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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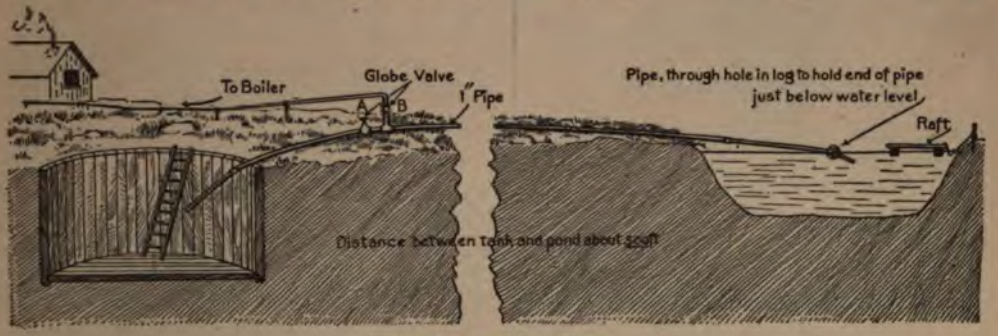
POPULAR MECHANICS, CHICAGO

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.

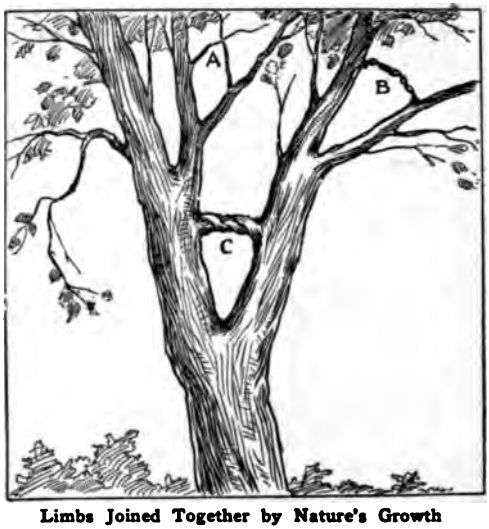
At times when the water in the tank would be low and there was not enough water in the boiler to safely start a fire in the morning, I would close the globe valve A, and open the valve B. The vacuum formed in the boiler caused by the steam going down would be sufficient to draw water up from the pond 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.

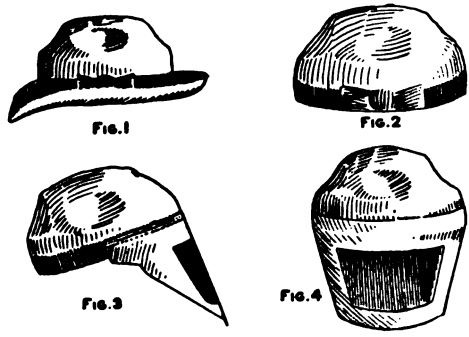
Coloring Iron and Steel for Laying Out Work

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

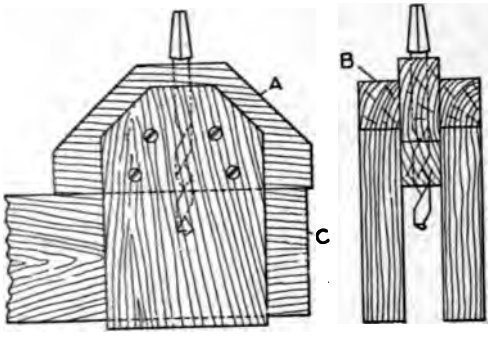


Cap and Eye Protector

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

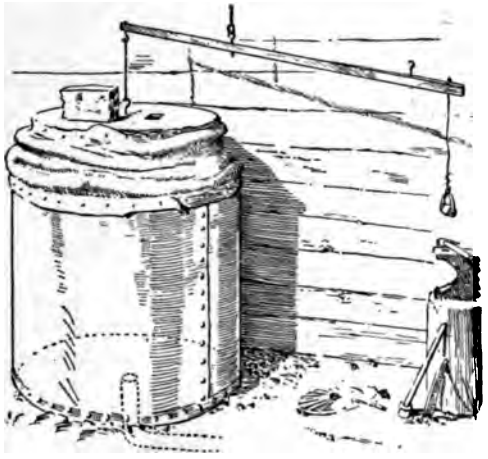


Boring Dowel Holes Straight

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.

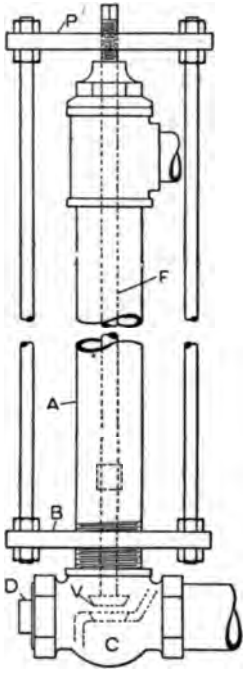
The tank can be put up out of the way, either in a corner or above the furnace hood, the lever hooked to the ceiling, and a wire handle run down to within reach.—Contributed by F. M. Berchmaus, Scio, Ore.

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.

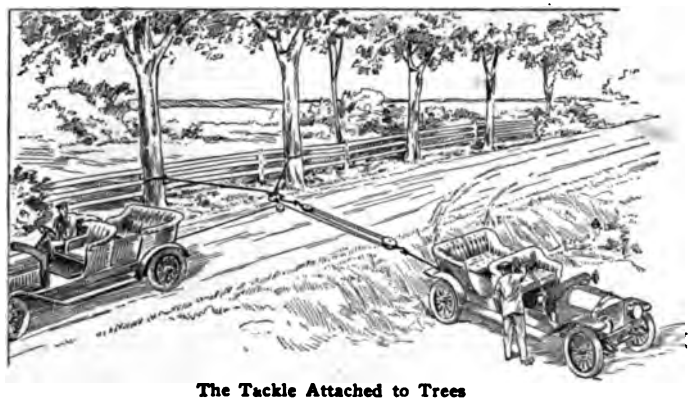
Fill the vessel with cold water up to the point at which it is to be broken. Pour enough boiling oil over the water to make a good coat on the surface and before the oil has time to cool dash cold water on the outside of the vessel. A clean break at the contact point of oil and water will be the result.—Contributed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

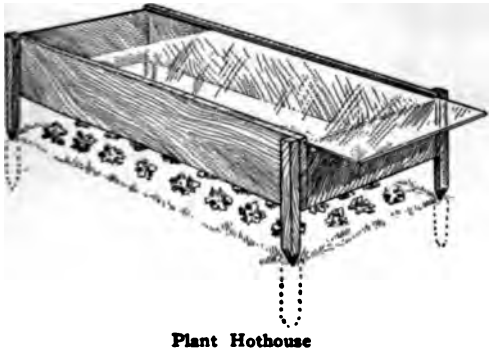
It is a true saying that "necessity is the mother of invention" and so it is that only a few know how to properly apply tools and material at hand in the case of an emergency. The accompanying sketch shows how I rigged a tackle to a very unusual condition in a case where an automobile was ditched and 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

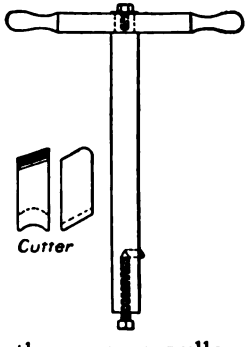
The small hothouse shown in the illustration can be used to protect plants from severe cold weather and high winds. The house can be moved from place to place to cover delicate plants or start seeds early in the season. It consists of a box without top or bottom and grooves cut for inserting a glass 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

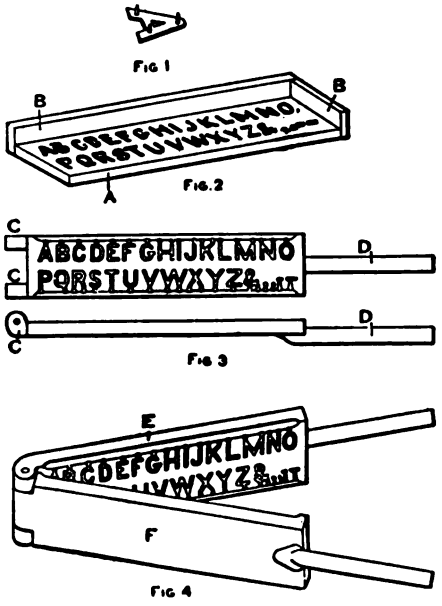
Large diameter pulleys and gears are often brought to the small repair shop to be rebored. If the shop does not have a lathe or boring mill large enough for the purpose, some other method must be employed. The job can be done very easily by hand if a tool like the one shown in the accompanying sketch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

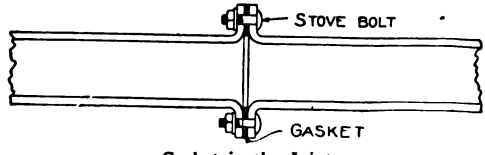
In the process of casting, the mold was closed and clamped by slipping a ring over the handles in the same manner that the blacksmith does over his tongs. It was necessary to heat the molds over a gas flame, hot enough to slightly discolor a pine stick held against them. The alloy was melted over a Bunsen 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 drawing the flanged ends tightly together on the gasket.—Contributed by C. C. Brabant, Alpena, Mich.



Gasket in the Joint

¶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.

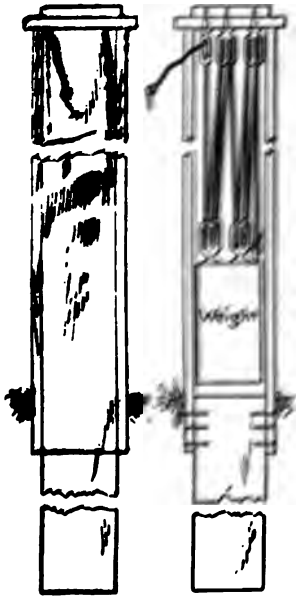


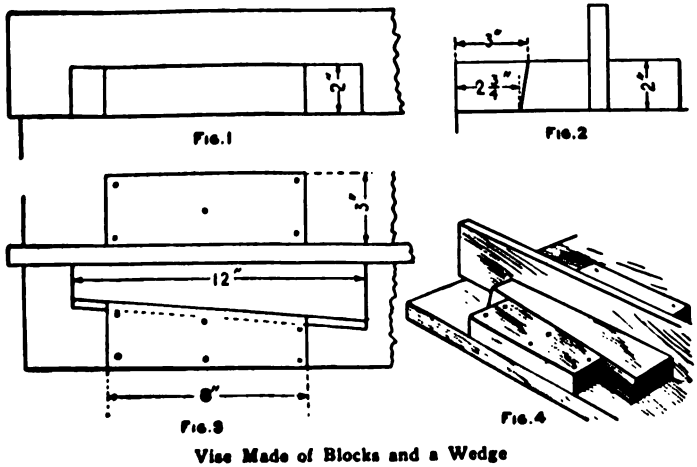
Fig. 1 Fig. 2

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.



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.

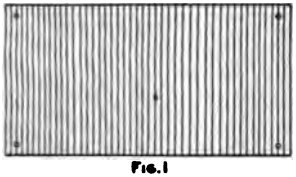


FIG. 1

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

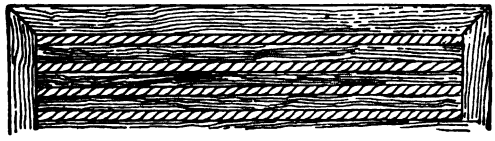


FIG. 1

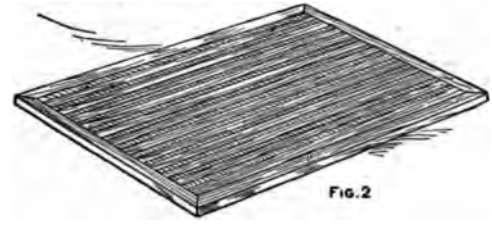


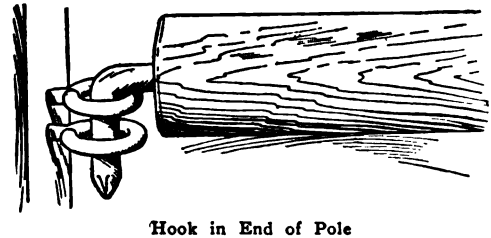
FIG. 2

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

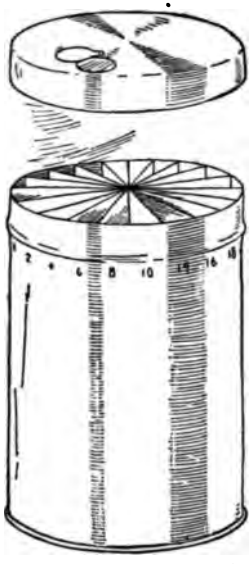
The roost is made round without any groove to harbor insects. It can be quickly removed, cleaned and replaced. Two screw eyes are turned into the wall in a vertical position, from 1/2 to 3/4 in. apart. Each end of the roost is provided with a hook or nail as shown.—Contributed by W. A. Jaquythe, Richmond, Cal.



Hook in End of Pole

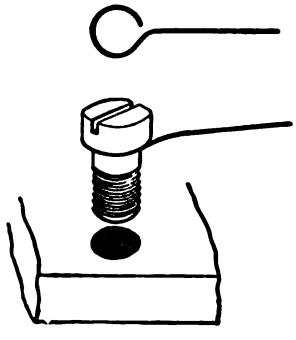
A Twist Drill Box

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.



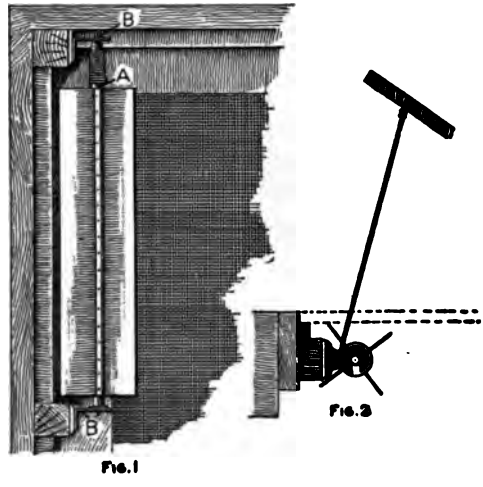
Inserting Small Screws

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

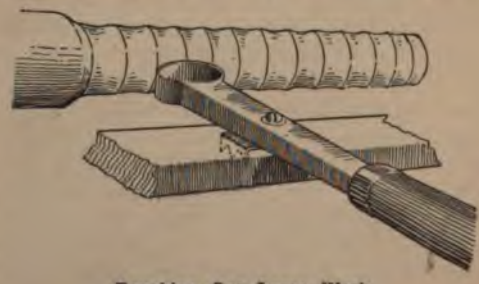
An end gate clamp that can be opened with one hand is shown in the accompanying sketch. Deliverymen,

End Board Fastener

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.

Turning Tool for Large Wood Pieces

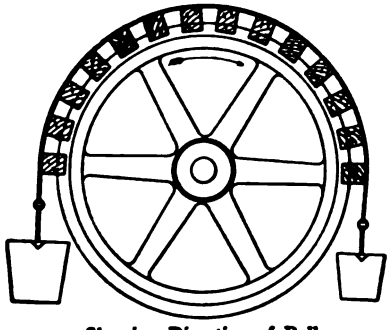
The ordinary tool used in roughing out large pieces of wood has a tendency to catch in the work and cause trouble. In using a circular-edged tool all of the material of the cut will be removed and no jagged ends left to draw the tool into the work. If such a tool is made as shown in the illustration, 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.

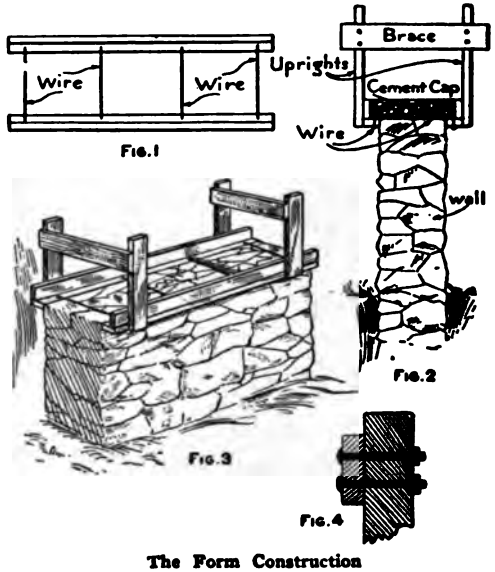
The blocks are fastened with screws to a piece of belt that is long enough to reach over the wheel and hang below the center on each side. Attach a bucket to each end of the belt, one of them larger than the other, the large one being pulled in the direction of the arrow. Place a quantity of sand in 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

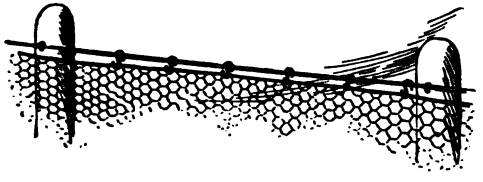
ping down over the wall. Uprights and crosspieces were used, as shown in Fig. 2, to prevent the forms from

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

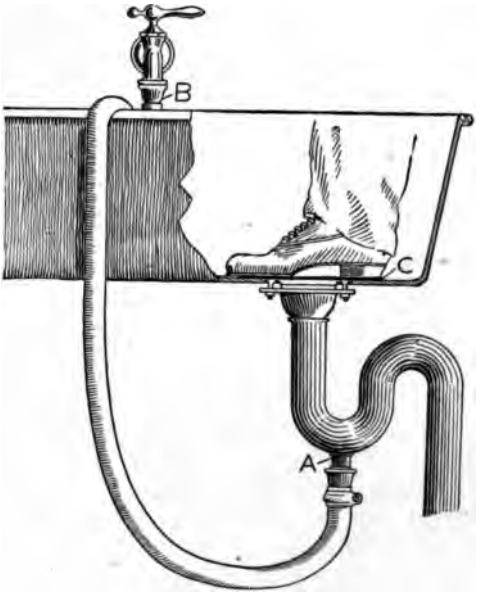


Wire Holding Up Mesh

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,

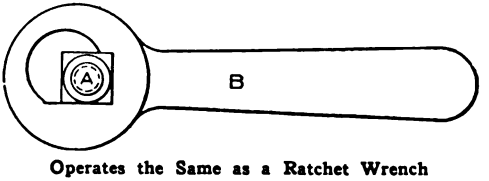


Removing the Obstruction

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.

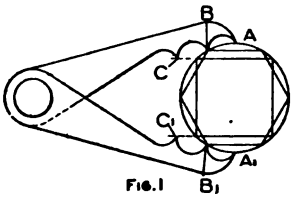


Fig. 1

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.

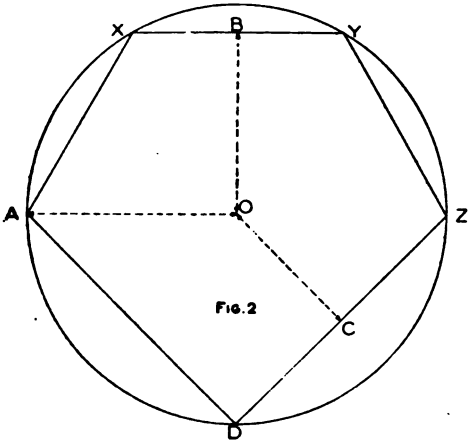


Fig. 2

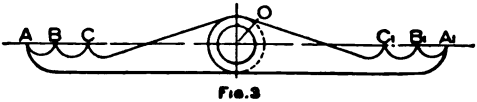


Fig. 3
Layout of Tool

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

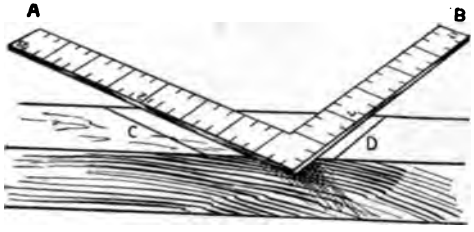


FIG. 1

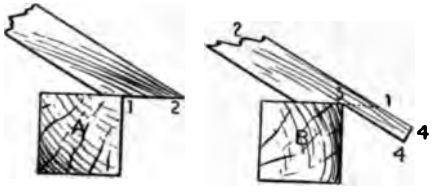


FIG. 2

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.

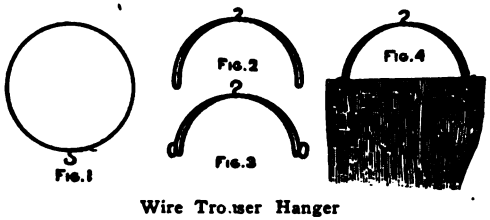
The length of the rafter and the marks for cutting can be done at the same time. This method saves calculating the length and does the measuring and marking in one operation. It will give the pitch of the roof approximately correct. While at certain pitches there may be a very slight difference in the 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.

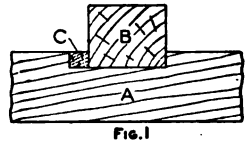


Fig.1

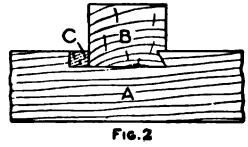


Fig.2

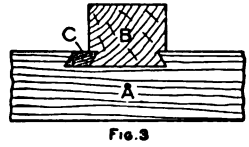


Fig.3

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 cem into the quicksand. One bag of ment will solidify 7 cu. ft. of quicksa

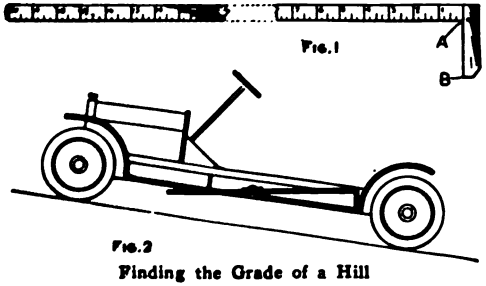
Air Lock for Boats

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



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

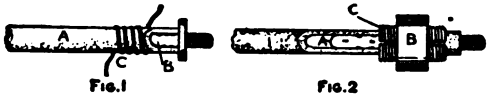


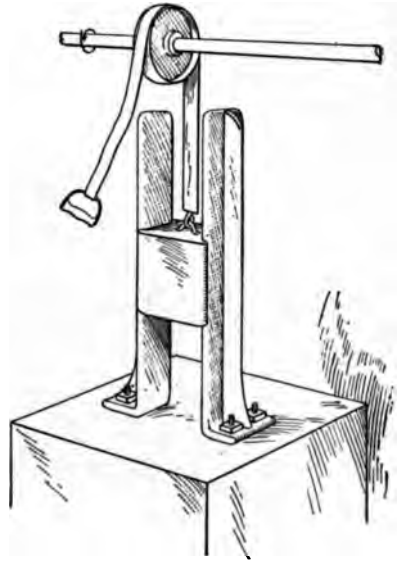
Fig. 1 Fig. 2

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

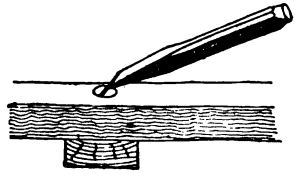


Friction of Belt Draws Hammer Up

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.

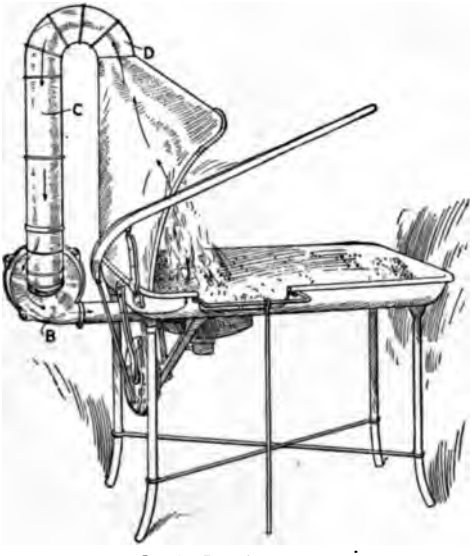
Turning a Rusty Screw

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.

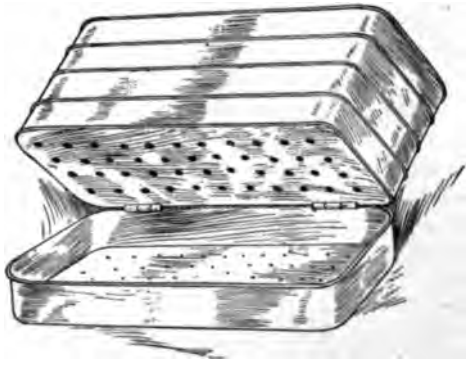
Oak Finish on Hard Pine

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.

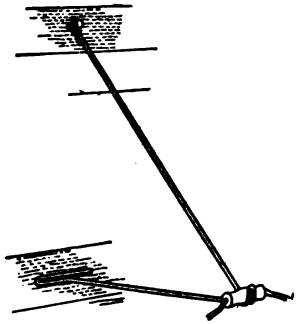
After cleaning the balls, all sizes are placed in the top box and the whole

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.



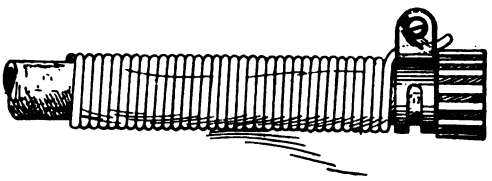
How to Draw a Wavy Line

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

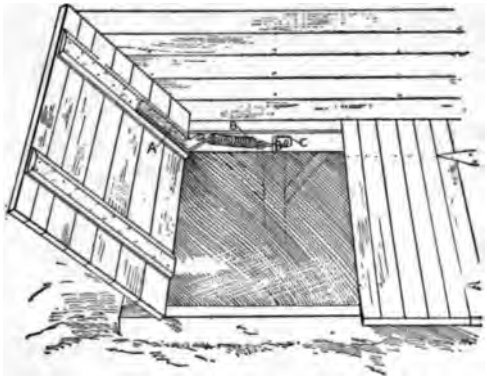


Coil Spring on a Hose

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

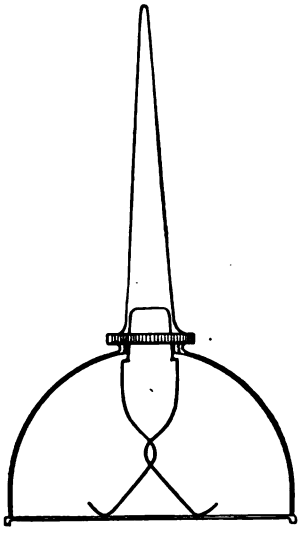


Cellar Door Counterbalance

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.

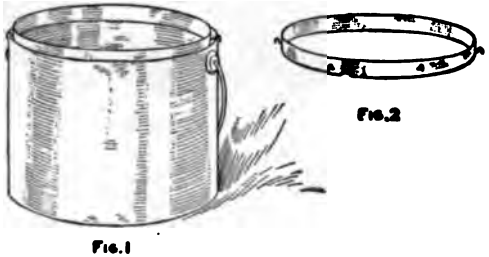


Fig. 1

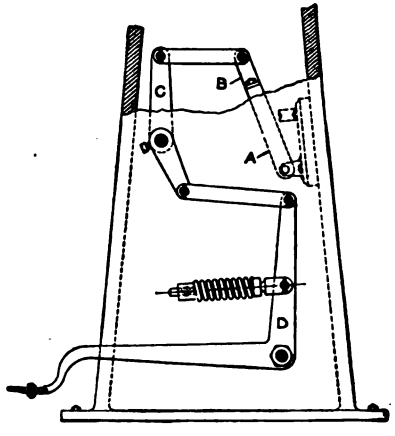
Fig. 2

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.



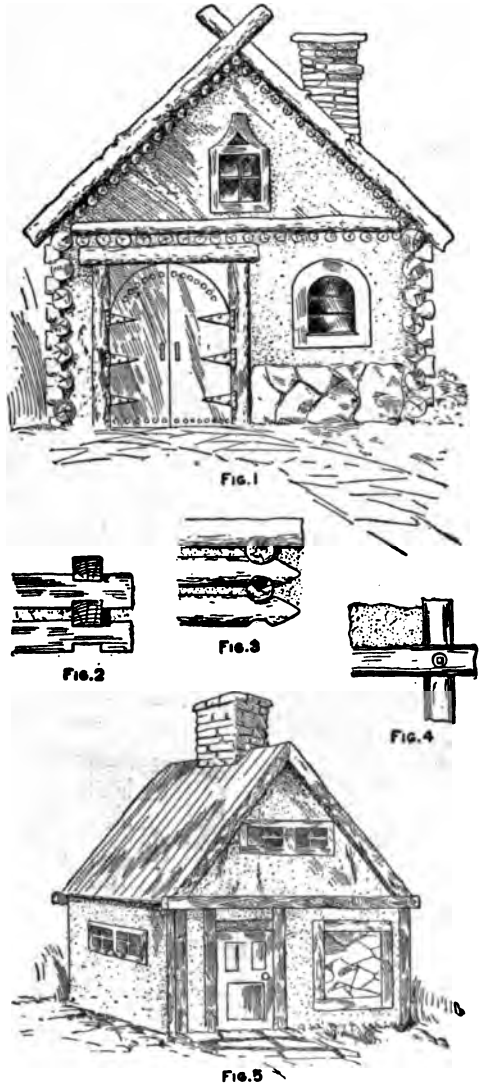
Switch Worked by a Foot Lever

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,

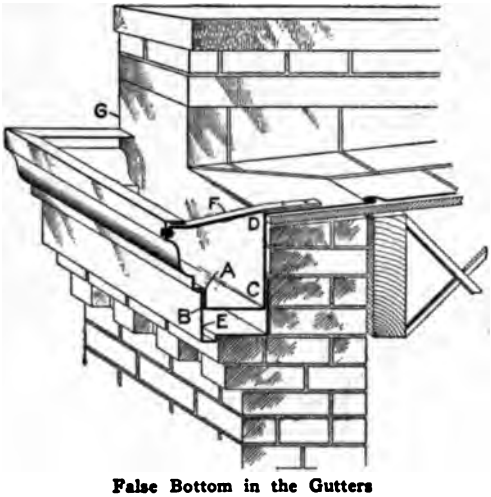
the mixed cement is packed in between the logs and permitted to set, resulting in a very firm and tight wall, if the work is correctly done. The cement, sand and water should be properly mixed and put in order for use. The cement, when too wet, cannot be properly packed. Again, if the mixture be too 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

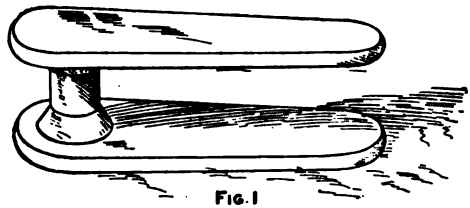


FIG. 1

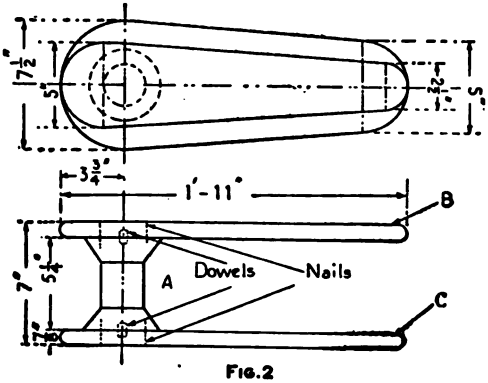


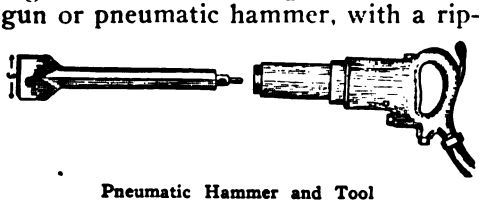
FIG. 2

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-

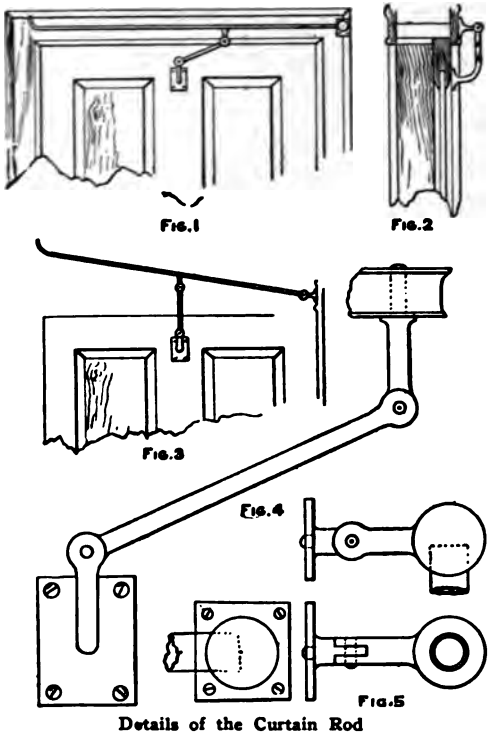


Pneumatic Hammer and Tool

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.

Automatic Lifting Curtain Rod

The accompanying sketch shows a curtain rod suitable for holding curtains in front of sitting room doors.



Details of the Curtain Rod

The rod is suspended in such a way that the opening of the door gradually lifts the curtain clear of the floor at the bottom edge. This is a decided advantage, as it allows the door to travel freely without the lower edge of the curtain dragging beneath the door.

In Fig. 1 is shown the rod in position when the door is closed and in Fig. 2 the side view. The rod should be made of ¾-in. brass tubing with one end inserted in a hinged joint, as shown in Fig. 5. The opposite end of the rod should be bent up to keep the curtain in place. If a bend in the rod cannot be made, a solid piece can be put in and soldered.

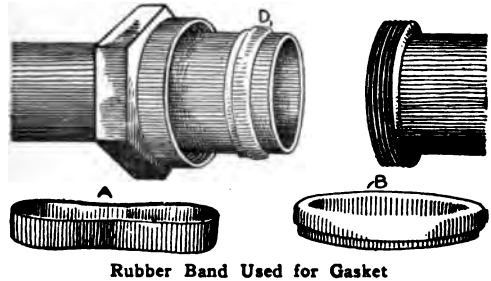
The hinge joint, Fig. 5, is to allow the rod to swing around with the door and at the same time turn slightly for the rod to rise. In Fig. 4 is shown the device for lifting the rod and Fig. 3 the position of the rod when the door is open.—Contributed by John T. Dunlop, Shettleston, Scotland.

Measuring Elevation by Water Pressure

To get the approximate difference in elevation of different parts of a city is a very easy matter where there is a waterworks system. This is done by attaching common steam gauges to the plumbing systems at each place and observing the readings. From the difference in pressure at the gauges, the difference in elevation in feet can be found. For every foot in height, the pressure will be .433 lb. per square inch. By multiplying the difference in pressure at the gauges for different elevations, by .433, we get the difference in elevation in feet. Suppose the gauge read 6½ lb. at the top of an elevation and 30½ lb. at the bottom. The difference is 24 lb. and this divided by .433 gives the approximate difference in height to be 55.426 ft.—Contributed by J. C. Murry, Lincoln, Nebraska.

