helix off the rod, take hold of one end in each hand and stretch it to a length of about five feet. This will separate the individual turns of wire so that they look something like Fig. 1, *H*.

The support for the heating coil, Fig. 2, *A*, should be made of a piece of asbestos board or magnesia board ¼ inch thick and of such a diameter as to fit easily in the bottom of the crock—in this case about 10¼ inches. If the asbestos or magnesia boards cannot be obtained, a good substitute may be found in slate, or in a disk of 1/16 inch thick sheet iron covered on top with several thicknesses of asbestos building paper. Ten porcelain insulators, each about 1 inch in diameter by 1 inch high and having a shallow groove near its upper end, should be fastened to the base with flat-headed stove bolts in the positions shown. When stretched on these insulators zigzag fashion, the heating coil will be retained in the grooves by its own elasticity. For the electrical connection to the heater use two pieces of No. 14 white asbestos-covered copper wire, each about two feet long. Attach these to the German-silver wire by twisting the ends, and tie them securely to the end insulators with wire. Place the heater in the bottom of the crock and bend the terminal wires close up against the inside of the latter and over the edge, so as to be out of the way of the cooking vessels that are to stand on the porcelains. The outer ends may be attached to a double-pole knife-switch mounted on the side of the cooker.

The electrical connections to the house circuit must be of a substantial character. Do not try to connect the cooker to a lamp socket or with small lamp cord—neither will carry the current safely. If no baseboard receptacle has been provided in the kitchen, wire all the way back to the panelboard with No. 14 rubber-covered wire and provide a pair of inclosed 10-ampere fuses. It is well to remember that it will be necessary to move the cooker occasionally, so that it is worth while to make provision for easily disconnecting it.

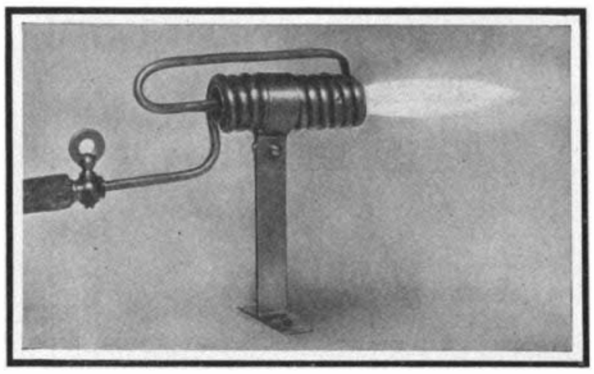
The operation of a cooker made as described is very simple. The prepared food is put in a covered tin vessel of suitable size and placed on the heater in the bottom of the crock, after which everything is closed up tightly. The current is then turned on for ten to twenty minutes, depending on the quantity and kind of food to be cooked, after which the cooker will keep hot for several hours. A little experience soon teaches one how long to keep the current on, and then the whole operation becomes as easy as the boiling of an egg in the old-fashioned way. In the cooking of roast meats it is well to apply the current a second time for two or three minutes after an hour has elapsed.

No danger of fire is to be anticipated from a cooker made and installed as described, but it is almost self-evident that if one were to forget to turn off the current both the food and the heating coil would soon be destroyed, since the heat is generated very rapidly and has no means of escape. To guard against such a mishap, procure about a foot of ⅛ inch brass or copper tubing and a very small whistle. Arrange the tube so that one end opens into the crock alongside of one of the connecting wires while the other end passes out through the wood case. To the outer end solder the whistle in such manner that it will be blown by steam escaping from the crock. With this device in working order, if the current be left on too long the steam escaping from the food will sound the alarm in good time.

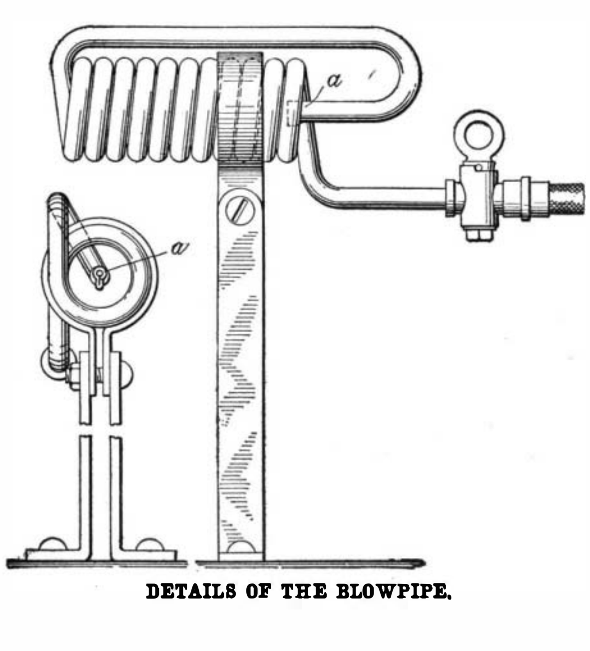
HOME-MADE BLOWPIPE.

