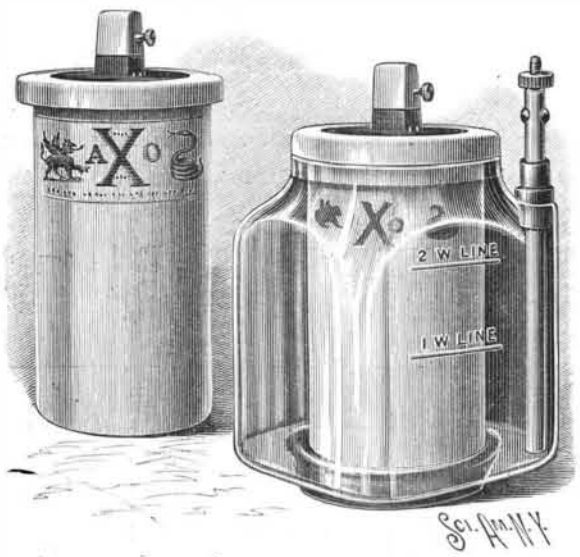
AN IMPROVED POROUS CUP BATTERY.

The Axo battery, illustrated herewith, meets and overcomes nearly all the recognized defects in open circuit batteries of the porous cup class. The porous cup has a flange which rests on the rim of the jar and forms of itself a cover for the cell. The zinc passes through an independent aperture of its own in the shoulder of the jar. The carbon conductor has inclined sides, increasing in size from the top to the bottom. By gravitation, therefore, the particles of the surrounding mixture are always in perfect and continuous electrical contact with its surface. The carbon itself is provided with ventilating grooves extending along its sides, by which it is much more readily relieved of the bubbles of gas which form on its surface, and retard the electric action, than by the holes usually run through the seal and into the mixture. The well known lead cap of the carbon is dispensed with, and in its place is used a thimble, with thumbscrew, which can be slipped off and replaced in a moment. The battery wire passes through a small hole in the top of the thimble and into a recess in the carbon, against which it is clamped by the thumbscrew. The jar is square in form, but the bottom is decreased in size, and is round, thus serving three different purposes: to hold the bottom of the porous cell in place, to keep it and the zinc separate at the bottom, and to raise the body of the jar above accumulations of dirt and mould in damp locations. A convenient method of setting up a battery of these cells is to set the bottoms of the jars in corresponding holes in a piece of board. The whole battery can then be taken up and removed without disconnecting the cells from each other.



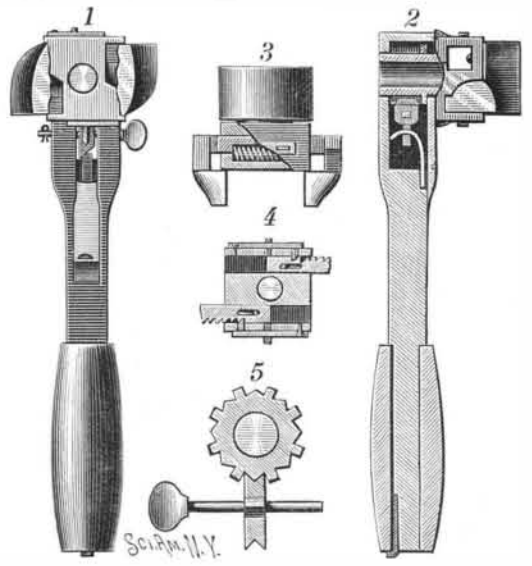
BREWER'S IMPROVED POROUS CUP BATTERY.

This battery, which is covered by no less than six different patents, is put upon the market by the Leclanche Battery Co., the manufacturers of the celebrated Leclanche Gonda batteries.

THE present series of experiments with ordinary live shells and shells charged with melinite and gun cotton against the Resistance, armorclad, have been concluded. The topsides and interior of the hulk are very much torn and rent, but the comparative values of the several explosives will not be determined until after a careful examination of the results has been made on board by a committee of experts. But the mere fact that it was possible to tow the ship into harbor immediately after the firing goes far to prove that the hull was not fatally damaged.

AN IMPROVED WRENCH.

