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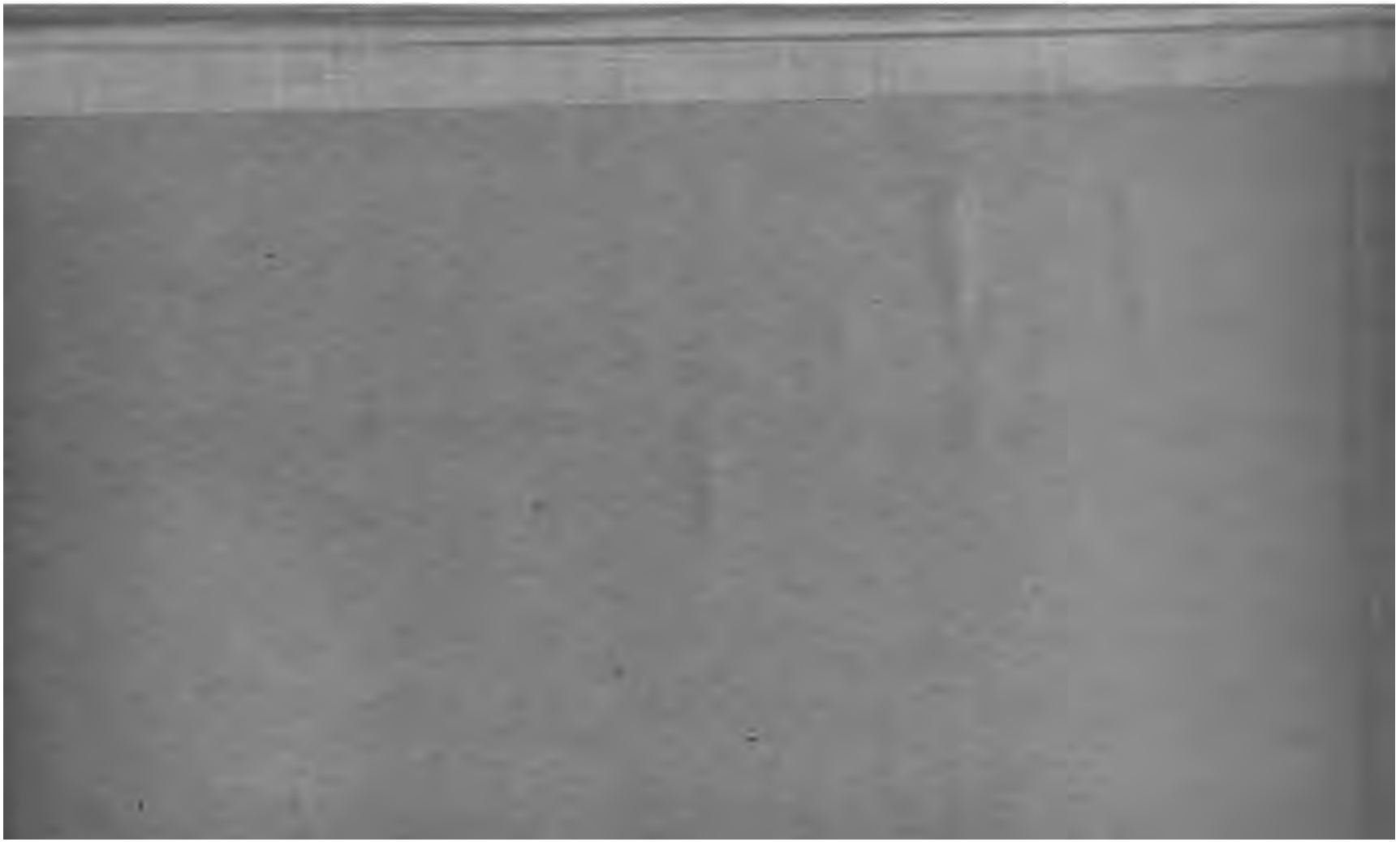
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POPULAR MECHANICS

SHOP NOTES

FOR

1912

EASY WAYS TO DO HARD THINGS

OF DAILY USE
TO EVERY MECHANIC

Vol. VIII—Table of Contents, Pages 1639-1645

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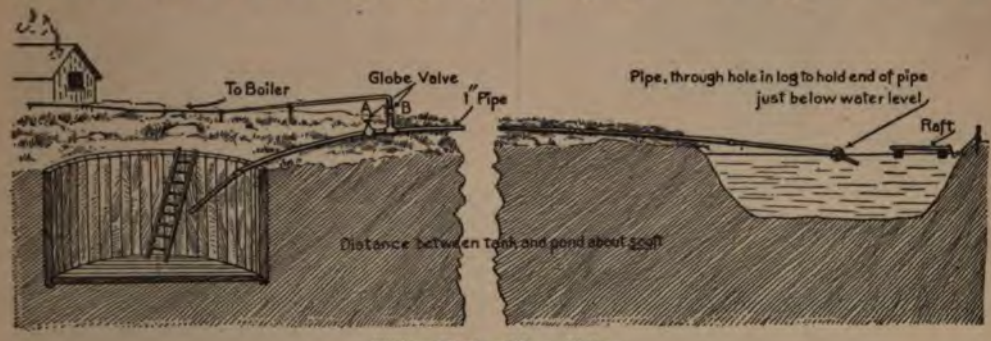
As Published Monthly During 1911

Edited by H. H. WINDSOR

SHOP NOTES

Siphoning Water from a Pond

A steam boiler, using water from a tank supplied by rain from the roof, had to be shut down during the dry season. On one occasion when the water supply failed and the plant was shut down, I decided to fill the tank from an old cellar that had been discarded on account of striking a spring that would fill it in about a day and a half.



Filling Tank with a Siphon

I put a line of 1-in. pipe to the cellar, extending the end to the middle of the pond. A hole was bored in a log of wood and the end of the pipe was inserted through the hole far enough to keep it just below the surface of the water. A raft was made from two railroad ties and used to get at the end of the pipe for filling it with water. A piece of pipe having sufficient length to reach almost to the bottom of the tank was attached to the pipeline at an angle. The end in the tank was plugged and the end in the pond raised and the whole pipeline filled by using a funnel, then the end was lowered into the water and the plug removed from the pipe in the tank. This started the siphon and the tank was filled.

At times when the water in the tank would be low and there was not enough water in the boiler to safely start a fire in the morning, I would close the globe valve A, and open the valve B. The vacuum formed in the boiler caused by the steam going down would be sufficient to draw water up from the pond and into the boiler to a level where it would show in the bottom of the gauge. The siphon would be started and the tank filled. This arrangement was kept in successful operation for a long time, or until natural gas was supplied to the city. Then a gas engine was installed to take the place of the steam engine.—Contributed by C. G. Smith, Brooklyn, N. Y.

To Keep Varnish from Crawling

Painters often have trouble in keeping the second coat of varnish from crawling away from the first, especially in cold weather. A simple remedy for this is to go over the first coat with benzine and allow it to dry before applying the second coat of varnish. The benzine leaves a gray film upon the varnish, which does not injure it in the least and causes the second coat to stick. To do a first-class job of varnishing, the temperature in the room should be about 65 deg. F.—Contributed by F. L. King, Islip, L. I.

Joining the Limbs of a Tree

When a tree is small, but with sufficient growth, select two small branches



Limbs Joined Together by Nature's Growth

growing opposite and as near the crotch as possible, as shown at A in the sketch, and twine them together horizontally, one overlapping the other as a rope is twisted, leaving the ends free as in B. It will take about a year for nature to join them. Then prune the ends off smooth and in time as the bark expands through the growth of the tree the connection will become as one solid piece, C, thereby binding the limbs together. This method may be used several times in one tree. Trees treated in this manner will not split through rapid growth or by the wind. This method can be applied to all fruit trees except the peach tree.—Contributed by D. English, Norwood, O.

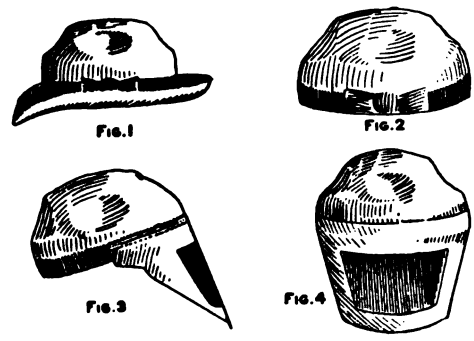
Coloring Iron and Steel for Laying Out Work

Various substances, such as blue vitriol, red lead, soapstone, chalk and Prussian blue, are used to coat metals which are to be laid out. There is a good method of doing this work, however, which requires none of these coloring substances, in fact, requires nothing but a fire. The lines show up clearly, and are finer than can be made with any of the above named substances.

It will not jar off, and the metal can be filed right up to the line, which makes it especially useful to tool-makers. To prepare the metal, simply put it in the fire, preferably inside of a piece of pipe, and heat it anywhere from a blue to a dull red. Then cool it quickly in water. This leaves the surface blackened, and lines scratched on it show up bright and clear, and the contrast between the black and the bright, clean-cut line is agreeably marked.—Contributed by D. Hampson, Middletown, N. Y.

Protector for the Eyes While Grinding

Glass protectors for the eyes are not always satisfactory, as they are liable to become covered with moisture from the perspiration of the face and make it hard for the user to see. Persons doing a great deal of grinding on emery wheels should protect their eyes with some kind of a shield. The one shown in the illustration is easily made and can be used with more comfort than ordinary glasses. Take a felt hat, Fig. 1, and remove the rim as shown in Fig. 2. Make and attach a cardboard shield as shown in Fig. 3. The cardboard has

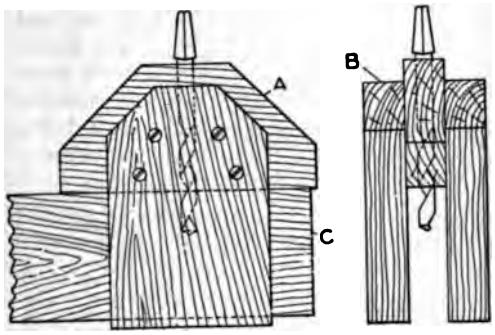


Cap and Eye Protector

an opening cut out and a piece of celluloid stitched in for the transparent window.—Contributed by C. C. Brabant, Alpena, Mich.

Gauging Dowel-Pin Holes

When boring dowel pin holes in parts that are to be fitted together it is often a very difficult matter to get them in straight so that the parts will fit squarely when assembled. When a number of holes are to be bored, the little gauge shown in the accompanying sketch will prove quite handy. It is a time saver and also insures accurate work. It consists of a block A, to which the two side pieces B, are fastened with screws. The block A has a hole in it to guide the bit. The side pieces serve to hold it squarely on the work. Make a punch mark on the work C to be bored, and slide the gauge over it until the point of the bit strikes the mark. Then bore the hole for the dowel. The gauge is to be held steadily

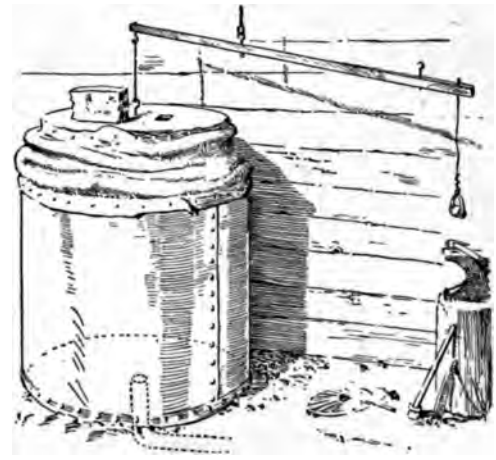


Boring Dowel Holes Straight

on the work with one hand while the other turns the brace and bit.—Contributed by Edward Moore, Philadelphia, Pa.

Blacksmiths' Bellows Made from an Old Tank

A serviceable blacksmiths' bellows can be made from an old tank by arranging it as shown in the accompanying sketch. Secure an airtight tank and remove the top. Fasten a wide band of soft and pliable leather around the top with a hoop and some rivets making an airtight joint. Make a round wooden top somewhat smaller than the opening in the tank and fit an air valve on the under side of it. Tack the upper edge of the leather to this top, care being taken to get it as nearly airtight as possible. Attach a handle as shown



Old Tank Used for Bellows

and place a weight on the top to make the leather fold into the tank, and to give pressure to the air. A few strokes of the handle will compress enough air to hold the leather up, then the weight in bringing it down forces the air to the tuyeres through the pipe at the bottom of the tank. This bellows does not need to be pumped steadily if the leather band is made wide enough, as sufficient air will be stored in the tank under pressure to supply the needs of the forge for some little time.

The tank can be put up out of the way, either in a corner or above the furnace hood, the lever hooked to the ceiling, and a wire handle run down to within reach.—Contributed by F. M. Berchmaus, Scio, Ore.

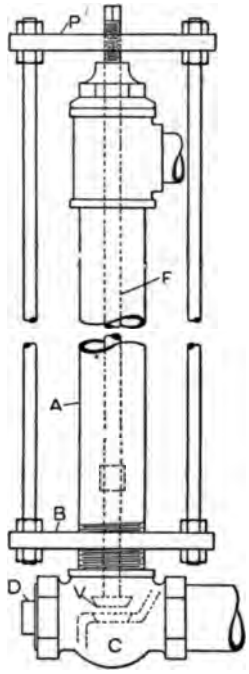
Makeshift Hook Lock

A simple lock for a hook is made by driving a nail about 2 in. above the staple and bending the end over so it can be turned either way. To lock the hook, turn the nail over it as shown in the sketch.—Contributed by Thos. L. Parker, Olaf, Iowa.



Home-Made Steam Trap

A steam trap is a self-acting device by means of which water that accumulates in a pipe or vessel containing steam will be discharged without permitting steam to escape. The means of doing this are various. Most of the traps make use of the expansion of metals to open a valve and the one shown in the accompanying sketch is no exception.



The pipe A can be of any size and should be at least 3 ft. long and have enough threads cut on the lower end to permit it to be screwed through the plate B, then into the globe valve C which has the bonnet removed. This valve should have the one end plugged as shown at D. A tee is screwed to the upper end of the pipe A, and on this is screwed the bonnet of the valve C. A rod, F, is connected to the valve stem and has the upper end threaded to screw through the plate P for adjustment. The end of the rod is square so that a wrench can be applied. The two plates B and P are held apart by means of the side rods R which have lock-nuts at both ends.

In operation the water accumulates in the pipe until the rod cools and contracts, thus opening the valve V, allowing the water to escape. As soon as the water is replaced by steam, the rod expands and closes the valve. This trap is very easily made and if properly adjusted, will work as well as any of the expensive ones upon the market.—Contributed by J. E. Noble, Toronto, Canada.

Breaking Large Bottles with Boiling Oil

The method of breaking small bottles or vessels at the place wanted with kerosene-soaked string is well known but this method does not work so well with the larger vessels. Following is a method by which any sized glass vessel can be broken,—as for example a glass tub to be made out of a carboy.

Fill the vessel with cold water up to the point at which it is to be broken. Pour enough boiling oil over the water to make a good coat on the surface and before the oil has time to cool dash cold water on the outside of the vessel. A clean break at the contact point of oil and water will be the result.—Contributed by F. M. J. Bercmaus, Scio, Oregon.

Substitute Bowl for a Lamp

A fruit jar is a very handy article to use as a temporary lamp bowl when that part of the lamp is accidentally broken and you cannot replace it at once. Take the fruit jar cap and cut a hole in the top with an old knife, the size of the screw end on the lamp burner. Make the hole so the burner will fit tightly in the cap, and then use wax or soap to seal the burner in place to keep out the air. The only precaution is to have the burner fit the hole tight enough to keep it in place. This temporary bowl, used with care, will give good service until a new lamp or a new bowl can be procured.—Contributed by C. Brabant, Alpena, Mich.



Removing an Automobile from a Ditch

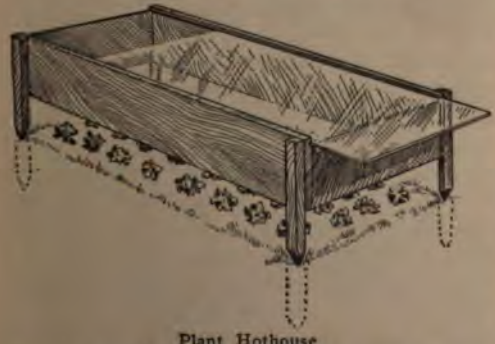
It is a true saying that "necessity is the mother of invention" and so it is that only a few know how to properly apply tools and material at hand in the case of an emergency. The accompanying sketch shows how I rigged a tackle to a very unusual condition in a case where an automobile was ditched and a straight pull could not be made, as the roadway was too narrow. A block and tackle was used with the double block near the load to increase the efficiency. The sketch clearly illustrates how the tackle was applied.—C. G. S.



The Tackle Attached to Trees

Small Movable Hothouse for Plants

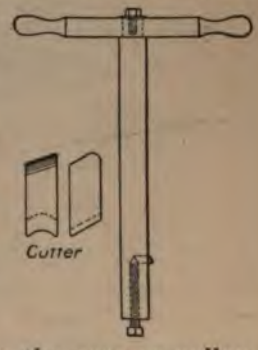
The small hothouse shown in the illustration can be used to protect plants from severe cold weather and high winds. The house can be moved from place to place to cover delicate plants or start seeds early in the season. It consists of a box without top or bottom and grooves cut for inserting a glass cover. The stakes at the corners will sink into the soil, holding the house firmly in place. The glass can be removed during the day and closed at night.—Contributed by W. A. Jaquythe, Richmond, Cal.



Plant Hothouse

Hand Boring Bar for a Large Pulley

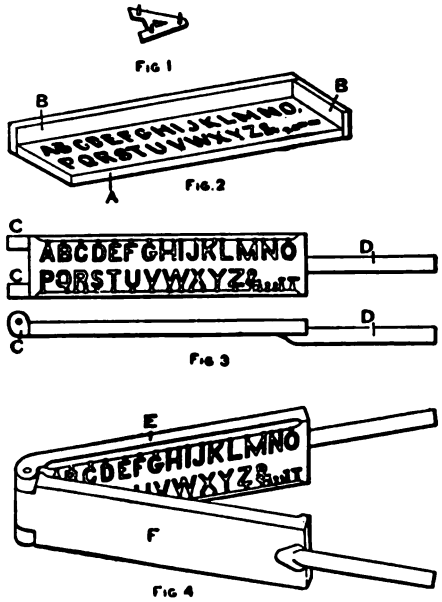
Large diameter pulleys and gears are often brought to the small repair shop to be rebored. If the shop does not have a lathe or boring mill large enough for the purpose, some other method must be employed. The job can be done very easily by hand if a tool like the one shown in the accompanying sketch is made.



To make the tool procure a piece of shaft that will just fit the hole already in the gear or pulley. Square one end and attach a handle as shown. Drill a hole in the bottom end of the shaft and tap it for a set screw. Cut a square hole at the upper end of this for the cutting tool. A sufficient amount of shaft should extend the cutter to act as a guide. Forge the back end of the cutting tool to fit the taper on the end of the set screw. In making a cut, turn the set screw up until the tool cuts as deep as is wanted. If more than one cut is made, a sleeve must be slipped over the lower end of the bar to act as a guide, as after the first cut the shaft would not fit the hole.—Contributed by J. N. Bagley, Webber, Kans.

Home-Made Pattern Letters and Figures

In carrying out the modern systems of the classifying, marking and recording sets of foundry patterns, it is frequently necessary to use large quantities of pattern letters and figures. A



Mold for Letters

condition of this nature occurred recently, in which many thousands of letters and figures were needed to properly inaugurate a new system of this kind, says a correspondent of the American Machinist. After a somewhat lengthy consideration of the matter, the following method was worked up and used with entire satisfaction, not only as to its efficiency and economy, but as to the quality of the product and the ease with which the letters and figures were applied to the patterns. The method of doing this work was as follows.

The letters and figures wanted were each to have two or more sharp points projecting from the back, by which they might be quickly and permanently attached to the pattern. This form is shown in Fig. 1. The plan was to make good and durable molds and to cast the letters of an alloy similar to type metal. To make molds of metal, as brass, and work out the forms by hand would have been much too expensive. Therefore some cheaper method must be devised.

In making the molds, several sets of good pattern letters and figures of the "sharp gothic" style were purchased. A ½-in. board, A, as shown in Fig. 2, was prepared shellacked and rubbed down, after which a rather heavy coat of shellac was applied and the letters arranged upon it as shown, while all around it were placed the strips BB in box-like form. The letters were very slightly oiled, and plaster of paris was mixed rather thin, poured into this box and as it was beginning to set was rammed down hard. When the plaster had thoroughly set, the strips BB were carefully removed and the plaster cast separated from the board A and the letters. It was then smoothed up on the back. The chamfers to facilitate, pouring and the "gates," one or more to each letter, were carefully cut, and it was given two light coats of shellac. The hinge lugs CC and the handle D were made of wood, but not attached to the plaster. This served as a pattern which was carefully molded in fine sand and a casting made of brass. The casting appeared as shown at E, Fig. 4.

In the meantime a wood pattern was made for the other half, F, of a jointed mold shown in Fig. 4, and also cast of brass. This casting was planed up on the face and casting E fitted to it by a slight straightening with a hammer and a file finish. The two were then clamped together and the rivet hole in the hinge lugs drilled and the rivet inserted. It will be noticed that the alphabet is arranged in two lines so as not to make the mold too long and narrow, and the "gates" so made as to pour the metal from either side so as to avoid long gates,

which would have the effect of cooling the metal and result in defective letters.

A smaller mold for figures was made in the same manner, except that in arranging the figures there was one of each figure, with the exception that there were three of figure 1, two of figure 6 (reversed to form the 9), and four of the figure 0.

The sharp points on the back of the letters and figures were provided for in this manner. The mold was closed and some melted lead, heated very hot, was poured into the mold. This marked the outline of the letters on the plain side of the mold. The location of the points was then marked with a prick punch. A small twist drill was ground to the proper form and the holes drilled to the depth required.

The molds having been made, the more difficult conditions of casting had to be considered and solved. This required considerable patient experiment in order to obtain a proper alloy, and to ascertain the proper temperature of the mold. This temperature was finally found to be much higher than at first supposed practicable. First the proper alloy. Various proportions of lead, antimony and bismuth were tried. A fair success was reached, with one of lead, 90 parts; bismuth, 10 parts. But this was later on improved by one composed of lead, 70 parts; bismuth, 12 parts; antimony, 18 parts.

Possibly the addition of a small quantity of tin might have improved the alloy, but in practice it is well to avoid too many ingredients lest mistakes in the exact proportions occur.

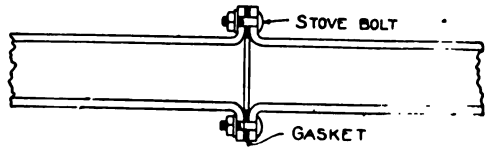
In the process of casting, the mold was closed and clamped by slipping a ring over the handles in the same manner that the blacksmith does over his tongs. It was necessary to heat the molds over a gas flame, hot enough to slightly discolor a pine stick held against them. The alloy was melted over a Bunsen burner, care being used not to overheat it, as even slightly overheating tended to destroy its fluidity. The test used was that it be hot enough to burn a pine stick to a rich brown.

An apprentice boy in casting these letters and figures used two molds, one in the process of heating, while he was casting with the other. By the use of these molds and the proper alloy, a boy was soon taught to be able to produce between two and three thousand good letters and figures per day. There was no finishing work required except to clip off the "gates" with a ¼-in pattern-maker's chisel, held at the same angle as the inclination of the side of the letter.

Lead Pipe Connection without a Wipe Joint

The accompanying sketch shows how a quick repair was made on a heavy lead pipe. In moving my sink from the basement to the first floor I had to lengthen the lead pipe, and not having the necessary tools or knowledge for making a wipe joint, I used the following method to join the ends of the pipe:

A child's top was used to turn out the lead on the ends of the pipe. This being done, I cut a rubber gasket from the sole of an old rubber shoe, placed it between the flanged ends of the pipe, and then drove a nail through the lead and rubber to make holes for the bolts. Four common stove bolts were used in



Gasket in the Joint

drawing the flanged ends tightly together on the gasket.—Contributed by C. C. Brabant, Alpena, Mich.

¶A heavy lathe cut will not do accurate work.

Housing a Clothesline in a Post

The care of the ordinary rope clothesline is not a little task when it must be put up and taken down each time there are clothes to dry. The line cannot be kept clean, nor will it last long if left stretched between posts all the time. A simple method for housing a line, and one that makes it handy to place the rope between posts quickly is shown in the sketch. The housing consists of a hollow post used for one of the line posts. The bottom part of this post is a solid piece of square timber, set in the ground and the top part boxed in with 1-in. boards. In Fig. 1 is shown the post complete. The rope passes over a series of pulleys, similar to a block and tackle, to which a weight is attached. The arrangement of the pulleys is shown in Fig. 2. It is obvious that when the rope is detached from the outer post it will be drawn by the weight into the hollow post, where it is housed until the next washday.—Contributed by Herbert Hahn, Chicago, Illinois.

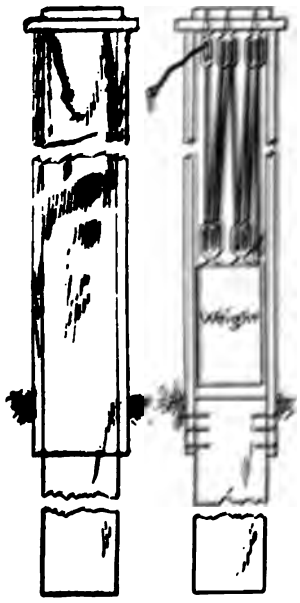


Fig. 1 Fig. 2

Preparing Plaster Walls for Papering

When preparing a ceiling for papering do not pull down any loose plaster, but get some tin washers used for fastening tar paper on roofs. Fasten the plaster on with these in the same manner as putting on the tar paper, driving the nails into the joists. Cover the washers over with plaster-of-paris. The washers will support the plaster and the paper can be put on in the usual manner.—Contributed by Norval Bradley, Paterson, N. J.

Wedge Vise for a Woodworker's Bench

The vise consists of three blocks of 2-in. pine, two of which are nailed solidly to the bench. Two of the blocks, one which is nailed and the wedge, are slightly beveled. This is to prevent the wedge and also the board from rising. The vise is tightened by placing the board to be held between the blocks and driving the wedge in tightly. The wedge is driven back to loosen the grip. In Figs. 1, 2 and 3, is shown respectively the side, end and plan view, and in Fig. 4 the perspective of the finished vise. The grip of this vise will not mark or otherwise injure the wood being held by it.—Contributed by Aaron Austin, Ontario, Can.

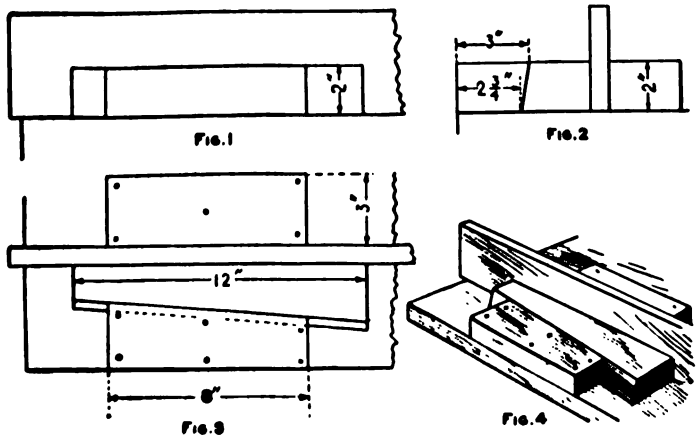


Fig. 1 Fig. 2 Fig. 3 Fig. 4

Vise Made of Blocks and a Wedge

Renewing an Old Window Wiper

In using an ordinary rubber window wiper the corners will invariably wear off, which causes streaks at the edges of the window when used. In this shape it is practically useless and the result is that a new one must be purchased, unless remedied.

By loosening and removing the handle, the rubber center can be pushed through the zinc holder, thus allowing the holder to have the worn ends trimmed off. Trim the rubber center to suit the holder, replace the handle, and the wiper is just as good as a new one, except that it is a trifle narrower. —Contributed by Felix Herz, Goldfield, Colorado.

Home-Made Rubber Curry Comb

One of the best things for removing the loose hairs from a horse when he is shedding is a rubber having an uneven surface. A comb of this kind can be made of a block of wood, 5/8 in. thick, 3 or 4 in. wide and 6 in. long. Tack a piece of corrugated rubber, a piece of rubber stair pad will do, on one surface of the block. Make a handle and fasten it to the other side of the block. The rubber tacked to the block is shown in Fig. 1 and the side view showing the handle in Fig. 2.—Contributed by Earl Streit, Newark, Ohio.

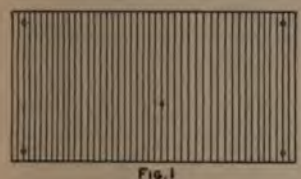


FIG. 1

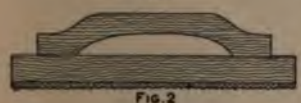


FIG. 2

Door Mat Made of Old Ropes

An outside door mat that will make a good substitute for the expensive metal or rubber mat can be made of old manila rope or clothesline, as shown in Fig. 1. The frame is made up of 3/8-in. lumber, cut to the desired length for the sides and ends. The ends of the pieces are mitered and nailed together. The wooden crosspieces for the center of the mat, each of which



FIG. 1



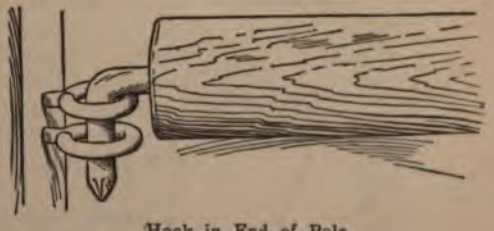
FIG. 2

Frame Made of Ropes and Wood

should be about 1 in. wide, are cut to fit the inside of the frame. Cut the rope or clothesline in pieces the same length as the wooden crosspieces. Lay the frame on a level surface and start by placing one piece of rope along one side. Then place one wooden crosspiece against the rope and nail through it and the rope into the frame. Continue this process until the frame is filled with alternate pieces of rope and wooden crosspieces. The completed mat is shown in Fig. 2.—Contributed by C. C. Brabant, Alpena, Mich.

Sanitary Chicken Roost

The roost is made round without any groove to harbor insects. It can be quickly removed, cleaned and replaced. Two screw eyes are turned into the wall in a vertical position, from 1/2 to 3/4

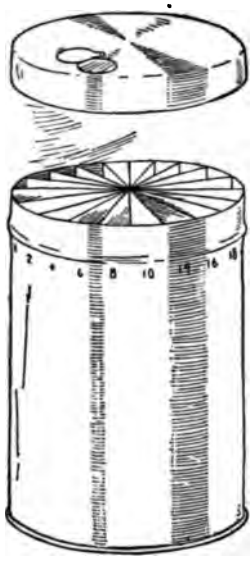


Hook in End of Pole

in. apart. Each end of the roost is provided with a hook or nail as shown.—Contributed by W. A. Jaquythe, Richmond, Cal.

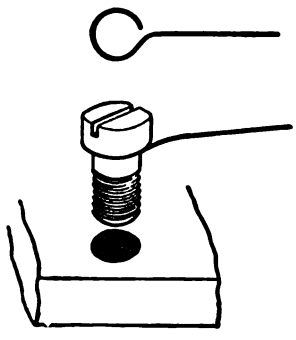
A Twist Drill Box

Small twist drills are apt to become lost or mislaid when not in use, if they are not kept in some special box or place provided for that purpose. A handy and easily made box for holding them is shown in the accompanying sketch. Secure an empty baking powder box and solder as many partitions in it as you have different sizes of drills. Make a hole in the lid, close to the edge, large enough to accommodate the largest drill. Now when the lid is in place on the box this hole can be turned to any desired compartment and a drill removed from it. A slide can be made to fit over the hole as shown. Each compartment of the box should have the size of the drill it contains stamped on the outside.—Contributed by C. G. Smith, Brooklyn, New York.



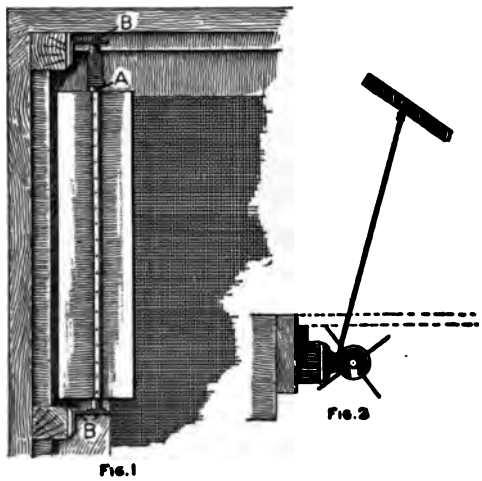
Inserting Small Screws

The illustration shows a method of holding very small screws ready for insertion in their holes, when one finds it clumsy and difficult to hold them with the fingers and manipulate the screwdriver, says Machinery. Take a piece of small wire and bend the end into a loop equal in diameter to the body of the screw. When the latter is dropped into the ring thus formed, it will be supported steadily, so that it can be readily inserted in the hole. After two or three turns with the screwdriver, remove the wire by pulling it. This will straighten it and free the screw.



Driving Flies Away from a Screen Door

The largest number of flies flock to the upper portion of a screen door ready to enter as soon as the door is opened. It takes some time to drive the flies away before opening the door. The illustration shows a device designed to do the "shooing" automatically when the door is opened. In Fig. 1 is shown the corner of the door with the device in place, and in Fig. 2, the top end.



Automatic Fly "Shooer"

An old curtain pole, A, is sawed off within 1 in. of the long, coiled spring inside and then placed in an upright position between the regular pole hangers BB. Blocks are used to make a support for the hangers. A cord having a length equal to the distance from the corner of the door when opened, to the pole, is fastened to these two parts, and the spring is wound up to about the same tension as for a curtain.

Four strips cut from the curtain material are doubled and tacked to the pole just below the cord to form fans. It is apparent that when the door is opened the cord will revolve the pole, and if the fans just touch the door frame, they will make such a noise that no flies will venture near.—Contributed by Frank L. Walter, Dayton, O.

Cutting Glass Disks

A simple method of cutting glass disks is shown in the accompanying sketch. Fasten a short piece of gas pipe in the lathe and bevel one end to a rather sharp edge and to the size you want the disks. The bevel can be inside or outside or both, to get the desired size. Heat the beveled end red hot, then stand the pipe on end and place the glass centrally on the hot beveled end as shown. The hot metal will cause the glass to break out in almost perfect disks.—Contributed by P. H. Campbell.



Tool for Putting on Automobile Tires

An old pair of bicycle forks, spread to 8 in. or more, makes a handy tool for replacing automobile shoes and tubes. In operation, put the forks under one side of the shoe and force the tire over to the inside rim, then pry up and you will have free access for placing the valve or lugs. A number of tools can be purchased for this work, but the old bicycle forks will beat them all at much smaller cost.—C. G. S.



Handy End Gate Clamp

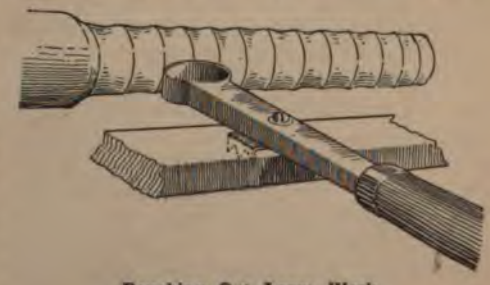
An end gate clamp that can be opened with one hand is shown in the accompanying sketch. Deliverymen, especially, will find this device handy for they can hold packages, crates, sacks, etc., in one hand and open the end gate with the other. This device is very simple and inexpensive and can be made by any blacksmith in a couple of hours.—Contributed by L. W. Van Nasdale, Lemoyne, Pa.



End Board Fastener

Turning Tool for Large Wood Pieces

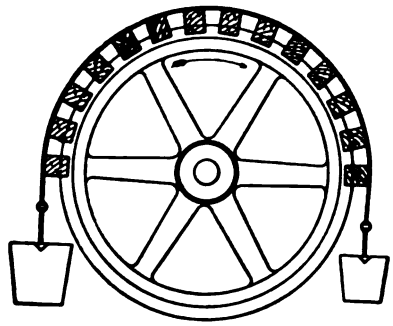
The ordinary tool used in roughing out large pieces of wood has a tendency to catch in the work and cause trouble. In using a circular-edged tool all of the material of the cut will be removed and no jagged ends left to draw the tool into the work. If such a tool is made as shown in the illustration, with a hole or opening for clearance, a deep cut can be made without drawing the tool into the turning wood. The handle is provided with a U-shaped piece of metal having saw-teeth edges on the place where it comes in contact with the rest.



Roughing Out Large Work

Finding the Brake Horsepower

A very accurate way to determine the brake horsepower of a gasoline engine is to use an arrangement as shown in the illustration. The device



Showing Direction of Pull

consists of a number of blocks fastened to an old piece of belt, to the ends of which weights are attached. The blocks are made of pine, and for a small engine, 2 by 4-in. timbers will do. Cut a recess in each block to fit over the rim of the flywheel to prevent them from slipping off when the engine is running. The recesses should be cut about ½-in. wider than the rim of the wheel to prevent them binding on the sides.

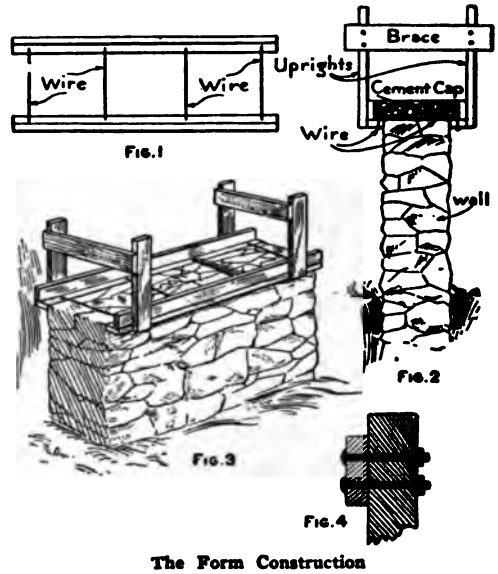
The blocks are fastened with screws to a piece of belt that is long enough to reach over the wheel and hang below the center on each side. Attach a bucket to each end of the belt, one of them larger than the other, the large one being pulled in the direction of the arrow. Place a quantity of sand in both buckets and start the engine. Keep adding sand to the large bucket until the engine is working to almost its limit without affecting the speed. Let the engine run in this manner for a few minutes, until you are sure the test is right, then stop it and weigh the contents of the buckets. The difference in pounds is the number of pounds pulled. Multiply the circumference of the wheel by the number of pounds pulled, the result by the number of revolutions per minute, and then divide the product by 33,000. This will give the actual brake horsepower of the engine.—Contributed by J. N. Bagley, Webber, Kansas.

Protecting a Newly Painted Wall from Flies and Dirt

After the paint on the wall has thoroughly dried, make some laundry starch, thin it out until it will flow nicely under a brush, and apply a coat to the wall. It will dry clearly and protect the paint. When the wall gets dirty all that is necessary to clean it is to wash off the starch and apply another coat.—Contributed by F. L. King, Islip, L. I.

Forms for Cement Coping on Walls

An old, crumbling stone wall can be repaired and given a neat appearance by laying on a cement coping. A contractor repaired such a wall by removing the crumbled portion and placing the cement on top in forms constructed as shown in the sketch. The forms consisted of pine boards, fastened together at intervals with heavy wire, as shown in Fig. 1, to prevent its drop-



The Form Construction

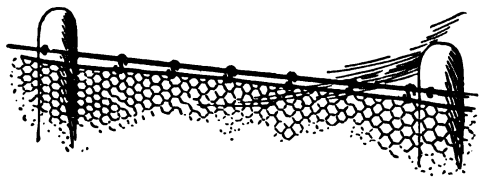
ping down over the wall. Uprights and crosspieces were used, as shown in Fig. 2, to prevent the forms from

spreading. The cement was first laid on the form and then toward the center, from each side. When the cement hardened properly, the crosspieces were loosened to allow the sides of the forms to tilt, then the wires were cut and the forms removed.

Each time the forms were moved and put in place on another part of the wall, new wires were used. In Fig. 4 is shown how bolts may be used instead of nails to hold end pieces together. The bolts will make it much easier to set up and take down the forms when changing them from one part of the wall to another.—Contributed by James M. Kane, Doylestown, Pa.

Keeping Wire Mesh from Sagging

I recently constructed a fence of wire netting in which I substituted a No. 10 iron wire for the wooden frame. The

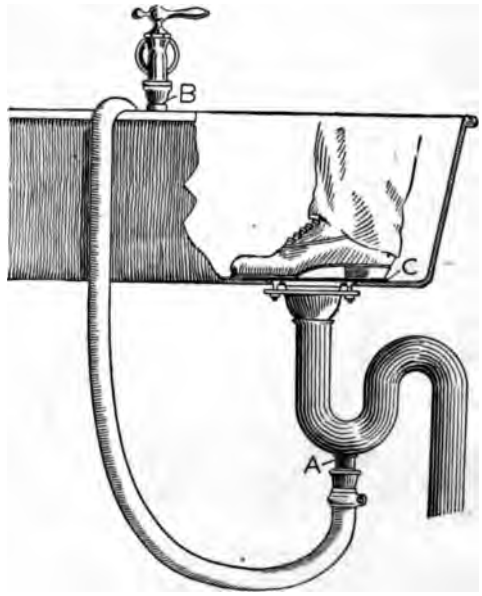


Wire Holding Up Mesh

netting is fastened to the wire at the top by means of hooks made of No. 10 wire and placed about 18 in. apart as shown in the accompanying sketch. This arrangement keeps the wire netting drawn up tight, is easier to put up, and looks better than a fence put upon a wooden frame.—E. M. Dunivant, Ft. Worth, Texas.

To Clean Sink Pipes

Sink pipes often become clogged with refuse and are hard to clean without the proper plumbing tools. The device shown in the accompanying sketch will do the work quite nicely and can be rigged up by anyone. Connect a hose pipe from the brass clean-out cap A to the faucet B, as shown. Place a sheet of rubber, C, and a block of wood over the strainer. By standing on the block of wood to hold in the water and turning on the city pressure at the faucet,

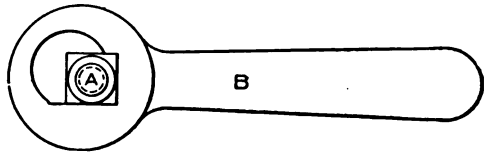


Removing the Obstruction

the obstruction can be easily washed out. If the hose can be attached to a hot water faucet, the flow of the hot water will wash out all grease that may have accumulated.—Contributed by C. G. Smith, Brooklyn, N. Y.

Substitute for a Ratchet Wrench

A common wrench can be made to operate the same as a ratchet wrench without taking it off the screw head, as shown in the illustration. A square-head cap screw is shown at A, and the wrench B is constructed so it will have all the essential gripping parts of a common wrench, yet turn around on the screw head in making



Operates the Same as a Ratchet Wrench

the backward turn. Turn the wrench over and it will remove a screw in the same manner.—Contributed by C. Purdy, Ghent, O.

Caliper for Hexagons and Squares

The tool here described is a combination caliper used to determine the exact size that a certain piece of round stock will "hex" or square. It will give in a moment's time the exact size of the full square for a tap, having given the diameter of shank. In Fig. 1, C to C_1 is exact size across flats, of the square of the shank whose diameter is A to A_1. For tool-room work it is almost indispensable and is something any mechanic can make in spare moments, says a correspondent of the American Machinist.

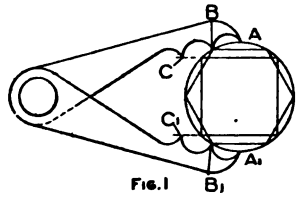


FIG. 1

Having determined the length of leg best suited to the work at hand, set a pair of sharp-pointed dividers to that measurement and describe (preferably on a sheet of tin) a circle as D-A-X-Y-Z, Fig. 2, with radius = OA, Fig. 3. Without changing the setting of the dividers, step off in the upper half of the circle, the half of the inscribed hexagon and connect these points with scribed lines as A-X, X-Y, Y-Z. Next lay off the sides of the inscribed square in the lower half of the circle as A-D, D-Z. Drop perpendiculars from the center O to the center of the sides of the inscribed hexagon OB and the square O C. These perpendiculars or distances from the center O are the measurements used, together with the radius OA, to ascertain the location of the points ABC and $A_1B_1C_1$ in the extended tool, Fig. 3.

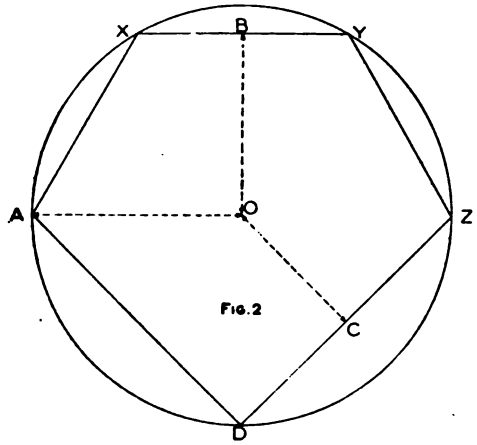


FIG. 2

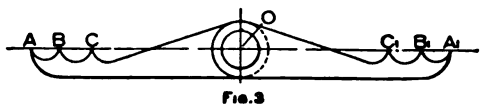


FIG. 3
Layout of Tool

Care should be taken to have the three points A, B and C on each leg, all in a perfectly straight line from the outer point to the center of the pivot hole, as all six points should be in contact when the tool is closed.

To use it as in Fig. 1, set the outer points A and A_1 to the diameter of the work to be squared or "hexed" and the points B to B_1 will give the exact size the piece will "hex," while the points C to C_1 will give the size to which the piece will square.

To Harden a Hammer

All hammers should be hardened on their striking faces only. As these are opposite each other and but a short distance apart, it would seem a difficult task, but in reality it is quite simple; the only difference from any other hardening and tempering job being that extra caution must be taken to prevent drawing the temper from the first face while heating the second. This can be done by filling the hammer eye with wet waste and keeping it wet, and by withdrawing the hammer from the fire occasionally and cooling the already tempered head in water. Thus the tempered head is kept cool and the heat confined to a short distance back from the second end or face. To temper, quench as you would with any chisel or tool, polish with emery cloth, and dip when the temper has drawn down to a light brown. Most authorities give 430° (light yellow) as the

proper color for hammer faces, but a majority of the present day hammers are softer than that, or about 450° (straw yellow). The ideal hammer is hard on the face only. The peen is usually made a little softer than the other face.

When you wish to do a first-class job of hardening of any kind, much better results will be obtained if the work is put in a piece of pipe or a special tube closed at one or both ends. The work will heat much more evenly and will come out of the fire perfectly clean and free from ashes. It will harden better, have a longer life and be much less liable to crack.—Contributed by D. A. Hampson, Middletown, New York.

Graduating the Stiffness of a Brush

The bristles of a brush can be easily changed from stiff to soft by placing a tin band snugly around the brush part so it can be readily moved up or down as desired. The bristles can be graduated to any degree of stiffness by changing the location of the band. —T. L. P.



¶The makers of shade rollers do not put in enough tacks and especially so at the ends of the rollers. It is best to put in a few additional tacks to save the annoyance of having to re-tack the shade on the roller in case of careless handling which children often give them.

Combination Compass and Dividers

The compass shown in the accompanying photograph is made from an old buggy top brace. This compass will prove very handy in all classes of work where a great degree of accuracy is not required. The ends are cut off



Made of a Buggy Top Joint

to the desired length and then pointed. This can be done by filing or by heating and hammering them out. A notch should be filed in one leg and a brass piece brazed in so as to form a slot for the circular arm. A hole should be tapped in this brass piece for the adjusting screw. Two arms can be brazed to the other leg for holding a pencil, if desired.—Contributed by J. W. Plemons, Circleville, Ohio.

Lathe Dog with a Notched Grip

This dog is nothing more than an ordinary lathe dog with teeth or notches cut in the inner surface of the opening. The notches make it possible to hold a shaft with only a slight pressure of the screw. A shaft as large as the opening can be turned in a lathe with this dog, using a pressure from the screw, produced by turning it with the fingers.—Contributed by Chester Purdy, Ghent, Ohio.



Measuring, Marking and Cutting Rafters

As a rafter is the long side or hypothenuse of a right angle triangle, the best way to find the length is to calculate it by mensuration and then mark

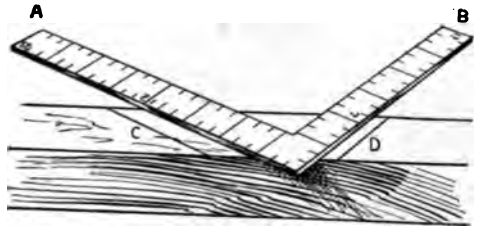


FIG. 1

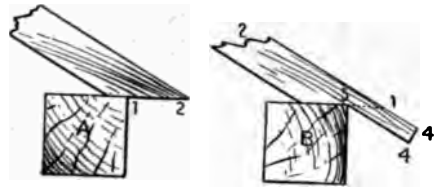


FIG. 2

Marking for Angles

each rafter at the proper angles for cutting. The length may be found by taking the square of the height of the roof, adding to it the square of one-half the width of the building, and extracting the square root of the sum. This will give the length. For example: suppose the height of the roof or gable is 6 ft. and the width of the building is 16 ft., then the square of 6 is 36, and 8 (one-half the width of the building) is 64; 36 plus 64 equals 100, and the square root of 100 is 10, which is the length of the rafter.

When the length is known, the following method may be used to mark the angles for cutting: If the roof is called a half pitch, the angle of cutting will be the same at each end, or 45 deg., and the rafters can be cut in a miter box and will fit regardless of which ends are placed together. Lay a square on the end of the rafter that is to rest on the plate of the building, as shown in Fig. 1. On the blade A let a figure represent one-half the width of the building and on the blade B let a proportionate figure represent the height of the gable. For instance, if the building is 24 ft. wide and the roof is to be 7 ft. high, lay the square with the figure 12 just to the edge of the rafter on the blade A and the figure 7 on the blade B. Make a pencil mark along the side of the blade as indicated by C. This will mark the proper angle for the lower end of the rafter. Move the square to the other end of the rafter and lay it down in the same manner and with reference to the same figures. Make a mark just outside of the blade B as indicated by D. This will be the upper angle for the top end of the rafter. This method gives the proper angle for each end of the rafter on any pitch of the roof. Always remember to have as many inches on the blade B as the roof is high in feet and as many inches on the blade A as half the number of feet the building is wide. Care must be taken to have the marks C and D the proper distance apart so that when the angles are cut the rafter will be the right length.

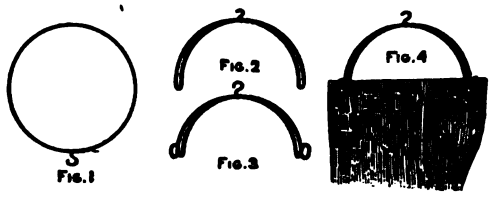
The length of the rafter and the marks for cutting can be done at the same time. This method saves calculating the length and does the measuring and marking in one operation. It will give the pitch of the roof approximately correct. While at certain pitches there may be a very slight difference in the height of the gable from what is expected, the rafters will always fit properly because they will be angled according to their strength. This method consists in laying the square as in Fig. 1, but at certain angles for different pitches, and moving the square along the rafter from mark to mark one-half as many times as the building is wide. When the square is laid on the first time, a mark is made along the side of the blade A. This mark will be the proper angle for the end of the rafter that sets on the building plate. Another mark is now made along the outside of the blade B and the square is moved along the rafter so

that the figure on A comes to this mark. This operation is done, as mentioned, one-half as many times as the building is wide in feet. The last mark made on the outside of the blade B will be the mark for cutting the top end of the rafter. When the square has been laid on the rafter the required number of times it is evident that the first and last marks will agree with the marks C and D, as shown in the illustration, and will be the proper angles and length for cutting the rafter.

The assumed projections of the opposite rafters must be taken in consideration and counted in on the width of the building to obtain the right figure to make the rafters fit properly. If the rafters are to be set on the plate as in A, Fig. 2, the width of the building must be taken from the point 2 instead of 1, and if they are set as in B, the length of the rafter must be measured from the point 1 and the width of the building taken from 1 instead of 3. The part from 1 to 4 and from 3 to 4 is regarded as an appendage—Contributed by J. G. Allshouse.

How to Make a Trouser Hanger

The hanger is made of a piece of heavy wire about 4 ft. long bent so as to form a complete circle with a hook made on one end and the other twisted about the wire at the base of the hook to hold them together, as shown in Fig. 1. The wire is then bent double, Fig. 2, and the ends turned up, Fig. 3, to make hooks for the buttons. The

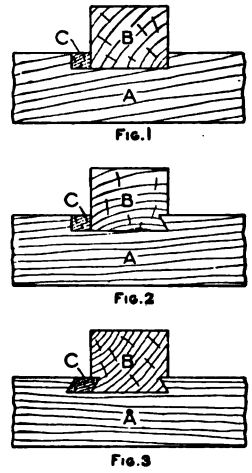


Wire Trouser Hanger

spring of the wire will keep the waist band tight. The method of application is shown in Fig. 4.—Contributed by Herbert Hahn, Chicago, Ill.

Keying Foundation Timbers

There are three ways of keying one timber crosswise to another, as, for instance, in making a temporary or semi-permanent foundation for a sawmill or other machinery, says Power and Transmission.



The first is shown in Fig. 1, where the sill A is simply boxed out a bit wider than the cross-tie B, and the wedge or key C is rectangular. The objection to this, which of course is the easiest way, is that the tie B can lift, unless the weight upon it is very great and it can tip, if there is any great cross thrust.

The lifting tendency is very largely overcome by making a dovetail on one side of the gain in the sill, as seen in Fig. 2. This prevents tipping to the left as seen in the sketch, but not to the right.

The best way, however, is to make the box in the sill a full dovetail, as seen in Fig. 3, and to use a rhomboidal wedge, as shown at C in the same figure. Several of these wedges can be made economically by taking a piece of wide plank, as long as the wedges are to be, and canting the saw table so as to cut it on the bevel.

Converting Quicksand into Rock

Quicksand can be made into a solid rock and save the driving of piles where it is desired to secure a good strong and lasting foundation for bridges, buildings or machinery. Tak a hand or power force pump and a l pipe nozzle, and inject liquid cen into the quicksand. One bag of ment will solidify 7 cu. ft. of quicks

Air Lock for Boats



Air Lock on the Side of a Boat

To make a useful and efficient air lock for boats take a board about 3 ft. long, nail ends and one side to it, and fit it to the side of the boat. Make two of them, one for each side of the boat and fasten them a little above the waterline. Fasten them securely and calk with tar. With these attached, the air caught in the lock will prevent a boat from upsetting.

Finding the Gradient of a Hill

Many motorists may have wished at some time or other to find out the gradient of some hill in their neighborhood, says Automobile Topics. This can be readily done with the assistance of a level and a piece of straight timber—a lath will do. First run the car on a perfectly level floor and have the tires all pumped up to normal. The footboard should be made parallel with the floor, that is, horizontal. Obtain a piece of lath, ½ in. thick, 2 in. wide and 5½ ft. long, and have the edges planed true and straight. Fasten a small piece of wood firmly at right angles on one end of this lath. The piece should extend 2½ or 3 in. below

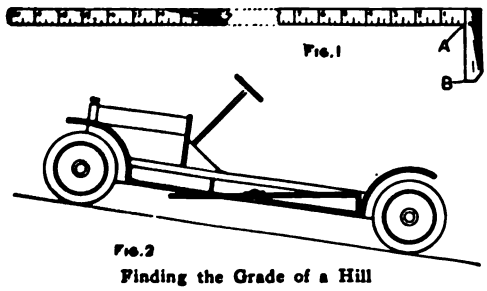


Fig. 1

Fig. 2

Finding the Grade of a Hill

the edge of the long piece. Along the bottom edge of the long arm mark off at a number of points the exact distance apart that the short arm projects from the long arm, or from A to B.

If the short arm projects 3 in., a 5-ft. long arm will give twenty readings. These can be again subdivided into as many parts as the accuracy desired may require. With this simple affair and an ordinary level, take the car to the center of the slope you wish to measure. Stop on the slope, stand the short arm on the edge of the footboard near the rear wing, Fig. 2. Place the level on top of the long arm, and when the long arm is moved to be exactly horizontal, read off the figure of the division cutting the rear edge of the footboard. This gives the slope, expressed as a fraction, viz., 1-20, 1-14, 1-17½, etc. This operation can be repeated on every change of slope, and if the surface distance between each change of slope be taped, the section of the hill can be easily plotted. If it be desired to express the slopes thus found in degrees, sufficient accuracy is obtained up to 20 deg. by dividing the denominator of the fraction into 60. Thus, a slope of ¼ equals 15 deg., 1/6 equals 10 deg., 1/8 equals 7½ deg., all approximate.

Add aluminum bronze to a white or light paint that is to be used for lettering on a dark ground.

SHOP NOTES

Home-Made Air-Hose Connection

Those who have used compressed air on pneumatic tools will appreciate the air-hose connection shown in the illustration. The ordinary method of connecting an air hose to a pneumatic hammer or other appliance of this kind very easily loosens it from the socket by the moving of the hammer and the force of the air. In Fig. 1 is shown the ordinary connection where A is the hose; B, the grooved connection and C, the threaded end to which the hammer is fastened. Wire is wound around the hose at C.

The home-made connection is shown in Fig. 2. I used a ¼-in. nipple, A, and cut nicks on the outside, about ½ in. apart, then forced it into the hose. The nicks hold the nipple from coming out. I slit a ¾-in. nipple, C, in two and placed the two halves on the ¾-in. hose, one-half on each side. Then I cut one arm from a ¾-in. tee, B, and

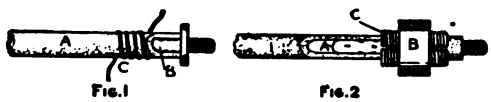


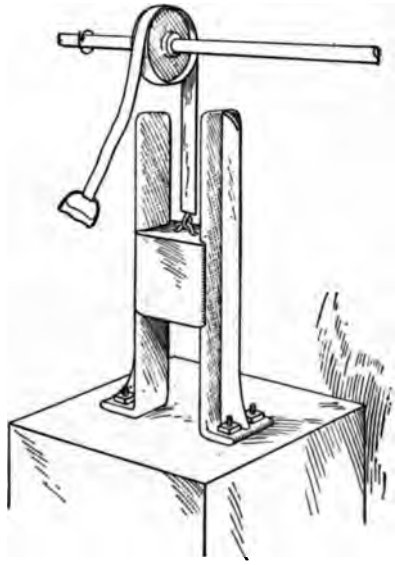
Fig. 1 Fig. 2

Connections for Air Hose

screwed it over the two halves on the hose, compressing the hose the thickness of the nipple slit, which forced the inside against the nicked part of the ¼-in. nipple and prevented it from coming out.—Contributed by Philip J. Conley, Chicago, Ill..

A Light Power Hammer

The accompanying sketch shows the construction of a power hammer for use in small shops, where the cost of an expensive machine is prohibitive. The guide and hammer are specially constructed parts. A little pull on the belt will cause enough friction to carry the hammer to the top of the guides. When released, the hammer will strike a blow proportional to its weight and

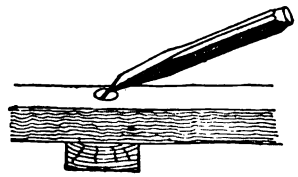


Friction of Belt Draws Hammer Up

height of drop. Different dies may be bolted to the anvil to make parts that will answer, in many ways, the same purpose as drop forgings.—Contributed by Urban A. Towle, Portland, Me.

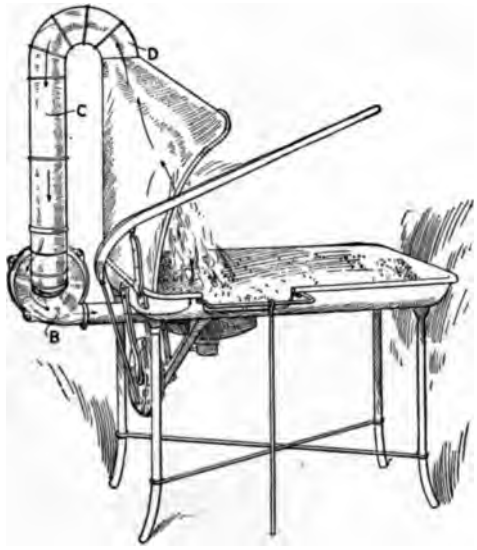
Turning a Rusty Screw

In turning a rusty wood screw, the head often becomes damaged so that the screwdriver will slip. This trouble may be overcome by putting the point of a chisel in the groove to one side of the center, as shown in the illustration, driving the chisel with a hammer and following around as the screw turns.—Contributed by W. C. Parker, Kanawha, Ia.



Burning Smoke from a Forge

Coal smoke is nothing else than unburned carbon. When great clouds of smoke go up from a forge, heat is wasted. I hit upon an idea to prevent



Smoke-Burning Forge

this waste and worked it out, as shown in the sketch, successfully.

Using a common forge with hood attached, I connected at D a tin pipe of the same size as the opening into the suction side of the blower, as shown at C. When the blower is in use, the smoke that rises from the fire passes in the direction of the arrows back through the blower and up to the fire without escaping into the open. By using this method, I have been able to get much more heat out of a given quantity of coal.—Contributed by J. N. Bagley, Webber, Kansas.

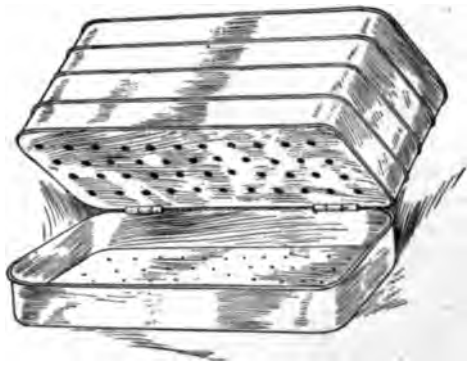
Oak Finish on Hard Pine

Owing to the scarcity and high price of oak for inside woodwork, many of the builders of moderate priced small houses are utilizing hard pine for their finishing material by using various shades of stains. This is the proper way to have a beautiful finish on hard pine and at the same time imitate oak. The proportions for the stain are: 1 part pure asphaltum; 2 parts linseed oil, 1 part turpentine. To each gallon of this, add from ¼ to ½ lb. of drop black and from ¼ to ½ oz. of burnt sienna, according to the shade desired. After thoroughly sanding, apply with a large brush and wipe dry within one minute. Allow this to stand two days.

Give the surface a coat of golden shellac cut in alcohol, to which has been added enough bismark brown to slightly color. Sandpaper and give the first coat of varnish, thinned slightly in turpentine. After from 24 to 48 hours, apply a second coat just as the varnish comes from the can. This will produce a very desirable finish much in favor.—Contributed by E. C. Andrus, Columbus, O.

Sorting Steel Balls

A number of small tin boxes having hinged covers with the cover of one box soldered to the bottom of another and each division drilled with holes of the same size, makes a convenient apparatus to quickly sort steel balls. Beginning at the top, holes which will allow all sizes of the balls except the largest ones to pass through them are drilled in the bottom of the first box; in the bottom of the next box, holes of such size that only the next smaller balls will be detained therein, and so on until



Compartments for Different Sized Balls

you have provided a box for each of the usual sizes of balls.

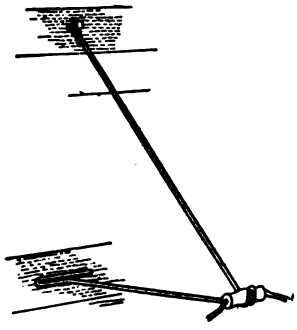
After cleaning the balls, all sizes are placed in the top box and the whole

combination shaken up. The balls will pass from box to box until they reach one with holes too small for them to pass through.

As the cover of each box is free to open, the right sized balls can be taken out without disturbing the others.—Contributed by C. G. Smith, Brooklyn, New York.

A Dairy Pail Hanger

The accompanying illustration shows a method of bending a wire so that when it is hung on a nail a pail may be suspended from the hook, keeping it clear from the wall. The bending of the wire is so clearly shown that the hanger needs no further explanation. The long bend resting against the wall at the bottom keeps the hanger from swinging around under the weight of a full pail. The base of the wire is 8 in. long and the upper part 16 in. Contributed by John A. Long, Walkerton, Canada.



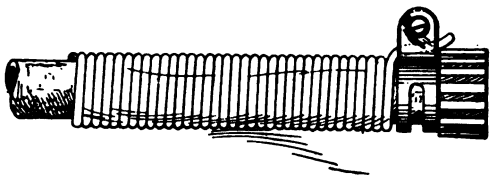
How to Draw a Wavy Line

When it is desired to draw a wavy line with the ruling pen, simply substitute the edge of a coarse-toothed comb for the straightedge. The more rapidly the pen is drawn past the teeth, the less wavy will the line be. Use a coarse comb in which the teeth are not too flexible.—Contributed by A. J. Augustine, Muskegon, Mich.

¶Should the paint on the rim of an automobile wheel be knocked off in places in removing the tire, take time to apply a good enamel to prevent the forming of rust.

Preventing Breaks in Garden Hose

Breaks in garden hose near the coupling can be prevented by removing

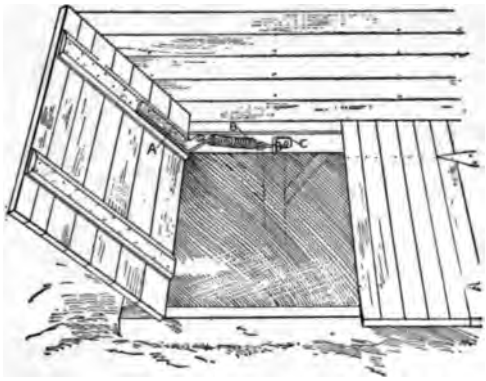


Coil Spring on a Hose

the hose and slipping a coil spring about 8 or 10 in. long over it, as shown in the illustration. The spring should fit the hose neatly. After replacing the coupling, the spring may be fastened to the band around the hose as shown.—Contributed by E. Maurice Dunivant, Fort Worth, Texas.

Counterbalance for a Cellar Door

The accompanying illustration shows a device attached to a cellar door to assist in lifting it, as well as to keep it from falling and breaking the hinges. A piece of heavy iron, A, is bent into the shape of an L and bolted to the door. The short end of A, which is 5 or 6 in. long, is attached to a coil spring, B. The other end of the spring is fastened to an L-shaped piece, C, on the joist, by a long threaded eye-bolt

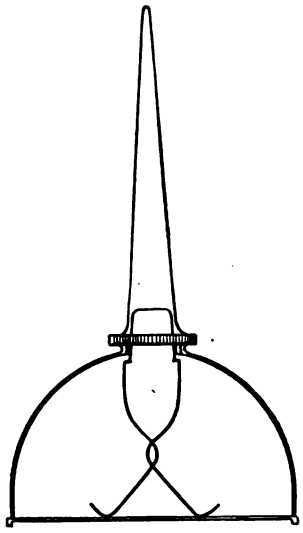


Cellar Door Counterbalance

for regulating the tension. This arrangement does away with the rope and pulley above the door.—Contributed by C. H. Floyd, Elwood, Ind.

Oil Can Bottom Spring

When the spring bottom in an oil can gives out, do not throw it away. Take a piece of brass spring wire, bend it as shown in the sketch, being careful to cut it to the proper length, and place it in the can. The pressure of the spring will keep the bottom out in the original position. The spring can be made in a few minutes and will save the price of a new oil can.—Contributed by C. T. Stendahl, Center City, Minn.



Paint-Brush Drainer

In the illustration, Fig. 1 shows a paint pot with a paint-brush drainer attachment. The attachment is made as shown in Fig. 2 from a 1-in. strip of metal. The diameter of the band should be ½ in. less than the pail. Hooks are attached to the band for holding it in position on the top edge of the paint pot. The outside of the paste, glue or paint pots will always remain clean, if this attachment is used. When the brush is drawn over the band, the surplus liquid drains down into the pot instead of on the outside of the pail.—Contributed by W. A. Jaquythe, Richmond, Cal.



Fig. 1

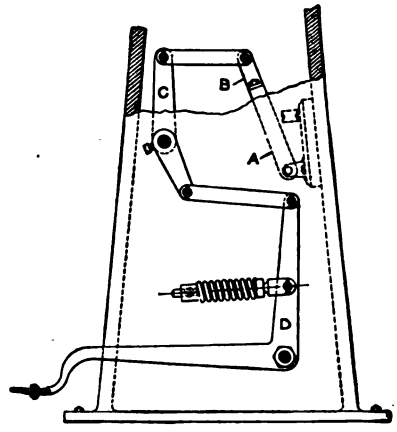
Fig. 2

Ring Drains Paint in the Pail

Emery Wheel Switch

It is well known that an emery wheel requires a considerable amount of power when running, even though no grinding is being done. It is also true in most shops that the men who use the wheel are very careless about shutting off the power when they are through using it. In order to prevent this waste of power a treadle device for throwing the switch can be used, as shown in the accompanying sketch, says the Railway Age Gazette.

The original switch A, has an extension B, bolted on, and this, through the two connections and the lever C, is connected with the upper arm of the lever D. This lever is pivoted at its lower extremity on a fixed shaft and has a bell-crank extension, at the end of which there is a treadle. Midway up this lever D, there is a helical spring which bears against a stop on the machine. When the machine is to be used, the operator puts his foot on the treadle and by pressing it down, throws the switch in and closes the motor circuit. He holds his foot on the treadle while he is at work, and when he lifts it to go away the spring throws out the switch and the wheel stops.



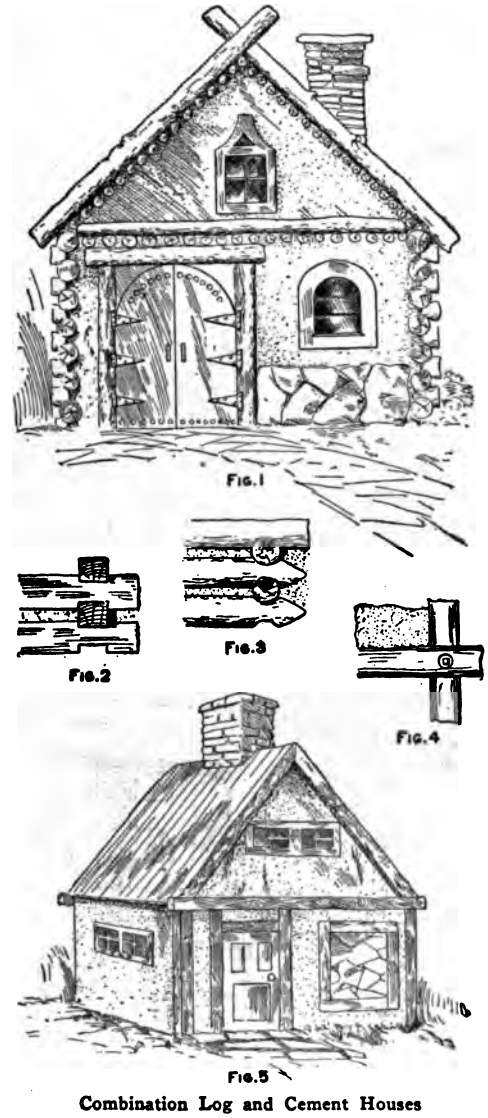
Switch Worked by a Foot Lever

Concrete Log Houses

Since the application of cement to so many kinds of structural work, there have been numerous designs created in connection with log houses. The development of the cement industry has enabled architects to form designs of modern log residences for the country, the beaches, the city estate or wherever required, says Rock Products. Some of the designs of logs in combination with concrete effects are exceedingly attractive in appearance. Stone or pebbles for the rubble surfaces are used with good effect, while other types are executed with imitations of the natural materials in cement. There are cottages designed with the rubble surfaces set off with broken bottle green glass. Some good effects have been secured with hard wood set in blocks, angles, sections, curves and the like in the cement walls of the log frame cabins. There are other patterns possible; parts of frames, turns, etc., are utilized in conjunction with the rubble, cement and log work. Furthermore, models of attractive combination log and cement houses are made by introducing novelties in window sash, frames of heavy doors, metal doors, sheet iron or tile smokestacks, novel shaped windows, projecting ends of logs at the corners and kindred combinations.

One form of a log house is illustrated in Fig. 1. The house is built with log sides, and the front and back with cement covering on the log base. The sides can be filled in with cement, too, if desired, so that the log work only shows at the edges. Or, instead of having a smooth front, made with the cement packed in between the logs, the cement packing may be used for filling purposes only. This filling need not extend so deeply as to entirely cover the lines of the logs. The log surfaces will then show, resulting in a novel exterior for the building. The detail of putting up the logs is shown in the sketches in order.

The manner of uniting the edges of the logs, when it is desired to have the ends square, is shown in Fig. 2. The



Combination Log and Cement Houses

ends are simply chipped down to the square form required, and then the logs of one series are cut out so as to admit of the jointing with the logs of the other, as shown in the sketch. After the jointing work is completed,

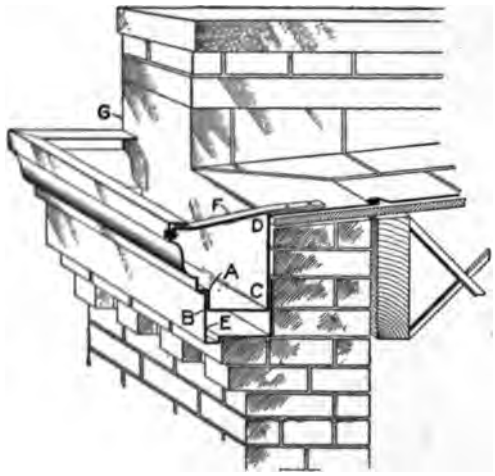
the mixed cement is packed in between the logs and permitted to set, resulting in a very firm and tight wall, if the work is correctly done. The cement, sand and water should be properly mixed and put in order for use. The cement, when too wet, cannot be properly packed. Again, if the mixture be too dry, proper packing will be equally difficult. Only when the mixture is of the right consistency, can it be placed securely in position and allowed to dry out. Such a concrete wall will last indefinitely.

A mode of effecting the corner connection, when the logs of one series are to be round, is shown in Fig. 3. The logs of one series are cut out oval-shaped at the joints and the logs of the opposite series are placed as shown. Then follows the concrete packing as before. Sometimes a joint is made with a bolt passing through the two logs at the terminal, as in Fig. 4.

A building erected with logs planed and their ends squared is shown in Fig. 5. This building is intended for service in parks, for care-takers on large estates, for garage purposes, etc. The wood should be of a quality capable of taking a finish. Polished hardwood door frames, window frames and framework for the entire structure give a building of this nature an attractive appearance, when built up in unison with the cement wall and fillings.

False Bottoms for Roof Gutters

All gutters must, obviously, have a pitch or fall toward the outlet, and in the hanging type, such as the eave



False Bottom in the Gutters

trough, this fall is perceptible from the ground. Often if the fall is pronounced, it destroys the symmetry of the house. To overcome this, the molded face styles are made throughout and a false bottom which has the necessary fall to the outlet, soldered in, says the Metal Worker. Considerable trouble is experienced with these bottoms, owing to their breaking from the sides of the gutter, despite rivets and soaking in solder.

Inasmuch as these gutters are intended to be ornamental, the sketch shows how this ornamentation can be enhanced by extending a few of the stretcher courses of the brick work, and by alternating the bricks of the header course one in and one out, an appearance of dentil blocks is obtained.

The gutter proper can have the required pitch in the vertical members A, B and CD, and the facia piece E made separate and with a drip as shown. This facia piece is soldered to the gutter and, as gutters are usually made of heavy material, can be one or two gauge lighter.

At the lowest point or outlet, the bottom of the gutter will be down to the horizontal line of the facia piece, which rests on the brick work. The outlet tube is put in and soldered in the customary manner and would either connect with a leader on the outside or the inside of the wall.

The braces F are of galvanized or tinned band iron, ⅛ by 1-in. stock, bolted to the front part of the gutter and riveted to the roof flange of the gutter as shown. These rivets are soldered watertight on the under side.

If, instead, it is specified that these braces be attached after the setting of the gutter and nails driven through to the roof sheathing, then the entire brace must be soldered to the roof flange of the gutter to prevent leaks through the nail holes. The braces are made all alike and spaced 2 ft. apart.

The gutters are made in a length on the crown line from the outer edges of the fire or battlement walls G. At the inner lines of the walls, the roof flange of the gutter is cut and flattened out and forms a flashing which goes up and under the cap flashing that was built in with the wall. The wall flashing connects with this flashing of the gutter as shown in the illustration. Should the wall flashing be very high at the outer edges of the walls, use some roofers' paint skin and secure it to the wall with hooks to keep rain from blowing in behind the flashing at G. A much better method would be to step the flashing into the brick work.

Improved Sleeve Ironing-Board

A practical sleeve ironing-board, having both top and bottom boards shaped for such use, is shown in Fig. 1. When the board is placed on the table, one can iron without bending over it. The small board is for ironing sleeves of shirtwaists and dresses, the other for waists, shirts, children's clothes and small pieces. This board will also fit the shoulders and fronts of waists.

The board is made of pine or basswood; the spool for the upright can be obtained from a tailor. After the boards are cut as shown by the dimensions and rounded at both ends, they are fastened to the spool with long brads. Bore holes through the boards matching the holes in the spool, fill them with hot glue and drive dowels of hard wood through both boards and spool.

Half a yard of white felt will be sufficient to cover both boards and extend over the sides, so that it can be fastened with tacks. One yard of unbleached muslin will make four covers for the outside. Two spools of narrow tape are used to run through the casings of the slips and the tape tied underneath

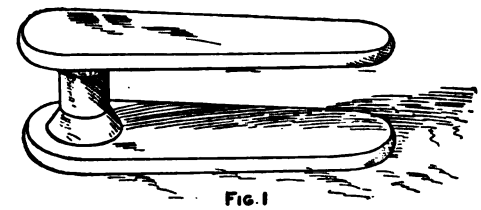


FIG. 1

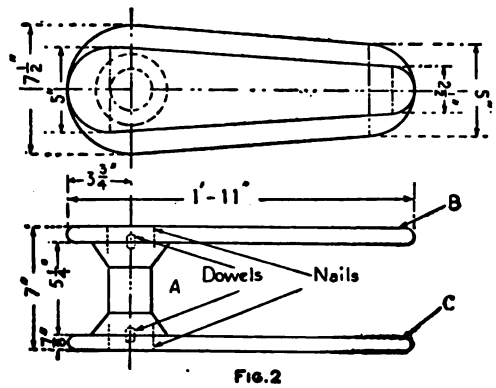


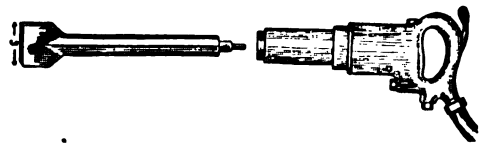
FIG. 2

Ironing-Board Details

the boards. Thus the slips can be easily removed and laundered. The upright, being made from a large spool, prevents the articles that are to be ironed from being caught underneath, and also gives depth enough between the boards to keep the waists and children's dresses in shape.—Contributed by Katharine D. Morse, Syracuse, N. Y.

Removing Old Paint with a Pneumatic Tool

Old paint on engine tanks can be quickly and effectually removed by using a boilermaker's 2½-in. stroke air-gun or pneumatic hammer, with a rip-

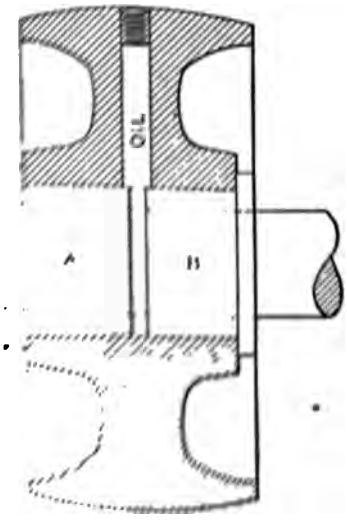


Pneumatic Hammer and Tool

per tool. Hold the ripper at an angle so as to clip off the paint and not cut into the metal.—Contributed by Harry F. Leonhardt, Minneapolis, Minn.

Bushing Loose Pulleys

[illegible] of the jobs that frequently fall [illegible] of the repair man is that of [illegible] the bushings in loose pulleys,



[illegible] of the American [illegible] recorded as a job [illegible] dreaded of all, they [illegible] to the power lathe [illegible] very. As a result, a [illegible] considerable [illegible]

[illegible] to make the [illegible] and to make tight fit [illegible] Long without number, [illegible] pulley bushings cracked [illegible] to make the bush [illegible] and the bushing hole re[illegible] duced [illegible] making necessary all [illegible] operations in reaming or scraping the hole to fit the bush. The brass usually found around the shop is not of the right character for the use to which it is put, and the slightest neglect in oiling starts it on its noisy way back.

The accompanying sketch illustrates a method we have employed for some years and for simplicity and economy in construction and efficiency in operation it is far ahead of the tight bushing. It has given complete satisfaction whenever used.

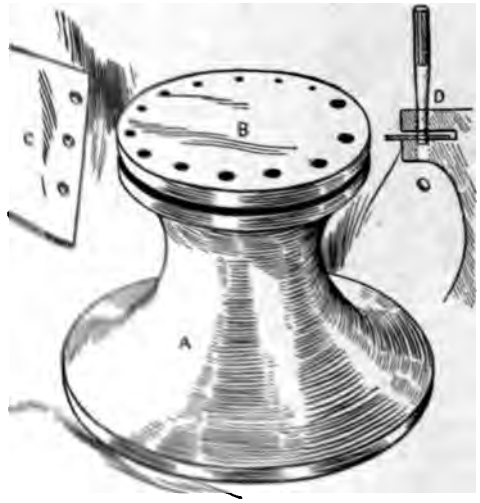
It consists of two flange bushings, A and B, of cast iron, bored and turned a running fit on the shaft, and in the pulley, with oil grooves inside and out, and an oil space in the center. Space for the flanges is obtained by facing the pulley hubs where necessary.

This style of bushing is easier to make, therefore cheaper, and will stand more abuse and neglect than the tight brass bushing, and if once used you will not revert to the old method.

Punch Block for Small Holes

Sheet metal workers will find the punch block, shown in the accompanying sketch, very handy for punching small holes in sheet metal. Its small size permits of it being carried about from place to place.

Turn up a block of steel, A, in the lathe to the desired size. Cut a groove about $\frac{1}{8}$ in. wide in the edge of the top flange. Around the top edge drill holes ranging in size from $\frac{1}{16}$ in. to



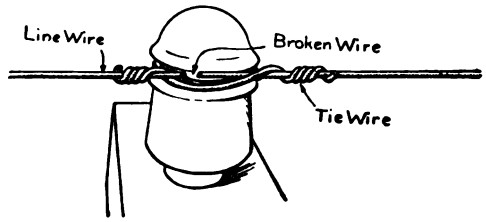
Punching Holes in Sheet Metal

$\frac{1}{4}$ in. and have a set of punches made to fit them. In punching a hole, slip the sheet C in the groove under the proper hole and set the punch on it. A sharp blow with a hammer will force the punch through, cutting a

smooth, clean hole. Better results will be obtained if the top flange is hardened after it is finished. The work done with this punch is fully as good as that done with a more expensive punch press.—Contributed by C. Purdy, Ghent, O.

Noisy Line Caused by a Tie-Wire Break

Having gone over a line that was reported noisy, and satisfied myself that the trouble was not in the instrument or fuses, I concluded that it was in the aerial, of which there were eight spans between the cable box and the instrument, says a correspondent of Telephony. On climbing a pole and ex-

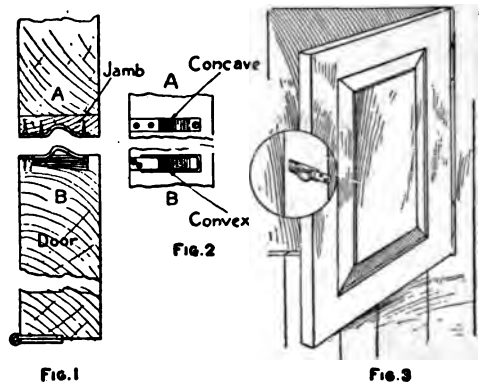


Showing Point of Break

amining the glass where the line was tied, I found the copper wire corroded and parted. It was held in place by the tie-wire, which was wrapped to hold the wires up, but would allow the ends to move just enough to cause the line to be noisy when a conversation was in progress. Splicing in a new wire cleared the trouble.

Invisible Door Catch

A catch for small doors on cabinets, bookcases, etc., can be easily and quickly made of two pieces of spring brass about ¼ in. wide. These pieces are bent as shown in the sketch, one to form the concave, A, and the other to form the convex, B, part of the catch. The concave piece is fastened to the door jamb so that it will extend to the outer edge of the jamb as shown. The convex spring is then fastened to the door over a slot previously cut in and exactly opposite to the concave piece, so that they will fit together when the door is closed. The slot over

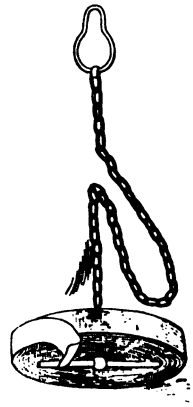


Invisible Door Catch

which the spring B is fastened should be cut deep enough to admit the end when it is pressed down flush with the edge of the door. This catch will hold the door securely, yet not so tightly that a slight pull will fail to open it.—Contributed by L. M. Eifel, Chicago, Ill.

Electrician's Tape Carrier

Secure an old key chain and put a wire through the end of it in place of the ring. Bend the wire around so it will not work loose from the chain. Slip the roll of tape on the chain as shown in the sketch. If allowed to hang outside of the garments, it will always be at hand when wanted, and save the electrician considerable time. —Contributed by W. T. Tarr, Joplin, Missouri.



¶Do not screw a spark plug in tight while the motor is hot. The result will be stripped threads when removing after the motor has cooled.

Calipering over Flanges

When it is necessary to gauge the thickness of a piece of work which lies behind a flange, the ordinary calipers

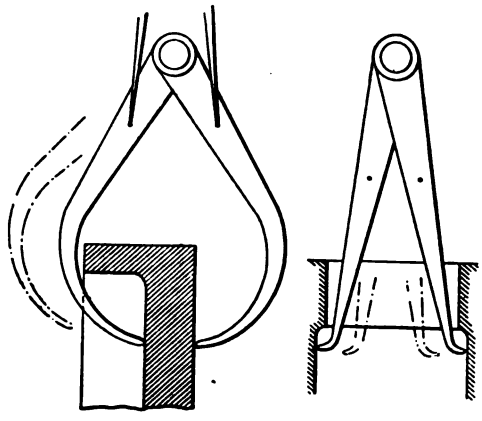


Fig. 1—Calipering with Prick-Punch Marks

are of no use, because the dimension is lost as soon as the calipers are opened for removal, says Machinery. The view to the left in Fig. 1 shows a neat method of repeating the setting. All that need be done is to make a fine prick-punch mark on the face of each leg, and carefully measure the distance between these marks with the points of a pair of dividers. After the calipers are removed they should be closed until the punch marks again coincide with the divider setting, when the dis-

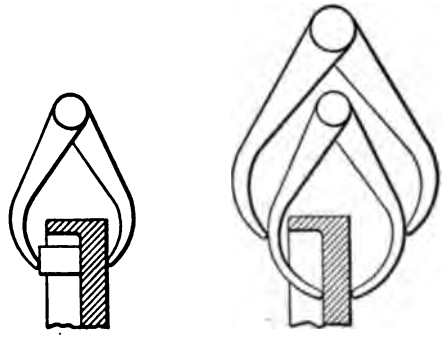


Fig. 2—Block or Two Pair of Calipers

tance between the caliper points will equal the thickness of the work. If this is done with care, very accurate results may be obtained. The same method is applicable to inside calipers when taking the size of chambered recesses, etc. The caliper setting is changed, as shown by the dotted lines, to get them out of the narrowed hole, and then they are again opened until the punch marks are the correct distance apart.

The methods shown in Fig. 2 are quicker and will permit measurements closer to the corner under the flange, To get the thickness of the flange, simply use a block as shown to the left in Fig. 2, then subtract the thickness of the block from the measurement obtained by the calipers. This method can also be used for measuring a chambered recess. If a block is not at hand, use a second pair of calipers as shown to the right in Fig. 2. After removing the first pair of calipers from the work, replace them to size by means of the second pair.

How to Repair a Cracked Water Jacket

Through neglect and carelessness many a gas engine water jacket is burst by being left with water in it on a very cold night. A crack of this sort gives a great deal of trouble and many times results in a loss of time in replacing with a new jacket or sending it to some factory to have it brazed.

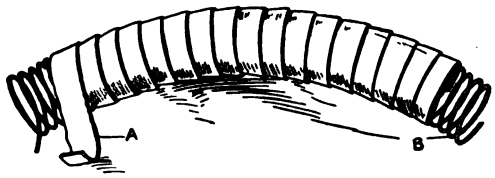
If the crack is in such a place that no strain comes on it except the water, it may be repaired in the following manner and will hold water as well as a new jacket would.

Mix litharge with glycerin to a stiff paste and force it into the crack with a putty knife or some similar instrument. After filling the crack, let it stand over night, if possible, and on starting in the morning run the engine until it gets well warmed up before turning the water into the jacket. If this mixture is properly applied, the job will be likely to last as long as the engine. One advantage it has over brazing is that it will give way again before breaking the cylinder, if the careless-

ness is repeated, and in this case, the mixture can be applied again in a short time and no serious delay will result. It is also valuable where the crankcase has been patched and leaks oil. This paste can be used in putting together the case in place of the regular packing. When the case is taken apart, the paste will cling to the metal and can be replaced as the regular packing.—Contributed by J. N. Bagley, Webber, Kansas.

An Emergency Hose

When in need of a short piece of hose for a siphon one day and having no ordinary hose at hand, I proceeded

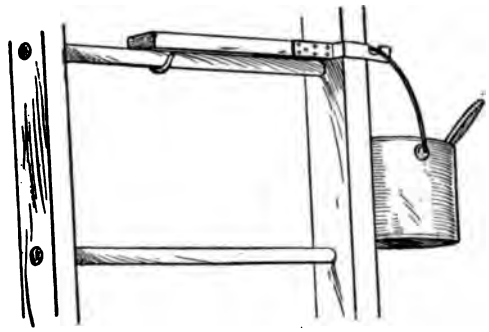


Oilcloth Wrapped around Spring

to make one from a blind roller spring and strips of oilcloth. The oilcloth was cut in strips 1 in. wide and then wrapped around the spring in a spiral, allowing each edge to overlap the other about ⅜ in. The oilcloth is shown at A and the spring at B in the sketch. Adhesive tape would be much better, but the oilcloth did good service.—Contributed by Wm. A. Robinson, Waynesboro, Pa.

Paint Pot Hanger Attachments for Ladders

The painter using a hook on the rung of a ladder for a pot hanger knows only too well how hard it is to dip the brush in the paint and draw it out without smearing the ladder or hands. The hanger illustrated herewith can be quickly adjusted to the ladder so the pot will hang n either side as desired. The pot is out of the way of the rungs and is free for dipping the brush in the paint. It consists of a strip of board about two-thirds as long as the rungs on the ladder, with two strips of iron fastened to one end and bent around the upright as shown. The irons are

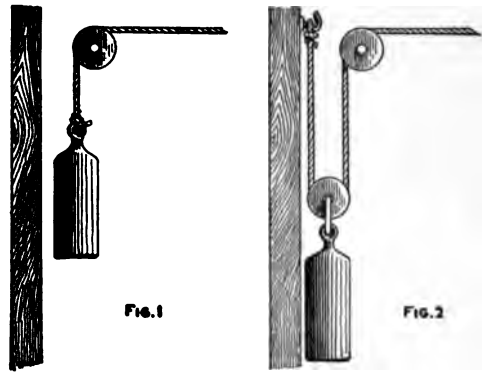


Pot on Hanger

notched on the ends to receive the bail of the pot. A small screw hook turned into the under side of the other end of the board holds the device in place on the rung desired.—Contributed by W. A. Jaquythe, Richmond, Cal.

Halving the Pull of a Weight

Sometimes the weight used to close a door or a gate is too heavy, and it is not convenient to secure a lighter one, says House and Garden. If you have a spare pulley that you can fasten to the top of the weight, you can reduce its pull one-half by lengthening the cord and carrying it through this pul-



The Weight Applied in Two Ways

ley, as shown in the illustration. The same weight is supposed to be used in both sketches, but arranged as in Fig. 2, it will pull only half as hard as in Fig. 1.

How to Make a Durable Heat-Black Finish on Brass, Bronze and Copper

The so-called "heat-black" finish on brass, copper or bronze, is one of the new methods of coloring metals that have recently appeared, and is one of the most durable. The color is an absolute dead black and is not difficult to apply to brass, bronze or copper, says the Brass World.

The article to be treated should be free from grease, although a slight tarnish does no harm. It is customary to sandblast the surface, although very good results may be produced without it. A sandblasted surface takes an excellent finish, but those who do not possess the necessary apparatus need not have any hesitation about using the finish.

Two stock solutions are first made up. One is a solution of nitrate of copper in water, and the other is a solution of nitrate of silver in water. The proportions need not be very exact, although it is preferable to keep them fairly close. The first is made up of 1 oz. of water, and 1 oz. of nitrate of copper. This gives a saturated solution of nitrate of copper in water and is used for a stock solution. If desired, the nitrate of copper may be easily made by taking 1 oz. of strong nitric acid and dissolving in it all the copper wire it will take up. A thick, blue solution is left, which is used for the stock solution. A few platers have nitrate of copper in stock, but if it cannot be readily obtained, it can be made up from copper wire.

The nitrate of silver solution is made up of 1 oz. of water and 1 oz. of nitrate of silver. This solution can be made up, also, by dissolving pure silver in nitric acid, until no more will dissolve, but dilute acid of equal proportions should be used, as silver does not dissolve readily in strong nitric acid. It is preferable, however, to purchase the nitrate of silver, as it is easily obtained. The nitrate of silver solution is practically a saturated solution and is used as a stock solution.

The mixed solution for applying to the metal is made as follows: water, 3 parts; nitrate of copper solution, 2 parts; nitrate of silver solution, 1 part. The solution is kept in a glass or stoneware vessel for use.

The brass, bronze or copper article to be treated is heated on a hot iron plate or in an oven to a temperature of about 250 deg. F. and the solution applied with a brush or cotton swab, so as to cover the surface uniformly. The brush should be a rather soft one so as to put on the coating in the best manner. The so-called rubber-bound brushes are the best for the purpose as there is no metal on them to be attacked by the solution.

One or two coatings of the solution on the surface of the article is usually enough, and it dries almost immediately, leaving a sort of green froth. The temperature is not sufficiently hot to draw the temper of hard brass, but it will usually melt soft solder.

When the entire surface has changed to a uniform black color, allow the article to cool and then brush off the fluffy material on the surface of the metal with a stiff bristle brush. The color will now change to a brownish-black that is quite pleasing for many purposes and which is very tenacious. When the fluffy material is completely brushed off, it is surprising how even and uniform the coating is and how well it adheres. If the brown black finish is desired, the surface may be now waxed or lacquered, but it is customary to give the article an additional treatment in a liver of sulphur solution, so as to change the brown-black coating to one that is absolutely dead black.

When the smut has been brushed off from the surface of the article, it is immersed in a cold liver of sulphur solution for five minutes. This solution is made by dissolving 2 oz. of liver of sulphur in 1 gal. of water. The article is immersed in it, allowed to re-

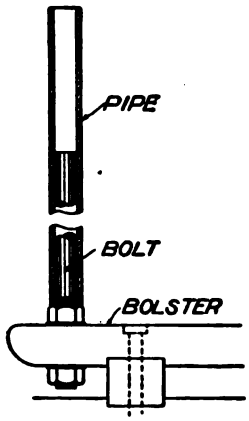
main about five minutes and then, without rinsing, is again heated until the surface is uniformly black.

The surface is again brushed with the bristle brush, when it will be found that the color is a dead black and quite uniform. It should be borne in mind that the article is not rinsed at all after it is removed from the liver of sulphur solution, but is simply drained off and then heated.

The article is now lacquered with a flat lacquer or waxed as may be desired. The final appearance of the surface will be found quite satisfactory and, contrary to what one would naturally expect, the coating of the solution that is first applied need not be very even, as long as a sufficient quantity is put on. If the surface is not satisfactory, or an old article is to be refinished, the wax or lacquer may be burned off and the process repeated.

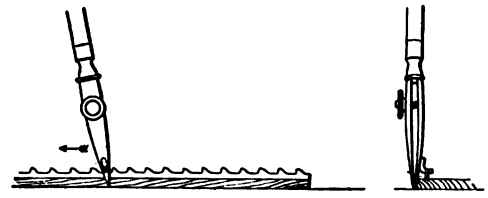
A Bolster Stake for Lumber Wagons

Some lumber companies equip their wagons with strong stud bolts, instead of the ordinary wooden bolster stakes. These bolts are much stronger than wooden stakes and hold the load much more securely. The bolt is about 18 in. long and is secured to the bolster with nuts on both sides, as shown in the accompanying illustration. This bolt is long enough for all ordinary loads, but when a higher load is hauled, pipes are slipped over the bolts as shown and the tops tied together with chains to keep them from spreading. These stakes are much handier to use than the wooden ones with the rings and pins.—Contributed by J. V. Romig, Allentown, Pa.



Dotting Attachment for Ruling Pens

The accompanying illustration shows a dotting device which a writer of Machinery uses in place of the expensive wheel or other dotting pens. The advantage of this is its cheapness, and the fact that either dotted or full lines may be drawn without any change whatever. A small rack with a series of rounded teeth is attached with cement or other adhesive to the face of the straight edge or T-square a little way back from the edge. On the back of the inner pen blade, a small piece of brass is soldered with a portion of the upper end turned out at right angles, so as to lie parallel with the face of the straight edge. This brass pin is set at such a height that when the pen is tilted over, about as illustrated, the pin just clears the bottom of the grooves in the rack, consequently permitting the pen to ink on the paper. In use. the pen is moved along, keeping it at the angle shown, and the teeth cause it to jump up and down, producing a series of dashes on the paper. A dotted line can be drawn in this way as fa as a full one, and without any of the fatigue which is caused by dotting in the usual way. The pen should be held lightly, to let it rise and fall in an easy manner. By simply bringing the pen into a vertical position, the brass pin will clear the tops of the rack teeth, and a full line can then be drawn. The rack can be made from a piece of hacksaw blade, by reducing its width and filing out each alternate tooth and rounding off the remainder to suitable outlines.

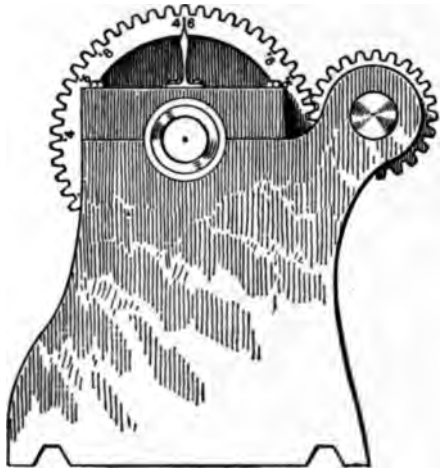


Dotting Attachment

¶Test a lathe for end shake from time to time.

Marking Turned Work in the Lathe

The lathe hand often has occasion to line off a turned piece of stock into a certain number of equal divisions, or



Gear Marked Off in Equal Divisions

parts, as in laying out bolt heads of triangular, square or hexagonal shape, in scribing a piece of stock for a key seat, or, in fact, in any case when equal spacing is required on a piece of turned stock. This is easily done, if the face of the large gear in the lathe head stock is marked off into equal divisions, and a stationary pointer supplied as shown in the accompanying sketch. Turn the gear until the hand points to the proper number, then scribe the work with a tool held in the toolpost. This puts the mark in the proper place. By putting in the back gears, the indications can be brought up very nicely. This idea can be applied to a great many other purposes.—Contributed by A. G. Smith, New York.

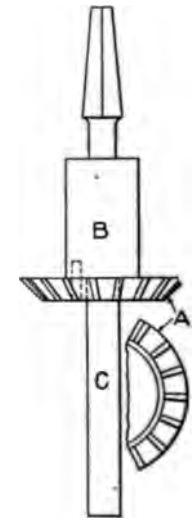
How to Cover a Pulley

It is an easy matter to cover a pulley, if the covering is prepared in the proper manner. The first thing to do is to remove all the old covering and pull out the nails and, if necessary, remove the wedges and replace them with new ones. The leather to be used for the covering should be wider than the pulley to be covered and about 3 or 4 in. longer than is necessary to reach around the pulley. Soak the leather in a pan of warm water for almost one hour. Square one end of the leather and nail it to the wedge, using nails that will just reach through and clinch on the side next to the pulley.

Stretch the leather as tight as possible and nail to the next wedge and continue until the last wedge is reached. Nail the leather to the last wedge before cutting it off. Trim the leather down to the rim of the pulley and the job is finished. Allow it to dry a short time, say 15 minutes, before putting it in service. If the leather is riveted to the pulley instead of being fast to the wedges, proceed in the same manner, punching the holes after the leather has been stretched.

Tool for Reseating Gas Engine Valves

Gas engine exhaust valves often become pitted from the action of the gases, and where the pits are not too deep, they can be ground out with emery very easily. If the valve has become warped from excessive heat, or the pits are too deep, it must be sent back to the makers to be reground and trued. The ordinary repairman can do the work just as well as it can be done at the factory and save much time, if he has a tool like the one shown in the accompanying sketch.

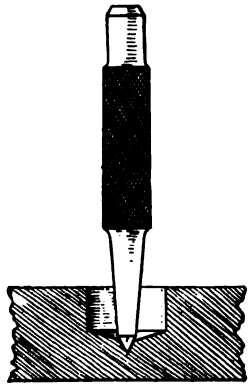


A cutting tool, A, is fitted on an arbor, B, and held in place by means of a pin. The arbor shank C should be of the same size as the valve stem, in order to hold the tool in line when in use. The arbor has a hole in the end to receive a common brace bit shank, so that it can

be turned. The cutting tool is made the exact size of the valve seat and has a pitch of 45 deg. After the tool has been shaped, cut small teeth around it as shown, being careful that all the cutting edges are of the same height and have the same pitch. The hole through the tool must be made to fit the arbor securely, but not so tight that it can not be removed for grinding. To temper the tool after it is finished, heat it to a cherry red, then plunge it into water or oil. Heat a block of iron and lay the tool on it, large side up, and draw to a deep straw color and cool. This tool will be valuable to the repairman who has much work of this kind to do on automobiles.—Contributed by J. N. Bagley, Webber, Kans.

Drilling Holes in Metal by Hand

Drilling a deep hole in metal with a brace-drill is a very hard job, as it takes quite a pressure to make a drill point take hold. In order to relieve the point, mark the work with a center punch which is well pointed. Drill until the punch mark is out, then make a new mark, say ⅛ in. deep, and drill again. Continue by marking and drilling and you will be surprised how quickly and easily a hole can be drilled.—Contributed by Ernest A. Nielsen, Boston, Mass.



Wrench for Turning Nickeled Fittings

I had occasion to move a bathtub and did not want to mar the coupling to the floor connection. I took two pieces of hard pine and cut the ends as shown in the sketch, mortising them as shown at A, so they could be tied together with a short piece of wire. The pieces should be at least 1½ by ⅞ in. and of a convenient length. They

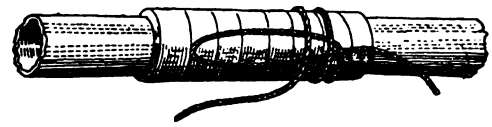


The Wood Cannot Mar the Nickel

can be cut out quickly with a pocket knife.—Contributed by Orris A. Cummings, Palmyra, Ill.

Making Flexible Hose Connections on Auto Engines

When a clip is too large to tighten up properly on rubber water connections, wrapping a few turns of insulating tape



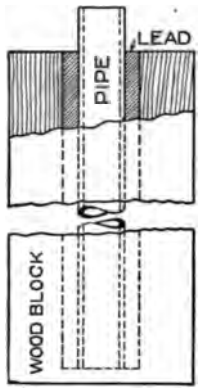
Enlarging Hose for Clips

round the tube to enlarge it, is a ready way of making the clip hold. A good substitute for a clip, and one that makes a good job, is to bind the tube with heavy twine, says the Automobile Dealer and Repairer. It is better than wire, and when wound on neatly and secured without a knot by underlaying the end, it looks well. To place it on, take about 5 ft., double it like a hairpin about 6 in. from one end, and lay it on the t··· . Take the first round turn over all about 2 in. from the bend and draw taut, following with as many more turns as may be required. Work toward the loop, as shown in the sketch, but keep the turns close together. Pass the long end through the bend or loop, pull the short end, drawing the bight well under the turns, and then cut off the ends close.

¶Safety razor blades can be sharpened by immersing them in a solution of 1 part, by weight, of muriatic acid and 20 parts water for 30 minutes, then removing them and honing each one to a polish.

Casting a Short Lead Pipe

A plumber, who was finishing a job in the country, found himself short of about 1 ft. of lead pipe. As he was some distance from the supply shop, he devised the scheme shown in the accompanying cut for making the extra length of pipe from scrap lead. Securing a dry wood block of the proper length, he bored a 1¼-in. hole into it, lengthwise, with an ordinary wood auger. He set a ½-in. pipe, to serve as a core, in the center of the hole. He then melted his lead and poured it about the pipe, first greasing the wood and core to keep the lead from splattering. When the lead had cooled he split the block, removed the ½-in. pipe and found his cast pipe to be just what he needed.—Contributed by James E. Noble, Toronto, Canada.



Filing the Edges of Short Surfaces Level

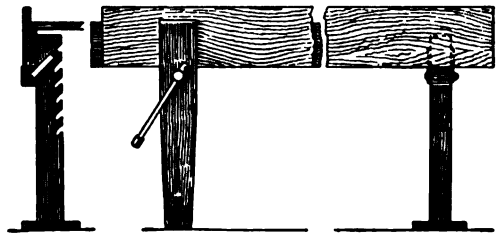
We had a few thousand small steel pieces ¼ in. wide with a little corner cut out, to be filed as shown in the sketch. It was difficult to file these and get them straight without sloping over on the outside edge, or filing more in front than on the back or vice versa. The method we finally adopted was rather novel. The pieces were placed on a flat metal plate with a steel roller of the same diameter as the height of the surface to be filed and in the positions shown in the sketch. The roller prevented the file from rounding the edge and also kept it from curving the shoulder in the other direction.—Contributed by Donald A. Hampson, Middletown, N. Y.



Filing Surfaces Flat

Holding End of a Long Board on a Bench

The ordinary carpenter's bench has an apron in which holes are bored for pins to hold the end of long boards. A device that is a good substitute for the pins and one that can be set at any point along the side of the bench, is shown in the sketch herewith. The main upright is a 2 by 3-in. timber, set on a square block. The top part of the upright along the back side is notched to receive a bolt. A block is attached with side bars in such a way that it may be raised or lowered to suit the width of the long board being surfaced on its edge.—Contributed by W. C. Heidt, Chicago.



Bench Jack

Failure by Disintegration of Concrete Roofing Blocks

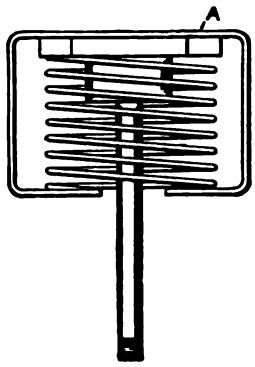
The porous character of the concrete and the use of cinder aggregate were apparently the cause of failure in the reinforced concrete slabs, used on the roof of the LaSalle station trainshed at Chicago. The slabs were made up of a gravel concrete exterior shell, ½ to ¾ in. thick; the interior portion was of cinder concrete, used to reduce the weight.

The disintegration was caused by gases and moisture penetrating from below the gravel concrete shell and entering the cinders. The steel was enlarged in sections or swelled by rust, causing it to crack off the cement. The

new slabs, used to take the place of the old, were made of stone concrete throughout and, when finished, were treated with a solution to close and seal all pores so that neither gas nor moisture can penetrate the facing of the concrete.

Tool for Inserting a Valve Stem

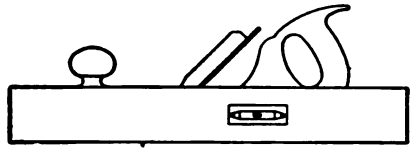
Often when inserting pump valves or other valves of a similar type, more or less trouble and inconvenience are experienced in getting the valve stem to catch the thread. This is on account of having to resist the pressure of the spring, while at the same time turning the stem, which, moreover, often has to be accomplished while reaching through a handhole. Therefore, if a number of valves are to be inserted, the work will be facilitated by temporarily compressing the springs to a uniform extent.



The accompanying sketch shows a very simple means of doing this. The flat piece of wrought iron A, about $\frac{1}{16}$ by $\frac{1}{2}$ in. is bent into the form of a rectangle, leaving an opening on one side. The ends of this opening are caught under the spring, and the opposite side slipped over the head of the valve stem as shown. Thus the stem can be quickly and easily turned in, and the piece of wrought iron as easily slipped off.

A Level on a Plane

The carpenter who does many jobs outside the shop is always trying to economize as much as possible on the number of tools he must carry. Many carpenters will be able to make use of the idea shown in the accompanying sketch for combining a level with a jointer plane. It is made by letting into one side of the plane a small level, such as may be bought for a few cents,



Combined Plane and Level

sinking it far enough in to be out of danger of breakage.—Contributed by C. W. Nieman, New York, N. Y.

A Sawdust Filler

The following preparation will be found useful for filling unsightly cracks and holes in furniture and woodwork. Place a quantity of sawdust in an earthenware vessel and pour boiling water over it. Let it soak for about one week, stirring frequently, then place it over the fire and boil until it is of the consistency of thick paste. Pour it on a coarse cloth and squeeze out the excess moisture. When wanted for use, mix a little of it with a thin solution of glue water and fill the cracks or holes with it. When dry and painted over, it will have the appearance of ordinary wood. —Contributed by Andrew Soderlund, Jr., Newport, R. I.

A Window Stop

Bend a piece of rod at right angles and bore a hole in the bend. Fasten it to the window frame at the edge of the sash by turning a screw through the hole into the wood. When attached, it



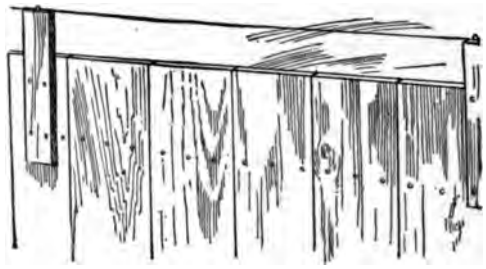
FIG. 1 FIG. 2

Catch in and out of Position

will support the sash as shown in Fig. 1. Figure 2 shows the sash released.—T. L. P.

Cat Guard for a Yard Fence

A simple way to prevent cats from using your back-yard fence for a concert stage is to place a wire 2 or 3 in.

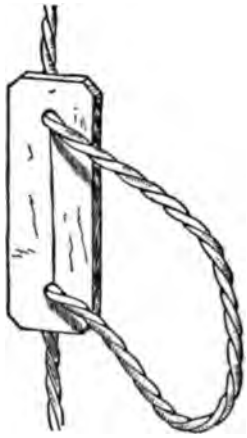


Wire on Fence

above and parallel with the top of the boards, and stretch it tightly. The wire makes it impossible for the feline to gain a foothold on the fence. The same method can be used to keep fowls from roosting on places where they are not wanted.—Contributed by Thomas L. Parker, Olaf, Iowa.

Flexible Lamp Cord Adjuster

While going through a local factory, I saw a device for holding an electric light and thought I might help others by passing the idea along. The device consisted of a piece of leather belt about 1 in. wide and 1½ in. long with a ⅜-in. hole punched in each end and the holes connected by a slit cut between them. The flexible cord is easily pushed through the slit, thus placing it in position without disconnecting the lamp socket. The cord can be pulled out in a loop so as to raise the light to any desired height. —Contributed by E. A. Gardner, Rochester, N. Y.



To Renew the Old Paint on a Buggy

The paint on a buggy soon loses its luster after it has been washed a few times. It may be brightened up, however, by the following method: Wash the buggy perfectly clean; then go over it with a rag moistened with linseed oil. Allow this to dry, then rub it with a soft rag.

Secure a pint of the best carriage varnish and a small can of paint of the same color as the original job. Add enough paint to the varnish to give it color, but not enough to cover up the stripes on the buggy when it is applied. Apply the same as varnish and allow plenty of time for it to dry. This adds much to the appearance of a buggy and protects the old paint.—Contributed by S. M. Hadley, Danville, Ind.

Tool for Cutting Boiler Plates

In the small machine shops where there is not a great variety of machines,

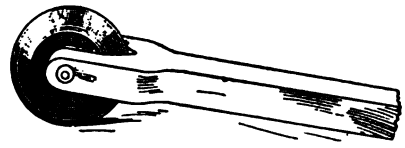


Fig. 1 Fig. 2

Roller Cutter

much scheming must be done sometimes in order to handle all kinds of work. In one shop of this kind it was necessary to split some sheets of $\frac{3}{16}$ and ¼-in. boiler plates. As there were no shears, the tool shown in the accompanying sketch was rigged up and used in the planer. A pipe cutter was fastened in a handle with a hardened steel pin as shown. By running this tool down the plate a few times, they broke quite easily.—Contributed by W. Clark, Cranbrook, B. C.

¶Storage batteries should fit or be held tightly in their box and all connections made secure. Sheet rubber is a good material for packing batteries. It deadens the vibrations and is a non-conductor of electrical currents.

SHOP NOTES

Bit in a Partition Removed with an Electro Magnet

While I was doing some electrical work, a very valuable bit slipped out of the brace and fell 12 ft. inside of a partition. I did not want to lose my bit, but I could not make a hole in the partition large enough to remove it. I had several sizes of wire with me and among my tools was a piece of wrought iron. This I readily bent into the shape of a horseshoe, wound with about 100 ft. of small wire, and connected in series with a 32-cp. lamp on a direct-current circuit. I lowered this improvised magnet into the partition by a string and, on pulling it up, was much pleased to find my bit clinging to it.—Contributed by G. H. Dalton.

Shooting Large Game with a Shotgun

The average hunter going out for small game carries only shot cartridges, but, if occasion demands, he can also kill large game, if the paper shell is cut as shown in the sketch. The perforations are made on the line of the wadding between the powder and the shot, usually about 1 in. from the cap end. In shooting such a shell, the end holding the shot will go out in one piece and with enough force to penetrate a 2-in. board.—Contributed by R. S. Gordon, Los Angeles, Cal.

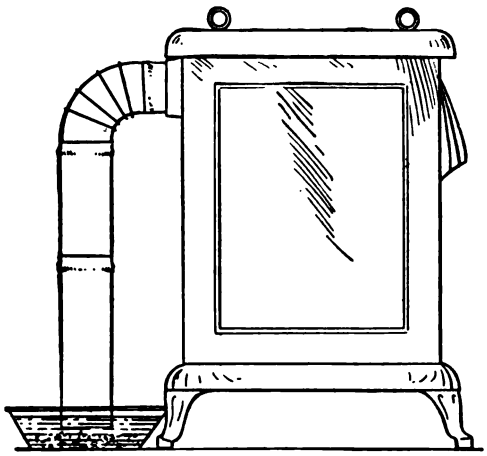


¶The lathe ways should be kept clean and oiled.

¶Waterproof show cards are made with Japan color.

Disposing of Fumes from a Gas Heater

In many houses there is some distant room that the furnace will not heat properly. For this reason a small gas stove is often used in such a room, but if there is no flue, the air soon becomes disagreeable and even dangerous to breathe, and water will collect on the windows and doors, causing the woodwork to warp and the windows to have a coating of frost. This may be remedied by connecting an elbow and a short length of pipe to the heater so that the end barely clears the floor. Place under this end a pan of water to which has been added a little slaked lime.

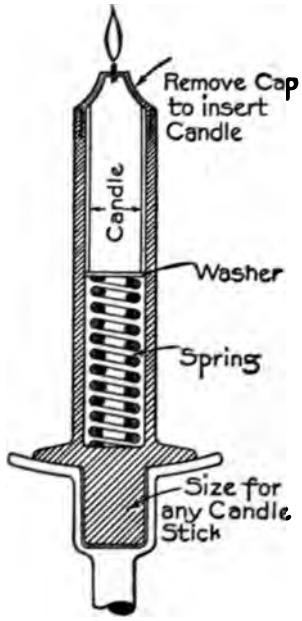


Pipe in Solution

Illuminating gas contains carbon and hydrogen. The oxygen of the air combines with them forming carbon dioxide and water. The lime in the water combines with the carbon dioxide and forms calcium carbonate, a form of chalk, and the steam is condensed by the cool water in the pan.—Contributed by Harold Cadwell, Kansas City, Mo.

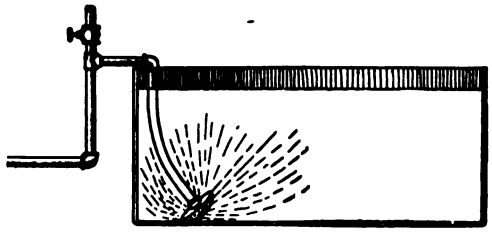
Automatic Feeding Candlestick

The sketch shows the parts of a candlestick that make up a self-feeding arrangement to make the candle appear at all times full size. The main body of the stick is cast in one piece and bored to receive a common tallow or wax candle. The top end of the stick has a removable cap for inserting the candle, and the bottom is fitted with an open spring. The base of the stick is made to fit any receiver, and the entire outside surface covered with a coat of white enamel to make it resemble a candle.—Contributed by Louis Cooperstein, Bremerston, Wash.



Agitator for Hardening Baths

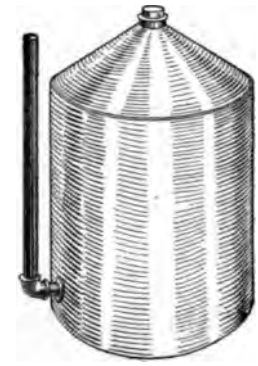
An effective apparatus for agitating a brine bath is shown in the accompanying sketch. Air from the relief valve of a gas furnace is introduced into the bath through a system of pipes, which causes the brine to circulate freely around the die and carry the coating of vapor liable to form on its surface. The air also has a tendency to keep the bath at a lower temperature. The apparatus has given good results on large work, especially drop forging dies, when a brine pumping system or running water is not available. The union between the pipes and the furnace is of a type that makes connection and disconnection easy.—Contributed by Martin R. Heath, Binghamton, N. Y.



Bath Agitator

Preventing Oil Drip of a Can

The oil used in a steam plant is often kept in galvanized or tin tanks having a cock attached to them for drawing off the oil. After the cock is closed, the oil remaining in the opening drips out into a tin or other dish provided for that purpose, but if the drip dish is moved out of place, the oil drips on the floor.



A method used by one of the men in a steam plant remedies this. The can is fitted with a pipe as shown in the illustration. The pipe joints are tightly fitted, yet so that the long piece can be turned down. No cock is then necessary, as the oil can be drawn by turning the pipe down. When the pipe is turned into its upright position again, the oil cannot drip from the pipe or can.—Contributed by James E. Noble, Toronto, Canada.

An Improvised Ladder

I had occasion recently to put a new glass into a transom in a house two miles from town. When I reached the house I found it vacant and no means at hand to reach the transom. As I did not want to go back for a ladder I improvised one in this way: I removed two doors from their hinges, placed one across the doorway with the edge

up and the other flatwise on this, with one end resting on the floor, into which I drove a couple of nails to prevent the door from sliding. Thus I had as good a platform as one could wish. Taking off my shoes so as not to mar the varnish, I walked up the door, removed the transom, put in the glass, and was on my way home in less time than it would have taken to procure a ladder from the city.—Contributed by W. A. Lane, El Paso, Tex.

Repairing a Coal Pail

If small holes have been worn in the coal scuttle, they can be repaired in the following manner: After scraping and removing all dust and dirt and drying the metal thoroughly, pour enough melted asphaltum into the scuttle to cover the surface and worn places and allow it to dry and harden thoroughly.



If the holes are too large to be mended in this way, put a piece of tin, iron or zinc over the worn part and hold it in place with a stick, as shown in the sketch, until the patch is covered with the asphaltum. When the asphaltum is dry and hard, remove the stick, and the pail will again be serviceable.—Contributed by J. C. Englehart, New York City.

Belt Hook Former for Round Belts

Certain kinds of manufactured goods are made on light machines where the parts are driven by round belts, the ends of which are joined by means of wire hooks. Where a quantity of these hooks are used they can be made in the shop, but a former for the bends is necessary.

The illustration shows a home-made former, cut from the head of an ordinary bolt. The head of a 2-in. bolt is shaped and grooves filed, as shown

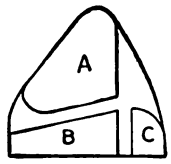


Fig. 1

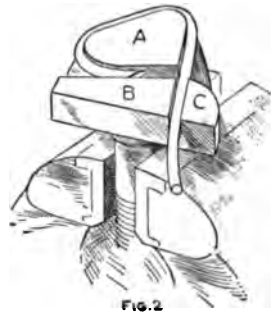


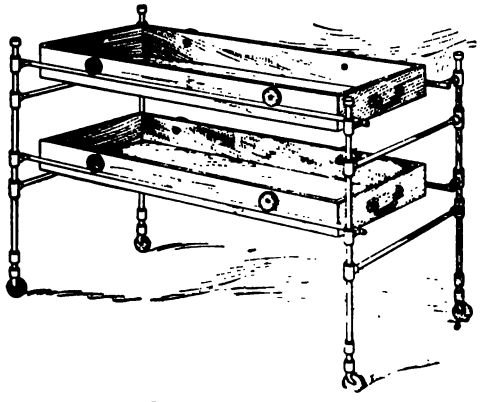
Fig. 2

Form on a Bolt Head

in Fig. 1. The raised portions A, B and C should have the thickness of the wire used. The bolt is clamped in the jaws of a vise and the hook formed around the raised part A. The straight part of the hook is shaped by a light stroke of a hammer.—Contributed by Chas. F. Matzek, Milwaukee, Wis.

Carrier for Hardware Stores

The carrier shown in the sketch is similar to those used in banks to carry large books. The frame is built of ⅜-in. gas pipe and fittings. The boxes are made of oak with grooved side-wheels, so as to be easily removable. The carrier is handy for transferring

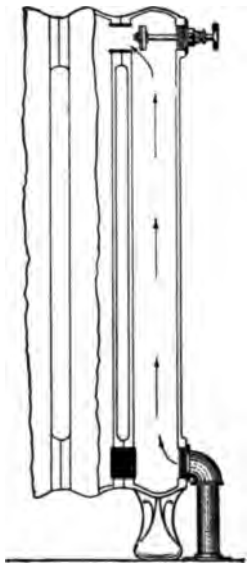


Light Parcel Carrier

small bundles, etc., from one end of the store to the other, or to the shipping room.—Contributed by Maurice Baudier, New Orleans, La.

A New Radiator Valve

The inventor of a novel hot-water radiator valve gives the following description of his device in Work, London: In the sketch is shown the end loop of a radiator with the valve fitted at the top. The bottom opening between the first and second sections of the radiator is stopped by a solid plug instead of by the usual tubular nipple. This causes the first section to act as a rising pipe from the bottom connection to the valve at the top. The valve, almost wholly consisting of a screwstem and collar, has the top of the radiator loop for its body. Its seating screws down on the nipple which joins the first and second sections of the radiator at the top. This puts the valve within easy reach without stooping.



Locating Short Circuits

All modern installations of low voltage electric-lighting systems have a fuse block as shown in Fig. 1. These fuse blocks are installed in wood or iron boxes usually placed in a partition. When short circuits occur, the melting of the fuse protects the wire, cord and sockets composing the circuits against over-heating. Short circuits can only be located by disconnecting one side of the circuit at each outlet. To avoid blowing fuses, and also to determine if the short has been cleared, screw a lamp into one side of a cut-out and a good fuse plug into the other side as in Fig. 1.

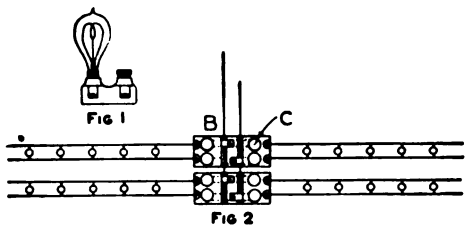


FIG 1

FIG 2

Fuse Block Connections

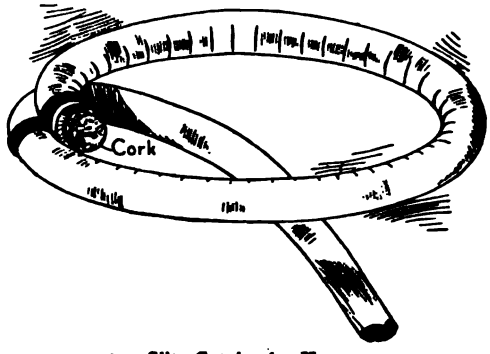
Suppose a short circuit exists at some point in the circuit shown by the upper right-hand lines in Fig. 2. If a lamp is screwed into the socket C and a good fuse plug into the adjacent receptacle, the lamp, being in series with the short, will burn with its full brilliancy and will go out when the short is disturbed. If the short is cleared and one lamp is turned on, the lamp at C will burn at about half its normal candlepower, as the two are in series. If additional lamps are turned on in the circuit mentioned, the lamp at C will burn brighter, while the lamps connected to the circuit will grow dimmer. The current received by the lamps connected to the circuit is only the amount that can flow through the lamp at C, which is one half ampere through a 110-volt, 16-cp. lamp. This current would be divided between all the lamps turned on in this circuit. It is assumed that the lamps are the same candlepower and voltage.

In case the old style link fuse block is used, connect a short piece of cord to a socket and place this in the block instead of the blown-out fuse, i. e., connect the two free ends of the cord to the screws to which the fuse was connected, and if the other fuse was also blown, replace it, then locate the short as in the preceding method.—Contributed by John S. Swanson, Duluth, Minn.

¶Hard putty for carriage work is made of equal parts dry and keg lead, mixed with equal parts of rubbing varnish and gold size japan, which must be mixed perfectly by kneading or pounding with the pigment material. A still harder putty can be made by omitting the keg lead. Keep it in water when not in use.

Home-Made Bath Spray

A very good and inexpensive bath spray can be made of 6 or 7 ft. of ⅜-in. rubber tubing by tightly plugging one end with a small cork, and cutting small V-shaped holes about ½ in. apart along the tubing with the points of a pair of scissors. Begin at the plugged end and cut the holes for a length of about 36 in. Form a ring of this part, so that the plugged end will come about ½ in. from the last hole, and tie the hose together at this point with tape or string. Do not tie hard enough to compress the tubing, nor wind all of the tape or string outside of both tubes, but make a turn around one tube then back between



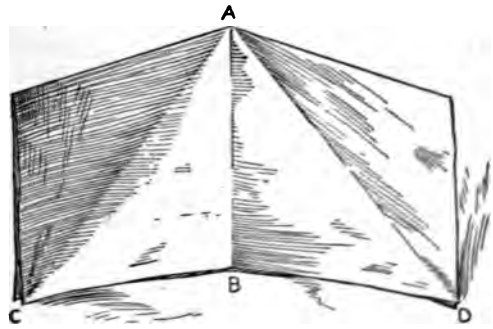
Slits Cut in the Hose

the tubes and around the other tube. This will prevent the tubes from sliding through the string.

Cutting the holes V-shaped will produce a fan-shaped jet of water. The spray coil can be put over the limbs, around the neck or held over the head.—Contributed by C. G. Carlstrum, Rochester, N. Y.

Squaring and Mitering without a Square

Anyone caught without a square or miter, when doing a common carpenter job, can make one quickly from a piece of paper—an old newspaper will do. Fold the paper in the middle, thus making a straight side, A, then fold again in the middle at right angles to the double straight side, AB. If the edges are carefully kept straight, this will make a perfect square. By folding the square in the shape of a triangle,

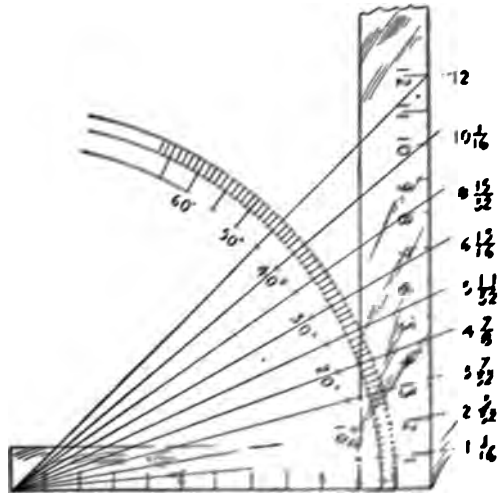


Folds in the Paper

ABC, you will have a perfect miter with a 45-deg. angle.—Contributed by L. H. Atwell, Atlanta, Ga.

Carpenter's Square Used as a Protractor

While the 45 and 90-deg. angles are easily found by the carpenter, other angles between these two are not so easily obtained. If the short end of a common square is taken for a base, the markings on the long blade, as illustrated, indicate the different angles



Angles on a Square

by intervals of 5 deg. up to 45 deg. Contributed by Urban A. Towle, Portland, Me.

Never use a file without a handle.

An Emergency Babbitt and Nails Pinion

A mill in an isolated section of the country was obliged to shut down because a small gear about 3 in. in diameter had been completely ruined.

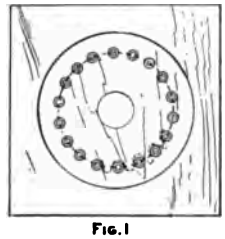


Fig. 1

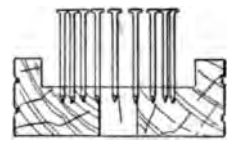


Fig. 2

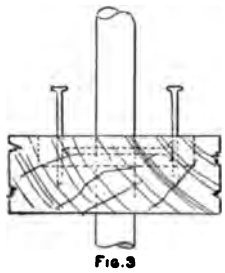


Fig. 3

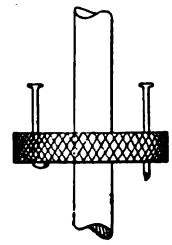


Fig. 4

Stages of Making the Gear

There was no foundry or machine shop accessible, and the plant could not afford to be idle for the 15 or 20 days required to secure a new gear from the factory. The engineer, therefore, made a temporary gear that gave good service for three months, or until the mill was shut down for general repairs.

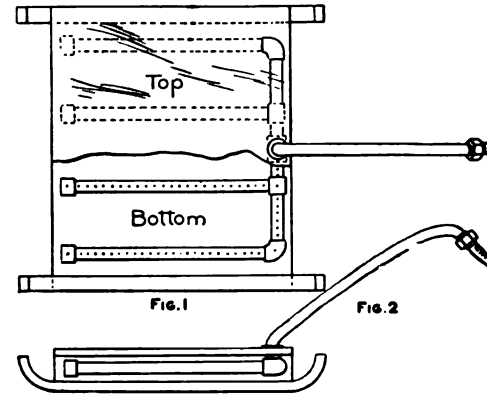
The manner of making the temporary gear is illustrated in the accompanying sketch. A ¾-in. hole, the size of the shaft, was bored in the center of a block of cypress plank, 2 in. thick and 6 in. square, and a depression made ¾ in. deep and 4 in. in diameter, as shown in Fig. 1. The shaft hole was plugged and centered, a circle scribed ⅛ in. smaller all around than the ends of the gear teeth, and the distance from center to center of the gear teeth spaced off on this circle. A 10-penny common wire nail was driven about ½ in. into the wood in each of the marks, care being taken to keep them vertical and at right angles with the face of the block, Fig. 2. This size nail fitted the spaces between the teeth of the old gear neatly.

A hole was then drilled through the shaft ⅜ in. from where the edge of the old gear was located, a nail driven through it for a key, and the shaft put through the hole in the block and adjusted, so that the bottom of the old gear space came just level with the top of the hole or face of the block, as shown in Fig. 3.

The shaft was then gripped vertically in a vise so the block, with the 4-in. circular depression up, was level and melted babbitt poured in, filling the space around the shaft and nails. When the metal had cooled, the wood was removed and the nail points turned over or clinched, as shown in Fig. 4. It took only a little over two hours to make this gear.—Contributed by J. W. Brelsford, Houston, Tex.

Removing Ice from Sidewalks with Steam

A bank occupying large quarters with considerable sidewalk surface provided the janitor with an ingenious device for removing ice and packed snow with steam. The device consists of a box similar in appearance to a carpet sweeper, except that it is mounted on runners instead of wheels.



Detail of Coil

The box contains a coil of pipe in the underside of which a number of small holes are drilled. Steam is fed to the coil through the handle from the

steam heating plant of the building, and jets of steam are directed through these holes against the ice, which crumbles so speedily that a man with a shovel has all he can do to keep up with the melter.—Contributed by J. J. O'Brien, Buffalo, N. Y.

Sliding Stall Partition

The sliding partition shown in the accompanying illustration provides a safe way to approach the head of a kicking horse to feed it or put on the harness. It does away with the necessity of entering the stall from behind and the risk of being kicked. The partition reaches as far as the manger, and the entire framework and boards are carried on two rollers attached to a joist above. Small metal clips are fastened to the floor on each side of the partition to keep the bottom in place and guide it in sliding back.—Contributed by C. C. Brabant, Alpena Mich.



Partition Separates at Manger and Slides Back

How to Harden and Temper Small Springs

The following methods will be found very good for hardening and tempering small springs for gun and novelty work and will apply equally well on coil springs or those that are flat or irregular. The first thing to be considered is the fire, which must be well burned down if the forge is used. A gas or gasoline fire is the best for work of this kind. A blow torch will answer well for the smaller springs. The first method is to heat the spring evenly, until it shows a light red, after which plunge it into a bath of lard oil, or tallow. This hardens the spring and by holding it over the fire, dripping from the bath, the oil takes fire and burns off, after which it is plunged in a bath of clear water. This will produce a good temper. A very good plan is to hang the small springs on a copper wire when dipping, as tongs will prevent the metal from hardening properly.

The second method is to heat the spring to a light red (in the shade) and plunge into warm water. This will give very good results and is quick and cheap. The third method is to heat the spring to a cherry red and plunge in a bath of brine. This will make the metal as hard as glass. Polish the spring and lay it on a flat piece of sheet iron. Then place it over the fire and as soon as the color draws to a light grey, remove it from the fire and let all cool together. If the spring is too hard to be cut with a sharp file, it is too hard for use and should be tempered over again. The fourth method is to heat the spring to a bright red and plunge into a bath of raw linseed oil and leave it until cool. The spring will have the proper temper without drawing.—Contributed by J. N. Bagley, Webber, Kans.

¶A lathe chip box is not the place to throw cotton waste.

Mouse-Proof Flour Bin

The ordinary flour bin in a kitchen cabinet is not always protected against mice or water. In making such bins,

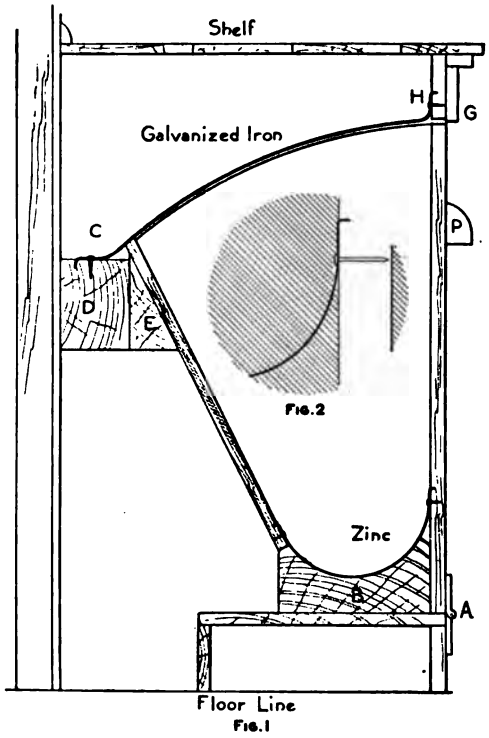


FIG. 1

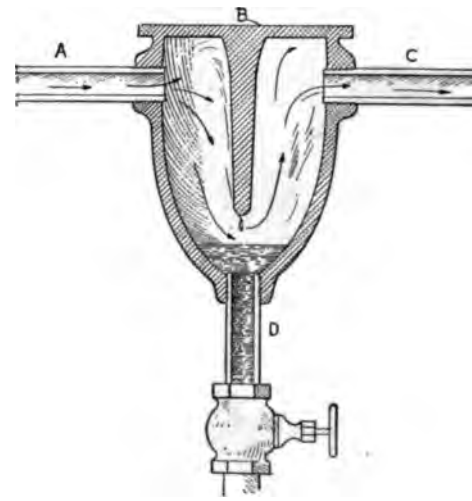
Bin with Metal Cover

it is best to provide a covering, as shown in Fig. 1. The bin with its front panel made of yellow or sugar pine, is set on a platform 4 in. high. The center of the hinge A should be taken as a center point, and the arc CH scribed with the trammel for the sides of the bin. Make the bottom end of each side a half circle and fit a sheet of zinc on the edges, turning the zinc over ⅛ in. and inserting it in a knife cut, as shown in Fig. 2. The zinc is well nailed to the circular bottoms of the end boards. A block is cut to fit under each side and then nailed securely in place. Put a block across behind the top, as shown at D, and a beveled buffer E, on the bin. Cut a sheet of galvanized iron to fit the top and bend the ends to fit the face board H and block D.—Contributed by E. E. Harriman.

Steam Separators for Ships

There are few steamers in which the steam is so "dry" that occasional trouble is not experienced, either from condensation of the water in the cylinders, or too high a water level in the boiler, or both. This decreases the efficiency of the engine and creates danger of an overflow of water which may more than fill the clearance space in the ends of the cylinders and cause a break of the cylinder head.

The average steam plant, having ample boiler capacity, the best feed water obtainable and all precautions against "priming," provides a steam separator in the pipes. This device has not come into use in steamships where the conditions are never as favorable as in the average steam plant. I have more than once, while overhauling a piston, discovered fractures which seemed to be caused by the shock of the piston striking the water in the end of the cylinder. The separator, unless it drains back to the boiler, should be fitted with a steam trap, as the separator arrests the water, but does not dispose of it. The accompanying sketch shows a sectional view of a separator, which, al-

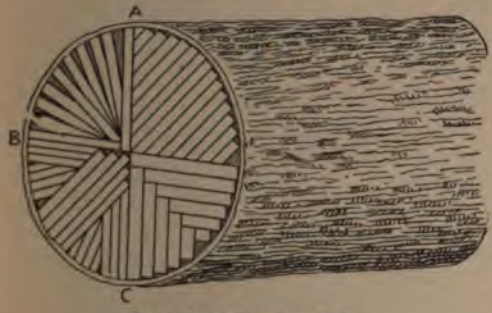


Steam Trap with Baffle Plate

though very simple, has proven entirely satisfactory.—Contributed by Joseph E. Guillonne, New York City.

One Method of Quarter-Sawing

If the saw is large enough to reach through the log, saw first line down the center of the log, leaving enough timber at the back end to gig back outside half, dropping it on log deck. Turn the remaining half flat face to headblocks and saw second line down the center, leaving enough timber at the end to gig back outside quarter, dropping same on log deck and leaving on carriage the last quarter, which is ready to be cut up into lumber by one of the four methods, says the Wood-Worker. The method shown between A and B gives the best results, if full-faced grain is wanted, but the waste is greater. The method shown between B and C is next best. If the log is too large for the saw, run the first line down the center of log,

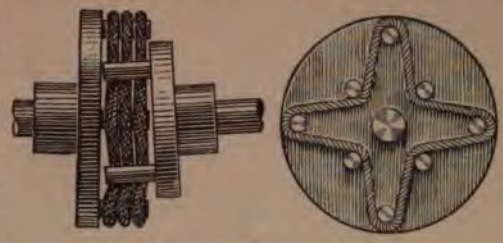


Method of Quarter-Sawing

gig back and quarter-cant the log from you; then saw second line down center, taking out a quarter of the log. Get the second quarter in the same manner. The log must be securely dogged.

A Flexible Coupling

I was in need of a coupling to drive a shaft at an angle, so I tried the following method which proved quite successful. A casting 18 in. in diameter, having four lugs 3 in. long and 2 in. in diameter, was keyed on the end of the engine shaft. A smaller casting, 13 in. in diameter and fitted with the same number and size lugs was keyed on the end of the shaft to be driven. The connection between these two castings to transmit the power consisted of three strands of 1-in. manila rope. After determining the length needed, the



Driving Shafts at an Angle

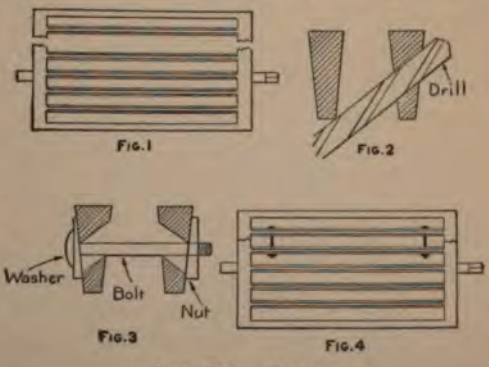
rope was cut and spliced, and put in around the lugs as shown in the illustration. This coupling will transmit power on shafts set at a 30-deg. angle. —Contributed by Robert E. Quinn, Brooklyn, N. Y.

Repairing a Stove Grate

When a stove grate breaks as shown in Fig. 1, a good repair can be made with a couple of bolts.

Drill two holes through the ribs at an angle as in Fig. 2. This allows the use of a short bolt instead of drilling through all the ribs and using a bolt longer than the width of the grate. Bevel the washers, as shown in Fig. 3, so as to secure an even pressure on the outside of the ribs. The finished repair is shown in Fig. 4.

This repair, if properly made, will save much inconvenience and give the

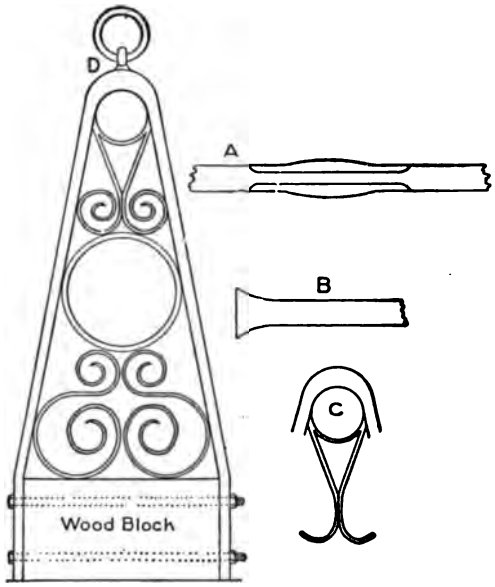


Grate Bolted Together

stove man plenty of time to get you a new grate.—Contributed by James M. Kane, Doylestown, Pa.

An Ornamental Tie Post

A tie post like the one shown in the sketch will be found more attractive than a cast-iron post, says the American Blacksmith. There is something



Tie Post Design

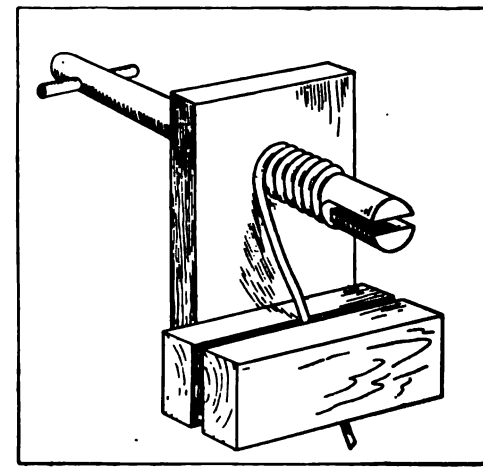
about iron and steel, with its clean, sharp corners, in conjunction with the fact that the article had been made with the hammer and tongs, that gives to a hand-forged post a certain distinction that a casting never possesses. Cast iron will never take the place of wrought iron or steel where these can be used and a first-class article is required.

The post here shown was made of ½ by 2½-in. soft steel in the following manner. For the frame, a piece 8½ ft. long is required. Center punch it in the middle and heat it, draw out on each side of the mark A in the sketch, and put in swedge, hollowing the inside slightly. Heat and bend to the radius which you desire for the top of the post. Flange the part that was spread into a rounding shape, driving it in from the outside with the hammer and making the top appear heavier, as shown. The bottom is then fitted to go over a piece of timber or a short post, or the ends can be turned in so as to be embedded in concrete. Forge a bolt with a ball on it, drill a hole through the center and weld it in the ring to be riveted in the top of the post. The scrolls and ring are made from ¼ by 1¼-in. stock, flattened at the ends similar to B in the sketch. Cut this off straight across the end and bend. When bending, guard against kinks and make the curves as graceful as possible. The top scroll is made like C. Set this up in the top so that it resembles a ring. The remainder is so easily made that no explanation is required. The whole is then riveted together with countersunk rivets and painted black.

A Simple Spring Winder

The man without a lathe is just as apt to want to wind a spring as the man with one, but often experiences considerable difficulty in accomplishing the operation. A remarkably efficient method, which will turn out springs in competition with the lathe, is illustrated in the accompanying sketch.

Procure a rod, of the diameter de-



Coiling a Spring

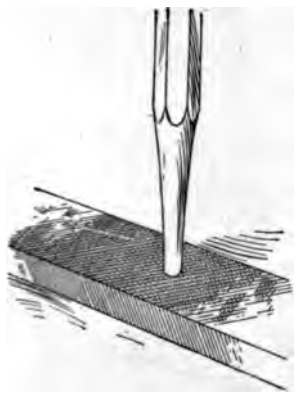
sired for the spring or a trifle smaller, cut a slot as wide as the diameter of the spring wire in one end and drill a

hole in the other. Insert in this hole a peg that will keep the rod from turning in a carpenter's brace. In a heavy piece of sheet-metal strap or wood, drill a hole in which the rod fits snugly. Secure this in a vise. Insert the rod in the brace, allowing the slotted end to project through the hole in the strap. Stick the spring wire through the hole in the other end of the rod and make a couple of turns around the rod to hold the wire securely. Lead the wire down between the two pieces of wood which have been clamped in the vise, both on the same side of the metal strap.

Begin turning the brace and pulling back so that the wire, as it winds on, will be under pressure between the metal strap and the spring already wound. The pressure of the two wood pieces on the wire should be as great as possible so that the tension will produce a tightly wrapped spring.—Contributed by C. W. Nieman, New York City.

A Non-Slipping Nail Set

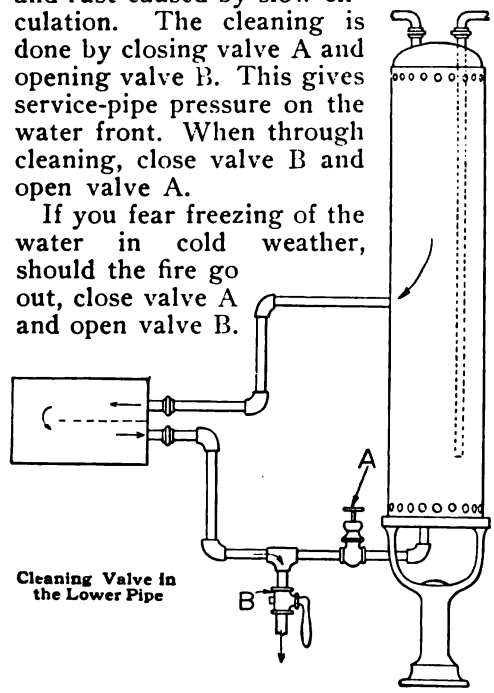
Form the punch to the desired size and shape, and allow it to anneal by cooling slowly. After it is annealed, hold the punch end vertically on an old flat file and strike a sharp blow with a hammer. Turn the punch one-quarter turn and strike another blow. This will produce a nicely checkered end which will have the exact impression of the file teeth. The punch is now ready for filing to shape and tempering. A good demonstration of the whole operation may be made by taking an impression on the file with beeswax.—Contributed by W. A. James, Rockford, Ill.



Pipe Connections for Cleaning Hot Water Fronts

The system here illustrated provides a way to clean out water fronts which have become clogged with sediment and rust caused by slow circulation. The cleaning is done by closing valve A and opening valve B. This gives service-pipe pressure on the water front. When through cleaning, close valve B and open valve A.

If you fear freezing of the water in cold weather, should the fire go out, close valve A and open valve B.



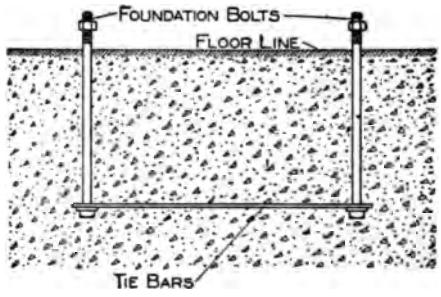
With this precaution you will know that it is safe to make a new fire.—Contributed by C. E. Weisgarver, Altoona, Pa.

Cleaning Gauge Glasses

Close the upper and lower valves and open the pet cock to empty the gauge glass of water. Hold a cup or other suitable receptacle containing muriatic acid of ordinary strength under the pet cock. Open the lower valve sufficiently to cause the acid to be drawn to the top of the glass. The alternate opening of the lower and upper valve causes the acid to be drawn up and repelled. Two or three applications will clean a dirty glass thoroughly.—Contributed by W. M. Gardiner, Brooklyn Hills, Long Island.

Small Engine Foundations

Many people have occasion to set up small or medium sized gas engines and dynamos and wish a solid foundation

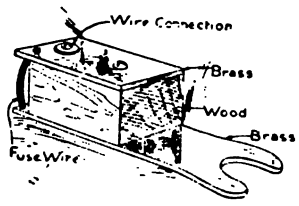


Bolts in the Cement

and the means to hold the engine or dynamo securely to it. Concrete answers all the requirements for the foundation. The fastening shown in the accompanying sketch is one of the best, and can be made from the stock found in any blacksmith shop. The tie straps should be cut to suit the holes in the base of the engine and are placed in the concrete in the form of a square or a rectangle with the bolts through the ends as shown. This fastening is cheap and quickly made and is absolutely reliable.—Contributed by Donald Hampson, Middletown, N. Y.

Battery Terminal Fuse Blocks

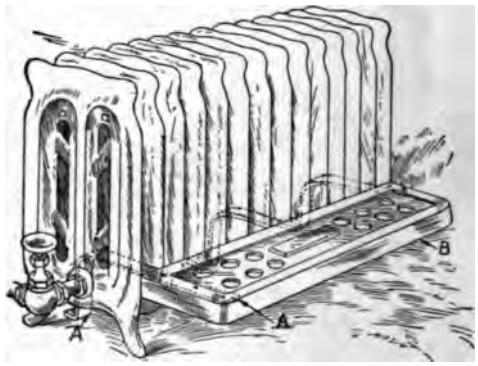
A storage battery for ignition and electric lights is usually supplied on automobiles. If a short circuit occurs in the wiring, lamps or ignition apparatus, the battery will be ruined in short order. The illustration shows a fuse block that will effectively protect the battery in case of a short circuit.



Each fuse block is made by cutting two pieces of heavy brass for the sides of the fuse holder. Mount the brass pieces on a small hardwood block with round-headed wood screws, as shown, taking care that the screws do not pass through the block and make a contact with the opposite plate. Procure a small piece of 6-ampere fuse wire and solder this to the two pieces of brass, as shown. Connect one of the wires from the battery to the fuse block by means of one of the wood screws and a small washer, and fasten the block to the battery terminal. The current from the battery passes through the fuse wire and should a short circuit occur, the wire will melt and break the circuit.—Contributed by John Sedelmaier, La Salle, Ill.

Foot Rest on a Radiator

A good foot rest for a radiator can be made of a rest taken from an old cook stove. It is attached to the radiator with pieces of ¾-in. iron bent



Foot Rest Attached

to fit through the bottom part of the sections. The illustration clearly shows how this is done.—Contributed by Percy Strudwick, Bad Axe, Mich.

Balancing Pulleys

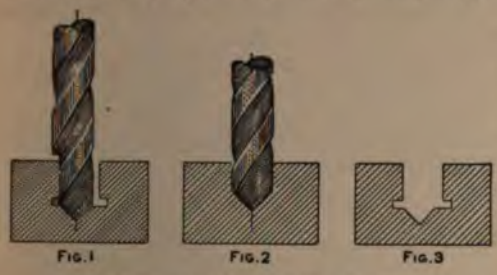
High-speed pulleys must be balanced. In the case of a solid web pulley this is easily accomplished by finishing it all over, but one having arms cannot be balanced in the same way. Such a pulley must be placed on an arbor, centered in a lathe and the side that turns down marked. Putty is then placed on the opposite side—or on two spots 120 deg. apart—

until the pulley balances well. Weigh the putty, cut off pieces of steel of equal weight and rivet them to the inside of the rim.

A pair of balancing ways are better than the lathe centers. These are made by fastening narrow strips of metal on the tops of two horses, placing them so that the arbor rests on each, and leveling the strips with a spirit level. This method produces little friction and a very close balance can be attained.

Drilling Holes Larger at the Bottom

A mechanic often has to drill a hole, which, when completed, should be larger at the bottom than at the top. This may be accomplished by grinding the center or point of the drill off to



Hole Drilled Larger at the Bottom

one side, as shown in Fig. 1. The drill can then strike a larger radius or diameter than that of a drill being used as in Fig. 2. In Fig. 3 one form of hole is shown which can be made by this method.—Contributed by Geo. W. Richardson, Chicago.

Filling Cracks in Walls before Painting

Instead of mixing plaster of paris in water to fill cracks in walls before painting, mix the dry plaster with the paint. Then the cracks will not show as they do if filled with the plaster of paris.—Contributed by F. L. King, Islip, L. I.

¶Automobile front wheels that "toe in" or "toe out" cause more wear on the tires than rough roads.

A Boring-Bar Holder

A good boring-bar holder for the lathe can be made in the following manner: Shape up a piece of steel so that it will fit in the slot of the tool post freely, allowing about 1/64-in. side clearance, and let it be about 1 in. longer than the shoe or slipper. Then set it in the tool post, so that it will be at right angles with the faceplate both ways, and tighten the screw so as to hold it firmly.



If you wish to have a boring bar made from ½-in. drill rod, place a ½-in. drill in the lathe chuck and drill through the holder, so as to leave about $\frac{1}{32}$ or $\frac{1}{16}$ in. on one side as shown in the sketch, then take it out and slot it on the milling machine or shaper through the opposite side, and case-harden. Holders for different sizes can be made in the same manner and are much stiffer and easier to set than other makes.—Contributed by Charles Homewood, Waterloo, Iowa.

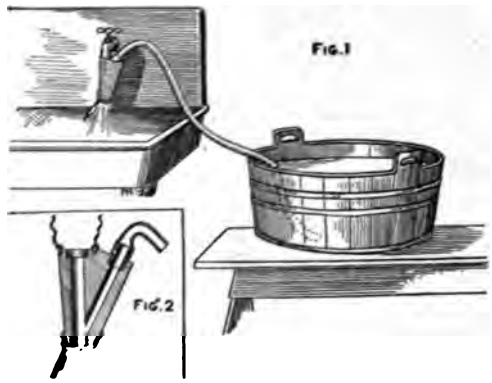


Courtesy American Vehicle

End Panel Design for a Heavy Border

Ejector for Emptying a Tub

Considerable difficulty is often experienced in emptying and refilling the common form of movable washtubs. Stationary washtubs are usually pro-



Ejecting Water from a Tub

vided with suitable plumbing connections whereby the water may be easily and quickly drained off, but with the ordinary form of movable wooden washtubs, the entire tub of water must be either lifted and carried to the sink or other drain to be emptied, or the water bailed out of the tub and carried to the sink or drain by the pailful, says Scientific American.

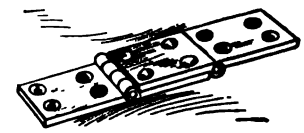
If the house be provided with running water at the sink, a very simple contrivance may be devised for utilizing the city water pressure for the emptying of the tub. By providing a simple form of ejector at the faucet and connecting one inlet of the ejector to a short piece of hose leading to the tub, the water may be easily drawn out of the tub into the sink, even though the latter be at a higher elevation.

Such a simple contrivance is shown in the accompanying sketch, in which the ejector is formed of a block of wood adapted to be detachably secured to the faucet. The block of wood has two passages intersecting at an angle, both having a common outlet as shown in Fig. 2. One of these passages receives a stream of water under pressure from the faucet, and the escape of this water from the lower end of the ejector creates enough suction to draw the water out of the tub, through the hose, and deliver it in the sink.

The same device can be used for refilling the tub. To this end, it is merely necessary to close the lower outlet of the ejector with a plug, or in any other suitable manner. The sketch shows a short rubber plug connected to a strap tacked to one side of the block. By inserting the plug in the lower end of the passage, and securing the free end of the strap to the button on the opposite side of the block, as shown by the dotted lines, the water will be forced to flow from the faucet down one passage, up the other and through the hose into the washtub.

Home-Made Hinge for a Double-Swing Door

Procure four butt hinges and rivet them in pairs, back to back, as shown in the sketch. The rivets should be ever with the surface of the hinge, so the wings will lie flat when closed. Cut the mortise



or slot in the door deep enough to take in the extra thickness of the wings. Put the hinge on so it will fold up and lie in the mortise cut for it. Attach a spring to each side of the door to hold it in place.—Contributed by George Schuehman, Chicago.

A Substitute for Bristles on Waxed Ends

When it is necessary to sew up a small break in a shoe and no shoemaker's bristles are at hand, take a fine wire, about 16 in. long, from a wire screen, double it and twist both ends together for inserting through the awl hole. The wire can be bent to pass through a hole made with a curved awl.

Repairing a Bit-Brace Handle

Many bit braces may be found with the top handle broken off and repaired in a very unsatisfactory manner. Such a break can be mended substantially by removing the handle and cutting a thread on the end for a nut. Select a 1¼-in. malleable pipe cap and plug, light and round. Bore out the cap endways and slip it over the threaded end of the brace. Next screw the nut on this threaded end, and the cap on the plug, and the job is complete.—Contributed by Frank Aagaard, Canyon Creek, Montana.

Grease Cup for Vehicle Wheels

By applying grease cups to the hubs of light delivery wagon wheels, as shown in the illustration, the unpleasant task of taking a wheel from the axle and lubricating it while mud covered and greasy is obviated. The grease cup is attached by simply boring a hole through the hub and skein and turning the screw end into the wood. Keep the cup filled with lard oil, and you will never have to remove the wheel again.—Contributed by Will Parker, Olaf, Iowa.

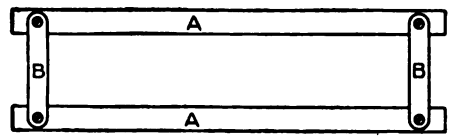


Replacing Piston Rings

Having had considerable trouble in replacing large piston rings on automobile engines, I tried many devices without success, but finally hit upon the following expedient. I encircled each piston ring with a piece of soft copper wire, twisting it tightly, after I had compressed the ring to its proper position. The cylinders then slid over the pistons readily, pushing the wires into the crankcase, from which they could be easily removed.—Contributed by Bryan W. Brown, El Paso, Texas.

A Parallel Rule

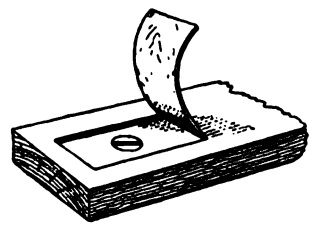
A parallel rule is a handy tool to have in the drafting room or machine shop. One can be made in a few minutes by taking two perfectly straight strips, A, of any desired length and connecting them at the ends with two brass straps, B, as shown in the accompanying sketch. The straps can be fastened to the strips with small screws or rivets. Be careful to have the distance between the screw holes in the straps exactly alike and also to have the screws fastened in the center of the strips, else the tool will not do accurate work. By moving the top strip endways, lines parallel to the base and at any height within the scope of the tool, can be drawn.—Contributed by C. Purdy, Ghent, O.



Home-Made Parallel Rule

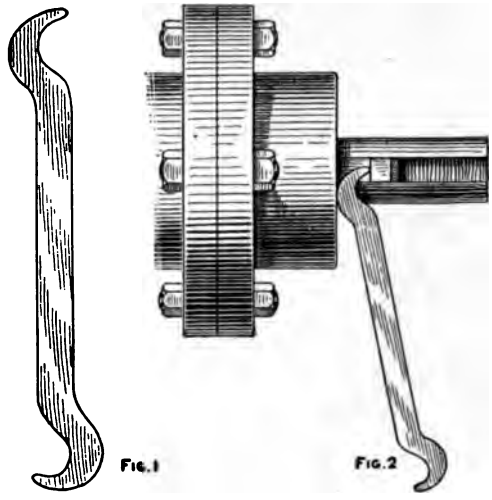
Covering Screw Heads in Cabinet Work

Cut a shaving with a sharp chisel over the place where the screw is to be turned in, using care not to sever the shaving from the main part of the wood. Turn the shaving up, make the hole for the screw with a small drill, and countersink the hole to receive the screw head. Turn the screw in place, being careful to leave the head flush with the bottom of the groove. Apply glue to the main portion of the wood and also to the under surface of the shaving. Lay the shaving back into its original position and place it under pressure until thoroughly dry. When dry, sandpaper well and finish.



A Key Puller

In the illustration, Fig. 1 shows the shape of the puller, which has a thickness equal to the height of the pro-

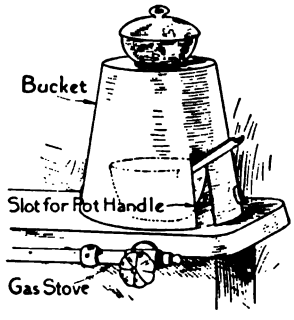


Pulling a Key

jection on the key. The puller is made of tool steel, the size of which depends on the size of the keys. The method of pulling a key is shown in Fig. 2.—Contributed by John Ramsay, Pearl River, N. Y.