Rubber Bands Used for Gaskets

The leaking of a rubber gasket on a piece of 2-in. nickel-plated pipe caused me to try an ordinary rubber band, A, in its place. In fact I used two rubbers, one over the other and each doubled as shown in B. When placed in position,



Rubber Band Used for Gasket

D, and the union parts screwed up, it made a tight joint. The rubber being elastic makes it adjustable, which is not the case with the ordinary gasket.—Contributed by J. M. Kane, Doylestown, Pa.

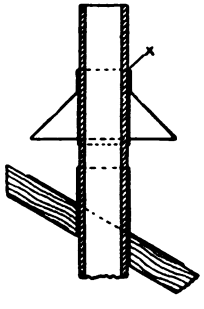
Pasting Labels on Tin

The curling of labels on tin, especially when the cans were first labeled and then filled with hot liquids, gave us much trouble in our factory until we started experimenting with the paste. We label our cans empty and then fill them with hot syrup, conditions which call for a very tenacious, tacky paste.

We use a fairly thin glue, made by soaking sheet glue in warm water until dissolved and then adding about one-fourth as much glucose (by volume) as we have glue. This paste applied either hot or cold with a brush will stick tight, will not affect the inks on the labels, as glycerine is apt to do, and will never curl, no matter how hot the contents of the can; neither will ordinary dampness loosen it. We have labeled more than a million and a quarter cans with this paste and have yet to see the first label so much as loosen at the corners.—Contributed by C. A. Munsterman, Peoria, Ill.

Attaching Pipe Flashings

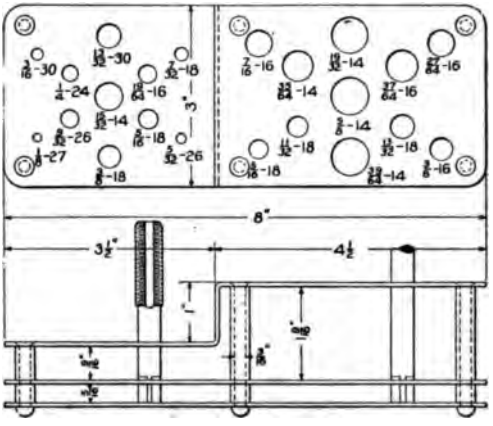
A novel method of attaching pipe flashings to exhaust, vent or vapor pipes that are subject to expansion and contraction, so that the rain will not follow down the pipe is shown in the accompanying sketch. Simply cut a groove, X, about ⅛ in. deep, about the pipe at the proper height, with a pipe cutter, then when the flashing is in place, bend the top edge into this groove. This will form a tight joint and prevent the rain from following down the pipe through the roof.—Contributed by S. S. Erickson, Seattle, Washington.



¶Do not lubricate magneto bearings too freely.

Steel Tap Rack

A simple and compact tap rack, which can be made in a couple of hours,



Details of Tap Rack

is shown in the accompanying sketch. It will prove to be a time as well as a trouble saver, and being made of steel, it is well able to stand the rough usage to which all shop tools are subjected, and consequently very durable. Each hole in the top plate should be marked with the number of threads and the size of the tap it is intended to hold. The holder can be made larger or smaller than the one shown, but this size will be found about correct for the ordinary shop.—Contributed by C. A. Allen, Linwood, Mass.

Combination Scale and Scriber

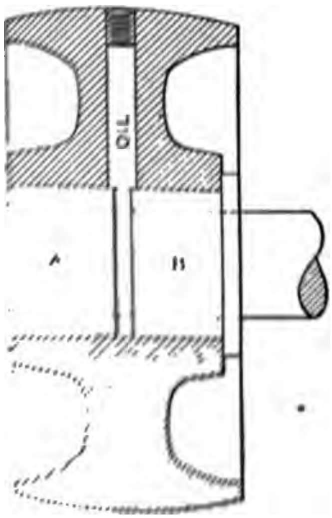
The accompanying sketch shows a 6-in. scale to which is attached a scriber made of tool steel. This scriber also acts as a pocket clip; in fact, that is the purpose for which it was originally designed, says a correspondent of Machinery. As a scriber is mostly used

Scriber on Rule

with the scale, the upper part of the clip was extended to form a scriber point, thus combining two tools in one.

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]

[illegible] of the American [illegible] regarded as a job [illegible] fall, they [illegible] the [illegible] lathe [illegible] As a result, a [illegible] considerable [illegible]

[illegible] practice to make these [illegible] and to make tight fit [illegible] without number, [illegible] pulley holes [illegible] make the bush [illegible] and the bushing hole re[illegible]duced in size making necessary an other operation in reaming or scraping the hole to fit the shaft. 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 starts it on its rocky 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

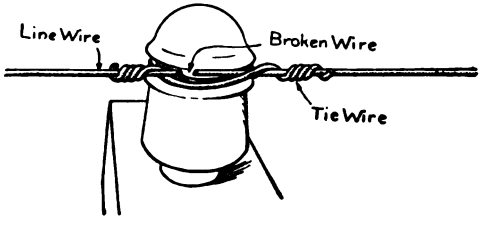
Punching Holes in Sheet Metal

$\frac{1}{4}$ 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-

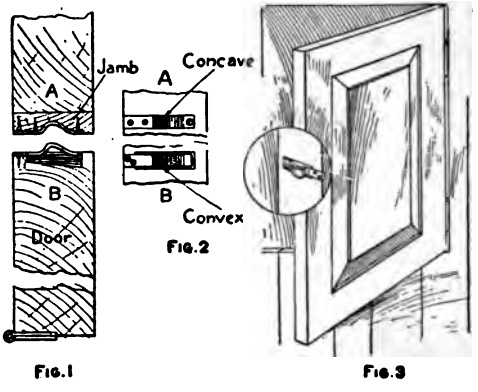


Showing Point of Break

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

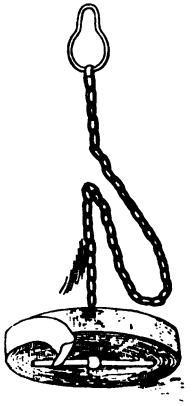


Invisible Door Catch

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

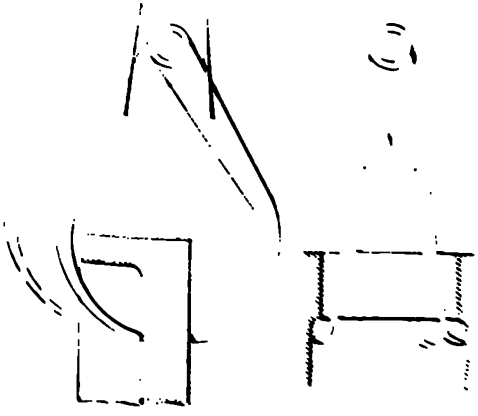


Fig. 1. Calipering with Dividers

are of no use, because the dimension is lost as soon as the calipers are moved for removal. Machinists' [illegible] view to the left in Fig. 1 shows a good method of operating the setting. What that need be done is to make a fine punch mark on the face of each leg, and carefully measure the distance between the 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 dividers setting when the dis-

Fig. 2. Method of Using 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 work pair of calipers from the work, replace them to size by means of the second pair.

How to Repair a Cracked Water Jacket

[illegible] neglect and carelessness [illegible] gas engine water jacket is burst [illegible] with water in it on a very cold night. A crack of this sort gives a great deal of trouble and many times [illegible] a loss of time in replacing [illegible] new jacket or sending it to some [illegible] brazed.

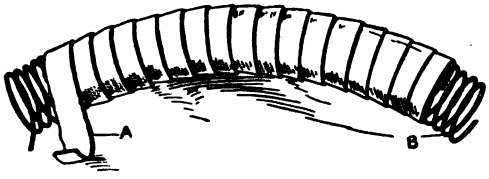
[illegible] is in such a place that [illegible] except the water, [illegible] the following [illegible] hold water as well as [illegible]

[illegible] glycerin to a stiff [illegible] the crack with [illegible] some similar in- [illegible] the crack, let [illegible] possible, and on [illegible] run the engine [illegible] warmed up before [illegible] the water into the jacket. If [illegible] applied, the job will be [illegible] as long as the engine [illegible] 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

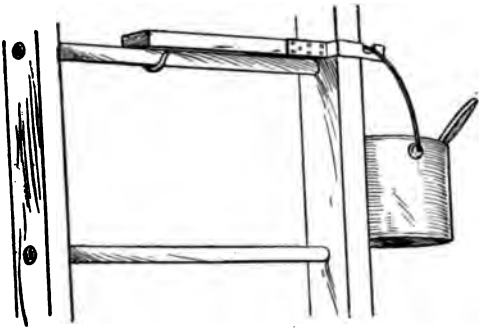


Oilcloth Wrapped around Spring

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

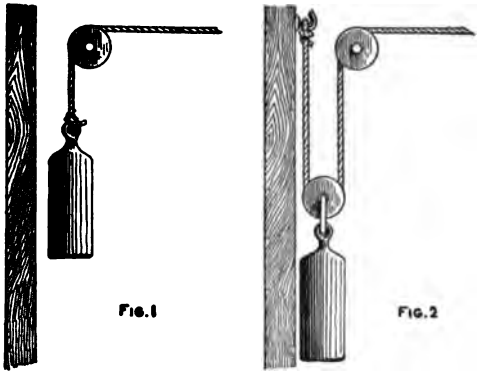


Pot on Hanger

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-

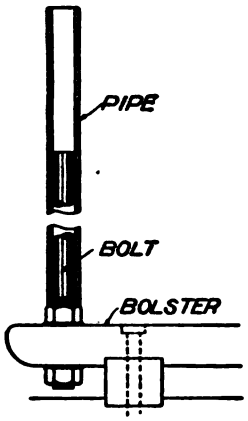
main about five minutes and then, without rinsing, is again heated until the surface is uniformly black.

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.

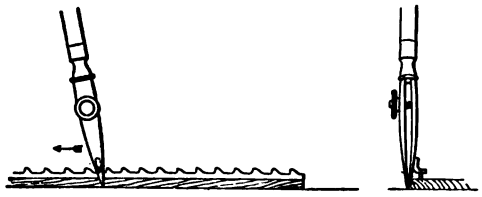
A Bolster Stake for Lumber Wagons

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.

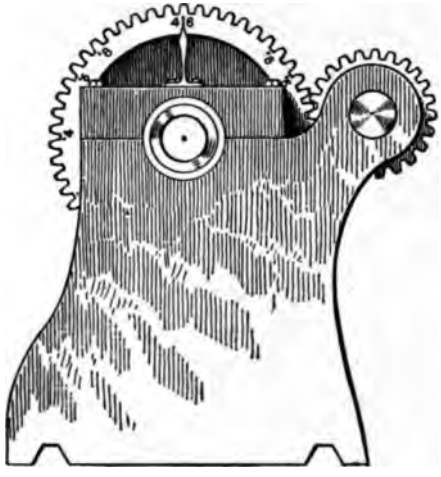


Dotting Attachment

¶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.

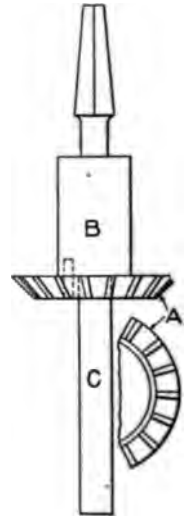
How to Cover a Pulley

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.

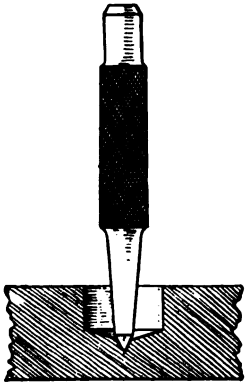


A cutting tool, A, is fitted on an arbor, B, and held in place by means of a pin. The arbor shank C should be of the same size as the valve stem, in order to hold the tool in line when in use. The arbor has a hole in the end to receive a common brace bit shank, so that it can

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

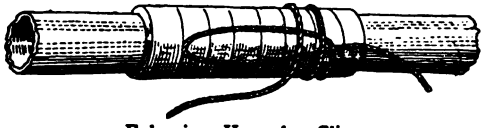
I had occasion to move a bathtub and did not want to mar the coupling to the floor connection. I took two pieces of hard pine and cut the ends as shown in the sketch, mortising them as shown at A, so they could be tied together with a short piece of wire. The pieces should be at least 1½ by ⅞ in. and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



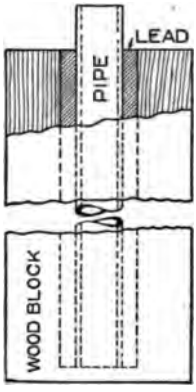
Enlarging Hose for Clips

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[illegible]. 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.

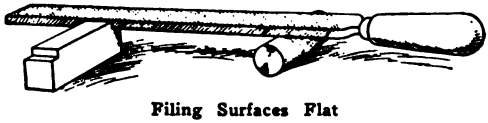
Casting a Short Lead Pipe

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

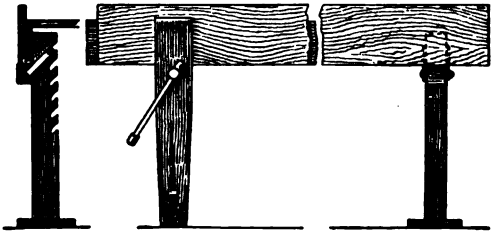


Filing Surfaces Flat

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.

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



Bench Jack

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.

Failure by Disintegration of Concrete Roofing Blocks

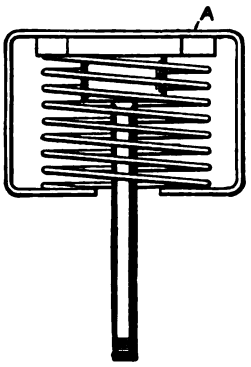
The porous character of the concrete and the use of cinder aggregate were apparently the cause of failure in the reinforced concrete slabs, used on the roof of the LaSalle station trainshed at Chicago. The slabs were made up of a gravel concrete exterior shell, ½ to ¾ in. thick; the interior portion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

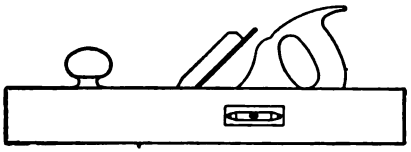
Often when inserting pump valves or other valves of a similar type, more or less trouble and inconvenience are experienced in getting the valve stem to catch the thread. This is on account of having to resist the pressure of the spring, while at the same time turning the stem, which, moreover, often 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 ½ 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

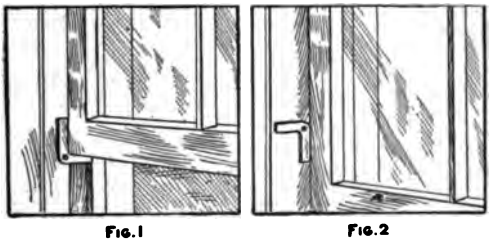


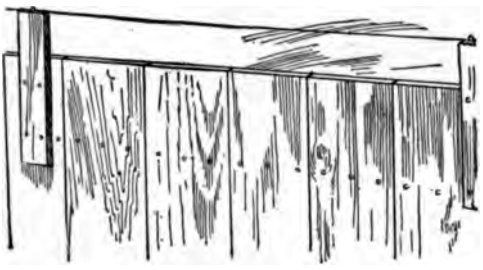
Fig. 1 Fig. 2

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.

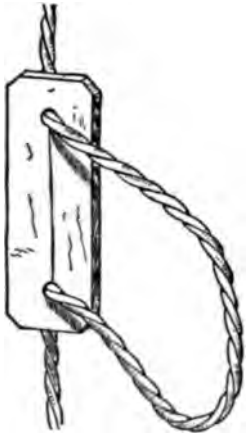


Wire on Fence

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,

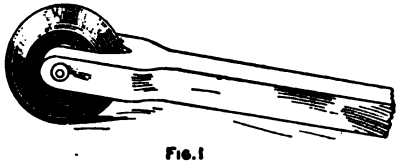


Fig. 1 Fig. 2

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

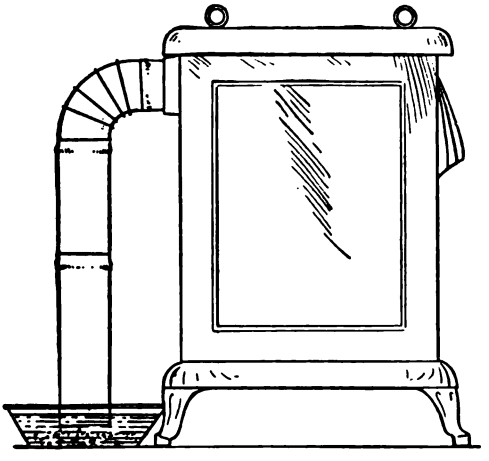
The average hunter going out for small game carries only shot cartridges, but, if occasion demands, he can also kill large game, if the paper shell is cut as shown in the sketch. The perforations are made on the line of the wadding between the powder and the shot, usually about 1 in. from the cap end. 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.

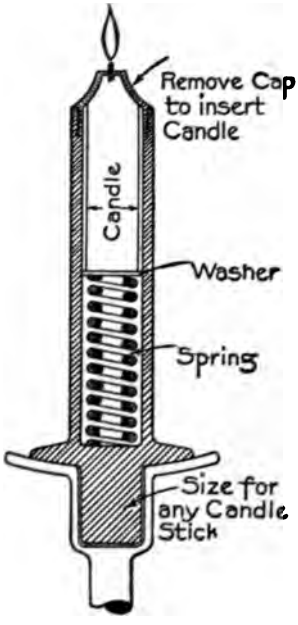


Pipe in Solution

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.

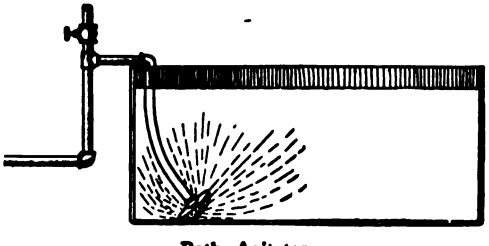
Automatic Feeding Candlestick

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

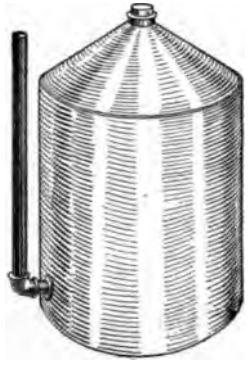
An effective apparatus for agitating a brine bath is shown in the accompanying sketch. Air from the relief valve of a gas furnace is introduced into the bath through a system of pipes, which causes the brine to circulate freely around the die and carry the coating of vapor liable to form on its surface. 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

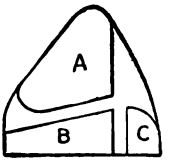


FIG. 1

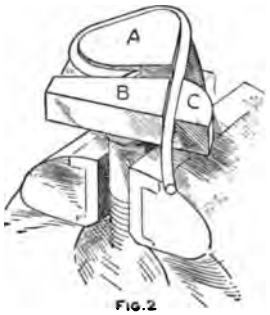


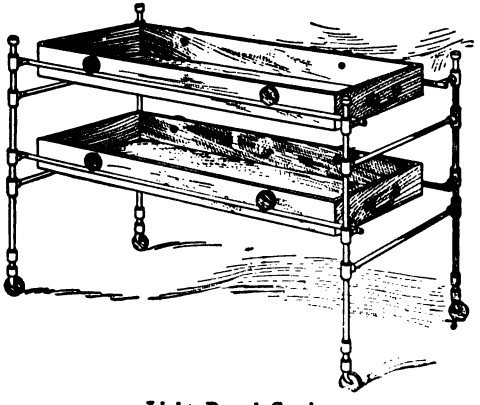
FIG. 2

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 sidewheels, so as to be easily removable. The carrier is handy for transferring

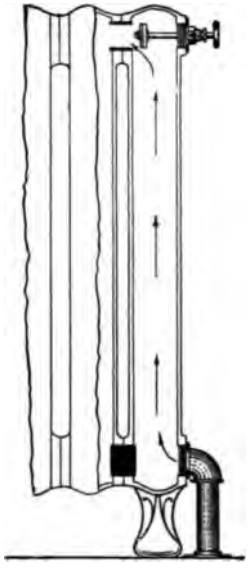


Light Parcel Carrier

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

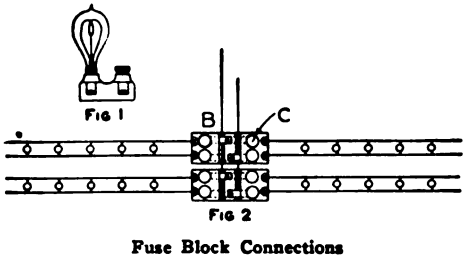
A New Radiator Valve

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.



Fuse Block Connections

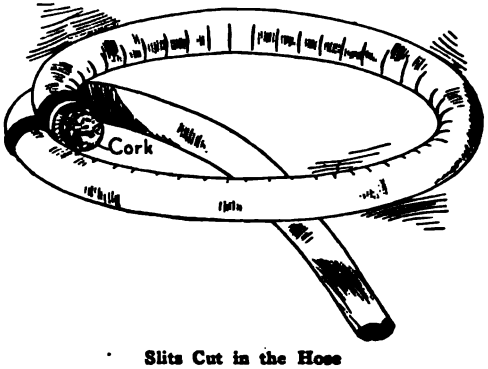
Suppose a short circuit exists at some point in the circuit shown by the upper right-hand lines in Fig. 2. If a lamp is screwed into the socket C and a good fuse plug into the adjacent receptacle, the lamp, being in series with the short, will burn with its full brilliancy and will go out when the short 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



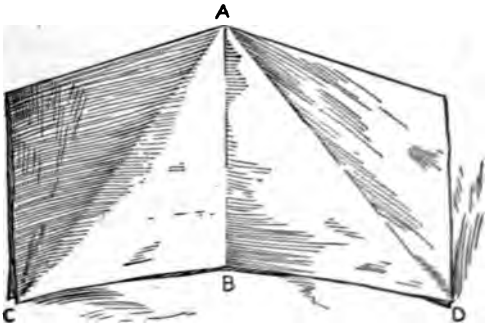
Slits Cut in the Hose

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,

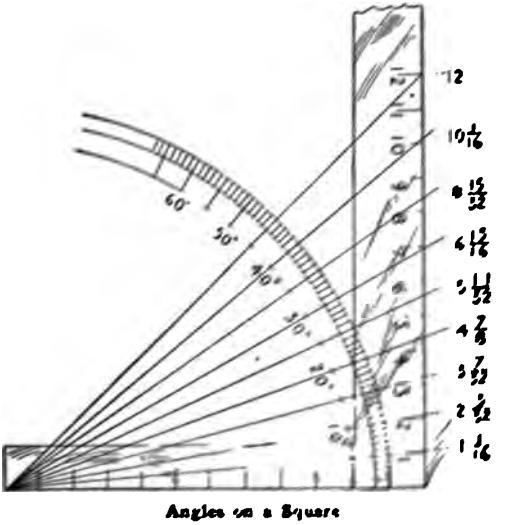


Folds in the Paper

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.

CNever 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.

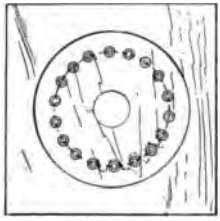


FIG. 1

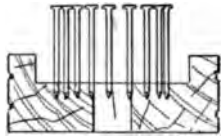


FIG 2

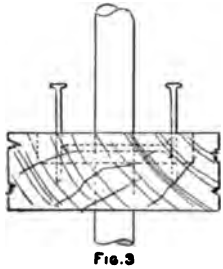


FIG. 3

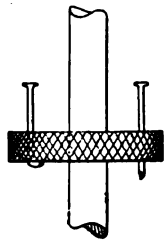


FIG. 4

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.

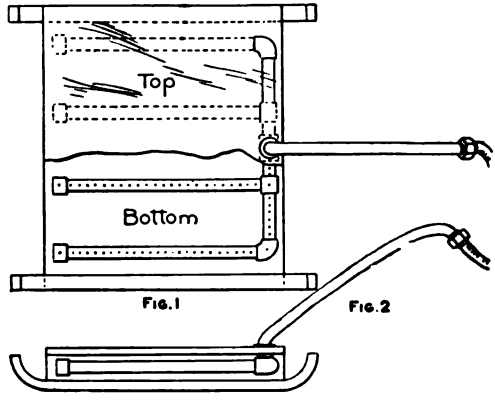
The manner of making the temporary gear is illustrated in the accompanying sketch. A ¾-in. hole, the size of the shaft, was bored in the center of a block of cypress plank, 2 in. thick and 6 in. square, and a depression made ¾ in. deep and 4 in. in diameter, as shown in Fig. 1. The shaft hole was plugged 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.



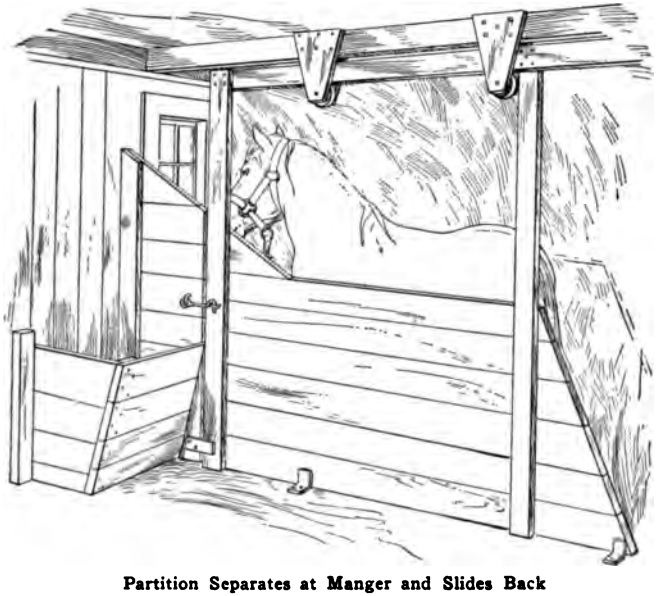
Detail of Coil

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,

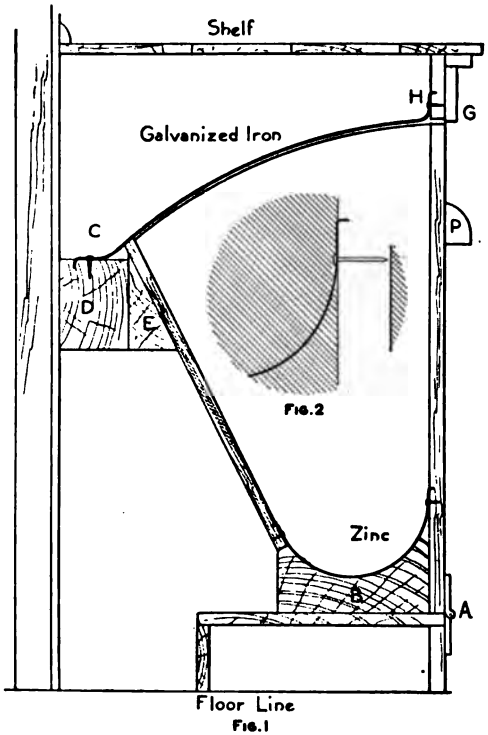


FIG. 1

Bin with Metal Cover

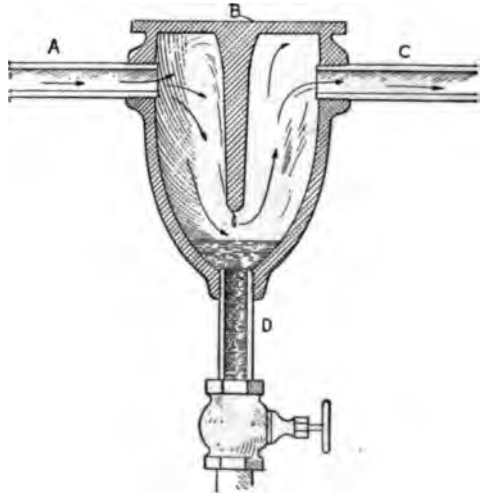
it is best to provide a covering, as shown in Fig. 1. The bin with its front panel made of yellow or sugar pine, is set on a platform 4 in. high. The center of the hinge A should be taken as a center point, and the arc CH scribed with the trammel for the sides of the bin. Make the bottom end of each 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.

FIG. 2

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-

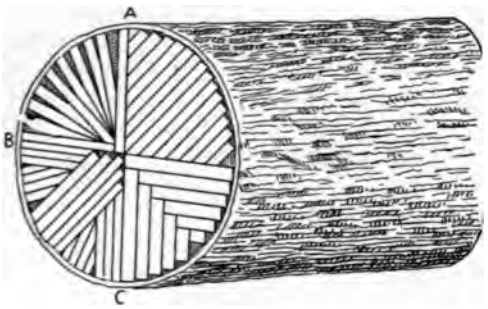


Steam Trap with Baffle Plate

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,

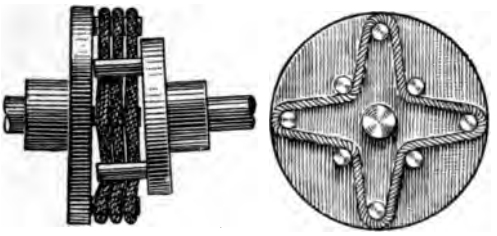


Method of Quarter-Sawing

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

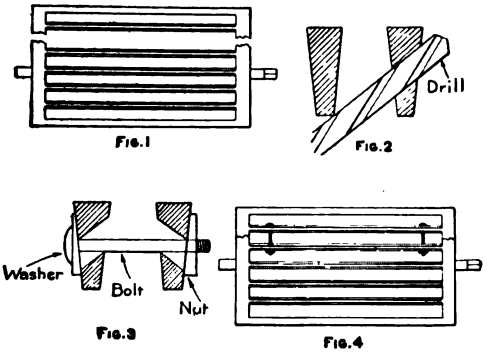
rope was cut and spliced, and put in around the lugs as shown in the illustration. This coupling will transmit power on shafts set at a 30-deg. angle. —Contributed by Robert E. Quinn, Brooklyn, N. Y.

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

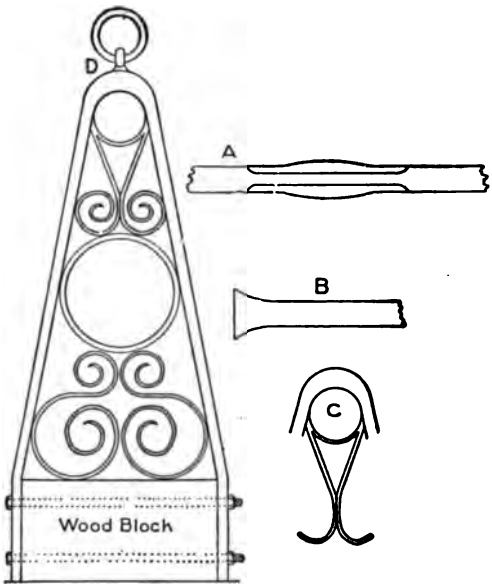


Grate Bolted Together

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

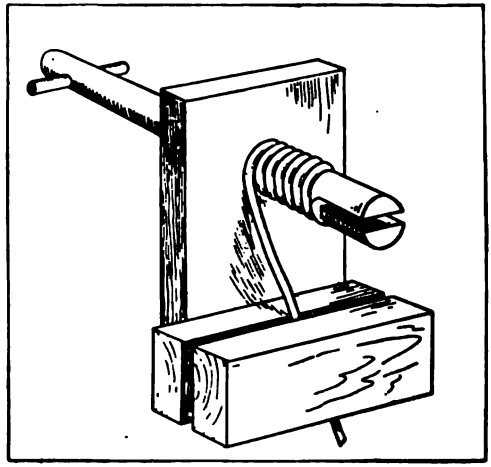
about iron and steel, with its clean, sharp corners, in conjunction with the fact that the article had been made with the hammer and tongs, that gives to a hand-forged post a certain distinction that a casting never possesses. Cast iron will never take the place of wrought iron or steel where these can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

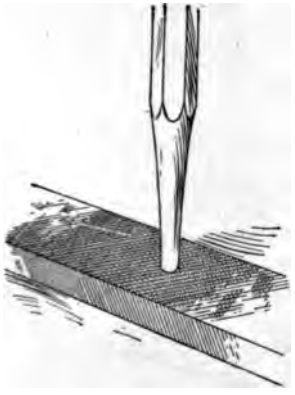
sired for the spring or a trifle smaller, cut a slot as wide as the diameter of the spring wire in one end and drill a

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

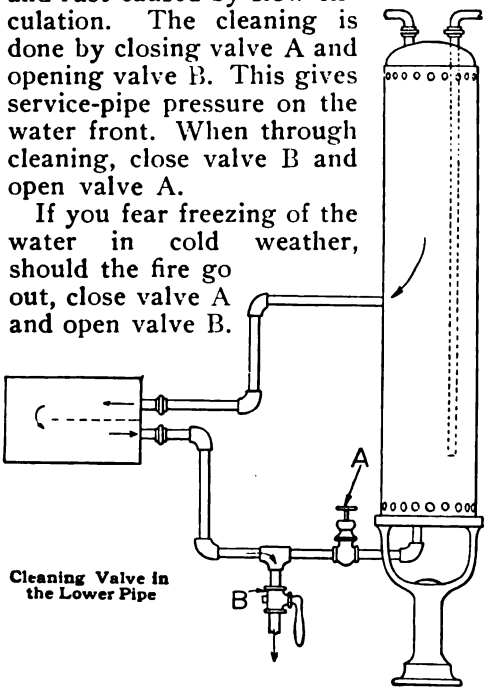
Form the punch to the desired size and shape, and allow it to anneal by cooling slowly. After it is annealed, hold the punch end vertically on an old flat file and strike a sharp blow with a hammer. Turn the punch one-quarter turn and strike another blow. This will produce a nicely checkered end which 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.



Cleaning Valve in the Lower Pipe

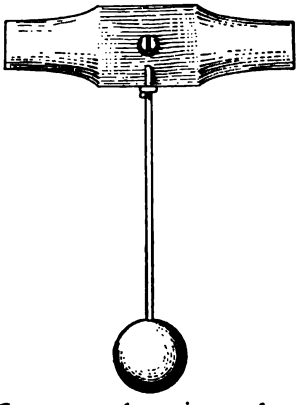
With this precaution you will know that it is safe to make a new fire.—Contributed by C. E. Weisgarver, Altoona, Pa.

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.

Door Button Latch

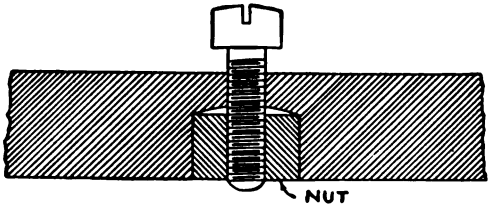
Anyone who has had to take care of horses knows how easily they manage to get out of the barn by pushing and working at a door until the button becomes loose and the door opens. After our horse had done this several times, I hit upon a scheme to keep the button in place.



