to state that in order to avoid resetting, it is a good plan to have the blank which is to be machined cast with a convex face of about the same curve as it should be when finished. If this is not done or we wish to use flat disks of cold-rolled steel or other metal, it will be necessary to move the cutting tool forward after each cut.

A SAFETY OIL CAN.

BY A. J. JARMAN.

When oiling electrical machinery, it is always advisable to safeguard yourself against accidental shock, especially when currents of high tension are being

OIL CAN WITH INSULATED TIP.

generated. It frequently happens when an ordinary long-spout can is employed for oiling dynamos that a severe shock is received by the oiler, resulting sometimes in death. Several years ago the writer invented an oil can that was perfectly safe under all ordinary conditions of use. Owing to the extreme simplicity of the design, any one possessing ordinary mechanical ability can convert an ordinary oiler, either of the vertical or horizontal kind, into a safety oiler. Cut the spout in the middle and solder upon each end a piece of brass tubing having either an external or internal thread cut. Fit thereon a coupling sleeve made of insulating material as shown in the sectional view. The insulator can be made out of either hard rubber or vulcanized fiber turned in the lathe, with a milled center to admit of a firm grip when screwing or unscrewing the parts. Since oil is an insulator, no current can get past the coupling sleeve to the oiler's hand.

INSTANTANEOUS WATER HEATER.

BY GEORGE M. PAGE.

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. It is made from an ordinary copper funnel and a cake tin.

The copper funnel should preferably be tinned on the outside. To the water supply pipe is attached a valve for the 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, however, 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

HOME-MADE INSTANTANEOUS WATER HEATER.

as may be purchased for ten cents. This 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.

STEAM BOXES FOR BOAT BUILDING.

BY A. F. BISHOP.

A simple method of rigging a steam box for boat work is as follows: Take a common wash boiler, put a $1\frac{1}{4}$ inch hole in the cover to receive a short piece of tubing 2 or 3 inches long, which should be soldered. The steam box is made of wood, of any length desired, and about 10 inches high by 8 inches wide inside. Make a couple of chocks hollowed out to fit the top of boiler cover, and nail them to the box. Cut a round

STEAM BOX CONNECTED TO A WASH BOILER.

hole in the bottom of the box to receive the tubing that has been placed in the cover of the boiler. Be careful not to allow the tubing to project inside the box. The ends of the box are generally stopped up with old rags. In operation put about a pailful of water in the boiler, fit the cover on, and then lift the

STEAM BOX CONNECTED TO A CAST-IRON MUFFLER.

steam box and place it on top of the cover, allowing the tubing to enter the bottom of the box.

Another method of constructing a steam box has been devised by William Ellis, a boat builder. It is made by taking a cast iron muffler, plugging the lower end, and connecting a short length of $1\frac{1}{4}$ inch pipe to the opposite end. A tee is put on the end of the pipe with a short piece of $1\frac{1}{4}$ inch pipe screwed into the tee at right angles to the muffler piece. The upper end of the tee is plugged up with a wooden plug, if there is no reducer handy.

Bore a hole in the wooden plug, and screw into it a short piece of $\frac{1}{4}$ inch pipe, fitted with a stop cock of some sort. Above the stop cock, place a can or wooden paint pail, which is quite easily attached by simply boring a hole in the bottom and screwing to the short nipple above the stop cock. In operation, the muffler is placed in the stove with a coal or wood fire. A piece of sheet iron with a hole through which the pipe projects, serves as a cover for the stove. Water is poured into the paint pail and allowed to run down into the muffler as desired. A wooden steam box mounted on legs is connected to the muffler by the $1\frac{1}{4}$ inch pipe. This style of boiler is not injured if it boils dry, and is frequently red hot when the water is put in. This, of course, makes it "flashy," but otherwise no harm is done, as the pipe is of sufficient size to handle all the steam that is generated.

MAKING TIGHT JOINTS IN BOAT DECKS.

A boat deck is more exposed to severe attacks of the elements than any other part of the boat. The hot sunshine may be drying it up half the time, while during the other half, it may be covered with rain, dew, or salt water. And on this account the majority of boat builders calk the seams, which does not make

MAKING TIGHT JOINTS IN BOAT DECKS.

as pretty a deck as a tight seam, made in the following manner:

Have the wood thoroughly seasoned and make a nice fitting joint for the deck plank that you are laying next to the plank sheer. When this is done, take the piece out and with a smooth steel rod or burnisher of some kind, burnish down, with quite a pressure, the corner of the jointed edge, as in Fig. 2 of the accompanying drawing. This of course compresses the wood. Now plane the wood down on the jointed edge, making a true corner again. This is now ready to fasten on the deck carlins. Proceed in like manner with the rest of the deck planks. The joints on a wooden tank or vat can be made tight by the same principle. Instead of burnishing the corner a round rod is laid in the center of the jointed piece and with a hammer is forced nearly half its diameter in the wood. (See Fig. 3.) This is planed down until there is no groove left; each joint is treated in the same way. When the wood is moistened, the part that has been compressed by the round rod will expand. This produces a very tight joint.

TO PREVENT OBSTRUCTION OF THE FEED PIPE IN AUTOMOBILES.

BY P. J. WATSON.

Among the worst and most costly troubles of the amateur motorist are those connected with the piston, and if he is unable to discover the cause of the disorder he may have to pay heavily for curing that which could be avoided by observing the following simple precaution:

Recently when my engine failed to work properly I determined to look into the matter myself, and started by removing the cylinder heads. I discovered small particles of metal around the edge of the cylinders and the cylinders themselves were scratched up. Tracing this to its cause, I discovered that the feed pipe was almost clogged up with small particles of corroded copper. Going further, my gasoline tank showed signs of corrosion, which I attribute to poor gasoline, containing considerable moisture, thereby causing corrosion of the copper tank. After giving my tank a thorough washing and scraping I had it electroplated inside with a coating of tin. All particles of metal were removed from the cylinders, the feed pipe was cleaned out, and the parts were connected up. I have been running my motor for the past eight months without the trouble recurring, and have saved myself the cost of a new tank.

HOW TO DRILL A HOLE CENTRAL IN A BAR.

It is a rather difficult matter to drill a hole in a bar and keep the hole central. The accompanying drawing shows a practical kink. A piece of tool steel

METHOD OF DRILLING A HOLE CENTRAL IN A BAR.

A is caught in the lathe chuck, and is turned and bored so the hole will run true with the outside diameter. The outside diameter is turned the exact size of bar B, which is to be drilled. The bar B is placed in a vise as shown, the drill jig A is placed on top of the job, and the vise is then tightened up. As the jig and the bar are of the same diameter, the vise will hold them both very rigidly while the bar is being bored.