Utilizing Waste Heat from a Gas Stove

An efficient way to boil water quickly on a gas stove is to cover the pan with an old iron bucket or large tin can which has had a suitable slot cut in its side to permit the handle of the pot to project through as shown in the sketch. The upper part of the bucket can be used as a hot shelf for dishes.—Contributed by A. P. Connor, Washington, D. C.

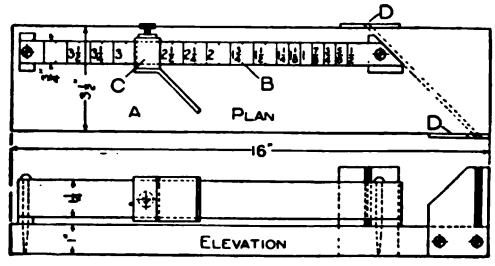


A Packing Cutter

Having seen several different kinds of gauges for cutting coil packing described in the past few months, some of which were quite complicated and costly, I will describe one I made some time ago, which is both simple and accurate, says a correspondent of the Practical Engineer.

The base A is made of pine, 1 in. thick, 3½ in. wide by 16 in. long, and shellacked. The gauge bar B is about 14 in. long and made of a piece of wood fiber, but any hard wood will do. One end is cut at an angle of 45 degrees. The sliding block C is part of an old brush holder of a motor with a piece of $\frac{1}{16}$-in. iron bent to an angle of 45 degrees and riveted to it. The bar B is made an easy sliding fit for the block which is clamped to it by the thumbscrew on the back side.

The knife guides D D are made of ⅛ by 2-in. iron and are about 3 in. high, with the slots cut on an angle of 45 degrees and set so that the knife will



Gauge for Cutting Coil Packing

just clear the end of the bar. A common bread knife with a scalloped edge is used for cutting the packing.

The top of the bar B is graduated so that the distance from the knife to the stop, when set at a certain number, gives the length of the circumference of a circle of that diameter, plus $\frac{3}{16}$-in. for expansion.

To lay off the graduations on the bar, get a table of circumferences of circles, which can be found in nearly every catalogue and handbook, and to the length of the circumference add $\frac{3}{16}$ in. for expansion up to 2 in. diameter, ¼ in. from 2 to 3 in. diameter and about ⅜ in. for sizes above 3 in. After

measuring off their distances on the bar, stamp them with small figures or other suitable means. The distance from the knife to the 2-in. mark by this method is 6½ in., the 2½-in. mark is 8⅜ in., etc.

To operate, first get the diameter of the rod, which is, say 2 in., add the size of the packing, which in this case we will take as ½ in., amounting to 2½ in. This is the diameter of a circle passing through the center of the packing ring. Set the gauge at 2½ on the bar, cut the first end on an angle in the slot, then butt the packing up against the stop and cut it off. This will be the proper length for a good fit with just the right amount of room left for expansion.

The reason that the size of the packing is added to the diameter of the rod is so that any size packing can be measured for any size rod and at the same time give the proper room for expansion.

Cutting Firebrick

Firebrick is extremely brittle, a great deal more so than ordinary brick. When such bricks have to be shaped or cut to size, considerable loss by breakage usually occurs. They can be broken safely, however, if deep nicks on both sides and on the edges are first made. A still better way is to get an old handsaw and saw them to size. This will make nice smooth faces, but the set on the saw will be worn off quickly, and must be renewed. A buck saw can be used for the purpose.

Driving an Automobile with a Broken Hub

The hub casting in the rear wheel of an automobile had broken, but, still, the machine was taken home by its own power, as illustrated in the sketch. A pipe wrench was set tight on the axle and strapped to one of the spokes. This transmitted the power from the axle to the wheel. The wheel wobbled considerably, but could not get off or loosen the grip of the wrench. The sketch clearly conveys the idea, and any one placed in a similar predica-

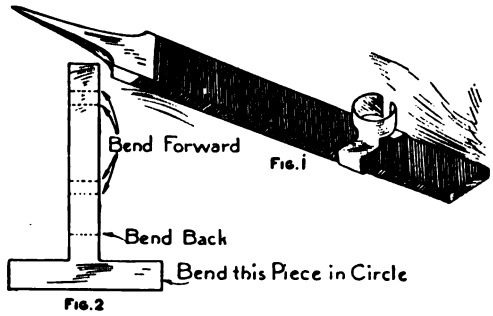


Wrench Tied to a Spoke

ment, will be able to get home by utilizing this plan.—Contributed by A. G. Smith, New York.

File Used for a Candle Holder

"One of the most useful articles in my tool bag is a candle holder made of an old file," says a telephone man. "I made the part for holding the base



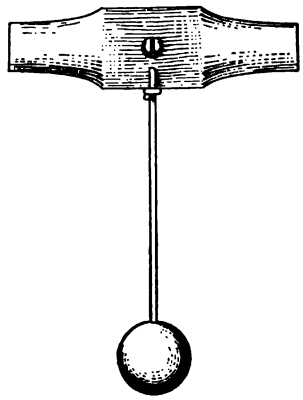
Tin Clip on a File

from a strip of heavy tin which I slipped over the end of the old file, as shown in Fig. 1. The shape of the tin and where it was bent is shown in Fig. 2."

¶Never guess the number of threads to be cut, count them.

Door Button Latch

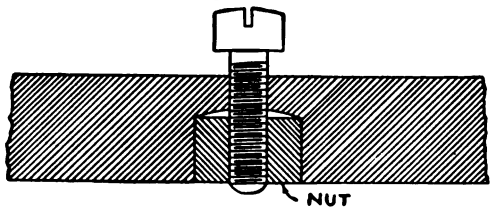
Anyone who has had to take care of horses knows how easily they manage to get out of the barn by pushing and working at a door until the button becomes loose and the door opens. After our horse had done this several times, I hit upon a scheme to keep the button in place.



I procured a piece of wire about 7 in. long and a lead ball about 1 in. in diameter. One end of the wire I nicked with a cold chisel and drove it into the lead ball, the other end was fastened to the button as shown in the sketch. When the button was fastened on loosely, I had the satisfaction of seeing it hang perfectly horizontal, and it hangs that way no matter how hard a horse pushes on the door or how carelessly I turn the button.—Contributed by J. C. Inman, Eden, Canada.

Repairing a Bit-Brace Handle

It sometimes happens that a threaded hole gets so worn that the screw will not fit, or that it is drilled too large for tapping. Such defects can be remedied by the simple expedient of counter-drilling the hole about half-



Nut Soldered in Plate

way through with a large drill, and fitting a round nut tightly in the hole. The nut should be sweated with soft solder to prevent it from turning when tightening up the screws.

Cutting Teeth in a Rack by Hand

A workman, having a rack to cut on the edge of a piece of steel about 12 in. long, had no machinery at hand other than a lathe. The rack required 12 teeth to the inch and as they did not need to be accurate, he intended to file them in. But he did not like to mark out the 144 spaces. Therefore he put the piece in the lathe, geared the machine to cut 12 threads to the inch, and nicked one edge of the piece for its whole length. The piece was set a little off the center, so that only one side was marked.

Non-Skidding Chain for Bicycle Wheels

The accompanying sketch shows how I applied an old window weight



Chain Wrapped Around Tire

chain to a bicycle tire to keep the wheel from skidding. The chain was wound around the tire between each alternate pair of spokes. The ends of the chain can be joined together after the entire rim and tire are wound as described.—Contributed by Fred Friedl, Chicago.

The Proper Way to Shift a Lathe Belt

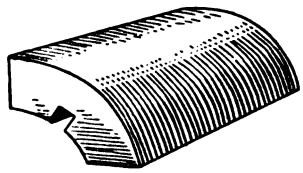
When handling a belt, first make sure that no wires, hooks or any fastenings are loose. Always shove the belt off from the cone first, so as to give a slack to the belt when you wish to throw it up onto the next step or to pull it down to a smaller one on the upper cone. Then push the belt on the corresponding step of the lathe cone.

If the belt is to be shifted to give

the lathe the highest speed, these instructions do not apply. It is then necessary to "sling" the belt up on the countershaft cone with considerable force, or use a belt stick. Never put the hand inside of the belt on the down running side of the pulley, but always on the edge. If the inside of the belt is touched at all, let it be on the upward running side.

Keying a Wood Pulley to a Shaft

Take a piece of iron equal in width to about one-third the circumference of the shaft, as long as the pulley is wide and thick in proportion. Make it slightly tapering, shape it to fit around the shaft, and cut a keyseat on the inside. If properly fitted into the wood pulley, it makes a substantial place for the key. —Contributed by H. M. Toepfer, Mt. Carroll, Ill.



An Easy Way to Reduce and Enlarge a Rectangle

The illustration, Fig. 1, shows how to reduce any rectangle accurately and quickly, the dimensions of the reduced rectangle being shown on the triangles. It will be necessary to mark out a scale on the triangles for this purpose, as scaled triangles cannot be procured.

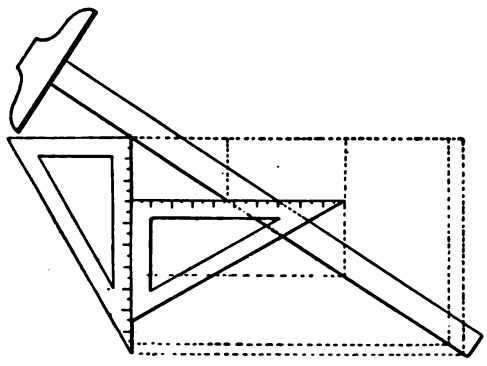


Fig. 1
Reducing a Rectangle

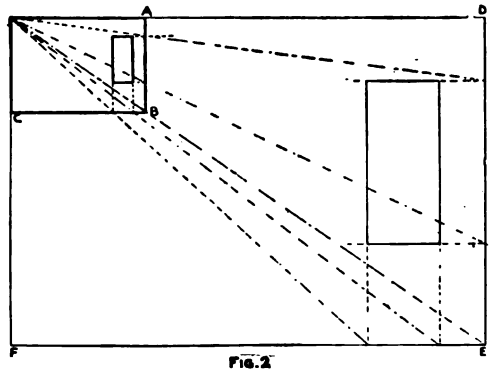


Fig. 2
Increasing a Rectangle

The method of enlarging one or more rectangles within a rectangle is shown in Fig. 2. The horizontal and vertical lines of the inner rectangle are continued to the outer angle A B C and running diagonally through the intersections, as shown at D E F. This will give the relative proportion of the rectangles.

Countersunk Riveting to Keep Rod from Turning

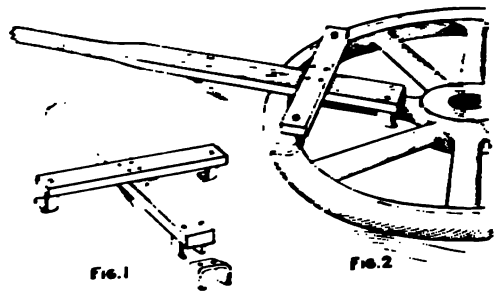
When a shaft or rod is riveted over in a countersunk hole, it is liable to work loose in time and turn around when the rod does not fit the hole closely. A rod may be kept from turning by cutting or filing one or more grooves in the bevel countersunk portion, and when riveting, by swelling the metal enough to fill the grooves. If desired, cut the grooves a short distance in the straight portion of the hole. This method is applicable to hot and cold riveting and with good sized grooves well filled, makes a job as secure against turning as if keyed in place.—Contributed by Donald A. Hampson, Middletown, N. Y.

¶Use a soft hammer for driving mandrels.

¶A "chattered" lathe cut cannot be made round by filing.

Valve or Brake-Wheel Wrench

Large valves, turned by a hand wheel, or large brake wheels are some-



Wrench on Wheel

times set so hard that it is difficult to turn them by hand and a bar or stick of wood must be used in the spokes of the wheel to give a leverage. The accompanying sketch shows a handy lever or wrench for this purpose. It is easily made and can be kept near at hand.—Contributed by W. A. Jaquythe, Richmond, Cal.

Cause of Explosion in Gas Generators

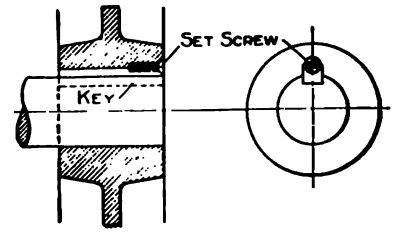
Acetylene gas generators, to give the service which may normally be expected of them, must constantly be maintained in good condition, says a correspondent of the Automobile. Private owners, as well as professional drivers, have a habit of permitting the generator to go unattended for several days after it has been used. Then, when the generator is opened, it is found to be more or less obstructed with the residue carbide that has become caked to the copper and is, accordingly, difficult to remove. The first thought of the average man is to take the nearest piece of metal, a file or a scraper, and set to work to remove the deposit. It is not generally realized that such a proceeding may lead to a serious accident.

The residuum left by the carbide after the generation of acetylene gas, attacks the copper of the receiver and chemically combines with it, forming a new substance known as acetylid of copper. This is a highly explosive product, which does not require much excitation to set it in action. Several instances are known where simply bending the copper tubing employed to conduct the acetylene gas from the generator to the lamps gave rise to a series of explosions of a startling nature. The whole interior of the tubing was coated with a light, hard film of copper acetylid and a report was heard every time the tube was bent.

In the case of a generator, striking the deposits with a tool or piece of metal of any kind is apt to explode this deposit, particularly as the residue frequently contains siliceous impurities that are hard and will either spark or generate considerable heat when struck. The violence of the explosion will naturally vary. The worst penalty of carelessness will probably be burnt hands or face. The best protection against this danger, naturally, is to clean the generator at a sufficiently short interval after using to avoid the hardening of the deposit on the copper surface: but when this has already taken place, the cleaning should either be done with a metal tool under water or a piece of wood.

A Key Lock

A handy method of preventing keys from working loose in pulleys on shafts is shown in the accompanying sketch. After the key has been driven home, drill a small hole and tap it for a set screw as shown. In case the pulley is to be hung at a point other than the



Key Holder

end of the shaft, it is best to drill and tap the hole before hanging the pulley.—Contributed by Geo. M. Harrer, Lockport, N. Y.

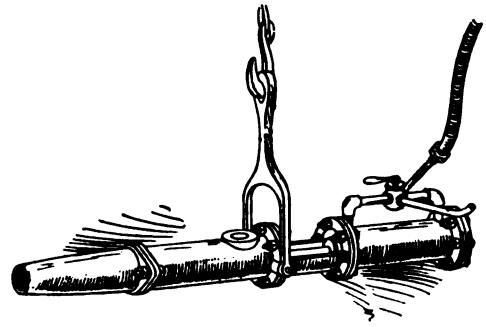
SHOP NOTES

A Mud Gun

The purpose of the mud gun, shown in the illustration, is to stop up the tap-hole through which the iron pours when casting. It consists of a steam cylinder, a mud cylinder and a nozzle. The piston rod of the steam cylinder is fitted on its other end with a mud plunger, working in the mud cylinder. Steam is supplied, through a hose, to a four-way valve, from which it passes to either end of the cylinder. The whole machine is hung from a small jib crane, mounted on one of the columns of the furnace.

When the desired quantity of metal has been tapped, a signal is given and the hot-air blast is turned off. The gun, the mud cylinder and nozzle of which have been packed tightly with mud (moist fireclay), is swung into position over the "runner" or stream of iron, and the nozzle tilted downward and dipped into the iron; a pair of hooks, mounted on a shaft over the runners, engage the projections of the flanges between the nozzle and the mud cylinder, which is used to jam the nozzle forcibly into the tap hole. The operator then quickly turns the valve, and the plunger rams a slug of mud, 3 ft. long and 6 in. in diameter, into the hole. Another turn of the valve brings the plunger back. An assistant quickly throws three or four balls of mud into the opening in the top of the mud cylinder, and the operator rams another charge into place. This process sometimes has to be repeated until 20 or 30 balls are rammed into the tap hole, and then the signal to turn on the blast is given. All this should be done as quickly as possible, for the heat is terrible and the length of time the blast is shut off is a matter of dollars and cents, as the furnace cools much faster than it heats up again.

The work requires men who are strong and active and resourceful in

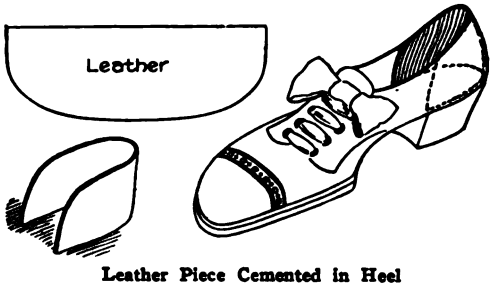


Steam and Mud Cylinders

an emergency.—Contributed by J. J. O'Brien, Buffalo, N. Y.

Preventing Holes Worn in Stockings by Oxfords

The wear on a stocking heel caused by the slipping up and down of the oxford or pump can be eliminated by cutting a piece of leather the shape of the heel and pasting it in the shoe, as shown in the illustration. The unfinished side of the leather must be next to the stocking. Pieces of leather the color of the shoes can be bought at any leather-findings store for a few cents.



Leather Piece Cemented in Heel

If preferred, a piece of velvet may be used instead of the leather.—Contributed by Kathrine D. Morse, Syracuse, New York.

Recording the Amount of Coal Used in Steam Boilers

In the plant where I am employed, we must keep a record of the quantity of coal we use in the steam boilers. The plan we adopted does not record the exact weight, but it comes very close to it. We weigh a certain box filled level with coal and then keep account of the number of boxes used in each firebox. The boxes are fixed permanently on the wheelbarrows used for transferring the coal from the bins to the boilers; and as each man wheeled in a load he was supposed to mark it down on a record sheet. But as he sometimes did not find the pencil, this would be neglected. Therefore we made a dial, using the figures from an old calendar, and a pointer that turned hard, and when a man delivered his box of coal, he had only to move the pointer on the dial to the next number. —Contributed by James E. Noble, Toronto, Canada.

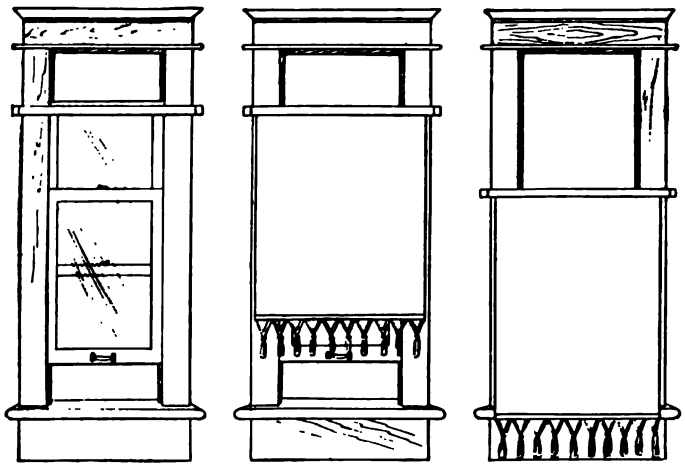


FIG. 1 FIG. 2 FIG. 3

Shade Roller Attached to Window Sash

Sash Shade Holder to Permit Ventilation

A shade fastened to the casing at the top of a window always hinders the free passage of air when the top sash is lowered. A simple arrangement to remedy this and provide free circulation of air is shown in the illustration.

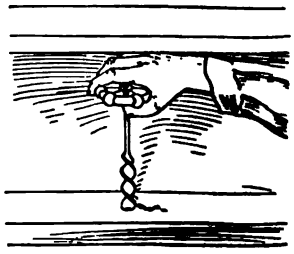
Fasten the short side of a 4 by 5-in. bracket on each side of the upper sash, 1 in. from the top. Attach a strip of wood, 1 in. wide and as long as the curtain is wide, to the projecting ends of the brackets with two T-bolts, put through the hole at the end of the metal, Fig. 1. Fasten the shade brackets with small screws to the ends of this strip of wood and insert the shade roller (Fig. 2). The shade and roller will then follow the upper sash in its upward and downward movements, Fig. 3. If the upper sash is lowered and the lower sash raised, perfect ventilation is obtained. —Contributed by Victor Labadie, Dallas, Texas.

¶The lathe is not the place to knock a file to remove the filings.

¶As a preventive against deterioration and protection from moisture, new leather fan belts should be rubbed frequently with castor oil.

Turning a Bit with a Valve Wheel

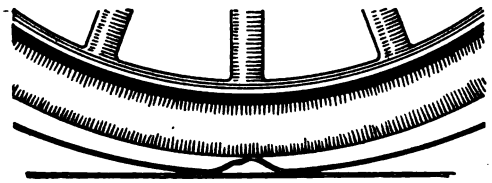
One of our men was putting up shelving, and some holes had to be bored in the crosspieces which were only 15 in. apart. This space did not allow the use of a brace and bit. But the man had evidently run up against such difficulties before, for he had in his kit a hand wheel from a ¾-in. valve with a tapered square hole which just fitted the tang of the bit. The wheel



gave him enough leverage to drive the necessary holes through 1-in. pine boards about as easily as with a brace. —Contributed by A. R. Cunning, Staten Island, N. Y.

Removing a Dent in an Automobile Fender

A bad dent in an aluminum fender was taken out in this way: The fender was removed from the irons and laid on a piece of cloth which was spread on the floor to protect the varnish against scratches. One of the rear wheels of the car, with the tire fully inflated, was then run back and forth on the concave side six or eight times. The car was next rolled off the fender, and the dent was found to have been removed without breaking the enamel. Small dents may be removed



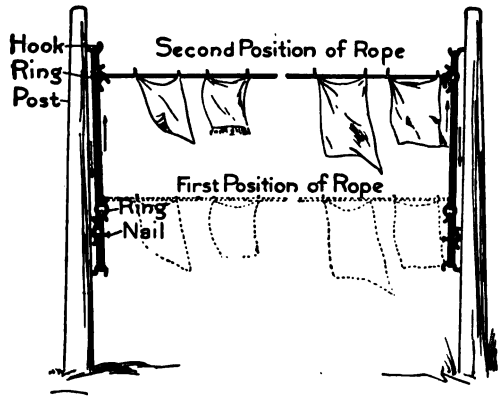
Dent Pressed Out by Tire

by laying a piece of wood on the surface to receive the blows and striking it with a hammer.—Contributed by Paul B. Wright, Twin Falls, Idaho.

Elevating a Clothesline

A clothesline which requires no prop, and yet can be raised out of the way after the clothes are hung on it, is shown in the accompanying sketch. It consists of three parts, two end ropes with rings and attachments as shown, the remaining part being the clothesline itself, preferably arranged with hooks at the ends so as to be easily removable. The supporting hooks are attached to walls or posts at either end of the yard and the loops hung on them.

The dotted lines show the line in a position convenient for hanging the clothes, and the other in an elevated position for drying. If necessary, another clothesline can be hooked into

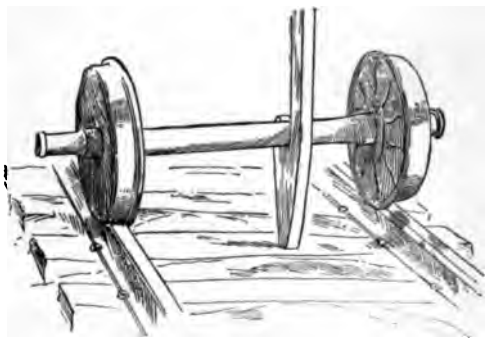


High and Low Position of Line

the extra rings.—Contributed by A. P. Connor, Washington, D. C.

Lever for Lifting Car Wheels on Axles

Sometimes it is necessary to turn a pair of car wheels in the shop, and this is a difficult matter without some means of raising the flange of one wheel over the rail. A lever cut from an old piece of scrap hard wood, as shown in the sketch, will make the job easy. The hook is placed under the axle and the wheel is raised by pushing against the lever. As the height of axles varies, the lever should be made

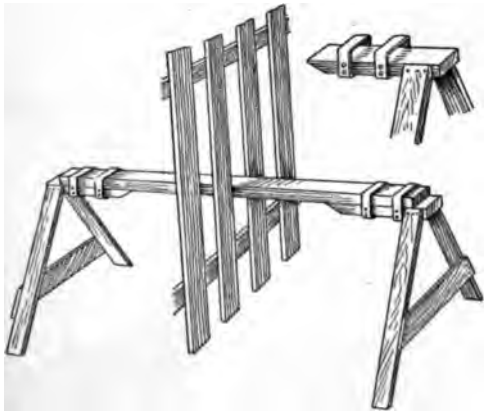


Lever for Raising Axle

to fit the lowest, and a plank or board may be used under the lever to adjust it for higher axles.—Contributed by Urban A. Towle, Portland, Me.

Extension Trusses

A truss or horse, that can be taken apart quickly and lengthened, makes a handy scaffold for some kinds of

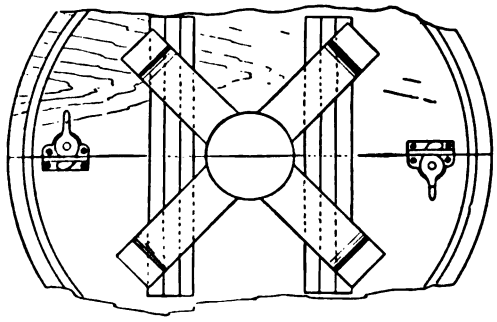


Separable Shop Horse

work, and especially for painting high picket fences. The crew can work on both sides at the same time. The sketch shows how each pair of legs is attached to a short block top, having two loops made of strap iron into which a long top piece can be inserted. —Contributed by W. A. Jacquythe, Richmond, Cal.

Fastening Extension-Table Parts Together

The extension dining-room table annoyed us a great deal by pulling apart, as it was not provided with locking



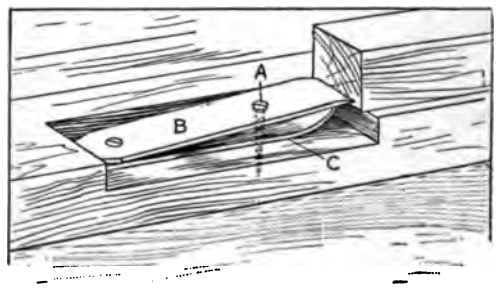
Window Fasteners on Table Parts

devices. I took two ordinary window fasteners and put them on the under side of the top, attaching one of the pieces on each side of the division. After pushing the table parts together, they are held closed by locking the fasteners. Extra leaves can be put in by turning the levers and unlocking the catches.—Contributed by B. V. Showalter, Philadelphia, Pa.

Bench Stop for Varied Thicknesses

A good bench stop for holding thin or thick stock while dressing the surfaces can be made from the back iron of an old plane. Cut a recess, about ¼ in. deep and the shape of the back iron, into the bench top. File teeth—about six to the inch—in the broad end of the back iron. Procure a piece of thin straight spring about 1 in. wide and 3 in. long; bore in one end of it a hole as large as the hole in the back iron, and bend the other end in an upward curve.

A large screw put through the holes



Stop Attached to Bench

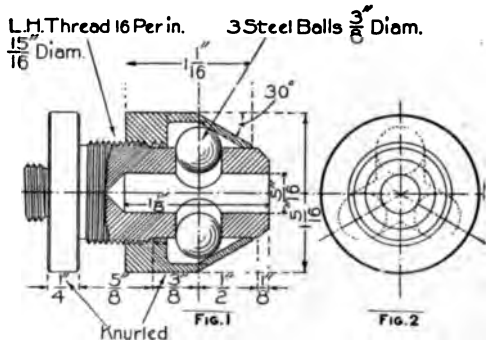
in the back iron and spring and turned into the bench holds the stop in the depression cut in the top of the bench and makes a stop adjustable for thin or thick stock. It can be turned down far enough to be out of the way while other work is being done.—Contributed by George Schellberg, Omaha, Nebraska.

A Ball-Grip Self-Centering Drill Chuck

The small chuck shown in the accompanying sketch can be easily made by any one who has access to a screw-cutting lathe. As the diagrams show, three steel balls replace the usual

jaws, the balls fitting in guides consisting of radial holes drilled in the body of the chuck. The balls are closed on the tool to be held by the hollow sleeve, which is bored out with an internal taper, and screws on to the body of the chuck with a left-hand thread. When the drill to be held is pushed in, its end centers itself in the taper end of the hole and the balls grip it centrally when tightened up by the sleeve.

It is important that the sleeve should be attached by a left-hand thread, as this makes the chuck self-tightening. Looking along the drill at the front end of the chuck it rotates, when slipping, in a clockwise direction. This causes the balls to roll in the opposite direction, and to transmit a similar rotation, i. e., counter-clockwise, to the sleeve, which is thus tightened up.



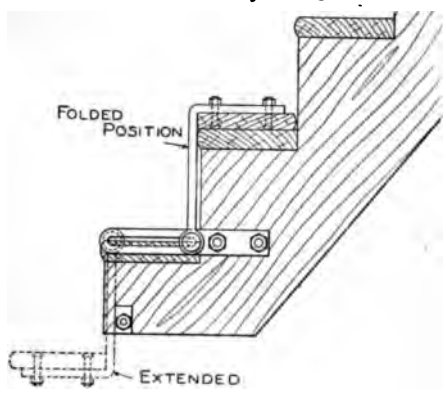
Details of the Chuck

A sectional view through two of the balls is shown in Fig. 1, and an end elevation from the front of the chuck in Fig. 2. The size given is for holding drills up to 5/16 in., 1/16-in. drills being the smallest it will hold. The balls are 3/8 in. in diameter, so they cannot fall out through the center hole.

The holes for the balls should be carefully drilled and filed or scraped so that the backs of all the holes are at the same distance from the front. This insures the proper centering of the drills. The chuck is improved by case-hardening the sleeve and ball guides, but this is not necessary.

An Auxiliary Step for Cars

Some railroads are attaching to their coaches an auxiliary step similar to the one shown in the accompanying sketch. This step does away with the familiar brakeman's "stepping box," which has always been more or less of a nuisance. The idea might easily and profitably be applied to trolley cars and other vehicles where a high step cannot be avoided and the stepping box is not available or desired. The step is fastened on the "L"-shaped brackets which slide back in a groove when the step is reversed or folded back on to the second step.—Contributed by D. A. Hampson, Middletown, N. Y.



Extension Coach Step

Medicine Dropper

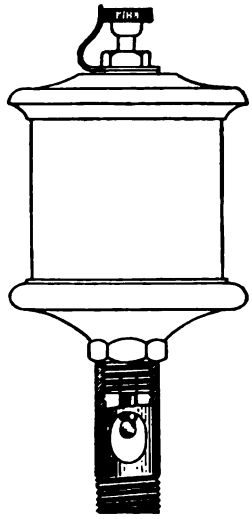
Take a piece of wire a little more than twice as long as the bottle, double and twist it like a rope, then bend about 1 in. of one end to a right angle. Place the other end in the bottle, tip the liquid well on the wire and it will drop steadily. This will only apply to liquids that do not act upon the metal.—Contributed by R. H. Workman, Loudonville, Ohio.



¶Always make sure that calipers are properly set before using them.

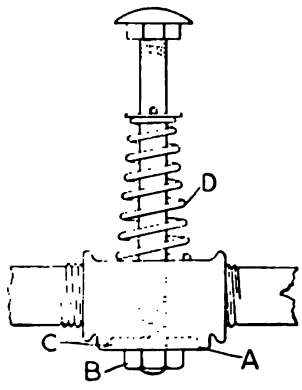
Home-Made Sight-Feed for an Oil Cup

The common set-feed oil cup can be easily changed to a sight-feed in the following manner: A short piece of pipe is threaded on the inside at one end to take the thread of the oil cup. The other end is threaded to fit the hole in the bearing to be oiled. An oval hole is cut through the center of the pipe, as shown. A small brass pipe is fitted in the lower end of the oil cup. The parts are assembled as shown.—Contributed by C. C. Brabant, Alpena, Michigan.



Exhaust Cut-Out Made from Pipe Fittings

A very satisfactory cut-out valve may be made from an old tee pipe fitting in the following way: Take a tee fitting the size of the exhaust pipe and drill a ⅜-in. hole in the center, opposite the side opening. Turn a seat for the valve at a 45-deg. angle, as shown at A. Thread a rod and fit the nut B. Turn a disk, C, and thread it to screw on the stem, so that it will lock with the nut B. Place in position, as shown, and put on an open coil spring to keep the valve seated. Drill a ⅛-in. hole in the stem and place a washer and pin to hold the spring in position. Cut the rod long enough to pass through the footboard, thread the upper end and turn on a round-headed nut taken from an old buggy top. This will serve as a head for the valve stem.—Contributed by J. N. Bagley, Webber, Kan.



An Indicator for the Lathe

Obtain a piece of sheet steel and shape it as shown at A, Fig. 1. Drill a taper hole in the middle, and drill and tap a hole for a small machine screw at the narrow end. Make the pointer C of drill rod and screw it to the plate. Great care should be taken to make the small screw J a close fit, so as to insure an accurate reading.

A ring, E, Fig. 2, is made with a slot in the top to receive the flat spring G, the extreme end of which should be twisted at a right angle. The stud D is riveted to the sheet metal, so that the ring E turns easily. Connect the pointer with the ring with a piece of spring wire, F, which completes the instrument. The indicator can be changed from left to right, or right to left, by simply pushing the flat spring G to the respective side. A suitable holder for use in the tool-post is shown at H.—Contributed by Max Lange, Hartford, Conn.

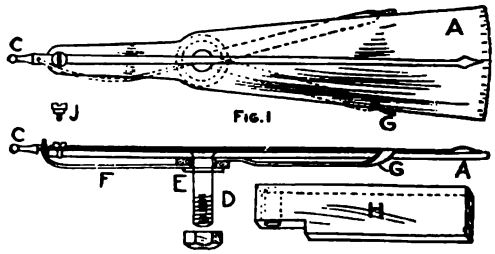


Fig. 1

Fig. 2
Details of Indicator

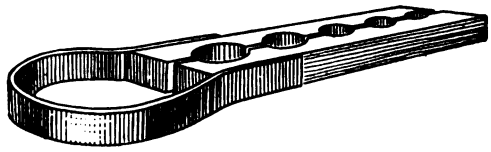
¶Allow plenty of time for the under coats of paints to dry before varnishing and there will be no danger of stains showing after the job is in service.

Handling Large Piston Rings

In setting up an engine having a cylinder 24 in. in diameter, considerable difficulty was caused by the springing out of the heavy piston rings so that the piston could not enter. The trouble was overcome by using a circular band of ⅛-in. flat iron, about 1 in. wide, with right-angle pieces welded to its ends and drilled for a ⅜-in. bolt. By means of this device, the rings are drawn down tightly to the surface of the piston, so that it can be driven in easily. The circular band is driven up and loosened for a second ring, and if there are more than two rings, the process has to be repeated for each one. —Contributed by Sidney K. Eastwood, Detroit, Mich.

Holding Screws for Slotting

The little clamp shown in the sketch herewith was made by me some years ago and I have found it very useful for holding screws. It consists of a piece of brass plate, ½ in. thick, 1 in. wide and 3 in. long, with a spring bow soldered on one end to keep the pieces in place and allow them to separate. The holes, which are different in size, should be drilled first and then a saw cut made through their centers. If you have to make a slot in the end of a setscrew, it can be cut by putting the screw in one of the holes and then clamping the plate in an ordinary vise. The thread of the setscrew will not be damaged in the soft metal. It is the best thing for holding nickel-plated or brass pipe when cutting threads, or anything round that must be handled with care. The plate should be annealed and the holes slightly countersunk.—Contributed by Harold James, New York City.



Screw-Holding Clamp

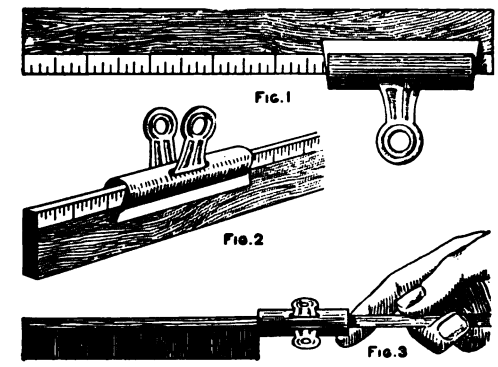
A Broom-Holder

Take a length of old stove pipe and cut it to the shape shown in the illustration. The sides should be doubled over for stiffness and a center hole cut, ⅜-in. larger than the diameter of the broom handle. Punch a hole at one side and fasten the device to the wall with a small staple. The handle of the broom is pushed through the hole, and its weight will keep the broom in the position where it is placed.—Contributed by Jas. Fregard, Mount Boydges, Canada.



Scale Indicator and Gauge

An ordinary paper clip can be used as a scale indicator as shown in Fig. 1. The same clip can be used on a lumber rule as shown in Fig. 2, or on a yardstick when gauging materials as in Fig. 3. The clip is clamped over the rule the same as over papers.—Contributed by James M. Kane, Doylestown, Pa.



Clamps on Rules

¶A tool for turning steel will not do for brass.

Dry Concrete Floor for Stalls

The method of constructing concrete floors for barn stalls which is shown in the illustration will overcome the



Cement Stall Floor

prejudice against this style of floor, as the channels will carry the water to the gutter easily and quickly, thus keeping the bedding perfectly dry at all times.

The floor is laid in the usual manner, with a proper slant toward the gutter. When finishing the top of the concrete, a straightedge is laid from gutter to manger and with the point of a trowel, grooves or channels are cut the entire length. These should be 3 in. apart and not over ½ in. deep. With such a depth there will be no danger that a sharp-shod animal might wrench a limb by catching the shoecalks in the grooves when turning around. This floor will give the animals greater comfort and save much labor in grooming them.—Contributed by A. A. Houghton, Northville, Mich.

Trapping Insects for a Collection

Wishing to catch specimens of insects that frequent the night air, I devised the following arrangement to that end: Upon a high support I placed a shallow plate almost filled with glycerine. About 2 ft. above this I suspended an electric light. Insects attracted by the light were decoyed to the white plate and entangled in the glycerine. Many hundreds of different "bugs" were caught in this way in a few hours. The arc light is best suited for the purpose.

Night-flying birds can be caught in this manner by using a 2 by 5-ft. board, painted white and placed on a high pole. The bird will be attracted by the white board just as by a lit up window in a dark wall, and rush toward it with increasing speed. When striking the board, it falls half stunned to the ground and can be easily captured. It is surprising what great variety of uncommon birds and insects frequent the night air, and the collector will be able to make many an interesting addition to his store by using this method.—Contributed by Loren Ward, Des Moines, Iowa.

Protecting the Edge of a Workbench

It is very handy for the home mechanic to use the bench edge as a support for holding a block while countersinking or boring a hole, but the bench edge becomes badly damaged by the point of the bit or countersink, and a handy device to protect the bench edge should therefore be welcome. Such a device is shown in Fig. 1 and

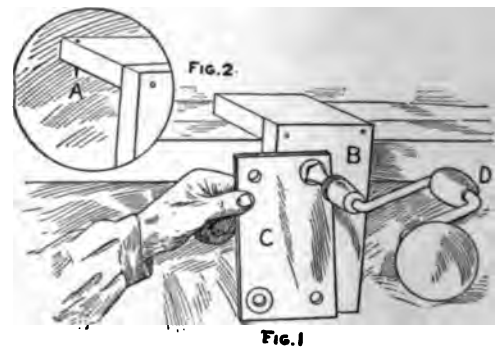


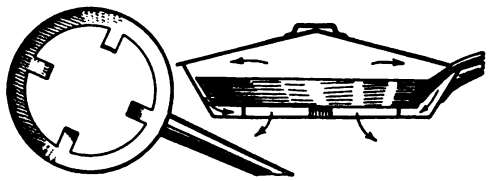
FIG. 1
Bench Protector

can be made from two blocks of wood, nailed together at right angles. Two small brads or nails are driven through

the back edge of the horizontal block (A, Fig. 2) to keep the piece from slipping off the bench top.—Contributed by Chester Purdy, Ghent, O.

A Cooking-Ventilator

This ventilator is made of an old, large frying-pan—even one that is ready to be thrown away will do—by cutting out the bottom, as shown in the sketch, leaving four lugs. These lugs are bent up inside, the ventilator placed on the stove, the frying-pan

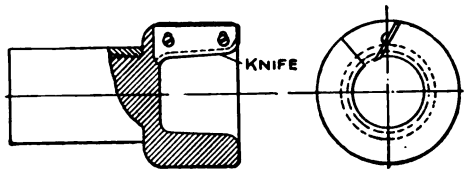


Vent for Odors

placed inside and the cover put on. When cooking steak or onions, the odor and smoke will pass from the frying-pan with the draft and out through the chimney.—Contributed by Chas. W. Thiede, Denver, Colo.

A Wood-Turner's Tool

A device for rounding one or both ends of irregular shaped pieces of wood to a size and shape that may be conveniently secured into a chuck, and held firmly with one end free, is shown in the accompanying sketch. It is made by using a pipe coupling that will fit on the spindle, then screwing a piece of hard wood into one end firmly and turning it to a suitable size and shape. After the hole is bored, trim it out and fasten a knife by means of screws as

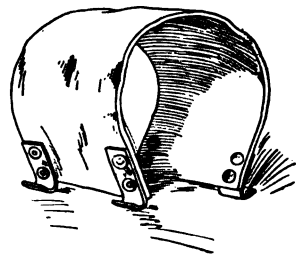


Knife in Coupling

shown. The screw-holes in the knife are slotted so that it is adjustable.—Contributed by P. H. Campbell.

An Automobile Tire Sleeve

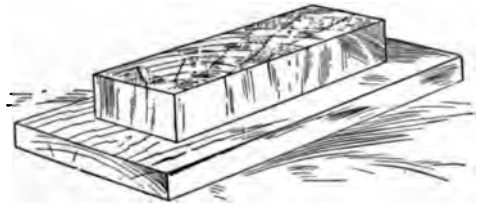
Get a piece of 5-in. rubber belting, some copper rivets and a piece of steel, 1/8 in. thick by 3/4 in. wide. Cut the steel into four pieces, bend them as shown in the sketch, and smooth the corners and edges with a file, so that they will not cut the tire. Drill holes and rivet one on each corner as shown.



A piece of the material cut from a discarded casing can also be used for the purpose.—Contributed by Claud M. Sessions, Waynesville, Ill.

A Knife Hone

An excellent knife hone for the kitchen or workshop can be made of a block of wood the same size as an ordinary oil stone. Basswood is best



Hone on End Grain of Wood

for the purpose, but any soft wood will do. Cut the block so that the end of the grain shows on the upper surface. If the block is small, glue it on a baseboard to prevent checking. Soak the top with oil and then dust on a small quantity of powdered emery, a heap not larger than a small pea being sufficient. Rub the powder in well and it will last a long time without renewing. This makes an ideal hone for the workbench or desk, and is much better than an oil stone where constant attention is needed to keep a fine edge on a tool.—Contributed by J. J. O'Brien, Buffalo, N. Y.

A Nail Box

A nail box, like the one illustrated, can be made with any number of divisions, but one of medium size answers

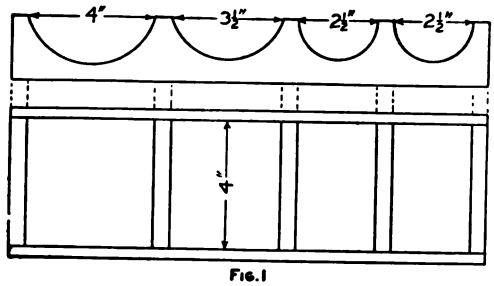
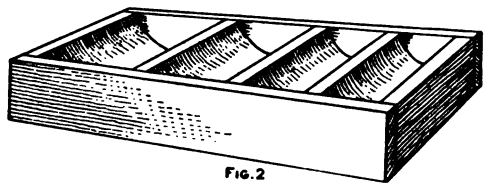


FIG. 1

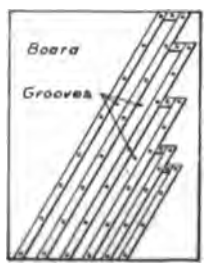

FIG. 2

Receptacles for Nails

most purposes. This particular one is made of white pine of the dimensions given in the detail, Fig. 1. Fasten sides on, Fig. 2, with a little glue and brads; then cover it over with a coat of shellac. This makes a very convenient box, as there are no corners and no need of always "fishing" for a nail. —Contributed by W. A. Lane, El Paso, Texas.

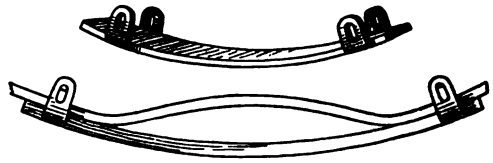
A Templet for Cutting Spiral Piston and Valve-Rod Packing

First cut a ring of packing for each piston and valve rod you have in charge. Cut these very accurate, as they are to be used for making the templet shown in the accompanying sketch. The board should be large enough to take diagonally across it the longest piece of packing used on your engine or pump. Then nail small strips on the board, forming grooves the width of the packing, until you have a groove for each size, and fasten small blocks in the grooves so that you have also a groove for each length wanted. By laying the packing in the proper groove and cutting it off flush with the end of the board, you will always have a ring that will fit the rod perfectly.—Contributed by E. J. Berry, Lake Providence, La.



Upsetting Wagon Tires

A wagon-tire upsetting machine is too expensive for the small shop and more so for the farm. The home-made affair, illustrated in the sketch, makes a good substitute. It is made of wrought iron, ½ in. thick, 1 ft. long and as wide as the tire. Four lugs are welded on the edges, as shown, keyways cut and keys to fit them made. and then the lugs are turned up at right angles. Make a bend in the tire and heat it well, quickly place it in


Tire Upsetter

the upsetter and drive in the keys as shown. Hammer the bend down, and the tire is upset.—Contributed by W. C. Parker, Olaf, Iowa.

Repairing a Mirror

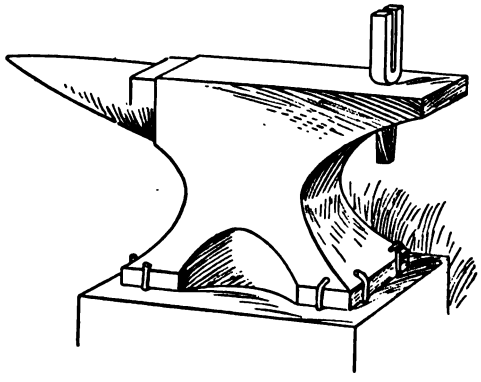
We doubt whether an amateur can patch the amalgam back of a mirror so as to make a satisfactory job, says the Druggists' Circular, but we know of nothing to prevent one from experimenting along this line if he wants to, and here is some advice which may be of assistance to the experimenter: First clean the bare portion of the glass by rubbing it gently with fine cotton, taking care to remove every trace of dust and grit. If this is not done carefully, defects will appear around the place repaired.

Outline on the back of another looking-glass a piece of silvering of the required form, but a little larger, and with the point of a penknife cut through the amalgam along the outline. Upon this piece of amalgam place a small drop of mercury. The mercury spreads immediately, penetrates the amalgam to where it was cut off with the knife, and the required piece may now be lifted and removed to the place to be repaired. This is the most difficult part of the operation. Then press lightly the renewed portion with cotton. It hardens almost immediately, and the glass is uniform in appearance.

Another way is to pour upon a sheet of tinfoil about 3 drams of quicksilver to the square foot of foil. Rub smartly with a piece of buckskin until the foil becomes brilliant. Lay the glass upon a flat table, face downward; place the foil upon the damaged portion of the glass; lay a sheet of paper over the foil, and place upon it a block of wood or piece of marble with a perfectly flat surface. Place sufficient weights upon it to press it down tight and let it remain in this position a few hours. The foil will then adhere to the glass.

An Anvil Yoke

The yoke illustrated in the sketch is for bending metal into circles or bands of any kind. The jaws should be about ⅜ in. apart and 4 in. long.

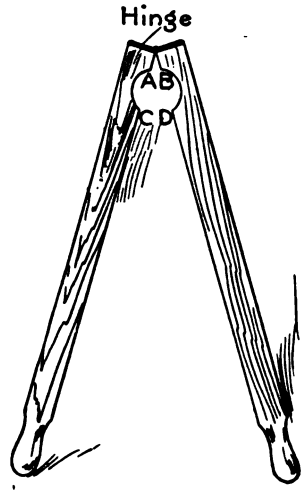


Bending Tool in Anvil

It is best to make it of ⅞-in. square iron.—Contributed by D. O. Wilkins, Hempstead, Texas.

Cleaning a Rusty Shaft

The light shafting used for driving sewing machines in a factory easily becomes rusty, and as I wished to keep mine clean and bright, I made a polisher from two pieces of wood, each 2 in. square and 16 in. long. One end of each stick was shaped into a handle, and the other ends joined together with a hinge, so that the device had the appearance of a large nutcracker. A piece of emery cloth was then stretched tight from A to B on the wood, left a little slack between A C and B D, and tacked in place. When polishing, the device is clamped over the shaft while it is turning. If the lever is held on a slant, it will travel along the shaft.—Contributed by C. F. Matzek, Milwaukee, Wisconsin.



Repairing a Hole in a Cistern

Several attempts were made to patch a hole worn in the bottom of a cistern by a chain pump, but all failed because water would soak up through the cement, before it had time to set. I wiped the hole out dry, put in dry cement to absorb the water and then mixed up some cement with very little sand, to make it set quickly. This method failed just as the others. Then I removed the cement, cleaned the hole dry and sealed the bottom and all the cracks with common sealing-wax. A neat mixture of cement on this made a watertight bottom.—Contributed by C. M. Rogers, Wellington, O.

¶Keep your oil can full.

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Home-Made Vegetable Paring-Knife

A simple vegetable peeler can be easily made as follows: Secure a block of wood, 1 in. thick, 2 in. wide

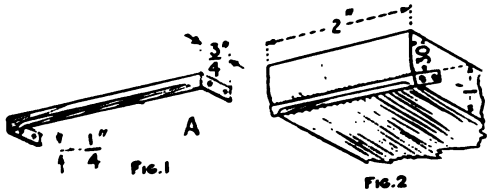


FIG. 1 FIG. 2

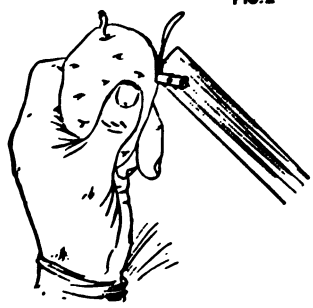


FIG. 3

Knife on Rounded End of Stick

and 6 in. long, and a piece of tin, iron or brass, ¼ in. wide by 3½ in. long. Bend the metal as shown in Fig. 1, and fasten it to the rounded edge of the block by means of four nails or tacks, as shown in Fig. 2. File it down at A, Fig. 1, to make the cutting edge, which should be no more than ⅛ in. from the surface of the block. The peeler is used as shown in Fig. 3. —Contributed by K. Kuga, Hoquiam, Washington.

A Handy Ladle

A ladle with an adjustable handle is shown in the accompanying illustra-



Movable Ladle Handle

tion. The ladle when filled with metal will remain in an upright position, no matter at what angle the handle is held. This is because the handle is flattened and loosely riveted to the ladle, which allows it to adjust itself. —Contributed by W. A. Jaquythe, Richmond, Cal.

Making an Old Soft-Wood Floor Smooth

An old warped, shrunken and generally dilapidated soft-wood floor can be renovated so that rugs may be used on it instead of unsanitary carpets.

Give the floor one coat of white lead and oil paint, tinted buff with yellow ocher and a very little burnt umber. When dry, putty only the very bad places. If the boards are wide, as is usually the case, take a strip of wood as a guide and, with a 5 or 6-in. wire nail, score a number of lines about 2 in. apart down each board. This gives the floor the appearance of being laid with 2-in. material. Apply a second coat of paint, same as the first, and when this is thoroughly dry, stain with a mixture of turpentine, yellow ocher and burnt umber (but no lead), using much more umber than in the paint, so as to effect a sharp contrast. A very small quantity of Van Dyke brown may also be added, if obtainable. While the stain is still wet, run over the floor with an ordinary coarse comb or a stubby whisk-broom, if you cannot procure a painters' graining comb.

After the stain has dried, apply a coat or two of a good floor varnish, and the result will exceed your expectations. You will have a fine imitation of an oak floor at a slight cost. If the parts, subject to wear, are recoated with varnish occasionally, the color will not wear off. Either the whole floor or merely a strip around the base may be so treated, if a single large rug is to be used.—Contributed by Norval Bradley, Paterson, N. J.

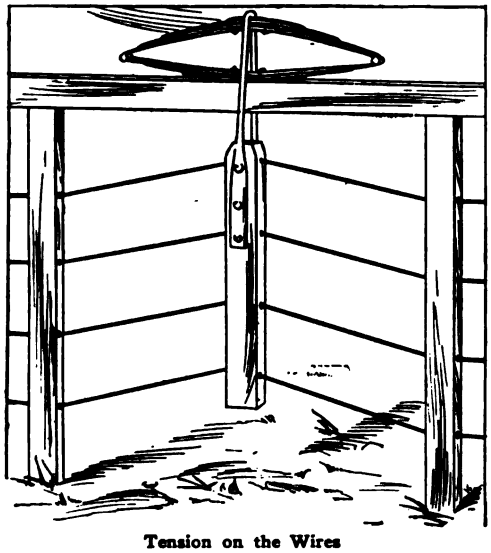
¶An old ivory effect may be made by applying two coats of white shellac and when it is dry scumbling with raw umber, rubbing it partially off with a rag, so as to leave a mottled effect.

Moving a Steel Water Tower

A large steel water tower, weighing 45 tons, in the Union yards at Peoria, Ill., had to be moved to provide additional space for tracks. As the tank was in almost constant demand, it could not be long spared from service. The method adopted for moving it was to swing the tank, using one post as a center. Sawed timber ties were laid close together to make the base of a semi-circular track, and curved steel rails of the proper radius were spiked to them. Rollers of 2-in. round iron were used on the rails. It required only a few hours to move the tank a distance of 20 ft.

A Tension for Wire Fences

The accompanying illustration shows how a farmer applied a tension to the wires on his fence to keep them taut, at the same time allowing for the contraction and expansion of the metal. The principle of the device



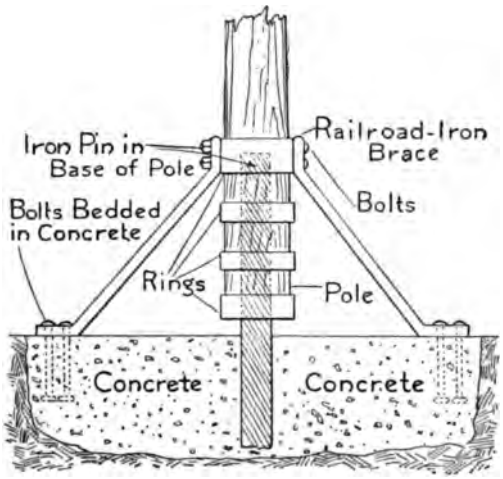
Tension on the Wires

can be readily understood from the sketch.—Contributed by R. Homer Edson, Middletown, Ohio.

¶A file may be kept from filling up with lead by applying a coat of thin oil just before filing.

Erecting a Flagpole

The accompanying sketch shows how to erect a flagpole so that the wood will have no contact with the



Pin Embedded in Concrete

earth and therefore not decay. A large iron pin is stuck into the base of the pole and extends into the concrete base. The end of the pole is well protected against splitting by shrinking several rings on the wood. Braces are attached to the top ring and to the concrete.—Contributed by James M. Kane, Doylestown, Pa.

Inexpensive Foundation Covering

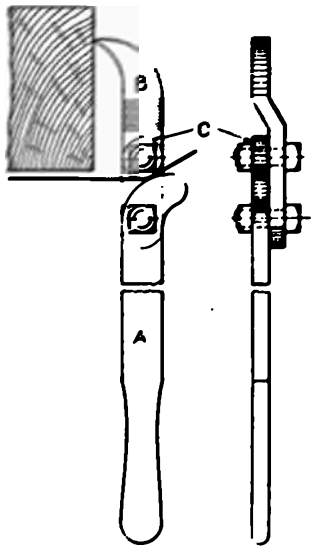
When houses rest on inexpensive wood foundations, these are usually boarded up to keep out the cold. A good substitute for the boards is the material used in making a gravel roof. This is cheaper and easier to apply. No wind or frost can penetrate this covering, and it gives the appearance of a stone foundation.

¶A piece of sandpaper is an excellent thing to keep near a gasoline or kerosene can to remove the cap when it is stuck.

¶Holes in grain sacks can be patched by shaking out the dust and pasting a piece of the same material on the inside over the opening.

How to Make a Wire Stretcher

A wire stretcher made as shown in the accompanying sketch will prove a very useful tool, as it will hold all kinds of wire and can also be employed for pulling bolts, if they are easily accessible. The handle, A, is forged from ½ by 1¼-in. stock and should be about 18 in. long.



Shape it as shown, and drill a hole for a ½-in. bolt or rivet at the upper end. The upper part B is made of the same material and is shaped with an offset as shown. This offset allows the pressure at the post to be in line with the handle, thus preventing the tool from having a tendency to turn in the hand. The roller C is ½ in. thick and 1¼ in. in diameter and is also attached with a ½-in. bolt or rivet. Drill a hole in the handle to hang it up by when not in use. Contributed by J. N. Bagley, Webber, Kan.

Non-Sagging Doors

An article in a recent number of Shop Notes suggested an idea for a novel door fastening. The idea is to hang a door on two sets of loose bolt butt hinges, one set on each side of the door. This makes it possible to lock the door by the hinges on one side and to prevent it from sagging. The door can be opened on either side.—Contributed by L. Alberta Norrell, Augusta, Ga.

Cracking Nuts

Heretofore only the wild pecan has been seen in the markets, but selected cultivated varieties are growing in commercial importance from year to year. Of late, large plantings of the latter kind have been made in the southern states and the product of these will soon become common in our markets. As prices are likely to remain high for some time to come, owing to the varied uses to which the meats are put, it is timely to describe the proper way to crack the nuts without damage to the kernels. The cultivated nuts, like fruits, are marketed according to varieties which will be sold under distinctive names. Each variety is uniform in size, and the shell on all is of about the same strength, so that the nuts should crack under about the same pressure. This quality will make it possible to avoid crushing the kernels, which means a great deal of waste. Excellent results can be obtained with the ordinary hand cracker if the following hints, plainly illustrated in the sketch, are observed:

With the nut in the left hand insert one end between the jaws of the cracker, using only enough pressure to crack the shell and rotating the nut until a seam is opened all the way around it. Treat the other end in the same way. You can then slip off both ends of the shell and see how the kernel lies within. Then apply pressure at the middle of the nut and the shell will split longitudinally into two



Proper Way to Crack Nuts

halves, from which the kernel may be easily extracted.

The machines used in cracking nuts for the confectioner's trade do perfect work and operate on the same principle, except that pressure is exerted on

both ends of the nut at the same time, causing the shell to burst along the middle.—Contributed by Victor Labadie, Dallas, Texas.

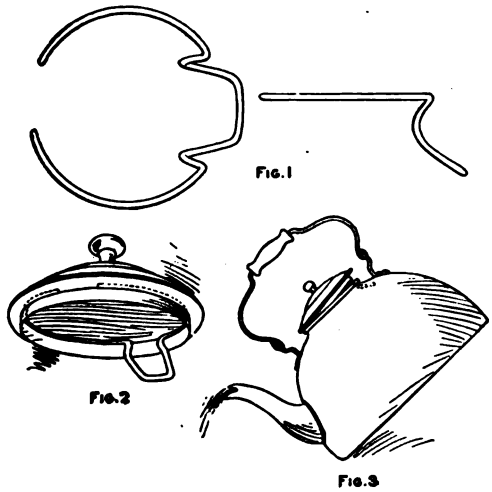
An Emergency Gasket Repair

A ship on a long trip encountered a gale, and it required all the power of the engines, running at full speed, to hold the vessel "head on" and keep it out of the trough of the sea, when about one-half of the gasket blew out of the high-pressure steam-chest bonnet, the cover being about 14 in. by 38 in. long.

Something had to be done at once, and as it was out of the question to stop the engine, the chief engineer ordered some pine boards brought up from the hold. The boards were cut in lengths of 6 ft. and sharpened to a thin wedge at one end, and when all was ready, two oilers stood by to slacken the nuts a turn, while the steam was shut off just for a moment. During that moment the end of a board would be driven into a section of the leaky joint, and then the steam would be turned on again to bring the ship up to her course. This operation was repeated until the leak was wedged all the way around, which required two hours. The nuts were then set down tightly and the wedges cut off flush. They swelled up during the first watch and stopped the leak entirely. The ship completed her voyage of 18 days with this emergency repair.—Contributed by M. C. Lord, Vallejo, Cal.

Kettle Lid Retainer

The loose kettle lid, that is always falling from its place every time the contents are poured, is a cause of much annoyance, which can be done away with by the use of a simple wire retainer, as shown in the sketch. The retainer is made of a piece of heavy wire, 17 in. long, bent as shown in Fig. 1. The wire is fitted on the inside of the lid, as shown in Fig. 2. The spring of the wire will keep it in place. The bend of the wire passes under the top of the kettle and prevents the lid

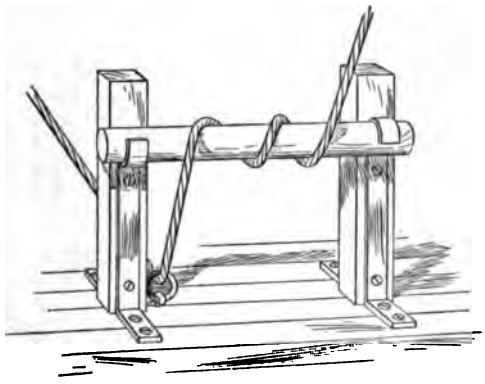


Holding Lid on Kettle

from falling.—Contributed by K. Kuga, Hoquiam, Washington.

Substitute Turnbuckles for Ropes

The substitute for a turnbuckle shown in the illustration is especially adapted for the stays on a sailboat, but can be applied to many other purposes. For ordinary use the standards are made of timbers 1½ in. square, and the

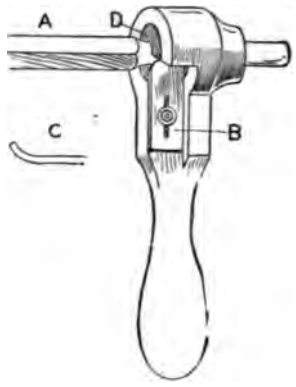


Rope around Cross Bar

cross bar 1 in. in diameter. The sketch clearly shows how the device is used.—Contributed by Arthur L. Chetlain, Chicago.

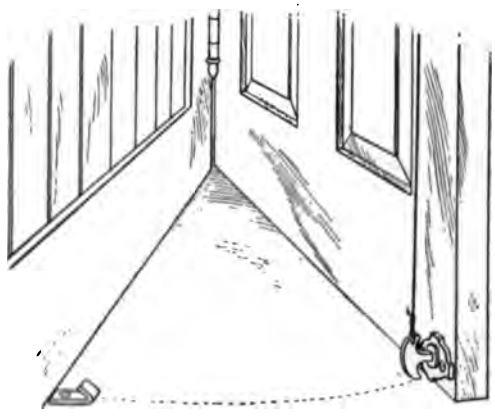
Hand Wood-Turning Tool

The tool illustrated is for turning round sticks of wood of uniform size in a lathe. The sketch shows a square stick, A, with a part of it already turned, and the hand tool B in place. The knife or cutter has a slight bend, as shown at C. The stick to be turned is placed in a square-hole mandrel, the left hand holds the cutter and pushes it along the revolving stick, and the right hand grasps the finished rod as it is cut by the knife. This simple tool can be adjusted to turn rods of different sizes.—Contributed by C. Purdy, Ghent, Ohio.



Catch for Holding a Door Open

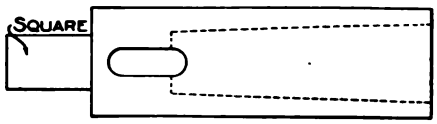
Secure a catch used on shutters and fasten the part to be attached to the sill on the floor near the wall, as shown in the sketch. The other part of the catch is screwed to the bottom edge of the door where it will be in line to hook in the part fastened on the floor. An easy way to release the catch is to attach a string between the door knob and the catch, as shown.—Contributed by Thos. E. Ryan, Chicago, Illinois.



The Hook as Applied

A Socket for Ratchet Drills

As nearly all ratchets are made with a square driving hole, the drills used in them must have square shanks. This means keeping a large stock of the square-shanked drills on hand or forging a shank on a twist drill, which operation usually spoils the tang of the drill. If a socket is made like the one shown in the accompanying sketch, this trouble is overcome. One end of the socket is bored to a Morse taper and the other end has a square shank that will fit the ratchet. By the use of this socket and the regular sleeves, most any sized twist drill can be used. This affords a saving of much time when a number of different sized holes are being drilled.—Contributed by D. A. Hampson, Middletown, N. Y.



Square Shank Socket

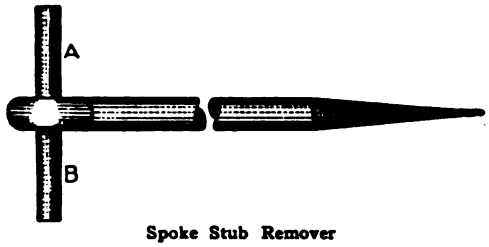
How to Set a Tool for a Close Cut

When doing fine work on a lathe, tools must be changed as well as on rough work, and it takes some skill to set them again without gouging into the last cut or leaving a ridge. One reason why this is difficult to do is because the work, tools and machine are almost the same color and it is hard to see so closely. If there were a contrast somewhere interposed, all would be different. This contrast can be furnished by placing a piece of white paper on the carriage of the lathe under the work and tool. When the tool is moved up close to the work the light background will make it possible to see the space quite plainly when it is only one-thousandth part of an inch wide. When truing up a pulley or a

turned piece that must be set exact before cutting, this method is a great help to the lathe man.

Removing Spoke Stubs

A tool for removing spoke stubs can be made from a ⅝-in. lag screw having a good, sharp thread, says a correspondent of the American Blacksmith. Cut the head off and draw it out, turn an eye and then weld a ⅝-in. round

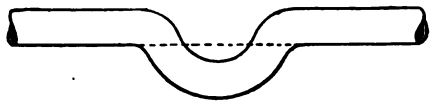


Spoke Stub Remover

iron in the eye. Bore a hole in the stub and turn the lag screw in as an auger. Take hold of the handle A and tap with a hammer at B.

Preventing the Clouding of Sight Feed Oil Glasses

The clouding of sight feed glasses, which very quickly become opaque, can be prevented in a simple manner, says the Automobile Dealer and Repairer. The cause of the trouble is that the heat of the lubricating oil in the crank chamber generates a smoke, which goes up in the oil pipes and renders the glasses opaque. To prevent this, make a U-bend in each of the oil pipes, as shown in the sketch, at some point in their length where they are horizontal. This makes a "trap" that

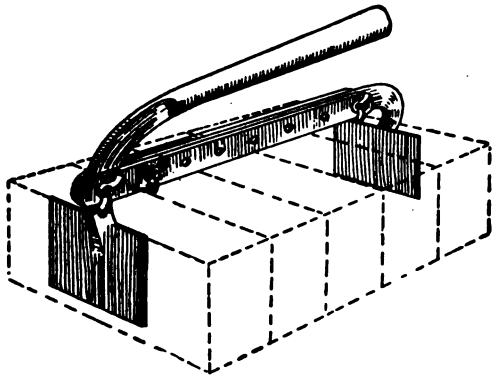


Bend in Pipe

will in no way obstruct the flow of oil, yet keep the smoke from circulating in the pipes.

Brick Tongs

Tongs for carrying bricks are shown in the accompanying sketch. The length is adjustable to fit different sizes of brick. When unloading brick from cars into wagons, the tongs holding four or six bricks are handed to the driver, who is thus enabled to pile that number about as quickly as one brick. The use of these tongs elim-



Tongs Clamped on Bricks

inates the old "chain gang" or hand to hand method and effects a large saving of time and labor.

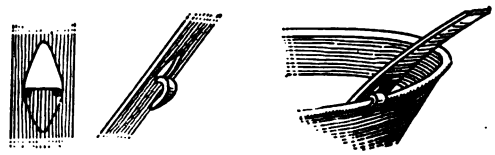


Courtesy American Vehicle

One Half Design for a Short Panel

Hook on a Spoon Handle

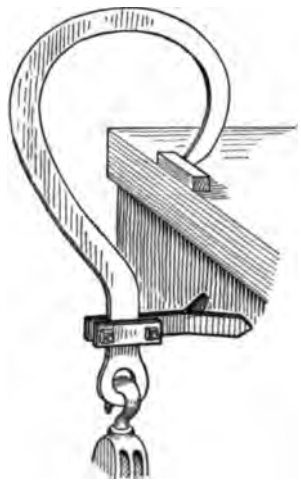
Spoons can be kept from falling into a soup bowl or kettle by making a small hook on the back of the handle,



Hook on the Spoon Handle

as shown in the sketch. A part of the metal of the handle is cut through on three sides and the piece bent back and down. The little hook thus formed slips easily over the edge of the vessel and prevents the spoon from sliding into the liquid.—Contributed by Charles Homewood, Waterloo, Iowa.

Holding-Bracket for Painter's Scaffold Hooks



The large hooks for holding the tackle on a painter's scaffold have a tendency to keep the scaffold too close to the surface being painted. The little bracket shown in the illustration not only prevents the hook from swinging sidewise, but also keeps the scaffold out at a convenient distance from the wall. It is nothing more than a forked piece of strap iron clamped to the shank of the hook. The ends of the fork are pointed.

¶Rub dry castile soap on the automobile wind shield and polish with a silk cloth to prevent the deposit of moisture.

Babbitting Boxes

When rebabbitting boxes, first remove all the old babbitt metal and give the box and shaft a good cleaning with gasoline or benzine. It is necessary to remove the old grease from the box with something of this nature to prevent "blow holes" when the hot metal is poured in.

If the box to be babbitted is a solid one, the shaft should be covered with paper which is drawn tightly and the edges stuck with mucilage. If this is not done, the shrinkage of the metal in cooling will make it so tight on the shaft that it cannot be turned. The use of the paper leaves the box just tight enough around the shaft to run smoothly. Before pouring the box, the shaft should be blocked up until it is in line, and as near as possible to the center of the box. Use a good stiff putty, placing it around the shaft and against the end of the box to prevent the babbitt metal from running out. Place a small, round stick in the oil hole, letting it rest on the shaft. This will leave a hole through the box to the shaft and will save the time of drilling one. Be sure to leave small air holes at the top by moulding the putty into a funnel around each hole. It is also necessary to make a funnel around the pouring hole. Heat the metal until it is just hot enough to flow freely, then pour it rapidly into the box until it appears at the small air holes.

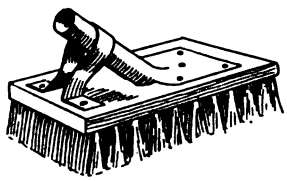
In babbitting the split box, the operation is the same, except that liners made of cardboard are placed between the two halves of the box and against the shaft to divide the metal. To let the metal run from the upper half of the box to the lower, cut a few small notches in the liner close up to the shaft. The liner should consist of a number of thin pieces of cardboard, rather than one thick one, as they can be removed one at a time to take up the wear of the box. Bolt the box down tightly when pouring the metal. When the babbitt is cool, remove the bolts and cut apart by driving a sharp chisel between the two halves. Cut away the

sharp edges and make the oil channels leading from the oil hole to the outer end of the box.

The ladle used for the ordinary box should hold from five to seven pounds of metal, this being as large as can be easily handled, and if this amount of metal will not run the box, it is a good plan to use another ladle and have an extra helper to handle it. In case of emergency, when no babbitt is at hand, ordinary zinc will be found a good substitute. A small piece of rosin dropped into the melted metal just before pouring helps to make a perfect box.

Handle Attachment for a Scrubbing Brush

With the common scrubbing brush the worker must perform his labor in a stooping position. To lighten this hard task, I provided a handle for an ordinary brush by attaching a socket on the wood back. The socket was made of light metal cut ½ in. smaller all around than the top of the brush. The metal was cut in from both sides about one-third the way lengthwise, and the shorter end formed into a ferrule. The other end was bent up at an angle and fastened with screws to the back of the brush. To add strength, an extra strap of iron was put around the ferrule part and fastened to the brush top. An old broom handle was inserted in the ferrule and fastened with screws.

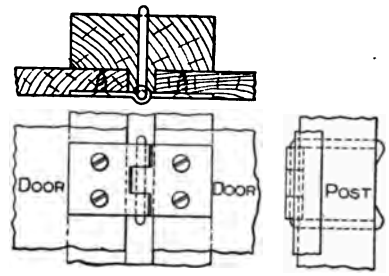


By means of this device which can be attached to a new brush when the first is worn out, scrubbing can be done in a standing position just as effectively as in the old way.—Contributed by W. A. Lane, El Paso, Texas.

¶The rear axle and driving pinion of an automobile should be kept well oiled and the universal joints never allowed to become dry.

One Pair of Hinges for Two Doors

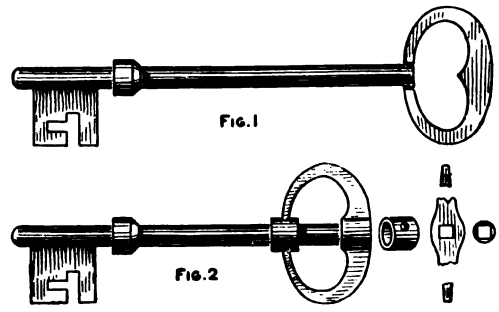
A simple method of attaching hinges so that they will swing two doors is shown in the accompanying sketch. A post is set between the doors and the hinges fastened to it by means of U-shaped staples as shown. These staples are long enough to go through the post and clinch on the back side. Only one hinge is shown, but of course two or more are used.—Contributed by C. C. Brabant, Alpena, Mich.



Hinge on Doors

Repairing a Broken Key

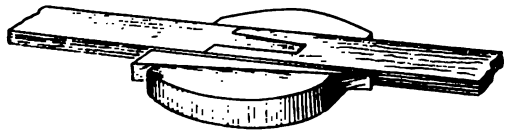
When the handle of a heavy key is broken off as shown in Fig. 1, a strong repair may be made as follows: Square the head of the stem and fit a sleeve over it. The sleeve, with two holes drilled in its sides, is then shrunk on the key stem, if this be steel or iron, or soldered in place, if the key is of brass. Place the handle on the square end of the stem and bend it, until the ends will fit into the holes in the sides of the sleeve. The ends may be further secured with a little solder.



Putting New Ring on a Key

Extension Trammel Point Rod

Large circles must be described at times and an extra length trammel point rod is necessary to cover the distance between the center point and the

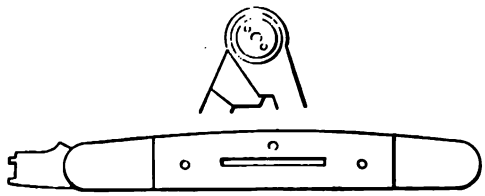


Clip on the Joint

circumference. The length of such a rod makes it inconvenient for storing in an ordinary tool chest. For radius of circles that would require a rod longer than the tool chest, sections of a rod can be joined together. These joints are hard to make so as to keep the rod perfectly rigid, but the one illustrated has proven entirely satisfactory. The clip can be made of either metal or hard wood. The method of joining the lengths together is so plainly shown it needs no explanation. The parts can be easily stored in a draftsman's tool chest.—Contributed by D. O. Wilkins, Hempstead, Texas.

A Handy Compass Key

A separate key is usually provided in sets of instruments containing compasses with the style of joint shown in the sketch. This key is small and inconvenient to use, and is often lost from the set in a little while, says a writer



Key on Knife Blade

in Machinery. A broken knife blade with its end filed to the shape shown, makes a good compass key. If a two-bladed knife is used, the other blade can be kept very sharp for erasing.

¶Color sifted on a cut-in sign in the place of smalts looks good.

Polishing Joints in Automobile Lamps

The seams and corners of automobile lamps are difficult to clean and polish, as the metal polish is apt to stick in these places. A toothbrush is the best thing to use for this purpose. It gets the polish out of the recesses and polishes them at the same time.—Contributed by A. Donley, Valparaiso, Indiana.

How to Properly Key a Pulley

It is something of a trick to key a pulley so that it will not work loose after a time, especially if the pulley is large and runs at a high rate of speed. In making the key, care must be taken that it be of uniform width and fit the seat in the shaft and the pulley snugly. The key should be driven tight, but not so tight that it will kink under the blow.

If the pulley runs with the hub against the box, which is the usual way, allow only about 1-32 in. end play between the box and the pulley.

When an old key is worn too thin, but fits properly otherwise, place a strip of tin under it to make it fill the keyway closely. To draw a key, a small end of which is projecting, hold it with a pair of pliers, pry against the hub of the pulley, at the same time driving the hub on the shaft with a hammer. This will loosen both the pulley and the key. If the key is cut off flush with the pulley, it may be necessary to remove the shaft and drive from the inside, in which case it is well to drive the pulley on a little, to loosen the key.

Rust-Proof Needle Protector

Cover a cake of high-grade soap with a dainty white linen or cotton cloth. Needles or pins stuck through the cloth into the soap will remain free from rust indefinitely.—Contributed by L. Alberta Norrell, Augusta, Ga.

¶Never leave your shirt sleeves unbuttoned when working about machinery.

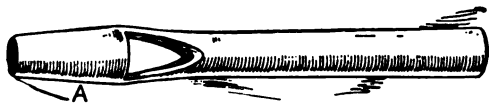
SHOP NOTES

Bending Wood

The bending of wood requires a steaming apparatus that would take considerable time to make and involve some cost for material. Where a few bent boards are wanted, a costly apparatus is not necessary, as the boards can be bent equally as well by soaking the wood in water for several days to make it thoroughly water logged and then passing it over a gas flame several times. The wood, being soaked through, cannot burn and the steam from the water softens the wood as well as if it were steamed in the regular way.—Contributed by Helge R. Crafton, Chicago.

Cutting Plugs for Filling Screw Holes

The ordinary leather punch that is driven with a hammer is a good substitute for the regular plug cutter to cut round pieces of wood for filling screw holes. The punches can be purchased from any local hardware dealer in almost any size. The cutting edge is ground or filed sharp and the cutter

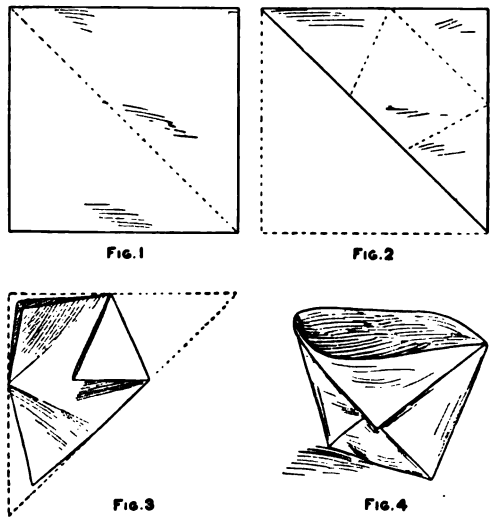


Leather Punch for Cutting Wood Plugs

used in a brace the same as a bit. Revolving the punch on the wood cuts out a smooth plug.—Contributed by W. H. Booker, Belfast, Maine.

A Paper Drinking Cup

Take a piece of clean paper about 6 in. square and fold it on the dotted line as shown in Fig. 1 so as to make a triangle. Do not use paper having anything printed on it as there is danger of poison from the ink. The other



Folds in the Paper

folds are made on the dotted lines as shown in Fig. 2. Each pointed end of the triangle is turned over on one side as shown in Fig. 3, then the sheets of the remaining point are separated and each one folded down on its respective side.—Contributed by R. H. Lufkin, Dorchester, Mass.

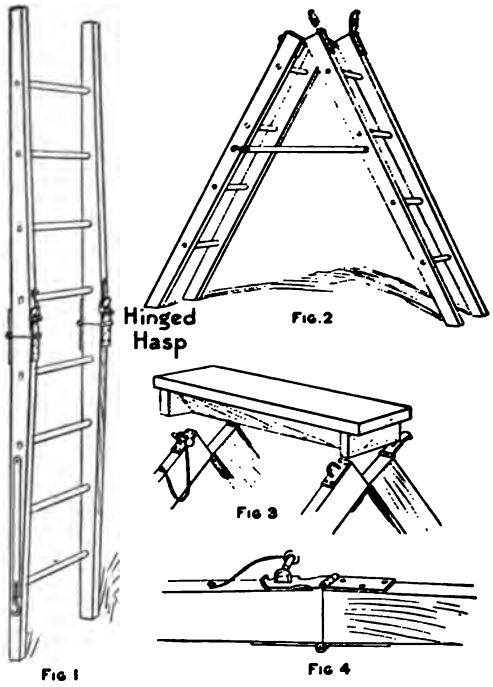
Hanging Ingrain Paper

It is best not to use a trimmer on ingrain paper, as the edges cannot be notched well enough to prevent showing a seam. Take the paper and roll it tight; then roughen both ends with No. 0 sandpaper which leaves a feather edge. This gives a straighter edge than when cut with a trimmer and the feather part will roll down and make a perfect joint.—Contributed by A. E. Johnson, Frankfort, Ind.

¶Do not forget that when a piece of work being turned in a lathe gets hot, it lengthens by expansion.

Combination Ladder

An ordinary ladder made up so it can be changed into a step-ladder is shown in the accompanying sketch.



Changing Ladder into a Step-Ladder

In this case a ladder 20 ft. in length (Fig. 1) was cut in the middle and a pair of hinges used on one side and a hinged hasp on the other to join the parts together. The hinges should be heavy and well screwed in place. The hinged hasp should also be heavy and a bolt used through the staple part to hold the ladder when extended. The ladder is folded as shown in Fig. 2 for use as a step-ladder. In Fig. 3 is shown a step for the top that is placed in the crotch formed by the ends of the ladder sides. One of the joints is illustrated in Fig. 4.—Contributed by Robert C. Knox, Colorado Springs, Colorado.

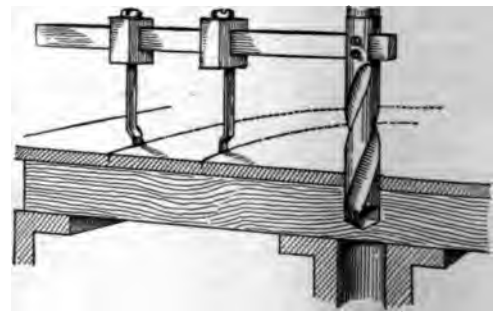
¶A quick way to charge the primer on an automobile engine is to saturate a bit of waste in the oil of the carburetor and squeeze it into the opening.

Tool for Cutting Fiber Washers

The tool here illustrated is used to cut all sizes of fiber and thin sheet-metal washers from a 3-in. hole to 18 in. outside diameter. With it fiber washers ¼ in. thick have been cut without any difficulty or trouble whatever, greatly reducing their cost. These washers I used mostly on large embossing dies. The tool consists of a 1-in. drill with a cutter head beam let through the slot and fastened by two setscrews.

The cutter heads are set to a good sliding fit on the beam, and the cutters are tempered and let into split seats in the cutter heads and also fastened by screws. The cutting tools are a trifle less than $\frac{1}{16}$ in. thick and are given sufficient side and back clearance to allow them to cut freely.

The sketch shows how the tool is used. A piece of 1½-in. planking is fastened to the drill press table and the table is clamped in a central position. A small pin forced into the planking at the right serves as a gauge for locating the fiber beneath the drill and also to space the washers evenly. The drill shank is fastened in the chuck, in the drill spindle, and the tool is rotated about 40 turns per minute. The drill cuts first, and as soon as it has passed through the fiber and entered the wood the inside and outside cutters begin to cut. A light pressure is all that is necessary to make the cut, the chips curling up nicely, and as soon as they



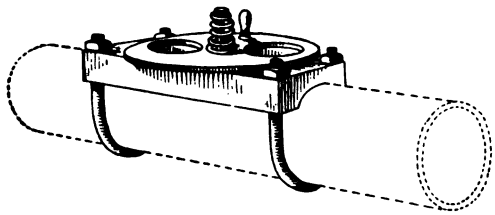
Two Cutters on a Bar

pass through the fiber or brass a quick rise on the feed lever causes them to pull free and clear of the work. As

will be seen, the tool cuts the inside and outside of the washers at the same time, and as the inside washers can very often be used, two washers are really cut at one operation.—Contributed by Jos. R. Weaner, Plainfield, New Jersey.

Exhaust Cutout for a Motorcycle Engine

The accompanying sketch shows a simple cutout I made to fit on the exhaust pipe of my motorcycle, the muffler being of the regular type. I used a piece of brass about ½ in. thick, and ground it out to fit the curve of the pipe as shown. This was secured to the exhaust pipe by means of two ¼-in. clips. Two holes were drilled through the side of the exhaust pipe and a brass

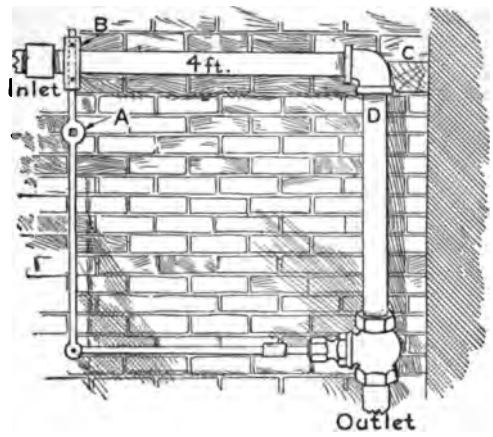


Cutout on Exhaust Pipe

disk fitted to revolve over the holes. Two holes were drilled in the disk to correspond with the holes in the pipe, making it so that a quarter turn would close and open the cutout. The disk was secured by a stud turned into the brass piece. A heavy coil spring, secured by a nut and washer, held the disk in close contact with the openings. The cutout can be made in any size.—Contributed by John H. Putgenter, Ilchester, Md.

Home-Made Steam Trap

A steam trap operated by the expansion of the metal pipes can be made from pipe and fittings as shown in the illustration. The outlet is an ordinary globe valve with the threads removed from the stem so it may be opened by an end pull instead of a turn. The end of the stem is then attached to the end of an arm joined to the lower end of a lever that works on a pivot, A. The upper end of this lever is securely



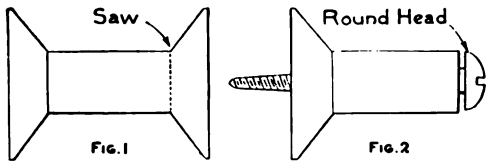
Steam Trap of Pipe and Fittings

fastened to the upper horizontal steam pipe with a band, B.

The turn, or L, in the pipe must be blocked at C or held with a strap around D, to prevent the expansion of the metal drawing the lever in the wrong direction. The operation of the trap can be easily understood from the illustration.—Contributed by James E. Noble, Toronto, Canada.

Roller Bearings for Bureau Drawers

An effective and economical plan to overcome the annoyance caused by bureau and cabinet drawers sticking is to attach rollers made of ordinary discarded thread spools to the strips on which the drawers slide. One end of each spool is cut off as shown in Fig. 1 and fastened to the strips with round-head screws, Fig. 2. Be sure to place the spools high enough to afford an



Rollers Made of Spools

easy roller for the drawer, yet not too high to bind the edge at the top.—Contributed by C. C. Reynolds, San Francisco, Cal.

Rolling a Band-Saw

The task of rolling a band-saw by one who has never handled such a saw is quite difficult, but if the different

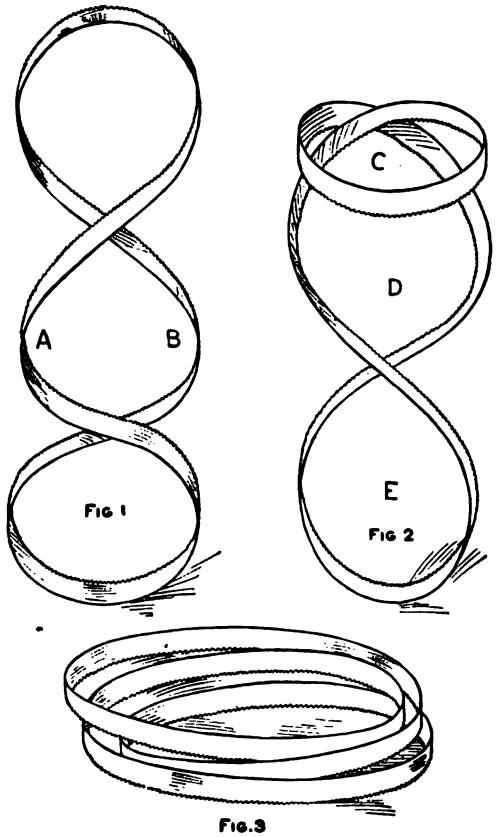


FIG. 3
Turns in the Saw Blade

stages of folding, as illustrated in the sketch, are followed out, the rolling will be quickly accomplished. Grasp the saw with the palms of the hands upward and allow the lower end to touch the floor near the feet, with the middle parts A and B, Fig. 1, swung away from the body. Place the curve A under the curve B so as to form the three loops shown. Turn the top loop toward you and down as shown at C, Fig. 2, and then turn loops C and D toward you again on E and you will have a roll as shown in Fig. 3.—Contributed by Benjamin Kruka, Kearsarge, Mich.

¶When one roughing cut will do on lathe work, do not make two out of it.

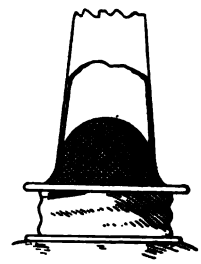
Testing an Electric Meter

The following is a quick and reliable method of testing electric watt meters: An incandescent lamp of a known wattage, at the voltage at which the meter is to be tested, is connected in circuit with the meter. Observe the time required for the disk to make one revolution with lamp in circuit. If, for instance, the constant is ½ (which is generally found at bottom of meter dial), then ½ of 3600 watts, which is a constant, will be 1800 watts. Supposing the disk required 32 seconds for one revolution, then 1800 divided by 32 equals 56 watts, or about the average consumption of a 16-cp. lamp, if this be the consumption of lamp in circuit.

Meters are regulated by a magnet through which a disk revolves. By moving the magnet towards the shaft on which the disk rotates the meter will run faster; by moving away from shaft, the meter will run slower. Many people have an idea that their watt meters are running too fast. As a matter of fact, a meter after running for two or three years will invariably run slow, caused by the steel pivot of the moving element wearing away the sapphire jewel upon which the disk revolves.—Contributed by Alvin Kolb, Bedford, Ohio.

Strainer in Oil-Can Spouts

Small particles of dirt and foreign matter would get into the small end of the spout of my oil-can and clog it up so no oil could be forced out. I inserted a small sieve, shaped like a thimble, in the lower end of the spout, as shown in the sketch. Any fine gauze wire can be used for the sieve. This catches all the dirt, but does not prevent the oil from flowing freely.—Contributed by Chas. Homewood, Waterloo, Iowa.



Remedy for Damp Walls

If a wall is suspected of dampness, a piece of gelatine held close to it will tell the story at once. If the wall is dry, the gelatine will not change: if damp, the gelatine will turn or curl more or less, according to the degree of dampness. If the wall is very damp, it will need no testing. One good remedy for a wall not very damp is a mixture of 1 lb. of good glue dissolved in 1 gal. of water, into which, while hot, has been stirred some dry red lead until the mass is of the consistency of ordinary paint. The surest and best remedy, according to the Master Painter is the Sylvester process, as follows: Cut up ¾ lb. of castile soap in 1 gal. of water, and dissolve; now dissolve ½ lb. of pulverized alum in 4 gal. of water. With a brush for each solution, using a wide brush, apply a coating of the soap solution, rubbing it well into the wall; let it dry until next day, then apply a coat of alum water; let this dry until next day, then repeat with the alum and soap once, as before. Thus the wall will receive two coats of soap and two of alum, which will form a chemical compound impervious to water. Very damp walls treated with this simple coating will give no trouble under paper for years.

How to Fasten Pipe into Hose

Anyone who has repaired a broken hose knows how hard it is to insert a pipe in an open end, as the pipe and the hose are usually not the same size. File the pipe to make it bright and heat it just enough to make the metal blue, then put it in a vise. Slip the hose on the pipe quickly and place it in water to cool, after which attach the clamp, and the hose will hold tightly.

Unloading Device

Many cities operate a sanitary plant for the disposal of refuse. The largest part of this material consists of papers and tin cans, which makes the unloading exceedingly hard where dump wagons are not used. One city supplied each wagon with a flexible wire screen, just wide enough to fit loosely on the floor of the wagon box, and with one end fastened to the tail-board hinge pin. The screen extends forward the full length of the body, then turns upward to the seat. In this end is fastened a ring.



Drawing Wagon from Under the Load

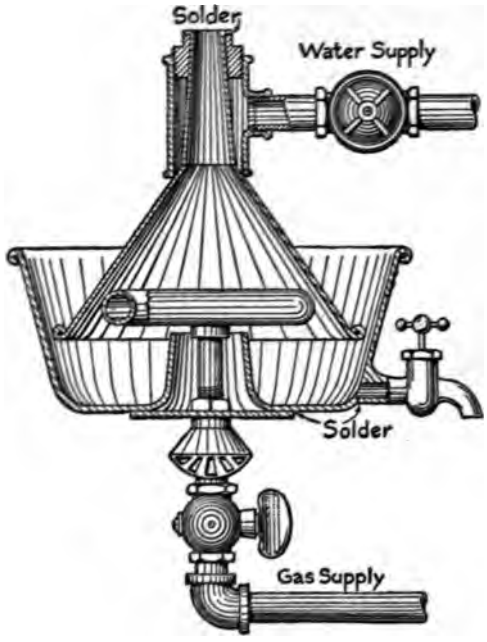
At the unloading point a hook is hung from a rope fastened to a support above. This hook the driver engages in the ring on the screen. When the horses are started, the wagon is drawn out from under the load. The device saves a great deal of time because the mass of paper, wood, cans, etc., becomes so packed that it is very difficult to shovel out.—Contributed by J. J. O'Brien, Buffalo, N. Y.

¶Always keep a lathe clean and in order.

¶Use shellac for the base when repainting a sign over red and the color will not bleed through and spoil the appearance of the job.

Home-Made Instantaneous Water Heater

The old proverb, "A watched kettle never boils," does not apply to the water heater shown in the accompanying illustration, because hot or even boiling water can be drawn from it the instant it is put into operation, says the Scientific American. It is made of an ordinary copper funnel and a cake tin.



Heats Water Instantly

The copper funnel should be tinned on the outside. To the water supply pipe is attached a valve for regulation of the flow of water. To this valve is fitted a short nipple and an ordinary tee fitting. One end of the arm of the tee is fitted with an ordinary plug which is bored and reamed out to fit the small end of the funnel, and the end of same is turned over with a small hammer and soldered to the plug. The other end of the tee is filed to fit very closely to the outside of the funnel, leaving a slight annular opening which may be regulated by screwing the plug in or out so that when the water is turned on it will flow in an even thin sheet over the funnel.

Inside the funnel is an ordinary gas burner, such as may be purchased for 10 cents. The burner is connected to the gas supply in the usual manner. It will be noticed by referring to the illustration that the funnel is in an inverted position. The lower part of the funnel is surrounded by an ordinary cake mold with the inside cone partly cut off. This tin forms a basin for the hot water, which may be drawn off with an ordinary faucet soldered to the cake tin, or it may be run off as the water heats. It will now be seen that when the gas is lighted the funnel becomes hot at once, and when the water is turned on it is forced through the narrow opening between the tee and the funnel in a uniform thin sheet which spreads over the funnel and becomes hot as it flows down. Almost any degree of heat may be obtained by regulating the flow of water with the valve. The spent gases from the gas burner pass up through the funnel and out to the atmosphere. Some arrangement may be made to connect the water and gas valves so that they will be turned on simultaneously, thus obviating the danger of overheating the funnel.

Sawing Tubes at an Angle

Tubing cannot be sawed accurately at an angle without a bench hacksaw. When one of these tools is not at hand, the following method will produce excellent results:

Say, for example, that one wishes to saw a piece of brass tubing at an angle



Angle of Cut Made in Block

of 20 deg. to its length. Take a block of wood of sufficient length and thick enough to admit boring a hole into it lengthwise without splitting the wood.

Bore a hole having the same diameter as the tubing, from end to end, perfectly parallel with the edges. With the aid of a protractor, adjust a sliding bevel to 20 deg. and lay off a line with it on the face of the block. Mark off another line with a square on the end of the block. Make a cut with a back or cross-cut wood saw along the lines drawn, sufficiently deep to bisect the hole already bored. It only remains then to shove the tubing into the hole, insert the hacksaw blade in the slot and saw away. The accuracy of the sawing depends on the precision with which the wood block is prepared.—Contributed by Harry F. Lowe, Washington, D. C.

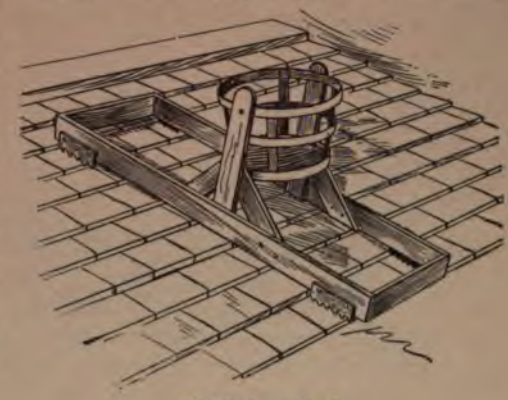
Keeping a Lantern Bail Upright

When setting a lantern down, the bail always falls to the side, thus making it necessary to stoop in taking it up again. This is sometimes very unhandy, especially if the arms are full. The trouble may be overcome by using a small weight soldered to the bail as shown in the sketch. Attach the weight to a wire about 2 in. below the end of the bail. This allows the bail to swing, but it will always come to rest in an upright position. Such a device may be used on pails, also.—Contributed by Stephen E. Shaw, No. Dartmouth, Mass.



Roof Jack for Holding Paint Pots

Painters who have much roof painting to do must have some sort of a device to hold the paint pot in an upright position, as it is very unhandy to carry it with one hand and paint with the other. A simple device to hold the paint pot, that is easy to make and will work on a roof of any pitch, is shown in the accompanying sketch. Secure some keg hoops and make a



Pot Jack on Roof

basket, as shown, large enough to hold the paint pot. The basket should have a wooden bottom and the top hoop should be fastened to two uprights of a wooden frame, so that it will swing freely between them. Four saw-tooth clips, fastened to the supporting frame, will hold it securely to the roof. This device can be easily moved about the roof and will always hold the paint pot in an upright position.—Contributed by W. A. Jaquythe, Richmond, Cal.

Repairing a Pump Jack-Arm

The arm of my pump jack broke at the place marked A in Fig. 1, and I repaired it in the following manner:

A piece of metal ⅜ in. thick and 1½ in. wide was bent and shaped to fit over the main part of the arm and was held in place with two clamps, as shown in

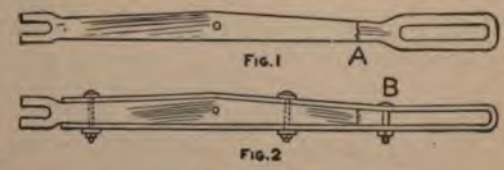


FIG. 1

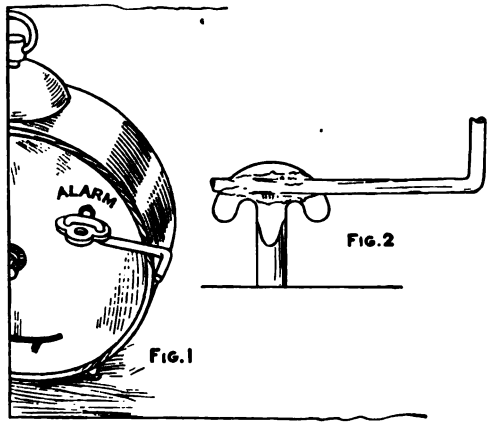
FIG. 2

Repaired Arm

Fig. 2. The bolt B was put in to keep the sliding bearing from becoming loose.—Contributed by Geo. Hess, Jr., West Grove, Pa.

Attaching Crank to a Clock Key

The ordinary wing key on a clock is usually hard to turn and this is especially the case if the clock be perma-



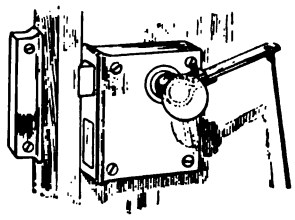
Crank on Clock Key

nently located on a more or less inaccessible shelf.

The attachment of a little crank to the key, as shown in Fig. 1, greatly facilitates the operation of winding, and causes much less fatigue to the arms and fingers. With the ordinary key having holes in the wings, it may be made of a piece of wire bent as shown in Fig. 1. If the key does not have holes in the wing, it may be soldered to the side of the key, as shown in Fig. 2.—Contributed by Thos. L. Parker, Olaf, Iowa.

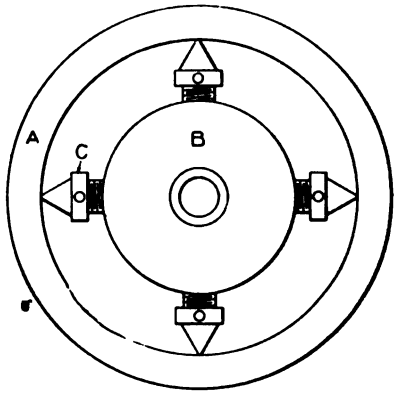
A Simple Door-Opening Device

Here is a device for opening a door which seems to me simpler than any other I have seen, and which requires but two or three minutes to assemble on the door. First bend to the shape shown by the full and dotted lines a piece of iron about 6 in. long, ½ in. wide and of suitable thickness; then drill holes for a small stove bolt to secure the bent portion when placed in position around the knob spindle, and one at the extremity of the straight end for a string. The stove bolt when screwed tight makes the iron stationary. The string should be long enough to reach to the bottom of the door, where it may be kept in position by means of a small screw eye.—Contributed by D. O. C. Kersten, Detroit.



A Center for Turning Large Work

It is sometimes necessary to make a center of some sort when turning certain kinds of large castings in the lathe. A handy adjustable center for such work is shown in the accompanying sketch. A is a casting to be turned and faced. B is a hub that is tapped for four steel-pointed screws, as shown at C. This hub can be adjusted to the inside of the casting and made con-



Hub with Center in Casting

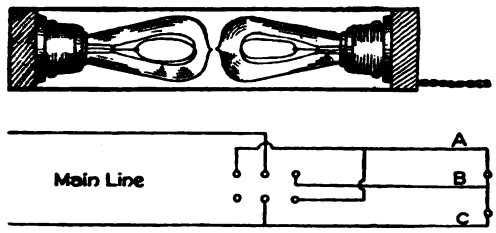
centric with it, so it can be turned in a lathe, by means of these screws. The hubs can be made of different sizes to correspond to the different sizes and kinds of work.—Contributed by C. Purdy, Ghent, O.

Electric Foot-Warmer

A simple electric foot-warmer which has many uses in the place of a hot-water bottle and which takes the place of the more expensive heaters now on the market, is shown in the accom-

panying sketch. Two 16-cp. incandescent lamps are turned into plain sockets in the ends of a tin tube about 2½ in. in diameter and 15 in. long. The lamps are joined in series and connected with a lighting circuit. When joined in this manner, the lamps heat slowly and are not liable to scorch the woolen jacket with which the tube should be encased. The consumption of current, too, is extremely small.

If it is desired to wire the lamps so that the device will heat much faster,

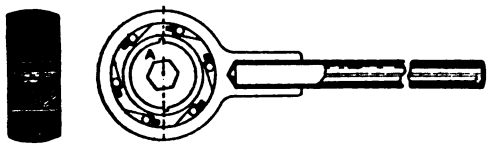


Lamps in the Tube

the lamps may be shifted from the series to the parallel arrangement by means of a double-throw switch connected as shown in the diagram. It then becomes necessary to run the three wires A, B and C from the switch to the heater.

A Silent Ratchet Wrench

The construction of a ratchet wrench with a roller-pawl action is shown in

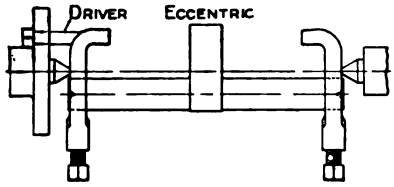


Roller Pawl Ratchet Wrench

the accompanying sketch. The roller pawl will catch and hold at any point, and the usual lost motion due to the ratchet not catching in the next tooth is avoided. The part A is removable and stud sets, stud extractors and similar tools used in its place. The construction of this wrench allows its use in close corners where even an open-end wrench would be at a disadvantage.—Contributed by Frank S. Bunker, Vallejo, Cal

Turning Eccentrics

A method of turning eccentrics without the use of special tools is shown in

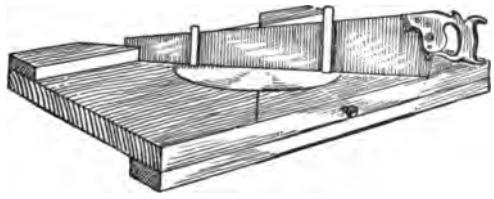


Dogs Used in Turning Eccentric

the accompanying sketch. This method applies to cases where the center falls outside the shaft. The shaft of course is turned on its own centers; then two lathe dogs are centered, drilled and applied as shown. They should be firmly clamped to the shaft so as to avoid slipping. A pin or a bolt in the slot in the faceplate serves as a driver.—Contributed by D. A. Hampson, Middletown, N. Y.

Forms for Sawing Miters on a Cabinet Bench

The illustration herewith shows a device in which a saw can be used for cutting square and miter joints. The main part is made of a plank 1¾ in. thick, 10 in. wide and 24 in. long. A riser to hold the work against while the cut is being made, is fastened to the back edge of this plank. A cleat attached on the front and under side holds the form against the bench. A disk, 7 in. in diameter, is cut in the center of the bed plank and fitted to turn freely, but not loosely. This disk has two standards for holding the saw perfectly vertical. By placing a set screw in the front edge of the plank,



Saw in Guides

the disk can be held in the required position to cut the square or miter desired.

Shutter Speed Tester

All photographers who use a shutter for quick exposures realize the value of knowing the actual exposure given by a shutter at its various speeds. This requires some kind of a speed-timing device. Many forms of speed-timing devices have been described, says a correspondent of Photographic Times, but they are usually too complex for the average photographer to construct. The illustrations show a device sufficiently simple for anyone to construct, and the records it gives are accurate enough for ordinary requirements.

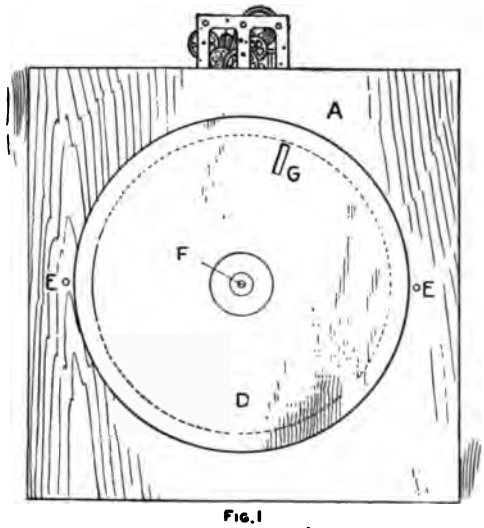


FIG. 1

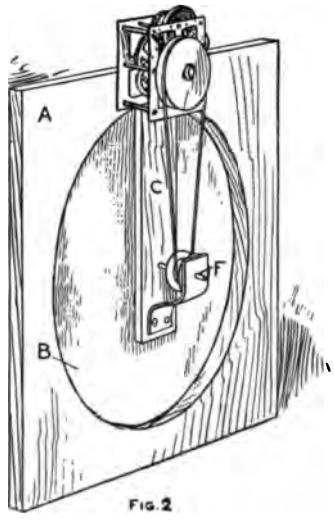


FIG. 2

Shutter Speed Recorder

The principle is that of photographing the light which passes through a slot in a disk while the latter is revolving at a known speed, then measuring the length of the impression on the sensitive plate.

The apparatus consists of a board, A, about 18 in. square, in the center of which an opening is made, shown by the dotted lines in Fig. 1. Over this a narrow strip of wood, C, Fig. 2, is fastened to form a support for the shaft F, of the revolving disk D, Fig. 1. The disk, which may be made of thin wood or a piece of mounting board, must be a little larger in diameter than the circular opening in the board A. Near the edge of this disk a narrow slot G, is cut, which must come within the opening in the board so that the light may pass through the slot. A stiff piece of wire may be used for the shaft F, a block of wood being glued on the center of the disk to allow of its being mounted true. The disk is placed in position by passing the spindle through a hole in the wooden strip C, the outer end being held in place by a bent piece of metal as shown in Fig. 12.

The disk is turned by clockwork, of which some of the wheels must be removed to allow the "post" to revolve fast enough. A grooved wheel is placed on the post in place of the clock hands, and a spool attached to the shaft F, the two being connected with a light twine belt. The difference in size between the two pulleys is regulated by the speed at which the larger one revolves, and the speed at which one wishes the disk D to turn, the latter depending on how rapid an exposure is to be tested. For tests up to about 1-100th of a second, one revolution per second might do, but for more rapid exposure the speed of the disk must be increased. It might be well to say here that clockwork which has been altered as previously mentioned

will vary a little in speed while running, so in taking the time of the revolution of the disk it is always well to allow the works to run a certain length of time before snapping the shutter. Accurate results always can be obtained by taking this precaution.

The tester is set up against a window with clear sky for a background and all light blocked out around the apparatus with heavy brown paper. The image of the slot G is focused sharply, then after setting the shutter at the speed desired and starting the disk revolving, the exposure is made. The diameter of the disk is recorded on the negative by the images of the two small holes E E, shown in Fig. 1, so all that is necessary is to measure the distance apart these are on the negative, and then draw a circle on paper of the same diameter. The length of the beam of light which passed through the slot G during the exposure is next measured with a pair of dividers, deducting the actual width of the slot, and the number of times this goes into the circumference of the circle plotted off, the result giving the duration of the exposure.

For example, suppose a 3-in. circle is indicated on the negative. The circumference of this is approximately 9 in. The length of the beam of light as recorded is ½ in., after deducting the width of the slot, and the disk was revolving one turn a second, so as ½ in. goes into 9 in., the circumference of the circle, 18 times, the speed of the shutter was 1-18th of a second.

One advantage of this tester is that it can be used indoors, while other simple speed-testers depend upon daylight for illumination and must be set up out-of-doors in bright sunshine.

Preventing Work Slipping from a Chuck

Anyone working at a lathe knows how disks chucked on a small center or pieces extending from a chuck will slip and turn, causing the piece to gradually come out of the chuck as the work proceeds. The accompanying sketch shows how to supply teeth or grippers for each jaw on the chuck so that it will hold the piece being turned.

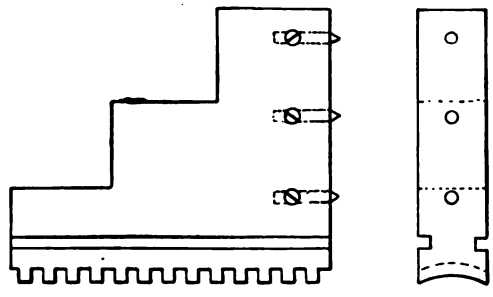


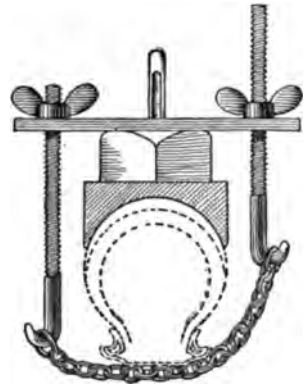
Fig. 1 Fig. 2

Steel Points in Each Jaw

When the grippers are not required they can be removed by loosening the setscrews. The pins should be made of steel and hardened.—Contributed by Walter L. Keefer, Waynesboro, Pa.

A Home-Made Vulcanizer

A novel vulcanizer for pneumatic tires, and one that will do excellent work, can be made of an old electric smoothing iron. The handle is removed and a ¼-in. hole drilled in the top, 1¾ in. deep, for a small thermometer registering high temperatures. A small wood pattern is made flat on one side, and cut out to fit the tread of the tire on the other, and used in making a mold for a brass casting. A piece of wood is formed to fit the inside of the shoe.



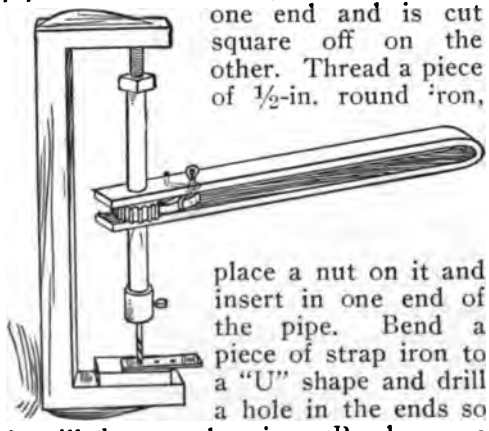
Two rods of wrought iron, ¼ in. in diameter by 6 in. long, are each threaded on one end for a distance of 3 in. The other end of each of these rods is formed into a hook to hold a piece of chain. The sketch clearly shows the apparatus, also the method of clamping

it to an automobile tire. It is only necessary to connect the iron by a flexible electric cord to a lamp socket in the ordinary way, the current being preferably turned on at the iron and not by the socket switch.

As soon as the right temperature is reached, the current is turned off to avoid overheating. This is repeated for a few minutes and then the apparatus is removed. The same method may be used for making repairs on casings as well as inner tubes in ordinary repairing.—Contributed by Geo. H. Handley, Newburgh, N. Y.

Home-Made Ratchet Drill

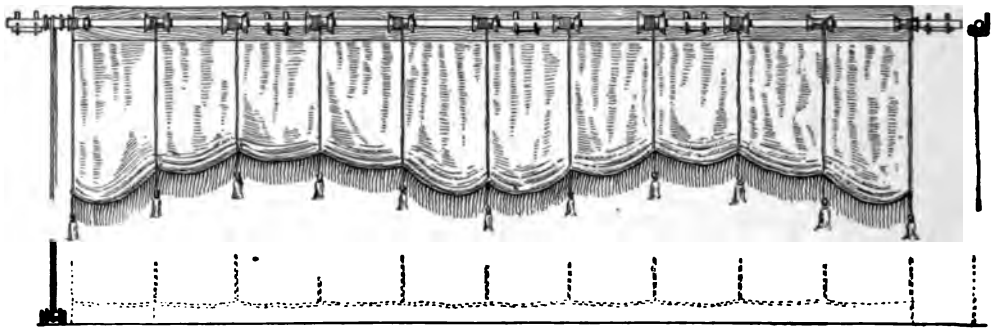
Secure a gear from an old clothes wringer and fit it over a piece of ½-in. pipe which has a coupling screwed on one end and is cut square off on the other. Thread a piece of ½-in. round iron,



place a nut on it and insert in one end of the pipe. Bend a piece of strap iron to a "U" shape and drill a hole in the ends so it will fit over the pipe. Bend an eye in a piece for a dog and fasten it in the lever with a cotter pin as shown. Then attach a small spring to keep the dog engaged in the teeth of the gear.

Drapery-Hanging Pole

In the accompanying illustration is shown a curtain pole having spools of various diameters on which the lifting cords are wound when the pole is revolved. This pole passes through the



Lifting Cords Varied by Different Sized Spools

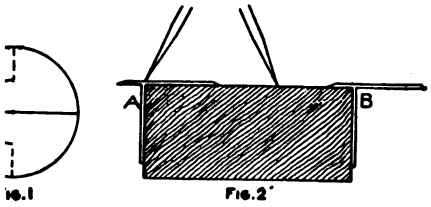
spools and is held in place by brackets at each end and in the middle which permit it to revolve freely either way when the cords are pulled at the left side, says the Upholsterer. A small bag of shot is sewn to the bottom of each shirring line, in order to make the curtain fall smartly when released. From right to left, the first spool is 1⅞ in. in diameter; the next, 2¾; the next two, 3 in. in diameter; the next, 2⅞, and the next, 2 in. This spool is the middle of the shade, and from that point to the left the diameters are a repetition of the first five mentioned, reading from 2⅞ back to 1⅞ in.

An Edge Center for Patternmakers

Patternmakers are often compelled to lay out a half circle on a block of wood, one face of which is the center line of the circle. In doing this they must hold or clamp a smaller piece to the work so as to make a surface for the compass or divider points. When this method is used, the center point or pivot end of the dividers sinks so far into the wood that a true circle cannot be made, especially when working on the end grain of soft wood.

A handy tool that will overcome these troubles is shown in the sketch. The tool is made by cutting a disk 2 in.

iameter from $\frac{1}{16}$-in. sheet brass aying out a center line on one and another center line on the site side at right angles to the line. In the center lay out and hrough a semi-circle as shown in 1. Bend the edge of the disk at angles outside of the small semi-, taking care that the bending is on the dotted center line. This tion leaves the ½-in. circle pro-ig, as it is not bent with the disk. a place on the center line down to rp edge and carry the line down ie bevel edge. Make two small ssions with a center punch on the r line, each at a point directly e the inner and outer vertical sur-of the part turned down. The tool ıced on the wood as shown at A,



ıe.1 FIG.2

Center for Compasses

2, for making large circles and as for the smaller ones.—Contrib-by D. K. Bowie, Detroit, Mich.

Drilling Holes Central with a Center-Punch Mark

the point of a drill strikes the side center-punch mark, the hole will rilled slightly to one side of the r because the work will not slide e metal of the faceplate. I made ice to place between the work and ıceplate that would adjust itself to slight touch of the drill. The od of construction is as follows: ɔcure two pieces of sheet metal $\frac{3}{32}$ iick by 2 in. square and fasten together with screws. Drill four . holes about ⅜ in. from each r. Take the pieces apart and tersink the holes on the inner deep enough so that when the s are placed together, a ¼-in. steel will roll freely and leave a small arc of the ball's surface protrude through the hole. Put a ¼-in. ball in each hole and screw the plates to-gether.

Set on this plate the piece of work

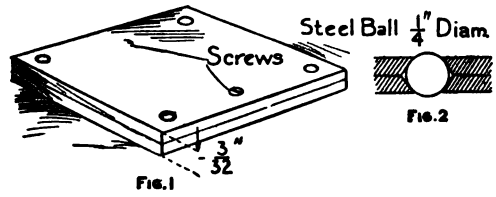


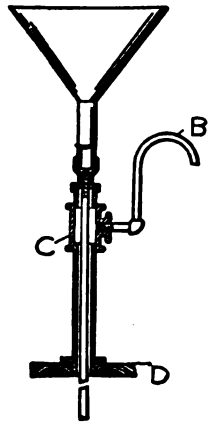
FIG.1 FIG.2

Four Balls in the Plate

to be drilled. If the drill does not strike the center-punch mark straight, the plate will shift itself and the work, so the drill will follow the center of the mark. On large work, two or more of these plates can be used.—Contributed by F. W. Granger, Waterbury, Conn.

Hydraulic Oil Pump

The sketch shows a home-made oil pump which I used for some time with satisfactory results, says a correspondent of Power. The pump is inserted in the head of a barrel and water poured in through the funnel A at the top, thus passing down through the inner pipe and into the bottom of the barrel D. The water being heavier than the oil displaces the latter and causes it to rise in the outer tube to the tee C and out through the curved spout B. This arrangement keeps the barrel clean and the water prevents it from becoming dry.

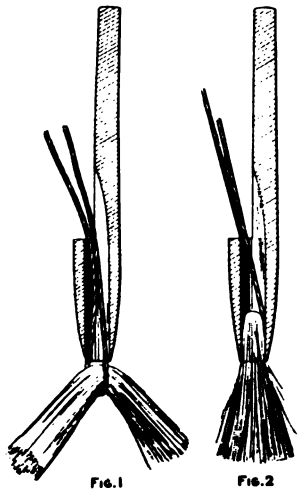


If the funnel is of 1-gal. capacity, a gallon measure may be used to catch the oil without danger of overflowing.

¶Never take it for granted that a reamer will ream to size.

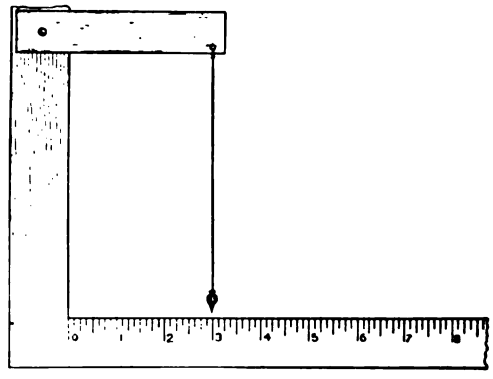
Belt Punch Used for a Brush Handle

Many times a workman in a machine shop wishes to use a small brush and does not have one at hand. Belt punches are more numerous than brushes in such a shop and one of these can be used as a handle. The bristles or a substitute can be drawn into the hole with a string to make the brush part. In Fig. 1 is shown the method of drawing the bristles in place and in Fig. 2 the completed brush.—Contributed by Geo. Schneider, Cincinnati, O.



An Extemporized Level

While helping to build a house many miles from town, I found that I needed a level but could not well spare the time to get one. I therefore made one by fastening to my square a piece of an old tin can and attaching a cord with a plumb bob, as shown in the sketch. The distance from the edge of the square to the cord at the top being 3 in., it was only required to have the plumb rest at the 3-in. mark on the square to have the work level.—Contributed by "Builder," Brooklyn, N. Y.

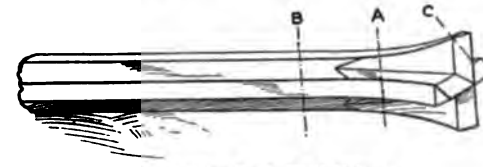


Plumb on a Square

How to Harden and Temper a Rock Drill

The following way of hardening and tempering a drill for rock work will give satisfaction in every case. Place the drill in the fire, heat the end evenly about 1 in. back from the cutting edge to a cherry red and plunge it, cutting end first, into a cooling bath of soft water and salt. This is known as the hardening process.

If the rock to be drilled is very hard, it will not be necessary to draw the temper, while for soft rock the temper may be drawn to a light blue. On small drills, the temper is drawn by heating a pair of tongs to a bright red and clamping them over the tool, as indicated by the dotted line B. Draw the color until the cutting edges C show a light blue. If the drill is too large for this method, the flame from a blow-torch can be applied 1 in. or so back from the cutting edge. When a blow-torch is used, the flame should be moved from one side to the other, to insure an even heat.—Contributed by J. N. Bagley, Webber, Kans.



Tempering Rock Drill Points

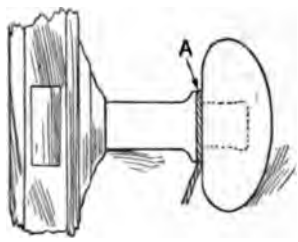
Protection for the Eyes from Intense Heat

When working at a forg
length of time the brightnes
of the fire is liable to injure
When the ey
temporarily
one's work.
necessary
bright a

one is getting on the work until the iron begins to "spit." Or, at hardening, if the job is carefully watched, as it should be, until the right heat and color are reached, when the eyes are quickly turned away and focused on the polished part of the job to see "the color come" they are so blurred and blinded from the light of the fire that the proper color cannot be distinguished. This may be remedied by setting a piece of colored or stained glass in a wood frame about 8 by 12 in. in size and hinging it from the hood of the forge. Then when doing a job as described, one can watch the fire and work in comfort and when the critical moment approaches, swing back the shield and look at the heat with clear eyes.

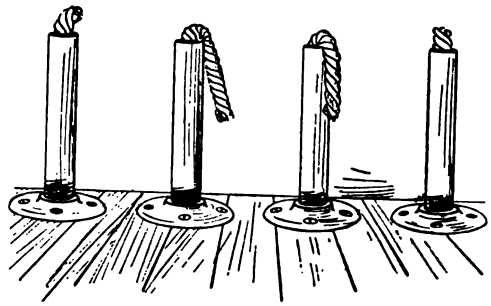
Fastening a Loose Door-Knob

The socket of a knob on one of my doors became loose from the grip and began to rattle. I repaired it by dipping some fine wrapping cord in cold glue and then winding it around the socket in the small joint, between the shoulder of the socket and the grip. The string was wrapped tightly until the joint was full, then the ends were tucked in with the point of a knife blade. The glue was given time to set, after which the knob was as firm as a new one.—Contributed by D. E. Woodoth, Moorestown, N. J.



New Way of Handling Rope

The arrangement illustrated herewith for handling rope, the stock of which is kept in the cellar was originated by a correspondent of Iron Age. Instead of the time-honored method of simply bringing the ends of the coils up through holes in the floor and tying knots in the ends, a series of pipes are screwed into floor flanges over the holes and the ends of the rope are drawn up through the pipes.

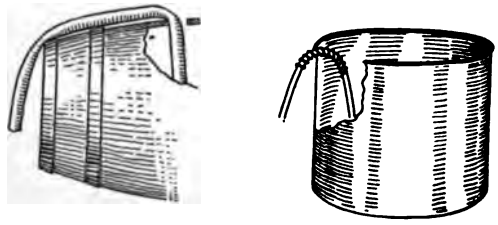


Ropes in the Pipes

A 1-in. pipe will readily pass a ¾ or ⅞-in. rope and a 1¼-in. pipe, the 1-in. size; while ¾-in. pipe answers for the smaller sizes. The larger sizes of rope are prevented from slipping back through the pipe by putting a large spike or nail in the pipe by the side of the rope. An advantage of this arrangement is, that the rope is not soiled by sprinkling the floor or in sweeping, and it is more convenient to get hold of the rope ends than if they were nearer the floor.

Preventing Plain Rubber Hose from Kinking

Rubber tubing, having no canvas interlining, is easily kinked. This trouble can be remedied by slipping a spring of flexible brass wire, about 6 in. long over the tubing. The spring should fit snugly but at the same time so that it can be slipped along the tubing to preserve its contour at the point or points where the kinking occurs.

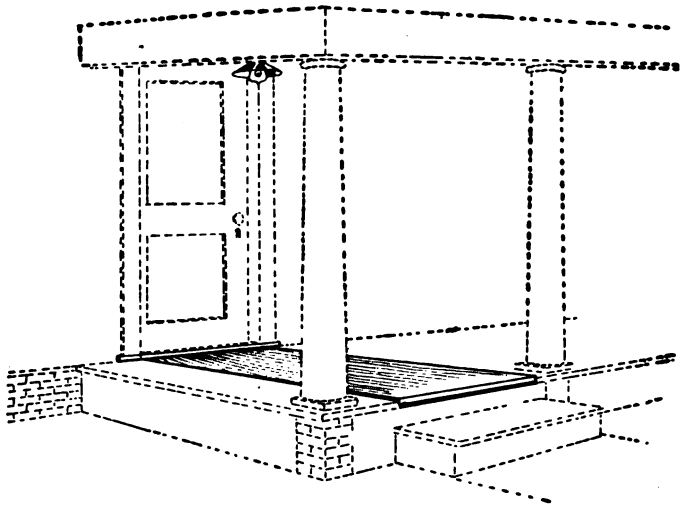


Preserving the Contour of Rubber Tubes

The wire spring from a discarded curtain roller will answer the purpose for the size tube it fits.

Automatic Porch Light

In some cities the current used for porch lights is charged for on a flat-rate basis, and usually the price is excessive considering the amount of actual service. The only time it is necessary to have one of these lights in use is when a person steps on the porch, be it a friend or foe. Where a meter is used, the light bill can be greatly reduced by using the porch lights only when necessary.



Porch Floor Operates Electric Contact

I have my porch so arranged that the boards leading to the door are hinged and held 1/8 in. above the sleepers by a spring, says a correspondent of Practical Engineer. The contacts on the wire leading to the porch are made weather-proof.

When stepping on the porch, the pressure of the foot "makes" the circuit, and the electric lamp is lighted and remains so just as long as one remains on the porch in front of the door. A burglar would be frightened away by the sudden glare of the light as he would think his presence known. A meter reading of a porch light like this is hardly noticeable and the light is more valuable than when burning all the time.

Tool for Boring Large Holes in Boiler Plate

The accompanying sketch shows how I made a tool for boring large holes in boiler plate in a case of emergency. The tool was used to cut some holes in the shell of a boiler of the locomotive type. The holes were then tapped with a 2-in. pipe tap. The shell of the boiler was 3/8 in. thick. The tool was driven with a ratchet drill stock.

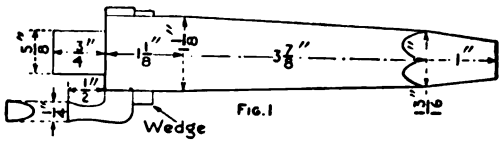


Fig. 1

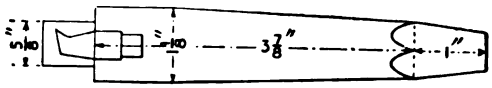


Fig. 2

Details of Boring Tool

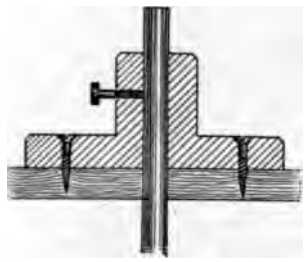
A 5/8-in. hole was first drilled in the center of the place desired for the large hole. The tool was then put in the ratchet stock and the cutting tool, which can be adjusted, set to $2\frac{3}{16}$ in. The center of the larger hole was then cut out, leaving a perfectly round hole for tapping the threads. As a number of these holes had to be made on a hurry-up job, this tool greatly aided the work.

A piece of old rock-drill steel was used after annealing as thoroughly as time would permit. The cutting tool

was made of ⅜-in. lathe-tool steel, forged and ground as shown. The ⅝-in. guide should be made tight enough to require some pressure to force it in a ⅝-in. drill hole when it is to be used with a ratchet stock. The shank could be made a standard drill taper and used in a lathe or drill press.—Contributed by Jack Campbell, Denver, Colo.

Elevated Center for Large Radii

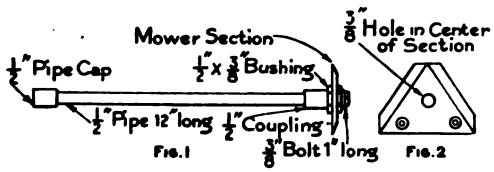
This center will be found handy for the pattern-maker, die-maker and machinist in striking large radii. It



may be placed on the end of a bench or table, or even on the floor, but in the latter case a place should be selected where it will not be stepped upon.. The center may be raised or lowered according to the thickness of the metal on which the arc or lines are to be inscribed. It may be made of wood or metal.—Contributed by G. Crawford, Schenectady, N. Y.

Home-Made Floor Scraper

The parts necessary to make the floor scraper illustrated in the sketch are some pipe and fittings, a bolt and a mower section. A hole is drilled in the center of the mower section and then fastened to the end of the pipe with the bolt. All the edges of the section are

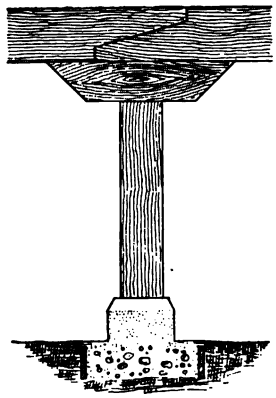


Scraper Made from Mower Section

ground sharp. This will make a satisfactory scraper for floors and trees.—Contributed by John Blake, Franklin, Massachusetts.

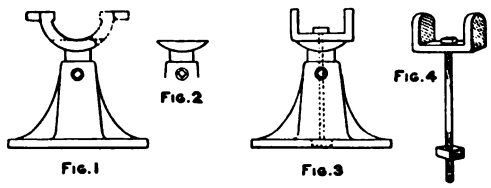
Foundation Supports

In the accompanying illustration is shown a method of placing a concrete base for foundation posts. For an ordinary house, the concrete should be about 2 ft. deep in the earth and the top part built up of a neat cement about 1 ft. high and finished smooth for the sake of appearance. This keeps the timber away from the earth and dampness; preventing rot. The timbers are jointed in the usual manner and set on a corbel placed on top of the post.—Contributed by Geo. Niesen, Chicago.



Shaft Hanger Repair

A cast-iron hanger had one of its arms broken off as shown by the dotted lines in Fig. 1. To make the hanger uniform, the remaining arm was re-

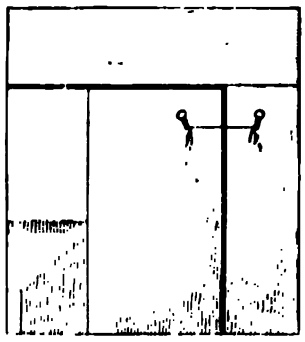


Wrought Iron Ears on Hanger

moved and the base ground off as shown in Fig. 2. A piece of ½-in. wrought iron, drilled for setscrews and a central retaining bolt, was placed on the pedestal and secured by a bolt, run through to the bottom of same, as shown in Fig. 3. The repair part and bolt are shown in Fig. 4. This made the hanger much stronger than the original casting.—Contributed by James M. Kane, Doylestown, Pa.

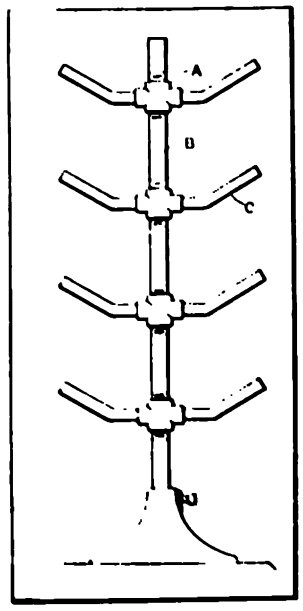
A Simple Thief-Catcher

A servant was suspected of robbing the pantry which was always kept locked, but to which she was not supposed to have a key. To make sure, a pin was set in the door and another in the frame near the top, and to these pins a black thread was tied. When the servant pried in, the thread broke. The petty thief confessed her guilt on being shown the evidence of the "little detective."—Contributed by Maurice Baudier, New Orleans.



Stock Rack for the Shop

A rack that is designed for holding long rods of bar stock is shown in the accompanying sketch. This rack is especially adapted to the screw machine department, where, in many instances, stock is left on the floor for lack of sufficient room on the rack usually furnished with screw machines. Standards or racks of this construction can also be used in connection with the screw machine as supports, by adding a suitable supporting piece to the top. The number of arms or brackets can be made to suit the requirements. The cost of this rack is comparatively small as all parts can be purchased ready to assemble. The piece A is a ¾-in. by ½-in. malleable cross; B is a ¾-in. by 6½-in. nipple, and the arms C are also made of pieces of pipe, ½ in. in diameter by 8 in. in length. The nipples and pipe are extra heavy. The base can be obtained from any stock house. These racks can be used to a good advantage in the stock room for holding rods or sheet metal.—Machinery.



Lining Cement Cisterns with Paraffin

A cement cistern may be made tight and clean enough for cider and vinegar storage by the following method:

The cistern must be thoroughly cleaned and then two coats of cement and water are applied to the walls. These coats may be applied on successive days. After the second coat has set for at least 24 hours, apply a coat of paraffin. This is done by heating it to a temperature slightly above the melting point. Apply a thin coat with a cloth or paint brush. The coating should be well rubbed before it gets cold and should not be disturbed after it gets solid. The bottom of the cistern is coated last. When applying the coat to the bottom, the workman should work from a suspended platform.

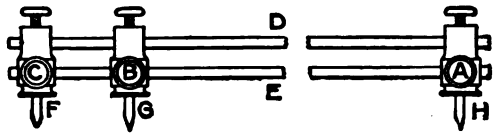
Binding-Posts Used for Trammel Points

The trammel points are a necessary tool for some work, but they are so seldom used that every draftsman does not have them in his kit. The cost is too much, for the amount of service. Substitute points can be made of three double binding-posts, A, B, and C, and two nickel-plated brass rods, D and E. Three pieces of ⅛-in. brass rod are pointed and threaded to fit the bottom

ends of the binding-posts, to serve as points. The parts are assembled as shown in the sketch.

These trammel points may be used to find the true points on an ellipse much quicker than by using a straight-edge, as follows: The post A is set at the ends of the rods and firmly clamped. The post B is set so that the distance from point H to G will equal the semi-minor axis, and the post C set so that the distance from H to F is equal to the semi-major axis and all firmly clamped in place. Any length of rods may be used for D and E.

The middle post may be removed



Binding-Posts on Rods

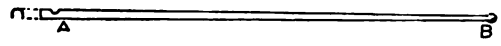
and a pencil or pen substituted for the point H, and the device used as a beam compass.—Contributed by J. L. Riley, Dallas, Texas.

Simple Mottling Process for Tool Steel

The attractive mottled finish put on dropped forged tools is produced by casehardening in bonedust. This is a long, slow process of several hours and requires a quantity of bonedust, a good-sized receptacle and fireclay. Practically the same thing can be obtained without these, though the case-hardening will not run so deep. Put enough potassium cyanide or prussiate of potash in a ladle, kettle or iron receptacle of any sort and heat until red-hot. Dip the article to be hardened and finished into this molten cyanide and leave a few minutes—long enough to be brought thoroughly up to the red heat, and a little longer. Then take out and quench in clear, cold water and you will have a fairly mottled surface.

Needle for Lacing Bicycle Tires

A very handy device for use in lacing bicycle tires instead of the ordinary needle is to take an end about 4 in. long from an old umbrella rib and file an eye as shown in the sketch at A. The



Umbrella Rib Needle

ball B on the other end prevents pricking holes in the inner tube, as is often the case when using a needle.—Contributed by Robert A. Cochrane, Adrian, Mich.

Turning "Springy" Stock in a Lathe

Turned bars and rolled steel, being perfectly round, can have a steady rest applied at any point, but long, slender pieces of rough stock are hard to turn in a lathe because of their "springiness." The easiest way to overcome this trouble is to use a "cat-head," the simplest form of which is made of pipe. Take a piece of 2-in. pipe, 5 in. long, chuck it, and turn a spot true 1 in. wide in the middle. Then about ½ in. from each end put in four $\frac{5}{16}$ by 1¼-in. set-screws, quartered. You then have a cheap and efficient cat-head for work ¼ in. to 2⅛ in. diameter. In use, this is slipped over the work and the set-screws set up till the turned spot runs true. Practice at this will soon make the job easy. The steady rest is then applied to the turned portion of the pipe, when a good big cut can be taken without fear of spring or chatter.

A Wood Cutting-Off Tool

The accompanying illustration shows how to forge a bar of steel to make a cutting-off tool that will give plenty of clearance in making the cut.



Cutting-Off Tool

The tool A is made thinner on the top and bottom, leaving the middle full at the cutting edge B, which is the width of the cut.—Contributed by C. P.

¶The lathe centers are not the place to straighten bars of steel.

Coat and Hat Hanger for Campers

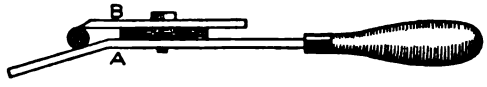
A suspended garment hanger especially convenient for soldiers or campers is shown in the accompanying sketch. The hanger can be hung from the ridge pole of a tent. It will economize space in a hall bedroom or cramped quarters. By attaching the hanger to a pulley arrangement, it can be raised and lowered at will. The clothes will be kept well aired and ventilated, and as they hang away from the wall where light strikes on all sides, no moths will get in the cloth.



A dozen garments can be hung from one line by attaching one device below the other. The hanger can be made of wood in any length and turned up in a lathe to suit the fancy of the maker. Ordinary coat hooks are fastened to the sides with screws. A common screw eye is used for the line at the top.

Tool for Cutting Tenons

A piece of steel, $\frac{3}{16}$ in. thick and ¾ in. wide, is used for the main part of the tool. It is bent as shown in the sketch, and a handle attached to each end. The sketch only shows one handle. The cutting knife B is fastened to A with a screw. The block between A and B should be the same thickness as the diameter desired for the finished tenon.



For Accurately Turning Tenons

Cement Concrete Vats and Tanks.

Impervious, odorless, tasteless and sanitary vats and tanks for buttermilk, wine, oil, pickles, sauerkraut, etc., can be constructed of reinforced concrete, the reinforcing to be designed by a competent engineer, provided the interior surfaces are treated as follows:

After the forms are removed, grind off with a carborundum stone any projections due to the concrete seeping through the joints between the boards. Keep the surface damp for two weeks from the placing of the concrete. Wash the surface thoroughly and allow to dry. Mix up a solution of 1 part water glass (sodium silicate), 40° Baume, with 4 to 6 parts water, total 5 to 7 parts, according to the density of the concrete surface treated. The denser the surface the weaker should be the solution.

Apply the water-glass solution with a brush. After four hours and within 24 hours, wash off the surface with clear water. Again allow the surface to dry. When dry, apply another coat of the water-glass solution. After 4 hours and within 24 hours, again wash off the surface with clear water and allow to dry. Repeat this process for three or four coats, which should be sufficient to close up all the pores.

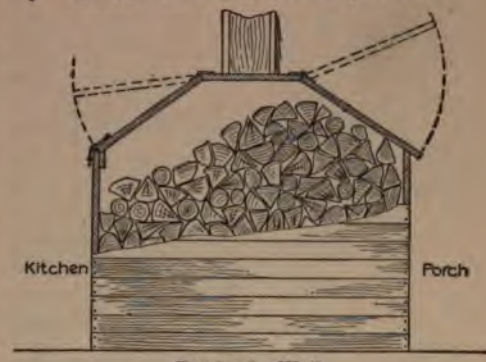
The water glass which has penetrated the pores has come in contact with the alkali in the cement and concrete and formed into an insoluble hard material, causing the surface to become very hard to a depth of ⅛ to ½ in., according to the density of the concrete. The excess sodium silicate which has remained on the surface, not having come in contact with the alkali, is soluble, therefore easily washed off with water. The reason for washing off the surface between each coat and allowing the surface to dry is to obtain a more thorough penetration of the sodium silicate.

It is obvious that concrete surfaces so treated, if hard, impervious and insoluble, are thus made tasteless, odorless and sanitary, also.—**Contributed by** Albert Moyer.

SHOP NOTES

Wood Box in the Wall of a House

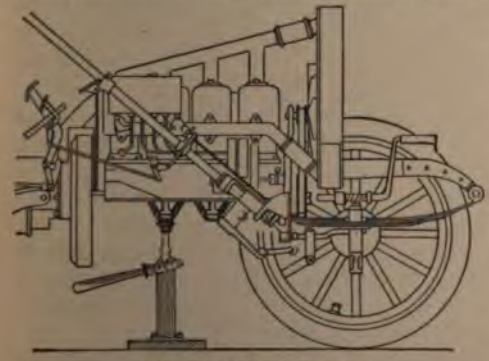
In planning a house or remodeling the kitchen, provision should be made for storing a liberal quantity of stove wood, heater chunks or coal, so as to avoid going out in the rain or snow to the wood shed for the house supply, which in a protracted cold spell must be replenished often. The sketch shows how a built-in wood box may be arranged to load from the outside and emptied from the inside. A spring lock or hasp on the kitchen side keeps the box closed against entry from the outside. This box insures a lasting supply of dry wood, as it may be built as large as one's needs demand.—Contributed by Victor Labadie, Dallas, Texas.



Box in the Wall

Finding Loose Bearings in Automobile Engines

The usual method of finding "play" in connecting-rod bearings on automobile engines is to remove the lower half of the crank case, open the cylinder relief cocks and "feel" the connecting rods either by hand or a pry-bar. Often the play is so small that the hands fail to locate it, in which case the pry-bar is used. Very often no leverage can be had on the pry-bar, then this method is not positive.



Jack under Crank Bearing

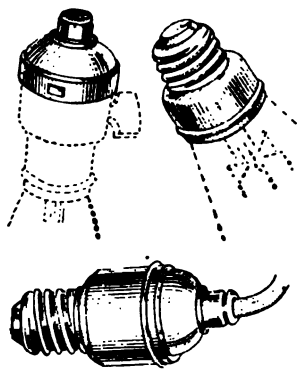
When there is any uncertainty about the pound or looseness of a rod or main bearing, a heavy pry-bar with exceptionally good leverage must be used to "feel" the crankshaft in its bearings. It is very inconvenient, however, to work such a bar up and down beneath a car.

The best method I have found is shown in the sketch. Run the car over a pit, if possible, although the bare floor will do. Raise the car by means of a jack to suit the conditions for testing. If the rod bearings are to be tried, run a jack head against the lower half of the connecting-rod bearing and work the jack handle up and down. The smallest amount of play can be detected in this way, especially on the main bearings, where the pressure of the jack is applied on the crankshaft against the weight of the car and "play."—Contributed by L. A. Prince, Cincinnati, O.

¶A good slate-colored paint for a roof is made from white lead, lampblack and yellow ochre.

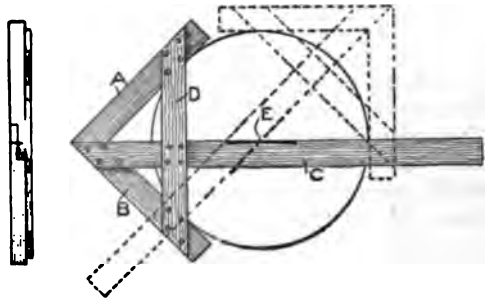
Attachment Plug Made from Lamp and Socket Parts

The accompanying illustration shows the parts that are used from an electric lamp socket and the metal base of a tungsten lamp to make an electric plug. The glass is broken away from the metal base of a discarded globe and the cap from a socket will fit snugly in the place of the glass. The wires are soldered to the places where the filament connections of the lamp were attached. The finished plug will have as good an appearance as one purchased from an electric supply house.—Contributed by Lee Kittredge, Jackson, Mich.



Tool for Finding the Center of Shafts

The center of a shaft, a round casting or a large round object may be easily found with the tool shown in the illustration. To make it, nail together two pieces of board, A and B, so that they form a right angle, and fasten a long piece, C, so that one of its edges



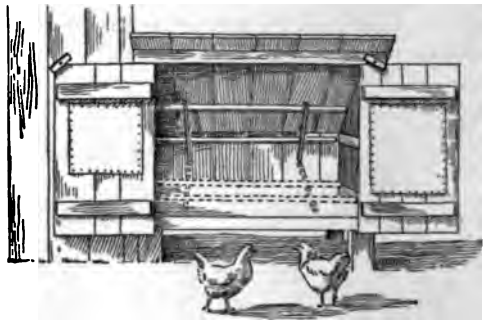
Finding the Center of a Shaft

bisects this right angle, a brace, D, being nailed over the three pieces to insure rigidity.

Lay the device on the end of the round object with the right angle drawn closely to the circumference and then draw a line along the edge of the long piece C. Move it to another position and draw another line. The intersection, E, of these two lines will be the center of the object.—Contributed by Walter Johnson, St. Paul, Minn.

A Chicken House

The owner and designer of the chicken house shown in the sketch has had remarkably good returns from his poultry, getting plenty of eggs at a time when other chicken keepers in the neighborhood were buying from the grocer, and he ascribes much of his success to the novel features contained in his device.



Sanitary Chicken House

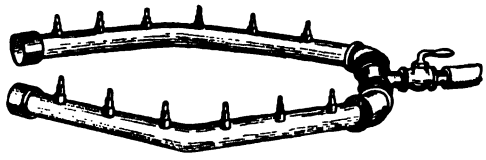
The house has a southern exposure, and the two doors which form the front can be thrown wide open so that the interior gets a sun bath every day. In addition to the frequent coats of whitewash, lime is sprinkled on the floor, which is easily kept clean. The doors are fitted with windows, unglazed, but screened with ordinary burlap, which allows sufficient ventilation and still keeps out objectionable drafts.

The most novel feature of the device is the roost, which is fastened by hinges to the rear wall and can be raised to the roof and hung on a hook, thus making it easy to clean the floor. At night the roost is let down and rests on two iron feet, and these, together with the roost, are covered with crude oil which does not need renewing very often. As

a result of this cleanliness, exposure to the sun and treatment with oil, there is not a resting place in the chicken house for the insect pests which make hens unhealthy and disinclined to lay, and the cost and care are practically no greater than with the old-fashioned house.—Contributed by C. L. Edholm, Los Angeles, Cal.

Portable Gas Heater for a Steam Furnace

Often in the fall and winter months and even early in the spring, it is desirable to have heat in the house for a short time only—just enough to drive off the chill. It is inconvenient and wasteful to build in the furnace a coal fire large enough to generate steam, for when the rooms are warmed, the surplus heat is allowed to escape through the smoke pipe. The sketch shows an inexpensive and easily constructed gas heater which I have made and used with much satisfaction. A piece of pipe shaped like a horseshoe, with about twelve 2-ft. burners, is inserted in the upper small door of the furnace and supported on the ledge of the small door in the rear. Rubber tubing is attached to the stop-cock and connected with the nearest gas-pipe. After allowing a gallon or so of water to enter the boiler, ignite the heater. Because the burners are in close contact with the boiler, steam is generated quickly and the house becomes warm at trifling expense. Where it is desired to start a coal fire, the heater may be removed instantly and hung on the wall for future use. Of course, with

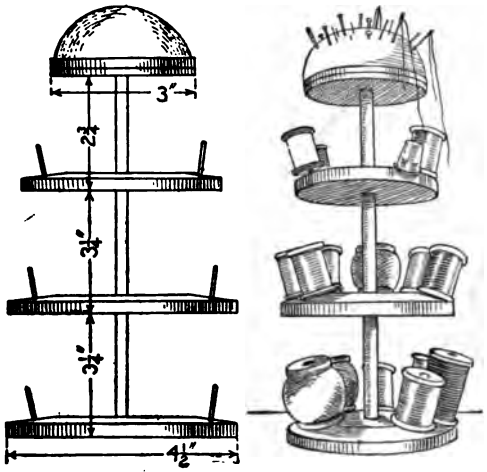


A Temporary Heater

some furnaces, the heater must be shaped a little differently, and the number of burners depends upon the amount of steam needed.—Contributed by G. H. Hill, Montclair, N. J.

Pincushion and Spool-Holder

An ornamental as well as a useful article for the sewing room is shown in the sketch. When made up and finished in the wood the same as the other furnishings of the room, it will have a neat appearance.



Spool and Needle Holder

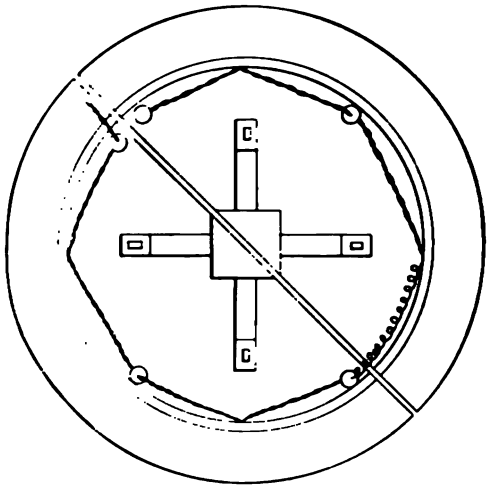
The center post is made of a $\frac{7}{16}$-in. dowel which is glued into the mortise of the base. The small pins are made of ¼-in. dowels and six or eight are set into each block. The cushion block is made of two thin pieces, the cushion being made over one and this nailed or screwed to the other before gluing it to the center post.—Contributed by Mrs. Carrie E. Dilly, South Haven, Michigan.

Removing a Stubborn Nut

Heat an open-end wrench that fits the nut and while hot place it on the nut and allow it to remain for two or three minutes, says the American Machinist. The heat will cause the nut to expand and it can be taken off with ease. A heated wrench gives much better results than a blow torch, as the torch will heat the nut and bolt at the same time, where the hot wrench only heats the nut. Any nut which resists the hot wrench will probably have to be split to take it off.

Electric Connections for a Dining-Room Table

The many electric devices for cooking a hasty meal have brought about conditions that must be considered when wiring for the electric current in



Showing the Wire Connections

order to have the connections near where the utensils are to be used. One family, desiring to have several small heating devices on the dining room table, "electrified" the table top as shown in the sketch.

The electrical equipment of the dining room consisted of the lights, a fan and three practical heating appliances, —a toaster, a coffee percolator and a chafing dish. When the owner of the house first purchased the appliances, he used them on extension cords which were plugged into the lighting fixtures, but he thought this method could be improved upon, so he called in an electrician and had the table wired as shown. A plug was set in the floor under the table and connected in the basement with the main feed wires. The connection between the plug and the tap under the apron of the table is a silk-covered flexible lamp cord of ample capacity to carry the current.

The wiring on the table top was made so that the extension could be drawn out without disturbing the circuit.

The electrical equipment is used at almost every meal. Toast and coffee are made for breakfast; luncheon dishes are frequently prepared in the chafing dish; the after dinner coffee is always made electrically, and frequently little suppers of oysters, rarebits and lobster are given. For formal dinners, a decorative lighting outfit of miniature lamps is used effectively.

A Shaft's Speed Determined without a Speed Indicator

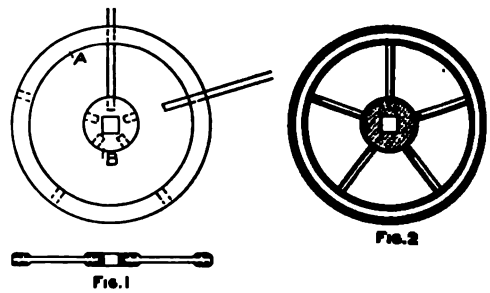
Having occasion to find the revolutions of a high-speed shaft, and no speed indicator at hand, I used the following method:

I moved the point of a lead pencil along the rotating shaft for a period of 10 seconds, then stopped the shaft and counted the spiral pencil marks. This number I multiplied by 6 which gave me the number of revolutions per minute.

Be sure to keep the pencil moving parallel with the shaft so the mark will be spiral and not one over the other.—Contributed by C. R. Poole, Los Angeles, Cal.

Aeroplane Steering Wheel

The accompanying illustration shows a simple construction of an aeroplane steering wheel. A 12-in. wheel is made of three pieces of oak, ⅜ in. thick and 19 in. square, glued together with the



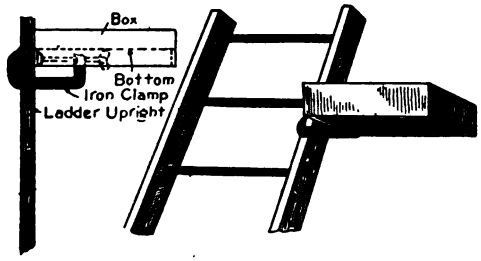
Wheel Made of Wood

grains of adjacent boards crossing at right angles. The rim A, Fig. 1, is sawed from these boards, and holes

bored through for the spokes. The spokes are made of hickory, ⅜ in. in diameter. They are fastened with brads and glue. The completed wheel is shown in Fig. 2.—Contributed by F. W. Stromer, Gig Harbor, Wash.

Sign Painters' Shelf for a Ladder

I recently saw a sign painter using the device shown in the illustration to hold his materials while working on a ladder. The bottom of the box was placed far enough up to permit an iro clamp to be placed underneath and against the end piece. This clamp fastened the box securely against one of the uprights of the ladder. The box



Sign Painters' Ladder Bracket

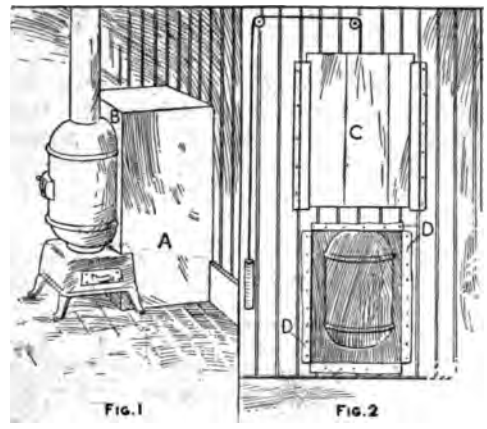
can be placed on either side.—Contributed by J. M. Kane, Doylestown, Pa.

Heating Two Offices with One Stove

In many business places which include a private office and a general waiting room, it is a problem to heat both these rooms effectively with one stove, at the least expense.

The accompanying sketch shows a simple method which has proven satisfactory. Make a connection from any kind of stove through the wall or partition behind the stove with sheet iron, A, Fig. 1. Insert the box-like form from the adjoining room so as to be able to have a turned-back edge (D, Fig. 2) left in the room to be heated, through which to drive nails to hold it in place. Bend and trim the sheet iron at B, Fig. 1, to fit the stove.

The heat is regulated in the inner office by a sliding lift door (C, Fig. 2),

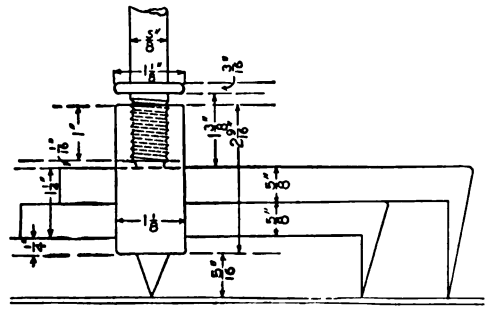


Heat Box on the Stove

which slides in grooves at each side. The door can be raised with a cord and weight, or by having a cord run to some convenient place in the office.—Contributed by Dr. D. D. Smith, Sandusky, O.

A Gasket Cutter

The detailed sketch shows an inexpensively made gasket cutter that may be used extensively in many shops. The tool may be of any size and proportion consistent with strength requirements. With the shank fitted to a drill press in the shop, or in a hand brace, it will quickly pay for the trivial expense of its manufacture, both in speed and the quality of work it will do.

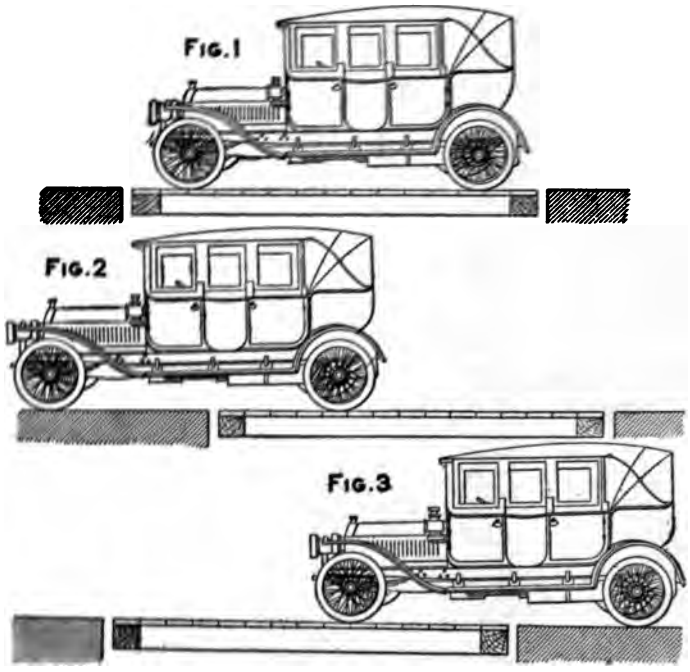


Details of Gasket Cutter

This tool can be used to cut gaskets from almost any material with the exception of metals.—Contributed by F. W. Bently, Jr., Huron, S. Dak.

How to Weigh an Automobile

The best way to ascertain the weight of a car is to take it to the public weigh scales and, if possible, place it so that the four wheels rest on the scales as shown in Fig. 1.



Three Positions in Weighing

Sometimes this is not possible, owing to the great length of the wheelbase and the shortness of the scales, says the Automobile. In any case, the car should be fully equipped with all accessories—spare tires, full tanks, water, oil and gasoline, and each seat that can be occupied filled with a passenger, for reasons that will be made clear. Of course, if the car can be weighed on the scales with both front and rear wheels resting on the bridge, to obtain the total weight it is only necessary to add 150 lb. average for the number of passengers the car will carry, but this does not give the weight per axle or per wheel—the important point in determining the proper size of tires.

It can first of all be assumed that the combined weight obtained by weighing the car as shown in Figs. 2 and 3 should give the total weight obtained by the method used in Fig. 1 to within a few pounds, but the weight carried on each of the four wheels is by no means one-fourth of the combined weight. The reason of this is that different bodies are of different weights, and the position of the body and seating capacity has a bearing on the amount of weight thrown on the front and rear wheels. Take, for instance, seven-seated limousine and two-seated runabout bodies that are used on the same chassis. The tires that are just large enough for the latter will be quite inadequate for the former, but the cost of upkeep on the runabout will be decreased if it is fitted with tires that are large enough for the limousine, although if detachable rims are fitted, a tire of smaller section could be used if desired. However, the cost of the rims would not compensate for the difference in price of the two tires.

To See Bearings in Fine Die-Cutting

I am a die-maker on watch work, the finest class of work known, and our dies have to be absolutely in perfect alinement. It has been the general custom heretofore to use Prussian blue to enable the cutter to see the bearings. Recently, however, one of our men discovered a new kink which has, with us, superseded the old method. Having a gas flame burning low and red,

he accidentally stuck the punch into the flame and thereby got a fine black coating on it. He tried that with the intricate cut he had in hand, and since then we have never used anything else. It is the best thing ever discovered for this purpose, for with it one can find bearings which could never be found any other way. Simply turn the gas down low without any blue flame, turn the punch around a few times, and you get a thin, fine black coating which will show the bright at the slightest touch, and give you every bearing perfectly. —Contributed by J. L. Van La Walker, Springfield, Ill.

Preventing a Bottle from Tipping Over

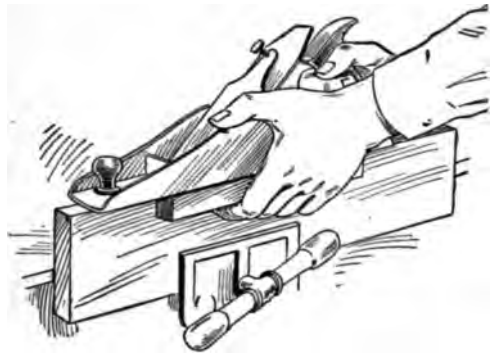
The bottoms of bottles or small vials commonly used for holding medicines, extracts or chemicals are so small compared with their weight that they are liable to be overturned and the contents spilled.



A simple expedient to make them more secure is shown in the sketch. The device consists of several pieces of tin about 2 in. long bent at right angles with a pair of pliers. Place three of them on a round vial at equal distances apart and use four on a square or rectangular-shaped bottle. Bind them tightly with a thread or twine as shown. This will make a base that is secure, and the bottle or vial will slide on a surface before it will tip over.—Contributed by C. S. Browne, Lowell, Massachusetts.