BY F. D. SWEET.

The blowpipe shown in the accompanying illustration will be found a very useful adjunct to any mechanic's workshop. For tempering tools, heating soldering irons, brazing, and melting metals in a crucible, it answers the purpose of the more expensive outfits, which the amateur as a rule does not feel able to invest in. Furthermore, there are no bulky air tanks and pumps to take up room, which to most amateurs means a great deal. The one illustrated can easily be carried in the pocket, so it is evident that the space required is indeed small. To construct one of this size, about 6 feet of copper or brass tubing 5/16 of an inch outside diameter will be required, also 2 feet of band iron about 1/16 of an inch thick by ¾ of an inch wide. Before bending the tubing to the required shape, it is necessary to fill it with lead or sand to prevent buckling. Either of these will be found to give good results, though for the smaller sizes of tubing lead is preferable. It is not advisable to attempt pouring the molten lead in the tube, as it cools too rapidly. The safest way is to use wire solder. A piece two or three feet longer than the tube will as a rule be enough. The lower end of the tube will have to be closed by hammering it down. Insert the wire solder, hold the lower end of the tube over a flame to melt the solder, at the same time pressing the wire slightly. Move the tube slowly over the fire and it will quickly melt the lead, and one may feel sure there are no bubbles. To form the coil, use a round bar about ⅞ of an inch in diameter. A broom handle will prove useful. It is best to reduce the nozzle *a* slightly, to increase pressure of the gas as it becomes heated in the coil. After this is done, and the coil assumes the shape shown, we can proceed to remove the lead, which may be easily done by heating over a fire until the lead melts, then by shaking slightly it will run out and leave the tube clear. The valve may be dispensed with, and a rubber tube from a convenient gas jet may be slipped on.



THE BLOWPIPE IN USE.

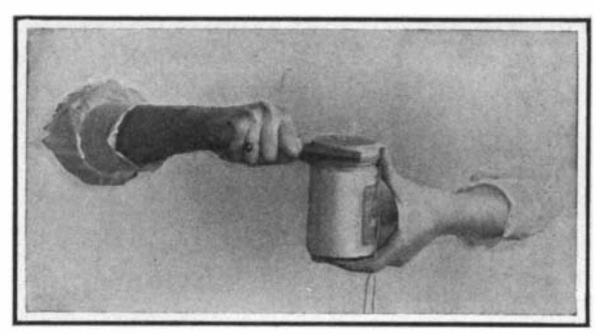


DETAILS OF THE BLOWPIPE.

UNSCREWING A TIGHT JAR TOP.

BY A. R. VAN DER VEER.

The writer desires to thank the Handy Man's Workshop for a suggestion that was printed in the issue of November 7th, 1908. The item referred to is the description of an improvised pipe wrench, consisting of a lever passed through a loop of rope, which is coiled about the pipe. When recently called upon to unscrew a jar cover that resisted all other efforts to loosen it, the writer bethought himself of the rope and lever pipe wrench. A length of strong twine was procured, and coiled double around the cover. Through the loop in the end of the doubled twine, a stick of wood was inserted. Then with the thumb of the left hand pressing lightly against the twine to prevent it from slipping, it was an easy matter to pry open the cover with the right hand in the manner illustrated in the accompanying photograph.



UNSCREWING A TIGHT JAR TOP.

CONSTRUCTION OF A SELENIUM CELL.

BY J. CARLTON PAULMIER.

The materials required for the construction of a selenium cell are as follows: Twelve feet of spring brass ½ inch wide, 1/16 inch thick, two small machine screws, two 3-inch bolts and nuts, a piece of thin mica 6 x 12 inches, ¼ ounce of selenium, a small piece of thin board, some wood screws, and a piece of glass about 3 x 3 inches.

From the brass cut 40 pieces 3 inches long, and drill a hole to take the bolts, ⅛ inch from one end. Also make up 39 washers by cutting pieces ½ inch long and drilling holes in the center. From the mica cut 39 pieces 2½ inches long by ⅝ inch wide. Take half the brass strips, place a washer between each, pass a bolt through the holes in the ends, and screw up the nut. Do the same with the rest of the strips, and you have two sections of the cell.