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.

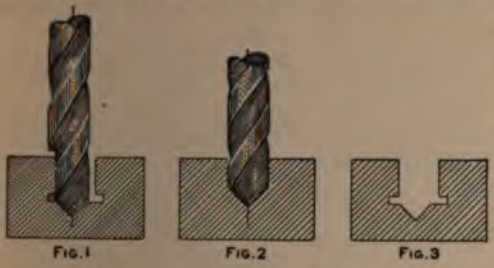
If the belt is to be shifted to give

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.

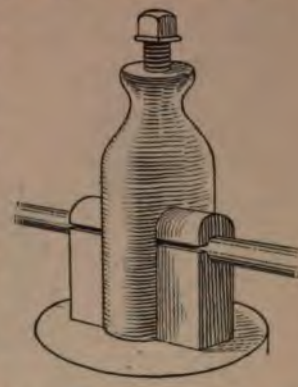
Filling Cracks in Walls before Painting

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.



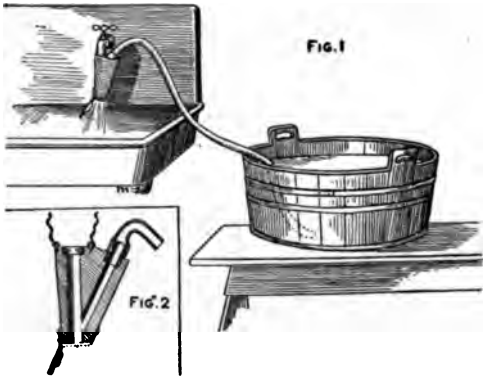
If you wish to have a boring bar made from ½-in. drill rod, place a ½-in. drill in the lathe chuck and drill through the holder, so as to leave about $\frac{1}{32}$ or $\frac{1}{16}$ in. on one side as shown in the sketch, then take it out and slot it on the milling machine or shaper through the opposite 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.

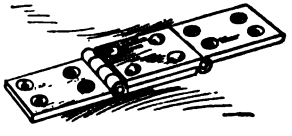
If the house be provided with running water at the sink, a very simple contrivance may be devised for utilizing the city water pressure for the emptying of the tub. By providing a simple form of ejector at the faucet and connecting one inlet of the ejector to a short piece of hose leading to the tub,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

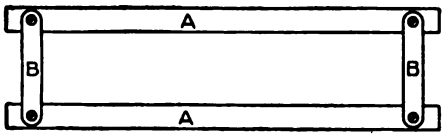
By applying grease cups to the hubs of light delivery wagon wheels, as shown in the illustration, the unpleasant task of taking a wheel from the axle and lubricating it while mud covered and greasy is obviated. The grease cup is attached by simply boring a hole through the hub and skein and turning the 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

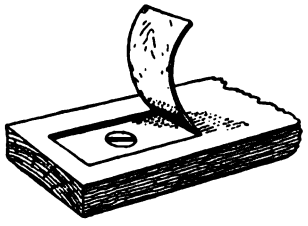
A parallel rule is a handy tool to have in the drafting room or machine shop. One can be made in a few minutes by taking two perfectly straight strips, A, of any desired length and connecting them at the ends with two brass straps, B, as shown in the accompanying sketch. The straps can be fastened to 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

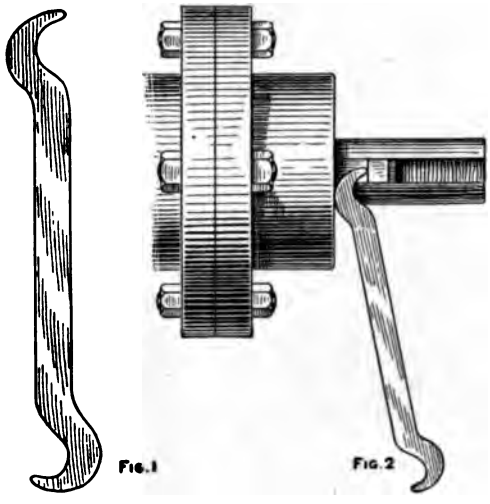
Covering Screw Heads in Cabinet Work

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-

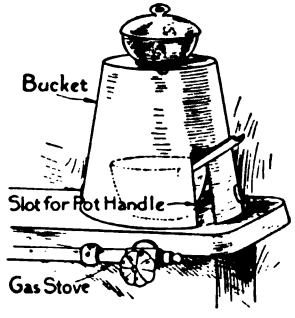


Pulling a Key

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.

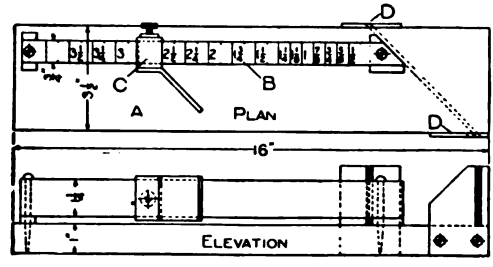


A Packing Cutter

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

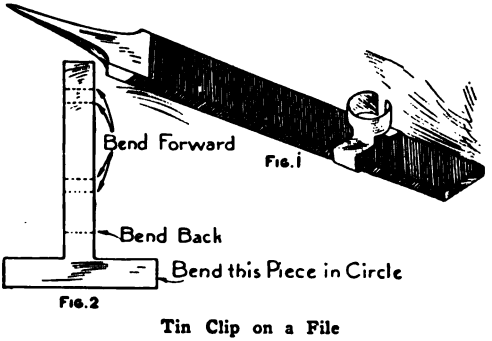
The hub casting in the rear wheel of an automobile had broken, but, still, the machine was taken home by its own power, as illustrated in the sketch. A pipe wrench was set tight on the axle and strapped to one of the spokes. This transmitted the power from the axle to the wheel. The wheel wobbled considerably, 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

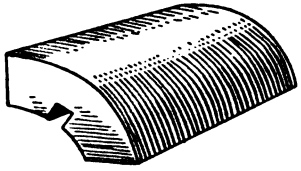
from a strip of heavy tin which I slipped over the end of the old file, as shown in Fig. 1. The shape of the tin and where it was bent is shown in Fig. 2."

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

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.

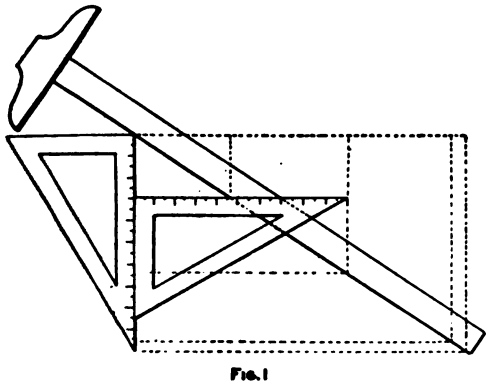


Fig. 1

Reducing a Rectangle

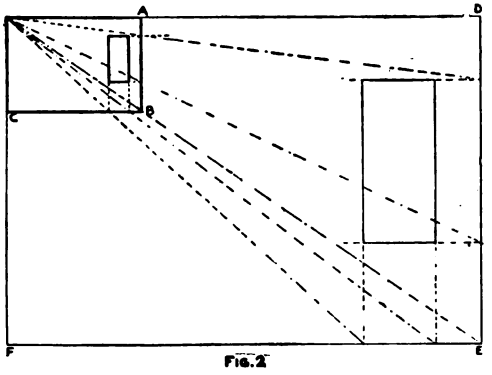


Fig. 2

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

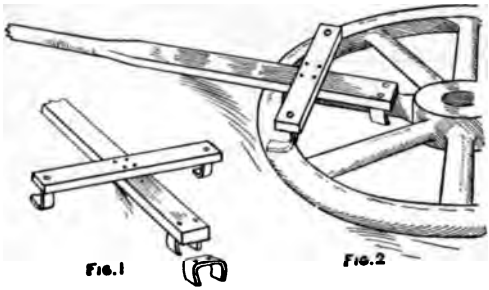
When a shaft or rod is riveted over in a countersunk hole, it is liable to work loose in time and turn around when the rod does not fit the hole closely. A rod may be kept from turning by cutting or filing one or more grooves in the bevel countersunk portion, and when riveting, by swelling the metal 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

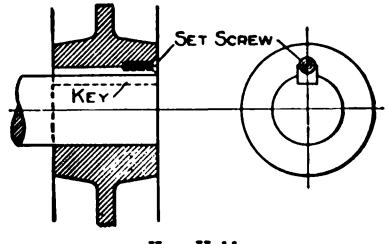
Acetylene gas generators, to give the service which may normally be expected of them, must constantly be maintained in good condition, says a correspondent of the Automobile. Private owners, as well as professional drivers, have a habit of permitting the generator to go unattended for several days after 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.

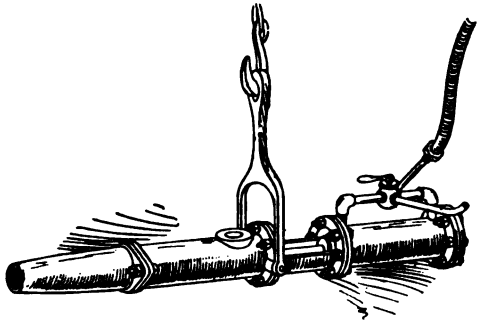
SHOP NOTES

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

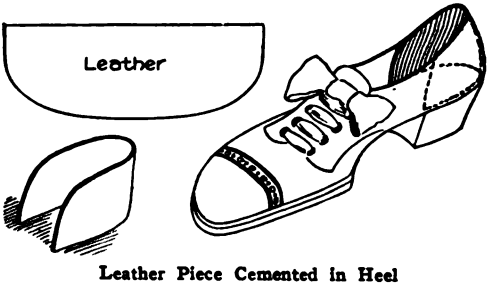


Steam and Mud Cylinders

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.

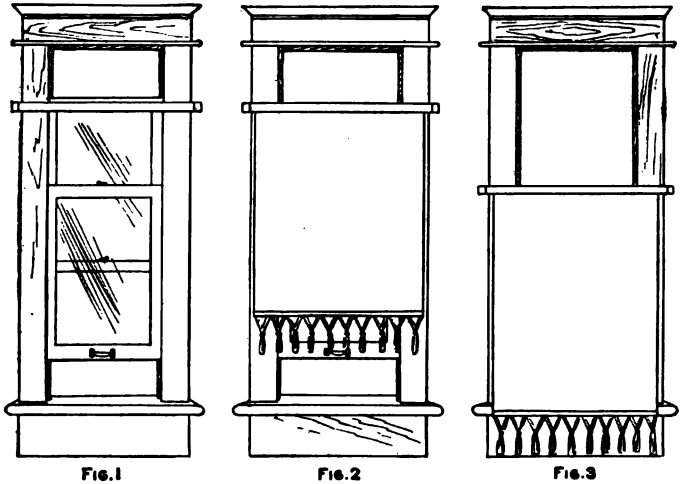


FIG. 1 FIG. 2 FIG. 3

Shade Roller Attached to Window Sash

¶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.

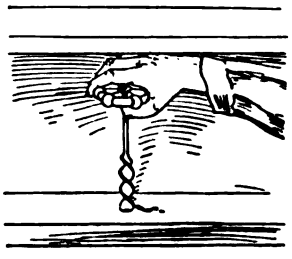
Sash Shade Holder to Permit Ventilation

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.

Turning a Bit with a Valve Wheel

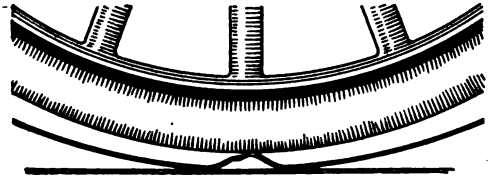
One of our men was putting up shelving, and some holes had to be bored in the crosspieces which were only 15 in. apart. This space did not allow the use of a brace and bit. But the man had evidently run up against such difficulties before, for he had in his kit a hand wheel from a ¾-in. valve with a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



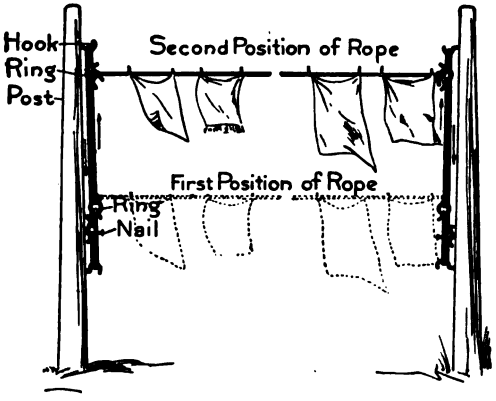
Dent Pressed Out by Tire

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

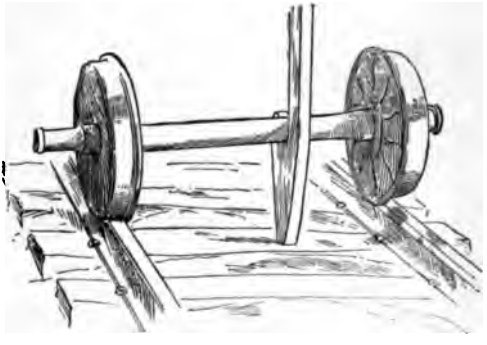


High and Low Position of Line

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

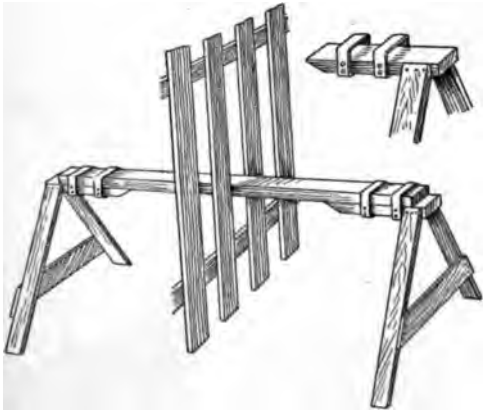


Lever for Raising Axle

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

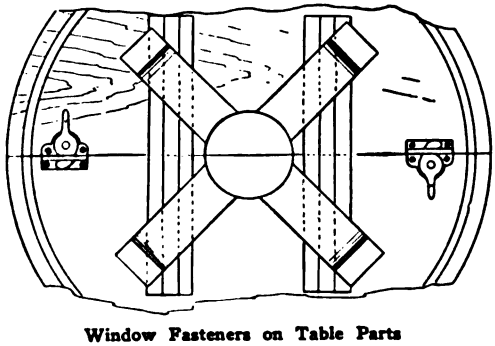


Separable Shop Horse

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



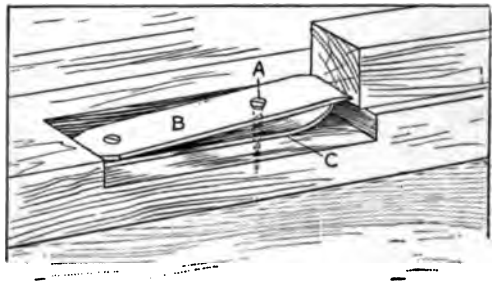
Window Fasteners on Table Parts

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

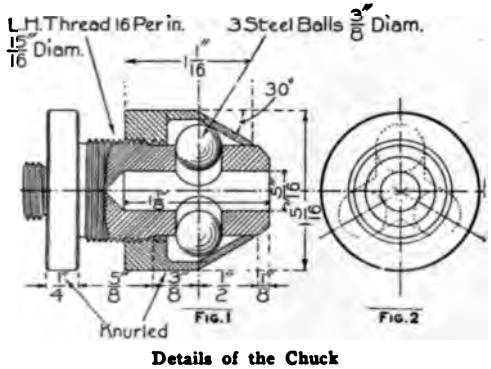
in the back iron and spring and turned into the bench holds the stop in the depression cut in the top of the bench and makes a stop adjustable for thin or thick stock. It can be turned down far enough to be out of the way while other work is being done.—Contributed by George Schellberg, Omaha, Nebraska.

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.



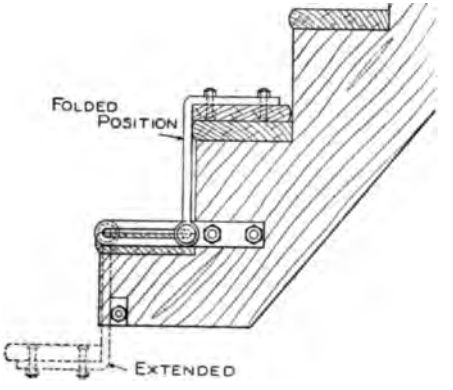
Details of the Chuck

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

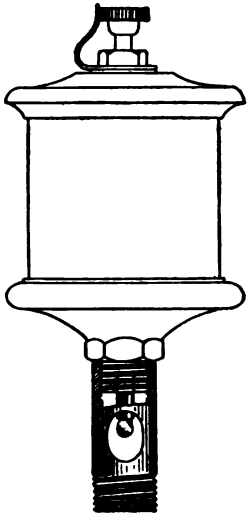
Medicine Dropper

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.

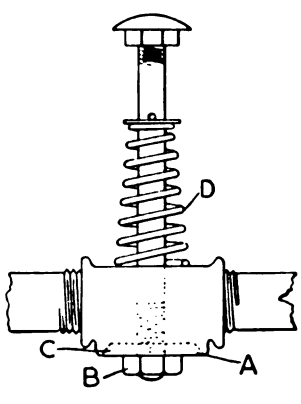
Home-Made Sight-Feed for an Oil Cup

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

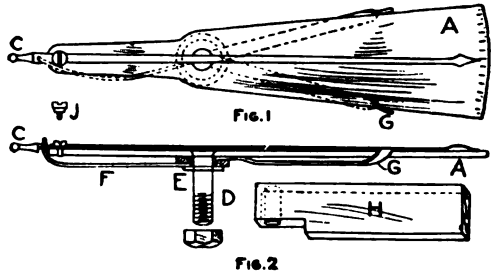
A very satisfactory cut-out valve may be made from an old tee pipe fitting in the following way: Take a tee fitting the size of the exhaust pipe and drill a ⅜-in. hole in the center, opposite the side opening. Turn a seat for the valve at a 45-deg. angle, as shown at A. Thread a rod and fit the nut B. 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.



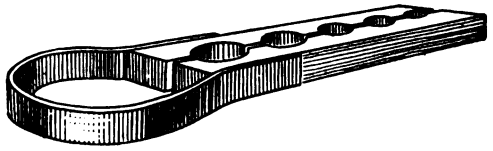
¶Allow plenty of time for the under coats of paints to dry before varnishing and there will be no danger of stains showing after the job is in service.

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.



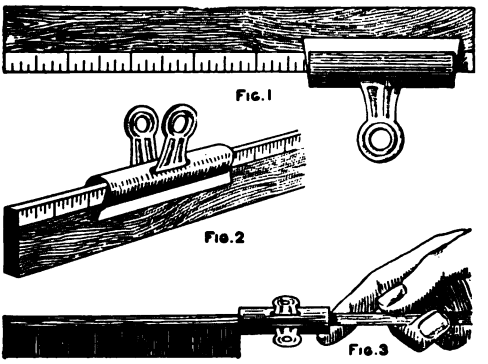
Screw-Holding Clamp

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

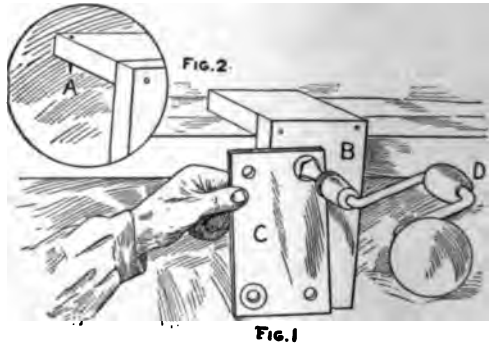


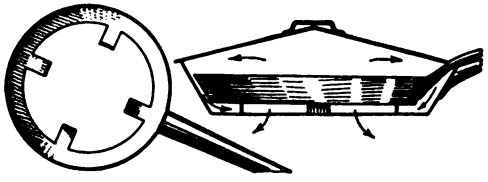
FIG. 1
Bench Protector

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

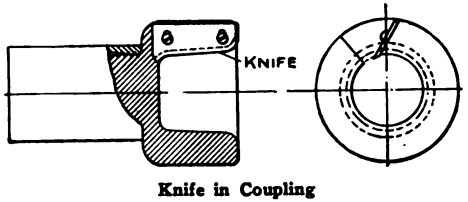


Vent for Odors

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

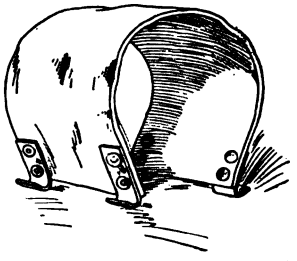


Knife in Coupling

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

An Automobile Tire Sleeve

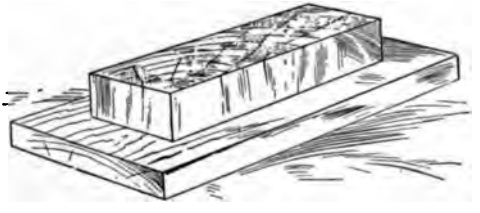
Get a piece of 5-in. rubber belting, some copper rivets and a piece of steel, ⅛ in. thick by ¾ in. wide. Cut the steel into four pieces, bend them as shown in the sketch, and smooth the corners and edges with a file, so that they will not cut the tire. Drill holes and rivet one on each corner as shown.



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

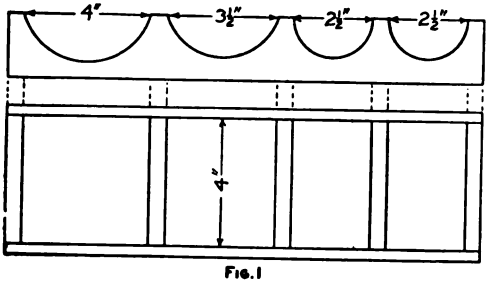


FIG. 1

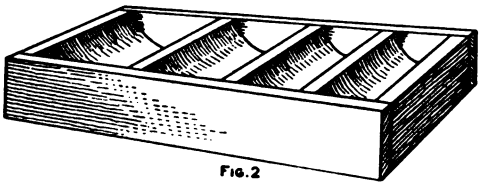


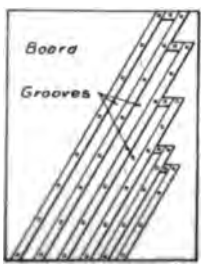
FIG. 2

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.

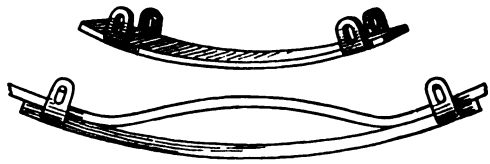
A Templet for Cutting Spiral Piston and Valve-Rod Packing

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

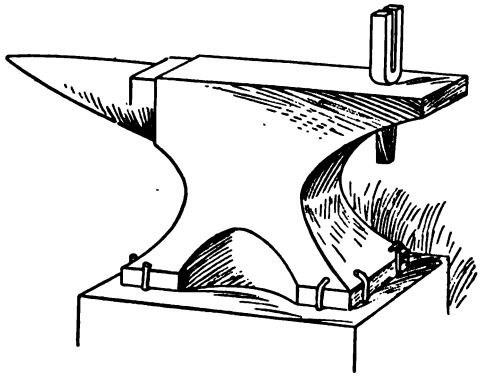
We doubt whether an amateur can patch the amalgam back of a mirror so as to make a satisfactory job, says the Druggists' Circular, but we know of nothing to prevent one from experimenting along this line if he wants to, and here is some advice which may be of assistance to the experimenter: First clean 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.

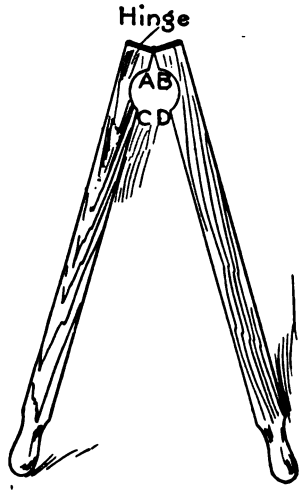


Bending Tool in Anvil

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.

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

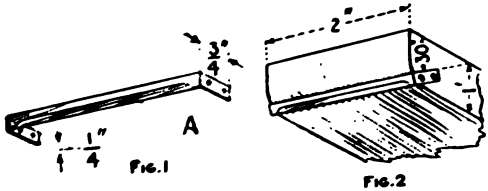


FIG. 1 FIG. 2

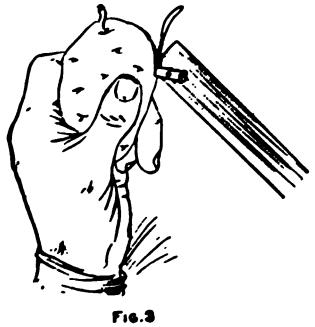


FIG. 3

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.

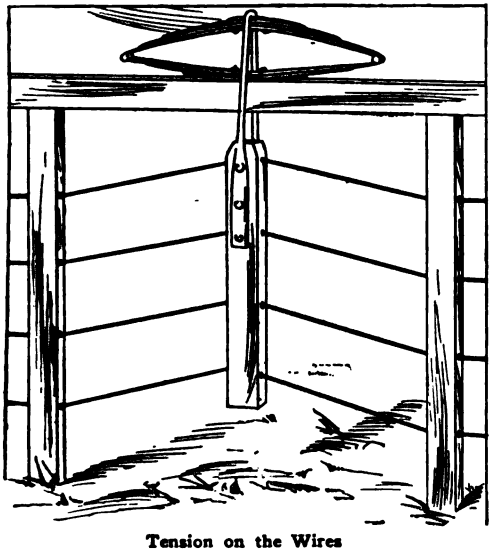
¶An old ivory effect may be made by applying two coats of white shellac and when it is dry scumbling with raw umber, rubbing it partially off with a rag, so as to leave a mottled effect.

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



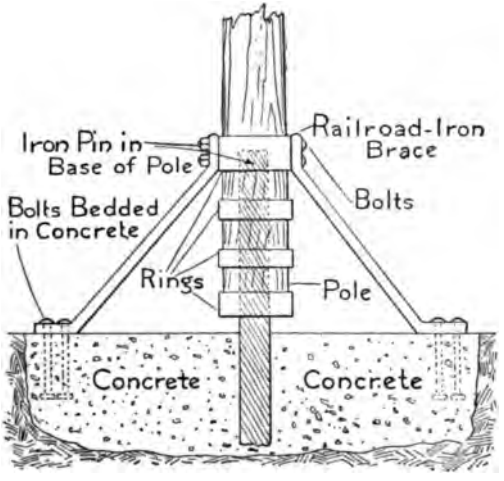
Tension on the Wires

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

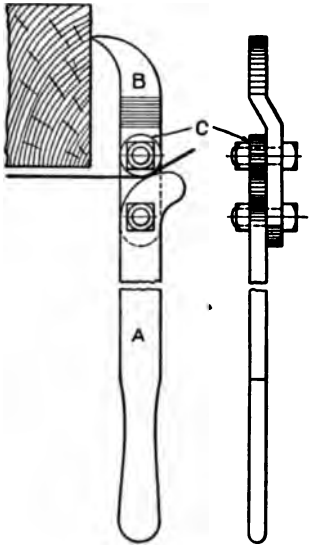
When houses rest on inexpensive wood foundations, these are usually boarded up to keep out the cold. A good substitute for the boards is the material used in making a gravel roof. This is cheaper and easier to apply. No wind or frost can penetrate this covering, and it gives the appearance of a stone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

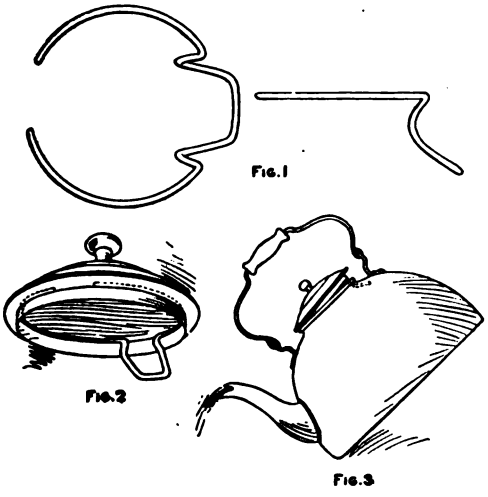
An Emergency Gasket Repair

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

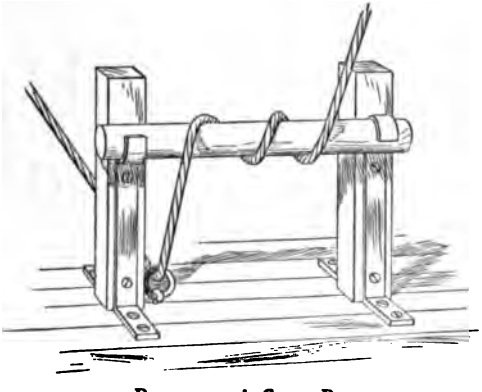


Holding Lid on Kettle

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

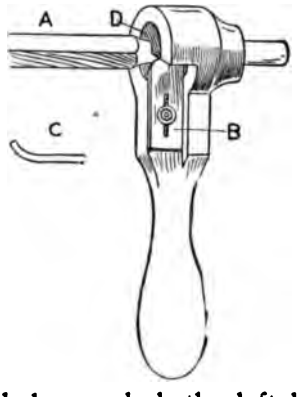


Rope around Cross Bar

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.



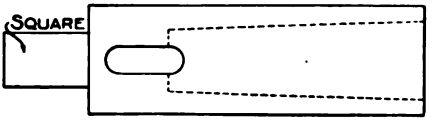
Catch for Holding a Door Open

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

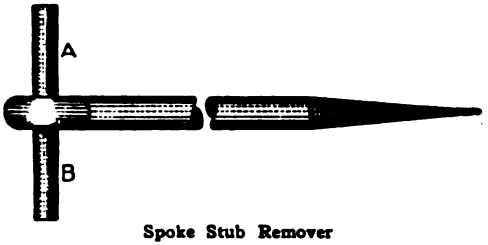
How to Set a Tool for a Close Cut

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

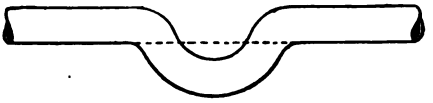


Spoke Stub Remover

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

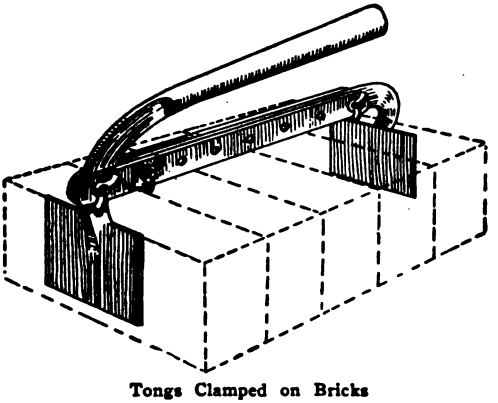


Bend in Pipe

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

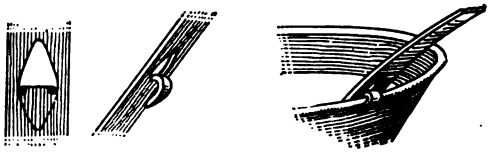
inates the old "chain gang" or hand to hand method and effects a large saving of time and labor.

Courtesy American Vehicle

One Half Design for a Short Panel

Hook on a Spoon Handle

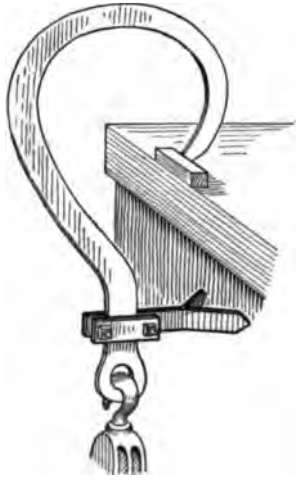
Spoons can be kept from falling into a soup bowl or kettle by making a small hook on the back of the handle,



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.

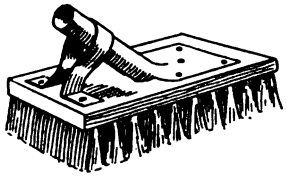
In babbitting the split box, the operation is the same, except that liners made of cardboard are placed between the two halves of the box and against the shaft to divide the metal. To let the metal run from the upper half of the box to the lower, cut a few small notches in the liner close up to the shaft. 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.

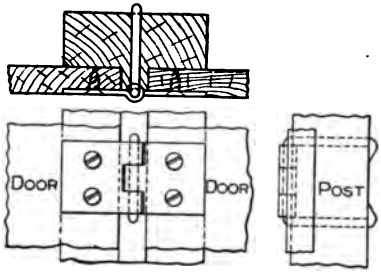


By means of this device which can be attached to a new brush when the first is worn out, scrubbing can be done in a standing position just as effectively as in the old way.—Contributed by W. A. Lane, El Paso, Texas.

¶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

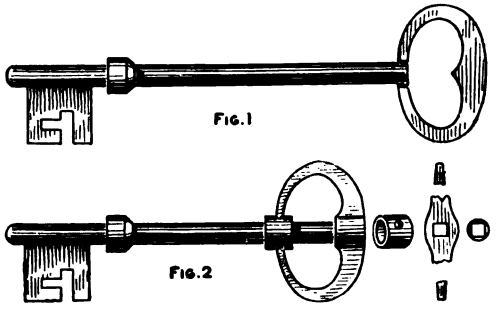
A simple method of attaching hinges so that they will swing two doors is shown in the accompanying sketch. A post is set between the doors and the hinges fastened to it by means of U-shaped staples as shown. These staples are long enough to go through the post and clinch on the back side. Only one hinge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



Hinge on Doors

Repairing a Broken Key

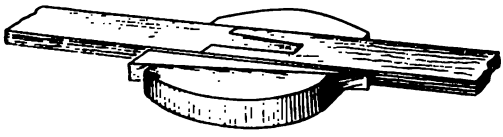
When the handle of a heavy key is broken off as shown in Fig. 1, a strong repair may be made as follows: Square the head of the stem and fit a sleeve over it. The sleeve, with two holes drilled in its sides, is then shrunk on the key stem, if this be steel or iron, or soldered in place, if the key is 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

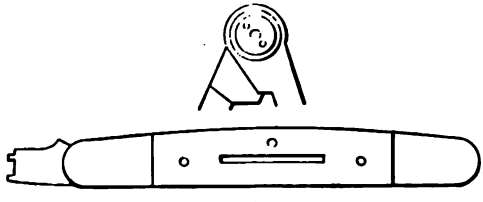


Clip on the Joint

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

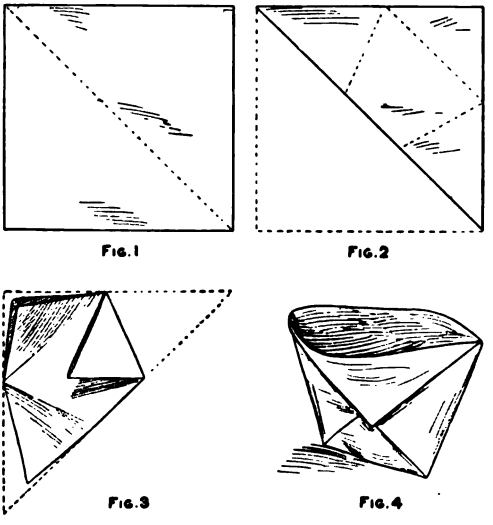
The ordinary leather punch that is driven with a hammer is a good substitute for the regular plug cutter to cut round pieces of wood for filling screw holes. The punches can be purchased from any local hardware dealer in almost any size. The cutting edge is ground or filed sharp and the cutter

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.