Planing the Edges of a Board Square

A time-saving method of planing the edge of a board square is to place a perfectly square block of wood on the bottom of the plane near the left side for a guide and holding it with the left hand, as shown in the sketch. This forms a vertical surface true with the surface of the board and holds the edge of the plane-iron at right angles. A little practice in holding the guide under the plane will enable one to plane the edge of a board perfectly true.—Contributed by J. J. O'Brien, Buffalo, New York.



Holding Block on Plane

Keeping Drinking Water Clean for Chickens

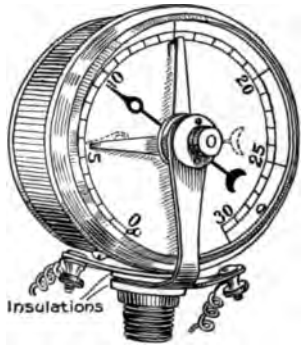
Cut several lengths of No. 9 wire about 24 in. long and secure them to a board in such a way as to form a circle of radiating wires from a center point similar to the spokes of a wheel. Melt some lead and pour it into the center, and when cold the wires will be fastened together. Bend the wires in a shape similar to the ribs of an umbrella and set the device over the pan of water, as shown in the sketch. The wires will prevent the fowls from stepping into the pan and give them plenty of room for their heads, when they want to drink.—Contributed by Otto J. Kling, Youngstown, Ohio.



¶Best results are obtained from hose nozzles made from 6 to 10 times the hose diameter in length, with the hole at the end one-third the hose diameter

A Steam-Gauge Alarm

On low-pressure boilers where the attendant is required to do other work away from the boiler room, the electric alarm attachment for the steam gauge shown in the accompanying sketch will prove quite valuable. The ordinary alarm attachments provide only for the ringing of the bell when the pressure is either too high or too low. The one shown not only gives an alarm under either of these extreme conditions, but can be set at any desired pressure instantly. The one shown in the sketch is set for giving the alarm when the high pressure reaches 15 lb. and the low pressure drops to almost 5 lb.



The position of the pointer shown by the dotted lines makes the contact for closing the electric circuit. The thumbnuts for setting the contact points are attached to a piece of brass extending over the edge and glass face of the steam gauge. The glass, being a non-conductor of electricity, provides a way to hold the contact points clear of the metal of the steam gauge. A hole is drilled through the glass in the center for the stems of the thumbnuts. The parts are insulated on the stem as shown.—Contributed by Herman Oenning, Chicago.

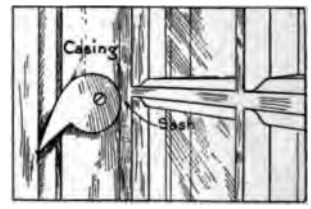
Marking Iron in a Structural Shop

The following method of marking iron will be found very valuable in locating material, saving the fitter's time and saving crane service.

Instruct the layout men to mark all iron as near to the right as possible. The fitter, knowing that all the iron is marked at the right end, can place it in position for assembling on the skids, thus saving the time it takes to check up and turn some pieces end for end. As all structural shop men know, a fitter will get his iron on the skids, then, after the crane has gone to some other work, he will check up his work and find some of it must be turned. This means a loss of time waiting for the return of the crane. The layer-out must stand while looking at the iron in the same relative position as when looking at the drawing, in order to locate the right end.—Contributed by Edwin J. Knapp, Cleveland, O.

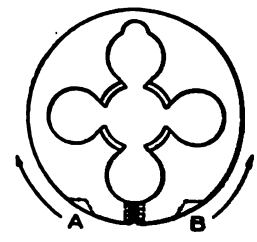
A Window Sash Stop

The accompanying illustration shows a small device to take the place of an ordinary window stop. It is made of soft wood cut out with a knife. If a more substantial stop is wanted, it may be made of metal. When two are placed, one on each side of the window casing, one as shown and the other turned over in a reversed position, they will hold the sash immovable.—Contributed by Lily M. Norrell, Blythe, Ga.



Correct Way to Use a Die

There is a right and a wrong way to use dies as with everything else. You have perhaps noticed that a die seems to work harder and to dig up the threads more at one time than at another. This refers to the round solid type that is split on one side and has a round countersunk hole on each side of the split



to receive the driving screw from the die stock. If the screw is put in hole A when run on the work and in hole B when backing off, a big difference will be observed. A moment's thought will convince you that this is the logical way, as the natural drag of the die will keep the side opposite the screw from pulling in on the work, and the position of the screw keeps its own side from crowding.—Contributed by D. A. Hampson, Middletown, N. Y.

Fastening a Hasp from the Inside of a Door

A good way to fasten a hasp or latch to a door and make it impossible to be removed when locked is shown in the sketch herewith. A narrow slot is cut through the door about ¼ in. from the edge and the tongue of the hasp inserted as far as it will go. It is then bent around as shown in Fig. 1 and fastened with screws from the inside. All the screw heads are on the inside or covered as shown in Fig. 2. It cannot be taken from its place but by removing the padlock.—Contributed by Chas. Homewood, Waterloo, Iowa.

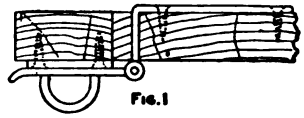


FIG. 1

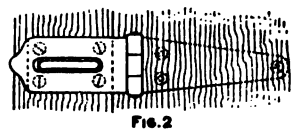


FIG. 2

Turnbuckles for Aeroplane Bracing

While building a helicopter I needed a lot of small, light turnbuckles, says a correspondent of Scientific American, and not being able to obtain anything suitable, I made them out of bolts and wire as illustrated in the sketch. They were made of No. 14 soft steel wire and an ordinary $\frac{3}{16}$-in. stove bolt. This

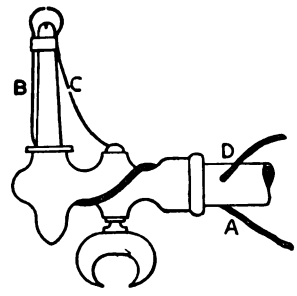


Wire and Stove-Bolt Turnbuckle

turnbuckle will easily stand a strain of 200 lb.

To Make an Electric Gas-Lighter

The electric gas-lighters now on the market are generally high-priced, but here is one that can be easily made at little or no cost. An insulated wire, B, is brought from the battery and wound around the fixture, the end being brought up and bent over the tip, as shown in the diagram. The wire may be held in place at the top of the tip by tape, but care must be taken to keep it well insulated from the fixture.



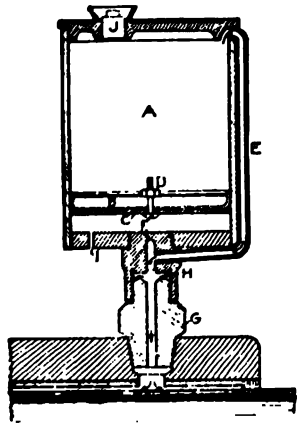
The screw which holds the key in place turns every time the gas is turned on or off. In the slot of this screw is soldered a piece of heavy copper or brass wire, C, which is bent over so as to come in contact with B when the gas is turned on. The contact should be broken just before the gas is turned full on, so that when the gas is burning the two wires are a little distance apart. If these two wires were kept in contact, the battery would soon run down. To complete the arrangement, a wire is grounded on the gas pipe somewhere near the battery. This should be soldered to the pipe to make a good connection.

Electric lighters like this have been in use by the writer for more than six months and give good satisfaction. If the flame is arranged to burn across the plane of the two wires, they will not burn or become coated with soot, although that can be easily wiped off. —Contributed by George Heimroth, Brooklyn, N. Y.

¶ When laying out six holes or dividing a circumference or circle into six equal parts, the straight-line distance is half the diameter—that is, the dividers should be set to the radius of the circle.

Forcing Lubrication by Centrifugal Force

If the ordinary oil or grease cup is used on a loose pulley, it will not allow the grease to feed on the shaft when the wheel is in motion. This is due to the centrifugal force which tends to keep the oil pressed against the top or cover of the cup.



If a small pail is filled with water and swung in a circle in any plane, not a drop of the liquid will be spilled, provided the velocity exceeds a certain value. The oil in the ordinary oil cup acts the same way when the cup is rapidly rotated. In the accompanying sketch a cup is shown which I have made to use the same force (centrifugal force) to force the oil into the bearing.

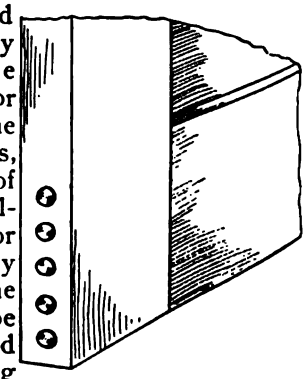
The cup is made of any straight-bored cup with a tight-fitting cover, but instead of feeding from the bottom it feeds through a separate pipe, E, whose upper end is attached as near the top as possible. This pipe leads around the cup and into the plug F, which screws into the bottom of the cup. The plug F is blind on the cup side and screws into the plug G, which in turn fits into the hub of the pulley to be oiled. Between the plugs F and G is fitted a diaphragm, H, which is made of sheet lead or soft copper and has a very small hole in its center.

The cup is fitted with a piston, B, which is also made of lead. A cup leather is used over the lead to make it oil-tight and a plate, C, bolted on with a stove bolt, D, whose upper end projects sufficiently to form a stop against the cover of the cup to protect the leather.

The action is simple, as the centrifugal force tends to throw the oil and the piston to the top of the cup. The oil exerts pressure on account of its own centrifugal force, but, as it cannot get away all at once, the pressure of the piston also helps to force it in the course taken by the arrows and then through the hole in the diaphragm H, and on the bearing to be oiled. The size of the hole in the diaphragm varies with the conditions of the pulley to be oiled. High-speed pulleys will naturally have a higher pressure on the oil, therefore they need a smaller aperture to obtain the necessary flow of oil. It is necessary to have a vent, I, in the bottom of the cup to relieve the vacuum under the piston.

This cup has the advantage of feeding only when the pulley is in motion, the only time it needs oiling.—Contributed by L. S. Bunker, Vallejo, Cal.

Preventing Rats from Gnawing through a Door



Rats and mice usually gnaw a hole through a door at one of the lower corners, as the angle of the crack allows space for breaking away the wood. The rodents can be prevented from gnawing by driving several finishing nails into the wood, as shown in the sketch.—Contributed by W. E. Cleveland, Chicago, Ill.

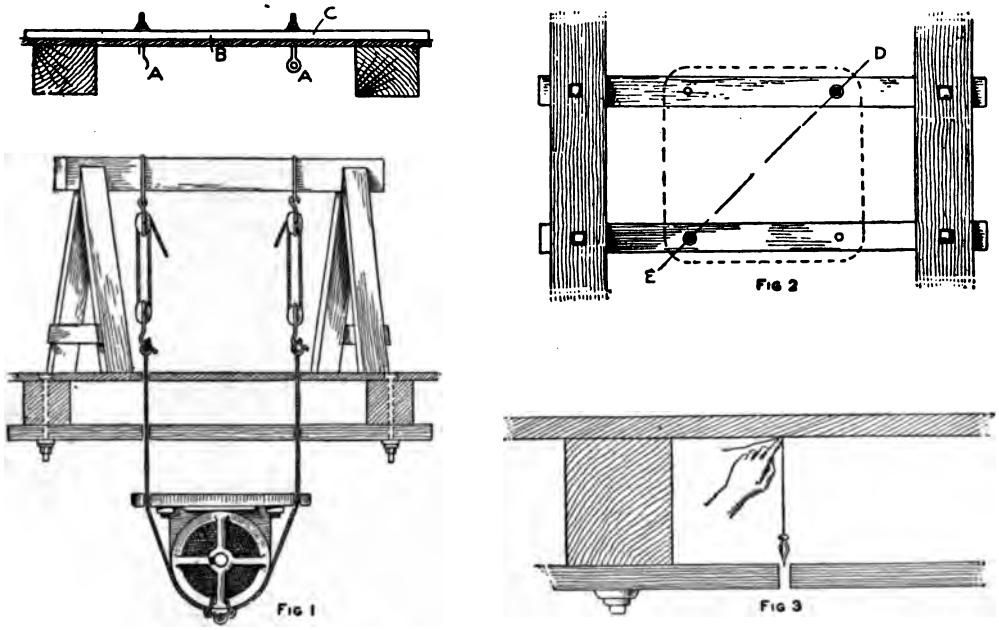
¶The motorist having need for a funnel when on the road can use the horn as a substitute. It requires but a minute's time to remove the horn from the car, disconnect it and take out the reed.

Raising Inverted Motors

Under certain conditions the method shown in the illustration will be found excellent for raising a motor to its intended place on a ceiling, says Electrical World. The tackle is arranged as shown in Fig. 1. The motor is raised with two ropes, each of which passes through a bedplate bolt hole and over the motor, and is fastened to the eyebolt in the top. The two holes used for the ropes are the ones at diagonally opposite corners. After being made fast to the motor, the ropes are run through two of the four holes which have been bored through the stringer pieces for the bolts to hold the motor. The ropes are then run through two holes accurately located in the floor above. The plan of the motor base with the diagonal holes located on the line ED is shown in Fig. 2.

The hoist is arranged so that it is directly over the two holes in the floor through which the hoisting ropes pass. Instead of using a horse to support the tackle, it is sometimes best to arrange temporary eyebolts in the floor next above, as shown at A, A. These bolts can be removed when the motor is in place. When the motor is drawn up against the stringer pieces, two bolts are inserted in the open holes and the nuts are set tightly. The hoisting ropes are pulled out and the other two bolts inserted.

When using this method, it is not necessary to cut large holes in the floor. The stringer pieces through which the holes are bored for the motor supporting bolts are bolted to the beams. Each hole should be ⅛ in. greater in diameter than the diameter of the supporting bolts. A long bit can be used for boring the two holes for the hoisting ropes through the stringer pieces and the floor. If such a bit is not at hand, the locations of the floor holes can be accurately determined with a plumb bob, as shown in Fig. 3. The floor holes should be large enough to prevent the rope from binding in them.



Hoisting an Inverted Motor into Place

¶Iron will show red at 1,000 to 1,300 deg. F., according to the light, and at 700 deg. in the dark.

A Rural Mail-Box Post

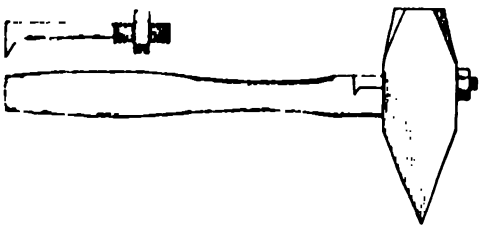
The accompanying sketch shows a rural mail-box post I made, which rests on the ground instead of being set in a hole. I have moved twice since this post was made and it was easy to place on a load with the household goods.



The post is made of 2-in. by 4-in. material, each piece of the triangle being 2 ft. long and the upright 4½ ft. high. The braces are ⅞-in. by 2½-in. material, 16 in. long. The block, to which the box is attached, is bolted to the upright so it can be raised or lowered to suit the convenience of the carrier. Contributed by O. H. Albaugh, Chesterland, Ohio.

Holding a Hot Cutting Chisel on a Handle

The wood handle of a hot cutting chisel burns from the intense heat and in time the head will become so loose from the shrinking wood that it will slip off when struck a glancing blow. The illustration shows a little device that will hold the chisel and handle together,



Bolt for Holding Hammer on Handle

no matter how the wood is charred or shrunk. The method of construction is obvious and does not need further explanation.—Contributed by Walter W. White, Denver, Colo.

Foot Support for Ladders

Painters and others who work on ladders know how exhausting it is to stand on a rung for any length of time without tiring the feet. One painter overcame this difficulty by making a pair of supports to fit on the soles of his shoes as shown in the sketch. They were made of hardwood, each having two metal clamps screwed to the sides. A strap passes under the support and through the clamps to hold the support against the sole of the shoe.

The device will be a little troublesome when used the first time, but the wearer will soon learn to lift his foot a little higher in climbing a ladder. They will prevent the feet from slipping on the rungs, but the main advantage is the way they rest the feet and limbs, as the weight of the body is supported on a much larger area of the shoe sole.—Contributed by James E. Noble, Toronto, Canada.

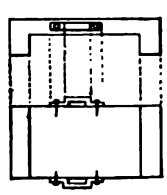


Fig. 1

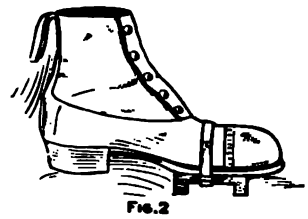


Fig. 2

Support on Shoe

How to Repair a Canvas Canoe

A good repair job on a modern canvas canoe is sometimes hard to make as it usually leaves a bulge in the canvas over the repaired spot. The exact method of procedure depends on the nature of the hole.

If the defect is only through the canvas, it may be repaired in this way: Pull the canvas loose from the wood for about 2 in. all around the hole and apply a little thick shellac. Next slip a piece of good silk under the hole and

see that it is placed smooth. As soon as the shellac becomes sticky, push the canvas down on the silk as smooth as possible. When the shellac is dry, fill up the crack between the edges of the canvas with a good grade of thick waterproof glue or white lead. When dry, sandpaper and paint. This makes a repair that can hardly be detected.

If the wood is broken, it must be repaired first with either a piece of wood or a thin piece of sheet copper placed over the hole between the wood and the canvas. The space between the copper and the ribs should be filled with wax or some like substance. When this is done, proceed as previously described.—Contributed by L. C. Helm, E. Lansing, Mich.

Removing a Tight Wood Screw

A screw that has been in the wood for some time is difficult to remove. The more you try to turn it with a screwdriver the worse it gets, and the head is liable to be damaged. Much time and trouble can be saved by heating a rod to a cherry red and placing the end of it on the screw head. Keep it there until the screw has become heated. Allow the screw to cool and then remove with a screwdriver. The expansion of the metal caused by the heat makes the hole larger, and when the screw has cooled and contracted to its normal size, it can be easily removed.—Contributed by Horace A. Person, Washington, D. C.

Heating Water in a Church Baptistry

There were no arrangements made for heating the water in the baptistry of our church, so the following plan was tried out and worked just as efficiently as a high-priced plant. A water coil heater, E, was made of pipe and fittings and connected to the water-main pipe A and the pipe for emptying the baptistry B, by two pieces of hose, C and D.

After the fire in the furnace burned to coals, the heater E was put in through the door as shown. The water was allowed to run slowly from the main A and through the coil. Starting this heating device early in the day, the

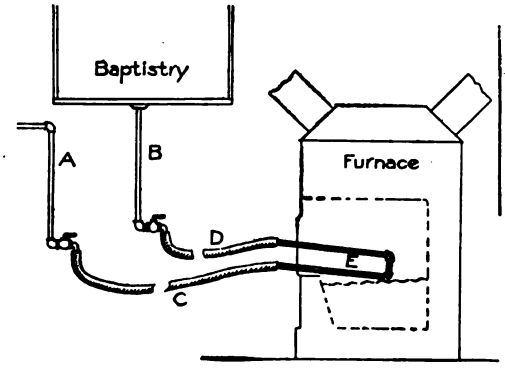
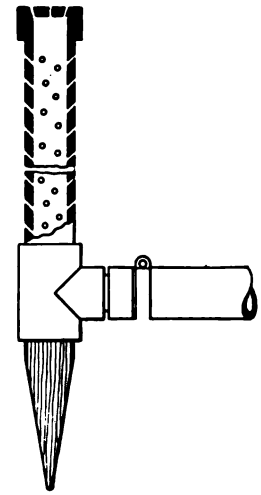


Diagram of Connections

baptistry would be full of warm water for the evening service.—Contributed by Frank H. Morse, Maplewood, Mo.

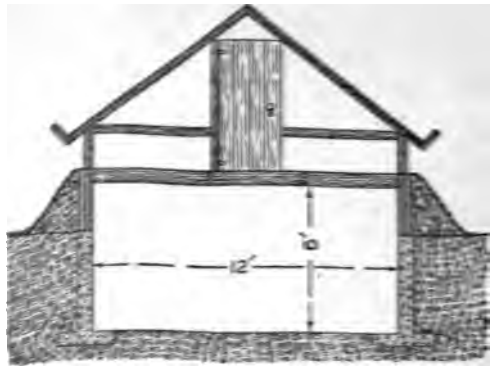
A Home-Made Lawn Sprinkler

An inexpensive and easily constructed lawn sprinkler is shown in the accompanying sketch. Secure a piece of 1-in. pipe, about 2 ft. long, and thread it at both ends. On one end screw a cap, as shown, and on the other end, a pipe tee which is tapped to receive a hose connection. Drill a number of ⅛-in. holes slanting upwards, in the pipe, as shown. A sharp pin, made of wood and fastened in the tee, serves to hold the pipe upright in the ground. This sprinkler will give as good service as any you can buy and costs less. It is also durable as there is nothing about it that can get out of order.—Contributed by C. C. Brabant, Alpena, Michigan.



A Cellar for Cold Storage

When keeping my dahlia roots in my home cellar which contains a hot-air furnace for heating the house, I lost



Sectional View of Cellar

many roots by drying and I was forced to get them outside, says a correspondent of Country Gentleman. I designed a cellar for keeping the roots as well as to furnish a place in which to work on sunny spring days. The roof is made of glass which covers the greenhouse part, this being set over a cellar dug in the earth.

The floor was put in loosely with the supposition that the warm air from the cellar would keep the greenhouse from freezing, but instead it helped the cellar to freeze. A small oil stove was sufficient to keep the temperature right during cold snaps in the spring. Such a cellar must be provided with proper drainage in localities where it is necessary.

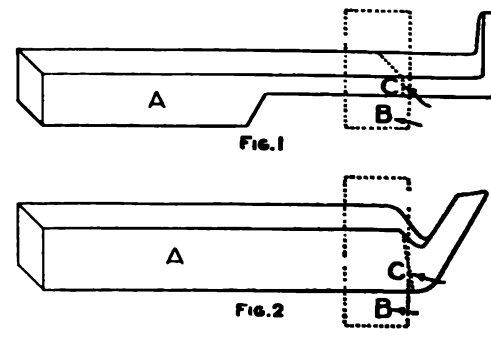
Emergency Repair on a Broken Cylinder Head

In case of a broken cylinder head, the following method of emergency repair has by actual test proven satisfactory, although at first sight it is seemingly impractical. Take a piece of tin and cut it the same size as the cylinder head and punch holes for the stud bolts. Fit a piece of hard wood, 3 or 4 in. thick, on the head of the cylinder, allowing 2 or 3 in. to project all around, to prevent the bolts from splitting out. Bore holes for the stud bolts, marking their positions from the broken pieces of the cylinder head. Make new stud bolts long enough to extend through the packing tin and the wood, with nuts and wide washers. Pack carefully between the tin and the cylinder with any good sheet packing and use care in tightening up the nuts evenly all around. I have seen a locomotive use this repair on one cylinder doing heavy work for more than one week, or until permanent repairs could be made.—Contributed by D. Bittenbender, Northwestern, Cal.

How to Harden and Temper a Lathe Tool

Many persons can forge a perfect lathe tool but, for some reason, have trouble when they undertake to temper it. I have many times noticed lathe tools with the cutting edge nicked or broken about ½ in. from this edge.

An inside boring tool is shown in Fig. 1. When hardening this tool, it is not good practice to hold it as indicated by the dotted line C while in the cooling bath. Heat it to the hardening temper up to this line, and plunge the entire tool, cutting edge down, in the bath. This will prevent breaking off the short end. Polish the tool as far back as the line C. Heat a pair of tongs to almost white heat, and place the tool between the jaws, as shown by the dotted line B. The size of the



Tempering Lathe Tools

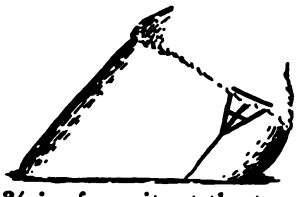
tongs will, of course, depend on the size of the tool. The hot tongs will

cause the temper to be drawn even, and the tool will be soft enough to file a short distance back from the cutting edge.

In most cases the temper should be drawn to a light blue and cooled in a bath of clear cold water with a quantity of salt added to make a brine. In Fig. 2 is illustrated the same method applied to a diamond-point tool.—Contributed by J. N. Bagley, Webber, Kansas.

Treating a Cracked Hoof

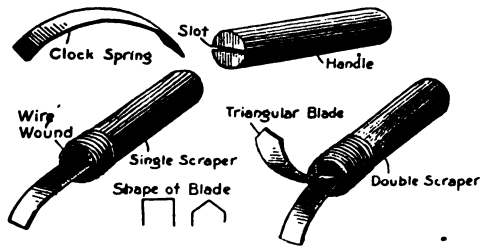
The proper place to stop the movement of a cracked hoof is at the top of the crack where the new horn is being formed at the coronary band, says the American Blacksmith. The thing to do is to cut a groove down through the horn on each side of the crack and about 5/8 to 3/4 in. from it, at the top, and coming to a point about 1/2 in. down the hoof. This will form a V-shaped line with the crack in the middle, as shown in the sketch. Clamp the V-shaped part of the hoof about half way up and draw a hot iron deeply across the top of the V, just above the horn.



Any flat, ordinary or bar shoe will do, if the bottom of the hoof is properly leveled. A clamp or two may be put in below the V. If the horn is kept at work, it will not grow together again. The object is to keep the part where the new horn is being formed from moving, and by practically isolating it from the other part of the hoof, nature is given a chance to do the work under most favorable circumstances.

A Steel Scraper

The steel scrapers shown in the accompanying illustration are made of stout pieces of clockspring, inserted in slots sawn in short wooden handles. They are handy for removing dirt and grease from machinery or old paint from uneven surfaces. The scraper blade is secured by wiring the handle or using a ferrule. Scrapers of various degrees of strength and flexibility can be fashioned from different sizes of springs. The double scraper has a triangular-edged blade added for use on carved or indented surfaces.—Contributed by James M. Kane, Doylestown, Pa.



Parts of the Scrapers

Keeping Paint from Running Down a Brush Handle

When painting a ceiling or overhead work the paint will run down through the bristles of the brush and onto the handle, making it disagreeable for the workman. I made an attachment as shown in the sketch for catching and holding any surplus color coming from the brush. The attachment is made of tin, funnel-shaped and nailed at the top edge of the metal around the handle. If tight joints are desired, they may be soldered. The paint caught in this cup will run back into the brush when it is held with the handle up.—Contributed by Ben Hemerka, Shamokin, Pa.



¶Work being turned on a lathe should never be allowed to "squeak" on the centers.

Increasing the Life of the Suction Pump



A Pipe Cleaner That Is Clean

The bicycle pump makes a good pipe cleaner and can be carried in the hand during [illegible]. To use, remove the stem of the pipe and connect the nipple of the pump hose. Then, pumping clean the plunger of the pump at the same time, and all the accumulated nicotine and tobacco will be forced through the bowl of the pipe, rendering it sweet and clean.

The bicycle pump may also be used to clean the tubes of a gas stove, by attaching it to one of the tubes at the end of the burner with a section of small rubber hose. The air pressure will force out all the sediment from inside the burner and pipes.—Contributed by [illegible] Wright, Mount Clemens, Mich.

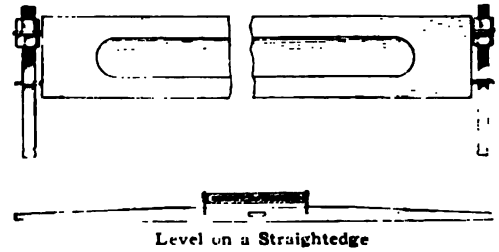
Cranking a New Automobile Engine

Engines in large automobiles when new or just after taking up the bearings are hard to crank by one man. In such a case, instead of wasting strength by trying to crank the engine over the starting crank and get as many persons as required to give the first quick turn. When a magneto is the only means provided for furnishing the spark, this method is especially adapted, as the ignition may be advanced to where a good spark can be obtained at a slow speed and yet without fear of having a "kick back." The latter, if sufficiently violent, will simply pull the rope out of the hands.—Contributed by M. R. Wells, Cleveland, O.

Adjustable Level Fastenings for a Straightedge

The illustration shows a convenient level attachment for a straightedge. Setting the ends of the level to an angle with the straightedge by the bolts, an accurate grade can be secured for ditching and the laying of drain tile.

The straightedge should be carefully jointed on the lower edge and the bolts



Level on a Straightedge

fastened to its side with nails or screws in the notches. Screw eyes are used in the ends of the level for the adjusting bolts and nuts.—Contributed by Geo. H. Sogle, Riverside, Wash.

To Get a Natural View from a Photograph

In photographs, half-tone prints, etc., the pictured objects appear flat when viewed with the naked eye in the open light. To bring out the perspective and to have the objects appear in their natural positions, the same as when viewed through a large magnifying glass, a simple arrangement may be used. Take a piece of moderately stiff dark paper, say 12 in. square, and make it into the form of a cylinder having a diameter of about 2 in. View the picture through this cylinder, holding it up to one eye while the other is kept closed.—Contributed by L. Bogia, Philadelphia.

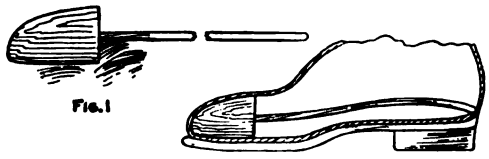
Locking Flat-Head Screws

After having considerable trouble with some flat-head screws coming loose on an automobile, I tried with success the following method of fastening them. Each screw was turned up tightly and then the position of the slot marked with a small sharp chisel. The screw was then removed and a small notch cut in the face of the countersunk hole. The screw was then replaced and part of the head driven down into the notch as shown in the sketch. This effectually locks the screw.—Contributed by Harry G. Fesenfeld, Black Earth, Wis.



How to Make a Pair of Shoe Trees

Obtain some soft pine blocks about 3½ in. long and 2 in. thick, cut them to the desired shape and sandpaper the surfaces smooth. In the center of the rear end of these blocks bore a ¼-in. hole, 1 in. deep, and glue a piece of reed or cane of the same diameter in it, making the whole thing some 2 in. longer than the shoe. Insert the block in the toe of the shoe and bend the reed into a bow with the free end pressing against the inside of the heel. It is obvious that the extra length of the reed will make the trees adjustable to the different sizes of shoes.—Contributed by Katharine D. Morse, Syracuse, N. Y.



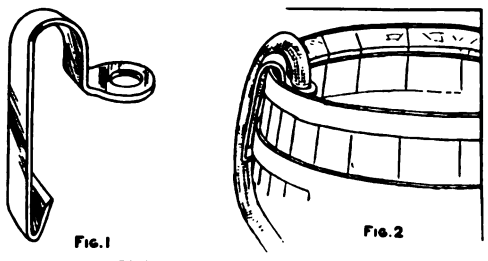
Tree in the Shoe

Making Brass Castings a Bronze Color

Dissolve 1 lb. of sal ammoniac in about ½ gal. of water. Thoroughly cleanse and remove all grease from the casting and heat it until the metal becomes red. Then plunge it into the solution and remove it quickly so that it will cool in the air. The surface will take on a light golden color.—Contributed by Peter Matik, Everson, Pa.

Rubber-Hose Holder for Barrels

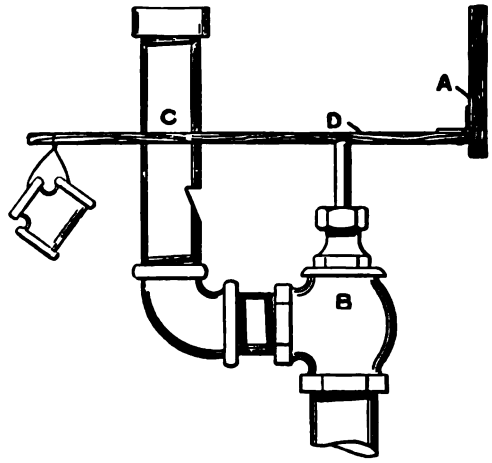
The end of an ordinary rubber hose will not stay in a barrel or trough if there is much pressure on the water running through it. The hose will have a tendency to straighten out under the pressure and fall from the barrel and wet things generally, besides wasting the water. In Fig. 1 is shown an attachment for a barrel, and in Fig. 2, the way it is used for holding the end of a hose. It is made of a strip of iron, bent and sharpened at the bottom so it can be slipped under a hoop, and an opening made at the top to admit the hose.



Holder Attached to a Barrel

A Safety Whistle

While visiting a small plant located in the country, I noticed the device shown in the accompanying sketch and questioned the engineer, who also acted



Valve and Whistle

as fireman, concerning it, says a correspondent of Power. He stated that when the old safety valve gave out after 60 years' use on various boilers, his employer would not purchase another, as there was no compulsory boiler inspection at the time. He therefore became apprehensive as he was often obliged to leave the boiler room after making a new fire, and as a result frequently stopped work in another part of the building and waited for the crash.

Becoming tired of this he made the alarm shown in the sketch, and attached it to the boiler. The piece of plank, A, is nailed to the rafters above and to this is hinged the stick D, about 4 ft. long. The angle valve B has the thread filed off the stem and the wheel removed, the upper part of the stem bearing on the stick D, while C is a whistle made from a piece of pipe. The tee hung at the end of the stick serves as a weight for varying the pressure at which the whistle will blow. All the fittings and pipe are ½ in.

With this device installed, when the pressure reaches the safety limit, the whistle blows and the engineer hurries to the boiler room and checks the fire.

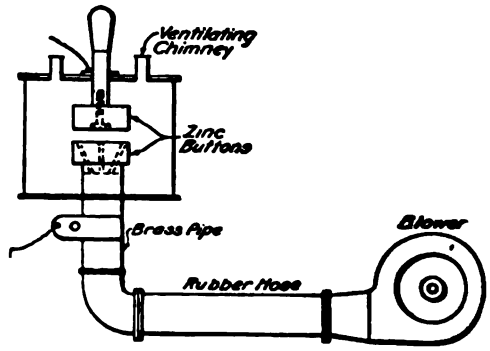
Measuring Gasoline in a Tank

The use of a small glass tube will be found a simple and accurate method of determining the depth of gasoline contained in the tank of either an automobile or a launch. The tube should be about ¼ in. in diameter and long enough to project a few inches above the top of the tank.

Insert the tube carefully in the tank and when it touches the bottom, place the thumb firmly over the top of the tube and withdraw it. The depth of the gasoline will be clearly indicated by the gasoline in the tube.—Contributed by D. F. Southgate, Rochester, New York.

Air Blasts Across Spark Gaps

An air blast across the spark-gap of a wireless instrument is said to materially increase the efficiency of the transmitter. The spark-gap is kept cool and at a practically uniform resistance, which allows the transmitter to be used indefinitely without the spark varying in pitch. Gases formed by the oxidation of the metal by the air, and which allow brush discharges of lower potential to pass and give varying and rough notes in the spark are dispersed.



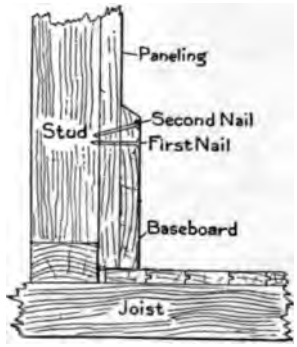
Diagarm of Spark-Gap Air Blast

One means of providing an air blast is shown in the illustration. The gap proper consists of two zinc disks. The lower disk has a shoulder turned with a slight taper so that it will fit snugly into a piece of ⅝-in. brass pipe about 6 in. in length. Six holes are drilled

through the disk, these converging within the shoulder to form a passage for the air. A shoulder and length of rubber hose lead from the brass pipe to the blower. The blower starts automatically with the starting of the transmitting motor-generator set, and is placed outside the operating room so that its noise will not interfere with the receiving of signals.

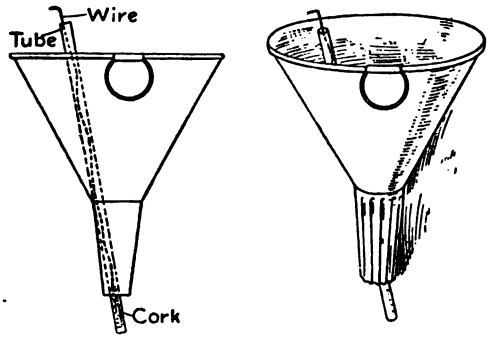
Nailing Warped Boards

A great deal of trouble has been experienced by every carpenter in nailing baseboards that are warped and springy against panels, as the boards are sure to jump apart when the nail that has drawn them together is "set." This trouble can be avoided by driving a nail home straight through the two boards at right angles to their surfaces and tapping it until the boards are drawn tightly together, then, before setting this nail, drive another home close to the other at an angle of about 60 deg. to the face of the board. Both nails can be set without danger of the boards springing apart.—Contributed by L. M. Hodges, San Jose, Cal.



Gauge and Vent for a Funnel

In pouring liquids into barrels or receptacles where the contents cannot be seen, the attachment for an ordinary funnel as shown in the sketch will prove advantageous. The small tube vents the receptacle being filled, and when full the wire indicator will rise. The tube is made of tin and soldered into the funnel. A stiff wire with a cork attached to the lower end is placed inside the tube. The cork is made smaller in diameter than the hole of the tube. When the level of the liquid strikes the end of the tube, the cork will float and carry the wire up, thus indicating that the receptacle is full.



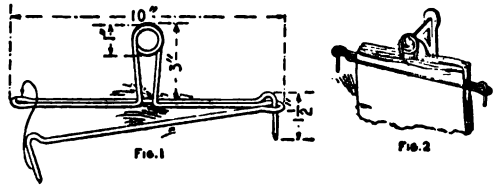
Tube Inside of Funnel

An Eye Shade

The eyes may be protected from the blinding glare of a light by taking a piece of paper (8 by 11 in. is a good size), folding it in the center, inserting a rubber band in the crease and adjusting the rubber over the head with the paper hanging over the eyes.—Contributed by A. S. Allen, La Belle, Mo.

How to Make a Double Trouser Hanger

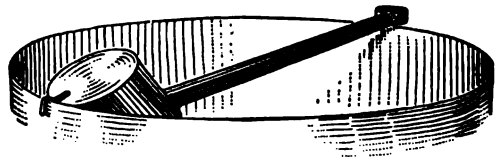
The hanger is made of a piece of heavy iron wire bent as shown in Fig. 1. The length of the wire used for each hanger is about 43 in. One pair of trousers can be clamped on each side of the hanger. The arrow shows the way the hook is inserted in the hole. The hanger in use is shown in Fig. 2.—Contributed by K. Kuga, Hoquiam, Washington.



Made of Wire

Holding Dipper on a Vessel Rim

The person who handles paint, soft tar or oil in barrels, usually puts the dipper to drain on a board or on the



Hook on Dipper Bottom

edge of the barrel so that the liquid will get on the side of the barrel and on the floor. This is a nuisance, which can be avoided by simply soldering a hook on the bottom of the dipper. It can then be hung on the inside of the barrel as shown.—Contributed by W. A. Jaquythe, Richmond, Cal.

Etching on Glass

A very easy and cheap formula for etching on glass, given by Pottery and Glass, is as follows: Barium sulphate, 3 oz.; ammonia fluoride, 1 oz. To the foregoing is to be added enough sulphuric acid to decompose the ammonia fluoride and make a mixture of semi-fluid consistency. It must be prepared in a leaden vessel and kept in bottles coated inside with a thick layer of paraffin, beeswax or gutta percha, and closed with rubber stoppers. The mixture can be used for printing with rubber letters for stencils, and be thinned so as to use with a common pen. The fumes are poisonous, and contact with the flesh should be avoided.

All glass, even the hardest, may be etched, but highly alkaline glass offers the greatest resistance to the influence of acids. Hydrofluoric acid develops in gaseous form from fluorspar, when the latter, in finely pulverized form, is wetted with strongly concentrated sulphuric acid.

For this purpose, vessels made of materials not affected by the acid are used, such as lead, platinum, rubber and gutta percha. The etching is accomplished by coating the glass surface with beeswax, paraffin or other suitable resistant, and then tracing the design desired, whether letters, figures or scrolls, by means of a stencil. A suitable pencil is used to remove the resistant, while the acid etches only the uncovered part of the glass. For lettering, an oiled paper, such as used in stenciling match designs, makes as good a pattern as sheet steel, and is more readily and cheaply prepared.

For rapid work, the following formula will be found of service:

No. 1	
Fluor-Ammonia	1 lb.
Hydrofluoric Acid	0.5 "
Sulphuric Acid	0.1 "
Ammonia	0.1 "
Water	0.1 "

No. 2	
Fluor Soda	1 lb.
Sulphuric Acid	0.2 "
Water	4 "

No. 3	
Carbonate Ammonia	2 lb.
Sulphate Ammonia	1 "
Hydrofluoric Acid	1 "
Water	1 "

Such baths produce in five to twenty minutes, according to the purity and strength of the materials used, a silky frosting or matt etching. Before frosting, the glass should be cauterized for one minute by immersion in diluted hydrofluoric acid, rinsed in warm water and then put into the frosting bath.

Turning Large Screws with a Small Screwdriver

While driving a number of large screws with a small screwdriver, as nothing in proportion to the size of the screws was at hand, I found it hard to turn the screws after they were about half way in and was unable to turn them without splitting or spoiling the heads.

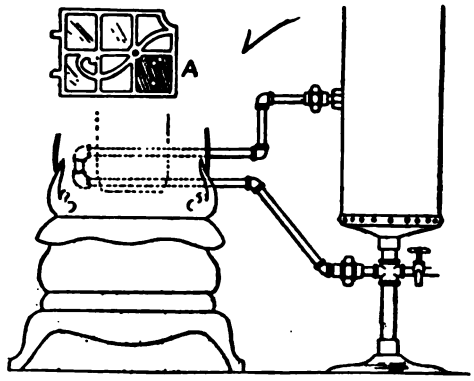
After spoiling several screws, I tried striking them a light blow with a hammer when unable to turn them farther and found that they could be turned easily. This did not injure the holding quality to any extent. These screws were placed in soft wood, but when striking them in hard wood there is some danger of splitting the wood. Experience will teach about how heavy a blow to strike.—Contributed by Felix Herz, Goldfield, Colo.

Base Burner as a Supply-Water Heater

A base burner can be made to heat the water in a kitchen-range boiler as well as a kitchen range having a water front. Two ¾-in. iron pipes, from 12 to 16 in. long (depending on the size of the stove), are connected together with a return or a combination of two elbows to take the place of the water front. This is placed behind the coal feed and above the fire pot at the rear of the firebox, as shown in the illustration, the ends of the pipes extending through a piece of tin, A, used instead of the mica in the side door.

From these pipes the ordinary connections to the range boiler are made. The top pipe must have some slant upwards to the connection in the side of the boiler. The pipes are not fastened in the stove, as their rigidity, when connected, is sufficient to keep them solid.

A continual supply of warm water, well-heated rooms and no ashes to



Coil in Heater

sift, recommend this device especially to those who cook with gas, as water is heated with little or no extra expense.—Contributed by Lloyd G. Miller, Chicago.

Holding a Revolver Steady

Paying a fancy price for a knife or razor does not insure getting a perfect blade. Similarly, in purchasing a revolver of large caliber, the largeness of the price does not necessarily enable one to get a weapon that will not kick. Some are so violent that accurate shooting is sometimes impossible, and the novice almost believes he will never learn to handle the gun he selected.



Holding End of Barrel Down

The sketch shows a wire device made to be slipped over the barrel just back of the sight and held in the left hand to serve in holding down the upward kick. This will steady the revolver in target practice and yet not cause the user to suffer powder burns as when holding the barrel with the hand.—Contributed by Victor Labadie, Dallas, Texas.

How to Set Sight on a Rifle

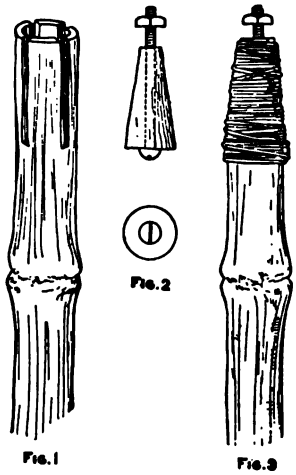
The sights on a rifle sometimes get out of place, or occasionally a new sight is to be substituted for the one already in use, in which cases the adjustment of the sights requires some little skill. However, they can be sighted accurately by fastening the gun barrel solidly in a vise and fixing a target 20 or 30 ft. away, so that the bull's-eye will exactly center the bore of the gun when looking through the barrel. Fit the sights until they correspond, and the gun will shoot accurately.—Contributed by J. N. Bagley, Webber, Kansas.

¶A scriber made from hard brass wire gives a fine light yellow mark on black metal surfaces such as stove-pipe material, boiler plate, etc.

¶Where oil will not act as a cooling agent on a drill working in hard metals, turpentine used instead will permit the drill to take hold and retain its temper.

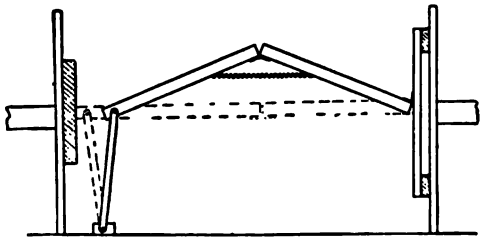
Fastening Bolts in the End of Bamboo Poles

A good way to fasten a bolt to a bamboo pole for use in aeroplane construction is shown in the sketch herewith. The end of the pole is cut with a hacksaw so as to form four or six pieces about 2½ in. long (Fig. 1). A hardwood plug is made tapering (Fig. 2) and a hole bored through its center for a bolt. The bolt should fit tightly in the hole so that it will not slip back when the nut is removed. Slip the plug into the slotted end of the bamboo with the large end first and wind tightly with No. 18 wire (Fig. 3). This will draw the slotted end of the bamboo in closely about the tapering plug.—Contributed by F. W. Stromer, Gig Harbor, Wash.



A Toggle-Joint Press

A quick-acting and powerful press that will find many uses in the shop may be made in a few minutes, if constructed according to the sketch. Supports should lead from the top and bottom of the press to the ceiling and floor to take care of the thrust. The upper of the two pieces forming the toggle joint is fastened by a hinge to a wood strip supported only at the ends. This forms a slightly yielding spring which will be found quite necessary. The dimensions of all pieces depend on the work, but the proportions shown are about right. Do not use too heavy material, as it will be cumbersome. If the toggle-joint members are 1 in. thick and 2 in. wide, they will be strong enough for ordinary use. A piece of leather should be nailed over the crack between the joint members, as otherwise the fingers may be seriously hurt, if caught in the crack as the press is pushed home.—Contributed by C. W. Nieman, New York City.


Press Open

Wheelbarrow Handle Shield

The hand shield shown in the sketch was adopted in a shop where it was necessary to use a narrow doorway through which to convey material from one department to another, and chafing of knuckles was quite frequent and often painful. This annoyance has been entirely eliminated since the adoption of the hand shield.



The shield is made of a piece of strap iron bent as shown and attached to the wood handle with screws. The shields can be attached to iron handles with rivets.—Contributed by W. E. Roberts, Allentown, Pa.

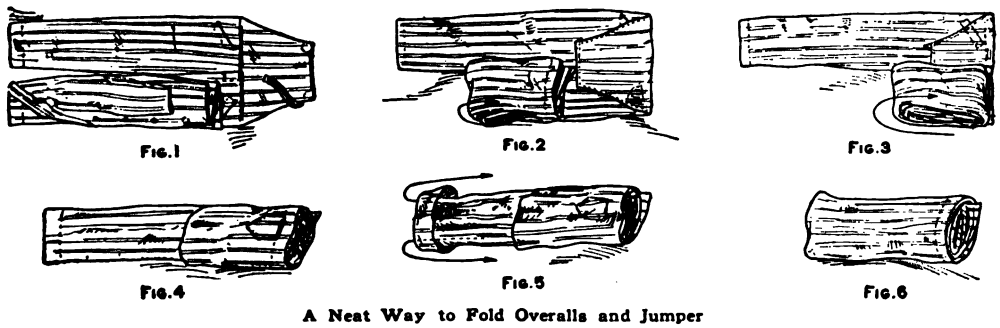
An Improvised Safety Light

A pair of scissors had been dropped down 8 or 10 ft. between the studdings from the floor of an unfinished attic room. On trying to fish them out with a magnet, considerable trouble was experienced in dodging nails and other obstructions protruding from both sides of the walls. The space was too narrow to admit of an ordinary lantern

being lowered. There being no electric light, a short piece of candle was placed in a glass tumbler that had been securely fitted in a wire loop in such a manner that it balanced right side up when suspended from another piece of light wire. The tumbler containing the lighted candle was lowered to the bottom of the cavity and illuminated the place so well that it became an easy task to raise the scissors by means of an old telephone magnet and a piece of string. A bucket of water was kept close at hand in case of accident from fire.—Contributed by John Teigen, Lake Mills, Ia.

How to Fold Overalls and Jumper

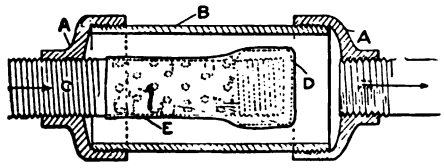
This series of sketches shows a neat and quick way to fold overalls and jumper. After thus disposing of them once or twice, it will become a habit, and it really takes no more time than to throw the outfit in a corner or to gather it up roughly and rearrange it when again used. 1. Lay overalls flat and place the folded jumper on one of the legs. 2. Half fold over leg and jumper. 3. Fold over to top from fork. 4. Roll the folded part over toward length of other leg. 5. Turn the loose leg inside out and pull it over the rolled leg and jumper. 6. You now have a neat, compact parcel. Any tools you may wish to carry with the overalls and jumper may be pushed down the leg and will thus be safely stowed and much more conveniently than if carried in a pocket.—Contributed by Amos Lithgow, Chicago.



A Neat Way to Fold Overalls and Jumper

An Air Check Valve

When installing a compressed-air tank in my shop I had trouble with leaks through the ordinary check valve. I could not find a valve that would hold the pressure for any great length of time. I set about to make one which resulted in the device shown in the sketch. The parts were made of pipe and fittings.



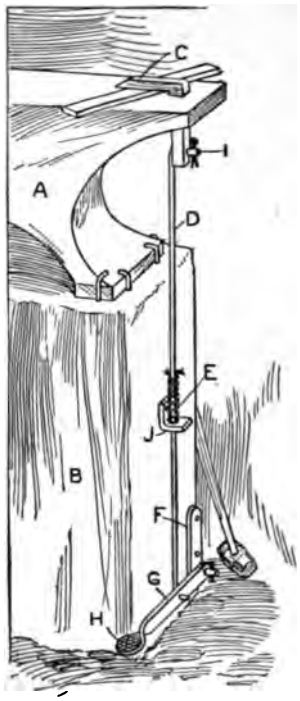
Made of Pipe Fittings

A number of ⅛-in. holes were drilled in the pipe C, which was covered with a cap, D. The cap and holes in the pipe were covered with a piece of inner tube, E, from a bicycle tire, and the pipe turned into the reducer A. Two or three thicknesses are used for high pressure. The two reducers, A A, are joined with a larger pipe nipple, B. The direction of the flow of air is shown by the arrows. The air coming into the pipe C will force itself out from under the rubber tubing which keeps it from flowing back through the holes.

The tank was made airtight by pouring in 1 gal. of liquid tar and rolling the tank around until it was well coated on the inside, then the surplus tar was emptied. Pipe leaks were overcome in the same manner.—Contributed by E. E. Docker, Berkeley, Cal.

Mechanical Helper for the Anvil

The device illustrated herewith is designed to take the place of the human helper at the anvil in many a job ordinarily requiring two men.



Forge an angle piece, C, to fit snugly but not tightly into the hardy hole of the anvil A. In one end of this angle drill a hole to take the bent-over end of the rod D, and secure this end by cotter pin I. On the front face of the anvil block B secure the guide piece J for the rod, on which, just above J, is placed the compression spring E, which is held to place by the cotter pin above it. The lower end of rod D extends to within a few inches of the floor, and is bent at right angles to pass through the hole in the foot treadle G, the step of which is shown at H.

The action is simple. The spring E normally holds the gripping piece C well above the anvil face. The piece to be held is placed in position under C, and foot pressure on H causes C to grip the work as tightly as may be required. Releasing H causes spring E to press up rod D and release C from the work.—Contributed by J. N. Bagley, Webber, Kansas.

¶Iron or steel may be made rustproof by boiling in 1 gal. of water to which is added 4 oz. of phosphoric acid and 1 oz. of iron filings. A black noncorroding coating is produced.

To Keep Windows Free from Frost

How most effectively to keep show windows from frosting in cold weather is to many an important consideration. A correspondent of the Optical Journal gives a cheap and simple method which is worth knowing. It consists of polishing the glass, after first washing in the ordinary way, with a piece of chamois skin on which have been scattered a few drops of glycerine. He says that this treatment is just as effective as the application of a proprietary article formerly employed by him with most satisfactory results.

Calipering over Flanges

A pair of outside and inside calipers especially constructed for calipering over flanges is shown in the sketch. These calipers have many advantages for measuring the thickness of metal back of a flange or an enlarged part in a bored hole.

These calipers should be made with all legs of equal lengths. The readings can be taken on a rule while the calipers are set over a flange as in Fig. 1, or inside of a hole, as in Fig. 2.—Contributed by Philip J. Duff, Montreal, Canada.

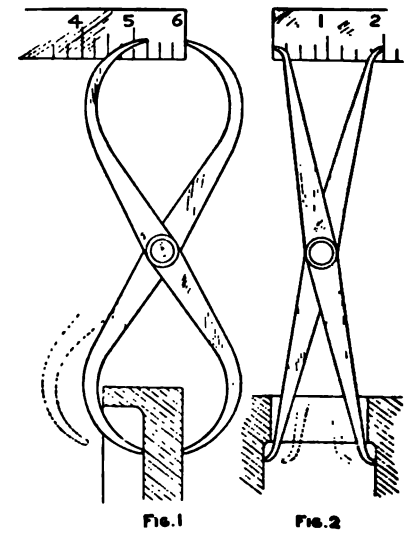
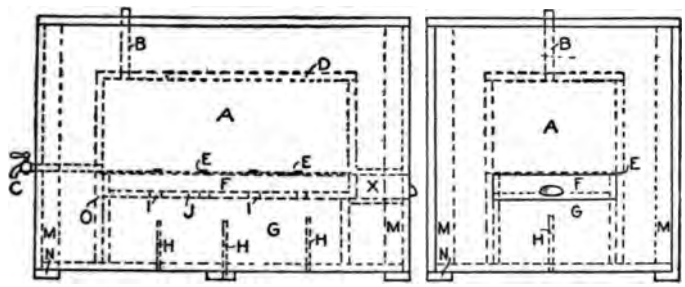


Fig. 1 Fig. 2

Outside and Inside Calipers

A Hot-Water Incubator

A hot-water incubator possesses several important points of superiority over the lamp-heated kind. In the first place, it can be operated anywhere without danger of fire; secondly, it has a very steady temperature and consequently will produce healthier chicks; and thirdly, it is so simple in construction that with the exception of the tank, which any tinsmith can make, any person at all familiar with the use of a hammer, saw and plane can easily make one.



Details of Incubator

To construct a 100-egg machine have a galvanized-iron tank, A, made 12 in. deep, 15 in. wide and 30 in. long. There should be a pipe 1 in. in diameter and 9 in. long placed in the top for filling, and another of the same dimensions and ending in a faucet in the bottom for draining. Inclose all but the bottom of this tank with a close-fitting box of 1-in. wood, D, to keep the tank in shape when filled, and fasten strips of strap iron, E, crossways every 6 in. beneath the tank to keep its bottom from sagging into the egg tray.

The egg tray F is 3 in. deep, 15 in. wide and 37 in. long, outside measurements. Partition off the part X and make a box of it. Pack this with sawdust (as it forms the front of the egg tray) to keep the heat from escaping. Fit in four crosspieces for the bottom of the egg tray proper, and stretch wire window screening, J, over them, tacking it securely to the sides and ends.

The ventilator G is a frame of 1-in. material, 8 in. deep, 15 in. wide and 30 in. long, outside. There is no top to this ventilator, but it has a bottom which projects 6 in. on both sides and ends. Three tubes, each 7 in. long, are placed in the bottom to admit air beneath the eggs. The ventilator is then packed with sawdust to a depth of 6 in. This leaves a 2-in. space under the egg tray in which to place pans of water for supplying the proper moisture to the eggs. It also provides a ventilated air chamber.

The parts are assembled by placing the egg tray upon the ventilator, and the tank, metal side down, on the egg tray. Vertical strips, O, 11¼ in. long, are nailed to the sides and back end of the ventilator and fitted close together. These support the whole weight of the tank so that the egg tray can slide in and out easily. They also seal up the spaces so that no sawdust can enter the egg tray chamber.

Place a post, M, 2 in. square and 30 in. high, at each corner of the extended ventilator bottom and form a box around these with 1-in. matched lumber. This box will be 6 in. outside of the three inner parts. Make the part around the end of the egg tray X so that the tray can be withdrawn without the sawdust entering the space. The 6-in. space on all sides and on top of the three inner parts is now packed hard with sawdust. Crumpled newspaper is even better, but whatever insulation is used should be packed hard in the open space. Nail six 1-in. pieces, N, on the bottom to allow the air below to circulate freely, and the incubator is ready for use.

The incubator is put into operation by filling the tank with boiling water and closing it tightly, first placing an accurate thermometer in the tray. It takes some little time for the heat to

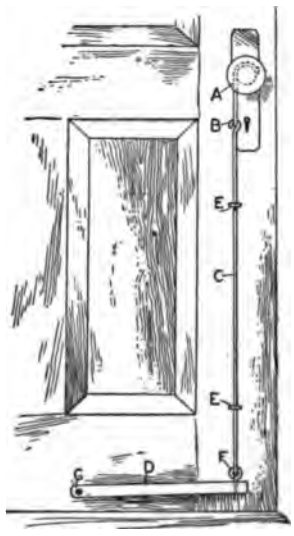
penetrate through the packing, but when it does, a kettle full of boiling water once a day in moderate weather and a less amount twice a day in cold weather will keep it at a comparatively even temperature of 103 deg.—the proper temperature. It is best to practice with the incubator for three or four days before putting the eggs in, to find how much water is necessary to run it.

Never try to cool the incubator by putting in cold water; the heat is in the packing and it will take hours either to raise or lower the temperature 2 deg. This is what makes the machine so faithful. Before putting in the eggs, adjust the temperature to 110 deg. and place the thermometer in the center of the egg tray—the bulb on a level with the top of the eggs and the top slightly higher. The eggs will cool the drawer, but if in the course of an hour or two the temperature has fallen below 100 deg., the addition of more hot water will soon raise it to the proper degree. If the temperature does not fall below 98 deg. or rise above 105 deg. the best results will be obtained, though a temperature of 108 deg. for a short time may do no harm. Always cool by opening the tray. Keep shallow trays of water in the ventilator and change this daily. Keep several moist sponges in the egg tray; if they are found to be dry, it is a sign that the eggs need sprinkling with tepid water. The general care of the eggs (cooling and turning) is the same as in any other incubator.

With a little experience, an operator can obtain as nearly perfect results with this machine as with the most expensive lamp-heated apparatus made. —Contributed by W. E. Morton, Marinette, Wis.

Foot-Operated Door Latch

A simple device for opening a door with the foot is shown in the sketch.



A thin leather strap, A, 5/8 in. wide, is fastened to the shank of the knob by the holding screw. The strap is then given two turns around the shank and connected at B to the lever with a piece of wire. The wire C is held in place with two staples, EE. The lower end of the wire is fastened to the foot lever D with a screw-eye, F. The foot lever is pivoted at G with a screw.—Contributed by C. H. Corner, Sedalia, Mo.

Working Aluminum

Aluminum is not worked as often as steel, wrought iron, cast iron or brass, and the average machinist does not know how to machine it. On all cutting except tapping, work the metal dry. Aluminum, like other cast metals, is lifeless; that is, long curling shavings cannot be taken off as with steel, but rather a shower of small chips as in cutting cast brass.

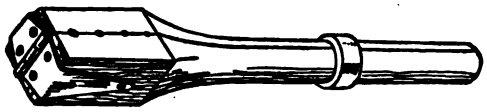
The metal is easily torn, especially in thread-cutting in the lathe, where, if not careful, the tool will dig in and rip out rough threads. In making fine, smooth threads, take several light finishing cuts. For a nice surface finish, either in a lathe or planer, use a broad tool, but with a light cut, and employ the same caution as in thread-cutting to prevent digging and tearing the metal. Aluminum can be cut as fast as brass.

¶When winding a small rope into a ball, wind it from the bottom out and over the top toward you and the rope will not twist into knots.

Driving Nails in Brick Walls

The accompanying sketch shows a device which was successfully used in a building where a large number of spikes had to be driven into the brickwork.

A piece of hardwood was dressed square and rounded off at one end to form a handle. Holes to receive different sized nails were drilled in a line through the center of the square part. The block was then sawed through so as to cut the holes in half and a large

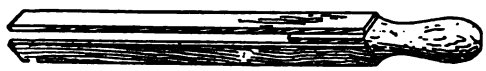


Nail Holder

strap hinge screwed to the back and bent over the sides. A ring made of a piece of pipe was slipped over the handle to hold the parts together. If necessary, different sizes can be made for use successively as the nail is driven. —Contributed by L. M. Eifel, Chicago.

A Mixing Stick

The mixing stick shown in the sketch has better stirring qualities than the usual variety, because the V-shape formed by the two flat pieces of wood draws the liquid to one point in the center and forms two spaces behind the stick when it is kept in motion. The liquid flowing through the opening between the sticks comes in contact with that passing around the outside, thus



Double Stirring Stick

causing the unmixed portions to come together from both sides.

The handle part is made from a square block of wood turned on one end for a handhold. Two strips of wood are nailed or screwed to the sides of the square at right angles, allowing a space of ½ in. between them. —Contributed by F. G. Rempe, Oakland, Cal.

Removing Hot Nuts

In removing nuts from hot engines, hot boxes or other hot parts, the method shown in the illustration is the



Taking Nut on Screwdriver

one I use to hold the nut and keep it from falling into moving machinery. The nut is turned until it is almost off, then a screwdriver, scratch awl or a short piece of rod is placed against the head of the bolt and the nut is then turned off and on to the holding tool. —Contributed by Herbert H. Van Kerner, Baldwin, Kans.

A Tin Weather Strip for a Hinged Window

The sketch herewith shows a little device to prevent dust and soot from blowing in at the bottom of windows where the sashes are hinged at the top. It is made of tin, about 1½ in. wide,

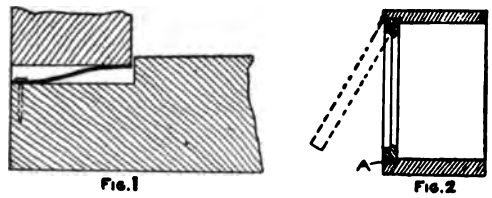


Fig. 1 Fig. 2

Strip in the Casing

bent in the shape shown in Fig. 1. Then it is nailed to the lower edge of the window sill. When the sash is closed, the tin will fit tightly against the edge, as at A, Fig. 2. If the sides are loose, the tin is used in the same way.—Contributed by Otto J. Kling, Youngstown, O.

¶Where an annealed copper gasket fails to make a tight joint, try wrapping the gasket with heavy cord or wicking. Soak the wrapped gasket in valve oil. When the gasket is again inserted you will have a permanent repair.

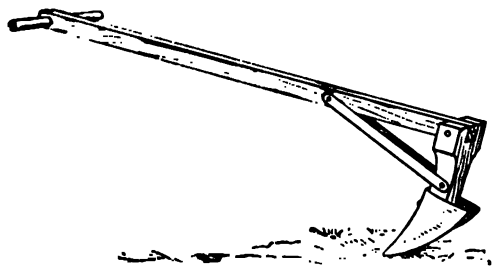
Babbitting Automobile-Engine Bearings

The main bearing on the crankshaft of an automobile engine is not easily accessible for rebabbitting. There is no way to get to the bearing with a ladle of melted metal without taking the engine apart. I did not care to take the time for this, so I made a device from an old bicycle fork and used it as a gate for the metal. The fork was cut off to make it about 12 in. long and shaped as shown in the sketch. The fork must be heated so that it will not chill the metal. It is then quickly placed over the bearing as shown. The melted metal poured in at the top flows down the fork sides and into the bearing.—Contributed by Chas. Straughan, Sprague, Wash.



A Garden Plow

The hand plow stock shown in the sketch is made preferably of white oak,



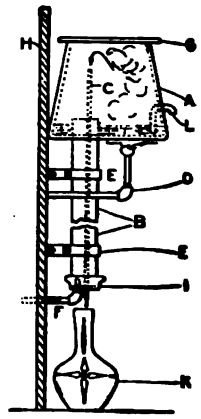
Hand Plow

but any kind of hard wood will do. The shovel arm is fastened to the beam with a wood pin or iron bolt. Two braces of iron or wood are bolted, one on each side of and connecting the beam and shovel arm. Several holes may be bored through the center line of the beam so that the draft of the plow may be regulated.

The shovel is fastened to the arm with a bolt. Shovel plows, or solid or winged sweeps may be used. A hole is bored through the front end of the beam and a wood handle inserted.—Contributed by R. A. Bryan, Corsicana, Texas.

Home-Made Water Still

The accompanying illustration shows a still made of pipe and fittings. The receptacle A has a 2-in. pipe, B, 24 in. long, capped on the lower end with its upper end extending into the receptacle about 1½ in. The cap I is drilled and tapped offset for two ¼-in. pipes. The ¼-in. pipe C is 30 in. long, and is threaded on its lower end so that it will extend through the cap I about 2 in.



The ¼-in pipe F leads to the water supply and should have a valve for regulation. The receptacle A is covered with a metal plate, G. The opening L is for the overflow. The pipe D leading from the gas main is fitted with a burner for heating the receptacle A.

The whole apparatus is fastened to a back board, H, with bands of metal, E E. The water enters the pipe B at the bottom and rises to the receptacle A, where it is converted into steam. The steam is forced downward through the pipe C, where it is condensed by the surrounding cold water, and then drops into the receiving bottle K.—Contributed by R. H. Burdick, San Diego, Cal.

¶Never loosen nuts on a lathe with a hammer. Always use a wrench and do not set them so tight that it requires a blow to start them.

A Time Regulator for a Furnace

Anyone who lives in a cold climate knows how disagreeable it is to get up in the cold and start the furnace. A time regulator such as the one described in the following makes it possible to have the drafts turned on at any desired hour of the day or night, so that the fires may be banked for the night and yet have the house nice and warm when one is ready to get up.

Secure a piece of strap iron about $\frac{3}{16}$ in. thick by ½ in. wide, with a length of about 14 in. Bend the top over at right angles so that the arm is about 12 in. long. Drill a hole at the lower end to receive the hook to which the chain is fastened. File a notch in one side, 1½ in. from the bottom as shown. File another similar notch 2½ in. above the first one.

Cut and shape two pieces of strap iron as shown at A, Fig. 1, and drill holes for screws. Shape a buffer, B, from a piece of hard wood and attach a rubber bumper which can be purchased at any hardware store.

Secure an ordinary alarm clock with a good strong spring on the alarm wind. The parts are attached to the back of the clock as shown in Fig. 1. The location of the tripping nail or screw, C, is to be determined by trial. It should be about ¾ in. above the top of the lower cleat. The alarm wind is shown by D. When the bar E is set with one of the notches on the lower cleat, it remains in this position until the key D turns and pries it off by pushing it against the pin C. The dropping of the bar E releases the chains to the drafts of the furnace. Two brackets are soldered or screwed to the back of the clock as shown at F, Fig. 1, after the other parts are in place. These are for holding the clock in place when used on the time regulator and to make it easy to remove the clock. The brackets slip into staples placed in the wall where the attachments are used.

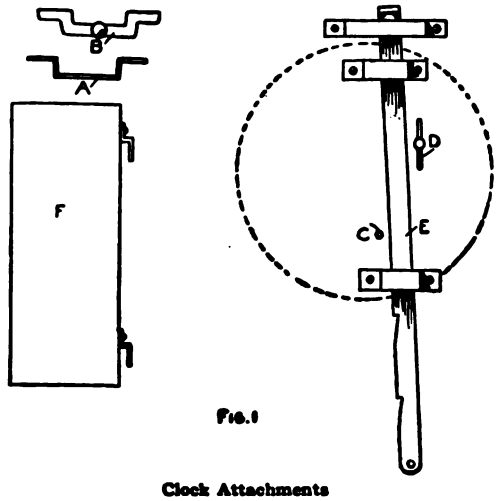


FIG. 1

Clock Attachments

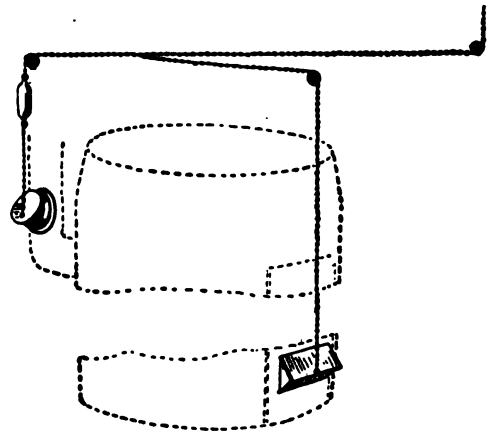


FIG. 2

Chains Attached to Furnace

The chains are connected as shown in Fig. 2. When the lever is down, the weight in the basement opens the draft door. When the lever is in its highest position, the check is open; when in the middle position, neither draft nor check is on. In adjusting the chains, the lever should be placed in neutral position and both chains made taut. An ordinary window weight is used and it should be no heavier than is necessary to raise the draft door.

¶One loose bearing on a machine has a tendency to loosen others, causing knocks, loss of power and the crystallization of metal.

Ice Scraper on a Broom Handle

Packed snow and ice on steps and sidewalks cannot be removed with an ordinary broom, and I made an attachment for the handle, as shown in the illustration, so that I could have a scraper and broom combined. The scraper is made of a piece of sheet iron cut on the lines A, Fig. 1. The metal above these lines was bent around the handle and fitted with a setscrew, as shown in Fig. 2. When the scraper is not in use, it can be removed.—Contributed by C. C. Brabant, Alpena, Michigan.

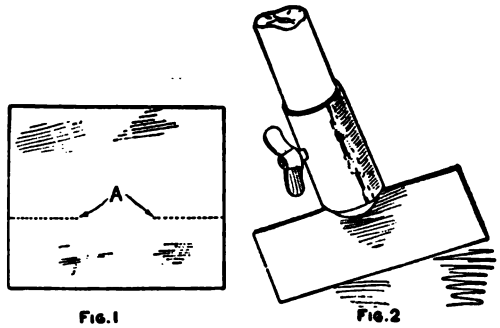
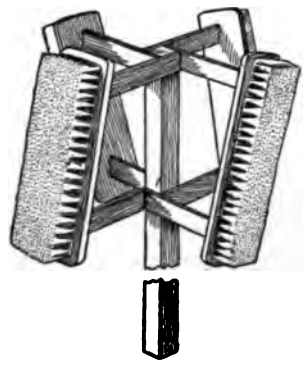


Fig. 1 Fig. 2

Scraper on End of Broom Handle

Stovepipe and Stack Cleaner

The construction of this device for cleaning stovepipes and stacks will be readily understood from the sketch. The center piece is 1¼ in. square, and on this are nailed eight 3-in. strips, ¼ by ½ in. in thickness. These strips are so nailed on the center piece that the brushes when attached are set at a slight angle. For pipes or stacks of large diameter, the strips may be made longer.—Contributed by Maurice Baudier, New Orleans, La.



Cutting Threads with a File

Having to repair some farm machinery about 10 miles from a machine shop, we had to shorten a 1-in. bolt about 4 in. This meant cutting off the threaded part and making new threads on the smooth shank of the bolt. The only tools at our command were a vise and some files. The problem was solved in the following manner:

A piece of paper, about 1½ in. wide, was cut so that the edges would meet when it was wrapped around the bolt. Eight threads per inch being the standard for a 1-in. bolt, the paper was laid out in eighths, as shown in Fig. 1. It was then pasted around the bolt, as in Fig. 2, the thread being correctly indicated by slipping one edge of the strip forward one division.

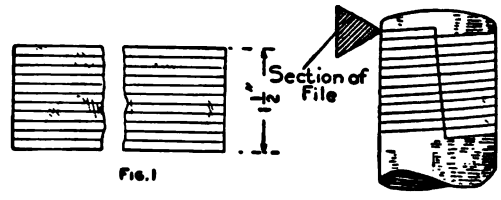


Fig. 1 Fig. 2

Marking the Threads

The threaded end of the bolt having previously been cut off, the new threads were cut by following the lines on the paper with a three-cornered file. The depth of the threads was tested by following the file with the nut as the threads were cut.

The thread thus made was not comparable with one made by the dies, but it was good enough to answer the purpose.—Contributed by Arthur D. Johnson, Philadelphia, Pa.

Self-Heating Soldering Iron

A soldering iron that carries its own heating device on the handle, shown in the sketch, is useful for the trouble man, as it can be made small enough to be carried in the pocket, also it is a useful household tool.

No dimensions are given as the size may be determined by the conditions.

The only caution is not to place the pan too far from the copper. The copper can be used from an old soldering-iron or one of the proper size may be purchased. A small rod is threaded on both ends, one end having sufficient length of threads to hold the copper and also a small pan. The pan is made of a cover from a baking powder tin which is filled with asbestos and covered with wire gauze, then placed on the rod back of the copper and fastened in place with a nut on each side.

The handle part may be made of wood, but to have the whole iron self-contained, it should be made of a small screw-top can for holding the fuel fluid. A can such as used for holding metal polish makes a good container. A hole is cut in the screw top to admit the threaded end of the small rod and is held in place with two nuts between which a leather washer is placed to prevent any leaks.

The copper is heated by placing a small quantity of the heating fluid—preferably denatured alcohol—in the pan and lighting it while the whole device stands in an upright position. A sufficient quantity of alcohol burned



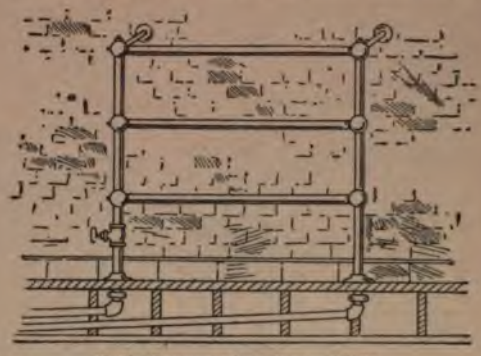
Heating Attachment

in the pan will heat the copper.—Contributed by Clarence A. Anderson, Halifax, N. S.

Heated Towel Rails

A fixture of considerable utility in the bathroom, and one that can be made to have an exceedingly attractive appearance, is the heated towel rail; yet it is one that has been almost entirely overlooked by plumbers, says the Metal Worker. The ordinary bent tube as a convenience for hanging towels upon is good enough, but the comfort and convenience of always having warm and dry towels in the bathroom are obvious.

The illustration shows a rail made of nickel-plated brass tube, 1¼ or 1½ in. in diameter. The tees are of an ornamental design and the wall and floor



Rails Connected to Steam Main

flange connections are provided for flow and return pipes. The connection to these are in the floor. The method of connecting a towel rail is identical with that of connecting a radiator, and there is no trouble at all in heating it, if the position is such that a circulation is possible.

Milling in a Lathe

In an emergency, the lathe can be used as a milling machine on surface planing. Mount an arbor between centers on which cutters are placed and the lathe is converted into a milling machine for light work. The manner of holding the piece to be worked depends on its shape. Sometimes a vise can be bolted to the cross slide and the work clamped in it, and sometimes work can be bolted to the cross slide by means of the tool-post slot. The feed is taken by the cross-feed screw.

A limited class of work can be bolted to the lathe parallels. This method is suitable for work requiring not a cross feed, but a feed up and down, which is obtained by means of the rise-and-fall carriage of the lathe when the latter is so constructed. Keyways of considerable length have been milled in the lathe by feeding the full length of the cross screw and then resetting the work. Very good work can be accomplished rapidly with a little practice.

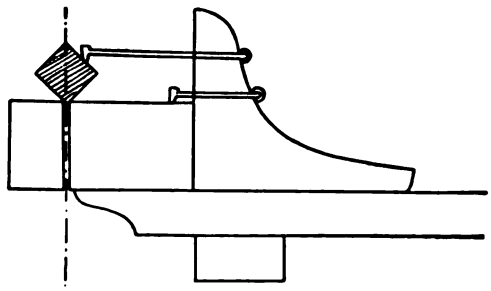
Clip for Holding a Trapdoor Open

A clip used in the place of a hook for holding a trapdoor open is shown at A in the sketch. It consists of a piece of strap iron, B, nailed or screwed to the wall or support. The screw or nail is set in just far enough to allow a space for the width of the door and the thickness of the strap iron. This device is much better than a hook as it will not shake loose if the door is disturbed by the wind or given a jar from a bump of a box or other article. —Contributed by E. A. Rauchschwalbe, Milwaukee, Wis.



Cutting Three-Cornered Pieces in a Sawmill

An order came into our sawmill for a large number of timbers to be sawed with three faces. Such a large number of pieces to be cut in an ordinary sawmill presented quite a problem. The sketch shows a clever way we used to get the work out. The view is in section and the dotted center line is the position of the saw. The ends of the large timbers on the carriage were held with double-ended dogs. Care must be taken not to run the carriage back too far as the dog in the end of the timbers is in the path of the saw.—Contributed by J. W. Bauholster, Gresham, Ore.



Holding Pieces to be Sawed

An Old Piston Used as a Pattern

It was necessary to have our gas-engine cylinder rebored and a new piston made to fit the enlarged diameter. As it would have taken considerable time to procure a new piston casting from the manufacturers, and not wishing to pay the price of a pattern, we decided to use the old piston as a pattern. This was done as follows:

The ring grooves were filled in with wood, which was driven in tight and smoothed off flush with the outside of the piston.

Three layers of thick rubber packing were used to increase the diameter and allow material for finishing. The packing was put on with shellac, and twine was wound around the outer layer to hold it in place while drying.

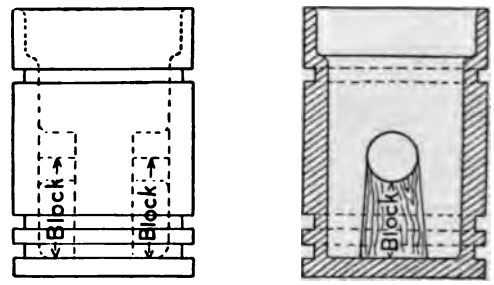


Fig. 1 Fig. 2

Old Casting Used for a Pattern

Under each of the connecting-rod-pin bosses, a block of wood was fitted as shown in the sketch. This made it possible for the molder to "lift" or "cope" out the inside of the piston and fill in the voids left by the blocks, using a loose boss to "make up" any deficiencies.—Contributed by Joseph A. Shelly, Brooklyn, N. Y.

A Method of Handling Liquid Manure

One of the hardest and most disagreeable chores on a dairy farm is handling the manure, from the cleaning of the barn to the final disposal of it on the land. How to lessen this labor, is a problem to which many dairymen have given considerable thought, as well as to save all or most of the fertilizer. A plan which proved successful to a correspondent of Hoard's Dairyman is given as follows:

We first dug a cistern outside of the barn where all the gutters would open directly into it. The cistern was made 16 ft. deep, 11 ft. wide and 30 ft. long, and is used for 30 cows winter and summer. If we were to make any change we would make it larger, as the longer the manure remains in it, the more liquid it becomes and the easier it is to handle. This size would be ample if cows were not stabled in the summer, and works very well as it is, but we would recommend 30 cu. ft. per cow each month the cows are stabled during the year.

Into this pit all manure, both solid and liquid, is pushed with a shovel, care being taken to keep the hay and bedding out of the gutters as much as possible. If the gutters have a slope toward the pit, it will be some advantage.

We used a 2-in. centrifugal pump to which was attached a 3-in. inlet pipe and a 2½-in. outlet. Such a pump will pump anything resembling liquid. This will pump a load in 2 or 3 minutes. A 2½ or 3-in. size is preferable, as it is not so likely to clog with the hay and trash that are so liable to get into the cistern.

The inlet pipe extends almost to the bottom of the pit and is fitted on that end with a plain sliding gate valve operated by a rod which extends up where it can be lifted with the hand. When the pump is in motion, the gate can be raised and the pump will operate. The gate must be closed before the pump is stopped or the pump will lose its priming.

The inlet pipe is placed inside a curb

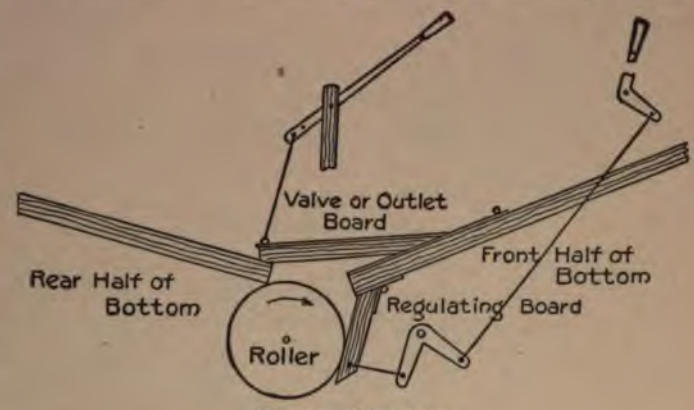


Diagram of Spreader

3 ft. square made of boards 1 ft. wide and 16 ft. long. A piece of heavy galvanized sheet iron perforated with 1-in. holes 4 in. apart each way is used on one or more of the sides in place of a board. This arrangement is to keep back the hay and trash and let the manure through. It is necessary to use a long-handled rake on the outside of this screen to keep it clean and draw out the hay. It is convenient to have a tight-and-loose pulley arrangement on the pump so that the latter may be started and stopped without stopping the engine.

Water should be supplied to the cistern when the manure gets too thick to pump. The water should be applied where the rake is used. The longer the manure remains in the cistern the more liquid it becomes, so that if the pit is large enough, but very little water will be needed. It is not necessary or desirable ever to empty the pit or lower it more than enough to insure plenty of room at all times.

A tank for spreading the manure is made of lumber and put on a wagon. The bottom of this tank slopes from

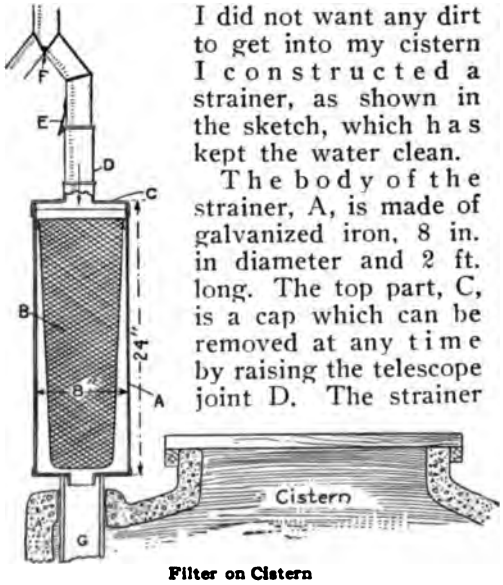
each end to the middle with a pitch of 1 ft. in 4 ft., so the liquid will all flow to the outlet going either up hill or down. The front and rear portions of the bottom lack about 4 in. of meeting in the middle, so there is an opening 4 in. wide extending across the whole width of the bottom, over which is hinged a board that can be raised with a lever from above. When this board is down, no liquid will flow out.

A 6-in. roller is placed under the rear edge of this opening with its top touching the bottom board. A board is hinged to the under side of the front edge which swings up against the front of the roller and is controlled by a lever to regulate the flow of the manure as desired. When the valve or outlet board is raised, the manure flows in the V-shaped space between the regulating board and the roller. The roller is made to revolve forward by a chain from a sprocket wheel on the rear wheel of the wagon, and by so doing keeps the space between itself and the regulating board clear, and the liquid will flow out in a solid sheet.

A Cistern Strainer

The first dash from a shower on the roof of a house carries with it all dirt, soot, leaves and branches. If the cut-out valve in the pipe is forgotten all this trash rushes into the cistern. As I did not want any dirt to get into my cistern I constructed a strainer, as shown in the sketch, which has kept the water clean.

The body of the strainer, A, is made of galvanized iron, 8 in. in diameter and 2 ft. long. The top part, C, is a cap which can be removed at any time by raising the telescope joint D. The strainer



Filter on Cistern

part B is made of a fine quality of screen wire having about ¼-in. mesh. The screen is made tapering with an iron band at the top to hold it in place. A band of iron is riveted to the shell A to make a shoulder on which to set the band in the screen.

The outlet from the strainer and inlet to the cistern, G, is a pipe that is as long as the cistern is deep. This is important as the new water stirs up the old, and, if there is any overflow, most of the old water is forced out. If the cistern is made of concrete, the pipe G can be fastened into the top of the cistern.

A finer screen can be placed inside of the coarse screen B to hold finer particles of dirt. Most of the sediment which comes from soot and dirt blown on the roof will be found in the bottom part of the screen when it is taken out for cleaning.—Contributed by F. E. Dougan, Pawnee, Okla.

Painting the Bathtub

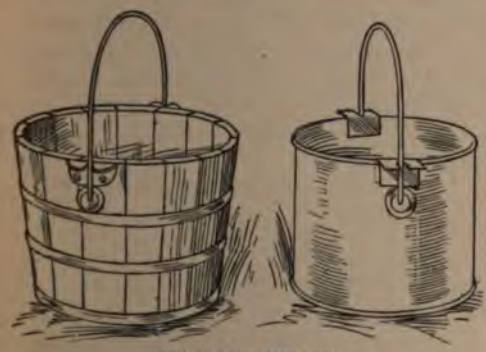
A very essential thing in painting a bathtub is to first clean it thoroughly. All old paint, if there is any, must be removed, and the surface sandpapered smooth. It may be necessary to use strong sal-soda water to get it right. When clean and perfectly dry, give it a coat of white lead in oil, mixed with equal parts of gold size and turpentine. Two or three coats should be given, says the Master Painter, allowing two days between each coat for drying. Lightly sandpaper each coat of paint. Now apply one or two coats of bathtub enamel, sold at the paint stores. Let this stand several days to dry. After this, a coat of enamel paint once or twice a year will keep the tub in fine appearance.

Labeling Barrels

Drug stores, oil cellars, chemical houses and liquor stores have many barrels and kegs from which the contents are taken from time to time and put into bottles. These barrels must be marked in some manner to identify each particular substance contained within. The ordinary way is to paste a label on each barrel as often as another is wanted. A much better way is to have an extra hoop securely labeled and which can be slipped easily over the top of the barrel.—Contributed by Jacob Zeithlin, New York, N. Y.

Bail Holders for Buckets and Pails

The devices shown in the accompanying sketch are made from small pieces of sheet iron and attached to the edge of the pail to hold the bail in



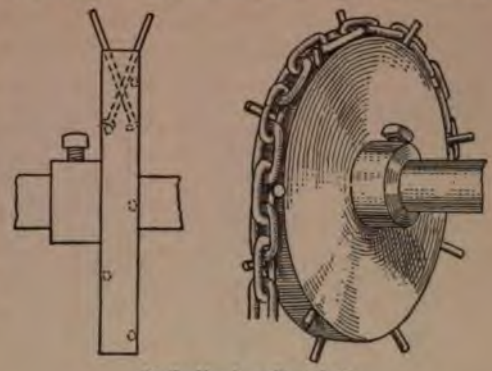
Bail Holder Attached

an upright position. The metal clip is fastened with screws to wooden buckets and clamped over the edge on tin pails. These clips are very handy for paint, glue and paste pails, to keep the handle clean.—Contributed by W. A. Jaquythe, Richmond, Cal.

A Temporary Chain Sprocket

The chain sprocket on an overhead traveling crane in a small foundry was so badly broken it could not be repaired. The sprocket was replaced in a quick and novel way as follows:

A pattern similar to a flange coupling was used and spaced on its circumference by wrapping a tape measure on the face. These spaces were marked



Nails Used as Sprockets

on the mold before the pattern was drawn from the sand. Nails were placed in the sand on the marked divisions. The hole for the shaft was made $\frac{1}{16}$ in. larger than necessary so there was no machine work except to drill and tap the boss for a setscrew. This emergency repair was used until a better sprocket could be made.—Contributed by M. E. Duggan, Kenosha, Wisconsin.

A Double-Bladed Offset Screwdriver

An ordinary offset screwdriver is a handy tool in an unhandy place, but in such a place it is usually awkward to shift the screwdriver end for end after turning the screw each quarter turn. Recently I saw a double-bladed screwdriver which was an improved type of the offset kind. The advantages of this screwdriver is that to change grips it is only necessary to turn it over in the



Offset Screwdriver

hand, thus bringing the other blade into use.

The screwdriver is easily made by upsetting the end of a steel rod and filing the blades into shape as shown in the sketch, then hardening and tempering to a deep blue.—Contributed by Chester L. Lucas, E. Saugus, Mass.

Boiler Water Level Determined by Gauge-Glass Shadows

Under certain conditions it is impossible to tell by examination of the water glass whether a steam boiler is

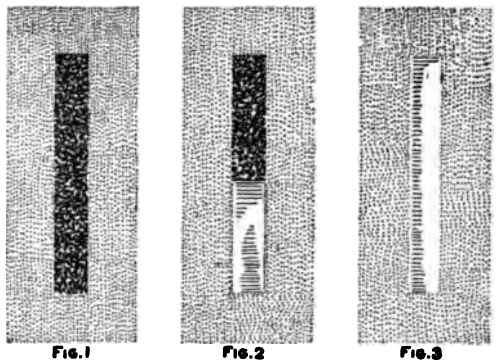


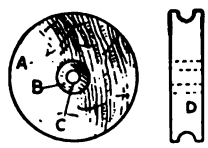
FIG. 1 FIG. 2 FIG. 3

Shadows from the Glass

full or empty, particularly if the glass is dirty, as it has the same appearance for its entire length. The trycocks will, of course, show the condition, but there is another way: The shadow cast on the boiler by an empty glass will be similar to Fig. 1, a dark line; but with one partly full, as in Fig. 2, or a full water gauge, a luminous stripe, as in Fig. 3, will appear. The full tube concentrates the light like a condensing lens, while the empty tube absorbs part of the light and therefore casts a shadow. These conditions are best noticed at night when a single light always hangs in front of the boiler.—Contributed by James M. Kane, Doylestown, Pa.

Pulleys for Aeroplane Construction

If no lathe is at hand, a good way to make pulleys for aeroplane construction is as follows:



Take a piece of round hardwood (a fork or broom handle will do), and cut as many blocks (A) ¼ in. thick as is necessary for the number of pulleys. Bore a ⅜-in. hole in the center of each block. Fill the hole with babbitt metal, B, and drill a hole, C, through the metal to admit a pin for a bearing. Cut a groove for the rope in the circumference, as shown at D. The bearing support may be constructed of sheet metal to suit the place where the pulley is located.

Quick Practical Method of Centering

In general machine shop practice a quick way of centering a bar for turning purposes is always very desirable. This can be readily accomplished accurately without the use of tools; that is, dividers or center square, in the following manner: Place the bar to be centered, which may be round, square or hexagonal, in a vise, allowing the face of the end of the bar to set about ⅛ in. below the top surface of the vise jaws, as shown in Fig. 1. Then place a rule, scale or any flat piece of metal of about one-half the diameter of the bar to be centered along the front jaw of the vise and scribe a line across the

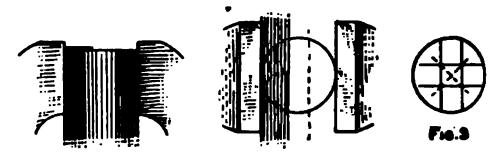


FIG. 1 FIG. 2 FIG. 3

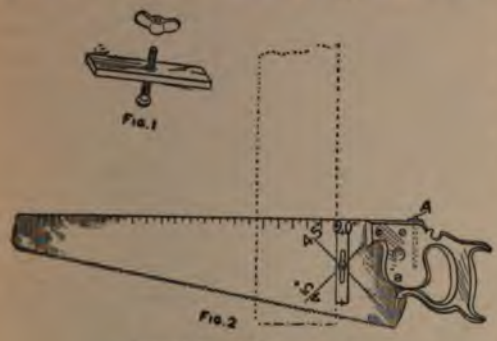
Holding Shaft in a Vise

end surface of the bar. Then shift the scale or rule to the back jaw of the vise and scribe a second line across the end surface of the bar. This gives two lines close together and parallel. Turn the bar about one-half turn and fasten it in the jaws of the vise in the same manner as before, then draw a line across the end surface of the bar with the rule or scale resting on the front jaw and on the back jaw of the vise, as shown in Fig. 2. This will give two parallel lines crossing the first two at the center, as shown in Fig. 3. The small square formed by the four lines intersecting is exactly in the center of the bar. The center may be easily determined by the eye or two cross lines as shown by the dotted lines.—Contributed by Angel Afanador, Indianapolis, Ind.

Combination Square and Handsaw

The sketch shows how to make a handsaw serve the purpose of a square, a scratch-awl holder and a rule. Another addition of a square and protractor can be attached by drilling a small hole in the saw blade close to the handle and inserting a machine screw to hold a piece of metal having its sides planed smooth. A thumbnut is used on the bolt for convenience. These parts are shown in Fig. 1.

Place the saw on a board with the smooth surface of the metal guide against the edge of the board and mark on the saw positions for the attachments such as 45 and 90 deg., as shown



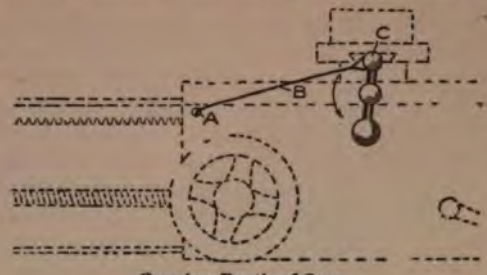
Square and Rule on a Saw

in Fig. 2, using a square or protractor to get them accurate. The straightedge of the saw is marked the same as a square.

A hole is drilled in the handle at A for the scratcher. The scratcher must fit snugly in the handle to keep it in place. It may be necessary to use a red-hot wire in making the hole, for the purpose of getting it small enough. —Contributed by A. P. Connor, Washington, D. C.

An Aid to Cutting Threads in a Lathe

A small hole is drilled and tapped for a screw, at A, in the apron of the lathe. One end of a chain, B, is fastened to the screw A and looped at the other end to slip over the handle C. The length of the chain from A to C must be just long enough to allow the crank to be rotated a little more than a half turn. The swing of the handle being limited, the feed will be always

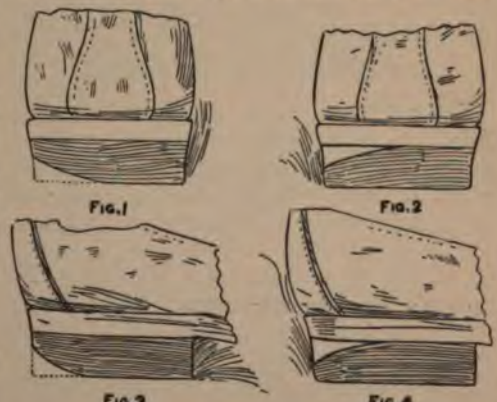


Gauging Depth of Cuts

the same. The handle is at the top in the position shown, when the tool is cutting; it is turned around to the bottom position for backing up to take another cut. The additional depth of cut is obtained with the compound screw feed, which is set anywhere inside of an angle of 30 deg. either side of straight across.—Contributed by C. R. Poole, Los Angeles, Cal.

Repairing Rubber Shoe Heels

If a rubber heel is worn as shown in Fig. 1, cut a leather wedge the shape of the worn place and put it between the shoe and the rubber heel, as shown in Fig. 2. In Fig. 3 is shown the wear

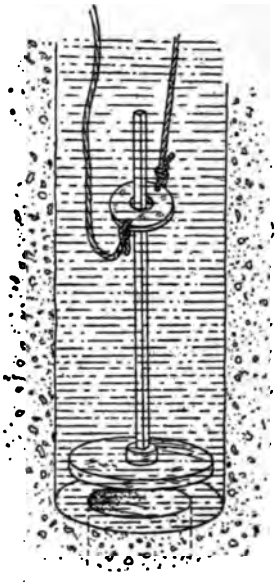


Showing How Wedge is Applied

on the rear part of the heel, and in Fig. 4, the method of applying the wedge. —Contributed by Walter W. White, Denver, Colo.

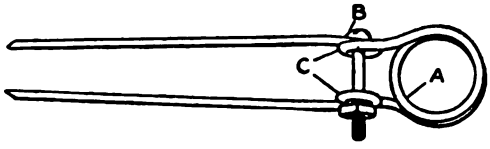
Lifting a Gate Covering from a Penstock

The lifting of the gate covering as shown in the sketch not only applies to this one article, but the method may also be used on similar articles in similar places. The lifting device consists of a large washer with teeth filed on the inner edges of the hole and the ends of a rope attached to each side as shown. When the washer is held level it can easily be dropped over the article sought, then by slacking on one rope, the disk will tip and the teeth on its inside circumference will engage the article which can then easily be drawn up.



Home-Made Compasses

When an ordinary compass is not at hand a very good substitute can be made of a piece of wire, as shown in the sketch. The wire is given a two-turn coil, A, and then each end is given a coil, C, to form a loop around the stove bolt, B. The two extending ends are pointed.—Contributed by Geo. Madsen, Chicago.



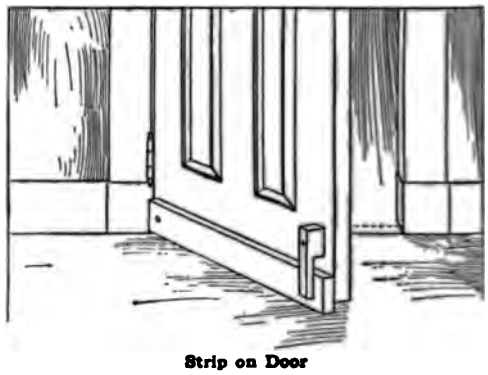
Compass Made of Wire

Preparing Calcimined Ceilings for Wallpaper

A size made of vinegar with a little paste added to give body and make it easy to apply kills the lime in the calcimine. The component parts of this size are things found in every household, and when the solution is applied to the calcimined surface, it dries quickly.—Contributed by Thos. F. Williams, New Bethlehem, Pa.

Automatic Weather Strip for a Door

The floors of an old house I used for a residence were not very level, especially in the hall. The inside partition had settled, making the floor in the hall so much out of level that the outside front door and also the inside vestibule door did not fit close to the floor. There was an open space of about 2 in. on one side when the door was shut. Mats or pieces of carpet were kept against the door to keep out the cold air. When the door was opened, the mats would cause trouble. I devised an automatic weather strip, as shown in the sketch, to take the place of the mats.



Strip on Door

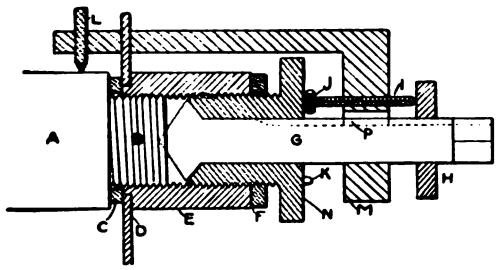
The strip was made of a piece of wood ¾ in. thick and 3 in. wide, with a length equal to the width of the door. One end was fastened to the door with a screw on the side near the high part of the floor, in this case the hinged side of the door. A piece of wood was cut out and fastened to the opposite side to act as a keeper for the strip of wood.

A piece of cloth was wrapped around the stick to make it close fitting and to lessen the noise when opening and closing the door. The movable strip would slip over the uneven floor and close the opening when the door was shut.—Contributed by R. Jocelyn, Toronto, Can.

Crankpin Truing Tool

The sketch shows a device for truing a crankpin without removing it from its place. The device is temporarily fastened to the crankpin A by turning it on the threaded end B. The washer C on the end of the socket E provides a groove for the metal piece D that holds the end of the cutter bar to prevent chattering. The main shaft G revolves in a bearing, N, which is screwed into the sleeve E.

The lock nut F sets the bearing N so the conical point on G will turn freely in the center of the crankpin A. The arm M is keyed loosely, at P, to the shaft G so that it will slide laterally. The feed is driven by a screw, I, having a six-winged knocker, J, which strikes on the pin K each revolution of the shaft. The collar H is shrunk tightly on the main shaft. The cutting



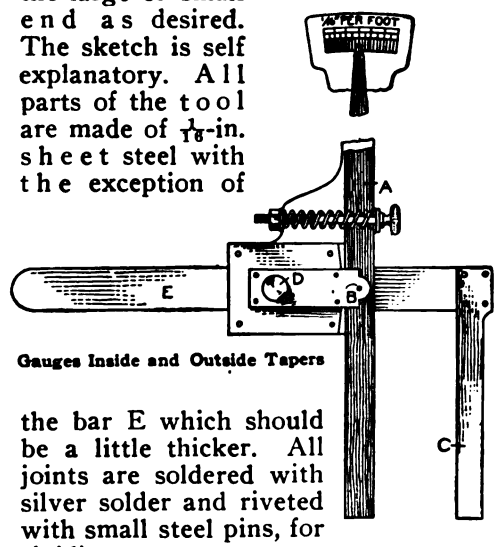
Details of Truing Tool

tool L is fastened into the end of the arm M with a setscrew. The shaft M may be turned with a flexible shaft or by hand with a crank. The method of truing the pin is obvious.—Contributed by Oliver S. Sprout, Harrisburg, Pa.

¶When lettering on a dark ground, add some aluminum bronze to a white or light paint.

A Taper Gauge

The tool shown in the sketch is one with which the user can ascertain immediately and accurately the taper of a hole, plug, keyway or the like, from the large or small end as desired. The sketch is self explanatory. All parts of the tool are made of $\frac{1}{16}$-in. sheet steel with the exception of the bar E which should be a little thicker. All joints are soldered with silver solder and riveted with small steel pins, for rigidity.



Gauges Inside and Outside Tapers

The measurements of the length of the pointer arm A from the swivel pin B to the pointer tip at the graduations should be exactly 6 in., and the graduations should be laid off very carefully to $\frac{1}{32}$ in. and engraved on the dial with a jeweler's small engraving tool. These measurements then give a direct reading of tapers in sixteenths of an inch per foot.

In selecting the zero or central point in the graduations, the blades A and C should be set perfectly parallel to each other, and the edges on both sides of each blade parallel, thus making the one reading dial correct for both inside and outside measurements when the pointer is set at zero. The tool may be used as a caliper square if so desired.

The swivel pin B passes through only the plate D and the pointer, and should be a very neat fit, as is also the case with the sliding head on the bar E. The neatness of these fits and the graduating of the dial are essential to the accuracy of the tool.—Contributed by L. S. Bunker, Vallejo, Cal.

Gas Engine Muffler Made of Funnels

A gas-engine muffler that will give good results and not materially affect the power of the engine is described by a correspondent of the Automobile Dealer and Repairer. It is made from a number of funnels and a piece of 6-in. stovepipe. Procure funnels that are the right size at the large end and cut each one off on the line C, Fig. 1, or about the size of the opening in the exhaust pipe. Slip these cut-off funnels into the stovepipe B, Fig. 2, and fasten the bell ends with small stove bolts in about four places around the pipe.

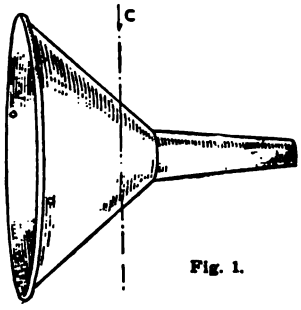


Fig. 1.

In placing the funnels, they should be in such shape that the small end of any one comes in exact line with the opening of the next one, as shown by the dotted line C. Place the funnels in this manner until the entire length of pipe is taken up. The ends are made of floor plates threaded to receive the exhaust pipe from the engine. Turn the flange to fit into the end of the pipe as shown at A. Tap this to receive a number of machine screws to hold it in place.

In the exhaust end place the same kind of a plate and screw a short nipple into the threads. The funnels should be placed so that the holes at the small ends will be in direct line. This gives a straight line for the exhaust gases to escape and still deaden the noise satisfactorily without the danger of the muffler becoming stopped up as sometimes happens with other kinds of silencers.

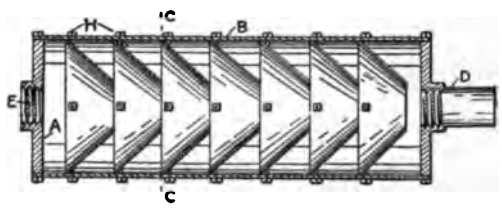
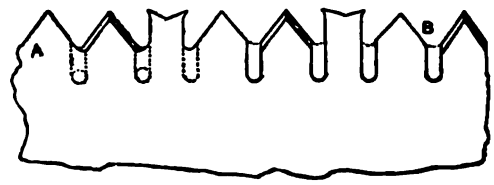


Fig. 2.—Funnels in Place

Many authorities claim that the muffler greatly lessens the effective power of the engine, but in making a brake test with a muffler made after the method described there will be found to be no appreciable change in power.

Metal Removed between the Teeth of a Crosscut Saw

An old crosscut saw having the teeth worn so that the spaces between them have entirely disappeared, can be made as good as new by drilling ¼-in. holes at the depth desired for the spaces, as shown by the dotted lines A, and cutting out the metal with a cold chisel. The finished openings between the teeth are shown at B.—Contributed by F. M. Warren, Central City, S. Dak.



Notches Cut Between Teeth

Home-Made Tobacco Moistener

The man who smokes a pipe and has a hard time to keep his tobacco moist, can do so by placing a small piece of apple with the tobacco in the box. This will not only keep the tobacco moist, but will also add a flavor that is relished by many.

In a tobacco jar the apple may take the place of a sponge. It should be renewed occasionally and must not be allowed to become rotten.—Contributed by J. F. Campbell, W. Somerville, Mass.

¶Never rebabbitt a crank box without liberal liners in it to take up the wear.

Making a Clock Run by Changing Its Position

Sometimes, especially in cold weather, when an alarm clock stops, it will run if placed on its back, face or side. While a clock in any of these positions is not very useful or attractive, it is much better to have it run in that position than not at all, as it may be the only clock in a house, where the alarm feature is needed.

Flower Pot Drain

The staining of woodwork on porches and posts caused by the dripping of water from flower pots can be prevented in the following manner:

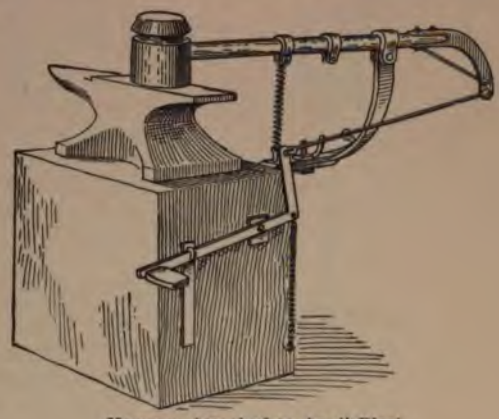
Make a zinc or galvanized tray of suitable shape in which to set the pots, as shown in the illustration. Solder a tube for the overflow, or dripping, on one side of the tray. Have the tube long enough to clear the post or part of the porch where the flower pot is set. The tube may be placed to the rear so it cannot be seen from the street, if desired. Place some small pieces of wood beneath the tray to allow the passage of air, thus preventing moisture. The tray can be made in any shape to conform to the shape of the pots.—Contributed by Dr. D. D. Smith, Sandusky, O.



Flower Pot in the Tray

A Foot-Power Hammer

The hammer is fitted with a heavy wood handle to which a curved piece of iron is attached with clamps, and


Hammer Attached to Anvil Block

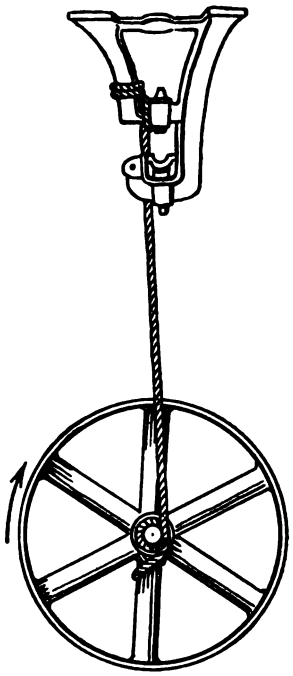
braced with a rod as shown. The yoke at the fulcrum is fastened securely to the handle and also to the bar-iron brace. The brace is attached to an L-shaped bracket on the anvil block, so it can be raised and lowered to permit the hammer to strike with the face parallel to the work. The bell-crank lever is attached to the side of the anvil block with the foot piece near the operator. If several holes are drilled in the top part of the bell-crank lever, the length of the stroke can be adjusted.—Contributed by A. Walle, Ludington, Mich.

¶Hard lumps of tar can easily be removed from the polished woodwork of a car by covering the spot with lard or olive oil, after which the tar can be removed without damaging surface.

¶A good way to remove whitewash is to soak it thoroughly with concentrated lye and then use a wire or hard-bristled scrubbing brush. If the lime was put on in a hot condition, it may require more than one such application to remove it entirely.

Raising a Countershaft

The method I used in putting up unassisted a heavy countershaft for a planer is shown in the sketch herewith. I tied a rope to each hanger and fastened their lower ends to the shaft. I turned the shaft by means of the large pulley, thus wrapping the ropes around the shaft and raising it to the bearings. The shaft was lifted into place with surprising ease.—Contributed by Harold M. Ilg, Lowell, Mass.



Reclaiming Scrap Solder and Lead

We had occasion to clean up the season's accumulation of scrap solder and lead, and after separating the two metals we found it necessary to melt them and run into a convenient form for handling.

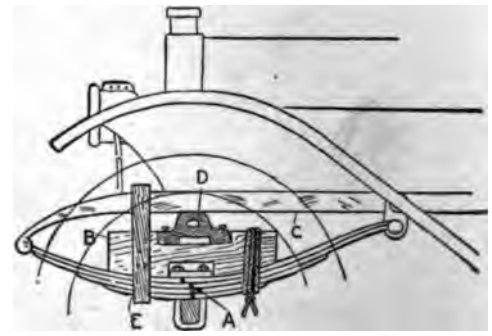
An old range boiler of 30-gal. capacity was cut in two, and seven or eight holes 2 in. in diameter were punched in the side about midway between the top and bottom of the lower half. The lower end of the tank was then placed in the ground in a hole about 1 ft. deep and tamped carefully to make it solid. The interior of the tank was then filled with dirt up to the holes that were punched in the sides. A coke fire was placed in the tank and a cast-iron soup kettle placed on top of the coke and filled with metal. The dirt was tamped off from the top of the melted metal and the clean metal was poured into molds. We found it to be the quickest and best method we had tried. —Contributed by W. W. Hughs, Minneapolis, Minn.

How to Clean a Straw Hat

A simple and inexpensive straw hat cleaner may be made by dissolving 1 oz. of oxalic acid crystals (these can be purchased at any drug store) in 1 pint of boiling water. After the liquid has cooled, it should be shaken thoroughly and then applied to the straw hat with a small nail or tooth brush. Apply copiously and briskly and then rub dry with a clean cloth. The hat should now be pressed with a hot iron over a dry cloth so as to preserve its shape, and when thoroughly dry, it will be as clean as a new hat. This cleansing mixture is the cheapest and most effective known, as the quantity mixed is sufficient for a dozen hats.—Contributed by W. B. Lipphard, Buffalo, N. Y.

Emergency Repair on an Automobile Spring

The front spring of an automobile broke while on a trip and it was repaired in the manner shown in the sketch. The car was raised with a jack above its normal position and the various leaves of the spring were placed end to end at the fracture A, and the U-bolt clamp drawn tightly down on



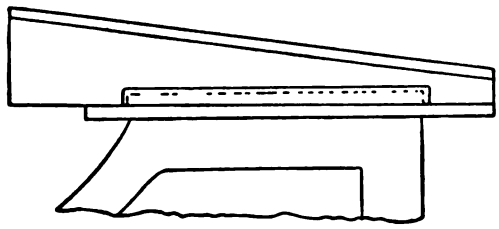
Spring Supported with Wood

them. A piece of 2 by 4-in. pine, B, was procured from a farmer, and, with the aid of a borrowed hatchet and a handsaw, it was cut to fit the curvature of the spring as shown, the top part of the block being left straight. A slot was cut into the block to receive the rubber buffer D, which was held in place by two nails, driven through its flanges and into the wood.

A 1 by 2-in. strip of wood, E, was nailed on each side of the spring near the front end, and a rope wound several turns around the rear part, to hold the piece B in place. When the jack was removed, the frame rested on the rubber buffer. A journey of 50 miles was made over dirt roads without trouble.—Contributed by F. C. Holly, Yazoo City, Miss.

A Partnership Desk

Where office space is limited an arrangement by which two men can work



Another Desk on Top

at the same desk will be found of such advantage as to repay the trouble of constructing an extra top, as shown in the illustration. The top board is very convenient for a bookkeeper or draftsman. The construction is self-explanatory. The addition is secured to the top of the desk by two strips which engage with the projecting ends of the desk top. The strips are screwed to the side boards of the addition after the latter is in place. Small strips of blotter should be laid on the desk on the part where the addition rests, to avoid marring the polished surface. Any desired height may be obtained by varying the width of the two side boards which support the false top. —C. W. Nieman, New York City.

Joint for Aeroplane Construction

A very simple, light and inexpensive joint for the framework of aeroplanes

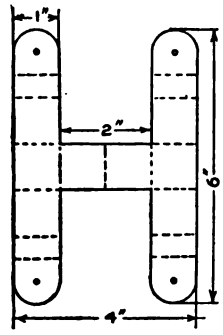


Fig. 1

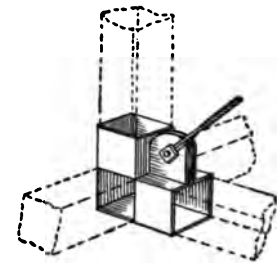


Fig. 2

Made of Sheet Metal

may be made of sheet brass or aluminum, about 22 or 24 gauge. The sheet metal is cut to produce the shape with the dimensions shown in Fig. 1. After bending the metal on the dotted lines it will take the shape about the joint as shown in Fig. 2. The bolt used for holding the ends of the wire truss clamps the ends of the metal together, thus making a solid joint. This joint is especially adapted for use on aeroplanes built of square material.—Contributed by Henry C. Wood, Toronto, Canada.

A Small Plow Plane

A plane for cutting small grooves in wood may be made in the following way: Saw a slot in a piece of steel, A, Fig. 1, and then turn down the edge E. Drill two holes, B B, for screws to attach the steel to a block of wood.

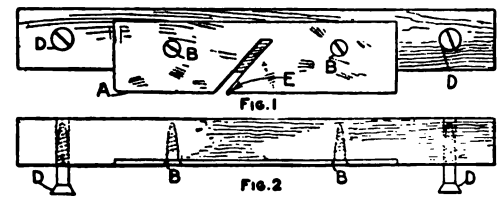


Fig. 1

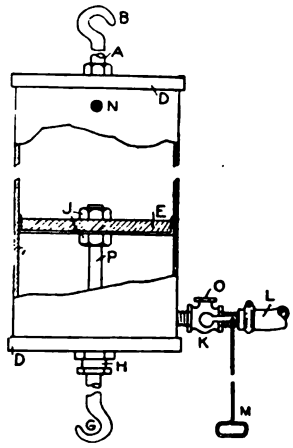
Fig. 2

Metal on Wood Block

Guides for the plane are made by turning two large screws in part way, as shown by D D, Fig. 2.—Contributed by Geo. Madsen, Chicago.

An Air Hoist

Procure a piece of 1-in. cold-rolled steel, A, and bend a hook, B, on one end. Thread the other end for a standard 1-in. nut. Take a piece of 4-in. steel pipe, C, of the desired length, and thread it on both ends for pipe caps DD. Bore out the pipe C so that the internal walls are straight and smooth. Make a piston, E, ¾ in. thick and 1/64 in. smaller in diameter than the inside diameter of the pipe C. Turn up a leather disk about ¼ in. thick and 1/1000 in. larger than the inside diameter of C. Drill a 1¼-in. hole in the center of the piston and the leather disk.



Make a piston rod, P, by turning down a piece of 1⅜-in. round cold-rolled steel to 1¼ in. in diameter and bend a hook, G, on the end. Turn a packing gland, H, into the pipe cap D and push the piston rod through the gland and cap and assemble by means of the lock nuts J. Screw the pipe caps DD in place, making the lower one air-tight with a gasket.

Drill and tap the cylinder for a ¾-in. pipe just below the lowest point of the piston travel. Connect a two-way valve, K, by means of a nipple and a hose, L. Make a control rod, M, to operate the valve, and drill a ½-in. hole, N, in the cylinder. After the hoist is connected and the parts fitted together, take it all apart, clean and oil thoroughly and then reassemble, making all fittings secure and tight.

The hoist is operated by pushing up or pulling down on the rod M. When rod is up, the air is admitted from ose L through the valve K, and into the cylinder. When the control rod is pulled down, the air is allowed to escape through the valve opening O.

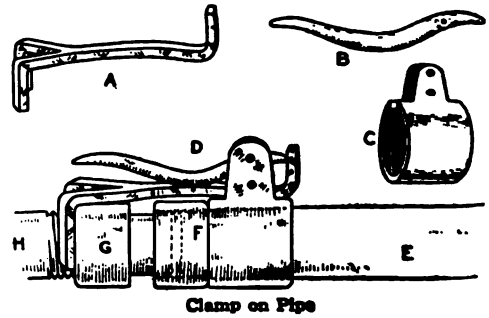
This hoist can be made cheaply and used wherever compressed air is obtainable. It will lift 700 lb. with an air pressure of 60 lb.—Contributed by F. B. Hays, St. Louis, Mo.

Clamp Coupling for a Water Pipe

A water pipe coupling had to be disconnected frequently, and, as it took some time with the ordinary screw coupling, I designed the following described joint:

The parts consist of a draw bar, A, made of ½-in. square bar, a lever, B, also made of ½-in. stock, and a split collar, C, which was made from sheet metal rolled into shape. The assembled parts are shown by D. An ordinary coupling was cut in half and the pipe E turned into the part F for about one-half its length. The other part, G, was turned on the pipe H, after some of the threads were filed off at the end, so that it would enter the coupling F freely. A small rubber gasket was placed in the coupling F to make a watertight joint.

To connect the pipes, pull the draw-bar back toward the pipe H, lift up and hook it back of the coupling G, at the same time placing the end of the pipe H into the coupling F. Pull the lever



Clamp on Pipe

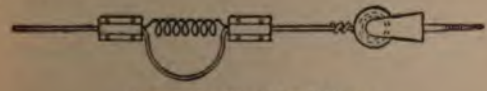
down and the parts will be drawn tightly together. The degree of pressure may be regulated by turning either half coupling.—Contributed by Thos. L. Parker, Olaf, Iowa.

How to Make Stamp-Pad Ink

Some typewriters and all rubber and metal stamps require the use of a special ink which is sold in small bottles. This ink is sometimes hard to obtain, especially if the address of the dealer is not at hand. It may be made at slight cost by dissolving the point of a common copying or indelible pencil in glycerine. Put a few drops of the glycerine into a bottle and stand the pencil in it after having cut the wood well back from the "lead." It will immediately begin to dissolve, and after a day or two the ink will be ready to use. The pencil will make a convenient tool for applying the ink to the pad or roller.—Contributed by Frank N. Blake, N. Adams, Mass.

Noise Caused by Service Wires

Several complaints came from my customers who claimed they could not sleep on cold nights owing to the noise caused by the service wires, says a correspondent of the Canadian Electrical News. I have tried several times to overcome this trouble and finally with success.



Removing Strain on Wires

A ¼-in. spring wire was coiled 1½ in. in diameter by 10 in. long and placed on the wire with two clamps as shown in the sketch. This takes the direct strain off the side of the house which acts as a sounding board.

Cranking an Automobile by Foot Power

The sketch herewith shows a device for use on an automobile to start the motor by turning the shaft with the pressure of the foot on a lever. While this device may not be efficient on large cars, it will work successfully on small machines. The parts connected to the machine are shown in Fig. 1. The drum C, Fig. 1, which should be about 6 in. in diameter, is made up of parts as shown in Fig. 2. The casing G encloses a spiral spring, F, and the

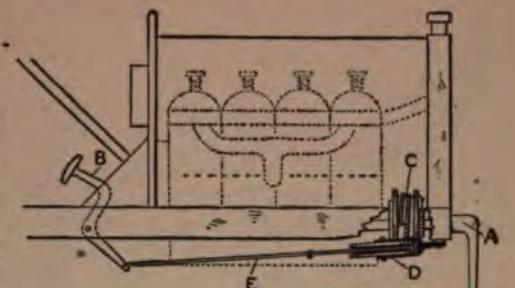


FIG. 1

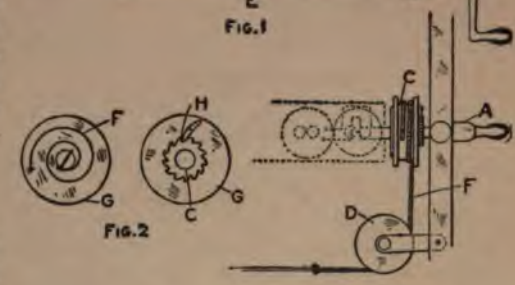


FIG. 2

FIG. 3
Foot Starting Attachment

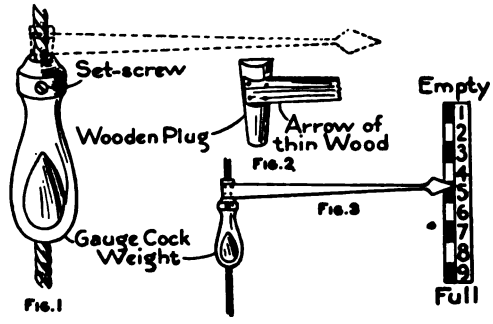
ratchet wheel H is fitted to the motor shaft C so it will disengage the same way as the ordinary crank A, Figs. 1 and 3. The drum C is turned with a bicycle chain, F, Fig. 3, which is connected to the foot lever B by a wire, E, Fig. 1. The idler wheel D, Figs. 1 and 3, can be placed in a suitable position to carry the chain to any desired place for the foot lever B, Fig. 1.—Contributed by D. H. Fairchild, Pana, Illinois.

How to Cut Brass Tubes with a Hacksaw

Place two blades in the saw frame, one in the usual way and the other reversed so that the teeth will point back toward the handle. One blade will cut while the saw is pushed forward, and the other makes its cut when drawing the saw back. While one blade is dragging, it will prevent the other from taking too deep a cut in the metal.—Contributed by H. D. Chapman, Washington, D. C.

Weight and Indicator for Tanks

The weight end of a gauge cock, Fig. 1, makes one of the best weights for a counterpoise or indicator rope,



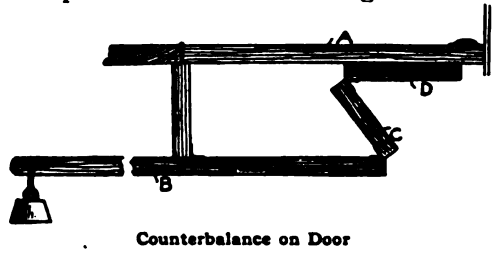
Parts of the Indicator

as it has an opening running through the metal from end to end and a set-screw by means of which it can be easily set at any point without knotting the rope.

In a soft-drink factory, where the indicating weight from the gas tank was in a dark corner, I was obliged to devise some means to show the bottler the condition of the contents. A device of light wood, Figs. 2 and 3, was constructed so that the arrow pointed to a portion of the wall where there was sufficient light to see a scale.—Contributed by James M. Kane, Doylestown, Pa.

Counterbalance for a Trapdoor

A heavy trapdoor opening up from the floor and out from a wall was used as a protection when standing erect in

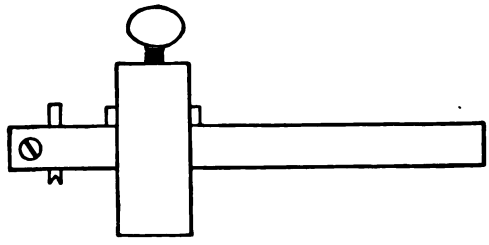


Counterbalance on Door

place of a railing. To keep the door, A, erect when open, an arrangement with a counterbalance had to be connected as shown in the sketch. A plank, B, was fastened with a hinge to the joist. The plank was cut in three pieces, B, C and D. The piece D was fastened to the door and C, connecting both B and D with hinges. The plank may be any desired length, but the piece C must be as long as the width of the joist plus the thickness of the door. When open, the pieces of plank will form a perpendicular piece parallel with the erect position of the door. The weight must be regulated to counterbalance the door.—Contributed by T. F. Solon, Solon Springs, Wis.

Cutter for Inlaying Wood

An ordinary carpenter's gauge with a V-notch filed in the end of the marker, is useful for cutting small grooves for inlaid work. This device was adopted by the writer in working on drawer fronts of a sewing table. The inlaid strip was $\frac{1}{16}$ in. wide and $\frac{3}{8}$ in. from



Cutter Made of Gauge

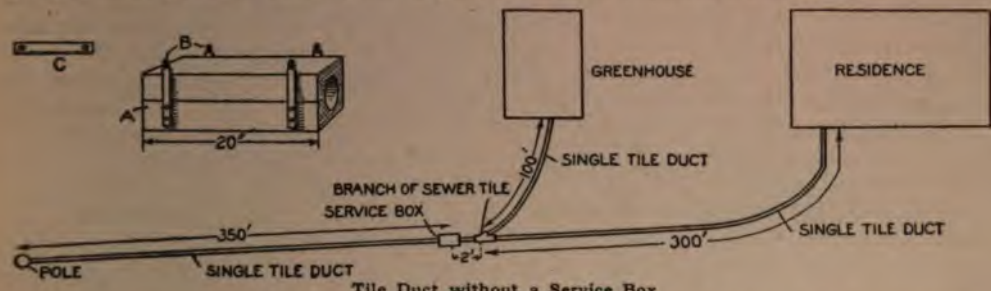
the edge all around. The marking gauge was supplied with a round steel wire having a notch cut in its end as shown. This gauged two lines $\frac{1}{16}$ in. apart and deep enough for the inlay. The stock between the two lines was removed with a narrow chisel made from a flat file.—Contributed by Joseph A. Shelly, Brooklyn, N. Y.

¶An emergency pair of tweezers can be made by flattening the ends of a common hairpin.

¶When the revolving work in a lathe chatters so as to destroy the fineness of the cut, the trouble sometimes can be overcome by placing a wad of waste between the arm of the lathe dog and the side of the faceplate slot.

An Underground Tile Duct

After having an underground cable proposition put up to us, we solved the problem as shown in the sketch. The plan was to carry a 26-pair, 22-gauge underground cable from a pole to the residence and an 11-pair 22-gauge from the greenhouse to either the pole or the residence, without going to the expense of a regular brick service box. This would naturally mean a two-duct run from either end to the middle, but we figured it out so that we could run one single-duct tile from the pole toward the house for 350 ft.



Tile Duct without a Service Box

A piece of creosoted wood duct, 20 in. long and equipped as shown in detail, was butted against the tile. A short piece of tile was placed next to the so-called "service box" and a regular sewer Y-branch placed next to it. One single duct run was carried to the residence and the other to the greenhouse. With this arrangement no tile or cable was wasted and the cost of a regular service box was saved.

The 26-pair cable was pulled straight through from the pole to the house, the 11-pair cable was pulled from the substitute service box to the greenhouse and bridged into the 26-pair cable at the service box, the cover of which was screwed into place to complete the job.

The service box used, as shown in the sketch, was a 20-in. piece of creosoted wood duct which was ripped lengthwise. Four iron rods, threaded at one end to receive wing nuts, B, were screwed to the bottom half, A. When the splicing was completed, two pieces of strap iron, C, were drilled to slip over the rods BB. The wing nuts held these in place.—Contributed by G. M. Petersen, Buffalo, N. Y.

Dressing for Mohair Automobile Tops

Manufacturers of mohair goods and others acquainted with their wearing qualities, etc., advise the use of plain soap and water as a means of keeping the mohair top in proper condition, says the Automobile.

When the top becomes dirty and takes on a "frowzy" appearance, brush very briskly with a stiff broom, or wash thoroughly with a solution of castile soap and soft water. Apply the solution with a wool sponge and dry off thoroughly. This is said to be the only safe method of treating a double-texture mohair top with a rubber interlining. The application of oil of any kind, or gasoline or any commercial cleaning preparation is very detrimental to the rubber interlining.

¶According to the Mechanical World, 4 parts of alabaster plaster and 1 part of finely pulverized gum arabic, mixed with a cold saturated borax solution into a thick paste, make an unequaled all-around cement for stone, glass, bone, horn, porcelain and wood, which becomes hard as marble and possesses the agreeable working quality of not solidifying immediately, but in 24 to 30 hours.

Splicing Rope Drives

By W. B. HOSFORD

Many interesting experiments in rope splicing have been made in an effort to obtain a splice that will fill the bill in every particular in connection with the American system of rope driving. A long rope splice that has so far given the best of results is shown in the sketches. These show each successive operation in splicing a 1½-in. four-strand rope.

After the rope has been tied and unraveled, measure back from the end of the rope the necessary distance, about 7 ft. for 1½-in. rope, and tie securely with a piece of twine, as shown in Fig. 1. A good rule for all sizes of rope is to measure back 60 diameters of the rope to be spliced and tie it, then unlay the strands of each end back to the twine tie. Cut the core close to the end of the solid rope and place the ends together and join each pair of strands as shown in Fig. 2.

Take one pair of strands and unlay one and lay in the other until the length is in place, allowing sufficient end to do the tucking as shown in Fig. 3. Treat the other pairs in the same manner, so as to leave the three spaces between strands the same distance apart, as shown in Fig. 4. Each pair of strands are unlaid two full turns back from the point of meeting, as shown by the half strands 3 and 4 in Fig. 5. Each strand is now divided equally, one-half of each strand is laid forward to the center of the space between the two dropped half strands and tied in a simple knot, so as to have the threads running in the same direction as they are running in the rope. These are shown at A in Fig. 6, after the tie is made. The rope is now held and opened with a marlin spike as shown in Fig. 8.

Take strand 3 (Fig. 7) and lay it around until it meets half strand 4. Untwist the threads in the loop as shown and draw them in until the threads run in the same direction as they do in the body of the rope. Repeat the same operation in the opposite direction using half strand 4 to meet half strand 3. The end is ready to tuck at this point. Treat all strands where they meet, in the same manner.

The operation of tucking is shown in Figs. 8, 9 and 10. Cut half strand 3, Fig. 8, for convenience, and take out one thread, and one thread out of strand 4, or the tucking strand, insert the marlin spike so as to open the strand, holding the rope as shown. Pull the remaining threads of half strand 3 out from under strand, making room for 4. Draw half strand 4 over and under, taking the twist out of the threads, as shown in Fig. 9, pull down firmly in the direction the strands run in the main body of the rope. Continue to repeat this operation, dropping a thread out of each half strand until all the threads are dropped. Treat all strands alike and the rope will have the appearance shown in Fig. 10. Cut the threads off close to the body of the rope and it will have the appearance shown in Fig. 11.

In splicing a three-strand rope, the operation of measuring back, tying, unraveling and butting together is the same as in a four-strand rope. There is one pair of strands less and one pair of strands is laid out in each direction, leaving a tucking end and one pair of strands remain in the center. Every other operation is the same as for a four-strand rope.

Grinding a Twist Drill

When drilling, either grind the cutting edge of the drill to the center of the supporting rib, or first use another drill which is not less in size than the center rib, as on a 1-in. drill there is about ⅛ in. of stock in the center without any cutting edge. If the cutting edge is not carried to the center of the rib or no small drill used in advance, there is a great waste of power and labor.



Fig. 1



Fig. 2

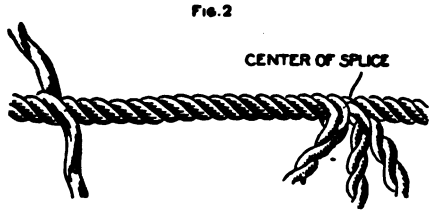


Fig. 3

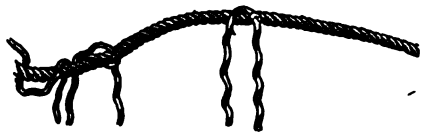


Fig. 4

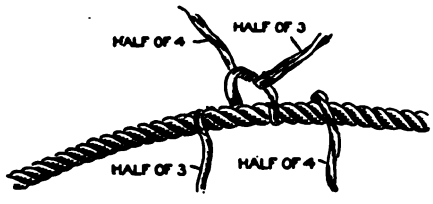


Fig. 5

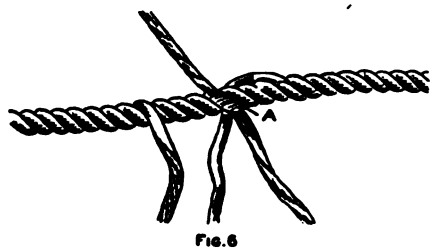


Fig. 6

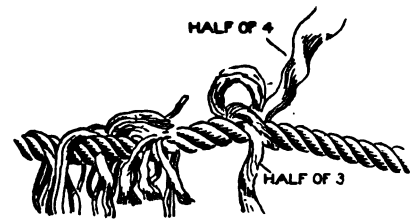


Fig. 7

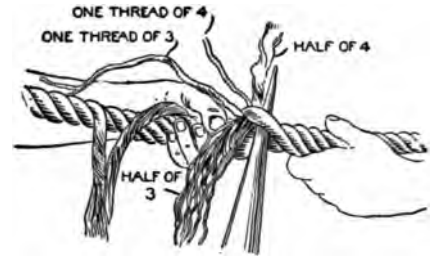


Fig. 8

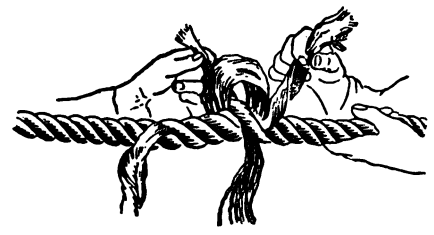


Fig. 9



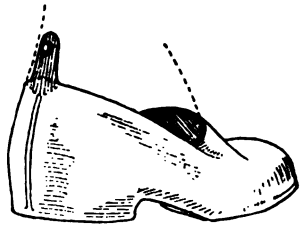
Fig. 10



Fig. 11

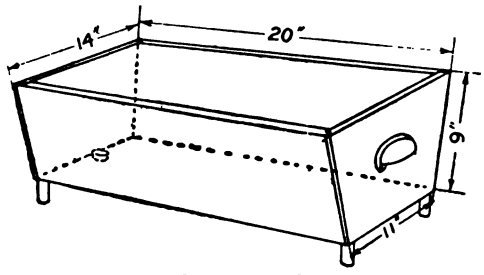
Attach ng Rubbers to Shoes

After wearing rubbers a few times, they will become a little larger and fit loosely over the shoes. Sometimes the looseness is quite annoying and when walking in slush and muddy paths it is almost impossible to keep the rubbers on. This trouble I prevented by attaching the tongue and button as shown in the sketch. A tongue is fastened to the upper part of the back on each rubber and a button sewed on the back of each shoe. The tongue has a hole for the button.—Contributed by C. Homewood, Waterloo, Iowa.



A Washtub for Use in a Sink

The average woman finds the filling and emptying of washtubs quite a task. Even when the washing is sent out, some fine pieces of clothing and flannels are always laundered at home because they are not to be trusted to a laundress or laundry. A tub that can be set in a sink and used in connection with a small washboard, costing 15 cents, and a cheap wringer, will enable any woman to do a small washing



Sink Washtub

without bending, or emptying or lifting the water or tub.

A carpenter can furnish the material and make such a tub for a nominal price. The handles for the ends, and the feet can be put on at home. A coat of paint may be applied to the outside if one cares for appearance. For the average sized sink the following dimensions will be found correct. It is better to measure the sink before making the tub. Pine wood is used for the material and should be ¾ or 1 in. thick. The height of the tub is 9 in. The sides are straight pieces of wood and measure 9 by 20 in. The two ends are 9 by 14 in., and the bottom is 11 by 19 in.

The two ends are rabbeted to receive the sides and bottom. Coat the rabbeted parts with white lead before nailing them together. A drain hole is bored in the bottom of the tub and a cork used instead of a wood plug. The cork swells with the water, but can be renewed when worn out. Feet are attached to keep the tub from resting on the bottom of the sink. This adds to the height of the tub and allows a free passage for the waste water. The feet can be made of pieces 1½ in. in length, cut from a broom handle. The handles for the ends of the tub are the kind that are used on kitchen cupboard drawers. —Contributed by Katharine D. Morse, Sycamore, N. Y.

Soldering a Hole on an Overhead Surface

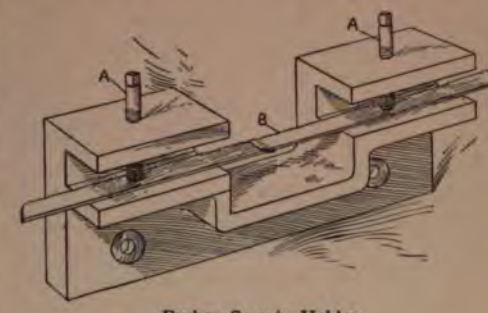
The mechanic as well as the owner of an automobile does not care to take off the body in order to remove the gasoline tank to solder a leaking rivet in the bottom. During an attempt made by the writer to effect such a repair, it was found that while the metal and rivet became well tinned, the solder would run back on the iron and the leak could not be stopped. The following method eventually proved successful:

A small tin cap of sufficient diameter and depth to cover the rivet head was first filled with solder and then held in place with the hot iron. After the solder was thoroughly melted, the cap was held in place with the point of a file until the solder cooled. A permanent repair was made in this manner.—Contributed by Fred C. Inghram, Tucson, Ariz.

Brazing Broken Band Saws

The factory or mill using band saws in any quantity must be provided with tools for filing and repairing them when they become dull or broken. For those who have only one saw the repair tools cannot be so elaborate. In this case, such a tool as shown in the sketch is not expensive and will be of great assistance in joining the ends of a broken saw blade. It is made of cast iron with the channel planed out perfectly straight. The channel provides a shelf for the saw to lie on and a place on each side of the gap for a setscrew to hold down the saw to the shelf. The saw can be clamped flat with its back against the rear of the casting while brazing, thus keeping the alinement perfect.

The two ends of the saw should be beveled and a piece of silver solder slipped between them. The joint should be made in the middle of the gap. A flame from a blow torch can be turned on the joint, and as soon as the solder has fused thoroughly, a clamp should be applied. On cooling, this will make a thin, tight joint. If many saws are to be brazed, fit the jaws of a pair of tongs with pieces of



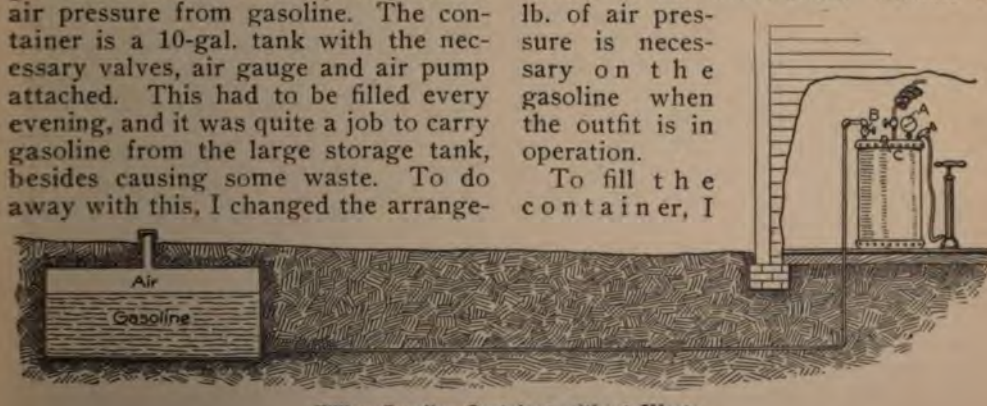
Broken Saw in Holder

steel, each about ½ in. thick by 1 in. square. These false jaws retain the heat well and can be heated in any blacksmith's forge or with a blow torch. The grip of the hands on the tongs will be a sufficient clamp. Ordinary brazing spelter can be used, but it is lumpy for small work and does not flow as readily as the silver solder. Use borax as a flux in either case.—Contributed by Donald A. Hampson, Middletown, New York.

Filling Container from Gasoline Storage Tank by Air Pressure

The light used in my plant consumed gas made in the ordinary way under air pressure from gasoline. The container is a 10-gal. tank with the necessary valves, air gauge and air pump attached. This had to be filled every evening, and it was quite a job to carry gasoline from the large storage tank, besides causing some waste. To do away with this, I changed the arrangement of the tanks by burying the 110-gal. storage tank in the ground, 50 ft. from the building and connecting it to the container with a ⅜-in. pipe, as shown in the illustration. About 40 lb. of air pressure is necessary on the gasoline when the outfit is in operation.

To fill the container, I simply open the valve B and let the air pass into the storage tank until the pressure is equalized in both tanks.



Filling Gasoline Container without Waste

The air gauge A will show from 10 to 15 lb., owing to the amount of air space in the storage tank, when the pressure is equal. The plug C is then removed to let the air out of the container. The air pressure in the storage tank will force the gasoline through the pipe, thus filling the container without waste. The flow of the gasoline can be watched through the hole where the plug C was removed.—Contributed by C. S. Enright, Cle Elum, Wash.

How to Fit Door Locks

Many beginners at carpentry approach the work of putting in a mortise lock with considerable doubt as to their ability of successfully accomplishing the task, and many others who have worked at the trade for years have no regular rule whereby they may do the work quickly and accurately. The tools necessary to do the work are, a screwdriver; a brace with two bits, one ⅜-in. and one ¾-in.; two chisels, one ⅜-in and one ¾-in.; a scratch awl; a pocket knife; and a marking gauge. A ½-in. chisel can be used to advantage, but is not necessary.

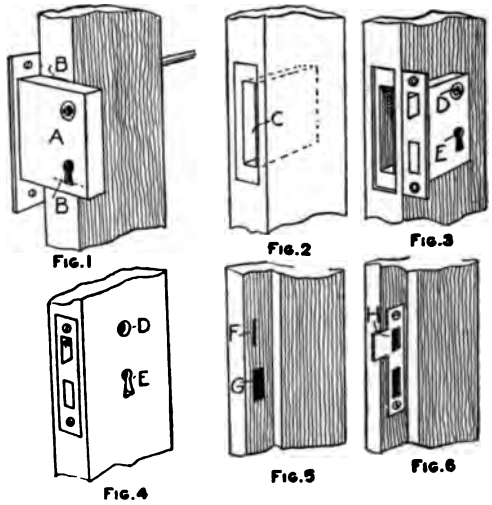


FIG. 1 FIG. 2 FIG. 3 FIG. 4 FIG. 5 FIG. 6

Different Stages in Lock Fitting

When putting in mortise locks, two things must be taken into consideration; first, the height from the floor that will make the knob easy to grasp and, second, the place where it may be let into the stile without doing harm to the strength of the door. The distance from the floor to the knob should be from 32 to 36 in., as this is a location easily reached by both children and adults. Sometimes the tenon on the end of a cross rail will be at this height and the lock, if possible, should be placed either above or below it. If placed in a tenon, it not only weakens the door, but it is difficult to properly clean out the mortise. All doors on the same floor in a house are generally of the same design and the location of the locks will be the same on all doors.

When the location of the lock is found, lay the lock across the edge of the door, as shown in Fig. 1, with the back of the faceplate against the side of the door, and scratch the short lines at the top and bottom with the awl as shown at BB. After setting the gauge to half the thickness of the door, mark a center line from B to B. Bore a hole at B and B with the ¾-in. bit so they will extend a little outside of each mark and to a depth of ¼ in. more than the depth of the lock, measuring from the faceplate. Bore as many holes between the two as will be necessary to remove the wood in the mortise. Be careful to bore the holes exactly parallel with the surfaces of the door stile. It is a good plan to file a notch in the bit for a depth gauge to prevent boring too deep.

When the holes are bored, take the large chisel and smooth the sides of the mortise and square the top and bottom with the narrow chisel. Slip the lock into the mortise until the back of the faceplate lies closely against the edge of the door and shows the same margin of wood on each side. Hold it firmly in place and mark along the top, bottom, and both sides of the faceplate with the point of the knife blade, Fig. 2. Remove the lock from the mortise and lay it along the side of the stile as shown in Fig. 3 and mark the location

of the spindle hole D and the inside shape of the keyhole E with the awl. Bore the hole D with the ¾-in. bit and the round hole E with the small bit and cut out the lower part of the keyhole with the knife blade. Should the door be of oak or other hard wood, a keyhole saw should be used instead of the knife. Deepen the cuts made around the faceplate with the knife blade and chisel the wood out around the mortise to a depth equal to the thickness of the faceplate. Insert the lock and fasten it with screws as shown in Fig. 4.

Many mechanics make difficult work of setting the keeper, yet it is the easiest part of lock fitting. When the lock is in place, insert the key and turn out the bolt while the door is open. Take some colored chalk and make it damp, or any other material that will adhere to the metal, and place a little on the face of the bolt and end of the knob latch, after it is turned out the full throw of the knob. Turn them both back and carefully close the door. Release the knob and turn out the key bolt. Turn them back again and open the door and you will find markings on the rabbet of the door frame as shown at F and G, Fig. 5.

Lay the keeper over the impressions on the rabbet and set it so as to have the same margin between the impressions and the holes in the keeper plate top and bottom and allow 1/32 in. between the upper impression and the front side of the hole in the keeper, as shown at H, Fig. 6. Hold the plate firmly in place and mark all around the outside with the point of the knife blade. Remove the plate and chisel out the wood inside of the knife marks to a depth equal to the thickness of the keeper plate. This is to make it flush with the face of the rabbet. Fasten the plate in place with screws taking care to turn the screws in at right angles with the surface of the work. The screw heads will be level with the surface of the plate, if this caution is observed.

Cut out the mortises in the wood through the holes of the keeper, using the narrow chisel. Make them deep enough to receive the latch and key bolt when they are entirely extended. If these simple instructions are carried out, each lock will work perfectly and the workman need not waste the time measuring for the different parts as in the usual methods.—Contributed by Ed. A. Peacock, Cincinnati, O.

Welding Steel without Compounds

One day I had several auger bits to lengthen and though I was short on welding compound at that time, I completed the work in the following manner:

I used ½ and ⅝-in. round iron to weld on the augers to make the length desired. I scarfed them in the ordinary way, then I heated the iron very soft and the steel only a little more than cherry red and used a little sand as a flux. I found that the weld was much better when I put the steel on the iron and hammered it rather light at first, then finishing with harder blows. All of the parts were joined perfectly and I did not miss one heat.—Contributed by Wm. Skoglund, Brooklyn, N. Y.

Making Clearance on a Twist Drill

A twist drill that has the clearance worn off can be repaired as shown in the illustration. Lay the drill flat on



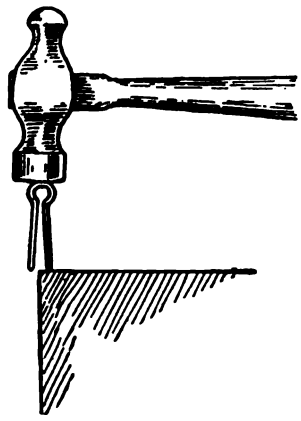
Drive Out the Point

an anvil and strike the cutting edge on the place marked A and grind it in the usual way. An old drill treated this way will work as good as new.—Contributed by Julius Fast, Milwaukee, Wisconsin.

¶Wet the surface of glass and the diamond or cutter will cut better.

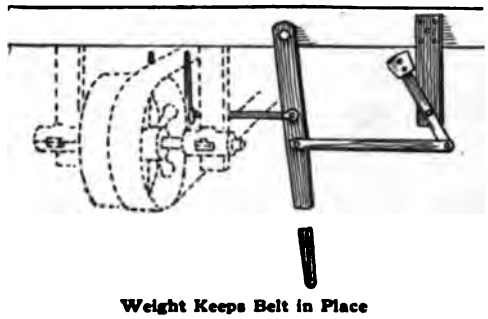
Closing a Split Cotter Pin

A split cotter pin after being opened requires a little "persuasion" to close it again. The quickest and most satisfactory way to accomplish this is to place one leg of the pin on an iron block or the jaw of a vise and gently strike the head with a hammer. This causes the legs to come together the same as a new pin.—Contributed by A. H. Burton, Chicago.



Weight on a Belt Shifter

The constant jar of a countershaft gradually works the shifter handle over until it hangs almost perpendicular, then the belt is half off and half on the driving pulley. The sketch shows an attachment for the shifter handle that will keep the belt on the tight or loose pulley as the occasion demands. When the weight is shifted to either side of the center, it has a tendency to keep the belt over in the opposite direction from its position by the jar of the machinery.—Contributed by C. Mike Graham, Oskaloosa, Iowa.

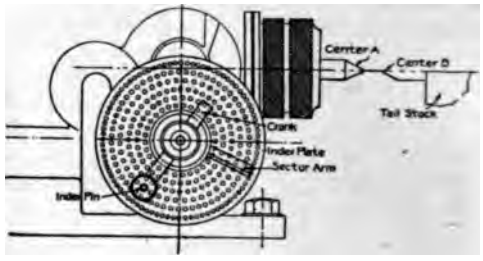


Weight Keeps Belt in Place

Cutting a Gear on a Milling Machine

The teeth on a gear can be cut with accuracy on the milling machine by using an index head as shown in the sketch. A blank, which has been previously turned up to the proper diameter, is placed on the centers A and B. The machine table is raised so that the cutter just touches the face in the center on the blank gear. Then move the table away from the work, but do not lower it. This will leave the cutter on a level with the face of the blank gear. The depth of the cut is now set by the dial on the milling machine proper. One revolution of this dial will raise the table ⅛ in. The depth of the cut can be set accurately.

The gear blank being set for the proper depth of cut, the next step to take is to make the proper space from one tooth to another. This is accomplished by the index head as shown. Take for example, a blank gear that is to have 45 teeth. Almost all index heads have a plate with a circle containing 90 holes. The sketch shows an index plate with 90 holes in the outside circle. To cut 45 teeth on a blank, set the crank so that the index pin will enter a hole in the 90-hole circle.



Index Head

Assuming that the ratio between the center A and the crank is 40:1 which means that 40 revolutions of the crank revolves center A one turn, then 1/45 of a revolution of the center A requires 40/45 of a revolution of the crank. The pin therefore must be moved 40/45 of 90 or 80 holes for each cut.

Another way which may be a little clearer, is to take the number of teeth on the worm wheel of the head, which is generally 40, for the numerator and

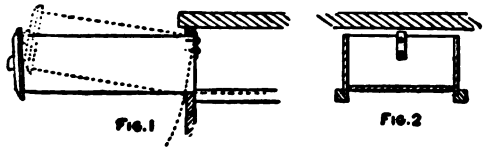
the number of teeth to be cut for the denominator of the fraction. Example: Suppose 30 teeth are to be cut in a blank gear, then the fraction would be 40/30 or 1 10/30, which would mean that the crank must be set so the index pin would enter holes in the 30-hole circle. The setting for each cut would require one complete revolution of the crank and 10 holes more.

If the index head does not have a circle of 30 holes, then the crank must be set on the 90-hole circle. In this case, the fraction, both numerator and denominator, must be multiplied by 3, which gives 1 30/90. The crank must be turned one complete revolution and 30 holes more, when using the 90-hole circle.

In using the index head on a milling machine, just as good work, and sometimes better work, can be done than on a regular gear cutter.—Contributed by Harold E. Murphy, Pawtucket, R. I.

A Stop for a Drawer

A simple yet practical method to prevent pulling drawers out too far and spilling the contents is shown in the sketch, Fig. 1. A piece of steel about $\frac{1}{8}$ in. thick, $\frac{3}{4}$ in. wide and 3 in. long is drilled and attached by two screws to the back of the drawer (Fig. 2) so as to project about $\frac{1}{2}$ in. above the top edge. The drawer may be removed to screw on the piece and then inserted by slightly tilting the same



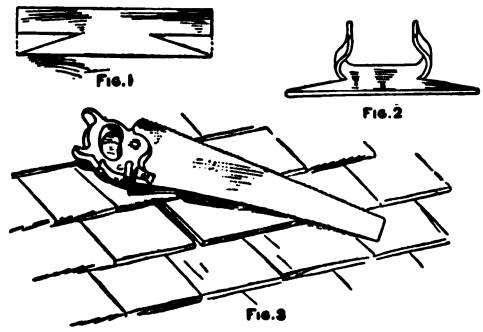
Stop on Drawer Back

upward, as shown in Fig. 1. The drawer is removed for cleaning in the same manner.—Contributed by Otto J. Kling, Youngstown, O.

¶An internal combustion engine run with the water jacket so hot that you cannot hold your hand on it uses less fuel than it would if the jacket were kept cold.

Preventing a Saw from Sliding on Sloped Surfaces

A saw laid on the sloping surface of a roof or on a scaffold is apt to slip and



The Saw Cannot Slip

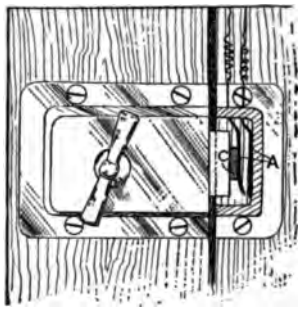
fall if slightly jarred. The sketch shows the construction of a small device I made to fit over the back of a saw handle to hold the saw wherever it is placed. It consists of a piece of sheet metal cut as shown in Fig. 1 and shaped as in Fig. 2. When slipped over the handle a point projects on each side as in Fig. 3. A saw cannot slip with this device attached.—Contributed by C. C. Brabant, Alpena, Mich.

Repairing Umbrellas

Umbrellas may be repaired with no other tools than a pair of pliers, a knife and a needle. No supplies are needed except some thread and a piece of small wire. The operation is too simple to require a description and about the only thing to look out for is to see that a whole rib is put into the place where a broken one was removed. The writer was surprised to find it so easy to make a repair, and, having begun at this work, it was found that there were enough broken umbrellas in the house to supply each member of the family with two good ones after they were mended. If a cover is needed, it may be that one can be taken from an umbrella that is used to supply the ribs for the others.—Contributed by Frank W. Blake, North Adams, Mass.

Electric Connection for a Door Latch

A door latch equipped with an electric connection for "switching on" a light is shown in the sketch herewith. The connection is for use on toilet and bathroom doors. When closing the door after entering the room the latch turns on the light. The socket part is fitted with two contact springs, A, which are the terminals of an electric-light circuit. A small block of wood or insulating material is fastened to the spring as shown, to prevent a shock when turning the handle. The two ends should be well insulated where they enter the lock. The light burns only when the door is secured by the latch.—Contributed by F. G. Christensen, Santa Rosa, Cal.



Balance for Measuring Liquids Automatically

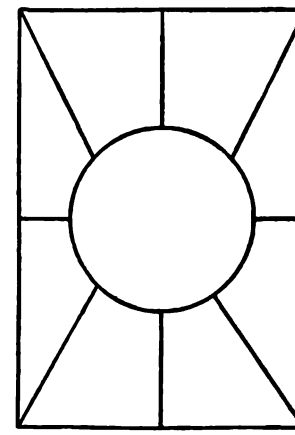
When any liquid is poured into an opaque container, it is difficult to determine the depth of the material until it overflows the mouth. To save time and avoid waste, a simple balance will give warning by tilting when the vessel is almost full.

Such a balance can be made of a piece of board, 1 or 2 ft. long, with a triangular strip of hardwood fastened with nails across the under side. Place the can or other vessel on one end and a weight on the other and adjust the balance by moving either fulcrum or weight until the full can just tips it. A strip of wood should be nailed across the end of the board to set the can against so that it will always be placed the same distance from the fulcrum. After adjusting, fasten the weight securely.

This simple apparatus is especially convenient for use in filling gasoline torches, stove reservoirs, etc. Those having occasion to do this know how slowly the gasoline passes through the strainer unless the funnel is kept well filled, and how carefully the liquid must be poured toward the last, else there is waste. It is particularly applicable to this use because gasoline is generally handled by artificial light, and a fair amount of daylight by which to watch the process of filling is not always available.

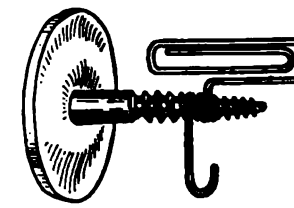
Cutting Steam-Gauge Glasses

When cutting a circular piece of glass for a steam gauge, many mechanics spoil piece after piece in getting the circular section. Radiating cuts to the edge of the stock, as shown in the sketch, will enable one to break away the unnecessary parts without danger of breaking the circular portion.—Contributed by F. W. Bentley, Jr., Huron, S. Dak.



A Vacuum Sticker

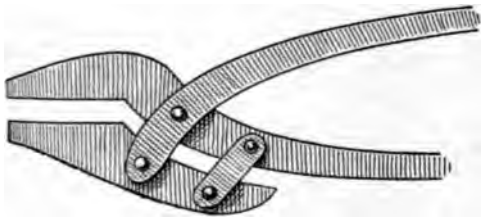
A handy vacuum sticker can be easily made from a round, red rubber taken from the porcelain stopper of a beverage bottle, a screw and a short piece of brass wire. The screw must be of the right size to tightly fit the hole in the rubber. After the screw is pushed through the hole,



the wire is wound on the threads as shown in the sketch. The upper part may be used to hold cards by pushing the edge of the card between the two wire loops. The hook may be used to hold light articles. The sticker is to be used on any non-porous and smooth surface and is applied by first putting some water or glycerine on the rubber, then pressing it against the surface so that the air is expelled. This sticker will hold 3 lb.—Contributed by Abner B. Shaw, N. Dartmouth, Mass.

Blacksmith's Parallel Tongs

The ordinary blacksmith's tongs are not constructed so they will grip pieces of various thicknesses and hold

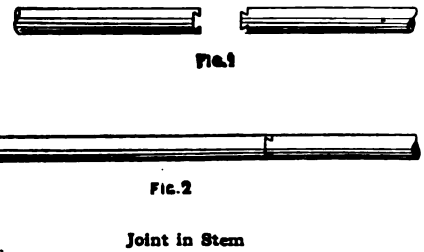


Parallel Jaws

them solidly. The jaws are set so that when opened they will be parallel only at a certain point of separation, thus making it necessary to have a number of tongs about the anvil. The illustration shows a way to make parallel jaws on tongs for holding pieces of various thicknesses. When holding with these tongs, the material held will not turn sideways or slip away from the grip of the jaws.—Contributed by Geo. Newfeld, Philadelphia, Pa.

Repairing a Broken Valve Stem

It is often necessary, because a new valve cannot be obtained immediately, to make a repair on a broken valve stem. The following is a method of repair that will make the old stem as good as a new one. The first operation is to dovetail the end of the broken stem, as shown in Fig. 1. Take a piece of round rod the same size as the stem and cut the end to fit in the dovetail. Place them together, as shown in Fig. 2, and heat the joint to a bright red, being careful not to burn

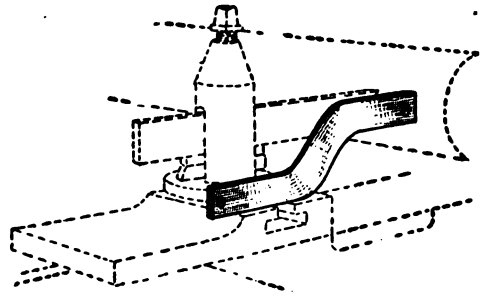


Joint in Stem

the metal. Cover the parts with borax, and just as soon as it flows, apply spelter. Leave it in the fire until the metal shows a dull red, then remove and allow it to cool. Clean and polish the rod to make it move freely in the guide. Cut to the right length, and the stem will serve as well as a new one.—Contributed by J. N. Bagley, Webber, Kansas.

Setting a Lathe Tool

Much time may be saved in setting the cutting tool in a lathe, by using the simple little device shown in the accompanying illustration. It is made of sheet metal and the holes are drilled in the ends for convenience in hanging it up. The vertical distance between the extreme top and bottom edges is equal to that between the flat surface of the lathe carriage and the point of either of the lathe centers. In use, the device is placed as shown and the lathe

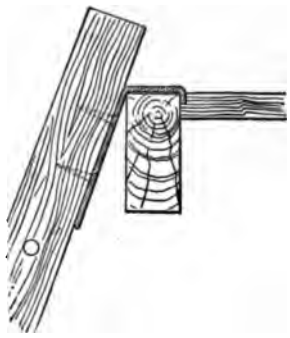


Gauge for Tool Setting

tool is adjusted until its top edge corresponds with that of the device.—Contributed by Joe V. Romig, Allentown, Pennsylvania.

Ladder Fastener

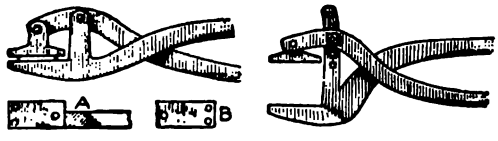
Ladders that are used in a loft, hay mow or similar places where they must be set at such a slant that slipping is liable to occur, should be provided with some kind of a fastener or grip. Such a fastener is shown in the accompanying sketch. It is made of a piece of ¼ by ¾-in. iron, bent as shown and attached with two ¼ by 1½-in. wood screws. One of these fastened on the upper end of each support insures the ladder against slipping.



If the lower ends are sharpened a little, they will dig into the floor where there is no recess just back of the beam.—Contributed by Donald A. Hampson, Middletown, N. Y.

Plowshare Tongs

When holding a plowshare for sharpening, some kind of tongs that will stick and at the same time be light and short so that one will have the weight of the share close to the hand are necessary. To get a good grip with ordinary tongs they must have long handles and then the smith must take hold out near the end. This places the weight of the share so far from the hand that it is difficult to manage, and then the share will slip



Three-Point Contact on Jaws

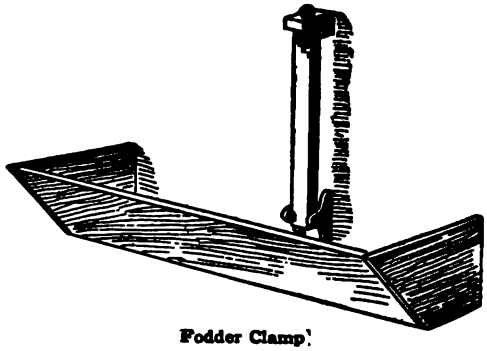
and turn where it is not wanted, says a correspondent of the Blacksmith and Wheelwright.

