of terpin are thrown into it, and about as much sulphuric acid is slowly poured into the flask. There is no danger in pouring sulphuric acid into water, but water should never be poured into sulphuric acid, as the heat thus suddenly generated may cause some of the caustic liquid to be thrown out of the bottle.

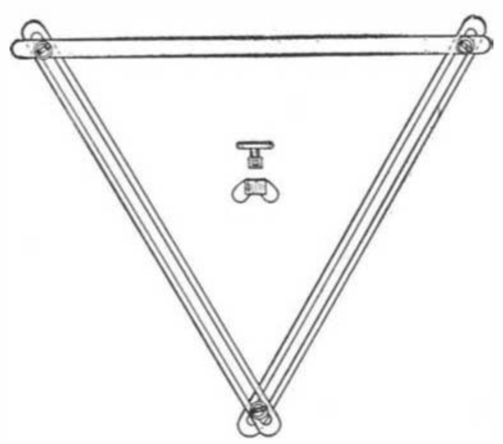
An alcohol lamp is now lighted directly under the flask. If a gas stove be used, a piece of wire gauze should be interposed between flame and flask. As soon as the liquid in the flask begins to boil, the glass tube is plunged into the water in a tumbler. There the steam and the terpinol carried along with it noisily condense. A delightful scent fills the room. To keep the tumbler cool, place it in a bowl of water. The operation is over when the liquid in the tumbler has become nearly hot in spite of the water in which the glass is immersed. A layer of liquid terpinol will then be found to float over the water. The fragrance, which is extremely strong while the essence is warm, becomes much more agreeable after it has cooled. Some odoriferous plants, such as marjoram, contain terpinol in their leaves, but the extraction of the essence from such sources is always much more expensive than its synthesis with oil of turpentine.

PAPER HANGER'S ADJUSTABLE TEMPLET.

BY I. G. BAYLEY.

This handy tool wil be found useful, and will save considerable time, in cutting wall paper up the rake of a stairway or where any roof slants, allowing the paper hanger to cut a number of lengths of paper on the paste board at once, where at present it is only customary to cut one at a time.

The tool can be made of wood, and satisfaction obtained, although a better tool can be made from saw steel. Each blade is about three feet in length, two of them being furnished with slots, running almost the full length. Three thumbscrews, detailed on a larger



PAPER HANGER'S ADJUSTABLE TEMPLET.

scale, will be necessary to hold the frame together after the proper adjustment is obtained. The paper should be hung in position on the wall, and one side of the tool held along the perpendicular edge of the paper, while one of the other sides of the tool is adjusted to suit the angle of the stairway or slanting roof, when the screws are tightened up, and the frame permanently set.

HOW TO MAKE A SIMPLE DRY BATTERY.

BY GEORGE F. WORTS.

Often the experimenter is in need of a good dry battery of a certain size or shape for some particular work, where the ordinary standard sized cell is either too large or not of the right shape for the same work. An inexpensive dry cell that will produce results, and can be made by anybody capable of handling a soldering iron, has long been the desire of every experimenter. The cell as described herein has been used for many purposes and with marvelous results by the writer, and has been used in other shapes where economy in space was desired, such, for instance, as in wireless telegraphy.

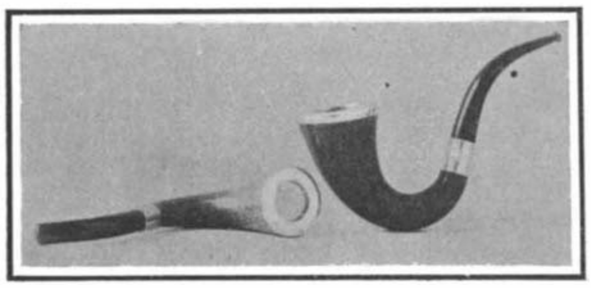
To make a cell of the standard size, a strip of zinc of medium thickness, 8¼ inches long and 6 inches wide, is necessary. The zinc is rolled into a cylinder 6 inches long and 8 inches in circumference, thus leaving a quarter of an inch which is to be tightly soldered. A zinc cap is next soldered on one end of the cylinder. Any solder showing on the inside is to be well shellaced. Do not shellac any zinc surface, as that will interfere with the action of the battery. Line the inside of the cylinder with a thin layer of blotting paper. For the positive pole of the battery the carbon from a wornout cell is the best if procurable, but if not, a bundle of arc light carbons with the copper surface well filed off is the next best. The chemicals for producing the action that generates the electricity are, ¼ pound of sal ammoniac, ¼ pound of chloride of zinc (paste form), ¼ pound oxide of zinc, and ¼ pound plaster of Paris. These salts should be thoroughly mixed with a mortar, and packed tightly in the cylinder about the carbon, which is a half inch from the bottom of the cell. This paste will fill the cylinder to within half an inch of the top, the rest being filled with paraffine. A copper terminal soldered to the zinc and a heavy copper wire scraped clean and bound about the protruding end of the carbon, form the negative and positive connections for the cell.

