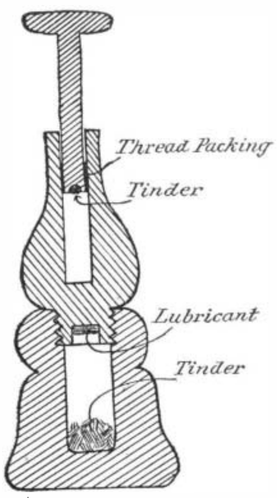
PRIMITIVE FIRE-MAKING MACHINE.

BY CAPT. JOHN G. MAC KIZER.

Some time ago the SCIENTIFIC AMERICAN published an article describing primitive methods of making fire. The accompanying sketch shows, in section, a fire-making machine which I obtained from a native in the Lobo Mountains, Batangas, P. I., and which embodies a different principle from any described in the article.



FIRE-MAKING MACHINE.

To operate it, the machine is held in the left hand, and the piston, loaded with tinder and inserted far enough in the well to insure a straight entrance, is struck home and quickly withdrawn. Some skill is required to accomplish this rapidly enough to get the spark to the air before it is extinguished. It is made of caraboa horn. The tinder is scrapings from the interior of bamboo, and the lubricant is tallow.

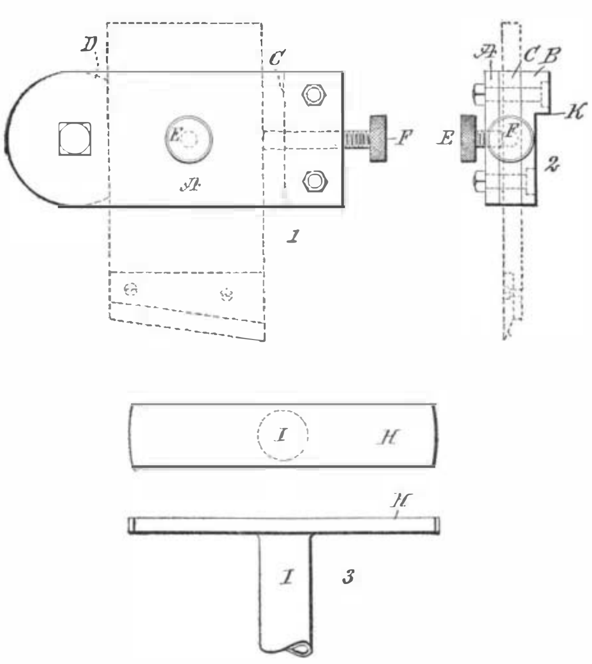
After some difficulty I induced the native, who was of the lowest type, to show me how he could make fire without his machine. Taking a large section of dry bamboo, he split off a piece about three inches wide and eighteen inches long, and cut a trough across it near one end. This trough he carefully deepened until at its middle point it just broke through. On another piece he cut a row of notches on one edge. Then scraping a quantity of fuzz from the interior of the bamboo, he pressed a bit of it through the small hole at the bottom of the trough, and laid the piece concave side down on a pile of tinder. He held this piece down with his knee, and with both hands sawed rapidly in the trough with the other piece. In a few seconds the tinder began to smoke, when he lifted the bamboo and blew the spark into a blaze. I then tried it with equal success, but have been unable to get just the right touch to pieces that I have prepared myself.

HOLDER FOR GRINDERS.

BY O. D. CARTER.

A very simple device for holding dies and other work of similar shape while grinding on small emery wheels may be made as shown in the sketch.

Between the top plate *A* and bottom plate *B* are two blocks, *C* and *D*, of sufficient thickness to allow the work to pass freely between *A* and *B*. The block *C* has a knurled screw passing through it, which firmly holds the work against the block *D*. The latter is



HOLDER FOR GRINDERS.

formed of a circular piece and may be clamped at any desired angle by means of a nut.

The knurled screw *E* holds the work against the lower plate. All bolt heads are sunk flush with the bottom plate. *H* is a suitable rest for the above clamp. Its shank *I* is turned to take the place of the ordinary rest of a small emery wheel. By raising or lowering the rest, the required clearance is obtained. When the grinding is finished, the edge of the rest engages the shoulder *K* of the lower plate *B*, thus making it certain that each piece will be ground at the same angle and length.