The sketch shows the construction of special plowshare tongs. The entire length from tip to tip is 12 in. The distance between the fulcrum and the load is reduced to the least possible. Each jaw has three raised points, the face of the lower shown in the sketch at A and the upper at B. These points working on the same principle as a stool having three legs, all points will touch the surface with equal weight or pressure. It will be seen that the points are reversed on each jaw; where there is one point on the lower jaw, there are two on the upper, and vice versa. This fulcrum applies great leverage in a short radius and the points give great gripping power.

The tongs shown first in the sketch are for a certain thickness of metal and the last shown are adjustable for various purposes.

Holding Food for Stock

Fodder, such as cornstalks that are not shredded, is frequently tossed out

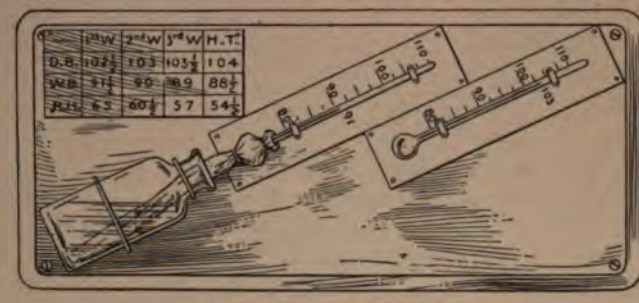


Fodder Clamp

of the manger and wasted. A device for holding this kind of feed against the wall in front of the manger is shown in the sketch. It is made of 2 by 4 in. material, about 3 ft. long, hinged at the lower end and clamped at the top. The stalks are placed behind the upright piece and securely clamped. Several of these devices placed at intervals along the manger will make it hard for the stock to pull the fodder out and waste it.—Contributed by Henry Weber, Sr., Friend, Neb.

Home-Made Moisture Gauge for Incubators

An incubator hygrometer that will give fairly accurate results can be made by fastening two thermometers and a small bottle to a wood back as shown in the sketch. The back should be from ¼ to ½ in. thick, as wide as the opening into the egg chamber will allow—usually about 3¾ in.—and long enough to hold the articles mentioned. Two holes ½ in. in diameter and ⅛ in. deep are bored to form bulb sockets. A place is hollowed out for the bottle and grooves cut along the upper edge of the thermometers to accommodate their turned-down edges. The general appearance of the instrument will be greatly enhanced if the back is stained or painted.



Moisture Gauge and Table

The two thermometers should be of the same make or at least should register within ½ deg. of each other. The bulbs should be as close together as possible and the center of each exactly the same height, 1⅝ in. above the bottom of the tray when the gauge is in position. If the tray is slatted, the thickness of the slats must be taken into consideration. The thermometers are fastened with brass-headed tacks put through small holes drilled in the metal back.

The bottle should be flat and hold from ½ to 1 oz. It must be placed as low as possible. The mouth must be slightly lower than the bulb and about ⅜ in. from it. The wick can be made of old muslin, wide enough at one end to encircle the bulb. A width of ¾ in. is sufficient for the remainder. The muslin is tied above and below the bulb with a thread.

Use distilled water or rain water in the bottle, as ordinary well water will soon clog the wick, thus giving inaccurate readings. In use, the hygrometer stands on edge among the eggs about where the thermometer is usually placed. The temperature is indicated by the dry bulb, the percentage of moisture by the difference between the two. If the relative humidity runs above 85 or below 25, no chicks need be expected.

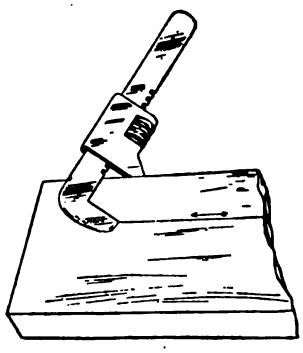
To secure the best results, the relative humidity should be about 65 when the eggs are put into the machine, and gradually reduced to about 55 by hatching time. To accomplish this, hold the gauge to the table on the base of the gauge shown in the sketch.

A variation of 1 deg. by the wet bulb when the dry bulb remains constant, indicates a difference of about 2½ per cent in amount of moisture. If too wet, give the egg chamber more ventilation. Should the wet bulb range several degrees too high and cannot be lowered sufficiently by the ventilation, then the room where the incubator is placed is probably too damp. The presence of mold will prove this. Air out thoroughly and use some air-slaked lime. In extreme cases, a small chunk of lime may be put in a pan or on a board and set inside the incubator until the humidity falls to the proper degree. If all remedies fail, move the machine to a dryer location. Humidity, like temperature, should be right before eggs are put into the incubator. After that, it is easily controlled.—Contributed by B. Orlando Taylor, Bosworth, Mo.

¶Mats for flower pots can be cut from the sides of worn-out hot-water bags.

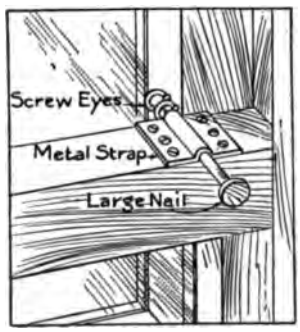
An Emergency Marking Gauge

Having lost or misplaced my marking gauge I used a monkey wrench in its place as shown in the sketch. The jaws were opened to the desired width and the lower jaw placed against the edge of the board, and I ran the wrench along the same as a marking gauge. The corner on the end jaw made the mark.—Contributed by W. D. Castle, Gridley, Ill.



Home-Made Window Lock.

A handy window stop that will permit either sash to be raised or lowered and locked in position can be made with two screw eyes, a large nail and an iron strap.



The iron strap is bent to the shape shown in the illustration and drilled for six screws, by which it is fastened to the top of the lower sash. Two screw eyes are screwed into the frame of the upper sash, one in front of the other, with the openings horizontal and in line at right angles to the glass.

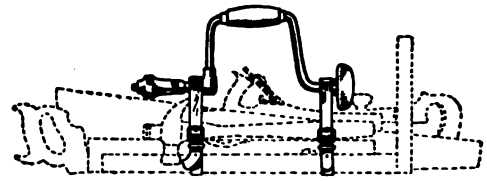
The nail is inserted under the strap and pushed in the screw eyes to lock the window. This arrangement allows air to be admitted to the room without fear of intruders climbing through the window.—Contributed by W. A. Jaquythe, Richmond, Cal.

Abrasive for Grinding Valve Seats

If emery cannot be procured for grinding in valve seats, take a piece of glass, any glass will do, and reduce it to a medium powder by pounding with a hammer. Mix the powder with a light oil of any kind and it will grind in a check or air valve quicker and better than the emery used for the same purpose. This is a good thing to remember when sent out from a shop and emery is not always at hand.

Handle for Carrying Tools

Carpenters, electricians, plumbers and others who carry tools, will find



The Brace Makes the Handle

the suggestion given by a correspondent of Wood-Worker of considerable assistance. He suggests to arrange the tools in a compact parcel, leaving the brace out, and placing two straps, one around each end of the bundle. Before buckling the straps, place the brace on top of the pack, then fasten the straps over each end of the brace, and you will have a handle which will greatly reduce the tedium of carrying tools any distance.

Tempering a Chisel

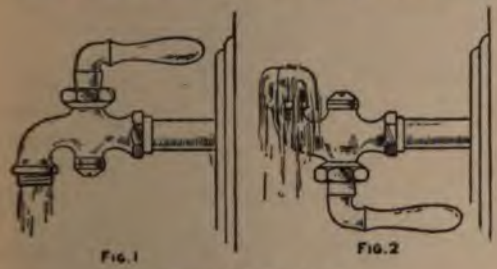
Heat the chisel about 1½ in. up from the cutting edge to a dark cherry red, then cool the edge in water and rub it with an emery stick or a whetstone. Let the heat run down to a dark straw color, then cool the edge again and brighten as before. Let the heat draw to the color of pigeon blue, then cool the entire chisel. Chisels tempered this way will stand much better than those tempered in the ordinary way.

Cutting a Hole in Earthenware

Desiring to make a water cooler from a couple of different sized kegs and a 6-gal. earthen jar, I wanted to attach a faucet in the lower part of the jar. A ¾-in. hole had to be cut for the shank of the faucet, and after trying many ways, I succeeded in the following manner: I chipped off a small place with a very hard chisel, then with a well hardened small drill I made a hole. This hole was enlarged by inserting a square, tapering file and giving it a circular motion at the outer end. This made a neat round hole sufficiently large to receive the faucet. —Contributed by J. B. Saunders, Ft. Worth, Texas.

A Sanitary Drinking Fountain

The illustration shows a simple method which I have used for some time as a sanitary drinking fountain.



Faucet Turned Over

In most shops no cup or glass is kept for drinking purposes. If the ordinary faucet (Fig. 1) is turned half way round, as in Fig. 2, it makes a sanitary fountain such as found in parks. When through drinking, the faucet can be turned to its original position.—Contributed by Walter C. Heidt, Chicago.

Felling Trees by Fire

A method of felling spruce trees by fire is shown in the sketch. A hole is bored horizontally into the trunk of the tree for about 1 ft. and another hole bored at an angle to meet the first one (Fig. 1). Hot coals are placed at the intersection of the holes so as to ignite the pitch running from the pores. The draft will cause a rapid combustion



Firing a Tree

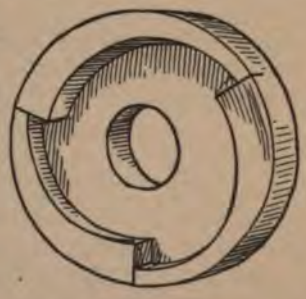
and in a short time the tree will be burned through, causing it to fall toward the burning side.—Contributed by A. J. Staver, Portland, Oregon.

How to Kill Dandelions

An easy way to kill dandelions in lawns is to apply kerosene to the roots of the plant. Cut the root about 1 in. below the surface and apply a few drops of the oil before the earth is pressed in place. The plant will not grow from a root treated in this manner.—Contributed by Charles W. Cooper, Oakland, Cal.

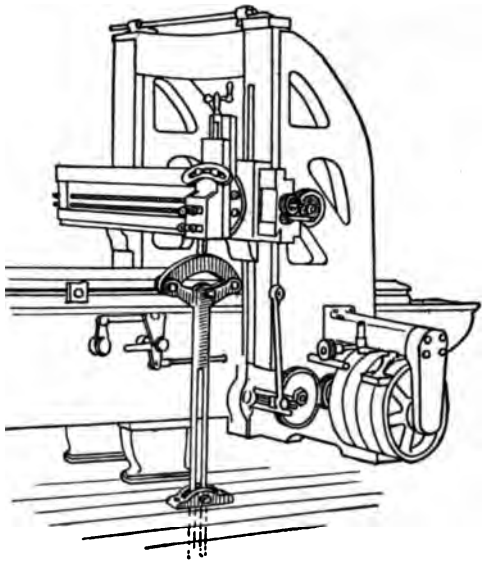
Repairing a Lawn-Mower Ratchet

A worn driving-pin or shoulder of the ratchet on a lawn-mower will cause the wheel to slip at times instead of driving. A longer pin will rectify one defect, but if the shoulder is rounded, it can be remedied by cutting through the casting with a hacksaw so as to make a new straight shoulder. The heavy line shows the saw cut and the dotted line the part removed.—Contributed by Frank S. Henry, Haddon Heights, New Jersey.



Cutting Arcs on a Metal Planer

Quadrants may be machined to any arc of a circle on an ordinary metal planer by using the attachment shown



Rocker on Planer

in the illustration. The device rocks on a bolt for an axis. This is set in the tee slot on the side of the planer bed. The rocking motion is caused by a slotted arm that passes through a metal block on the floor. This block is fitted with a pin to slide in the slot of the arm.

If the arm is slotted at both ends, it will provide an adjustment for cutting various sized quadrants.—Contributed by Carmi L. King, Concord, New Hampshire.

Cleaning Gas Mantles

Because of the imperfect combustion of the carbon in the modern gas lighting jet, when a mantle is used, the part enclosed usually collects a deposit of carbon which shortens the life of the fixture and gives to the mantle a smoky appearance.

The carbon can be removed and the mantle cleaned by sodium chloride, better known in household circles as salt. It may be gently sprinkled on the burner or in it, if possible, while the gas is burning. The salt unites with the carbon, leaving the gas burner and mantle clear of it, and coated with a substance that will not allow carbon to deposit on the burner or mantle for some time. The application of the salt is perfectly harmless and no injury can result to the fixture.

A large quantity of salt is not needed. The same material can be used in cleaning gas stove burners and gas irons which collect carbon deposit inside while being used.—Contributed by Loren Ward, Des Moines, Iowa.

Holding a Door Open

A clip that will hold a door open and work almost automatically is shown in Fig. 1. It is made of a piece of strap iron 1 in. wide and about 6 in. long. Both ends are turned up as shown and a hole drilled in the center for a screw. When set in the position shown in Fig. 1, the movement of the door will cause the clip to turn over the end as in Fig. 2. In closing the door the clip is turned with the foot.—Contributed by J. C. Judkins, W. Medford, Mass.

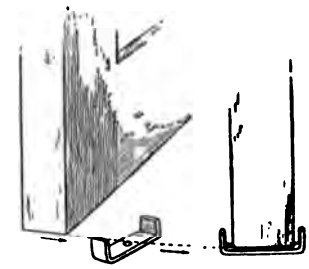
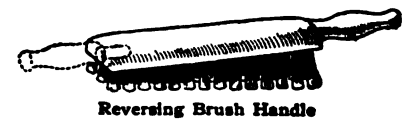


Fig. 1 Fig. 2

Renewing an Old Brush

Anyone who has used a common brush for any length of time finds that the point end will wear faster than the



Reversing Brush Handle

heel and the brush becomes tapering as shown. If one is inclined to economize in such matters, it is possible to

get nearly double the wear out of a brush by squaring the worn end, sawing off the handle and fastening to the opposite end as shown by the dotted lines in the sketch. The wear will then come on the unused part.—Contributed by C. S. Bourne, Lowell, Mass.

Space Economy in a Lumber Yard

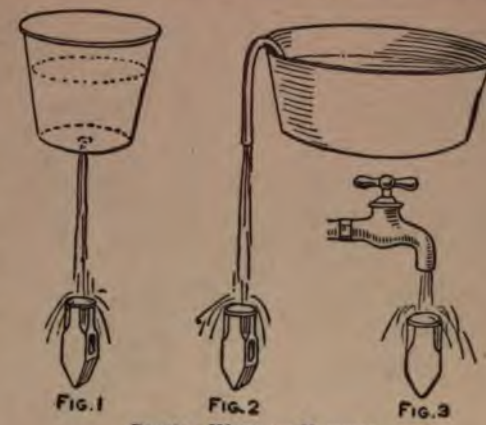
A western lumber man, who has a limited space in the city for piling his stock, has hit upon an ingenious way of stacking lumber so that it can be within reach and take up very little room. A strong rack of 6 by 6-in. material was built and the lumber was upended against this, care being taken to balance the stacks on each side so that the support will not be forced out of plumb. In this way the owner was able to carry a great variety of lengths and sizes which would otherwise require many times the ground space, and in addition to that, he could pick out any particular piece he required with less trouble than it could be sorted from an ordinary flat pile.—Contributed by C L. Edholm, Los Angeles, California.

Hardening Hammers

Hammers for working iron and steel are hardened with good results in the following manner: Heat the hammer to a cherry red, using a blast to produce a quick heat, then hold it so that a stream of water will strike the face and flash away from the eye. This will temper the face only, with the hardest part in the center. This will prevent water cracks and the cracking of the metal through the eye. A bucket with a hole in the center of the bottom (Fig. 1) or a siphon placed in a tub of water (Fig. 2) will do equally as well as the faucet shown in Fig. 3.

Do not take the hammer away from the water until it is perfectly cold, as it is not necessary to draw the temper. Ball-peen hammers are tempered in the same way, only less heat is used. If the steel be of a poor grade or a harder temper is wanted, then hold the hammer lower down in the stream of water.

Hammers tempered by tnis method

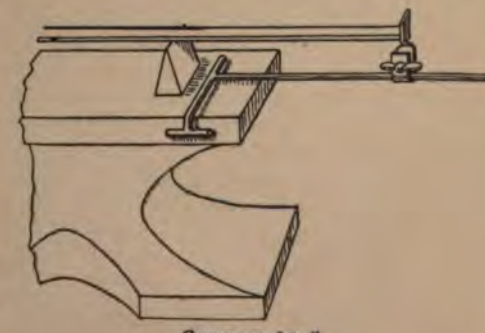


Pouring Water on Hammer

are good for working iron or steel, but it is not the right temper for stone and brick work. — Contributed by James E. Roy, Philadelphia, Pa.

Gauge for an Anvil

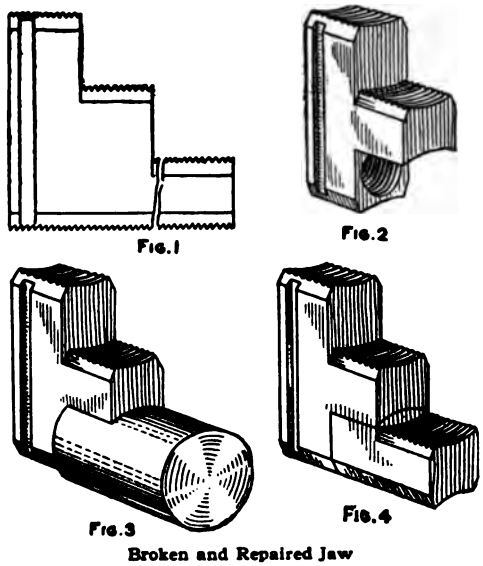
A length gauge that can be easily placed in the round hole of an anvil and used for measuring while cutting red-hot metals is shown in the illustration. The gauge consists of a T-shaped rod with an adjustable attach-


Gauge on Anvil

ment to set for the lengths to be cut. The method of construction is obvious and further explanation is unnecessary.—Contributed by Raymond E. Chase, Mellville, R. I.

Repairing a Broken Jaw on a Chuck

The lower lug on the jaw of a chuck used on our 18-in. lathe broke at a time when the shop was rushed with



Broken and Repaired Jaw

work, and a repair was made as shown in the sketch.

The broken jaw (Fig. 1) was placed in another chuck and the broken part centered. The piece was turned out so that a part of a circle remained on the lower part of the second lug. A hole was drilled in the center and tapped (Fig. 2). A piece of metal was then turned up round and one end threaded to fit in the hole. The round piece was plenty large (Fig. 3) to square up on a shaper and finish as shown in Fig. 4. The repaired part proved to be as strong as the other jaws and it saved considerable time that would be required to receive a new one from the factory.—Contributed by W. R. Ayers, Pittsburg, Pa.

Distinguishing Wrought Iron from Steel

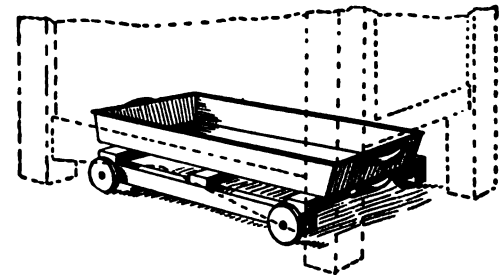
For many purposes wrought iron is superior to steel, although large quantities of soft steel are now used where wrought iron was previously employed. Wrought iron resists corrosion better than steel, as the slag in the fibers acts as a protective coating when corrosion sets in. For skimmers and stirrers used in brass melting, wrought iron lasts much longer than steel and should be used for this purpose. The Brass World gives a test that will serve to indicate the difference between wrought iron and steel. The sample to be tested is cleansed of grease and scale by scouring and is then immersed in a solution composed as follows:

Water	9 parts
Sulphuric acid	3 parts
Muriatic acid	1 part

The acids are poured into the water and allowed to cool. A glass or porcelain vessel is used. The specimen is allowed to remain in the solution for 15 or 20 minutes, when it is removed, rinsed in water and dried with a cloth. The fibers should now show plainly; but if not, the specimen is returned and allowed to remain longer. As iron is made up of a series of fibers, with slag between, it is a simple matter to distinguish it. Soft steel dissolves uniformly and without the fibrous structure found in wrought iron.

Truck for a Refrigerator Drip Pan

Having been troubled with spilling water when drawing the drip pan from under the refrigerator, I devised the simple pan truck shown in the sketch. The wheels are 2¼ in. in diameter with ½-in. face. The size of the refrigerator will determine the dimen-



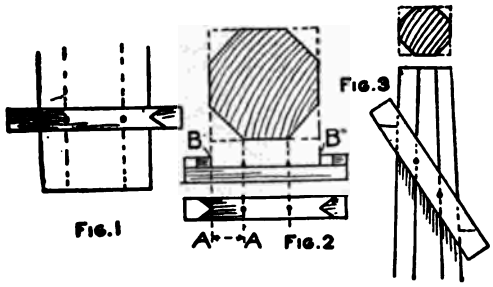
Pan on Truck

sions for the truck frame which can be made of spruce. The handle is made of a strip of tin.—Contributed by J. E. Cooley, Hartford, Conn.

Gauge for Marking Tapering Octagon Poles

In making a flagpole or a mast, it is essential first to taper and square the stock and then cut it to an octagon before rounding. A gauge is shown in Fig. 1 for making the lines necessary to reduce the wood to an octagon. The gauge is made of a piece of pine, 1 in. thick, 2 in. wide, and about 4 in. longer than the widest dimension on the end of the pole. Cut the wood as shown in Fig. 2, so that it will fit neatly over the large end of the pole.

Lay out the octagon on the end of the pole and the distance AA will be the depth of the cut from the corner. Drive a nail through the gauge at each

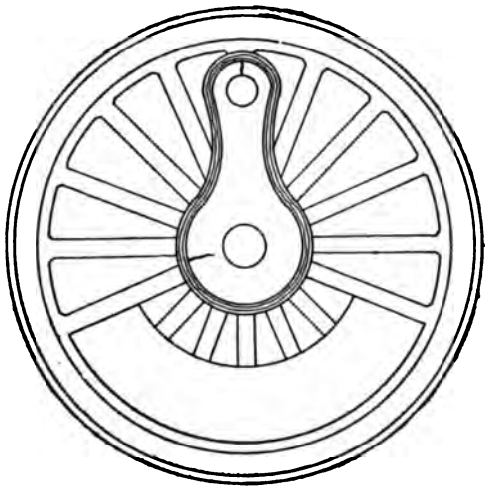


Positions of Gauge on Pole

inside point, A, and sharpen the ends for markers. Start the gauge at the large end of the pole and pull it toward the smaller end, at the same time twisting it so that the points BB will be close against the wood. The gauge in position at the small end of the pole is shown in Fig. 3. The points BB are shaped so the gauge can be turned as it slides toward the small end of the pole.—Contributed by F. O. Andersen, San Francisco, Cal.

Repairing a Broken Locomotive Wheel

The crank part on a locomotive drive wheel was cracked in two places, as shown in the illustration, and an inexpensive repair was made by shrinking a 1½-in. square band of metal around the contour of the crank. To keep the band from slipping off, the metal on the hub was

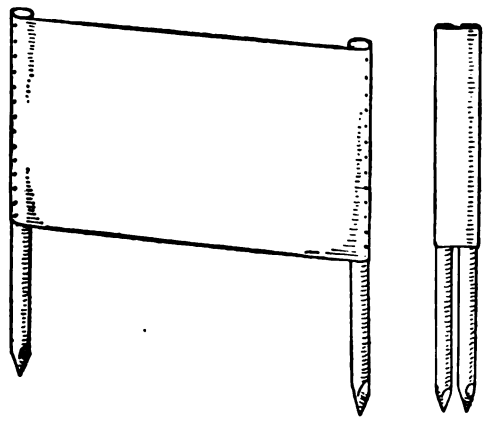


Band Shrunk on Cracked Crank

chipped off on an angle toward the center.—Contributed by Benjamin H. Baird, Kingsland, N. J.

Plant Protector

A device for protecting plants from wind and rain can be made from stakes and a piece of canvas. The stakes may be of any desired length and if more than two are used, the plant can be protected from all sides. Three



Canvas on Stakes

stakes will form a triangle and four a square. When not in use, it can be rolled up and put away.

An Inexpensive Drilled Well

By J. G. ALLSHOUSE

The unhealthful well sunk by old-fashioned methods, is practically a thing of the past in all localities where drilling machines are to be found. The only safe and successful way of getting a supply of well water is by casing to the rock, thus cutting off the impure surface water, and drilling into the rock until an artesian stratum is struck which furnishes water made pure by filtering through the rocks and sands of the earth. Where it is not possible to drill a well because of the expense or the lack of suitable machines, the dweller in the rural districts or suburbs, who has average mechanical ability, can accomplish the purpose by his own work and the use of easily constructed tools at an insignificant cost.

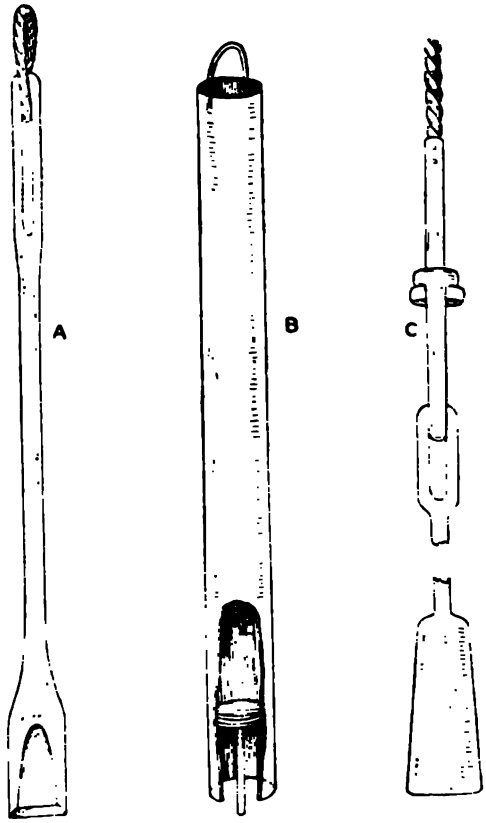


Fig. 1—Drilling Tools

In Fig. 1 is shown some tools the writer used successfully to drill a well 34 ft. in depth. Any blacksmith can make them. To a bar of iron about 1 in. in diameter and 5 ft. long weld enough steel to form a bit. This bit (A) should be fashioned as nearly as possible like the regular bits used on heavy drilling tools. The face of the bit, or the gauge, can be about 2½ in. for starting the well, then reduced in gauge after the well is cased. A sand pump or bailer shown at B is necessary. It is made of a piece of 1½-in. tin pipe about 3 ft. long with a heavy wire bent in the form of a bail and fastened in one end. A dart valve is placed in the other end. It is made by driving a wooden ring or core into the pipe so it will act as a valve seat for a piece of leather, through which a large nail or spike about 3 in. long has been driven. The valve seat is held in place by several small nails or tacks driven through the tin. In case the tin pipe cannot be procured, 1-in. iron pipe may be used. Manila rope, ¼ to ⅜ in., is heavy enough to use with the bailer. For the drilling tools use ⅜-in. or ½-in rope.

The tool shown in C is to be used when drilling a deep well. Two pieces of 1¼-in. pipe, one 5 ft. and the other 10 ft. long, are required to make this tool. Make from suitable material a pair of jars, which loop together like links in a chain with a play or stroke of about 18 in. These links each have a shank 1 ft. long, welded into each piece of the pipes mentioned. The one link is left open until they are welded to the pipes and then the link is closed by welding. The links must be made small enough to work freely inside of a 2-in. pipe. Make a steel bit like the one for the tool first described with a shank 1 ft. long, which is welded into the remaining end of the 10-ft. piece of pipe. Drill several small holes in the end of the 5-ft. piece of pipe to attach

the rope. Take a piece of 1-in. rope as long as will be required and fasten one end in the pipe with rivets. After riveting, drive some soft-wood wedges round between the rope and metal of the pipe.

The rig or derrick is made as shown in Fig. 2. It is about 15 ft. high, simply constructed of poles or scantling with pulleys, and any suitable windlass. A ratchet device can be attached to the windlass to regulate the rope, and a brake to save time when lowering tools in the well. The illustration shows the manner of drilling. A jerk line tied to the main rope is used to raise the tools and let them drop. The main rope is kept taut to get all the drop possible, and as the drill cuts deeper, it is let out gradually. If too much rope is let out at a time, it will be impossible to keep the hole round and smooth. Allow the tools to drop without aid in turning and they will make a nice round hole in rock. When drilling keep 2 or 3 ft. of water in the hole and after sinking

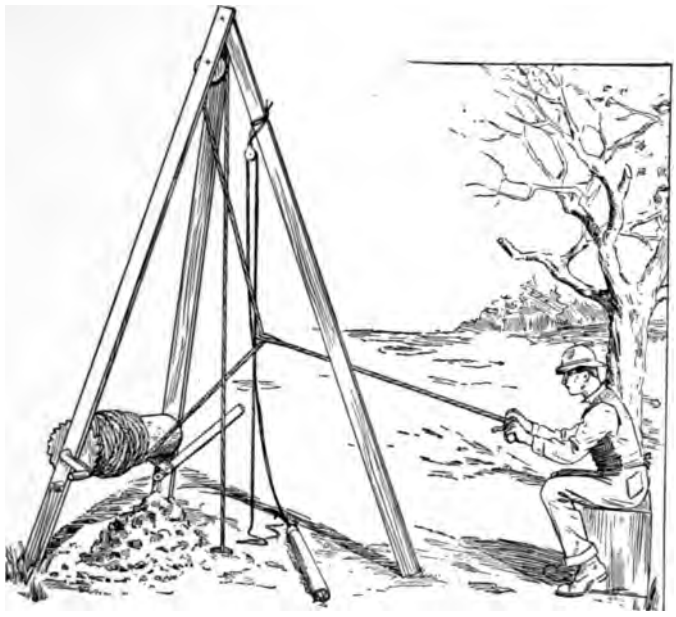


Fig. 2—The Derrick

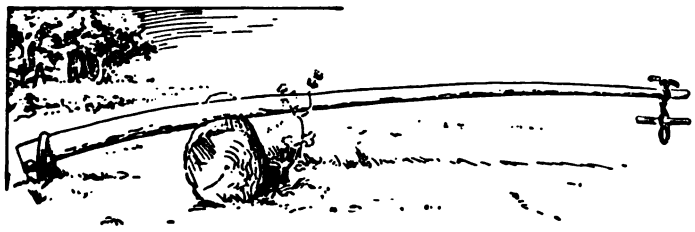


Fig. 3—The Spring Pole

from a few inches to 1 ft., as the case may be, pull the tool out and use the bailer to remove the sediment from the bottom of the well. The sediment mixes with the water and enters the bailer through the dart valve. The jars enable the driller to loosen a tool if it becomes wedged in the hole. A few upward strokes of the jars after loosening the ropes will be sufficient to remove a wedged drill. It is best to start a hole with a 2½-in. bit and after it is down below the soft clay, which is liable to cave in, drive a joint of 3-in. casing. Continue drilling inside of the pipe until the hole is below the strata of surface water and impure drainage and case the well with 2-in. pipe. Reduce the size of the bit to 1¾ in. and continue drilling inside of this casing until pure water is found. Drill deep enough below the point where this water is found to insure a basin to hold water enough for immediate demands, if the flow does not come fast enough.

When drilling a deep well, use a spring pole as shown in Fig. 3 in connection with the derrick. This pole should be from 20 to 25 ft. long with a block placed under it, 8 ft. from the end fastened to the ground and in such a manner as to raise the end of the pole

over and about 4 ft. up from the hole. The rope holding the tool in the well is fastened to the pole with clamps which are arranged to turn on a swivel or by a link large enough to receive a loop of the rope. There should be a handle above the clamps or the link for use in turning the swivel. The first 15 ft. will be the hardest to drill with this rig and tools. If the formation is clay, a 2½-in. well auger may be used to drill the first 15 ft., but if it is gravel or the like, the tools must be spudded in the same as with the derrick, until the hole is deep enough to use the spring pole.

The bits used with either of these methods determine to a great extent the ease and speed of drilling. For soft material they may be made rather sharp and shaped as in C, Fig. 1, but for rock, the bit needs to be fashioned more like the ones used on heavy water-well, oil or gas-well machinery, that is, a rather short bevel for the cutting edge—in fact almost blunt. As it wears out of gauge, even if not too dull to drill well, it must be dressed frequently to preserve the gauge. It is almost impossible to give instructions as to the proper shape of a bit. This must be learned by experience of the driller. If possible, examine a large bit used on the regular drilling machines and note the shape. The speed of drilling by hand is greater than would be expected after a slight experience in drilling at the top of the hole. With the tool as shown in C, Fig. 1, operated with the spring pole, 30 or 40 ft. can be drilled in clay or 10 to 15 ft. in rock, in a day.

Pipe Tool Attachments for Monkey Wrenches

Two useful attachments that can be easily fitted to the ordinary types of monkey wrench to make them suitable for working on pipe are described by the Motor Magazine of Canada. The

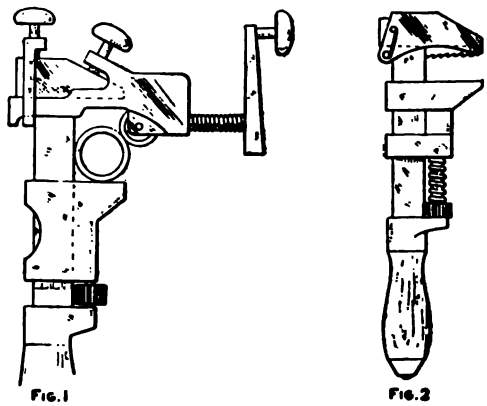


FIG. 1 FIG. 2

Pipe-Cutting and Wrench Attachment

one outlined in Fig. 1 is a simple pipe cutter comprising a jaw member having a recess to receive the jaw of the wrench, this being provided with parallel arms adapted to straddle the shank of the wrench. A cutting wheel or roller is mounted in a block sliding in and guided by a suitable yoke piece. This can be moved as desired by turning the crank on the feeding screw. Simple clamp screws make it possible to easily and quickly attach it securely to the wrench. The pipe is placed between the movable jaw of the wrench and the cutter, and is backed by the shank of the tool. The device is used in the same manner as a pipe cutter, the wrench being revolved around the pipe and the pressure on the cutter block being increased gradually to cut deeper into the pipe each revolution.

The device shown in Fig. 2 is a simple member having a series of serrations or teeth to permit it to grip a round surface. This is made of hardened steel and has a simple clip member by which it may be easily attached to the fixed jaw of the wrench. The U-shaped plate is adapted to closely engage the top and sides of the wrench jaw. The serrated plate is pivoted to the plate to lie beneath the face of the fixed member. A locking member, composed of a pin having a grooved end and retention spring, is passed through

the U-member back of the wrench shank to hold the attachment in place. The spring catch engages the groove in the pin when the latter is in the position indicated.

Form for Molding Concrete Slabs

A form for making concrete slabs that is easily made, convenient to handle, and constructed similar to a snap flask used by foundrymen, is shown in the accompanying sketch.

The form may be made in any size from ¾ or 1-in. lumber. Two of the sides are nailed or screwed securely together at right angles. The other two sides are hinged on the ends of these two joined sides as shown. When in position, the two hinged sides are



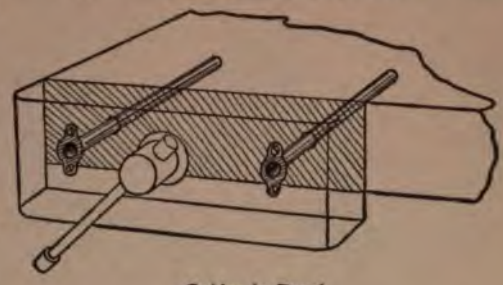
Removing Form from Block

locked by means of a hinge and two screw eyes or a large hasp. The screws are put into the wood through the screw holes in the long wing of the hinge.

Paper may be placed between the concrete and the inner faces of the frame, or the frame may be greased instead. When the concrete is set, the screw eyes are withdrawn, the frame opened, the two sides swung clear of the slab, and the frame pulled away from the other two sides of the slab.—Contributed by James M. Kane, Doylestown, Pa.

Pipe Guides for a Bench Vise

In fitting up a home-made bench with a vise, I found it rather difficult to mortise in the two guide pieces, so I decided to make it an easier way. I had an iron bench screw, and my vise block being 1¾-in. maple, I procured two pieces of ½-in. pipe, each 15 in.

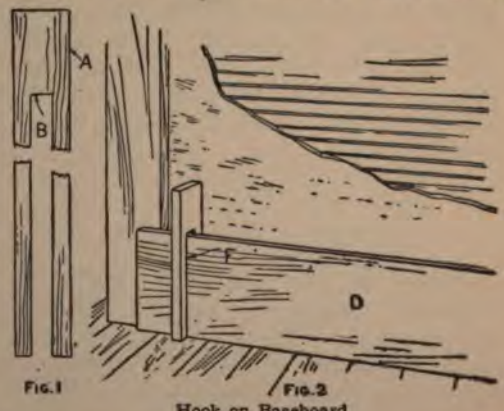


Guides in Bench

long with threads on one end, and each was fitted with a ½-in. waste nut. The block was then screwed up tight against the bench by means of the screw and two 1-in. holes bored through for the guides, which were easily slipped through, and the waste nuts screwed to the outside.—Contributed by Edwin Otto, Chicago, Ill.

Baseboard Marking Hook

The device shown in Fig. 1 is for marking a line on the baseboard for sawing closely against a door facing. It consists of a piece of wood, A, Fig. 1, 2½ in. wide and 12 in. long, squared up true on all sides. A 1-in. opening, B, is sawn out 10 in. long. The hook is placed on the baseboard D, Fig. 2,



Hook on Baseboard

and the line made along the opposite edge from F when the hook is against the facing.

Portable Lamp for the Garage

In garages and repair shops, extension cords for electric lamps are practically indispensable, and strange though it may seem, there are few, if any shops, that have practical supports for these portable lamps, says Motor Age. The illustration shows a home-made portable lamp of gas pipe and fittings. The base A is a 2-in. pipe flange, 8 or 10 in. in diameter. A reducer is used in the 2-in. hole to make the size ¾ in. A ¾-in. nipple and a plain coupling is turned into the base and fastened to a piece of flexible conduit, C, which connects the base with the electric lamp D.

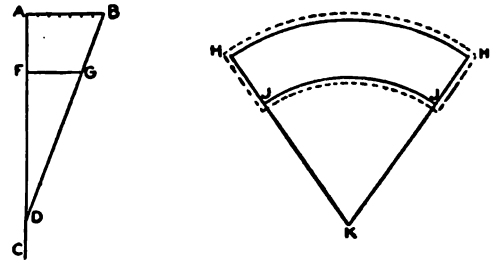


All the fittings included in the make-up of this lamp are standard and may be assembled without the use of tools. This lamp can be placed anywhere about or under the automobile. The lamp may be raised, lowered, or twisted into almost any desired position by means of the flexible conduit, which is stiff enough to hold it in the position set.

A Flaring Pattern Rule

Draw the lines AB and AC with an ordinary square and mark a point B from A on the line equal to the large diameter of the finished object. The slant height is from A to F. Draw a line parallel to AB on the slant height, or FG. The small diameter of the finished object is marked on the line at G from F. A line drawn intersecting B and G and extending to D, establishes a center from which an arc of a circle is drawn with a radius from A to D.

The arc is shown from H to H with the center K. The small arc having a radius from D to F is shown from J to J. The length of the arc is determined by spacing the line AB into seven equal parts and using the dividers set for one space to step off the arc HH 22 times for one piece, 11 times for two pieces, 7 1/3 times for three pieces and 5½ times for four pieces. The pattern is then given sufficient edge, as shown by the dotted line, for seams or other purposes.—Contributed by S. C. Shipman, Steubenville, Ohio.



Laying Out the Pattern

Bakery and Milk Check Holder

The accompanying illustration shows how common paper clips can be used to hold milk and bread checks. The paper clip, Fig. 1, is fastened with two small nails or brads to the edge of the shelf, as shown in Fig. 2.—Contributed by Victor Labadie, Dallas, Texas.

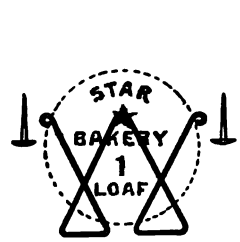


Fig. 1

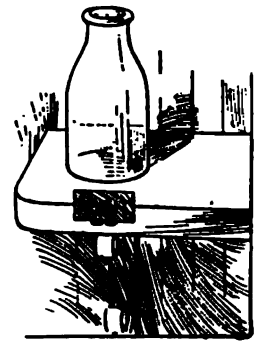


Fig. 2

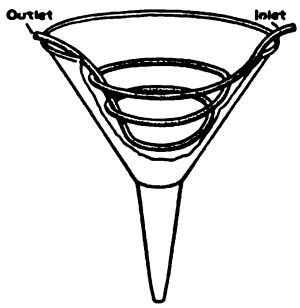
Method of Using a Paper Clip

An Inexpensive Flower Pot

An artistic flower pot can be made from an old paint keg—one made of oak preferred. Saw off one of the ends, leaving two-thirds of the keg, remove the hoop and scrape the paint or varnish from the wood. Sand the hoops and paint them with bronze and stain the wood a dark color, allowing the grain to show; then replace the hoops and drive them tightly in place. Fasten them to the keg by boring holes through both hoop and stave and driving pins in the holes. Bore several holes in the bottom of the keg for drainage. Attach drop handles on opposite sides of the keg.

Heating a Funnel for Thick Oil

It is difficult to empty a keg of oil into the engine-room tank or can in cold weather, as the oil will not run through the funnel fast enough to take the flow from the bunghole. The remedy is a simple one and can be adapted to any sized funnel. If a coil of small copper pipe is wound spirally round the mouth of the funnel and a small amount of steam applied to the pipe, the oil will flow steadily. The heavy oils that need warming up do not generate explosive gases, so the method is quite safe.—Contributed by Hy. W. Hankin, Troy, New York.



Setting a Diamond for Dressing Emery Wheels

The holder is made of a piece of machine steel with the end prepared in a lathe, as shown in Fig. 1. The hole in the center must be large enough to easily take the base or largest part of the diamond and about $\frac{1}{16}$ in. deeper than the depth wanted when finished.



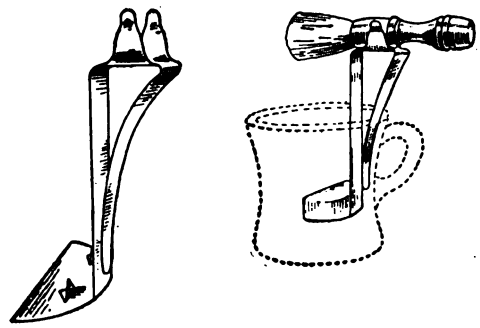
Setting Diamond in a Steel Rod

Make a groove around the hole, as shown at A, so that the metal between will be very thin.

Place enough clean iron filings and flux in the hole to keep the diamond at the proper height. The filings are important to make a perfect seat for the base of the diamond. Select the largest part of the diamond and set it firmly on the filings and close the thin metal in snugly all around with a small punch. Provide a small hole at B, Fig. 2, to admit spelter to the filings. Fill the groove heaping full of spelter and flux. Heat slowly and evenly to the melting point and then remove the holder from the fire and let it cool slowly. Finish the end as shown in Fig. 3.—Contributed by Rudolph Miller, Shippersburg, Pa.

Soap and Brush Holder for a Shaving Mug

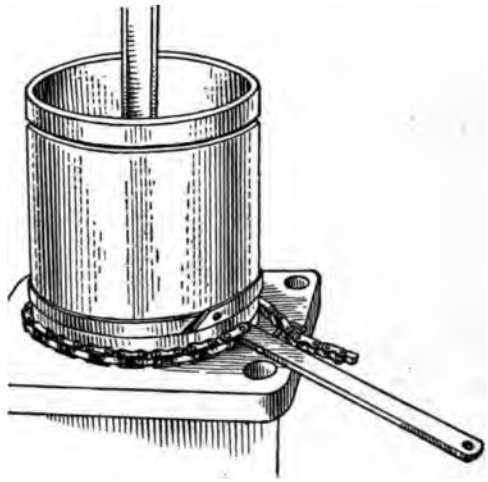
An attachment for a shaving mug for holding the soap and brush can be made of a piece of sheet metal. The illustration plainly shows the construction. The piece is cut and shaped to slip over the edge of a cup. It can be easily attached and removed.



Holder and Position on Cup

Tool for Holding Piston Rings While Replacing Piston

When replacing pistons in cylinders of gasoline engines, some device must be provided for holding each ring in its groove so it will easily enter the bore.



Holding a Ring in Place

Copper wire may be used to advantage where one or two pistons of the same size are to be replaced. In repairing engines of various sizes and replacing their pistons, the tool shown in the sketch can be quickly applied to each ring just before it enters the bore.

The tool is made from a length of bicycle chain with a lever attached to one end on which a hook is fastened in such a manner as to take up the chain and close it in on the ring. The sketch shows its construction.—Contributed by Orlia A. Young, Loudonville, Ohio.

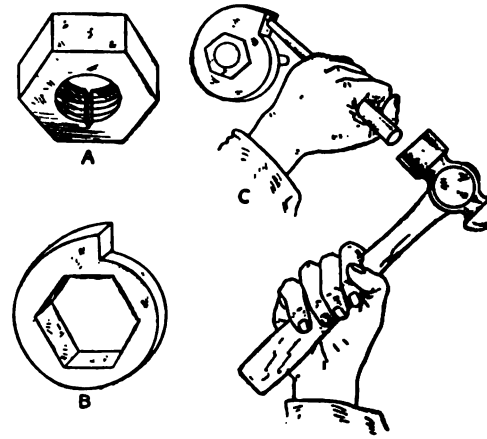
Small Spanner Wrench and a Nut-Threading Tool

In motor car repairing, one is often forced to drive a particularly stubborn bolt or bearing pin, having a threaded end, out of place because it has become firmly fixed by rust. The thread is bruised to some extent, even if care is taken in driving the bolt out, by some projecting piece of metal in the bearing in which it sits.

When the bolt is replaced, it is often difficult or even impossible to get the nut to run on the damaged thread, says the Motor Magazine of Canada.

A simple screw thread corrector may be made of a steel nut of the right size to fit the thread. This is softened, and a V-shaped slot cut on the inside, running across the threads and a little deeper than the bottom, as shown at A in the sketch. This must be cut very carefully with a fine three-cornered file, so that no burrs adhere to the edges. The nut is then tempered to a light straw color, and when cooled it is ready for use. Screw this nut on and off the threads several times and they will be toned up and straightened, and the original nut can be replaced without difficulty. A set of these handy tools can be made from a number of standard sized nuts commonly used and they will do the work as well as the more expensive stocks and dies.

In removing inaccessibly placed nuts and bolts it is often necessary to screw these out by driving a chisel or punch held against the corners of the facets, which damages them and makes it difficult to apply a wrench to the nut or bolt head with success when this is necessary. The small spanner shown in B is intended to be placed over the nut or bolt head and the projection struck with a hammer directly, or

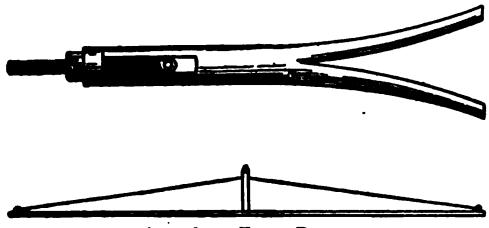


Threading Die and Spanner

turned by a chisel struck with a hammer, as shown by C. These can be made in different sizes to fit standard nuts and bolt heads.

A Truss for Aeroplane Construction

A truss for strengthening the weak places in aeroplane construction is shown in the sketch. It is made of a $\frac{5}{16}$-in. bolt having the head cut off and a hole drilled through for a No. 18-gauge wire. The body is made of ash with a hole bored into the top end the length of the bolt and the side cut out to form a slot. The other end may be formed to suit the frame where it

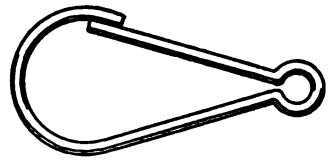


Aeroplane Truss Frame

is to be placed. A brass ferrule is placed under the nut of the bolt and over the end of the slotted part. The tightening of the truss is plainly shown. —Contributed by F. W. Stromer, Gig Harbor, Wash.

An Emergency Snap

A snap can be made from an ordinary split cotter pin for temporary use. To make the snap, spread the parts, cut off one end and bend the

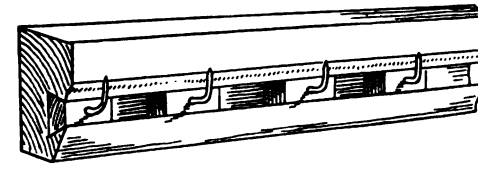


Snap Made of a Cotter Pin

other as shown in the sketch.—Contributed by Lester L. Kell, St. Louis, Missouri.

Adjustable Curtain Stretcher

There is hardly a household in which a curtain stretcher does not, at some period of the year, play an important part, says the American Carpenter and Builder. A prominent woodworking concern makes what is known as the adjustable pin stretcher, the brass nickel-plated pins which hold the curtain being set in adjustable sliding



Adjustable Hooks

blocks. The sketch shows how the groove is cut for the sliding blocks to adjust themselves to any position endways.

Locking a Wood Screw

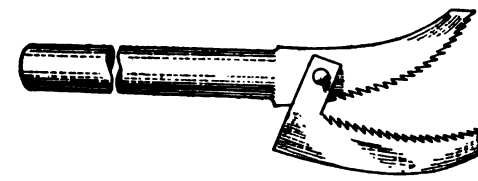
Many times advertisements or framed notices fastened with screws on the outside walls are stolen for their wood frames. By using the ordinary wood screws with



the heads filed on two sides, against which the screwdriver blade bears when unscrewing, it makes the screw easy to turn in but impossible to turn out.—Contributed by Percy d'Romtra, Cape May Point, N. J.

A Simple Pipe Wrench

The illustration shows a very serviceable wrench which may be made in a short time. The wrench is, in every way, as efficient as the best factory product. It is forged from steel and the teeth filed in the jaws before tempering. This wrench may be made in all sizes and will be found very



Home-Made Pipe Wrench

handy for any branch of the mechanical trades.—Contributed by A. J. McKelvie, Ladysmith, B. C.

Boring Oval Holes

Lay out and cut to shape a form or guide, A, Fig. 1, of machine steel, as required, and fasten it to the work to

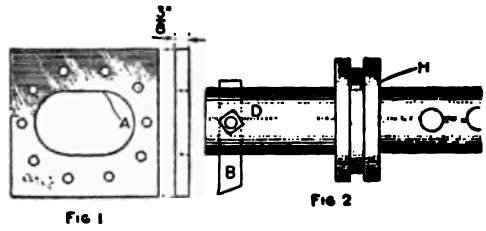


Fig. 1 Fig. 2

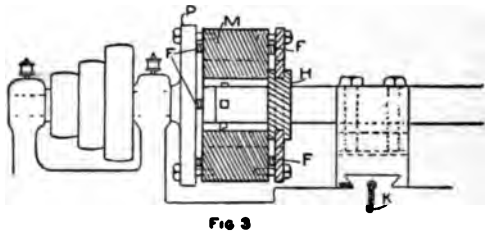


Fig. 3

Shape and Position of the Guide Form

be bored or turned. The boring bar (Fig. 2) has the usual cutter, B, fastened with the setscrew D. A collar, H, is made a sliding fit for the bar. Drill the guide and work for cap screws and place parallels, FFF, Fig. 3, between the guide, work M, and faceplate P, for clearance. The boring bar collar H is held against the guide plate by attaching a weight to a chain, K, which is fastened to the tool-post feed after removing the screw.

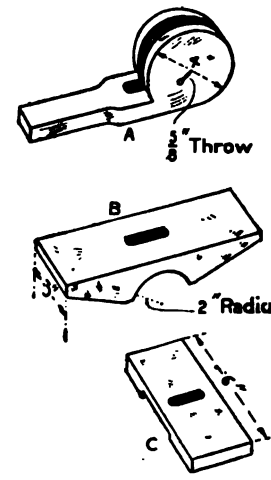
The guide plates can be made in various shapes for making cams, cylinder, jig, and experimental work.—Contributed by J. B. Roberts, Everett, Massachusetts.

Preparing Logs for Sawing

All the logs for a hardwood mill were shipped by rail and a large amount of mud and gravel was found sticking to the surfaces. A derrick was used to load the logs on a car in the yard and at the foot of the incline the car was stopped for a short time, and a stream of hot water from an injector cleaned off nearly all the mud, and softened what it did not remove. The mill turns out a large amount of quarter-sawed material, and saws are changed three times a day. The forced stream of water from an injector is better than cold water, and the saws are saved at a trifling expense.

Eccentric Clamp for Wood Lathe Rest

A quick acting eccentric clamp for a rest on a wood lathe can be made of parts as shown in Fig. 1. The eccentric lever A takes the place of the regular hand wheel on the bolt. The lever turns in a half circle bearing, cut in the cross block B. The piece C is fastened on top of the block B to keep it straight across the bed of the lathe. Both pieces have a slot cut in them for the lateral movement of the bolt. The lever A is fastened to the end of the bolt, a little off center, with a pin. A spring, D, is placed above the clamp to release it from the bed when adjusting the rest.



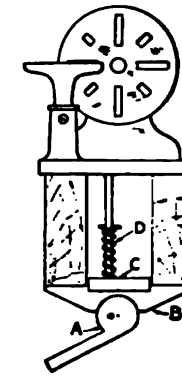


Fig. 1 Fig. 2

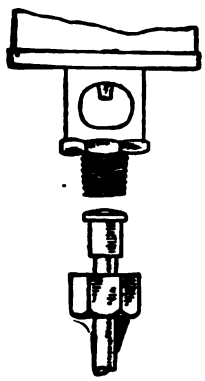
Clamping a Wood Lathe Rest

The lever may be tightened and released with the foot, thus leaving both hands free to move the rest.—Contributed by C. M. Graham, Oskaloosa, Iowa.

¶A kitchen-sink putty is made of litharge, 20 oz.; dry slaked lime, powdered, 1 oz., and linseed oil.

Lug on a Pipe to Hold a Locknut

Sometimes a lubricator or steam gauge has, of necessity, exceedingly long connecting pipes of copper for pressure or oil feed, and a great deal of annoyance is caused by the connecting nuts slipping down on the pipe to a turn or other fittings. Where they are located over a hot boiler or leading through a maze of other hot pipes, it is dangerous to reach for the nut and slip it back to place. A good way to keep the nuts up near their place is to braze a small brass lug to the copper pipe, a little below the joint. It will save a great many burned wrists and, if placed on the back side of the pipe, it will never be seen. The nut cannot slip past the lug.



Shear-Holder for Paperhangers

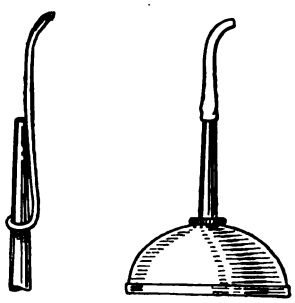
An ordinary wire opener such as is used for opening bottles having a crown top makes a good shear-holder for paperhangers. The opener is sewed to the outside of the overalls as shown in the sketch. The angle with the opening is suitable for the shears or a painter's duster.—Contributed by Hazel Duncan, Denver, Colo.



¶The ornamental raised ledge around the keyhole of a lock often keeps the latch key from readily entering. Unless the key happens to be put directly in the hole, the ledge will prevent it from slipping in. The ledge can be removed in a few minutes by cutting it off with a sharp cold chisel.

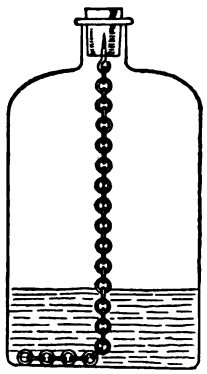
Extension Spout for an Oil Can

The straight spout on an ordinary oil can is not long enough or shaped right to oil bearings located in complicated machinery. The straight spout can be extended and a bend made in it by attaching a piece of wire of the desired length and shape, then drawing a piece of small rubber tubing over it. —Contributed by Harry S. Moody, Newburyport, Mass.



Bottle Cleaner

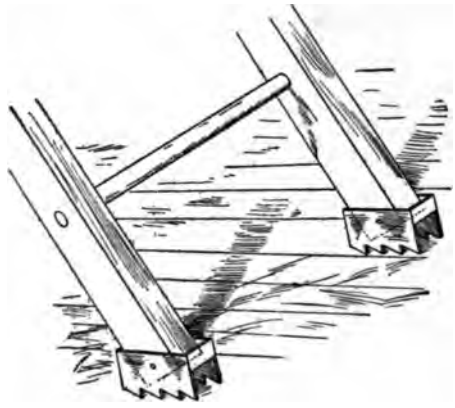
The usual method of cleaning the inside of a bottle is to put into it some nails or sand, partly fill with water, and shake well. While this will clean the bottle, there is a possibility of leaving a nail or some sand within. This trouble may be overcome and the bottle thoroughly cleansed by using a chain cleaner attached to the cork of the bottle as shown.



The cleaner can be made of an old key chain attached to the cork with a small brass screweye. The chain should have a few knots of cord tied at intervals in the links. Pour some warm water in the bottle, place the chain and cork in and shake well. This is especially useful for cleaning tea, nursing and all kinds of small medicine bottles. — Contributed by David Major, Providence, R. I.

Preventing the Lower End of a Ladder from Slipping

The lower end of a ladder may be kept from slipping by using a device made from heavy sheet metal, as

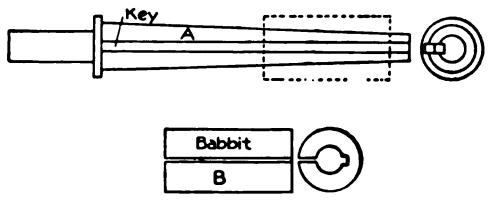


Nonslipping Ladder Ends

shown in the sketch. The attachments are made to fit the wood loosely, and the edge intended for the lower part is notched like a saw. A hole is drilled through the metal and a corresponding hole is bored in the wood for a drawpin or bolt. This makes them fit the base, no matter at what angle the ladder slants, and also provides a way to quickly remove them.—Contributed by W. A. Jaquythe, Richmond, Cal.

A Lapping Tool

An adjustable tool used for lapping out hardened bushings such as wrist pin bushings for automobile engines, can be made of babbitt metal. The babbitt is placed on a taper arbor turned from cold rolled steel. A ¼-



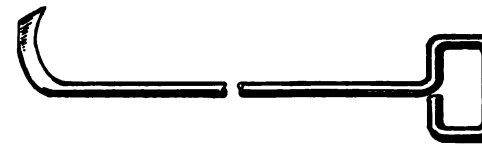
Detail of Lapping Tool

in. keyway is cut and a key inserted the full length of the taper. Use a piece of tubing larger than the hole and as long as the lap to be made and place it on end on a smooth surface for a mold. Hold the taper arbor in the center with the small end down and fill the space with melted babbitt. When cold, remove the tube from the babbitt and turn it to the right size. Remove the babbitt from the arbor and split it opposite the keyway.

If there is a great deal of lapping of one size, it is best to use copper instead of the babbitt. When using copper, there is no need of a keyway as this metal will grip the taper. The tool can be used in a drill press or a lathe. As the lap wears, it is driven up on the taper arbor to increase the size.—Contributed by V. E. Swanson, Chicago.

A Pruning Hook

The pruning hook shown in the illustration is for cleaning the dead wood from raspberries, currants and other small fruit, as the handle per-



Made of a Steel Rod

mits it to be drawn towards the worker, thus making the task much easier.

It is made from a length of steel rod, 3½ ft. long, one end of which is bent into a hook and flattened. The flattened part is tempered and ground to a knife edge. The opposite end is bent into a handle as shown, making it easier to grasp than the ordinary straight handle.

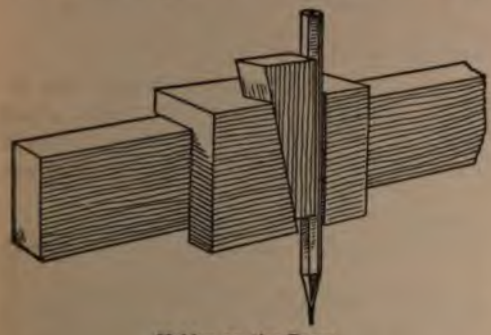
Fitting Glass in Picture Frames

When cutting glass for picture frames do not fit it to the rabbet tightly, says the Master Painter. Allowance should be made for expansion and contraction. For the same reason, springs should not be forced hard on the packing at the back of the glass.

Pencil Holder for Beam Compasses

An easily made, yet very efficient pencil holder for use with beam compasses is shown in the sketch. Care should be taken that the wedge-shaped piece have the same taper as the groove in the sliding block. One side of the wedge should be beveled and made to dovetail into the block. This will give a better grip on the pencil.

This pencil holder has an advantage over the ordinary type of holder in that it can be easily slipped along the trammel rod and any number of lines made without the usual tedious and very trying method of screwing and unscrewing the head as in the case of the ordinary beam compass. Of

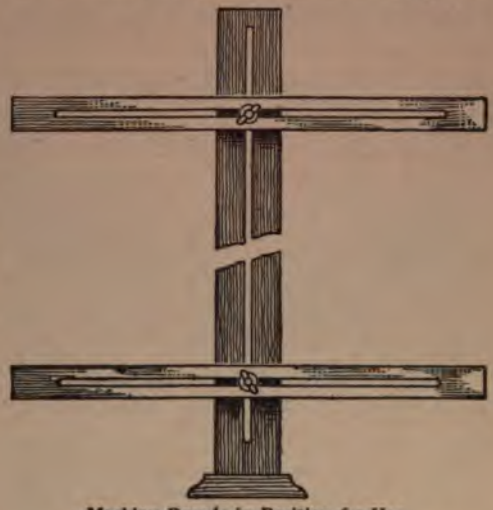


Holder on the Beam

course, it has to be grasped in the hand while the line is being made, but if both are grasped in the hand at the same time, no trouble will be experienced.—Contributed by Wilfred Butler, Perth Amboy, N. J.

A Panel Spacer

The device shown in the sketch is for use in spacing panels in painting, paper hanging and decorating. In use, the bottom of the spacer is placed on the baseboard and the crossarms are set to suit the width of the stiles for the panel. When it is once set, no change will need to be made for the entire room. When not in use, the spacer can be folded up for carrying or storing. The crossarms can be made of wood or metal. If made of wood, they should be lined on both sides with channel brass and countersunk screws, so that they can be used as a straightedge for trimming paper



Marking Boards in Position for Use

with a butting knife.—Contributed by A. E. Johnson, Frankfort Ind.

Gauge and Protector for a Hatchet

The attachment for a shingler's hatchet, as shown in the sketch, can be used as a gauge (Fig. 1) in shingling, and a protection for the edge (Fig. 2) when the hatchet is being carried to and from work or placed in a tool box.

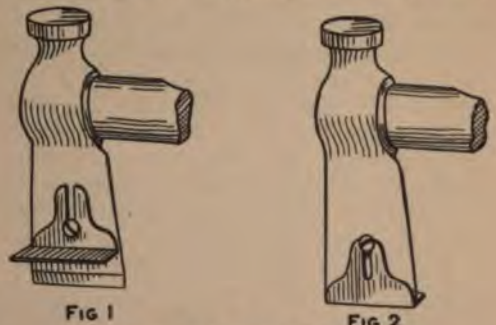


FIG 1 FIG 2

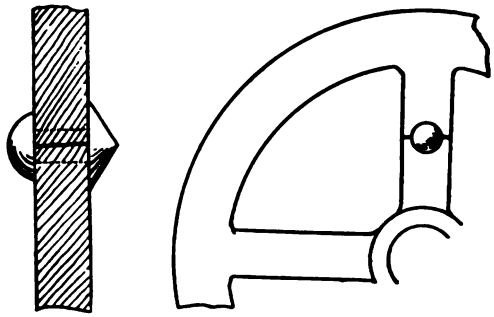
Attachment as Gauge and as Protector

The illustration shows its construction and how it is attached to the blade of the hatchet.—Contributed by M. M. Burnett, Richmond, Cal.

¶A strong solution of oxalic acid will usually remove stains from lumber.

Repairing a Cracked Spoke in a Wheel

A cracked spoke may be permanently repaired by drilling a hole through the crack and putting in a rivet. The rivet heads prevent side play in one direction and the shank prevents motion in a direction at right angles to this.—Contributed by Will Parker, Olaf, Iowa.

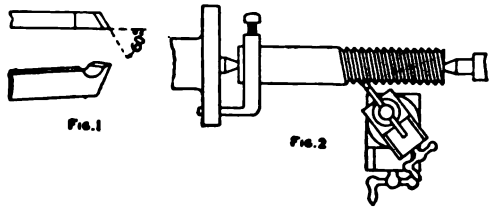


Repaired Spoke

An Improved Thread-Cutting Tool

A common thread-cutting tool is not free cutting as it has no top rake. The strain being so great on such a tool, it is hard to keep it sharp and in good condition.

If a lathe has a compound rest, the tool shown in Fig. 1 may be used for cutting V-threads. The compound rest is set at 60 deg. with the axis of the work as in Fig. 2 and the tool is set with the thread gauge in the usual manner. This tool is given a top rake and cuts a clean clip from the edge, the feed being set to the work by the compound slide.—Contributed by E. R. George, Baltimore, Md.



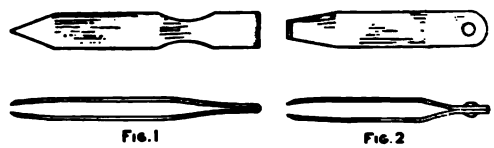
Tool in Position

¶The lead screws of a lathe should be adjusted from time to time.

How to Make Tweezers

Every workman in a factory, garage or home workshop should be provided with at least one pair of "sliver pullers" or tweezers. A sliver in the hand is a very painful thing, especially if it is run under a nail, and should be removed as soon as possible. If you do not care to buy the tweezers, but have a little spare time, you can make them from a broken hacksaw blade, the teeth of which have been ground off. Heat the blade in a fire and bend it to the shape shown in Fig. 1. Do not try to make the bend after one heating, as the metal is so thin that it cools before the bend can be completed. The sides can be ground out in curves and the surface highly polished. After polishing, lay the tweezers on a heated stove and allow the metal to take on a blue finish.

The tweezers shown in Fig. 2 are made with flattened instead of sharp points. The latter are made of the perforated ends of the saw blades and riveted together.—Contributed by Donald A. Hampson, Middletown, New York.



Tweezers Made of Broken Hacksaw Blades

How to Use an Expansive Bit

I was boring a 1½-in. hole with an expansive bit in a dry, hard maple timber, and it took a good deal of muscle to keep the bit turning, says a correspondent of the Wood-Worker. A carpenter passed and advised me to turn the cutter of the bit in the same direction as the handle of the brace, and stand with the grain or length of the stick. The result was it lightened the strain of the cutting a good deal and taught me something new. The hardest part of the cut, across the grain, is made while you have the greatest leverage on the brace.

Tin Tongs for the Kitchen

A device which will often be found useful in the kitchen is a pair of tongs cut out of heavy tin and shaped as shown in the sketch. The length is 20 in., with the width of each member ½ in. at the points and ¾ in. in the middle where it is bent. Corrugating the points will cause them to hold more satisfactorily. Any tinsmith will cut out these tongs for a small price, and they will last for years. They can be used for taking out boiled eggs, extracting pickles from a deep jar, removing soap from hot water, and also for washing the inside of lamp chimneys. The corrugated points will also hold a dust



A Useful Kitchen Utensil

cloth firmly, and there are scores of other uses which will occur to the intelligent housekeeper.—Contributed by Katharine D. Morse, Syracuse, N. Y.

Coat Hanger for the Shop

The device shown in the accompanying illustration is used for hanging up coats in the workshop on a nail well above the heads of persons passing by. The coat is hung on the peg and the stick is suspended on the nail by means of the hole shown near the end of the stick.

The stick may be 5 to 6 ft. long and the peg or dowel about 5 in. long. The

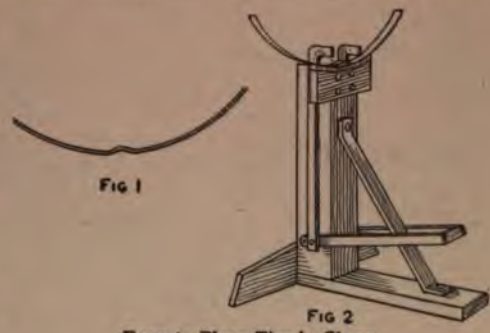


A Coat Hanger for Use in Shops

hole for the peg is about 6 in. from one end of the stick and the other hole about 3 in. The diameter of the holes and of the peg may be about ⅝ in. The stick may be made of ⅞-in. stuff, and taper in width from 4 in. at the top to 2 in. at the bottom.—Contributed by William M. Kishpaugh, Harrisburg, Pennsylvania.

Home-Made Tire-Upsetting Machine

The work of upsetting tires can be done so well with home-made devices



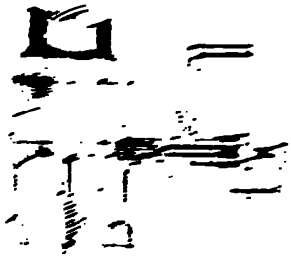
Easy to Place Tire in Clamp

that it does not require the expensive upsetting machine in a small shop. While the small clamps do good work, they are not easily handled by one person. The illustration shows a device which, although more elaborate, can easily be constructed by any smith. With all of the devices a bend must be made in the tire as shown in Fig. 1, then after taking a good heat, the tire is set on the anvil of the upsetter (Fig. 2) and clamped in place by a pressure of the foot on the treadle. The large parts are made of wood and fitted with a metal anvil and clamps.—Contributed by John C. Ham, Pine City, N. Y.

Oiling a Screw Jack

It is very aggravating to be compelled to relieve a screw jack when it is under a load for oiling, and then to oil it good the screw must be removed. This difficulty may be overcome by cutting a few nicks with a chisel in the body to keep the drill from working over, and drill into the threads as shown in the sketch. Holes ⅛ or $\frac{1}{16}$ in. in diameter are large enough. The jack can be oiled under load and without removing the screw.





...the upper end of the check valve ... the admission pipe J. The ... pipe is shown at K, this being ... the ... position as when used on the ...

The mixing valve, as described, has been operating perfectly ever since it ... made and installed. The suction ... the engine causes the valve D to lift and induces a flow of air through ... and a spray of gasoline through K. It thought advisable, however, an air-... which can be attached at ... when the ... is ... Paper ... Canada.

A Home-Made Marking Pen

... marking pen can be made of a ... and two pieces of thick ... The ... which is to be used ... be made about ¼ in. thick. ... is ... and 1 in. long. ... two pieces of thin thick spring ... which ... to the wood with ... screws, allowing ½ in. of each spring ... end ... to the wood. The ... is then inserted in the wood ... the ... made so as to bring ... ends very closely together. ... that ... the two springs should ... such ... that they will give the full

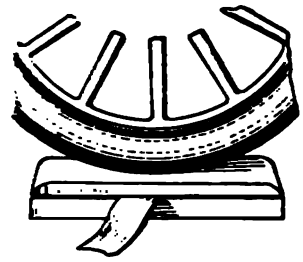


Showing Ink in the Handle

... with a smooth broad line.—Contributed by Harry L. Wood, Toronto, Canada.

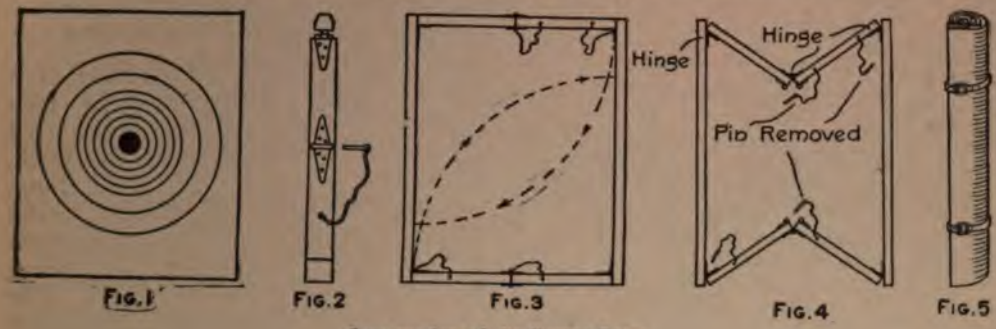
Applying Pressure on Patched Inner Tubes

The motorist when making a tire ... on the road can apply sufficient ... to a patch by using two blocks of wood as shown in the sketch. The blocks can be carried in the tool box. They should be shaped for the tires, about 5 in. wide and 9 in. long, with a curve cut in the one used on top. The inner tube with the patch in place is put between the blocks and one of the inflated wheels on the car rolled on to it.—Contributed by Edwin Marshall, Oak Park, Ill.



Folding Target

The construction of a target for field practice that can be rolled up and carried is shown in the illustration. The target ready for use, shown in Fig. 1, is made of cloth stretched on a frame which is hinged together at the corners and in the center of two sides, as shown in Figs. 2 and 3. Where the two sides are hinged in the center, two hinges are provided, one on each side of the wood, the inside one having a loose pin which is kept from being lost by tying it to the frame. When the pins are removed, as shown in Fig. 4, the frame separates and closes, then it can be rolled into a small bundle, as shown in Fig. 5.—Contributed by Walter W. White, Denver, Colo.



Construction of the Target Form

Engraving on Glass

A simple way to mark glassware, such as tumblers, fruit dishes, etc., and also glass of small sizes for doors, is shown in the sketch. Procure or make a small oblong box large enough for the pieces to be marked. For ordinary purposes the box should be made of ¾-in. material about 7 by 12 by 18 in. with one end left open. Make several ends of the same material to fit the open end of the box. Bore a small hole in each corner of the end pieces to admit screws for fastening them on the box. A hole, shaped so that the article to be marked will fit in the center of an end piece should also be provided. The one shown is for a tumbler.

Procure some shot (about No. 8 will do) and some medium fine emery, place them in the box and fasten the end in place. Paste a stencil having the desired design on the article to be engraved, and fasten it in place with straps, as shown in the sketch. Shake the box so that the shot falls from one end to the other. The emery soon becomes imbedded in the shot, thus forming sharp cutting surfaces.

The shot falling on the glass will cut it through the open places in the pattern. Letters or designs used should have no fine lines.—Contributed by R. B. Cachamed, Ohio, Ill.



Box with Tumbler Strapped in Place

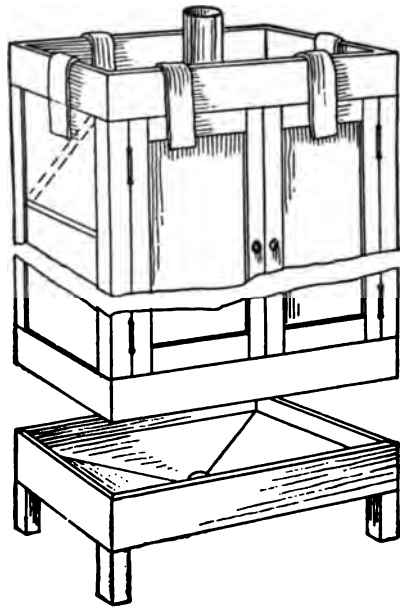
Paper Gaskets for Cylinder Heads

Some time ago I worked in a shop where they manufactured air compressors, and while there they had considerable trouble with the gaskets used in the cylinders. After an extensive test, we found a remedy in paper gaskets, which we made in the following manner:

The gaskets were cut from heavy wrapping paper to the proper size and soaked in boiled oil for about 10 hours, then they were hung up to drip, after which some flake graphite was dusted on their surfaces. The result was a tight and durable joint.—Contributed by R. R. Knapp, New York City.

Iceless Refrigerator

A good cooling box or refrigerator suitable for camp use can be made as follows: The inside measurements of the base are 18 by 48 in. The posts



Frame of the Refrigerator

are of 2 by 4-in. material 15 in. long, and 1 by 6-in. stuff is used for the frame. Let the frame extend above the top of the posts 1½ in., to allow the drip pan to set on top of the posts. The drip pan is made of galvanized iron, 18 by 42 in., with a turned-up edge, 1½ in. high. The pan is made sloping toward the center, where a drain pipe is soldered to the metal.

The outside dimensions of the top part at the base are 15 by 39 in., and at the top, 13 by 39 in. The corner posts are 2 by 2 in. and the rails around the bottom are 1 by 4 in., and at the top, 1 by 10 in. The height of the top may be from 48 to 60 in. Brace the ends and back in the form of a cross between each shelf. The braces are made of 1 by 2-in. material. The top rails are extended 3 or 6 in. above the tops of the posts, to provide a place to set the water tank. The tank is made of galvanized iron, 5 or 6 in. deep, with a round ventilator, 4 in. in diameter, soldered in the center. The ventilator should be long enough to create a good draft.

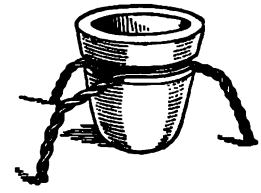
The bottom and top rails of the doors are of 1 by 4-in., and the side rails, 1 by 3-in. material. The number of shelves is determined by the height of the top. They are made of 1 by 12-in. boards, which are held in place with long screws turned into the corner posts.

Cover the entire top and all sides, including the doors, with burlap, allowing it to reach to the top of the tank on all sides. Keep the shelves away from the wet burlap. The cooling agent is the water in the tank, which keeps the burlap constantly damp by the aid of six siphons from 4 to 6 in. in width, made of lamp wick, old blanket or felt. If they siphon too fast, make them narrower.

Paint all the woodwork. The strip of burlap across the 1 by 10-in. rail at the top must be raised when the doors are opened. An outside case, well perforated, can be made to fit over the entire box to make it more presentable. Fill the tank with water and set the top on the base. If the box is made right and a good draft obtained, the inside temperature will be lowered to a surprising degree. The siphons must rest over the burlap and extend well into the water.—Contributed by F. W. Preston, Paterson, N. J.

Receptacle for Soldering Acid

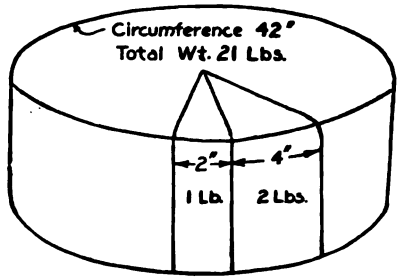
A glass insulator used on telephone or telegraph wires makes a good receptacle for soldering acid, if it is fitted with wire legs, as shown in the sketch. When the lengths of wire are carefully measured and twisted, the legs will project at equal distances apart. Two legs are first twisted on the wire then it is placed in the groove on the



insulator and the ends twisted together to form the remaining leg.—Contributed by Claude M. Sessions, Waynesville, Ill.

Measuring Cuts of Cheese

Not having a regular cheese cutter which automatically registers half pounds, etc., I devised a plan of measuring the cheese into parts equal to ¼ lb. The circumference of the standard round cheese was measured with a tape measure and found to be 42 in. The weight of the cheese was exactly 21 lb. Each 2 in. on the circumference cut to the center, wedge-shaped, represented 1 lb. in weight. The circumference was divided into ½-in. parts and marked with a pencil. Costly guess work was avoided by this method.—Contributed by John Shahan, Attalla, Alabama.

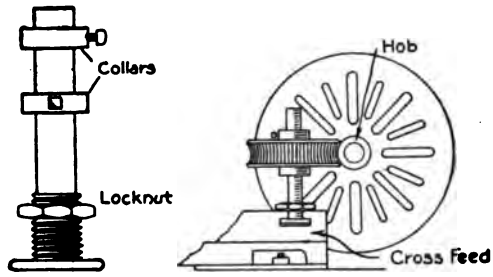


Each 2-In. Slice Weighs 1 Lb.

Cutting Worm Gears on a Lathe

While working in a small repair shop I had occasion to cut several worm gears, and not having a milling machine, the work was held back until a jig could be made for the lathe. I turned up a post to fit in the T-slot or tool-post holder. The post had a shoulder which extended far enough above the T-slot to allow a nut to be screwed on to act as a locknut. The post extended 1½ in. above the lathe centers and two collars were turned to fit the post, and each was provided with a setscrew. The complete post is shown in the sketch.

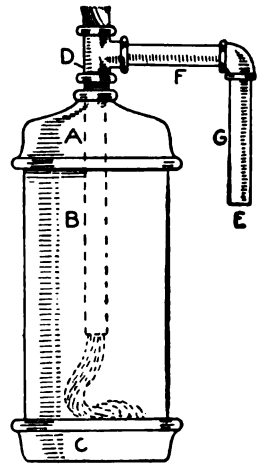
The hob was placed on a mandrel and put in the lathe centers. The post was placed in position and locked, and a blank gear put on between the collars. The feed was screwed up so as to hold the blank against the hob while the setscrews were tightened to hold the collars in place. Then the machine was started and the gear fed slowly against the hob.—Contributed by W. R. Ayers, Pittsburg, Pa.



Wheel on Special Post

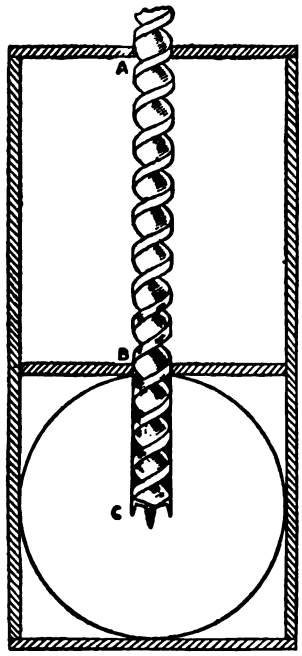
Home-Made Torch

A torch that will produce a strong light can be made of pipe and pipe fittings as shown in the sketch. The top part of the body A is a reducing coupling, ⅜ by 1½ in., screwed on to a 1½-in. nipple, B, 6 in. long, which has a cap, C, for the bottom. The wick pipe is fitted with a tee, D, to which the pieces of pipe, F and G, are attached for a handle in carrying, or to hang the torch on a pipe or other projection. A certain amount of the air entering at E goes through the wick and helps to produce a brighter light than the ordinary torch will make.—Contributed by J. E. Noble, Toronto, Canada.



Boring Holes in Balls

A carpenter having a contract to build a pavilion for a fair, the plans of which called for 16 flag poles on the roof without mentioning any ornaments for their tops, put up the building and started to raise the poles. The poles without ornaments appeared unfinished and it was decided to place a ball on the end of each pole. As it was impossible to turn up balls on short notice, common croquet balls were used. These were taken from sets purchased at a local hardware store. A box was used as shown in the illustration to guide the bit for boring a hole part way in each ball. In this case the box was made the right size for a croquet ball. The ball was held so it could not turn while the hole was being bored.—Contributed by Edward Hild, Lake Forest, Ill.



Keeping a T-Square from Slipping

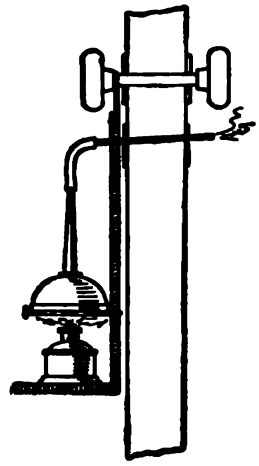
Place two rubber bands on the blade of the T-square, one near the head and one at the other end, and it will remain in place when the board is at any ordinary angle. The wider the bands the better.—Contributed by Henry R. Bowman, Baltimore, Md.

¶Keep the spoons bright for spoon-hook fishing.

Fumigating Rooms

Formaldehyde and sulphur dioxide are the two agents generally used in fumigating after contagious diseases. The vapor from formaldehyde is caused by heat which is produced by igniting the chemical, placed in an old tin pan within the room. The same vapor will exterminate moths. As it is inconvenient to vaporize a closet or a small room I devised a simple and effective method whereby a closet or room may be fumigated without a person entering it.

The apparatus described in the following can be used in small places. The exact amount of formaldehyde to be used can be easily determined. It requires no experience to adjust the flame which is used to produce the vaporization. It is not necessary to remove any of the clothing from the room, but be sure they are far enough apart so that the vapor can easily get between them.



The amount of 40-per-cent formaldehyde solution to be used for each 1000 cu. ft. of air is about 3 pt. Commercial formaldehyde contains approximately this percentage of the active constituent.

Take a piece of board, 1 by 5 by 14 in., and nail a piece of 5 by 6-in. material to the bottom of it, letting the end project beyond the upright piece so that when it is tied to the door knob, the back will hang straight. Set a small alcohol lamp on the 5 by 6-in. piece and drive two long nails or spikes just above the lamp flame and allow enough of the end to protrude to support the oil can that is used to hold the formaldehyde.

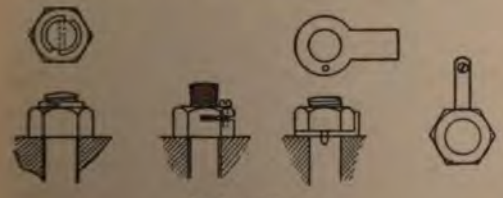
A small alcohol lamp can be made from a discarded ink bottle. A hole is punched in the cork and a piece of tin is rolled and placed in it; then a wick is inserted in the tube. The spout of the oil can is extended with a piece of hollow wire such as used for installation of gasoline lighting systems, or with a small rubber hose. Run this tube through the board and keyhole and allow it to extend into the room to be fumigated about 5 or 6 in., or enough to clear the knob on the inside.

After giving the room a good fumigating, leave the door closed for 24 hours before airing. It takes only a short time to get rid of the odor.

The same results can be accomplished by the use of sulphur dioxide. Sulphur either in the "flowers" or rolls, is placed in an iron water bath which is set over a large pan of water. Each 1000 cu. ft. of air space will require 3 lb. of sulphur to which is added about 1 pt. of alcohol. Set fire to the alcohol and the heat will form the vapor. These same methods and amounts are used in fumigating after contagious diseases.—Contributed by Dr. D. D. Smith, Sandusky, Ohio.

Four Ways of Locking Nuts

A great many methods are used to fasten piston-head and other bolt nuts to keep them from working loose under heavy strain. The sketch shows four of the best and simplest ways to lock these nuts. In the first sketch is shown a wire pin through the bolt end; a clamp made of the nut, in the second, while the third is held with a pin and clip. The fourth is locked by a clip held against the facet with a screw.



Locking Nuts

Hedge-Trimming Machine

The revolving cutter and blade from a small, discarded lawn mower can be made into a hedge-trimming machine



Cutter in Frame

by constructing a frame for the shaft to turn in and a holder for the cutting blade. The sketch clearly illustrates the way to make the frame. Such a machine will quickly trim the tip ends of a hedge smooth and leave no unevenness.—Contributed by H. Krauskoff, New Rochelle, N. Y.

Idler for a Belt

An inexpensive belt idler may be made by removing the straps of metal from an old bicycle pedal and allowing the belt to ride over the center of the revolving part. Such an idler can be used only on narrow belts.—Contributed by C. Darling, Worcester, Mass.



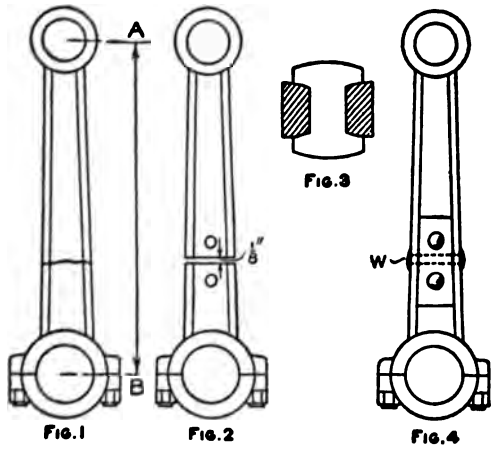
Idler Made of Bicycle Pedal

Replacing Automobile Cylinders

An easy way to replace automobile cylinders without help or without danger of breaking the piston rings is to disconnect the connecting rods and pistons, taking care to keep account of the shims required for each one, and insert the pistons in the cylinders, and the whole can be easily set in place and the connecting rods fastened from underneath the crankcase.—Contributed by William J. Weber, New York City.

Repairing a Broken Connecting Rod

One of the connecting rods on an automobile engine broke, as shown in Fig. 1, and I made the repair in the



Connecting Broken Parts with Steel Plates

following manner, which has stood the test of daily use for a year. The broken parts were placed together and the distance from A to B accurately measured. Both ends of the parts were filed off flat and smooth. This made a space of ⅛ in. (Fig. 2) to be filled with a wedge.

A hole for a rivet was drilled in the channel about ½ in. from each end and ½-in. machine steel side plates fitted as shown in Fig. 3. Holes were drilled in the side plates so that when they were riveted in place, the connecting rod was about $\frac{1}{32}$ in. short. The wedge W, Fig. 4, was driven into the space between the ends and riveted to keep it in place.—Contributed by Emil M. Buerger, Cincinnati, O.

Blueprint Washing Tank

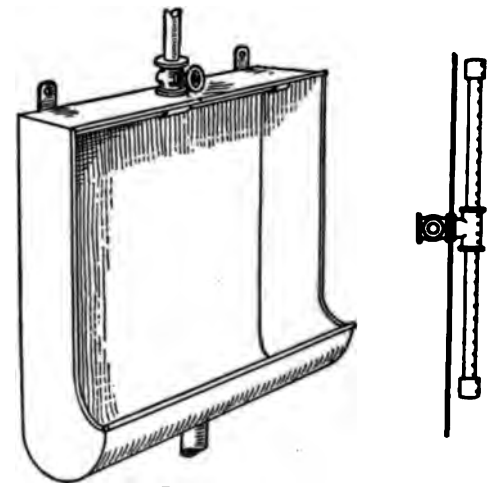
There are many small manufacturing concerns that have occasion to make blueprints in moderate quantities, and the best method of handling this work is always a problem, especially if room is scarce, and initial expense a consideration.

A tank designed by a correspondent of the American Machinist should appeal to anyone having little space to spare and but few prints to make. The tank is made to hang on the wall in any convenient location, suspended by two straps as shown, and is made of heavy galvanized iron with a ¼-in. stiffening wire rolled around the front.

The water supply enters from above through a ¾-in. globe valve, and the stream is distributed over the back of the tank by means of a T-shaped sprinkler, the construction of which is readily seen by inspection of the detail view of same.

When assembling the piping, the horizontal pieces and the ¾-in. T are located so that the streams of water play against the back of the tank, and the flange of the globe valve and the flange of the T serve to hold the sprinkler in position in the tank. A short drain pipe or a brass union may be soldered into the lower portion of the trough, and the outlet piped to any convenient point.

The width and height of the tank will, of course, depend on the size of the largest blueprint that it will be necessary to wash. To wash the prints, the water is first turned on and after the back of the tank is wet all



Tank for Small Space

over, the print is placed against it with the sensitive side of the paper outward, and so that the upper edge of the paper will come above the point

where the small streams of water hit the back of the tank. The water will then flow down over the print, which will adhere to the back at once and remain there until removed, to be hung up and dried.

A Small Screw Jack

The tool shown in the illustration proved to be quite handy for use in riveting a liner on a locomotive crosshead. It was impossible to hold a solid surface on the rivet heads while riveting, and the little jack was placed in the intervening space with its bottom against the rivet head and then screwed up tight. The work was accomplished without wasting time.

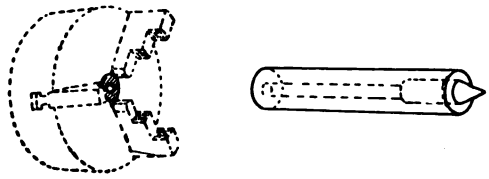


The jack can be easily made on a lathe. The base dimensions are 2 in. square and 3 in. high. The screw is ¾ in. in diameter.—Contributed by Harry J. Ruark, Interbay, Wash.

Universal Chuck Used as a Centering Tool

Any universal chuck may be used to spot round stock for centering by simply making a plug with a center to fit the hole in the chuck. This plug should be made a snug fit and a small hole drilled through its center. One end of the small hole is made larger and a plug with a 60-deg. point turned up to fit it. The plug should be as long as the chuck is wide so that when the chuck is laid on a block the point will just project above the face of the chuck.

When a round piece of stock is put into the chuck and the jaws turned up snugly on its circumference, it is struck with a babbitt hammer, which spots the lower end. This method is



Center in Chuck

many times quicker than using a bell center or calipers.

The large plug is fitted snugly in the chuck and the small plug is hardened and fitted into the hole of the large plug. The small hole is for use in removing the small plug if the point breaks. — Contributed by Andrew Smith, New Haven, Conn.

Placing Coil Springs in Hose

When putting in a new water-supply connection between the engine and the tank on a locomotive, it is necessary to run a coil of spring wire through the hose to keep it from kinking. The hose that is furnished for this purpose is generally flattened out through shipment or in packing. An easy way to insert the coil is as follows:

Procure a gas pipe about ¼ or ⅜ in. smaller in diameter than the inside diameter of the coil, and cut a small slot in one end of it. Slip the coil over the pipe and fasten one end of it to the pipe by means of the slot. Place the pipe in a vise and twist the coil until it is drawn closely on the pipe. The hose can then be easily slipped over it, and when the coil is released, it will spring right back into position and

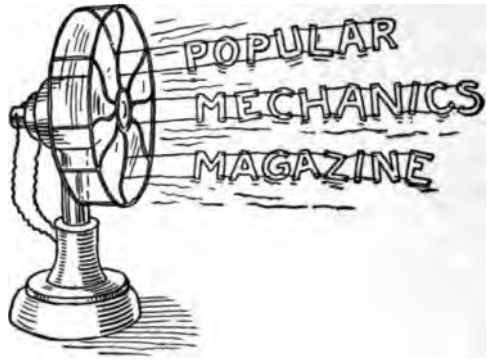


Coil Spring on Pipe

the hose and coil can be easily removed from the pipe. In using this method the coil is evenly distributed throughout the whole length of the hose.—Contributed by Harry L. Ruark, Interbay, Wash.

Sign in the Blast of an Electric Fan

One sign maker constructs for his customers signs for window attractions which have words spelled with

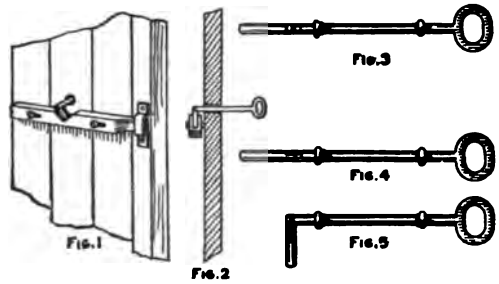


Letters Tied to Strings

letters tied to strings and attached to the guard on an ordinary electric fan. The current of air will keep the letters out in a readable shape, yet they will swing like a waving flag. The letters are made of light material and coated with tinsel. The tinsel gives a beautiful effect at night.—Contributed by A. Jungman, Bronx, N. Y.

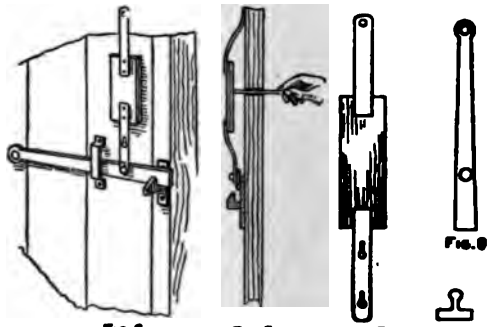
Locks for Camp and Shed Doors

Doors on empty buildings and places that do not require expensive locks, yet should be kept closed from pilfering marauders, can be fastened with home-made latches that will serve the purpose as well as any lock. An ordinary sliding latch, operated with a key, is shown in Figs. 1 and 2. The latch is made from a stout piece of hard wood and has two slots which slide on two screws turned into the door. The key is made to hinge, as shown in Fig. 3. The keeper is a piece of strap iron bent into shape and fastened with screws. The key is inserted through a round hole in the door while it is held in the position shown in Fig. 4. Turning the key causes the end to drop down (Fig. 5) and enter the notch cut in the top of the latch.



Key for a Wood Latch

In Fig. 6 is shown a back sneck. In this device, the sneck is lifted from the outside by passing a small wire through a hole in the door (Fig. 7) thus pressing out the hinge strap and raising the sneck from the keeper. The hanging straps are made of two small pieces of leather, 1 in. wide and 7 in. long, the lower one having two holes cut in it, the lower hole for the sneck when in use and the top one made so the sneck can be hooked up when not required as a lock. The other strap has one hole in the upper end for fastening it to the door. A small piece of wood joins the two straps in the center as shown in Fig. 8.



Straight Wire Pin Key

The sneck is shown in Fig. 9, and the cross section through the button in Fig. 10.—Contributed by John T. Dunlop, Craighead, Tollcross, Scotland.

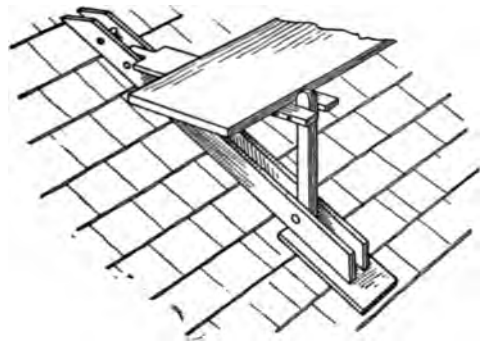
¶When painting stairs, apply the paint to every other step, and when dry, paint the remaining steps, placing small blocks on the dry ones to attract attention. Stairs may be used all the time by painting in this manner.

Bracket for Roof Scaffolds

Almost 40 per cent of the accidents in building operations are due to inadequate construction of false work and scaffolding. In building frame structures accidents of this nature show even a larger percentage. The fault is not always laid at the door of the contractor, for workmen will often take risks that endanger their lives, without any good reason other than to save time and labor. A carpenter who builds his own scaffolds is often as careless as any one in this respect. Lack of proper time or material for building strong scaffolds will often induce him to put up flimsy affairs that may any day fall and kill or wound several men.

Shingling roofs is even more risky than framing the house. Where the pitch is sharp, the risk is greatly enhanced. In repairing roofs, a good many carpenters do not even go to the bother of building scaffolds, but depend upon their ability to hold themselves on the slope. If one had folding brackets which would make roof shingling simple and safe, fewer accidents of this nature would be recorded. A carpenter with a pair of folding brackets as a part of his equipment would never be in danger of slipping or sliding from the roof while shingling. His equipment would consist simply of a pair of brackets and a board.

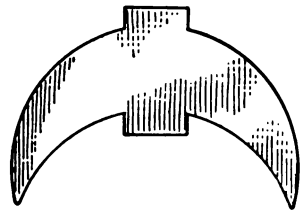
The brackets, as illustrated, are made to fold up and are self-sustaining. That is, the board which fits flat against the slant of the roof is spiked to cling to the surface and it would take a good deal to break it loose from its moorings. The spikes are made of ordinary screws with the ends protruding ¼ in. beyond the flat board and filed to a sharp point. Three of these at the lower end of the bracket and two at the upper end serve to hold the brackets firmly in position. A slight tap of a hammer will drive the brads in sufficiently and when the scaffolding board is placed across the brackets, the thrust, being downwards, tends to push the points of the spikes deeper into the wood surface. A pair of brackets of this nature will sustain the weight of several men working on the same board. The illustration shows clearly the construction of each bracket.—Contributed by Geo. E. Walsh, New York, N. Y.



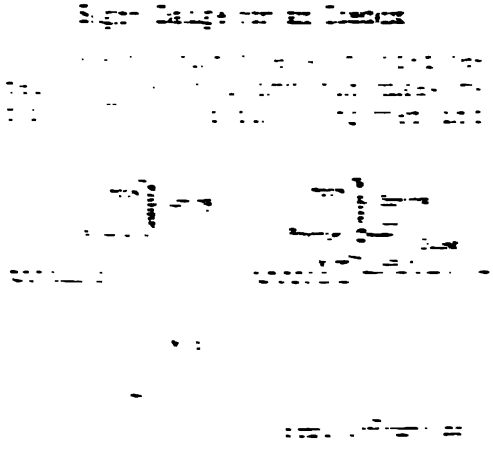
Folding and Adjustable Bracket

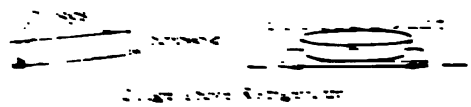
Keyseat Gauge

The illustration shows an internal and external keyseat gauge made of sheet metal. The outside arc has the same radius as the inside arc, thus forming a combination gauge for a certain size shaft and bore of a pulley having the same diameter. Such a gauge can be used for laying out the keyseat, and as a depth gauge. A set of such gauges with the size, width and depth on each made to standard will enable the workman to cut all keyseats and make all keys uniform.—Contributed by E. D. Reynolds, Los Angeles, Cal.



¶A tent may be warmed up for the night by an inverted metal bucket filled with red-hot stones. A discarded bucket will do.





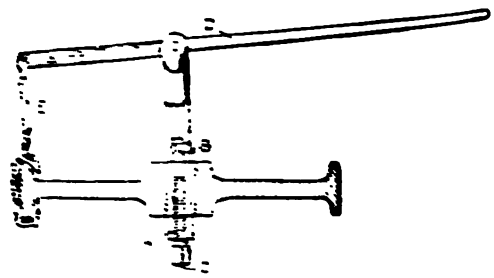
Library Paste

A good method of making library paste that will keep well is to dissolve 2 oz. of lump starch and add enough cold water to make a thick liquid, then heat water lukewarm and add the thick liquid starch to it very slowly and stir constantly all the time. When the mixture is entirely heated it gently and stir more rapidly all the time until a translucent, white and thick paste forms. Stir in 1 oz. of powdered alum, which will absorb the surplus water and keep the paste indefinitely.

This paste is as good as any chemical paste and much better for mounting specimens as it will not discolor them. The paste can be used where it is impossible to use acid paste, especially in printing and bookbinding.—Contributed by Loren Ward, Des Moines, Iowa.

Reversing a Large Pulley by Hand

Occasionally a large pulley comes to the shop to be repainted, and, if the shop is a small one, no appliances are at hand to conveniently do the work. A man can do the job satisfactorily with the aid of the following way: Procure a piece of shaft which will fit the hole in the hub, must be turned down until the shaft and hub fit to receive a threaded bolt, as shown at A. The point of the threaded bolt should be tapered. A cutter B should be made and the back end rounded to fit the taper on the bolt. Allow the shaft to project above the hub, drill a hole and attach a lever D as shown. Drill a hole in the opposite end of the lever and fasten a short piece of chain E, which in turn is fastened to the rim of the wheel. Screw the bolt up until the cutter is forced out far enough to make a cut. Apply pressure to the end of the lever and

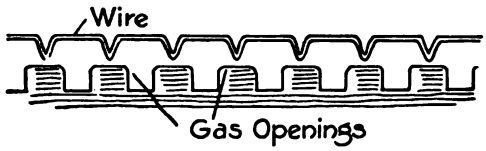


Lever Operates Cutter

force the cutter through. Draw the cutter back and turn the bolt up a little to force the cutter out for a second cut and again apply pressure to the lever. In this way a keyseat can be cut as perfect as if done on a keyseating machine. —Contributed by J. N. Bagley, Webber, Kansas.

Remedy for Roaring Gas Burners

Gas stoves in which the gas, just before combustion, enters through a row of openings, perhaps 3/8 in. in diameter, will make a roaring noise when the gas is turned on full force. This may be remedied by bending a piece of wire in the shape shown in the sketch so that each bend or projection shall enter one of the openings. This checks the pressure of the gas so that it begins to



Position of Wire on Burner

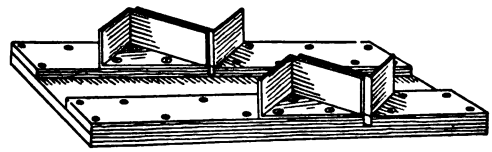
be consumed as soon as it enters the stove and not 2 or 3 in. above the opening.—Contributed by Walter E. Wright, Delaware, Ohio.

Sharpening Oilstones

Fine oilstones, emery wheels, or other grinding stones sometimes become covered with a coating of hardened grease and dirt which forms a smooth and useless surface. This may be removed quickly and easily without harming or wasting the stone, by boiling it for a few minutes in water containing about one teaspoonful of lye to a quart of water. Care must be taken not to let the stone rest on the bottom of the pan, as the heat may crack it. The lye unites with the grease, forming soap, which comes to the surface, thus freeing the dirt from the pores of the stone. Stones treated in this manner have the appearance of new stones.—Contributed by R. H. Galbreath, Denver, Colo.

Miter Box Made of Box Corners

A durable miter box which is simple as well as cheap may be quickly

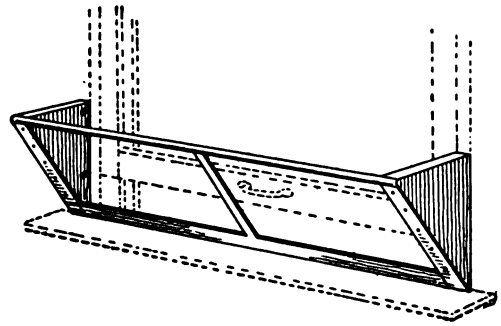


Box Corners on the Base

made by screwing four box corners to a board, as shown in the illustration. The corners are raised from the baseboard by strips of wood fastened to the edges. The box corners are set just far enough apart to allow the saw to pass freely between them.—Contributed by Edwin C. Wright, Newport, Kentucky.

A Ventilator and Draft Deflector

An excellent way to ventilate an office is to use an arrangement as shown in the sketch. It permits a constant flow of fresh air which is deflected upward, and letters, papers, etc., will not be blown from desks. The device is constructed of two wood brackets secured to the window casing and two glass panels inserted in a frame supported by the brackets, the top being left open for the free passage of air. The glass frame may be constructed detachably, sliding in a groove on each

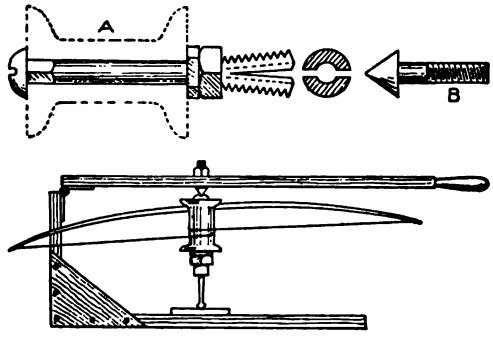


Ventilator on Window

bracket formed by two pieces of quarter round. The glass panels can be removed if one wishes to lean out of the window.—Contributed by Victor Labadie, Dallas, Texas.

Hand Drill for Fine Work

A very handy little tool for drilling small holes is the so-called fiddle drill, says the American Blacksmith. The tool is very easily made, and costs noth-



Fiddle Drill

ing but a small amount of time to put it together. All the material required is a spool, a ⅜-in. bolt long enough to go through the spool and allow about 1 in. to extend at the end, one small hinge, one short ¼ or $\frac{3}{16}$-in. bolt, and one narrow piece of leather or belt lacing. A piece of stout cord will answer for the latter.

Use a springy piece of wood about 25 in. long for the bow. The cord is tied on the ends of the bow, leaving it so that when the cord is wound once around the spool there will be sufficient tension to turn the spool. The ⅜-in. bolt has a hole drilled about $\frac{3}{16}$-in. deep in the end. The bolt is then taken to the vise and a slot sawed down with a hacksaw, about ¾ in. deep. This part of the bolt serves as a chuck to hold the drill.

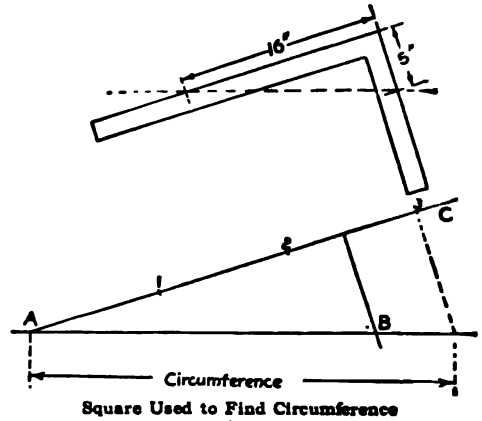
The shank of the drill should be made a little larger than the hole in the bolt, so that when it is put in, the end of the bolt will spring apart, and when the nut is screwed down tight, it will squeeze in on the drill and hold it securely. There should be two nuts on this bolt, one to jam up and hold the spool tight and the other to clamp the drill as shown at A. A deep hole is then made with a center punch in the center of the bolt head.

Procure a ¼-in. bolt and shape the head as shown in B by filing to fit the center-punch hole on the head. Build a small frame of wood and assemble the parts as shown. When the bow is drawn back and forth, the spool with the drill will revolve rapidly. The drill can be ground so that it will cut both ways by leaving a very thin edge.

The top piece of the frame with handle and hinge are used to feed the drill. Small holes can be drilled with this better than by the hand drill press. It is very handy for anyone having light, delicate work to perform at home.

Circumference of a Circle Obtained with a Square

The circumference of any circle may be secured with an ordinary 2-ft. carpenter's square, when the diameter is given, in the following manner: Draw a straight line; then lay the square on the line with the 16-in. mark of the long side and the 5-in. mark of the short side, both intersecting the straight line as shown in the upper sketch. Draw a line on the long side of the square A C and measure off three divisions, each the length of the diameter of the circle. Draw a line at right angles from the third division mark on A C, until it intersects the

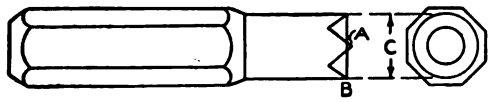


Square Used to Find Circumference

line A B. The distance from A to where the line crosses the line A B will be the circumference of the circle.—Contributed by S. J. Heath, Lestershire, N. Y.

Boilermaker's Center Punch

A time and labor-saving tool that takes the place of a scratch awl and dividers for marking location of holes on a plate through holes of another, is shown in the sketch. The required center is located and at the same time a test circle is marked as a guide in drilling and punching. The center point A of the tool should extend $\frac{1}{32}$ in. beyond the cup rim B, and the diameter C

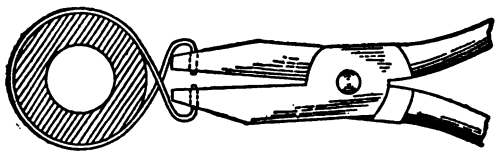


Marks Circumference of Holes

should be the same as that of the holes to be marked. Such a tool should be used only for marking, as the center can be enlarged with an ordinary center punch.—Contributed by Claud H. Sanford, Fayetteville, Ark.

Pliers for Twisting Wire on Hose Connections

An ordinary pair of pliers with holes drilled in the tip ends of the jaws, as shown, makes a good tool for fastening wire rings around rubber hose. The ends of the wire are stuck into the

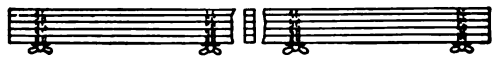


Wire in the Holes

holes, then the handles of the pliers are spread to draw the wire closely on the hose, after which the ends are twisted together by turning the pliers. —Contributed by S. N. Crane, Anderson, Cal.

Spline for Laying Out Boat Curves

A spline for use in taking off and laying out curves in building small boats can be made of four or five pine strips about ½ in. thick and ¾ or 1 in. wide with any length suitable to the work. Lay the strips together and bore oblong holes through them every 14 in. Countersink the holes and use



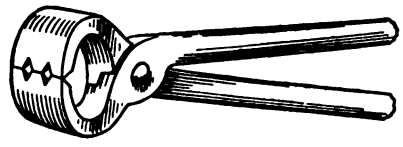
Bolts in the Strips

thumbnuts on the threaded end of the bolts. The spline is set for a curve, then the nuts are turned up to hold the shape.

The holes must be bored and cut long enough to give the strips end play as they bend around a curve.—Contributed by Joseph F. Bolton, Jr., South Duxbury, Mass.

Home-Made Staple Puller

A very handy staple puller can be made from an old pair of pinchers by

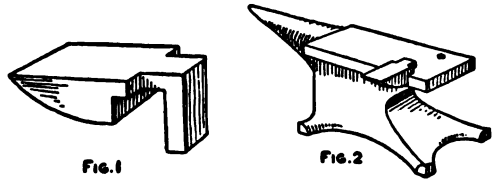


Notches Filed in the Jaws

simply filing notches in the jaws, as shown. The manner of removing the staple is obvious.—Contributed by Will Parker, Olaf, Ia.

Improved Hardy for an Anvil

While trying to draw out a split weld to the proper shape as most smiths do, I thought of a way to make a hardy that would be of assistance after the iron was split. The tool is shown in Fig. 1. The shank of the

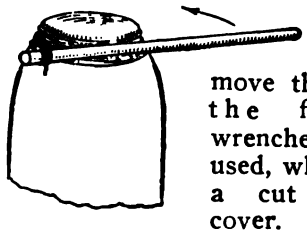


Tool on the Anvil

tool fits the square hole in the anvil and the heel lies closely against the side as in Fig. 2.—Raymond E. Chase, Melville, R. I.

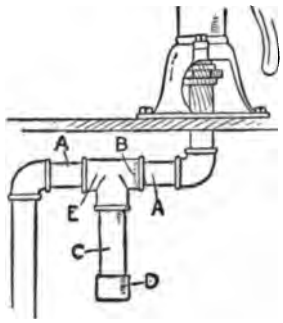
Removing Screw-Top Can Covers

Considerable trouble is experienced many times in removing the metal caps screwed on cans and canisters of different kinds. Where one cannot remove the cover with the fingers, then wrenches or pliers are used, which results in a cut or mashed cover. One of the easiest ways is to take a strong cord or string and wrap it around the cap from right to left several turns, making each turn cover the end of the string. Then take a few turns around the end of a strong stick and twist so that the string will pull the stick up snug against the cap. The stick will come in contact with the string and press it against the cap so it cannot slip, and the cap can be turned easily. —Contributed by L. A. Gardner, Oakland, Cal.



Removing Sand from Water in a Pump

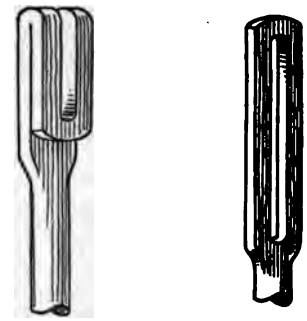
A great deal of inconvenience is generally experienced with newly driven wells using common pitcher pumps, as small gravel stones are apt to be drawn up and lodged under the lower valve, scoring the cylinder walls and causing damage to the valve seats. When the lower valve is held open by a small stone, the pump will not work and it becomes necessary to take it apart and remove the obstruction.



Nearly all of this trouble may be eliminated by placing in the pipe line A, preferably near the pump, a pipe C capped on the end D and screwed into the tee E. A piece of about No. 20 gauge mesh screen wire is put over the end of the pipe A at B. This same trap can be put into any pipe line to arrest particles which would otherwise pass and cause obstructions in pumps. —Contributed by Clare L. Parshall, Wayland, N. Y.

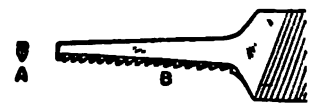
Making an Eye in a Rod End

The average mechanic will find it no small task to put an eye in the end of a rifle-cleaning rod, after it has been broken, or when making a new one. An easy method is to heat the end of the rod red hot, flatten it for a length of about 1½ in., double the end back at the center of the flat surface, place it in a vise and saw a slot for the length wanted. Heat it again, straighten it, and smooth with a file.—Contributed by Geo. A. Hinkle, Halstead, Kansas.



Cutting Threads with a File Tang

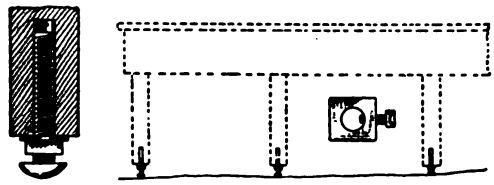
The lubricator on my engine froze and broke the thread off from one of the fittings, and as I had no screw plate small enough to rethread it, I succeeded in cutting the threads with the shank of an old file shaped as shown at A in the sketch, with teeth B, and tempering it. Starting on the old thread and sawing around I succeeded in making a fairly good thread and the lubricator worked as good as new.—Contributed by L. A. Knutsen, Tacoma, Wash.



Leveling Table Legs

The sketch herewith shows how an object—in this instance a heavy bench—can be made perfectly level on an uneven base. The number of supports the object has does not render the leveling process any more difficult.

Bore the holes deep enough in the supports to permit the bolts being placed as shown. Holes must be just large enough to allow the bolts to fit in without any play sidewise. Round-headed bolts are used with threads running to the heads if possible. The size of the bolt will depend upon the thickness of the support. For instance, a large bolt would be strong enough in itself but would not be advisable in a slender support, as there would be but a shell of wood surrounding it. Use a



Bolts in the Table Legs

round washer between the nut and the bottom of the support so as to prevent wear.

When the bolts are in place, set the object on the base and turn the nuts so as to raise or lower the object to the proper level. If desired, the nuts may be locked by tapping them and inserting setscrews as shown. In leveling a heavy object, it may be necessary to grip the bolt with a wrench to prevent it from turning while the nut is being screwed up or down.—Contributed by James M. Kane, Doylestown, Pa.

Double-Acting Pliers

The tool illustrated will be found very useful about the shop and especially so for removing screw calks from horses' shoes and for turning any metal rod or bolt. It should be made of good tool steel and well tempered.

The handles are forged into the shape shown and teeth filed in them. They are made to hinge at the end with a strong pin. The side plates are cut out and teeth filed in them, and a slot cut diagonally to slide on a pin in

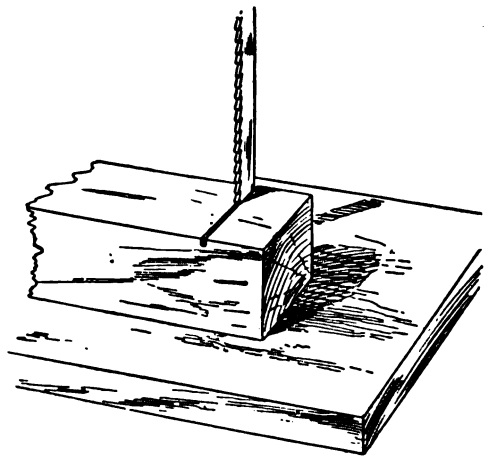


Pliers for Removing Screw Calks

one of the handles, the other end being pivoted on the other handle. As the handles are spread or brought together the pin sliding in the slot forces the side plates in or out with great leverage, as the jaws coming together form a triple grip much stronger than afforded by the ordinary pliers.—Contributed by Thos. L. Parker, Olaf, Iowa.

Squaring a Timber on a Band Saw

When a post or board of some thickness and width is to be cut on a band saw, and a square end is desired, instead of using a square, run the board against the saw and then draw it back. A saw mark is cut on the board. Turn

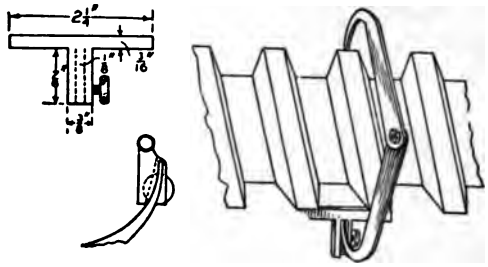


Saw Mark on Post

the post over and use the saw mark for a guide line.—Contributed by R. M. Barth, Chicago, Ill.

Calipering Large Threads

The ordinary caliper cannot be used to obtain the outside diameter over large threads, owing to the space on

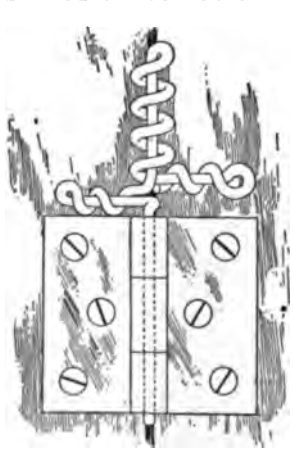


Bridging Device on Caliper End

one side being directly opposite a thread on the other. If the space is bridged, the diameter can be readily obtained and this may be accomplished with the little device illustrated which fits on the leg of any caliper. The shape of the piece and the manner of securing the diameter is clearly shown. —Contributed by Adolph Schiver, Buffalo, N. Y.

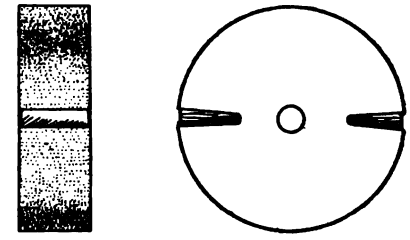
Hinge Spring for a Door

The sketch shows pretty plainly how I fixed a door that was hard to keep closed. I bought a piece of copper-plated spring wire and first bent it out ¾ in. and over to the left 2 in., then round, and gave it a couple of twists on its way back to the starting point. From there I bent it up and let it run straight for 3 in.; then bent it down and round and round in a coil till within ½ in. of the first bend; then 3 in. in the opposite direction the left arm, thereby making an arm to rest on the door. Then I turned it round and twisted it as shown on its way back to the coil. Removing the pin from the hinge of the door, I gave the spring one turn and inserted the stem into the hinge. Where one coil is not strong enough to swing a door, another may be affixed to the other hinge.—Contributed by George Madsen, Chicago.



Polishing Wheel for the Lathe

A polishing wheel for the lathe can be quickly made by turning up a board 2 in. thick and about 7 in. in diameter, then boring a hole in the center of any desired diameter to fit a mandrel and attaching emery cloth to its face. The



Emery Cloth on Wood Wheel

emery cloth may be fastened by wedges as shown in the sketch.

Two notches are sawed in the wood, one opposite the other across the diameter, and wood wedges fitted in them. Take two strips of emery cloth as wide as the wheel and place them on the circumference, tuck the ends into the notches and drive the wood wedges in place. The wedges will draw the emery cloth close on the face of the wheel.—Contributed by Chas. Homewood, Waterloo, Iowa.

Imitating Hard Wood on an Old Floor

A floor that is old and rough with yawning cracks can be converted into a floor equal to a new one, in fact a carpet will not be necessary. Any person can do the work at a nominal expense.

The first and most tedious part of the process is to clean out the cracks.

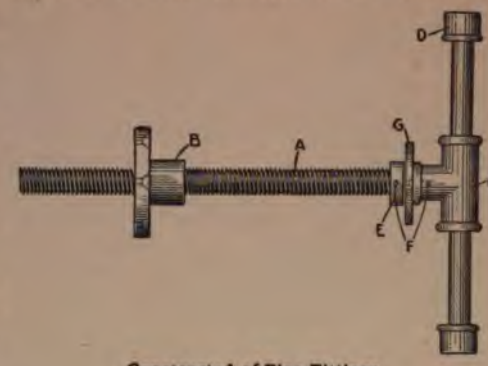
This is done by brushing with a whisk broom. Where the dirt is solidly packed some edged tool like a screw driver or the claw end of a hammer may be used. When cracks are free from dirt, cleanse the floor by thoroughly scrubbing it with hot soapsuds.

Allow the boards to dry. After a day's time apply a good coat of cream-colored paint to them, using a large brush, and work lengthwise of only one board at a time. A freshly opened can of ready-mixed paint sold in the shops is of proper consistency and needs no thinning. If the can should stand open for some time, a little turpentine may be added to the paint.

Allow the paint to become thoroughly dry, then fill all the cracks and other holes with putty or with one of the patent crack and crevice fillers sold at paint stores. The best tools for this job are the fingers and the thumbs assisted by a broad, flexible case knife, if a putty knife is not available. Wipe off all the loose crumbs of putty with a dry cloth and immediately apply a second coat of the same cream-colored paint. Let this dry for a day or more and then stain the floor with the lightest shade of oak that can be had in an oil stain, and after it is dry, complete with a coat of varnish. A second coat of varnish can be added for effect but it is not necessary. If the foregoing directions are followed, the floor will shine like a mirror and will be smooth enough for a ballroom.—Contributed by Katherine D. Morse, Syracuse, New York.

Bench Screw Made of Pipe Fittings

Having need for a bench screw and it not being possible to purchase one in our small town, I set about to make one from pipe fittings, says a correspondent of the Automobile Dealer and Repairer. In the first place, a piece of 1-in. pipe, A, is threaded for about 14 in. On one end of this, screw a 1-in. tee, C, and drill a small hole, F, and drive a pin in to prevent the tee from unscrewing. Next in order is a 3-in. washer reamed out to slip freely over the pipe. Four holes are drilled and countersunk in this washer for screws. Slip it up against the tee C, after which take the



Constructed of Pipe Fittings

hacksaw and saw a coupling in the middle and screw one half with the square shoulder E up close to the washer, allowing just room for the washer to turn freely. Cut a piece of ¾-in. pipe, 12 in. long, and thread both ends to receive a cap as shown at D. Use a floor plate for the stationary nut B. Place the screw in the wood jaws in the same way one would fit an ordinary screw, and it will work in the most satisfactory manner.

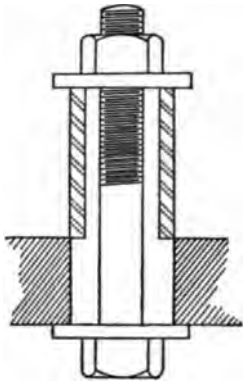
Fastening Screws in Brick

In hanging fixtures, brackets, etc., on brick or marble, I have found the following device very effective, where expansion sleeves are not at hand. Make a wood plug a little larger than the hole drilled and as long as it is deep, and open the small end with a knife or chisel. Make a wedge as shown, and insert it in the opening in the plug and drive in place. When the wedge strikes the bottom of the hole, it will spread the plug and act just as an expansive sleeve, making a very tight wedge. —Contributed by G. T. Nelson, St. Paul, Minn.



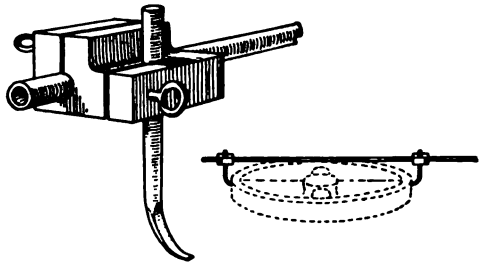
Forcing Bushings in Place

In many cases bushings are pressed into large parts of machinery that are too heavy to readily take apart, or because the places are not easily accessible. Driving them in with a hammer and a block of wood or brass is bad, and poor practice. The sketch shows a simple method of quickly and safely drawing them in with nothing but a bolt and two washers. The bushing is bound to go straight and is in no danger of being bent, as when driven with a hammer.



Beam Calipers

A caliper head for a trammel makes it possible to measure diameters of large wheels. Such a caliper head can be made of a block of hard wood, preferably maple, which is used on ¼-in. pipe as a beam. The wood is shaped as shown and the caliper points made of ¼-in. round steel.

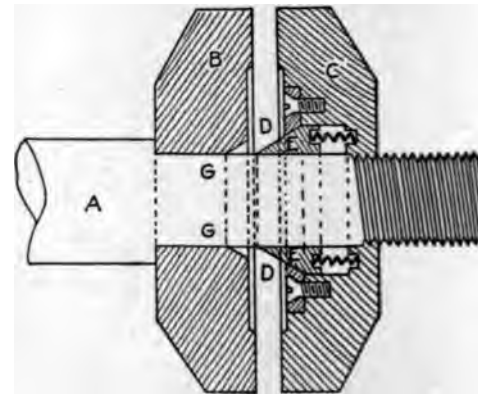


Wood Block Holding Caliper Point

To grip the head on the beam and the points in the head make saw cuts from the edge of the block to the holes as shown and insert screweyes for clamping. A mechanic can usually find the materials to construct this instrument on the job. The pipe beam is especially advantageous as it may be enlarged to any size by screwing together several lengths of pipe.—Contributed by J. J. O'Brien, Buffalo, New York.

Self-Centering Saw Arbor

All circular saws bored for a certain sized mandrel do not always fit snugly. In changing one saw for another, it may not fit close enough to make the teeth cut true all the way around. To obviate the trouble, some kind of a self-centering device must be employed. The illustration shows a device, designed by a correspondent of Wood-Worker, to center a saw perfectly, if the hole is quite large. It consists of an ordinary collar, being fitted to allow the free action of the centering piece, which is a steel ring or band, about $\frac{5}{16}$ in. thick and ¾ to ⅞ in. wide, with ⅜ in. of the width beveled to the inside diameter, as shown by EE. This adjustable ring rests on spiral springs which are held in place by seats drilled in the back edge of the ring and the bottom of the cored-out part of the main collar, as shown. The ring E is held in place by another ring D, having its inside beveled to fit the bevel on E. This ring is sunk flush with the face of the collar and held in place by screws, as shown. If a saw fits the arbor, the centering ring E will be pressed back in the

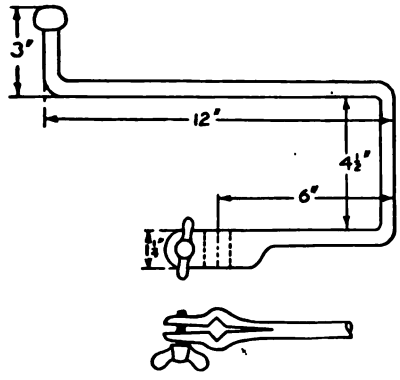


Cone in Collar Centers Saw

collar. If a saw having a larger hole is used, though the variation may be but little, the ring E will be forced into it by the springs and hold the saw on an absolute center.

A Detachable Auger Crank

Carpenters using large augers have a crank handle welded to the shank of each auger so that it can be turned easily. If only one auger is used, this plan is a good one, but if several sizes are carried in a tool box, the crank handles are rather bulky. The sketch shows a crank handle that may be attached to any large-sized bit or auger. The dimensions given will make a well



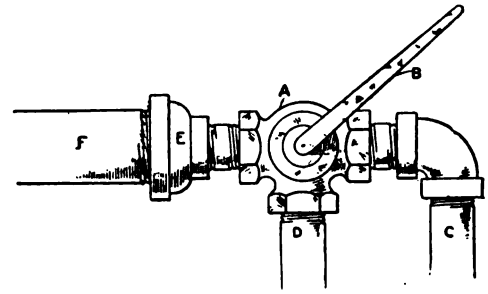
Crank Details

proportioned handle, using ½-in. round machine steel as material.—Contributed by Wm. Skoglund, Brooklyn, New York.

Testing Wrought-Iron Pipe

The device shown in the sketch was designed for testing small sizes of wrought-iron pipe under steam pressure. The operation is as follows:

The three-way valve A is operated by the lever handle B. The steam entering the valve through the pipe C, is used and exhausted through the pipe D. The reducer E can be changed to suit any size of pipe, F, which is being tested. The outer or coupling end of the pipe is closed with a plug which, for convenience in handling, can be a capped nipple, about 6 or 8 in. long. The steam can be successively ad-



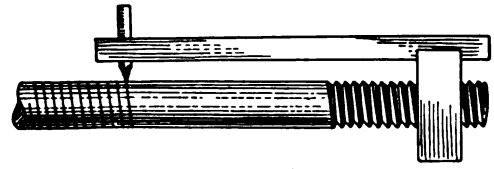
Operating Valve

mitted and exhausted from the pipe F. The pipe should be struck several sharp blows with a hammer while under pressure to expose any split or rust hole.—Contributed by Jas. N. Kilgore, Hollidaysburg, Pa.

Marking Threads on a Bolt

Some bolts had to be shortened about 3 in. in repairing a steam pump located a long distance from a machine shop. The threads varied in size, owing to the bolt sizes, and the length cut off from each bolt would remove the threaded portion, thus making it necessary to cut new threads on the shank of the bolts.

The only tools at hand were a vise and some small files and the threads were cut in the following manner: The nut was placed on the end of the bolt and given a turn on one thread. A piece of board was notched out to fit on the nut and a hole made through the other end by driving in a nail and drawing it out. A pencil was put in

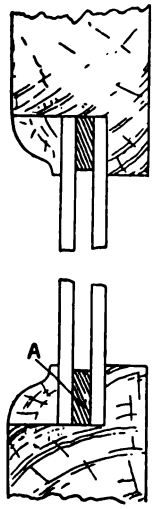


Marker Fastened to Nut

the hole and the bolt was rubbed with chalk and then, by turning the nut and wood strip, it marked the thread wanted. The old thread was cut off and a new one filed in with a three-cornered file.—Contributed by Arthur L. Kerbaugh, Allentown, Pa.

Double Glass Windows

In many localities the frosting of glass windows is some little source of annoyance aside from the obstruction of light. The sketch shows how by the use of two glass plates a dead air space can be formed. The two plates of glass are set in the frame in the same manner as a single plate with a thin sheet of rubber, A, placed between their outer edges. This will prevent the accumulation of frozen moisture on the inside glass.—Contributed by F. W. Bentley, Jr., Huron, South Dakota.



Bushing a Pulley with Babbitt

I had a 24-in. pulley with a 2⅜-in. hole, that I wanted in a hurry to use on a 1 3/16-in. shaft. To make an ordinary cast-iron bushing would take too long; so I laid the pulley, rim down, on the planer table. Then a short piece of 1 3/16-in. shaft was faced off square on both ends and stood up inside the hole, and a clamp put on top to keep it in place. The shaft was squared up with a try-square and a bar of straight steel laid across the upper rim face of the pulley. Then the pulley was shifted until it was concentric with the shaft, as near as could be measured with a scale, and clamped too. The setscrews were brought down until just in contact with the shaft, and the hole was filled with babbitt.

Thus in a half hour's time I had a pulley bushed to run true within less than 1/32 in., and with setscrew holes all tapped. This was not, of course, a very durable job, but it was a quick one, and subsequently, though not at first intended to, it ran over a year in steady service.

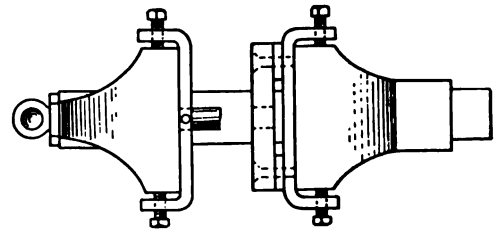
Drilling Holes in Lead

At one time I had to drill ⅛-in. holes in a large number of lead pieces. At first glance this appeared to be a snap—nice, soft metal, etc., but that very softness proved the undoing of the snap. The holes were ½ in. deep and before half that depth was reached, a ragged burr of considerable size was thrown up around the top, the hole would be worn out of shape by the "crawling" of the chips, and the drill clogged and stuck repeatedly. I tried water drilling compounds, kerosene, drilling without lubricant, but to no avail.

A good grade of lard oil, and plenty of it, was used as a last resort, and the holes were drilled through straight and smooth, without any burr except the usual small one on the under side. With the oil, it was necessary to lift the drill out at least once to clean up the chip. A drill speed of 800 to 900 r. p. m. was found to give good results. —Contributed by Donald A. Hampson, Middletown, N. Y.

Punching Attachment for a Vise

Light punching can be accomplished on an ordinary vise with the attachment shown in the sketch. Two clamps of flat bar are tapped to receive screws for fastening them on the punch and die. Setscrews hold the clamps to the vise jaws, which also provides a way for considerable adjustment. Irregular-shaped holes can be punched with dies fixed to this attachment.—Contributed by Norman Best, Monmouth, Ill.



Punch and Die on Vise Jaws

Machinists, Save Your Eyes

Small lathe work, such as very fine threads, is hard on the eyes. The strain is enormous, and the effect is all the more dangerous because it may show no immediate effects. A magnifying-glass, or even a reading-glass, held in one hand, will prove a great aid. When much of this work is to be done, it pays to construct a suitable frame or holder for the glass. Thus equipped, one can cut with ease and comfort the 32, 40 or 48 threads per inch that are demanded by some work, and one can really see whether the thread is smooth and finished, whether the tool really has the fine V-point required, and just when and where the thread ends.

Anchoring a Motorboat

A motorboat anchored in deep water at a distance from the shore can be reached only by using a rowboat or wading. I overcome this objection by anchoring my boat as shown in the illustration. The anchor line is not attached to the boat, but is passed through a pulley, as shown, and a weight tied to the end of the line. All that is necessary to bring in the motorboat is to pull in on the bow line and the weight will rise and let the boat



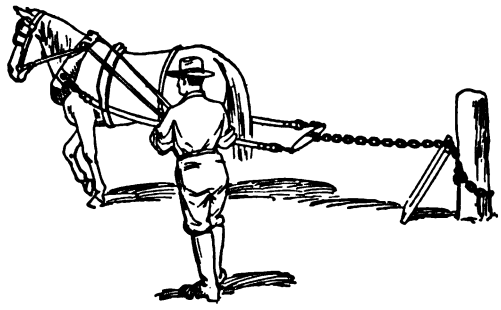
Boat Anchored in Deep Water

come to shore. When released, the weight will pull the boat out into deep water.—Contributed by W. W. McLean, St. Louis, Mo.

¶A substitute file brush can be made of a piece of soft wood cut to a wood-chisel edge. The dirt and filings are pushed out of the file with the edge.

Pulling Posts

The device shown in the sketch is very simple for pulling old posts, but it works as well on any post. A plank, 2 in. thick, 6 in. wide and 3 ft. long,



Manner of Attaching Chain

is set slanting against the post and a chain is fastened around the post just above the ground and run up over the end of the board. A horse hitched to the end of the chain can pull out any ordinary post.—Contributed by Harry E. Wells, Scottsburg, Ind.

Removing Tooth Paste from a Tube

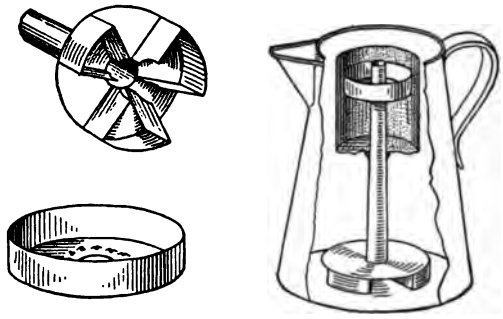
After squeezing out the desired amount of tooth paste from a tube, it very often makes a mess when the cap is screwed down on the surplus paste. A good way to avoid this is to press on two sides, in the usual manner, to get the paste, then change the position of the fingers to the ridges made by the first pressure and give it only a slight pressure. This will draw the paste down from the opening and leave a clean top.—Contributed by I. B. Thompson, Harrow, Ont.

Killing the Grass Jigger

Outside workmen in the summer who are annoyed by the grass jigger, a skin-burrowing insect, can find relief by bathing or sponging the body in a solution of a few ounces of sodium sulphate added to a gallon of water. This kills the summer pest and is good for the skin. The sulphate of soda can be purchased cheaply at any drug store. —L. W.

Fountain Percolator for a Coffee Pot

The construction of the base of the fountain is shown in the upper left corner of the sketch. It is made of a heavy, pressed tin cup which has radial



Parts of the Fountain

partitions soldered in place and alternate parts removed to make openings for the water to enter.

The large end of a tapering tube is soldered into the center of the tin cup. The tube should be ⅜ in. in diameter at the bottom and tapering to ½ in. at the top. An ordinary percolator is placed on the tapering tube at the top and a small receptacle, made of a can cover, slipped on the tube within the percolator. The bottom of the can cover is perforated by driving a sharp-pointed nail through the metal from the under side.

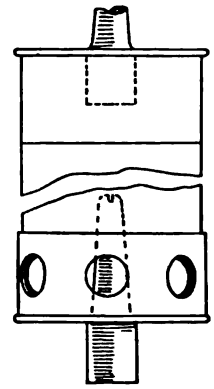
When the water begins to boil it flows through the tube, pours over into the small cover, drips through the small perforations, and then trickles through the coffee in the percolator. The water is slightly cooled below the boiling point before coming in contact with the coffee, and the conditions are provided for making perfect coffee.

Boiled coffee is a decoction and harmful. Good authority condemns a coffee pot in which the grounds are held in the infusion, thus the "two-story" coffee pot is desirable. After the water has come to a boil and has had time to circulate about three times, the percolator with the grounds is removed. The coffee can be kept at a boiling point after the grounds are removed without harm to the flavor.

Instead of the percolator, a cheesecloth bag may be used to hold the coffee. In using a bag, the center tube is bent at the top and arranged with a spout, upon which the bag is tied or hung so that the water circulating through the tube pours through the bag of coffee. The bag should be washed in cold water and quickly dried, and a new one provided at the end of each week. The bag should never be placed in soapsuds for cleaning, as this ruins the flavor of coffee.—Contributed by W. R. I.

Bunsen Burner Made of Metal Shot Shells

Two shotgun metal shells and two brass gas tips were used in making the Bunsen burner illustrated in the sketch. The shells were drilled through the primer hole to make a hole slightly smaller than the gas tip so as to make a force fit. The gas tip was forced into this hole until the shoulder fitted closely to the bottom of the shell. The shell which forms the cap is slightly enlarged so it will fit snugly over the other shell. This shell should be cut off about ½ in. from the base. The expanding is accomplished by holding a round piece of steel in a vise and placing the short shell on it and hammering it lightly all around on the metal.

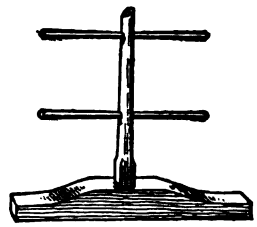


The tip which is put into the cap shell is pushed through from the inside. The air-controlling ring is made from a part of the upper shell which is cut off and also slightly expanded so it will turn easily on the base shell. Six

$\frac{1}{16}$-in. holes are drilled through the ring and shell. By turning the ring, the air is regulated. All the material on the inside of the upper gas tip is removed and the lower tip used as an ordinary tip. The burner will produce a very hot, blue flame.—Contributed by Andrew Smith, New Haven, Conn.

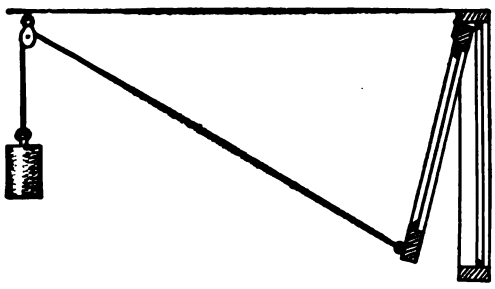
An Orchard Ladder

The upright of this ladder is a round pole of any desired length, with rungs driven in holes bored through its diameter. A nail is driven through the pole and rung to hold them in place. The pole is tenoned to fit into a foot made of a 4 by 6-in. piece of wood, 2 ft. long. The advantage of this ladder is that it will stand against a limb of a tree without turning.—Contributed by F. M. J. Berchmans, Scio, Oregon.



A Cellar Window Weight

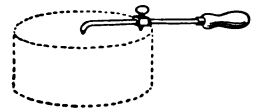
The inconvenience of having to prop open a cellar window may be easily remedied by weighting it as shown in the sketch. The weight may be made of concrete, using a can as a mold. A piece of window cord (or small rope) and a small pulley comprise the rest of the apparatus.—Contributed by Fred V. Brook, Ardmore, Pa.



Weight Applied to a Window

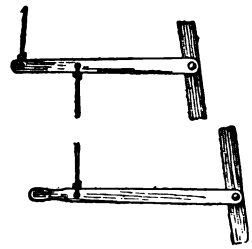
Can Opener

Some people find it extremely difficult to manipulate an ordinary can-opener, so the invention illustrated is sure to be welcomed. It consists of a steel rod, bent and sharpened at one end, with a cutting attachment in the middle. The cutter is a small square of steel with a sharp point, which can be moved to any desired point on the rod and secured in postion by the screw on top. To open a can, a hole is made in the center with the bent point, the cutter is pressed into the can top after setting it to the desired radius, and the opener run around the can by rotating the handle while pressure is applied to keep the device in position.



Double Levers for a Windmill

Some windmills have a very long pull of the operating wire to start or stop them, necessitating a very long lever at the base which is inconvenient, but this objection may be overcome by the double lever as shown. This consists of an ordinary lever about halfway up the tower, to the middle of which the wire from the lower lever attaches, thus requiring but a short pull on the lower lever to stop the mill.—Contributed by Thos. L. Parker, Olaf, Iowa.

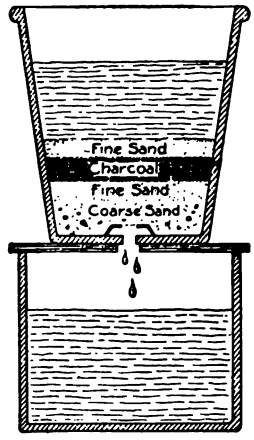


¶The shine on clothing may be removed by rubbing lightly with a piece of sandpaper.

¶A mechanic's finger nails can be kept from splitting and breaking by applying olive oil once or twice a day.

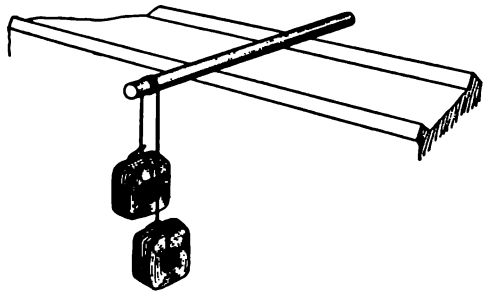
A Home-Made Filter

A break in the intake pipe of a water supply for a large city allowed considerable dirt to get through to the house faucets. One citizen procured clear water through a filter he made at practically no cost. He used a large flower pot with a drip dish from a small flower pot covering the hole in the bottom. The bottom was filled with clean sand and charcoal as shown in the sketch. An enameled utensil was used to catch the filtered water.—Contributed by J. E. Noble, Toronto, Can.



Weighing without Scales

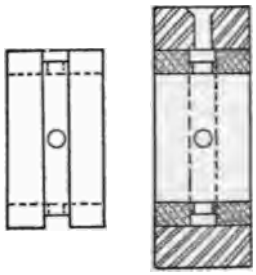
When winding a field coil one day, I found my weighing scale broken so I could not determine the weight of the coil, and my winder ran too fast to count the turns. I wound what I judged to be more than necessary on the new coil, and then, taking a piece of string about 3 ft. long, I tied the old coil to one end and the new one to the other. I then placed a short piece of ½-in. shaft on the ways of the lathe, first making sure that it was level, and hung the two coils attached to the string over the shaft, one on each side. The new coil proved to be the heavier, causing the shaft to roll along the ways in its direction. It was only necessary to take off wire from the new coil until the piece of shaft remained stationary, and the coil was finished.—Contributed by H. L. Davies, Duluth, Minnesota.



Substitute for a Scale

Oiling Bushings

Small bushings are apt to loosen and turn, and then, if there is an oil hole for lubrication on the casting of the machine, the oil hole through the bushing for pin lubrication is useless. On a certain part of locomotive assembly there is one of the above class of bushings, which often turns, and by blanking the oil hole, becomes useless and dangerous. The sketch shows how the bushing can be machined so that it will take oil, even though it may have turned. Four holes are drilled, one lining with the hole in the strap, and before taking the bushing from the lathe chuck, a groove is cut through the ends of all holes and lining with the hole in the strap. In case the bushing should become loose and turn, it would still get plenty of oil and not be dangerous.



Cutting Glazed Tile

The owner of a house, who wishes to keep his residence in good repair, often finds that he must reset loose tile and replace cracked ones. This is quite a difficult job for an inexperienced person for the tile must be reduced in size. This can be accomplished by filing or grinding them on an emery wheel, but a better method is

to use an ordinary glass cutter on the glazed side where the tile is to be cut and then break off the part to be removed with parallel-jaw pliers. To cut the tile in half, use the glass cutter as mentioned above and tap gently on the under side with the sharp edge of the hammer face.—Contributed by Max Wolfsteiner, Washington, D. C.

Cutting Square Threads

Here is a trick in cutting square threads in a lathe that is worth knowing. With an ordinary V-shaped tool cut first a thread of the proper lead that will be equal in depth and width to the cut of the finished square thread. Then follow down with the regular square tool. This relieves the square tool of a considerable part of the work and makes it cut a divided or broken chip, which is easy both on the tool and the work. In any thread-cutting, use a roughing tool first. If more than one piece is to be threaded, rough first and then finish. This keeps the good tool sharp and gives a nice finish. Speed up the roughing tool and let it dig out the metal, disregarding the finish.

Penholder for a Beam Compass

A simple and inexpensive beam-compass point is shown in the sketch. The construction of this instrument is such that almost any one can make it with few tools and little material. The finished instrument can be used either with a ruling pen, pencil or steel point by simply releasing the thumbscrew and inserting the desired article.

A small piece of 16-gauge sheet brass is cut to the shape shown in Fig. 1 and bent on the dotted lines. The holes AA are for the purpose of admitting the machine screw B, Fig. 2, and the hole C, Fig. 1, to admit the thumbscrew D, Fig. 2. These holes are not threaded but are made just large enough to let the screws pass through freely. Bend the brass to shape as shown in Fig. 2. Procure a brass binding-post, E, such as is used for electrical work, and make the hole for the pen or pencil at least ¼ in. in diameter. Fasten the binding-post as

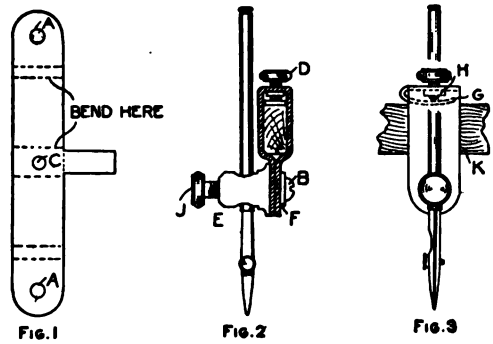


Fig. 1 Fig. 2 Fig. 3

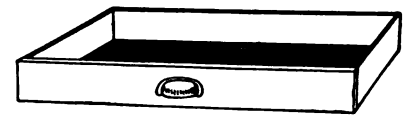
Holder Made of Sheet Metal

shown, placing a metal washer, F, between the head of the screw and the brass.

Procure a thumbscrew, D, Fig. 2, and a square nut, H, Fig. 3, of the same thread, making sure that the nut is large enough to keep it from turning in the space it is to occupy. After putting these together as shown in the drawing, the end of the thumbscrew D, Fig. 2, should come in contact with the strip of brass G, Fig. 3, and by turning the thumbscrew, it makes the brass strip bear upon the beam K, thus clamping the whole in place. Place the ruling pen or pencil in the hole provided and, after clamping it with the thumbscrew, the instrument is ready for use.—Contributed by Ray C. Cavell, San Diego, Cal.

Wire Mesh Drawer Bottoms

The ordinary bench drawer soon collects considerable litter and if not cleaned often it presents an untidy appearance. In building the drawers for



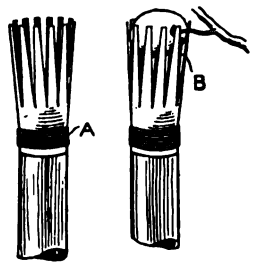
Mesh Applied to a Drawer

my shop I made the sides and ends of ⅞-in. material and then I used galvanized wire netting for the bottoms.

Two strips were put in the bottom to hold the wire in place, and the edges were turned up on the sides and fastened with tacks. Such a drawer will hold articles, but the dirt will sift out.—Contributed by C. H. Mount, Galesburg, Ill.

Picker for Small Fruit

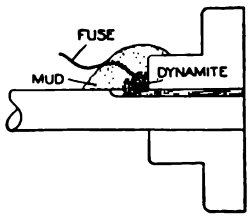
The picker is cut on the end of a bamboo cane as shown in the illustration. A cork is inserted on the inside and pushed down below the cuts and then the cane is wound with wire tightly at the place marked A to keep it from splitting.



To pick figs or other small fruit, simply insert the stem of the fruit in one of the slots B and push upward on the cane with a slight twist. The fruit will fall into the opening of the cane without being bruised.

Removing a Key with Dynamite

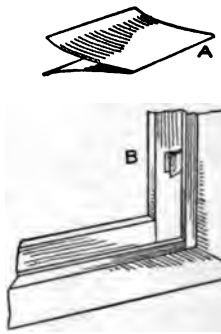
Two machinists and a helper had worked almost all day trying to remove a coupling from a large piece of shafting that had been out in all kinds of weather for several years. With some others I was working near them and as usual they were joked about their inability to make a success of the job. When they said they did not have the proper tools, one man suggested using dynamite. Although intended for a jest they took him at his word, hastened away for the dynamite, and in a short time had the coupling removed.



They used about one-third of a stick of dynamite. The paper was removed and the loose dynamite pressed down into the keyseat over the end of the key and against the hub of the coupling, as shown in the sketch. A fuse about 18 in. long with a cap fixed on the end was pressed into the dynamite and the whole covered over with stiff mud. The fuse was lighted and we went away to a safe distance. After the shot we found that the coupling was almost off and it was only necessary to drive the key about ½ in. to remove it entirely.—Contributed by W. A. Lane, El Paso, Texas.

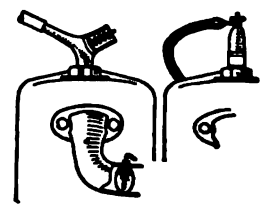
Anti-Rattle Clip for Loose Windows

As I was annoyed by the rattling of a loose window sash, I picked up a piece of sheet metal and bent it in the shape shown at A in the sketch. This converted it into a spring clip, which, when inserted between the sash and the frame, as shown at B, effectually stopped the rattling.—Contributed by James M. Kane, Doylestown, Pa.



Filling Tires with an Automobile Engine

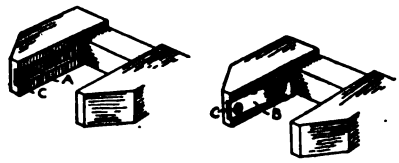
One of the cylinders on an automobile engine can be used to pump pure air into tires by using the attachment shown in the sketch. The device is made to take the place of the spark plug and consists of a poppet valve inlet and an outlet to attach to the air hose. A small shutter valve is placed in the mani-



fold, as shown, to keep out the gas mixture. The shutter is arranged to lock both open and shut.—Contributed by Paul Shrier, Paterson, N. J.

Nut Holder for a Monkey Wrench

The attachment for an ordinary monkey wrench shown in the sketch is for holding greasy and dirty nuts,

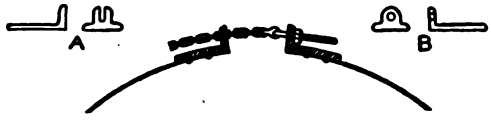


Spring in a Wrench Jaw

to hold them after they are turned from the threads and for starting a nut on a bolt without turning a few threads with the fingers. A groove, A, is cut in the stationary jaw and a hole, C, drilled and tapped for a screw. A spring, B, is fastened in the slot with the screw C. The spring holds the nut in the jaws until released.—Contributed by Irl R. Hicks, Hallsville, Mo.

Attaching Locomotive Jackets

The device shown in the sketch is for use in putting on locomotive jackets. As the jackets are made of very thin metal they are hard to get in place. The edges of the metal must be brought up together and buttoned or



Clamps on the Ends of Sheet Metal

bolted, as the case may be, and the arrangement shown will do the trick. The part A is made to receive the links of a chain and the one shown in B is to hold the bolt end. The parts A and B are attached to the ends of a piece of sheet metal that is long enough to reach around the boiler. The sketch shows how the device is used.—Contributed by Urban A. Towle, Portland, Maine.

Clothes Hook for Tent Poles

A useful clothes hook for camp purposes is made to fold up, when not in

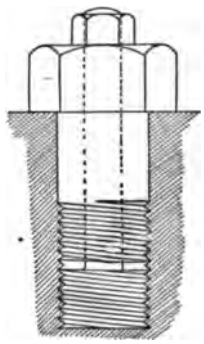


Tent-Pole Hooks

use, into a small space as shown. It fits around the pole of a tent and fastens with thumbscrews.

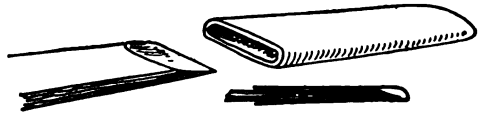
A Lock Stud Bolt

The lock stud bolt shown in the sketch is made in two parts, the first being the same shape as an ordinary stud bolt with a hole drilled through its central length, and the second made up of an end the same diameter as the first with a shank having such a diameter as to enter the hole in the first part. The shank has a fillet at the lower end so it will force the threads of both parts in opposite directions when it is screwed in place, thus locking them. A nut may be used on the outer end of the shank or it may be secured by a solid pin driven through a hole drilled in the shank.—Contributed by Oliver S. Sprout, Harrisburg, Pa.



Protecting the Edges of Chisels

The one who carries tools around considerably or who has a trunk chest with drawers that necessitates turning



Cover for a Chisel End

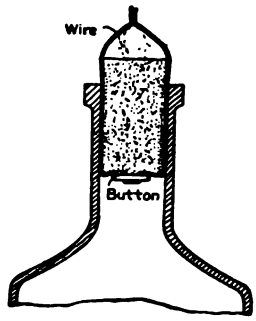
on its side to place the cover on, will find that the tools become badly

nicked. To keep from dulling them, provide caps for the chisels and cover the bit ends by turning a small disk of leather on the screw.

The chisel caps or covers are made of strong manila paper, wrapped around the tool end spirally and thoroughly glued as the wrapping proceeds. Leave the cap on the tool until the glue is thoroughly dry. Paint the outside with shellac, colored black.

An Easy Way to Remove Corks

When catsups, summer beer or grape wine is bottled, it is most convenient to seal each bottle as shown. Before inserting the cork into the neck of the bottle, lace a large flat pearl button on a piece of wire about 10 in. long — the wire attached to ice-cream buckets is convenient for the purpose — then place the cork into the loop and drive it into the neck of the bottle.



Have the two ends of the wire firmly twisted together at the top. Dip the whole cork, wire and all, into sealing wax or melted paraffin. When ready to open the bottle, knock off the wax, place a lead pencil under the wire, pull gently, and the cork is easily withdrawn. The button prevents the wire from cutting into the cork.—Contributed by Miss Margaret S. Humphreville, Mount Pleasant, O.

Truing Oilstones

An India oilstone was used to put the finishing edge on a certain special knife, made in lots of several thousands. The sides of the work had to be maintained almost flat, which made it necessary to true up the stones quite frequently to keep a true surface.

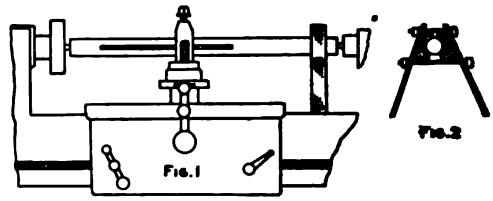
The stones were made level by holding them against the face of an emery wheel of the cylindrical ring form, which was run slowly for the purpose. This reduced them to a true flat surface. The grinding had, however, the effect of filling and glazing the face of the oilstone, something that involved a sharpening operation for which a flat metal surface, a sheet of emery cloth and a little kerosene were needed.

A stone was grasped in both hands and given a dozen brisk rubs across the emery cloth saturated with kerosene, and laid on the metal surface. The pores of the stone are thereby opened up, and the stone brought to the finest kind of a cutting surface. This process has also the effect of giving a more perfect flat face on the sides of the stone. When not badly worn, and for sharpening purposes only, this latter process is all the stones require.—Contributed by Donald A. Hampson, Middletown, N. Y.

Cutting Keyways on a Lathe

The ordinary lathe can be used in an emergency for cutting keyseats in shafts. All that is necessary is to place the shaft between centers as shown in Fig. 1 and lock it so that it will not turn, set the thread screw on the carriage for a large thread and feed a specially made tool into the metal as the lathe turns. The locking device is shown in Fig. 2. The number of cuts taken will depend on the size of the lathe and keyway.

As the tool comes to the end of the



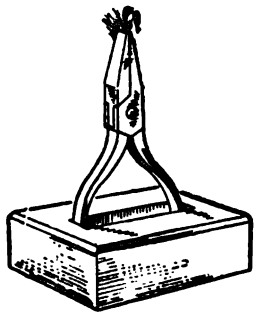
Shaft in a Lathe

cut it is only necessary to cut out the feed, run the carriage to the starting point and proceed as before until the

desired depth is attained. The width is regulated by the width of the tool. If a wide keyway is to be cut it is best to cut a narrow keyway first and finish with a tool of the proper width.—Contributed by J. F. Tholl, Ypsilanti, Mich.

A Fisherman's Fly Vise

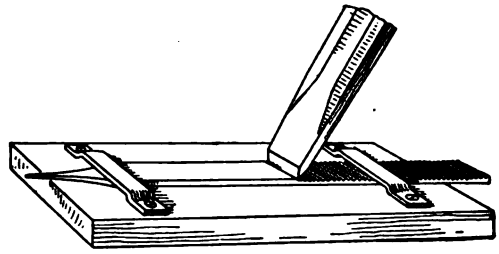
Finding myself unexpectedly within reach of some decent fishing one day, there was a question of tying some flies, and nothing in the way of a vise being procurable, necessity called forth the substitute described herewith, which will be of interest to others who may be faced with the same difficulty, says a correspondent of the Field.



The apparatus consisted of a pair of flat-nosed pliers, which I carried in my tackle box, and a block of hard wood in which a slot was cut to take the handles of the pliers, so that when they were pressed in the slot the jaws would close tightly. This proves as easy to handle and as efficient as any fly vise I have ever used.

How to Make a File

Procure a piece of steel and forge it to the shape desired, then heat it and lay on a piece of hard wood. Allow the heat to imbed the metal snugly in the wood. Clamp one or two pieces of flat brass over the blank to hold it while cutting the teeth. Take a flat cold chisel of the right width and start cutting the teeth from the tip end of the file, always putting the cold chisel close to the tooth that was previously cut. When cutting a coarse file the chisel should be held at a greater angle, the blows of the hammer should be heavier and the cutting edge of the chisel should be ground blunter than for making the finer-cut file. A very little practice will soon show the way

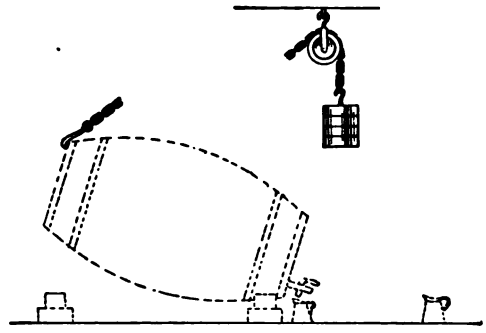


Cutting the Notches in Steel

of manipulating the chisel and hammer. Should the blank become bent in cutting the teeth, straighten it with a wood mallet. The file should be tempered quite hard.—Contributed by Chas. Bruderlein, New York City.