This cell can be easily formed in various other shapes to suit the experimenter's fancy. The cell herein described, if constructed according to specifications, will produce very satisfactory results, especially in ignition work or for wireless. It will register about 1 2/5 volts and between 10 and 15 amperes.

HOME-GROWN CALABASH GOURDS.

BY CHARLES A. SIDMAN.

The Department of Agriculture, through its office of foreign plant introduction, has brought to the notice



PIPES MADE FROM CALABASH GOURDS.

of the smokers of the country one of the most useful articles of their trade. This is the curious calabash gourd, a plant indigenous to South Africa, and from which the highest quality of pipe bowls can be made.

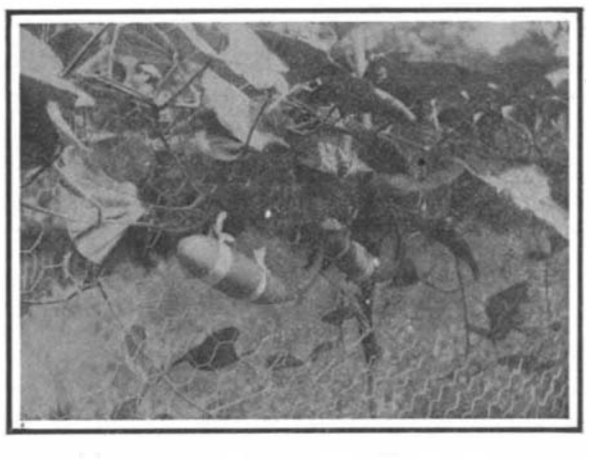
The plant is now being introduced into the United States for the purpose of pipe making, and it has been found by experiments to thrive perfectly in our climate. The perfect success with which the gourd can be grown in almost any part of the country warrants the belief that it will prove a good investment to import a large amount of seed from South Africa.

A curious feature of the calabash gourd pipe is its great resemblance to a certain capacious-bowled meerschaum popular in Germany. It is said that a Boer farmer first utilized the gourd as a pipe, and that the English shortly afterward recognized its merits and the use to which the plant could be adapted.

From the educated smoker's point of view, the calabash pipe not only yields a very sweet and cool smoke, but it colors beautifully, far surpassing in this respect the finest meerschaum. Besides taking on a high polish, its life is about as long as that of a French brierwood pipe. The usual lining is of plaster of Paris, usually known by the trade as pipe meerschaum.

The present market price of these calabash pipes is rather high, owing to the fact that there are but few grown in this country, and also to the fact that these gourds are never of the same shape and size, necessitating the making of the mountings by hand.

The writer was given a few seeds for testing, and his success was all that could be desired. The plant was of very hardy growth, and the fruit set very easily. As there was only one plant, each flower had to be pollenized. The plant was grown on a trellis about five feet high, but as the fruit began to get very heavy, it had to be tied to the wire. In growing the



THE GOURDS ARE TIED TO THE TRELLIS TO GIVE THEM THE PROPER SHAPE.

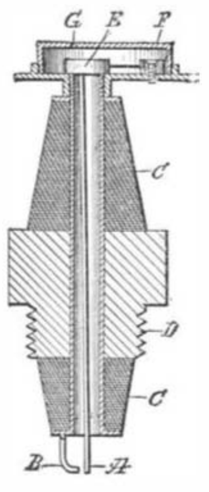
plant for pipes, it seems to demand a very hot and dry soil, with rain at the right season to bring the gourds to perfection. The curved stem end of the calabash forms a light and appropriate shape for the pipe. The majority of the gourds take their own shape, but for special shapes they must be tied.