A wrench which can be readily changed to operate as a ratchet wrench or plain wrench, and the jaws of which can be easily adjusted to and released from a nut, has been patented by Mr. Jonathan M. Silvis, of Kittanning, Pa., and is illustrated herewith, Figs. 1 and 2 showing a vertical section, Fig. 3 a plan view and Fig. 4 a horizontal section of the head of the wrench, Fig. 5 being one view of the pawl and ratchet mechanism. Sliding jaws are mounted in a support having a tubular shank, the latter, located in a shank of the handle, and extending across the upper end of a chamber therein, the tubular shank being formed with a ratchet with which a pawl is held in engagement by means of a spring, the pawl being mounted on a rod having an operating thumb screw. The pawl is made with two oppositely beveled sides and two oppositely V-shaped notches, and by rotating a quarter of a turn the rod on which it is mounted, a notched side is brought into engagement with a projection, as shown in Fig. 5, or a beveled side is projected into the path of the ratchet, in the former case locking the ratchet and preventing the wrench from acting as a ratchet wrench, and in the latter case permitting it to so act. The sliding jaws are adjustable on their support for different sized nuts, being automatically moved into extended position. The handle is shown in shortened position, but the construction is such that it can be conveniently lengthened by disengaging a spring and extending the handle on the square end of the shank of the wrench. This wrench is designed to work between bars, or in close quarters, where other forms of wrench cannot be used, and the tubular shank of the jaw support allows the head of the wrench to go over the end of the bolt.



SILVIS' WRENCH.

THE LUCIGEN.

The new system of lighting known as lucigen permits of obtaining an intense light of great brilliancy under very remarkable conditions. This system, which was devised by two English engineers, Messrs. Hannay & Lyle, is based upon the atomizing of combustible liquids by means of a current of compressed air. We shall describe it with sufficient completeness to allow our readers to appreciate the interest of it.

Let us first describe the oil reservoir, which is represented in Fig. 1. The lucigen employs the most diverse oils—crude and rectified petroleum, naphthas, oils of tar, vegetable oils, waste lubricating oil, etc. It can burn all of these, but the luminous intensity varies with the amount of carbon contained in the oil used. It is indispensable that the oil be anhydrous, and that it contain no solid particle large enough to stop up the orifices of the burner.

The oil is poured into the reservoir through the sieve, E, which retains the solid particles, if there are any. It collects in a compartment, F, which communicates with the lower part, D, through a tube provided with a cock shown to the right of the engraving. The compressed air enters through the pipe, A, descends through the tube, B, into the air chamber, C, and causes the oil to ascend in the tube, D, which leads to the burner. The oil reservoir has a double bottom that forms a feed chamber that can be filled during the operation of the system.

Fig. 2 will allow the operation of the burner to be understood. The oil enters the tube, A, under pressure, and makes its exit through a cylindrico-conic ajutage placed within the lamp. This ajutage is capped by a second ajutage, B, serving for the passage of the air and the atomized oil. The air enters through a conduit, C, parallel with the tube that leads the oil, circulates and becomes heated in the worm, D, placed in contact with the flame in the combustion chamber, K, and returns to the annular chamber, E, crowned by the exit ajutage. Here it heats the oil in a certain measure, thus rendering its division easier and surer, and finally seizes it between the two ajutages and carries it to the exterior under the form of extremely small drops. The outflow of oil and air is regulated by a double cock, R (Fig. 3), placed at some distance from the burner.

To complete the description of the burner, it is necessary to mention the role of an accessory oil tube, F, placed at the side and provided with a regulating cock, G (Fig. 2). The oil, on making its exit from this cock, enters a vertical tube, H, that debouches below in the combustion chamber. It here impregnates an asbestos wick, which, during the operation of the lamp, burns constantly, so as to light the burner automatically, in case the flame should become extinguished through any cause.

The apparatus here described is the one constructed and improved by Messrs. Rouart Bros., grantees of the Hannay system for France. It furnishes a broad, thick flame, which might aptly be called a "plume" of fire (Fig. 3, A). The denticulations, observed along the edges of the flame are produced by the shock of the gases in combustion against the surrounding air, which, although carried along in an ascending motion by the ignited, vapor, has an incomparably less velocity.

Messrs. Rouart have devised a series of apparatus designed for the various possible applications of this new mode of lighting. Where the apparatus are to be stationary, the burners are arranged at proper distances upon supports of various heights, according to their