TOOLS FOR THE WORKSHOP.—II.

BY I. G. BAYLEY.

(*Continued from the issue of April 24th.*)

A COMBINATION PLANING AND SHOOTING BOARD.

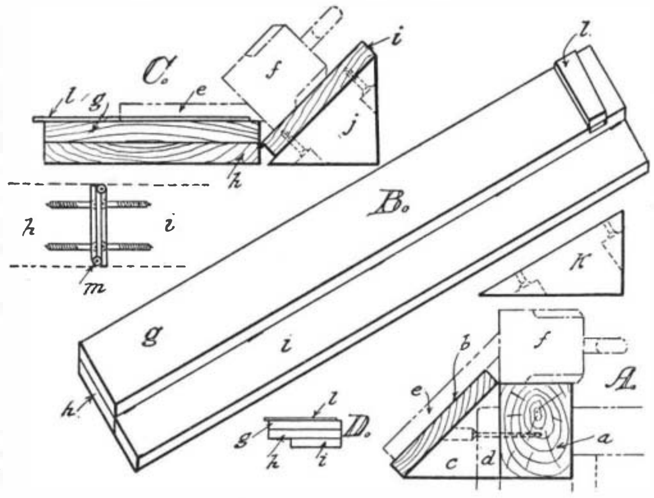
It is sometimes necessary to put a long straight or bevel edge upon a board; and while this can be done by the aid of the try square or bevel square, the board being held in the vise, the accuracy of the work depends largely upon the skill of the mechanic, and requires much practice. For the amateur, and even the professional, a board such as shown in the accompanying illustration is desirable.

All that is necessary for planing square edges only is a board about 9 inches wide, secured to one underneath, 15 inches in width, each ⅞ of an inch thick, and as long as the bench. The boards must be planed perfectly true, the working edge in particular, and a stop of some kind should be furnished at one end.

Sometimes it is necessary to plane a long miter edge on a board, in which case an ordinary shooting board, such as described, will not do.

One arrangement of shooting board for long miter joints is shown in the cross-sectional view *A*, in which *a* is a length of 3 by 4-inch timber, to which is secured a board *b*, at an angle of 45 degrees, by means of triangular blocks *c*, spaced about 2 feet apart, commencing near the ends. One end of the shooting board is held in the vise *d*, the other end resting upon pegs in the apron of the bench. The board *e*, whose edge is to be planed, is clamped to the board *b*, and the plane *f* shot along the 3 by 4-inch piece *a*.

At *B* is shown another scheme, where two 9-inch boards, *g* and *h*, are secured together by means of screws, driven in from the underside of the lower board *h*, which in turn is hinged to a board *i*, in the same plane, 6 inches wide. By means of blocks, *j* or *k*, secured to the board *i*, bevel or miter edges of 45, 60,



COMBINATION PLANING AND SHOOTING BOARD.

and 30 degrees can be planed along the edge of any board *e*, as detailed at *C*. A wedge stop *l*, of hard wood, is furnished at the far end of the plank *g*, several being made of various thicknesses, to suit the work in hand.

Before using the board, the work bench should be swept down, and it is very necessary to have it level.

Ordinary hinges for holding together the boards *h* and *i*, are perhaps best, being steadier; but for convenience when the board is out of use, if the double swing hinges *m* are used, the 6-inch board *i* can be folded under the others, as shown at *D*, the blocks of course having first been removed.

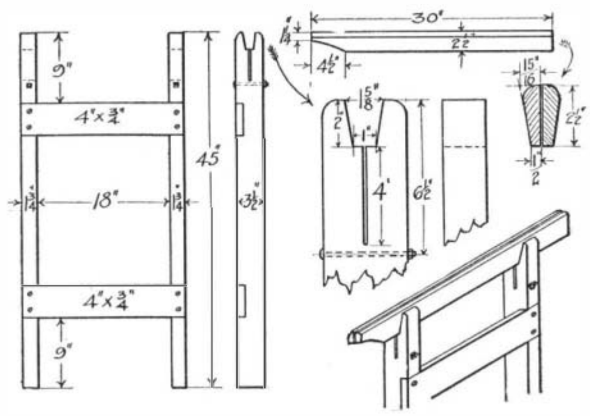
Care must be taken to place the hinges a trifle below the surface, or the edge of the plane will wear over them, as it is shot from one end of the board to the other.

