

**A NEW HEAD PROTECTOR.**

In view of the great amount of travel upon both land and water, and of the dangers accompanying the present means of locomotion, it is a source of wonder to us that inventors have not given greater attention to the matter of life saving apparatus. The accompanying engraving represents a recently patented life saving device, to be applied to the heads of shipwrecked persons, or to persons exposed to the smoke and heat of a fire. It consists of a rubber helmet that closes tightly at the neck, but fits loosely on the head, and has at the upper part a device for ventilation. The helmet is made of a single continuous piece of rubber or of several pieces cemented together. The lower part of the helmet is made narrow so as to fit tightly around the neck and over the shoulders.

The ventilating device at the back of the head near the top of the apparatus consists of two layers of rubber, the inner layer being perforated at the bottom and the outer layer at the top, so that any water that might enter the airspace will naturally run out without entering the interior of the helmet. There are eye apertures at the front of the helmet which are closed by glass eye pieces, and the helmet has a mouth piece which is provided with a stop cock for excluding water. The mouth piece is used in case it is necessary for the wearer to communicate with his companions. The device may be used as a protection against rain, sleet, snow, and spray, while on the deck of a vessel in storms; or it may be used when made of suitable material by firemen; or when it is made of lighter material it may be used by ladies as a bathing cap. This invention is represented in detail in the smaller engraving, and in actual use in the larger engraving.

Further particulars may be obtained by addressing Mr. Francis P. Cummerford, 609 North 7th st., Wilmington, Del.

**THE POLYSCOPE.**

M. Trouvé has recently presented to the Physical Society of France a new apparatus—the polyscope—designed for

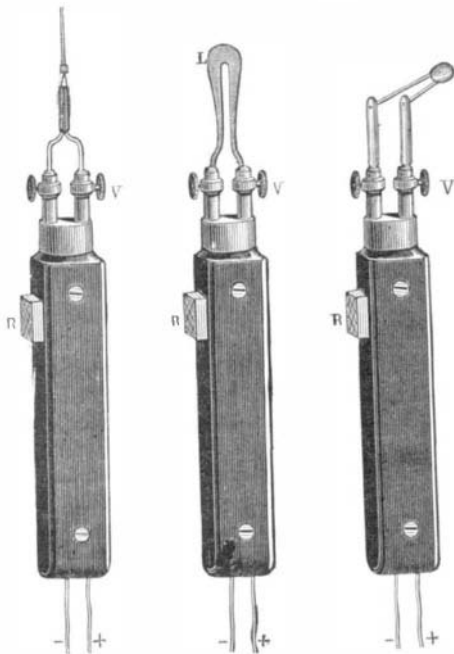


Fig. 2. CAUTER. Fig. 3. CAUTER. Fig. 4. MOUTH REFLECTOR.

lighting up cavities in the human body, the interior of mines, powder mills, deep waters, etc. This device is based on the property possessed by a voltaic current of giving out heat in a short circuit, and the law of which Joule has given as follows: The quantity of heat given out in a unit of time, in a metallic wire traversed by a voltaic current, is proportional—1st, to the resistance that the wire opposes to the passage of the electricity; 2d, to the square of the intensity of the current.

This property of the voltaic current of making metallic resistant conductors red hot in traversing them was made use of in surgery by John Marshall about 1851; by Leroy d'Etoiles, in 1853; by Middendorp, in 1854; by Broca, in 1856, etc. The production of illumination was not tried till later.

In 1867 Dr. Bruck, a dentist of Breslau, brought out an apparatus called the "Stomatoscope," designed for lighting up the mouth cavities. A little later still, in France, Dr. Millot made numerous experiments in lighting up the stomachs of animals at the Ecole Pratique of Paris. These trials were not followed by success, owing to the in-

constancy of the electric source (Bunsen and Grove couples), which necessitated at that time the use of thick platinum wires to prevent constant volatilization. Many luminous effects were obtained, but the calorific effects which accompanied them were too intense to allow any practical application of

ing to his pleasure, the flow of the fluid, and always know by means of the galvanometer how much of a charge there is in the secondary pile. We use the word "flow" because those who are acquainted with the secondary pile know that it may be likened to a hydrostatic reservoir. The rheostat in the secondary pile is analogous to the stop-cock in the latter, both serving to modify the outflow of fluids.

M. Trouvé's apparatus is so regular in its action that it allows a platinum wire from 1.15 to 1½ millimeter in diameter to be brought up to the point of fusion and kept there for several consecutive hours without ever going beyond it. This is readily conceived, however, when we reflect on the constancy of the electro-motive force of the secondary pile and the minute degree to which the regulator is graduated. The point of fusion of the wires determined once for all, further trouble is ever after avoided.

The platinum wires, instead of being spirally bent, as is usually the case, are here simply flattened in the middle, so as to form a small incandescent disk. This device gives an illuminating power fully double that by the spiral method—a statement which has been confirmed by Captain Manceron in his experiments in lighting the interior of cannons at Saint-Thomas d'Aquin. By means of the polyscope this distinguished officer has been enabled not only to illuminate the interior of can-

nons and howitzers, but also to throw on a screen the minutest defects found in any piece of ordnance.

The polyscope is provided with a series of concavo-spherical or parabolic reflectors (Figs. 5, 6, 7,) with or without mirrors, for giving certain effects of light. A handle and conductors connect these reflectors with the reservoir at C and D



**CUMMERFORD'S HEAD PROTECTOR.**

the method. Recourse was then had to a circulation of water to destroy the heat as fast as produced, but this made the apparatus too bulky, and it became also difficult of management, and was consequently abandoned.