Any man who has a small space in his yard can grow enough pipe gourds in a season to last him for several years.

THE HANDY MAN'S SPARK PLUG.

BY R. W. PEARSE.

The spark plug shown here is equally well adapted for high or low tension ignition. It may be made by a handy workman out of an old mica plug by taking out the steel wire down the center and putting in its place a piece of brass tubing, 3/16 of an inch ouside diameter and ⅛ of an inch inside diameter. *A* and *B* are the terminals forming the spark gap, *C* is the mica, and *D* the threaded body of the plug. The upper end of the terminal *A* is riveted to a small valve which is pressed down by a weak spring and thereby closes the upper end of the tube, as shown in the sketch. A valve chamber is screwed on the upper end of the tube, thus holding the mica together. The valve operates in the chamber, being fastened thereon by the screw *F*. The valve and its seat should be ground flat, and then the terminal *A* should be riveted to it. There is a small hole *E* in the cover of the air chamber. The cover should be fastened to the chamber with a screw or other simple means, so that it may easily be detached for the purpose of cleaning the valve. In use the terminal *A* vibrates with a noise like the trembler of a coil, and in this way strikes the terminal *B*.



THE HANDY MAN'S SPARK PLUG.

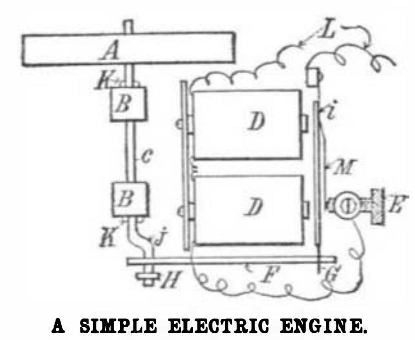
During the compression stroke the compressed gases travel up the central tube, lift the small valves, and instantly fill the valve chamber to the same pressure as the cylinder. With the same pressure on both sides of the valve, it will be forced down by its spring. But as the gases in the chamber *C* escape through the hole *G*, the pressures will be thrown out of balance, and the valve will again be raised by the pressure in the cylinder. This action will continue during the entire compression stroke. The hole *G* should be extremely small, and the amount of gas that will escape during compression will not perceptibly lessen the power of the engine. It will be clear that as the valve is raised, *A* approaches *B* and also that *A* moves away when the valve is closed, because the fulcrum is virtually at the screw *F*.

As *A* keeps striking *B* while it vibrates the low-tension contact, or touch spark, may be used with this plug. This plug gives many contacts, and therefore many sparks, instead of the single contact given by the usual hammer and anvil. This plug is far simpler than the hammer and anvil system, and besides it does not leak and lose compression like the latter does when worn. It will work with high-tension ignition with a trembler coil. As the terminal vibrates, it keeps itself clean, and an excess of oil or soot will not affect it like an ordinary plug. If used for high-tension ignition, the period of vibration should not be the same as that of the coil trembler, or an odd spark will be missed, owing to *A* being sometimes in contact with *B* when the high-tension current is in the act of flowing. The terminal *A* may be made to vibrate as rapidly or slowly as desired by strengthening or weakening the valve spring.

HOW TO MAKE A SIMPLE ELECTRIC ENGINE.

BY ROBERT H. BROCKMAN.

A simple electric engine may be made as follows: Take an ordinary electric bell and remove the gong. The striker arm should be cut off about ¾ inch from the armature, leaving the butt *G*. A strip of brass 1/16 inch thick and ¼ inch wide of suitable length is bored at both ends, one end to fit the butt *G* and the other end to fit the crank *J* of the shaft *C*. The shaft is made of ⅛-inch diameter brass or steel. Care should be taken to make the stroke of the crank *J* the same as that of the armature.



A SIMPLE ELECTRIC ENGINE.

The balance wheel *A* is fastened to the shaft *C*. Any wheel of suitable size and weight can be used. In the model made by the writer a valve wheel 2 inches in diameter was used.

The bearings *B* can be made of strip brass—in the model screw eyes were used. *K K* are wire rings soldered to the shaft *C* to keep it in place. *H* is a wire ring soldered to the crank to keep the strip *F* in place.

When the screw *E* is properly adjusted and the terminals *L* are connected to a battery the engine will run at a high rate of speed.