THE SAW CLAMP.

The majority of saw clamps on the market are either secured to the workbench by means of a thumbscrew clamp or other adjustment, or they are held in the vise—an arrangement having several bad features, which are overcome by the clamp here described. With this clamp it is unnecessary to take out the saw, or unscrew the vise, when changing off to file the other edge of the teeth. Instead, the clamp and framework is turned around bodily. It can be moved from place to place, to a good light, or wherever most convenient, since it is not dependent upon a vise or bench for its support. The clamp being longer than the width of the vise, takes a better grip upon the saw; and the simplicity of clamping it (without the usual adjustment by means of a screw or pin) recommends it.

The framework may be made of light wood; the 4 by ¾-inch pieces being let in flush with the face of the 1¾ by 3½-inch side bars, to stiffen it. To prevent the 4-inch slot for the saw splitting down when the clamps are driven in, a bolt is put through, as indicated, 6½ inches from the top.

The clamps should be hard wood, 30 inches long, shaped out as detailed. The 4½-inch recess, to allow for the saw handle, should be cut when the two clamps are together, since this makes them right and left handed. When making the two clamps, the taper should be obtained before the edges are rounded off, as shown in broken lines.



CONVENIENT CLAMP FOR SAWS.

The lower right-hand corner sketch shows the clamp in the framework without the saw. When necessary to set a saw, it is dropped in the 4-inch deep slot, teeth up, the two clamps wedged into place on each side of it being driven home with a mallet or hammer.

(*To be continued.*)

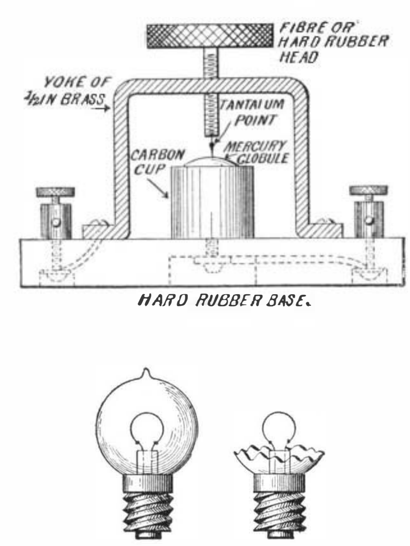
A TANTALUM DETECTOR.

BY ALFRED P. MORGAN.

A detector for wireless telegraphy has recently been devised, which makes use of a tantalum wire or filament in contact with a globule of mercury. While this detector is not so sensitive as the electrolytic or silicon type, and will not respond as well to very faint signals, it more than makes up for this when used for detecting signals of ordinary strength. It will then give tones several times as loud as either of the two types mentioned, and does not require the use of high-resistance telephone receivers. Its normal resistance is about 1,500 ohms, which drops as low as 250 to 270 when struck by oscillations. The construction of such a detector is quite simple and well within the ability of the amateur. The first operation is to secure the tantalum wire. This may be taken from a tantalum lamp of the battery type. A deep scratch is made in the glass all the way around the base of the globe by means of a small three-cornered file moistened with turpentine and camphor. A second scratch is made from the base to the tip on both sides. A light tap will then break the globe in two. Do this carefully lest you break the filament.

Cut the filament off within about 1/16 of an inch from where it is joined to the platinum or iron wires. This can best be done with the points of a small pair of scissors. Then break the small glass stub which holds the wires in place, so as to secure the tantalum with about ¼ inch of wire fastened to it.

A screw in which to fasten it so as to permit of adjustment may be taken from the carbon of an old dry cell. A fiber or hard-rubber washer will make a good head for the screw. Bore a 1/16-inch hole in the end of the screw. Make it about ⅛ of an inch deep.



HOME-MADE TANTALUM DETECTOR.

Place the end of the wire opposite the tantalum point in this hole, and pack tinfoil around it with the head of a sewing needle, or if preferred fasten it to the screw by means of a small drop of solder.