Tilting a Barrel

When the contents of a barrel reach a low ebb, the barrel needs tilting each time when more liquid is withdrawn. This disturbs the sediment, and the liquid comes out muddy. To prevent this, anyone with a few tools can make a tilting apparatus as shown in the sketch. A chain is hooked to the back

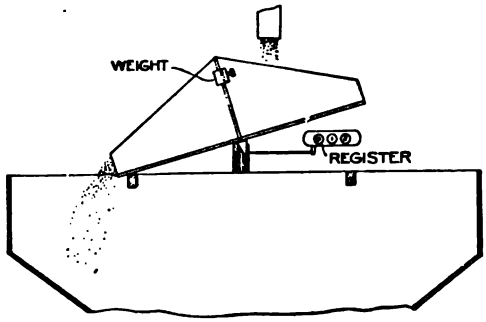


Weight Keeps Liquid Level with Faucet

of the barrel and runs over a pulley, bearing a weight at its other end. The pulley is suspended from the ceiling by two staples. As the liquid in the barrel becomes less the weight raises the barrel, the liquid thus coming out clear to the last.

Automatic Wheat Dump

The device shown in the sketch is intended for the same purpose as the automatic scales, says the American



Dump in Action

Miller. The dump has a weight on a small bar, which can be set so that the box will dump with 30 lb. in either end. This will make 60 lb. when both ends are dumped. As the register works on every other dump, it registers 60 lb. or one bushel of wheat.

Hardening Narrow Strips of Steel

The method used by a correspondent of the American Machinist for hardening some narrow strips of steel without warping is given as follows:

The pieces were ¾ in. wide, $\frac{3}{32}$ in. thick and 4 in. long. I used a pair of ordinary tongs and heated the pieces in an open fire to the proper temperature. I then quickly transferred them to a pair of cold cast-iron tongs,

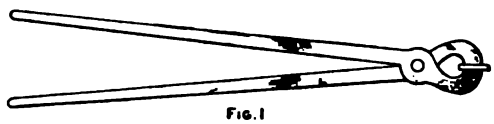


FIG. 1

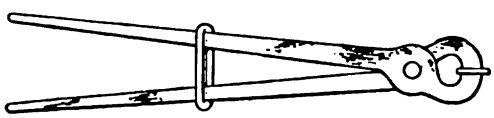


FIG. 2

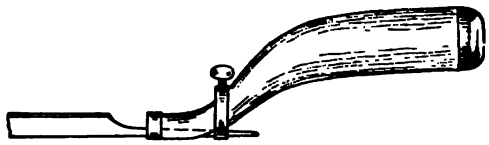
Tong Jaws for Hardening Steel Strips

4 in. wide, as shown in Fig. 1, the jaws of the tongs being the same width as the pieces were long. After quenching the pieces with these tongs, they were found to be straight and hard throughout.

If, as is often the case, it is desirable to have the center of the pieces soft and one or both edges hard, they should be held in tongs made heavier, as shown in Fig. 2. When heated directly in these clamping tongs, the heat in the tongs will prevent the center of the piece from cooling as rapidly as the edges, and hence it will remain soft.

Offset Handle for Chisels

Gouges and chisels with bent shanks are expensive, and where a great many of these tools are necessary, two sets, one of straight and one of bent shanks, makes a large parcel to carry. A detachable handle, as illustrated, will enable one to carry only half the tools



Handle on Chisel

that otherwise would be necessary. The handle can be changed from one tool to another.

The handle should be made of boxwood or some other very strong and tough wood. Cut a groove in the lower part for the shank of the tool. A part of the shoulder and a little of the shank must be ground off on some gouges and chisels so that the tool handle will be in the same plane as the cutting edge. Make the ferrule and ring strong but very thin. This will save grinding the shank off, thus keeping it in condition to replace the old handle when desired.

"Fishing" a Cork from a Bottle

Double a stout cord and thrust it through the neck and into a bottle containing a cork, then invert the bottle and pull the string out. The string will remove the cork.

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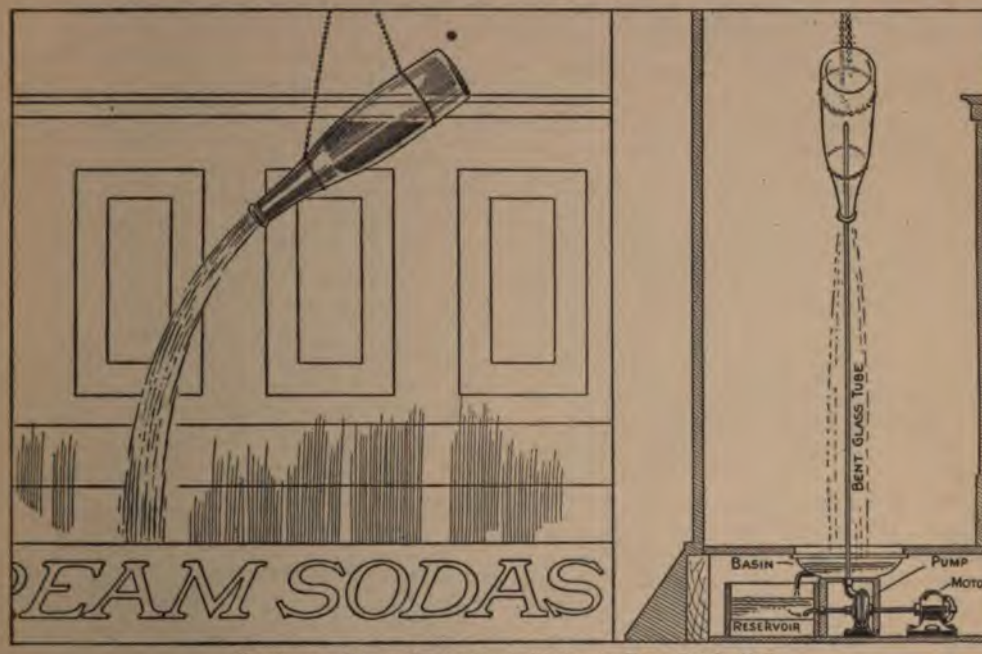
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Endless Supply of Liquid Flowing from a Bottle

An interesting advertising object as well as a center piece for a show window for a drug store or candy shop is a bottle with an apparently inexhaustible supply of liquid flowing from it, without any visible source. The bottle is suspended by wires or a chain in an inclined position. If used in a candy shop or ice cream parlor, grape juice can be used for the liquid. The exhibit will attract a large crowd and create a great deal of speculation as to its mysterious source of supply.

The bottle is suspended over an apparatus shown in the sketch which keeps it filled as fast as the liquid runs out. A small centrifugal pump is run by a small motor concealed under the base of the platform. This pumps the liquid back into the bottle through a small tube. The liquid in leaving the bottle flows down the outside of the tube into the basin, thus concealing the position of the tube by the opaque color of the fluid. If an opaque bottle is used, the illusion is perfect.—Contributed by Morgan Larsen, Brooklyn, New York.

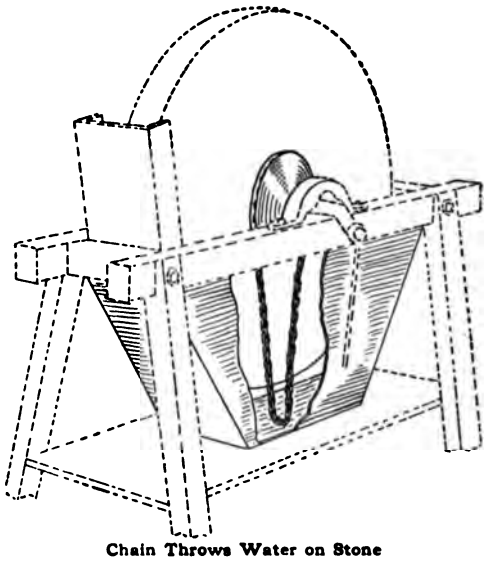


Continuous Flow of Liquid and Device to Keep Bottle Full

¶Malleable cast iron is made by heating ordinary castings for a number of hours in contact with oxide of iron.

Wetting a Grindstone

Grindstones are frequently made so as to have the lower edge run in water in order to obviate the necessity of



Chain Throws Water on Stone

pouring water on the face. When the stone is not in use, the lower part is always in the water, usually at the same portion of the circumference, which soon softens and wears out of true.

When the grindstone is set up, bolt a disk of wood against the stone. The wood should be of sufficient thickness to allow a narrow detachable-link chain to run over its circumference. Fasten a flange of tin or sheet iron against the board to keep the chain running in place and attach a water trough under the stone, so the water level will not touch its surface. The chain runs in the water at all times, and carries the water to the surface of the stone.—Contributed by C. R. Poole, Los Angeles, Cal.

¶Putty is composed of dry whiting and raw linseed oil. For glazing, add about 10 per cent of white lead to increase durability. In hot climates a little cotton-seed oil should be added to prevent the putty from drying too quickly.

How to Spread Fertilizer

Fasten a common rotary blacksmith's blower to a small hand sled and attach a 6-ft. length of 2½-in. rubber hose to the delivery pipe. Make a hopper of an old can and attach it so as to feed the fertilizer into the side opening of the fan. The slight vibration of the turning fan will work the fertilizer into the fan wheel. The air current will force it out through the rubber hose. The device is worked by two men, one man handles the hose while the other turns the fan. A horse is used for drawing the sled over the field.—Contributed by J. W. Bauholster, Gresham, Oregon.

An Electric Vacuum Cleaner

The principle on which many vacuum cleaners operate is the setting in motion of a large volume of air, and the efficiency of such cleaners is proportional to the volume of air set in motion rather than to the degree of vacuum created. The air being in motion carries with it dirt and dust which are subsequently sifted or screened from the air.

If a box is constructed and an ordinary electric fan placed so that the fan rotates in an opening in one end, the chief essential part of the cleaner will be completed. In Fig. 1 is shown such an arrangement. The other end

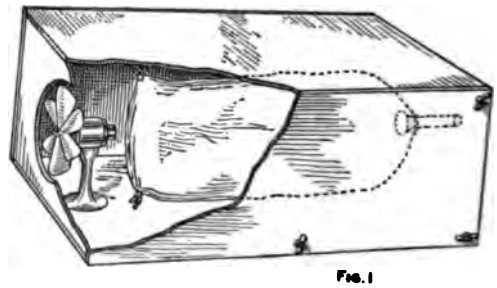


FIG. 1

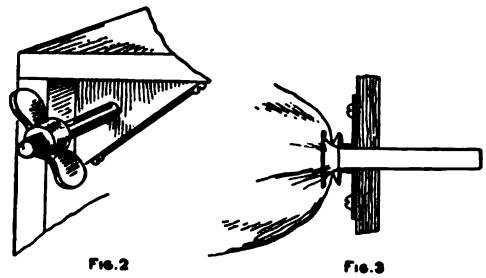
Fan in End of Box

of the box should have a funnel shaped inlet as shown in Fig. 3. A bag is made of cloth, preferably cheesecloth, and tied around the neck of the funnel, the other end being fastened in the box

with screweyes turned into the sides just back of the motor.

As it is necessary to remove the bag for cleaning, one end of the box should be fastened with carriage bolts and thumbscrews as shown in Fig. 2. All joints should have a strip of chamois skin or other soft material placed in them so that little or no air enters the box except through the orifice in the end provided for the passage of the dirt and dust.

When the motor is started, the fan tends to create a vacuum in the box, but the air rushes through the opening in the end of the box, carrying with it dirt and dust which are kept in the bag while the air passes through the cloth. A good electric fan costs



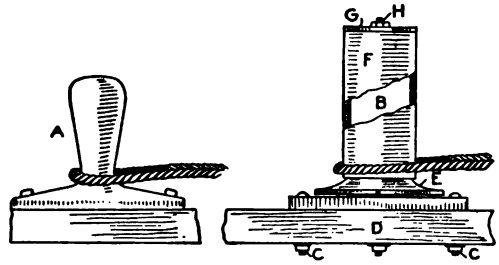
Joints and Air-Tube Connection

very little in comparison to a vacuum cleaner.—Contributed by J. E. McIntire, Watsontown, Pa.

Tie Post for Wharves

Owing to the friction between the ropes and the iron posts when the design shown at A in the sketch was used, a new line had to be supplied every day, which made it quite an expense. A scheme was successfully carried out by a ferry company which reduced the repairs to a very low figure.

A post was made as shown in the second figure, in which B is a straight iron post bolted at C to the wharf D. A collar, E, is riveted to a plate, F, which fits around the post B. On top of the post is a disk, G, held by a bolt, H, which allows the part F to turn and remain in place. When the line is thrown over F and resting on E to tie up the boat there is no appreciable



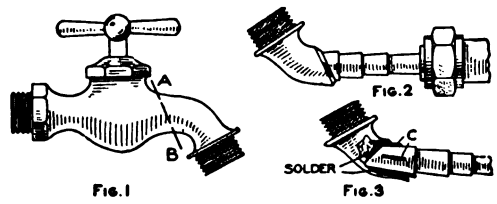
Two Forms of Posts

friction on the line.—Contributed by Maurice Baudier, New Orleans, La.

Angle Faucet Fitting

Finding it necessary to connect a large tubing to a small hose connection at a certain angle and not having a proper fitting, I cut off a portion of a worn-out faucet as shown on the line AB, Fig. 1., and placed on the hose connection at the desired angle, securely soldered to make a satisfactory job as shown in Fig. 2.

To secure it at the proper angle before soldering, wedges of brass or copper wire were driven in tightly between the hose connection and the faucet end, as shown in Fig. 3. The other end of the faucet section was plugged with paper to prevent the solder from running where it was not wanted. The hose connection was



Parts of Old Faucet

tinned before it was placed in the faucet section.—Contributed by J. M. Kane, Doylestown, Pa.

¶A good polish for woodwork is a mixture of 2 parts copal varnish, 1 part gum arabic, 5 parts of shellac cut in 100 parts alcohol and thoroughly mixed.

Primer for Automobile Engines

A primer is almost indispensable for the owner of an automobile, especially in cold weather. The method of installing a primer in a machine is shown in Fig. 1. A cross section of the primer and the method of connecting the parts are shown in Figs. 2, 3 and 4. In this way any number of cylinders may be connected.

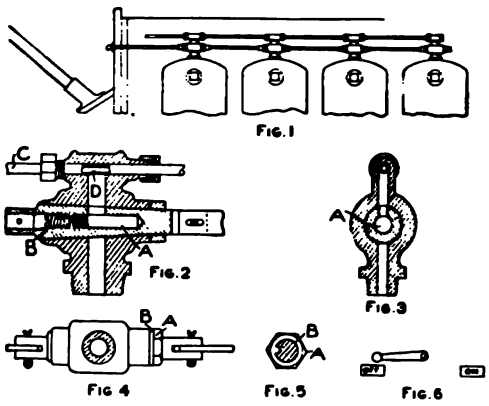


FIG. 1 FIG. 2 FIG. 3 FIG. 4 FIG. 5 FIG. 6

Parts of the Primer

The gasoline supply comes through the pipe C and enters the small chamber A through the opening D. This keeps the chamber A filled at all times. The action of throwing over the small crank shown in Fig. 6 causes the charge to be turned into the cylinder. The amount of gasoline may be adjusted by the small screw B. The nut and washer A and B, Figs. 4 and 5, are used to keep the cone-shaped valve in place.—Contributed by D. H. Fairchild, Pana, Ill.

Friction Hold for Drilling

A piece of metal of such a shape that it is hard to hold and too small to bolt on a drill-press table makes a difficult thing for drilling. Such a piece of metal can be kept from turning by placing a stiff piece of paper or emery cloth between it and the table. This method is very effective.—Contributed by H. W. Hankin, Troy, New York.

Concrete Mixtures

A rich mixture is composed of 1 part cement, 1½ parts sand and 3 parts gravel or crushed stone. This mixture should be used for structural parts where water is to be kept from columns and other parts subjected to high strain.

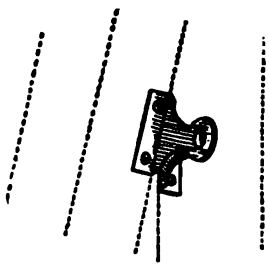
A standard mixture is composed of 1 part cement, 2 parts sand and 4 parts gravel. This should be used for machine or engine reinforced foundations subject to vibrations, for reinforced beams, columns, arches, floors, and for watertight work such as tanks, conduit sewers, etc.

A medium mixture consists of 1 part cement, 2½ parts sand and 5 parts gravel. This mixture is used for ordinary floors and machine foundations, piers, thin foundation walls, abutments, retaining walls, sidewalks and heavy wall sewers.

A lean mixture is composed of 1 part cement, 3 parts sand and 6 parts gravel. This mixture should be used only for unimportant mass work, heavy walls, backing stone masonry and for large foundations supporting a stationary load.—Contributed by G. M. Peterson, Buffalo.

Repairing a Mirror Friction Hinge

The mirror and frame on a dresser and chiffonier very often come loose from the standard and then the friction hinge will break As it is hard to procure these hinges, I make them from shade-roller brackets. The ends having the holes for the roller pins are riveted together to make a hinge joint and their bases are fastened to the mirror frame and standard as shown in the sketch.—Contributed by Jos. L. Schrieck, Portsmouth, O.

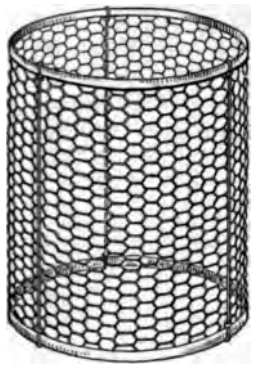


Drilling Deep Holes

When drilling deep holes with a twist drill the cutting edge should be ground so that the point will be a little out of center. This will make one cutting edge longer than the other, thus causing the drill to make a trifle larger hole. This gives clearance to the drill.

Wire Firebox for Burning Papers

A firebox for burning waste matter should be in every yard, providing no city ordinance prohibits the burning of refuse on personal or public property.



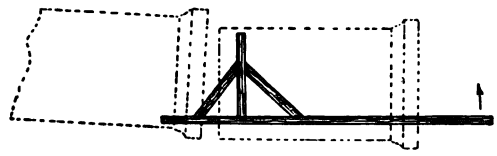
The box can be made by any boy. Procure two iron hoops from a barrel and attach to them a piece of poultry wire 24 in. wide for depth. Three stout braces of heavy wire or straight pieces of iron can be interlaced through the wide meshes to support the wire on the sides. To attach the wire at the top and bottom hoops cut the wire and fasten the edges securely with short pieces, using a pair of pinchers to square the ends and bend under all projecting points.

While this is useful for its original purpose, it also offers a good suggestion for making a pretty flower trellis. Fill the center with red salvia and surround with myrtle or ivy.—Contributed by Margaret S. Humphreville, Mount Pleasant, O.

Laying Terra-Cotta Sewer Pipe

Much time and labor can be saved in laying terra-cotta sewer pipe by using the device shown in the sketch.

The base is a piece of wood about 5 ft. long and 1½ in. square. These dimensions of course will vary with the size of the pipe used. On this is fastened another piece of wood about 21 in. long and 1½ in. square. Two



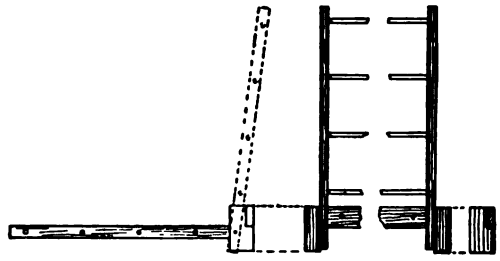
Lever for Lifting Tile

braces are attached as shown in the sketch.

To use this device it is only necessary to lift the stick by the long end and push the pipe in with the knees. I have seen one man lay 36-in. terra-cotta pipes with ease by means of this little device.—Contributed by Gilbert A. Wehr, Baltimore, Md.

A Wall Clothes Rack

The towel or clothes rack shown in the sketch has the advantage over the ordinary kind that it is always ready for use while it is out of the way when not in use. The main arms are 17 in. long, 1 in. wide and ½ in. thick. Four bars are fastened in holes bored in the arms at equal distances apart. The holder for the arms is made of a piece of wood, 2 in. wide, ½ in. thick and as long as the space will allow for the rack. Two blocks, 5 in. long, 2 in. wide and ¾ in. thick, are fastened to the ends of the strip as shown in the sketch. The arms are pivoted to these

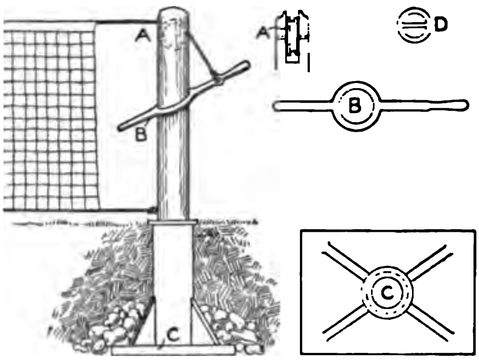


Rack Turns Back Against Wall

blocks by driving a large nail through the end of each arm and into the block. When the rack is not in use, it is turned back against the wall.—L. R. Buzzell, Malden, Mass.

Removable Lawn-Tennis-Net Pole

The net pole shown is especially adapted to country places where a tennis court is wanted with the least pos-



The Post and Its Parts

sible delay and where it is desired to have a lawn without obstruction for mowing or rolling purposes, says the Field.

The lower end of the post is set in a box which is solidly embedded in the ground. This box C has a large flat base which is covered with earth and stones and well tamped. The pole has an attachment for tightening the net. The stretcher B is made to slip over the pole loosely and when the net is [illegible] the lever is carried up at an angle. [illegible] there is [illegible] a grooved [illegible] provided [illegible] C, when [illegible]

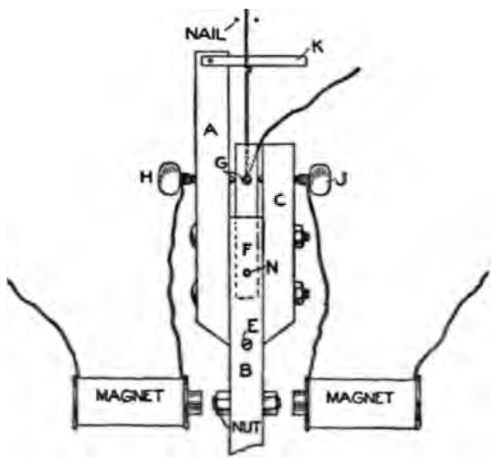
[illegible] Wood-Screw

[illegible]

An Electric Sign Flasher

The arrangement for alternately flashing the lights on our firm name and the name of our business I made principally of wood binding strips used for fastening windows in the frame. The pieces A, B and C are fastened securely together with two bolts. The piece B is about 6 ft. long and has a small weight fastened to the lower end and is pivoted on a screw E which is turned into the wall.

The piece F is 6 in. long and is fastened on the back of B with a screw, N, so that its upper end can move from A to C and vice versa. In this piece a screw, G, is fastened so it will come in contact with the thumbscrew ends H and J alternately. In the top end of F a hatpin is driven to form a spring which strikes two nails alternately, as the piece B swings.



Details of Flasher

When the piece B swings, it causes the hatpin to strike first one and then the other nail, causing the screw G to touch first the end of the screw H and then J, and so on, making contact for the electric current to travel through one magnet and then the other. The magnet attracts the metal of the nuts placed on the sides of B. The strip K is made of metal and fastened loosely on the upper end of the piece A. The outer end lies on a bend in the hatpin. This holds the screw G in close contact

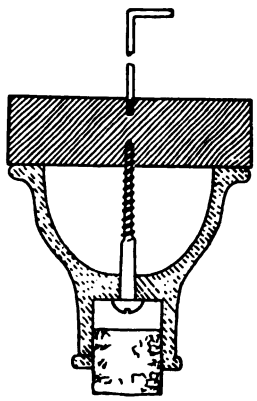
until it is driven to the other side. The electric connections are shown. The flasher when started will run continuously as long as the current is applied.—Contributed by Ralph Edwards, Spencer, Ind.

Face Lotion for Mechanics

A good lotion for removing grease and dirt from the face and hands can be made according to the following formula: To 7 oz. of pure alcohol add 1 oz. of glycerine and a drop or two of camphor. This not only dissolves the grease, but reduces the size of the pores in the skin thus preventing the muddy appearance of most mechanics. The solution is quite harmless. In cold weather it will prevent cracked hands if used after washing.—Contributed by Loren Ward, Des Moines, Iowa.

Substitute for a Flush-Box Release Ball

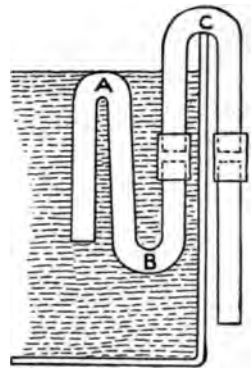
The rubber release ball in my toilet flush-box became unserviceable and had to be replaced. For a substitute I removed the rubber from a cheap plumber's force pump and fastened it with a brass screw to a circular piece of painted wood. A cork was fitted in the place where the handle was removed. This works as well as the original ball.—Contributed by Lloyd G. Miller, Chicago.



¶Tack an old sack or other piece of cloth on the top of the door frame so that it will drag over the back of cattle as they enter, and it will keep most of the flies out of the building while milking.

Self-Starting Siphon

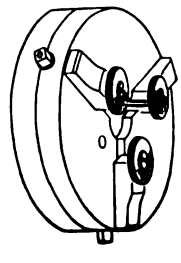
The little siphon shown in the sketch has proved very useful in laboratory work in siphoning certain solutions such as sulphuric acid or nitric acid when it would be dangerous to start the siphon by the usual method of sucking until the tube is full.



If made of one piece of glass tube, so much the better, although I have found it easier to use two or three pieces connected with rubber. The ratio between the lengths of A-B and B-C must be about as four is to five. To begin with, the solution must be high enough to cover the first bend, then according to the law that a liquid always seeks its own level, one would suppose that it would enter the tube and settle at a point between B and C. However, the kinetic energy produced by the falling of the liquid from A to B is sufficient to force it up over the bend C. From there it simply falls and the siphon is in running action, having started automatically.—Contributed by Willis H. Cole, Brooklyn, N. Y.

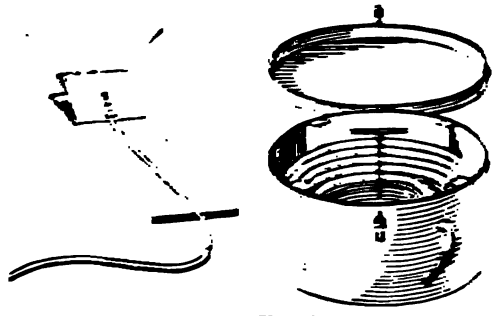
Knurls Attached to a Chuck

A novel way of using knurls is shown in the sketch. The knurls are attached to the jaws of a three-jaw universal chuck with small studs made to fit the holes in the knurls. When not in use, they can be removed.—Contributed by John M. Newbig, Brooklyn, N. Y.



A Hose Holder

The [illegible] shows a sprinkling device for a hose. It is made of a base-board about 2 ft. long to which is attached a 6-in. piece of board at an angle of 45 degrees. The force of the water striking the angle board spreads it in a spray several feet in each direction.

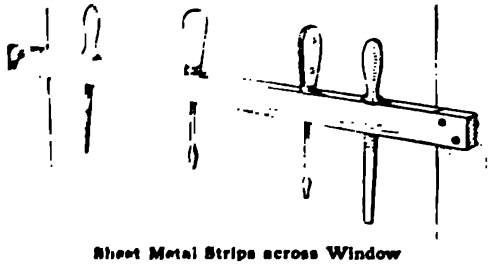


Sprayer and Hose Box

The holder is made of a common cheese box with the bottom knocked out. The cover is hinged and provided with a hasp and staple for a lock. The box is placed over a hydrant where the hose is connected and staked to the ground with four pieces of 2 by 2-in. material. The hose can be coiled in this box, which can be locked.—Contributed by Hazel Duncan, Denver, Colorado.

File or Screwdriver Holder

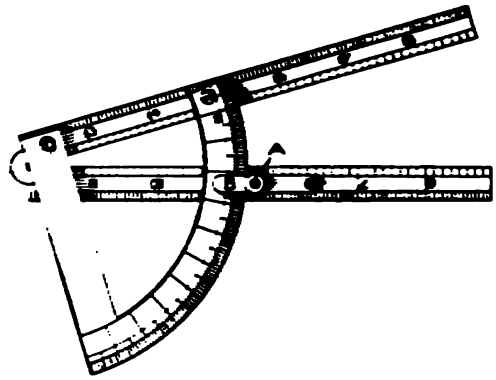
A very convenient file or screwdriver holder may be made of two strips of sheet metal spaced with a ½-in. block at each end and fastened across a window or opening as shown. Files or screwdrivers placed in this holder are always in plain sight and the desired tool can be quickly found and easily taken out. The holder can be fastened to a wall by placing a piece of wood in the back of the strips.—Contributed by A. Lester Shipton, Watertown, Mass.



Sheet Metal Strips across Window

Homemade Arm Protractor

As I had a large number of winding courses to plan it became necessary to have an arm protractor, and not being able to afford such an instrument I made one of a 10-cent pocket rule and a protractor. The protractor was fastened to the rule with screws taken from discarded electric light fixtures and the clamp was made of a binding-post, A, taken from an old battery, and a strip of brass B. The protractor was cut off so that it did not quite reach the outer edge of the rule and was fastened on so that the 90-deg. line coincided with the inner edge of the rule. The angles were read against the inner edge of the arm. Either arm can be used against the T-square, as the rule is thicker than the blade of the T-square, which allows the projecting end of the protractor to pass over it. When the protractor is set the same angle can be ruled on either side of the 90-deg. line without changing it over.



Carpenter's Rule Used for Arms

The ends of the rule were cut off at the first joint as the hinge made a projection that would not allow the instrument to lay flat. This made the

arms only 6 in. long, but did not prove a drawback, as the line could be produced by sliding the T-square up and moving the instrument along until the lines coincided.—Contributed by F. G. Carscallen, E. Las Vegas, New Mexico.

Forcing Out Obstruction in a Drain Pipe

Instead of sending for a plumber or borrowing a force pump from a neighbor, I use the top of an ordinary pot in a sink when the outlet becomes obstructed. When the drain pipe is stopped the sink fills with water and I take the top of the pot and place it over the opening and quickly give it a hard pull upwards. The suction created is sufficient to clear the pipe.—Contributed by B. A. Taylor, Halifax, Nova Scotia.

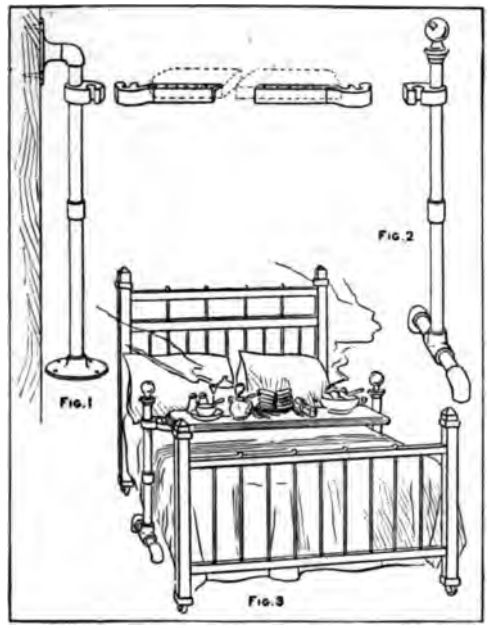
Keeping Squirrels out of Trees

The device shown in the sketch is used to keep squirrels from climbing trees and destroying the nuts. It is made of heavy tin or sheet metal fastened together with stove bolts after it is in place on a tree trunk. The device also prevents small boys from climbing a tree.—Contributed by Chas. M. Horsfield, Kansas City, Mo.



Use for Old Iron Beds

The illustration shows how a part of an old iron bed, or one that has been through a fire can be utilized for an ironing-board stand, all of which can be placed in a closet when not in use. All that is necessary is to thread the ends of the legs and add an extra length of pipe, using a coupling to connect them and employing three elbows and two floor plates, all of which are shown in position in Fig. 1.



Ironing-Board and Table Supports

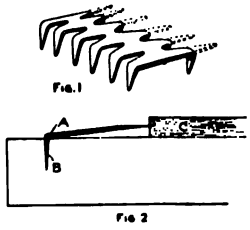
If two legs are made like the one shown in Fig. 2, and a nicely finished board screwed to another side rail of an iron bed, through which holes have been drilled to receive the screws, a most serviceable invalid's table can be made that will reach across a bed in front of the patient. Such a table, when not in immediate use, can be left in position and placed across the foot of the bed. It also has the advantage of being easily stowed away in a closet in a compact package.—Contributed by Victor Labadie, Dallas, Texas.

¶Where large posts of oak are to be used in making a chair or any piece of furniture, plain oak can be used many times instead of the quarter-sawed, thus saving at least one-half the cost of the lumber. The only requirement is that pieces of heavy plain oak each having one or two quartered sides be selected.

¶A much better way to keep gauge glasses than on a string is to set them on end in holes, bored in a wood block of sufficient size.

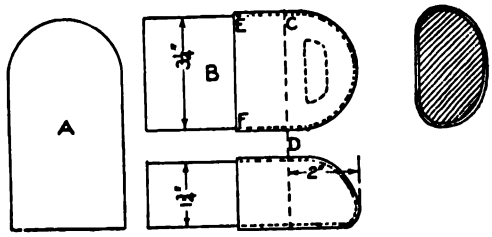
Belt Hook Used as a Bench Stop

A very good bench stop can be made from an ordinary metal belt hook. Procure one that measures ¾ by 1¾ by 2½ in. and straighten out the points on one side as shown by the dotted lines in Fig. 1. If the points are too sharp, round them off a little with a file. Lay the hook on the bench top at the place wanted and strike the part marked A to drive the points B into the wood. Raise the points that hold the work C with the claw of the hammer.—Contributed by W. A. Lane, El Paso, Texas.



Homemade Ear Phone

A person who was slightly hard of hearing made a phone that enabled him to hear quite well while in church or at public meetings. While the phone is visible, it is not unsightly, if carefully made. It is constructed of paper glued together over a wood form as shown at A in the sketch. The form is first covered with a thin sheet of paper carefully shaped over the rounded end and the edge is pasted to the wood at E F. The thin paper is then covered by gluing narrow strips of brown wrapping paper all over the surface as far back as the line E F.

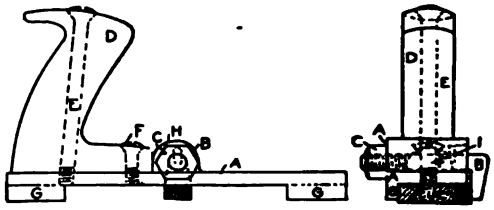


Phone Made of Paper

Cover it again and lay the strips so as to cross the first layers. Repeat the operation until there are six or eight coverings. When the paper drys, rub it down with a very fine emery cloth or sandpaper, cut it neatly on the line C D, and slip it from the mold B. A hole is cut in the flat side to fit the ear near the head. The phone is very light, and, if carefully fitted, it can be worn without annoyance or fear of falling off. The phone acts on the same principle as placing the hand behind the ear.—Contributed by J. E. Noble, Toronto, Canada.

A File Holder for Flat Work

The tool or handle shown, when clamped to a large file, comes very close to being a planer when it is required to remove stock from a flat surface. For metal use a long file and for patterns use a short one, says a correspondent of American Machinist. A short file can be made of a 14 or 16-in. file, cut in half by grinding, then removing the tang and squaring the end, thus making two short pieces.



Holder is Used Like a Plane

The holder consists of a piece of machine steel, A, with jaws, G G, and a hub, H, through which a ¼-in. hole is drilled and reamed to receive the shank end of the jaw B. The jaw B is made of tool steel, threaded for a casehardened nut, C, and the inner surface of the jaw milled the same as the jaw of a vise. The position of the pin for holding the shank of the jaw B is shown by I. To allow a lateral motion for the jaw B in the boss H, a slot or keyway is cut to fit the pin I. A wood handle D, such as used on carpenter's planes, is fastened to the metal A, with two bolts, E and F. A section of the file is shown clamped in position.

Homemade Derrick Crane

A simple and cheaply constructed hand-power windlass and derrick is often desired for lifting bulky objects a short distance, loading heavy articles, etc. Figure 1 shows one type of crane. The bearing of the arm of the derrick is arranged to allow it not only to rise up and down but to revolve around the center post. One of the clips is shown at A. A windlass can be attached to the post with a stationary bearing or with one like that used for the arm with the extension as at B. The diameter of the post should be about 4 in., or heavy enough for the work it is intended. The bearings of the arm and windlass are 1½ in. less in diameter. Any local blacksmith can make them and other iron fittings that are needed. The ends of the boom are supplied with parts as shown at C and D.

A boom derrick arranged as in Fig. 2 will be found of great service for loading and unloading boxes, barrels, sacks and any heavy articles stored in a basement. One man without some mechanical assistance of this kind is often unable to lift heavy articles from a cellar-way and load them on a wagon conveniently, and even if several men engage in the work they cannot remove

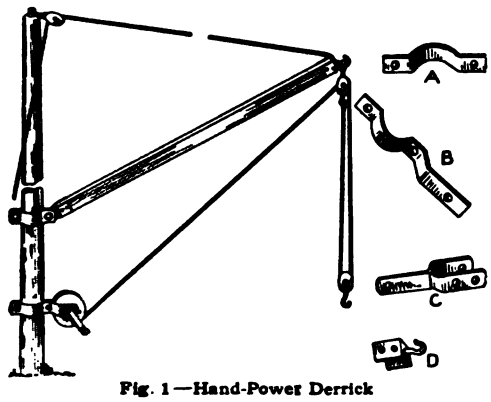


Fig. 1—Hand-Power Derrick

and load the articles as easily and speedily without the derrick as they can by its help.

Use a stout piece of timber for the derrick post, not less than 4 in. square, or a round pole, and a square piece of wood 10 or 15 ft. long for the boom. Insert a heavy iron pin in the top and lower end of the post and shrink iron

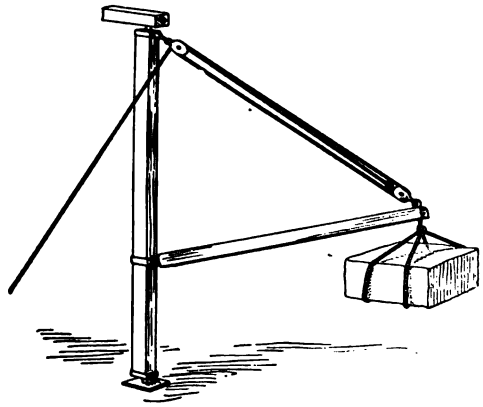


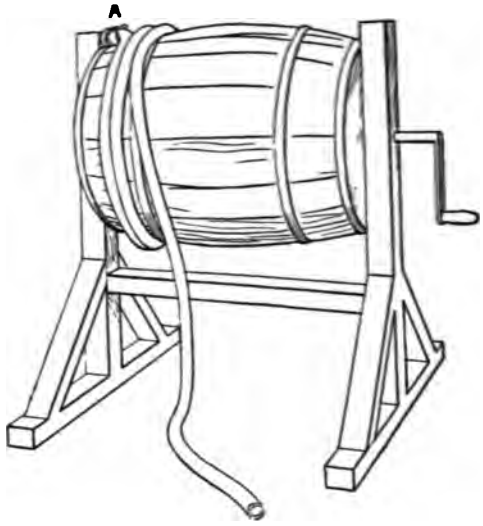
Fig. 2—Derrick Crane

bands around the wood. Hinge one end of the boom with iron straps and bolt them to the post about 5 ft. from the bottom, and on the other end put a band with eyes or hooks. If the post is round, the boom may be hinged by using a band on the post and a knuckle joint similar to the one shown in Fig. 1. These can be made of old wagon-tire iron. The top pin of the derrick post is held by a strong projecting iron or wood cleat, or one of the building timbers, and the lower pin revolves in a wood block having an iron socket or a heavy stone with a hole drilled to receive it.

The top of the post and end of the boom are connected with a rope and single pulleys or by a double-block tackle. One man with ordinary exertion will be able to handle conveniently a very heavy weight, which, when elevated by means of the boom, can be swung around to the point desired for loading or unloading. If a pulley is attached to the building near the foot of the post, the rope may be conducted over it and have a horse or windlass attached, when it is necessary to handle unusually heavy objects.—Contributed by J. G. Allshouse, Avonmore, Pennsylvania.

A Hose Reel

An ordinary nail keg hung on a shaft as shown in the sketch makes a good hose reel. The standards are made of

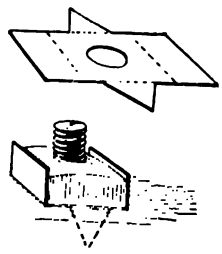


Keg on Standard

five pieces of 2 by 4-in. material braced with two ⅞-in. strips. Two nails are driven into the keg at A to hold the hose end connection. The shaft can be made of an ordinary ½ or ¾-in. rod with a crank bent on the end.—Contributed by Theodore Becker, Kansas City, Mo.

Combined Washer and Nut Lock

Nuts and bolts on wood framework frequently come loose. A way to prevent this is to secure a suitable piece of light iron and cut it as shown in the sketch. It is then placed over a bolt and the points bent down so they will press into the wood as the nut is turned. When the nut is set, turn up the iron clips to lock it.—Contributed by W. A. Jaquythe, Richmond, Cal.

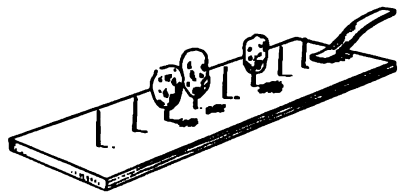


Grinding Carburetor Valves

An expanding watch-key makes an effective tool to grasp the stem of the needle valve of a carburetor when grinding in a valve. As the stems of these valves are usually so small that it is difficult to get at them and to hold them securely, this watch-key kink is a great help in grinding in, removing and replacing valves of this class.—Contributed by James M. Kane, Doylestown, Pa.

A Potato Baker

The potato baker I made consisted of two pieces of sheet asbestos, 18 in. long, ¼ in. thick and 4 in. wide. Over these pieces I placed a piece of tin, 18 in. long, 11½ in. wide, turning it over from the top and lapping on the bottom. Through the pad there were driven several nails on the points of which the potatoes could be impaled. The handle was made by folding a strip of tin over several times and driving brads through the end of the



Asbestos Pads with Nails Protruding

pad. Potatoes baked on this device cook through and through and are very mealy.—Contributed by Joseph H. Noyes, Murfreesboro, Tenn.

How to Make Paracentric Keys

Probably nothing is more puzzling to the amateur or even to some locksmiths than to make a key to fit a Yale or any other similar lock when the original key is lost, without partly destroying some part of the combination or defacing some part of the cylinder.

The sketches, Figs. 1 and 2, show the cylinders of a mortise lock and rim lock, respectively. These were orig-

inally made with a slide at G to keep the springs and pin tumblers in their respective chambers, all of which are shown in Fig. 3. The present method of making these cylinders is to bore the tumbler chambers from the bottom, insert the springs and tumblers, and then plug the holes.

If one has occasion to make a key for the former, it is rather a simple matter as the slide at G can easily be removed, the springs and upper pins carefully taken out, and then, after fitting the key, all the parts can be replaced.

With the more modern cylinder it appears to be a more difficult task, but after a few trials and careful study of the following instructions, it will be found much easier than the other, and less troublesome. First procure a piece of wood 3 or 4 in. long and of the same thickness as the barrel B, Fig. 3. Remove the screw at C and hold the cylinder in the left hand with the thumb on the back of the barrel and the index and middle finger on the front. The sketch Fig. 1 shows the mortise lock cylinder, also the proper way of holding either style of cylinder. Tap the top sharply at G with a hammer handle, at the same time applying a slight pressure with the thumb. After a few blows the barrel will move out of the cylinder. Be careful not to let it move more than 1/16 in., then give it a quarter turn. Gently push out the barrel with the dowel stick and at the same time be careful not to let the tumblers drop out of the barrel. The dowel serves two purposes, viz., to push out the barrel and to keep the pins D and springs E in the cylinder as shown in the upper part of sketch Fig. 3.

Usually five or six blows will be sufficient, but do not be discouraged if success is not immediate, as a good many blows are sometimes required. Strike quite sharply as the hammer handle will not injure the lock in any way. After the barrel has been removed, take out the pins and lay them down in such a way that they can be replaced in their respective chambers without trouble. Put a blank key in the barrel, and by using the tang of a file mark through the tumbler holes for each pin. Remove the key and replace



Fig. 1

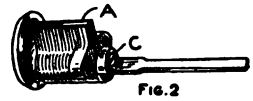


Fig. 2

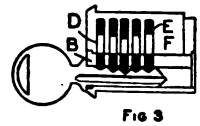


Fig 3

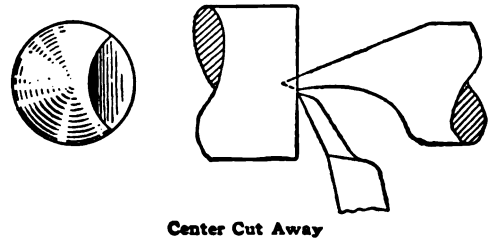
Parts of a Pin-Tumbler Lock

the tumbler pins. File V-shaped notches in the key, testing frequently so that each pin will be level with the top of the barrel. Leave the key in the barrel and carefully replace in the cylinder, finally screwing on the connecting bar.

The notches in a key for holding the pins at the proper height to permit the tumbler to turn in F are shown in Fig. 3.—Contributed by R. E. Davall, New York City.

Lathe Center for Facing Work

A center which does not have to be pulled away from the work a little to allow the side of the tool to face into the center is shown in the sketch. It is an ordinary lathe center which has been cut away on one side to within $\frac{3}{16}$ in. of the point. The corners of the portion cut away are rounded to avoid reaming the center hole. This center has been in use several years with entire satisfaction. It requires little time



Center Cut Away

to take the full center out and insert the one-half center, when some work must be faced or recessed near the center.—Contributed by Andrew Smith, New Haven, Conn.

Former for Pipe Hangers

It pays to have tools to make pipe hangers where they are wanted in large quantities, says the American Black-

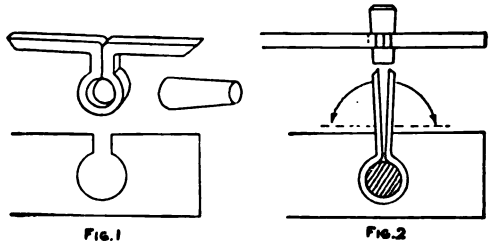


Fig. 1 Fig. 2

Former Parts

smith. One pipe hanger and the tools with which to make it are shown in Fig. 1. These are for a small pipe and are slipped on before screwing on the coupling. The pieces are cut to the proper length and bent in the middle in the shape of a rough eye which will go into the tool. The pin is then driven in. This trues up the eye and holds it secure while the ends are bent down as shown by the arrows in Fig. 2.

How to Tie a Flag-Pole Rope

When fixing a flag-pole rope it is necessary to tie it right to keep the strain off the pole caused by the drawing of the rope when it gets wet. If the rope is tied as shown in Fig. 1, it will begin to draw the pole out of

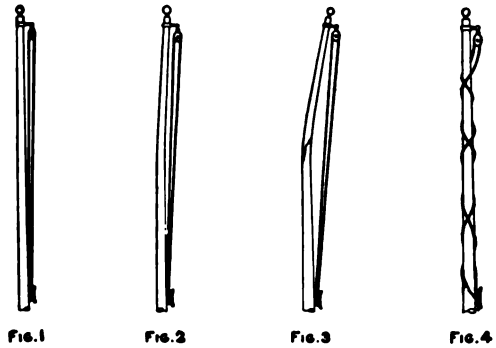


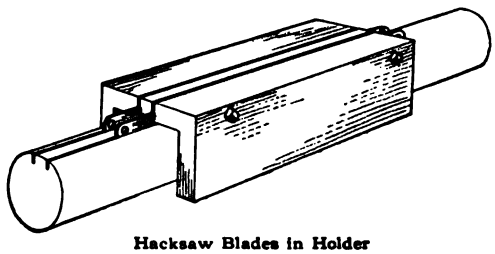
Fig. 1 Fig. 2 Fig. 3 Fig. 4

Tying a Flag-Pole Rope

plumb, as in Fig. 2, and as soon as the rope gathers some dampness and gets thoroughly soaked, it is liable to break the pole as shown in Fig. 3. The proper way to tie the rope is shown in Fig. 4.—Contributed by Edward Von Kaenel, Cleveland, O.

A Keyway Cutter

Anyone who has had to cut keyways in shafting while in the hangers knows how hard it is to accomplish the work without proper tools. I find that a straight keyway can be cut by using the device shown in the sketch. The edges of two L-shaped pieces of wood are bolted together with another strip of wood having the width of the keyway to be cut placed between them. Hacksaw blades are placed in each joint before the nuts on the bolts are



Hacksaw Blades in Holder

drawn up. It will take only a few minutes' time to cut the depth of the keyway, when the metal between the saw cuts can be chipped out with a keyway cutter.

Collapsible Water Pail for Automobiles

Procure an old inner tube that has been discarded and select from 3 to 4 ft. or more of the rubber that is watertight. Cut the desired length from the tube and close one end by cementing it under pressure. This is a cheap and easily made substitute for the ordinary collapsible pail, and can be packed in a small place.—Contributed by Wm. L. Hoff, Washington, N. J.

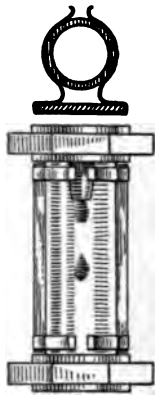
¶Leather washers cut from a piece of old belt and put on a monkey-wrench tang, then dressed down with a block plane, make a better handle than wood.

How to Remove Varnish from Floors

Dip an ordinary scrub brush in pure ammonia, scrub over the surface to be cleaned until all the varnish is removed, and wipe off with fresh water, using a rag or sponge. When dry, varnish or shellac, as desired. After drying, the surface has the appearance of new wood.—Contributed by H. W. Ravens, Seattle, Wash.

Reflector on a Lubricator

Sometimes it is difficult to see the oil drops in the sight feed of a lubricator, owing to its position. If the choke plug becomes stopped, it will flood the glass with oil. I had a locomotive-type lubricator, triple sight feed, of the bracket type connected to three air pumps on the testing rack.



Necessity required the placing of the lubricator on a cross bar quite high, between and over the pumps. The bar was in line with the sight-feed glasses and made it possible to watch the drops for timing only at close range, as the bar behind destroyed the usual transparency of the glasses. In this case, where the feed cannot be seen because of the location, the difficulty was overcome by fastening a mirror behind the feed glass, whereby the drops may be plainly seen almost as far away as the lubricator is visible.—Contributed by F. W. Bently, Jr., Huron, S. D.

Crane for a Cripple's Bed

The apparatus shown in the sketch may be attached to any bed and used as a swing or derrick for patients with disabled limbs, and especially for one with a broken limb when a plaster cast is used, making the disabled member heavy and painful to move. With this device the patient can move about in bed at will, unassisted, by pulling



Crane on a Bed

the small rope. The limb can be raised so as to allow the patient to turn over, sit up, or lie in any position.

The arches are made of ½-in. iron rod with a shoulder at the ends where they rest on the side rods of the bed in which holes have been bored to admit them. The end for a wood rail is shown at A, and for an iron one, at B. The arch resting across the bed has a 2-in. loop at the top into which the rod resting on the foot of the bed is hinged so that it may have a joint that can be adjusted to any size of bed.

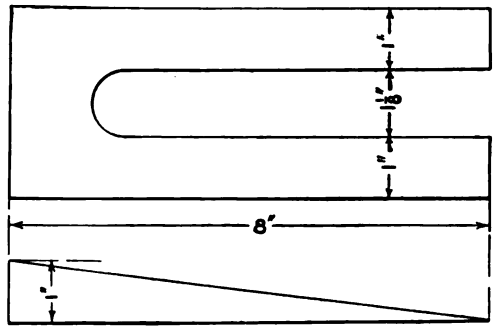
A pulley is attached in the loop at the top of the arch by a hook and a flat, notched ½-in. rod that is fastened to the cast by loose bandages so that the limb may be turned in it. This is swung on another pulley and the two pulleys are connected with a small cotton rope.—Contributed by Dr. C. A. Noland, Monroe City, Mo.

How to Clean Steel Tapes

Cover the tape with crude oil and rub down with No. 0 steel wool. This will clean the rust from the tape without injury to the etching. If the tape is not very rusty, it may be brightened up by rubbing with powdered pumice or dry cement.

A Bolt Remover

The bolts that become stuck in locomotive frames I easily remove with a split wedge, as shown in the sketch.



Details of Remover

The wedge can be used in removing bolts on all kinds of work. The bolt should be loosened first by pulling on the nut with a long wrench and striking the head with a hammer. The wedge is then started under the head and driven in with a hammer.—Contributed by Earl S. Goddard, Ridgway, Colorado.

A Tilting Manger

A very handy tilting manger for the barn is shown in the accompanying sketch. In Fig. 1 is shown the manger in place, the weight being sufficient to keep the front vertical. The lower part is hinged to the floor so that it may be swung back out of the stall for

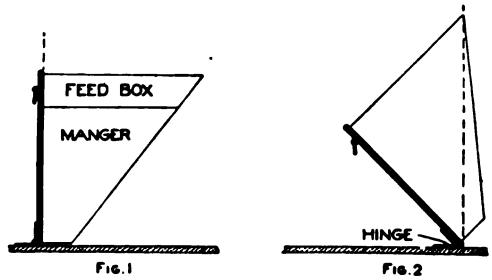


Fig. 1 Fig. 2

Manger Swings on Hinges

placing in the feed. See Fig. 2. This also provides more room for the animal.—Contributed by C. C. Brabant, Alpena, Mich.

One-Man Cable Test

Very few electricians and cable splicers know how to test dead cables without a helper, and as an experienced helper is not always at hand, the following method may be of value.

The example used for illustration is a small telephone cable which has been "cut in" at random on the main distributing frame. It is understood that the cable is not "code," that one side of the pair is a solid color while the other side is white. After "cutting in" the cable on the main distributing frame or box, the tip of the pair No. 1 is grounded. The ring of the pair No. 1 is connected to the tip of the pair No. 2, and the ring of No. 2 to the tip of pair No. 3 and so on through the cable as shown in Fig. 1.

The cable having been connected up

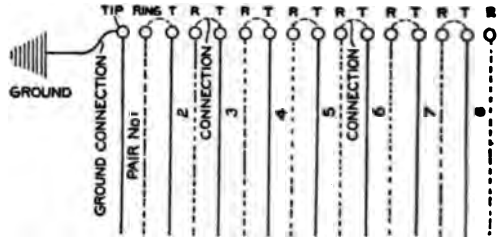


Fig. 1—Main Distributing Frame

as shown, the tester enters the manhole, opens the cable, clears the ends of the wire, and connects up as shown in Fig. 2 with a head receiver in series with a battery. The other side of the battery is connected to the ground. A search line is attached to the open side of the receiver.

Test out by touching each wire with the search line until a loud click is heard in the receiver. This will be pair No. 1. The battery lead is now removed from the ground and placed on the ring wire of No. 1. Touch the ends with the search wire as before and pair No. 2 will be tested. Place the battery wire on the ring wire of No. 2 to test out No. 3 and so on through the cable, putting each pair into fanning strips as they are tested out.

This test, while slow in changing

the battery lead on each pair, is extremely simple and thoroughly practical, if the cable is tested for opens, crosses and grounds previous to making the test. If trouble is found on the preliminary test, that pair should be left out when "bunching" on the frame and left until the last. The odd pair will be the one which is in trouble and can be placed in its proper



Fig. 2—Testing Device

position in the fanning strip when found.—Contributed by G. M. Peterson, Buffalo, N. Y.

Lubricant for Threads in Heated Places

All nuts, cap screws, plugs and pipe fittings that are installed where they will be heated should have the threads well smeared with graphite and oil before they are screwed together. If oil alone is used, it is sometimes impossible to remove them as the oil burns out and the joints become rusty and stick.

Protecting Freshly Varnished Floors

It is often necessary to walk upon freshly varnished hardwood floors and the usual thing to do is to lay boards on the sticky surface and walk on the boards. When the boards are removed some of the varnish comes with them and the spots must be varnished over again. The boards may be kept

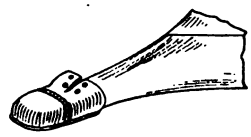


Cleats on Board

from sticking by applying a coat of wax to the side placed on the varnish. A little paraffin, beeswax or common floor wax rubbed on the surface will be sufficient. It is also advisable to build up the boards as shown in the sketch. This will make very little surface contact with the floor.—Contributed by Philip Edelman, Minneapolis, Minnesota.

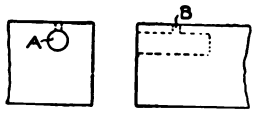
Shoe on a Plowshare Point

When passing from one field to another it is difficult to keep the point of a plow out of the ground. By carrying a part of an old shoe this trouble may be overcome. The sole of the shoe should be cut off just below the instep. The toe of the shoe is placed on the plowshare point as shown.—Contributed by Carl Lung, Camelius, Oregon.



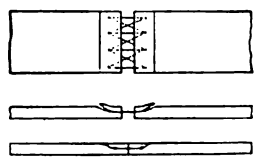
Drilling Cotter Holes

A simple jig that is in use in our shop for drilling cotter holes in small rods has proved a great time saver. As it takes but a few moments to make it, we usually make one for each job. A hole B, the same size as the cotter, is drilled in an old piece of cast iron, near one edge and entering a hole drilled for the rod. The jig is clamped on the drill press and a drill run through the hole already drilled. With this jig a hole can be drilled through an ordinary nail. In drilling a number of pieces, the jig has the advantage of keeping the holes all the same distance from the end.—Harold M. Ilg, Lowell, Mass.



Lacing Belts

The method of lacing a belt shown in the sketch makes a neat joint and the belt will run smoothly over the pulleys. A light score is made with a knife, ½ in. from the end and across the flesh side of the leather. If it is a 1-in. belt, about four holes ¼ in. apart are made with an awl endways through the leather

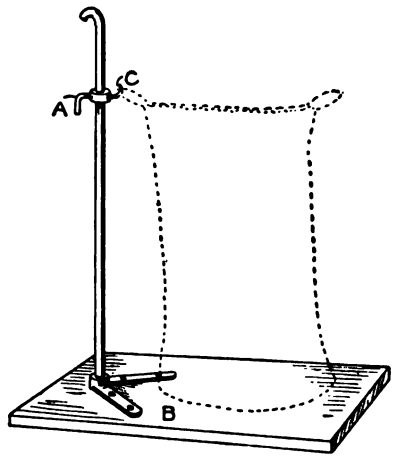


starting them in the score. Lace the belt through and through with a waxed thread and tie the ends in the score. When finished, the thread lies beneath the score in the thickness of the leather out of sight. The joint is almost indestructible, as the thread does not touch the pulleys.

This kind of lacing is particularly adapted for belts of dynamos or any high-speed machinery.—Contributed by Arden D. Whipple, Oakland, Cal.

Holding Sacks while Sewing

A device for use in holding sacks and bags while sewing up the opening is the invention of a correspondent of



Position of Sack on Stand

American Miller. It consists of a table, B, with an upright round iron fastened to it as shown. The hook, C, is attached to a sliding collar with a set-screw (having a lever A) to hold it in place. This is to provide adjustment for long and short sacks. The sack is hooked on C to steady it while sewing.

A Chuck for Turning Dowels

A good chuck for turning dowels or other slender pieces of wood is shown in the sketch. It is made of tool steel



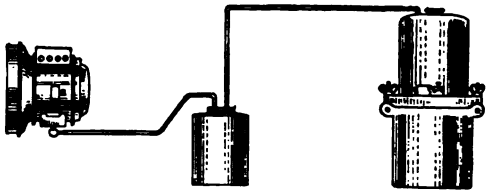
Dowel in Chuck

and is turned to fit the tapered hole in the lathe spindle. The other end is recessed at a very sharp angle taper then a thread is cut on the taper. readily seen that the greater the retarding force on the stick, the tighter it drives.

The great trouble with the common spur center for turning small work is its tendency to split the wood. One manufacturer had trouble until he made this driver which has so far never spoiled a stick. This tapered internal thread is rather hard to cut unless a lathe is equipped with special attachments.

Improving Acetylene Gas for Automobile Headlights

Wet gas is a certain cause of flicker in acetylene headlights for automobiles. Dry gas will burn steadily. For this reason, I constructed the dryer shown in the sketch. I made it from a solidly constructed 1-quart tin can having a screw top. Two small holes were punched in the cap and a 3-in. piece of brass generator tube inserted in each for about one-half its length, and



Connections from Generator to Lamps

soldered. The upper ends were bent so they would meet the rubber tubing. The dryer can be placed under the hood, seat or in the tool box.

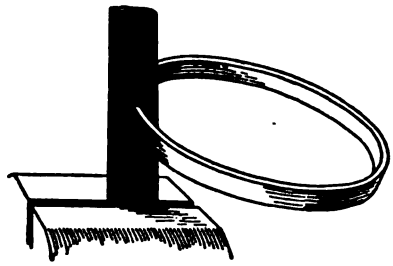
Put a small handful of carbide in the can and screw the cap on tight, then pipe from the generator to one pipe of the can and from the other to the lamps. The water in the gas which leaves the generator will be left in the can, as it cannot get out, and will drop to the bottom on the carbide and be

turned into gas. All moisture is taken up by this method and nothing but dry gas can reach the lamps.

The carbide should be renewed in the can from time to time, but not very often, unless the lamps are used every night.—Contributed by Earl R. Hastings, Corinth, Vt.

Filing Piston Rings

In filing small metal packing or cylinder rings, it is a hard task to get the ends of the split to fit close against



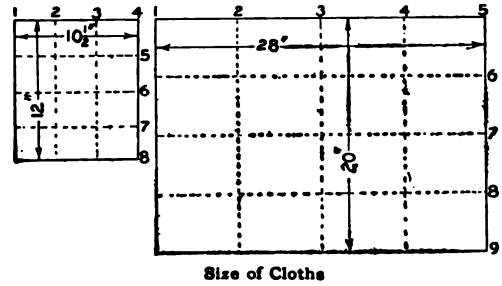
Filing Ends True

each other. If they do not come together closely, the ring will be weak, no matter how well it fits the bore of the cylinder. The sketch shows a way to file the ring so that this trouble will be overcome. The ends of the ring are grasped in the hands and worked on a file held in a vise.

Wiping and Catching Cloths

The best size for an all-around wiping cloth for wiping lead-pipe joints is about 3 by 3½ in. with strips on the material running lengthwise as shown in the sketch. The material is cut 10½ by 12 in. and strips fastened parallel to the 12-in. edge. The piece is then folded as follows: The first division is folded to 3, and 4 is folded to 2. This makes the cloth the width of one section. Using 4 as the top edge, fold 4 and 8 to 6 and then 5 and 7 to 6. Make a few stitches in each narrow end and soak the cloth in heated tallow and paraffin.

The catching cloth should be cut 20 by 28 in. with strips running parallel to the 28-in. edge and folded as follows: The first division 5 is folded to 7 and 9 to 7 and folding at 7 brings



Size of Cloths

6 and 8 together. Then fold 1 to 3 and 5 to 3, then fold at 3, bringing 2 and 4 together. Stitch on the narrow ends and soak in the tallow and paraffin.

Coloring Meerschaum

An easy way to color a meerschaum pipe and avoid finger marks is to use the method shown in the sketch. Cut a hole in the bottom of a bottle large enough to receive the bowl of the pipe. Place the pipe in the bottle with the stem protruding through the neck and wrap paper around the stem and seal it with wax to make an airtight joint. Place the stem of another pipe through the large hole in the bottom of the bottle and fill in with paper and seal with wax. Place the tobacco in the bowl of the protruding pipe and begin smoking through the stem at the neck



Pipes in Bottle

end. The coloring can be watched through the glass.—Contributed by Henry E. Seidell, Jr., Ft. Worden, Washington.

¶External corrosion of boilers is caused by leaking seams, rivets and gaskets. Wet ashes and soot will corrode the plate if left in contact with it.

New Method of Setting Commutator Brushes

A new and successful method of setting brushes, which does not require expensive instruments or special apparatus, is described by a correspondent of Power. All that is required is a short piece of No. 12 insulated copper wire from which the insulation has been removed for about 2 in. from one end. This end is flattened and tapered to a point, as shown in Fig. 1. It will be found convenient to bend the end backward as indicated. When the machine is running and carrying its regular load, the wire should be brought into contact with the commutator and carefully moved toward the brush until it touches it. Usually the toe of the brush is the edge which sparks, and this edge should be tested first. If the brush spits and glows when touched with the wire, the brushes are not on the neutral line corresponding to the load on the machine.



FIG. 1

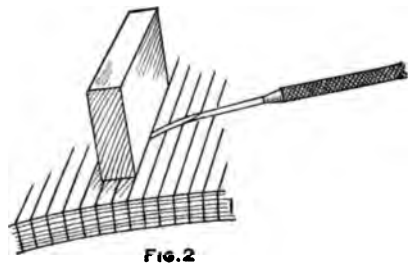


FIG. 2

Applying Wire to the Brush

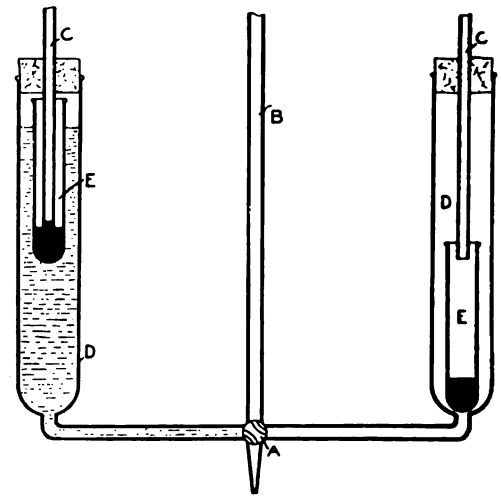
Both the toe and the heel of the brush should be tested and the yoke shifted until the glowing stops. The brushes on each arm of the machine should be tested. If some spark while others do not, this is an indication that the spacing is not right. If a position cannot be found where the glowing stops, it shows there is something wrong in the adjustment or the design of the machine. Small 500-volt machines and machines having high commutator speed will always spark more or less under this test, but the sparking is very slight if the machine is in good condition, even when carrying full load.

This test is based on the fact that a copper wire, simultaneously in contact with the commutator and brush, provides a low resistance path between the two. The carrying capacity at the point of contact on the brush is low, so that if the potential is greater than it should be, enough current flows to heat this point to incandescence.

Measuring Liquids Automatically

In an analytical laboratory a certain amount of salt solution was used from time to time and as the operator did not care to take the time to stop and measure it out, he devised the apparatus shown in the sketch. All of the parts were made of glass, but could just as well be made of other material.

The flow of the liquid is controlled by a four-way valve, A, located at the intersection of the three tubes of which B is the tube from the source



Measuring Tubes with Valve

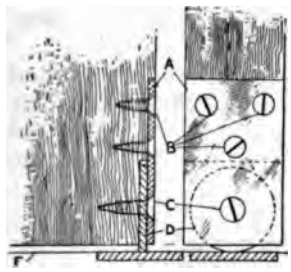
of supply. The air tubes C C are fitted tightly in the corks and also the corks in the tubes D D. The last named

tubes resemble large test tubes. Inside of the large tubes D D are small test tubes E E, each containing about a teaspoonful of mercury.

When the four-way valve A is in the position shown, the liquid from the supply pipe enters the tube at the right, which forces the test tube upward until it is in the position of the one shown at the left when the mercury seal stops further progress. While this is taking place the left tube, which has been previously filled in the same manner, is emptying into whatever receptacle placed beneath. The quantity of liquid is regulated by raising or lowering the tubes C C.—Contributed by W. F. A. McIntyre, New York City.

Preventing a Door from Sagging

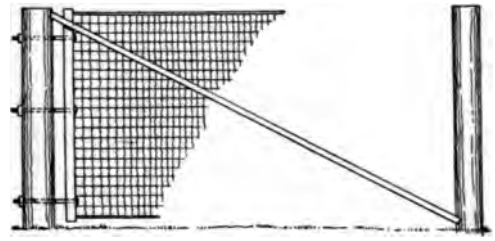
The sketch shows how I fixed a sagging door to keep it from sticking at the bottom. I cut out the corner of the door to receive a piece of metal, A, and a washer, D. The metal A was drilled and countersunk on the top end for three 3/16-in. wooden screws B, and a ⅜-in. hole drilled on the lower end to admit a larger screw, C, to hold the washer in place. The metal and washer were fastened to the edge of the door as shown, and a piece of metal set in flush on the threshold to support them. This is a good preventive for a door that is liable to freeze and stick at the bottom.—Contributed by Geo. Madsen, Chicago.



¶The lost motion in the steering gear of an automobile has led to many accidents. The wear will be detected by the wabble of the front wheels when passing over a rough road.

Keeping Poultry Wire Taut

Poultry netting will not always remain stretched the same as when first stapled to the posts, and for this reason

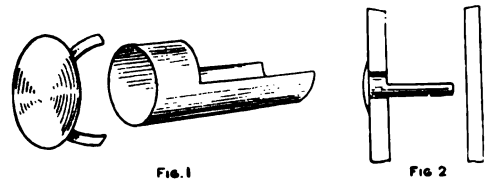


Stretcher Attached to Post

I made a tightener as shown in the sketch. The end of the netting was clamped between two boards, each 1 by 3 in. and as long as the netting is wide. Three ½-in. bolts, each 12 in. long, were flattened on one end and attached to the board at equal distances apart. The bolts were run through holes bored in the end post. The netting can be tightened at any time by turning up the nuts.—Contributed by Carl Lung, Cornelius, Oregon.

Soot Scoop for a Chimney

After removing the heating stove for the summer, the flue opening is covered with a round disk of metal having spring arms to hold it in place. The disadvantage of this device is that the soot gathers in the opening and falls out if the cap is slightly drawn away from its place. It is best to fasten the ends of the arms into the end of a piece of stovepipe and cut a portion of its top out as shown in

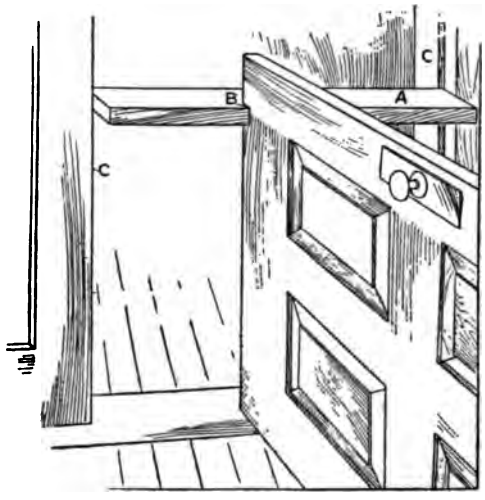


Scoop for Catching Soot

Fig. 1. This provides a scooplike device, Fig. 2, that will catch all the soot and retain it when taken from the flue opening.

Holder for Jointing Doors

The sketch shows a good method of holding a door while planing the edges. When the time comes to fit the doors



Door in Holder

in a new house, begin with the widest door. Fit a board, A, in between the door casings CC, and cut a notch, B, in the center. The board A can be easily removed for testing the door in the opening. After the widest door is in place, fit the board to the next largest door opening, and so on until the smallest door is finished. This will make it possible to use only one board, A, as it can be cut down to fit between the casings of the smaller openings.

A Shrinking "Kink"

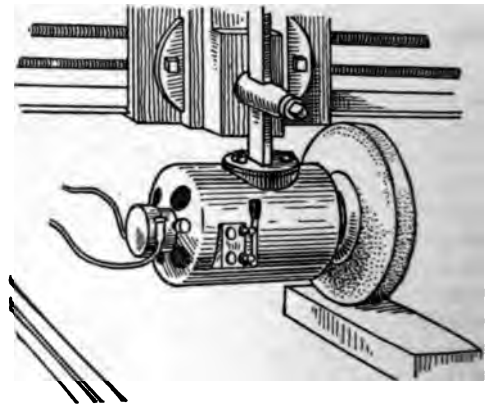
When shrinking a pulley, collar or ring on a shaft, it is well to have a shoulder to shove the ring up against for a positive stop. There are, however, cases where it is impossible to provide such a stop and where it is more a case of luck than anything else that the ring cools at the right spot, longitudinally, on the shaft. Lathe dogs are good for this purpose. The dog should be set so that when the ring butts up against it, it will be in the right location. But be careful not to put on a and find, after shrinking, that it is a prisoner between two rings or collars. More than one man has had to help himself out of such a hole by sawing the dog in two. Where such a thing occurs and the dog cannot be placed otherwise, use a regular split dog. It might be used in any case, for then no sawing or removing of newly shrunk pieces would be necessary.

Surface Grinding on a Planer

One factory, not large enough to warrant the purchase of a large surface grinder, says Factory, fitted up a small electric motor so that it could be used in a shaper or planer. In the factory a number of dies were made for the toy industry, the surface of the dies sometimes measuring 24 by 30 in. The small dies were machined on a shaper, the large ones on the planer, and after they had been hardened, there was no way to finish the surface.

To meet the requirements, the manager of this factory bought a ½-hp. motor and fitted it with a shank so it could be placed in the tool holder of the shaper or planer. The shank was welded to the plate and bolted to the motor as shown, then placed in the tool holder just the same as a regular cutting tool.

After setting the motor to the proper



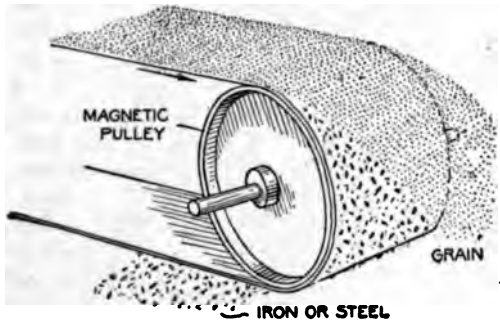
Grinder on a Planer Head

angle, the current was supplied to it by attaching a plug to the nearest lamp socket. The feed could be adjusted to

grind by setting the shaper or planer just as you would set it for the same purpose for an ordinary cutting tool.

Magnetic Separator for Grain

A magnetic separator for removing iron and steel from grain was recently described in an English journal. The separator consists of a steel pulley magnetized by a current of electricity run through coils placed within the rim. The belt conveyor running over the pulley carries the grain in the usual manner, but as the iron or steel particles reach the magnetic field, they are kept in close contact to the belt until



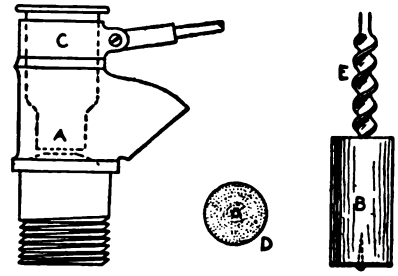
Separating Iron Particles from Grain

after it leaves the pulley on the under side. The sketch clearly illustrates the operation.

Grinding Valve Seats on Flush Tanks

Sometimes the interior valve seat A on a water closet flushing tank becomes corroded and rough after the tank has stood empty for a while and the seat requires grinding. In the absence of a lathe and proper tools, a simple tool for grinding such and similar interior valve seats, which are not accessible with ordinary tools, may be made by whittling a piece of hard wood, B, to such a diameter as to snugly fit the bore of the valve casing C, cutting it about 2 in. long. Tack a couple of pieces of emery cloth, D, to the end of the wood, or leather will do, with emery powder and oil used as an abrasive.

Place the valve seat casing in a vise and turn the wood plug with a brace, the bit E having been previously set into the wood far enough to turn it. In cities where meters are used, the

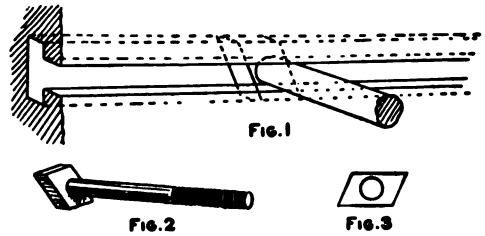


Grinder Made of Wood

amount of water flowing through for flushing may be cut down considerably by bending the float lever down sufficiently to cut off the supply valve when the flushing tank is about one-half full.

Bolt for T-Slot in Machine Tools

An ordinary square-headed bolt must be slid in from the end of a slot on machine tools, and if an intermediate fastening is necessary after the end bolts are placed, it is impossible to put an extra bolt in without removing the work. A bolt having a diamond shaped head should be made for this emergency. Such a bolt is shown in place in Fig. 1 and the shape of the



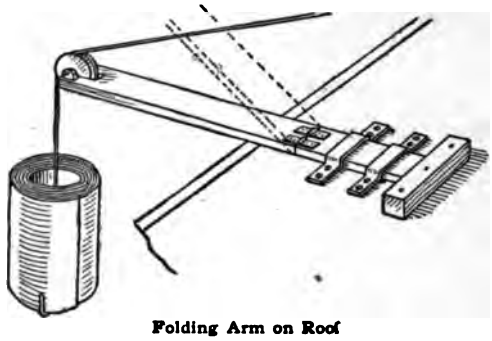
T-Slot Bolt Head

head in Figs. 2 and 3. The shape of the head prevents it from turning in the slot when the nut is tightened.—Contributed by Chester Purdy, Ghent, O.

¶A solution of 1 dr. sodium carbonate in 1 qt. of milk is a good cleaner for motor gloves.

Hand Hoist for Roof Workers

The sketch shows an important practical contrivance devised by a correspondent of Metal Worker to eliminate the friction produced when hoisting



Folding Arm on Roof

material up the side of a building, with the rope sliding along the edge of the roof. The dimensions given are: Roof piece, 3 ft. long, and the projecting part, 2 ft. long, 1½ in. thick and 6 in. wide. Two extra heavy strap hinges are used.

The projecting part is notched out at the end just enough to allow a heavy sheave wheel to pass in so that the axle can have sufficient support. The axle is held in place by straps bent to fit over it and screwed to the board by four wood-screws.

Instead of nailing the arm to the roof on every occasion of use, thereby filling it full of nail holes, two band-iron straps are permanently fastened to it by means of wood-screws. These straps are bent to the shape of the board, as shown, and nails are driven through the holes in the straps to the roof. As most of the stress is a backward push against the arm, it is well to nail a cleat to the back of the board.

The mode of operation is to lower the rope, and if it is a roll of tin being hoisted, to hook the rope on the tin as shown. By steady hauling, it will be found that the tin will be raised with surprisingly little exertion. This hauling is continued after the roll of tin strikes the wheel, for the main feature of having the arm hinged is to act like the boom of a derrick and raise ıll back on the roof.

Uses for Old Emery Wheels

Broken emery wheels should not be thrown away. There are many uses for them about the house or home workshop. Take pieces of different grades and grits; have a chunk as coarse as No. 40, a piece of No. 80 and a piece of No. 100 or 120, if possible. Every machine shop has broken wheels that can be had for the asking or at a nominal price, and they will save many a quarter in sharpening pocket knives, table hardware, scissors, pruning shears, hatchets, etc. For carpenters' tools, of course, a piece of grindstone is better than the machine-shop emery wheel, but soft, fine grades of the latter will do in a pinch. Automobilists will find a piece of emery wheel a pretty handy thing in their tool box for touching up commutator parts while on the road.

A Special Lathe Dog

Work being done on a lathe sometimes is continuously, or for quite a length of time, of the same nature. In removing the work from the centers for fitting or trying, much time is lost in removing the dog and again tightening it in place. A small piece of ¼-in. sheet iron or steel, cut and slotted as shown, and bolted to the faceplate through one of the slots will save much time. The work is driven as

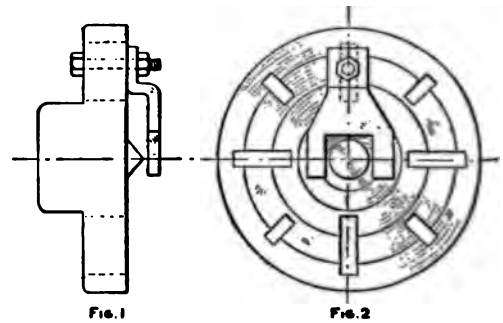


Fig. 1 Fig. 2

Dog Attached to Faceplate

well as with a dog and can be instantly removed and replaced without the time taken to remove a dog. A little time

spent in making a few of these with different sized slots will save the busy lathe man much time and trouble. For a rod bolt machine, it cannot be surpassed.—Contributed by F. W. Bently, Jr., Huron, S. D.

An Apple Picker

Apples for packing or for keeping any length of time should be carefully picked from the trees so they will not be bruised. As the climbing of the trees made the picking a tedious job, I devised a picker as shown in the sketch.



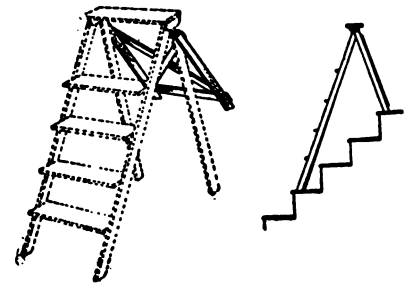
I took a pine stick, 12 ft. long, 2 in. wide, and ⅞ in. thick, and hinged a 2-ft. length of the same material to its side so that the ends were even, and placed an old-fashioned half-round tin cup on each strip so that their openings would register. A row of holes were punched around the edge so that a soft pad could be sewed in each cup.

A stout cord was attached to the short piece and run through a hole in the long piece allowing end enough to equal the length of the long strip. A piece of heavy clockspring was placed between the strips to keep them apart. The operation is obvious.—Contributed by W. D. Gay, Essex, Iowa.

Short Legs for a Stepladder

Make an attachment of the same stock and quality as the back support of the ladder and fasten it to the ladder as shown in the sketch. Use carriage bolts of the desired diameter and length, with the head on the inside and countersunk; put a washer and a nut on the opposite side and rivet the end of the bolt slightly so the nut will not come off. Use a good sash cord between the short legs and the main part of the ladder to keep them from spreading.

The length to make the attachment is easily determined by placing the ladder closed on any ordinary stairway

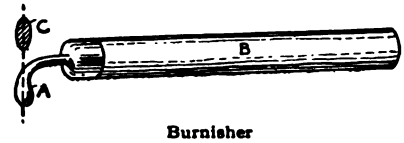


Legs Attached to Ladder

and measuring for the short legs. This attachment can be used on almost any stepladder.—Contributed by J. C. Polin, St. Paul, Minn.

Removing Dents from Automobile Brass Fixtures

Very often the automobile owner brings a brass lamp or a horn into the shop to have the dents removed. This is a very easy job, if a burnisher as shown in the sketch is used. The burnisher should be made of tool steel and highly polished after being hardened. A good many of the dents may be removed by placing a block of wood inside the article and tapping the outside with a wood mallet, but after this there still remain the fine wrinkles. These can be removed with the burnisher. Place a solid substance on the under side and with a little pres-



Burnisher

sure of the tool on the opposite side, the dents can be rubbed out. Tools of any desired shape can be made to fit the job in hand.

¶Do not throw away a leaky hot-water bottle or bag. Heat clean white sand in the oven and pour it into the bottle. Sand will remain hot longer than water.

Systematic Oiling of Automobiles

THOMAS P. HALLOCK

Working on the principle that an ounce of prevention is worth a pound of cure, I have devised an automatic reminder of the time and place to oil and grease my automobile that it may be kept in perfect running condition. The simplicity of my system is, I believe, its best recommendation and it could well be used in large garages—especially where motor trucks are kept—to prevent carelessness or forgetfulness on the part of chauffeurs and mechanics.

The extreme importance of proper lubrication of the many parts of the motor car is emphasized by the fact that one of the trade journals recently accounted for 14 locations for greasing and 28 locations for oiling a single type of car. During the course of one year, the author contended, 1,227 applications of oil and grease—in a regular succession of dates—ought to be made in these places.

I have found that the danger of running dry at any particular spot where oil should be applied does not lie so often in carelessness as it does in forgetting—though to forget is unquestionably evidence of lack of care in the business man of today. Next best to a perfect memory is a perfect system of memory aid. I could not decide to my satisfaction that the 1,000 or more applications of oil and grease would be faithfully given my car throughout the year, so I sought to simplify the problem by devising a schedule of oiling locations for certain dates in each week and month.

I took a large calendar and pasted at the top a diagram of my car, furnished by the manufacturer. On this diagram I marked—some manufacturers provide their diagrams already marked—each point where lubrication ought to be applied, and by a system of red and blue lettering I denoted whether oil or grease was the proper lubricant for this particular spot.

Then I made a schedule giving the name of each location prefixed with the red or blue letter which had already been assigned, and my key was complete. My next move was to begin with the first oiling date in the year, which I chose as Jan. 7. In the space where the figure representing this date was printed, for instance, I marked the following letters:

Red	Red	Blue
B	S	A
C	U	M
F	W	R
G	Z	LA
J	AA	
L	CA	
P	GA	
Q	HA	

This presented quite a bewildering appearance, but to me it meant quite clearly that on this date I should apply oil and grease as follows:

Red—Oil

B—Steering-knuckle bolts
C—Front-wheel bearings
F—Fan-bearing oiler
G—Starting-crank bearing
J—Valve-rod guides
L—Shock-absorber studs
P—Commutator oiler and greaser
Q—Crank-case filler and oil tank
S—Magneto oil cups and wells
U—Brake-pedal bearing
W—Brake and gear lever ratchets
Z—Brake fittings and connections
AA—Plate clutch housing
CA—Gear and brake lever shaft bearings
GA—Shock-absorber bearing studs
HA—Differential housing

Blue—Grease

A—Front-wheel hub caps
M—Steering-cross-tube greasers
R—Steering-case greasers
LA—Rear-axle outside greasers

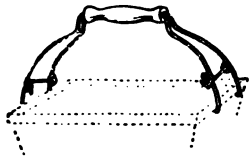
Certain of these same operations must be repeated daily, others weekly, and still others semiweekly and monthly, but, no matter how often my attention is required to each particular lubricating location in my car, I am sure to be reminded by my faithful calendar.

Since systematic lubrication is unquestionably an insurance on the life of my car, I have not counted the short time lost that I spent in marking my calendar. Exactly the same system,

prepared to fit the requirements, could be used in a garage where several different types of cars were kept, and the results would entirely warrant the adoption of this practice.

Detachable Peach-Basket Handle

A peach basket is rather an awkward thing to carry because it has no handle. A handle that will do for all sizes and kinds of baskets can be made as follows:

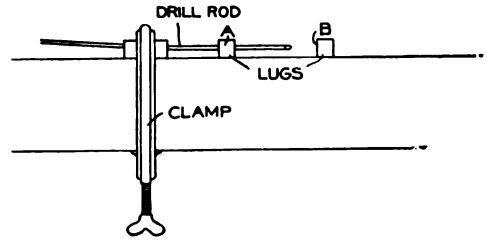


Procure the wood part of an old bucket bail and two pieces, each 3 ft. long, of galvanized wire and place them through the wood handle, allowing the ends to project evenly on both sides. Bend the ends as shown. Make two wire hooks and attach the ring of the hook in the ring of one wire and hook it in the ring of the other wire. This will spread the wires and give them stability while in use. When not in use the hooks can be unfastened and the handle brought into a smaller space. The turned-up ends of the long wires hook under the outside rim of the basket.—Contributed by Frank S. Henry, Hadden Heights, N. J.

Drilling Projecting Lugs

It often happens that one must drill holes that are so close to other parts, or have projecting parts in the way, as to make it impossible to get the chuck of the drill press or breast drill directly over the hole to be drilled. The usual way is to drill the hole on an angle and finish straight with a file, or to drill a larger hole than is necessary. Frequent examples of such holes are pin holes for doors on the side of machinery and other hardware products.

An alternate method is to use a length of drill rod formed into a drill point at one end and gripped in the chuck at the other. This is illustrated in the drawing, where A and B are the lugs on a casting to be drilled for a

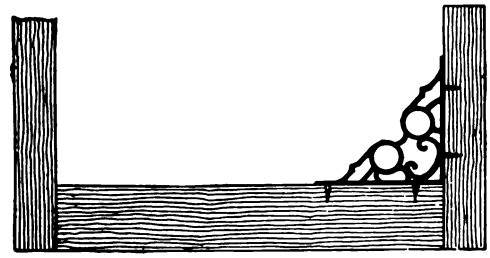


Grinding the Drill Rod

door hinge. Here a block is held on with a clamp and used for a guide for the drill rod. This block is first drilled the size of the rod and then countersunk at one end—the end the drill enters from the chuck. Sometimes two blocks are necessary. The drill should be supplied with lubricant at this point. Feeding must be done with care and not too fast or the rod will buckle.

Bracket Brace for a Sagging Door

Screen doors sagging on the opening side which causes them to rub on the floor as they are opened and shut may be repaired in the following manner: On the opposite side from the hinge and in the lower corner of the frame, place a small ornamental bracket which will not mar the appearance of the door and yet make it



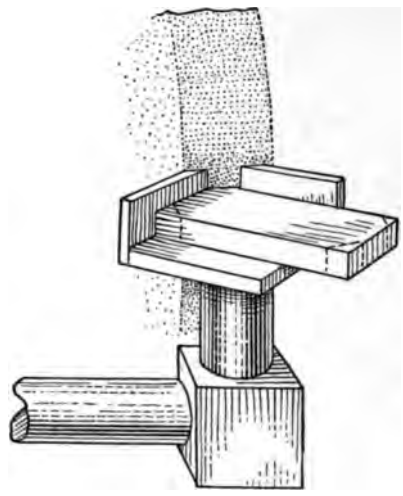
Bracket in Door Frame

perfectly rigid. Before placing the bracket, drive a small wedge under the door to hold it in the correct position.

¶Graphite should not be used on an engine timer as it will short-circuit the current.

Corner Grinding Tool

Several thousand rectangular pieces made in brass and steel had to be finished with the corners cut on an angle of 45 deg. as shown by the dotted lines



Tool Attached to Grinder

in the sketch. The way the corners were removed was by grinding, and the fixture used for holding the pieces to secure the proper angle consisted of an arm from the bracket for supporting the rest, both forming part of the ordinary grinder outfit.

A special rest was made by an upright having a surface square in shape and turned with one corner to the wheel. Two sides were attached to the square. A piece was placed on the flat surface and pushed against the turning wheel. The sides guided the pieces so that all corners were ground true.

Fluids for Drilling or Filing Glass

Several fluids are used in the operation of drilling or filing glass, of which vaseline oil and a solution of camphor in spirits of turpentine are the most general. A French scientist recommends a solution of 30 gr. of camphor and 1/5 of a fluid ounce of sweet almond or olive oil in 7 fl. oz. of benzine. This mixture will not deteriorate, renders filing and drilling easy, and can be removed from the glass by simply dipping the latter into benzine.

The vaseline oil is objectionable because it leaves the glass greasy, and the solution of camphor in spirits of turpentine, because of the disagreeable smell.

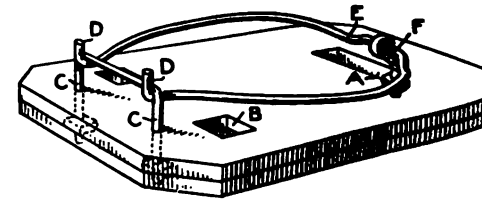
Repairing Broken Cogs in Pattern Gears

A good way to repair broken cogs in small wood spur or bevel-gear patterns without putting in new ones is to use a stiff paste of litharge mixed with beeswax. Drive some brads part way into the place to be built up, keeping their heads slightly below what will be the finished surface, and apply the mixture. When this gets hard, it can be shaped with a knife or chisel and sandpapered. If a coat of shellac is applied to such a cog, it will not stick in the sand.

Horseshoes for Marsh Land

Fit up the ordinary horseshoe with toe and heel, throwing the heels well out, says the Blacksmith and Wheelwright. Make the bottom of the marsh shoe of two thicknesses of ½-in. hard wood, crossing the grain of the boards to prevent splitting. Slots A and B are cut for the toe and heel calks to rest in. This will prevent the marsh shoe from slipping around on the horse's foot.

Make a staple of ⅜-in. round iron and thread each end about 3 in. long.



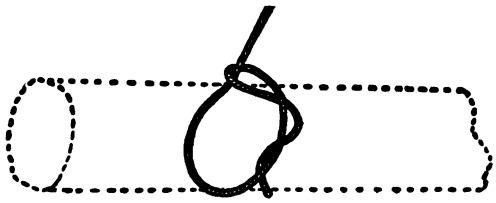
Marsh Land Horseshoes

The width of the staple will depend on the width of the shoe. The staple is fastened to the board by inserting the ends through holes bored at CC

Bend another piece of ⅜-in. round iron E in the shape shown to fit around the horse's foot about 2 in. below the hair. The ends DD are bent up to fasten into the staple. Forge an eye on a bolt to fit over the rod E and attach to the board at F.

A Timber Hitch

One of the most useful and easily tied and untied hitches or knots made with a rope is shown in the sketch. This tie is used extensively by sailors, but is little known among landsmen. It can be used for hoisting timbers, logs, boxes, barrels and in fact any



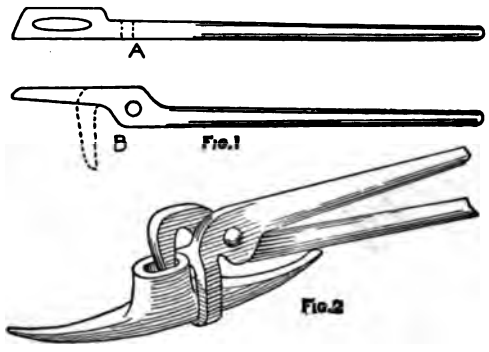
Hitch on a Log

article that a loop can be placed over. —Contributed by L. A. Gardner, Oakland, Cal.

Tongs for Handling Picks

In piecing picks with steel, when they have become too short and are worn down, a common pair of tongs will not hold them steady, and they will slip back from the taper on the pick while it is being hammered, says the American Blacksmith. A pair made like those shown in the sketch will give satisfaction, as it will hold the pick firmly and securely, no matter how much hammering is done on the metal.

The lower part of the tongs in the jaw part is first made in a ring (A, Fig. 1), which should be large enough when closed together to form a rectangular opening through which the end of the pick will pass all the way up to the eye. This is bent down at right angles and the other part, B, is forged as in the ordinary pair of tongs, after which it is bent down to go inside of the eye of the pick. The manner of holding a pick is shown in Fig. 2. The



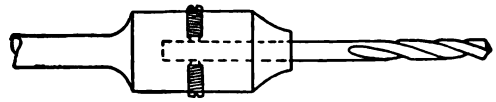
Pick Tongs

smith who has much of this kind of work to do will be well pleased with a pair of these tongs.

Holder for Broken Drills

The accompanying illustration shows a design of a holder for broken twist drills. The hole is bored the size of the drill and setscrews with rounded points are placed opposite each other. These enter the flutes of the drill and make a positive drive. The other end of the holder is turned to fit the chuck.

These holders soon pay for their making. In one instance, a new high-speed drill, costing $2, was broken off by carelessness right at the end of the flutes. If it had not been for the holder made for the drill, it would have been worthless, as when broken it would not run true or positive enough for the



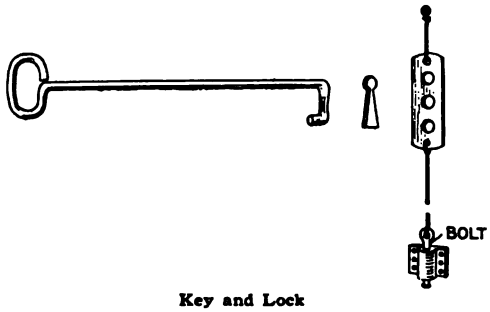
Drill in Holder

work. Fitted with the holder it ran every day for over three months.—Contributed by Donald A. Hampson, Middletown, N. Y.

¶Noseglasses can be held firmly to the nose by the use of powdered rosin. This is flesh colored and the heat will make the glasses stick so no ordinary wind will dislodge them.

Homemade Lock and Key

The illustration shows a simple fastening for a door that will keep out intruders better than the ordinary lock. The common locks are so much alike



Key and Lock

that a key may be found that will turn them. The fastening can be used on a door of which the key is lost, or as a double safeguard in locking the door. It may be made by attaching a bolt to the bottom of the door with a cord and a thin piece of wood with three or four holes in it that are near the keyhole as shown in the sketch.

A piece of $\frac{3}{16}$-in. wire is bent as shown for the key. It is made long enough to reach through the keyhole and past the block of wood. It is then pulled back so that the point will enter one of the holes in the wood. A turn of the key lifts the bolt. A more elaborate lock can be made of brass and corded wire. One turn of the cord around the screw head keeps the bolt from the keeper when not in use.—Contributed by Bert Hillyer, Chrome, New Jersey.

Cleaning Brick Walls

A solution of about 2 oz. of muriatic acid to 5 gal. of water makes a good wash for cleaning brick walls. This wash should be applied and the wall scrubbed down with a wire brush made for this purpose. Care should be taken to keep the solution from touching the hands or clothes.

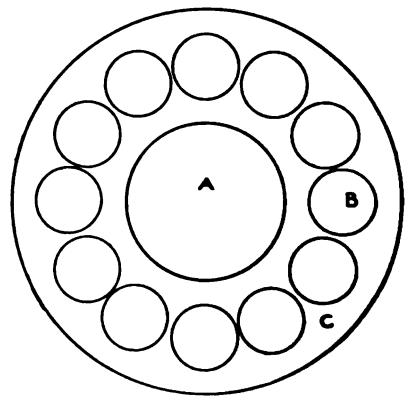
¶The main bearings of a lathe should be loosened when they run hot.

Thumbscrew on Lathe Dogs

For quick work on small things to be turned in a lathe, a thumbscrew put in place of the usual setscrew on a lathe dog is much more convenient. Only light chips can be taken, of course, as the leverage is not enough to tighten for a heavy cut. Small drills, reamers and counterbores are quickly put in and taken out of the lathe, and much time is saved, if there is a large number of pieces to be worked.—Contributed by Andrew Smith, New Haven, Conn.

Boring Large Holes with an Expansive Bit

Anyone having used an expansive bit by hand to bore a large hole finds it a difficult job, as the material taken out by the cutting edge on the regular screw feed requires more power than can be applied to the brace. A good method is as follows: If a hole 3 in. in diameter is to be bored, set the bit to 3 in. and fasten it in the brace so that the cutter is in line with the handle of the brace. Lay out the circles A and C and bore a series of holes B with a ½ or ⅝-in. bit to remove a part of the wood between A and C. Set the expansive bit in place and



Material Removed by Boring Small Holes

stand with the grain of the wood and turn with a slow steady pressure.—Contributed by W. A. Lane, Dallas, Texas.



A Water Heater

In places where the bath room adjoins the kitchen, and the gas stove and tub are in close proximity a simple and cheap bath-water heater may be arranged as shown in Fig. 1.

Make a cone-shaped coil similar to an old-fashioned beehive of ½-in. copper pipe. The base should be 8 in. in diameter to fit detachably over the stove burner. At the ends insert a garden-hose connection and solder in tightly. Connect the coil to the sink faucet with a piece of garden hose of the right length having the usual connections at each end. Use a similar piece of hose to connect the top of the coil with the bath tub. An efficient and continuous flow of hot bath water may be secured with this coil.

A piece of galvanized iron is shaped as shown in Fig. 2 and set over the coil to utilize all the heat and confine the gas flame within the coil. Slip hose connections would answer as well as metal connections, if a close fit is



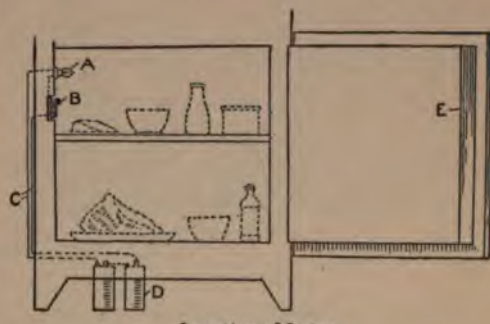
Fig. 1 Fig. 2

Copper Coil and Iron Cover

secured. The water should be turned on before lighting the burner. A decreased flow will give hotter water.—Contributed by Victor Labadie, Dallas, Texas.

Lighting Interior of Refrigerator

The place for the refrigerator in my home does not permit enough light to enter when the door is opened to



Location of Lamp

plainly see the articles within. This made it necessary to have a light of some kind, and I rigged up a very practical little device to light the interior when the door is opened. The lamp is a miniature, flashlight-type globe set in a miniature socket, fastened with screws on the wall inside of the refrigerator, where it will not be in the way.

The switch is an ordinary one-pole type, which is fastened to the refrigerator just inside the door with the handle projecting so that it will be pushed open by the shoulder on the door when this is closed. This prevents leaving the lamp burning thoughtlessly. The wires are carried through the wall or floor and connected to a battery of two dry cells beneath the refrigerator. —Contributed by Clarence G. Myers, Waterloo, Iowa.

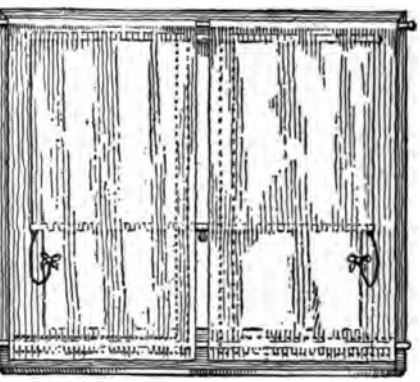
¶Filing babbitt is made easy by using a rod having a standard thread, newly cut. This will not fill up like an ordinary file.

Painting the Inside of a Rain Pipe

While painting the rain pipes on a house I thought of a way to paint the inside of the pipes. I procured a sponge large enough to fit the inside of the pipe and fastened a weighted cord to it. I then dropped the weight through the pipe and forced the sponge a few inches into the pipe, making a cavity large enough to hold paint. Fill the cavity with paint and pull the sponge by the cord slowly through the pipe. Place an old pail at the bottom to catch the surplus paint. This method will apply a coat of paint to the inside of the pipe that will preserve the metal as well as if painted with a brush. — Contributed by Ed. Borchik, Cleveland, O.

Emery Cloth Used in a Hacksaw Frame

The illustration shows an emery-cloth holder for polishing small places or round edges. It consists of a hack-saw frame and emery cloth. The cloth is cut ½ in. wide and the length of the saw blade. Punch a hole in the cloth ½ in. from each end. Procure some eyelets from a shoe store and rivet them in the holes. The cloth is shown at A in the sketch and one of the eyelets at B. The cloth is kept taut by the thumbscrew in the same way as drawing up the hacksaw blade. Strips of emery cloth in the various grades can be prepared and kept ready for use in the frame. — Contributed by Oscar Carlson, Tacoma, Wash.



Emery Cloth in Frame

FIG 1

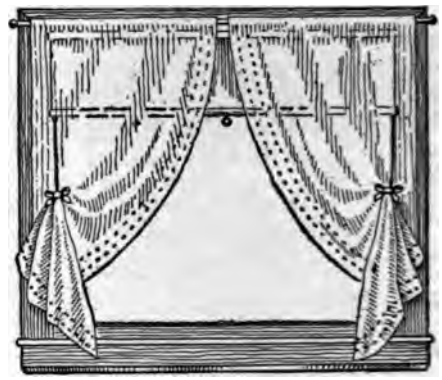


FIG.2

Curtains Tied to the End of the Shade

Lace Curtains Drawn Back with the Shade

An easy and convenient way of drawing back lace curtains is to attach them to the window shade as shown in the sketch. On bright days sufficient light will enter the room for reading when the shade is within 18 in. of being closed as shown in Fig. 1. On dark days, even with the shade to the top of the sash, I find the light insufficient, unless the lace curtains are drawn back, also. I accomplish the whole process by just raising the shade.

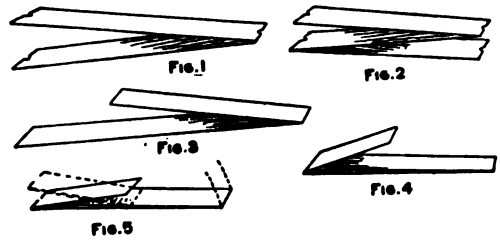
Attach a small screweye to the end of the bottom slat. Connect it with some part of the lace curtain with a cord in such a way that it will allow the shade to be closed entirely, and when raising the shade higher than shown in Fig. 1 it will draw the curtains back as though they were draped, as shown in Fig. 2. A bow of ribbon, artificial flowers or any other suitable ornament, may be placed where the cord is attached to the curtain.—Contributed by M. O. Henning, Swissvale, Pa.

Marking Divisions on Circumferences of Shafts

A method of finding certain equal divisions on the circumferences of shafts, body bands of gas and electric fixtures or on any cylindrical surface where dividers are not at hand or cannot easily be used, is shown in the sketch.

Cut a piece of paper about ½ in. in width, or smaller if necessary, and a little longer than the length of surface to be divided. Put the paper around the cylinder and cut it so that the ends just meet when the paper is pulled snugly to the surface, then fold and cut for the various divisions as follows:

To find the point diametrically opposite, fold as in Fig. 1 and cut notches

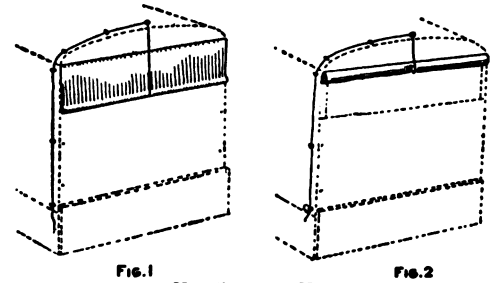


Strips of Paper Folded

out at the ends, then place the paper on the cylinder and mark the division in line with the fold or break on the surface through the holes. For three divisions fold the paper as shown in Fig. 2, and for four divisions, fold as shown in Fig. 1 and then double. For five divisions, fold as shown in Fig. 3 by lapping the end over two-thirds the way, then folding the single end back over the double part, Fig. 4, then doubling in the center, Fig. 5. With a little practice one can make these papers quite perfect with almost any number of divisions.—Contributed by G. T. Nelson, St. Paul, Minn.

Curtain Ventilator for a Van

When passing a large van one day I saw it was fitted with a clever curtain ventilator, evidently homemade, that could be raised and lowered at will from the side of the wagon. The usual curtain on the back end extended to within 6 or 8 in. of the top. Above this was hung a small independent

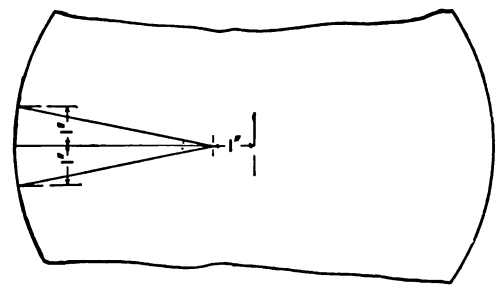


Ventilator on Van

curtain having an iron rod fitted in the hem so as to cause it to hang without flapping, and also to make it drop when the elevating cord is released. The cord is run through screweyes turned into the side of the van, as shown in Fig. 1. The curtain is shown drawn up in Fig. 2.—Contributed by Jas. M. Kane, Doylestown, Pa.

How to Cut a Cone-Shaped Kettle Cover

Cut the metal 1 in. larger in diameter than the hoop after the edge is turned. Mark a line starting 1 in. from the center and extend it to the edge. Mark two other lines starting from the same point and extending each to a point 1 in. on each side of the center line as shown in the sketch. Cut out the gore and turn the edge tapering from

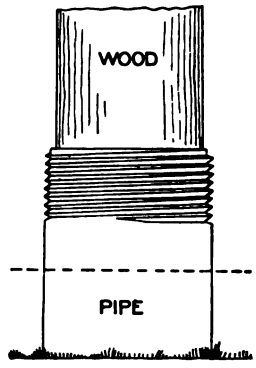


Size of Gore to be Cut

the circumference to the center on a hatchet stake. No edges are to be allowed.—Contributed by S. C. Shipman, Steubenville, O.

Removing Obstruction in a Well Casing

When putting down or driving the ordinary tubular wells it often happens that the pipe must pass through a stratum of soft sticky soil or clay.



The strainer or point on the bottom end of the pipe will become completely sealed up, thereby preventing the entrance of the water into the pipe, which naturally prevents the pump from raising the water.

Ordinarily it is the custom to pull out the pipe and clean the strainer to remedy the trouble, but having had trouble of this kind recently, it occurred to me that the obstruction might be removed without withdrawing the pipe.

When I found that the point was sealed, I procured a round piece of wood that would fit the inside of the pipe snugly, the wood being about 1 ft. in length. The pipe was filled with water to the point shown by the dotted line in the sketch, then the wood plunger was placed on top of the water and struck a sharp blow with a hammer. The obstruction was completely removed. The wood must be held or else the suction of the water will draw it into the pipe.—Contributed by E. S. Sheperd, Wichita, Kans.

Producing Marble Effects with Paint

Prepare the colors to be shown in the marble, using varnish for the vehicle and japan colors, reduced in turpentine, making glaze colors or varnish stains. Put in the ground color with lead and turpentine and allow it to dry, then apply different glaze colors so as to give a mottled, variegated effect. No care need to be taken for this part of the work, as the crudest efforts give the best results.

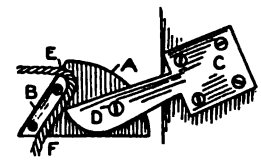
Dissolve a lump of potash the size of a pea in 1 oz. of kerosene, and while the glaze coat is fresh, dash small drops of this on the painted surface. This will separate the colors and blend them into very pretty marble effects.

By the exercise of a little taste and ingenuity surprising effects can be obtained. If spar varnish is used, it can be rubbed down and a coat of clear spar put on as a protector.

I have in my yard a pair of large garden urns made of plaster-of-paris marbleized to a malachite green, and these have stood the weather for four years.—Contributed by Wm. G. Browning, Los Angeles, Cal.

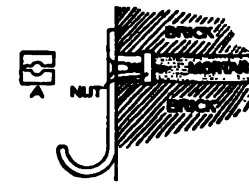
Clothesline Holder

The holder consists of a stationary piece, C, fastened to the post, on which the piece A is pivoted on the screw D, the piece A having a block B fastened to its edge as shown. The clothesline E is passed over the block B and drawn as taut as necessary, then it is gripped between the block B and the pointed end of C.—Contributed by H. Frisch, St. Louis, Mo.



Substitute for an Expansion Bolt

A very effective, simple and cheap method of fastening anything on brick walls where expansion bolts are not at hand is as follows: Take a common nut, ⅜ in. square, and cut it almost through with a hacksaw as shown at A. The size of the nut is governed by the thickness of the joint between the

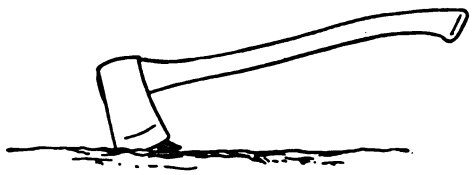


bricks or the size of the hole made in the wall. The size of the hole in the nut should be about the same diameter as the wood screw at a point about ¼ in. from the end.

After making a hole in the mortar between the bricks, the prepared nut is inserted and the screw driven into it. The screw will spread the parts of the nut and firmly hold it between the bricks. Be sure to have the cut in the nut parallel with the two bricks between which it is wedged.—Contributed by Gilbert A. Wehr, Baltimore, Maryland.

Removing a Stuck Ax

An easy way to remove an ax stuck in a log is to use the method shown in the sketch. A small chip is placed under the cutting edge of the ax on the handle end and a pressure on the



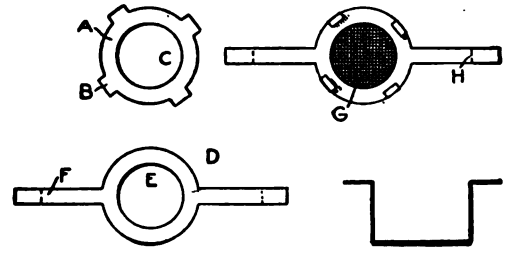
Ax in the Wood

handle will easily withdraw the blade. When the ax is stuck so that the entire edge is in the wood, raise the handle until a part of the edge is out above the surface.—Contributed by Fremont Leland, Chester, Conn.

Sink-Drain Strainer

Bath, sink and other drain pipes clog easily where the opening is left entirely open. A little device can be made at home to keep the drain pipes clean, and its cost will be practically nothing.

The illustration A shows a piece cut from tin having four projections B and an opening C. Another piece is cut as shown at D with projections F and an opening E the same size as the one at C. A small piece of screen is placed over the opening E and the projections B bent over the edge as in G. The long projections F are bent in the shape shown in the last sketch. The diameter of A and D should be a trifle less than the inside diameter of the drain opening.

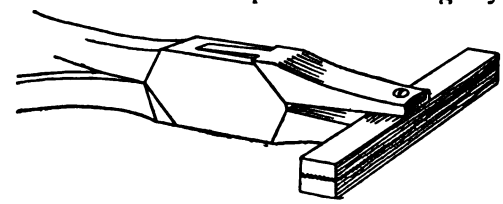


Parts of Strainer

Set the strainer in the opening of the drain and it will keep out all dirt that is apt to stop in the pipe. The wire screen can be easily replaced if it becomes worn.—Contributed by Maurice Baudier, New Orleans, La.

Stretcher for Covers

The ordinary way of stretching a piece of leather, canvas or other like covering is to pull the edges with the fingers. This will make an uneven surface, as the material cannot be drawn very tightly or at every part of the edge. The tool described herewith will be found quite useful for the home or shop. It is made of a pair of long-nosed pliers provided with a pair of notched clamps which are fastened with machine screws. In using the tool the edge of the cover is gripped between the clamps and then tightly



Notched Clamps in Pliers

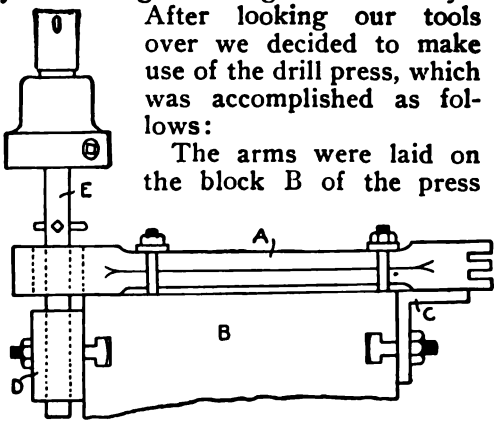
drawn and held while tacking the cover.—Contributed by Wm. Grotzinger, Baltimore, Md.

¶Approximately every 2 ft. of elevation is equal to 1 lb. pressure per square inch of water in pipes.

Boring in a Drill Press

Having some cast-iron arms to bore out for bushings, we naturally turned to the lathe, but found the pieces were just too big to swing over the ways. After looking our tools over we decided to make use of the drill press, which was accomplished as follows:

The arms were laid on the block B of the press



Boring Bar in Drill Chuck

and fastened down. One end was flat, the cross section was of irregular form, and under this the knee or angle plate C was bolted. This served to locate the arms at once and leveled them up by this surface so that all were duplicates. To the other side of the block was bolted a casting, D, having a 1-in. hole through it. A boring bar, E, was provided, placed in the chuck of the drill press, and the chuck centered over the hole D. The castings were then trued up by the bar and the boring begun. The job was done as well as in the lathe and almost as quickly.—Contributed by Donald A. Hampson, Middletown, N. Y.

Preventing the End Grain of Wood from Checking

Blocks of wood stored for use in turning are usually coated on the ends with oil to prevent cracks and checks during the drying-out process. A most desirable substitute for oil is paraffin melted and poured lightly over the ends. This is clean and not greasy to handle, answers every requirement and has found favor with the best woodworkers.

Cleaning Brass Fixtures

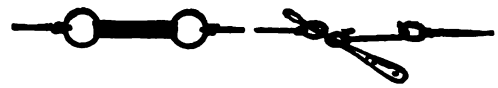
Brass rules used in a printing office, or brass fixtures of any kind, can be cleaned with acetic acid. This is the best and cheapest cleaner obtainable and is a harmless substance to use. Acetic acid is strong vinegar and can be purchased at any local drug store. The action against fly specks is hastened by the addition of salt to the acid. This substance is not harmful to the hands and can be used without injury while most other cleaners are harmful. The brass should be wiped with a dry cloth after the acid has removed the tarnish. The acid is also excellent for washing grease from glass articles, especially fly-specked windows.—Contributed by Loren Ward, Des Moines, Iowa.

Smooth Edge on a Drawing Board

Fasten a strip of smooth oilcloth of any color over the front edge of a drawing board with small tacks well driven down so that all the slivers and rough spots on the wood are covered. The oilcloth is smooth and does not wear the clothing, which makes it unnecessary to wear an apron.—Contributed by W. E. Morey, Chicago.

Substitute Turnbuckles for Aeroplanes

A very inexpensive way to fasten brace wires on gliders and aeroplanes is shown in the sketch. The device takes the place of turnbuckles. The



Fastening Brace Wires

rings that are attached in the line can be purchased from any local harness shop or hardware store. A wire loop with a ring and a screwdriver is used to draw the ends together as shown in the first part of the sketch. A piece of copper wire is then used to connect the rings as shown complete in the second part of the sketch. This sub-

stitute turnbuckle has been used with success on gliders carrying two men. —Contributed by Don Mac Kean, Alameda, Cal.

Thread-Cutting Dies

Thread-cutting dies cannot be expected to cut cleanly and well without rake. This rake or lack of it makes quite a difference between a cutting die and one that only scrapes the metal off. The cutting edge of each "land" of the die should be made an acute angle with a line passing through the center of the work and through the extreme point of the cutting edge. Avoid dies that cut both ways. Such dies do not cut cleanly or easily when either face is to the work and they must of necessity drag the idle cutting edges over the work and dull them. One set of bolt dies that had the cutting edges parallel to the center line, or rather if continued would form the centerline, never cut so well as might have been expected. They were ground out so that the cutting edge had rake and after that they always cut nicely.

Preventing Work Chattering in a Lathe

A simple method to prevent chattering in lathe work is as follows: The chatter marks may be removed by grinding the tool at an angle so that its broad edge will keep from falling into the old chatter marks.

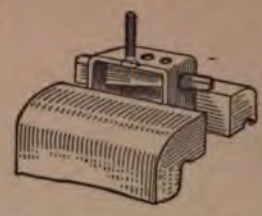


The line AB in the sketch represents the cutting edge of the tool as the first cut was taken, and the line CD is the slant that the tool should be ground so that its cutting edge will cut across the chatter marks.

¶Jumpers and overalls used when working about acid can be made impervious by rubbing the goods carefully all over with a piece of beeswax or paraffin, and ironing with a warm smoothing iron.

Holding Screws while Filing

A clamp for holding screws while filing the ends can be made of a ¾ by ⅛-in. strip of steel about 6 in. long and a metal wedge. The strip of steel is bent U-shaped and notches are cut for the wedge. Holes are drilled in the top for different-sized screws. The manner of using the clamp is shown in the sketch. —Contributed by I. B. Spittel, Baltimore, Md.



Gaskets for Automobile Transmission

Cut from a piece of good, smooth and medium-weight brown paper the shape of the gasket and soak it in cylinder oil. Place the gasket in position and draw the parts together. If this method is properly carried out, an oil-tight joint, one that will hold for a considerable length of time, will be secured.—R. B. Hollaway, Lydon, Vermont.

Cutting Brass Tubes

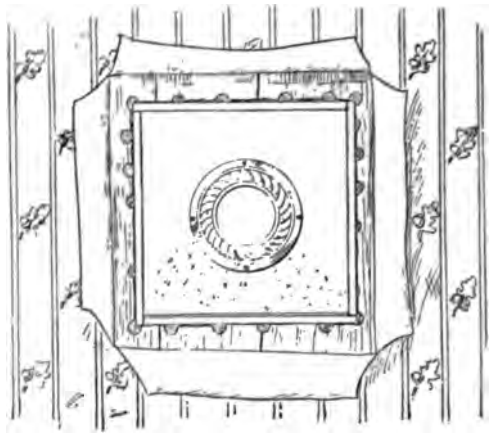
When cutting brass tubes by hand, use the back of the hacksaw blade held in the ordinary frame. This cuts very fast and works fully as well as a regular tube-cutting saw on very light tubes. Tubing will collapse when held in a vise unless it is filled or held in circular jaws. To put a piece of round steel into the tube is good, and it need not fit closer than $\frac{1}{32}$ in., for the elasticity of the tube will make up for the difference. Stock within this limit is usually at hand.

For flaring the ends of brass tubes, punches and dies are usually necessary, but if the flare does not have to be very great or too accurate, it can be accomplished by the use of a punch, or punches, alone.

¶Always use a lead or soft-faced hammer to drive out arbors.

Protecting a Wood Partition Around a Stovepipe

The sketch shows a very satisfactory method of protecting a thin board partition through which a stovepipe is passed. A square, 14 in. each way, is



Asbestos Filling

marked on the wall where the pipe is to pass through and the wallpaper cut with a sharp knife in such a way that it will turn back and expose the boards. Bore sufficient holes on the lines of the square to enable one to cut it out with a keyhole saw or ordinary handsaw.

Place a piece of asbestos board that is about ⅛ in. thick in the space where the boards were removed. The asbestos can be obtained at any hardware store. Fasten the board on all sides with eight small pine strips, each about ⅜ in. thick and of a length to make a neat double frame which can be held secure by a few nails or screws. Turn the wallpaper back and paste in place, or put on new paper around the frame, if the old paper has been damaged. Cut a round hole, a little larger than the stovepipe, in the asbestos before fastening it in the partition.

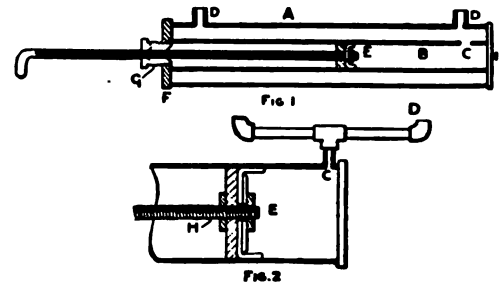
Procure a couple of tin stovepipe collars and lay them down together evenly and punch four or more small holes in their rims. Fasten the collars, one on each side of the asbestos board, over the hole with roundhead stove bolts. The stovepipe joint is run through the collars. This will make an arrangement that will be a safe one, and, if well done, a neat appearing job in a situation where it would be impossible to use a chimney ring.—Contributed by J. G. Allshouse, Avonmore, Pa.

Pressure-Gauge Tester

Every engineer, stationary or marine, can easily make the pressure-gauge tester shown in the sketch. The cost for the material will be small, and, although not so elaborate as the factory-made article, it will give first-class results.

The main body A is a piece of brass tubing, 12 in. long and 1½ in. in diameter. Two holes are drilled on one side, one at each end, and fitted with two ¼-in. pipe couplings, DD, which are soldered in place. Another brass tube B, 12 in. long and 1 in. in diameter, having a hole in it at C, is fastened with the tube A on a solid disk, I. A 1½-in. washer, F, with a hole the same size as the inside tube is soldered on the other end of the tubes. The hole in the washer is threaded to receive the bushing G, which has a bolt with a long thread to fit its internal threads. An iron washer and a good cup leather is attached to the end of the rod at E.

Fill the tubes with water and place a test gauge on one of the openings D and a gauge to be tested on the



Details of the Tester

other opening D. Before filling with water, the piston E should be at the washer end F. Turn the rod to make a pressure on the water. The number

of pounds pressure can be raised as desired.

In Fig. 2 is shown a single tube tester which is very simple. Its construction can be understood by the sketch. As high as 300 lb. pressure can be obtained with a few turns of the rod.—Contributed by Jas. E. Noble, Toronto, Can.

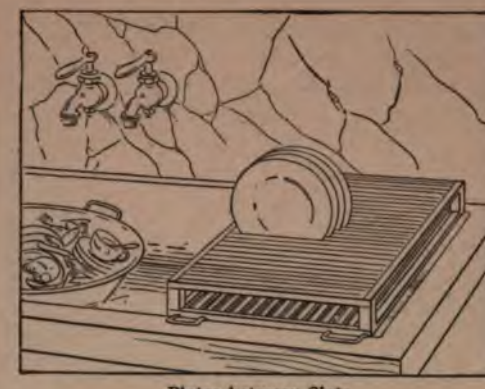
Ink Well for a Lettering Pen

The sketch shows an ordinary drawing-ink bottle filled with cement up to the neck, leaving a very small space at the top for ink. The advantage of this well, which is for use with the lettering pen, is that the pen need be only dipped in the ink a short distance, avoiding the smearing of ink on the pen holder, as is usually the case. The cement filling makes a heavy paper weight of the bottle, which will not easily tip over. The stopper should be cut as short as practicable so that it will not limit the ink space. While the capacity is small, it is sufficient for ordinary work, as the lettering does not require much ink.—Contributed by J. J. O'Brien, Buffalo, N. Y.



Drain Board for a Sink

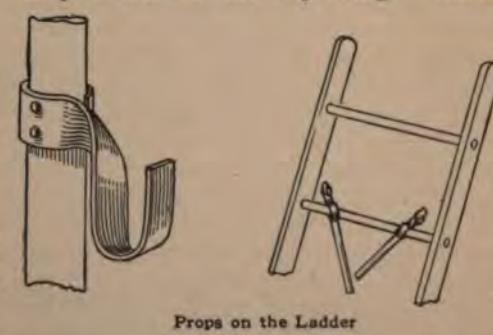
The simple drain board shown in the sketch is a great kitchen help. It consists of two frames of pine strips each 1 ft. wide and just long enough to fit across the sink. Nail the cross strips far enough apart to allow a plate to stand upright. Reverse the frames so that the strips in one frame will be at right angles to those in the other. Make four uprights about 2 in. high to support the corners and keep the two frames apart. In washing dishes place them on this drainer and pour boiling water over them. No other drying is necessary. The end of the board nearest the wall may be hinged and when not in use it is hooked up out of the way.



Plates between Slats

Ladder Props

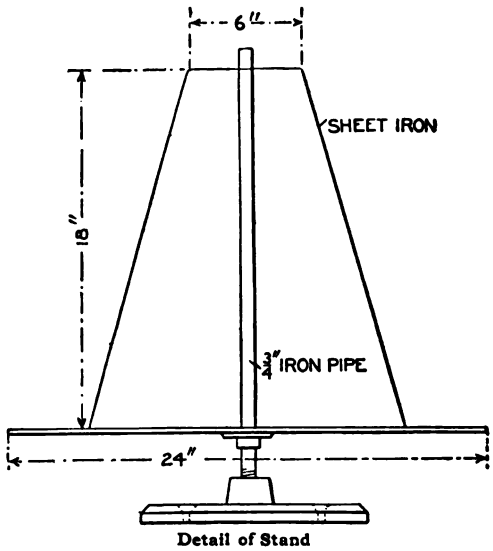
It is often necessary for the owner of a house or garden to do some work that requires a ladder. Most ladders are heavy and hard to handle. The illustration shows a light ladder that can be placed anywhere alone or against uneven surfaces. The two props, which extend to the ground, are detachable and can be set up at any angle. The hooks are easily made by any blacksmith and riveted to the poles. They are set under any rung and, when climbing the ladder, it will stay where it is placed. The climber need not fear falling headlong, even though he may stand on the top rung. When gathering fruit, this ladder can be set against any limb without danger of breaking the branches.—Contributed by Lou Kostelak, Stamford, Conn.



Props on the Ladder

Stand for Holding Coiled Wire

A stand for holding coiled wire in various sizes is shown in the sketch. The stand is suitable for the shop or



Detail of Stand

salesroom. Such a stand will hold a coil of wire and keep it from becoming tangled as the wire is used or sold.—Contributed by Peter J. Theisen, Denver, Colo.

How to Prevent Motorcycle Belts from Slipping

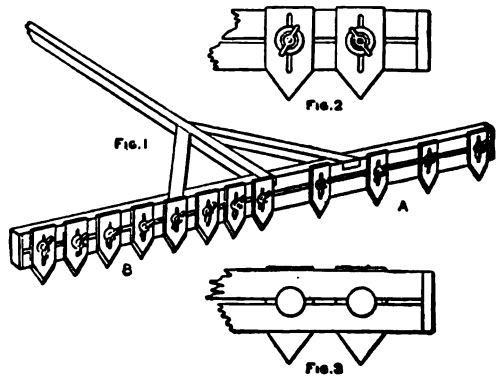
Having had considerable trouble with flat belts slipping on motorcycle engine pulleys owing to dust and dry surfaces, and after trying various kinds of dressing and building up the metal surface with friction tape, leather, rubber, etc., to increase the friction, I used the following method with better results: A strip of canvas was cut to fit in between the flanges of the driving pulley, thoroughly soaked in good glue, and wound tightly on the pulley surface until it consisted of six layers. After this dried, it gave excellent results. The band wears well and increases the friction between the surfaces, and it also allows the driving belt to run with less tension.—Contributed by Geo. Forest, Crystal Lake, Illinois.

Test of Humidity in Living Rooms

The French Journal de la Santé (Sanitation or Health Journal) gives the following simple test for determining whether or not the humidity of a building unfits it for habitation. Place a known quantity, say 2 or 3 lb., of newly slaked lime in the suspected apartment, closing the doors and windows hermetically as in disinfecting it, and after 24 hours weigh the lime again. If it has increased in weight one per cent or more, the apartment should be pronounced insanitary.

An Adjustable Garden Marker

The adjustable marker is made on the same principle as the ordinary garden rake or marker with the exception of the teeth, which can be set at any distance apart (Fig. 1). The part holding the teeth consists of two strips of wood, 3 ft. long, 1½ in. wide, and ⅝ in. thick, fastened at the ends so that they will have a space between them for bolts. The teeth or markers are fastened with ⅜-in. bolts having washers and thumbnuts. These are shown in Fig. 2. The opposite side of the strips with the bolt heads is shown in Fig. 3. The teeth can be set from ¼ in. to 3 ft. apart. The teeth are shown set 4½ in. apart at A and 2¼



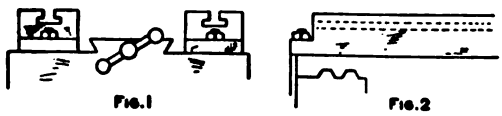
Sliding Markers

in. at B. The markers not in use can be raised up so the points will be on a level with the lower edges of the bottom strip.—Contributed by E. R. Zehner, Easton, Pa.

Lathe Parallels

For boring, facing and special lathe work, a pair of parallels such as shown in the sketch is quite useful. Reference to the sketch shows that the parallels are provided at each end with a foot through which bolts are passed to secure them to the lathe carriage. A T-slot is cut in the top to provide a way for clamping the work to the parallels quickly and securely. If both parallel castings are planed up alike, work set on them which must be bored parallel to a given face is directly in line with the cut of a lathe.

When a large number of pieces of the same kind are to be machined, it will pay to make a special plate to fit them and bolt it to the lathe parallels. Cylinders, bearings and work too large to



Parallels on Lathe Carriage

swing on a faceplate may be bored and faced with this aid.—Contributed by Donald A. Hampson, Middletown, New York.

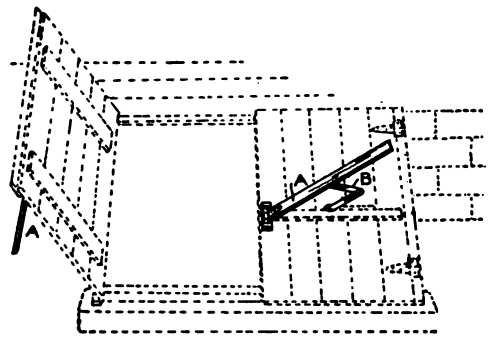
Keeping Vermin out of Beehives

Mice and ants can be kept from entering beehives by setting the hives on the bottoms of inverted quart bottles whose necks are set in the ground. Be sure to keep the grass or weeds cut close to the ground about each hive.—Contributed by Paul Woodward, Rodney, Iowa.

Cellar-Door Support

The illustration shows a self-opening and self-closing support for a cellar door. One-half of the door is shown opened and resting on the support A. The other one-half shows the support fastened in place. It is very simple to make and attach.

Use a strip of wood for the support, 7/8 by 2 in., with the required length to allow the door to rest at the height wanted when open. Fasten two blocks with screws, one on each door as shown, and attach a support to each

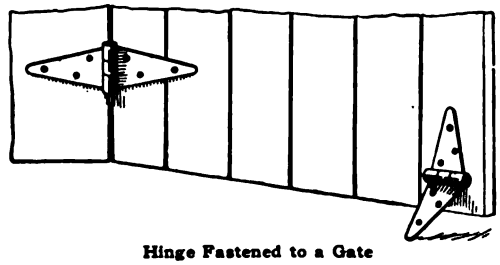


Folding Support

block with a tee hinge. The folding bracket B is easily made of a piece of hoop iron. The support will lay flat on the door when it is closed but will open up to the right position for a support as soon as the door is opened. —Contributed by W. A. Proctor, Cleftondale, Mass.

Hinge Stop on a Gate

An ordinary gate or barndoor can be kept partly open or held in any position against a wind or draft by the use of a stop as shown in the sketch. The stop is made from an ordinary hinge which has only one wing fastened to the lower part of the door or gate. The loose wing catches on the floor, ground



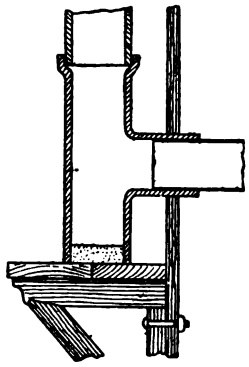
Hinge Fastened to a Gate

or cement walk. When not in use it is turned up against the gate.—Contributed by W. E. Cleveland, Chicago.

¶After cutting a taper on a lathe, do not forget to reset the tail stock.

Fireproof Chimney for Frame Houses

In a mining camp where many fires were caused by defective chimneys the one described herewith was adopted as the best and safest kind for a frame house. It finally became compulsory to have every frame house equipped with this chimney. This style of chimney is inexpensive and the parts can be purchased in almost any little country place.



A bracket is made and fastened to the outside of the wall on which a tee joint of terra-cotta sewer pipe is set and a bottom of cement put in on the boards. The tee opening extends through the wall and is used for the stovepipe opening. The chimney is then built up as high as desired with sewer pipe, the joints being well cemented.—Contributed by W. A. Lane, El Paso, Texas.

Testing Lubricating Oils

Place one drop of each oil to be tested on a piece of glass so that the drops will be in a line at one end. The glass should be about 30 in. long with a width sufficient to hold the number of drops without their mixing. Raise the end on which the drops were placed, about 6 or 8 in., to form an inclined plane. The oil will run down this plane. An oil having a light body runs and dries quickly, but an oil that has both a body and a free flow will be readily detected by this test. An oil may have a good body and yet may have a tendency to gum badly, which quality will also be detected on the glass. The oils should be protected from dust while these tests are being

Furniture Polish

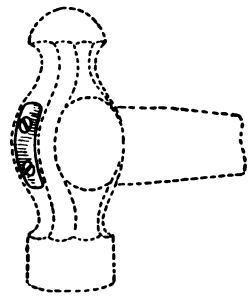
The following formula makes an excellent creamy furniture polish:

Animal oil soap	1 oz.
Solution of potassium hydroxide	5 oz.
Beeswax	1 lb.
Oil of turpentine	3 pt.
Water enough to make	5 pt.

Dissolve the soap in the lye with the aid of heat; add this solution all at once to the warm solution of wax in the oil, says the Druggists' Circular. Beat the mixture until a smooth cream is formed, and gradually beat in the water until the whole is completely emulsified.

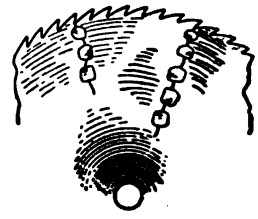
Fastening Hammer Handles

The illustration shows a method used by a correspondent of American Blacksmith to keep hammers from coming loose on handles. The hammer is first set on the handle and then it is wedged as tightly as possible. Two $\frac{1}{16}$-in. holes are drilled in the end of the wood and two large wood screws driven into the holes. The screws never come out and the hammer head does not come loose.



Electric Welding of Metal Saws

The installation of a cold-metal saw in a factory called for an operator, and the man selected was unskilled in the use of the machine. The saws used were ¼ in. thick and 3 ft. in diameter. Three of the saws were broken by the workman. One of the saws had a crack 4½ in. in length from the cir-



cumference. This was placed on an electric welding machine and a piece about the size of a silver quarter broken from a $\frac{1}{16}$-in. thick metal saw placed on each side of the crack. These welds were made about 1 in. apart. The current was used on the fourth power. The surplus metal was chipped off and the surface ground.

Another saw had six cracks all running toward the center from the outside. They were all treated in the same manner. This method was used after an unsuccessful attempt to join the break by brazing. — Contributed by John B. Roberts, Pittsburg, Pa.

Adjustable Mirror

A flat piece of iron, A, Fig. 1, 6 ft. long, ½ in. thick and 1 in. wide, is attached to the wall or window casing with a screw. The mirror B is attached



Fig. 1 Fig. 2

Mirror Slides on Bar

to the iron bar by a clasp on the back as shown in Fig. 2. The object of such a device is to adjust the mirror to accommodate different heights. This device will be found quite convenient where there are small children. —Contributed by Milton O. Freeman, Ghent, O.

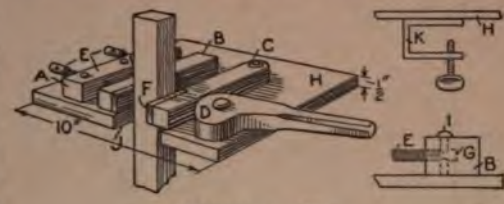
Cementing Brass to Glass

An elastic cement for holding brass to glass can be made by mixing together with a gentle heat 5 oz. of rosin and 1 oz. of beeswax, then stirring in 1 oz. of dry Venetian red slowly, after which take from the fire and let cool. This is used as a cement.

¶Stains on gold and silver can be removed by immersing in a solution of cyanide of potassium, ½ oz., rain water, 1 pt., and brushing off with prepared chalk.

Vise for a Drill Press

When a number of bars of a uniform size are to be drilled, the vise shown in the sketch is a great time saver, as



Quick Acting Vise

one movement of the lever D tightens or releases instantly after setting the jaws B and C to the right size by the screws E which turn in the piece A. The pieces A, B and C should be 8 in. long and 1½ in. square. The pieces B and C are fitted with steel jaws F. The piece A is riveted to the base plate H. The ends of the screws E have grooves turned in them to admit a part of the rivet I so that the jaw B may be moved either way with the screw. The clamp K is attached to H so that the whole device can be quickly fastened to the drill table. — Contributed by J. W. Vener, Boston, Mass.

Revolving Drawing Board

In lettering certain kinds of work on an ordinary drawing board the draftsman must move around the board to do credit to his work. He either walks around the board or moves it to get at the work. If the drawing board is attached to a revolving stool, as shown in the sketch, the board can be turned

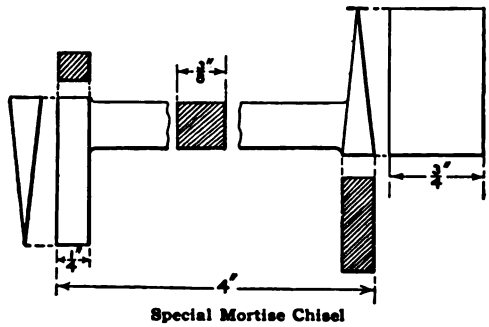


Drawing Board on Revolving Stool

to any angle desired, and also elevated or lowered to a convenient height.— Contributed by F. E. Robertson, College Station, Texas.

Chisel for Cutting Mortises in Cabinet Drawers

When fitting locks in drawers on cabinet work, it is necessary to cut a mortise in the rail above the drawer



Special Mortise Chisel

end to receive the bolt of the lock. If the drawer is not a very deep one, the work becomes difficult, as the space between the rails is too small to work an ordinary wood chisel. The sketch shows the dimensions and shape of a tool that will do the work. It is made of tool steel and sharpened like a chisel.—Contributed by F. O. Andersen, San Francisco, Cal.

Making Brass Letters in Steel

The letters, name or numbers are cut in the steel surface with acid or steel letter punches and the indentation filled with brass. This is accomplished by heating the prepared steel red-hot in a brazing furnace, forge or kitchen range, and flowing spelter in the indentations. Use borax as a flux and a piece of brass wire for the spelter. The wire can be handled much easier than the regular brazing spelter. Be sure to braze a good thick coat of brass on the lettered surface. After cooling, the surplus brass is filed away from the top of the article and the steel surface polished. The indentations will be filled with brass.

Tools may be marked in this manner. If used for paper weights, the steel surfaces must be lacquered after polishing to keep them from tarnishing.—Contributed by D. O. C. Kersten, Detroit, Mich.

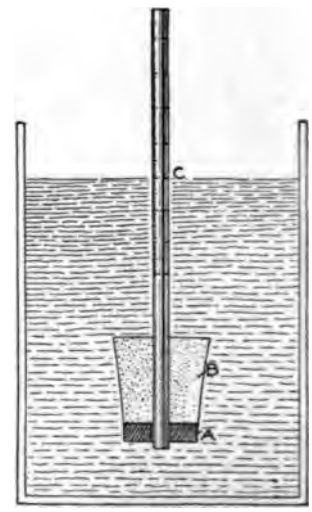
Automobile Cooling Alcohol Mixtures Kept at Proper Strength

According to law, denatured alcohol is the "grain alcohol of commerce rendered unfit for beverages." The freezing point of this alcohol is about 160 deg. F., says the Automobile. When added to water in various proportions, it lowers the freezing point of the water. An approximation of the freezing points of various proportions of water and denatured alcohol is given in the following table:

Proportion of water in gallons	Proportion of denatured alcohol in quarts	Freezing point in deg. Fahr.
1	1	10
1	1.5	5
1	2.5	−20
1	4	−35

In order to maintain the solution at proper strength, it may be necessary from time to time to add one or other of the constituents to keep the proper proportions. If it is safe to employ a mixture holding 2.5 quarts of denatured alcohol to the gallon of water, it is advisable to maintain this proportion.

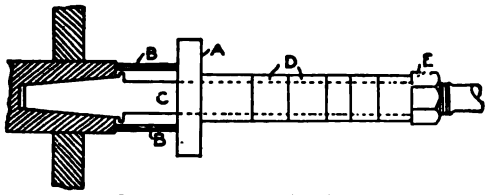
A very simple way of observing the relation of alcohol to water is to mix, say, 2½ qt. of denatured alcohol with one gallon of water and then by means of a weighted float with a stem on it find out how low the float sinks in the solution and mark this point on the stem as shown at C. With a good-sized cork, B, a long slender stick of wood and a washer, A, it would be possible to make a measuring instrument in five minutes that will serve every purpose. Calibrate the instrument by finding



out how low it will sink into the solution, and mark the place. After this, all that has to be done is to draw off some of the solution from the radiator in a bucket and drop the instrument into the liquid, noting how low it will sink. If it does not sink down to the mark, add alcohol until it will; if it sinks below the mark, add water to float it up to the same.

Removing a Milling-Machine Arbor

The arbor of a small milling machine had become so firmly lodged in the taper hole that it was impossible to drive out with a hammer from the back, so I had to use some other method to loosen the shank. I stripped the arbor of all its bushings and put on a cutter,



Drawing Arbor with a Nut

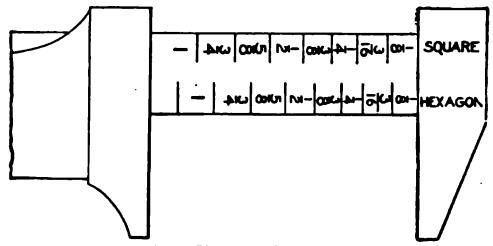
A, then placed two pieces of steel, B, of equal length, between the cutter and the end of the spindle, one on each side of the arbor C. The pieces of steel were long enough to hold the cutter some distance from the shoulder of the arbor. The arbor was filled to the end with bushings, D, and the nut, E, screwed on them. The pressure removed the arbor with ease. Be careful to use a cutter heavy enough to stand the pressure.—Contributed by C. H. Rauschenberg, Greenville, Pa.

How to Bend Tubing or Pipe

Heat the piece where the bend is to be made to a good red heat, then put it in a vise or other convenient place and bend while a stream of water is turned on the inside of the bend. Pipe can be bent in almost any angle in this manner without kinking or breaking.—Contributed by Irl R. Hicks, Hallsville, Mo.

Scale on a Monkey Wrench

A scale stamped on the side of a wrench provides a means for setting the jaws so they will slip on a square

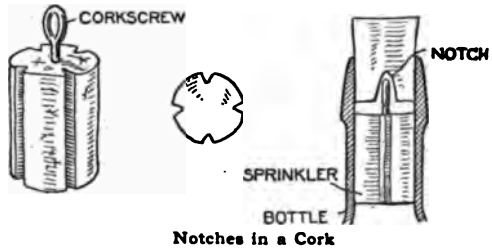


Nut Sizes on Wrench

or hexagon nut without fitting it to the facets. This makes it quite handy for turning nuts in dark and unhandy places. The scale may be marked after setting the jaws on standard square and hexagon nuts of the different sizes. The fractions designate the size of the bolt in fractional parts of an inch.—Contributed by Cecil Richards, Wheeling, W. Va.

A Sprinkler Bottle Stopper

A sprinkling stopper to fit any size bottle can be made by cutting four long notches in a cork as shown in the sketch. Force this notched cork well down in the neck of the bottle after first turning in a small corkscrew so that it can be easily withdrawn when the bottle is to be refilled. Cut a notch



Notches in a Cork

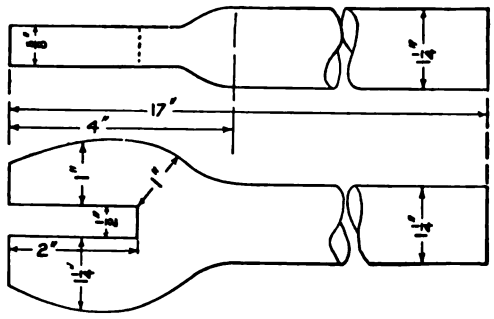
in another cork so as to allow it to fit over the corkscrew. This last cork is to close the bottle when it is not in use.

¶Do not flood the bearings of a magneto with oil, a few drops once a month is sufficient.

A Pipe-Ripping Tool

The sketch herewith illustrates a very handy tool for ripping wrought-iron pipe. It can be made by any blacksmith at very little cost.

This tool was originally intended for

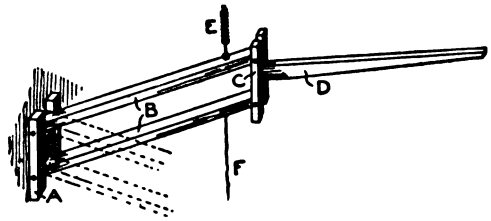


Details of Ripping Tool

breaking 3-in. wrought-iron pipe which contained a cable. The old method of removing the cable was to saw a piece off the side of the pipe and slip the cable out. The ripping tool is held against the open end of the pipe, which enters the opening in the jaws freely. A hard pull upward on the handle will tear a large piece free. One man can rip more pipe in a half hour with this simple tool than he could saw in a day. Such a tool is also of value to plumbers, steam fitters and electricians.—Contributed by G. M. Peterson, Buffalo, New York.

Overhead Clothes Rack

The accompanying illustration shows an overhead rack that is designed to lift up out of the way articles placed



Rack above One's Head

upon it to dry, thus economizing room and using wasted space. The rack can be placed over the range in a kitchen to receive the tea towels and dishcloths and as they are directly above the heat that rises from the stove, they will dry in a few minutes.

The base A is 1 in. thick, 3 in. wide and 8 in. long, mortised 1½ in. deep by $\frac{5}{16}$ in. wide on each end. The piece C is 1½ in. thick, 2 in. wide and 8 in. long, mortised in the same manner as the base, with the addition of a central mortise, 3 in. long, ½ in. wide and 1½ in. deep, to accommodate the end piece D. The two pieces B are ½ in. thick, 1 in. wide and 30 in. long with a $\frac{7}{32}$-in. hole bored 1 in. from each end. The piece D is ½ in. thick by 3 in. wide at one end and 1½ in. at the other, and 36 in. long.

To assemble and hang this rack, first screw the base to the wall at the desired place and about 6½ or 7 ft. from the floor. Fasten the pieces B into the mortises in A with a $\frac{5}{16}$-in. by 3¼-in. bolt in each. Insert the piece D into the central mortise of the piece C and nail on each side and back with small nails. Fasten the loose ends of the pieces B into the mortises in C with $\frac{5}{16}$-in. by 1¾-in. bolts and fasten a screweye in each of the pieces B, as shown in the sketch. One end of a spring taken from an old shade roller is attached to the upper screweye and the other end is fastened to a screweye turned into the ceiling, after first drawing the spring up with sufficient tension to hold the rack at the desired place. A cord is attached to the lower screweye so that the rack may be pulled down to place the clothes on it for drying.

If it is desired to hang the rack over the center of a stove or table, simply hinge the piece A to the wall with a small pair of butts, then as the rack is pulled down it can be swung around to the side of the stove or table and brought within easy reach.—Contributed by H. J. Tinsley, Lancaster, Ky.

¶Automobile tires should be inspected after every long run and the cuts attended to immediately.

Fumigating School Books

Many times children are found in school who are suffering from some contagious disease and who are not sick enough to stay at home. They are a source of danger as well as the books and other articles which have been used by them. I devised a way to fumigate these articles whereby they can be disinfected at once and at very little cost.

The device consists of a can—an empty carbide can is very good for this purpose—with a screw top and a place for a candle in the bottom. A carbide can is about 2½ ft. high and 15 in. in diameter. The top of one of these cans can be screwed down tightly to keep in the gas. Formaldehyde candles are used for fumigating. The candles are set in a small tin about 1½ in. in diameter and ½ in. in height. These can be obtained at a slight cost and each one is sufficient to fumigate 1,000 cu. ft.

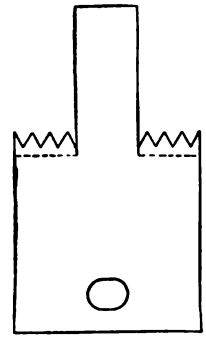
A hole is cut in the bottom of the large can so that it will admit the upper part of the candle. The books are then placed in the can, which is raised off the floor enough to permit the lower part of the candle to touch the bottom of the fumigator. The top of the can is not put on until the gas begins to issue forth and it is then screwed down firmly. The candle is allowed to burn about one minute, or until the can is well filled with gas The gas is allowec to act on the books and other articles for about 7 hours. This insures perfect and complete fumigation. The odor of formaldehyde is sometimes unpleasant, but this can be overcome by sprinkling household ammonia over the articles after they are removed.—Contributed by George Thomas Palmer, M. D., Springfield, Ill.

¶A thick, soft painter's brush is better than waste for removing dust from an automobile engine.

¶Calipering the front end of a hole does not show that it is bored straight.

Door Lock for Travelers

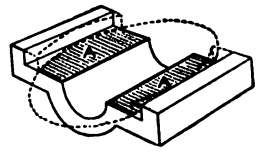
A very simple and effective lock for the inside of doors can be made of two pieces of sheet steel or galvanized iron cut in the shape shown in the sketch.



The teeth are about ⅛ in. long, and the metal is bent at right angles on the dotted line. The oval hole is made large enough to admit an ordinary lead pencil. The lock is applied by pushing the teeth of one piece into the door casing and the other directly opposite in the door. Close the door and put a pencil or nail through the holes and it will be impossible to open the door from the outside —Contributed by A. Lester Shipton, Watertown, Mass.

Planer Work in a Lathe

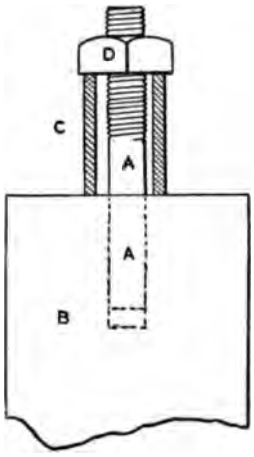
Quite a variety of small machines were made in a shop equipped with a lathe, drill press and grindstone. The lathe, naturally, did most all the work including some planer work. The sketch shows a box having cast edges to guide the cap. These were made in quantities. The portion marked A is the seat for the cap, which had to be machined flat. They were put in a four-jawed chuck in the lathe and faced out as far as the dotted line. This cut out more than three-quarters of the face and a boy chipped out the corners.



Keyways, both internal and external, may be cut by mounting the work and hand-feeding the carriage. Fairly good flat surfaces can be produced by clamping the work to the faceplate and hand-feeding the carriage, using the coarse feed screw each time to take a deeper cut.

Removing a Pin from Cast Iron

My foreman told me more as a joke than otherwise to pull out a ½-in. cold-rolled steel pin, A, which had been driven 1 in. without lubrication into cast iron, B. Thinking I must do it, I tried to turn it with a pipe wrench and only succeeded in roughing the pin in the hole. I then used a method as follows that removed the pin without much work. I cut a thread on the pin with a ½-in. die and then put a collar, C, on it and ran a nut, D, on the threads. A hard pull of a 12-in. wrench on the nut removed the pin.—Contributed by Roy E. Coram, No. Chelmsford, Mass.



Coloring Concrete

The latest report of the National Association of Cement Users recommended only certain mineral pigments that should be used for obtaining tinted mortars for concrete or stucco surfaces. These pigments are given in the following list:

Grey	Lampblack, manganese dioxide
Slate	Lampblack, manganese dioxide
Red	Red iron oxide
Bright Red	English red oxide
Brown	Brown roasted iron oxide, brown ocher
Yellow	Ocher
Blue	Ultramarine
Green	Chromium oxide, ultramarine green
Violet	Violet oxide of iron

The amount used should be small, owing to the danger of impairing the strength of the resulting mortar. The limit should be 5 per cent by weight to that of the cement. Even this amount of certain colors which differ little from that of cement, such as yellows and reds, does not produce a marked change from that of neat cement. Lampblack is best for darkening, and to lighten the color, use lime. The coloring constituents can be used dry or in a paste, but it is most convenient for mixing to use the dry form, which should be thoroughly mixed with the dry mortar before adding water.

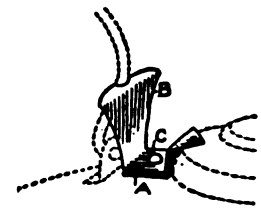
Glass-Cleaning Solution

Glass tumblers, tubing and fancy bottles are hard to clean by washing them in the ordinary way as the parts are hard to reach with the fingers or a brush. The following solution makes an excellent cleaner that will remove dirt and grease from crevices and sharp corners. To 9 parts of water add 1 part of strong sulphuric acid. The acid should be added to the water slowly and not the water to the acid. Add as much bichromate of potash as the solution will dissolve. More bichromate of potash should be added as the precipitate is used in cleaning.

The chemicals can be purchased cheaply from a local drug store, and made up and kept in large bottles. The solution can be used over and over again. If a large jar is filled with the solution, articles of glass can be dipped in it for a few minutes and then washed in clear water.—Contributed by Loren Ward, Des Moines, Iowa.

Kettle Cover Holder

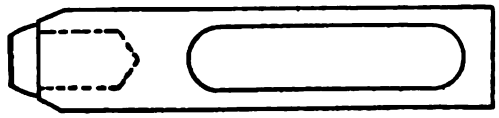
A cover if not hinged to the kettle will fall off when the kettle is tilted for pouring, and this is not only a source of annoyance every time any of the contents of the kettle is poured out, but often results in a bad scald or burned fingers. This annoyance can be prevented by making and attaching to the kettle top the little device shown in the sketch. It is made of



two strips of metal, one soldered to the kettle top and the other riveted to it. When the handle of the kettle is raised it forces the clip over the cover.

Steady-Rest Jaws with Babbitt Ends

In using the steady rest on lathe work, I have always had a lot of trouble with the jaws cutting into and marring the work, especially brass work, says a correspondent of American Machinist. I tried fiber, rawhide and other materials with little or no success, as they all wear away in a very short time; so,



Babbitt in End of Jaw

finally, I tried drilling out the ends of the jaws and filling the hole with babbitt, as shown in the sketch. This method works to perfection.

Spark Gap for Testing

An adjustable spark gap to be used in testing and timing automobile engines can be made as follows: Take a piece of fiber, ⅛ in. thick, ½ in. wide and 1¾ in. long. Bore a $\frac{3}{16}$-in. hole near each end and fit with a bolt or connection taken from an old dry cell. Put the nuts on a piece of 18-gauge copper wire, about 1 in. long, and fasten them down. Attach a large ter-



Adjustable Spark Gap

minal on one end to slip on the spark plug, and fasten cable to the other end. The spark gap is adjusted by bending the ends of the wires closer or farther apart.—Contributed by C. R. Poole, Los Angeles, Cal.

¶While automobiling give the engine a rest by advancing the spark and nearly closing the throttle. It is not good practice to run on full throttle for long periods.

Holder for Starting Screws

The tool shown in the sketch is for holding screws when starting them in tapped holes. It consists of a wood

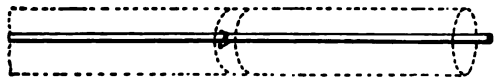


Screw in Holder

handle having two pieces of clock-spring, ⅛ in. wide, bent at the points, as shown, to spring into the slot of a screw. The manner of using the tool is obvious.—Contributed by Henry Hertiner, Amarillo, Texas.

Fastening Stovepipe Joints

While putting up a stovepipe recently I found that I did not have any place to fasten the guy wires. In their stead I used a 1-in. iron pipe, which I placed in the stovepipe, and fastened each joint with a rivet. A small piece of wire, wrapped a couple of turns around the iron pipe and run through holes in the stovepipe, will hold the

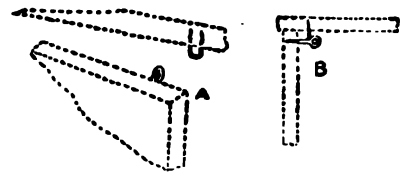


Iron Pipe in Stovepipe

parts together as well as the rivets.—Contributed by Victor Maene, Bustleton, Pa.

Catch for a Small Door

An easily made and very effective catch to hold any small door, as in a washstand, sideboard, etc., is shown in the sketch. It is simply a small screw-eye and an upholstering staple attached as shown at A. The manner in which

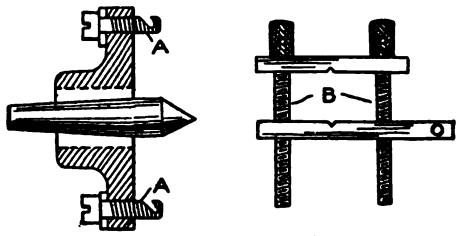


Catch on Door

they hold the door is shown at B.—Contributed by Jos. L. Schreick, Portsmouth, O.

Holding Work on the Center of a Lathe

All that is necessary to use is two fillister head screws, A A, with two coiled springs of even tension. File a



Springs Hold Work on Center

groove in each screw, as shown in the sketch, put one spring on each screw B of the small lathe dog, and when in position it can be readily hooked on the screws in the driving plate, thus holding the work back securely.—Contributed by Arthur W. Andrews, Brooklyn, N. Y.

Coloring Brick

Brick owes its color to the presence of iron in the clay from which it is formed. Usually 5 or 6 per cent of oxide of iron (ferric oxide) will give a deep red color to brick, a higher percentage giving a deeper color. The presence of carbonates of lime and of magnesium will modify the color.

Sharpening a Nail Set

A nail set will become worn in time so that the face will be flat as shown at A. This will allow it to slide off the head of the nail when it is struck with a hammer. If the edge is hammered down, it will form a concave



End of Punch Hammered Over

as shown at B. When hardened, it will work as well as a new one.—Contributed by Albert Hahn, Chicago.

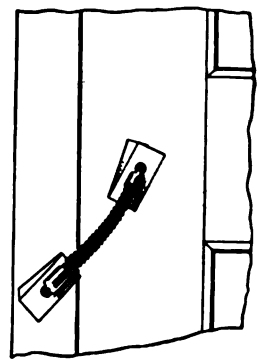
¶An ordinary curling iron makes a very good finger stretcher for kid gloves.

Reflector for an Automobile-Trouble Lamp

A handy reflector for a trouble lamp for automobiles can be made by taking a funnel and putting it over a light bulb and fastening it with insulation tape to prevent a short circuit. We have used this reflector in the shop, and find it cheaper to go to the hardware store and buy a funnel than to buy a reflector at an automobile-supply house.—Contributed by Thos. J. Becker, Kansas City, Mo.

Increasing Efficiency of a Coil Door-Spring

The efficiency of an old-fashioned coil door-spring can be increased by applying two blocks of wood as shown in the sketch. The blocks are cut triangular-shaped. One is fastened to the door and the other to the casing. The spring is applied as shown. This will curve the spring backward a little when the door is closed, and cause the spring to exert constant pressure against drafts on the door.



The manner of holding the spring does not increase the tension, but applies the pressure when the door is closed.—Contributed by Victor Labadie, Dallas, Texas.

Operating Air Pumps

Many engineers start the pump, set it at its normal speed and let it run regardless of the load. The result is that the air pump does a great deal of unnecessary work, and, at times, it is pumping steam to a greater extent than air. This often can be quickly checked by slowing down the air pump materially without any appreciable effect upon the vacuum.



Combination Fishing Sleigh and Boat

During the winter there is a great deal of fishing done through the ice on Lake Erie. In the neighborhood of Buffalo the strong current of the Niagara River causes treacherous breaks to occur in the ice, often marooning parties of fishermen with their dog sleds five or ten miles from shore on ice floes.

During the past winter a few sleds were made up as shown in the sketch with a small flat-bottom boat, instead of the ordinary box, mounted on top. With this arrangement the fisherman, when he comes to a break in the ice,



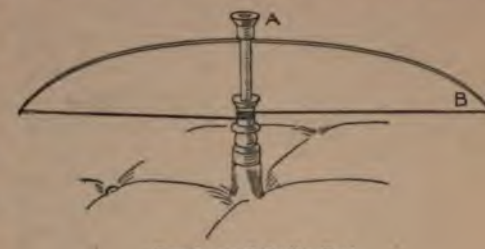
Boat on Runners

takes his dog team aboard and launches his sleigh-boat and rows to the next ice floe.—Contributed by James O'Brien, Buffalo, N. Y.