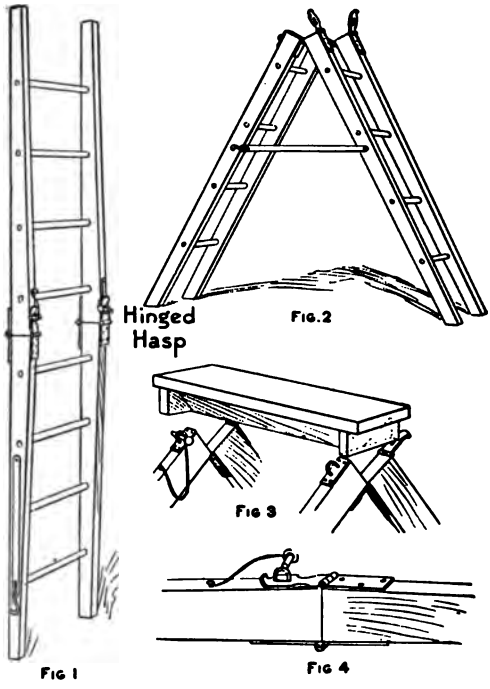
Hanging Ingrain Paper

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.

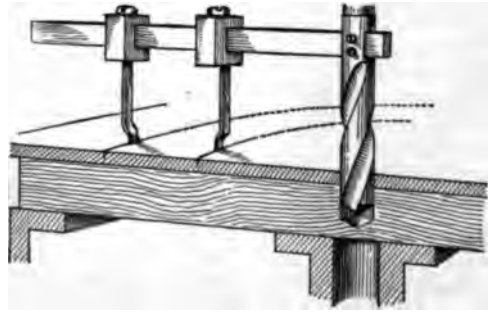
¶A quick way to charge the primer on an automobile engine is to saturate a bit of waste in the oil of the carburetor and squeeze it into the opening.

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



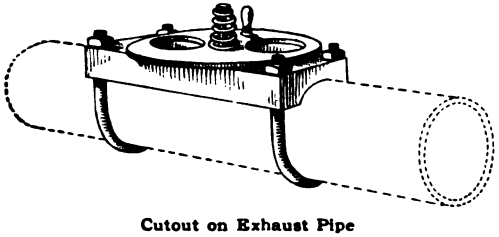
Two Cutters on a Bar

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

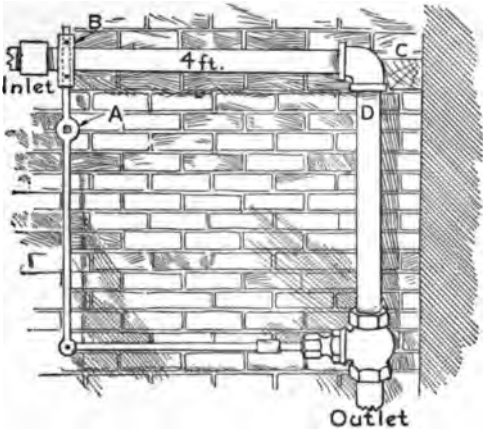


Cutout on Exhaust Pipe

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



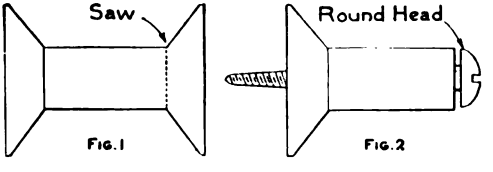
Steam Trap of Pipe and Fittings

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

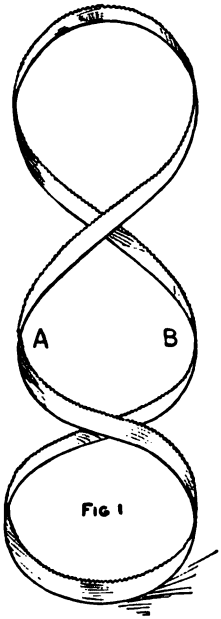


Fig 1

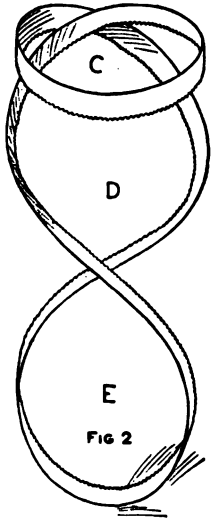


Fig 2

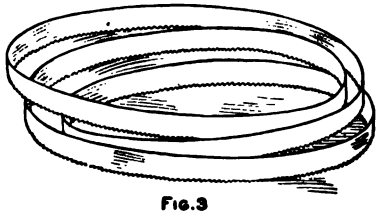


Fig. 3
Turns in the Saw Blade

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.

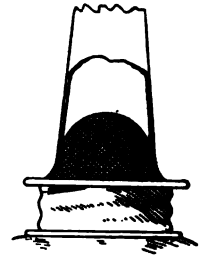
Testing an Electric Meter

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.

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.

...sten Pipe into Hose

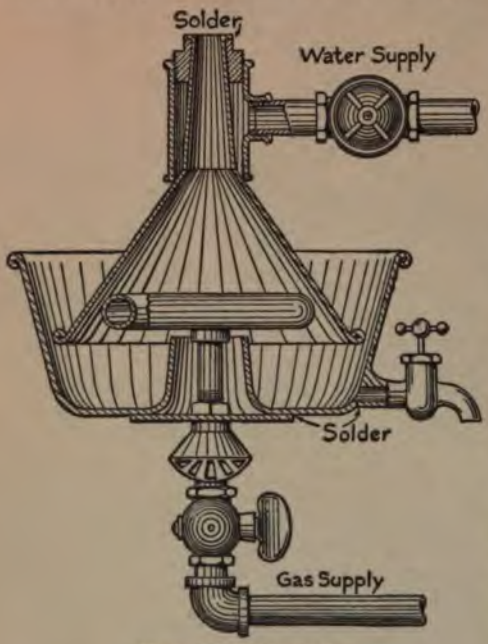
...o has repaired a broken ...ow hard it is to insert a ...end, as the pipe and the ...ly not the same size. ...make it bright and heat ...ake the metal blue, Slip the hose on ...e it in water ... clamp,

¶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

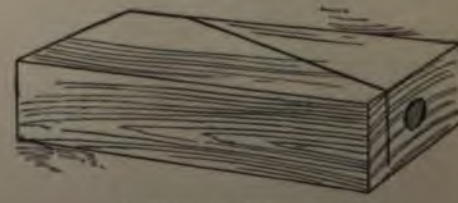
The copper funnel should be tinned on the outside. To the water supply pipe is attached a valve for regulation of the flow of water. To this valve is fitted a short nipple and an ordinary tee fitting. One end of the arm of the tee is fitted with an ordinary plug which is bored and reamed out to fit the 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.

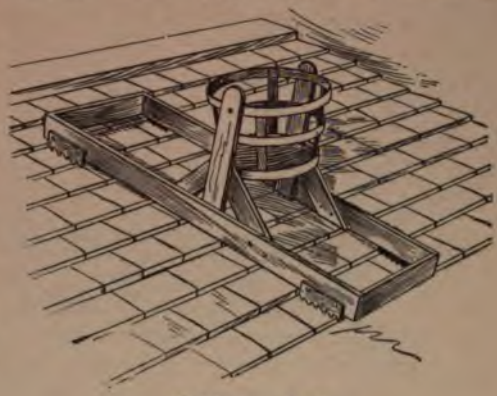
Bore a hole having the same diameter as the tubing, from end to end, perfectly parallel with the edges. With the aid of a protractor, adjust a sliding bevel to 20 deg. and lay off a line with it on the face of the block. Mark off another line with a square on the end of the block. Make a cut with a back 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 3/8 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

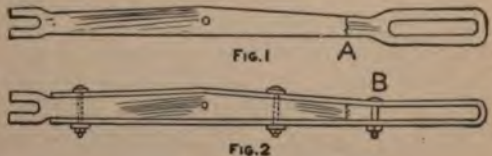


Fig. 1

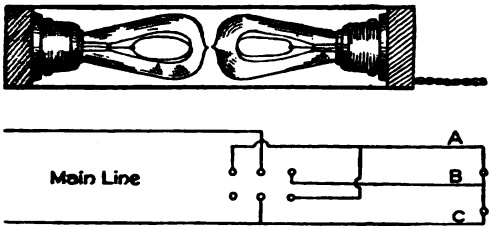
Fig. 2

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.

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,

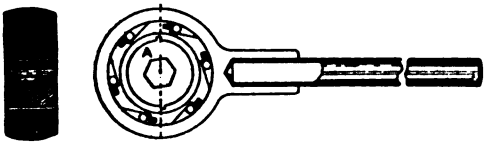


Lamps in the Tube

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

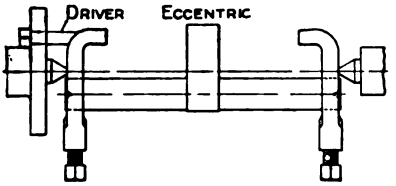


Roller Pawl Ratchet Wrench

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

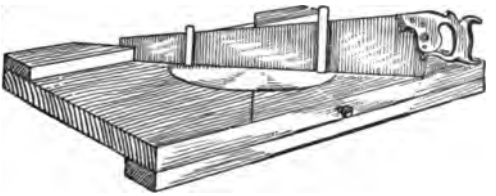


Dogs Used in Turning Eccentric

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.

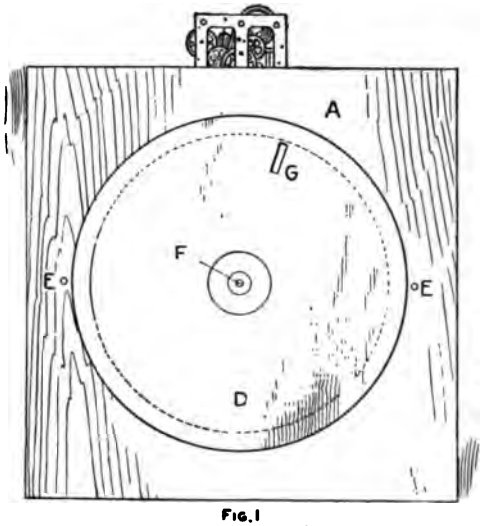


FIG. 1

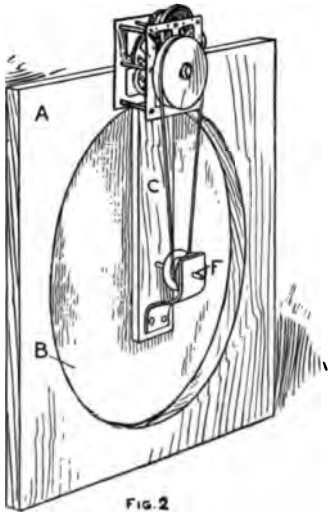


FIG. 2

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.

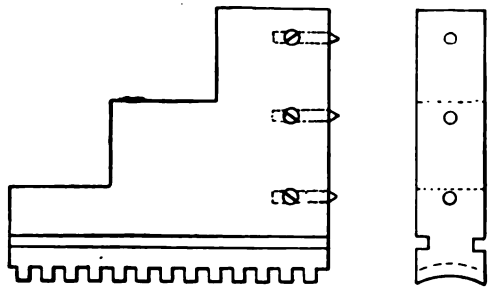


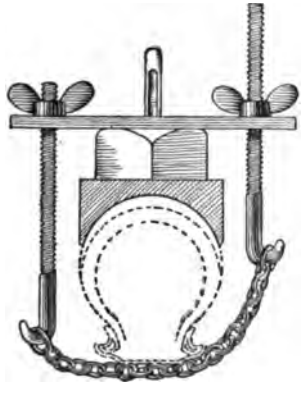
Fig. 1 Fig 2

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.

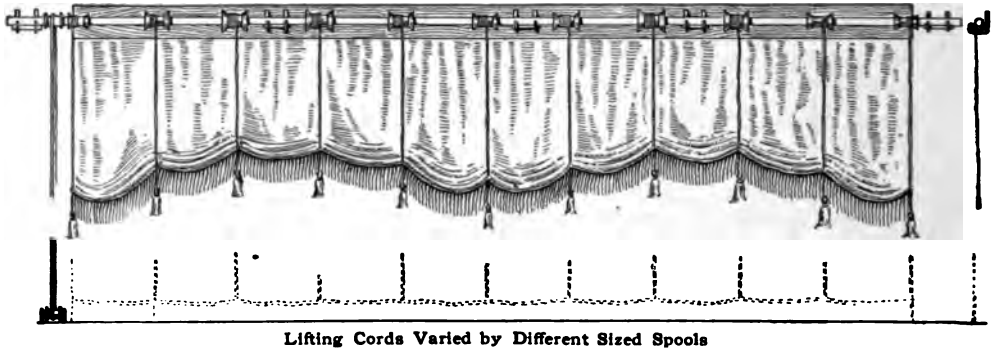


Two rods of wrought iron, ¼ in. in diameter by 6 in. long, are each threaded on one end for a distance of 3 in. The other end of each of these rods is formed into a hook to hold a piece of chain. The sketch clearly shows the apparatus, also the method of clamping

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.

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



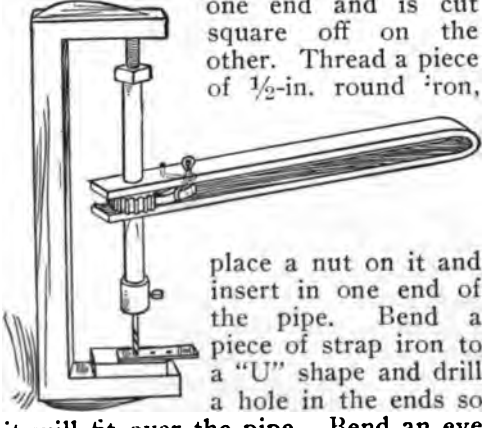
Lifting Cords Varied by Different Sized Spools

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.

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.

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.

liameter from $\frac{1}{16}$-in. sheet brass laying out a center line on one and another center line on the ɔsite side at right angles to the line. In the center lay out and through a semi-circle as shown in 1. Bend the edge of the disk at t angles outside of the small semi- e, taking care that the bending t is on the dotted center line. This ation leaves the ½-in. circle pro- ng, as it is not bent with the disk. a place on the center line down to arp edge and carry the line down he bevel edge. Make two small essions with a center punch on the er line, each at a point directly e the inner and outer vertical sur- of the part turned down. The tool aced on the wood as shown at A,

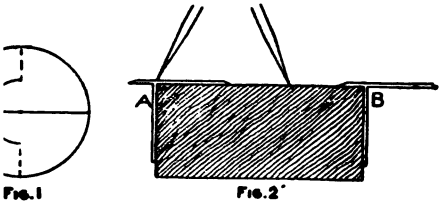


Fig. 1 Fig. 2

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 lrilled slightly to one side of the er because the work will not slide he metal of the faceplate. I made vice to place between the work and faceplate that would adjust itself to slight touch of the drill. The hod of construction is as follows: rocure two pieces of sheet metal $\frac{3}{32}$ hick by 2 in. square and fasten n together with screws. Drill four n. holes about ⅜ in. from each ıer. Take the pieces apart and ıtersink the holes on the inner s deep enough so that when the es 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

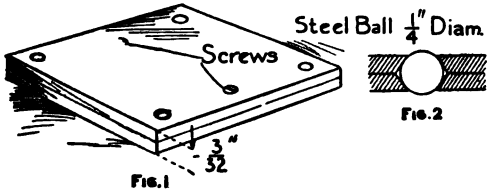


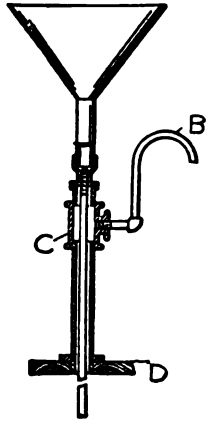
Fig. 1 Fig. 2

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.

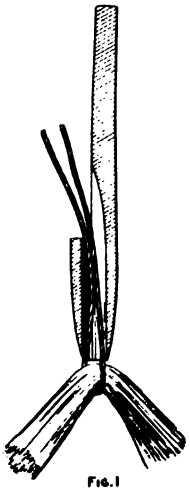
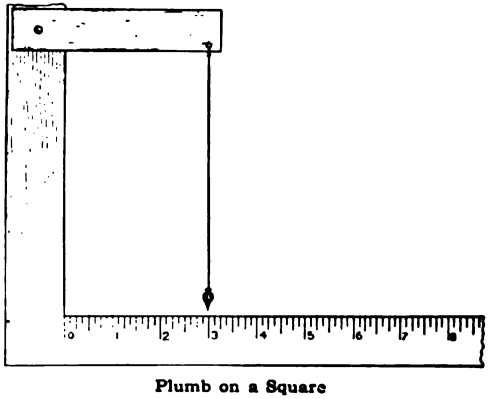


FIG. 1 FIG. 2

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.

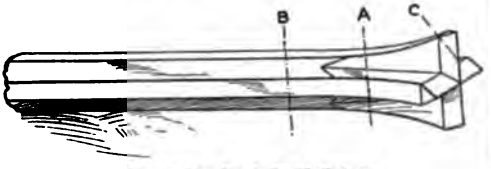


Plumb on a Square

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



Tempering Rock Drill Points

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.

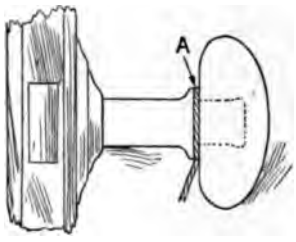
Protection for the Eyes from Intense Heat

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.

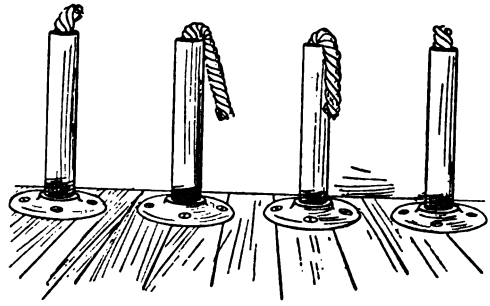
Fastening a Loose Door-Knob

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.

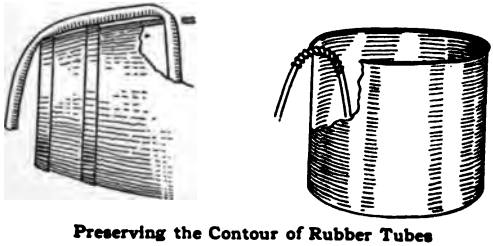


Ropes in the Pipes

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.

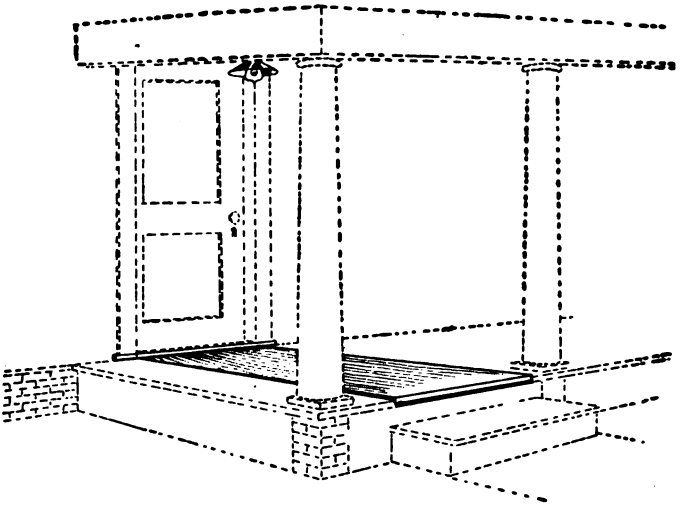


Preserving the Contour of Rubber Tubes

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.

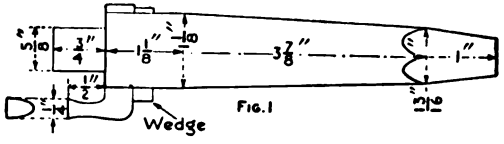


Fig. 1

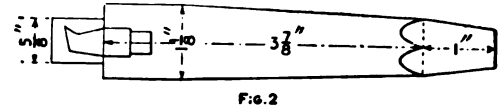


Fig. 2

Details of Boring Tool

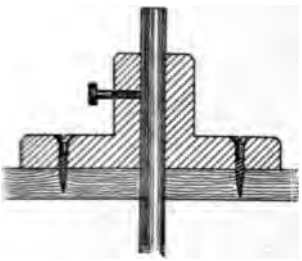
A 5/8-in. hole was first drilled in the center of the place desired for the large hole. The tool was then put in the ratchet stock and the cutting tool, which can be adjusted, set to 2 3/16 in. The center of the larger hole was then cut out, leaving a perfectly round hole for tapping the threads. As 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

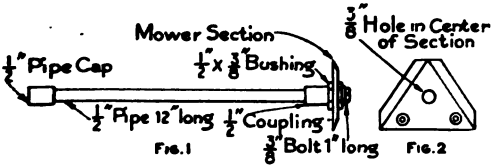
This center will be found handy for the pattern-maker, die-maker and machinist in striking large radii. It



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

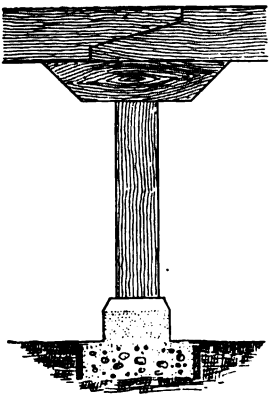


Scraper Made from Mower Section

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

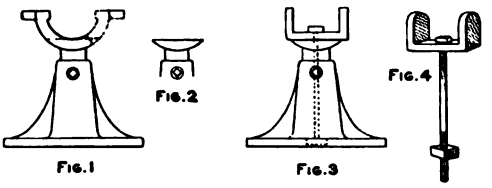
Foundation Supports

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-

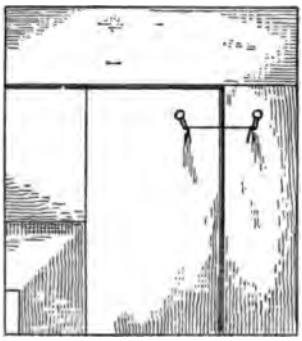


Wrought Iron Ears on Hanger

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.

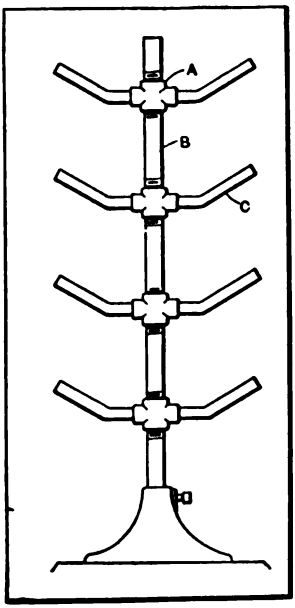
A Simple Thief-Catcher

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.

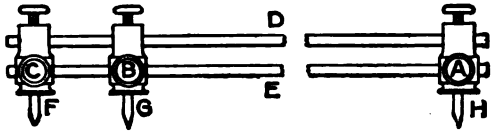
Binding-Posts Used for Trammel Points

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 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

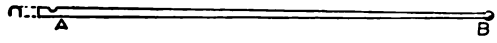
and a pencil or pen substituted for the point H, and the device used as a beam compass.—Contributed by J. L. Riley, Dallas, Texas.

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 casehardening 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

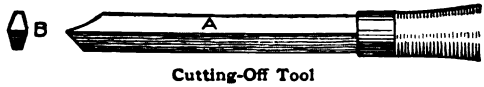
ball B on the other end prevents pricking holes in the inner tube, as is often the case when using a needle.—Contributed by Robert A. Cochrane, Adrian, Mich.

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 $\frac{3}{4}$ 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 $\frac{1}{8}$ to $\frac{1}{2}$ 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

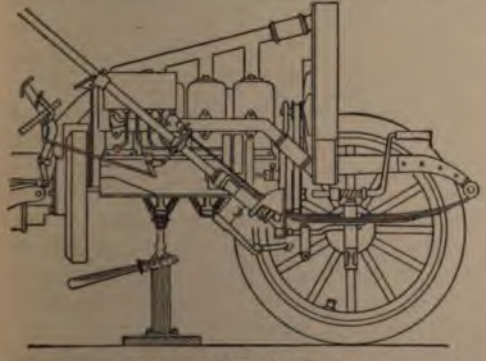
Wood Box in the Wall of a House

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

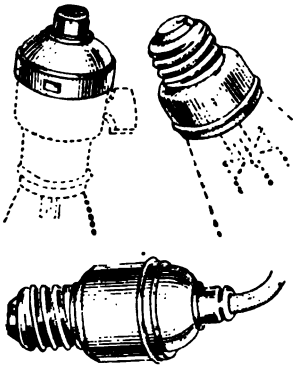
When there is any uncertainty about the pound or looseness of a rod or main bearing, a heavy pry-bar with exceptionally good leverage must be used to "feel" the crankshaft in its bearings. It is very inconvenient, however, to work such a bar up and down beneath a car.

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.

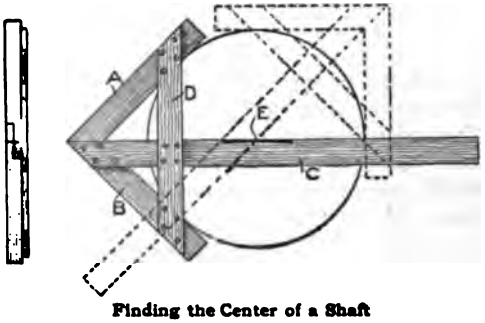
Attachment Plug Made from Lamp and Socket Parts

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



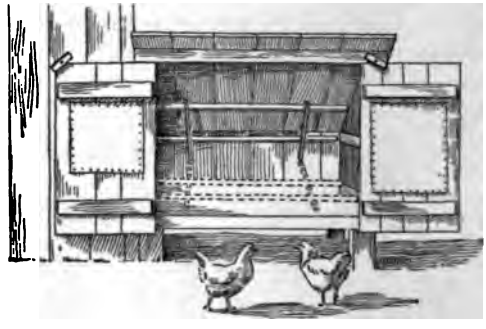
Finding the Center of a Shaft

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

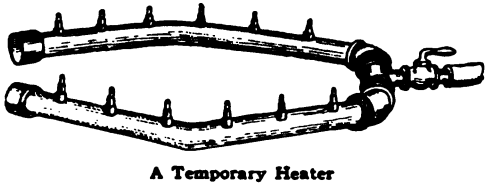
The house has a southern exposure, and the two doors which form the front can be thrown wide open so that the interior gets a sun bath every day. In addition to the frequent coats of whitewash, lime is sprinkled on the floor, which is easily kept clean. The doors are fitted with windows, unglazed, but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

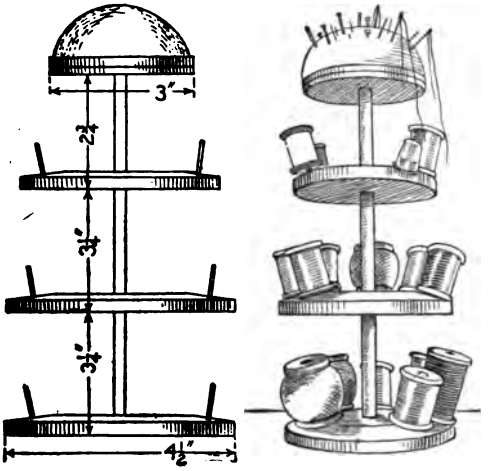


A Temporary Heater

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

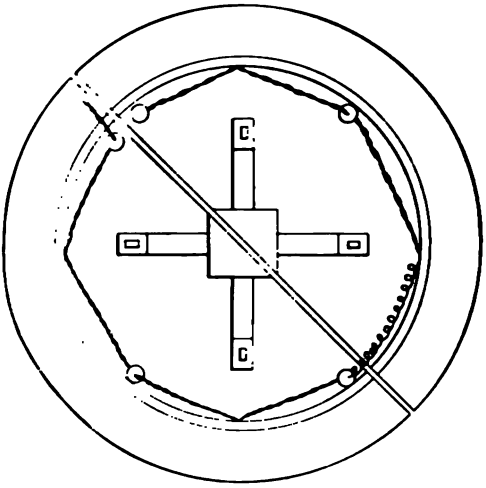
The center post is made of a $\frac{7}{16}$-in. dowel which is glued into the mortise of the base. The small pins are made of ¼-in. dowels and six or eight are set into each block. The cushion block is made of two thin pieces, the cushion being made over one and this nailed or screwed to the other before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

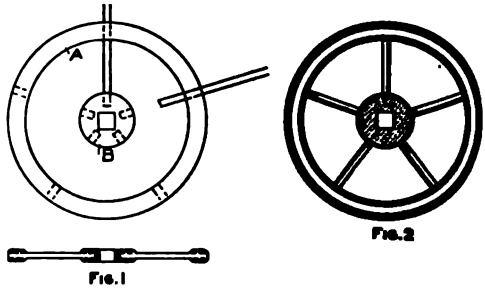
Having occasion to find the revolutions of a high-speed shaft, and no speed indicator at hand, I used the following method:

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



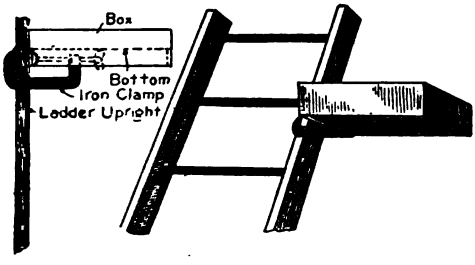
Wheel Made of Wood

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, 3/8 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

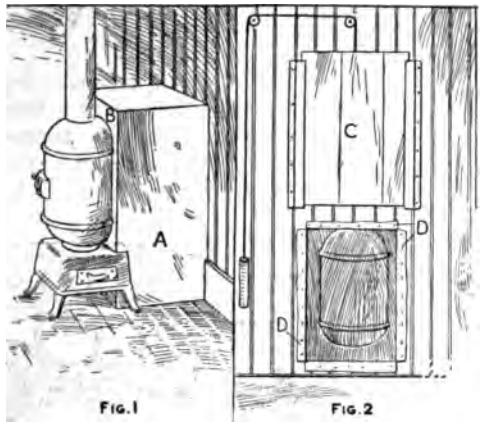
can be placed on either side.—Contributed by J. M. Kane, Doylestown, Pa.

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),

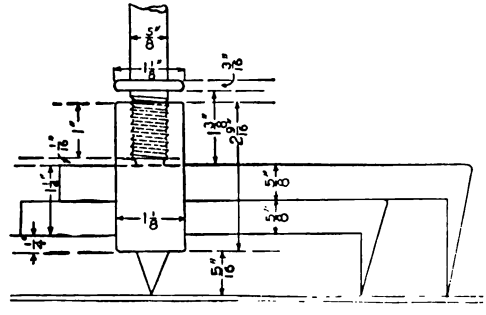


Heat Box on the Stove

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.

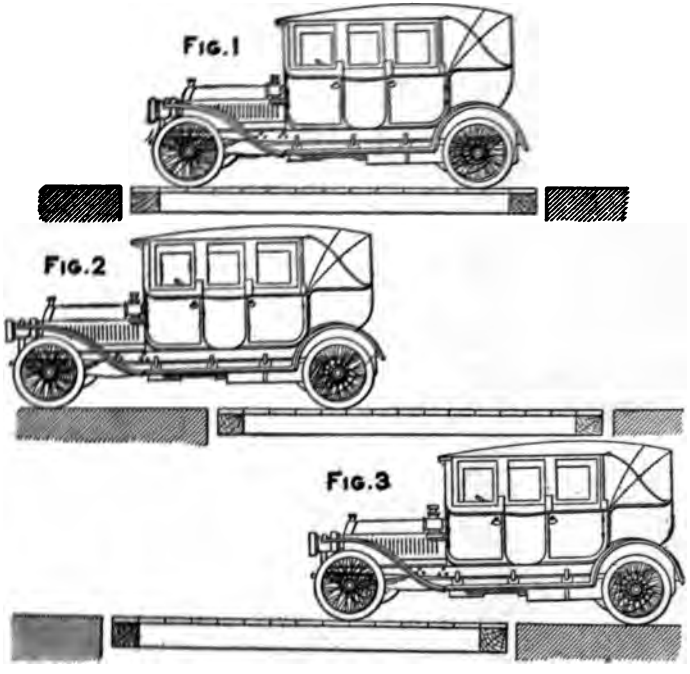


Details of Gasket Cutter

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.

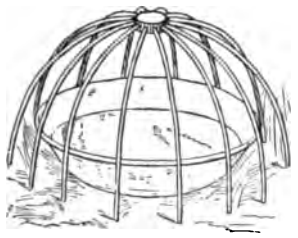
Planing the Edges of a Board Square

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

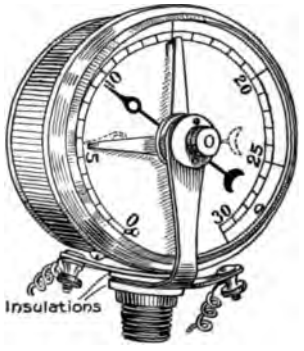
Cut several lengths of No. 9 wire about 24 in. long and secure them to a board in such a way as to form a circle of radiating wires from a center point similar to the spokes of a wheel. Melt some lead and pour it into the center, and when cold the wires will be fastened together. Bend the wires in a 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.

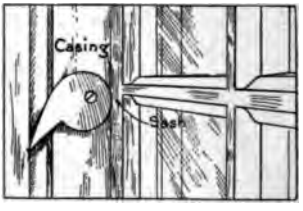
Marking Iron in a Structural Shop

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.

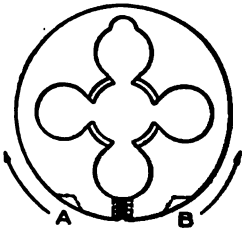
A Window Sash Stop

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.