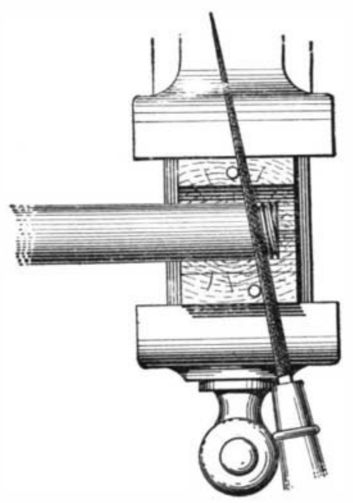
The cup is best made from a piece of carbon rod. Remove the rod from an old dry cell, and saw off a piece about an inch long from the end containing the brass connecting cap. Then trim off all the rough edges of the carbon with a coarse file. A hole ½ inch in diameter and ¼ inch deep should be bored in the center of the rod at the end, forming the cup for the mercury. Bore a 1/8-inch hole through the base where the cup is to be fastened, and countersink it to 1/2 inch in diameter from the under side. This enables the brass nut to be put on the under side, thus serving both to hold the cup firmly in place and as a connection for a wire to the binding post. This is shown by dotted lines in the drawing. The yoke is made of a piece of sheet brass. Two holes are bored in the feet, and it is fastened to the base by means of screws. A hole is bored and tapped to receive the screw point. If a tap is not to be had, a 1/4-inch hole may be bored in the yoke, and a battery nut soldered directly over the center of the hole.

The detector is best mounted on a piece of 1/2-inch hard rubber measuring about 3 by 4 inches. Four binding posts will be required for the usual connections.—Electrician and Mechanic.

THREAD CUTTING WITHOUT A DIE.

BY J. A. BERGSTROM.

It sometimes happens that the threads of a bolt or a pipe break off and must be cut without the aid of a screw-cutting die. This can be accomplished very



THREAD CUTTING WITHOUT A DIE.

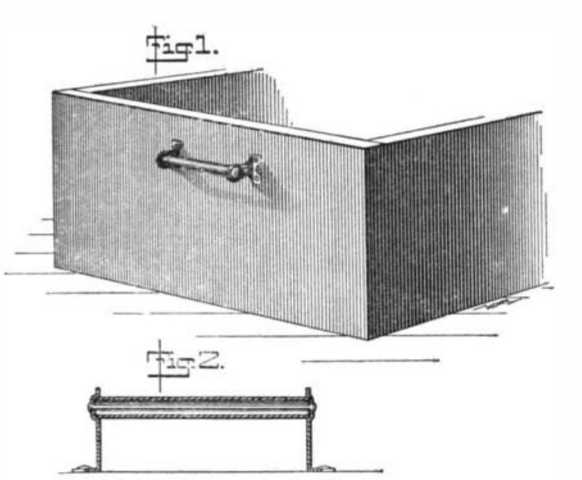
easily with the aid of an ordinary half-round file and a little patience.

Take a block of wood and fasten it in a vise. Make a V groove in the block deep enough for the center of the pipe to come a little below the surface. If the pipe is long, it will be better to make two of these blocks, so as to keep it steady. Now into this groove place a pipe with thread same as wanted, and on one side of the block drive in a nail. Place the flat side of a half-round file against this nail and see that it forms the same angle with the pipe as the thread does. Then drive in another nail on the opposite side of the block, so that it will touch the flat side of the file. Now remove the pipe and replace with the one to be threaded. Hold the file with the smooth side against the nails and while filing keep turning the pipe. The pipe should be rocked backward and forward. That is to say, on the forward stroke of the file turn the pipe in the opposite direction, thereby insuring a much better thread.

A SIMPLE METHOD OF CONSTRUCTING A HANDLE.

BY W. C. M'KENZIE.

The accompanying illustration shows a simple method for constructing a neat and strong handle for a box, or a drawer. The handle is fashioned from two similar shade roller brackets which are fastened in place by means of screws at the points where the handle is needed. A piece of pipe or tubing is positioned between the brackets and is held in place by a stiff wire or other rod which passes through the tubing and the openings in the brackets, having the ends hammered down or riveted at the outside of the bracket. The tubing may be of brass or any other suitable material adapted for the purpose, and preferably tending to add to the appearance of the handle.