Cleaning Tufts in Upholstered Furniture

A handy device to clean the dust out of the tufts in upholstered furniture can be made as shown in the illustration. Procure an ordinary round paint-brush and attach a half of a common spool so it will turn loosely on a screw turned into the end of the handle. Near the brush, on the handle, fasten a whole spool with brads. Make a bow of an old umbrella rib and a stout cord. Before fastening the cord it is given a couple of turns around the spool.

Hold the half spool, A, in one hand,



Brush on Spindle End

and the end of the bow, B, in the other, and push it back and forth. This causes the brush to revolve very rapidly, loosening the dirt and throwing it out.—Contributed by Joseph L. Schreick, Portsmouth, O.

One-Man Crosscut Saw

The illustration shows how I rigged up a large crosscut saw to cut large logs without the aid of another person. The opposite end of the saw is kept from digging too deeply into the wood by a rope run over two pulleys on posts and a weight tied to its end. The weight should be in proportion

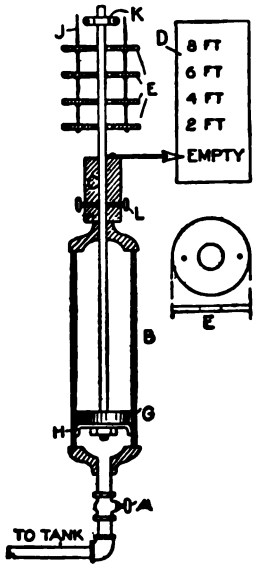


Balance for Saw End

to the weight of the saw end.—Contributed by Fremont Leland, Chester, Connecticut.

Water-Level Indicator for a Tank

A pressure gauge is sometimes used to take the place of a water-level indicator on a tank. This method is not always reliable, as on high-pressure gauges the movement of the indicator hand is so slight, even for a difference of 2 ft. in the depth of the water, that it is hardly noticeable. The level indicator shown in the sketch is a homemade affair which can be placed in a pump room. The indicator has length enough to register any depth of water, and the size of the cylinder makes it less liable to stoppage from sediment.



The cylinder B is of cast iron, which can be bought cheaply. A pump cylinder with the guide rod will answer the purpose nicely. The pipe at the bottom is connected to the delivery pipe from the bottom of the tank or to the pipe from the pumps that enters the bottom of the tank. It is optional with the builder to use the globe valve A. The piston consists of a cup leather, H, and an iron washer, G. The piston rod has a guide, K, at the top and a lead weight, C, which is just heavy enough to balance the weight of the water from the bottom of the tank. The weight is held in place with the thumbscrews L. Small lead or iron weights, E, are hung on the cords J. The heft of these weights must be determined by testing. As the water rises in the tank, the weight C rises with the piston until the first weight E is reached when it comes to a stop until the water is raised high enough in the tank to raise the extra weight, and so on for each succeeding weight. The indicator board and pointer are shown at D.—Contributed by Jas. E. Noble, Toronto, Ont.

Emergency Bolts

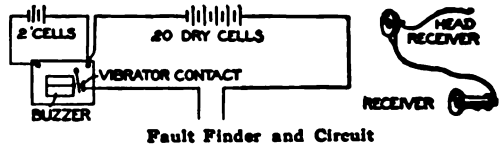
It is impossible to carry with any traveling machine, such as an automobile or any commercial machine, a sufficient number of bolts of the right length to replace any bolt that may be broken or lost. In making a temporary repair of this nature I found it quite handy to thread a piece of rod having a diameter that will answer the purpose for the majority of the bolts in the machine, for its entire length, say, 10 in. or any convenient length.

When any bolt is lost, a new one that will serve temporarily may be made by cutting off a suitable length of rod and placing a nut on each end. Almost any bolt may be replaced in this way, in fact the rod may be bent to make a U-bolt if desired.—Contributed by Thos. L. Parker, Wibaux, Montana.

Homemade Fault Finder

The sketch illustrates a homemade fault finder which will readily locate grounds, crosses and shorts in an aerial cable. I have used such an apparatus for several years and have yet to see it fail to do its work.

In using this apparatus, connect the two leads to each side of the pair of crossed or short-circuited lines. If



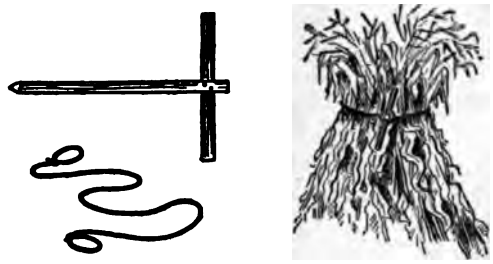
Fault Finder and Circuit

lines are grounded, connect the wires to one lead while the other lead is connected to the sheath. The helper now puts on the head receiver and rides out

on the cable in a "buggy," holding the large bipolar receiver against the cable sheath until he loses the "buzz." The buzz stops as soon as the receiver passes the trouble. The cable should be cut where the buzz is lost and the trouble cleared. The large receiver should have the cap and diaphragm removed.—Contributed by G. M. Peterson, Buffalo.

Tying Fodder

A very useful device as an aid in tying fodder can be made of two pieces of wood, one about 2 ft. long and the other about 18 in. long, formed into a cross and firmly fastened together, and a piece of rope 9 ft. long with an eye



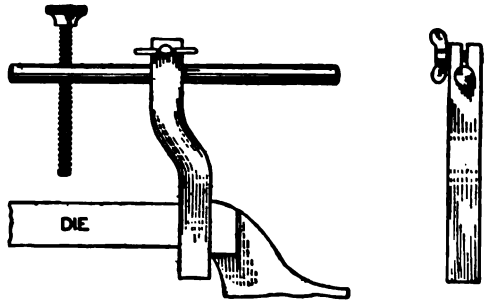
Aid in Fodder Tying

in each end. The long piece of the cross is stuck into the fodder shock and one loop of the rope placed over one end of the cross. The other end of the rope is passed around the shock and the loop placed over the other end of the cross. A few turns of the cross will draw the fodder together for tying. —Contributed by R. H. Workman, Loudonville, Ohio.

A Die Clamp

The accompanying sketch shows a simple die clamp I made and am using to good advantage. A piece of ½-in. square steel was cut 4½ in. long and bent to shape as shown and a $\frac{5}{16}$-in. hole was drilled and reamed so that a 5½-in. length of drill rod would have a sliding fit.

The top of the square piece is split to clamp the drill rod and a small thumb screw fitted on one side. The ends of the rod are rounded off neatly. A hole is drilled and tapped ¾ in. from one end. A 4-in. screw having a

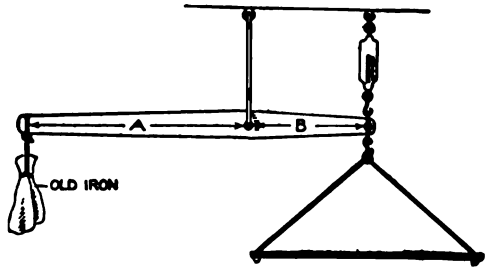


Clamp for Holding Die Pattern

knurled head and threaded the entire length is turned into the threaded hole. The rod can be extended as far as any ordinary vise will open. This is a very handy tool for holding down work on a plate to be marked out for a die.—Contributed by J. A. Kottmann, Ansonia, Conn.

Beam Attachment for Spring Scales

Spring scales weighing articles up to 50 lb. can be used with a beam attachment for weighing any number of pounds within a reasonable limit. The beam is attached to an overhead support with a screweye, the pivot being in such a place as to make the length A twice the length B. Bags of old iron weighing 25 lb. each are used on the end of the beam. If an article weighs 110 lb., it will require two

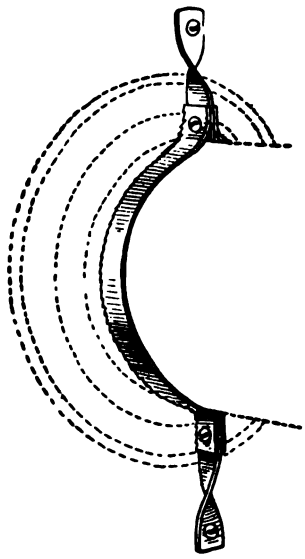


Beam Attached to Scales

weighted bags and the 10 lb. will be registered on the dial of the spring scale.—Contributed by Joe V. Romig, Allentown, Pa.

Securing a Stovepipe in a Flue Opening

A simple method of preventing stovepipes from sliding too far in flue openings is shown herewith.



Take two hacksaw blades and cut them off to such a length that they will overlap an inch or so at the end when bent over on opposite sides of the pipe. Two flat strips of iron, about 4 in. long and twisted through a right angle, two short stove bolts for securing the saw blades to the strips through holes drilled or punched in their ends, and two screws for fastening the free ends of the strips to the walls are also required, the method of installation being clearly indicated in the sketch. By screwing up the stove bolts, the saw blades will tightly grip the pipe, the natural spring of the blades serving always to give a good grip which will never permit the device to work loose as long as the bolts hold.

This makeshift device is far more sightly and serviceable than ceiling wires and if carefully made will last a lifetime.—Contributed by Victor Labadie, Dallas, Texas.

Black Acid-Proof Stain

A stain made up by the following formula has been in use for some time in our laboratory for staining the tops of tables. It produces a soft black color which no reagents affect. Neither lye nor acids discolor it. Tables treated with this stain should be wiped off about every two months with a cloth moistened in boiled linseed oil.

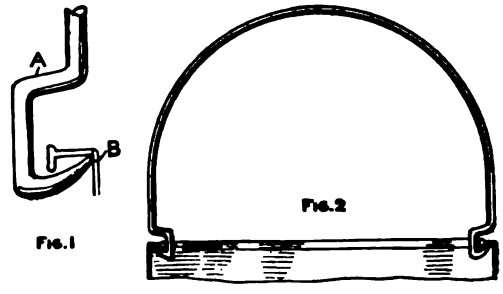
Take 1¼ lb. of copper sulphate (blue vitriol) and 1¼ lb. of potassium chlorate, and add sufficient water to make 1 gal. of solution. Boil and stir to dissolve completely and label No. 1. Mix 1 pt. of muriatic acid in 1 pt. of aniline oil. Add the acid to the oil slowly and in small quantities. Add sufficient water to make 1 gal. of solution and label it No. 2.

Apply a coat of No. 1 and allow it to dry, then put on a coat of No. 2 and let that dry. Wash well with soap and water and allow to dry. Then apply another coat each of No. 1 and 2, allowing time for each coat to dry. Wash again, dry and apply another coat of No. 2 and let it dry. Wash and rinse the surface well and let it thoroughly dry and apply two coats of boiled linseed oil.—Contributed by A. W. B., Rockville, Ind.

A Paint-Pot Bail

A convenient bail for attaching to a paint can having a ridge around the inside top for the airtight cover to fit into may be made in the following manner:

Procure a piece of No. 8 steel wire, 16 in. long, and bend it at both ends as shown in Fig. 1. The part A is to prevent the bail from falling down into the paint when the can is set down.



Bail in Top of Pot

The only point of contact, B, should be filed down from the under side as shown. Bend the wire into the shape of a bail as shown in Fig. 2 and leave

the two ends far enough apart so that they must be sprung together slightly when putting the bail in place. When not in use the bail is easily removed and the airtight lid replaced.—Contributed by J. R. Montague, Niagara Falls, Ont.

Preventing Anchor Chains from Breaking

Chains which are subject to shocks, especially those used for anchor chains and hawsers, break, not from the steady strain which is applied to them, but from the sudden shock. To overcome this trouble, insert a spring where most convenient by hooking the ends of the same into the links of the chain as shown in the sketch. This leaves the spring independent of the holding of the chain. The material, resistance



Spring in the Chain

and length of the spring, also the number of links to skip are determined according to the nature of the work and size of the chain.—Contributed by H. A. Hobelman, Baltimore, Md.

Keeping Kettle Handles from Heat

Two methods to prevent a kettle handle from touching the side of a hot vessel are shown in the sketch. One method is to bend an elbow or shoulder in the piece of metal or ears holding the bail, as shown in Fig. 1. If the bend is made at the proper place, the wire will rest upon it, and the handle in the center of the bail cannot touch the sides of the hot kettle. This method may make it necessary to remove the bail and slightly bend it so that it will extend over the slightly increased distance between the ears.

The second method is to drill two holes in each ear, Fig. 2, and place small pins or stove bolts in them. The bail will rest upon these pins and prevent the handle from touching the hot sides of the kettle.

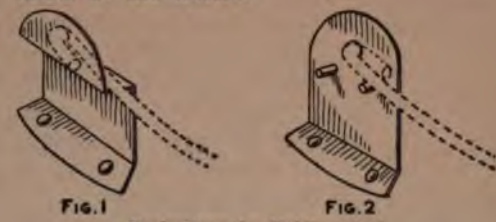


FIG. 1 FIG. 2

Projections for Holding Bail

A simple plan of warming plates and dishes and to keep the food in them hot is to place the pins in such a position that the bail, in resting upon them, will be on a level with the top of the kettle. A plate or dish set on top of the kettle is partly supported by the wood handle, and the steam from the boiling water will keep the plate hot, it being necessary, of course, to remove the kettle cover when thus used.

Tongs for Pulling Concrete Forms

Quite often when pulling out forms used in making "goose-neck" curbs, the edges of the concrete are broken off by the crowbar in lifting them. The tongs shown in the illustration will avoid this trouble and will make the task much easier. The tongs are constructed of two pieces of ½-in. steel, each about 14 or 15 in. long. The tongs are made on the same principle as ice tongs, but of a different shape. Two pairs of these tongs are

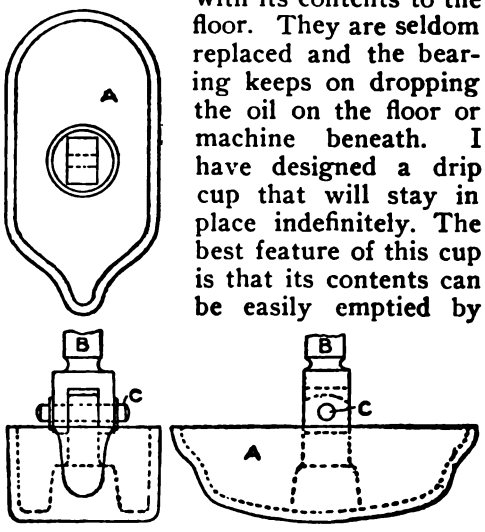


Form-Pulling Tongs of Steel

necessary when the long rear or front boards are pulled out.—Contributed by Gilbert A. Wehr, Baltimore, Md.

A Drip Cup

Drip cups are usually fastened to the hanger with a screw, which in time loosens by the vibration and drops with its contents to the floor. They are seldom replaced and the bearing keeps on dropping the oil on the floor or machine beneath. I have designed a drip cup that will stay in place indefinitely. The best feature of this cup is that its contents can be easily emptied by simply tipping the part A. The construction of the cup is very simple and inexpensive. The cup part has a round hub in the center with a rectangular projection as shown. This projection is drilled for the pin C. The cup should swing easily on the pin so that it may be tipped.



Details of a Drip Cup

The fork-shaped part, B, can be made on the hanger casting, or, if the hanger is already in place or on hand, it can be made to screw in and pinned.

When the oiler oils the bearings, it is only necessary for him to tip the cup to take out the contents.—Contributed by Harold E. Murphy, Pawtucket, R. I.

Polished Floors

After much experimenting with wood fillers and finishes of various kinds and degrees of excellence, we have decided that plain boiled linseed oil, applied hot, makes the most desirable floor finish. To secure the best results, the oil should be put on the floor at the time it is nailed down. Lay a few boards, beat them together as firmly as possible, and nail them securely. Cover this strip with hot oil, then lay another strip and oil it, and continue until the space is filled.

If this procedure is not practicable protect the floor from stains by a layer of sawdust, or old newspapers weighted down, and oil it as soon as it is finished. If the floor is soiled, it will have to be scrubbed before oiling, and this is not desirable, as it tends to increase shrinking. If oiled at once, the pores of the wood are filled and the floor will never show the unsightly gaps and cracks that come so soon, even in well laid floors. In six months' time, it may be well to go over the floor again. After this application, a coat once a year will be sufficient.

Nothing but oil should be put on an oak floor. Oak is a very porous wood and needs to be well filled. With time and use and an occasional rubbing with warm oil it will take on a high polish which is more beautiful and far more durable than any varnish. We have used the oil on hard pine also with excellent results. Varnish gives a quicker finish and at first looks well, but unless the boards have been filled with oil and used for a time before varnishing, they will warp and draw apart, and in a year or two you will need a new floor. Varnish can be used after the oil is thoroughly dried in but it is best to leave the floor without varnish.

Wax is less objectionable. It may be used after the wood is well filled and the surface absolutely dry. It gives a fine polish, does not warp the boards and makes a beautiful floor, but it requires too much care for a room constantly used. The oiled floor acquires its polish more slowly, and through usage. With a little care it is durable. The floor is easily cleaned and not easily injured. Grease does not hurt it. The dust may be wiped off once a week with a soft mop and clear water. Do not use soap—scrubbing is never necessary.

Heavy brushes are best for sweeping such floors, but a piece of outing flannel tied over an ordinary broom

makes a very good substitute.—Contributed by Mrs. Helena Korte, Jamul, California.

Repairing Tin Gutters

An easy way to repair a leaky bucket or a tin gutter so it will last a year or more is as follows: Paint the metal inside and out, then paint one side of a strip of cloth and apply it to the inside painted surface of the metal. Paint over the cloth and metal, and you will have a first-class repair.—Contributed by Maurice Baudier, New Orleans, La.

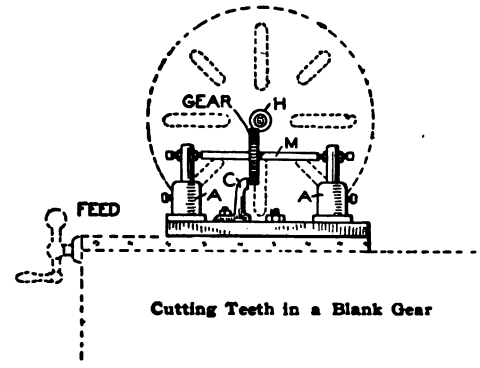
Heel Support for Automobile Drivers

When driving my car with the accelerator pedal, I found it very hard on my ankle and leg to hold the foot in the abnormal position required, says a correspondent of Cycle and Automobile Trade Journal. I nailed a block of wood, 3 by 3½ by 3½ in., to the floor board in such a position that with my heel upon it the accelerator pedal was under my toe, with my foot in a comfortable, nearly horizontal position. I covered the top of the block with rubber matting to prevent my heel slipping off and painted the wood black. This is a great comfort and aid to me in driving. I can slide my foot forward until my toe touches the toeboard, supporting my foot, while I can push the accelerator pedal by simply bending my foot.



Cutting Small Gears in a Lathe

The workman in a small repair shop not equipped with gear-cutting or milling machines can cut small gears on a lathe, if it is fitted with a jig as shown in the sketch. The jig consists of a flat bed, which is bolted on top of the cross feed, fitted with two posts, A A, that telescope so as to admit blanks of different diameters. A setscrew with



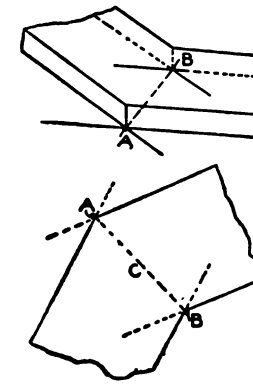
Cutting Teeth in a Blank Gear

a locknut is provided for the top of each post as centers.

The blank gear is turned up to the proper size to cut the right number of teeth and placed on a mandrel, M, and set between the setscrew centers. The posts can be adjusted to make the hob H cut the right depth. The brace C is to support the gear while it is being cut. The blank is fed on the hole by the cross feed.—Contributed by W. R. Ayers, Pittsburg, Pa.

Cutting Miters

The diagrammatical sketch shows how I cut molding to fit any angle without a miter box. Place a piece of the molding along one surface of the object where it is to be fastened and scribe the outer surface against the ceiling or floor, as the case may be; then place the molding along the other side and scribe a line. While in that position scribe the inner surface of the molding with a sharp knife at the point marked B, also at A, the intersection of the lines scribed on the

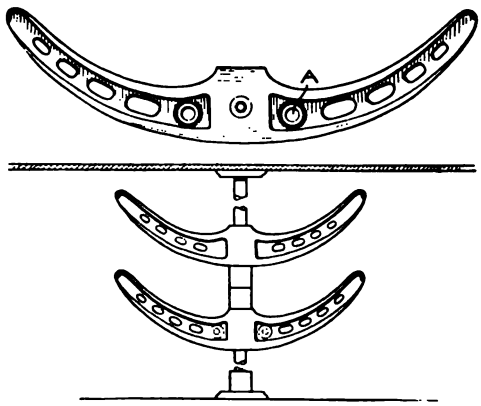


outer surface of the molding. Connect the two knife marks as shown by the dotted line C, and saw outside of the line about $\frac{1}{32}$ in. Cut all the molding before nailing.

In case of a crown molding on a wardrobe, put a temporary top on, letting it project far enough to get the necessary marks, then remove and nail the molding in place. This method will work on any angle.—Contributed by W. E. Gore, San Francisco, Cal.

Pipe and Rod Storage Rack

The illustration shows the general arrangement of a rack for the storage of rod stock and pipe. Extra heavy



Castings for the Storage Rack

steel pipe is used for the uprights which are fastened to the floor and ceiling with 6-in. round floor flanges. Three cast-iron separating collars are placed at the base to raise the lowest rack section some distance from the floor, then alternately one of the rack sections and one of the separating collars.

The rack sections are held from turning by a $\frac{5}{8}$-in. setscrew which is screwed into the tapped hole in the hub and also by placing sections of 1-in. pipe between the racks. A piece of $\frac{5}{8}$-in. round steel is run through these sections of pipe and also through the holes A in the racks. These rods are threaded on both ends for nuts which hold them in place.—Contributed by D. A. C., Harrisburg, Pa.

Depth Cutting in a Lathe

There are numerous ways better than using a depth gauge in cutting to a certain depth on a lathe. The gauge method of finding the proper depth requires cutting and trying several times before the result is obtained. Sometimes the compound rest is set at an angle of 30 deg. for thread cutting, and is left in that position, unless some other angle is required. Where the compound rest is graduated on the lathe, the depth can be obtained by simply multiplying the required depth by 2. The sine of 30 deg. being 0.5, the compound rest would have to move 1 in. in order to make the tool move in ½ in. Take for a more comprehensive illustration an equilateral triangle, the sides of which are 1 in. long, the angles being 60 deg. One-half of this would be 30 deg., hypothenuse 1 in. and the opposite side ½ in. The hypothenuse represents the center line of the compound rest.

Another method is to set the compound rest at zero (any angle) and run the carriage up until the tool just touches the work, lock the carriage and run the compound rest out, until you can "feel" with a piece of cold-rolled steel of the required size. Then unlock the carriage and run it up until it touches and lock again. Feed the compound rest in to the zero point and note the revolutions.

Still another method is to clamp a piece of stock with the square end on the lathe, where it will come against a clean, smooth surface of the carriage, put a piece the right size between them, lock the carriage and feed the compound rest up until it touches. Take out the piece and run the carriage to the stop.

These methods have been used with success and have been found very handy and simple.—Contributed by John Homewood, Chicago.

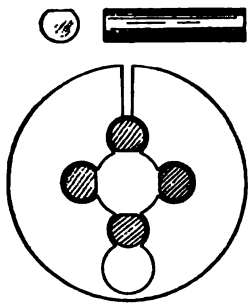
¶A sash lock can be used the same as a bolt on a door, if the casing is flush with the surface of the door.

Waterproofing Blueprints

Blueprints to be carried into wet mines or tunnels may be made waterproof by the following process, according to the Mining and Scientific Press: Immerse a number of pieces of absorbent cloth, 1 ft. or more square, into melted paraffin until saturated. When removed and cooled they are ready for use at any time. Spread one of the saturated cloths on a smooth surface, place the dry print on it with a second waxed cloth on top, and iron with a moderately hot flatiron. The paper immediately absorbs paraffin until saturated and becomes completely waterproof.

Retapping a Die

When a die becomes worn so as to cut a ragged thread, anneal it, close the die down and fill the open spaces with plugs as shown. Each plug should have a flat surface toward the center of the die. Tap out the threads the same as tapping a hole, remove the plugs and temper.—Contributed by J. F. Tholl, Ypsilanti, Mich.

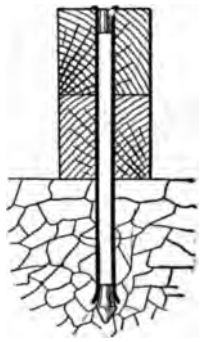


Fireproof Paste for Furnaces

A paste or mortar that will close up cracks in furnaces to keep the gas from escaping can be made as follows: Mix together 75 parts of wet fireclay, 3 parts of black oxide manganese, 3 parts of white sand, and 1 part of powdered asbestos. Thoroughly mix by adding enough water to make a smooth paste. Apply this paste over the cracks and when dry it will be as hard as iron and stick like glue.—Contributed by H. D. Chapman, Washington, D. C.

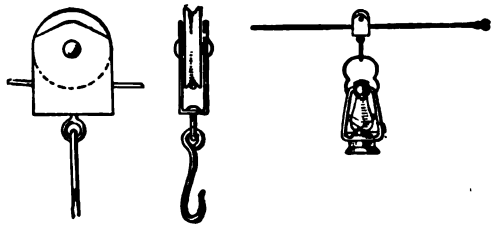
Anchoring Beams to Rocks

Beams or timbers may be solidly fastened to a rock or concrete foundation with a piece of pipe as shown in the sketch. A hole is drilled into the foundation the same diameter as the pipe. A taper plug is cut from a piece of hard wood having its largest diameter just equal to the hole drilled in the rock. The pipe is driven through the hole in the beams and into the rock. When the end of the pipe strikes the taper plug, it is spread out against the sides of the hole. If the pipe is expanded at the top, the beams are more firmly held to the rock.



Lantern Hanger for a Barn

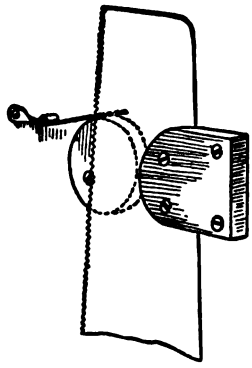
The hanger shown in the sketch makes a safe and handy way to use a lantern in a barn or stable. It is constructed of an old grooved pulley with a U-shaped hanger made of sheet iron. The hook hanger is made of a screweye cut off and riveted in place, the hook being formed of heavy wire. The pulley is run on a wire stretched overhead from one end of the barn to the other. The lantern can be easily moved from place to place, and, as it is up out of the way, it cannot be turned over.—Contributed by I. B. Spittel, Baltimore, Md.



Trolley Lantern Hanger

Holder for a Handsaw

The workbench should be provided with a place for each tool where they will be handy for the workman. The saws are usually hung on a nail driven into the wall over the bench. When hanging a saw on a nail it must be held by the blade, which necessitates both hands in turning the saw. I use a holder such as is shown in the sketch.



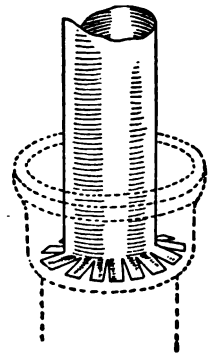
The holder consists of two blocks of wood, one 2¼ in. long and 2 in. wide, having one end cut on an arc of a circle, the other being a circular disk 2 in. in diameter. The former block is fastened with screws to the wall and the latter is attached off center so its edge will turn close on the rounded edge of the stationary block. A spring is applied to the disk to keep its edge in close contact with the edge of the other block. The downward pressure of the spring clamps the saw and holds it very firmly. A slight movement of the saw upward and outward releases it.—Contributed by Irl R. Hicks, Hallsville, Mo.

How to Clean Brass

Keeping the hundred and one brass articles, now so popular in the home, bright is a matter of a little effort at virtually no expense, says Beautiful Homes. If the teakettle becomes stained, dissolve some whiting in lemon juice and apply with a soft piece of flannel, after which give it a bath in soapy, hot water. When a tray becomes cloudy-looking, it may be restored by using salt and vinegar. Drop the salt upon the tray, moisten it with vinegar, and scour with paste thus formed. Candlesticks discolored by gas from coal or wood may be brightened by rubbing them with a piece of soft leather. An old suede bag, a torn glove or a wornout leather pillow are just the articles to use. Soapsuds with a little ammonia is effective for embossed or pierced brass. It should be applied with a brush, and the article rinsed in warm water, then polished with a piece of leather.

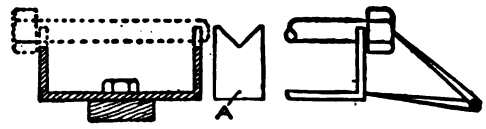
Fastening Leader Pipes in Soil Pipes

When fastening leader pipes in soil pipes some of the cement is apt to drop into the soil pipe. As I always had trouble with making a joint of this kind, I decided to use the following method, which has given good results: The end of the leader pipe is cut and the parts turned out, as shown in the sketch, so that they will hold the cement in the joint.—Contributed by H. Van Vliet, Paterson, New Jersey.



Centering Bolt Heads

The average bolt made from rods does not have its body central with the head. The end of the bolt never is cut off squarely and it is hard to make center holes for the lathe. When the upper end is centered from the sides of the head the body is apt to run out of true. If there is not much stock on the bolt, it will require a bit of "center throwing" to get the bolt ready for centering.



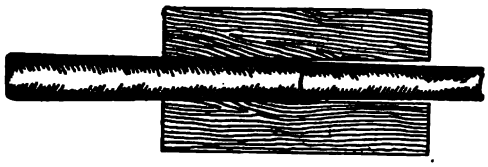
Centering the Head of a Bolt

The sketch shows a handy centering

arrangement made of sheet iron. The center-punch mark A is used for one leg of the dividers. The centers found by the dividers on this jig are the centers of the body of the bolt, and it requires but one drive of the center punch to fit it for the lathe. The tool can be attached to the wall or bench near a lathe.—Contributed by F. W. Bently, Jr., Huron, S. D.

Repairing a Whipstock

In a block of wood bore a hole the same size as the whipstock 1½ in. below the break. If the whipstock is tapering, place the block over the break and pour melted babbitt metal into the space as shown in the sketch. If the whipstock is straight or does not taper very much, the hole must be bored ⅛ in. larger than its diameter, but not entirely through the block, the remaining distance being bored to fit tightly on the whipstock. The space is then filled with babbitt. When cool, the babbitt is finished with a sharp knife or file.—Contributed by S. V. Crane, Anderson, Cal.

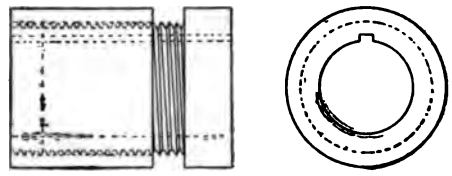


Whipstock in Mold

An Adjustable Spacing Collar for Arbors

An old slab-milling machine used for cutting keyways in shafting had no side adjustment, and, as different-sized shafts were keyseated each day, the collars had to be changed each time. Adjustment was made easy by constructing adjustable collars as shown in the sketch.

One of the collars was placed on between the shoulder of the arbor and the first cutter, and the other between the cutters, says American Machinist. The collars were made of cold-rolled steel, having a nice snug fit so that they could be screwed together or apart as the case might be, with the fingers. The sleeve and the main body were knurled to simplify the movement. By loosening the nut on the end of the arbor it makes a very short job to arrange the cutters where they are wanted.

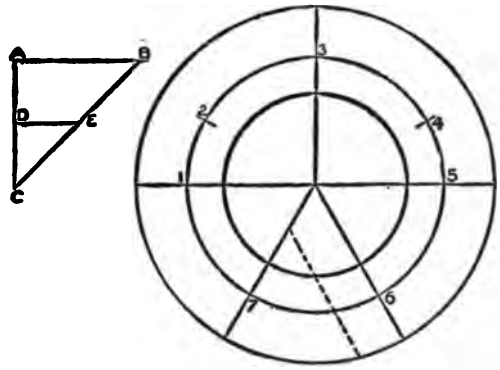


Adjustable Collar

Rule for Smokestack Pitch Top

Draw the lines AB and AC with a square and mark the length of one-half the diameter of the top on the line AB. The height is marked on the line AC. Then one-half the diameter of the pipe is marked DE, parallel to AB. Set the compass from C to B and scribe the outside circle and set from C to E and scribe the inner circle. Set the divider points on A and B and step off six spaces on the outside circle.

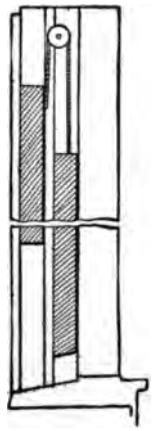
Cut the gore out on the dotted line and line 7, extending latter to the center. Draw lines 1, 3 and 5. The inner circle and lines 1, 3 and 5 show where to attach straps for holding it on the pipe.—Contributed by S. C. Shipman, Steubenville, O.



Layout for a Pitch Top

Ventilating at the Top and Bottom of Windows

The ventilation of rooms should be accomplished through window openings both at the top and bottom. If the window sashes are fastened as shown in the sketch, the opening can be made in one operation. The top of each sash is connected with a rope which runs over a pulley at the top of the window opening. When the lower sash is raised, the top sash will descend and make the openings both top and bottom equal.—Contributed by Paul H. Burkhart, Blue Island, Ill.



Bending Short Pieces of Pipe

It is very difficult to bend short pieces of threaded pipe without damage to the threads or kinking the pipe. The bend can be easily made in the following manner: Screw an ordinary coupling on each end of the pipe and heat it almost to a white heat. Then cool each end in water, place in a vise, and tighten the jaws just enough to hold it firmly.

Insert an iron bar into each end of the pipe and force the bars in an upward direction and the result will be a smooth bend. If the pipes are too short to be held in the vise without clamping the couplings, use two pieces of flat iron between the couplings.—Contributed by J. B. Shiver, Rock Hill, South Carolina.

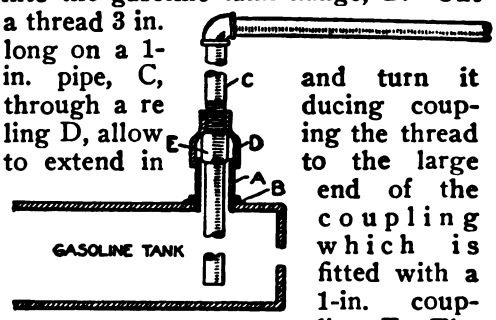
Finding Polarity of Electric Wires

The polarity of wires can be found by placing the ends of the wires in a common white potato cut in halves. The wires should be stuck in a small space apart, the distance depending on the voltage. The positive wire of a current will turn the potato green and the negative side will remain uncolored. Both ends of the wire on alternating current will turn the potato green.

This method can be used in finding the polarities of current from one dry cell up to 500 volts direct current, the only difference is that with very low voltages the wires should be stuck in the potato closer together than with higher voltage. In using 110 volts, the time necessary to determine the polarity is about 10 seconds, and with a current of, say, 2 volts and upward to 10 volts, it will require about 1 minute. If electrical workers will always carry a potato in their tool bag, they will always have a reliable polarity indicator.—Contributed by Geo. H. Davie, Erie, Pa.

Air-Tight Connection for Underground Tank

Screw a 2-in. nipple, 2 in. long, A, into the gasoline tank flange, B. Cut a thread 3 in. long on a 1-in. pipe, C, and turn it through a reducing coupling D, allowing the thread to extend in to the large end of the coupling which is fitted with a 1-in. coupling, E. The end of a 1-in. pipe is threaded and then cut long enough to allow a space of 1 in. at the bottom of the tank, when it is screwed into the coupling E. When the reducing coupling D is turned on the nipple A, all joints will be air-tight.—Contributed by Geo. M. Crawley, Jr., Newark, New Jersey.



Pipes in Tank

¶The ordinary lamp wick is too loosely woven to give best service in incubator lamps. This can be remedied by sewing back and forth across the wick, about 6 or 8 rows of stitches to the inch.

Hose Connections

Wishing to use my garden hose which had a leak and not being able to get a regular coupling I made the repair without one. The job turned out as good as if the ordinary coupling were used.

I cut the hose as true as possible at the point of the leak and then inserted a ½-in. nipple, 3 in. long (Fig 1). I twisted one turn of bailing wire directly over the threads of the nipple



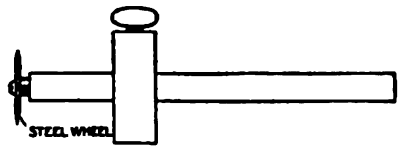
Fig. 1 Fig. 2

Pipe Nipple Used for Connection

(Fig. 2) and twisted it up tightly with pliers. The result was exceedingly satisfactory under high water pressure. —Contributed by Frank E. Drumm, Johnstown, N. Y.

Rotary Marking Gauge

Every woodworker knows that the ordinary marking gauge with the pin arrangement has a tendency to follow the grain of the wood, causing the line to be drawn irregularly. This trouble may be overcome by placing a small steel wheel so that it will easily revolve on the end of the gauge as shown in the sketch. When marking a piece of irregular-grained wood, the steel wheel



Wheel on Gauge

will not dig into the grain, but will roll over it and make a straight mark.

Wood Turning with a Ripsaw

In a mill where I was working we had an order to make a number of rollers and not having a lathe in the mill, I turned the pieces on a ripsaw. Figure 1 shows the work in position on the table against the gauge, and Fig. 2 the construction of the box with the stock held in place with two screws as centers. The stock was first cut to



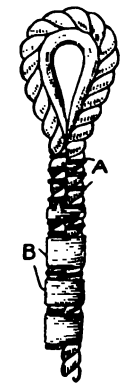
Fig. 1 Fig. 2

Material in the Box

an octagon shape, then successive slight turns were made to cut off all corners. The same method can be used on a bandsaw.—Contributed by F. O. Anderson, San Francisco.

Putting an Eye in a Wire Rope

A simple method of splicing an ordinary wire rope for an eye so it will be as strong as the rope, is as follows: Use a strong thimble for the eye. Turn the rope around the eye and carry it back about 6 ft. along the main part. Lash the two parts together by passing a wire over and under the rope, forming a turn similar to a figure 8; then put on several short lashes, B, by wrapping the wire tightly around the two parts of the rope. This method of splicing for an eye will hold heavy work without breaking the eye or slipping.



Laying a Plank Sidewalk

In laying boards or plank where they are exposed to the weather they will last much longer if laid with the heart side down. If the planks are placed as shown at A, they will retain the water and moisture much longer and cause



Showing Position of Grain

decay more rapidly than if placed as shown at B.—Contributed by Geo. M. Harrier, Lockport, N. Y.

Mayonnaise Mixer

The method of preparing mayonnaise and whipped cream, which have become necessities of the modern home, has not kept pace with their increasing appreciation by the public. Their popularity would be greater if a handier method for the proper mixing were available. A good mixer can be purchased, but the price is out of reach of many. The one shown in the sketch is a homemade affair the parts of which can be purchased very cheaply.



The outfit consists of the following parts: A hardwood bracket, ¾ in. thick, 2½ in. wide and 7 in. long, with a place chiseled out to receive the handle of an egg beater. The beater is made detachable by means of a 1¼-in. cupboard button fastened to the bracket with a stove bolt. A ring such as used by harnessmakers is fastened to the opposite side of the bracket for holding the funnel.

The flow of the oil in making mayonnaise should be restricted by a cork with a small groove cut in the side. The oil should flow a drop at a time into the bowl just outside the whirl of the dashers which will quickly draw it into the vortex and thoroughly mix it. Constant beating is essential to the proper incorporation of the oil and consequent thickening of the mayonnaise, which can be easily accomplished by this method without suffering from cramped fingers and necessitating frequent stops.

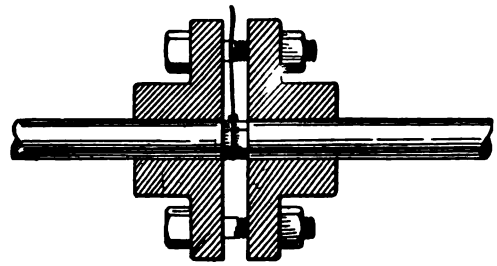
A shelf on which the bowl rests is supported by an ordinary bracket. This is placed at such a distance below the bottom edge of the bracket to correspond with the size of the egg beater used.—Contributed by Victor Labadie, Dallas, Tex.

Depositing Copper on Glass

A new method of depositing copper on glass has recently been discovered by an English investigator. A mixture of 1 part of freshly distilled phenylhydrazine and 2 parts of water is heated until the solution is clear. A warm solution of cupric hydroxide in ammonia is then added (made by precipitating sulphate of copper by potash, washing and dissolving in ammonia). The cupric hydroxide is reduced to cuprous hydroxide with evolution of nitrogen gas. A hot 10-per-cent solution of caustic potash is then added until a slight precipitation of cuprous hydroxide takes place. If the solution, in this condition, is brought in contact with a clean glass surface, a bright deposit of copper forms on it. This is thin and perfectly reflecting.

Removing Flanges from Shafting

Machinists often remove couplings or flanges from shafts or pump rods by driving them with a sledge hammer. This will batter them up or crack them, if they fit the shaft tightly. After removing the keys, spread the coupling apart and place an ordinary nut or block of steel between the ends of the shaft. This is done by swinging the nut in place with a string as shown in the sketch. All that is required to remove the coupling parts is to turn up the nuts on the bolts.



Nut between Shafts

If the part comes off without start-

ing the other, place a piece of heavy steel plate across the hole of the removed part and swing the nut in position. It is now ready to push out the shaft by turning up the nuts.—Contributed by J. Kotanchick, Ran-Shaw, Pa.

Writing on Blueprints

To write notes or dimensions on blueprints use a pen dipped in saleratus water, or rub a cloth saturated with the solution on the print and write with a pencil on the resulting white spot.

Placing Fibroid Filler in a Friction-Drive Automobile

The usual way of placing fibroid fillers is to take the secondary shaft from the machine and slip the ring over the end. This requires considerable time. The following method will only require an hour's time.

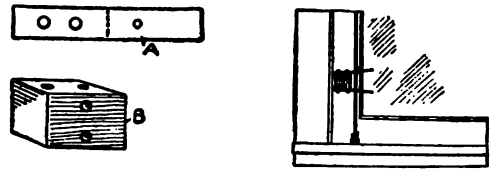


Saw the filler with a very fine saw diagonally across the driving face through one of the holes. This will allow the ring to spring apart and slip over the shaft without removing it from the machine. This cutting of the ring will not damage it, as the bolt goes through both ends and holds them together.—Contributed by Earl R. Hastings, Corinth, Vt.

Window Sash Lock and Adjuster

A device that will serve to lock a window and to keep the sash in position when raised can be easily made of two pieces of heavy spring metal, ½ by 3 in.; a piece of hardwood, 1 by 1½ by ¾ in.; two screws; some bolts, and a length of heavy wire.

Drill two $\frac{1}{16}$-in. holes for screws, one ½ in. from the end and the other ½ in. from the first hole; then drill a ⅛-in. hole 2 in. from the end A and bend 1½ in. from the end as shown by the dotted line. Drill two holes through the block on the ¾ by 1½-in. face and



Lock Attached to Window

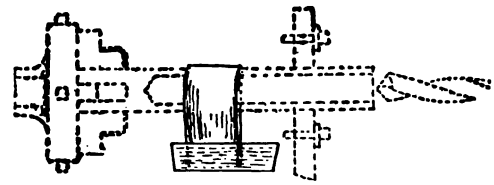
on the center line of the 1 by 1½-in. face. Drill two screw holes as shown at B.

The two pieces of metal are fastened to the block with bolts and the block is fastened to the sash with screws. The wire is fastened to the top of the window casing with a screweye and run through the two holes in the metal and fastened tightly with another screweye to the window sill.

The lock is released by pressing the two pieces of metal toward each other with the thumb and forefinger, and when the pressure is released the two springs will catch on the wire and hold the sash wherever located.—Contributed by P. H. B.

Cooling Work in a Lathe

Having a number of shafts to make, I had considerable trouble in keeping them cool while drilling until I made the simple little device shown in the sketch. It consists of a tin pan of cold water and a piece of cloth or flannel, preferably the latter, long enough to reach over the shaft and into the pan

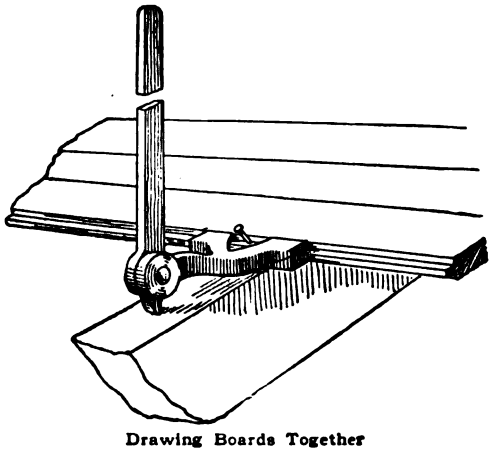


Feeding Water on Shaft

of water the same as a belt. As the water becomes warm it should be changed.—Contributed by Arthur W. Andrews, Brooklyn, N. Y.

Lever for Laying Flooring

Recently I had several thousand feet of matched flooring to lay and it necessitated some kind of a tool to draw the joints together on winding pieces.



Drawing Boards Together

I designed a tool to meet the emergency which does the work to perfection. The sketch shows its construction and how it is applied to the boards. It consists of a lever to which a grooved and notched arm is pivoted. The groove fits the tongue on the boards and the notch provides a space for driving the nail.—Contributed by S. J. Heath, Lestershire, N. Y.

Making Use of a Table-Board Case

The extra case of table boards finds no place in the ordinary kitchen where they will be out of the way and kept in good condition. If a board and covering is placed on one side and a curtain fastened to the ends and front the rack can be used for a window seat, or it can be placed on brackets and used for a shelf. When a board is wanted the curtain is raised and the board pulled out.—Contributed by C. H. Floyd, Elwood, Ind.

¶A good bushing for sheave wheels, pulleys, etc., can be made of a piece of brass tube.

Green-Gold Finishes

To produce a good green-gold finish on articles at a fair cost, that neither blends to the shades of yellow or gray, but is purely green in shade and tone and cannot be termed as a yellowish or silver-green, is one of many irritating features of the electro-plating art. This is especially so when a dark or antique gold is called for.

I was called upon some time ago to produce a dark green that was green all over, both in background, as well as on the high lights, and after considerable experimenting with different chemical agents, such as lead, sodas, antimony, cadmium and nitrates, I found that the best results could be obtained from a solution containing arsenic.

I may state that it requires considerable care in the manipulatory process connected with the production of the finish obtained from the following formula:

Water	1 qt.
Potassium cyanide	3 oz.
Potassium ferro-cyanide	1 oz.
Caustic potash	1 stick
Ammonium chloride	1 oz.
Gold as perchloride	2 dwt.

Dissolve nitrate of silver in water, crystals are best, and after having the above solution in working condition suspend a platinum anode on the negative and one on the positive pole and set in action. While working, add a little of the nitrate-of-silver solution at a time until deposit shows green, then add, a drop at a time, a solution of arsenic that has been thoroughly cut and boiled with potassium cyanide until the green deposit shades over to a deep green smut. When the high lights are relieved with bicarbonate of soda on articles plated in this solution, which is used cold, they show out in a deep, rich green color.

It can be readily seen by the complication of metals and chemicals used, that this solution requires the utmost care in handling, making, keeping and working, but like everything else, it is no trouble when you get used to it and can be placed in the same class as a brass solution, so far as the plater is concerned.

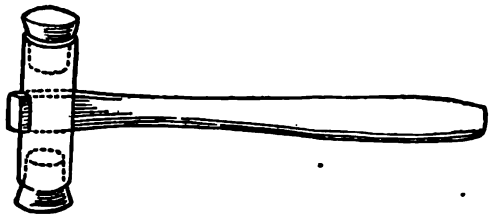
Rejuvenating Old Awnings

A faded awning may be made as good as new, and possibly better, by painting it. Paint alternate stripes white and red or brown, allow time to dry, and the awning will look as bright as new; also, it will make the cloth waterproof.

Pin strips of paper on the cloth as wide as the stripes desired and paint between them. This will make the painting easy.—Contributed by Maurice Baudier, New Orleans, La.

A Soft-Faced Hammer

A soft hammer, which is very handy in removing dents from copper or sheet metal of any kind, may be made in the following manner:

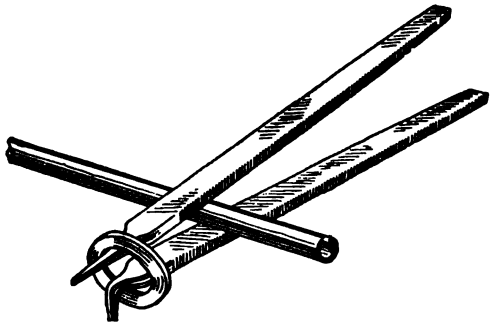


Wood Plugs in a Pipe

Procure a piece of steel or iron tube and cut it 2 in. long and drill a hole in the center for the handle. Wedge the handle in the ordinary way and cut two wood plugs, slightly tapering, to fit the ends of the tube. The plugs may be removed and new ones inserted at any time. Rawhide is excellent to use instead of the wood as it will last much longer. No dimensions are given as the hammer can be made in any size. —Contributed by John L. Waile, Cambridge, Mass.

Turning Pipes with Files

Almost every person has in his home tool chest a wrench of some kind for doing odd jobs that do not require a mechanic, but not everyone has a pipe wrench. It often happens that a tool of this kind is required for turning pipe or holding anything round. An emergency wrench of this kind can be made of two files and an ordinary washer. The tang on one of the files is bent at



Position of Files

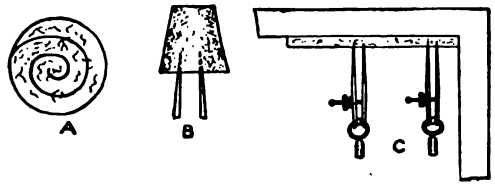
right angles and the ends of both slipped into the washer as shown. The manner of using the device is obvious. —Contributed by Joseph Olesen, Milwaukee, Wis.

Shifting Gears on an Automobile

When shifting gears on an automobile, disengage the clutch quickly and shift the gears with a quick push or pull. At the same time close the throttle almost tight and allow the clutch to come back quickly, as soon as the gears have been shifted.

Protecting Tool Edges in a Chest

The illustration A shows how to cut an ordinary cork to get long strips for attaching to the inside surface of a tool chest to protect the edge or points of tools. The strips are tacked or glued to the inside of the drawer or box. The points of dividers may be protected by sticking them into a cork as shown at

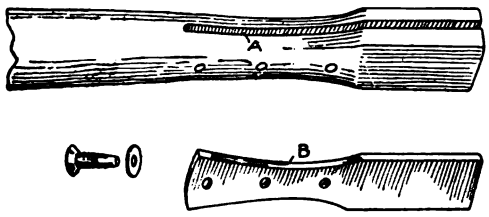


Tool Edges Protected with Cork

B. The strip protecting the tools in a chest is shown at C.—Contributed by J. F. Tholl, Ypsilanti, Mich.

Strengthening a Hammer Handle

A nail-pulling hammer handle may be made strong enough to stand hard usage without breaking by placing a

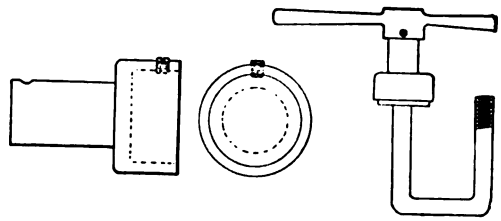


Metal Strip in Handle

piece of metal in the slot A of the handle shown in the sketch. The slot is cut in with a ripsaw past the small part of the handle. The metal B is cut to fit the slot, then drilled, and the wood countersunk for rivets. The rivets are well hammered down and smoothed off level with the surface of the handle. The hammer is fastened on in the usual manner.—Contributed by Irl R. Hicks, Hallsville, Mo.

Diestock Extension

In the sketch is shown an extension for a diestock for threading the ends of U-bolts. It is turned from machine



Extension in Diestock

steel in the shape indicated in the diagram. This tool is especially adapted for making clips for automobile springs.—Contributed by Urban A. Towle, Portland, Me.

¶When fishing with a drop net place a fresh water worm in a clear medicine bottle and tie it in the net. The worm will be greatly magnified. A ground worm in salt water will go through contortions that will attract the fish.

Turning a Typewriter Ribbon

It may interest those who use a typewriter to know that the life and usefulness of a ribbon may be almost doubled by simply turning it over after it becomes worn on one side and the impression becomes faint. I discovered this recently. Knowing that ribbons did not last long, six weeks being the limit with mine, I reversed the ribbon and was delighted to find it as good as when new. My ribbons last twice as long as when using only one side.—Contributed by A. Ashmun Kelley, Malvern, Pa.

Keeping Lines from Under the Ends of Singletrees

A simple method of keeping a line from catching beneath the end of a singletree is to connect the clevis on



Bar of Metal on Singletrees

each singletree with a rod or strap iron. The method of applying the rod is shown in the sketch.

Stay-Bolt Repair on a Boiler

We were running an engine in the backwoods at 75 lb. pressure and had a couple of stay bolts to fix. They had been leaking so long that the iron around the stay bolts had rusted to almost a feather edge. There was not enough metal left to hold an ordinary stay bolt, although the boiler was in good shape otherwise. We used ⅝-in. bolts and put large washers and double nuts with asbestos packing instead of riveting the ends. They made a permanent and perfect repair.—Contributed by Marion P. Wheeler, Greenleaf, Oregon.

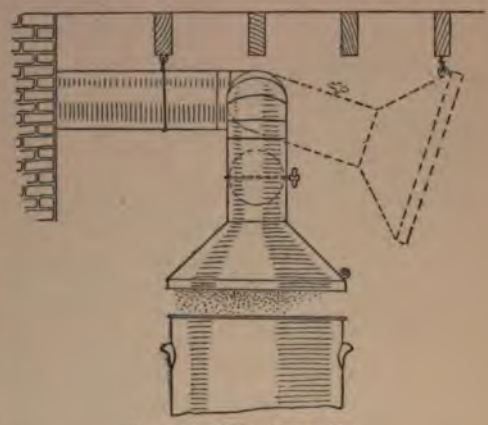
¶If cotterpins are rubbed with flake graphite, they will not rust and can be easily removed.



Ash-Can Dust Absorber

The dust rising from cinders taken from a furnace will, in a short time, cover everything in the basement with a coat of fine ashes and many times it gets into the rooms on the first floor. A great deal of this fine dust can be disposed of, if the ashes are put into a can which is directly located beneath a large funnel covering having pipe connections to the chimney.

The pipe must have two elbow joints and a connecting short piece so that the funnel-shaped covering can be turned up and away from the can top, as shown by the dotted lines in the sketch. The pipe and funnel are turned up when the can is taken out for emptying. A damper is placed in the pipe so it can be turned to prevent a draft when not in use.—Contributed by John Blake, Franklin, Mass.



Position of Hood over Can

Wheels on a Shop Stepladder

A ladder with wheels is very handy for the oiler, as it saves considerable time in moving it from place to place. The ordinary wheel attachments are objectionable as the ladder is liable to move on an uneven floor when the oiler is at work. In the illustration, Fig. 1, a wheel attachment is shown which has a spring strong enough to carry the weight of the ladder, but will allow the wheel to rise under the weight of a person. This causes the ladder ends to come in contact with the floor and makes it impossible to move the ladder while the oiler is at the top. The wheels on the vertical supports are attached as shown in Fig. 2.—Contributed by D. J. McKenna, New Britain, Conn.

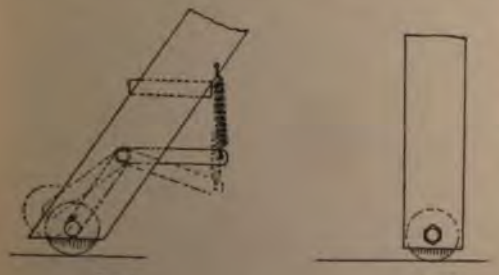


Fig. 1 Fig. 2

Wheels on Ladder Legs

¶An adjustable water drip for a grindstone can be made by sewing the ends of several pieces of burlap together, wide enough to fit in a can, and long enough to hang below the bottom on the outside. If water drips too fast, strips of the burlap can be folded back.

Substitute for a Small Lifting Magnet

A device that is quite useful and will take the place of a magnet for picking up small pieces, such as bolts, nuts, plugs, or anything not weighing over 1½ lb., can be made of a long stick on the end of which a can is fastened and filled full of hard oil or grease.



Some small tool or part of machinery often falls, when making repairs, into a place from which it is hard to recover, and sometimes this will cause the dismantling of the different parts to get it out. When this happens, a magnet comes in handy. If a magnet is not at hand, the device described and shown in the sketch is a very good substitute. If the parts are brass, then this substitute will lift them where a magnet would not attract them.

The device is made of an ordinary tin can with one end open and the other nailed to a slender stick, the can being filled with hard oil or grease. When the can is pushed down on the dropped part, the grease will pick it up.—Contributed by Joseph Oleson, Milwaukee, Wis.

Protecting Automobile Engines from Intense Cold

One difficulty in running an automobile in the winter is to keep the engine from getting too cold and the carburetor from becoming covered with frost. This trouble can be avoided by making a heavy wire frame the same shape and size as the radiator front and covering it with dark bunting which will make it look like a sieve. Fasten a strap around the wire at the top and buckle it around the water filling cap. Attach straps to each of the lower corners for buckling to the automobile frame or lamp brackets.

The bunting will stop the cold air rushing through the radiator and will shield the engine. The engine will then keep the air in the hood warm and the frost away from the carburetor. In very cold weather several layers of bunting should be used.—Contributed by Earl R. Hastings, Corinth, Vermont.

An Air Compressor

A simple air compressor that will produce about 50 lb. pressure in a tank can be constructed with two ordinary cast-iron open-well pump cylinders, 2½ in. inside diameter, and pipe connections. These cylinders can be purchased cheaply, complete, including guide rods and plungers. Packing boxes, A and B, Fig. 1, from old discarded valves are fastened into the tee connections on the end of the pipe C. The valve rods D and E pass through the packing boxes and are attached to a device for driving the pistons F and G. The pipe connections on the ends of the cylinders have two inlet check valves, H and I, and two outlet valves, J and K, to the pipe L attached to the tank.

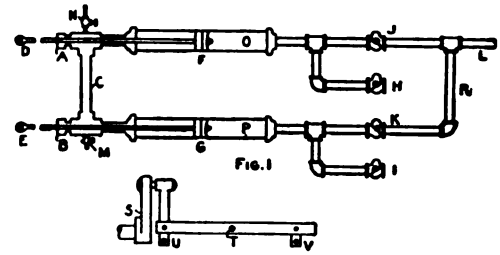


FIG. 1

FIG. 2

Pump Cylinders and Pipe Connections

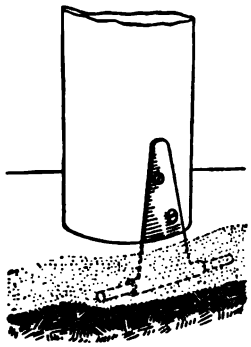
The cylinders are cooled by water in the pipe C, which is regulated by the valve M. The water outlet is through the valve N. These valves

should be regulated so that there is no pressure on the water to keep it from entering the air chambers O and P.

A crank arrangement can be fixed to operate the compressor from a shaft as shown in Fig. 2. The crank S operates an arm pivoted in the center at T. The plunger ends D and E, Fig. 1, are attached to the projections U and V, Fig. 2.—Contributed by J. S. Noble, Toronto, Ont.

Anchoring a Post to Concrete

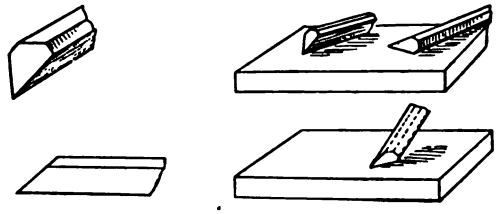
Wood posts may be attached to concrete floors by setting one-half of a heavy hinge in the wet concrete, allowing sufficient length above the surface to admit two of the screw holes. When the cement is dry the post can be fastened to its support with screws. The hinge can be reinforced by inserting a piece of rod iron into the hole before the cement is tamped in around it.—Contributed by Paul H. Burkhart, Blue Island, Ill.



Bright Cutting on Aluminum

Grind the face of the graver in the direction of the lines, as shown in the sketch, to an angle of 45 deg. Use a fine oilstone wheel without oil. Leave the face of the graver rough and remove the bur by jabbing the end into wood. Polish the sides as shown on a hard oilstone which has had some brass rubbed into it and has been used without oil. Draw the graver from the heel toward the point to sharpen the cutting edges. Keep it moistened with pure vaseline. If the face of the graver is not polished, the metal will not adhere to it, thus allowing the chips to roll off from the point.

This method of sharpening applies to tools for cutting any kind of jewelry except turning gravers. Turning gravers for cutting bright on brass or steel may be polished as described and given a very keen edge by drawing the face the same as the sides over the stone.—Contributed by Geo. W. Coplin, Bay City, Mich.

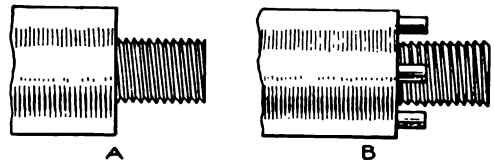


Whetting the Graver

A Nut Arbor

Nut arbors are used to turn up pieces having threaded holes. The most common form of an arbor is shown at A in the sketch. This form has the objection of making it necessary to use a collar for the work to fit against, or the threads must be recessed in the work so as to have a close fit, or else the threads must be cut out close to the shoulder on the arbor.

An arbor made as shown at B does not have the objections mentioned. After the threads are cut on the arbor, four holes are drilled longitudinally in the shoulder and pins driven in tightly. The arbor is then put in a lathe and the pins faced off true. This makes an arbor that is good for any kind of work without resorting to collars and recesses.—Contributed by Donald A. Hampson, Middletown, N. Y.



Pins in Arbor Shoulder

Adjustable Feed Bags for Horses

When the feed in the ordinary feed bag gets too low for the horse to reach easily, he either throws his head up or sets the bag on the ground to get

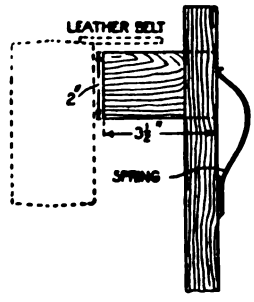


Feed Bag Hung on a Rein

the grain. In either case, much of the food is wasted. The illustration shows a feed-bag holder on the principle of a rein, which quickly adjusts the level of the grain to the mouth of the horse by a slight movement of his head downward. The sketch fully illustrates the construction of the headgear and the rein connection.—Contributed by Leonard L. Miksch, Buffalo, N. Y.

A Belt Stick

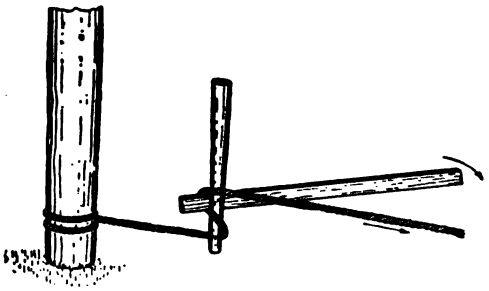
The belt stick shown in the accompanying sketch consists of a long handle made of wood with a square hole mortised in its upper end and a block, 3½ in. long, fitted to slide easily in the mortise and held in place with a spring. The block is kept from slipping through the hole by cleats or screws placed on the top and bottom sides of the block and entering a recess cut in the handle.



When a belt slips off a countershaft pulley, all that is necessary is to put the block under the belt and press the shifter stick on the side of the pulley. The block naturally slides back against the spring, leaving the belt free to slide on the pulley.—Contributed by Harry L. Berry, Philadelphia, Pennsylvania.

Pulling an Automobile Out of a Rut

There is a handy way of getting an automobile out of a rut if you are fortunate enough to have a rope along and the rut happens to be near a telegraph pole or tree, says the Automobile. The accompanying sketch depicts a method which was much used in the old days of the horse. A turn



Position of Lever for Taking up Rope

is taken about a convenient tree or post, then a smaller pole is placed in the position shown, to act as a fulcrum for the lever pole. In this way quite a purchase can be obtained, and if the rut is not too deep and the car not too heavy, so that the rope will not break, the car often can be withdrawn.

Quickly Made Tool for Bending Pipe

A pipe bender can be made by boring a few holes in a piece of oak plank and inserting heavy bolts or short pieces of pipe for pegs, about which the pipe may be bent as desired.

¶Rivet heads should be kept well below the surface on leather-faced clutches.

Stencil Making

By HOMER H. KNODLE

PART I—Designs

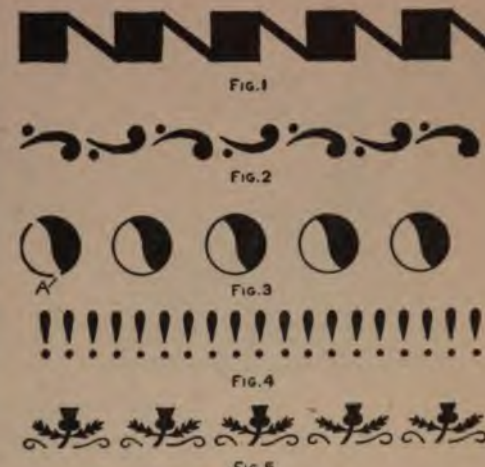
Painters, decorators and practically everyone have at some time or other felt the need of a good stencil to produce artistic duplication and were unable to make one because they did not know how to do it. Stencil making is quite simple and a few suggestions as to the methods of designing and the operations in cutting them will enable anyone to make them for pleasure or for profit.

The only tool necessary is a good sharp knife, preferably with a rounding point. The material used for a stencil is a heavy grade of tag or manila board which can be secured of a local printer or at a drug store. A small amount of boiled linseed oil will be required to coat the finished work, and, aside from the drawing tools, will be all that is necessary to do the best work.

A drawing board is necessary for designing, which must be as large as the largest size stencil to be made, a T-square, triangles, one 30 and the other 45 deg., and a set of drawing instruments. A fair grade of instruments amply accurate for this rough drafting should not cost over $3 for the set. A box of 2-oz. tacks will be needed for fastening the paper or tag board to the drawing board.

A very simple design consisting of a square block connected by a bar, which will serve very well for practice work, is shown in Fig. 1. This is first drawn on stencil paper by dividing the horizontal lines into equal squares, then forming the blocks and connecting them with the bars, using the 45-deg. triangle on the T-square. When drawn as shown, it is ready to be cut. This design does not require binders.

In Fig. 2 is shown another simple scroll design without any binders, intended for practice work. The design is first drawn in rectangles and then the scroll is drawn in freehand, finishing with the dots at regular intervals. The designs in Figs. 1 and 2 should not be made more than 2 in. wide.



Simple Designs for Stencils

The design shown in Fig. 3 is made up of circles which contain some black and some white. The black represents the part to be stenciled in all cases and in this particular design the white space in the circle must be held firmly in place. To do this a narrow strip, called a binder, must remain in the black surface (in this, a part of the enclosing circle, as shown at A) to hold the white crescent-shaped piece in place. When through stenciling, the uncolored part under each binder may be painted or not as conditions suggest. The binders are necessary in all intricate stencils and they must be placed as inconspicuously as possible and yet hold the part firmly.

Another practice design is shown in Fig. 4 which eliminates the binders. The method of drawing is simple spacing and duplication. This design should not be over 2 in. wide or its effect will be ordinary. It is especially adapted to be cut about 1 in. wide and used in connection with another bold





Fig. 2. Designs

Fig. 4 Stenciling a series of these designs around a corner will make a fine scroll to surround a center piece. It will serve equally well as a border. A pretty border can be made by placing a plain line on each side of the wreath or a design similar to Fig. 1 may be used. The wreath design at the top may be made smaller than 4 in. or larger than 8 in. The dies forming the flowing ends should be ¼ in. in diameter for the larger size and reducing the diameter for the smaller ones down to 1/16 in.

Another border design which should not be made over 1 in. wide is shown in Fig. 5. The petals are stenciled in first, then the dots and then the small squares. The border design shown in Fig. 6 is for practice in painting rather than a design for stenciling. It may be used in places requiring a very light design with little ornament.

Figure 11 shows a bold design of a letter that will prove valuable for places requiring a heavy design of medium size. This design should not be less than 10 in. wide on the base and not over 12 in. It will give a very good effect if used with a darker tone of the body color and edged with a contrasting color. Binders will be necessary and these should be painted over after stenciling as important a piece as this one shown.

In lay out the design, mark the bounding circles first and then use the two triangles to draw the centerline of each bar as it appears in the sketch. Sketch in the outline of the bar at equal distances on either side of the centerline. Continue this over the entire design, sketching in the ornament around the border last.

When a stencil is finished remove it

from the board and place it in some convenient place and give the surfaces a coat of linseed oil. This serves to keep it and finishes the stencil. The knife should be very sharp and kept so, as a line cut over twice is always rough and cannot be trimmed without destroying the symmetry of the design. Constant practice on the simple designs will soon enable one to work on larger and more intricate work.



FIG. 8



FIG. 9

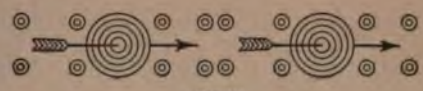


FIG. 10



FIG. 11

Designs for a Center Circle and Borders

(To be continued.)

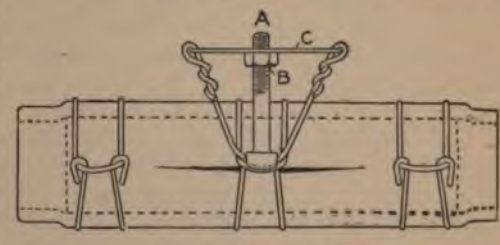
Repairing a High-Pressure Hose

A hurry-up job had to be made on a high-pressure hose which was used in connection with a water-turbine boiler-tube cleaner with water at 150 lb. pressure per square inch. The hose had a split about 2 in. in length. The hose could not be cut off, as it would be hard to hold together under the working pressure, says a correspondent of Power.

The repair was made quickly by splitting the hose for a distance of about 5 in. on each side and inserting a nipple about 10 in. in length, first pushing it into the hose on one side of the split until the other end would enter the hose. Then the nipple was centered in the cut section. The two sides kept it from pulling apart.

The clamps used to make the connection water-tight were made of wire as shown in the illustration. When the wire was drawn tightly, the tool was pushed forward, thus hooking the two ends over the bight of the wire.

If wire of high tensile strength is used and a little care exercised in getting the wires straight, a permanent job is usually the result. A great deal depends, of course, upon the workmanship.

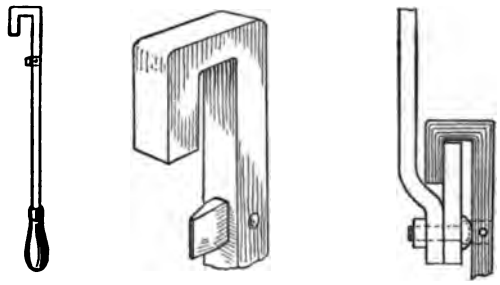


Clamping Hose with Wire

¶Spots on varnish can sometimes be removed by rubbing them well with a soft rag saturated in boiled linseed oil.

Holding Screws When Repairing Beef Tracks

The condition of the atmosphere about beef tracks soon rusts all nuts on screws and bolts. In making re-



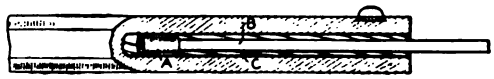
Screw-Holder Lever

pairs it is difficult to remove a nut without some means of holding the screw to prevent it turning with the nut. The leverage on an ordinary screwdriver is not sufficient to hold the screws, therefore I made a tool as shown in the sketch, the end of which is bent and fitted with a screwdriver end as shown in the enlarged view. The method of holding the screw is clearly shown.—Contributed by I. B. Spittel, Baltimore, Md.

Removing Rust Pits in a Rifle Barrel

The rust and pits on the inside of rifle barrels can be removed without rounding the edges of the rifling, with a tool of babbitt metal made to fit the bore of the rifle.

This tool can be made by inserting a wad of paper, A, about 4 in. in the barrel from the muzzle end, and a rod, B, preferably brass, held centrally in the bore while the space C is filled with melted babbitt metal. The end of the rod should be roughened or



Molding Soft Metal End on Rod

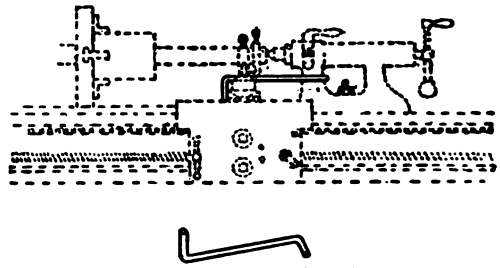
notches filed to securely hold the metal, and it should be longer than the barrel so that a loop handle can be bent in the end.

The babbitt metal will contract sufficiently in cooling to permit it to be screwed out of the barrel.

Dip the babbitt end in oil and dust emery flour over it and turn the tool through the barrel. All rust is quickly removed in this manner without damaging the rifling.—Contributed by Wilfred E. Bertrand, Philadelphia, Pennsylvania.

Drill Feed for a Lathe

Place the drill on the center with a dog as usual, then bend a piece of iron rod as shown, one end to hook over the base of the tool-post and the other to slip into the depression in the tailstock. Put a tool in the tool-post to keep the drill from "digging in" and take up the slack by screwing drill and dog up



Automatic Screw Feed for a Tailstock

tight against the tool-post. Put a slow speed on the screw feed. This will save feeding by hand.—Contributed by J. F. Tholl, Ypsilanti, Mich.

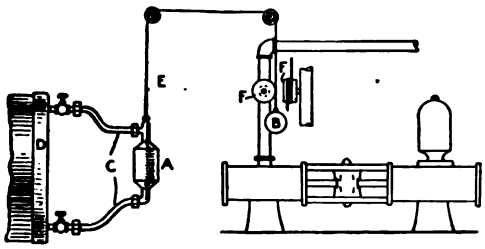
Automatic Pump Control

The device shown in the sketch is designed to control the action of a pump drawing water from a tank or hot-water receiver. It is designed to supplant the ordinary float control. The small water receptacle A is balanced, when empty, by the counterweight B. The receptacle A is filled with water through the flexible connections C as the tank fills. As it gets heavier on account of the increased amount of water contained, it slowly falls.

The flexible cord, E, by which it is suspended, is passed two or three

times around a sheave on the valve stem of the pump throttle. This winding is done in such a way that as the weighted receptacle falls the throttle valve opens. This change continues until the pump is removing water from the tank as rapidly as it comes in. Any variation in the amount of inflow is taken care of by the same process or the reverse of it. When properly adjusted the controller will maintain a level almost constant —not more than 1 in. variation being noticeable. The same device can be connected to the ordinary automatic electric motor starter and thus control motor-driven pumps of any kind.

Experienced engineers know the trouble caused by tank floats. They frequently break, and breaks are hard to discover and difficult to repair. Usually it is necessary to shut down the whole system before attempting repairs. The apparatus described may be installed, repaired or dismantled without disturbing the action of the pump or the flow of the water. It also has the advantage over the internal float of not being influenced by the surge of the water rushing into the tank or the agitation caused by the boiling when the tank is used as a heater.



Substitute Float Attached to Engine Throttle

Repairing a Loose-Jointed Chair or Stool

The joints of stools and the majority of chairs are sure to become loose in time as they have no diagonal bracing, and, as time goes on, the wood of the rungs dries out and becomes smaller than the holes they fill, which causes the chair or stool to drop to pieces, unless steps are taken to hold them together. Nails are useless as they soon work loose and screws are of little value. The following method is sure to make the most shaky chair or stool in the shop firm as new:



Fig. 1

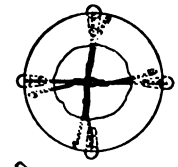


Fig. 2

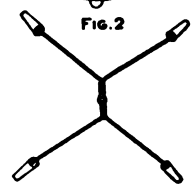


Fig. 3

Wire Braces for Stools

A section of a repaired stool taken in the plane of two opposite legs is shown in Fig. 1. To repair a stool there will be required a 1/8-in. drill or bit, a brace, a pair of pliers, hammer, screwdriver and a quantity of No. 12 gauge galvanized wire. Drill four holes diagonally through the edge of the seat at one side of each leg, so that they come out on the under side; one hole through each leg obliquely toward the center, about 10 in. below the bottom of the seat, and a similar hole in each leg about the same distance above the bottom, unless it is a very low stool or chair, in which case the latter will not be required.

Insert the end of the wire through one of the upper holes in one of the legs and through the hole in the seat edge diagonally opposite. Bend a short close hook on the end of the wire with a pair of pliers, the end of the hook being parallel to the body of the wire, and hammer this into the leg like a nail, the hook lying in the plane of the grain, that is, lengthwise of the leg. Pull the wire almost taut, leaving about 2 in. slack to spare, and cut off the wire on the outside of the seat-edge hole. Turn another hook on this

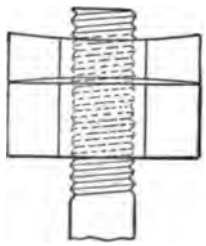
end and drive it into the seat edge, the hook in this case lying horizontal. Do the same with the diagonally opposite leg and seat-edge hole.

Take a large wire nail or screwdriver and insert it between the two lengths of wire and twist up tightly. Do the same with the other two legs and seat-edge holes, but in this case be careful to have one of the wires run over and the other under the twisted loop already formed and leaving rather more slack, because in this case two twists have to be formed in the wire on opposite sides of the first twist, as shown in Fig. 2, which is a plan view with the middle portion of the seat broken away.

The lower guying is simpler, there being only two lengths of wire, each extending between two opposite legs, and the two being twisted together as shown in Fig. 3. The whole operation takes from 20 to 30 minutes and when finished the stool is much stronger than a new one, in fact, it will hold its shape indefinitely.—Contributed by Geo. W. Colles, Milwaukee, Wis.

A Double Nut Lock

The sketch shows the principle employed. The last or lock nut is concaved on both sides.



When set up tightly the center of the nut springs down and in a way acts similar to a spring washer. At the same time its sharp corners cut into the lower nut and hold the lock nut in position. Extensive experiments on rail bolts have been entirely satisfactory.

¶Rats may be caught by putting a piece of cheese in the bottom of a wide-mouthed bottle and placing it in the hole. The rat will go in, but ...et out.

Thawing a Frozen Pipe

It is no easy task to thaw out a frozen pipe where the heat cannot be applied to the outside of the pipe. If hot water is poured into the pipe, it soon cools on the ice and accumulates in such a quantity that it is impossible to touch the ice with the hot water. A very efficient method is to insert a smaller pipe into the frozen one and pour the hot water into the smaller pipe. If the end of the smaller pipe touches the ice, the hot water will come directly in contact with it in a continual stream. This will force out the cold water and thaw the ice quickly.—Contributed by John Mason, Armstrong, Okla.

Shaking Up a Telephone

Where you cannot make your party hear over a telephone, shake it up by giving the transmitter a downward strike with the open hand. Do not abuse your telephone. If a portable or desk telephone is used, turn it upside down and then right it again.

The reason for this is that talking causes waves in the air like ripples on the water when a stone is thrown into it. In a transmitter there is a small receptacle containing fine grains of carbon. The waves of sound strike upon a disk that in turn squeezes the carbon particles together. This constant compression, together with their own weight, causes the carbon grains to settle and pack into a hard lump that does not respond to the vibrations of the metal disk. When giving the transmitter a downward strike with the hand the particles are disturbed and loosened and made soft so that they easily respond to the varying pressure caused by the sound waves. When a portable telephone is turned upsidedown, all the fine grains of carbon fall to the top of their container and as the telephone is righted they settle again, but are loose and soft.

When the carbon particles are com-

pressed, the electric current flows through the transmitter easily. When they are not compressed, the current does not flow so easily, thus the sound waves produce in the transmitter a current of varying strength that passes over the line.

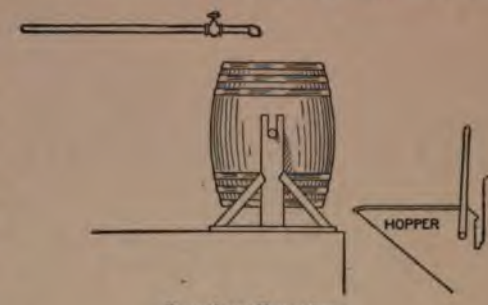
The receiver consists of a metal disk and a magnet inclosed in a hard-rubber casing with a cap. The magnet draws the metal disk. The varying current coming over the line flows through coils of wire around the magnet which weakens and strengthens the magnetism and makes the disk vibrate. The disk in turn causes sound waves the same as those given into the transmitter. If the cap of the receiver is loose, the disk often touches the magnets, which prevents it from vibrating easily. In such a condition it is hard to hear your party. If the cap is screwed up tight the disk is sprung away from the magnet about 1/100 in. and it has a hollow sound when struck with the end of the little finger. This will make the receiver produce the sound waves clearly.

The heat of the ear expands the cap and in cooling it creeps on its threads so that it will come loose in time. This will make it sound like the party on the other end of the line is very far away. Shaking up the telephone will make your party hear you well, and keeping the cap tight will enable you to hear them well.—Contributed by E. M. Morgan, San Gabriel, Cal.

Water Barrel for a Concrete Mixer

On a concrete job, a water barrel is usually behind the mixer, and the man in charge of the mixing uses a pail to get the water from the barrel to the mixer, says a correspondent of Cement Age. The accompanying sketch shows the arrangement of a barrel mounted on a trunnion and placed to one side of the mixer. This is filled to a certain height, and when the batch is ready for the water, the barrel can be tilted and emptied easily and quickly. This allows a measured and uniform quantity of water to be added to the mixer in the shortest time possible.

The trunnions could be mounted on



Barrel on Trunnions

a band and the band bolted at any desired height on the barrel. This would allow the easy dumping of any required quantity of water.

Bending Heavy Brass Braces

Heavy brass angular braces, such as are often used for automobile repair work, can be successfully formed to any desired angle without checking in the bend by using two ordinary monkey wrenches. The jaws of the wrench being smooth permit the metal to slip just enough to avoid breaking. And therefore this method is preferable to a vise.—Contributed by F. B. Mallory, Flemington, N. J.

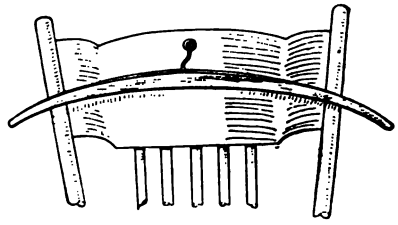
Aid in Nailing on Long Ceiling Boards

When ceiling a porch one day I had some 16-ft. pieces to put on, and as I was alone, I could not hold them while driving the nails. I secured a piece of heavy wire and bent it around a joist, as shown in the sketch, so that it would hold one end of the board while I jointed and nailed the other end. This wire clip did the work of an extra man in holding the boards.—Contributed by Albert J. Weier, Eavons, S. Dak.



Coat Hanger on a Chair

After leaning a few times against my newly pressed coat that had been placed over the back of a chair, I fastened a coat hanger on the chair back as shown in the sketch, and used it to

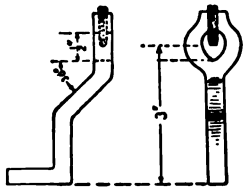


Hanger Attached to Chair Back

hang my coat on while at work. The chair can be used for the purpose it was intended.—Contributed by Victor Labadie, Dallas, Texas.

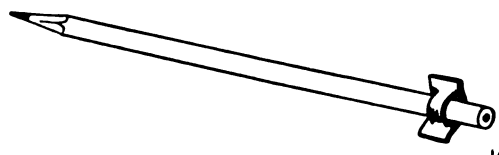
Lathe Dog for Small Work

The ordinary lathe dog used on small and short pieces is in the way of the tool-post block. To overcome this trouble, bend the tang of the dog at an angle of 30 deg. and use a headless set-screw. The sketch shows the shape of the dog and dimensions.—Contributed by Chas. Hattenberger, Buffalo, New York.



Clip to Keep a Pencil from Rolling

A draftsman usually has several pencils on the drawing board at a time and as these boards incline, it keeps one busy at times grabbing pencils as they roll down the board, says



Clip on Pencil

a correspondent of American Machinist. A piece of belt lacing placed on pencil as shown in the sketch will provide an anti-skid device that will keep the pencil where it is placed. The sketch clearly illustrates how the piece of lacing is applied.

Homemade Canvas Belt

Cut a tarpaulin into strips an inch or two wider than the desired belt. Procure some old roller composition that printers use and make it into solution with water and keep it hot. If the solution is too thick, add a little syrup. Cement the cloth strips together with the composition, taking care to put the laps the same way, and make it as many ply as needed for the heft of the belt. Use enough of the cement to firmly cement the strips and when done go over it with a hot flatiron to make sure that all parts are cemented together. Lay the belt straight on the floor and line it to the desired width with a chalkline and trim the edges. If carefully made, the belt will be as good as could be bought, and less expensive.—Contributed by J. S. Van Alstin, Norfolk, Nebraska.

To Keep a Paint Brush Soft

After finishing a job of painting and not desiring to have a can of oil standing around the house, I filled the bristles of the brush with a good supply of paint, carefully wrapped it in paper, tied it securely with a string and placed the brush on a shelf. A short time ago I wished to use the brush and upon unwrapping it I was surprised to find the bristles as soft as when put away. The oil in the paint having soaked the inner wrappings of the paper, thus preserving the brush in first-class shape for two years.—Contributed by F. D. Koon, Schoolcraft, Mich.

¶ Whitewash for outside work is made of ½ bu. slaked lime, 1 lb. salt, ½ lb. sulphite of copper and 1 gal. of sweet milk.

Underground Conduit Construction

The unsightly poles and wiring which have for years marred the appearance of city streets and country highways, as well as constituting a nuisance and source of danger, are gradually disappearing, and the innumerable wires are being laid in underground conduits. Even the smaller towns, proud of the appearance of their main streets, are replacing the poles with conduits.

The present method of construction which has been adopted by the telephone and power companies consists of placing a 4-in. concrete base on which is laid vitrified clay conduit. As the material used in this conduit usually forms a cheap glass in baking, it is absolutely the best material to construct a main conduit or subway. Creosoted-wood ducts and fiber ducts are also used, but do not give as satisfactory results as the tile on heavy runs.

After the concrete bottom is placed the multiple-duct tile is laid, Fig. 1, the joints being made by placing dowel pins in the two top holes. A piece of single-ply tar paper, about 8 in. wide, and long enough to lay on the sides of the tile, is then placed around the joint to exclude dirt, concrete, etc., from the interior of the ducts. The paper is held in place by a dab of mortar as shown in Fig. 4. The clay conduit is then capped with a layer of concrete, 3 in. thick, which projects down the sides of the tile for 3 in. This cap is to protect the conduit and the cables within from damage that may be caused by other excavations in the vicinity.

One creosoted-wood duct having an inside diameter of 3 in., or one single-duct clay tile is usually run along on top of the cap as shown in Figs. 2 and 3. These ducts are provided to allow for laterals which may be required from time to time, and which would otherwise necessitate excavating from the pole to the manhole. When the creosoted-wood duct or tile is used, the lateral is built from the pole to the single duct which is "tapped." A lateral, or subsidiary, is a term which applies to a one and two-duct run from a manhole or service box to a pole or building and, generally speaking, means a short light subway. The laterals are used to carry the underground cables to the poles or buildings above ground, so that the service from the wires can be distributed. The bends shown in the laterals in

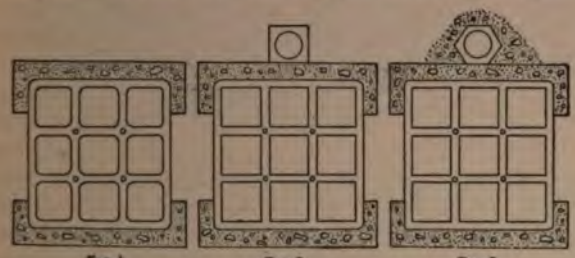


FIG. 1 FIG. 2 FIG. 3

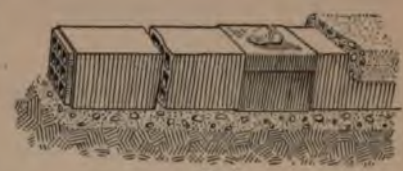


FIG. 4

Concrete Bed and Covering

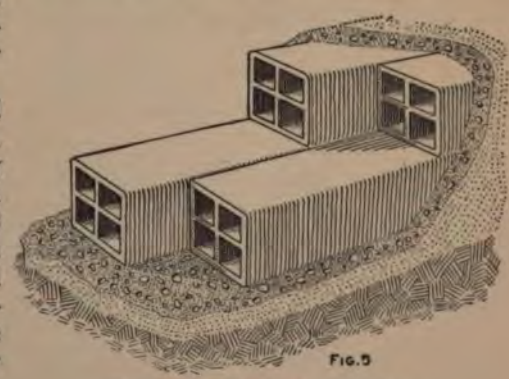


FIG. 5

Four-Tile Unit in a Concrete Casing

Fig. 7 are made of 6-in. iron pipe, which is bent to shape before delivery on the job.

When creosoted wood is used on top of the tile, the joints are simply fitted together and the earth replaced. When the single tile is used on top of the main conduit, it must be laid very carefully and covered with concrete.

As the multiple-duct tile is only made in two, three, four, six and nine-hole sizes, it often becomes necessary to build the subway using more than one unit, as shown in Fig. 5. When laid in this manner the joints must be "broken" or "staggered" and the whole run is usually, but not always, encased in a concrete jacket or envelope. When laying two-tile units, one on top of the other, it is customary in first-class work to place from ¼ to ½ in. of mortar between the units so that the upper course of tile may be laid straight and true.

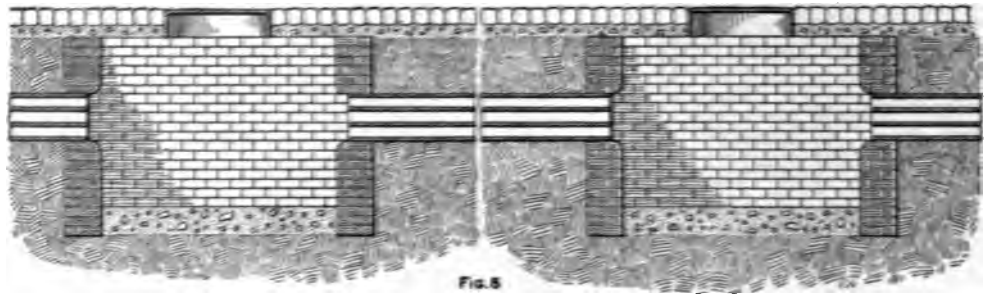


Fig. 5
Manholes

placed in the trench and on this the bottom ducts are laid. Concrete is then poured over these ducts and tamped into place. More ducts are laid and concrete tamped in to make it appear as in the cross section, Fig. 8. The lengths of tubes are connected by a slip joint, as shown in Fig. 10. The average length of a fiber duct is about 8 ft.

Another method of building a subway is shown in Fig. 9. When the conduit is built above ground, as is sometimes the case, it is made up of fiber ducts. This method needs no description except to state that a box is built, forms are placed to line up the ducts and the concrete placed the same as in the previous description. The disadvantage of fiber ducts lies in the fact that fiber is not an insulator, as the material of which it is composed consists partly of vegetable matter. The ducts also become soft in warm weather. Great care must be exercised while placing the concrete.

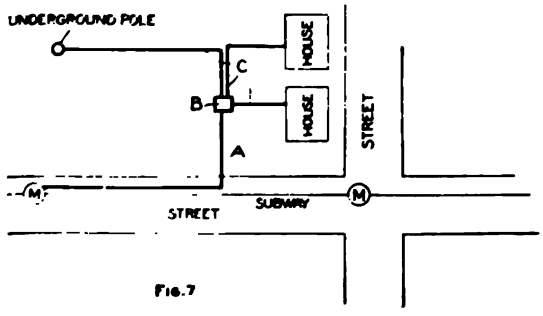


Fig. 7

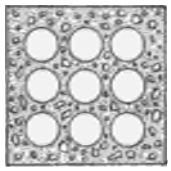


Fig. 8

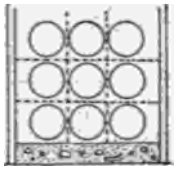


Fig. 9



Fig. 10

Plan of Subway and Fiber Ducts Covered with Concrete

When the subway is built of fiber duct instead of vitrified clay, the method of constructing is changed. A bed of concrete, 3 in. deep, is first

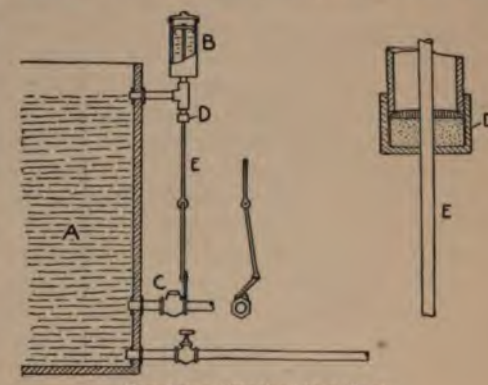
The manholes used in connection with the conduit run are usually built

of hard-burned common brick laid up in walls 8 in. thick with cement mortar. The floor is usually of concrete, 8 in. thick. The thickness of the walls depends largely on the size, location and earth pressure. A conduit construction with a manhole at each end is shown in Fig. 6. The walls are built up straight and a flat iron manhole frame set on top of them. This style of frame does away with the necessity of placing railroad iron in the walls to form a roof upon which to place the old-style round frames. The standard size for manholes as specified at present is 7 ft. long and 4 ft. wide, with 5½ ft. depth from floor to top of wall. Service boxes differ from manholes only in size, the length and width being from 3 to 4 ft. and the depth about the same. Service boxes are placed where there is an exceptionally long or crooked lateral, or in special cases, one of which is shown in Fig. 7. This allows for one 150-pair cable, A, to be drawn into the service box B from the manhole, where the three 50-pair cables, C, are spliced into it. The sketch Fig. 7 also shows a method of making up a working drawing of a job of this kind.—Contributed by Geo. M. Petersen, Buffalo, N. Y.

Water-Depth Regulator for a Tank

A tank used for a water supply in connection with a laundry was constructed with a close-fitting cover which would stand a 4-lb. pressure when full. A regulator was attached to the side of the tank A to keep it full all the time without attention. The regulator consisted of an iron pump cylinder, B, such as is used on a hand pump, with a plunger and connecting rod to a quick-acting valve, C, on the inlet pipe. The rod E of the plunger passed through a packing box, D, made on the end of a short piece of pipe. This is shown plainly in the enlarged part of the sketch. The short pipe was fitted with an ordinary pipe cap having a hole drilled in its center a trifle larger than the rod E. A washer was placed over the end of the pipe and packing put into the cap. The check in the pump plunger was closed and blocked to make it airtight.

The water is admitted through valve C in the inlet pipe, when the valve is in the down positon. When the tank is full of water, a portion passes into the pump cylinder and under the pump plunger forcing it up in the position shown and carrying with it the rod that connects the plunger and lever on the valve C, thus raising the lever and closing the valve. When drawing water through the outlet pipe, a vacuum is caused in the top of the tank and in the cylinder, which draws the plunger down and



Regulator Attached to a Tank

opens the valve. This admits water through the inlet again to fill the tank. The action takes place as soon as the outlet valve is opened. The inflow of water offsets the vacuum, which makes the action of the water entirely free.

If the inlet is as large as the outlet, the water cannot be lowered in the tank. If the inlet is the largest, the valve will open and close like the slow motion of a piston on an engine.—Contributed by C. S. Enright, Cle-Elum, Wash.

Taking Care of Leaks through Hinged Windows

Most every hinged window that swings toward the inside leaks when the rain beats against it. There is no

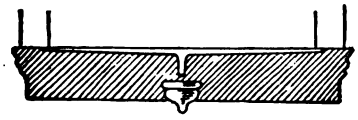


FIG. 1



FIG. 2

Cup on Window Sill

remedy for this as these windows leak even though equipped with the very best weather strips, yet architects are specifying them on new houses quite often.

While abroad I saw an attachment for these windows that interested me very much. It was nothing more than a gutter or groove cut in the window sill, being very shallow at the two extreme ends and gradually getting deeper toward the center. Right at the deepest point a hole was bored about ¼ in. in diameter, to which was attached a small pipe as shown in Fig. 1. At the end of this pipe a hook is soldered upon which a can of some ornamental design, Fig. 2, is hung. While this is not a very artistic addition to the window it looks very much better than the sill covered with towels and rags to catch the water, or having the wallpaper beneath the window stained. The device does not remedy the fault, but protects the wall and floor.—Contributed by Gilbert A. Wehr, Baltimore, Md.

Holding a Bolt in a Turning Crank

A bolt and nut may be held in the end of a turning crank or shafting by the following method, which seldom fails, even though it is inclined to work loose. Before inserting the screw place a small block of wood in the hole. When the screw is turned up tightly against the wood, the revolving motion of the machinery will not cause it to work loose.—Contributed by Loren Ward, Stockport, Iowa.

Detector for Polarity of Electric Wires

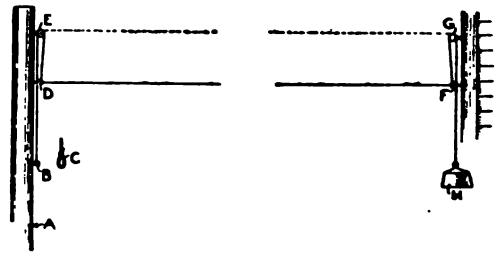
One of the simplest detectors for electrical polarity is white filter paper immersed in a solution of sodium sulphate to which has been added a small quantity of phenol phthalein. The result is a colored paper, which, if moistened, will turn violet when touched with the negative wire, but remains unchanged when in contact with the positive. The paper retains this property indefinitely, and is sensitive to a very feeble current.

Blueprint paper may be used for the same purpose, a white spot developing around the negative pole when the paper is in contact with the wire, while the positive wire has no effect on it.

Adjustable Height Clothesline

The ordinary clothesline is a source of much trouble. To have it low enough for hanging the clothes, to keep them from dragging on the ground and then to prop it up high enough for drying the garments, is invariably a stumbling block to the housekeeper. The sketch shows an easy way to adjust a line which is never slack, never drags the clothes in the dirt, is always high when the clothes are drying and is easily lowered to hang or remove the garments.

Two spikes, A and B, are driven



Clothesline with Weight

into one of the posts and two pulleys, E and G, are fastened at the top of the posts or 7 ft. from the ground. About 5½ ft. above the ground, screw in two screwhooks, D and F. The nails A and B should have a dis-

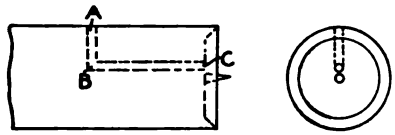
tance between them equal to the distance D and E.

Make a loop, C, in the end of the line, or tie an iron ring in the line after running it through the pulleys. Loop the end over the spike B and fasten a heavy weight, H, at the other end. Pull the line down and hook it over the hooks D and F. This will give the line the proper height for easily hanging the clothes, and the weight will keep it taut all the time.

Unhook the line at D and at the same time take the loop from the spike B and draw it to A. This action will take up that part of the line from D to E, thus making it possible to utilize all the space between the posts. Release the line from the hook F and the weight will automatically take up the line between F and G, thus keeping it taut all the time without the use of props.—Contributed by Axel C. Hanson, Lincoln, Neb.

Oiling a Lathe Cup Center

An ordinary cup center for a wood lathe can be made with an oil hole so that oil can be applied without removing the work. The oil hole is drilled from A to B and then the hole C is drilled to intersect it at right angles. The oil being put in at A runs through the hole and strikes the end of the work at C.—Contributed by Julius Barnes, Columbus, Ga.



Hole for Oil in Cup Center

Grip for Strap Iron

The article here shown is a little device for erecting pipes or stacks, especially where strap-iron hangers are used, but it will grip wire just as well as strap iron, says a correspondent of Sheet Metal Shop. When putting up hangers, it is difficult to pull the slack out and get them uniform. With this little device, which is composed of a wedge and link, one can, by the use of a very small set of blocks, draw the hanger to the desired tension with perfect ease and without loss of time. The wedge and link can be quickly adjusted.

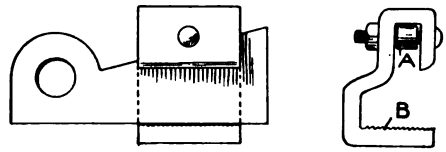


Fig. 1



Fig. 2
Grip in the Form of a Wedge

The side and end views of the wedge and link are shown in Fig. 1. It will be seen that a small roller is placed at A, which allows the wedge to roll freely to its full limit. This roller is made of ⅜-in. gas pipe with a ¼-in. bolt and nut to hold it in place. The surface of the link is made rough, as shown at B, causing it to hold while the wedge slips freely on the roller. The link may be made of ½ by 1¼-in. tool steel, but the wedge can be made of any kind of ½ by 1¾-in. iron. In Fig. 2 is a view of the grip in use.

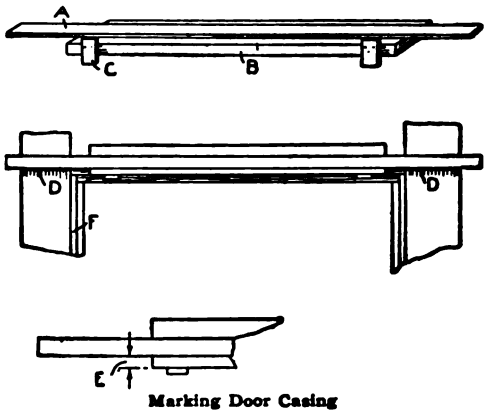
Pointing Brick Walls

When pointing up a crack in the mortar between bricks, it is necessary to cut out the mortar a little longer than the crack and about ½ in. deep. This should be filled with a half-and-half mixture of cement and clean, sharp sand. In replacing cracked or broken bricks, great care should be taken to see that the brick is firmly bedded into the mortar on all sides, or the wall will leak and eventually settle in that particular spot.

¶Do not forget to oil a machine the first thing in the morning.

A Marker for Door and Window Head Casing

The marker consists of four pieces put together as shown in the perspective sketch. The pieces can be of any convenient material and size, but the relative sizes shown in the sketch will be found most practical. In this case



Marking Door Casing

A is a piece of window stop, ⅜ by ¾ in., fastened to a piece, B, ¾ by 3 in. The pieces C are cut 1¼ in. long from window stop. The length of the tool will depend on the size of the doors and windows.

The pieces C are placed flush against the outside groove of the door frame. If the distance E corresponds to the thickness F, a pencil drawn along the edge D makes a mark which is true with the frame of the door. The head casing can be placed on the ends of the side casing cut to the marks and nailed without fear of a crack showing.

In the case of a window head where the frame is made of different material, the piece A is placed flush with B. This tool is particularly applicable to carpenters whose door and window frames do not always fit true in door and window openings.—Contributed by Jo Sorensen, Portland, Ore.

Fitting Screws in Old Holes

When window or door screens are removed for the winter, and it is intended to hang them again in the spring, paint the holes where the screws were removed from the wood with a small brush or a piece of cloth. When the screens are replaced the next season the screws will not be loose but will hold as firmly as when the holes were first made.—Contributed by John T. Timmons, Cadiz, Ohio.

¶If one bolt is lost on a planetary transmission, the overweight on the others is apt to shear them off.

Lemon Squeezer

As we were very much in need of a lemon squeezer one day and did not have one in the house, I soon made a substitute that gave better results



Fig. 1 Fig. 2

Nails in a Board Take the Place of a Squeezer



Fig. 3

than an ordinary squeezer. I made a handle of soft pine in the shape of a paddle (Fig. 1) from the wood of an old packing-box end. The handle was 3 in. wide and 7 in. long. A 2-in. circle was drawn on the paddle part and eight 6-penny nails were driven part way in on the line, in a slanting position (Fig. 2), so that the heads formed a circle about 1 in. in diameter.

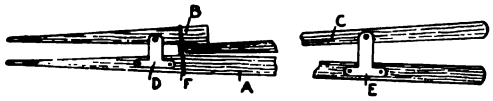
The squeezer is used by holding the paddle edgewise across the top of a cup or glass with the nails in the positions shown in Fig. 3, and one-half the lemon is pushed onto the nails and turned. The squeezer can be used a great

many times as it is easily cleaned.—Contributed by W. A. Lane, El Paso, Texas.

A Show-Window Stick

A stick, as shown in the sketch, that will prove quite useful to the window dresser, can be made in a short time and used to place small articles in a window without getting inside. The stick is made of three pieces of white pine, ½ in. thick, ¾ in. wide and in the following lengths: First, 36 in.; second, 31 in., and the third, 4¾ in. long. The longest piece, A, is first tapered from one end to the other; the next longest piece, C, is tapered to ¼ in., and the short piece, B, is tapered the same as A on the end.

The pieces are fastened together with inverted T-shaped pieces of



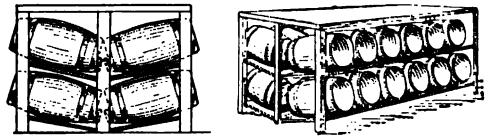
Stick Operates Like Pliers

sheet brass, D and E, placed on each side in the positions shown. The shorter one is 1⅜ in. high and the other is 1¾ in. A large rubber band, F, serves as a spring to keep the points separated. The stick is operated the same as a pair of pliers.—Contributed by W. J. Faulkner, Russellville, Ark.

Nail Kegs Used as Bins

Large hardware stores do not require bins as receptacles for nails. The loose stock of nails should not be kept on the salesroom floor except those sold in 1-lb. boxes, says Hardware Reporter. A large stock of nails can be kept in the basement and orders filled from the original kegs, which can be arranged in rows underneath the counter or table.

The kegs can be arranged so they will incline outwardly on a plank shelf, the upper part of which is sheathed with angle iron to guard against wear. The bottoms can rest upon another plank of less width, securely fastened at right angles to the shelf and elevated from the floor sufficiently to render the contents of the



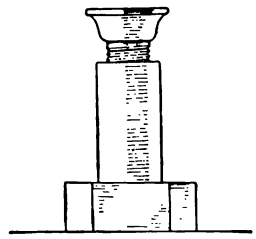
Kegs in a Table

kegs accessible without the necessity of much stooping.

The kegs should be arranged in order according to the size of the nails they contain, and as each one is emptied of its contents, it is removed and another keg full of the same size nails put in its place. The sketch shows the ingenuity of the plan, in which each keg serves as a bin for its contents, and does not permit of the accumulation of dust as does the average nail bin. It also affords more advantageous use of valuable space on the first floor of the store.

How to Make a Small Jack

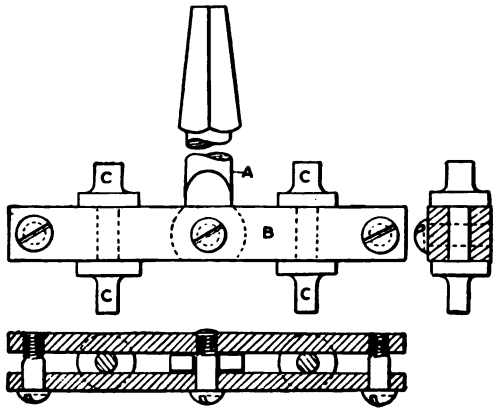
Small jacks are useful tools in any shop or garage. The shop that is not provided with these tools in sufficient numbers can have its workmen make them in spare time from scrap material. The sketch shows a jack the body part of which is made of a bolt with a hexagon



head. The head is turned off to make a flat surface and a hole is drilled through its center and tapped the full length. The screw is a part of an old or broken clamp having a swivel head, which is very handy for adjusting itself to slanting surfaces. Any size or length can be made to suit the individual needs.—Contributed by Donald A. Hampson, Middletown, N. Y.

A Spanner Wrench

A tool for use in connection with an ordinary brace for grinding in valves of gas and gasoline engines is the in-

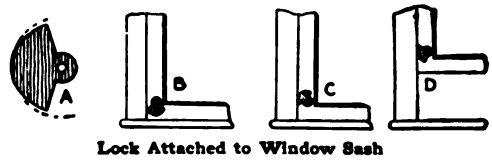


Spanner for a Brace

vention of a correspondent of American Machinist. The shank A is of any desired length. One end of it is squared as shown, while the other end is pivoted in the swinging yoke B which carries the adjustable driving-pins C. These driving-pins enter the holes usually provided in gasoline-engine valves for the purpose of grinding them in their seats.

Window Lock

A simple and effective lock which will hold the window in any position is shown in the sketch. It is attached to the window sash by means of a screw and is placed just far enough



Lock Attached to Window Sash

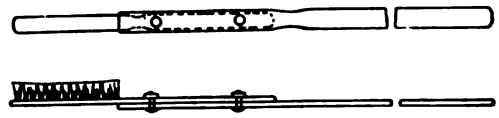
away from the window casing so that the edges of the outside circle will engage firmly against it, but will not allow the catch to pass the center. The outside edge is not an arc of a circle but is cut as shown at A. In the illustration, B represents the catch attached to the sash; C, in position to lock the closed sash, and D holds the window open at any point.—Contributed by Geo. M. Harrier, Lockport, New York.

Attaching a Lathe Dog on Threads

In shop practice it is often necessary to apply the dog to the threaded ends of bolts and studs. Where no threaded dogs are provided, the following method can be used to advantage: Take an ordinary nut, having the correct number of threads, and saw it centrally in halves. Place one half of the nut in the bottom of the dog and the other half on top. Insert the bolt or threads of the work between the two halves and tighten with the set-screw.—Contributed by J. B. Shiver, Rock Hill, S. C.

Brush for Cleaning Commutators

In the accompanying illustration is shown a little tool which comes in very handy for cleaning dirt, carbon and copper dust from commutators and brush holders, says Building



Toothbrush Fastened on Long Handle

Management. It is made by fitting a good stiff toothbrush with a long handle, as shown in the sketch. When the bristles of the brush become worn, the brush may be taken off and the handle fitted with another. This brush is also handy for cleaning the parts of circuit-breakers and other switchboard appliances.

Finishing a Hammer Handle

To put a fine working finish on a hammer handle rub in a filler consisting of a thin paste made by mixing plaster of Paris and linseed oil. This prevents the hammer from soaking up oil, and at the same time insures a good hand grip.



Lighting Moving-Picture Theaters

To meet the requirements of the new law in a certain city, various nickelodeon managers have tried different methods of lighting their theaters while the moving pictures are being shown. The majority have installed green lights on the side walls, with which, although a dim light is furnished, it is hard to distinguish one person from another.

A unique lighting method, which makes the theater as light as day, has been employed by the manager of one theater. The ceiling of the theater was painted white and six electric lights were placed inside of wooden chopping bowls, 2 ft. in diameter and suspended from the ceiling. Although no lights are visible to the audience, the light reflected from the ceiling



Lights in a Chopping Bowl

illuminates the entire theater, and one can even read a newspaper while the pictures are being shown.—Contributed by Geo. A. Obenauer, Buffalo, N. Y.

Extension Stock for a Revolver

When firing a large revolver, it is hard to hold it from kicking out of range and missing the mark. With the



Stock Made of Rod Iron

use of the little device shown in the sketch, the weapon can be held steadily, and accurate shooting will be an easy matter. The device is made of an iron rod, about $\frac{3}{16}$ in. in diameter by 15½ in. long, bent as shown in the sketch and attached to the revolver with two screws. The hook end of the rod is placed over the forearm when firing the revolver.—Contributed by Gilbert H. Holter, Jasper, Minn.

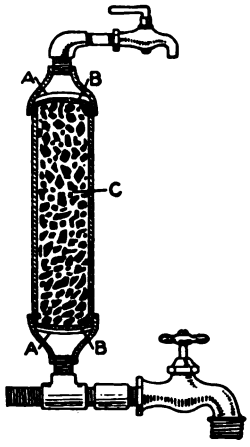
Adjusting a Battened Door

A cottage door made of boards and battened can be adjusted in the following manner: Take the door off its hinges and stand it in a vertical position, grasp the sides and jolt it forcibly down on a heavy block or stone on the corner that is low. The weight of the door added to the force of swinging it down on the block will quickly put it in proper shape.—Contributed by John V. Loeffler, Evansville, Ind.

¶A garage should be built to exclude all dampness, as moisture will cause much labor to keep the brasswork clean, and will also corrode part of the machinery.

A Water Filter

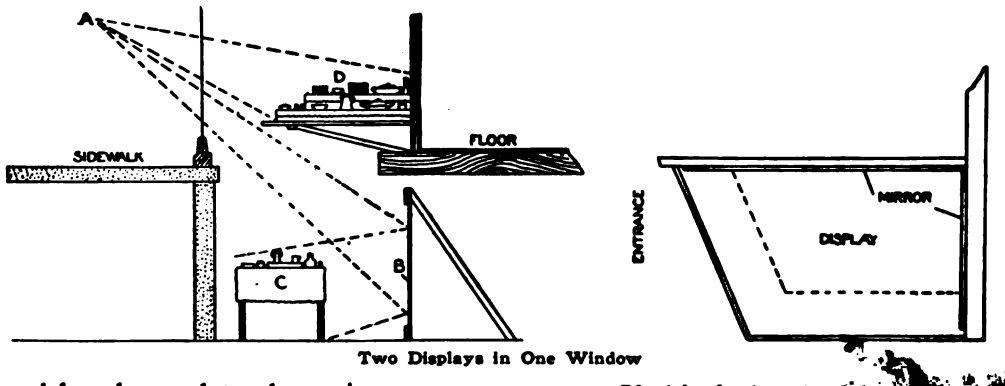
A cheap, simple and efficient water filter may be made of ordinary pipe and fittings. Owing to the bad condition of the water supply in our city, I constructed such a filter, and it gave good results. The filter is attached to the water main just back of the faucet. The large pipe or body of the filter is filled with charcoal, C, which is held in place with wool felt or filter paper, B B, and backed with wire gauze, A A. The main body of the filter is made of 1½-in. pipe with 1½ by ⅜-in. reducers on the ends.—Contributed by Whitney W. Jones, Baltimore, Md.



Enlarging Window-Display Space

The proprietors of a store doubled their show-window space by the method shown in the sketch. The floor and joists under the window-display space were cut out and a display placed on the basement floor near the front wall, or partially under the sidewalk, and four large plate-glass mirrors were so arranged that those entering or leaving the store could view the

The arrangement can be better understood from the sketch. A very good effect can be obtained without the use of the mirrors by placing the basement display back far enough to be viewed direct. In the sketch, A represents the eyes of a person viewing the basement display C through the mirror B. The display D can be seen direct.—Contributed by Merle Robison, Pittsburg, Pa.



Two Displays in One Window

Care of Oil-Soaked Waste and Rags

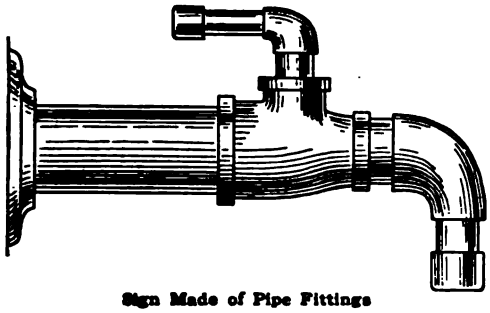
The danger of spontaneous combustion from rags or waste saturated with oil in shops, garages and residences is not sufficiently understood. This is, no doubt, because most people do not know that linseed oil will oxidize rapidly, and if cotton is soaked with oil, enough heat will be generated in a short time to char the cotton. The addition of red lead seems to make the heating more rapid, as pipe fitters have frequently observed.

It is a common thing for pipe fitters to clean the red lead and oil from a new joint by wiping it with a handful of waste. It is also common for the workman to carry the waste in his pocket. A pipe fitter once felt a hot spot against his body, which caused him to investigate his pocket with the result that he found a pocket lining burned out and a mass of charred waste. If this jacket had been hung in the clothes closet at home, a [illegible] dwelling might have resulted, with the origin of the fire a mystery.

The safe thing to do is never to put oil-soaked rags away for safe keeping. Either burn or wash them at once. In mills, power stations, shops, garages, etc., where there is a quantity of oil-soaked waste, cans should be provided to receive the discarded waste. The cans should be made of heavy sheet metal with riveted seams, and with iron legs to hold them several inches from the floor. Use a tight-fitting metal cover.—Contributed by F. W. Brady, Scranton, Pa.

A Plumber's Sign

An enterprising plumber constructed a very attractive sign that at once suggests the kind of business carried on within. The sign is in the shape of an ordinary faucet constructed of large

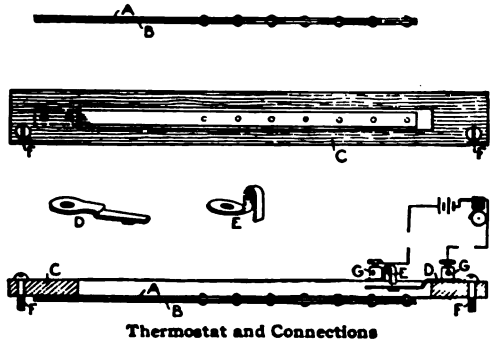


Sign Made of Pipe Fittings

pipe and fittings. It is about 2 ft. long and painted yellow to look like brass.—Contributed by John J. Keenon, Chicago.

Alarm for a Hot Bearing

The alarm consists of a device very similar to a thermostat. A tongue is made of a strip of copper, A, and a strip of zinc, B, both the same size and gauge, riveted together with small rivets. The tongue is fastened to the base C, made of ¼-in. fiber similar to an organ reed. The slot in the fiber should be about ⅛ in. wider and ½ in. shorter than the tongue. Two screw holes, F F, are drilled in the fiber, as shown. The tongue is fastened to the base with the copper side in contact with the fiber. The electrical contacts are made as shown at D and E. These contacts are attached to the fiber



Thermostat and Connections

base with binding-posts, G G. The circuit is wired as shown.

The action is as follows: The instrument is fastened flat on the bearing cap with the metal tongue in contact with its surface. If the bearing gets warm, the zinc will expand much more than the copper strip, which causes the tongue to curl at the free end. In doing so it lifts the lever contact D into contact with E, thus closing the circuit and ringing a bell or lighting an electric light, as the case may be.—Contributed by W. W. Savage, Buffalo, N. Y.

Bit Used as a Belt Punch

An old-style gouge-shaped bit, as shown in Fig. 1, rounded at the point, as in Fig. 2, makes a good emergency belt punch. A handle may be made of a cork. The shape of the cutting point of the gouge is shown at A. This

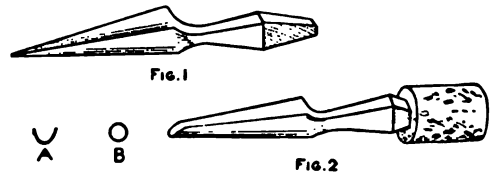


FIG. 1

FIG. 2

Bit Formed to Cut Round Holes

will make a neat round hole, B, if the tool is turned when cutting the hole. —Contributed by James M. Kane, Doylestown, Pa.

¶Sew straps to the sides of mattresses and they can be handled more easily

Replacing Belts on Wheels

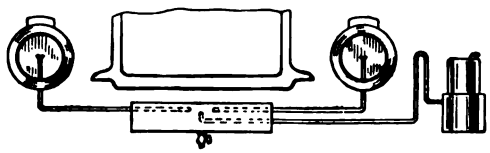
The contraction of a belt not used for some time will make it hard to replace it on the pulleys. The same trouble may be experienced after cutting out a little too much material when taking up a belt. In either case, the belt cannot be readily put on the pulleys by hand or with a stick. A safe way is to proceed as follows:



Procure a piece of rope, 6 or 8 ft. long and not over ½ in. in diameter,—preferably a piece of window-sash cord. Place the belt around the driven pulley after the power is stopped. Double the rope and pass the loop end through the driving pulley just ahead of one spoke. Put the belt on this pulley and around it as far as possible by hand, then pull the loop around the belt and pass the two ends of the rope through the loop and draw it up tightly, holding the ends in one hand. Start the power slowly and the belt will easily run on the pulley, and as it does so, let go of the rope ends. The belt will cause the loop to open and the rope will ride to the next pulley and fall to the floor.—Contributed by H. E. Parker, Bridgeport, Conn.

Gas Purifier for Automobile-Lighting System

The purifier consists of a cylinder made of 1½-in. brass tubing, with ends of sheet brass soldered in. The cylinder is placed transversely under the



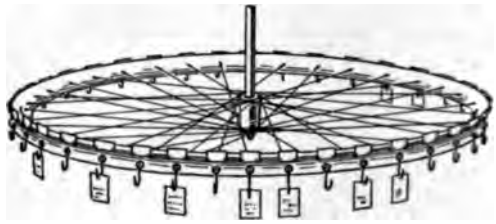
Location of Tank in Pipe Line

front of the engine, as shown in the sketch. The pipes leading to the headlights enter the ends and nearly reach the center at the top of the chamber, as also does the pipe from the generator. The reason for this arrangement is to avoid filling the tubes with water when the car tips.

This device serves a twofold purpose. It keeps all water and lime dust from the lead pipes, and also serves as a storage tank for the gas, preventing flickering and other troubles and furnishing a more constant pressure. A stopcock is soldered in the bottom to drain the tank, though the purifier will operate when almost half full of water. —Contributed by Donald H. Johnston, Collins, O.

Sales-Ticket File

A very useful and handy device for the rapid filing of sales tickets is shown in the accompanying sketch. The owners of a department store, employing 30 clerks, were obliged to use as many spindle files as there were clerks. They could not use a card-index system for the rapid filing of the sales



Filing Sales Tickets on Bicycle Rim

tickets, so they suspended an ordinary bicycle wheel, with the tire removed, from the ceiling, and on its rim hung 30 hooks, one for each clerk, and each marked with a small tin plate tacked to the rim bearing the file number. The wheel being placed so that the hooks were within convenient reach of the cashier's right hand, any number could be readily located by turning the wheel.—Contributed by Axel C. Hanson, Lincoln, Neb.

¶The best sidewalk manhole guard is a barrel with both ends removed. Lighting and ventilation are perfect.

The Art of Stencil Making

By HOMER H. KNODLE

Part II—Cutting

After the design is originated, which may be much smaller than the stencil, the next step is to transfer it to the manila paper used to make the stencil. This is done by the use of dividers and drafting tools, and the measurements should be in such proportion that the design will be enlarged to the necessary size. Two boards are needed, one, built as described, to do the cutting on, and a regular drafting board. The reason for having two boards is that if the cutting is done on a drafting board, it will soon be useless for drafting. For drawing out the full-size design, a 31 by 42-in. board will be large enough. The cutting board should be larger, not less than 36 by 55 in. in size, and constructed as follows:

Using good white-pine boards dressed on four sides, not less than 1½ in. thick and 6 in. wide, build a board as shown in Fig. 12. The cross-pieces should be of the same material as the board and fastened to the board with screws, using at least two to each piece making up the board. The support is made from heavier lumber, substantially as shown in the illustration. The board may or may not be inclined, as desired.

The usual size of stencils ranges from 2 by 6 in. to 30 by 50 in. The paper used should be 3-ply manila,

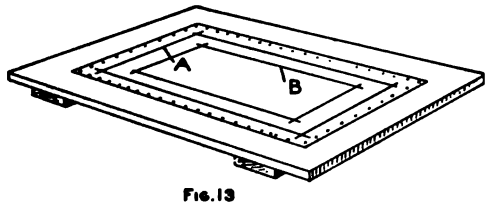


Fig. 13
Drawing Board

which can be obtained cheaply from a printers' supply house. The paper should be cut about 4 in. larger each way than the extreme size of the stencil to be made, to allow an edge for tacking to the board, as shown in Fig. 13. The tacks are placed around the entire edge of the paper, so as to hold it firmly. One-ounce tacks will be found amply large.

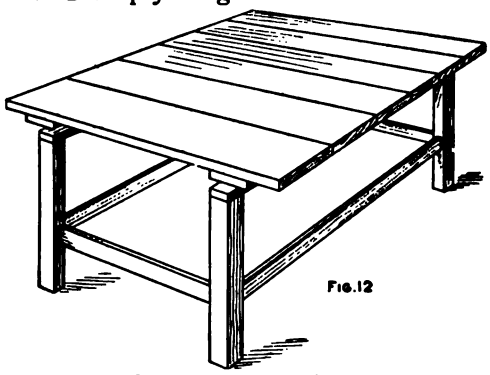


Fig. 12
Cutting Board and Stand

In drawing the large full-size designs, the triangles should be from 12 to 16 in. long. (Triangles made of wood are not expensive.) After the paper is fastened to the board, lay out the extreme border line A and the design border line B, as shown in Fig. 13. Starting at the left-hand part of the border, draw in the design just as it would appear on the wall, as shown in Fig. 14, paying no attention to the binders. The best effects are usually obtained when the design is finished as a whole and not each particular part separately.

The number of binders to hold each part of the design should be considered. An especially large surface should have more than three binders, while for ordinary-size pieces, three binders, if properly placed, will hold the piece in position very well. In handling very small units, two binders will be found sufficient, but never less than two. The location of the binders are marked with a red crayon, as shown by the dotted lines in Fig. 15. Beginning at one corner of the design go over it to see if any have been omitted, as a binder cut out will spoil a stencil. Mark each part to be cut out with blue crayon.

It will be found best to follow, to some extent, the outline of the piece, so that when a binder is reached, the colored crayon will be a signal to look out for the red line. A finished design as it will appear when stenciled on a wall is shown in Fig. 16.

The knives which will be found useful in cutting out stencils are shown in Fig. 17. These can be obtained at any hardware store. One is a common steel eraser and the other is a Swedish carpenters' knife. No other tools are necessary. The operation of cutting out the stencil is purely mechanical and consists of simply following the lines drawn, being careful to hold the knife so that a perpendicular cut will be made, and also being sure to cut entirely through the paper, as a recut will make a ragged edge. When the lines are completely cut out, the stencil is finished with the exception of oiling, and that should be done with a camel's-hair brush and boiled linseed oil. Both sides should be coated and the piece hung up to dry. The oiling should be done before the outside border of the stencil is cut away so as to have all the surface well oiled. A name and address, or some other mark, should be stamped in one corner before oiling, so as to designate which side to place against the surface to be stenciled. This will preserve a clean surface on the stencil.

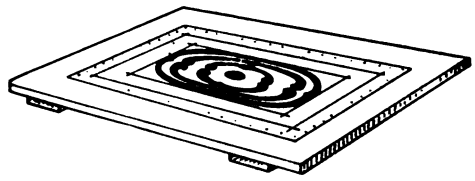


FIG. 14

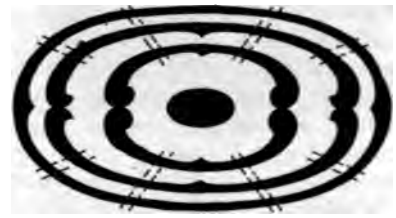


FIG. 15

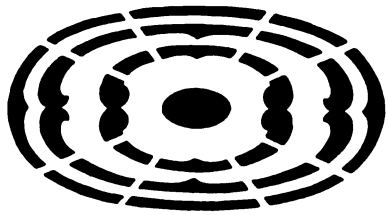


FIG. 16
The Full Size Design

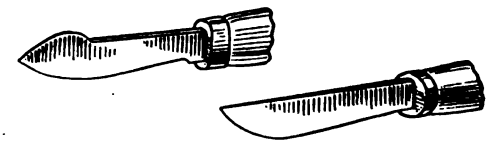


FIG. 17
Marking the Binders
Cutting Knives

(To be continued.)

Repair on an Automobile-Horn Bulb

The ordinary rubber horn bulb used on an automobile can be repaired with the use of a vulcanizer in the following manner, as described by the Automobile Dealer. A very common form of damage, a split on the top of the bulb, is shown in Fig. 1.



FIG. 1 FIG. 2 FIG. 3
The Split and Its Repair

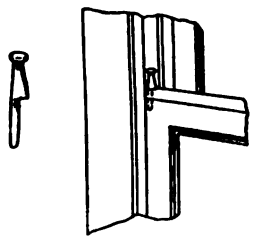
The first process of repair is to thoroughly clean the rubber where it is split, with benzine, outside and, if possible, inside. The inside of the rubber should be roughened with a rasp or wire scratch brush, and the outside edges of the split beveled off with a pair of scissors and roughened with a rasp. The split after this treatment is shown

in section in Fig. 2. If the size of the split is sufficiently large to make this possible, a piece of old inner tube should be inserted to cover the split, the rubber having previously been roughened and covered with vulcanizing solution. The inside of the bulb is also treated with the vulcanizing solution. It will be easier to insert and place the patch before the solution dries.

The split and beveled portion should be coated with the solution and allowed to dry, if possible, for several hours. Some lengths of vulcanizing compound, about ¼ in. wide, should be cut and softened by heating on the vulcanizer and then pressed into the V-section split until the whole is level with the outer surface of the bulb. The lower part of the bulb can then be pressed up as shown in Fig. 3. The doubled-in portion, back of the split, should be filled with waste or rags as tightly as possible and the whole covered with a piece of thin linen, sprinkled with soapstone where it comes in contact with the vulcanizing rubber. Care must be taken that no creases in the bulb are allowed to remain in contact with the vulcanizer, as this will make them permanent.

Anti-Rattler for a Window Sash

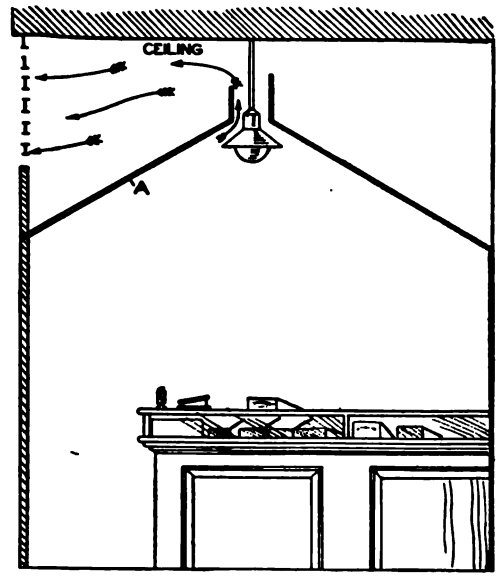
An ordinary wood clothespin, having one leg broken off as shown in the sketch, makes a good anti-rattling device for a window sash. The remaining leg of the pin is pushed between the sash and window casing. —Contributed by Paul H. Burkhart, Blue Island, Ill.



¶The tires of an automobile placed in storage should be cleaned with castile soap and tepid water and then stored in a dark place, well ventilated.

Ventilating with a Gas Lamp

A small cigar store located in a large office building had no outside opening and the air was bad and made more so



Lamp Ventilator

by the smoke from the patrons' cigars. To obtain good ventilation for this room, it was fitted with a sub-ceiling, A, tapering up to a peak in the center. A large gas lamp was placed in an opening in this peak, so that the heat from the lamp and its consumption of air created a strong upward draft which causes the smoke and air to flow out of the room and exhausts it into the main corridor through a perforated plate. The lamp must be used continuously regardless of the brightness of the day. — Contributed by Albert Scheible, Chicago.

Wallpaper Protection

The condition of the paper on a wall behind pictures may be kept similar to that on the uncovered surfaces by placing a glass push pin in the wall where each lower corner of the frame rests. This keeps the picture away from the wall and allows the air to circulate freely.

Pole for Hanging Pictures

The accompanying sketch shows a holder for picture-frame hooks for use in hanging pictures. The holder can

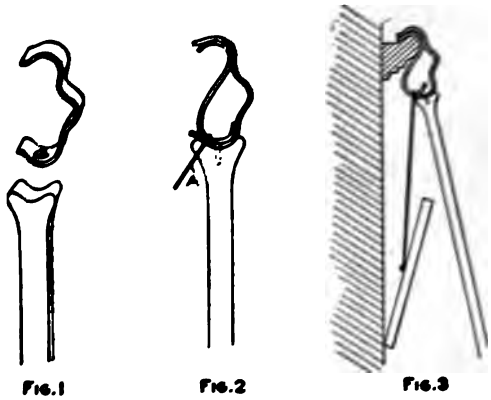


FIG. 1 FIG. 2 FIG. 3

Clip on the End of Pole

be made of brass or steel, ½ in. wide, or slightly under the width of the picture hook. When forming the holder, as shown in Fig. 1, use a hook as a pattern or form. Make half of the lower bend first, then drill a hole for fastening it to the rod or pole, as shown. Cut out the end of the pole to fit the holder and attach it as shown in Fig. 2. The hook is placed in the holder and the picture-frame wire A in the hook. The manner of hanging the picture is shown in Fig. 3.—Contributed by C. G. Carlstrum, Rochester, New York.

Lathe Work in a Milling Machine

From the history of machine tools we learn that the early milling machine was a modified form of lathe without

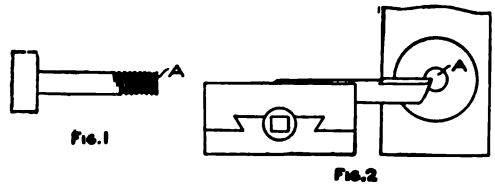


FIG. 1 FIG. 2

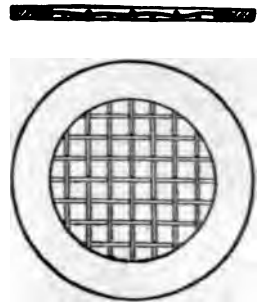
Cutter in the Vise

the long bed and the tailstock. In shop practice today it is of common occurrence to see the lathe doing the work of the miller, and vice versa. An instance of lathe work done in a milling machine is as follows:

We had several thousand screws of the shape shown in Fig. 1. These had been made on an automatic screw machine. They had to be within less than .001 in. of the specified length, which, as they were all over size, meant facing off one end. Ordinarily this would have been a lathe job, but no lathe was available at the time. An unused milling machine was made to take the place of the lathe. The screws were held in the chuck on the nose of the milling-machine spindle, each one being set against a positive back stop. They were then faced off on the small end by a regular side tool. The arrangement is shown in Fig. 2. The job was finished as quickly as if done on a lathe.—Contributed by Donald A. Hampson, Middletown, N. Y.

An Open Stove Plate

The stove plate shown in the sketch is used for setting small utensils on to keep them from falling into the fire. To make this plate, cut a ring pattern to fit the stove cover and procure a piece of ½-in. mesh screen made of about No. 10 gauge wire. Cut the screen to almost the outside diameter of the plate. Take the pattern and screen to a local foundry and have the molder lay the screen between the mold parts. When the metal is poured and the casting finished, the screen will be solidly fastened in the iron ring, making a plate that one would hardly part from after once using it.—Contributed by Henry C. Ronfeldt, Toledo, Ohio.



¶Pianos should never be set against an outside wall as dampness is apt to rust the strings.

The Repair and Care of Lubricators

Loose lubricator brackets not only cause serious leaks of oil and water where they screw into the lubricator body, but are also the cause of the aggravating and dangerous breakage of sight-feed and register glasses.

The brackets can be securely and permanently tightened by inserting a thin copper gasket (Fig. 1) between the bracket joint and its seat in the body. The bracket is turned into line with the one above or below against the jacket, which, as it is squeezed against the body, makes the joint tight and holds the bracket rigidly in place.

Worn choke or reducing plugs are not only a source of trouble in the operation of the lubricator, but cause the excessive use of valuable oil. A number of lubricators, each of a different type, may be used on the engines about the plant, each lubricator possessing differently constructed choke or reducing plugs. When no extra ones are kept on hand, new ones are often made on a common lathe, necessitating a bit of expensive labor.

The usefulness of a reducing plug can be prolonged considerably by closing the small oil passage, using a hollow punch as shown in Fig. 2. A number of lubricators in a plant having excessively worn reducing plugs can waste a great amount of oil, and the use of a punch for this purpose on

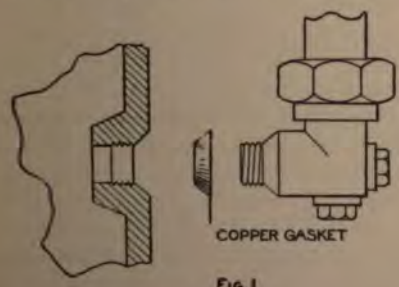


Fig. 1
Gasket in Joint

the reducers will result in the saving of money expended for lubricant.

A bracket that is not in line with the one securing the other end of the glass is very liable to break the glass when it is forced to withstand its pressure of water and oil. The two can be lined up very quickly and accurately by the

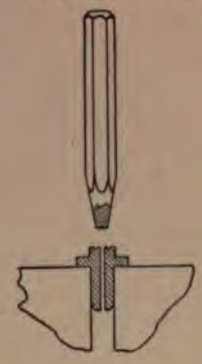


Fig. 2



Fig. 3

Closing Passage and Lining Parts

use of the glass itself as a tool. The opening in the upper bracket through which the glass is inserted is large enough to allow the glass to be swung some distance each side of the bracket below (Fig. 3). By forcibly turning the bracket, through which the glass is inserted, the glass will clear each side of the other bracket an equal distance, at which position the two brackets are correctly in line, permitting the glass to hold its pressure without danger of breaking.—Contributed by F. W. Bentley, Huron, S. D.

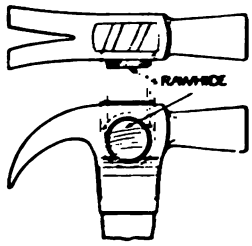
Coloring Brass Black

The solution made up as follows is given by Camera Craft for coloring brass articles black: Dissolve blue vitriol in water and add washing soda. Allow precipitate to form and then pour off the clear liquid. The precipitate is carbonate of copper, which, mixed with strong ammonia and heated to 150 deg. F., will stain brass black if dipped in it. Be sure and clean the article well with potash before staining.

¶Always caliper work when at rest and not in motion.

Combination Hammer and Mallet

A carpenters' hammer with a rawhide insert in the side is a very handy substitute for a mallet. The hammer is removed from the handle and a hole drilled in the side and tapered. A piece of rawhide is shaped to fit the hole and put into place. The hammer is then put on and fastened to the handle. The temptation to drive a chisel with the ordinary hammer is removed, as a mallet and hammer are combined.

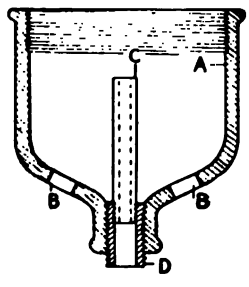


Drilling Dies

Die makers should space off a die with a double-center punch having a space between points equal to any desired number of drill. Alternate holes should be drilled first, after which the intervening holes should be made with a drill having a point to fit into an angle of 45 degrees or less. Such a drill will cut into the holes on both sides without running off, as long as the taper guides the drill. The core will drop out of the die after the last hole is drilled.

Sanitary Drinking Fountain

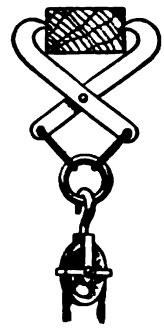
Ordinary pipe fittings can be arranged to make a sanitary drinking fountain. A reducer, 2 by ½ in., forms the main body of the fountain. It is screwed on a water main, D, which has a short extension of ⅜-in. pipe, C. The holes B B may be of any size to drain the water away. A valve is placed in the flow the fountain.



Homemade Hoist for Garages

In all automobile-repair shops there must be some arrangement for hoisting work that is too heavy to be lifted by hand. This is true particularly during the overhauling season, when motors, transmissions, etc., are removed from the frames, and other heavy operations must be performed, says the Motor Magazine of Canada. A device is shown in the sketch to take the place of the more expensive and cumbersome hoisting outfits, and one that can be made easily by the repair man. It will be found equally handy in a private garage, the expense of making being small.

The essential members are two hooked pieces and three rings, two of which are oval in shape. The size recommended for a hook for use on a 6-in. joist is 1½ in. wide by ⅜ in. thick. The metal is forged and holes ½ in. in diameter drilled ¾ in. and 3 in. from the end to receive the links and hinge pin. The hooked pieces are then fastened by a ½-in. rivet or cap screw, leaving them free to turn. The oval links go in the end holes and are connected by the other ring, into which is hooked the tackle. The stock for the links is ⅜ in. in diameter, welded into shape, as shown.



In using the device, the hooks are clamped on the timber, the points being driven in with a hammer. The chain hoist is then hung into the lower ring. The greater the strain the deeper the hooks will sink into the beam, thus giving more and more holding power. For use on larger joists, or for holding more weight, this appliance can be larger and heavier to suit the requirements.

¶Plaster of paris mixed with paperhangers' paste is the proper material for stopping holes in a plastered wall.

Rust-Proofing Iron and Steel

The metal to be treated is first briefly immersed in a boiling solution of sodium or potassium hydrate to remove oil and grease. If rusty or badly tarnished, it is given the ordinary sulphuric-acid pickle. It is then well washed in clean water, preparatory to the final treatment.

The rust-proofing solution consists of a 4-per-cent solution of phosphoric acid mixed with clean iron filings. It is kept at boiling temperature. The article to be treated is prepared as described and then immersed in the boiling solution for 2½ to 3 hours. The metal will then have a greenish-black appearance. Dry the article and oil it with linseed or paraffin oil. The final color will be gray-black.

Tire-Pulling Tool for Blacksmiths

The tool shown in the illustration is specially designed to remove a steel tire from a felloe without splitting the latter or marring the paint. The sketch clearly illustrates its construction. The size of the material will depend on the work it is intended to do. The several holes in the tire hook make it adjustable for various widths of rims.—Contributed by J. W. Plemons, Circleville, Ohio.



Puller on Tire and Felloe

Fruit Cans as Oil Retainers

Empty fruit cans are very handy to have in a small workshop. They can be used for holding oils, paints or small parts. Cut the cover off one of these cans as near the rim as possible, turn over the jagged edges to make them safe for the fingers, and it will make a fine oil container. Hammer out a place, as shown at A, Fig. 1, and a good spout is formed. These cans are good

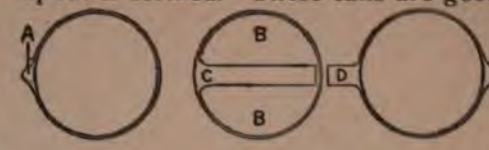


Fig. 1

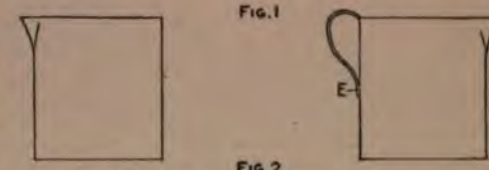


Fig. 2

Cans with Spouts and Handles

for holding drill compounds on the drill press, or kerosene oil or any liquid that does not require the oil can.

Small-size cans used for condensed milk can have a handle formed of the part C by cutting out the spaces B B. The strip C is turned over to form the handle D. The end E of the handle may or may not be soldered, as desired. —Contributed by Hy. W. Hankin, Troy, N. Y.

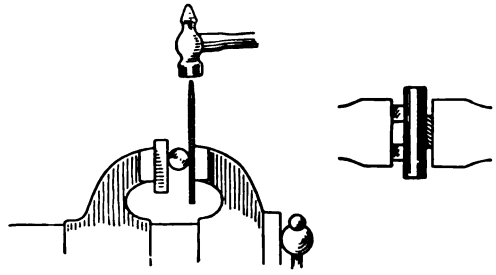
Reversing Bristles in a Brush

Having occasion to use a small varnish brush, I found that it had been put away without cleaning and that the bristles were stuck together in a solid mass. After removing the small nails holding the bristles in the tin binding, I pulled out the bristles and reversed them, forcing the end that was stuck together into the binding, and after replacing the nails I had a brush that was as good as ever and one with which I did a big job of varnishing without a bristle coming out. The ends of the bristles that had been protected from the varnish by the binding were as soft as those in a new brush.—Contributed by W. M. Hope, La Crosse, Wash.

¶An old rat-tail file, ground smooth and rounded to a point on the end and magnetized, makes a useful tool for removing steel particles from the eyes.

Knurling with a File

Take a sharp file and two pieces of square stock; place the file on one side of the piece to be knurled and the

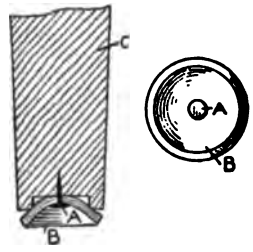


Driving the File through the Jaws

square stock on the opposite side as shown in the sketch. The surface of the file placed against the face of the jaw is ground off and made smooth. Continuous striking on the end of the file causes it to slide down thus rolling and knurling the piece. The square stock gives clearance to the knurl. Sheet-brass jaws will give good results on very small rods, if used in the place of the square stock.—Contributed by J. F. Tholl, Ypsilanti, Mich.

Cushions for Chair Legs

The ordinary felt tips for chair legs can be supplanted by homemade rubber tips as shown in the illustration at less expense of time and money. An old discarded tire casing will furnish the material from which to cut the rubber disks. The disks B are cut ¾ in. in diameter and are attached to the legs of the chair C by boring a hole, ½ in. in diameter and ⅛ in. deep, in each one and driving a tack, A, in the center. The disks form a cup that makes them stick to the floor without scratching the varnish.—Contributed by John V. Loeffler, Evansville, Ind.

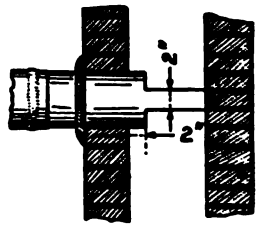


Securing a Fork in a Stag Handle

I had a stag-handle carving fork which came apart and, as it was too good to throw away, I mended it as follows: I warmed the handle by standing it in boiling water, open end up, being careful to keep the water out of the hole. When it was thoroughly hot I poured melted sealing wax into the hole until it was nearly full and then forced the tang of the fork, which I had previously notched with a file, into the wax until the shoulder came against the end of the stag handle. This made a good repair which was not affected by hot dishwater.—Contributed by W. E. Morey, Chicago.

To Keep Pipe from Entering a Flue Too Deeply

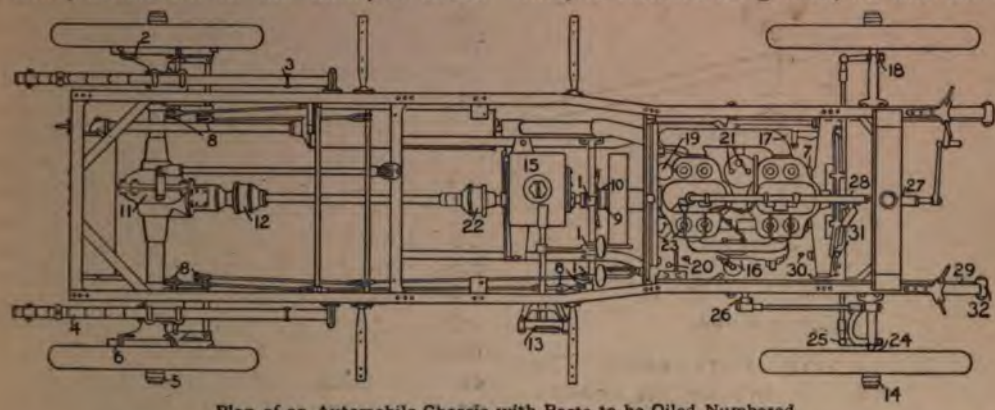
When setting up a stove, the pipe always has a tendency to slip into the chimney too far, thus closing off the draft and making the stove smoke. This can be remedied by cutting the pipe to form a projection on each side, as shown in the sketch. The projections should be just long enough to rest against the opposite side of the chimney when the pipe is in its proper place.—Contributed by P. J. Theisen, Denver, Colorado.



Lubricating an Automobile

In lubricating an automobile, it must be borne in mind that no two automobiles of the same make and model will consume the same amount of oil with the same mileage. This is because the frictional resistance of the bearings will be in proportion to the actual work done, with the load and the condition of roads. While the accompanying

chart and following table of reference will be found simple and convenient, the question of mileage must also be taken into consideration. The oiling time, as shown in the table, is based



Plan of an Automobile Chassis with Parts to be Oiled Numbered

upon the maximum work an automobile should do. The table is made up on a monthly basis.

1—Brake-lever shaft bearings	Twice
2—Internal-brake cam oilers	Once
3—Rear-spring bolt greasers	(non-fluid oil) Twice
4—Rear-spring leaves	" " " Once
5—Rear-wheel hub caps	"
6—Rear-axle outside bearing greasers	(non-fluid oil) Weekly
7—Magneto-shaft coupling	Twice
8—Brake fittings and connections	Weekly
9—Clutch-pedal bearings	Twice
10—Clutch-housing	"
11—Differential housing	(non-fluid oil) Once
12—Rear universal joint	" " " Twice
13—Gear-shifter shaft	Once
14—Front wheel hub caps	(non-fluid oil) Once
15—Transmission case	(special non-fluid oil) Once
16—Air-valve stem	Once
17—Magneto oil cups and wells	Twice
18—Steering-knuckle bolts	"
19—Commutator oiler and greaser	
20—Steering-case greasers	(non-fluid oil) Once
21—Crank-case filler and oil tank	Daily
22—Front universal joint	(non-fluid oil) Twice
23—Valve-rod guides	Weekly
24—Front-wheel bearings	(non-fluid oil) Once
25—Steering cross-tube greasers	(non-fluid oil) Weekly
26—Steering connecting-rod greasers	(non-fluid oil) Once
27—Starting-crank bearing	Twice
28—Fan-bearing oiler	Weekly
29—Front-spring leaves	(non-fluid oil) Once
30—Water-pump shaft coupling	Twice
If shaft has greaser	(pump lubricant) Twice
31—Timing gear compartment	(non-fluid oil) Once
32—Spring-bolt greasers	(non-fluid oil) Twice

One filling of the differential housing and transmission case will run 1,500 miles. A little oil should be added each month to keep up the proper amount and insure the best lubrication. The crank-case filler and oil tank should be always examined before starting out, to insure a plentiful supply of oil for the trip.

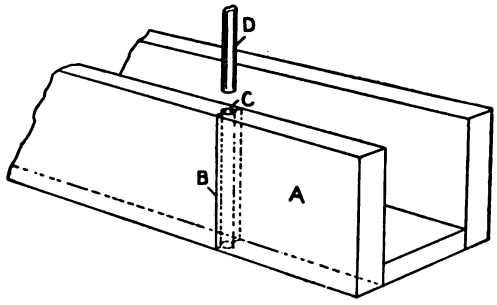
Repairing a Flexible Shaft

Clean both ends of the shaft which are to be joined together with gasoline, to remove all grease, oil and dirt. Secure a piece of brass tubing about 4 in. long, no less than $\frac{1}{32}$ in. thick, and a trifle smaller in diameter than the shaft. Split the tubing with a hacksaw all the way down one side so that, when the ends of the shaft are inserted in the tubing, it will expand and make a tight fit around the shaft. Place one end of the shaft in a vise and fasten the other end on a block of wood, making the part to be joined level and rigid. Heat the joint with a blowtorch, being careful not to draw the temper in the brass tubing or shaft. When the joint is hot, pour melted babbitt metal in through the split in the brass tube until the babbitt sweats itself thoroughly into the ends of the shaft and fills up the seam in the tube. The babbitt must be heated until it chars a piece of wood when dipped into it. Dress the joint with a file, and it will be found to work perfectly. As many as four joints of this kind have been made in one shaft, 7 ft. long, with satisfactory results.—Contributed by J. O. E. Dieterich, New York.

¶The atmosphere of a cellar where vegetables are kept is not fit for an incubator. The air is charged with carbonic-acid gas, which is fatal to young chicks.

Water-Tight Joint in Sluices

Laundry tubs, sluices and troughs that are longer than the material used in making them should have the joints



Pin in the Joint

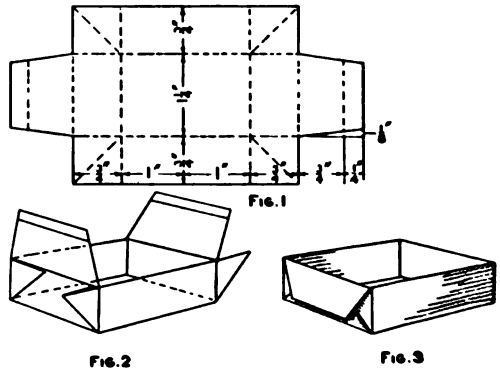
matched as shown in the sketch. The joint is made by squaring the ends of the boards, butting them together and putting a pin between the ends. If the ends are not a good fit, take a saw and cut through the joint, then nail a piece on one side to keep them in line temporarily.

The sketch shows a sluice of which A is the side and B the joint to be made water-tight. If the sides are of 2-in. material, take a 5/8-in. bit, long enough to extend through the width of the board, and bore a hole, C, through the joint. Bore a hole in a piece of scrap with the same bit. Cut a pin, D, from soft wood, a trifle longer than the width of the board A, dress it round and just a little larger than the hole bored with the bit, point the end, and then carefully drive the pin through the hole in the scrap. This will make it to size. Drive the pin in the hole C, after the boards are nailed in place, and a perfect water-tight joint is secured.—Contributed by W. A. Lane, El Paso, Tex.

Waterproof Cups for Painters and Decorators

The painter, and especially the sign painter, often has occasion to use a small quantity of one color or another and the color mixed would be of no further use if any were left over. Furthermore, it would possibly consume valuable time to clean a cup, and different cups for the various tints would take up too much space in a kit. I use a waterproof cup that can be made in any size, and carried conveniently in the paint kit, and is so cheap that it may be thrown away after using.

The cups are made up of oiled stencil board that is not too heavy. The board is cut into pieces 5½ in. long by 2¾ in. wide, as shown in Fig. 1. The dotted lines are run over with a blunt knife so that the board may be folded easily without breaking at the folds. After following the measurements in Fig. 1, proceed to shape the cup by folding both ends and sides until the corners meet, as shown in Fig. 2, leaving a triangular flap at each corner. Bend the flaps back on the ends, as shown in Fig. 3. Take the long end and bend down over the flaps, after which push the remaining ends between the triangular flaps; and a neat waterproof cup will be formed. Several dozen cups can be made from the aver-



Pattern and the Finished Cup

age-size oiled board. A great many pieces can be cut out and scored ready to be formed into cups and carried flat in the kit, ready for use on any job.—Contributed by Harry Marcelle, San Diego, Cal.

¶Brass work requires a higher lathe speed than for cast iron or steel.

Using Old Inner Tubes

Do not throw away or sell for scrap old inner tubes, which have sound sections of unperished rubber. By saving the old tubes, and cutting out and sending the sound sections to a tire company, they may be joined into a new tube, says Cycle and Automobile Trade Journal. While this joined tube does not have a good appearance, it will be found capable of giving good service, and when the shoe is put on, only the owner will know how the tube looks.

A Draftsman's Ink-Bottle Holder

A handy ink-bottle holder for a draftsman's slanting board can be made as shown in the sketch. A block of wood is turned up, having the dimen-

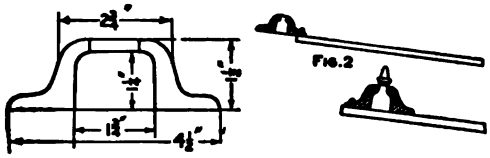


Fig. 1
Holder Attached to Board

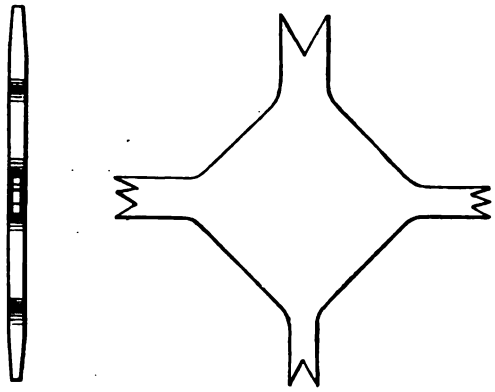
sions shown in Fig. 1. The block is then attached to the upper edge of the board with one screw through the rim so that the holder may swing down over the board as shown in Fig. 2. The ink bottle is slipped into place before turning the block.—Contributed by A. V. Borklund, Cleveland, O.

Removing Small Steel Particles from Brass, Copper or Nickel

Place the piece of brass, copper or nickel in a porcelain dish and add a generous amount of powdered alum. Cover well with water and boil over a fire. It is only a matter of a few hours' time until a small tap, as large as No. 10 size, will be entirely dissolved in this solution. The method is especially adapted for removing broken screws from watch plates.—Contributed by Geo. W. Coplin, Bay City, Michigan.

Lettering Guide

A very handy device for the spacing of title letters on drawings is shown in the sketch herewith. The device is



Arms with Different Spaces

the invention of a correspondent of American Machinist. It is made of sheet brass about 3/64 in. thick. The points are filed to a blunt edge, and the spacing of the points may be made to suit the size of the letters used on the drawing.

Removing Lead from Wood

A contractor securing a job of refinishing some church benches damaged in a fire found that the melted lead from the skylight had spattered over a number of the benches, burning part way into the wood wherever any of it struck.

The problem was how to remove this lead. A scraper made no impression upon it and sandpapering only rubbed the particles of lead further into the grain of the wood. After much experimenting, the finisher discovered that when the wood was thoroughly cleaned of the old varnish, the lead could be easily rolled out of the wood with sandpaper while the surface was wet with gasoline.

¶Aluminum steels containing less than 3 per cent of aluminum have the same properties as ordinary steels. Above this percentage they become quite brittle.

Setting Lathe Tailstock for Turning Tapers

It is sometimes necessary to figure the amount to set over the tailstock in turning a taper where there is no taper-turning attachment. The amount can be determined only approximately by calculations, as it is not known how far the lathe centers enter the piece, and the final adjustment must be made by trial.

When the piece is to be tapered the entire length, the tailstock should be set over the amount obtained by the following rule: Suppose the piece is 8 in. long and the taper per foot is to be ¼ in. Divide the taper per foot by 12 which will reduce it to the taper per inch. The problem can be easier worked in decimals. The decimal for ¼ in. is .25. Then .25 ÷ 12 = .0208+ in., which is the taper per inch. If the piece, is 8 in. long, then .0208+ in. × 8 = .1664+ in. As the tailstock must be set over one-half the amount of the taper, the result is divided by 2. Then .1664+ in. ÷ 2 = .0832+ in., or almost 5/64 in., a fraction, the amount to set over the tailstock to turn a piece tapering that is 8 in. long with a taper of ¼ in. per foot.

It is sometimes necessary to find the amount to set over the tailstock for work tapering its full length when only the two diameters are given, the diameter of the large and small ends of the work. In this case subtract the small diameter from the large and divide by 2. For example: Suppose a piece of work is to be turned tapering its full length, the large end to be 2 in. and the small end 1½ in. in diameter. When subtracted the remainder is ½ in. The ½ in. divided by 2 gives ¼ in., or the amount to set over the tailstock.

A tailstock must be set over sometimes for a piece of work, on which only a part is to be tapered. If the diameters of the large and small ends of the tapered portion, the length of the taper and the length of the work is given, then proceed as follows: Subtract the small diameter from the large diameter of the tapered portion, divide the result by the length of the taper and multiply the quotient by the length of the work, and finally divide by 2. Suppose a piece of work is 12 in. long and only 6 in. of its length is to be turned tapering, the diameter of the large end being 2 in. and the small 1½ in. Using the preceding rule, subtract 1½ in. from 2 in. and the remainder will be ½ in. Dividing the ½ in. by 6 in., the length of the taper, the decimal problem will be .5 in. ÷ 6 in. = .0833+ in. Multiply the result by the full length of the piece, .0833+ in. × 12 in. = .9996+ in., and this divided by 2 gives .4998+ in., or about ½ in., the amount to set over the tailstock.

Then again, on such a piece of work where only the taper per foot and the length is given, the amount to set over the tailstock must be determined as follows: Divide the taper per foot by 12 which reduces the taper to the inch. Multiply this result by the length of the work and divide by 2. Suppose a piece of work 12 in. long is to be turned to a taper of ⅛ in. to the foot. As the rule states divide the taper per foot by 12. The problem in decimals is, .125 in. ÷ 12 = .0104+ in., the taper per inch. Multiply this amount by 12 in., the length of the work, and the result will be .1248+ in. Divide this amount by 2 and the result will be .0624 in., or about 1/16 in., the amount to set over the tailstock. —Contributed by Harold E. Murphy, Westerly, R. I.

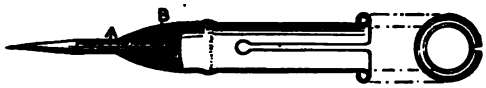
Holding Water in a Tank while Replacing Valve

A large tank placed in the back yard and supplying the house with water had a 1½-in. gate valve in the main line that developed a leak. It was found that a new valve must be put in place of the old one. The

problem was to remove the old valve and put in the new without emptying the tank. The job was accomplished by stopping up the end of the pipe in the tank with a brick covered with clean rags. The rags were tied around the brick which was lowered with a cord into the tank near the pipe opening. When the pipe was disconnected at the union above the valve, the first rush of water drew the rag-covered brick over the end of the pipe and stopped the flow of water. When the new valve was replaced, the brick was removed.—Contributed by L. W. Javete, Honolulu, T. H.

Weighted End on a Pencil

A very useful draftsman's device, to keep a sharpened pencil from breaking when it drops to the floor, may be made in the following simple manner: Take a pencil-point guard and a com-



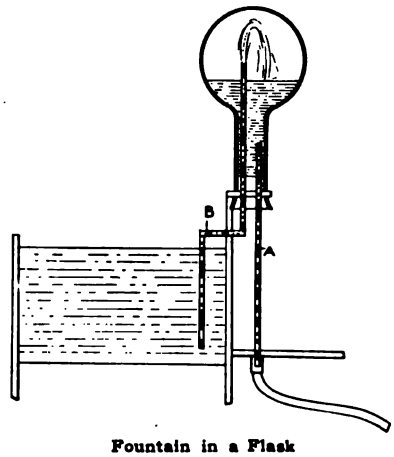
Steel Point in the Guard

pass point or a point made by filing and hardening a piece of steel wire; notch the large end of this point A to lock it into the solder B, which may be poured into the open end of the thimble, the point being previously forced through the guard from the inside.