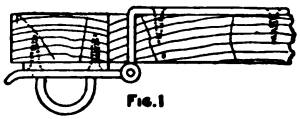


FIG. 1

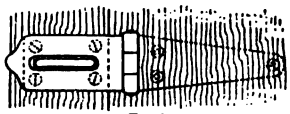


FIG. 2

Turnbuckles for Aeroplane Bracing

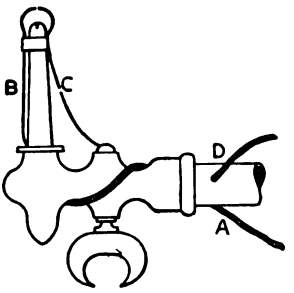
While building a helicopter I needed a lot of small, light turnbuckles, says a correspondent of Scientific American, and not being able to obtain anything suitable, I made them out of bolts and wire as illustrated in the sketch. They were made of No. 14 soft steel wire and an ordinary $\frac{3}{16}$-in.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



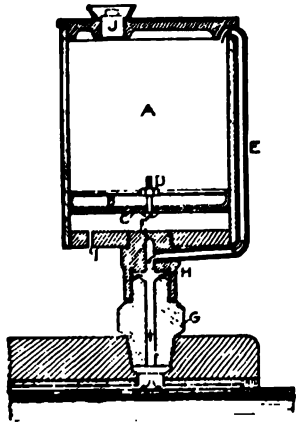
The screw which holds the key in place turns every time the gas is turned on or off. In the slot of this screw is soldered a piece of heavy copper or brass wire, C, which is bent over so as to come in contact with B when the gas is turned on. The contact should be broken just before the gas is turned 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.

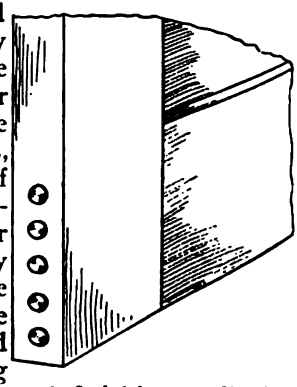
The cup is made of any straight-bored cup with a tight-fitting cover, but instead of feeding from the bottom it feeds through a separate pipe, E, whose upper end is attached as near the top as possible. This pipe leads around the cup and into the plug F, which screws into the bottom of the cup. The plug 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.

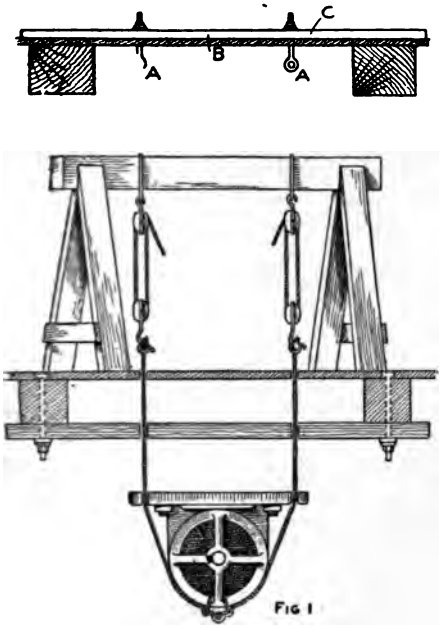
¶The motorist having need for a funnel when on the road can use the horn as a substitute. It requires but a minute's time to remove the horn from the car, disconnect it and take out the reed.

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.

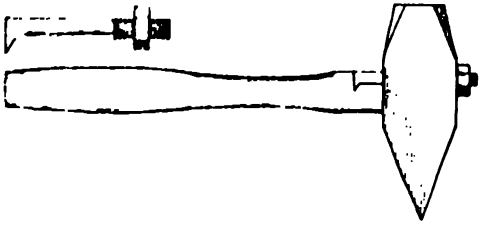
A Rural Mail-Box Post

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.

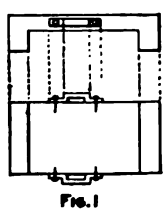


Fig. 1

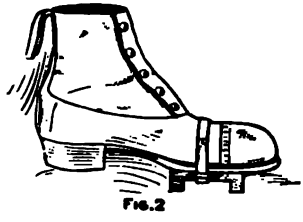


Fig. 2

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

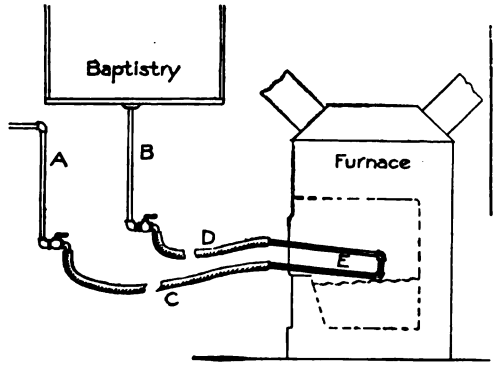
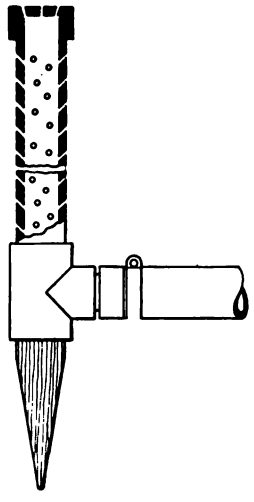


Diagram of Connections

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

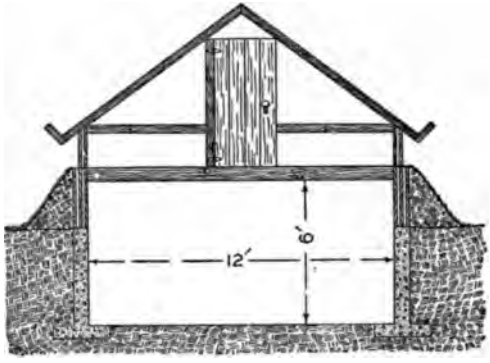
A Home-Made Lawn Sprinkler

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

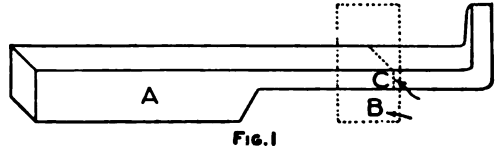


FIG. 1

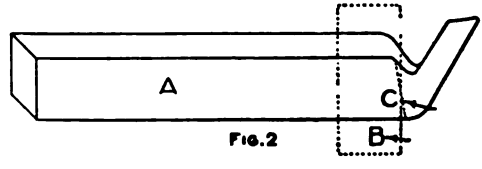


FIG. 2

Tempering Lathe Tools

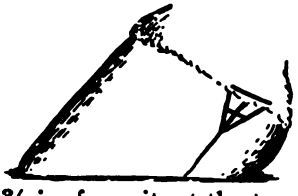
tongs will, of course, depend on the size of the tool. The hot [illegible] will

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

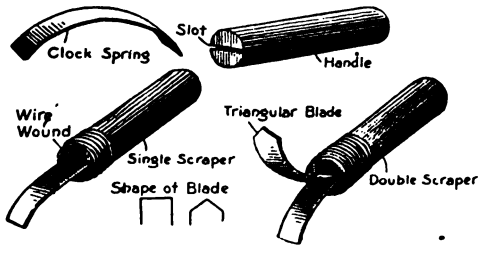
The proper place to stop the movement of a cracked hoof is at the top of the crack where the new horn is being formed at the coronary band, says the American Blacksmith. The thing to do is to cut a groove down through the horn on each side of the crack and about 5/8 to 3/4 in. from it, at the top, and 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

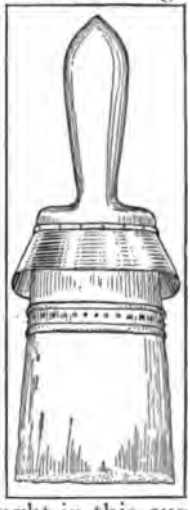
The steel scrapers shown in the accompanying illustration are made of stout pieces of clockspring, inserted in slots sawn in short wooden handles. They are handy for removing dirt and grease from machinery or old paint from uneven surfaces. The scraper blade is secured by wiring the handle or using a 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 Lift of the Suction Pump

[illegible] ... pump ... lift ... over 30 ft. ... The ex... pipe. Instead ... are em... rods be... side of the ... The pump ... water from the ... discharge into a ... other pump, the ... to the ... that ... the same rate ... effect from ...

A Pipe Cleaner That Is Clean

A bicycle foot pump makes ... pipe cleaner and can be ... always at hand during ... [illegible] ... place the nip... end of the pump hose. Then ... down the plunger of the pump a few times, 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 or at the ... 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 A. ... Houghton, Northville, Mich.

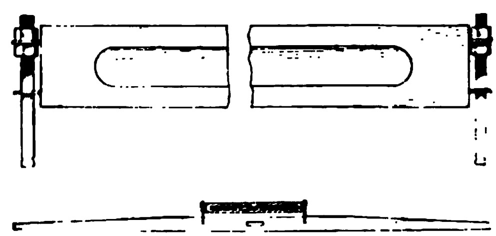
Cranking a New Automobile Engine

Engines on 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 it alone, loop a rope 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 position 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

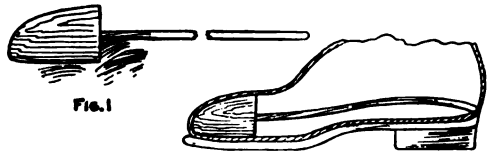
In photographs, half-tone prints, etc., the pictured objects appear flat when viewed with the naked eye in the open light. To bring out the perspective and to have the objects appear in their natural positions, the same as when viewed through a large magnifying glass, a simple arrangement may be used. 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



Tree in the Shoe

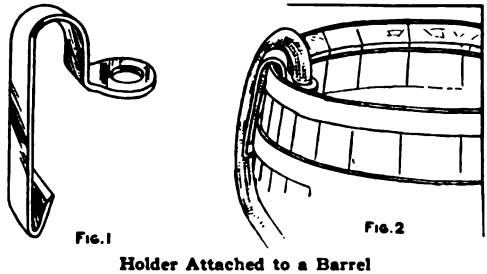
reed will make the trees adjustable to the different sizes of shoes.—Contributed by Katharine D. Morse, Syracuse, N. Y.

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

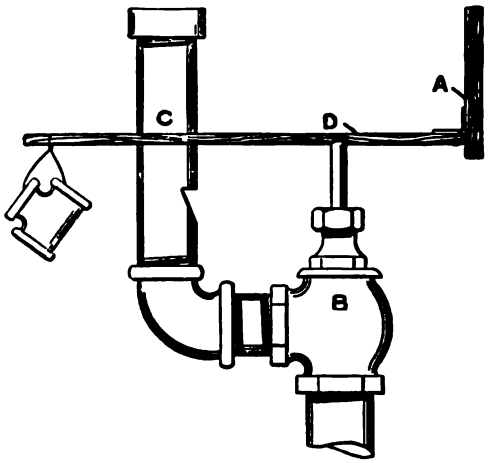
The end of an ordinary rubber hose will not stay in a barrel or trough if there is much pressure on the water running through it. The hose will have a tendency to straighten out under the pressure and fall from the barrel and wet things generally, besides wasting the water. In Fig. 1 is shown an attachment 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.

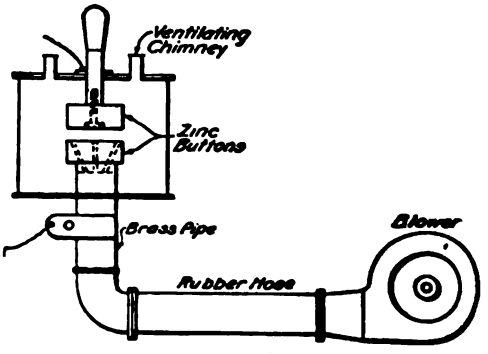
Measuring Gasoline in a Tank

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.



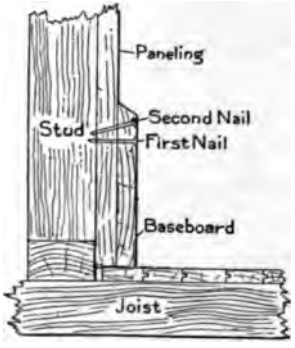
Diagarm of Spark-Gap Air Blast

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.

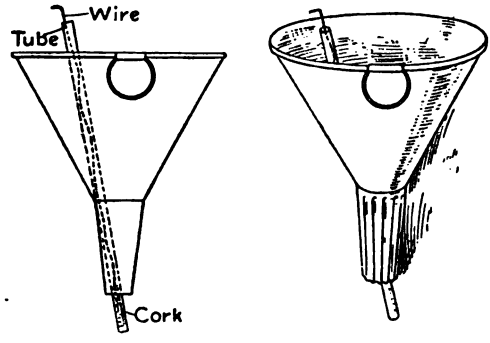
Nailing Warped Boards

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.



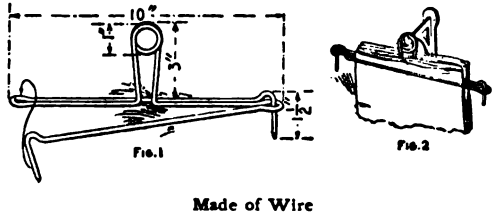
Tube Inside of Funnel

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

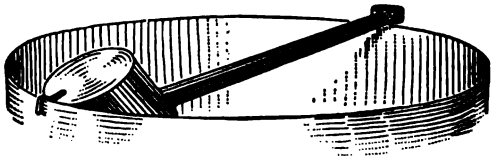
The hanger is made of a piece of heavy iron wire bent as shown in Fig. 1. The length of the wire used for each hanger is about 43 in. One pair of trousers can be clamped on each side of the hanger. The arrow shows the way the hook is inserted in the hole. The hanger in use is shown in Fig. 2.—Contributed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

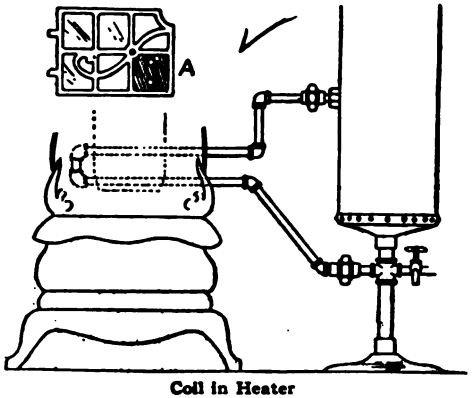
After spoiling several screws, I tried striking them a light blow with a hammer when unable to turn them farther and found that they could be turned easily. This did not injure the holding quality to any extent. These screws were placed in soft wood, but when striking them in hard wood there is some 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

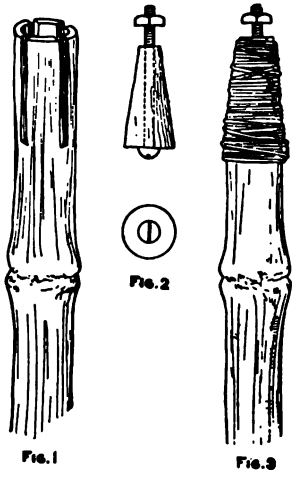
The sights on a rifle sometimes get out of place, or occasionally a new sight is to be substituted for the one already in use, in which cases the adjustment of the sights requires some little skill. However, they can be sighted accurately by fastening the gun barrel solidly in a vise and fixing a target 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.

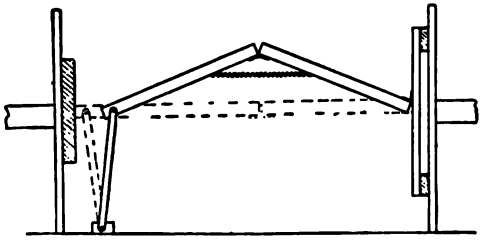
Fastening Bolts in the End of Bamboo Poles

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.

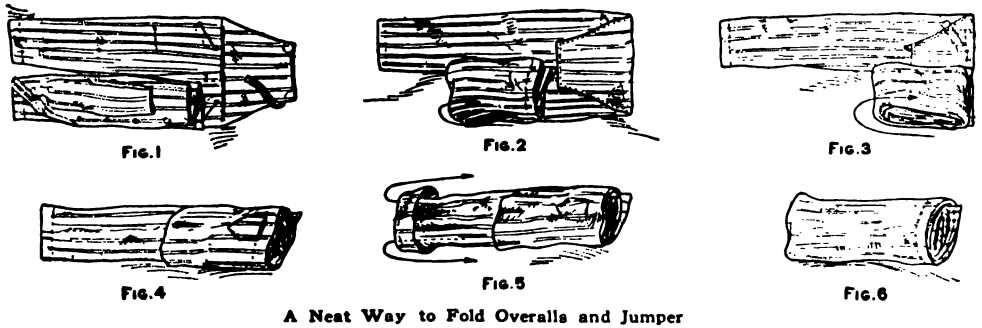
An Improvised Safety Light

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

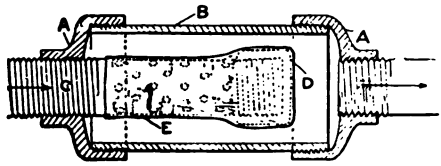
This series of sketches shows a neat and quick way to fold overalls and jumper. After thus disposing of them once or twice, it will become a habit, and it really takes no more time than to throw the outfit in a corner or to gather it up roughly and rearrange it when again used. 1. Lay overalls flat and 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



Made of Pipe Fittings

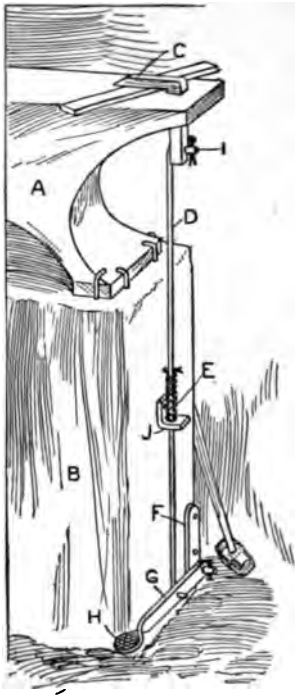
the pressure for any great length of time. I set about to make one which resulted in the device shown in the sketch. The parts were made of pipe and fittings.

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.

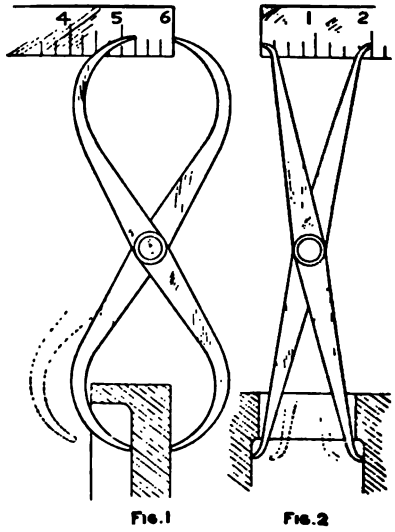
To Keep Windows Free from Frost

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.

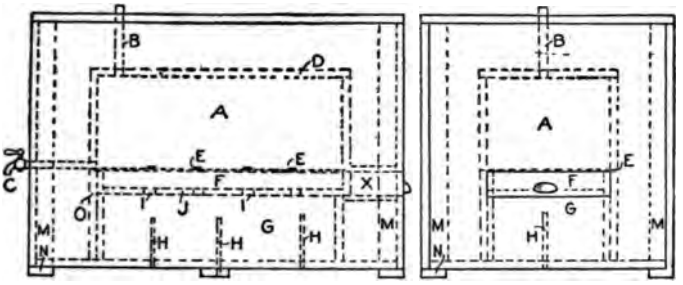
These calipers should be made with all legs of equal lengths. The readings can be taken on a rule while the calipers are set over a flange as in Fig. 1, or inside of a hole, as in Fig. 2.—Contributed by Philip J. Duff, Montreal, Canada.



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

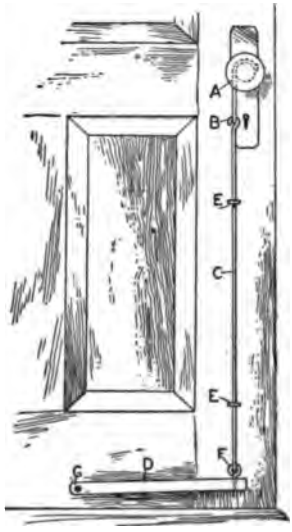
penetrate through the packing, but when it does, a kettle full of boiling water once a day in moderate weather and a less amount twice a day in cold weather will keep it at a comparatively even temperature of 103 deg.—the proper temperature. It is best to practice with the incubator for three or four 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, ⅝ 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.

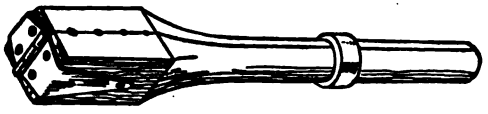
The metal is easily torn, especially in thread-cutting in the lathe, where, if not careful, the tool will dig in and rip out rough threads. In making fine, smooth threads, take several light finishing cuts. For a nice surface finish, either in a lathe or planer, use a broad tool, but with a light cut, 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

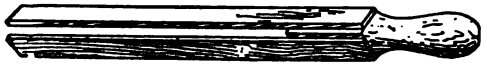


Nail Holder

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,

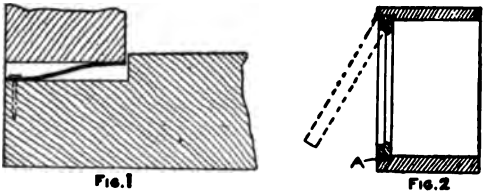


Fig. 1 Fig. 2

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.

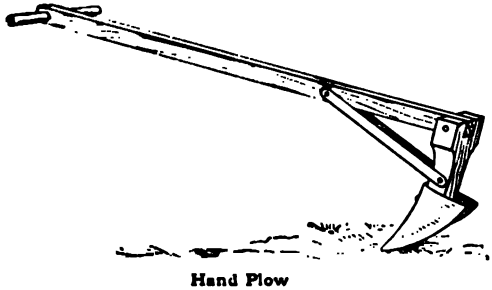
¶Where an annealed copper gasket fails to make a tight joint, try wrapping the gasket with heavy cord or wicking. Soak the wrapped gasket in valve oil. When the gasket is again inserted you will have a permanent repair.

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,



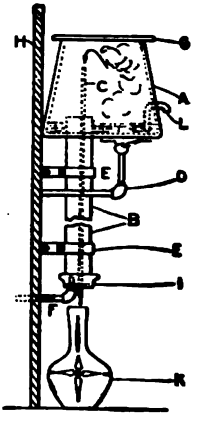
Hand Plow

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.

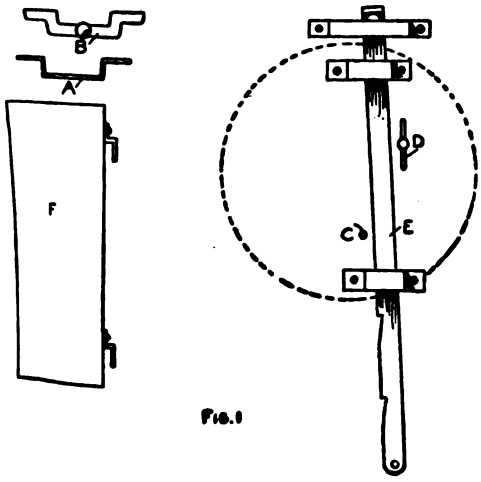


FIG. 1
Clock Attachments

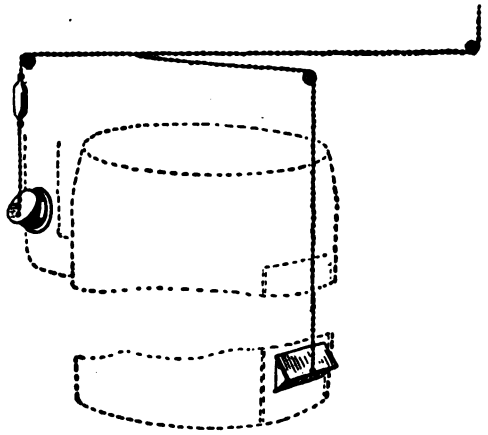


FIG. 2
Chains Attached to Furnace

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.

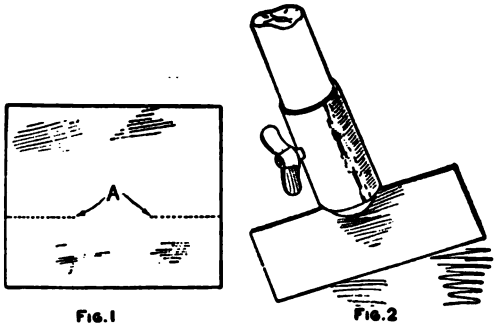
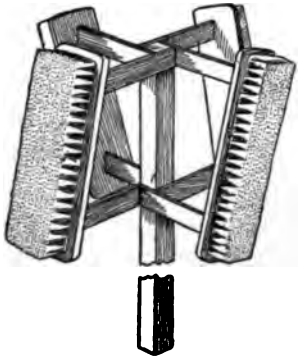


Fig. 1 Fig. 2

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.

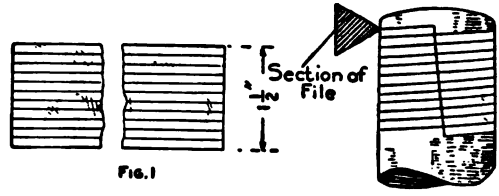


Fig. 1 Fig. 2

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

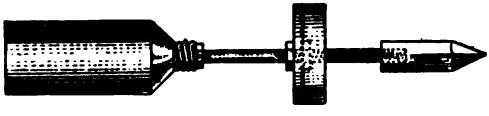
A soldering iron that carries its own heating device on the handle, shown in the sketch, is useful for the trouble man, as it can be made small enough to be carried in the pocket, also it is a useful household tool.

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



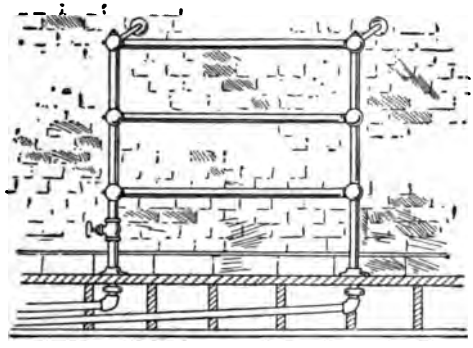
Heating Attachment

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.

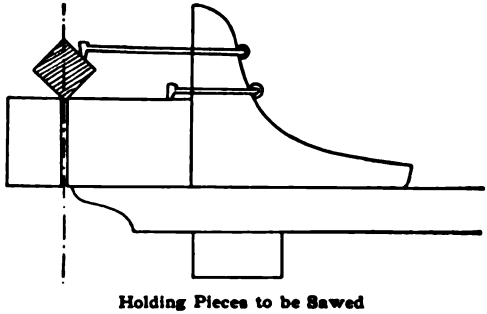
A limited class of work can be bolted to the lathe parallels. This method is suitable for work requiring not a cross feed, but a feed up and down, which is obtained by means of the rise-and-fall carriage of the lathe when the latter is so constructed. Keyways of considerable length have been milled in 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 practi-

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.

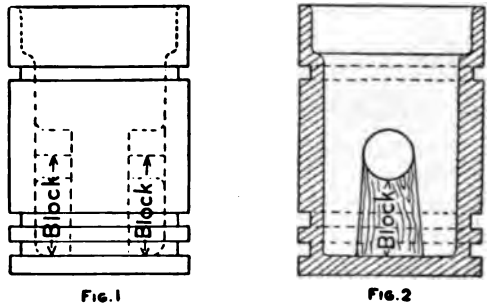


Fig. 1 Fig. 2

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

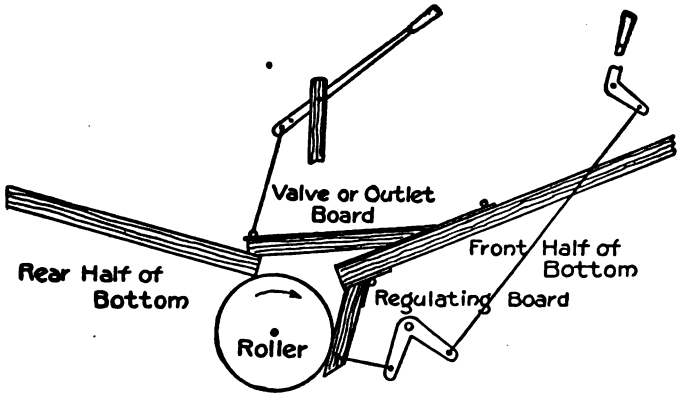


Diagram of Spreader

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.

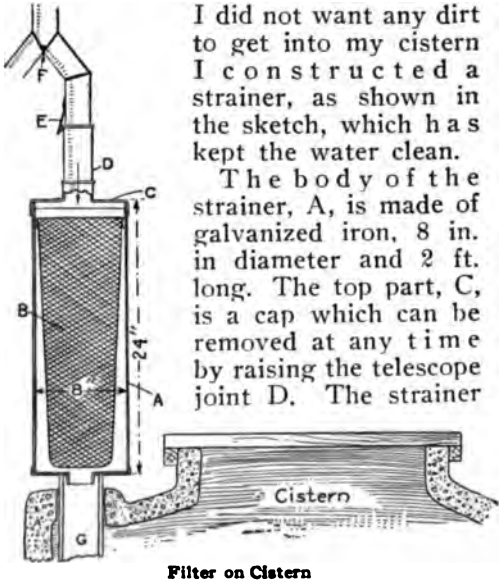
A tank for spreading the manure is made of lumber and put on a wagon. The bottom of this tank slopes from

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.



Filter on Cistern

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 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

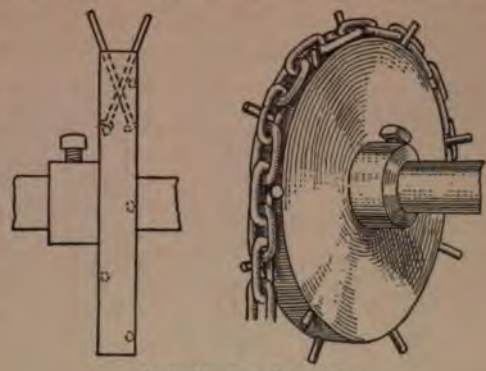
Bail Holder Attached

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

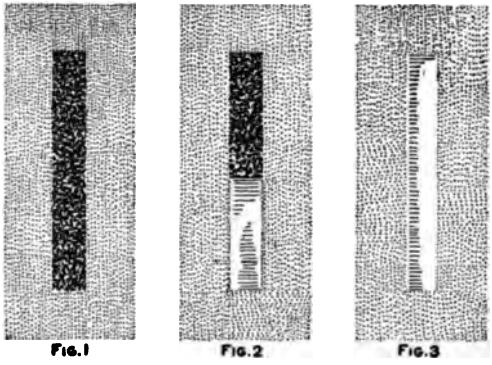
Offset Screwdriver

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

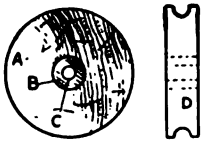


Shadows from the Glass

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

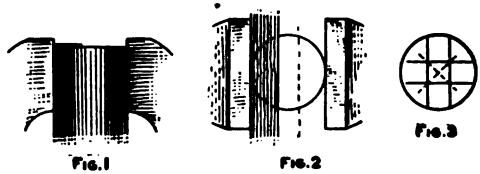
If no lathe is at hand, a good way to make pulleys for aeroplane construction is as follows:



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



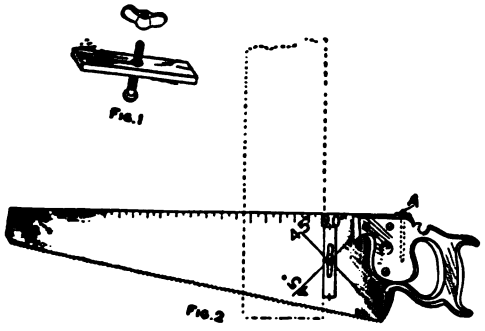
Holding Shaft in a Vise

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



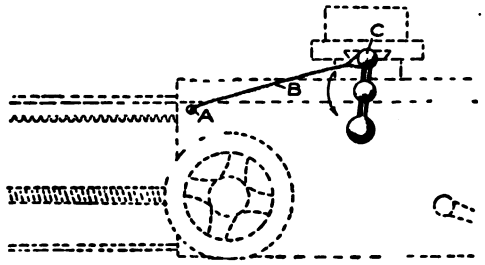
Square and Rule on a Saw

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

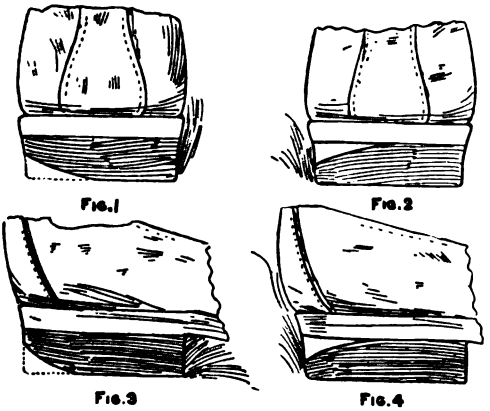


Gauging Depth of Cuts

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

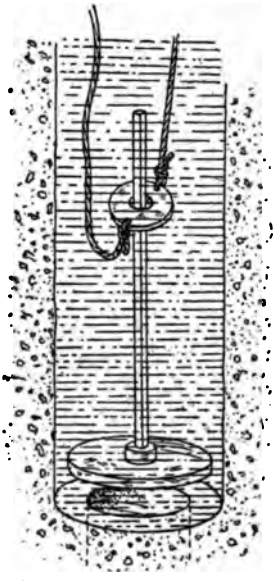


Showing How Wedge is Applied

on the rear part of the heel, and in Fig. 4, the method of applying the wedge. —Contributed by Walter W. White, Denver, Colo.

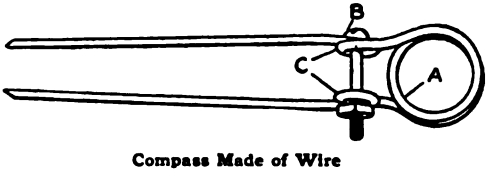
Lifting a Gate Covering from a Penstock

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.