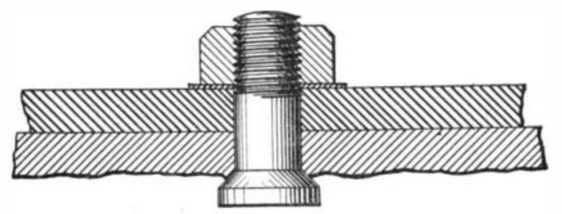
SIMPLE METHOD OF CONSTRUCTING A HANDLE.

The ends of the tube should be inserted in the concavities of the brackets, as is shown most clearly in Fig. 2.

METHOD OF PATCHING A BOILER.

BY JOHN W. E. LAKER.

The following method of bolting a patch on a boiler perhaps shows some originality. It was required to patch the bottom of a combustion chamber



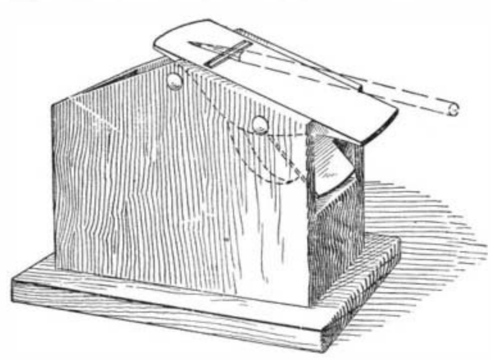
BOLTING A PATCH ON A BOILER.

of a very old boiler, badly pitted on the water side. Riveting was impossible for want of space. The patch was five feet by two, fitted on the fire side, and the greatest difficulty to overcome was to make the bolts watertight, owing to the impossibility of driving them or getting a contact under the heads against the bad plates. Gaskets did not appeal to the repairer, and a metallic contact was aimed at. This was accomplished by making each bolt act as an ordinary miter-seated valve. They were turned a hand-workable fit (all but the last 1/4 inch, which was tight) to reamered holes of steel, and case-hardened, fitted in from the water side, and hammered up with a spanner. The "seat" was sunk into the boiler plates. There were altogether 128 bolts in the patch. The job when finished passed a government surveyor's examination, and steamed from Honolulu to San Francisco without mishap.

PENCIL SHARPENER.

BY JOSEPH N. PARKER.

I have to provide means for the sharpening of one hundred or more pencils daily, and after having tried with little success a number of the expensive sharpeners, I fitted up a small all-metal carpenter's plane in a box, and it answers the purpose admirably. After a little practice one can easily make any kind of a point desired. The bit will stay sharp long enough to point several thousand pencils, and then it can easily be removed for sharpening. The accompanying sketch shows how it is done.



CARPENTER'S PLANE AS PENCIL SHARPENER.

Shavings from pencils are excellent for driving away moths.

COPPERING FLOWERS WITHOUT WAX.

BY ARTHUR E. HAGARTY.

The writer is interested in electroplating flowers, etc., and has had considerable success in coppering and silvering, using no wax. The rose (or other article) is dusted over with the finest graphite (blow the excess off) and immerse in the copper solution. An ordinary rosebud is thickly and sufficiently plated in about fifteen hours, using six large-sized gravity batteries. Of course the silvering and gilding are easy after a good coat of copper has been deposited. The wax is unnecessary except to stiffen the petals or when glass, etc., is to be plated.