When the pencil rolls from the board with the weight on the eraser end, this end will strike the floor first, and the sharp point will stick therein, thus saving the pencil point from breaking.—Contributed by L. L. Williams, Cleveland, O.

A Fountain Window Display

An attractive window display for a drug store or soda fountain can be made of an inverted flask which is supplied with water through tubes in the manner of a siphon, causing a miniature fountain within the flask. The two tubes, A and B, entering the flask must be of the same size. They are fitted tightly in holes in the cork of the flask. The flask is partly filled with

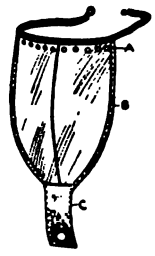


Fountain in a Flask

water. The relative positions of the tubes must be as shown in the sketch. The flow of water is started the same as a siphon. The waste water, flowing from the tube A, may be caught in a vessel and returned to the tank. —Contributed by W. J. Archibald, New Westminister, B. C.

Face Protector for a Motorcyclist

A good face protector for motorcyclists' use in the winter can be made of a piece of celluloid. The celluloid is cut in the shape shown in the illustration, and a wire, B, is stitched in the edges to keep it from cracking and to hold it in shape, says Motorcycling. Holes for ventilation are cut as shown at A. Elastic bands are attached at the top to go around the head. The lower end C is shaped to be fastened under the coat. Such a protector will not steam or crack in the winter wind.



¶The insulation on fine enameled wire can be easily removed by drawing the wire between a fold in fine emery paper.

Color Harmony in Painting

Color harmony is, or ought to be, a very important subject to the painter, says a correspondent of the Painters' Magazine. A working knowledge of color harmony can be acquired only by long experience.

The primary colors, which cannot be made by mixing two or more colors together are red, blue and yellow. The colors obtained from mixing any two of the primary colors together are called secondary colors. There are three secondary colors, namely, purple, green and orange. Red and blue give purple, blue and yellow make green and red and yellow produce orange.

By mixing any two of the secondary colors together we get what is called the tertiary colors, citrine, olive and russet. Thus, orange and green produce citrine, green and purple make olive and orange and purple give russet. Black and white are not regarded as colors.

A good black can be produced by mixing the three primary colors together in proper proportions. By adding white to any color you produce a tint of that color. By adding black to any color you get a shade of that color. This is the difference between "tint" and "shade." Black subdues or lowers the tone of any color to which it is added.

To preserve the richness of colors when you wish to darken them, use the primary colors instead of the black; for instance, to make a yellow darker, use red and blue; to blue add red and yellow, and so on. Every shade or tint of color required by the painter can be made from red, blue and yellow with black and white.

To make any of the umbers or siennas lighter in color and to preserve the clear richness of tone, always use lemon chrome instead of white. If you want a subdued or muddy umber or sienna color, then use white.

The most useful primary colors are: Yellows—lemon chrome, deep ocher; reds—vermilion, Venetian red and crimson lake; blues—Prussian blue and ultramarine.

Gold and silver leaf harmonize with all colors, and with black and white in small quantities, and can be used to bring into harmony the most glaring colors.

Some colors never look well on large wall spaces. Blue is not a good color to use in large quantities unless there is a transparent effect obtained by glazing over with a light ground, and even then the effect is depressing. Red on walls makes a room look smaller and absorbs light. Yellows give light and airiness to any room and will reflect light.

The best colors to use in large quantities for churches and public halls are, primrose yellow, terra cotta (white, burnt sienna and lemon chrome), all tints of ocher, flesh color (white and burnt sienna), pea green, apple green, gray-green (white, paris green and a touch of black), ivory shades (white, lemon chrome or ocher), old rose (white, ocher, Venetian red or pure Indian red and black), nile blue or nile green (white, Prussian blue, lemon chrome), light citrine, light olive or light russet.

For ceilings, the best tints are the creams, or ivory tints and grays. Creams and ivory tints are made from white tinted with one or more of these colors: lemon chrome, orange chrome, ocher, raw sienna. To produce a warmer tone add a small quantity of burnt sienna, vermilion or Venetian red. To produce a colder tone use a little green, black, raw umber or blue.

Grays are made from white, tinted with either black, black and green, blue and umber, black and red, red and blue or burnt sienna and blue. Light colors are always to be used for ceilings in preference to darker colors.

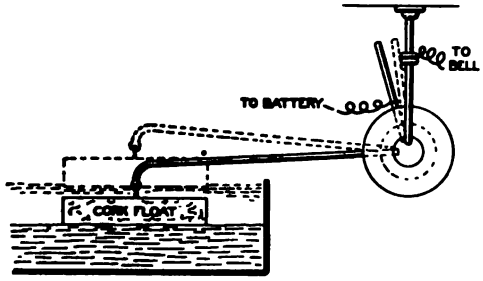
A knowledge of color harmony is

even useful in outside painting. For instance, if you want to find a good color for a trim in contrast to any primary color, use the other two primaries together, thus—principal color used, red; trim, green (blue and yellow). Principal color, yellow; trim, purple (red and blue), and so on, remembering that black and white and shades of gold color can be used for trim to any color.

There is no use trying to mix good clear tints with cheap materials. Only the best goods should be used. It is a good plan to procure a few tubes of artists' colors, imported if possible, as a standard to compare with the colors purchased.

Alarm for a Drip Pan

Being annoyed by the overflowing of the refrigerator drip pan, I attached the small device shown in the illustration to the refrigerator to remind me to empty the pan before it would overflow. A cork float and a common spool with wires set into it at right angles comprise the outfit. The whole device was fastened with screws to the under side of the refrigerator. When the float has risen to the top, an electric circuit is formed, which rings a



Battery Connections to the Float

bell. The wires can be lengthened and bent to suit the size and depth of the pan used.—Contributed by Frank W. Preston, Paterson, N. J.

¶Test the heat of an oven with a piece of bond paper. If the heat turns the paper light brown, the oven is moderately hot.

Type Made of Leather

A printer in a small town, not having large type of the desired size for a job, made up sufficient letters for his

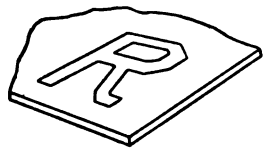


Fig. 1

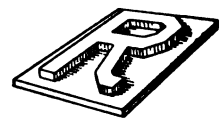


Fig. 2

Leather Face on a Wood Block

needs from leather glued to blocks of wood. The leather used was the best quality patent leather not less than $\frac{1}{32}$ in. thick. The letter was laid out on the polished side of the leather, as shown in Fig. 1, and then cut out with a sharp knife. Each letter was glued to a block of wood, Fig. 2, making both together type-high, and weighted.

The type so made seemed to spread the ink better, making no air bubbles, and thus eliminating the small white spots usually seen on large ink surfaces.—Contributed by Homer H. Knodle, Decatur, Ind.

Drilling a Hole in the Joint of Two Pieces

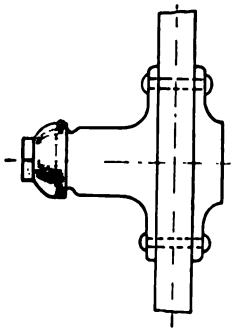
Put the pieces to be drilled, one at a time, into the shaper and with a V-shaped tool just mark the work along the centerline the drill is to follow. When the work is put together, there is a very small hole for the center of the drill to follow, says American Machinist. By using a small drill first, to widen out the hole, other drills can be easily held in their course.

¶A good paint for ironwork is composed of best French yellow ocher, 39 lb.; lampblack, 1 lb.; raw linseed oil, 54 lb., and Japan drier, 6 lb.

¶The ways of a lathe should never be used to knock the file on for removing filings.

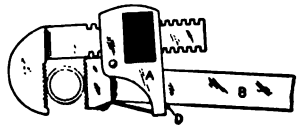
Fastening Automobile Hub Caps

Place the cap on the hub and drill three holes through the cap and into the hub. Tap these holes for suitable machine screws. The screws will hold the cap securely, and the whole presents a neat appearance. —Contributed by O. L. Bontz, Greenville, Pennsylvania.



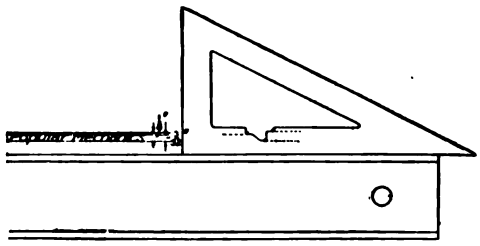
How to Use a Pipe Wrench

Pipe can be very easily crushed with a heavy pipe wrench, if the workman does not understand its use. A correspondent of Power suggests placing the wrench on the pipe and pulling lightly to get the jaw to take hold, then slacking off on the nut until the frame A comes in contact with the handle B at D, as shown in the sketch, thus preventing the jaws from closing. The wrench then has power to turn, but not to jam, the pipe.



Letter-Ruling Triangle

A simple device for ruling a drawing for letters can be made of an ordinary triangle, as shown in the sketch. The notches are cut to the desired depth for each line. By placing the point of a pencil in the notches and sliding the triangle along the T-square, light and uniform guide lines may be quickly drawn.—Contributed by C. S. Orcutt, Buffalo, N. Y.



Notch in the Triangle

A Hardening Mixture

The following mixture produces a temper in tools that will not "bend or break":

Whale oil	1 gal.
Tallow	4 lb.
Beeswax	1 lb.
Rosin	¼ lb.

Make a brine that will bear up a fresh egg, adding to it 2 oz. of saltpeter and 1 pt. of vinegar for every 12 qt. of brine. Put this into a tank or other suitable receptacle and cover with the above mixture.

For lathe and planer tools, and also for milling cutters, dip into this bath, letting the tools cool in the brine, but do not draw the temper. For tempering springs, the first solution is most excellent. In this case it is used alone without the brine. In the usual manner of tempering springs, dip the work into the solution when it is at the proper temperature. When it has ceased to "sing," hold over the fire and blaze off the oil, then allow to cool in the air.—Contributed by Donald A. Hampson, Middletown, N. Y.

Easy Way of Removing Corks

Corks that have been replaced in bottles are often hard to pull out again. Especially is this true when one is in a hurry and has neither the time nor patience to hunt for a corkscrew or a knife. To remedy this, take, before replacing the cork, a piece of thin white cloth about 3 in. square, and wrap the cork in it, tying it at the top with a piece of twine and allowing the cloth to extend far enough to take hold of with the fingers. The cork may be then easily removed.—Contributed by Louis Fisher, Kansas City, Mo.



Keeping Dampness from Tools

In most climates where excessive dampness prevails, the manner in which rust attacks edged tools is very aggravating. It will be found that a small open box of unslaked lime, kept in a corner of the tool box or cabinet and replenished from time to time, will absorb the excessive moisture and keep the tools in good condition.—Contributed by Bert L. Forse, Poughkeepsie, N. Y.

Sliding Partition in a Chicken Coop

A good retaining pen from which to sell poultry may be had by building a coop of the desired size and placing in it a sliding partition for use in forcing the fowls toward the door at either end, enabling a person to take out one at a time.

The sliding partition may be used for dividing the pen into two compartments by placing the partition in the center of the coop. The pole which runs from the center of the sliding partition through a hole at one end of the cage for pulling the partition back and forth may be used also as a roost

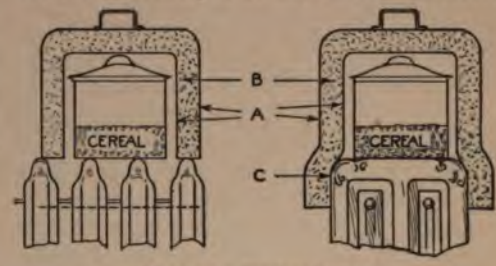


Partition Forces Chickens to the Door

when it is desired to leave the fowls in the pen for several days for fattening purposes. — Contributed by Monroe Woolley, Ft. Casey, Wash.

A Radiator Cereal Cooker

The accompanying sketch shows a cereal cooker designed to use the heat of an ordinary radiator in conjunction with the principle of the fireless cooker.



Used as a Fireless Cooker

The device consists of a pail or other suitable receptacle in which the cereal may be brought to a boil, and a cover consisting of two tin shells, A, with about 1½ in. of insulating material, B, between. The cover extends downward below the top of the radiator C, on two sides, to retain the heat better, and it is readily set over the pail after it is placed on the radiator.—Contributed by W. E. Morey, Chicago.

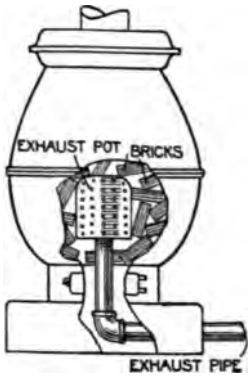
Draining Water from an Automobile Gas Generator

Drill or punch a ¼-in. hole in the bottom of the water tank over the carbide basket. Cut threads in a nut with a ¼-in. pipe tap and solder the nut over the hole. Procure a ¼-in. faucet or pet cock and turn it into the threads of the nut. Use white lead on the threads.

In cold weather the water may be easily removed by turning the faucet after removing the bottom carbide can. —Contributed by Earl R. Hastings, Corinth, Vt.

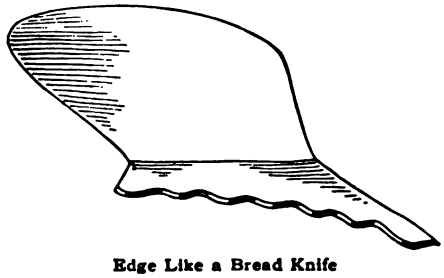
Heating Stove with Gasoline-Engine Exhaust

An inventive miller utilized the exhaust from his gasoline engine to heat his office stove in cold weather. The stove was an ordinary coal stove and the exhaust pipe was run from the engine to its base. The pipe was wrapped with asbestos to prevent loss of heat. The muffler, or exhaust pot, was screwed on the pipe in the lower half of the stove and a number of bricks placed over and around it. The smoke and fumes from the exhaust pass out through the chimney. The stove keeps the office well warmed, and, as the bricks hold heat for some time, the room is kept warm long after the engine is stopped.—Contributed by Irl R. Hicks, Hallsville, Mo.



Plowshare for Alfalfa

Anyone that has ever plowed alfalfa sod knows how hard the roots are to cut. In plowing many of the roots are not cut off. I had a field of alfalfa at one time that I was unable to plow, as my team was too light to draw the plow through the roots. After thinking it over for a time, I decided to make the edge of my plowshare like the cutting edge of a bread knife. The edge was ground on an emery wheel as shown in the sketch. I had no trouble in plowing the field. The roots slip over the scallops and are cut off easily and clean.—Contributed by A. S. Thomas, Amherstburg, Ont.

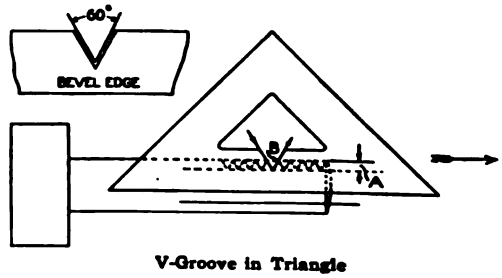


Edge Like a Bread Knife

Drawing the Pitch of Threads

Sometimes it is desirable to show threads in full on a drawing instead of using the conventional methods. The best way to draw these threads is to add a V-notch of 60 deg. in the triangle, as shown in the sketch, and bevel its edges. The part to be removed must be carefully marked and cut out, and the edges dressed straight with a common file. The beveled part makes a thin edge to keep the ink from running under the triangle.

For all ordinary threads the triangle will be self-spacing, and all that is necessary to draw them are the construction lines for the top and bottom of the thread A. The triangle is set against the T-square so that the point of the pencil or pen will just touch the bottom construction line, then, when the pencil point is at B, the triangle is moved along until the opposite side of the notch touches the pencil point, when the operation is repeated. With a little practice the threads can be drawn very rapidly.—Contributed by H. G. Clay, Washington, D. C.

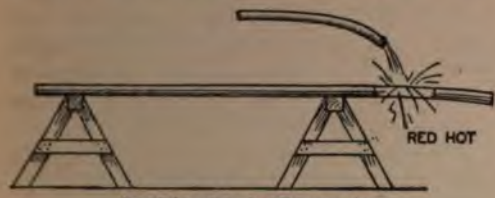


V-Groove in Triangle

¶Coffee can be made without a fire by setting the coffeepot on a piece of limestone and banking sand around the lime and pot so it cannot turn over, and then pouring water on the lime. In a few minutes the coffee will be boiling.

Straightening a Small Bend in a Large Shaft

Place the shaft upon the horses and set a forge under the bend and heat it to a bright red, then remove the forge or roll the shaft along the horses until it clears the forge and turn the shaft so that the bow will be up. Apply a small stream of water on the center of the bow. This will cause the top to cool and contract while the lower side remains hot, thus stretching the lower side and straightening the shaft. I have tried this on a large screw, 5 in.



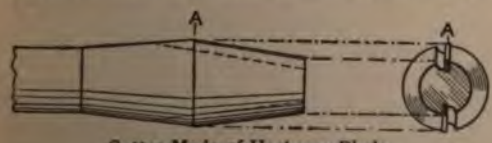
Straightening by Contraction

in diameter, and the results were satisfactory. If a lathe is not available to make a test for straightness, use a straightedge.—Contributed by F. J. Schenck, Hugo, Okla.

How to Make a Taper Reamer

Turn a piece of brass or cold-rolled steel to the same size and taper as the hole to be reamed, leaving it long enough to be held in the chuck. Saw a slot lengthwise of the tool on each side of the tapered part and remove the metal on the cutting side to make a flute for clearance.

Procure two pieces of a broken hacksaw blade—power saws are the best—and solder each securely in the slots cut in the tapered part. Grind the outer edge of the saw blades to form a cut-

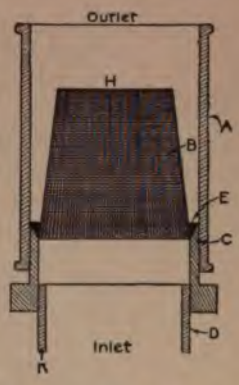


Cutter Made of Hacksaw Blade

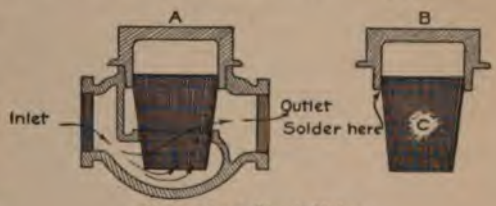
ting edge and to make the same taper as the tapered part. This will make a very good and cheap reamer.—Contributed by M. Hohn, Chicago.

Sediment Kept from House Water Pipes

The same principle of placing a strainer on the gasoline pipe near a carburetor can be used on a larger scale for a simple, efficient and inexpensive strainer for eliminating foreign matter, such as vegetable matter, sand, etc., in the water in many localities, and thus preventing it getting into the house pipes, water meters, steam boilers, etc. It is especially valuable on pipes from 1 to 2 in. in diameter. About the only cost is the bare fittings, and it requires no mechanical skill to put it together.



An extra-long pipe coupling, A, is fitted with a fine, strong brass screen, B, formed into a frustrum, and a flat top, H, is soldered to it. This is soldered to a bushing, C, at E. A union can be used on the nipple end



Screen in a Check Valve

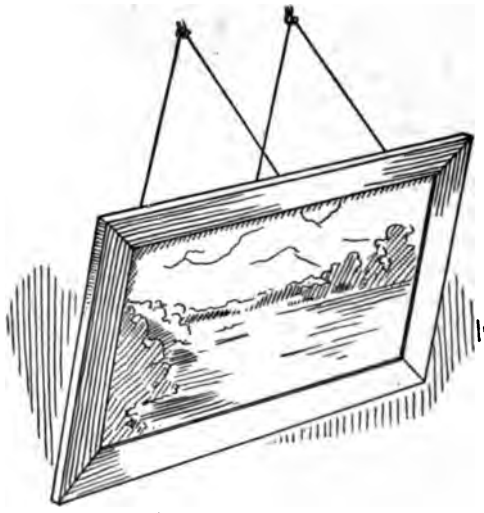
K, so that the screen may be removed with little trouble when it requires cleaning. A tee with a blow-off valve can be attached, instead of the union, and the filter cleaned in a few seconds by opening the valve and allowing some of the water in the outlet side of the pipe to flow back.

Another simple way is to secure an old check valve that has been discarded as worn out, and fit the screen in it. Unscrew the top and remove the disk and stem. Shape a piece of screen, C, the same as described, and solder it to the top as shown at B. Screw on

the top, as at A, and you have as fine a screen as can be bought for delivery pipes. To clean this type of strainer, unscrew the top A, and wash out the screen.—Contributed by Jas. E. Noble, Toronto, Canada.

Hanging Pictures

A large picture hung by one wire is hard to keep in place so that it will always appear straight, as a slight jar



Two Hanging Nails

or a gust of air may shift it. An improvement in the hanging can be made by attaching two wires as shown in the sketch. The hanging can be better accomplished and the picture held more firmly in place in this manner.—Contributed by Frank Rosenberg, Worcester, Mass.

Removing Carbon Deposits in Gasoline Engines

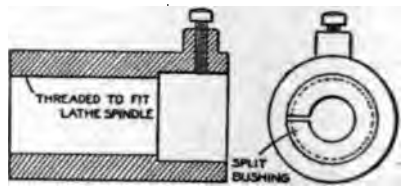
Carbon deposits in a gasoline engine cause considerable trouble, and while scrapers can be used in some engines, others must be taken apart to remove the carbon.

A very simple way is to use two metal pot washers in the following manner: If you have a 4-cylinder motor, remove the valve caps from cylinders one and four, then put one of the washers and about 1 pt. of kerosene in each cylinder. Replace the valve caps and remove one and four spark-plug wires. Start the motor on cylinders two and three and allow it to run about 10 minutes, then remove the washers with a wire hook. Do the same with cylinders two and three. On a 6-cylinder motor three cylinders can be cleaned at a time.—Contributed by Fred Grinham, St. Louis, Mo.

Chuck for Cold-Rolled Steel

Few lathe chucks can stand the hard and varied service they receive and have their jaws remain straight and true after a couple of years of steady work. For holding work of standard size, such as pins, bushings, etc., but more particularly for holding the commercial sizes of cold-rolled steel, the device shown in the sketch is of great value.

It consists of a body of cast iron which is threaded to fit closely on the lathe spindle when in position. The front end is bored out as shown. This gives a recess concentric with the motion of the lathe. A boss provided for a setscrew is drilled and tapped. Bushings are made with the holes to receive the standard sizes of steel and their exteriors turned to fit closely in the recess of the improvised chuck. Make as many of these bushings as there are sizes of stock, split them and one has attachments that will prove invaluable.



Bushings in Holder

If the fitting has been well made, the "squeeze" of the setscrew will not throw the work out of true over 0.001 in.—Contributed by Donald A. Hampson, Middletown, N. Y.

¶A lathe center should be in first-class shape to do first-class work.

Tracing Down Telephone Troubles

By GEORCE M. PETERSON

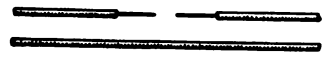
PART I

Terms

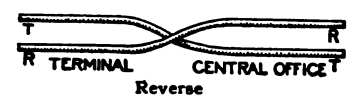
An explanation of the principal terms used on "trouble" is the first thing which must be understood in order to arrive at the fundamental principles of the art of galvanometer work, or, as the common expression goes, "shooting trouble." The terms in use on telephone troubles are, "short" or "short circuit," "open," "reverse," "split pair," "ground," "cross" and "transposed pairs," and are defined as follows:



Short



Open



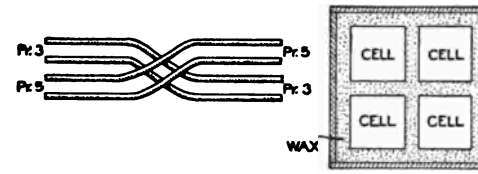
Reverse

A "short" is the term applied to a pair of wires from which the insulation has become removed in some manner, so that the two wires touch each other. An "open" indicates that one or both wires of a pair are broken, thereby causing an open circuit. A "reverse" signifies that the two sides of a pair of wires are either reversed in the sheath or quite often in a splice. A "split pair" shows that in some manner, usually due to clearing trouble, one wire of a pair has become separated from its mate and is working with an odd wire—possibly the mate to a wire which is in trouble.

A "ground" is the most common of all cable troubles and is used to indicate that in some manner the electric current has broken through the insulation and is leaking to ground. This is sometimes caused by the insulation being torn off or broken, although grounds are usually the result of moisture entering the cable. The two causes can be readily separated, on account of the fact that a moisture ground will nearly always affect more than one wire, while a ground due to mechanical troubles usually takes but one or two wires at a time. A "cross" indicates that the insulation of one wire of two or more pairs has broken down or leaked so that they are touching each other. A "transposed pair" means that the wires are improperly fanned out in the central office or cable terminal box.

Instruments

A voltmeter having a range of from 0 to 150 volts, a portable battery having an electromotive force (E. M. F.) of from 100 to 130 volts, a Wheatstone bridge, a fault finder, a buzzer test set, a galvanometer and an induction test set usually make up a trouble man's outfit. These instruments must be purchased from some maker of standard goods, but the battery and buzzer test set can be made in a short time and will give better satisfaction than any which can be purchased complete.

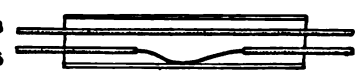


Transposed Pair Battery in Box

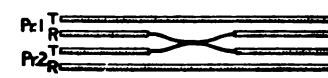
The battery consists of 40 pocket flashlight batteries, each one of which has an E. M. F. of 2½ volts. A box is made in which to place the battery for carrying purposes. As the batteries each measure about 3 by 3½ by ¾ in., and are usually placed two wide and two high, the carrying case should be about 7 by 8 by 10 in. inside dimensions, to allow space for the paraffin around each cell. The bottom of the box is lined with heavy paraffined pa-



Split Pair

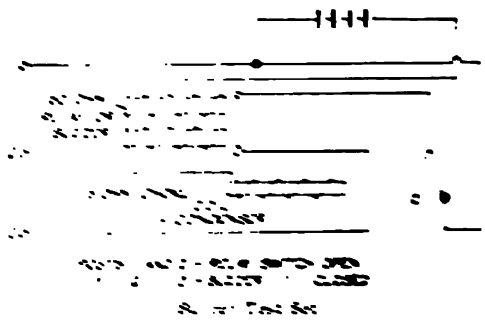


Ground



Cross

per. The batteries are connected in [illegible] in the box, the connections are carefully soldered to avoid [illegible] and the positive and nega-



placed between the rows of batteries and then the outfit is tested. If the test shows the battery to be perfect, the box is then filled with hot paraffin, care being taken to insure the wax getting into all the corners and inclosing the batteries in a solid cake. This will prolong the life of the battery 100 per cent, as it is protected from the deterioration due to dampness. The sketch shows a cross section of a complete battery.

The buzzer test set shown in the sketch should be made up and placed in a small box having a shoulder strap for carrying it easily. This set has the advantage over the old style in that it does not always require a head receiver. The relay, or buzzer, can be used, and the earphone usually can be omitted.

A New Attachment for a Speed Lathe



[illegible]-shaped brass piece, D, was bored to fit over the stem of the pump plunger and an upright pin was inserted therein, which was bored to receive the crankpin. The air passes from the pump to the tank through a rubber tube, E. The pump oscillates with the motion of the crank, but on account of the flexibility of the rubber [illegible] this is no drawback.—Contributed by Harry F. Lowe, Washington, District of Columbia.

How to Make a Set of Steel Figures

[illegible] set in a shop desiring to [illegible] figure punches of his own [illegible] make them in the following [illegible] usually enough discarded [illegible] other punches can [illegible] a shop that will serve [illegible] but these are not to be [illegible] of steel of the right [illegible] purchased to make [illegible] of the punches. [illegible] of tool steel, about [illegible] sufficient surface [illegible] ts and the cipher [illegible] the punch ends.

[illegible] punch must be [illegible] and squared, so that it will

receive the figure without much extending edge. They are then annealed, as well as the flat piece of steel.

Secure the loan of a set of steel figures from the tool room and sink each figure in the surface of the steel plate, while it is soft. Be sure to drive in a perfect impression of each figure. The indentation is shown by the figure 6 in Fig. 1. After all the figures are indented into the steel plate, dress up the surface with a very fine file to remove any bur that may have been raised by the punches, so that the indentation will be as shown, in section, in Fig. 3. After a perfect indentation of each figure is secured in the surface of the steel plate, temper it, and this die will always be ready to make any subsequent punches desired.

Take the prepared punches and remove by drilling any unnecessary metal for each figure the punch is intended to make. For the figure 6 the metal is removed by drilling two holes as



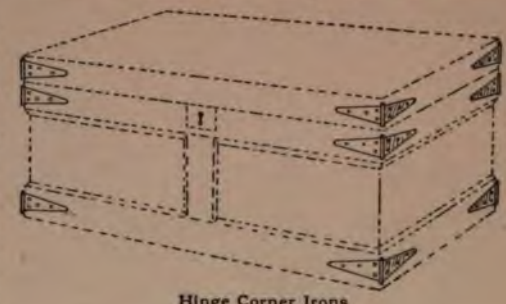
FIG. 1 FIG. 2 FIG. 3

Die and Punch Faces

shown in Fig. 3. Drill these small holes wherever possible and it will help the piercing die. Make sure the ends of the steel to be stamped are square. Stamp them all, cut and dress away the outside metal and any unnecessary metal remaining inside, until only the outline of the figure remains. Temper the ends and you will have as good a set of figures as can be purchased.—Contributed by Clement Howe, Plainfield, N. J.

Corner Irons for Chests

A strong and inexpensive corner iron for boxes and chests that are heavy and much handled can be made by using light wrought-steel strap hinges. They also relieve the strain on the lock if two of them are fastened over the joint of the cover near the ends. The lower ends of these hinges can be fastened with screws while shipping, or they can be made



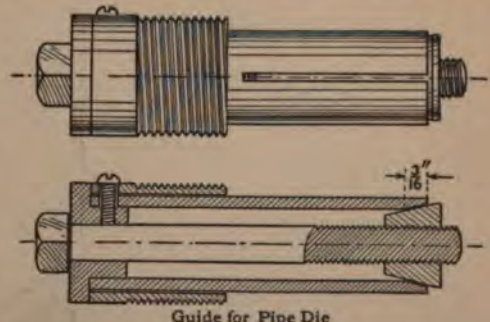
Hinge Corner Irons

to slip into staples made for the purpose.—Contributed by W. A. Lane, El Paso, Texas.

Die Starter for Cutting Threads on Pipe

Many times the plumber or steamfitter must cut threads on broken pipes in places where it is impossible to work a regular stock and die. Without the stock it is hard to start the die, but a starter, as shown in the sketch, makes it possible to start a die on the square end of a pipe.

The way to use the starter is to screw the die on the threads backward and insert the small end in the pipe. The bolt is then tightened to hold it firmly in place. The die is next turned off the threaded portion of the starter and onto the pipe to be threaded. The screw



Guide for Pipe Die

feed will force it to go straight and cut the threads as it turns. The sketch plainly shows its construction.—Contributed by Sandford A. Larson, Denver, Colo.

Weatherboard Spacing Gauge

Where one man is working alone, nailing on weatherboards, the device shown in the sketch not only gauges the part to the weather, but also holds the opposite end of the board. The gauge is made as shown in Fig. 1, with the length A equal to the amount of board allowed to the weather. After two or three boards are put on, shove the spring up under the last piece of siding and then place the next piece on top in the notch.

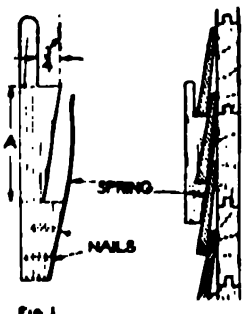


Fig. 1

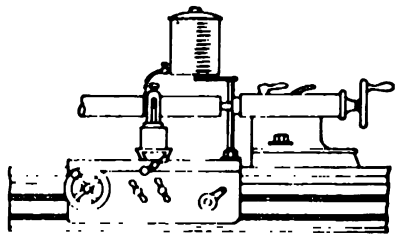
Fig. 2

Contributed by D. L. Kellogg, Stillwater, Minn.

Oiler on a Lathe

Most lathes in ordinary machine shops are not equipped with a can for dropping lard oil on cutting tools. Having a large number of pieces to cut off recently, I rigged up a can in a few minutes, as shown in the sketch. A milling machine close by being idle at the time, I used its oil can.

The can has an arm about 7 in. long and swings on a short tapered post driven into the housing of the milling

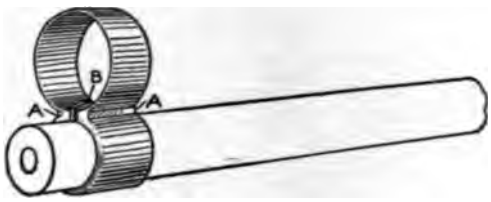

Oil Can on Arm

machine. All I needed was a ⅝-in. bolt, about 10 in. long, with a 2-in. length of thread on the end. I sawed the head of the bolt off, so that it would allow the can to swing over the tailstock of the lathe and tapered the end to fit the arm of the can. A nut and washer was run well up on the thread and another nut run on just far enough to have a full thread. I inserted the bolt in the slot at the rear end of the carriage and turned the top nut down on the washer. This made a rigid post for my can. The oil can may be swung in any position to follow the movement of the tool. When not in use, it can be swung out of the way or detached entirely in a moment.—Contributed by H. L. Raabe, Akron, O.

How to Make a Globe Sight

A handy globe sight for a single-barrel shotgun or rifle may be made of two 1-in. pieces of thin brass or steel tubing. The pieces may be of the same diameter, or one may be larger than the other.

Connect the two pieces with two ribs of solder as shown at A A, then



Sight Made of Tubing

file a slot through the pieces to separate them. This permits the sight to be slipped over the muzzle without removing the bead sight B at the point. The section to be slipped on the barrel should be of the same diameter as the barrel so that when the slot is cut, it will expand enough to slip on and fit tightly.—Contributed by Jas. M. Kane, Doylestown, Pa.

Use for Old Blueprints

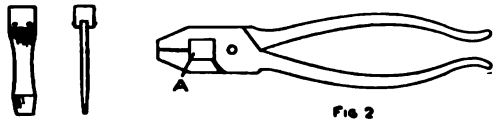
In many establishments blueprints accumulate until the quantity reaches amazing proportions. Some concerns keep a record and file of all prints made and at fixed times destroy the old ones. It makes no difference what method is used in handling them, at some time great quantities of these prints are destroyed in some way and the paper is a total loss. In addition to this,

at the time of printing, there is sure to be a certain waste due to poor exposures, blotchy paper, etc. A method for turning this waste into a useful article is presented by a correspondent of the American Machinist.

These old or useless prints may be bleached by immersing them in a soda bath, containing 4 oz. of soda to 1 gal. of water. If it is desired to bleach only a portion of the print, this may be done by painting that part with this solution. By washing the prints in fresh water, after bleaching, any discoloration is prevented. The blank paper thus obtained furnishes a fair grade of sketch paper, and there are numerous other ways in which it may be used.

A Lineman's Screwdriver

Every lineman has use for a screwdriver, but this tool is not always a handy thing to carry. A screwdriver point to be used in connection with the pliers is made as follows: Cut a piece of ⅛-in. steel 3 in. long, and shape it as shown in Fig. 1. Then shape a piece of steel to just fill the opening A, Fig. 2, in the pliers. This latter piece is grooved to receive the end of the screwdriver point, then they are riveted together. In use, the large end



Screwdriver Blades for the Pliers

is placed in the opening A, and the jaws of the pliers closed tightly.—Contributed by John H. Selden, Lynn, Mass.

Straightening an Automobile Front Axle

Quite often, through accident, the front axle of an automobile is bent out of line. To straighten the axle it is either necessary to remove it and place it in the fire or to straighten it cold. Heating an axle destroys a certain part of its strength, therefore it is best to straighten it cold. This can be done quite well in the following manner without removing the axle from the car:

In the first place it is necessary to have a steel shaft stronger than the



Jack on the Axle

axle to be straightened, a couple of chains and a screw jack, all of which may be procured with very little trouble. By placing the chains around the axle and shaft as shown, with the jack between them, the axle may be straightened by turning the screw. I have straightened axles on heavy cars in this way, without removing them from the car.—Contributed by J. N. Bagley, Superior, Neb.

Making Blueprints from Blueprints

The making of a blueprint from a blueprint is described by a correspondent of Machinery, as follows: To obtain good results, a clear, sharp and rather dark print is essential, for if it is blurred or light, it will not reproduce satisfactorily.

The method consists of coating the print with a little kerosene and then printing immediately. The oil used will not affect the reproduction of the new print, unless it is applied very thickly, nor will it spoil the original, as the oil soon dries, leaving the print in as good condition as before. This process will also work perfectly when it is desired to make prints from heavy drawings. It has been used with success to make blueprints from printed matter. To make the original perfectly transparent, apply a coat of boiling hot paraffin.

¶Anti-fatigue metal is vanadium steel which has very great resistance to repeated shocks.

The Art of Stencil Making

By HOMER H. KNODLE

PART III—DESIGNS

Originality is the key to success in stencil making, and although the designs and descriptions given in this article present some of the principles of the art, the resourceful worker can secure hundreds of others by additions to and variations of them.



FIG. 18



FIG. 19

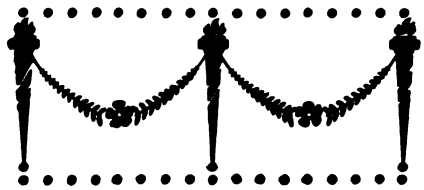


FIG. 20
Border Designs

Each design given is original and anyone may use them, keeping in mind that slight changes may add individuality and insure a design different from that used by any other decorator.

A very light border, formed entirely of even lines, is shown in Fig. 18. This is drawn by laying out the square and then drawing in the diamond shape by means of the 45-deg. triangle. This design also can be made to represent a rope border by leaving narrow binders across the face at regular intervals. The stencil should not be made wider than 4 in. and the width of the line in proportion.

A straight, geometrical border, formed of parts of a circle, is shown in Fig. 19. First lay out the inclosing square and therein draw the four circles; then divide the center so that the parts that are to show will be of even length, and the design is finished. This border can be made as large as 6 in. with the lines in proportion. It may also be varied without destroying the effect. For instance, the small circle in the center may be made larger.

A wide border, demanding light treatment, is shown in Fig. 20. This design should be from 6 to 18 in. wide, and the dots of such a size that all will be in proportion.

A combination of very light and heavy treatments is shown in Fig. 21. This is appropriate only in very dark corners and out-of-the-way places. The scroll can be ornamented as desired, but should not bear too much detail.

A design which can be adapted to almost any space is shown in Fig. 22. It may be made about 6 in. high and repeated for a border design, or, if made larger, may be used for a panel. In case it is made over 1 ft. high, it should be narrower than the sketch shows.

A centerpiece can be made by stenciling several times around a center. This will produce a heavy effect. In planning a centerpiece it should be remembered that it may be used only with a tint of the body color. Almost any style of leaf design can be adapted to this outline, and with a little ingenuity a large number of designs can be worked out from this motif.

A design for heavy treatment intended for a centerpiece is shown in Fig. 23. This design can be made from 8 to 40 in. in size. All sizes over 20 in. are made in half and the stencil repeated to complete the design. For a room longer than it is wide and having enough ceiling space, this design will prove valuable as a centerpiece with other designs placed around it.

A very appropriate design, either for a panel repetition or as a border, is shown in Fig. 24. When used as a panel, it should be surrounded by a square or rectangular light border of

some plain design to mark the real outline of the panel. If repeated as a border, it should have a light border on either side to offset the commonplace effect of repetition. This design is made by first drawing a circle and sketching in the point and the bottom outline. Inside of the circle, draw a line to denote the bottom of the leaves and sketch in the vertical leaf, and, with the use of the two triangles, separate and combined, draw at the proper angle the centerline of each succeeding leaf, which, in this case, is easily done. This design should not be made smaller than 10 in. Many different designs can be devised from the general outline of this figure.

A light design to fill the requirement of an artistic combination of lines in a panel or wide border is shown in Fig. 25. The layout is the same as shown in the complete design. The lines should be of proper width to balance well, but aside from that no special effort need be given to it.

The design shown in Fig. 26 is another that can be used in the same positions and under the same conditions as the one shown in Fig. 24. It is merely a different treatment of the same idea.

An oval design is shown in Fig. 27.



Fig. 21



Fig. 22



Fig. 23

Border and Centerpiece Designs



Fig. 24



Fig. 26



Fig. 25



Fig. 27



Fig. 28



Fig. 29

Panel Designs

This will appear well in a border, if not made more than 3 in. wide. Use care in forming the leaves to have them the proper shape and size, as the design is entirely in the form of leaves.

A heavy design for a centerpiece is shown in Fig. 28. This is excellent when used with a darker tint of the body color. The effect can be heightened by outlining the work with a color or shade of contrasting tint. In making the stencil, only half of the design shown need be made; but if the design is drawn small enough, it is well to make it all in one piece. The circles of the design, where the leaves appear, are drawn first and then the design drawn in the finished form. Draw in the denture ovals and finish the design with the parts as shown.

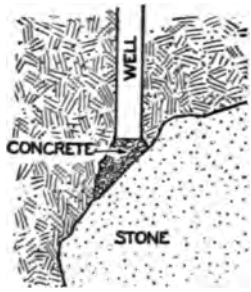
Another design for a centerpiece is shown in Fig. 29. This piece is laid out by means of the compass and triangles. After the circle is divided the work of sketching in the detail is easy, if care is taken to follow the original closely. This design is applicable to almost any size, and the figures can be enlarged or made smaller to suit the size of the stencil. Take care to keep every part in proportion.

In making stencils of any kind, always be careful to place the binders correctly and have them in sufficient numbers to hold the inside parts. As the placing of the binders in a stencil is the last thing in drawing a design, and as they could not be clearly marked in designs so small as the ones illustrated, it was thought better to leave them out.

(*To be continued*)

Drilling Well on a Slanting Stone

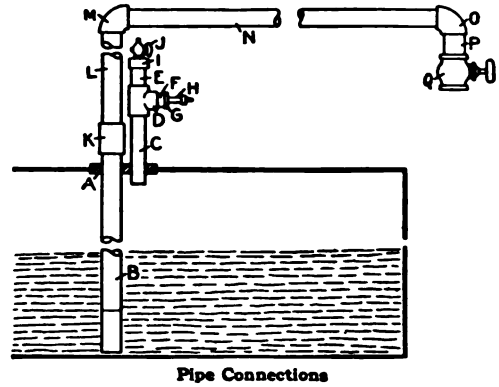
When a slanting rock is struck in boring a well, the drill will push to one side and not enter the rock on a straight line. This trouble can be overcome by mixing some cement and fine stone and pouring it into the hole. Allow the cement to set 24 hours, and the drill will cut through the concrete and stone in a straight line.—Contributed by J. S. Grant, Winchester, Va.



Removing Gasoline from a Barrel

If gasoline or oil is kept in a barrel, it is slow work to draw the liquid out through a faucet or bibcock. Also there is apt to be considerable waste.

The illustration shows a compressed-air apparatus which will remove the oil from the top or bung of the barrel. The apparatus can be made by anyone who has a few tools as the pipe can be purchased cut in the right lengths, or they can be cut by anyone having a diestock. A plug, A, having holes to receive a ⅜-in. pipe, B, and a ¼-in. pipe, C, is fitted in the bung of the barrel. The connections on the pipe C, are a ¼-in. tee, D, and two nipples, E and F, each 2 in. long, on which two ¼-in. caps, G and I, are fitted. The caps are drilled, tapped and fitted with a tire valve, H, and an air cock, J. The ⅜-in. pipe B has connections as follows: Coupling K, with pipe L, has an el, M, to which the long pipe N is fitted, with end connections of an el, O; nipple, P, and a globe valve, Q.

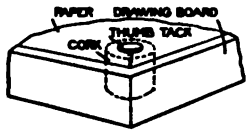


Pipe Connections

All joints should be lubricated with rosin soap before screwing the parts together. The pipes L, N and P may be of such lengths as to carry the oil to a handy place. Pressure is applied to the oil through the valve H. An automobile tire pump can be used for applying the pressure. When the desired quantity of oil is secured through the valve Q, open the air cock J, and allow the air pressure to escape.—Contributed by Earl R. Hastings, Corinth, Vermont.

Cork Corners in a Drawing Board

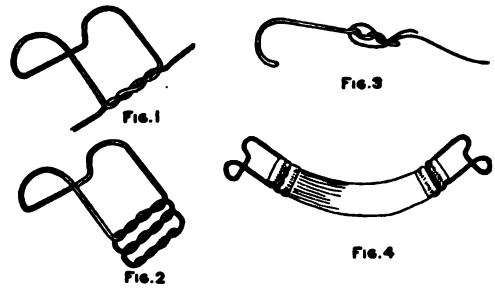
While fastening a piece of drawing paper on my drawing board I noticed at each corner there were many small holes, made by the thumb tacks which were used to hold the paper. I decided to remedy this and at the same time make an improved drawing board.



I bored ¾-in. holes at each corner of the drawing board, procured four large solid corks, and pressed them firmly into the holes. The tops were trimmed off flush with the surface of the drawing board. The thumb tacks can be easily pushed into and removed from the corks. The tack will hold the paper as firmly as if it entered the wood of the drawing board. The corks can be taken out and replaced when they become full of tack holes. — Contributed by Chas. Homewood, Waterloo, Iowa.

Bathtub Seat

The holders for the seat are each made of one piece of heavy wire, the ends of which are bent at right angles, leaving 4 in. of wire straight in the middle. Both ends of the wire are bent in hook shape, so as to form a grip or roll over the edge of the tub. At a convenient distance from the hook part, the wire is again bent at right angles, so that the ends will lie parallel to the part of the wire forming the hook. The ends of the wire are twisted together as shown in Fig. 1, and are turned again and another twist made,

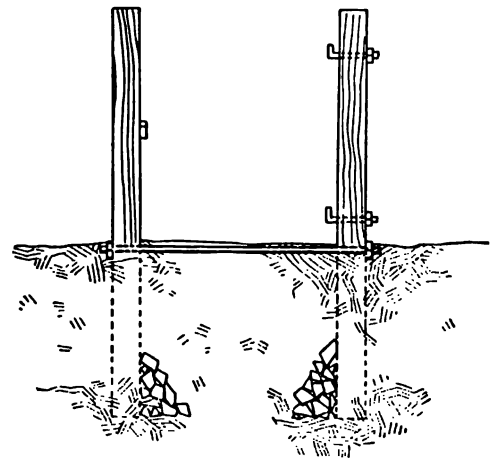


Wire and Web Connections

and then still another, as shown in Fig. 2. The ends of the web are woven into the twisted ends of the wire as shown in Fig. 3. The completed seat is shown in Fig. 4.—Contributed by John Dunlop, Craghead, Eng.

Preventing Gate Posts from Spreading

Gate posts may be kept parallel vertically, without cumbersome braces, by connecting them beneath the surface of the earth with a long rod. When setting the posts, small rocks or bricks should be packed tightly on the inside of the lower ends. This construction will make a substantial brace, which

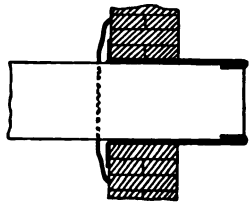


Bolt under Ground between Posts

will be out of sight and will effectively prevent the posts from spreading.—Contributed by Gilbert H. Holter, Jasper, Minn.

To Hold Stovepipes in Place

A very practical way to hold a stovepipe in place is to bend two pieces of wire in the shape of hooks as shown by the heavy lines in the sketch, and put one on each side of the pipe in the chimney hole. The ends of the wire, turned at right angles, are covered over with the collar. The hooks will prevent the pipe from slipping into the chimney.—Contributed by C. H. Mount, Galesburg, Illinois.

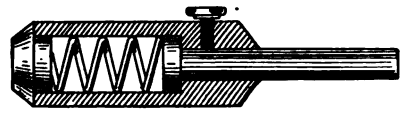


A Roller Chair

Any straight-back chair can be easily converted into a roller chair for an invalid by the use of roller skates. Procure a pair of roller skates and cut each skate in two, crosswise, giving a complete roller for each chair post. The parts may be strapped to the posts, or a metal clip riveted to the skate top with an upright end for screwing to the leg can be used. This makes a very satisfactory invalid's chair, as the occupant can easily turn it in any desired angle.—Contributed by Mrs. Della Schempp, Broadhead, Wis.

Caliper-Setting Tool

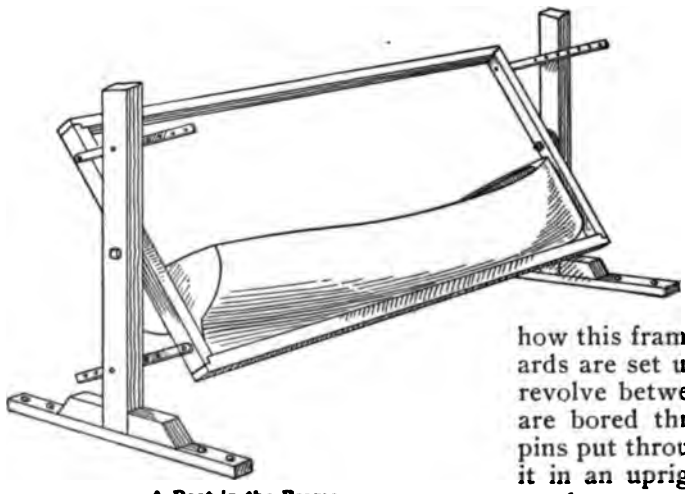
The device shown in the sketch has been designed and used by a correspondent of American Machinist for setting calipers accurately. It is placed between the micrometer anvil and head, the micrometer then being adjusted to the size required, and a small thumbscrew tightened. The spring inside is just strong enough to bring the plunger back in place.



Tool to Set Calipers

Frame for Holding Boats while Building

Boat builders will readily recognize the value of the boat-building frame illustrated herewith. This device saves great deal of the labor in moving the boat about and allows the builder to readily place it in a position to work on any part.



A Boat in the Frame

Several frames can be made for the different-sized boats. The standards are 4 by 6-in. material, and the bottom piece of the swinging frame is 4 by 4-in., with the other parts of lighter material.

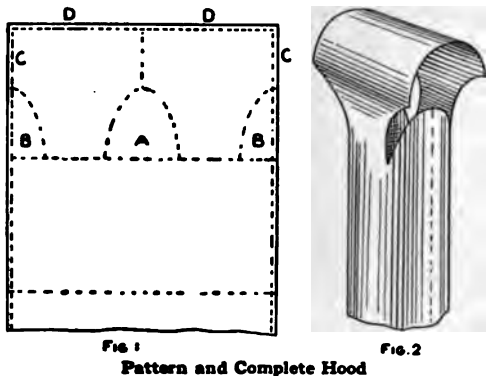
The illustration gives a good idea of how this frame works. The two standards are set up and the frame made to revolve between them on pins. Holes are bored through the standards and pins put through into the frame to hold it in an upright position. These pins can be removed and the boat swung so as to permit the builder to get at it easily from all sides, and without hav-

ing to lift it. Pieces are arranged at each end and connected to the standards. These are provided with holes and pins so as to hold the frame in any desired position while working. The boat can be turned completely over and the shavings easily removed. Care should be taken to make the frame perfectly square and solid, as the keel is laid on the bottom piece and the stem and transom squared up by the ends of the frame.—Contributed by James Bashford, Tacoma, Wash.

Pipe and Hood Made of One Piece

A hood is necessary on a stovepipe used as a chimney, to keep out the rain and prevent the wind from checking the draft. Such a top piece with a hood can be made from one piece of metal. For a 5-in. pipe, mark a square, 16 by 16 in., on a piece of metal as shown in Fig. 1, allowing a ¼-in. margin at the top and sides for overlapping at the seams.

Draw a line across the center and draw a half ellipse, A, 4 in. at the base, then one-quarter ellipses, BB, 2 in. at the base. Also draw a line from the top of the ellipse A to the edge of the metal. Cut out the metal on the dotted lines, then bend the lower part into the form of a pipe and join the edges.

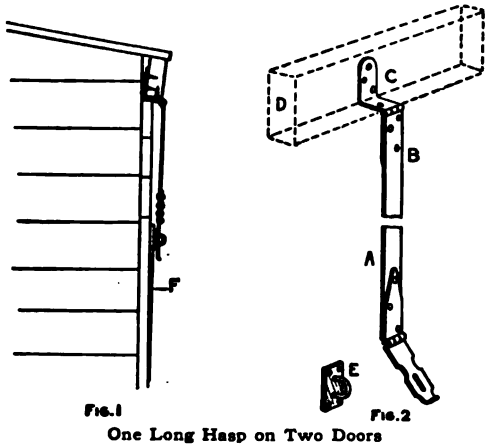


Pattern and Complete Hood

Shape the upper ends to form a half circle and join the edges DD. This will make the pipe and hood as shown in Fig. 2.—Contributed by H. Horace Romig, Allentown, Pa.

One Lock for a Double-Door Coal Bin

The sketch shows a way of using one padlock to serve two purposes on a coal bin with a hinged cover. Both



One Long Hasp on Two Doors

the cover, which can be elevated while loading, and a small hinged door on the front may be locked with one padlock, as shown in Fig. 1. The device consists of one whole hinge hasp and a part of another.

One side of the hinge hasp, B, Fig. 2, is riveted to a strip of metal, A; the other side, C, is fastened to the cover brace D. The hasp is bent to conform to the shape of the cover brace and fastened with screws. The other hinge hasp is riveted to the lower end of the metal A. The hinge hasp E is fastened to the door F with screws.—Contributed by Victor Labadie, Dallas, Tex.

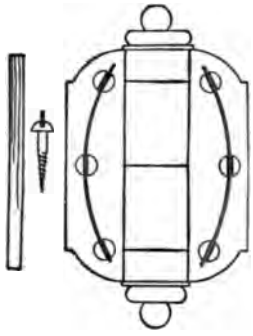
Preventing Drill from Catching as It Passes through Hole

If a drill squeaks or catches on a burr as it breaks through the work, peen the corner at the heel of the cutting edge, slightly increasing the length of the edge. This will also cause a drill to make a slightly larger hole.

¶A radiator may be made to appear oxidized by painting it a dull yellow and, when dry, lightly smoothing it with sandpaper, then applying a thin coat of the desired color, a mere glaze, and rubbing out to imitate oxidizing.

Screw Lock for Screen and Storm-Door Hinges

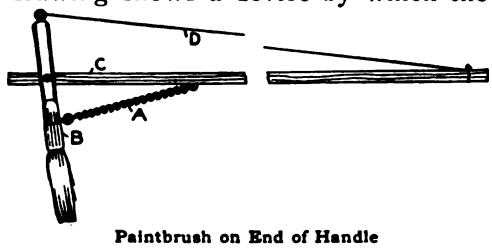
Screws in screen and storm-door hinges are very difficult to prevent from working loose, as these doors are usually supplied with springs which will close the door with such force that in time it will jar the screws loose. Wood screws, once loosened, will never hold firmly. The sketch shows a very successful way to lock the screws after they are in place.



A stiff flat spring, ⅛ in. wide, is attached so as to engage the slots in the screw heads and then soldered in place. For best results the spring should be attached before the screws have had time to work loose.—Contributed by Irl R. Hicks, Hallsville, Missouri.

Extension Handle for a Paintbrush

Some time ago I had a few gutters to paint which were very difficult to reach. It was necessary to take a ladder up on the roof in order to get at them. Being alone I was unable to place the ladder on the roof. The drawing shows a device by which the painting was done without a ladder, and with much less exertion.

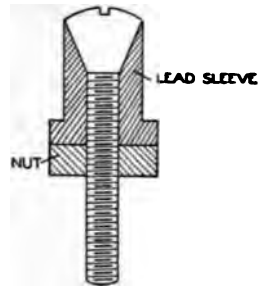


Paintbrush on End of Handle

An ordinary paintbrush, B, was pivoted on the extension handle C and operated with the cord D, the spring A drawing the brush back after each stroke. The brush may be mounted either flat or edgewise, according to the shape of the object to be painted. —Contributed by Mark A. Franklin, Schenectady, N. Y.

Repairing a Leak in a Stove Reservoir

A leak developed in the hot-water tank attached to my kitchen range, and after several unsuccessful efforts to repair it, the following plan was adopted: The hole was reamed out and a small bolt with a tapering head which would just pass through the hole selected. This was inserted head downward in a hole bored in a block of wood, and a lead sleeve cast around it, with a shoulder on one end. The sleeve was removed and reamed out to remove the threads in it and to allow it to slip on the bolt. Then the sleeve was replaced, the nut screwed up against it, and the device inserted in the hole as far as the shoulder. The bolt was held from turning by gripping the projecting end, and the nut turned up tightly. This expanded the inner end of the sleeve and made a perfectly water-tight repair. The end of the bolt was then cut off and smoothed with a file.—Contributed by J. A. Bannister, Cobourg, Ont.



Repairing a Cracked Nut

Sometimes a new nut cannot be easily had to replace a cracked one, because of its odd size or thread, and the repairing of the damaged nut becomes necessary. In one instance where a nut on the rear axle of a motorcycle was cracked from being drawn up too tightly, it



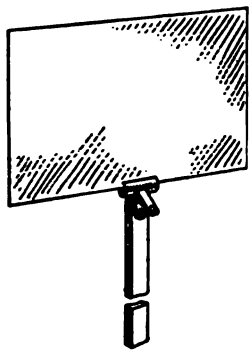


was repaired in the following manner, and used permanently in preference to a new one afterward purchased.

The illustration shows clearly how the nut was repaired. It was clamped in a vise and a recess was filed on the inner surface, just deep enough to form a shoulder to keep the washer in place. The washer was of a size to fit snugly over the round part when the crack was forced shut. No welding or heating was necessary, the washer was merely forced on and the nut was ready for use.—Contributed by L. M. Eifel, Chicago.

Bill-Card Poster

Having occasion to put up a number of bills for a coming fair, I used the following plan to put them high up in inaccessible places, far from the reach of the small boy.

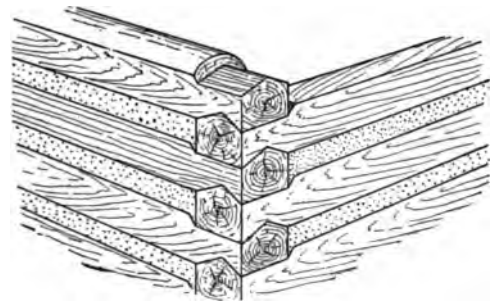


An ordinary clip, such as is found in most offices, is fastened to a strip of solid wood of the desired length. This, in connection with a long-handled magnetic hammer, makes a complete outfit for putting up cardboard bills.—Contributed by Chas. W. Meyer, Brooklyn, N. Y.

Log-Cabin Construction

The essential part in making a log cabin is locking or building the corners, says the American Carpenter and Builder. The first thing to do is to square off the sills on four sides, frame them for joists, and lay them on the wall; then square off two pieces on three sides and cut the saddles as shown. One man should be at each corner to cut the saddles so that they will be plumb, and other men should be stationed at the middle of the sides to hold the logs in place, while the corner men cut the saddles. Enough help should be on hand to make the work easy.

After the walls are built, cut openings for the windows and doors, allowing room to admit a 2-in. plank on each side, spiked or pinned to the ends of the logs. Then slip in the frames. The plates should be squared and the end ties and rafters should be framed into the plates. At each corner, bore a 2-in. hole, about 18 in. deep, into which drive a good hardwood pin.



Saddles on the Ends of Logs

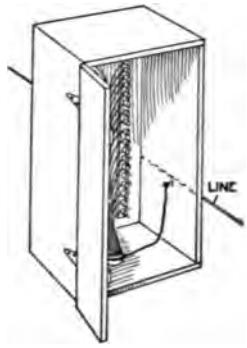
In selecting timbers to be flattened, get as near one size as possible and remove all of the bark. Care should be taken to keep the walls level by selecting logs for the purpose. Reversing the ends on each layer will keep the wall true and level. After the building is up, chink in between the logs with wood and fill in with mortar. About all the tools required are a good chopping ax, a broadax, a square and a crosscut saw.

In hewing timbers, care should be taken not to score so deeply that it will show after the surfacing is done. The hewer should trace his line 3 or 4 ft. and cut down plumb; then score back and hew; then the second line should be hewed. Care should be taken to have the top and bottom of the same width.

¶In cold weather when one is in haste to remove thick liquids, such as syrups, molasses, etc., from jugs, the flow can be increased by inserting a bent metal, rubber or glass tube into the mouth of the receptacle.

Nail in a Cable Box Causes a Ground

A certain line of a telephone system caused trouble by flashing in during storms accompanied by winds, says a correspondent of Telephony. A quiet rainstorm would not cause the trouble. When the storm was over the trouble would disappear. On testing, the trouble showed as a swinging ground.

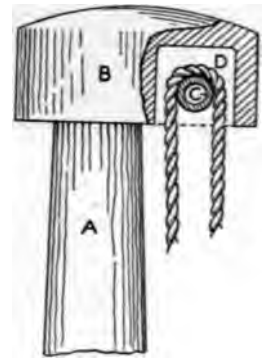


The trouble men failed to locate the fault for some time, but one finally noticed that the line was swinging against a wood cable box. He climbed the cable pole and observed the mark the line made striking the box. Then, opening the door, he saw a wire running up the side and fastened to a nail, where the line struck the box.

Looking outside he saw that the line was striking the nail head. Then tracing back the wire inside the box he found that the other end was fastened to the grounded lead sheath of the cable. This explained why the trouble occurred only during a storm accompanied by wind.

Rigging for the End of a Flagpole

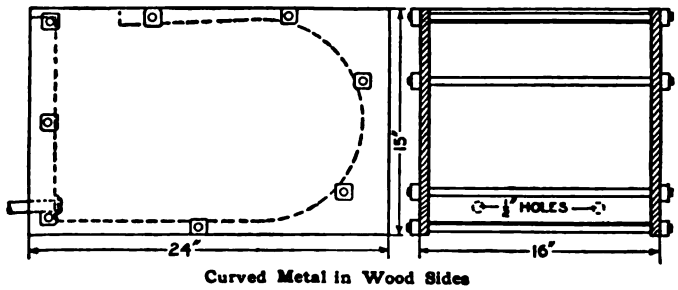
A simple and sure way to rig the top of a flagpole for carrying the flag rope is shown in the sketch. The flagpole A has a cap, B, with a ½-in. hole, C, in which a ½-in. glass tube or bar is inserted. A recess, D, is cut part way through, large enough to allow plenty of room for the rope. Close the ends of the glass tube with putty and paint the cap, but not the glass, where the rope passes over the center. This makes a rigging that will not stick in wet weather.



¶Copper in small quantities will increase the strength and toughness of steel.

A Shop Steam Washer

The washer is made of two 1-in. boards, 24 in. long and 15 in. wide, between which a curved piece of metal is



Curved Metal in Wood Sides

ld with ½-in. bolts, 17 in. long. A ve is cut in each board the shape : ... before it is put in place. Two ½-in. pipes are connected to the lower edge of the vertical part of the metal for steam connection.

This washer is made for shops and factories to wash grease-covered outer garments. The clothes are thrown into the washer with a little piece of soap and a little washing soda, and the steam is turned on the inlet pipes. The flow of steam along the bottom drives the clothes up the curved end and they will drop back into the steam, causing a continuous rotation of the garments.

A little water should be added to the washer after the steam is applied.—Contributed by John Kotanchick, Ran Shaw, Pa.

Opening Evaporated-Milk Cans

Those using various brands of evaporated milk find it necessary to procure a hammer and nail to puncture the can. This is considerable trouble and at the same time unsanitary, as both dust and flies get into the openings.

The simple device shown in Fig. 1 punches the holes with a slight pressure of the hand, and when not in use it serves as a suitable cover. The perforator consists of a strip of metal, A, having a hole in each end, with part of the metal turned over after the tacks B B are inserted. The cover is

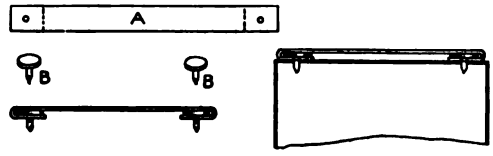


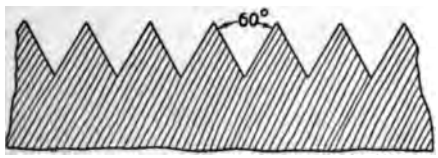
Fig. 1 Fig. 2

Tacks in the Metal Strip

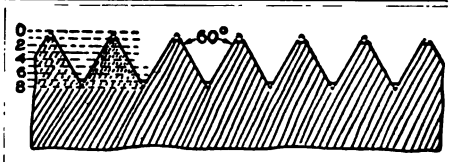
had by leaving the tacks in the holes as shown in Fig. 2.—Contributed by W. A. Jaquythe, Richmond, Cal.

¶Although cobalt and nickel have very similar properties, cobalt steels do not resemble nickel steels in the least.

TAP-DRILL SIZES



Standard "V" Form of Threads



United States Standard Form of Thread

Size of Tap	Threads per Inch	Tap-Drill Size	Threads per Inch	Tap-Drill Size
1-16	60, 64, 72	58, 57, 56	60, 64, 72	57, 56, 56
5-64	56, 60, 64, 72	54, 53, 53, 52	56, 60, 64, 72	53, 53, 53, 52
3-32	48, 50, 54, 56, 60	51, 50, 50, 49, 48	48, 50, 54, 56, 60	50, 50, 49, 49,48
7-64	48, 56	44, 43	48, 56	44, 43
1-8	32, 36, 40, 48, 50	44, 43, 42, 40, 39	32, 36, 40, 48, 50	43, 42, 41, 38, 37
9-64	32, 36, 40	39, 37, 35	32, 36, 40	37, 35, 34
5-32	30, 32, 36, 40	33, 32, 31, 30	30, 32, 36, 40	31, 31, 1-8, 30
11-64	32, 36	29, 29	32, 36	29, 28
3-16	24, 27, 30, 32, 36	29, 28, 27, 26, 24	24, 27, 30, 32, 36	28, 27, 25, 24, 5-32
13-64	24, 32	26, 19	24, 32	23, 19
7-32	24, 28, 32	18, 17, 15	24, 28, 32	18, 16, 14
15-64	24, 32	15, 10	24, 32	13, 8
1-4	20, 24, 27, 32	12, 9, 7, 4	20, 24, 27, 28	11, 7, 5, 4
9-32	20	2		
5-16	18, 20, 24, 27, 32	D, 1-4, F, 17-64, I	18, 20, 24, 27	D, F, 17-64, I
11-32	18	I		
3-8	14, 16, 18, 20, 24, 27	9-32, N, N, 5-16, P, 21-64	16, 20, 24, 27	N, O, 21-64, Q
13 32	16	Q		
7-16	12, 14, 16, 20, 24, 27	P, T, T, U, W, 25-64	14, 20, 27	23-64, V, 25-64
15-32	14	W		
1 2	12, 13, 14, 16, 20, 24, 27	Y, Y, 13-32, Z, 7-16, 7-16 29-64	12, 13, 20, 27	13-32, 13-32, 7-16, 29-64
17-32	12, 13	27-64, 27 64		
9-16	12, 14, 27	15-32, 15-32, 33-64	12, 18, 27	13-32, 1-2, 33-64
19-32	12	31 64		
5-8	10, 11, 12, 20, 24, 27	31-64, 33-64, 33-64, 9-16 9-16, 37-64	11, 12, 18, 27	33-64, 17-32, 9-16, 37-64
21-32	11	35-64		
11-16	10, 11, 12	9-16, 37-64, 37-64	11, 12, 16	37-64, 19-32, 39-64
23-32	11	39-64		
3-4	10, 12, 20, 27	5 8, 41-64, 11-16, 45-64	10, 12, 16, 27	41-64, 21-32, 43-64, 45 64
25-32	10	21-32		
13-16	10, 12	11-16, 45-64	10, 12	45 64, 23-32
27-32	10	23-32		
7-8	9, 10, 12, 27	47-64, 47-64, 3-4, 53 64	9, 12, 14, 27	3-4, 25-32, 51-64, 53-64
29-32	9	49-64		
15-16	9, 12	51-64, 53-64	9, 12	13-16, 27-32
31-32	9	53-64		
1	8, 12, 27	27-32, 57-64, 61-64	8, 12, 14, 27	55-64, 29-32, 59-64, 61-64

Metal Jaws for a Wood Vise

An old 12-in. file makes fine jaws for a wood vise. The file is heated and then allowed to cool in the air or in

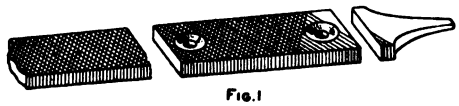


FIG. 1

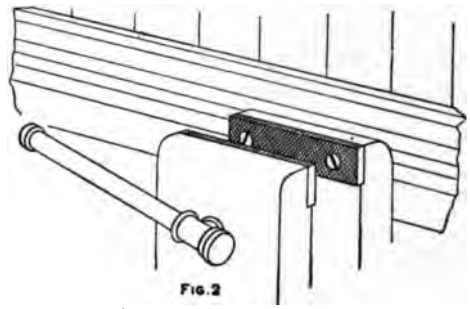


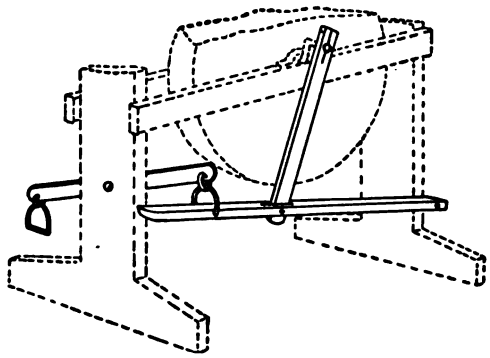
FIG. 2

Old File Used for Vise Jaws

lime. It is then cut and two holes drilled as shown in Fig. 1. Two pieces can be cut from one file. These are fastened to the jaws as shown in Fig 2.—Contributed by Clarence L. Orcutt, Buffalo, N. Y.

Attaching Pedals to a Grindstone

The grindstone I had was one of the old-fashioned kind having only one short crank. I wanted to use a double treadle, so I made the attachment as shown in the sketch. A seat was attached to the top of the front support.



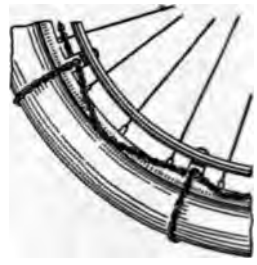
Two Pedals on One Crank

This is the way I saved changing the fittings, and it works to perfection.—Contributed by A. S. Thomas, Gordon, Ontario.

Motorcycle Anti-Skid Chains

For wet, slippery or snowy weather there is no better way to prevent skidding than to fit a chain to the rear wheel of a motorcycle, says Motorcycling. This almost eliminates the side slip, and the fitting of such a chain is easier than most riders imagine. A number of different chains which will serve the purpose may be purchased at any hardware store, and the cost is quite low, being about 4 cents a foot.

The accompanying sketch shows the method of fixing the chains on the wheel. Short lengths of chain are cut to go around the rim and tire and the ends fastened together. The number of these chains should be about 16 — twice the number of belt-rim lugs on the rim—and a chain should be firmly fastened to each lug. To prevent the chains from creeping, they are all fastened to another long chain extending around the inside of the rim. It is not a good method to fasten the chains to the spokes, for the wear soon loosens them. When putting on the chains which go around the tire it is best to let a little air out of the tire so when it is pumped up the chains will be held very tightly, in which condition they are less liable to cause trouble.



¶In overhauling an automobile, cover the fenders with newspapers or old rags to prevent scratching them. They make a handy place to lay tools and parts.

¶Brass should be annealed at a temperature between 600 deg. and 700 deg., in order to obtain the best combination of strength and ductility.



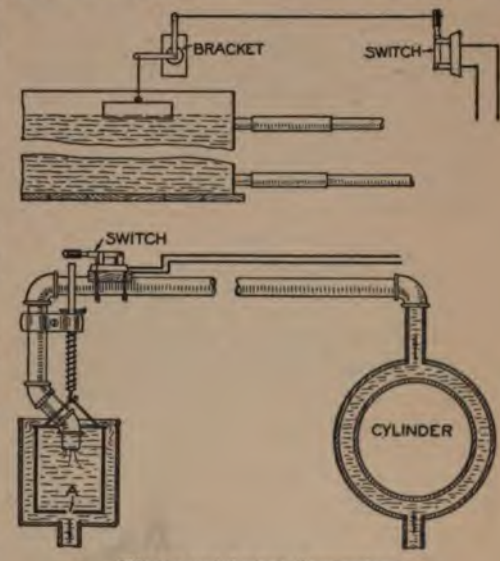
Safety Stop to Prevent Gasoline-Engine Cylinders Overheating

In the accompanying illustration are shown two ways of inserting a safety switch in the circuit of electric wires on the ignition system of a gasoline engine to prevent overheating, should the water for any reason fail to reach the cylinder.

On the thermo-siphon system of cooling, it is easily made, as it requires only an extra switch, a block of wood for a float, some wire and an L-shaped piece of metal. The first sketch shows how it makes a break in the circuit when the water falls below the required amount.

For engines using forced-feed circulation from a low water supply the safety switch can be installed as shown in the second sketch. This requires an extra switch, an old curtain-pole spring with the wooden rod in it, a sheet-metal clamp to hold the spring, and a small pail. A larger pail to receive the overflow from the small pail is connected to the return water pipe as shown. In the bottom of the small pail there is a hole, A, one-quarter the diameter of the outlet on the pipe. As long as there is plenty of water the small pail will overflow and hold the pail down, but when the water fails to run, the small hole will drain the pail, the spring will draw it up, and the small rod inside of the spring will make the break at the switch. A small nail driven in over the clamp will keep the pail from stopping the flow of water through the pipe below.

When adjusting the small pail upon installation, it should be filled with water and the hole in the bottom plugged until the right adjustment is reached. When starting the engine, pull the plunger rod in the spring to one side of the switch. The flexibility of the clamp will allow this to be done. —Contributed by J. P. Simons, Herrick, So. Dak.



Wiring and Switch Connections

Homemade Chair Bottoms

Chair bottoms can be made at home by anyone who can drive a nail straight. The following method was used by a suburbanite who could not take advantage of city conveniences or afford the prices. This chair bottom can be easily duplicated by persons similarly situated. The cost is small and the labor so slight that 15 min-

utes will be sufficient to complete the job.

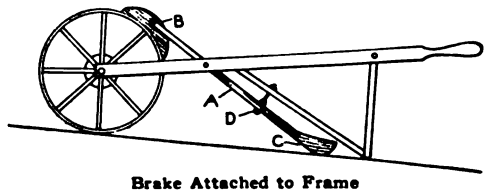
Scraps of the paper that was left from the roofing of his bungalow were utilized. These pieces were a very good grade of paper, which can be procured from a first-class dealer in lumber. The paper has the appearance of leather, is about the same thickness, and wears well. The paper can be bought by the roll or square foot, and a single square yard should be sufficient to make bottoms for several small chairs.

The paper is fastened with carpet tacks or brass-head upholstering tacks, the latter making a better appearance. Place the material under the bottom of the chair and mark with a pencil the size of the opening. Cut out the bottom with scissors or a sharp knife, 1 in. outside of the pencil line and tack it on the top of the chair frame. —Contributed by Della Yoe, Knoxville, Tenn.

A Wheelbarrow Brake

Pushing or rather holding a loaded wheelbarrow in going down an incline is very tiresome, and I made a brake as shown in the sketch that works exceedingly well. The brake consists of two pieces of channel iron, A, run between the handles of the wheelbarrow frame down to a trifle below the level of the supports on the handles. On the top of these channel irons I fastened a block of wood, B, by means of a single bolt. Another block, C, is placed at the bottom.

To prevent the brake from sliding on the ground when the handles were

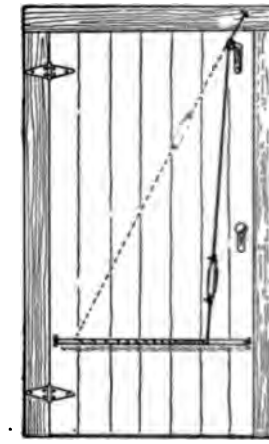


Brake Attached to Frame

lifted, an eyebolt, D, was placed in the brace to hold the channel-iron arm. When going down an incline with a load, it was only necessary to slightly lower the handles and the pressure on the block C would cause the brake block B to be held tightly against the wheel.—Contributed by J. N. Bagley, Superior, Neb.

Use for an Old Shade Roller

Many shed and storm doors are hung where it is almost impossible to attach a weight in the ordinary way without interfering with other doors or with people passing in or out. By using an old shade roller, as shown in the drawing, the weight can be put on the door itself, taking up no room, the roller keeping the weight in place.



Take an old shade roller and break off the stops or checks, leaving the roller, when the spring is wound up, to run its limit without stopping. Take the holders of the same roller and place them on the door about 1 ft. 6 in. from the bottom in a similar manner as when they were on the window. Then place the roller in the holders and drive a nail over the side with a slot in, to keep the roller from slipping out. Then take the end of the line (heavy twine will do) and tack it in the roller on the side nearest the hinges, and wind the line around the roller. In that way, when you pull the string, you wind up the spring, just as a curtain is wound around a roller, and when you release the string it winds up. After this is successfully tried, turn the spring around about ten times so that it is always strong, and tie the other end of the line to the weight.

The rest is simple. Put a small hook in the frame over the door; fasten the end of the string to this, pass the line

through the pulley, which is on the upper corner, down, and attach it to the other end of the weight.—Contributed by J. L. Brown, Jersey City, New Jersey.

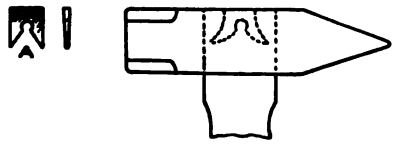
Care of Blowtorches

When extinguishing the flame of a gasoline blowtorch or fire pot, the valve should never be allowed to remain tightly closed. If it is closed tightly and left so, the hot valve body will contract as it cools on the needle, and this will cause the needle to slightly enlarge the hole through which the vapor issues, and the torch will fail to work so well.

To shut off the flame, the valve should either be nearly closed and the flame blown out, or else entirely closed and then slightly opened.—Contributed by Van Allen Lyman, Paynes Creek, Cal.

Wedge for a Hammer Handle

A common wedge in a hammer handle usually comes loose in time and causes considerable trouble to keep the hammer tightly on the handle. If the wedge can be kept in place, the hammer will not loosen on its handle. A simple wedge that will not come out is shown at A in the sketch. It is made



Shape of the Wedge

of soft steel. When driven into the hammer handle, the wood spreads the two prongs so that it is impossible to pull the wedge out.—Contributed by F. G. Marbach, Cleveland, O.

How to Stiffen the Backs of Saws

When cutting hard wood with a carpenter's saw I have had much trouble with the sudden bending of the saw, which would cause it to break or get out of line. Where there is no heavy work to be cut requiring the saw to pass entirely through it, the device described as follows will be found helpful.

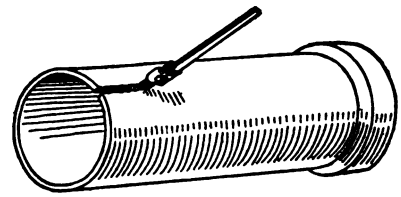


Metal on Saw Back

Secure a piece of stiff sheet metal, about 18 in. long and 1½ in. wide. Bend it to a narrow U-shape so it will fit over the back of the saw, as shown in the sketch. This will prevent the saw from bending, and the metal may be easily removed when desired.—Contributed by Wm. Grotzinger, Baltimore, Md.

Cutting Terra-Cotta Tile with a Pipe Wrench

An ordinary large pipe wrench makes a much better tool for cutting terra-cotta sewer tile than a chisel and



Wrench in a Cut

hammer. The wrench is less apt to break the tile where it is not wanted.

The manner of using the wrench is very similar to that of breaking glass away from a cut with a pair of pliers. The jaws are set to the thickness of the tile wall and short bits are broken away by leverage as the course of the cut is followed.—Contributed by L. H. Atwell, Atlanta, Ga.

¶Two mill files placed crosswise in a vise so as to form a V, make a good knife sharpener. The knife edge is drawn through the V-notch.

¶Cement work, consisting of 1 part cement and 3 parts sand, can be made waterproof after the work has set by applying as much kerosene oil to the surfaces as they will absorb.

[illegible]

[illegible]

... spring K K ... keep ... plate against the ...

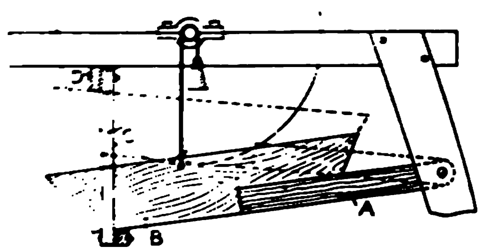
The dimension ... H H, Fig. 2, must be determined by the size of the wheels procured. The top of the shaft E must be turned to form a notch to slip into a ... cut in the plate G, which is 1¼ in. ... All bolts and studs are ⅜ ... Contributed by J. W. Verner, Rox-...

Removing Fence Posts

[illegible]

Wetting Attachment for a Grindstone

[illegible] ... thereby ... unevenly ... The sketch shows ... which is raised ... bring- ... the face ... the grinding ... are bolted ... the stand and ... the trough B, ... the support ... is fastened to the ... the shaft to ... A small ... the trough to



Swinging Water Trough

the stop D. When through grinding, raise the weight, and the trough will lower itself.—Contributed by John V. Loeffler, Evansville, Ind.

The Art of Stencil Making

By HOMER H. KNODLE

PART IV — Centerpiece and Panel Designs

A design that will fill the need of a dark effect where it is necessary to balance the scheme of treatment is shown in Fig. 30. It may be used for a panel by surrounding it with a border, either fancy or straight-line. If a line is used, it should be heavy enough to harmonize with the main part of the design. The torch should have the binders across to relieve the monotony of the heavy outline. It should not be made much larger than 2 ft., nor smaller than 1 ft., as the massiveness of the design necessitates large treatment. This design is susceptible of a variety of changes without altering the general outline. A slight change may be made by leaving narrow binders throughout the length of each bar crossing the darts.

A heavy effect, for a centerpiece, is shown in Fig. 31. The central oval may be attached to the balance of the design, if so desired, or it can be kept separate. In the former case, the oval should have a lighter treatment. The scrolls can be ornamented in any manner in harmony with the general style of the design, and the outer border may be varied in several ways. A large portion of the design should be left white so as to relieve the heavy outlines and give the desired contrast. This design can be made in almost any size, and only one-half need be cut out as the stencil can be reversed to finish the other half. It should not be made smaller than 30 in.

Another panel design that can be treated in various ways is shown in Fig. 32. It may be used as shown, or inclosed in a border of proper proportions, or it may serve for a combination border and panel by using the top portion as a border, inclosing it in a neat border, and the bottom part as a panel design, inclosing it also, but stenciling the bottom design only under every other motif of the top. This will give about the proper proportion and will be found to look very well. It will prove doubly effective if it is stenciled in a lighter tint of the body color, and trimmed with a contrasting color. This design also may be variously altered to produce original patterns.

A heavy centerpiece design that will be found especially adapted to use in conjunction with other designs in the decoration of Gothic buildings, is shown in Fig. 33. The leaves of the design are laid out on radial lines drawn with the aid of the 30 and 60-deg. triangles, used separately and together. The outside border may be given a variety of treatments and permits some delicate work.

The various panel designs can be changed by using different borders,



Fig. 30



Fig. 31



Fig. 32



Fig. 33

Centerpiece and Panel Designs

which, however, must harmonize with the design to produce the proper effect. Four such designs are shown in Figs. 34, 35, 36 and 37. That shown in Fig. 34 should be made from 1 to 2 in. high, or may be made as high as 4 in. and be used alone as a border. The one shown in Fig. 35 is very similar, but is not adapted to be used alone. It must not be cut larger than 2 in. Figure 36 shows a purely geometrical design which will stencil in conjunction with other designs along the same line. It should not be made much larger than 3 in. It is designed by crossing a perfect square with another perfect square at an angle of 45 deg. and using the perimeter thus formed for the outline. The design in Fig. 37 is useful only for its contrast. The diamonds are shaped with the 30 by 60-deg. triangle, and the squares drawn in to suit the designer. Diamond shapes may be substituted for the squares.

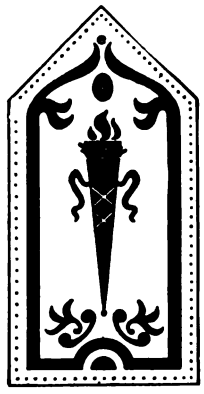


Fig. 38

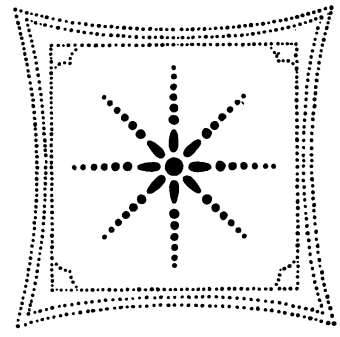


Fig. 39

Panel and Centerpiece

Another torch design adapted to a panel is shown in Fig. 38. A smaller design of a torch can be used with equally good results, and the design will look well also without the outside border.

A centerpiece, intended for light treatment or in small sizes in medium-heavy treatment, is shown in Fig. 39. This design can be made in any size needed, and is one of the most flexible motifs known. The center can be completely changed and the symmetry of the design still be maintained. The design is laid out mechanically and necessitates no free-hand work.

Throughout the work great care should be taken to preserve sufficient binders. The design should first be drawn full size, completely ignoring the binders, and first when this work is completed, the binders should be laid in and colored as previously described, starting at the center of the design and working outward. If a design contains 12 repetitions and one or more binders each, one of the binders in each design connecting like pieces are cut one after the other. This will prevent the maker cutting or forgetting a binder. The binders need not be any wider than ¼ in. Only one principle need be observed: to place the binders where they will be as short as possible.



Fig. 34



Fig. 35

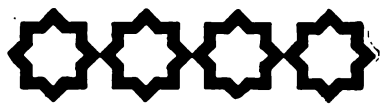


Fig. 36



Fig. 37

Borders for Panels

¶Oiling nails with common machine oil makes it easy to drive them into hard wood.

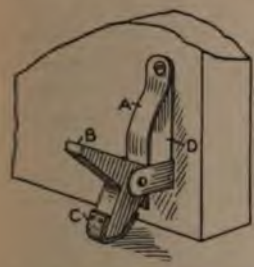
Ash for Cleaning Cooking Utensils

A good ash for this purpose can be made by burning rags coated with the following solution: Dissolve 2 lb. of coarse salt in 1 gal. of water and soak the rags in this solution. After drying the rags they are burned in the open air and the ash saved. To use, moisten a rag in water and sprinkle a little ash over it and scrub the utensil.

This ash with a little vinegar added also removes flyspecks from gas-lamp globes and all glass articles. It does not injure either the hands or the articles to be cleaned—Contributed by Loren Ward, Des Moines, Iowa.

A Door Holder

A door that is closed with a spring can be held open at any point with a stop as shown in the illustration. The stop can be thrown in or out of action with the foot.



The base D is a piece of sheet metal cut and bent to form a bearing for the L-shaped block of wood B. The spring A holds the block either up or down as it is set. A piece of rubber, C, is put on the wood for contact with the floor.—Contributed by C. R. Poole, Los Angeles, Cal.

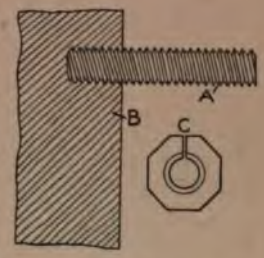
A Draftsman's Substitute Horn Center

Take an ordinary solid-head thumb tack and make a small depression exactly in the center of the head with a center punch. File the tack part until it is about 1-32 in. in diameter. This will prove valuable to the draftsman where a lot of circles are to be drawn from one center. It will not dull the compass points.—Contributed by Theo A. Oberhellman, St. Louis, Mo.



Removing a Threaded Stud

A threaded stud screwed solidly into metal is hard to remove without injuring the threads. Such a stud was in a flywheel of an automobile engine and I wanted to remove it without twisting the metal off or mashing the threads. The threaded stud A was very solid in the metal B. I used a split nut, C, clamped like the jaws of a vise over the threads, in turning the pin. The stud was thus easily removed and without injury to the threads.—Herbert A. Bartlett, Brockton, Mass.



A Belt Stick

The illustration shows a very handy device for placing belts on pulleys. The device is made of ½-in. iron in any suitable length. If it is to be used for very heavy belts, make it of ¾-in. iron, and the length will depend on the height of the pulley from the floor. Belts can be easily put on pulleys from 16 to 18 ft. from the floor. —Contributed by Lewis F. Enyeart, Marion, Ind.

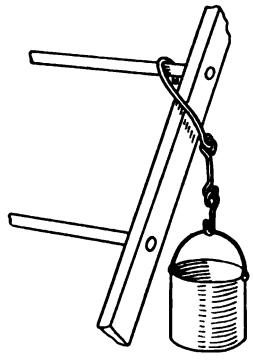


Coloring Iron or Steel Silver-White

Dissolve about 1 qt. of white-ash bark ashes in the cooling water, which must be soft. Heat the iron or steel to a good red and then plunge it into the solution to cool. The metal will be silver-white when removed.—Contributed by Irl R. Hicks, Hallsville, Mo.

Paint-Pot Hanger

The ordinary method of hanging a paint pot on the rung of a ladder makes it necessary to pass the brush between the rungs to reach the paint. A very handy way to hang a pot is to use a hook made up in sections, as shown in the sketch, and hang the pot over the side of the ladder. This will prevent dropping of paint on the rungs of the ladder, and also makes it accessible for the painter.—Contributed by Fred L. King, Islip, N. Y.



Emergency Belt for a Motorcycle

A little distance from home I broke the V-belt which drives my motorcycle. A new belt could not be secured and the old one was beyond repair. I tried a number of ideas, but to no avail. Finally I decided to take the clinch from an old automobile tire and use it as a belt. This belt carried me about 500 miles, and when I removed it to put on a new belt, it was in fine condition.—Contributed by J. N. Bagley, Superior, Neb.

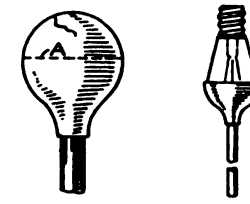
Increasing the Killing Power of a Small Rifle

A 22-caliber cartridge may be made to equal that of a larger-bore rifle in killing power by the following method. A long cartridge should be used. Split the lead from the point of the bullet almost to the edge of the shell. Flare the split slightly and place a small shot in the split as shown in the sketch. Use a shot about B-size. Close the lead over the shot with a pair of pliers so that it is held [illegible] The shot should project a little beyond the point of the bullet. In striking an object the shot is driven into the bullet by the impact, thus spreading the lead still more and increasing the killing power. Trim off the bullet after cutting it open and fastening the shot, so that it will fit the bore of the gun.—Contributed by John L. Waite, Cambridge, Mass.



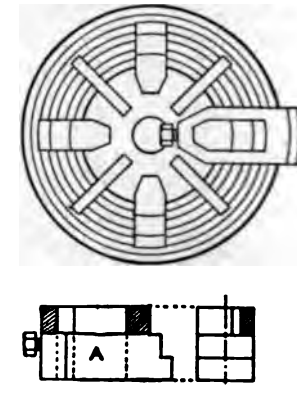
Long-Handle Electric-Globe Remover

A discarded automobile-horn bulb makes an efficient receptacle for replacing or removing electric-light globes in places too high to reach. The bulb is cut off on the line marked A in the sketch and the lower end is fastened to a long pole. The rubber will have sufficient hold to the glass bulb to allow it to be unscrewed from the socket. The use of the device is obvious.—Contributed by Morgan Hand, Jr., Ocean City, N. J.



Increasing the Size of a Lathe Chuck

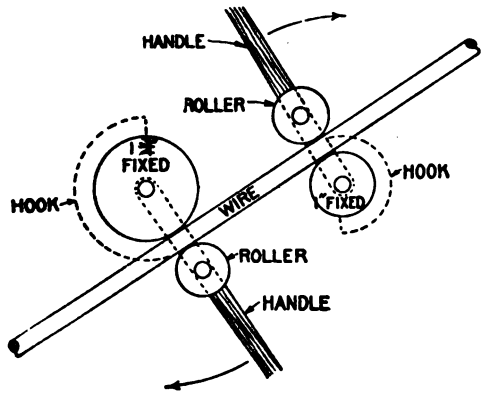
The attachment shown in the sketch is in use in a shop for the purpose of increasing the radius of an ordinary lathe chuck of small dimensions. The auxiliary jaws A slip over the regular jaws and are held in place by set-screws. The one shown is intended for holding piston rings or other hollow work that may be held from the inside. It is evident, however, that a modification of the same arrangement, having an over-



hang, may be applied, by which larger diameters may be chucked than would be possible with the regular chuck.

Making Hooks for Trolley Ropes

In making hooks for use in holding trolley ropes, instead of heating the wire and bending it over the horn of an anvil, a handy device used by a correspondent of Electric Traction Weekly makes the work easy and saves much time. This is shown in the sketch. It consists of two slightly grooved disks, respectively 1¾ in. and 1 in. in diameter, fixed to the base. Around the pins by which the disks are

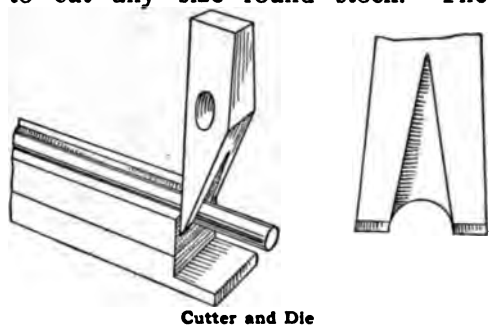


Levers to Bend the Wire

fastened to the base rotate two handles, to each of which, in the same plane as the disks, is attached a roller. The wire used, which is $\frac{5}{16}$-in. mild steel, cut to the proper length, is run between the fixed disks and the rollers, and by working the handles in the directions indicated in the illustration, the wire is bent into the desired shape.

Cutting the Ends of Round Stock

The base of the cutting tool is forged the same as a swage and capped with steel. An offset is formed to provide a cutting edge and a soft base for the chisel edge to strike when it cuts through the metal. The semicircle in the chisel edge should have a long slope filed so that it will extend upward on the sloping side of the chisel. The steel cap is rounded out to fit the round stock. A tool of this kind can be made to cut any size round stock. The



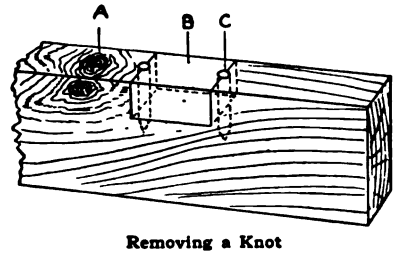
Cutter and Die

larger sizes should be cut hot. Both tools should be tempered, in the same manner as chisels.—Contributed by D. O. Wilkins, Hempstead, Tex.

Filling in the Place of a Knot

Sometimes, in using second-grade lumber for sluices, troughs and laundry tubs, a board will be sound except for a large loose knot that may happen to be on the edge. To cut the board at that point would be a waste of lumber, and to leave the knot in would present a bad appearance. The knot may be successfully removed as shown in the sketch. At A is shown a knot, and at B how the board will appear after the knot is cut out and a block put in its place.

The first thing to do is to mark around the knot, squaring a portion a little larger than the knot, then sawing on both end lines and carefully cutting the bottom out with a chisel. The chiseling can be better accom-



Removing a Knot

plished if several saw cuts are made through the knot. Fit a straight-grained block of the same material

tightly in the opening so that it will need driving in place. Bore a hole, deeper than the notch cut, at each end of the block and drive a pin, C, into each hole. Dress the surfaces with a plane. A knot in the center of a board can be fixed in the same manner with the exception that no pins are used.—Contributed by W. A. Lane, El Paso, Texas.

Method of Laying Out Angles in Degrees and Minutes

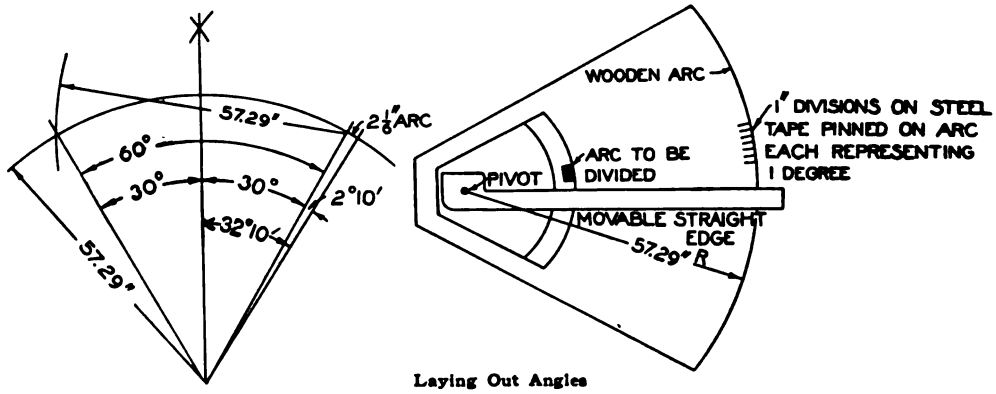
The following method for obtaining odd angles will be found very useful by patternmakers, machinists and those engaged in laying out bends for pipe lines, which are usually given in degrees and minutes.

Any angle can be obtained by the use of a trammel and pair of dividers, without any calculation, as follows: If an arc be drawn having a radius of 57.29 in., then 1 in. of the arc will subtend an angle of 1 deg., or in other words, if two points 1 in. apart be located on the circumference and a line be drawn from each point to the center, the angle between these lines will be 1 deg. It should be noted here that while this distance, to be absolutely correct, should be measured on the arc, for practical purposes the chord and arc for a distance of 1 in. may be considered equal. From the above it will be seen that an angle of 30 min. would have an arc ½ in. long; 15 min., ¼ in. long; 7½ min., ⅛ in. long, and 5 min.. 1/16 in. long. It will be seen also that 1/60 in. on the circumference represents 1 min., and where a scale is not available having divisions in multiples of 60, a scale with 64ths can be used, if the number of minutes is small. When taking 1/64 in. to represent 1 min., it will be seen that the error is 1 min. in 15. If, however, the arc be drawn with a radius of 53.71 in., 1 min. on the circumference will be subtended by 1/64 in., or in other words, every 1/64 in. of the circumference will represent an angle of exactly 1 min., and 1 in. will represent 1 deg. 4 min.

It may be of interest to know how the radius 57.29 in. is obtained, which is as follows: If we assume that 1 in. on the circumference is to represent 1 deg., then the whole circumference which contains 360 deg. will be 360 in. long. If we divide this by 3.1416, we obtain 114.58 in., which is the diameter of the circle, and one-half of this is 57.29 in., or the radius.

It is evident that the method outlined is not intended for laying out directly a very wide angle, but rather for finding the odd degrees and minutes after the approximate number of degrees has been found in some other way.

For example, suppose it is desired to lay out an angle of 32 deg. 10 min. First scribe the arc with a radius of 57.29 in., then with the same radius lay off a chord on the arc which will give 60 deg. Bisect this arc and each half will be 30 deg. From one end of the 30-deg. arc lay off a distance of



Laying Out Angles

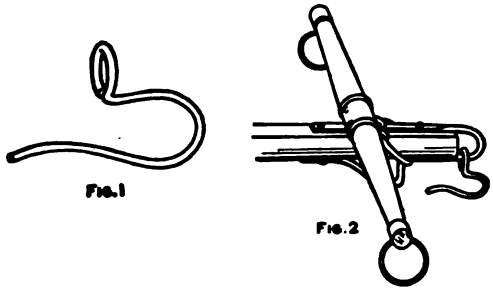
2 1/6 in., which added to 30 deg. will make the desired angle. This operation is shown in the first sketch.

If the angle is not required to be laid out very accurately, a radius of 28.64 in. can be used for the arc, then ½ in. of the circumference will represent 1 deg.; or with a radius of 14.32 in., 1 deg. will be subtended by ¼ in. on the circumference.

This method may be used for graduating arcs in degrees and fractions by sawing out an arc of the desired radius and pinning a steel tape on it as a scale. The arc to be graduated is fastened so that its center coincides with the center of the large arc. By means of a straightedge, pivoted at the center of the arcs, a very accurate division can be made. If a radius of 57.29 in. be used for the large arc, then with an ordinary steel tape the 1-in. divisions will represent degrees; the ½-in., 30 min., and the ¼-in. divisions, 15 min. The method of doing this is shown in the second sketch.—Contributed by C. A. Jackson, New York.

A Neckyoke Safety Hook

The purpose of the hook is to prevent the neckyoke from accidentally slipping off the tongue. It is made of a piece of round iron bar, about 12 in. long and bent into the shape shown in Fig. 1. The hook is fastened into the end of the iron on the tongue, as shown in Fig. 2. If, from any cause, the neckyoke should slip toward the

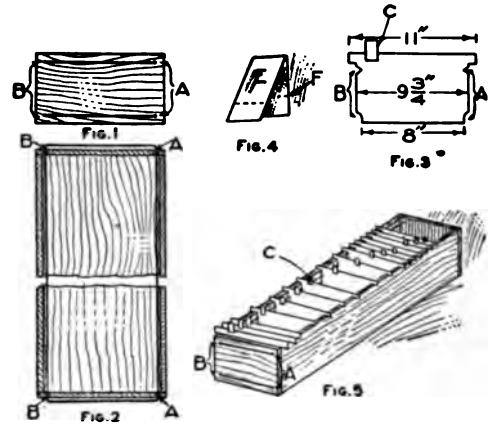


Hook on Tongue End

end of the tongue, the ring will catch in the hook and prevent the tongue from dropping down.

To Make a Check and Bill File

Take two cypress boards, 4 ft. long and 6 in. wide, one board, 4 ft. long and 10 in. wide, and two pieces, 11 by



Check and Bill File

6 in., all ½ in. thick. Out of these make an oblong box, and at each end bore four holes, about ¾ in. from the bottom and sides, as indicated at A and B in Fig. 1. Run picture wire through from one end to the other, A A, Fig. 2, then across the end and back from one end to the other, B B, and fasten the ends at the starting point. Cut 26 pieces of pasteboard, as in Fig. 3, with notches as shown at A and B. Cut some heavy paper into 3-in strips about ½ in. wide and fold as in Fig. 4. Paste at dotted line F to board, and letter cards. Then insert cards in box in alphabetical order. The notches and wire will keep the boards upright and thus prevent loss and mixing of checks and papers. —Contributed by Maurice Baudier, New Orleans, La.

Removing Old Paint or Varnish

The average person, when wanting to revarnish or paint some article, removes the old coating with sandpaper. This is a waste of time and labor, as old paint or varnish can be washed off much easier in the following manner:

Dissolve one-half cupful of washing

...da in a pint of warm water. Wet the stain with this solution, then ... Rinse with ... and let it dry thoroughly ... The method will ... paint from ... used by Katharine ... Issue of ...

Wood Pulley with Internal Setscrew

The drawing shows how I built a wood pulley which gave good satisfaction and cost but a trifle for materials.



Parts of a Wood Pulley

Cypress wood was selected because with it there is less danger of cracking. Four circular pieces were cut and placed together, with the grain of each piece at right angles to its neighbor ... to prevent warping. See Fig. 1.

Placing these in a vise I fastened them with two carriage bolts, and then bored the hole for the shaft (Fig. 2). The shaft hole was bored so as to secure a snug fit. A ¾-in. hole for the set screw was then bored between the two central sections until it met the shaft hole (Fig. 3). Withdrawing the bolts, I cut a square pocket, A, Fig. 4, across the setscrew channel in each of the central sections. The pockets were cut a short distance from the edge of the shaft opening. Cutting the head off a ⅜-in. bolt I filed a screwdriver slot in it. This bolt when finished should be a trifle shorter than the channel so that it will not project beyond the face of the pulley.

The square pockets mentioned above should be cut just large enough to allow the square nut to fit in them ... play.

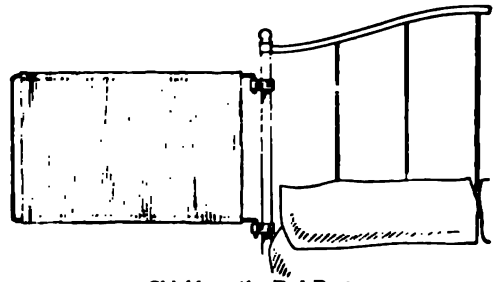
After placing the nut and bolt in the channel and pockets, I smeared the sections with white lead, inserted the two carriage bolts and added the remaining bolts as shown in Fig. 5.

As it was not advisable to screw the nuts and washers so tightly as to force them into the wood, I cut another piece of wood a trifle less in diameter than the other sections, Fig. 6, and bored holes in it to correspond with the bolts in the pulley. This piece was screwed to the pulley face to conceal the nuts and prevent them from tearing the belt, should it slip off on that side. This shield could be cut in half on the line AA, so that it could be removed without disturbing the pulley.

After filing a seat in the shaft for the setscrew, I placed the pulley in position and tightened the setscrew. I found that it held quite as well, if not better than a wedged pulley. If one setscrew is not deemed sufficient, more can be added in the same way.—Contributed by James M. Kane, Doylestown, Pa.

Draft Shield for a Bed

A screen for preventing drafts blowing across a sleeper's head, when a window is left open for fresh air, is shown in the sketch. The screen is attached to the bed post on hinges, so that it may swing in any position. This permits it to swing out of the way either when getting into bed or in case the sleeper gets up suddenly in the dark, in which case he might break



Shield on the Bed Post

an ordinary stationary screen or injure himself, if it were permanently attached.—Contributed by W. E. Morey, Chicago.

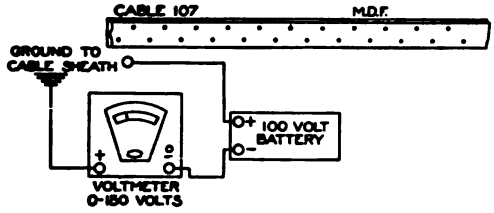
Tracing Down Telephone Troubles

By GEORGE M. PETERSON

PART II — TESTING

When a case of cable failure is reported, the galvanometer man is immediately called and he at once connects his voltmeter and battery on the cable and pairs which are in trouble, the connection being made as shown in the sketch, and care being taken to connect like poles together.

The first operation consists of connecting the voltmeter lead to a good ground, usually the cable armor, and touching each wire in the cable with the battery lead. This is the test for "grounds" and will show up grounded wires having anywhere from 2 volts to a "solid," or full voltage of the battery ground. A grounded wire with less than a 6-volt ground is fit to use, but is apt to be a bit noisy. If the voltmeter shows up several

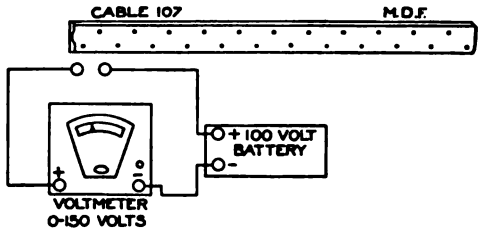


Voltmeter Test for Grounds

heavily grounded pairs, the trouble may be taken for a "ground" and a Wheatstone bridge or any of the various faultfinders is brought into action to obtain the exact location.

If the trouble happens to be "shorts" instead of grounds, the voltmeter is connected as shown and the leads touched to each side of a pair, taking the pairs straight through the cable and recording the voltage of each pair. If the full voltage of the battery is recorded, it shows a "dead" or "solid" short, and again the bridge is used to determine the actual location.

Crosses are also located with the voltmeter and battery by attaching one lead to the crossed wire until the wire with which it is crossed is picked up by the other voltmeter lead. If the battery has an E. M. F. of 100 volts and the crossed pair should register up to 140 volts, it shows that

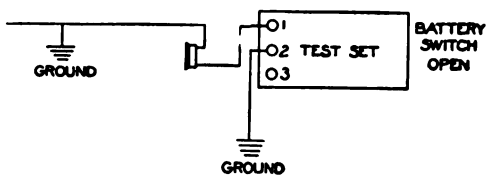


Voltmeter Test for Shorts

it is crossed with "battery," as the "common battery" system carries a voltage of 40. Often the voltage of a cross will be so high that the voltmeter needle leaves the dial completely. Then look out, as the cross may be with a high-potential circuit and great care must be exercised, not only to protect the instrument, but life as well.

The buzzer test set can also be used for testing out open crosses, shorts, etc. When testing for "grounds" with the outfit described in Part I, the circuit is arranged as shown for grounds. A heavy ground closes the relay through the receiver, but a light ground causes a faint click in the receiver alone.

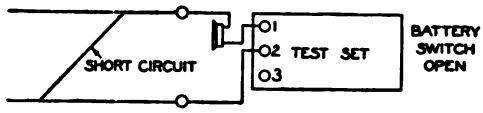
By putting a "ground" on certain wires at the farthest terminal box, one after another, and connecting test set as shown, the wires may be tested



Buzzer Test for Grounds

for continuity or "opens." A sharp click of the relay shows the wire to be continuous or closed, but the lack of any click in the receiver shows the wire to be open.

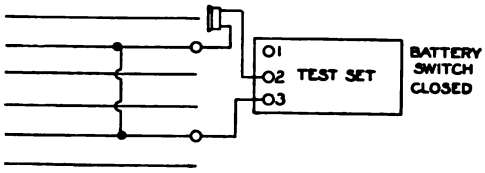
A "short-circuited" pair can be tested by arranging the set as shown for "shorts." The short circuit will cause the relay to close through the



Buzzer Test for Shorts

receiver. If the relay remains open, the pair is all right unless it is open.

In testing for crossed pairs in a working cable, the set must be con-



Buzzer Test for Crosses

nected as shown for "crosses," and test must be made from terminal. The cross will also make itself known by closing the relay through the receiver.

In an underground case, where tests show several heavy shorts and grounds, together with numerous crosses and opens, an experienced man would know that most likely the cause of the trouble was the cutting, or the breaking in two, of the cable. A solid ground on several pairs usually indicates that water has entered the cable through some poorly wiped sleeve, that electrolysis has eaten away the armor allowing the water to enter, or that some similar accident has happened.

In aerial cables the troubles are many and varied, the main trouble being from "burn outs" caused either from high-potential crosses with the cable itself, or from lightning. Then there are the mechanical damages caused by bullets, knife cuts, spur holes, etc.

(To be continued)

Heating a Shop with Engine-Jacket Water

In a small shop operated by a gas or gasoline engine considerable expense can be saved in winter by utilizing the cooling water from the engine for heating purposes, says a correspondent of Power. The method employed is shown in Fig. 1, where A is the jacket-water outlet pipe, and D the cooling-water return pipe. The pipes E and F are the circulating pipes connecting the engine with the regular cooling tank, and B and C, Fig. 2, are the heating coils. Valves are provided to control the flow in all of the pipes.

To secure the most efficient operation of the system, the coils and piping should be arranged as shown in Fig. 2, as this arrangement gives better circulation than when the coils are placed on the same level.

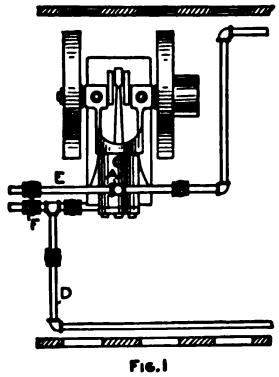


Fig. 1

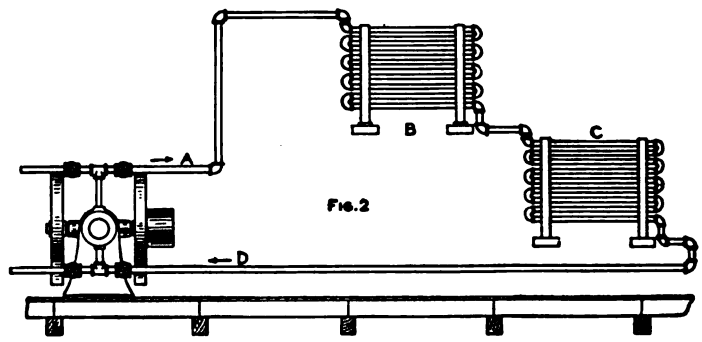


Fig. 2

Plan and Elevation of Piping System

If the volume of water passing through the heating coils be regulated by the valves in the supply and return pipes, the temperature of the room being heated may be varied to suit the weather conditions. It must be remembered, however, that when these valves are partially closed, the valves in the pipes E and F must be opened an equal amount to allow the engine to receive the required volume of cooling water.

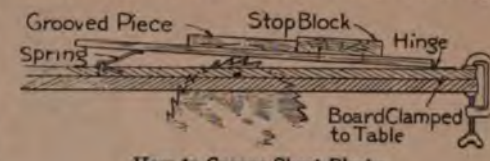
The amount of space that the system will heat depends, of course, upon the amount of cooling water passed through the engine jacket, and the power and efficiency of the engine. Under ordinary conditions, the quantity of heat carried away per hour by the cooling water is from 2,000 to 4,000 B. T. U. per brake horsepower. A fair average is 3,000 B. T. U. per brake horsepower and about one-half of this is available for heating. Multiplying this quantity (1,500) by the brake horsepower and dividing by the number of B. T. U. required per hour to heat 1 cu. ft. of free air from 20 to 75 deg. F. for ordinary climates (or from —25 to 75 deg. for cold climates) gives the number of cubic feet which the system will heat.

The number of B. T. U. required to heat 1 cu. ft. of air through the required number of degrees of temperature can be obtained from any standard book on heating and ventilation, and will vary somewhat with the construction and exposure of the building.

The heating coils should not be built haphazardly, but should be figured out beforehand by the use of some of the simple formulas found in books and catalogs on heating and plumbing.

Grooving Short Pieces on the Saw

The sketch shows how short blocks of wood may be grooved on the saw without danger of kicking back, thereby preventing accidents. The drawing will be understood at a glance by any woodworking mechanic, and the rigging can be made in 15 minutes. This method not only eliminates the possibility of injury to the operator's hands, but also makes it possible to do more work in the same time than by



How to Groove Short Blocks

the old way of dropping the pieces on the saw.—Contributed by Henry Zahn, Chicago.

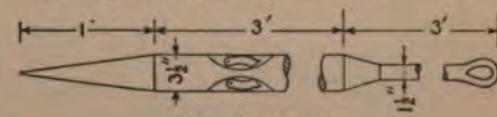
A String Cutter

The accompanying sketch shows a handy little string cutter for fastening to the edge of the counter. It is made of a thin piece of steel and the cutting edge A tempered and sharpened. The shape of the cutter forms a guard over the cutting edge and prevents anyone from being cut. It also allows the string to reach the cutting edge easily.—Contributed by Abner B. Shaw, N. Dartmouth, Mass.



Pipe Puller

A puller the right size to pull a 4-in. pipe must have the dimensions shown in the sketch. The main body is made of soft steel and the catches of tool steel tempered. The two catches are pivoted in notches milled in opposite sides of the main body in such a way that when the puller is lowered in the pipe, they will slip through, but, upon drawing the puller, the catches will



Puller for 4-In. Pipe

take hold on the pipe and pull it out. As many catches as are desired can be fastened to the puller.—Contributed by J. C. Talley, Rock Hill, S. C.

Mending Moving-Picture Films

A little device which gives the best results in repairing films, says a correspondent of the Moving Picture World, is made of steel, ¼ in. thick by ⅝ in.



Fig. 1 Fig. 2 Fig. 3

Hinge Clamp

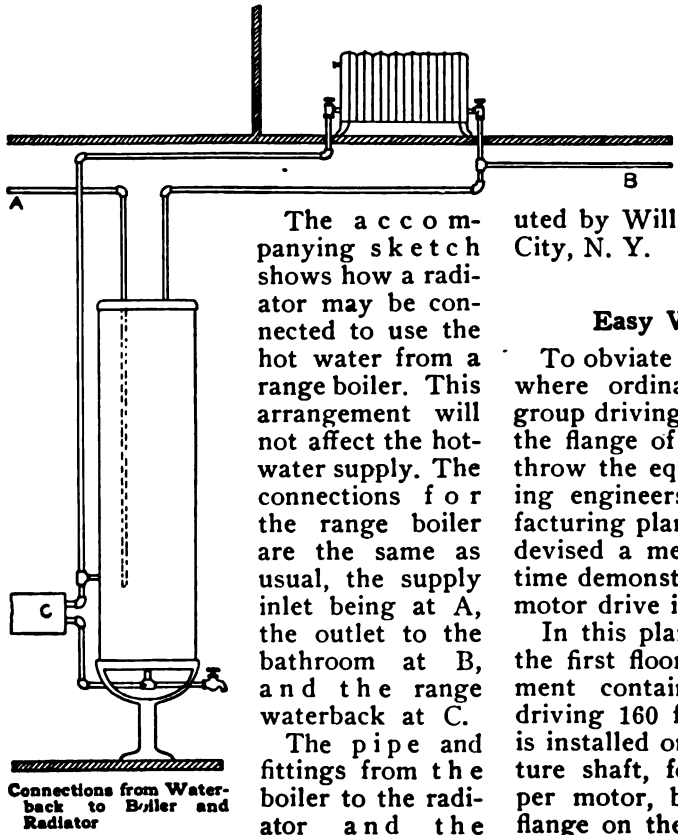
wide. Two pieces are hinged together as shown in Fig. 1. Small pins, the same shape as those on the sprocket of a moving-picture machine, are set in one half of the hinge, spaced the same distance apart as the two rows of perforations in the edges of the film. Two holes, A and B, are drilled in the other half hinge to receive the pins. This makes an effective press for the patch.

The ends of the film are prepared in the usual manner. The mend is made as shown in Fig. 2. This will not split the sprocket holes. If it is desired to split the holes, as in Fig. 3, then use more than one set of pins in the mending hinge.

¶A tool for cutting brass should have no top rake, but for cast iron it should have at least 5 deg. and for steel at least 15 deg. rake.

¶Small jugs, 1-qt. size, covered with crocheted wool make excellent hot-water bottles.

Connecting a Radiator to a Range Boiler



Connections from Waterback to Boiler and Radiator

The accompanying sketch shows how a radiator may be connected to use the hot water from a range boiler. This arrangement will not affect the hot-water supply. The connections for the range boiler are the same as usual, the supply inlet being at A, the outlet to the bathroom at B, and the range waterback at C.

The pipe and fittings from the boiler to the radiator and the waterback and return should be 1 or 1¼ in. The inlet pipe and the pipe supplying the bathroom can be the regular size for the boiler. The radiator will heat a good-sized room nicely.—Contributed by William Carroll, Long Island City, N. Y.

Easy Way to Shift Belts

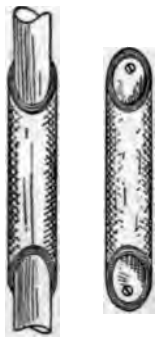
To obviate the tendency of the belts, where ordinary pulleys are used in group driving of machines, to slip over the flange of double pulleys and thus throw the equipment idle, the designing engineers of a big cotton-manufacturing plant at East Boston, Mass., devised a method which at the same time demonstrates the flexibility of the motor drive in special cases.

In this plant, according to Factory, the first floor of the spinning department contains forty 20-hp. motors driving 160 frames. A double pulley is installed on each end of each armature shaft, four frames being driven per motor, but instead of the usual flange on the double pulleys to separate the belts, the crowning on each

section is made ¼ in. off center, away from the middle of the pulley. By this means the belts are kept apart without any danger of their climbing the flange and being thrown off, and in addition, by centering these tight and loose pulleys on the frames with the highest point of the crown on the driving pulley, the belt can be shifted without throwing it off the motor pulley.

Broom Holder Made of Rubber Hose

A piece of rubber hose, 6 or 8 in. long, cut as shown in the sketch, and nailed or screwed to a wall, makes a handy broom holder. The hose should be tacked to the wall about 2 or 3 ft. from the floor, so that the broom handle can be pushed through from the top and rest on the floor. This holder is easily made and will give satisfaction.—Contributed by Irl R. Hicks, Hallsville, Mo.



Tamper Made of Pipe and Fittings

A very satisfactory tamper for earth can be made of a 1-in. pipe, fitted with a bushing and caps, as shown. The pipe should be about 5 ft. long. The



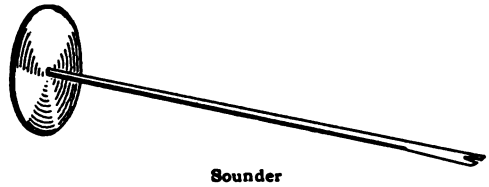
Tamper of Pipe and Fittings

bushing is used to secure a large tamping head.—Contributed by Earnest Boyce, Winterset, Iowa.

Boring-Tool Sounder

When boring on a lathe it is quite hard to determine whether or not the tool is cutting properly. The instrument shown in the sketch will tell with a remarkable degree of accuracy. The instrument is made of a piece of ⅛-in. drill rod, about 13 in. long, set in an elliptical piece of wood, 1⅛ in. long and ⅜ in. in diameter in the largest part. A small fork is formed on the end, as shown in the sketch.

In using the fork, place it on the bor-



Sounder

ing tool and place the wood knob close against the ear. If the tool is cutting a trifle out of the way, the vibrations will show it instantly.—Contributed by F. W. Shrier, New Haven, Conn.

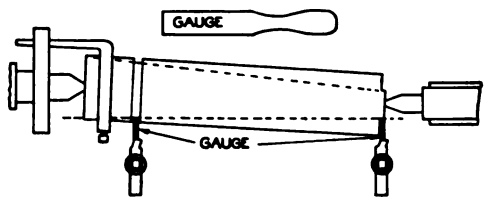
A Safety Lathe Dog

The construction of this lathe dog is apparent from the illustration, from which it will be seen that the setscrew is so protected as to avoid the familiar accident due to the lack of such protection. The setscrew can be adjusted by the ordinary type of wrench, and should it become burred or damaged, can be readily renewed by the use of a socket wrench inserted through the hole in the protection frame.



A Gauge for Setting Centers in Taper Turning

It is not always necessary to know the amount to set over a tailstock on a lathe in turning tapers. A very easy



Gauge Used in Setting Taper Stock

way to set the work in the centers to turn a taper is to use a gauge as shown in the sketch. The first requirements

are to turn a place to the right diameter at each end of the part to be tapered, then loosen the tailstock so that it can be easily moved. Set the gauge between the surface of the turned part and the cutting edge of the tool first at one end and then the other, without changing the crossfeed, but moving the carriage back and forth until the tailstock is set right to make it gauge the same in the cut at both ends. Set the clamp bolt on the tailstock and cut the taper.—Contributed by C. Gatter, Bridesburg, Pa.

Cutting Off Hollow Bored Cores

Cylindrical hollow steel bodies with bottoms can be made from the solid bar by boring out a core down to the inside of the bottom and using an undercutting tool to cut down to where the core may be broken off, as shown in Fig. 1. This method is applicable to all kinds of steel, says the American Machinist. It is especially advantageous, where valuable material is used, in saving the stock in the core, and, where the interior pressure is to be high, in simplifying the construction and reducing the cost.

The cutting-off tool for hollow core borings is shown in Fig. 2. Its construction is special. The body of the tool, A, is made of steel. A steel bolt is screwed into a milled eye and on this bolt a tool-holder, B, is pivoted, curved in conformity with the bore. The cutter C, of high-speed steel, is dovetailed into the holder. In the end of the holder there is a hole in which there are fastened two cords of very high-grade steel wire, with loose ends. The cords are led out through opposite eyelets in the tool body, parallel to its axis. The cord that is entirely visible in Fig. 2 serves to feed the cutter under. The smaller cord may be used to pull the cutter out of the undercut. The body of the tool is centered in the bore that has been made by four hardwood blocks, D, dovetailed into the periphery of the body.

The cutting off of the core is performed on the same machine that is used for the boring, Fig. 3. The cutting-off tool is attached in the same manner as the hollow boring tool, by means of threads on the hollow boring bar. The cord F, Fig. 3, used to feed in the cutting-off tool, is led over the pulley G, and wound on the drum I, which is driven by the feed rod H. For undercutting the core, the axial feed

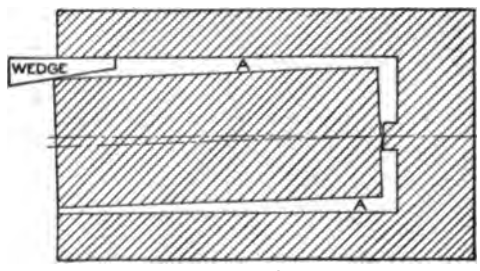


Fig. 1

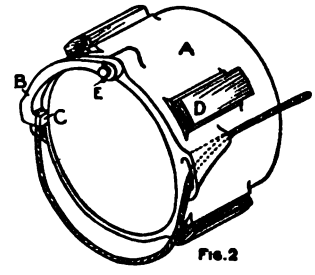


Fig. 2

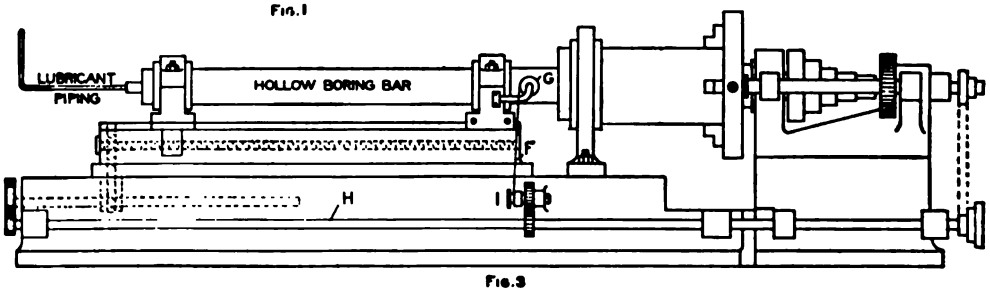


Fig. 3

Cutting-Off Tool and Its Position on a Lathe

of the hollow boring bar must, of course, be disconnected.

The cutting lubricant, composed of a mixture of water with a cutting oil soluble in water, is forced, under high pressure, through the boring bar, to wash away chips. It is of great importance to grind the cutter so that the chips do not roll off as long shavings, but break into small pieces.

Chip Magnet for Drill Holes

When drilling holes in parts that cannot be turned over, the little tool shown in the sketch cannot be excelled for removing the metal chips from the

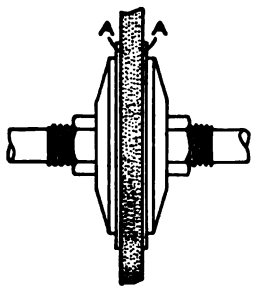


Small Rod Magnet

bottom of the holes. It is made of a piece of ⅛-in., or larger, drill rod. The rod has a slot cut in it, as shown; then the steel is magnetized by placing on an electric generator, or, by wrapping a coil of insulated wire around the head end and passing an electric current from a battery through the wire. —Contributed by J. F. Tholl, Ypsilanti, Mich.

Mounting Emery Wheels

A way to lessen the chances of an emery wheel breaking is to use two rubber washers, AA, between the sides of the wheel and the nuts. In case the wheel should break, the greater part of the fragments are prevented from flying. I have tried this only on wheels up to 6 in. in diameter. —Contributed by Chas. Hattenberger, Buffalo, N. Y.



¶Window sash can be made to run smooth in the grooves by applying a solution of paraffin in turpentine.

An Emergency Tire-Lacing Needle

A needle for lacing the casing of a double-tube tire can be easily made of a piece of medium-weight wire

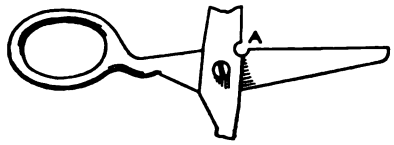


Needle of Twisted Wire

twisted as shown in the illustration. Such a needle is better than the ordinary steel needle as it can be bent to pass through the holes, and not being sharp, it is not so liable to puncture the inner tube.—Contributed by Paul H. Burkhart, Blue Island, Ill.

Wire-Cutting Notch in Shears

A small pair of pocket shears can be fixed to cut small wires by forming a notch in each blade, as shown at A in



Notch in Blades

the sketch. The notch does not interfere with the ordinary use of the shears.—Contributed by C. Irving Fisher, New York City.

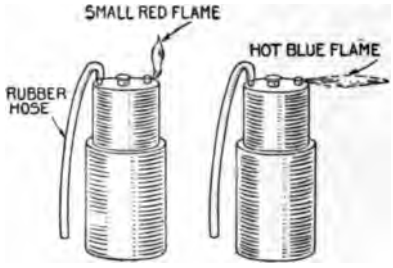
A Whitewash Mixture

Walls may be given a bright, clear, white coating with a whitewash made up as follows: 1 teacupful of salt, 1 teacupful of brown sugar and 2 oz. of powdered blue vitriol are separately dissolved in hot water and then added to 1 pailful of water-slaked lime. Stir the parts together thoroughly. This will make a whitewash that will not rub or peel off.

The vitriol gives a bright, clear color. If a yellow tint is desired, use green vitriol instead of blue. The mixture will have a green tint, but when it dries on the wall it will be a nice yellow.—Contributed by Frank J. Lilja, Indian Orchard, Mass.

A Gasoline Torch

An old discarded gas generator used on a motorcycle served the purpose well in making a gasoline torch, says a

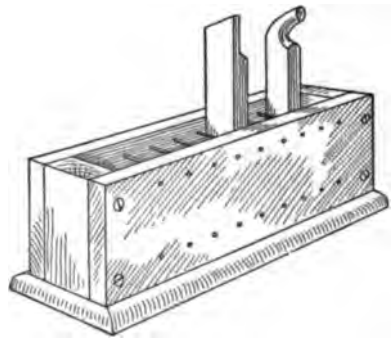


Connections to Tank

correspondent of Motor Cycling. I put a hose, 6 or 7 in. long, over the water pipe on top of the generator, and then lit the gas that escaped from the opening in the top. It burned with a small red flame. When blowing through the tube, it was changed into an intensely hot blue flame. This is a handy torch for a multitude of things where the ordinary gasoline blowtorch is generally used.

Stand for Lathe Tools

Lathe tools often become scattered, and even when they are laid in order, it is sometimes difficult to pick out the right one. To overcome this difficulty, the stand shown in the sketch was



Tools in Stand

made, in which the tools are kept upright and the points in plain sight. In addition to this, all the tools may be [illegible]. No dimensions are given, as each stand will have to be made for each particular set and size of lathe tools. The stand will be of more use for small lathe tools.

The stand is made by clamping two sides together and laying out the holes, which are spaced so that the distance between them will be about $\frac{1}{16}$ in. larger than the thickness of the lathe tools. The lines of the holes are about as far from the edge of the side pieces as the pieces are thick. Each hole in the bottom line is directly under the corresponding hole on the top line, so that when the tool is placed in the stand it will be held upright. The holes for the crosspieces, which are wire finishing nails, are drilled through one side but not quite through the other, and must be a shade smaller than the nails, or else the nails will work loose and fall out. If the nails fit too tightly, the wood will split when they are driven in.

The end pieces are cut $\frac{1}{8}$ in. wider than the largest tool and as long as the sides are wide. Small round-head screws are used to hold the sides to the ends. The base is $\frac{1}{4}$ or $\frac{3}{8}$ in. larger all around than the main body and is rounded or chamfered on the four top edges. It is fastened to the body by countersinking a screw through it into each end piece.—Contributed by Donald A. Price, Wilmington, Del.

Drilling Holes in Metal

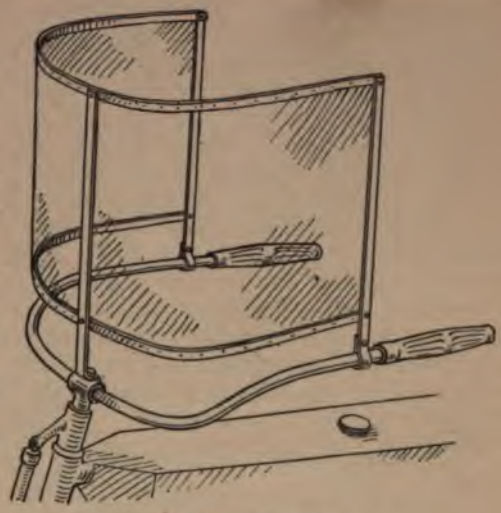
Starting a hole with a center-punch mark and drilling until the depression is gone, then using the punch again, is slow work on large holes and, besides, is not very accurate. I tried using a small drill and following with a larger one. Holes $\frac{1}{2}$ in. in diameter can be drilled through very heavy plate in this manner without any particular effort. Start the hole with a $\frac{1}{8}$-in. drill and follow with a $\frac{1}{4}$-in. drill. Holes can thus be drilled both quickly and accurately either by hand or on a makeshift drill press.—Contributed by C. W. Goddard, Bellaire, Mich.



Windshield on a Motorcycle

A good motorcycle windshield can be made by constructing a frame of copper strips, ⅛ in. thick and ½ in. wide, as shown in the sketch. The frame is fastened to the handlebars and covered with celluloid, the edges of which are attached with small bolts. In this operation care should be taken to keep the celluloid taut, and washers should be used on the bolt ends. The shield is easily adapted to the shape of any handlebar.

The shield may be made long and high enough to protect the greater part of the rider's body, but should not be so long as to interfere with the cooling of the engine.—Contributed by Harry C. Kelley, Pittsfield, Mass.



Shield on Handlebar

Humidifier for a Hot-Air Furnace

The chief difficulty in heating a house to summer temperature is to supply the proper amount of moisture. A room with humid air, at 65 deg., seems warmer than with dry air at 70 deg. In addition, the humid air is more healthful because more like the air of outdoors. Hot-air furnaces seem to dry all the moisture out of the heated air. To supply humidity the furnace is usually provided with a small pan, which, however, is not very effective, as it does not present sufficient evaporation surface to the air current within the furnace.

A practical scheme for moistening the air is to connect a water pipe as shown in Fig. 1. The vertical ¾-in. pipe is placed directly above the pan. The water flows out from the upper end A of the pipe, and runs down along the outside of the pipe, which presents a large surface to the current of hot air. The unevaporated water drips into the pan B, from which it is drained by the pipe D, leading to the cellar drain. By properly regulating the valve C, there will be very little overflow into the drain.

To find whether the air is being prop-

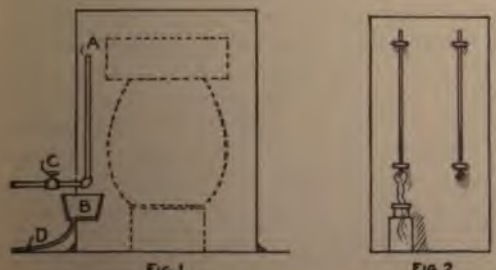


FIG. 1

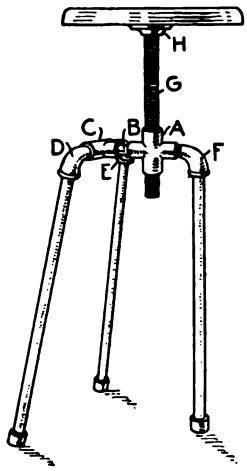
FIG. 2

Humidifier in the Furnace

erly humidified or not, a hygrometer must be used. A sufficiently accurate hygrometer can be made at home as shown in Fig. 2. Take two thermometers which register alike or nearly so, and mount them side by side on a board. Under one of them place a small bottle filled with water. Wrap a wick of cotton batting around the bulb of this thermometer and immerse the other end of the wick in the water. The two thermometers will register different temperatures if the air is dry. If it is moist, they will read alike. The greater the amount of moisture in the air, the less the difference in the readings. The reason is that the drier the air, the greater the amount of moisture that will be evaporated from the wick, and since the water must absorb heat to evaporate, the thermometer bulb is cooled, causing the wet thermometer to register a lower temperature than the dry.—Contributed by J. J. O'Brien, Buffalo, N. Y.

How to Make a Shop Stool

The central piece consists of a ⅜ by ½-in. reducing cross fitted on one end with a close nipple, B, which in turn is screwed into the side outlet of a ⅜-in. tee, C. Two ⅜-in. street els, D and E, are screwed into the end openings of the tee, and one into the cross. Three pieces of ⅜-in. pipe are cut about 2 ft. long, and a thread cut on both ends of each piece. One end is fitted with a cap, and the other end turned into the street els D, E and F. This completes the three-legged base of the stool.



The standard G of the seat is made of a piece of ½-in pipe about 1 ft. long. A long thread is cut on this pipe so that it can be secured into the ½-in. threads of the cross A. The upper end of the standard is fitted with a floor flange, H. The seat is a wooden disk turned to about 8 in. in diameter. The floor flange H is fastened with screws to the under side of the disk. All joints should be turned up tightly; and to make a more rigid stool, drill holes and place rivets through the parts.—Contributed by F. S. Moore, Los Angeles, Cal.

Coating Cistern Walls

A way to prepare a sanitary cistern is by painting it with two coats of "water glass" or glass paint. The painting insures the softness of the water, since no chemical action can take place between the walls and the water. It also keeps the cistern from leaking and prevents pollution of the main part of the cistern by surface or sub-surface water.

A good and cheap cistern may be made by simply plastering the dirt wall and floor of an excavation with a 1-in. coat of cement and painting it with the water glass. The water will then be soft from the start, as it is not necessary to allow the water to saturate the chemicals of the cement, before it will be kept soft in the cistern.

The water glass is absolutely harmless and can be purchased at any drug store and is a very cheap material to use for sanitary measures.—Contributed by Loren Ward, Des Moines, Iowa.

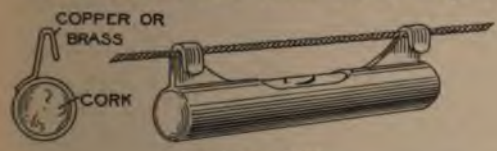
A Homemade Line Level

A very handy and convenient tool, known as a line level, is shown in the sketch. It can be made quickly and easily and only the spirit bubble glass need be bought. This level not only takes the place of an ordinary 12 or 16-ft. straightedge, but can also be used for rough-grading of sections up to 100 ft. in length.

Bubble glasses can be purchased in several sizes, the smallest being 1⅛

by ¼ in., and the next larger, 2 by ⅜ in. The latter size is the best to use for this purpose. A piece of copper or brass tubing, ⅜ in. inside diameter and 2½ in. long, is used for the barrel. An opening, 1 in. long, is filed in the center of the tube for observing the bubble in the glass. Two copper or brass hooks are soldered on the ends of the barrel as shown, great care being taken to have the hooks exactly the same height. A piece of white paper is then fastened on the under side of the glass firmly secured to it with narrow strips of gummed paper at each end. After inserting the glass in the tube a little wad of cotton or tissue paper is put into each end, and corks, previously dipped in shellac, are pushed in as far as possible. The corks are then cut off flush with the ends of the tube and covered with shellac.

To test the line level a line is put



Level on a Line

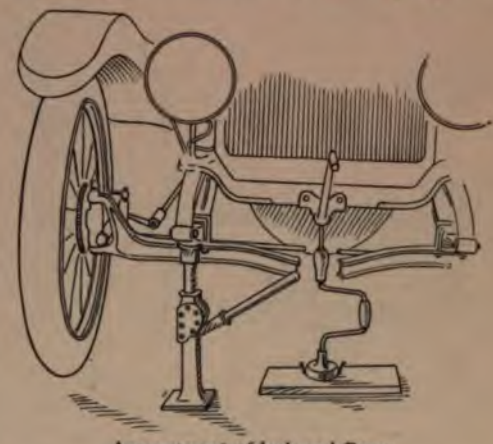
up and leveled. The level is then reversed, end for end, and when the bubble rests in exactly the same position either way, the instrument is ready for use.

Drilling an Automobile Crankshaft by Hand

The crankshaft pin, engaging with the dog of the starting crank of a four-cylinder automobile, sheared off and had to be drilled out in order to put in a new pin. The position of the front axle prevented the use of a breast drill, and the radiator hindered working from above.

The car was jacked up and a carpenter's brace, with the proper drill, was set below with the handle fastened by driving nails into a board under it. The car was gradually lowered, its own weight being the "feed," and in a short time the hole was drilled.

Thus all the trouble of removing the radiator, etc., was avoided, and what at first seemed a hard proposition, was easily accomplished. A ratchet brace was used, as the axle and tierod were in the way. This method could be easily used instead of a chain drill for many jobs around the shop. —Contributed by Odin Dorr, Bala, Pa.

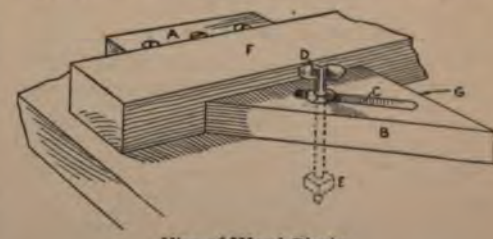


Arrangement of Jack and Brace

Bench Vise for Light Work

A bench vise for light work can be made of two blocks of wood and a bolt. The block A is fastened to the bench with screws. The block B being triangular has a slot, C, cut parallel to the long side. The bolt head is forged into a thumbnut, D, and the bolt inserted through the slot and bench top, and screwed into a nut beneath.

The work F is placed between the blocks, and the triangular piece B is tightened like a wedge by driving with

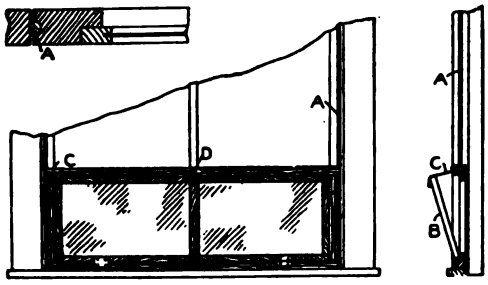


Vise of Wood Blocks

light blows of a hammer, on the edge G.—Contributed by James E. Noble, Toronto, Ont.

A Window Ventilator

The perplexing problem of ventilating a room on a windy night without causing a violent draft and yet have



Ventilator in Window

fresh air, caused me to construct the ventilator shown in the sketch. A frame, about 1 ft. high, was made to receive a lighter frame, B, containing two panes of ordinary window glass, and fitting in the same slides A on the window frame as were used for the screens in the summer. The light frame is fastened with two hinges at the bottom to allow it to open inwardly, so that, when the lower window is raised, fresh air can be admitted without a draft.

Pieces of leather, C, are fastened at either end of the frame A, and on the window B, to allow this to open about 3 or 4 in. A small wooden button, D, is used to hold the window closed. The whole frame can be removed to another window of the same width when desired.—Contributed by C. D. Maxson, Westerly, R. I.

Turning Dowels

As I had occasion to use a large number of small dowels and had nothing but a small lathe to turn them on, it was quite a problem how to do the job easily and quickly, until I worked out the little device shown in the sketch. I drilled a hole of the right size for the dowel in a piece of steel and then, with a cold chisel, cut some teeth in the edge of the hole on one side. After the teeth



were cut, a drill was run through again to remove the burrs. This, used in connection with the lathe, made an excellent cutter for dowels.

Pieces of wood were planed out and held in the chuck of the lathe and the tool run on the wood while it was turning.—Contributed by J. H. Beebe, Rochester, N. Y.

Soldering Metal Fixtures to Lead Pipe

A cone-shaped piece of strong asbestos sheathing fastened on a piece of copper, iron or brass tubing, as shown in Fig. 1, allows enough solder to be built up around the point where the two pieces of tubing are to be joined, to assume the shape shown in Fig. 2. This mass of solder can be filed or rasped into the form shown in Fig. 3.

Besides being a reinforcement, this joint is more uniform in shape and thickness than the joint ordinarily made with the soldering iron. Instead

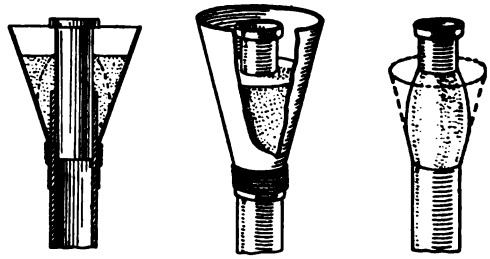


Fig. 1 Fig 2 Fig 3

Cone on the Pipe

of the soldering iron, a blowtorch can be used, the joint first being tinned and then pieces of melted solder dropped into the asbestos cone and heated to the requisite degree for forming a joint.

Preserving an Oilstone

Some time ago I wrapped my oilstone in a piece of cotton cloth after having used it and upon unwrapping it the next time discovered that the stone was perfectly clean. Since then I have always kept it rolled up when not in use. The cloth seems to ab-

sorb the oil and remove the particles of steel. The stone is always keen and never gums up, notwithstanding it is used by everyone in the shop, and with all kinds of oil.—Contributed by Fred N. Parks, Norwich, N. Y.

Repairing a Broken Spring

Springs broken as shown in the sketch can be very easily repaired by bending a piece of round iron of the same size as the spring wire into a U-shaped eye and applying it as shown.

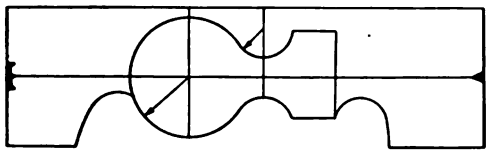


Clip on Spring End

A spring repaired in this manner will be found as good as new.—Contributed by G. H. Holter, Jasper, Minn.

Wood Turning without a Template

When turning work for which a template is necessary, the following method will prove quite accurate, and the work is quickly accomplished. Turn the work cylindrical to the largest diameter of the pattern. While the piece is turning, use the dividers to lay off the centerlines. Take the piece out of the lathe and lay out the outline on the parting of the lower half,



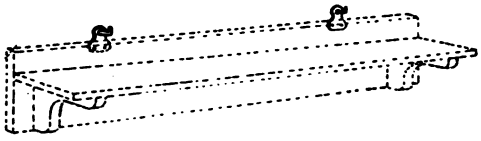
Form of Wood

as shown in the sketch, with the crowfoot center at the left. Cut the wood on the jig or band saw accurately on the line drawn. Fasten the halves together and place them in the lathe. If the job is one that is not parted, the pieces may be glued. In finishing the piece, turn the wood down on the line sawn.—Contributed by W. C. Conway, Eddystone, Pa.

¶ **Never work over open running gears without buttoning the blouse.**

Hanging a Shelf

The lugs taken from a discarded tin pail are worth keeping. They can be

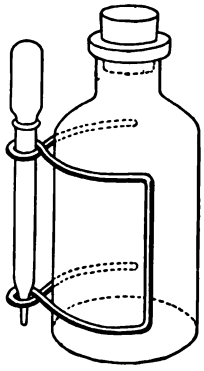


Pail Ears on the Shelf

used to hang shelves, small medicine closets, etc. The lugs are easily fastened to the wood with screws.

Bottle Clip for a Medicine Dropper

The accompanying illustration shows a medicine-bottle clip for holding the dropper or pipette. Anyone can make the clip of a piece of wire by bending it to fit the size and shape of the bottle as shown. Two loops are formed in the wire, the one at the top being large enough to receive any pipette loosely, while the lower loop holds and supports the tip. The pipette can thus be easily removed and replaced.



Extension Shank of a Twist Drill

Procure a piece of round stock, a little larger than the drill shank, and drill a hole in one end, about ½ in. deep. File a ½-in. slot, A, to the center, with its edge even with the bottom of the hole. File the shank of the drill B flat for about ½ in. When

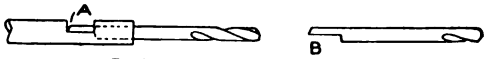


Fig. 1 Fig. 2

Drill Shank Extension

the drill is inserted, the two flat surfaces will prevent it from turning.—Contributed by I. W. Verner, Roxbury, Massachusetts.

Portable Automobile Crane

A crane for use in a garage can be easily constructed of scrap material picked up about the shop. It is made principally of gas pipe and angle iron.



Crane of Scrap Material

The base is 5 ft. long, 3 ft. wide at one end and 18 in. at the other. It is built of 4 pieces of ½ by 3-in. iron bars. The upright post is a 3-in. gas pipe, 6½ ft. long, set in a collar fastened to a cross plate of ½ by 6-in. metal.

The narrow end of the bed has a V-shaped brace made of 1½-in. angle iron. The 3-in. tee on the top of the upright is bored out to fit the arm of the crane, which is also a 3-in. gas pipe. A 1¼-in. shaft constitutes the drum, which is passed through bearings in the V-shaped angle-iron brace and on the upright. A crank and ratchet is attached to the outer end to facilitate the hoisting.

Two straps of metal, each ¼ by 4 in., are shaped similar to a horseshoe and placed over the top of the crane arm, one at the end, and the other central between the upright post and the end brace. A pulley is placed between the ends of these straps, and a hole cut on the under side of the pipe to allow the chain to enter the pipe.

Such a crane will easily lift one end of an automobile and is very handy for removing the power plant or transmission to make necessary repairs.—Contributed by J. C. Turner, Franklin, Kentucky.

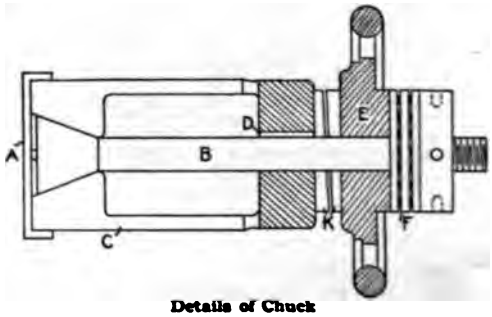
Expansion Chuck for Automatic Buffing Machines

The chuck shown in the accompanying sketch was devised by a correspondent of American Machinist to hold work securely in an automatic buffing machine to increase its output.

The central expander post, B, has no end motion, the angle on the expander end being made fairly steep, so that the expanding sleeve C, which is a sliding fit on B, will release itself as soon as unlocked. The lever D turns the ring C with the post B, which is an extension of the machine spindle proper.

The locking ring E is the principal feature of the chuck. This ring, with a handwheel attached, or made integral, as preferred, is made with two cam pieces, K, directly opposite each other. The locking ring is a running fit on the expander B. The ball thrust bearing F takes the thrust.

The operation of the chuck is simplicity itself. As the buffing spindle revolves, the operator grasps the handwheel on the locking ring E for an instant; this either releases or engages the cam K with the expanding sleeve C, causing it either to contract or expand, as required. In making different chucks for various sizes of work, it is necessary to make only one new piece, namely, the expanding sleeve C. After its first in[illegible] the cost of maintenance is [illegible]



Details of Chuck

The Use of Stencils for Interior Decoration

By HOMER H. KNODLE

Part I—Preparing the Room

The first problem that confronts the decorator or maker of stencils when he comes to use them, is the preparation of the walls of the room.

The coating of color is applied in the usual manner and lines along which the different shades of the wainscoting, wall and ceiling meet are rough and ragged. The dividing line between the ceiling and the wall is usually covered with a picture molding, and that between the wainscoting and the wall, by an ornamental border or chair rail. Sometimes only a plain band, about ½ or 1 in. in width, is used with good effect.

The stencils must be in good order and, if used before, should be thoroughly cleaned so that none of the color used on a previous job remains on them to mix with the new color to be used.

In the preparation of colors, the usual practice is to make a darker tint of the wall color for the border, where a dark shade is used on the ceiling. If the ceiling is light, a lighter tint of the wall color is used. In mixing stencil color, add enough lampblack to the wall color to obtain the desired tint. Above all, mix the colors thoroughly, and be sure to prepare a sufficient quantity for the whole job in one mixing, as a second mixing will never prove the same tint as the first. Only one color at a time can be used in stenciling. If two colors seem desirable, shade the stencil design with the selected second color. Two-color work requires two sets of stencils cut so accurately that the design will register, and even then, if they are not placed correctly, the finished design will be rather unsatisfactory.

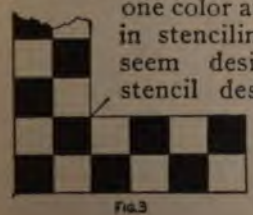


FIG.3

Before beginning to stencil, it is necessary to lay out the guide lines accurately in order to obtain the best result. Measure the vertical dimensions accurately with a yard stick from the floor upward, and make distinct marks that can be readily found. When this is done, take a chalkline, chalk it thoroughly, and draw it taut against the wall, then let someone "snap" it by pulling it from the wall at the middle and then suddenly releasing it. This will produce a perfectly straight line. Make these lines on all vertical measurements. In laying out the ceiling, measure from the edge, again using the chalkline.

After the lines are all laid out, measure them and see if the stencil will match properly. If this cannot be accomplished, make the junction of the design in the corner, where it will not be readily seen. This is shown in the illustration. A matched stencil in a corner is shown in Fig. 1, and one that is not matched, in Fig. 2. No

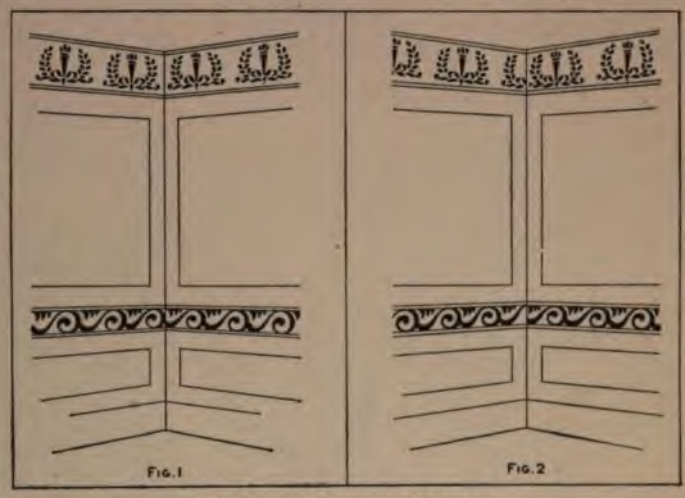


FIG.1 FIG.2

Matched and Unmatched Corners

effort should be made to patch up the work, as this would only make the junction more noticeable.

If no cornerpieces are used on a ceiling panel, the corners must be matched



FIG. 4
Holding the Stencil

as shown in Fig. 3. A line is drawn at the corner of the ceiling at an angle of 45 deg., to show where to stop the color. If this is followed closely, it will give a neat joint.

Still greater care must be exercised when oil colors are used, as they are of a permanent character, and it is difficult to change the colors if a mistake is made. Only the best quality of oil colors should be used. They are always mixed with boiled linseed oil, to which sufficient turpentine has been added to produce a flat color. A good mixture is made of half oil and half turpentine.

Very little color should be used on the brush. The color is stuck on the wall through the perforations with short strokes of the brush. The method of holding the stencil to the wall while painting the design is shown in Fig. 4.

Water colors are used in the same manner, the only difference being in the mixing. The color should be mixed very thick. Some decorators use them mixed to the consistency of a thin wax, and stipple the design on the wall. If a standard color is used in water-color work, it is not so important that a large amount be mixed, as the shade can be duplicated by buying it from the same manufacturer. Homemade water colors are not so reliable and it will pay to purchase colors that are guaranteed.

When stenciling with calcimine, it will be necessary to coat the stencil in order to protect it from the chemical action of the liquid. Coat the stencil sheet on both sides with orange shellac, taking care to cover the edges. If a used stencil of the right pattern is at hand, another can be made by stenciling the pattern on another piece of stencil board and cutting it out.

(*To be continued*)

Strike-Off Tool for Cement Workers

A tool for striking off the surface of cement in sidewalk construction is very important. Such a tool can be made by any blacksmith. The illustration



Angle-Iron Strike-Off Tool

shows a tool which was designed by a correspondent of the Cement World. It is simply a piece of 1½-in. angle iron, 6 in. or more longer than the width of the sidewalk on which it is to be used, with a large handle on each end. The handles are of ¾-in. round iron, with ends flattened and riveted to the inside of the angle.

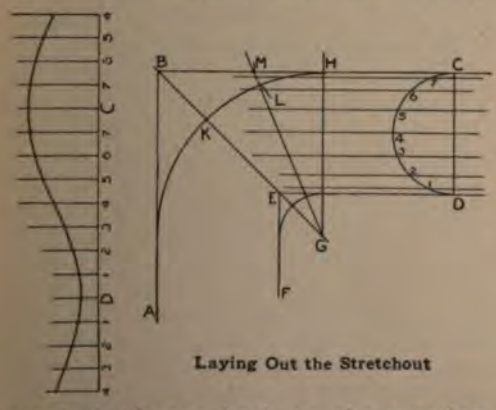
To use the strike-off tool, a workman at each end grasps it by the handle, each handle being convenient for holding with two hands, and the surface of the top coat is cut off neat and clean with a sort of sawing motion. Each man in turn pushes his end slightly forward so as to keep the surplus material on the walk ahead of them. When this accumulates, it may be removed with a shovel. If a little care and judgment are used in the striking-off process, it saves a large part of the work of finishing and greatly improves the quality of the work.

¶A large tool should never be hardened in a small bath, as this will result in uneven hardness.

Pattern for a Three-Piece Elbow

Draw lines ABC and DEF, the distance between these lines being equal to the diameter of the elbow, and find a point G on the line BE extended, so that EG equals one-half the diameter of the elbow. With G as center, scribe two arcs of a circle each one being tangent to the lines AB and BC; DE and EF, respectively. Space off one-half the distance from H to K at L, and draw the line MG. Draw a semicircle, CD, and divide it into as many equal parts as suitable for the size of pipe. Then draw the horizontal lines on the divisions, and lay out the stretchout as shown.

As the seam is to be on the side of this elbow, begin to determine the points of the curved line by setting off at the end (4) of the stretchout a distance equal to that part of the middle horizontal, or line marked 4, which lies between the lines HG and MG. Proceeding downward on the stretchout, next set off the corresponding part of horizontal line 5 on the line marked 5 in the stretchout, and so on, until the line BC is reached. Now return and set off the proper distances of the horizontal lines on the lines in the stretchout marked with the corresponding numbers, until line DE is



Laying Out the Stretchout

reached, thence back to the starting point or central line 4. By joining all the points thus determined on the stretchout, the line to which the flat sheet iron should be cut is found.

It is scarcely necessary to state that the lines on the stretchout should be stepped off the same distance apart as the divisions between C and D on the semicircle.—Contributed by S. C. Shipman, St. Petersburg, Fla.

Motorcyclist's Headgear for Cold Weather

Several kinds of caps and face protectors were tried out by a correspondent of Motorcycling and none found



Face Protector of Chamois

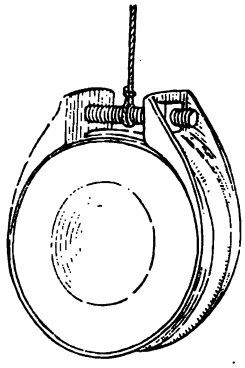
as good as that shown in the sketch. It is made of four pieces of chamois skin, which were stitched together as shown, to make one of the seams come in the center of the face and another back of the head. Two holes were cut for the eyes and one for the mouth. The hood should be long enough to come down over the neck and inside the coat or sweater. The headgear is worn under a riding cap or knitted toboggan cap.

Tapping Composition-Rubber Bushings

At one time I had a large quantity of composition-rubber bushings to tap, such as used for insulating purposes on electrical connecting cords. After breaking a good many, I tried soaking them in hot water until they were soft, and then tapped them without any loss.

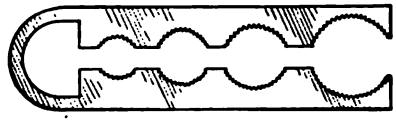
Billiard Chalk Holder

A very serviceable billiard chalk holder can be made of hose clamps, as shown in the sketch, by using a piece of wire as a connection between the holder and the cord. The cord may be tied directly to the bolt. If small clamps cannot be obtained, a little friction tape can be wrapped around the chalk before it is inserted in the holder.



Pipe Jaws for an Ordinary Vise

The average mechanic cannot resist the temptation to hold a pipe in an ordinary vise when no pipe vise is at hand. The pipe will be dented or crushed, if the jaws are closed too tightly. This may be prevented by using a pipe jaw especially made for the ordinary vise. The jaw is made by drilling a number of holes to fit the different sizes of pipe in a piece of flat steel, and notching their edges. A slot is cut lengthwise of the piece through the holes and one end cut out to form a spring. When this pipe jaw is slipped over the pipe and clamped in



Pipe Jaws

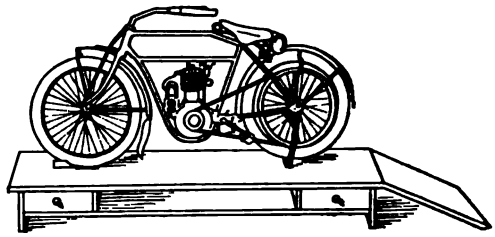
a vise, an equal pressure is distributed around the pipe. The teeth will prevent the pipe from turning.

Plumbing Tall Work

Sometimes it is necessary to plumb high and heavy work and have it quite accurate. The usual way is to attach the plumb-bob line to the object as it is raised. This means that somebody has to climb up and release the line. A much easier way is to place the plumb-bob line on some object about on a level with a person's head at a distance, and sight along the line and the object to be plumbed. It can thus be readily determined which way to move the object in order that it may be in line.

Motorcycle Repair Bench

The object of the bench shown in the sketch is to get the motorcycle well off the floor, so that the repairman can work without too much stooping. The bench is about 15 in. high. A drawer is provided at each end for special motorcycle tools, parts, etc. These drawers slide both ways, giving access from either side of the stand. The central space is spanned



Motorcycle on Bench

by an open shelf which is very convenient. Such benches are usually nailed to the floor, and the inclined board is permanently fastened in its position.—Contributed by Donald H. Johnston, Collins, O.

Covering Ignition Wires

High-tension cables and other insulated wiring of automobiles become short-circuited with oil after they have been in use for some time, causing the current to jump through the insulation instead of jumping across the gaps in the spark plugs. This is very annoying as spark plugs will work very well when they are out of the cylinders, but will not spark under compression. This trouble can be remedied by covering the cables with old or new rubber hose, either of which is much cheaper than new cables.

A Homemade Brass Furnace

Brass casting has been accomplished for more than 25 centuries, yet in all that time the crucible brass furnace has changed but little. The simplicity of the method seems to have made it difficult to improve upon, although of course there have been many changes in the details of construction and in the fuel used.

There is hardly an iron foundry today that does not devote some of its floor space to making brass castings, and there are numbers of foundries casting brass only, or perhaps brass and aluminum. A correspondent of Southern Machinery had occasion to install a double furnace, as shown in Fig. 1. For various reasons—chiefly, however, to test some theories of his own—he decided to build the furnace himself. He secured a furnace giving excellent satisfaction.