M. Trouvé, convinced of the practical importance of such a system of lighting, has given himself up since 1870 to indefatigable studies in this direction. That his experiments have been crowned with complete success is due, he asserts, to the judicious selection and use of the secondary pile of M. Gaston Planté.

The illuminating apparatus, or polyscope, of M. Trouvé is composed of a reservoir, A (Fig. 1), storing up dynamic electricity, or, in other words, secondary pile of Planté. By means of a special rheostat, AC, of great simplicity, in conjunction with a galvanometer, B, of two circuits, in

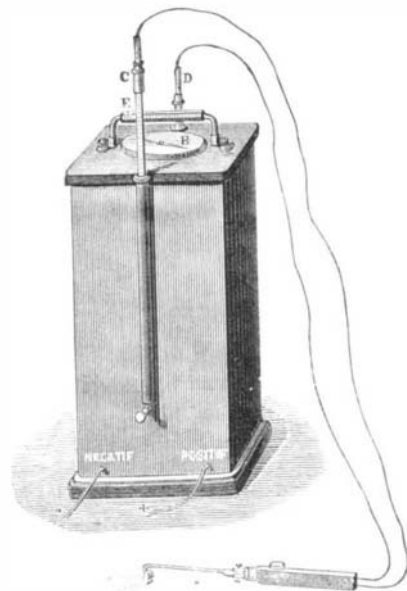


Fig. 1.—THE POLYSCOPE.

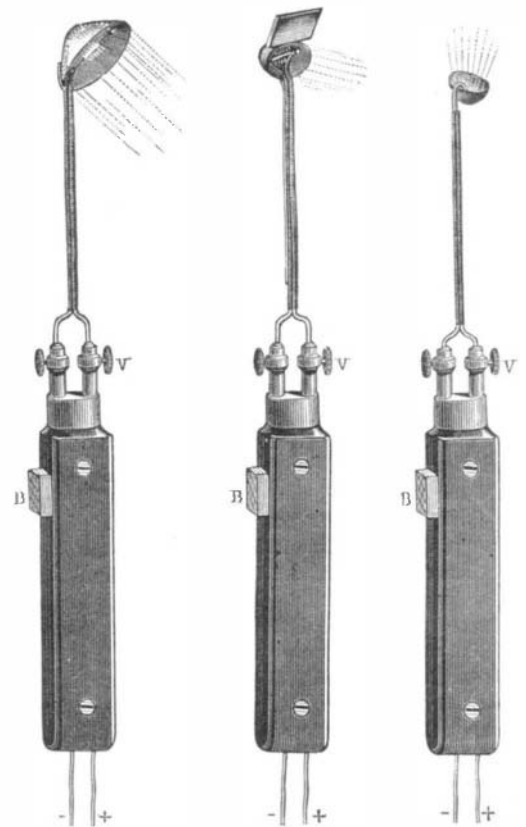
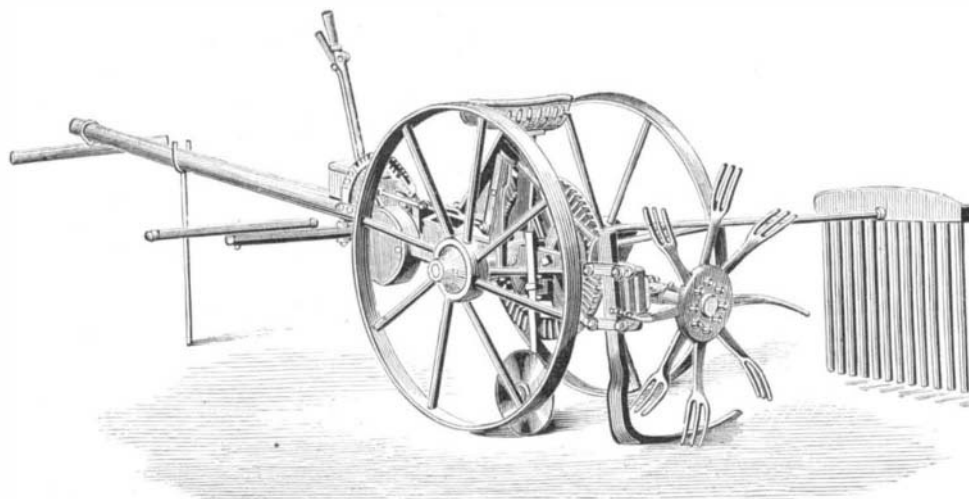


Fig. 5. Fig. 6. Fig. 7. VARIOUS FORMS OF REFLECTORS.

(Fig. 1). Figs. 2 and 3 represent cauters for physicians. Fig. 4 is a mouth reflector for the use of dentists.

**POTATO DIGGER.**

The great importance attached to the successful cultivation of the potato has led agricultural engineers to pay much attention to the manufacture of machines required for cheapening and improving the successive manipulations of this root. The implement which we illustrate this week was invented by Mr. Winton, and is being manufactured by Messrs. Penney & Co., of Lincoln. As will be seen from the engraving, which we take from *Iron*, the machine is drawn by a couple of horses, and is carried (together with the driver) on a pair of large wheels, which take the weight of the whole of the gear, and by their rotation impart the required motion to it. The loosening of the ground is effected by a powerful and broad knife, bent to the required shape so as to pass completely beneath and partly lift up even the deepest roots.



**WINTON'S POTATO DIGGER.**