Now slide one section into the other, tighten up the nuts, and place in a vise. File down and polish the edges of the strips so as to form a perfectly smooth surface on one side.

Next separate the two sections again, place a piece of the mica between each strip, so as to insulate one section from the other, then assemble as before, being careful to get the top surface perfectly level and smooth.

Take another piece of the brass, 4½ inches long; ½ inch from each end drill and tap a hole to take the machine screws, and bend up ¾ inch of each end. Use this piece to clamp the two sections together in the center, being careful to insulate it from them. After making sure that the sections are properly insulated from each other, the selenium may be applied as follows: Hold the brass over a flame until the selenium melts freely, then rub the stick of selenium over the polished surface. If the brass is hot enough the selenium will adhere readily, but if too hot it will burn off. After applying the selenium, and while it is still soft, pass a knife blade lightly over the surface. This removes the surplus selenium, and leaves a thin smooth coating.

Now bake the cell in an oven for one hour, having the temperature just below the melting point of the selenium. Then take out and allow to cool in the open air.

Make a box with a glass cover, and wedge the cell in this with small pieces of wood. Fasten two binding posts in one end, and connect each binding post to one of the sections. The cell is now complete.

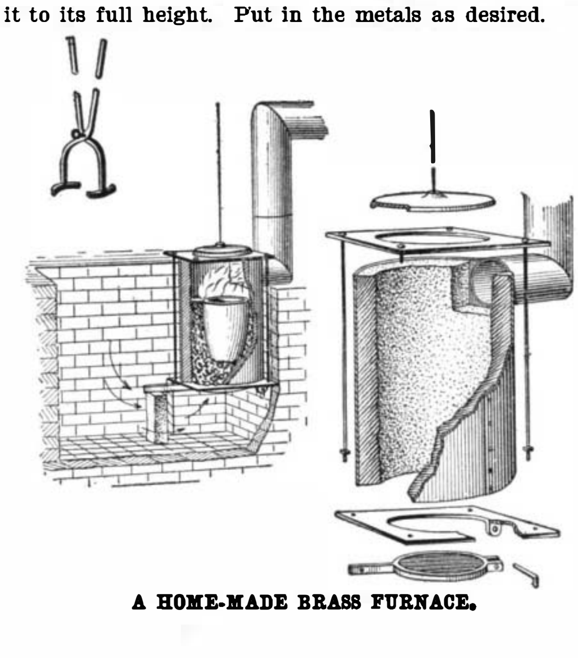
The advantages of this type of cell are that it is easy to get the top surface of the brass strips perfectly smooth; and as the insulation is of mica, there is no danger of burning it and thus spoiling the cell. It is not necessary to tin the edges of the brass strips, and it is better not to do so, as the solder used in tinning is apt to melt and run between the strips, short-circuiting the cell.

HOME-MADE BRASS FURNACE.

BY ALBERT F. BISHOP.

The accompanying sketches show how the amateur can make a brass furnace. One of the views represents the furnace set up in the pit, which is best made by bricking up, leaving room enough in front for removing ashes and clinkers. The grate is held up by placing a brick under the front projection. It is important to have the draft warmed before entering the furnace at the bottom. The pit produces this result. The form of the tongs and crucible are outlined, although they are pretty well known. Another view represents the parts separated. It will require three patterns; one pattern for the rings with about a 10-inch hole, made of wood about 7/16 of an inch thick and 13 inches square. Put a lug underneath for hanging the grate. This pattern will answer for top and bottom. The cylinder is made of heavy sheet iron, joint riveted. Cut out an opening near the top for the stove pipe, which can be attached to any ordinary chimney.

The diameter of sheet iron is 12¾ inches and height 20 inches. Fill up the inside of the sheet iron with fireclay even with the hole in top ring, which should be 1¼ inches thick; but it would be much better to make the lining thicker if the furnace is to be used a great deal. The cover on top should be cast iron, cast from a pattern about ½ inch thick and 11¼ inches in diameter, with a small flange on the bottom edge and an iron rod put in the center standing up about 3 feet high. Grate pattern should be about 9¼ inches diameter outside, with ordinary straight bars, and with lugs as represented in the sketch. Four 5/16 inch rods will answer to clamp the rims together. Project the brick outward for the bottom ring to rest on while building the pit. This will take the weight of the furnace. In operating, start a coal fire in the bottom of the furnace, place the crucible on the fire, then pack coal around it to its full height. Put in the metals as desired.



A HOME-MADE BRASS FURNACE.