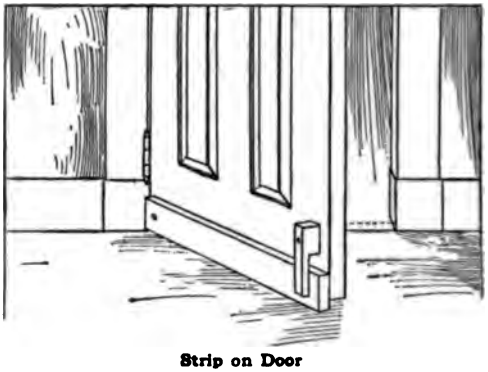
Compass Made of Wire

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

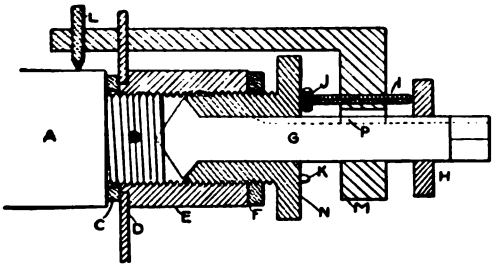
The strip was made of a piece of wood ¾ in. thick and 3 in. wide, with a length equal to the width of the door. One end was fastened to the door with a screw on the side near the high part of the floor, in this case the hinged side of the door. A piece of wood was cut out and fastened to the opposite 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



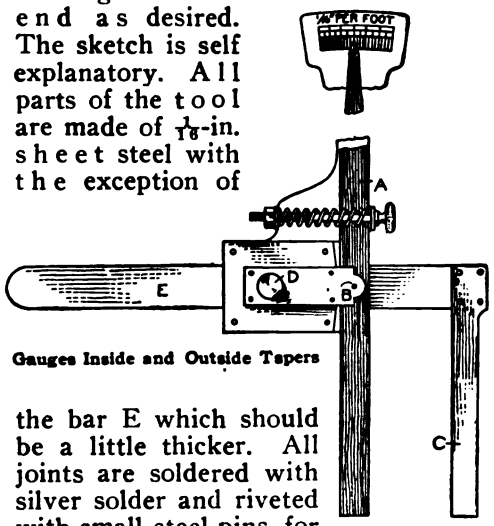
Details of Truing Tool

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.

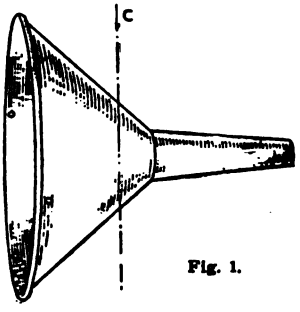


Fig. 1.

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.

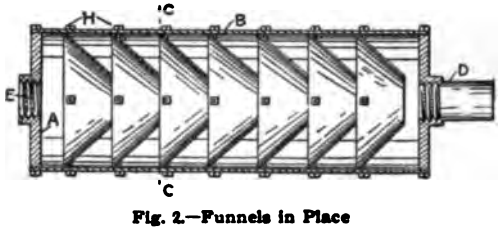
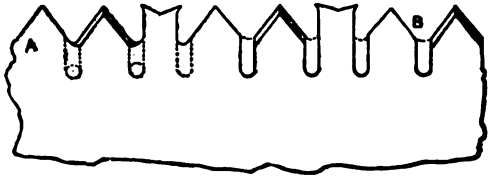


Fig. 2.—Funnels in Place

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

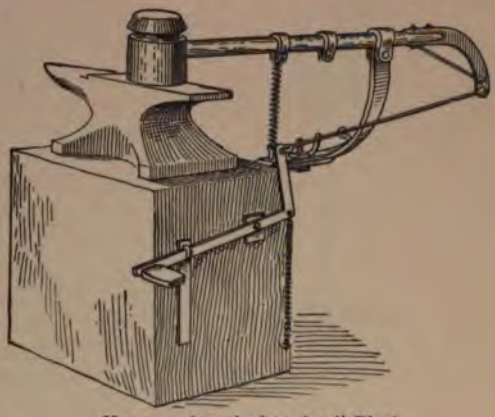
The staining of woodwork on porches and posts caused by the dripping of water from flower pots can be prevented in the following manner:

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

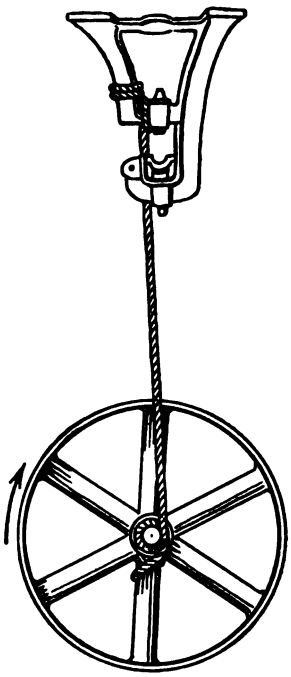
braced with a rod as shown. The yoke at the fulcrum is fastened securely to the handle and also to the bar-iron brace. The brace is attached to an L-shaped bracket on the anvil block, so it can be raised and lowered to permit the hammer to strike with the face parallel to the work. The bell-crank lever 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.

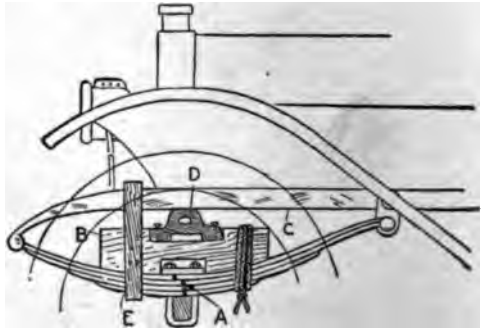
An old range boiler of 30-gal. capacity was cut in two, and seven or eight holes 2 in. in diameter were punched in the side about midway between the top and bottom of the lower half. The lower end of the tank was then placed in the ground in a hole about 1 ft. deep and tamped carefully to make it solid. 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



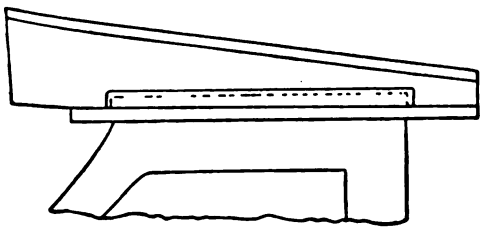
Spring Supported with Wood

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

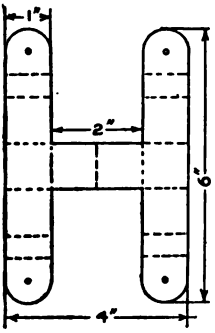


Fig. 1

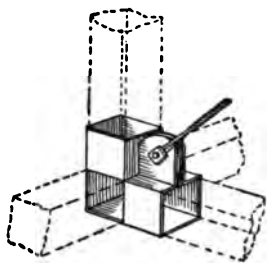


Fig. 2

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.

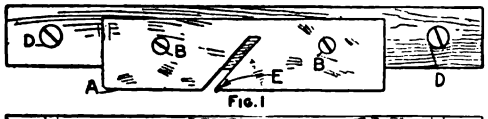


Fig. 1

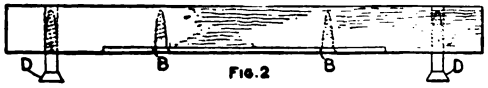


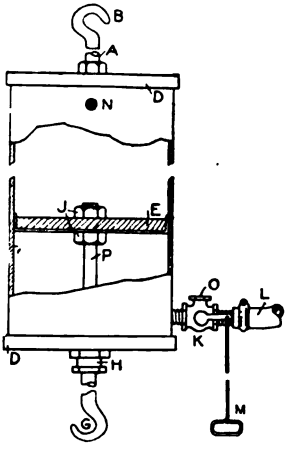
Fig. 2

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 the rod is up, the air is admitted from the hose 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.

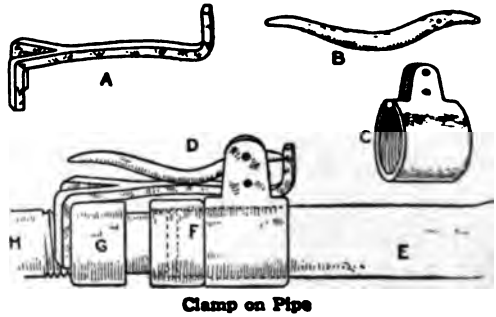
This hoist can be made cheaply and used wherever compressed air is obtainable. It will lift 700 lb. with an air pressure of 60 lb.—Contributed by F. B. Hays, St. Louis, Mo.

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 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.



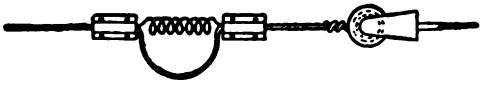
Clamp on Pipe

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.

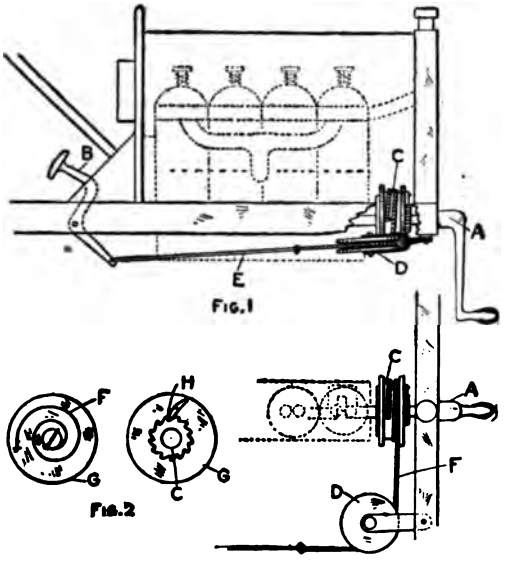


Removing Strain on Wires

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



Foot Starting Attachment

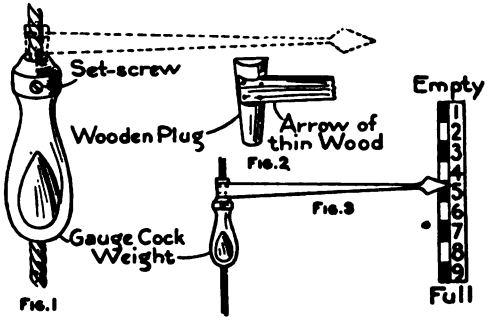
ratchet wheel H is fitted to the motor shaft C so it will disengage the same way as the ordinary crank A, Figs. 1 and 3. The drum C is turned with a bicycle chain, F, Fig. 3, which is connected to the foot lever B by a wire, E, Fig. 1. The idler wheel D, Figs. 1 and 3, can be placed in a suitable position 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,



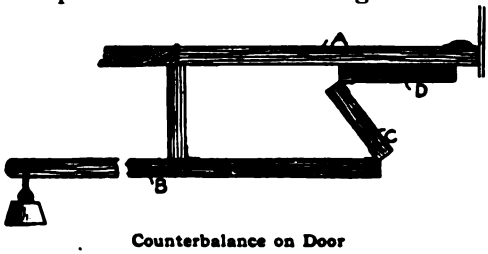
Parts of the Indicator

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

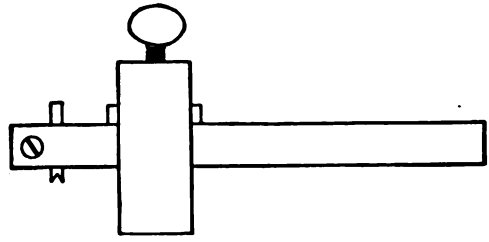


Counterbalance on Door

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.

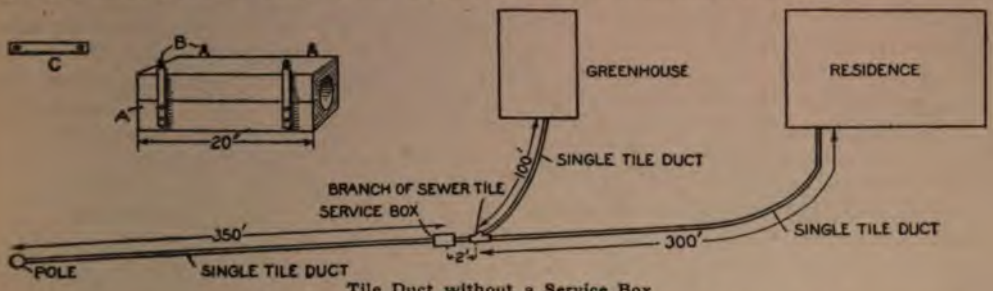
An Underground Tile Duct

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.

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.



Tile Duct without a Service Box

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

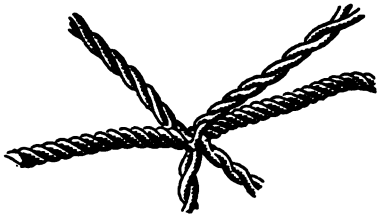


Fig. 2

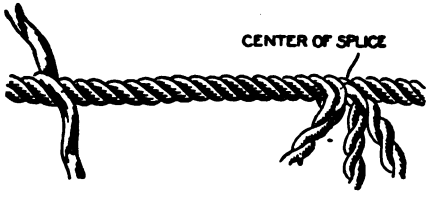


Fig. 3

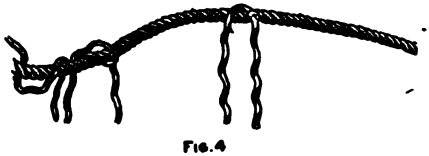


Fig. 4

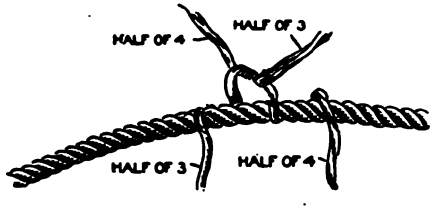


Fig. 5

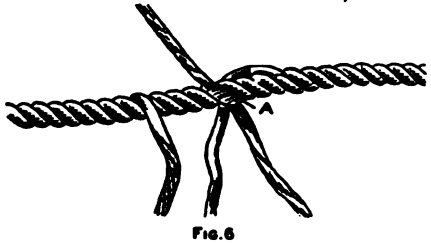


Fig. 6

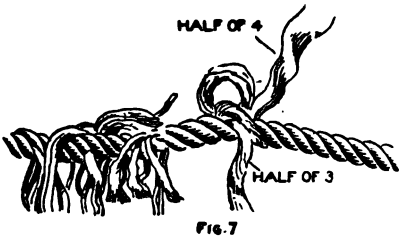


Fig. 7

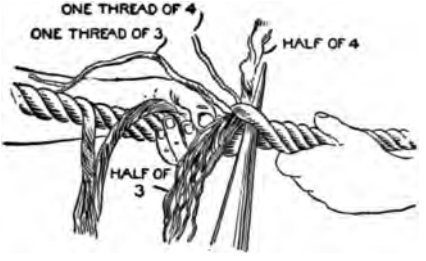


Fig. 8

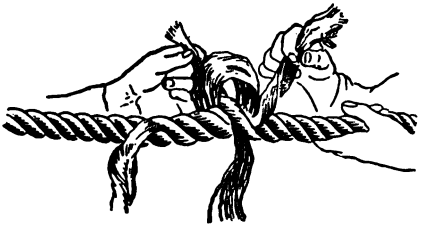


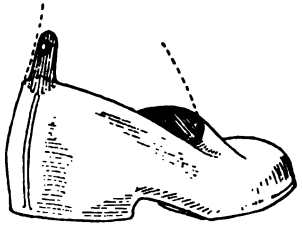
Fig. 9

Fig. 10

Fig. 11

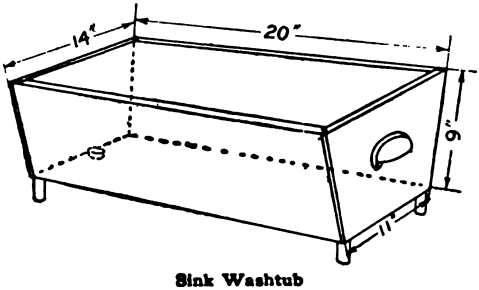
Attach ng Rubbers to Shoes

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 without bending, or emptying or lifting the water or tub.



Sink Washtub

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

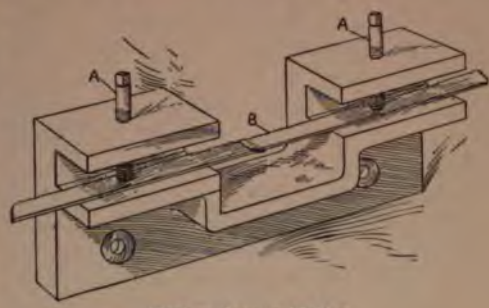
The mechanic as well as the owner of an automobile does not care to take off the body in order to remove the gasoline tank to solder a leaking rivet in the bottom. During an attempt made by the writer to effect such a repair, it was found that while the metal and rivet became well tinned, the solder 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



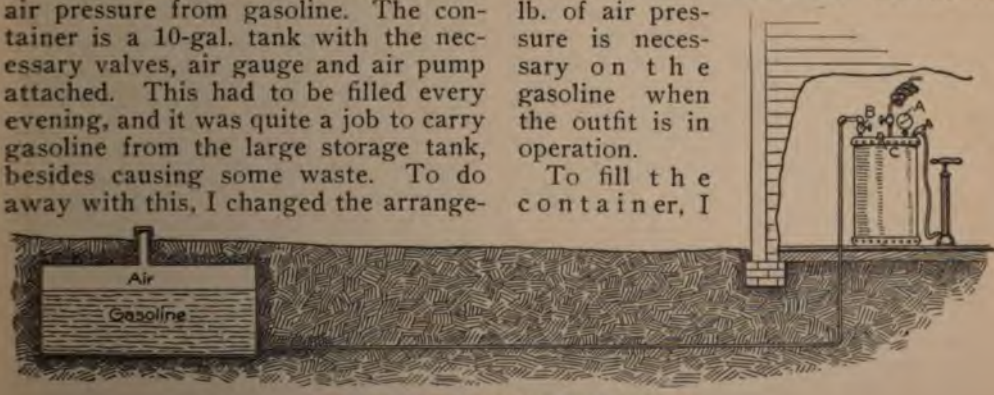
Broken Saw in Holder

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.

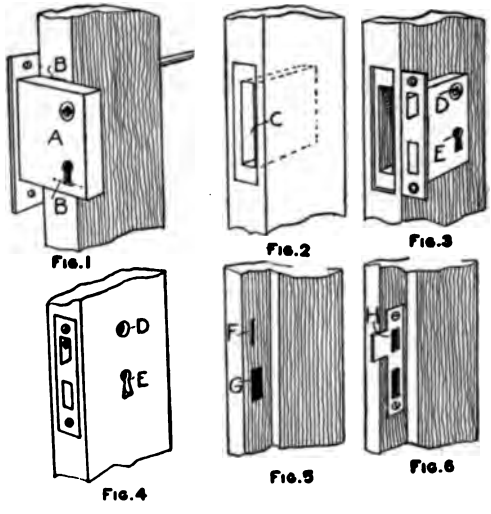


Fig. 1 Fig. 2 Fig. 3 Fig. 4 Fig. 5 Fig. 6

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

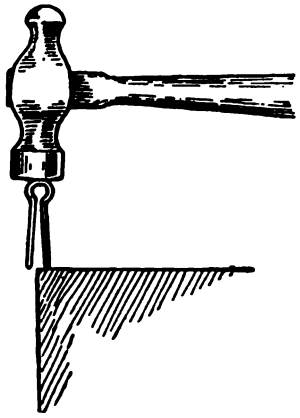
Drive Out the Point

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.

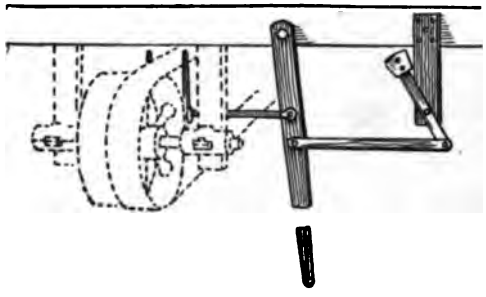
Closing a Split Cotter Pin

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.

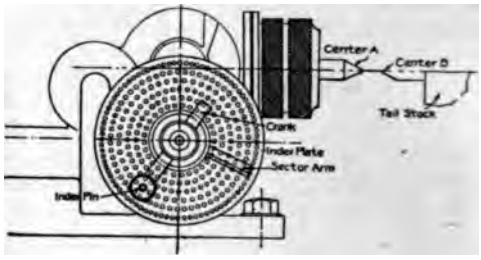


Weight Keeps Belt in Place

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

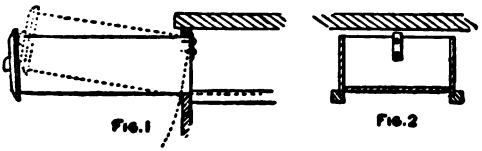
the number of teeth to be cut for the denominator of the fraction. Example: Suppose 30 teeth are to be cut in a blank gear, then the fraction would be 40/30 or 1 10/30, which would mean that the crank must be set so the index pin would enter holes in the 30-hole circle. The setting for each cut would 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



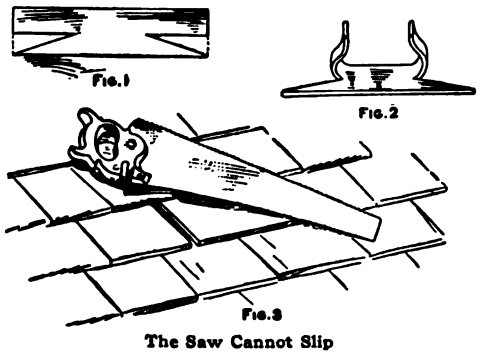
Stop on Drawer Back

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

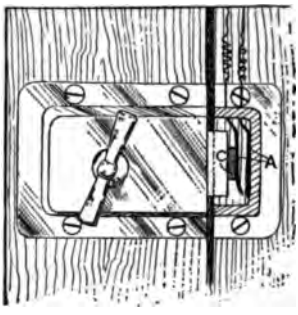
fall if slightly jarred. The sketch shows the construction of a small device I made to fit over the back of a saw handle to hold the saw wherever it is placed. It consists of a piece of sheet metal cut as shown in Fig. 1 and shaped as in Fig. 2. When slipped over the handle a point projects on each side 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

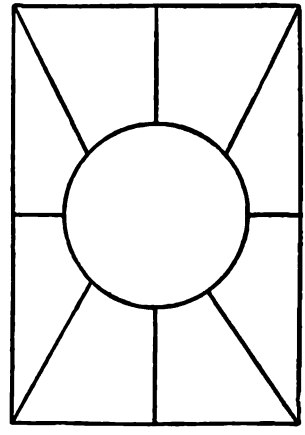
When any liquid is poured into an opaque container, it is difficult to determine the depth of the material until it overflows the mouth. To save time and avoid waste, a simple balance will give warning by tilting when the vessel is almost full.

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.

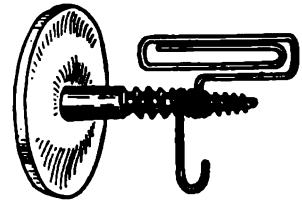
Cutting Steam-Gauge Glasses

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

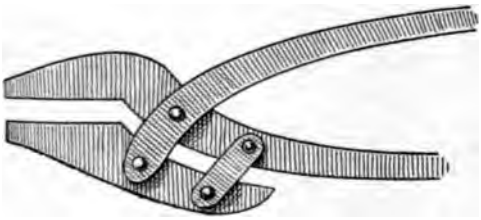
A handy vacuum sticker can be easily made from a round, red rubber taken from the porcelain stopper of a beverage bottle, a screw and a short piece of brass wire. The screw must be of the right size to tightly fit the hole in the rubber. After the screw is pushed through the hole,



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

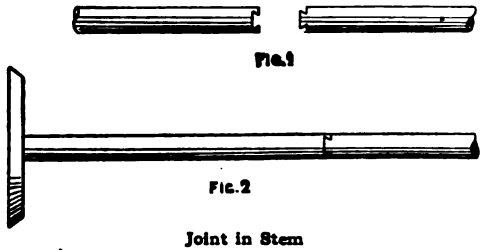


Fig. 1

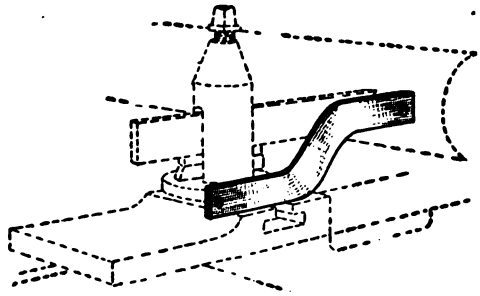
Fig. 2

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

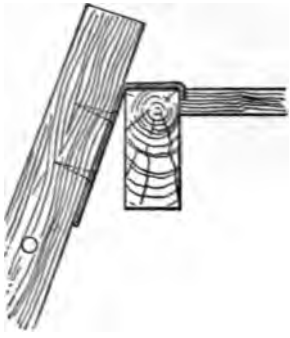


Gauge for Tool Setting

tool is adjusted until its top edge corresponds with that of the device.—Contributed by Joe V. Romig, Allentown, Pennsylvania.

Ladder Fastener

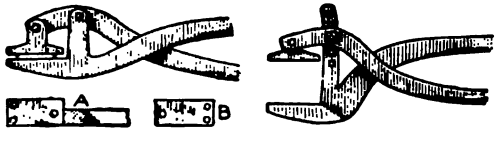
Ladders that are used in a loft, hay mow or similar places where they must be set at such a slant that slipping is liable to occur, should be provided with some kind of a fastener or grip. Such a fastener is shown in the accompanying sketch. It is made of a piece of ¼ by ¾-in. iron, bent as shown and 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 and turn where it is not wanted, says a correspondent of the Blacksmith and Wheelwright.



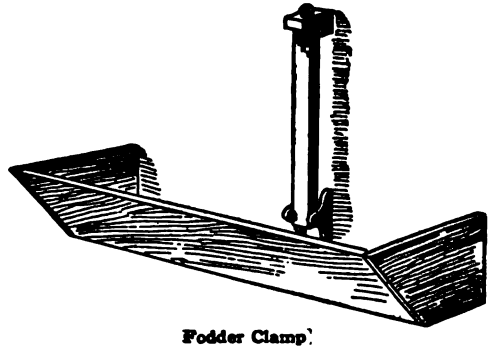
Three-Point Contact on Jaws

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

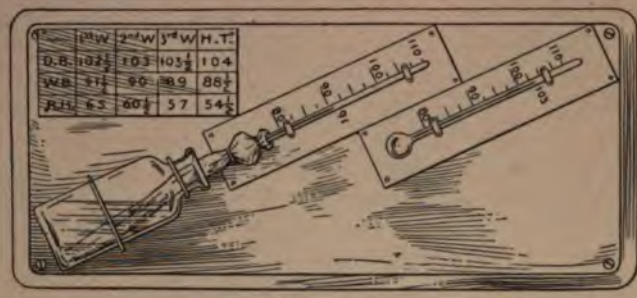
Fodder, such as cornstalks that are not shredded, is frequently tossed out of the manger and wasted. A device for holding this kind of feed against the wall in front of the manger is shown in the sketch. It is made of 2 by 4 in. material, about 3 ft. long, hinged at the lower end and clamped at the top. 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.



Fodder Clamp

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.

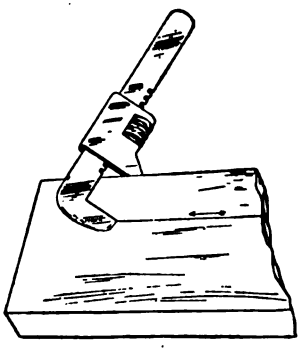
To secure the best results, the relative humidity should be about 65 when the eggs are put into the machine, and gradually reduced to about 55 by hatching time. To accomplish this, hold the gauge to the table on the base of the gauge shown in the sketch.

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.

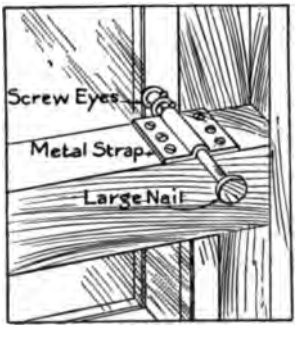
An Emergency Marking Gauge

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.

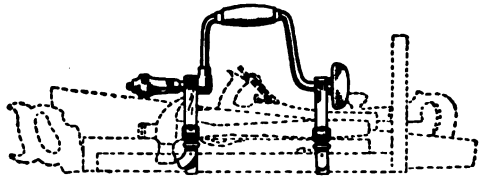
The nail is inserted under the strap and pushed in the screw eyes to lock the window. This arrangement allows air to be admitted to the room without fear of intruders climbing through the window.—Contributed by W. A. Jaquythe, Richmond, Cal.

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.

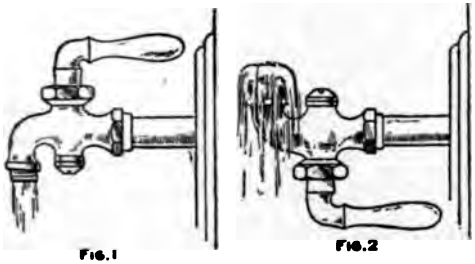


FIG. 1 FIG. 2

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

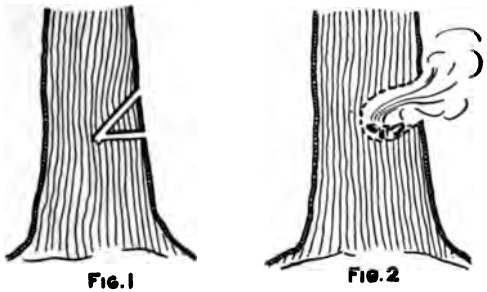


FIG. 1 FIG. 2

Firing a Tree

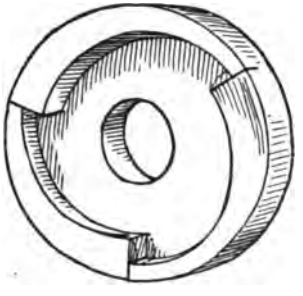
and in a short time the tree will be burned through, causing it to fall toward the burning side.—Contributed by A. J. Staver, Portland, Oregon.

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.

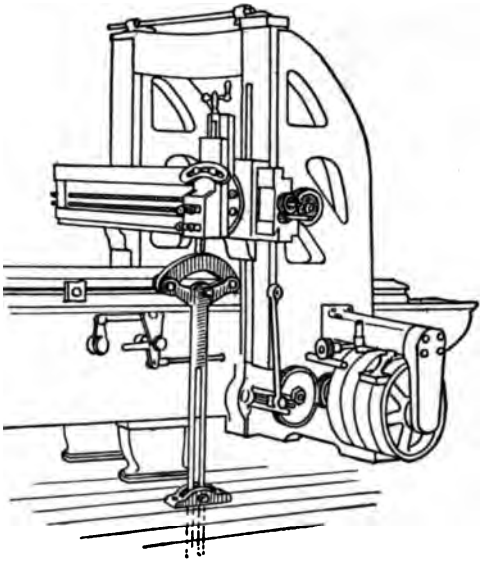
Repairing a Lawn-Mower Ratchet

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.

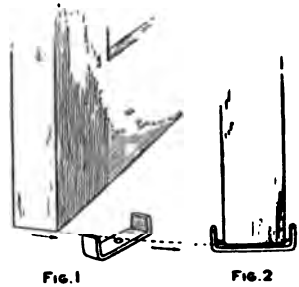
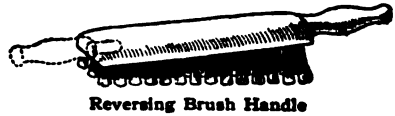


Fig. 1 Fig. 2

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

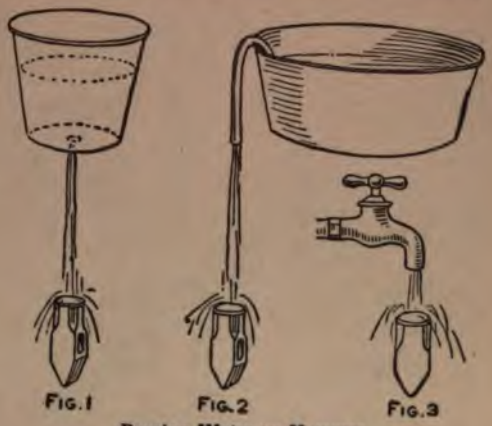
A western lumber man, who has a limited space in the city for piling his stock, has hit upon an ingenious way of stacking lumber so that it can be within reach and take up very little room. A strong rack of 6 by 6-in. material was built and the lumber was upended against this, care being taken to balance 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

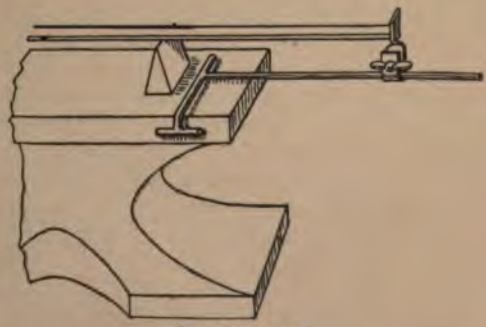


Pouring Water on Hammer

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

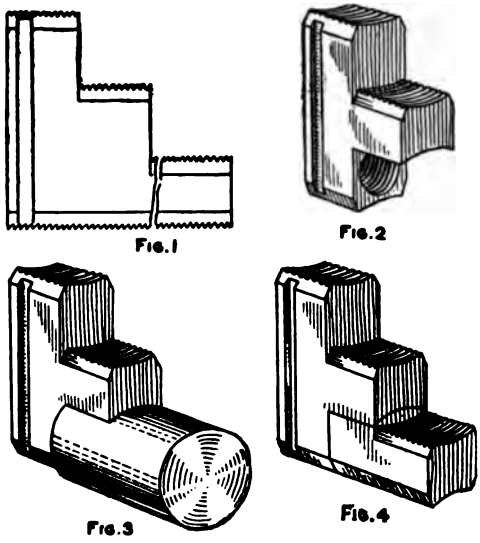
A length gauge that can be easily placed in the round hole of an anvil and used for measuring while cutting red-hot metals is shown in the illustration. The gauge consists of a T-shaped rod with an adjustable attach-


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

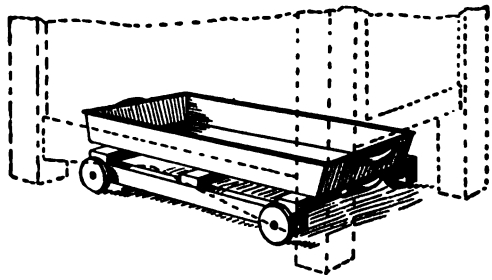
For many purposes wrought iron is superior to steel, although large quantities of soft steel are now used where wrought iron was previously employed. Wrought iron resists corrosion better than steel, as the slag in the fibers acts as a protective coating when corrosion sets in. For skimmers and stirrers 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-



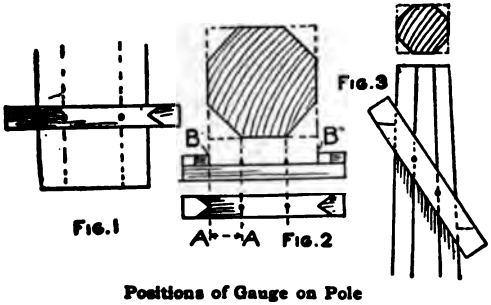
Pan on Truck

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

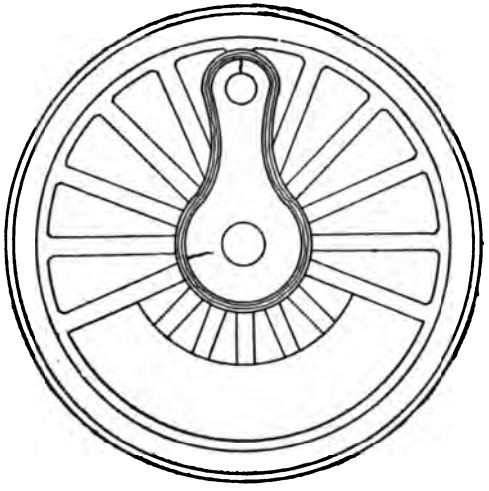


Positions of Gauge on Pole

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

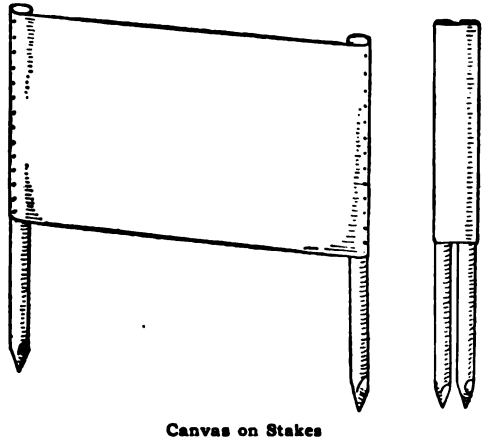


Band Shrunk on Cracked Crank

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.