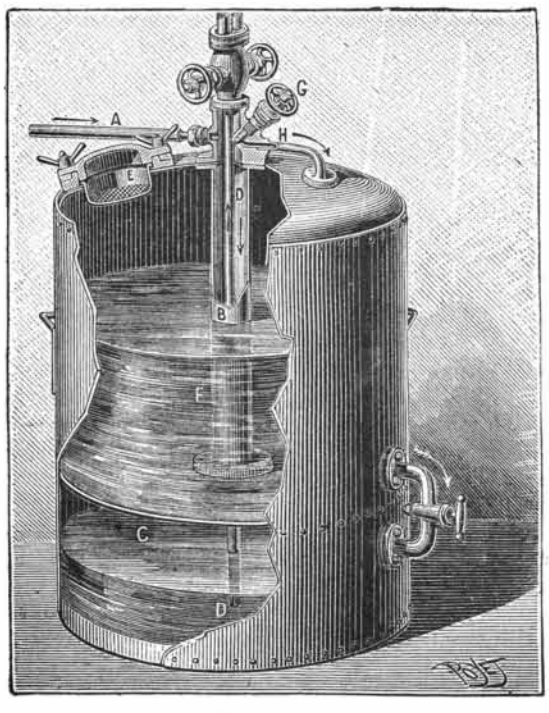


Fig. 1.—OIL RESERVOIR.

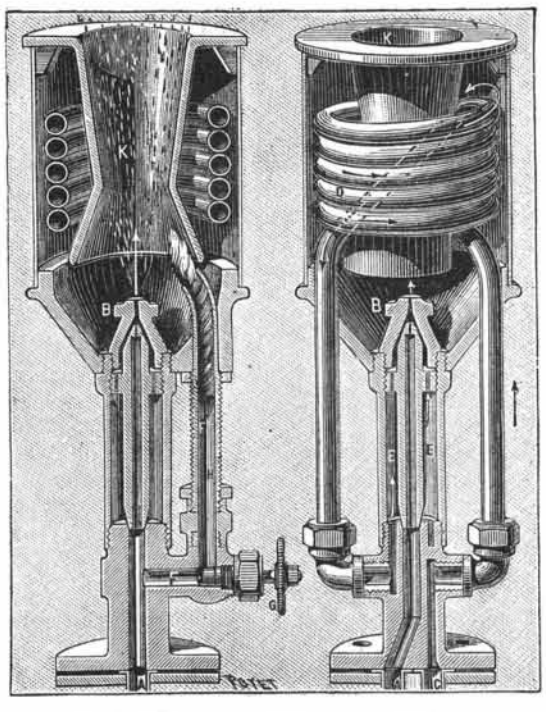


Fig. 2.—DETAILS OF THE BURNER.

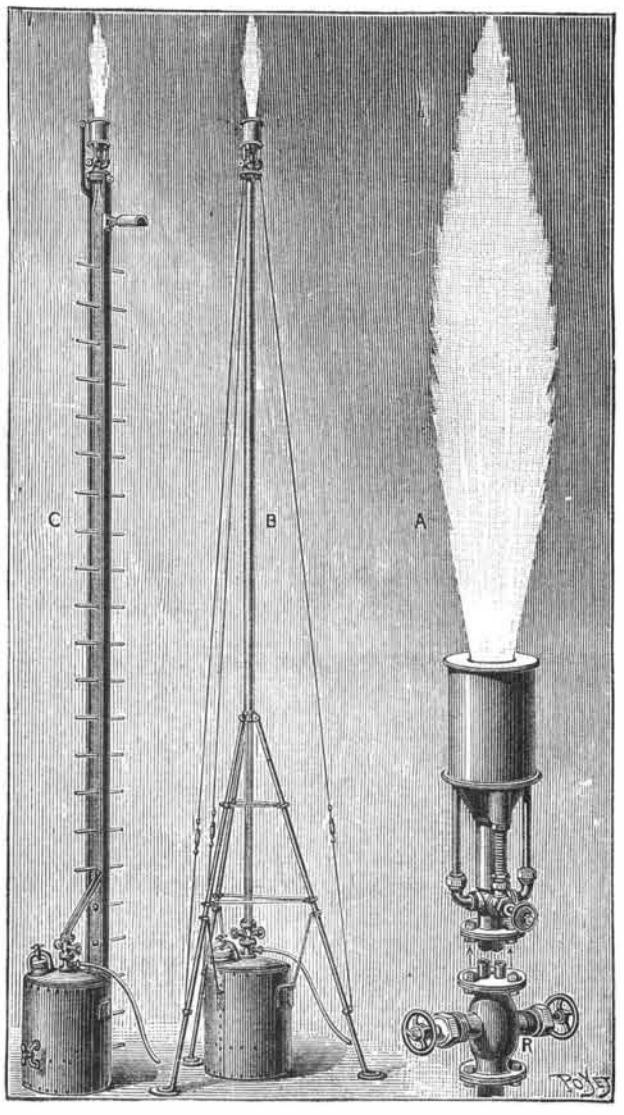


Fig. 3.—A, APPEARANCE OF THE LUCIGEN FLAME. B, MOVABLE SUPPORT. C STATIONARY SUPPORT.