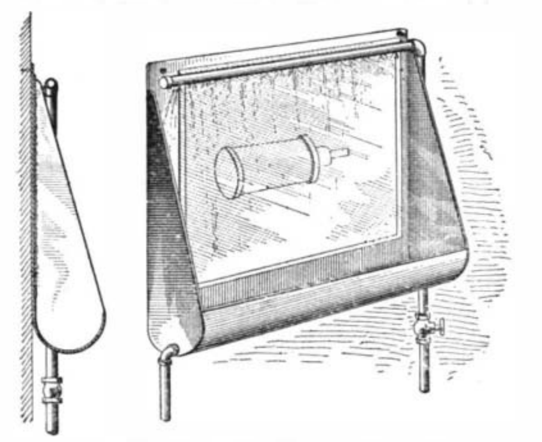
Some beautiful rosebuds have thus been plated in copper and silver, with the stalks, etc., enameled green. Undoubtedly many amateurs would like to experiment with this work, if they knew it was so easily done. A stout copper wire is pointed with a file and carefully drilled (by hand) into the center of the lower part of the bud, care being taken not to break off the small green petals. After dusting well with the graphite the wire is thrust through a piece of heavy cardboard as a handy means of adjusting in the plating bath, which should be about 1/4 inch above the flower. The wire is then connected, and in a few minutes the copper can be seen creeping over the petals. The flower should not be disturbed till entirely plated. Of course the flower can be put in any position, but the vertical position is the best, because the petals tend to float out of position when inverted. The wire can be bent in the form of a large hook with the point upward, but this makes unnecessary and wasteful surface to plate with a small battery. All the plating should be concentrated on the flower, if possible. The finished flowers should be polished for bright effects, and well rinsed in hot water, or boiled, to get rid of the acid, which would otherwise corrode.

Some very beautiful effects can be obtained with ferns, etc. Anything can be plated which is not affected by the acid during plating. To deposit on glass it must be coated with paraffin first, all the excess of graphite being brushed off.

BLUE-PRINT WASHER.

BY W. J. C.

A very compact blue-print washer, which has the great advantage not only of taking up very little space, but also of permitting the washing to be done without the usual slopping over and dripping incidental to the use of tanks, can be made very cheaply of galvanized iron, as shown in the accompanying sketch. The washer is attached in a vertical position on the wall, and the pipe furnished with valve running up the side and across the top. The last piece of pipe, the horizontal, is drilled with one row of holes 1/16 inch diameter about 3 inches apart, and so placed that the water strikes the back of the washer at an angle of about 45 deg. To wash a print,

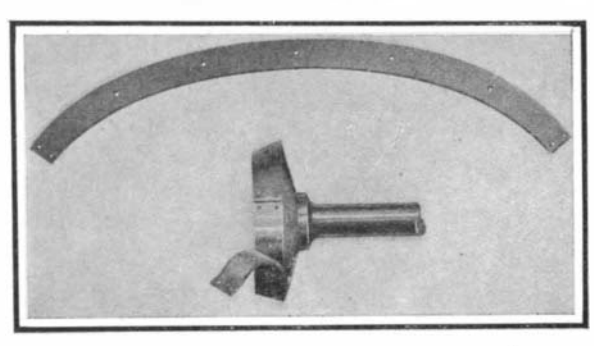


A VERTICAL BLUE-PRINT WASHER.

the water is turned on for a moment, wetting the back of the washer, and then shut off and the dry print stuck up on the wet surface. Care should be taken that the top edge of the print comes slightly above where the water strikes, to prevent the print being washed down by water getting back of it. The water is then turned on, and a thin film of water allowed to run over the face of the print. If there is no trimming space left on the print, it can be turned upside down after a few moments, to insure the top edge being washed evenly. This method washes prints in a very short time, as the running water is much more effective than the tank method. Painted with aluminium paint, the washer looks well in any office, and will save its small cost in a very short time.

PUTTING ON A NEW CLUTCH LEATHER.

A clutch leather may be cut from a wide piece of leather belting of uniform thickness, usually 1/4 inch. If the piece chosen is too thick, it will be impossible to release the clutch fully. Take off the old clutch leather, lay it out flat, and use it as a pattern for the new leather. (See cut.) As the leather will stretch somewhat, it is not essential to have the new leather curve as much as the old one. Cut the new leather about 1/2 inch short, and punch and countersink holes in its ends for the rivets, whose heads should be below the surface of the leather. Soak the new leather in water until it is thoroughly soft. Stretch it over the clutch, and put temporary rivets in the ends. Mark the central rivet hole, remove from the clutch, and punch that hole. Put the leather on



PUTTING ON A NEW CLUTCH LEATHER.

the clutch again with temporary rivets, and punch and mark the remaining holes. When all have been punched and countersunk, rivet the leather in place. For this purpose it is necessary to have a bar whose end diameter is about the diameter of the rivet heads. This bar is used as an anvil against the rivet heads. Two men are necessary, and the whole job, after the leather has been taken out of the water, must be done quickly, else the leather will shrink so that it will not go on.