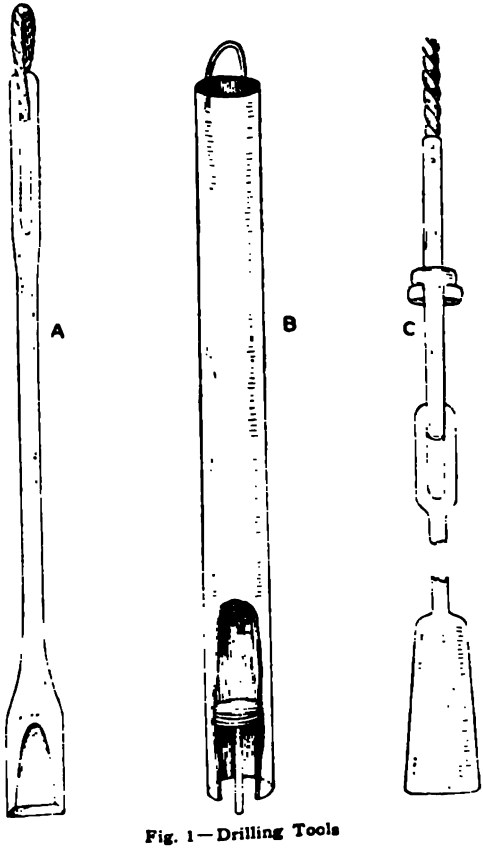


Fig. 1—Drilling Tools

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 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.

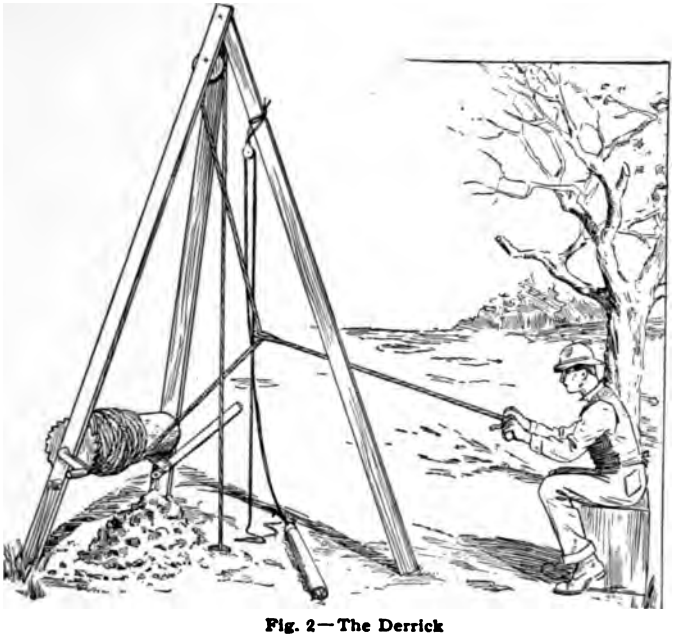


Fig. 2—The Derrick

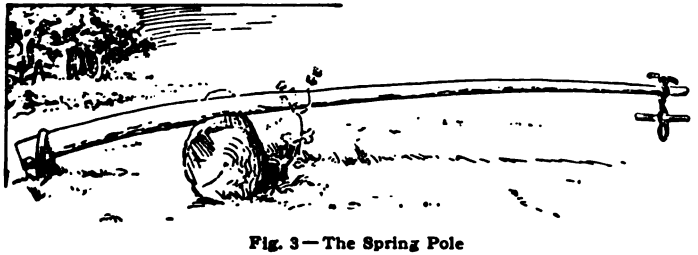


Fig. 3—The Spring Pole

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

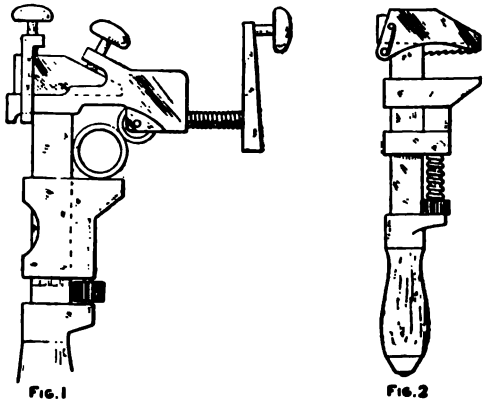


Fig. 1 Fig. 2

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.

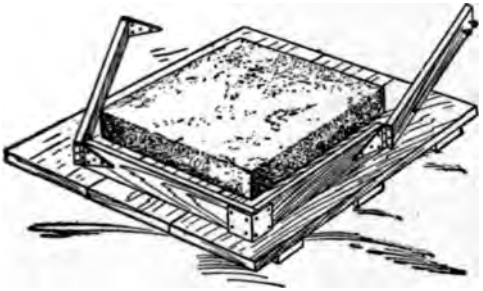
The device shown in Fig. 2 is a simple member having a series of serrations or teeth to permit it to grip a round surface. This is made of hardened steel and has a simple clip member by which it may be easily attached to the fixed jaw of the wrench. The U-shaped plate is adapted to closely engage the 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



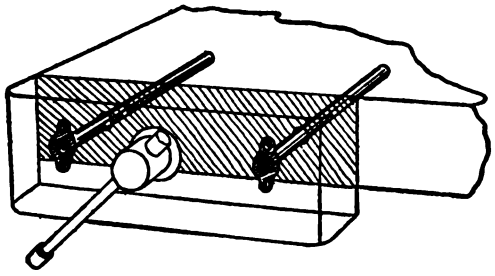
Removing Form from Block

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,

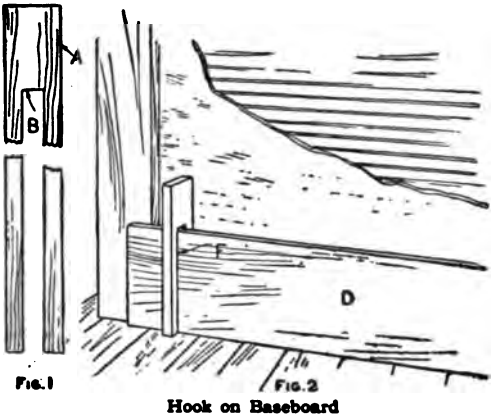


Fig. 1 Fig. 2

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

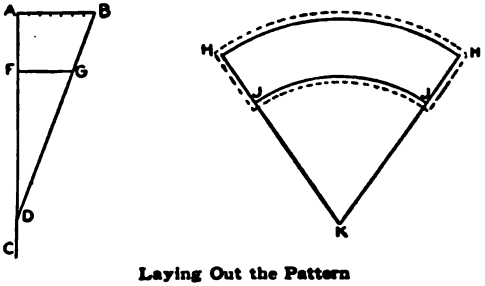
In garages and repair shops, extension cords for electric lamps are practically indispensable, and strange though it may seem, there are few, if any shops, that have practical supports for these portable lamps, says Motor Age. The illustration shows a home-made portable lamp of gas pipe and fittings. 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



Laying Out the Pattern

purposes.—Contributed by S. C. Shipman, Steubenville, Ohio.

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

Fig. 1

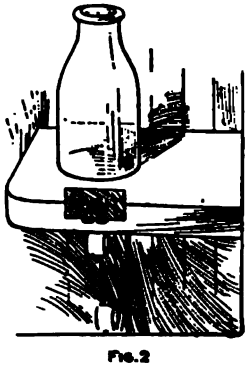


Fig. 2

Method of Using a Paper Clip

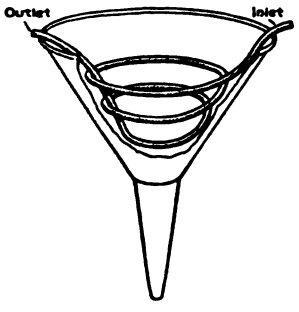
small nails or brads to the edge of the shelf, as shown in Fig. 2.—Contributed by Victor Labadie, Dallas, Texas.

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.

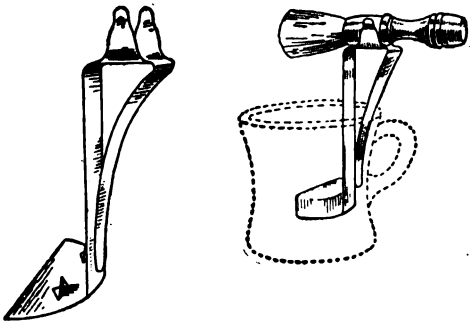
Setting Diamond in a Steel Rod

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

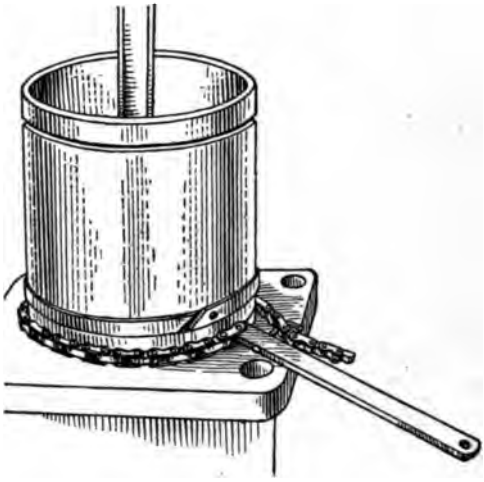
An attachment for a shaving mug for holding the soap and brush can be made of a piece of sheet metal. The illustration plainly shows the construction. The piece is cut and shaped to slip over the edge of a cup. It can be easily attached and removed.



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.

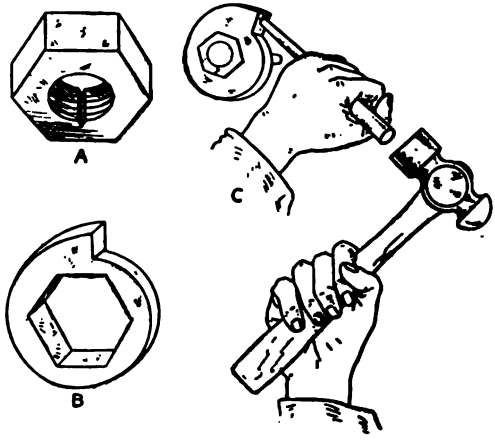
Small Spanner Wrench and a Nut-Threading Tool

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

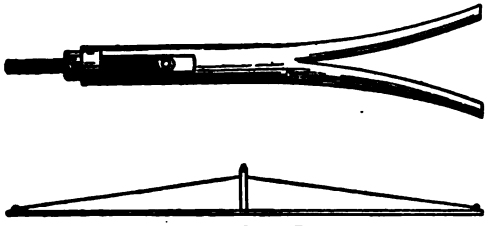


Threading Die and Spanner

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

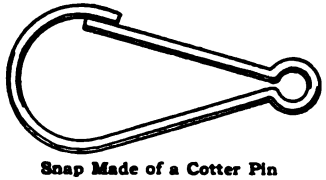


Aeroplane Truss Frame

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

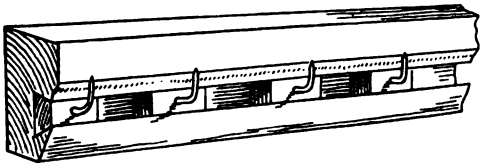


Snap Made of a Cotter Pin

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.

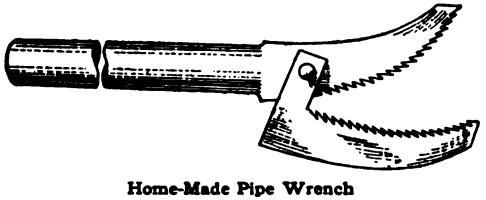
Locking a Wood Screw

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

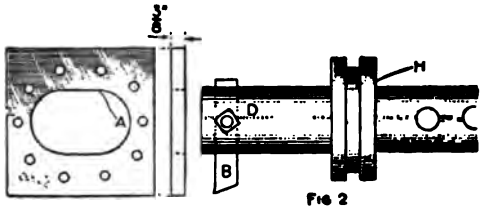


Fig 1 Fig 2

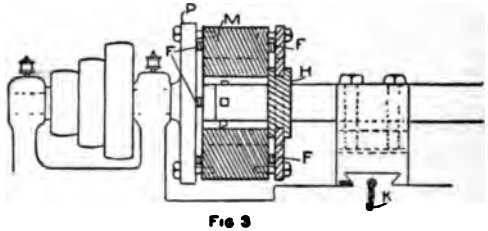


Fig 3

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.

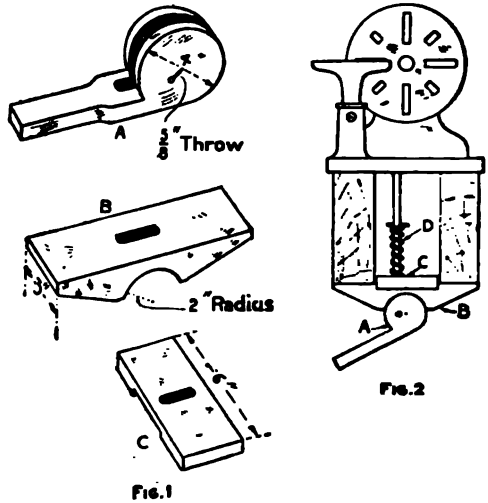


Fig.1 Fig.2

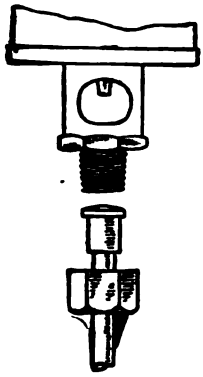
Clamping a Wood Lathe Rest

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.



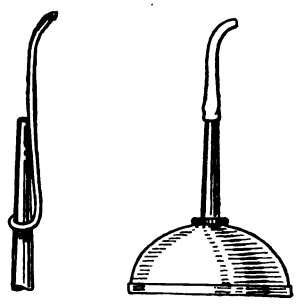
Shear-Holder for Paperhangers

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.

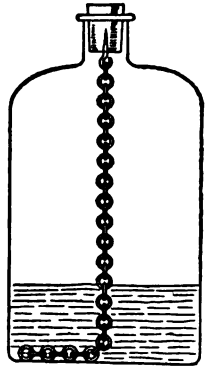
Extension Spout for an Oil Can

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

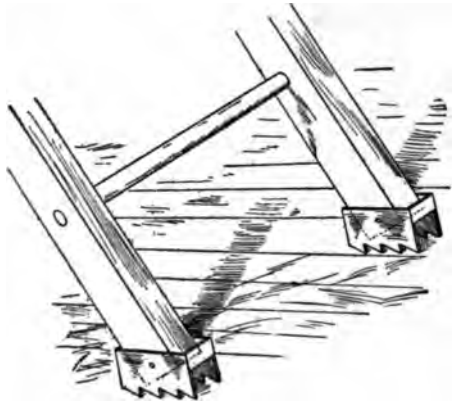
The usual method of cleaning the inside of a bottle is to put into it some nails or sand, partly fill with water, and shake well. While this will clean the bottle, there is a possibility of leaving a nail or some sand within. This trouble may be overcome and the bottle thoroughly cleansed by using a 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

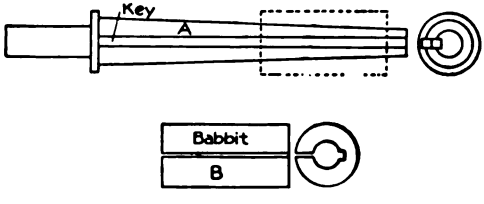


Nonslipping Ladder Ends

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-



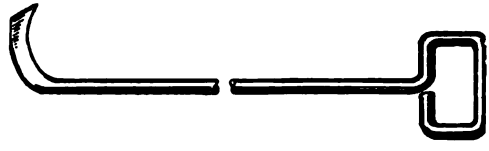
Detail of Lapping Tool

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.

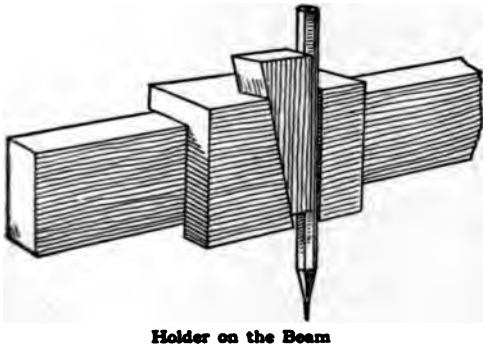
Fitting Glass in Picture Frames

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.

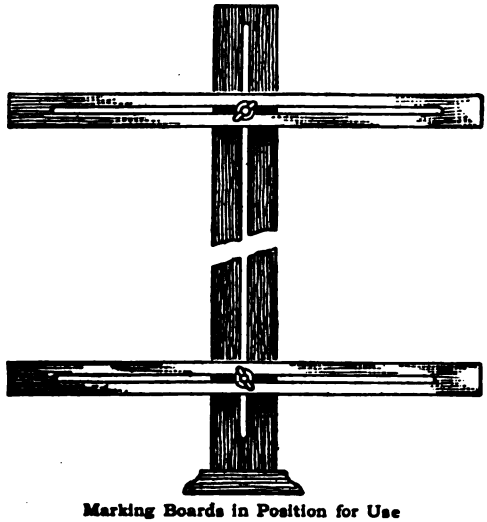
This pencil holder has an advantage over the ordinary type of holder in that it can be easily slipped along the trammel rod and any number of lines made without the usual tedious and very trying method of screwing and unscrewing the head as in the case of the ordinary beam compass. Of course, it has 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.



Holder on the Beam

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 with a butting knife.—Contributed by A. E. Johnson, Frankfort Ind.



Marking Boards in Position for Use

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. The illustration shows its construction and how it is attached to the blade of the hatchet.—Contributed by M. M. Burnett, Richmond, Cal.

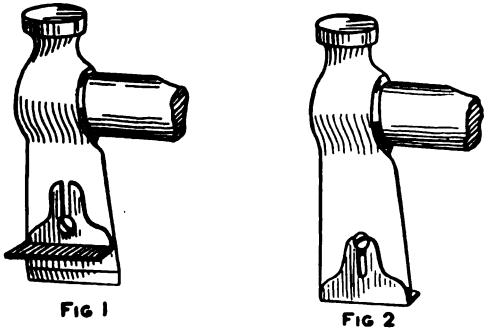


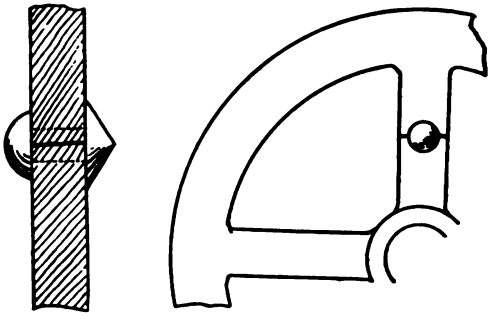
FIG 1 FIG 2

Attachment as Gauge and as Protector

¶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 direc-



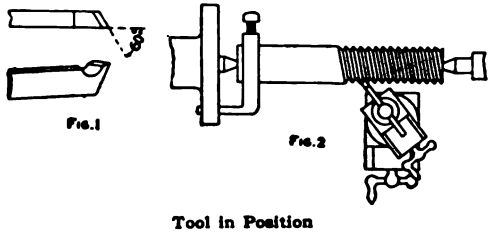
Repaired Spoke

tion and the shank prevents motion in a direction at right angles to this.—Contributed by Will Parker, Olaf, Iowa.

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



Tool in Position

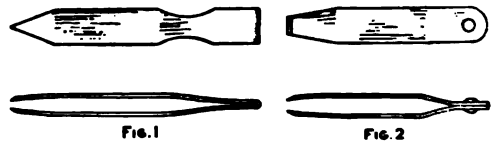
and cuts a clean clip from the edge, the feed being set to the work by the compound slide.—Contributed by E. R. George, Baltimore, Md.

¶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 per-



Tweezers Made of Broken Hacksaw Blades

forated ends of the saw blades and riveted together.—Contributed by Donald A. Hampson, Middletown, New York.

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

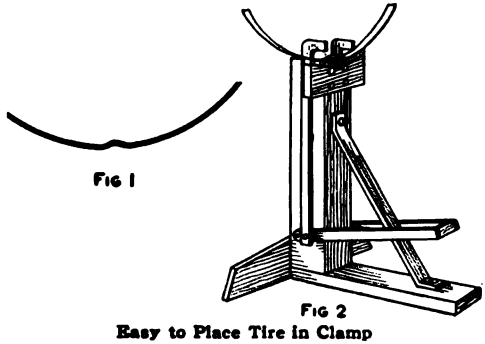


Fig 1

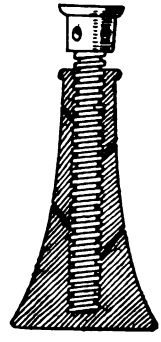
Fig 2

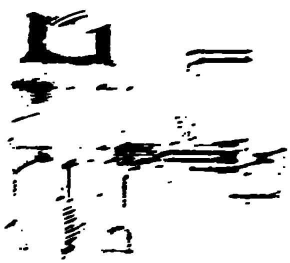
Easy to Place Tire in Clamp

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 $\frac{3}{16}$ in. in diameter are large enough. The jack can be oiled under load and without removing the screw.





[illegible]

... passing to the engine. To the upper end of the check valve ... attached the admission pipe J. The gasoline pipe is shown at K, this being in the same position as when used on the ...

The mixing valve, as described, has been operating perfectly ever since it was made and installed. The suction of 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-

[illegible] ... Eager ... Canada.

A Home-Made Marking Pen

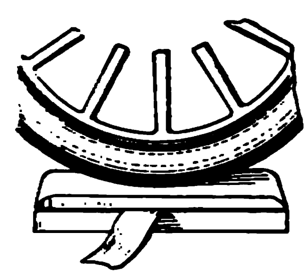
[illegible] ... should ... the full

[illegible]

... with a smooth broad line.—Contributed by Henry ... Wood, Toronto, Canada.

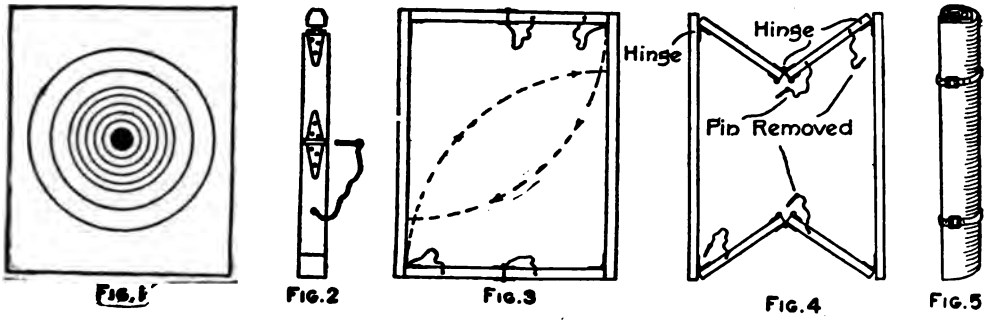
Applying Pressure on Patched Inner Tubes

The motorist when making a tire repair on the road can apply sufficient pressure on 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.



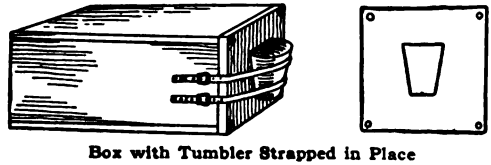
Construction of the Target Form

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

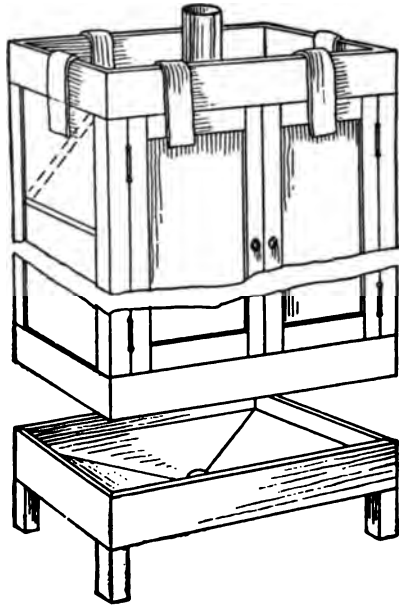
Paper Gaskets for Cylinder Heads

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.

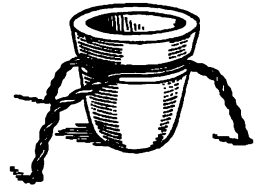
The bottom and top rails of the doors are of 1 by 4-in., and the side rails, 1 by 3-in. material. The number of shelves is determined by the height of the top. They are made of 1 by 12-in. boards, which are held in place with long screws turned into the corner posts.

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

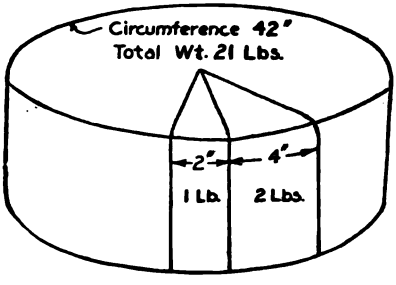
A glass insulator used on telephone or telegraph wires makes a good receptacle for soldering acid, if it is fitted with wire legs, as shown in the sketch. When the lengths of wire are carefully measured and twisted, the legs will project at equal distances apart. Two legs are first twisted on the wire 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 circumfer-



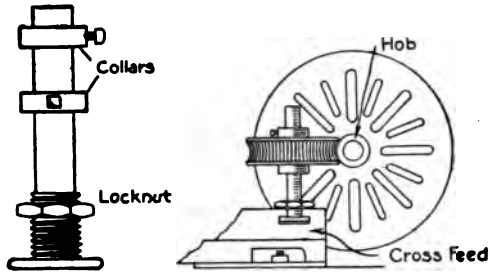
Each 2-In. Slice Weighs 1 Lb.

ence 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.

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

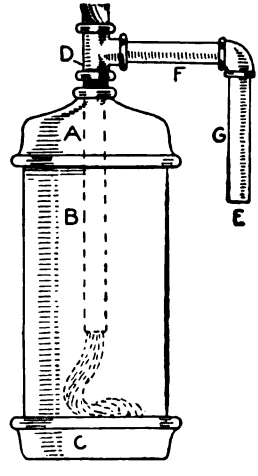


Wheel on Special Post

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.

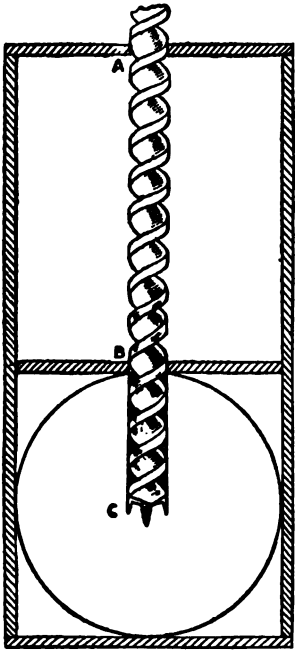
Home-Made Torch

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

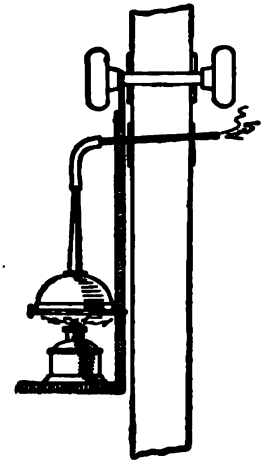
Place two rubber bands on the blade of the T-square, one near the head and one at the other end, and it will remain in place when the board is at any ordinary angle. The wider the bands the better.—Contributed by Henry R. Bowman, Baltimore, Md.

¶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.

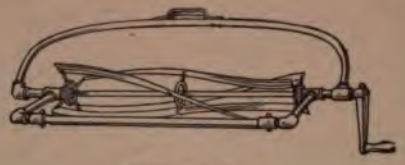
Four Ways of Locking Nuts

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 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.

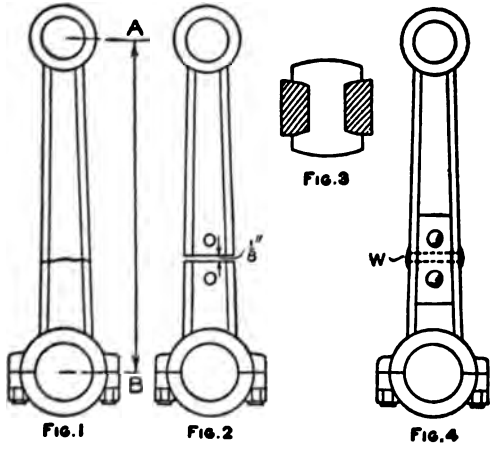


FIG. 1 FIG. 2 FIG. 3 FIG. 4

Connecting Broken Parts with Steel Plates

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

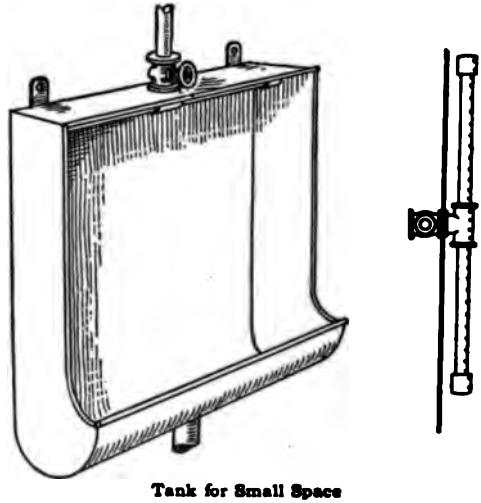
There are many small manufacturing concerns that have occasion to make blueprints in moderate quantities, and the best method of handling this work is always a problem, especially if room is scarce, and initial expense a consideration.

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 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

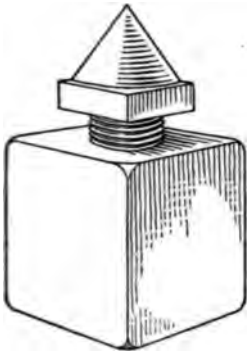


Tank for Small Space

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.

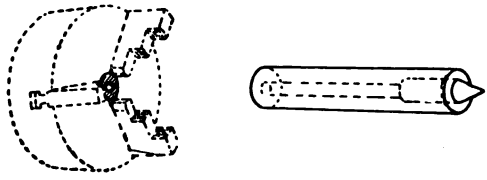


The jack can be easily made on a lathe. The base dimensions are 2 in. square and 3 in. high. The screw is ¾ in. in diameter.—Contributed by Harry J. Ruark, Interbay, Wash.

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:

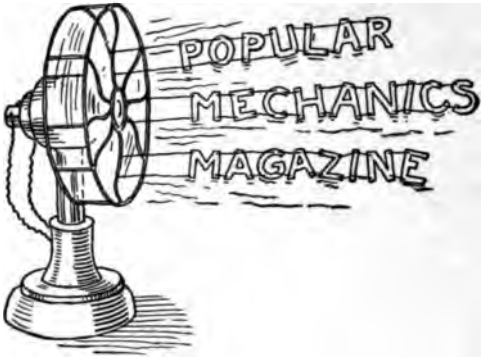
Procure a gas pipe about ¼ or ⅜ in. smaller in diameter than the inside diameter of the coil, and cut a small slot in one end of it. Slip the coil over the pipe and fasten one end of it to the pipe by means of the slot. Place the pipe in a vise and twist the coil until it is drawn closely on the pipe. 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

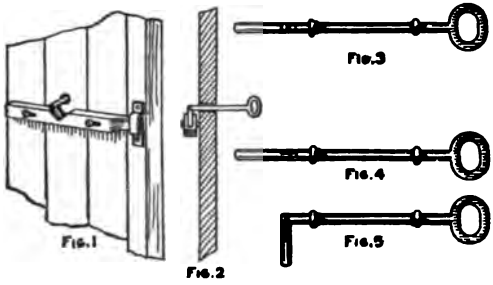


Letters Tied to Strings

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.

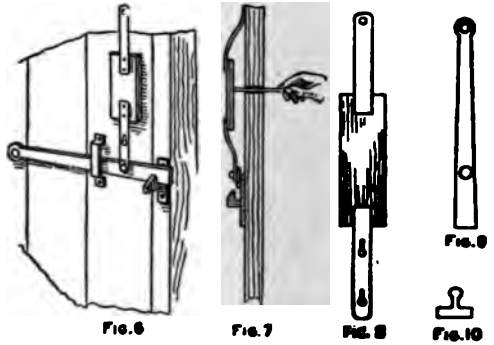
Locks for Camp and Shed Doors

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.

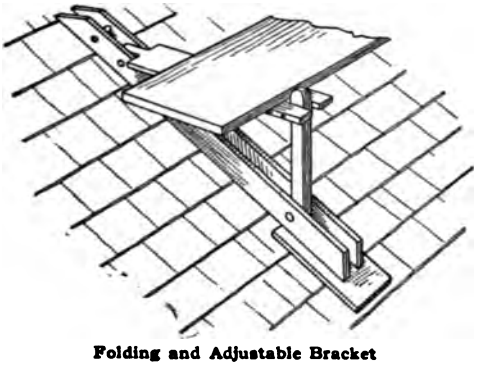
¶When painting stairs, apply the paint to every other step, and when dry, paint the remaining steps, placing small blocks on the dry ones to attract attention. Stairs may be used all the time by painting in this manner.

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.