The furnace was made as follows:

A single furnace, Fig. 2, can be taken as the example, the only difference being in the size of the main chimney. All that is necessary in the way of patterns is the bottom plate and the grate, which most foundries will have in stock. It should be mentioned that these are natural-draft furnaces. The inside dimensions are 16 in. in diameter by 30 in. deep. The flue opening is in the side, about 2 in. below the top of the furnace wall. In this instance the flue was made rectangular, 6 in. deep and 8 in. wide. This gave a depth for the fire and crucible of 22 in. below the flue. The top and bottom plates were made from the same pattern, the only difference being the lugs on the bottom plates for hinging the grate. The plates and grate being made, a sheet-iron drum large enough to admit a brick lining, leaving a diameter of 16 in., or the same size as the opening in the top and bottom plate, was obtained.

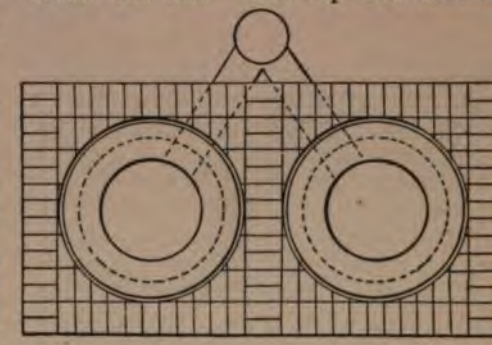


Fig. 1—Homemade Double-Crucible Furnace

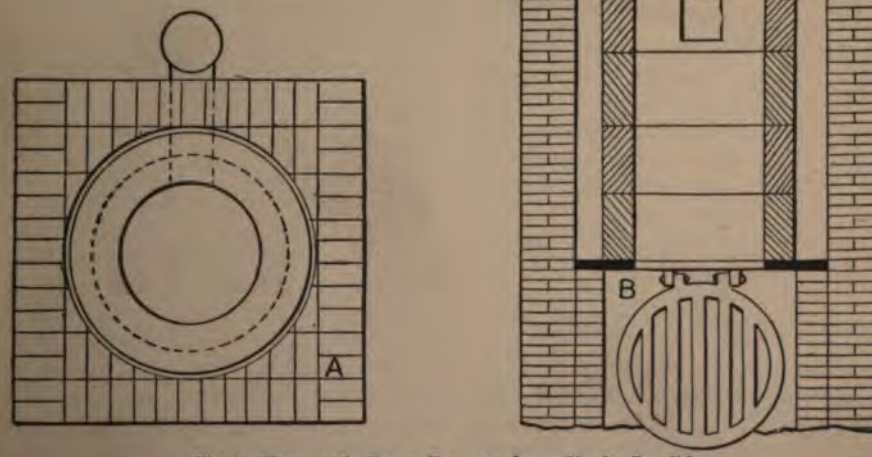


Fig. 2—Homemade Brass Furnace for a Single Crucible

This furnace was set in a pit so that the top would come even with the floor. The pit was dug and walled up with brick, and a concrete floor laid on the

bottom. The pit was large enough to allow of its being easily cleaned out and deep enough to allow the grate to swing free from the floor when it was dropped—that is to say, the depth equaled the height of the furnace plus the diameter of the grate plus about 2 in. After flooring and walling up the pit, a brick foundation wall, 18 in. high, was laid up next to the outside wall on two sides of the pit. This wall supports the bottom plate. This allowed plenty of room for a free draft and for the grate to swing clear.

Sufficient space must be allowed for the crucible, and the space between it and the furnace wall must, to secure the best results, be three times the area of the grate surface, and in no case less than twice this area. Under these circumstances, a free circulation of air is obtained from the grate to the flue. In building the stack, or chimney, its area must be at least equal to that of the flue, but the best results will be obtained when it is 1⅓ times this area. The height of the chimney will influence the draft, but usually 25 or 30 ft. will be sufficient. If two or more furnaces, Fig. 1, are connected to the same chimney, the area of the chimney should be 1⅓ times the combined areas of the flues.

The illustrations show the construction so clearly that little description is required. A start in the calculations is made by taking the largest crucible to be used and from this determining the size grate, depth of furnace, diameter of furnace, size of flue, size of chimney, and, finally, the pit. By following out these steps little trouble should be experienced.

Color Holders for Decorators

When doing stenciling and line work on walls and ceilings it is necessary to have several colors at hand. To have these handy it is best to arrange a sufficient number of tin cans on a stout cord or small rope, tying it as a belt around the waist. Holes are made in the tops of the cans to admit the cord or rope. This will save a great deal of stooping to secure the colors desired.—Contributed by C. O. Soots, N. Salem, Ind.

Harness Hanger

On my little farm are a number of labor-saving devices, the best of which, I think, is my method of hitching and unhitching, which is similar to that used in fire-engine houses. In the barn, directly over the point where the horse stops, two pulleys are fixed to the ceiling and one double pulley is placed in the ceiling near the side wall. A sack filled with enough sand to make it a little heavier than the harness and shafts, is tied with two sash cords which run up to the double pulley and branch out to the two angle pulleys then drop to the level of the horse's back where they are fitted with large hooks, one to catch in the saddle on the back band, and the other just in front of the crupper.

The buckles on the harness are replaced with snaps. Patent fasteners are placed on the hames and collar. These can be procured from any harness shop.

The horse is driven under the device and stopped at a point where the front hook is directly over the saddle. The two hooks are attached to the harness. The belly bands, hames and lines are unsnapped, and the harness and shafts are lifted from the horse by the weight. The whole operation requires less than two minutes.

This method of hitching and unhitching has other advantages. As stated, there are no buckles to unfasten, which is a great convenience, especially on a cold or wet night. The traces, hold and back straps, and lines, all remain fastened to the wagon. The harness is never in the mud or dirt, nor does it become misplaced. To hitch up takes no more time than the unhitching.

The cost is practically nothing, as the whole outfit of pulleys, sash cord, snaps, etc., will be less than one dollar.—Contributed by H. P. Ijams, Knoxville, Tenn.

Extension Clamp

Anyone having some small screw clamps can easily make them into extension clamps, as shown in the sketch. Drill six $\frac{3}{16}$-in. holes in the clamp and saw it in two, as shown by the dotted line A A. Make the extension bar of an old wagon-tire iron and drill holes in the ends to match the holes in the ends of the clamp. Fasten the parts with small bolts. Make some small strips of metal for each side of the



Bar on Clamp

clamp, so that it can be used as it was originally. Several different lengths can be made by having several extension bars.—Contributed by W. A. Lane, El Paso, Tex.

Paint-Pot Bracket Hanger

The hanger shown in the sketch is intended for use on the side of frame houses, and is very handy for hanging paint pails, as it can be fastened anywhere on the siding of a frame house, and is very easily moved from one place to another. It is made of steel and consists of two parts. The top part is simply an arm with a hook in one end and a row of fine teeth on the other end, as shown in the sketch. The teeth slip up under the lower edge of the siding and prevent the hanger from pulling away. The bottom arm is hinged to the top arm near the center and the tapering end has a sharp point which prevents it from slipping.—Contributed by Chas. Homewood, Waterloo, Iowa.



Garden-Hose Nozzle

A nozzle on a garden hose that throws only a straight stream can be made to spray by means of a triangular


Netting on Hose Nozzle

piece of galvanized wire netting bent as shown in the sketch. The wire netting is fastened with wire and can be taken off when a spray is not desired.—Contributed by Paul H. Burkhart, Blue Island, Ill.

Adjuster for Flexible Lamp Cords

Among the many adjusters for the flexible electric cord the open-spiral spring is one of the best. The globe can be readily adjusted to any height. The spiral spring is simple to make, if one cannot be found, and when fastened to the flexible cord it serves both as adjuster, and to take up any jar on the electric globe. The spiral should be of spring wire and about ½ in. in diameter by 1½ in. long. The coils should be close enough together to hold the cord firmly.—Contributed by Abner B. Shaw, W. Lynn, Mass.

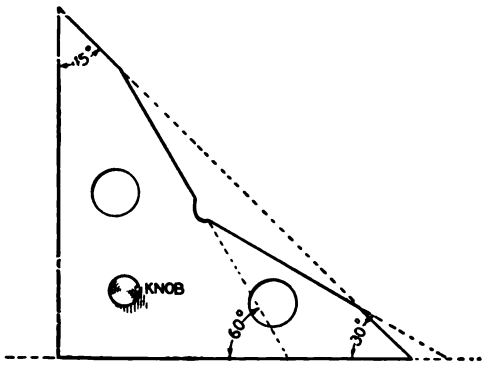


How to Clean a Cistern

An easy and effective way to clean a cistern is as follows: Procure a hose long enough to reach from the top to the bottom of the cistern and use it as a siphon, the top end being placed in a tub or large vessel of water. The lower end of the hose is used as an ordinary hose nozzle under pressure for washing the dirt and sediment from the walls.—Contributed by J. F. Garlick, Addinville, Ill.

Combination Triangle

A triangle having short edges of 30, 60 and 45 deg. can be made from an old discarded 45-deg. triangle. The knob



Combination of Angles

is quite handy in holding the triangle. The combination of angles makes the instrument quite useful.—Contributed by G. T. Kutz, Stamford, Conn.

Oversize Printer's Rollers

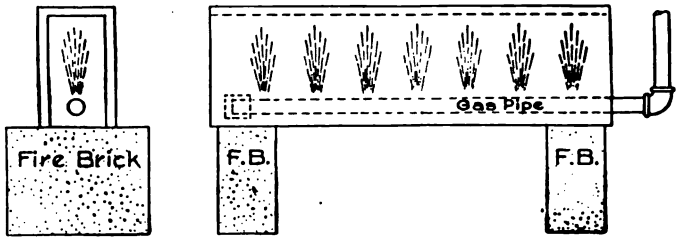
Rollers for presses are cast larger than the bearing rollers at the ends, and as a result the rollers jump when passing onto the type forms. This is especially troublesome with small forms as it not only fills the type with ink but is very wearing on the rollers. The usual method, where anything at all is done by job printers, is to lock up type-high roller bearers in each end of the chase. The bearers will take the ink and smear it on each end of the drawsheet where one is liable to get his fingers into it—and besides it wastes ink. A better way is to get one or more strips of felt and fasten them with glue on the roller guides at each end of the press. This raises the rollers so that they pass over even single-line card-job forms smoothly. The felt will wear for months in the ordinary small-town job shop before they need be replaced.—Contributed by C. W. Goddard, Bellaire, Mich.

Bronzing Cast Iron

A German paper gives the following process of bronzing cast iron without covering it with a metal. Thoroughly cleanse the metal and rub it smooth. Apply evenly a coat of sweet or olive oil and heat the iron, being careful that the temperature does not rise high enough to burn the oil. Just as the oil is about to decompose, the cast iron will absorb oxygen, and this forms upon the surface a brown oxide skin, which holds securely, and is so hard that it will admit of a hard polish, thus giving it the appearance of bronze.

Temper-Drawing Outfit

Having a large number of small tools to make, which demanded, for certain reasons, that the temper color should be left on them, it was necessary to get out more than one at a time. The arrangement for doing this is shown in the sketch. A connection with the gas line was made and ended by putting a cap on the end of a ⅜-in. pipe that had been perforated in several places on top. Over this was placed a U-shaped hood of $\frac{1}{16}$-in. sheet steel and this set on two firebricks high enough for the top of the flame to about strike the

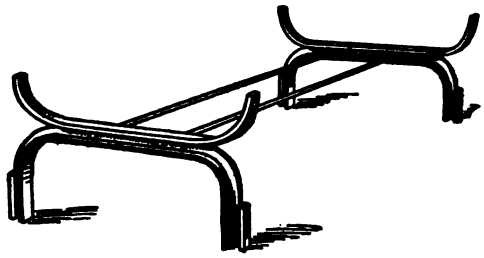


Outfit for Temper Drawing

steel. Air could then enter from the bottom and pass out at both ends. This outfit was placed where the light was good but not too brilliant and glaring, for that would have made a false color appear on the work. The tools, after hardening and polishing, were laid on the flat top, 20 or 25 at a time, and were quickly and uniformly drawn to a brown color. They were then taken off and allowed to cool.—Contributed by D. A. H.

Pipe Stand

Procure two lengths of 35 or 40-lb.-per-yard railroad rail, cut through the head about 12 in. from each end, and cut it from the rail for another 12 in. Turn this part up and bend the bottom as shown in the sketch. An 8-ft. length of rail makes a well-proportioned stand. Two rails fastened together with distance pieces make a very handy stand. Old discarded rails may be utilized.



Stand of Railroad Rails

Improved Caliper Gauge

Every machinist and toolmaker has undoubtedly experienced some trouble in gauging parallel surfaces with a caliper gauge, especially at the moment when the work is about to enter the jaws of the gauge, says Machinery. If the gauge is held so that the jaws are slightly inclined to the surfaces to be gauged, the piece will not enter the gauge, even if it should be several thousandths of an inch under size. This condition is indicated in Fig. 1.

In Fig. 2 is shown a caliper gauge which eliminates this difficulty, and allows the gauging to be done quickly and accurately. When this gauge is used, the long jaw A is held against one of the sides of the piece to be gauged and moved along it until the piece enters completely between the jaws, provided it is of the correct size or under size. If the piece is above the correct size, it will be brought to a stop against the gauge as soon as the short jaw B is reached.

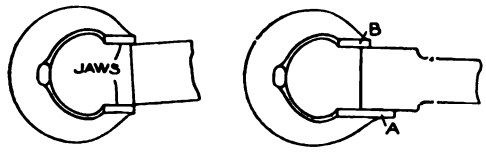


Fig 1 Fig 2

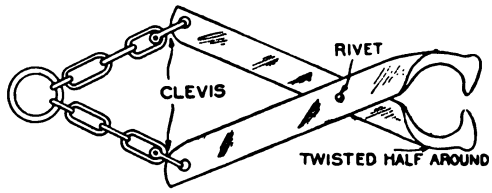
Gauge for Calipers

A Lath Holder

Most workmen find it quite difficult to place the lath in a place conveniently at hand while putting them on a ceiling. This trouble may be overcome by using an ordinary nail keg with a wide bottom attached to it, and standing a bundle of lath inside. A brick placed in the bottom of the keg increases the stability.

Tongs for Handling Ties

The tongs illustrated are used for handling ties. Such tongs have taken the place of the more complicated types formerly used, says the Railroad Age Gazette. A pair of tongs may be made of two old switch bars riveted together, the ends being twisted to form points. Similar tongs are also used for handling rails.

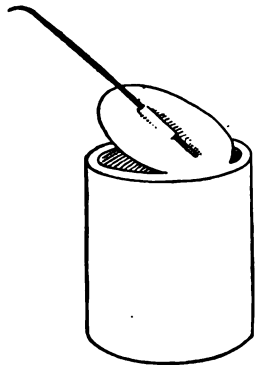


Tie-Handling Tongs

¶In drawing the temper, do not hurry the work. The slower, the better.

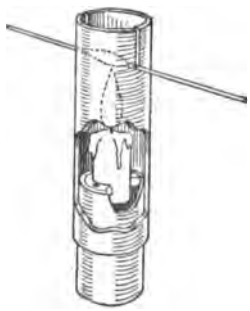
Homemade Surface Gauge

A very handy surface gauge for planer work can be made from an ordinary tin can and a piece of heavy wire. The cover or part cut to remove the contents of the can is bent up at an angle, and the wire inserted through two holes cut in the cover as shown. The outer end of the wire is sharpened. The cover may be raised or lowered as desired.—Contributed by N. L. Danielson, Oshkosh, Wis.



Soldering Line Joints with a Candle

The accompanying sketch shows how a candle may be used for soldering a line splice even in a strong wind, says a correspondent of Telephony.



The device consists of two brass tubes, one of which slides tightly in the other. A candle stub is fastened to the inside tube and two holes are punched to allow the air to make a draft. The top of the outer tube is slotted, and after the splice is made, the candle lighted and the tube slipped up to the proper point so that the hottest part of the flame will envelop the splice, a very good job results. This works almost as well as a Bunsen burner.

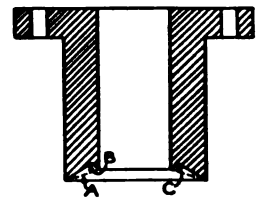
¶A tap will never run straight in a jig unless the pilot at the end fits the hole closely.

Leather Piston Packing

A service pump in a street-railroad power plant gave considerable trouble by water slipping past the plunger, says Power. The engineer could find nothing that would remedy this trouble until he tried ordinary leather packing rings, six in number, which easily fitted in the water cylinder when dry. These were placed on the piston just as ordinary packing, and the follower plate and nut put in position. Since using this method of packing the water plunger, the pump will often run 18 months without attention.

Shaping a Stuffing-Box Gland

The straight taper on a stuffing-box gland should be turned to a double taper as shown in the sketch to hold the packing on a worn piston rod. The straight taper A squeezes the packing against the rod, and if the rod or hole is worn, the packing will blow out. But if the taper is cut as shown at B, the packing will be squeezed also against the small taper C, which keeps it from blowing out through the worn hole.—Contributed by Joe V. Romig, Allentown, Pa.



Testing the Indelibility of a Typewriter Ribbon

All aniline colors fade and finally disappear from the effect of light, and only ribbons impregnated with a color containing a carbon base are permanent, says a French magazine.

To find if the ribbon will give indelible writing or not, scrape off some of the substance on the ribbon, stir it up in hot alcohol and put a drop of the mixture on a blotting paper. If the spot made is uniformly colored, the ribbon contains aniline, but if there forms around the central colored spot an outer uncolored ring of moisture, the ribbon will make indelible writing.

Tracing Down Telephone Troubles

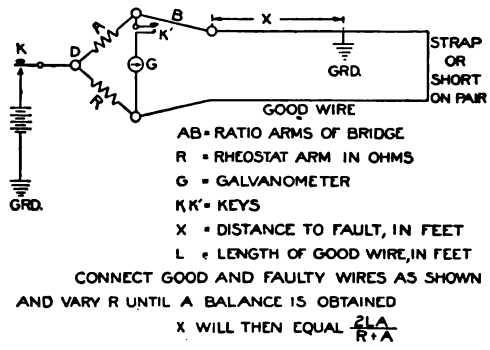
By GEO. M. PETERSON

Part III — Locating

Knowing the nature of the trouble and having obtained some idea of the extent of the damage done, the Wheatstone bridge is brought into action. In locating faults with the Wheatstone bridge, there are two methods in universal use: the Murray loop and the Varley loop. The Murray loop is generally preferred, and the Varley is used to check. The two methods are shown in the sketches.

As the Murray loop locates the fault, while the Varley loop locates from the "short" back, it can be readily understood why the Murray is taken as standard. In making an open test with a Murray loop, alternating current is supplied at E from a secondary circuit formed by bridging a condenser across a buzzer of 60 ohms' resistance, which is in series with a battery of four dry cells. A shall be made 1000 and B zero.

All "bridge" readings are taken in ohms and then multiplied by the number of feet per ohm. The accompanying table will be found useful in this connection. Having obtained the number of feet to the seat of the trouble, a print of the plant is obtained, and the distance scaled. This will show the exact location of the trouble, and locates it in a splice or a section of cable.



Murray Loop Test for Grounds

A great deal could be written on this subject by going into details as to the methods of using the bridge, and the various kinds of faultfinders; by explaining the methods used in "clearing" the trouble after it has been tested out and located, and by detail-

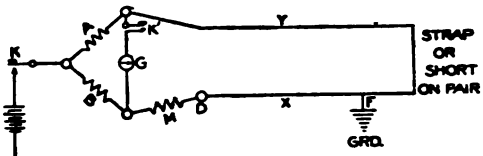
COPPER WIRE ONLY

Gauge No.	Diameter in Mils or 1/1000 inch			B. and S. Weight in Pounds		Length in Feet		Resistance in Ohms at 68° F.	
	Brown & Sharpe B. & S.	Birmingham or Stubs B. W. G.	New Brit. Standard N. B. S.	Lb. per 1000 Ft.	Lb. per Mile	Ft. per Lb.	Ft. per Ohm	Ohms per 1000 Ft.	Ohms per Lb.
11	90.74	120	116	24.93	131.63	40.120	795.3	1.257	.05045
12	80.81	109	104	19.77	104.39	50.590	630.7	1.586	.08022
13	71.96	95	92	15.68	80.791	63.790	500.1	1.999	.1270
*14	64.08	83	80	12.43	76.191	80.440	396.6	2 521	.2028
15	57.07	72	72	9.858	52.050	101.400	314.5	3.179	.3225
16	50.82	65	64	7.818	41.277	127.900	249.4	4.009	.5128
17	45.26	58	56	6.200	32.736	161.300	197.8	5.055	.8153
18	40.30	49	48	4.917	25.96	203.400	156.9	6.374	1.296
*19	35.89	42	40	3.899	20.595	256.500	124.4	8.038	2.061
20	31.96	35	36	3.092	16.324	323.400	98.66	10.14	3.278
21	28.46	32	32	2.452	12.946	407.800	78.24	12.78	5.212
*22	25.35	28	28	1.945	10.268	514.200	62.05	16.12	8.287
23	22.57	25	24	1.542	8.142	648.400	49.21	20.32	13.18
24	20.10	22	22	1.223	6.457	817.600	39.02	25.63	20.95
25	17.90	20	20	.9699	5.121	1031.000	30.95	32.31	33.32

* **Indicates gauges** generally used on telephone work.
Add 1% to resistance for every 4° the wire is above standard temperature (68° F.).
Subtract 1% from resistance for every 4° the wire is below standard temperature (68° F.).

Table of Gauges, Weights, Lengths and Resistance of Copper Wire in Ohms

ing the numerous cases of seemingly freakish trouble which one encounters. It has been the purpose of this article,



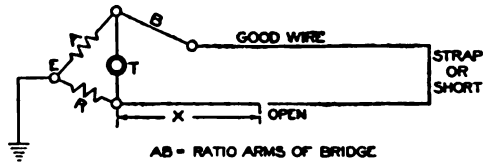
AB = RATIO ARMS OF BRIDGE
G = GALVANOMETER
M = RHEOSTAT ARM IN OHMS
KK' = KEYS
D = FAULTY WIRE
Y = RESISTANCE OF GOOD WIRE LOOP TO F
X = RESISTANCE FROM D TO F
R = TOTAL RESISTANCE OF LOOP X+Y, IN OHMS.

CONNECT GOOD AND FAULTY WIRES AS SHOWN AND VARY M UNTIL A BALANCE IS OBTAINED. X WILL THEN EQUAL $\frac{BR-AM}{A+B}$

Varley Loop Test for Grounds

however, to explain the methods used, and to have the reader understand the great part "trouble" plays in the maintenance of a telephone system.

While there is plenty of light, easy work to be done by the galvanometer man, such as testing out bad pairs or clearing up a single pair of wires for immediate use in a congested cable, etc., there is also plenty of hard work and long hours at a stretch. It must also be understood that in this work, as in all others, no hard and fast rules can be laid down, and that only years of experience and training can produce the quick-acting and accurate galvanometer man who can take in the situation at a glance and apply the



AB = RATIO ARMS OF BRIDGE
R = RHEOSTAT ARM IN OHMS
T = HEAD RECEIVER
X = DISTANCE TO FAULT, IN FEET
L = LENGTH OF GOOD WIRE, IN FEET

CONNECT GOOD AND FAULTY WIRES AS SHOWN AND VARY R UNTIL NO TONE IS OBTAINED IN RECEIVER. X WILL THEN EQUAL $\frac{AL}{A+A}$ IN WHICH R EQUALS RHEOSTAT READING WHEN NO TONE IS OBTAINED.

Murray Loop Test for Opens

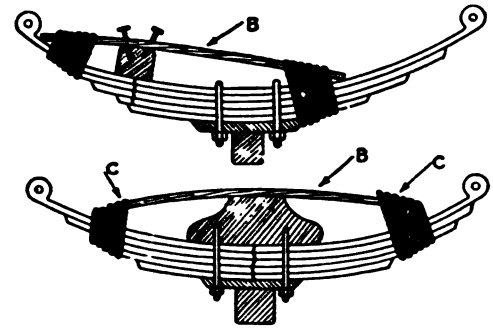
shortest possible test in order to locate and clear the trouble with the least loss of time.

(The end)

Temporary Repairs on Elliptic Springs

When breaks occur on elliptic springs, and especially those on automobiles, it is well to know how to make repairs without unnecessary delay, says the Motor Magazine of Canada. Springs break in various places, but most commonly in the center between the spring clips or in proximity to these fastening devices, as shown in the sketch. While these clips will hold a spring together, the ends are liable to sag and put a dangerous strain on the fasteners. An emergency repair of a broken spring can be made as indicated in the sketch.

If the break is near the end, a block of wood should be nailed to the board



Two Methods of Repair

over the break. The operation of fastening is practically the same as for the center break, which is as follows: A hardwood board, B, from 1 to 2 in., is trimmed on its sides so that it will be about 5 in. in the center and 2 or 3 in. at the ends. Drive nails in the ends of the board to hold the binding, lift the frame of the car with a jack to take the weight off the spring and put the center of the board on the rubber bumper, or, if there is no bumper, on a block of wood. Bind the ends of the board tightly to the springs with straps, wire or rope.

¶Tin can be removed from tin-plate scrap by boiling in caustic soda. The tin in the solution can then be deposited on a sheet-iron plate by electrodeposition.

Holding Eyeglass Case in the Pocket

Many an eyeglass lens is unnecessarily broken when the eyeglass case chances to slip from the vest pocket and drop on a hard floor or pavement. This happened to the writer once and wishing to avoid a repetition of such an accident, I tried to devise some means of preventing it. A pencil pocket clip was purchased, and the circular portion was straightened out and shaped to fit the lid of the eyeglass case. Two holes were drilled in this part of the clip, about $\frac{1}{16}$ in. in diameter and $\frac{3}{8}$ in. apart, and then transferred to the lid of the case, which was afterward drilled with the same drill. Two round-head brass nails were cut to length, the clip was fastened to the lid with the nails, which were riveted on the inside. The round heads on the outside gave a more finished appearance to the job.—Contributed by E. N. Davey, Lachine Locks, Can.

Tongs to Hold Plowshares

A method of making tongs to hold plowshares is described by a correspondent of the Blacksmith and Wheelwright as follows: First make one side of the tong to fit on the share, Fig. 1, same as the land bar, with a hole that corresponds with the hole in the share on the land side, and make the other jaw of the tong as an ordinary



Fig. 1

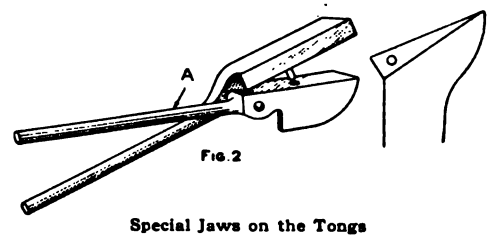


Fig. 2

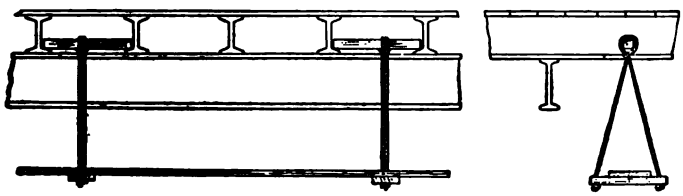
Special Jaws on the Tongs

flat tong with a pin so that, when the handles are pressed together, the pin will go through the hole in the land side of the share and the other jaw of the tong. The jaw on handle A, Fig. 2, must fit the same as the land bar. With this tong I hold my shares just as if a land bar were bolted on.

¶A casting should be well pickled and free from sand before it is placed on a milling machine.

Swing Scaffold for Painting Bridges

While painting several county bridges, I was unable to find a way of hanging a scaffold under one of them.



Scaffold Attached to the I-Beams

The bridge was 30 ft. wide and had a sidewalk on one side. Having nothing convenient, long enough to reach across the full width of the bridge, a scaffold was made as shown in the sketch.

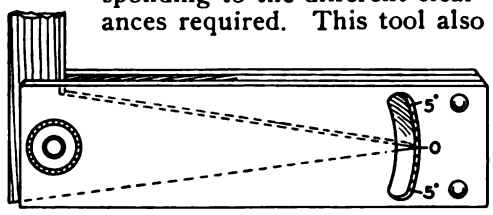
Two pieces of wood, 2 by 3 in., cut with little clearance so that they could slide easily between the floor beams and turn flat when in place, were the principal parts. Two hangers were made as shown, with a 1-in. rope and a board, 1½ by 6 in., having holes for the rope to pass through 3 in. from each end at the center. The knots on the ends of the rope were made large enough so that they would not pull through.

In moving this scaffold, the third and fourth planks of the bridge from where the blocks rested were raised each

time, and the blocks were drawn and moved ahead under the next third or fourth plank. In this way, a space of 15 ft., which was the distance between the crossbeams, was painted by moving the scaffold only twice. One-half of the bridge was painted going in one direction, and the other half on the return.—Contributed by Mathew H. Jones, Cresco, Pa.

Angle Square for Die Filing

The angle square shown in the sketch will give the degree of clearance of the dies when machined or filed, eliminating the need of having solid-degree squares corresponding to the different clearances required. This tool also

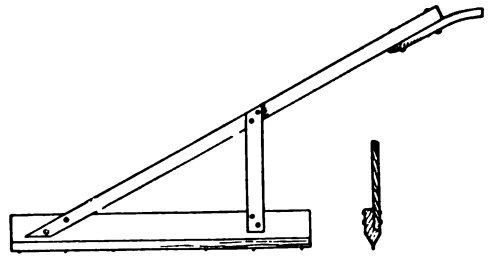


Blade can be Set at Any Angle

does away with the necessity of setting a small level to a graduated protractor. A screw and knurled nut bind the scale between the stock of the square.—Contributed by Henry C. Ronfeldt, Toledo, O.

Garden Seed Row Marker

The hoe is generally used for marking seed rows in a small garden. A line is stretched taut and the hoe is drawn along it to make the rows straight. I constructed the tool shown in the sketch to mark the seed rows

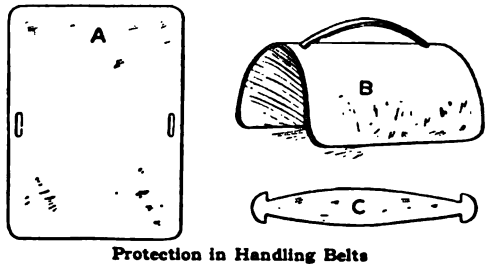


Marker for Seed Rows

and to make them straight without a line. The marker will make a row straight for 100 ft. and make it narrow and of even depth. The sketch clearly shows its construction. The length of the marker will cause it to make a straight row.—Contributed by A. S. Thomas, Gordon, Ont.

Mitten for Handling Belts

A handy device for protecting the hands of those working around belts can be made of a piece of flexible, single-leather belt. This is used in the palm of the hand by bending it in a U-shape, says the American Miller. The corners of the belt are trimmed as shown at A, and two slots cut as indicated. Another piece of leather is formed as shown at C, for the strap over the back of the hand. Insert the



Protection in Handling Belts

two ends of this piece in the slots and the protector will be complete, as shown at B. Put a protector of this kind on when attempting to throw on a running belt.

How to Straighten an Automobile Frame

Some time ago I had to straighten an automobile frame which had been in a wreck. I straightened it in the following manner: A chain having a turnbuckle in the center was run diagonally across the frame between the corners that were out. The turnbuckle screw made it easy to draw the frame perfectly square at the corners.—Contributed by J. N. Bagley, Superior, Nebraska.



Covering a Stovepipe Hole in a Chimney

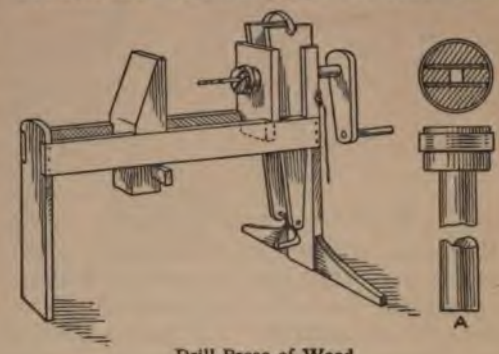
The stovepipe hole in a chimney can be easily covered when the stove is removed for the summer by using an asbestos stove mat in the following manner: The metal ring on the mat is removed and the asbestos cut to fit the hole. Paste the asbestos on a square of muslin and allow both to dry under a weight. Place the asbestos in the chimney hole and paste the muslin to the wall. Paste wallpaper over this. When it is necessary to open the hole, cut around the circle and remove the asbestos.—Contributed by L. G. Roberts, Mt. Carmel, Illinois.

A Homemade Drill

The farm workshop seldom has many tools, and especially the more expensive ones are naturally missing, for the cost of a drill press or lathe is entirely out of proportion to the amount of work for which they would be needed on a farm. One farmer solved the problem of drilling holes by making a device, almost entirely of wood, which would serve to drill any hole that may be required on farm machinery.

The illustration clearly shows its construction. The pressure of the foot on the stirrup will make the drill take hold sufficiently, but, if not, the wedges may be struck with a hammer. A small rope is provided to hold up the wedges when they are not in use.

The spindle and chuck is made of a piece of tough wood, the smaller diameter being 1¾ in. and the larger, or chuck end, 2¾ in. This allows ½ in. flange, which must be well lubricated when using the drill. A ¼-in. hole is bored for the shank of the bit, then a slot about ¾ in. in depth is cut on either side of the hole. Pieces of a broken file are inserted in the slots and



Drill Press of Wood

a metal ferrule shrunk on the outside of the wood, as shown in A. The hole in the chuck is either squared or left round, to fit the drills that may be on hand.—Contributed by A. S. Thomas, Gordon, Ont.

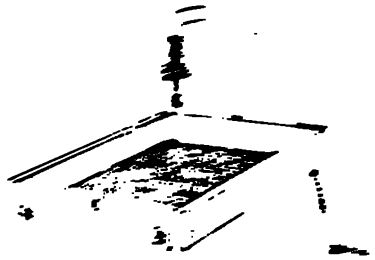
Removing Splinters from the Flesh

An ordinary steel writing pen is handy to have in the workshop for use in extracting splinters from the flesh.

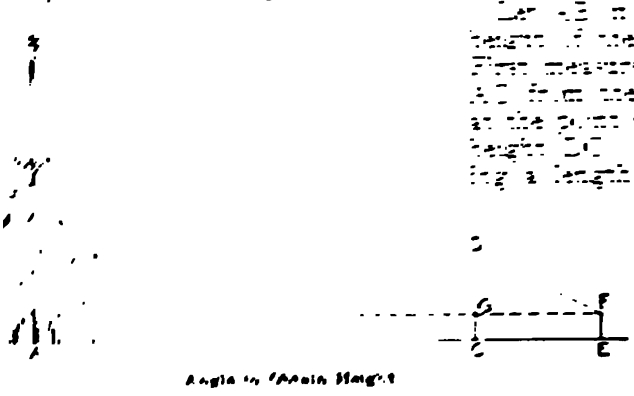


Pen Point Serves as Tweezers

Press the pen down on the flesh, as shown in the sketch, so as to slightly open the points and then push toward the splinter. Allow the points to close



Easy Method of Determining the Height of an Object



Angle in Obtain Height

the following method, which does not necessitate climbing to the top of the object it is first necessary to make the measurement.

Let AB in the figure represent the height of the object to be measured. First measure off a known distance, AC, from the base of the object, and at the point C erect a pole of known height DC. Cut a straight piece, having a length approximately equal to the height of the observer's eye above the ground, and then find the point where this piece must be placed in order that its top, the top of the piece DC, and the top of the object being measured, will all be in line when sighting over their up-

per ends. The short piece should always be held in a vertical position when sighting over it, and the lower ends of all the pieces should be in the same horizontal line. After locating the position of the short piece, measure the distance of its base from the object. When the above dimensions have been determined, the following relation is obtained: The height BH is to the height DG, as the distance HF is to the distance GF, or the height BH is equal to

$$\frac{HF \times DG}{GF}$$

After determining BH, as indicated above, the height of the short piece, which is equal to HA, must be added in order to get the height of the object.

A Buzzer Test Set

The set shown in the sketch is what might be called an "old-timer," but the results which are obtained with it are far ahead of those obtained with the more elaborate apparatus of the present day. The set is composed of the following parts: One No. 13 induction coil; two 2-M.F. condensers; two standard dry batteries; three binding posts; one one-point switch, and one carrying case.

This set can be used in testing for "opens," "grounds," and "crosses," as well as for buzzing out a working cable. In use, the ground wire is securely fastened to the sheath of the cable to be tested, while the "live wire" is attached to one side of the talking pair. The "talking set" or head phone is bridged directly across the pair of wires to be tested. The buzzer must always be used from the C. O. end when testing a working cable, or the line lamps on the switchboard will be continually flickering as the search needle is run over the cable wires.

The splices at the outer end of the test tell the man in the office which pair of wires to place the search on, one side at a time. If no tone is heard, the wire is "open." If a tone is heard on more than one wire in the cable, but rather faintly, a "ground" is indicated. A full, strong tone on more than one wire indicates a "cross," but

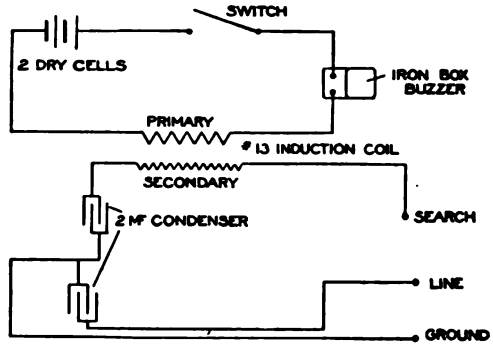


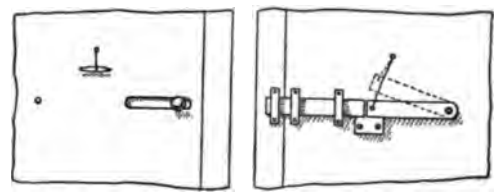
Diagram of Set

if the tone is heard clearly on both wires of a pair, it shows that the pair is crossed with itself, or, properly speaking, is "short."

Such trouble should be tested out with a voltmeter and battery, or more exact apparatus, but the buzzer gives the workman a good idea of the condition of the cable in which the lines are being tested, and if it is in very bad condition, it may be reported to the galvanometer department for a test.—Contributed by Geo. M. Petersen, Buffalo, N. Y.

A Barn-Door Latch

Every farmer or horseman knows how provoking it is to own a horse that will unlatch a stable door by sliding or lifting the latch with his teeth



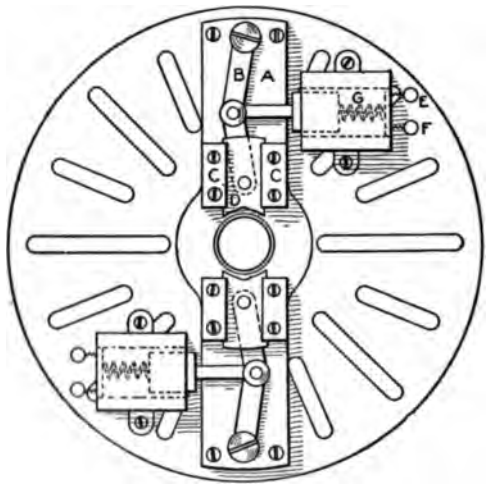
Out and Inside Parts

or nose. The accompanying sketch shows a latch fastener that will baffle the efforts of any horse to open the door. The latch cannot be pushed back until the bar is raised, thus requiring two movements at the same time to open the door. The latch can

be drawn from the outside by using the old-style latch string to lift the bar, and a knob in a slot to move the latch. —Contributed by J. L. Wright, Granville, O.

Automatic Magnetic Lathe Dog

The magnetically operated jaws shown in the sketch were designed to facilitate the handling of lathe work,



Magnets on Faceplate

and to do away with the ordinary lathe dog, where hundreds of pieces of the same kind are to be turned between centers.

The toggle joint B and the guide pieces CC are attached to the piece A, which is fastened to the faceplate of the lathe. The driving dog D is attached to the toggle joint and slides between the guides CC. The soft-iron movable cores of the magnets are connected to the toggle joint as shown.

Two brushes, communicating with a switch connected to the belt-shifter rod, are attached to the lathe bed back of the faceplate, one bearing against the latter and the other on an insulated ring. The terminal E of the magnet is connected to the faceplate, and F, to the insulated ring.

After the proper adjustments are made, a piece of work is inserted between the centers of the lathe. When the lathe is started, the switch connected with the belt shifter closes and sends a current through the magnets. The operation is obvious. Stopping the lathe opens the switch, the current is broken and the movable cores of the magnets are released. A spring, G, is used to make the release prompt and to remove any pressure on the dogs.

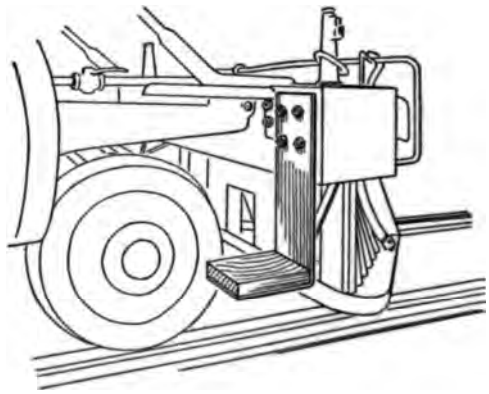
The piece A is fitted loosely on the faceplate, so that the pressure of the dogs upon the work will be equalized. The dogs are not powerful enough for roughing cuts, but are very useful for light work. The current may be taken from an ordinary lighting fixture.—Contributed by Chas. Schaffner, Chicago.

Pilot Footboards on a Locomotive

Any measure adopted by the railroad companies that tends to lessen the danger under which its employes perform their duty, is of interest to everyone, whether connected with railroad activities or not.

Perhaps the latest action taken for the safety of trainmen, is the installation of an ample footboard on the rear side of the pilot beam, and consequently in such a positon that the trainman is at all times plainly visible to the engineer taking signals.

For a long time previous, the trainmen while switching rode standing on the thin lower board of the pilot. This



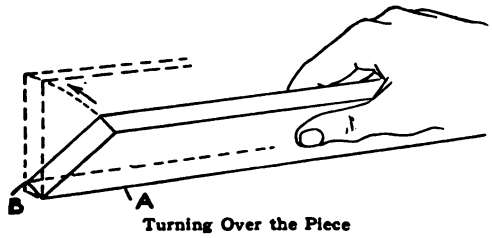
Footboard on Pilot

affords but very little footing and many a trainman has accidentally fallen off, suffering in many cases the

loss of limb and even life. The footboard illustrated in the cut insures the safety of a trainman riding on the pilot of any locomotive, no matter how badly it may pitch and rock while in motion.

Making a Margin Line in Job Presswork

Mark the margin line on the tympan sheet, for the purpose of setting the gauge pins, with the edge of a piece of wood furniture. If a letterhead with a corner card, a 24-point top margin is about right. Take a two-em piece of wood furniture and touch one edge, B, lightly on the ink roller, then lay the adjoining edge A along the top of the letters of the impression on the



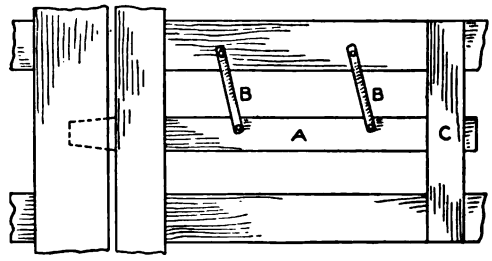
Turning Over the Piece

draw sheet. Tip the piece of furniture firmly outward onto the inked edge B. This is done by rolling the wood and keeping it in contact with the tympan sheet. A neat line will be made by which to set the gauge pins. If the job is a handbill, with, say, 1-in. margin, take a six-em piece of furniture, and so on, as the size of the work increases.—Contributed by C. W. Goddard, Bellaire, Mich.

A Gate Latch

A good latch for farm gates may be made as shown in the accompanying sketch. The slide A is suspended by the hangers BB, which are placed on each side of the gate. The back end of the latch works between the guides C, and the front end between the end pieces of the gate. The slide engages with a slot in the gate post when the gate is shut.

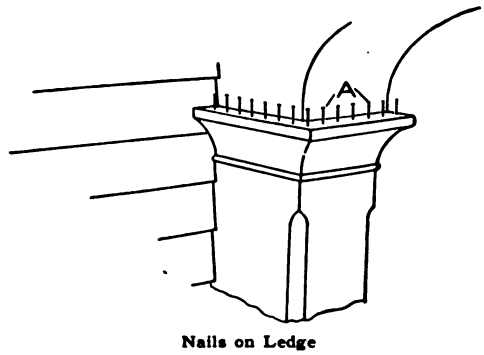
The hangers BB are made in any convenient length. The holes are ¼ in. in diameter and tire bolts are used as fasteners. The holes for the hangers should be drilled one-third of the width of the latch from its top to make the largest part of the weight fall below the fastenings of the supports. The slide being in a horizontal position, it works better between the guides. When the slide is in the gatepost slot, the hangers should be at the angle shown, so that the weight of the slide helps to hold it in place.—Contributed by Willard H. Elder, Berkeley, Cal.



Swinging Gate Latch

To Keep Sparrows Away from Ledges on Buildings

If a row of finishing nails, A, are driven part way into the ledge or projection of a building, as shown on the projecting part of a column capital in the sketch, they will prove an effective means of keeping sparrows or other

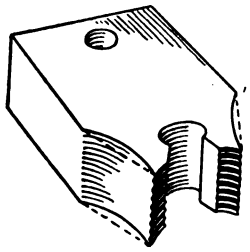


Nails on Ledge

birds from nesting thereon. The sketch clearly shows the way to place the nails.—Burton F. Harrington, Providence, R. I.

Grinding Dies

A set of dies that had been ground as shown by the dotted lines in the sketch were thrown away as worn out. I picked them up and ground them concave, and they seemed to cut better than when they were new.—Contributed by L. H. Atwell, Atlanta, Ga.

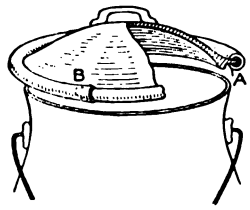


Cushion Made of Steam Hose

Some repair work had to be done on a locomotive standing on a siding. As the boiler had been washed out, I found the ground very wet. I did not have a cushion, nor could I secure one. In looking about for something to sit on while working, I found a length of hose which I made into a coil that served the purpose much better than a cushion.—Contributed by Frank O. Kunkel, Cochrane, Ont.

Noiseless Slop-Jar Cover

The noise made in replacing the cover on the ordinary slop jar used in a sick chamber is often very annoying to the patient. To remedy this, and to render the slop jar more sanitary by preventing the escape of foul gases, I used the device shown in the sketch with success.

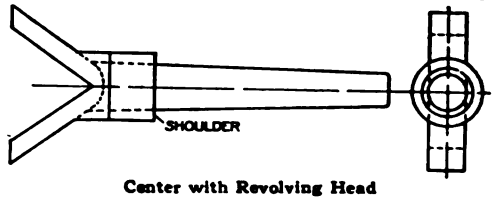


Take a piece of rubber tubing of, say, ¾ in. outside diameter—red rubber preferred—and slit it open on one side the full length, being careful to cut straight with the tubing, then slip it over the edge of the cover as shown at A, and stretch it taut all around, allowing the ends to overlap about 1¼ in., as shown at B, and after removing the tube from the cover cement the ends together using ordinary rubber cement. After the cement has dried enough, slip the ring over the cover.—Contributed by A. P. Weitz, Toledo, Ohio.

A Revolving V-Center for a Lathe

A handy revolving V-center for a speed lathe can be made as shown in the sketch. The main feature of this center is that it can be turned to any position to correspond with the work being drilled. In using the ordinary kind, as shown by the dotted lines in the sketch, the center must be removed from the socket to locate its correct position.

The shoulder is squared off until the taper shank becomes a snug running fit, and at the same time the shoulder fits up against the socket so as to prevent the taper shank from binding.—Contributed by David Major, Providence, R. I.



Center with Revolving Head

An Emergency Router

Sometimes a carpenter on a repair job runs into work where he could use a router to advantage. Should he have none in his tool box, a router is easily devised by taking the plane bit out of a small wood plane and using a narrow chisel instead. Set the chisel edge to the right depth and tighten the wedge just as when adjusting a bit, and the router is ready for the work. It takes only a few minutes to make the change, and this emergency tool will do better work than could be accomplished by cutting the wood out with a chisel and mallet.—Contributed by W. A. Lane, El Paso, Tex.

How to Make a Permanent Magnet

By A. E. MARLIN

A permanent magnet is a piece of iron that possesses magnetic properties, it having acquired these properties by being placed under the influence of another permanent magnet, an electromagnet, or a solenoid, and retaining a certain amount of the magnetism set up in it after it has been removed from the influence of the magnetizing force. All grades of iron are not equally suitable for making permanent magnets, as some grades retain the magnetism to a greater extent than others, even though they be subjected to the same treatment mechanically and the same method is used to magnetize them.

The best grade of steel to use in the manufacture of permanent magnets is known as tungsten steel. It has the property of retaining a large part of its magnetism, when subjected to a magnetizing influence and that influence then removed. This property is called the retentiveness of the iron. It also requires a comparatively large magnetizing influence to demagnetize tungsten steel after it is magnetized. This property is called its coercive force, or ability to resist being demagnetized. Soft iron will retain quite a bit of its magnetism after being subjected to the influence of a magnetizing force; but its coercive force is so small that it easily loses this magnetism, and for this reason such iron is not suitable to use in permanent magnets.

The piece of iron, after it has been formed into the desired shape, should be well hardened, as that increases its coercive force and retentiveness. In tempering the iron be careful not to make it too hard, as it will not stand any mechanical abuse then without being easily broken. The best results are obtained in tempering by immersing the iron in the water when it is a pale straw color, it having been heated uniformly to a bright red. There are three methods that may be employed in magnetizing: first, by means of a very strong permanent magnet, sometimes called a "king magnet;" second, by means of an electromagnet; third, by means of a coil of wire, called a solenoid, through which a current is flowing.

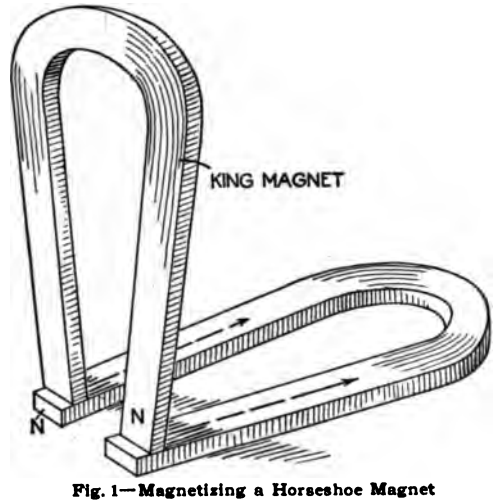


Fig. 1—Magnetizing a Horseshoe Magnet

It is best to have the "king magnet" of what is called the horseshoe form, and if it is to be used in magnetizing a large number of other magnets, it should be very large, and the distance between its two ends, or poles, should correspond to the distance between the poles of the magnets being magnetized. The polarity of the "king magnet" should be determined by means of a compass needle, and its north pole marked with the letter N. Each of the pieces to be magnetized should have one end marked with the letter N also.

To magnetize the magnet proceed as follows: Place the unmagnetized horseshoe, assuming it is of the horseshoe type, in a horizontal position. Then place the poles of the "king magnet" in contact with its ends, making sure that the south pole, or unmarked end is in contact with the marked end of the horseshoe being magnetized, and that the other two ends are also in contact as shown in Fig. 1. Move

the "king magnet" along toward the bend, as indicated in the figure, until its pole reaches the bend and then reverse it to its original position, when



Fig. 2 Fig. 3

Magnetizing a Bar Magnet

it should be lifted up and away from the new magnet. The "king magnet" should then be carried back through the air, and placed on the new magnet at the bend, the poles being in the same relation to each other as in the previous case, then drawn towards the end of the new magnet and again removed. This operation should be repeated a great many times, and the new magnet then turned over, and the same procedure repeated, on the opposite side. Make sure you have the poles of the two magnets in their proper relation to each other, north to south and south to north, when the new magnet is turned over.

A bar magnet can be magnetized by means of a permanent magnet as

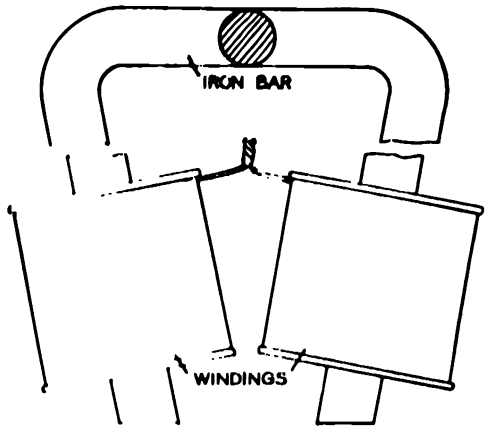


Fig. 4 An Electromagnet

shown in Figs. 2 and 3. The poles are alternately presented to the center [illegible] magnet, and they are moved [illegible] directions. If properly carried out, this method will give a fairly strong permanent magnet, provided the "king magnet" is itself of sufficient strength; but the magnets will not be nearly as strong as if magnetized by the second or third method.

An electromagnet consists of a bar of iron about which there is wound one or more coils of wire, and arranged so that a current of electricity may be sent through these windings. The various coils should all be connected in such a way that the current in each of them passes around the iron core in the same direction, or, in other words, so that the polarity becomes the same in all of them. A simple horseshoe electromagnet can be made, as shown in Fig. 4, from a bar of iron about 1 in. in diameter and 10 in. long, with two coils of wire about its ends. These coils should consist of such a number of turns, and be capable of carrying such a current, that the product of the total number of turns and the current in them is approximately 1,000. For instance, 100 turns on 10 volts. This electromagnet can be used in magnetizing a magnet just as the "king magnet," but it will produce a much stronger magnet.

If the piece of iron to be magnetized has a temporary winding placed about it and a current sent through this winding, it will become magnetized and will retain a certain part of its magnetism after the circuit is broken. The winding may be removed after the piece of iron is magnetized, or it may be wound upon a form of such shape that it can be slipped on and off the piece of iron, which permits its being used an indefinite number of times. The construction of a coil, or coils, suitable for this purpose will depend upon the dimensions and form of the magnet being magnetized.

An electromagnet that will operate satisfactorily on a 110-volt direct-current circuit, and one that can be used in magnetizing different forms of magnets, may be constructed as follows: Procure two pieces of brass tubing, each 6⅛ in. long, with an inside diameter of 1¼ in. and a wall $\frac{1}{16}$ in. thick.

Square off one end of each of these pieces of tubing and then cut the other end off until they are 6 in. in length. Now obtain four pieces of ⅛-in. brass, two, 3¼ by 3¼ in., and two, 3¼ by 4 in. Cut two circular washers, 3¼ in. in diameter, from the two square pieces, and then cut a circular opening in the center of these pieces so that they will slip on the brass tubing. Cut openings in the remaining two pieces as shown in Fig. 5 so that they will slip on the brass tube. Solder, or preferably braze, these pieces to the brass tubing, placing one round and one square piece on each tube as shown. Make sure to get the pieces squarely on the tubes. Take a hacksaw and saw a slot in each of the completed spools from end to end. The slot should be sawed in the position shown in Fig. 6. Four $\frac{3}{16}$-in. holes are drilled in the corners of the square pieces, as shown, before they are soldered to the tube; if this was not done, it should be done before proceeding with the winding of the coils. Two ⅛-in. holes are also drilled in these pieces, to be used in mounting a terminal strip for the binding posts. Cut, from some mica, about .02 of an inch in thickness, eight circular washers, with an outside diameter of 3¼ in. and the diameter of the opening about $\frac{1}{16}$ in. greater than the outside diameter of the brass tube. Slit each of these washers along a radius so that they can be put on the brass tube. Then wind on the brass tube at least six layers of paper .004 in. in thickness. The width of this paper should be at least ¼ in.

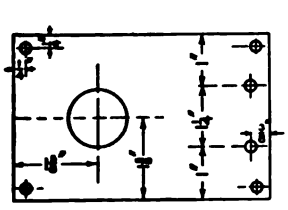


FIG. 5

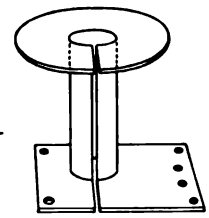


FIG. 6

Headpiece and Complete Spool

greater than the inside distance between the heads of the spool. Slits should be clipped along the edges of the paper before winding, which will allow it to extend along the heads about ⅛ in. on each. The various layers may be shellacked in place. Place four of the mica washers loosely

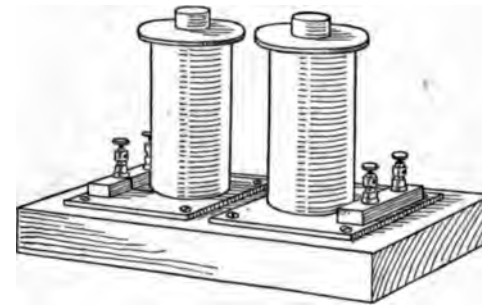


FIG. 7

Complete Electromagnet

on each of the spools, two at each end. Cut, from some cardboard about $\frac{1}{16}$ in. thick, two more washers, and in each of these washers cut a slot about ⅛ in. in width. The spools are now ready to be wound, which is done as follows: Obtain approximately 12,000 ft. of No. 28 gauge double-silk-covered copper wire. Solder a piece of insulated No. 16 gauge copper wire about 12 in. long to the end of the No. 28 gauge wire, and insulate the joint with a piece of tape. Place one of the pasteboard washers between the mica washers against the rectangular head of the spool. The No. 16 gauge wire should be placed in the slot cut in the pasteboard washer and the inner end firmly bound to the brass tube with several turns of good linen thread. The groove in the pasteboard washer should be so placed that the No. 16 wire will come out directly opposite one of the ⅛-in. holes. After this has been done, push the second mica washer down against the pasteboard washer and proceed with the winding. In putting the various washers in place make sure that the slits in those that are at the same end of a spool do not come opposite each other. Place a layer of onion-skin writing paper between each two layers of the winding. Wind 38 layers on each spool. The winding will then terminate at the same end at which it was started.

A piece of heavy wire should be

soldered to the outside end of the winding, and the heavy wire wrapped around the spool several times and firmly bound in place. The outer end should terminate opposite the second ⅛-in. hole.

When the two windings are completed, they can be covered with several layers of heavy paper or cloth, which will serve as a mechanical protection. Two small binding posts may be mounted on a small piece of hard rubber which in turn may be mounted on the inside surface of the rectangular head by means of two screws that pass through the ⅛-in. holes, Fig. 5. The ⅛-in. holes should be countersunk on the outside and flathead screws used. The terminals of the windings should now be fastened to the binding posts and the coils are complete.

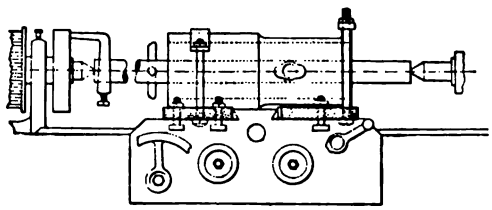
The base of the electromagnet may be made from a piece of cast iron, approximately 8 by 10 in. and at least 1 in. thick. The cores of the coils should be made from a good grade of wrought iron, and should be at least 6½ in. in length. The ends that are to rest upon the base plate should be perfectly square, so that there will be a minimum of air space between them and the plate. The upper ends may be made in several different forms, depending upon the shape of the magnet to be magnetized. Holes may be drilled in the base plate and screws used in mounting the coils, the four holes in the corners of the rectangular heads being used for this purpose. The upper ends of the cores should be fastened together by means of strips of brass, which will relieve the coils of some mechanical strain. If all the magnets that are to be magnetized are of the same dimensions, it is best to fasten the cores to the base plate permanently by passing a machine bolt up through the base plate into the lower end of each of the cores. The two coils should be connected in series and they should act in conjunction in magnetizing the cores. Figure 7 shows the completed electromagnet.

The magnetization can be accelerated by tapping the magnet when it is under the influence of the magnetizing force. The tapping is supposed to aid the molecules in readjusting themselves.

All magnets lose some of their magnetism with age. This loss can be reduced by placing across the poles, when the magnet is not in use, what is called a "keeper," it being nothing more than a piece of soft iron. Better results will be obtained if this keeper is placed across the object being magnetized, before the magnetizing force is removed.

Boring a Cylinder

In boring or machining a gas-engine cylinder, in a shop where there is no special boring machine, and facilities



Cylinder Bolted to Lathe Carriage

are somewhat limited, I found the following method gave good results:

I first removed the saddle of the lathe, and bolted two pieces of hardwood plank, about 2½ in. thick by 8 in. wide, crosswise of the lathe bed, as shown in the sketch. These planks formed a base upon which the cylinder was to rest, and were of a sufficient thickness to raise the cylinder ½ in. above the center, so that it was necessary to cut a recess in the wood, which both lowered the cylinder to center and at the same time formed a close-fitting support for its lower side. A strap of iron, 1½ by ⅜ in., was bent to fit the upper side of the cylinder and bolted down with ½-in. bolts through the plank on each side, a straight piece of iron of the same dimensions being used for the base end of the cylinder, which was square, and similarly bolted

to the plank below. A 2-in. boring bar was used, and the cutter, which was made from ½-in. stock and ground to a length corresponding to the bore, with a cutting edge at each end, was adjusted so as to cut at both ends at the same time, and wedged into the bar and further secured by two set-screws. The centering of the cylinder was then perfected by running up to the cutter on the head end, then reversing boring bar and using the same method at the base end, moving the cylinder slightly as required to aline it properly for boring. After boring, the ends of the cylinder were faced by putting a longer cutter in the bar (reversing, of course, for the two ends) and completing the operation without disturbing the alinement of the cylinder. The grinding in of the piston was accomplished while the cylinder was still in position, the bar being removed and a chuck substituted for the faceplate. Into the chuck was secured a steel bar which was fitted between the wrist-pin lugs on the piston. The lathe was then started, with the feed on, plenty of oil and a fine grade of emery being used, and the result was a finely finished cylinder and piston.—Contributed by H. L. Elfes, Minneapolis, Minn.

Reinforced Doubletree

A reinforced doubletree can be made of two 1-in. oak boards with a piece of metal, A, between them. The metal should be about $\frac{1}{16}$ in. thick. All three pieces should be cut and shaped alike and riveted together. The singletrees



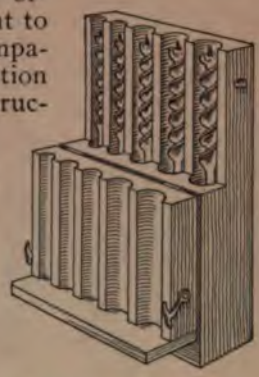
Metal between the Wood

are made in the same manner. They are not difficult to make and will hold the strongest team, besides outlasting a dozen ordinary doubletrees.

¶Uneven heat in tempering causes irregular strain and cracks in tools.

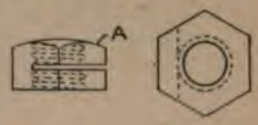
Homemade Bit Case for Carpenters

A carpenter should be ready to make use of any suggestion that will help keep his tools in order and convenient to carry. The accompanying illustration shows the construction of a wood case for the bits of various sizes which make up part of the carpenter's kit. It is made of a block of wood into the end of which are bored several holes of the proper size to receive the bits. A part of the block is cut out and hinged to form a cover.—Contributed by B. E. Blanchard, Chicago, Ill.



A Remedy for a Loose-Fitting Nut

A loose nut may be made to fit the threads of the bolt tightly by cutting a slot in the side, a trifle over half way through the nut, and striking it at A with a hammer to close the opening and shorten the pitch of the threads. The nut will turn on tightly, and where the threads fit very closely it takes the place of a locknut.—Contributed by Chas. Williams, Indianapolis, Ind.

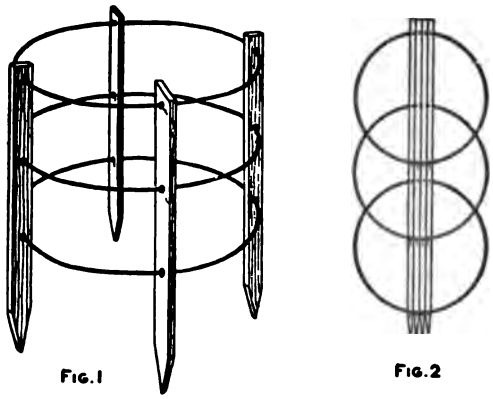


Pumping Clean Water from a Cistern

Clean water may be drawn from a cistern in the following manner: Use a rubber hose instead of the lead pipe and attach a block of wood a little above the lower end so as to keep the end of the hose under water. The wood will float and keep the hose end just under the surface at any level of the water.—Contributed by G. R. Lloyd, Jackson, Mich.

Folding Tomato-Vine Arbor

The arbor is made of 1 by 2-in. strips of wood, 3 ft. long, fastened together with three hoops about 18 in. in diameter. The hoops can be constructed of No. 9 gauge galvanized wire. The lower end of each strip or stake is pointed, and three ½-in. holes are bored in the upper part, about 9 in. apart. Before the ends of the wire hoops are twisted together they are run through the holes in the sticks, as shown in Fig. 1. The arbor is placed over the tomato vine and the stakes are spaced evenly and driven into the ground. The vine is trained inside the hoops and the stakes make an ideal support.



Arrangement of the Stakes and Hoops

This rack takes up little space and leaves room to work all around the vine. When not in use, it can be folded as shown in Fig. 2 and stored. —Contributed by H. H. Renges, Shippersburg, Pa.

Finishing Wood Patterns

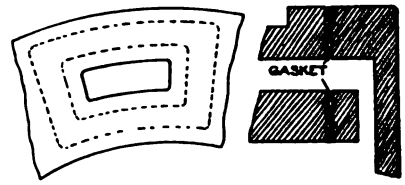
The finish on a pattern has a distinct effect on the finish of the casting produced. A rough pattern cannot leave a smooth mold in the sand. The dampness of the molding sand and the cleaning of a pattern by washing with water from a hose bring out all the "hair" from the surface of the wood, leaving it covered with small raised particles. Cleaning patterns by the use of water is, therefore, extremely poor practice, as is also drying them near steam pipes. Places where the end wood appears on the surface of the patterns are most difficult to get smooth and keep smooth. After once smoothing the pattern, the least dampness brings out the roughness again to a greater degree than on portions with the grain.

To prevent this, prepare some glue water—a small quantity of glue in hot water—and with a brush apply two coats to the end grain of the wood. This fills up the pores with a retaining substance, which effectively prevents "pulling out." Over this apply finishing paint as usual. This kink is also often applied to hardwood furniture.

To Prevent Copper Gaskets from Leaking around Port Openings

It is sometimes almost impossible to get a copper gasket to form a perfectly tight joint around port holes, no matter how tightly the head bolts may be drawn. The outer portion of the gasket can be calked if it leaks, but the inner leakages around a port are not so easy of access, and may seriously interfere with the action of an engine or other power machine.

If the metal can be nicked completely around the port, as shown by the dotted lines in the sketch, with the point of a small cold chisel, the metal is raised at the edges and a groove is formed. The raised portion of the metal cuts into the gasket, while the gasket is also squeezed into the groove caused by the point of the chisel.



Grooves to Hold Gasket

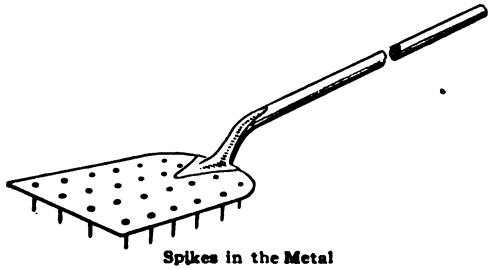
This bit of work will make almost any copper gasket form a tight joint around a port hole, and keep the pressure of an engine, or other device, from being lost.

Protection for Paint on an Automobile

Dissolve a piece of paraffin, the size of an English walnut, in a pint of gasoline and apply the solution to the surface of the paint with a soft piece of waste or rag after a good cleaning. This will leave a thin coat of paraffin on the painted surface, which will prevent dust or dried mud from scratching the varnish, and at the same time give it a good luster. Apply the preparation after every three or four washings.—Contributed by Emil M. Buerger, Cincinnati, O.

Earth Pulverizer for Gardeners

A handy garden tool for pulverizing the soil can be made of an old long-handled shovel, as shown. Heat the shovel and flatten it out, drill holes



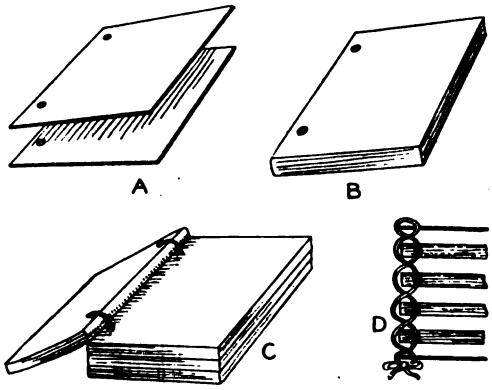
Spikes in the Metal

about 2½ in. apart and rivet spikes in them. A board with large nails, having a long handle attached will also answer the purpose, but not so well as the shovel.

Preserving Trade Papers

Many trade publications are worth saving for future reference, but unless fastened together, they become scattered and perhaps destroyed. The accompanying sketch shows a very simple and easy way of tying them together, which has the further advantage that the books will open out flat and any of the issues can be easily read.

If a cover is desired, procure two pieces of cardboard the size of the magazine and punch holes as shown in A. Punch corresponding holes in each magazine as shown in B. These holes can be made with a belt punch. The magazines are tied together as shown in C and D, using a shoelace or fancy cord if desired.



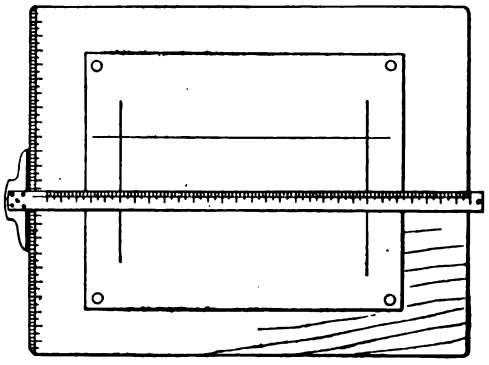
Back and Method of Tying

Magazines can be added one at a time by simply untying and adding the copy to the others and tying the binding cord again.

Scaling with a T-Square

A very handy way to scale drawings on a large board is to use a scale on the edge of the T-square, also one on the edge of the drawing board. The divisions may be marked the same as on a rule, without any figures, says a correspondent of American Machinist.

In making centerlines, start the horizontal opposite an inch mark on the side of the board, and the vertical cen-

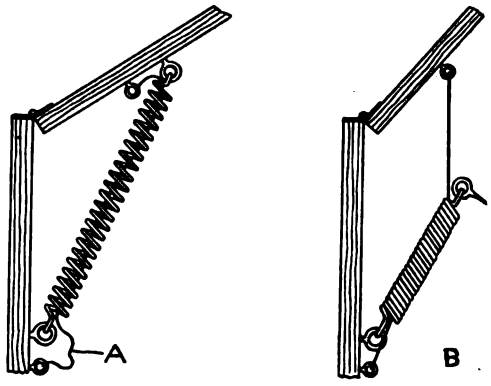


Scale on the Board and T-Square

terline opposite an inch mark on the T-square. The distances on each side of the centerlines can be marked without taking up the rule.

Safety Cable for Door Springs

Where springs are set up on doors as shown in the illustration, there is danger that they injure someone

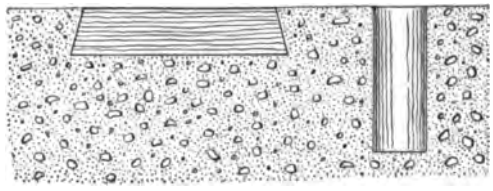


Cable through Spring Fastened at Both Ends

should they break, and especially, if they should fly out when the door is opened too wide. To prevent this, a small piece of cable should be passed through the spring and fastened to the door and jamb with screweyes. If the spring should break, it cannot hurt anyone, as it will be kept back by the cable. The cable need not be very strong—fishing cord will do—as it is not subject to much strain when the spring breaks, and none at all otherwise. For large springs use a piece of chain such as a key-ring chain.—Contributed by P. Mertz, Jamaica, Long Island.

Fastening Machinery to Concrete Floors

The sketch represents a small section of concrete floor and shows two ways of placing fastenings. The first



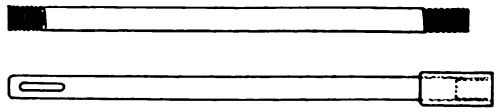
Wood Blocks in the Concrete

is a plank imbedded in the concrete. The plank may be of any size to suit the work in hand, and of suitable length to accommodate the feet of the machine, or its base. Sometimes the plank is made narrower at the top than at the bottom, to increase the holding power of the concrete. The planks must be set when the floor is laid.

A method of placing a fastening when the floor is already laid, is shown by the plug, which is of hard wood and driven into a hole drilled in the concrete. Lag screws are turned into the plug.

A Way to Run Wires between Walls

Electricians often have trouble getting wires down or up inside of a wall, especially when the upper and lower holes through the plates are not on the same vertical line, or when there are cross braces inside the walls, says a correspondent of Electrical Review. On such jobs I use a steel rod, threading the wire through a hole at one end



Rod Sections

of the rod. The rod I make is built up to any desired length in sections of 12-in. bars of cold-rolled steel, the diameter of which is $\frac{3}{16}$ in. Each section of the rod—except that having the hole for the wire—is threaded on both ends, and adjacent sections are held together by means of a short coupling having the same thread on the inside at either end.

If preferred, the couplings may be knurled, and a coupling pinned permanently on one end of each section of rod. I carry sections enough in my tool kit to make up a rod 14 ft. long. I find that with this device I can fish wires in walls much more readily than is possible with a chair and fish wire. The sketch shows two sections of rod.

¶A metal chip from a cutting tool should never be pulled off with the bare hand.

The Use of Stencils for Interior Decoration

By HOMER H. KNODLE

PART II—Laying Out the Work

The problems arising in the layout of continuous designs, while extremely simple, nevertheless require close attention and accuracy in order that the results of the stenciling may harmonize with the scheme of decoration. The layout is made by the use of the chalkline as described in Part I.

In making the initial layout of a job that includes panels, the first thing to do is to lay out accurately the continuous designs. In other words, the most simple part of the work should always be laid out first. This will furnish a basis to work from, and will allow such proportioning of the more difficult layout that the whole may be in harmony. In laying out a panel, first find the exact center of the area that is to contain it. The method of doing this is clearly shown in Fig. 5. The lines need not be prominent, merely heavy enough to be seen, and will then not show in the finished work. In case the area is to contain more than one panel, make the layout as in Fig. 6, which shows an area intended to be decorated with three panels. Make all measurements from this center, and the boundary of the panel design may be determined as shown in Fig. 7.

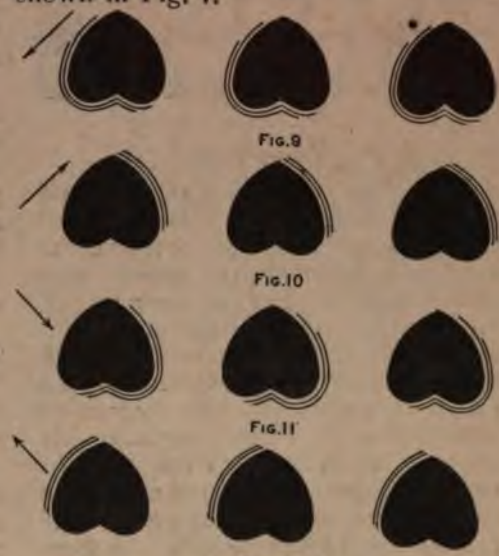


Fig. 9

Fig. 10

Fig. 11

Fig. 12

Shading

When laying out centerpieces, the center of the ceiling must be found, and the extreme boundaries of the design drawn from that center. The principle is exactly the same as in the layout of a panel and should not be difficult of execution. If a center design must be circular to form the centerpiece, lay out the necessary guide lines to properly space it around the 360 deg. of the circle. If it is to be stenciled at some distance from the center of the ceiling, as shown in Fig. 7, draw a circular guide line around the center as shown. The point of intersection of the circle and any guide line gives the starting point for the inside of the design. By laying the stencil design with its cen-

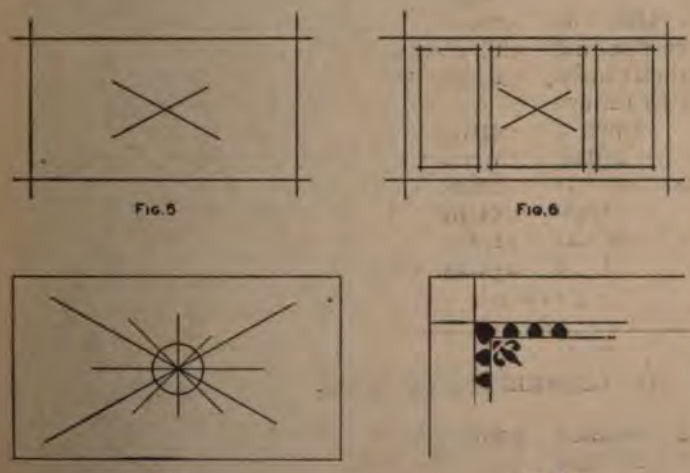


Fig. 5

Fig. 6

Fig. 7

Fig. 8

Layout for Panels

terline perpendicular to the guide line, the design will come into its correct position.

Corner pieces are easier to place than centerpieces, but they, too, re-



FIG 13

A Retouched Stencil

quire to be correctly set in their proper positions. From two points at equal distance from the corner on the two walls forming the corner, draw two intersecting lines as shown in Fig. 8. Continue these guide lines for a sufficient distance to cover the length of the design. With the intersection of the two lines as a base, stencil the corner piece in its right position. In all cases the distance of the point of departure from the wall is determined by the consideration of giving the ceiling panel proper display. In stenciling the corner pieces be sure they are at the correct angle with the layout, as a mistake here will result in either a crooked line or a badly joined border.

Sometimes it is best to shade the stencil designs with a corresponding color. This adds to the attractiveness of the work and also serves to relieve the monotony. In Fig. 9 is shown a simple design and how it is shaded, the design being solid black, and the shading denoted by lines. It is necessary to shade all the parts from the same direction, as in Figs. 9, 10, 11 and 12, which show the effects of shading, the four drawings being identical, while the shading is applied from different points as designated by the arrows. The importance of proper shading may be easily seen from the contrasting drawings, the difference in the direction of the shade causing quite a difference in appearance.

As to the color of the shading, never use a contrasting color. The best color that can be selected is a lighter shade of the wall color. If the stencil is placed in a lighter shade of the wall color, the shading color must be still lighter. The wall, stencil design and shading should be of different tints of the same basic color.

Occasionally there is demand for a decoration in retouched stencil work. This is the nearest approach to freehand decoration that can be accomplished with mechanical means. Instead of the design showing the binders, these are carefully painted out and the shading done as described. A retouched stencil is shown in Fig. 13. The design is complete without a break in the motif. The retouching will require a good set of brushes, the smallest practical outfit being a set of "riggers" from 1 to 6, and a set of flat artist's brushes, sizes 1 to 12. With this combination the work can be done satisfactorily.

A torn stencil can be repaired by cutting out a pattern that will match the torn places, and, after cleaning the stencil thoroughly, gluing it on the outside. Thus a smooth surface is preserved on the inside, or the one laid against the wall.

(The End)

How to Measure the Internal Resistance of a Battery

The current that can be obtained from a battery is dependent not only upon the electromotive force and the resistance of the circuit to which the battery is connected, but, in addition, upon the internal resistance of the battery. The principal factors upon which the internal resistance of a battery depends are: the area of the plates forming the electrodes; the distance between these plates; the kind of electrolyte used; the age of the battery, and the current the battery is supplying. As the internal resistance of a battery increases, due to any cause, such as continued use; drying out of the paste

used in dry cells; decrease in area of plates, etc., the current it is capable of supplying to a given circuit decreases and, as a result, the battery in time will fail to operate any devices that may be connected in circuit.

The internal resistance of any cell can be determined as follows: The voltage of the battery is first measured by means of a voltmeter, having a comparatively high resistance, when the battery is connected to the voltmeter alone. This reading is called the open-circuit voltage, and we will represent it by the symbol E_o. Now connect a variable resistance (rheostat) and an ammeter in series to the battery terminals, allowing the voltmeter to remain connected, and place a switch in both circuits, as shown in the figure. (If the voltmeter be constructed with a key for opening and closing its circuit, no switch need be connected in series with it.) The circuits may now be closed and readings taken on the ammeter and voltmeter as promptly as possible after the current has been adjusted to the desired value. This second reading of the voltmeter is called the closed-circuit reading, and we will represent it by the symbol E_c. The difference between the closed and open-circuit readings of the voltmeter represents the pressure required to cause the current to pass through the internal resistance of the battery. The current, I, was read on the ammeter and the internal resistance can now be calculated by dividing $(E_o—E_c)$ by I, or

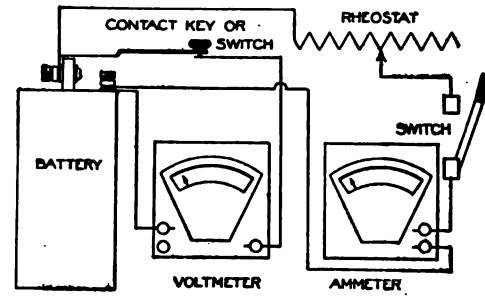
$$\text{Internal resistance } (R_{int}) = \frac{E_o - E_c}{I} = \text{ohms}$$

The internal resistance can be determined for different currents and after the cell has been operating or connected in circuit for different intervals of time. The battery should be given ample time to recuperate after each set of readings before the following set is taken.

The ammeter can be dispensed with by using a piece of wire or a coil, whose resistance, R_c, is known, instead of the rheostat. The current can be determined by dividing the closed-circuit voltage by the resistance, R_c, connected to the battery.

$$\text{Current (I)} = \frac{\text{Closed-circuit voltage } (E_C)}{\text{Resistance of coil } (R_C)}$$

If the voltmeter has a rather low resistance, considerable current will be

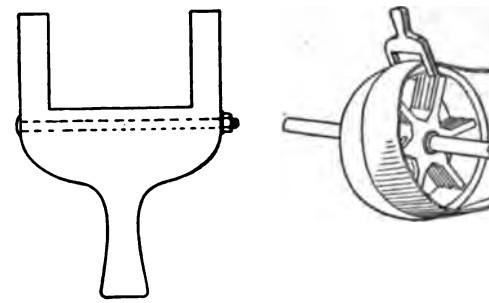


Voltmeter and Ammeter Connections

taken from the battery to operate it, and its indication, when there is no resistance across the battery, will not be the total voltage of the battery, as there is a small part of the total battery pressure required to cause the voltmeter current to pass through the internal resistance. Hence it is desirable to have a high-resistance voltmeter.

Belt-Throwing Yoke

To make the job of putting a belt on a pulley by hand simple and safe, cut a fork or yoke from a wood block 1¼ in. thick, with a handle of sufficient length, as shown, and use it in place of the bare hand. The fork should be


Yoke and Manner of Using

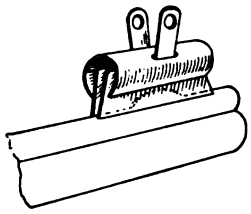
reinforced with a bolt to prevent its splitting.

The belt is thrown on the revolving pulley by pulling the fork over the wheel and belt at the same time.

Where there are several sizes of belts and pulleys, a belt yoke can be made for each width.—Contributed by John V. Loeffler, Evansville, Ind.

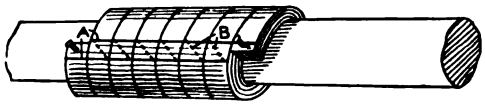
Temporary Globe Sight for a Gun

An ordinary bill clip of the type shown in the sketch makes a good globe sight when fitted to a rifle having a large front sight. The clip is simply set over the sight on the end of the barrel.—Contributed by James M. Kane, Doylestown, Pa.



Cutting Packing on Wood Mandrels

The following hints may be of practical assistance to some engineers in cutting packing on wooden mandrels, says a correspondent of Power. As a rule, the space between the ends of a ring should be about ⅛ in, for every



Packing on the Mandrel

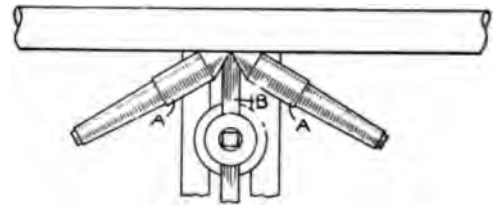
1 in. diameter of the rod. Using that as a basis, the following sizes of wooden mandrels are necessary for winding the coil packing to cut it for the various sizes of rods:

Diameter of Rod	Diameter of Mandrel	Diameter of Rod	Diameter of Mandrel
¼	15/16	1⅝	1⅝
⅜	1⅛	1¾	1¾
½	1⅜	2	1⅞
⅝	1½	2¼	2⅛
¾	1¾	2½	2⅜
⅞	1⅞	2¾	2⅝
1	2⅛	3	2⅞
1¼	1 5/16	3¼	3⅛
1½	1 9/16	3½	3⅜
1¾	1 13/16	3¾	3⅝
1⅞	1 15/16	4	3 13/16
1⅝	1 11/16		

Nail one end of the packing on the mandrel. Wind the packing spirally around the wood and nail the other end. Mark two lines, A, parallel to the axis of the mandrel and about 1¼ times the thickness of the packing apart. The packing is cut into rings by cutting obliquely between the parallel lines, as shown by the dotted lines B. This will make about the right allowance for the end expansion of the packing. Before inserting the rings, they should be dipped into cylinder oil and placed in position so that the open spaces are staggered and do not fall one on top of the other.

To Set a Lathe Tool

In preparing to cut a thread one day, I could not find the center gauge and, to set the threading tool B, I made use

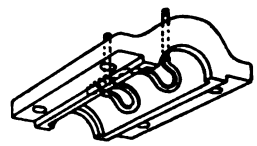


Setting Tool at Right Angles

of two other centers, A A, as shown in the sketch. The angle of both centers and the threading tool combined made 180 deg., so that the threading tool B was thus set at right angles to the work.—Contributed by H. Robinson, New Bedford, Mass.

Water-Cooled Bearing Cap

The accompanying sketch shows how a large, high-speed, heavy-duty bearing cap, which ran hot very often, was effectively cooled with water. As may be seen, the cooling was accomplished by placing a coil of pipe in the babbitt space. The babbitt was subsequently poured over the coil, completely imbedding it. Although the thickness of the babbitt over the coil was much less than ordinary, no



difficulty was experienced, and the overheating of the bearing was effectually stopped.—Contributed by J. J. O'Brien, Buffalo, N. Y.

To Straighten or Bend a Shaft

The principle of the method of bending a shaft here described applies to the straightening as well as the bending of bars, shafts or castings. In the sketch is shown a shaft which it is desired to bend in the direction of the dotted line. It is held in the center of a lathe, a pinch bar is pressed against

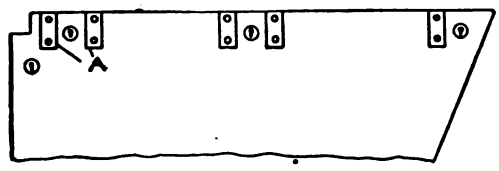


Bending a Shaft

the under side, and while thus sprung, the upper side is given repeated blows with a hammer, the heft of the blows depending on the size of the shaft. In this way it is easy to give a permanent "set" to a piece. The piece may be held or clamped in any position or manner that suggests itself or is most convenient, the point of the trick being to hammer on the high side while in the sprung position. Heavy bars are easily set.—Contributed by D. A. Hampson, Middletown, N. Y.

Reinforcing Side Curtains on Buggies

The side curtains of a buggy top will in time become sagged and, in that condition, do not present a neat ap-

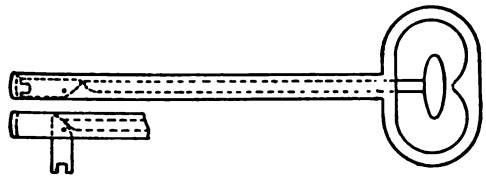


Leather Strips on the Curtain

pearance, nor will they keep out rain or snow. I remedied this by fastening pieces of sole leather, 1 in. wide and 2 in. long, one on each side of the buttonholes as shown by A in the sketch. These should be put on while the side curtains are new and not much used. —Contributed by Bennett Vanfossan, Cove, O.

Door Key for a Round Hole

The illustration shows the construction of a key to fit a round hole. The main feature of this key is to prevent

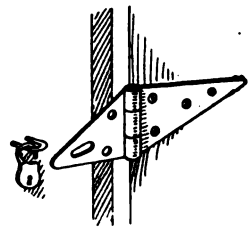


Movable Tumbler-Turning Projection

the use of skeleton keys in the lock. The key is inserted in the hole, then the plunger or rod is pushed in, which forces the tumbler-turning projection out into position.—Contributed by Francis Chetlain, Chicago.

Hasp Made of a Hinge

Requiring a hasp and having none handy, I made one from an old strap hinge, as shown in the illustration. This served the purpose as well as the ordinary hasp. To still better prevent interference, the part screwed to the door can be bent over the edge, and the screws turned in from the back side.—Contributed by Oscar N. Anderson, Canby, Minn.



An Electrician's Pipe Wrench

A wrench that will be handy for putting up gas or combination fixtures can be made of a common alligator wrench and a piece of steel to form an offset handle. The manner of construction

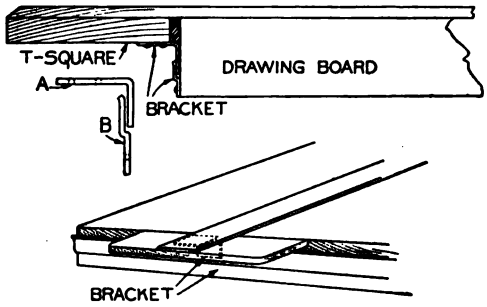


Extension Handle on Wrench

and dimensions for the handle are shown in the illustration.—Contributed by E. G. Backus, Hackensack, N. J.

T-Square Attachments for a Drawing Board

The attachments are used to hold the T-square firmly against the edge of the drawing board. The end of the

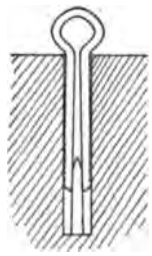


Parts Attached to the Board

board is fitted, for its whole length, with a brass strip 1 in. wide and $\frac{1}{16}$ in. thick. This strip is bent as shown at B. A small piece of brass is shaped as shown at A and two holes drilled for screws to fasten it on the head of the T-square. The long brass strip is also drilled, and fastened to the board with screws. The lower bracket or strip bears against the small angle A and keeps the square in the right position, while at the same time allowing it to be freely moved up and down the board.—Contributed by Chas. Homewood, Waterloo, Iowa.

A Substitute for an Expansive Bolt

If in need of an expansive bolt when there is none at hand, use an ordinary cotter. Pick out a pin a little smaller than the hole bored to receive it. File a few grooves in the outer surface and insert it in the hole with a wood wedge between the legs. As the wedge strikes the bottom of the hole it forces the legs of the cotter apart and expands it against the sides of the hole. Small metal rings can be very easily fastened to sidewalks or walls in this manner.—Contributed by G. H. Holter, Jasper, Minn.

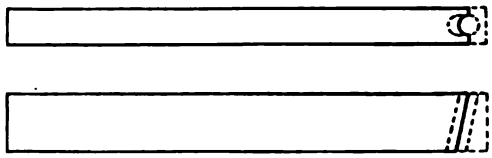


Inflating a Bicycle Tire without a Pump

When going out for a ride on my bicycle one day, I found that a tire was without air, and I had no bicycle pump. The idea occurred to me to use the water pressure from the hydrant. I drained the garden hose and made a tight connection between the nozzle and the tire valve. I then turned on the water which forced the air in the hose into the tire. When the desired pressure was obtained, I broke the connection and turned off the water.—Contributed by James Leslie, Arrowrock, Idaho.

Forming a Lathe Tool

A number of cam rolls with a rounded face had to be made, and not desiring to spend much time on them,



Showing Part Cut Away

I avoided making a template from which to file a tool in the following manner: The stock for the tool was tilted at an angle of 10 deg. and a hole drilled of the proper diameter. The surplus metal shown by the dotted lines was then removed from the front of the tool.—Contributed by Jos. C. Wilson, W. Lynn, Mass.

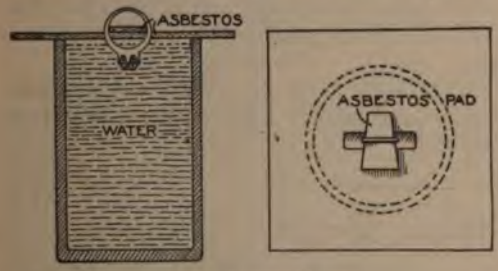
How to Drive Nails to Avoid Splitting

When it is necessary to drive nails in places where there is danger of splitting, and a drill of the proper size is not at hand for starting a hole, simply file or grind the point of the nail to a chisel edge instead of the regular four-sided point, and drive the nail with the sharp edge thus made cutting across or at right angles to the grain of the wood.—Contributed by Aug. Gertenbach, Quincy, Ill.



Hard-Soldering a Stone-Set Finger Ring

A method of soldering a stone-set ring without danger to the stone from the heat is illustrated in the sketch. An earthenware jar is filled with water and a piece of sheet asbestos having a hole in the center is placed on top of the jar. The ring is put in the hole with the stone downward in the water and a tapering piece of asbestos is slipped in the opening as far as it will go, for a support. Apply borax and water with the solder to the joint and the ring will stand the hottest flame

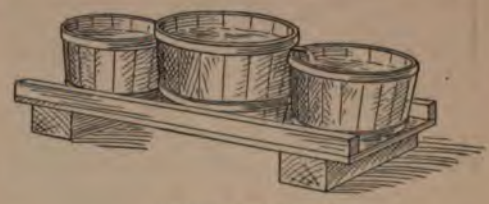


Jar with Asbestos Cover

without damaging the settings.—Contributed by Wm. A. Jones, Raleigh, North Carolina.

Watering Tanks

Some animals like to splash the water after they have quenched their thirst. This will render the water unfit for use of other animals, and also causes a muddy place near the tank. I have prevented this by making the arrangement shown in the sketch. Iron-hooped barrels were used for tanks. They were sawn in the center and the half barrels set on a broad platform made of several planks. The one shown is made of three half barrels, the center one being a little larger



Half Barrels on Base

than the other two. They were held in place on the planks with a piece of 2 by 4-in. material bolted at each edge. Their inner surfaces were notched to fit the barrels. Two short pieces of pipe connect the center tank to the other two. The center tank receives the water from the source of supply. A small stream of water, kept flowing in and out all the time, keeps the water from becoming stagnant.

The earth can be kept dry about water tanks of any kind by preparing the base as shown. The overflow or leakage will drain away and prevent a mud hole. Many times ashes or dirt are thrown about a tank to absorb the moisture which makes the leakage flow back under the tank. The constant

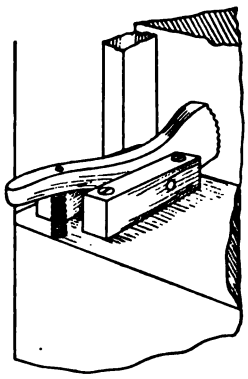


Surface Construction beneath Tanks

dampness rots the wood and renders the foundation insecure.—Contributed by J. G. Allshouse, Avonmore, Pa.

A Window Lock

A combined window lock and stop that is handy for the summer time is made of wood or metal as desired and attached to the upper part of the lower sash with screws. The serrated edge of the lever is kept in close contact with the upper sash by a coil spring placed under its outer end. Either sash can be adjusted and locked at any point. The stop also keeps the sash from rattling.—Contributed by S. Yamaskita, Hoquiam, Wash.



How to Make a Concrete Settee

A concrete settee for the summer house, cemetery or lawn, can be easily made over an old discarded wood settee. The one described was made over an old depot seat, which was 10 ft. long, with a cast-iron frame and wood slats for the back and seat. The seat was cut to make it 6 ft. long. This was done by removing the screws holding the slats and sawing the slats to the proper length, then securely fastening them again.

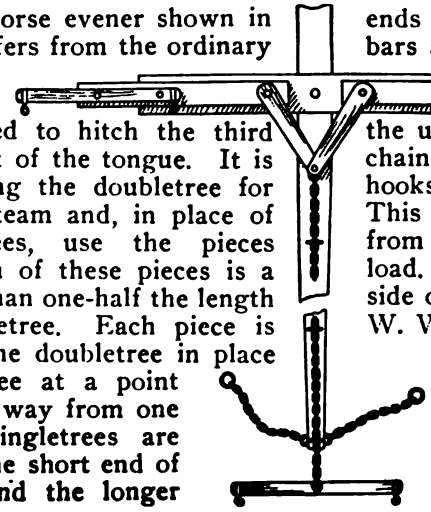
The back was reinforced with two ⅜-in. rods crossing it in the form of an X, which were passed through small holes drilled in the casting behind the slats, and drawn up tightly. Similar rods were crossed under the seat. This made the frame very rigid and the whole thing was then covered with expanded metal such as used for stucco houses. This was nailed to the slats and wired to the legs and other metal parts. The entire settee now appeared as if it were made of expanded metal.

A stiff mortar of sand and cement, with about two parts of sand to one of cement, was applied to the metal lath, care being taken to fill all the openings in the meshes. The mortar was applied until the metal was all covered, then a smooth coat put over it. This made a solid settee that would stand any kind of weather.—Contributed by W. E. Morey, Chicago.

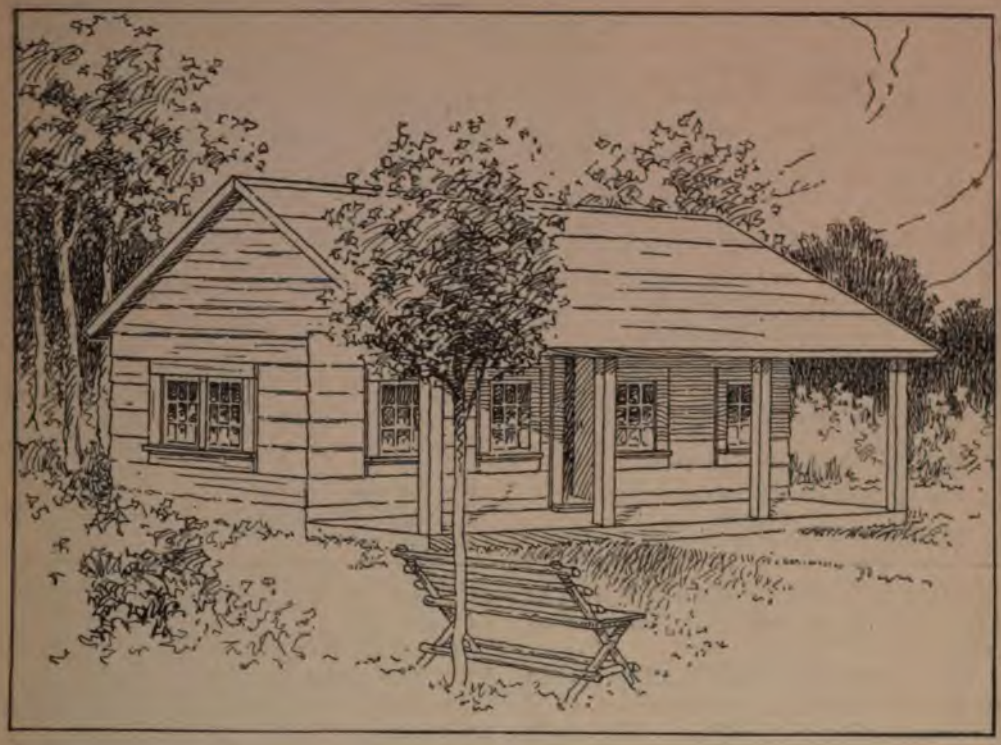
¶A white spot on furniture varnish may be removed by holding a hot iron over it.

A New Three-Horse Evener

The three-horse evener shown in the sketch differs from the ordinary kind in that extension parts are used to hitch the third horse in front of the tongue. It is made by using the doubletree for a two-horse team and, in place of the singletrees, use the pieces shown. Each of these pieces is a little longer than one-half the length of the doubletree. Each piece is fastened to the doubletree in place of a singletree at a point one-third the way from one end. The singletrees are fastened to the short end of *the pieces,* and the longer ends of the two are joined with two bars and a clevis which is attached to a chain running on the under side of the tongue. The chain is kept from sagging by several hooks or rings fastened in the wood. This evener prevents the lead horse from pulling the greater part of the load. The sketch shows the under side of the tongue.—Contributed by W. W. McLean, St. Louis, Mo.



¶A small brass tube forced through the earth into a gopher hole leaves a channel for charging the animal's nest with poison or gas.



How to Build a Permanent Camp

By FRANK L. RUSSELL

To the man who delights in the woods or takes pleasure in spending an occasional week in pursuit of the elusive game fish, but whose time is limited, and whose purse has not yet reached proportions which make it burdensome, a permanent camp, at some favorite spot where the smell and soot of soft coal have not entirely driven off the invigorating fragrance of the pine and hemlock, is a great source of enjoyment.

A camp of this sort need not be expensive, if a person has had some experience with tools, and has ingenuity to overcome the trifling problems presented by local conditions. The comfortable camp which I am about to describe need not cost over $200 at the outside, and by the judicious selection of material may be built for as low as $125. While this little house of mine was built for a camp, it would make a far better home for a pioneer farmer than many I have seen that cost three times the amount that this one does.

In making up the accompanying list of materials, however, nothing necessary for the construction is omitted, but the builder can substitute for porch posts or corner posts lengths of small trees dressed to take the siding or porch floor plates.

The roofing can be made up of 16-ft. boards, laid horizontally, with the joints staggered. The appearance of the interior will be greatly enhanced by having the roofing boards of matched lumber, surfaced on both sides, and one side beaded. The studs, plates, tie joists and rafters will also add to the appearance, if they are surfaced on all sides.

The amount given in the material list for flooring will figure more than the actual surface. This is for waste

List of Materials

FOUNDATION POSTS
12 posts, 6 in. or more in diameter and from 4 to 6 ft. long.

FLOOR JOISTS
31 pieces, any inexpensive wood, 2 by 10 in., 12 ft. long.
14 pieces, 2 by 10 in., 10 ft. long.
3 pieces, 2 by 10 in., 16 ft. long.

STUDS
46 studs, 2 by 4 in., 6 ft. long.
3 studs, 2 by 4 in., 16 ft. long.

PLATES
20 pieces, 2 by 4 in., 16 ft. long.
12 pieces, 2 by 4 in., 12 ft. long.

UPPER JOISTS OR TIES
13 pieces, 2 by 4 in., 12 ft. long.
13 pieces, 2 by 4 in., 8 ft. long.

RAFTERS
26 pieces, 2 by 4 in., 14 ft. long.

SIDING AND PARTITIONS
65 boards, ⅝ by 12 in., 16 ft. long, S-4-S.

ROOF
Sufficient lumber to cover 1,000 sq. ft.

FLOOR
Sufficient tongue-and-grooved boards to cover 700 sq. ft.

ROOFING
Sufficient prepared roofing material to cover 1,000 sq. ft.

EAVE-FINISHING MATERIAL
4 boards, ⅝ by 4 in., 16 ft. long, S-4-S.
4 boards, ⅝ by 4 in., 14 ft. long, S-4-S.

WINDOWS
2 double casements.
6 single casements.

DOORS
88 sq. ft. of ⅝-in. tongue-and-grooved material, S-2-S, in 14-ft. lengths.

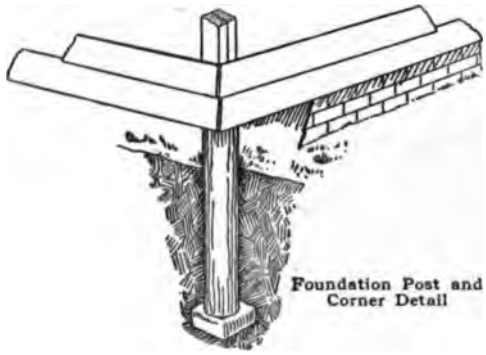
DOOR CASINGS
6 pieces, ⅝ by 6 in., 7 ft. long, S-4-S.
1 piece, ⅝ by 6 in., 16 ft. long, S-4-S.
6 pieces, ⅝ by 1 in., 7 ft. long, S-4-S.
1 piece, ⅝ by 1 in., 16 ft. long, S-4-S.

HARDWARE
15 pairs of hinges.
2 chain bolts.
3 locks.
10 sets of hooks and eyes.
About 50 lb. of 20 d nails.
50 lb. each 10 d and 8 d nails.
Screws for locks and hinges.

and loss in matching the boards. The same will hold true with the roofing material.

There are several kinds of prepared roofing material. Some of it is a good imitation of red shingles. The nails and washers are furnished with the roofing. Be sure to have the nails shorter than the thickness of the roofing boards.

The windows can be purchased complete with sash and frames, including



Foundation Post and Corner Detail

the outside trim. The size to purchase is sash having 9 lights of 8 by 10-in. glass.

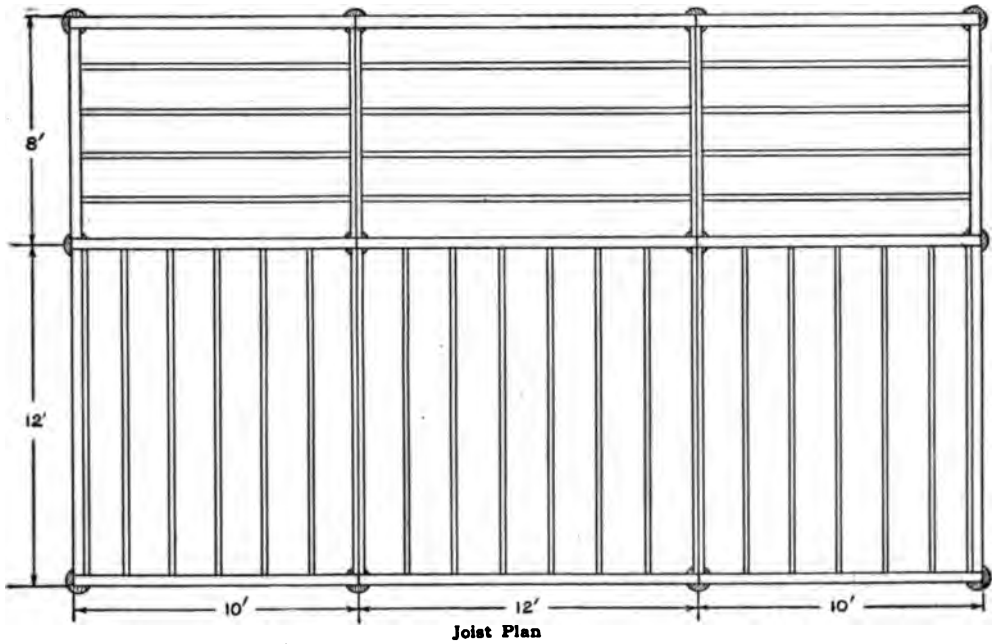
A full set of carpenter's tools is not necessary. A hammer, crosscut saw, rip saw, square, level, chalkline, block plane, screwdriver, one ¼-in. and one ½-in. chisel, a mallet, brace, and set of bits are the tools most necessary.

The first thing to do is to locate a level site and lay out the ground plan with stakes and the line. Square this up so as to form a perfect rectangle, 20 ft. by 32 ft. Locate the foundation posts and dig holes for them. Allow their upper ends to project 6 or 8 in. out of the ground. The posts are set in the holes as shown in the sketch. A few stones or flat rocks placed in the bottom of each hole will make a firmer foundation. Before tamping in the earth about each post be sure it is in its proper place. This can be determined by the line.

A 12-ft. straightedge should be made from one of the flooring or finishing boards and used with the level in lining up and leveling the top ends of the posts. After marking the tops with the aid of the level and straightedge they are sawed off and the joists placed on them as shown in the joist plan. The ends of each joist are kept in place with spikes driven through the stringers. The location of the joists can be found by laying out the divisions given in the plan. They are bridged through the center as shown in the detailed sketch.

After the joists are all in place lay three lines of floor plates for the studs,

two on the long sides and one on the line of the wall back of the porch. These are squared to fit in place and spiked to the joists. A few boards are laid temporarily on the joists and the studs made ready for raising. It



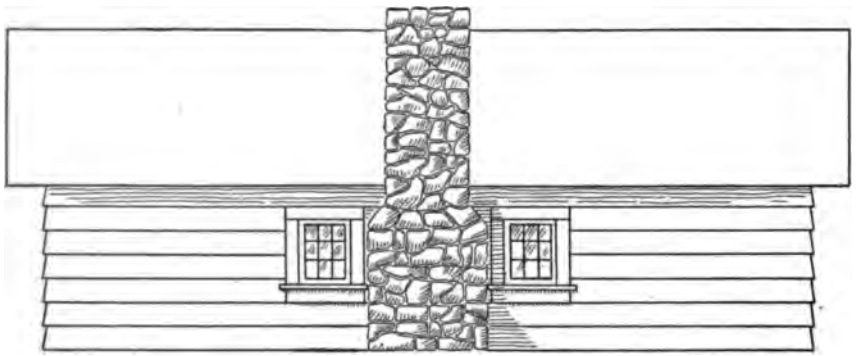
Joist Plan

would be well to purchase a dozen or more rough boards 16 ft. long for this purpose and for staging where required. The studs are measured, squared, and sawed to length.

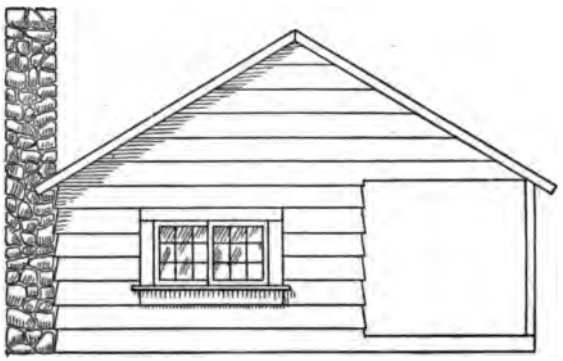
The location of each stud is laid out on the floor plate; first measure the width of the window frame which is set between studs, and locate them to fit the frame. After marking these plates, the upper plates that go on top of the studs are laid out by the floor plates and marks made to locate the studs in exactly the same positions. Each pair of plates should be similarly marked. As the top plates consist of double pieces, they are cut with the joints staggering, and after spiking one plate to the top ends of the studs, the other one is then spiked on top of the first. This operation is done while the studs and top plates are lying on the temporary floor. After accomplishing this bit of work, the entire side is raised and braced to the joists, after which each stud is plumbed and braced to keep it in the right place until other work is finished. Both sides and porch posts are raised in like manner and the tops joined by the upper joists or tie pieces. The locations of these are laid out on the top plates, as shown by the rafter plan. Each piece is placed on the outside of each rafter location, beginning in the center until the ends are reached, then each end tie is placed on the inside of each last rafter. They are toe-nailed to the plates. Be sure to properly brace the studs both ways and keep them plumb as the work progresses.

The rafters are now laid out and cut, then raised in pairs in the positions designated, the upper beveled ends being spiked together. The lower ends are spiked to the plates. They are then braced to keep the space between them equal. It may be well to state that the bracing for the studs and rafters is only temporary and a few of the flooring boards may be used for this purpose.

The end studs are now cut and put in place with top plates. Be sure to measure the window frames before locating the studs on the plates. The



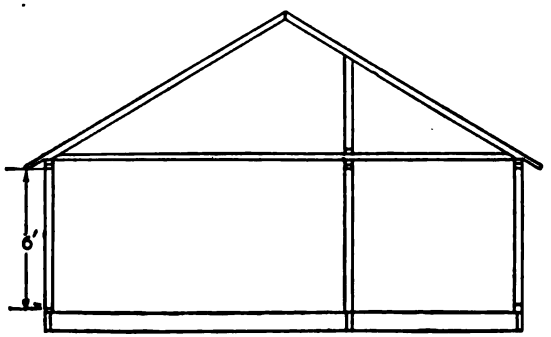
Back Elevation



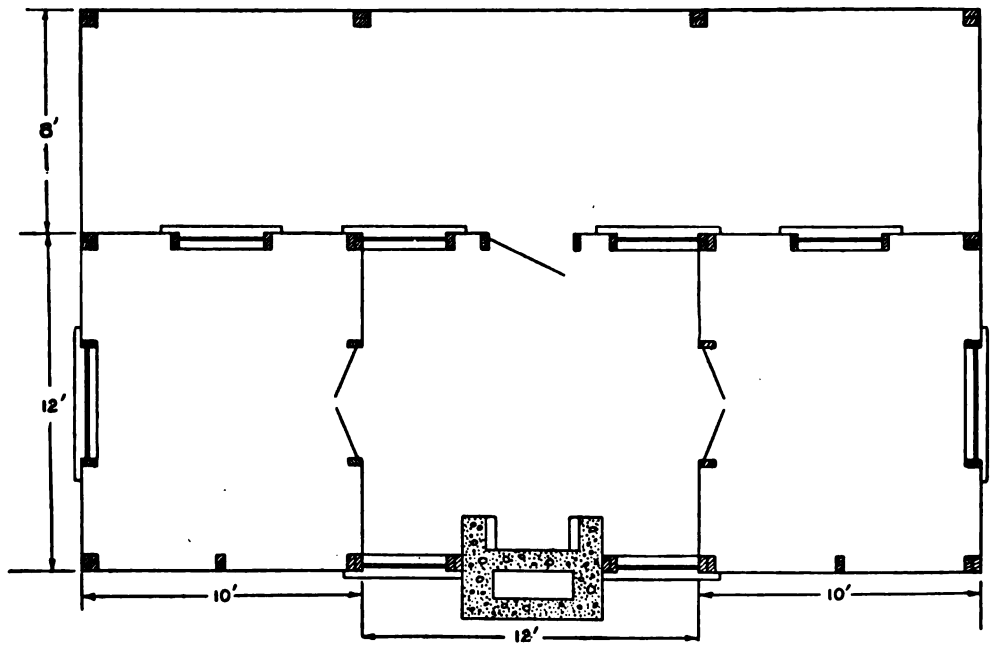
End Elevation



Front Elevation



Section through Center



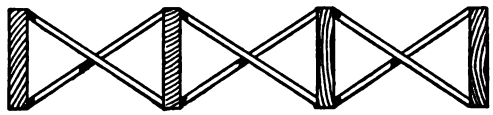
Floor Plan

plates are cut to fit in between the ends of the plates running the long way of the building, or they may be lapped at the corners, one crossing the other, if desired.

The roofing boards are next laid on the rafters. If beaded material is used, the beaded surface is turned down. Start at the bottom and lay the boards toward the top, staggering the joints and cutting them to match on the rafters. Be sure to draw the tongue closely in the groove before nailing each board. Allow the ends to project about 13 in. over the end rafters. When this is complete mark the projecting ends of the boards on the gables at the ridge and the eaves 12 in. from the outside surface of the location of the siding. Chalk the line and snap it full length on both sides of the roof at each end on the 12-in. mark. Saw the ends of the boards off square on the chalked line and proceed to put on the finishing boards.

The finishing boards are nailed to the ends of the rafters at the eaves, and to the ends of the roofing boards on the gables. The boards are now ready for the roofing, which is cut in horizontal lengths. Each length is put on and nailed down with the roofing nails and washers, placing them only in the lower edge of each piece. Begin at the bottom on both sides and lay the lengths the same as shingles, overlapping the edges 3 or 4 in. The lower edge of the first length is turned over and nailed into the eave-finishing boards, and the ends turned over and nailed into the gable-finishing boards.

Nailing the siding in place is next in order. A 1-in. strip is nailed at the bottom edge of the stringers and joist to make the slant for the first row of


Joist Bridging

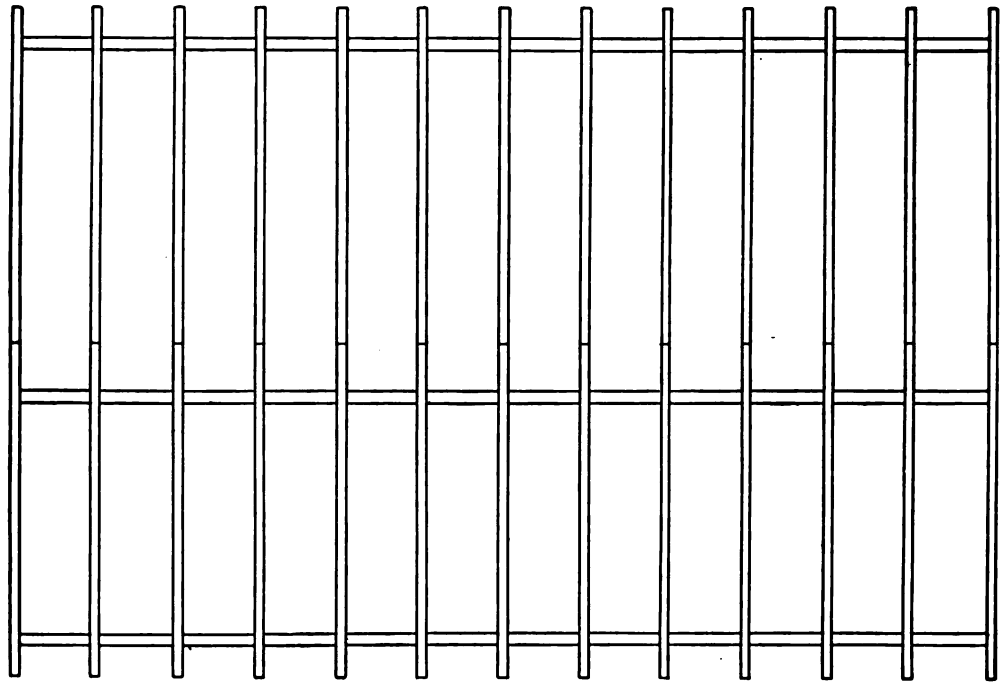
boards. These pieces can be cut from any rough material. The siding boards are lapped about 1 in. This lap can be determined by stepping the divisions—seven for the space up to the top of the upper plates—on the corner and window studs. The boards are so cut as to have them project a little over into each window space. When

the boards are all on, this allows sufficient end for making a chalked line and sawing to closely fit the window frame.

The ends at the corners are cut on a bevel, so that the boards will fit without upright corner-finishing boards. The detail sketch of the corner shows how the joint is made. Commence nailing the boards on at the bottom and finish the course around the building before starting the next course. After nailing the siding on, plumb and make chalked lines for the window frames and saw off the projecting ends of the boards. Put in the frames and hinge the sash at the top or sides as desired.

The flooring is now laid. Be careful to draw the tongue-and-grooved edges close together. After laying both porch and inside floor, lay out the location for the partitions and set the studs. The partition boards are not lapped. They are only nailed on to cover the space up to the top of the plate, the upper part being left open for ventilation. A plate is nailed on the upper joists or ties just over the wall studs back of the porch, and studs cut and nailed into place connecting the rafters to make the wall extend to the roof.

The open part on the outside below the joist can be covered with metal,



Rafter Plan

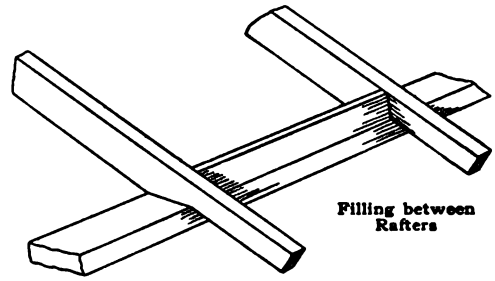
made to imitate brick or stone, to keep vermin out. If an oil stove is used for cooking, there is no need of a chimney, but if a stove is used a chimney can be constructed of terra-cotta sewer tile. If a fireplace is wanted, one can be put in with field stone or brick. The one shown is of field stone picked up in the vicinity of the building. In building the fireplace, the stringer on the back side of the building is cut out, the ends of the joists cut off and a header put in, back far enough for the front of the fireplace, and the stone or brick started on the earth and built up through the opening, carrying it up and finishing with a chimney. When putting in the fireplace it is best to provide four extra foundation posts to set at the ends of the header and at the ends of the stringer where it is cut.

The boards for the doors are placed

on two timbers having a level surface, and they are drawn closely together with clamps, or they can be placed between blocks spiked to the timbers and drawn together with wedges. After the tongues of the boards are drawn closely in the grooves, two battens are nailed across the boards, one near each end, and one batten is nailed diagonally between them. Use short nails, driven in on a slant, so that they will not pass through the boards. Be sure to have enough boards to make the full size of the door with a surplus sufficient for dressing to fit the opening. The doors are then fastened to the casing the same as an ordinary door.

It is best to paint the outside with three coats of paint, allowing each coat to dry thoroughly before the next is applied. If surfaced material is used, the interior can be stained to produce a pleasing effect.

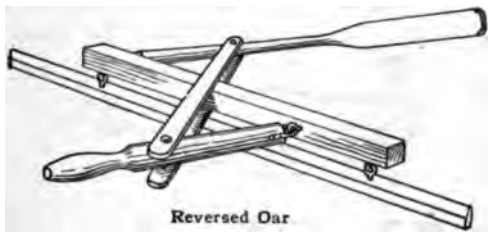
The size and construction of this



house may be somewhat modified, but the general scheme is especially adapted for a permanent camp in the woods, or near a river or lakeside.

Attachment which Permits Oarsman to Face Forward

When a person rowing wants to face in the direction he is traveling, the


Reversed Oar

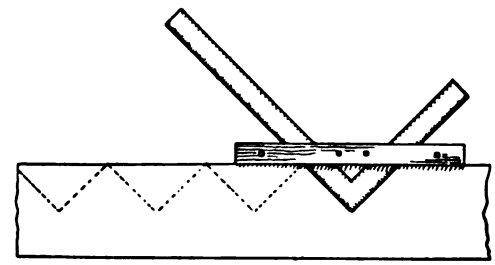
attachment for each oar shown in the sketch will serve his purpose. The oar is cut in two at the place where it rests in the oarlock of the boat. Each part of the oar is hinged to a piece, which is also hinged to the gunwale of the boat. The oar parts are connected with two straps of metal. The construction is clearly shown.

How to Sharpen Old Files

A method to sharpen old files that has proven quite satisfactory, although it is rather odd, is to clean them of all grease and foreign matter and suspend them from a metal plate, by a piece of bare wire, in a bath of 3 parts of sulphuric acid, 6 parts of nitric acid and 100 parts of water. Several plates of carbon should be immersed in the same bath and connected by bare wires to the metal plate supporting the files. The cavities in the file are eaten deeper, and the edges are made almost as sharp as if worked by a file cutter.

Laying Out Stair Strings with a Square

In laying out stair strings I find that time will be saved if I attach two $\frac{7}{8}$-in. strips of wood, one on each side


Clamps on the Square

of the square, as shown in the sketch, so as to obtain the desired rise and run. All treads can be quickly and accurately marked with this device.—Contributed by C. Elmer Boehmer, Pittsburg, Pa.

Small Clamp for Woodworkers

Cut two pieces of $\frac{3}{16}$-in. sheet metal, 2 in. wide and $3\frac{1}{2}$ in. long as shown at A, Fig. 1. Make a slot at

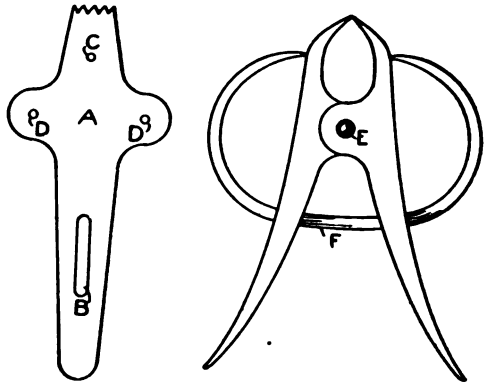


FIG. 1 FIG. 2

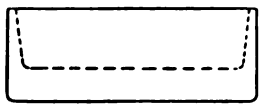
Woodworker's Clamp

B, a little over $\frac{3}{4}$ in. long by $\frac{1}{8}$ in. wide. Drill $\frac{1}{16}$-in. holes at points DD, and make a dent at C. File small notches in the end as shown.

Bend or hammer the plates to the shape shown in Fig. 2 and fasten them together with a rivet E. The spring F passes through the slot B in each jaw and the points are set in the dents made at C. This makes a very handy clamp for small woodwork.—Contributed by W. B. Matthews, Rochester, New York.

Melting Pot for Cyanide of Potassium

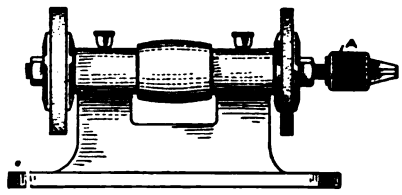
For ordinary casehardening (other than the slow process called pack hardening), I have found a most useful adjunct in the cast-iron melting pot shown in the figure. As will be noticed, it has a relatively thick bottom. This is an advantage over ladles and similar thin receptacles because it is not easily burned through in the forge fire, it retains the heat when once brought to a red, and it does not readily warp. Enough cyanide should be put in to fill the pot about half full when melted. Then it is only necessary to drop in small pieces to be hardened, leave them a couple of minutes, and dip in water. An article immersed in a red-hot liquid heats up more quickly than if in a red-hot coal fire, because of the more complete contact of the source of heat.



When casehardening for colors, this pot turns out work perfectly clean. If it is possible to have running water, an air jet in a tank of water or a water jet, the full benefits of the melting pot are realized and one is rewarded with fine mottled surfaces. The pot is round in shape and may be made of any size proportional to the work at hand. For small screws and nuts, a pot 4 in. inside diameter by $1\frac{1}{2}$ in. deep is sufficient.—Contributed by D. A. H.

Combined Emery Stand and Speed Lathe

The ordinary emery stand can be used as a speed lathe by boring a hole in the end of the spindle and inserting a chuck, A. This can be used for filing



Chuck on End of Shaft

pins, polishing and lapping bushings for jigs, and for a number of small jobs that have to be done on a regular speed lathe.—Contributed by F. G. Marbach, Cleveland, O.

Rubber Stamps Used on Tracing Cloth

Sometimes a number of blueprints are needed for announcements or other purposes, and to make the tracing by the usual method would take several hours of time. With a set of rubber type and a pad of heavy-body black ink one can do the work very quickly and better than if the letters were drawn.

The tracing cloth or paper is placed

upon the board as usual, and the spaces for the letters marked with a hard pencil. The rubber types, thoroughly inked, can then be applied in their proper order. If an imperfect print of the letter is made, a very soft eraser used at once will easily remove the ink. A simple border can be drawn around the letters, if desired. The cloth or paper will dry in a few minutes and the blueprints made therefrom will be as good, if not better than when made in drawing ink with a pen.

Repairing Tire-Casing Blowout with a Strap

Every person running an automobile will at some time have a blowout in the outer casing. When this happens in the country or away from home, a casing of the required size cannot always be secured at small shops, so the autoist must make some kind of a repair. I have found that a strap about



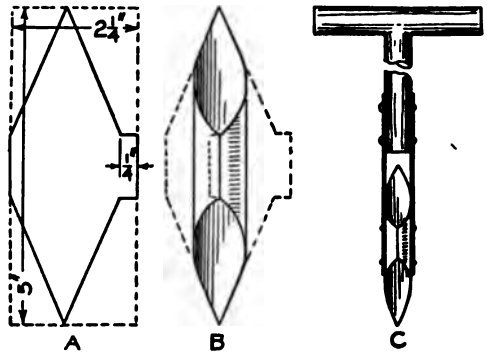
1 in. wide and long enough to reach seven or eight times around the tire makes a very satisfactory repair covering in emergencies.

The strap should have a buckle and a keeper at one end and a number of holes at the other. In placing the strap, a portion of the air is let out of the tire; then the strap can be wrapped tightly. After the strap is in place, inflate the tire and it will give from 300 to 500 miles' service. A strap can usually be secured at any farm house.

How to Make a Weed Puller

The puller is made of a piece of heavy galvanized iron, 5 by 2½ in., cut as shown at A, and bent into the shape B. After shaping the metal, the small ¼-in. projection is placed under the opposite side and then soldered. The tube-shaped metal is then fastened to a handle with two pieces of strap iron, using bolts and rivets as shown at C.

The puller is used by pushing the

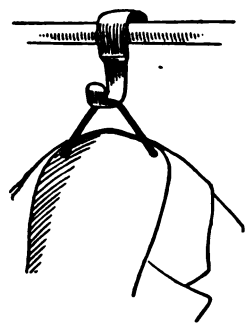


Pattern and Shaped Metal

sharp point of the metal into the earth, having first inserted the stalk of the weed in the hole. Then turn the handle and draw the puller out, and the weed with all its roots will be removed.—Contributed by Arthur L. Chetlain, Chicago.

A Coat Hanger

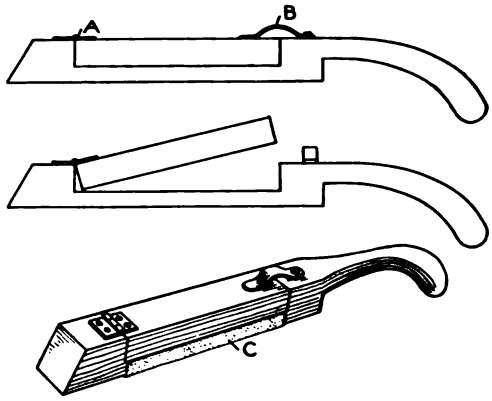
When attending a meeting or social assemblage where no accommodation is made for wraps, I find it very handy to take along an ordinary picture hanger. The broad end can be hung over any window sill, door or any protruding object and the coat hung on it as shown in the sketch.—Contributed by J. A. Whamer, Schenectady, N. Y.



¶Aluminum surfaces may be cleaned with a stiff-bristled brush and a solution of from 5 to 8 parts of water to 1 part of sulphuric acid. Then a mixture of fine emery and turpentine should be applied vigorously with the same brush.

A Sandpaper Holder

The accompanying illustration shows the construction of a sandpaper holder used by a carpenter. The



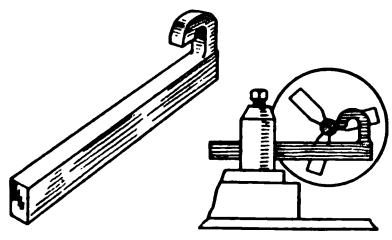
Holder for Sandpaper

hinge A and lock B are of iron, the other parts are of wood. After the sandpaper C is placed around the bottom of the holder, it is folded up and over the space covered by the holding block. The lock is swung around on the pivoting screw, fastening the block and holding the sandpaper securely.—Contributed by Jas. M. Kane, Doylestown, Pa.

A Back Cutting-Off Tool for a Lathe

When cutting off drill rods or small wire in the lathe with an ordinary cutting-off tool, much trouble is experienced owing to the fact that the tool will either dig into the work or else the work tries to climb on top of the cutting-off tool.

A tool made like that shown in the



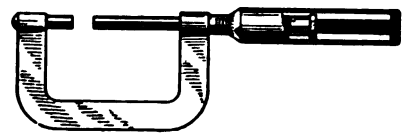
Back Cutting-Off Tool

sketch will work extremely well. The only difference between this and the ordinary tool is that the work is cut off from the back instead of in front. The tool will spring away from the work instead of digging into it and when the piece is cut off, it will have a nice smooth face and be straight.—Contributed by Chas. Homewood, Waterloo, Iowa.

How to Make a Micrometer

A caliper that will read in thousandths of an inch is a very handy tool, but its high price prohibits many amateurs from possessing one. However, by following the directions closely, one that will fill all the requirements of the most expensive instrument can be made at a nominal cost.

The frame is cut from heavy sheet metal and the ends rolled over to form openings ¼ and ⅜-in. in diameter. A piece of brass tubing, ⅜ in. outside diameter and 2 in. long, is fastened securely into the larger opening. On the other end of this tube braze a nut tapped with a ¼-in. tap, having 40 threads. The sleeve is made of an-



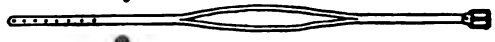
Homemade Micrometer

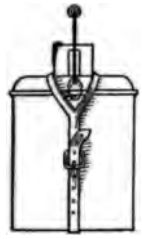
other piece of tubing large enough to go over the nut. Fit a bushing in one end of this sleeve and bevel the other to about 45 deg. Divide the bevel on its circumference into 25 parts, numbering every fifth graduation, beginning with zero. Thread a 4-in. rod about half way to fit the nut and fasten it in the outer end of the sleeve with a bushing. The anvil is a piece of ¼-in. rod fastened in the opposite frame opening, allowing it to project inside the frame ½ in. Run the sleeve down until the screw comes against the anvil and make a mark on the stationary tube to register with the zero mark on the sleeve and at right angles to it. Turn the sleeve one revolution and make another mark. Continue this operation until the caliper is

opened to its full capacity. One complete turn of the sleeve represents 1/40 in. One twenty-fifth of a turn equals 1/25 of 1/40 or 1/1000 in. Half and quarter thousandths can be readily estimated.—Contributed by A. Weaver, Clemmons, N. C.

Strap for a Metal Lunch Pail

One day I noticed that the lunch pail carried by a workman had a leather

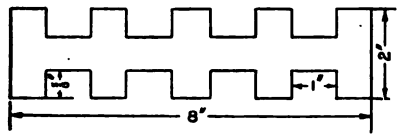




strap, cut in the center and placed around the lunch pail as shown. This is a very good idea for anyone that wishes to carry the lunch pail so that the cover is held tightly and safely in place.—Contributed by Jas. E. Noble, Toronto, Canada.

Carrier for Lead Fuse Wire

An exceedingly handy and simple arrangement for carrying fuse wire in a kit can be made of a leather strap, 8 in. long and 2 in. wide. Cut four notches on each side of the strap, each pair of notches being directly opposite. The notches are 1 in. wide and 5/8 in. deep. Four sizes of wire can be kept

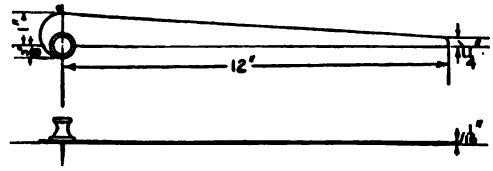


Notches in Leather Strap

on this strap, where it will not get twisted and is always easily found.—Contributed by G. B. Pollock, Chicago.

Drawing Points on the Circumference of a Circle

When it is necessary to draw a number of locations for bolts, studs, rivets, etc., on the circumference of a circle in drafting, the spaces are generally stepped off with the dividers and their center lines drawn with an angle. This is a very tedious job and I therefore constructed a straightedge of celluloid, as shown in the sketch, to draw these



Straightedge for Drawing Points on a Circle

lines rapidly. It is held to the center of the circle by a glass-head push pin, while the bar is being swung around to any point on the circumference to draw the centerlines. The hole for the pin is made an easy fit.—Contributed by C. P. Caulkins, New London, Conn.

How to Make an S-Wrench

Secure a piece of 10-in. I-beam, ½ in. thick, and heat the flanges and turn them outward to fit over nuts of the desired size. Bend the web into S-shape as shown, and finish as desired. This

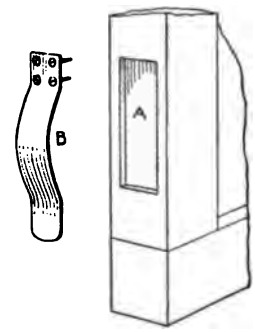


Made of I-Beam Section

is a simple way of making a very good wrench, which, being of the best material, is also very strong.—Contributed by W. H. Ruchlein, Soldier, Idaho.

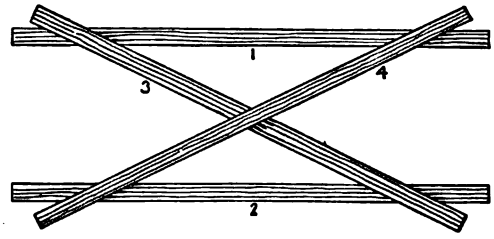
Substitute for Window Weights

Cut a groove in the window sash on one or both sides, as shown at A in the sketch, and fasten a good stiff spring, B, in the recess with screws. The outward pressure of the spring will hold the window at any desired point, while the sash can be raised or lowered without the least difficulty.



Piling Lumber for Drying

When piling lumber outside to dry, lay it up as shown in the sketch instead of in the usual triangular pile.



Method of Laying the Boards

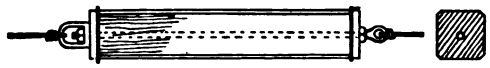
Lay the boards on in the way they are numbered to the full height of the pile. —Contributed by C. R. Poole, Los Angeles, Cal.

To Hold a Bandage in Place

Use two or more strips of adhesive plaster applied up and down on the wrapping at equal distances apart. These will hold the turns of the bandage in place as well as making a support. This will apply to a bandage on a finger as well as to one on the arm or leg.—Contributed by Mrs. Homer S. Smith, Westerville, O.

Cleaning Out Conduits

The sketch illustrates a mandrel which I consider to be the best I have ever seen for cleaning out conduits. It

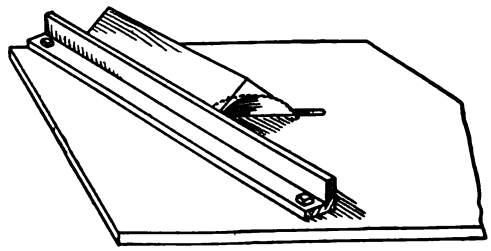


Wood Block with End Washers

is designed to be pulled through vitrified ducts to remove any stone, concrete or other obstruction which may have entered during the construction of the duct. For this reason the leather washers at each end should always fit the duct snugly and should be changed when worn, so that they will always have such a fit. If a pulling line of ⅜-in. stranded wire is used, almost any obstruction which may have entered the duct can be removed. A line should be fastened to the rear end of the mandrel as well as to the forward end. This allows for pulling the mandrel back and forth, when it is necessary to remove some obstruction by the "bumping" method.—Contributed by Geo. M. Petersen, Buffalo, New York.

Cutting Coves on a Saw

On one occasion it was necessary to make some large coves to place on forms for concrete work and as we had no sticker or knives large enough to cut the arc, I suggested that the cove could be successfully made on a ripsaw so constructed that it may be raised and lowered by turning a screw. A guide was placed diagonally on the table as shown, and the saw lowered



Manner of Setting the Gauge

so that it projected about ¼ in. above the table top. The timber was pushed over the saw for the first cut. The saw was raised a little each cut and a perfect cove was thus made. Almost any size cove can be cut by placing the guide at different angles.—Contributed by S. Stackey, Niagara Falls, Ont.

Tongs for Carrying Large Shafting

It is unsatisfactory to carry large shafting by hand as it cannot be laid down without the risk of injuring a finger. Tongs made as shown in the



Shafting Tongs

sketch are very convenient, as four men can carry large shafting, easily picking it up or laying it down.

To Keep Vines out of a Scythe Crotch

About 5 in. from the butt end of the scythe blade and in the center drill a ¼-in. hole. Bend a piece of $\frac{3}{16}$-in. iron, 10 in. long, into a small hook at one end and make a small loop at the other. Place the hook in the hole in the blade and fasten the loop end on the snath. This will keep vines from getting fastened where the blade joins the snath.—Contributed by Jos. E. Thompson, Griswoldville, Ga.

Making a Curved Hole in a Shaft

A certain piece of work called for a 1-in. shaft, 7 in. long, with a ⅜-in. hole in the center of it for about two-thirds of the way, then abruptly ending and opening out on the surface. The hole was made in the following manner: A 1⅛-in. shaft was procured and bent

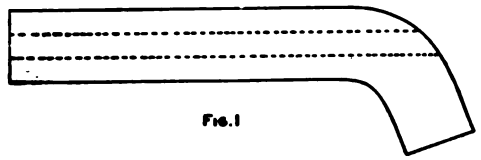


FIG. 1

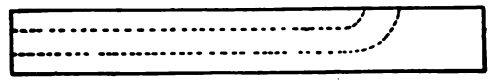


FIG. 2

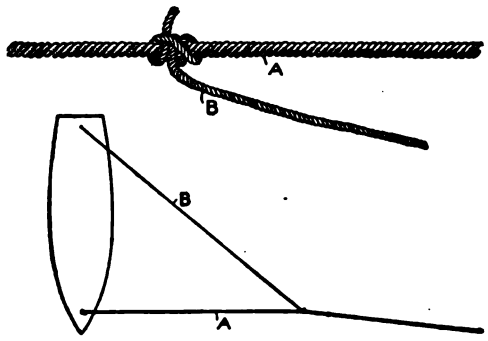
Curved Hole in Shaft

at about one-third of its length as shown in Fig. 1. A ⅜-in. hole was drilled through the center of the shaft so it would come out on the bend. The shaft was then heated and straightened out, after which it was turned down to 1 in. in diameter, as shown in Fig. 2.—Contributed by Chas. Hattenberger, Buffalo, N. Y.

A Fisherman's Bridle

The fisherman when fishing for mackerel finds it very important to bridle the boat and make the craft lie broadside or crosswise to the tide or current.

The chum or stosh which is thrown on the water to attract or bait the fish will eddy around on the lee side of the boat and will not drift away with the tide so rapidly. The slick on the surface of the water which is produced by the oily chum will generally go the way the wind drives it. The anchor line A is attached to the bow of the boat and the bridle line is shown at B. The sketch also shows the bridle hitch which will not slip or gain when in use. This bridle line is attached to the stern of the boat and is adjusted to suit the fisherman's fancy.

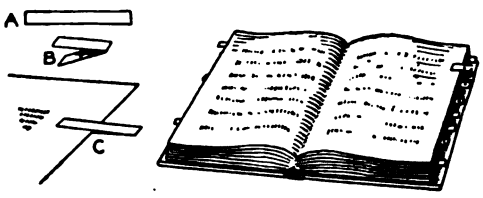


Bridle on a Boat

Bridling the boat for snapper blues or other fishing is found to be quite an advantage to the angler.

Tabs for the Leaves of a Book

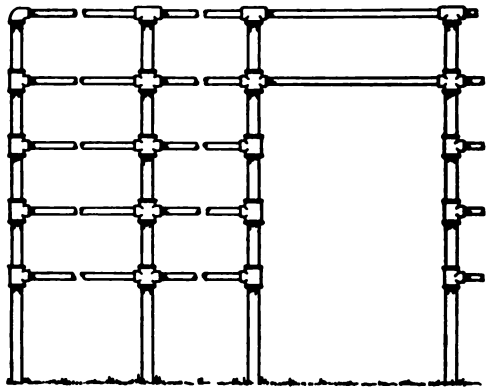
In books containing any special information, markers are very desirable to make it possible to refer quickly to some particular subject. I have found that strips of courtplaster, A, doubled, B, and applied to the leaf, as shown at C, make good markers. They do not injure the book and can be soaked off when desired. Even a thumb index can be made this way.—Contributed by A. S. Thomas, Gordon, Ontario.



Courtplaster Tabs

Grape Arbor of Gas Pipe

A very substantial grape arbor can be made of pipe and fittings, the posts or uprights being 2-in., and the horizontals, 1-in. pipe. The holes for the uprights are dug, and after the pipes are all in the fittings, the entire arbor is raised and the lower ends of the pipes set in the holes. It is then plumbed and propped, and concrete is tamped in the holes. This will make an arbor that will be solid and last a long time, if kept well painted.—Contributed by R. M. Peffer, Camp Hill, Pennsylvania.



Gas-Pipe Arbor

A Disinfectant for Shops

To disinfect a room having machinery in it is difficult to do by the ordinary means. Sulphur cannot be used as it injures the machinery, and corrosive sublimate is harmful to the finish on the metal. The following method will be found satisfactory: The room should be saturated with steam and tightly closed. In a few minutes a goodly amount of formaldehyde gas should be liberated by a formalin lamp, which can be secured at any drug store, or if this cannot be had, a quantity of 40-per-cent formalin may be purchased —an ounce for each room—and placed in a tin pan and heated by setting the pan on hot sand or clay. The best method is to heat the sand in an oven while steaming the room. After the room is well moistened the sand holding the pan should be placed in the room and all openings tightly closed. After a few hours the room should be well aired.

The quantity of formalin to be used is governed by the size of the room. Enough should be used to saturate the steam. One ounce of 40-per-cent formalin should saturate a very large room.—Contributed by Loren Ward, Des Moines, Ia.

Locating a Ground on a Circuit

Often in the operation of a circuit it will, in some way, become connected to the earth, or "grounded" as it is termed, which may result in the circuit being thrown out of use until the ground connection is removed.

A simple and fairly accurate method of locating a ground is as follows: Assume that a circuit is composed of two wires, AB and CD in the diagram, of the same material and the same cross-section, and that one of these wires, say, CD is grounded, but the location of the ground unknown. Join the distant ends of the two wires together between B and D by means of a heavy copper lead so as to introduce a very small resistance in the circuit. Obtain a piece of resistance wire, having a uniform cross-section, and connect its ends to the ends A and C of the wires as shown in the diagram. Now, by means of a battery or generator, send as large a current through the grounded circuit as the wires will safely carry. There will be at the same time a current in the resistance wire. The rheostat E shown in the figure is introduced so as to regulate

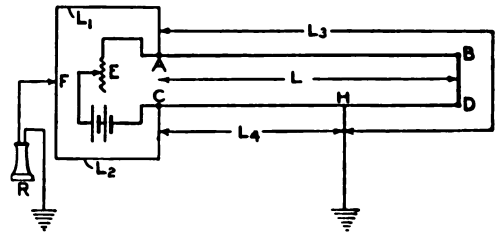


Diagram for Locating a Ground

the current. While the current is turned on, take an ordinary telephone receiver, R, and connect one of the terminals to the ground and touch the other terminal at various points along the resistance wire until a point, F, is found, where a minimum click is heard in the receiver when held to the ear. Measure the distance of this point, F, along the wire from the points A and C. If the lengths of the two wires, AB and CD, are known, the ground can now be located. The same relation exists between the two parts of the resistance wire, EA and EC, as exists between the resistances ABDH and CH. The relation of the resistances EA and EC is the same as their respective lengths, which we shall call L_1 and L_2, since the wire is uniform in cross-section. Likewise the resistance ABDH bears the same relation to the resistance CH as exists between their lengths, which we shall call L_3 and L_4, of these respective parts of the circuit. Then

$$\frac{L_1}{L_2} = \frac{L_3}{L_4}$$

Let us now express L_3 in terms of the length of one wire, which we shall call L (and the length L_4) and we have L_3 equal to $2L - L_4$. Then

$$\frac{L_1}{L_2} = \frac{2L - L_4}{L_4}, \text{ or}$$

$$L_1 L_4 = 2L L_2 - L_2 L_4$$

transposing

$$L_1 L_4 + L_2 L_4 = 2L L_2$$

factoring

$$L_4 (L_1 + L_2) = 2L L_2$$

and

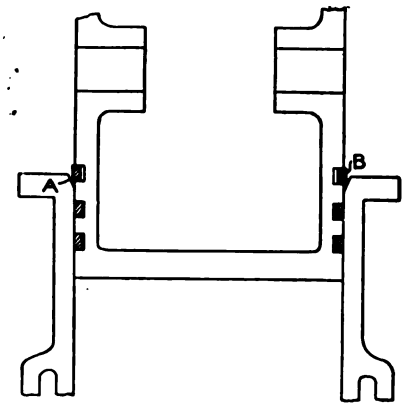
$$L_4 = \frac{2L L_2}{L_1 + L_2}$$

The above expression then gives the distance in feet to the fault, or ground, when all other measurements are made in feet.

¶A length of hose having holes punched in its sides greatly facilitates the speedy sprinkling of a lawn, the end of the hose being plugged.

Piston Rings Easily Placed by Taper Bore in Cylinder

A manufacturer of small gasoline engines found it quite an advantage and selling point to prepare the cyl-



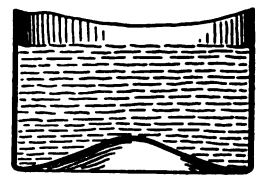
Bevel in Cylinder Bore

inders of each engine to receive the piston rings without clamps or other devices to hold the rings in their grooves while the piston is slipped into the bore. An angle, A, was turned out while boring the cylinder to size. The ring B will slip down the angle as the piston enters the bore.

The angle is easily turned when making a new cylinder as well as when reboring an old one, and the time taken will be gained many times over when replacing pistons.—Contributed by L. B. Green, Cleveland, Ohio.

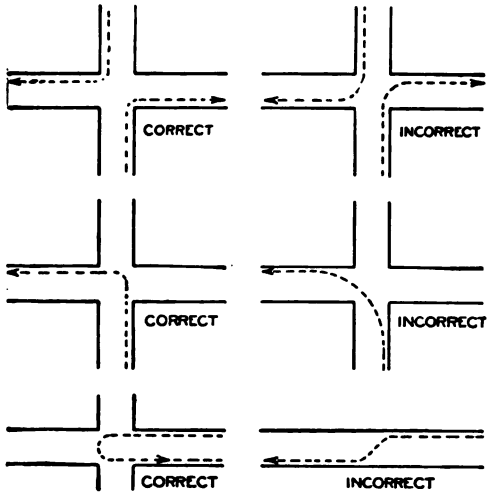
Raised Bottom in a Pail

A quart of water may be boiled from the flame and heat of a burning newspaper by having the bottom of the utensil made like that of a wine bottle. To have the bottoms of cooking utensils fixed in this manner is a great boon for campers. The bottom being raised causes the heat to strike the center of the water.—Contributed by W. D. Brooks, Paterson, N. J.



Driving Automobiles in Cities

Owners of automobiles in the country as well as some of the city owners, for that matter, may not be familiar



Street Corner Diagram

with the correct way to drive in cities and main traveled roads, says the Automobile Dealer and Repairer. The accompanying diagram shows the right way to drive on streets and of turning corners.

How to Fasten Loose Spectacle Lenses

Persons using spectacles are sometimes annoyed by a loose lens—one that persists in dropping out of the frame. This trouble is caused by some slight defect in the edge grinding of the lens or to an imperfection in the size of the eye wire of the frame.

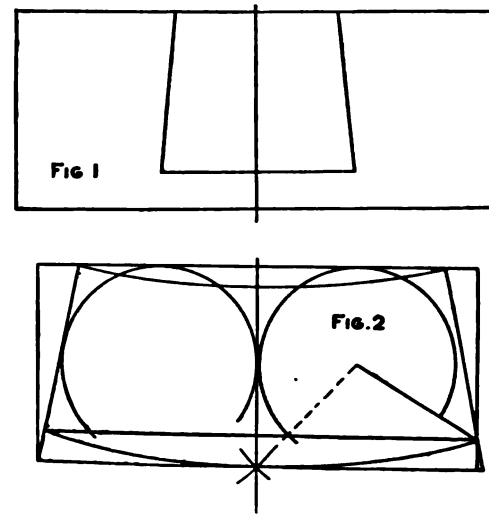
If the spectacles cannot be taken to an optician or spared to be sent for repair, simply place a strip of tinfoil in the groove of the frame, reset the lens and trim off any tinfoil that may remain in sight with a sharp knife. When this is carefully done, the foil will not show and the lens will be held securely in place.

Rimless spectacles and eyeglasses frequently give trouble as the lenses are apt to become loose and wiggle disagreeably in the mountings to which they are attached. This trouble may be traced to a loose screw, or the back of the straps that grasp the lenses may not be set sufficiently close to the lenses. Remove the lenses, bend the straps so that they will engage the edges of the lenses properly, replace the screws carefully, and the trouble will be remedied.—Contributed by Rem A. Johnston, Ossian, Ind.

Layout of a Taper Sheet

The simple method here shown of laying out a taper sheet will prove especially acceptable to boilermakers who are not expert with figures. It is contributed to The Boilermaker by John A. Higgins:

Select a sheet 2 or 3 in. wider than the height and draw a center line in the sheet, as shown in Fig. 1; also draw a full-size view of the cone, as shown in Fig. 1, and find the circumference of the top and bottom ends by multiplying the respective diameters by 3 1/7. Lay off one-half of the circumference of the small end on each side of the center line. Measure off the height of the cone on the center



Laying Out a Taper Sheet

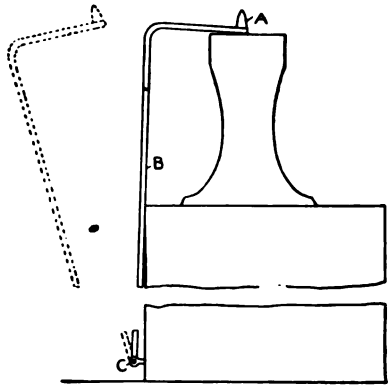
line, draw a line across the sheet at this point, and on this lay off the circumference of the large end as before, and strike in the side lines.

Now find the center of a circle which will strike three sides of the layout, as shown in Fig. 2, and from that center spread the trammels to the high corner and bisect the center line. You have then found the chord of the arc, and with a batten held at the outer points and sprung in the center to touch the point on the center line, draw in the curve around the batten. Now lay off the height of the cone on the center line and transfer the batten to the top and draw in the upper curve. The top and bottom lines are the lines to which the pattern should be cut, while the side lines locate the centers of rivet holes.

With a little care on the part of the layer-out, this method will be found satisfactory, and it will give sufficiently accurate results.

Anvil Hardy Holder

After using a hardy on an anvil it is sometimes in the way for finishing the work in hand. I devised a hardy holder which I attached to the anvil block as shown in the sketch. The hardy A, or a similar tool, fits in a hole in the upper end of a bar of iron B, which is made of 1 by 1-in. stock, and the lower end is hinged at C to the anvil block. When needed, the

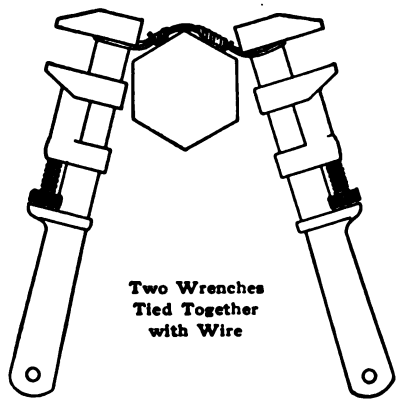


Holder Attached to Anvil Block

hardy can be quickly pulled into position without taking the hands from the hammer and tongs.—Contributed by J. A. Polk, Mansfield, O.

Emergency Wrench for Large Work

As I desired to remove the base nut from a large hand pump and had no wrench large enough to fit over it, I



Two Wrenches Tied Together with Wire

used two small wrenches, tied together with wire as shown in the sketch. The handles were drawn tightly together as they were turned. The nut was easily removed.—Contributed by Jas. J. Reeves, Chicago, Ill.

Drilling with Small Drills

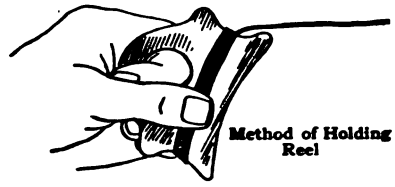
A small drill is very apt to break off while being used, especially in a breast drill. I remedy this trouble by having two drills of each size, one of which I break off, saving some of the twisted portion of the bit and grinding a point on it. This is used exclusively for drilling through thin metals, and for starting holes in thicker metals.

Small drills also break easily when applying too much feed, but a short drill will stand more pressure. The full-length drill is substituted when the hole is drilled as deep as the short one will cut.

The center web of a drill being thicker back of the point, a drill broken off and then sharpened will not cut quite so easily or quickly as the point of a new full-length drill, but in cutting with a short drill, the elimination of that fear of its breaking will more than make up for the extra time spent. —Contributed by C. W. Goddard, Bellaire, Mich.

Chalkline Reel

A simple chalkline reel can be made of a thin board cut as shown in the

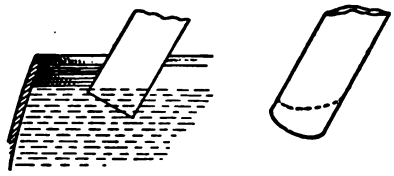


Method of Holding Reel

illustration. This reel makes a rapid and easy way to wind up the line. The line will also reel out as easily as if it were on a roller.

Marking a Miter for Cutting Sheet-Metal Pipe

While putting up some galvanized sheet-iron rain pipe, I had occasion to make a miter joint, and as the pipe was formed, I secured the miter line as follows: The end of the pipe was

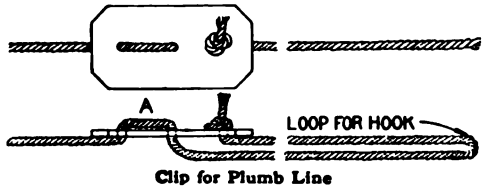


Angle Marked with Water

submerged in a barrel of water until the mark for the miter was at the surface of the water. I cut the pipe on the water line and thus secured the proper miter.—Contributed by Geo. M. Mock, Buffalo, N. Y.

Adjuster for a Plumb-Bob Line

The length of a plumb-bob line may be quickly adjusted by the clip shown in the illustration, which was redrawn

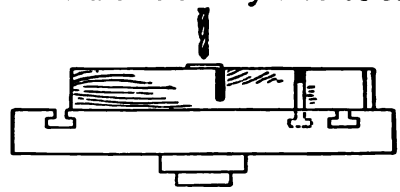


Clip for Plumb Line

from the Engineering and Mining Journal. The clip was made of a piece of brass or copper with three holes drilled in a line and as close together as possible. The clip should also be as small as possible to prevent it from throwing the bob off center.

Drilling Holes in Angle Iron

Among the many devices used for holding angle iron while drilling, one of the quickest and easiest methods is to make a groove in a block of wood to receive one wing of the angle and fasten the block to the faceplate. True and accurate holes may thus be read-

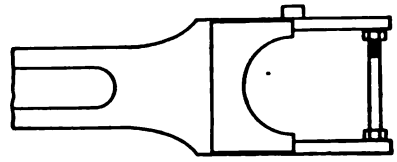


Wood Block on Faceplate

ily drilled in the angle.—Contributed by Geo. Lundberg, Huron, S. D.

Removing Close-Fitting Brasses

In the accompanying illustration is shown an easy way to loosen brasses in main connecting rods. After removing key, block and bolt from the rod and finding the brass tightly wedged in, use a bolt of 1-in. diameter having sufficient length to fit between the



Bolt between Jaws

jaws. Place the bolt as shown and turn the nut in the direction to spread the jaws. It is necessary to use two wrenches, one to hold the bolt from turning and one to turn the nut. This gives sufficient pressure to loosen the brass, but not enough force to distort the jaws.—Contributed by Oliver S. Strout, Harrisburg, Pa.

¶Any lost motion should be quickly taken up on the bearing of any machine.

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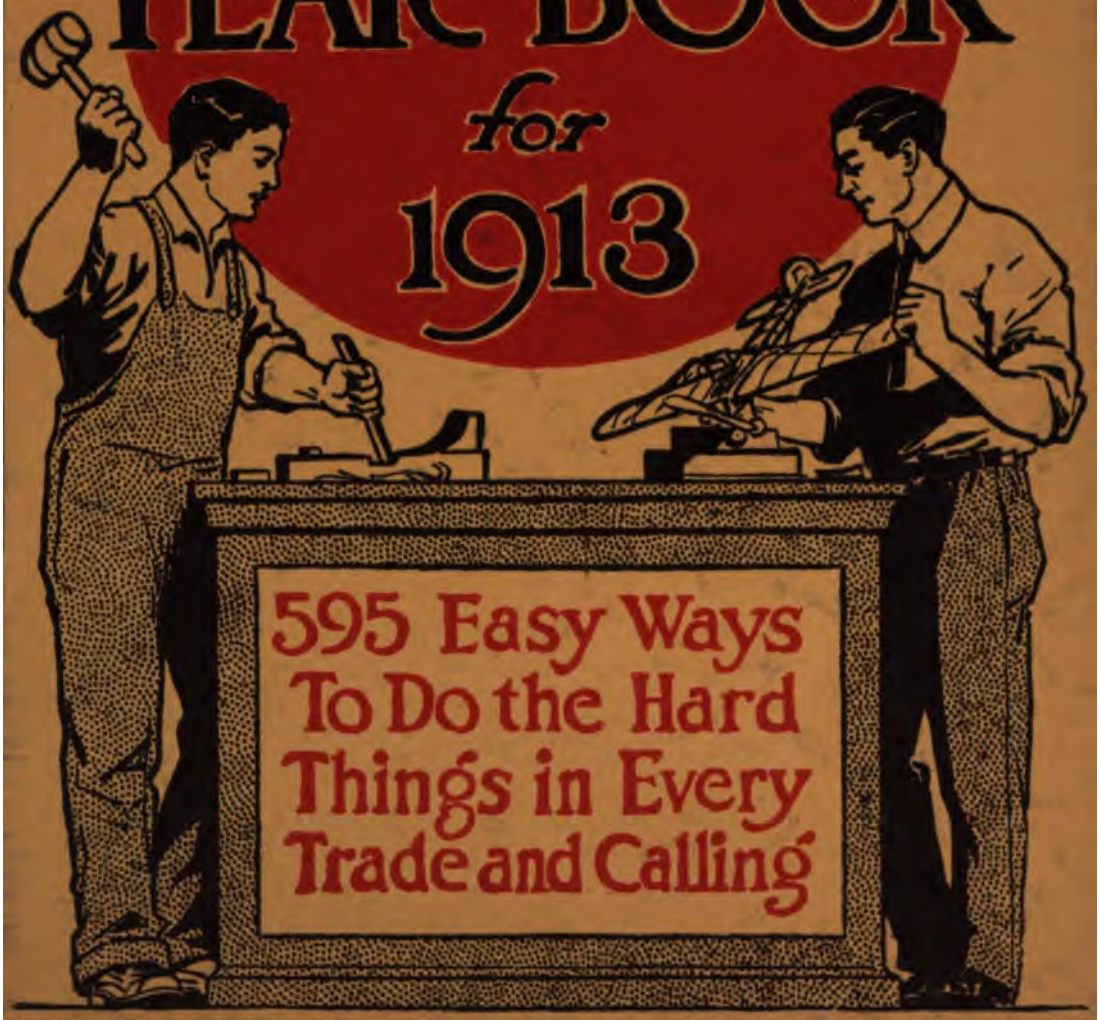



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