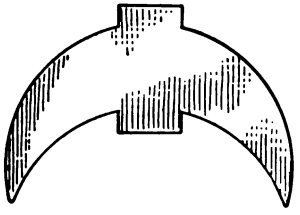
The brackets, as illustrated, are made to fold up and are self-sustaining. That is, the board which fits flat against the slant of the roof is spiked to cling to the surface and it would take a good deal to break it loose from its moorings. The spikes are made of ordinary screws with the ends protruding 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

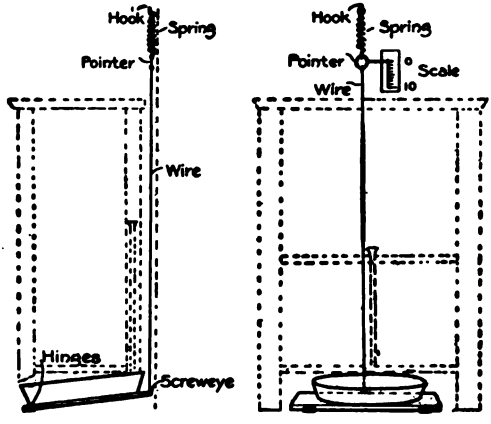
The illustration shows an internal and external keyseat gauge made of sheet metal. The outside arc has the same radius as the inside arc, thus forming a combination gauge for a certain size shaft and bore of a pulley having the same diameter. Such a gauge can be used for laying out the keyseat, and as 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.

Sight Gauge for an Icebox

Where no drain pipe is provided beneath an icebox, a drip pan takes its place. This is usually forgotten and



Gauge above Refrigerator

runs over before it is emptied. As the pan cannot be seen beneath the box, a simple gauge can be worked by the weight of the water so a pointer will designate the depth of the water in the pan. The arrangement is shown in the sketch.

The drip pan is set on a board that is hinged on the front side and attached to a wire on the back side with a screweye, the wire having a spiral spring on the upper end above the top of the icebox. The upper end of the spring is placed over a hook turned into the wall. A pointer and scale is provided, all in plain sight above the top of the box. Anyone taking food from the icebox cannot do so without seeing the scale, which will designate at all times the depth of the water in the drip pan, and the running-over point.—Contributed by K. Kuga, Hoquiam, Wash.

Library Paste

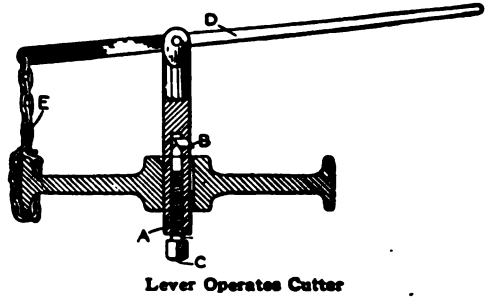
A good method of making library paste that will keep well is to take 4 oz. of lump starch and add enough cold water to make a thick liquid, then heat 1 pt. of water lukewarm and add the thick liquid starch to it very slowly and keep stirring all the time. When the mixture is complete heat it gently and stir vigorously all the time until a beautiful 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 photographs as it will not discolor them. The paste can be used where it is impossible to use acid paste, escially in printing and bookbinding.—Contributed by Loren Ward, Des Moines, Iowa.

Keyseating a Large Pulley by Hand

Occasionally a large pulley comes to a shop to be keyseated, and, if the shop is a small one, no appliances are at hand large enough to do the work. A tool that will do the job satisfactorily may be made in the following way: In the first place, a piece of shaft which just fits into the hole in the hub must be obtained. Drill into the shaft and tap the hole 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 ground to fit the taper on the bolt.

Allow the shaft to project above the wheel 12 or 14 in. 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 fas-



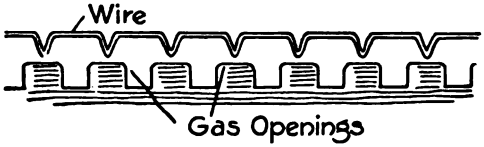
Lever Operates Cutter

tened to the rim of the wheel. Screw the bolt C up until the cutter is forced out far enough to make a cut. Apply pressure to the end of the and

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 ⅜ 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

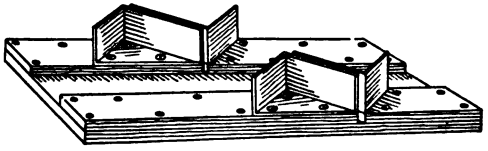
be consumed as soon as it enters the stove and not 2 or 3 in. above the opening.—Contributed by Walter E. Wright, Delaware, Ohio.

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

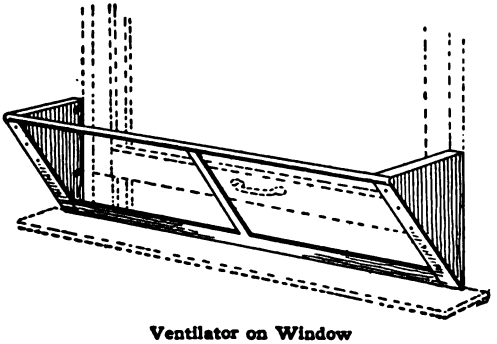


Box Corners on the Base

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

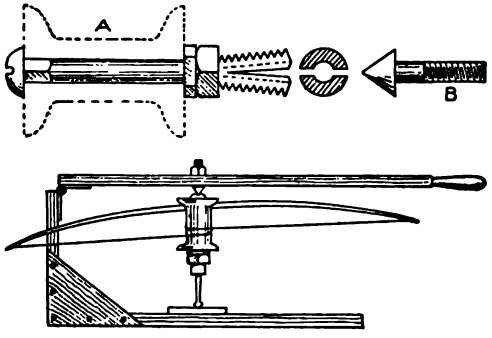


Ventilator on Window

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 nothing 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.



Fiddle Drill

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.

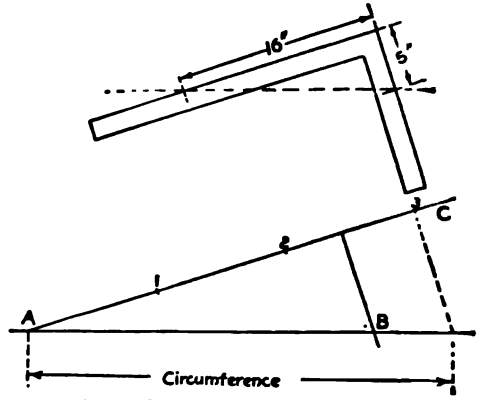
The shank of the drill should be made a little larger than the hole in the bolt, so that when it is put in, the end of the bolt will spring apart, and when the nut is screwed down tight, it will squeeze in on the drill and hold it securely. There should be two nuts on this bolt, one to jam up and hold 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

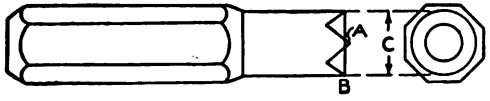
The circumference of any circle may be secured with an ordinary 2-ft. carpenter's square, when the diameter is given, in the following manner: Draw a straight line; then lay the square on the line with the 16-in. mark of the long side and the 5-in. mark of the short side, both intersecting the straight 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 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.



Square Used to Find Circumference

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

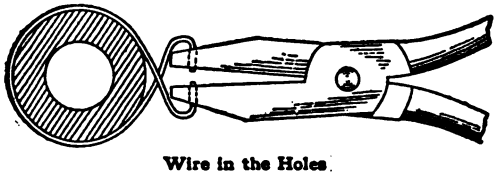


Marks Circumference of Holes

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

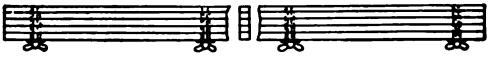


Wire in the Holes

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



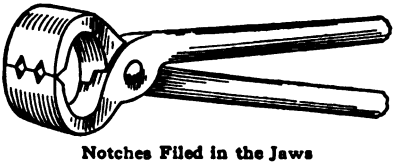
Bolts in the Strips

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

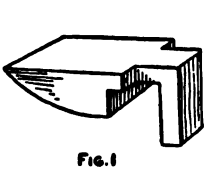


Fig. 1

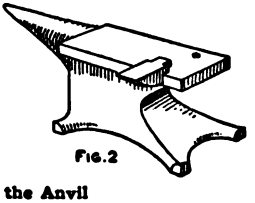


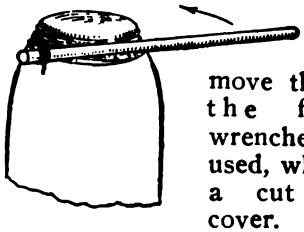
Fig. 2

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.

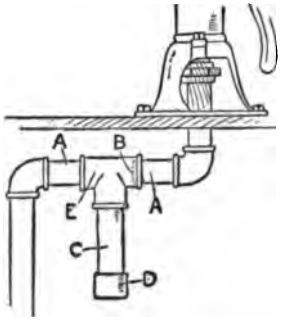
Removing Screw-Top Can Covers

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

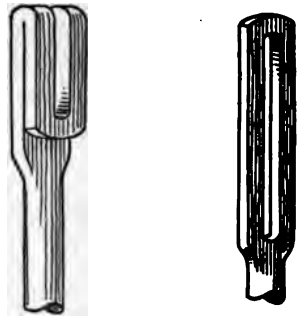
A great deal of inconvenience is generally experienced with newly driven wells using common pitcher pumps, as small gravel stones are apt to be drawn up and lodged under the lower valve, scoring the cylinder walls and causing damage to the valve seats. When the lower valve is held open by a small stone, 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.

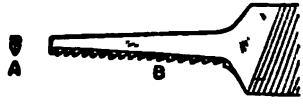
Making an Eye in a Rod End

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

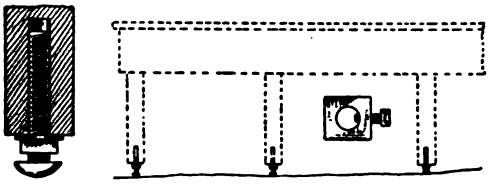
The lubricator on my engine froze and broke the thread off from one of the fittings, and as I had no screw plate small enough to rethread it, I succeeded in cutting the threads with the shank of an old file shaped as shown at A in the sketch, with teeth B, and tempering it. Starting on the old thread 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

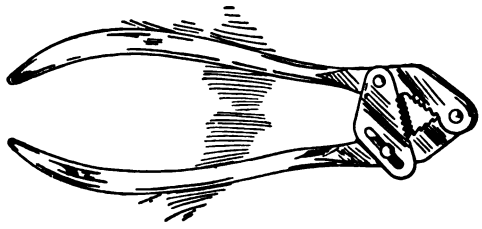
round washer between the nut and the bottom of the support so as to prevent wear.

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

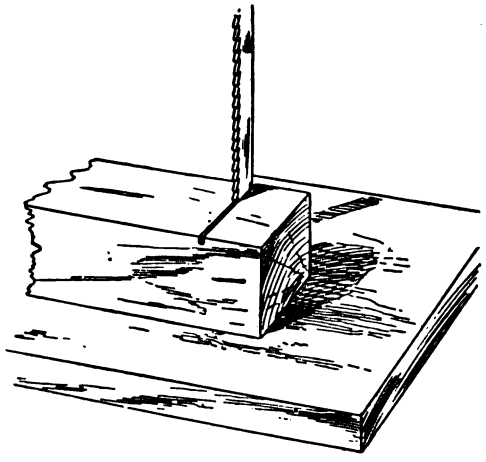


Pliers for Removing Screw Calks

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

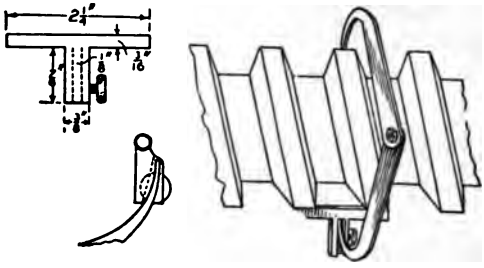


Saw Mark on Post

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

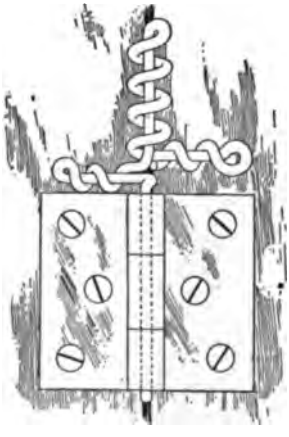


Bridging Device on Caliper End

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.

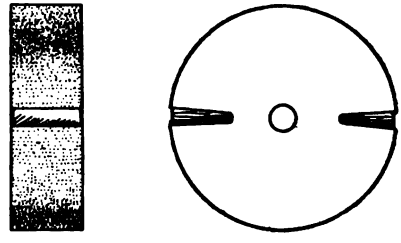
Hinge Spring for a Door

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.

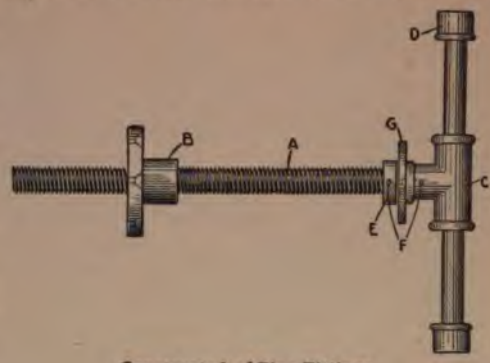
This is done by brushing with a whisk broom. Where the dirt is solidly packed some edged tool like a screw driver or the claw end of a hammer may be used. When cracks are free from dirt, cleanse the floor by thoroughly scrubbing it with hot soapsuds.

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

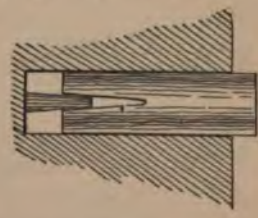


Constructed of Pipe Fittings

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.

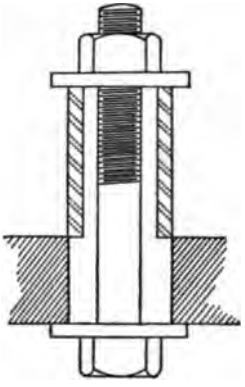
Fastening Screws in Brick

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.



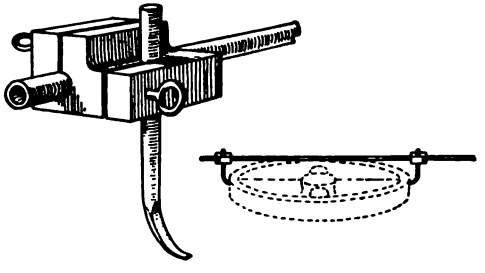
Forcing Bushings in Place

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.

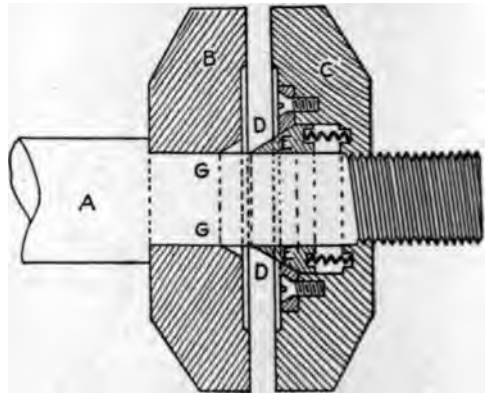


Wood Block Holding Caliper Point

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 $\frac{1}{16}$ 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

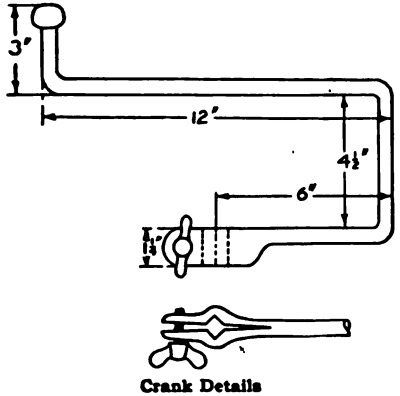


Cone in Collar Centers Saw

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



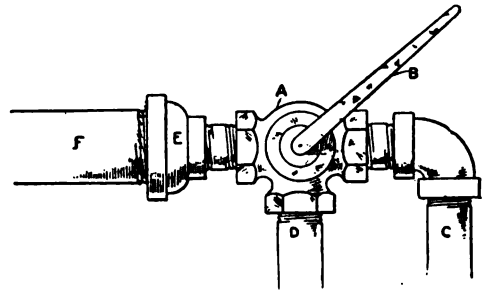
Crank Details

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 admitted 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.

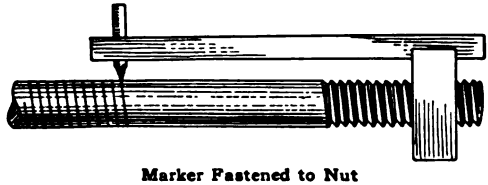


Operating Valve

Marking Threads on a Bolt

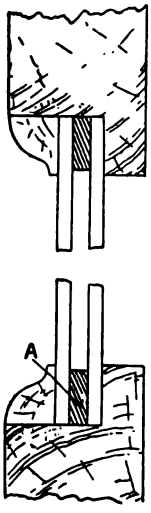
Some bolts had to be shortened about 3 in. in repairing a steam pump located a long distance from a machine shop. The threads varied in size, owing to the bolt sizes, and the length cut off from each bolt would remove the threaded portion, thus making it necessary to cut new threads on the shank of the 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 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.


Marker Fastened to Nut

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.

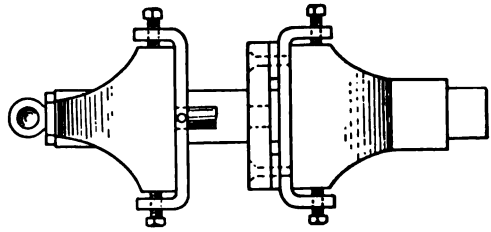
Drilling Holes in Lead

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.



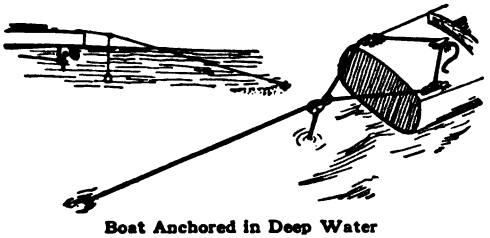
Punch and Die on Vise Jaws

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



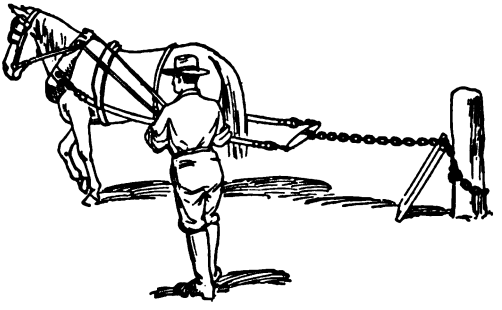
Boat Anchored in Deep Water

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

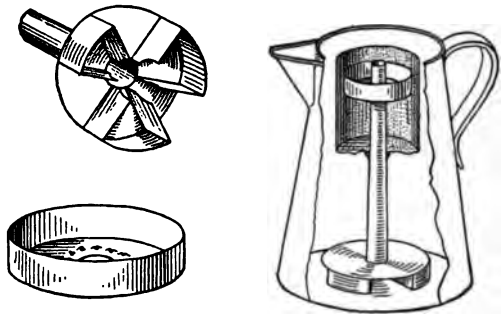
After squeezing out the desired amount of tooth paste from a tube, it very often makes a mess when the cap is screwed down on the surplus paste. A good way to avoid this is to press on two sides, in the usual manner, to get the paste, then change the position of the fingers to the ridges made by the 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.

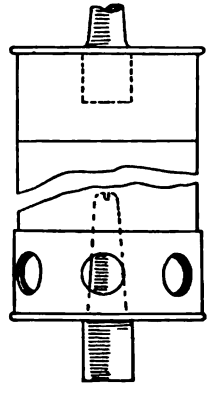
When the water begins to boil it flows through the tube, pours over into the small cover, drips through the small perforations, and then trickles through the coffee in the percolator. The water is slightly cooled below the boiling point before coming in contact with the coffee, and the conditions are 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.

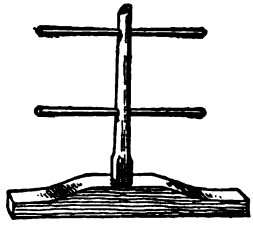


The tip which is put into the cap shell is pushed through from the inside. The air-controlling ring is made from a part of the upper shell which is cut off and also slightly expanded so it will turn easily on the base shell. Six

$\frac{1}{16}$-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.

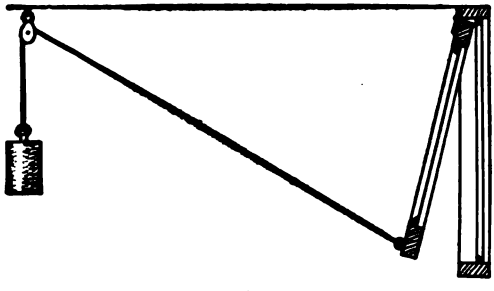
An Orchard Ladder

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

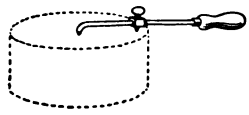
The inconvenience of having to prop open a cellar window may be easily remedied by weighting it as shown in the sketch. The weight may be made of concrete, using a can as a mold. A piece of window cord (or small rope) and a small pulley comprise the rest of the apparatus.—Contributed by Fred V. Brook, Ardmore, Pa.



Weight Applied to a Window

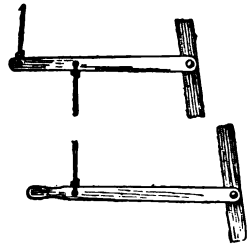
Can Opener

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.

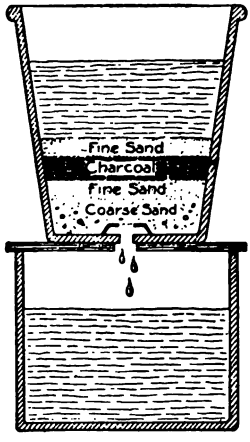


¶The shine on clothing may be removed by rubbing lightly with a piece of sandpaper.

¶A mechanic's finger nails can be kept from splitting and breaking by applying olive oil once or twice a day.

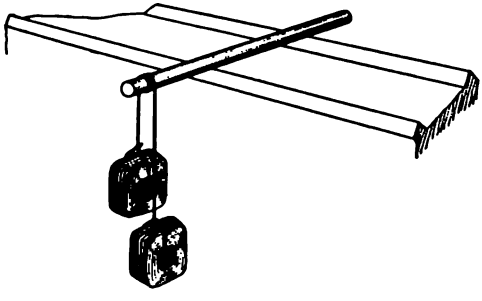
A Home-Made Filter

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

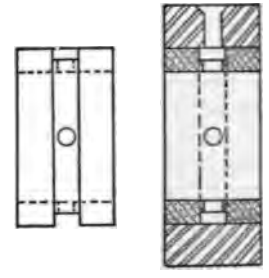
When winding a field coil one day, I found my weighing scale broken so I could not determine the weight of the coil, and my winder ran too fast to count the turns. I wound what I judged to be more than necessary on the new coil, and then, taking a piece of string about 3 ft. long, I tied the old coil 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

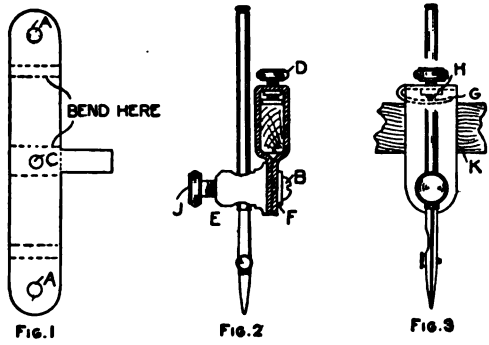


FIG. 1 FIG. 2 FIG. 3

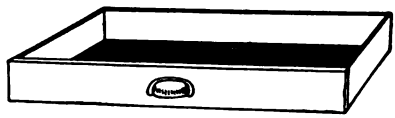
Holder Made of Sheet Metal

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



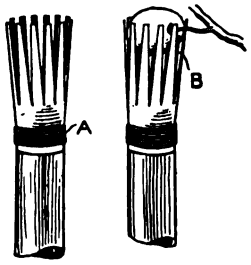
Mesh Applied to a Drawer

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

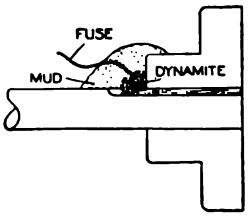
The picker is cut on the end of a bamboo cane as shown in the illustration. A cork is inserted on the inside and pushed down below the cuts and then the cane is wound with wire tightly at the place marked A to keep it from splitting.



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

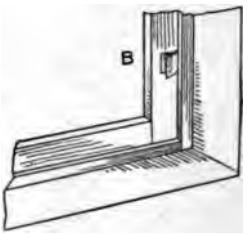
Two machinists and a helper had worked almost all day trying to remove a coupling from a large piece of shafting that had been out in all kinds of weather for several years. With some others I was working near them and as usual they were joked about their inability to make a success of the job. When 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.

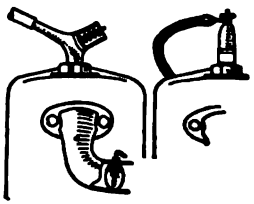
Anti-Rattle Clip for Loose Windows

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

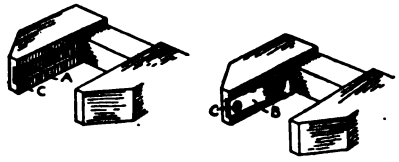
One of the cylinders on an automobile engine can be used to pump pure air into tires by using the attachment shown in the sketch. The device is made to take the place of the spark plug and consists of a poppet valve inlet and an outlet to attach to the air hose. A small shutter valve is placed in the 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,

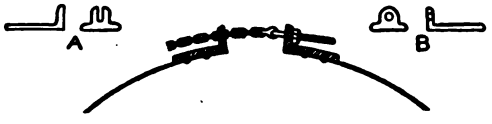


Spring in a Wrench Jaw

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

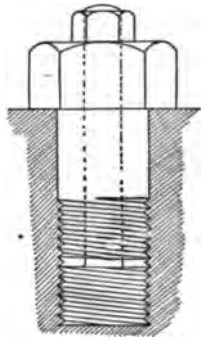
A useful clothes hook for camp purposes is made to fold up, when not in

Tent-Pole Hooks

use, into a small space as shown. It fits around the pole of a tent and fastens with thumbscrews.

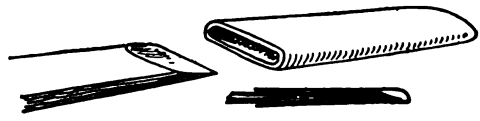
A Lock Stud Bolt

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

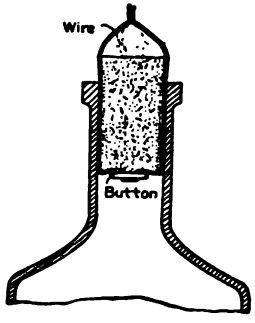
on its side to place the cover on, will find that the tools become badly

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.

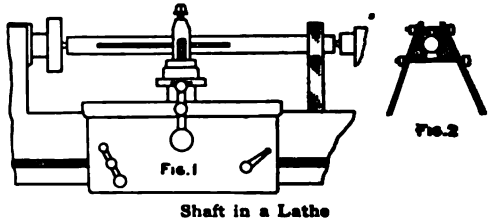
The stones were made level by holding them against the face of an emery wheel of the cylindrical ring form, which was run slowly for the purpose. This reduced them to a true flat surface. The grinding had, however, the effect of filling and glazing the face of the oilstone, something that involved a 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



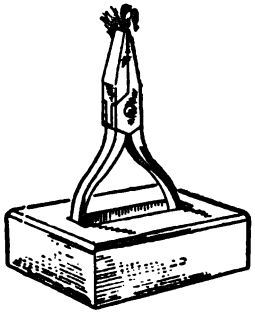
Shaft in a Lathe

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

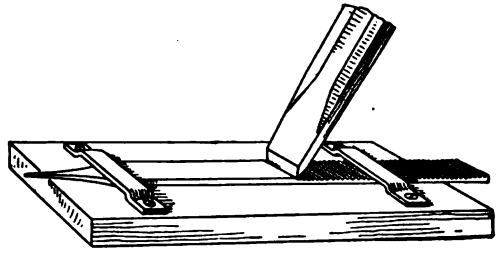
Finding myself unexpectedly within reach of some decent fishing one day, there was a question of tying some flies, and nothing in the way of a vise being procurable, necessity called forth the substitute described herewith, which will be of interest to others who may be faced with the same difficulty, 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

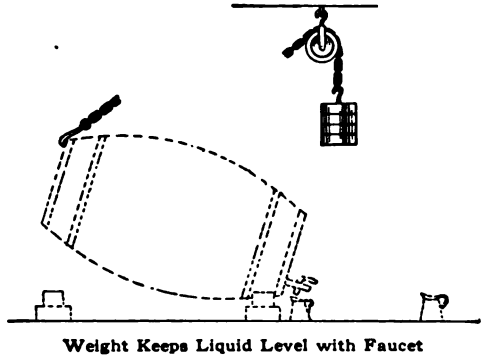


Cutting the Notches in Steel

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

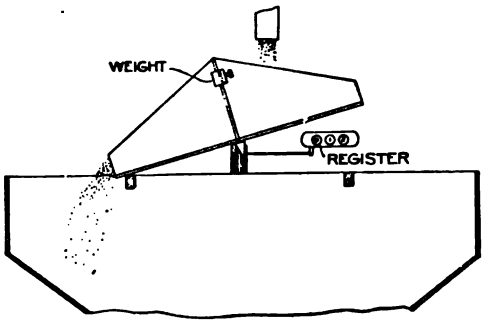


Weight Keeps Liquid Level with Faucet

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,

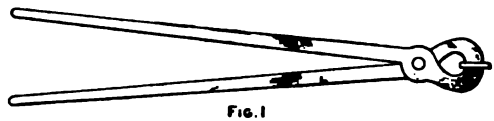


FIG. 1

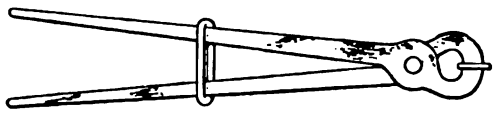


FIG. 2

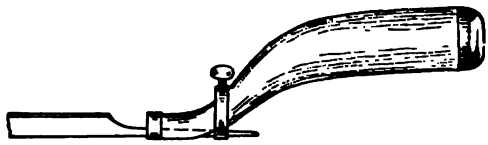
Tong Jaws for Hardening Steel Strips

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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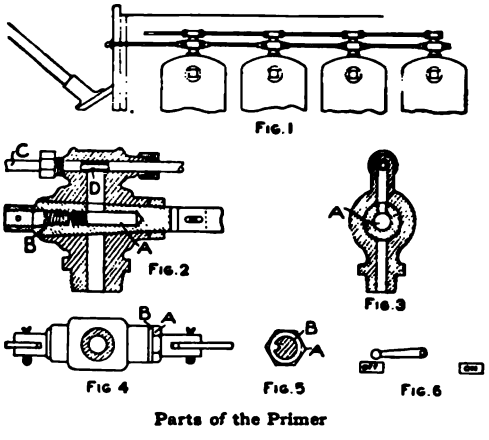
SHOP NOTES FOR 1912

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.



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.

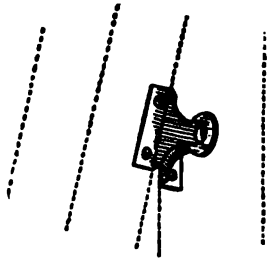
A standard mixture is composed of 1 part cement, 2 parts sand and 4 parts gravel. This should be used for machine or engine reinforced foundations subject to vibrations, for reinforced beams, columns, arches, floors, and for watertight work such as tanks, conduit sewers, etc.

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.

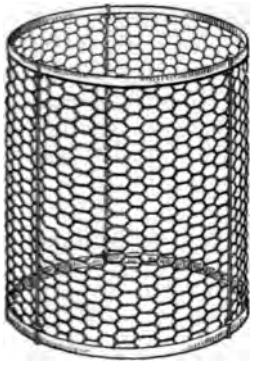


Drilling Deep Holes

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.



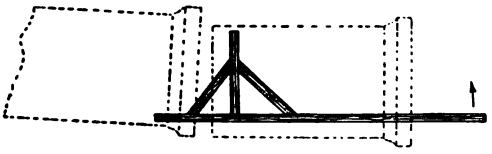
The box can be made by any boy. Procure two iron hoops from a barrel and attach to them a piece of poultry wire 24 in. wide for depth. Three stout braces of heavy wire or straight pieces of iron can be interlaced through the wide meshes to support the wire on the sides. To attach the wire at the top 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



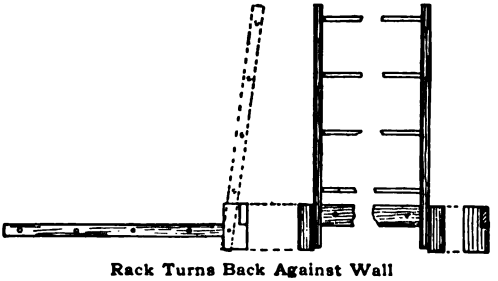
Lever for Lifting Tile

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

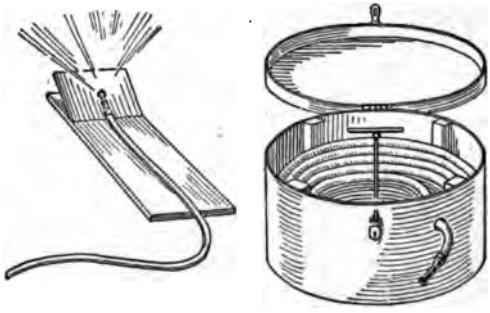


Rack Turns Back Against Wall

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.

A Hose Holder

The first sketch shows a sprinkling device for a hose. It is made of a baseboard about 2 ft. long to which is at-



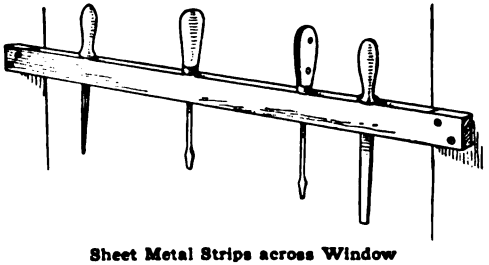
Sprayer and Hose Box

tached 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.

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

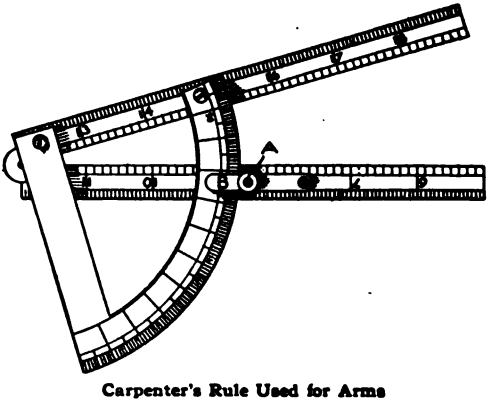


Sheet Metal Strips across Window

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 on the back of the strips.—Contributed by A. Lester Shipton, Watertown, Mass.

Homemade Arm Protractor

As I had a large number of winding courses to plat, 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



Carpenter's Rule Used for Arms

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.

The ends of the rule were cut off at the first joint as the hinge made a projection that would [illegible] the instrument to lay flat.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