

the zinc plate. In setting up the battery, the copper is coated thickly with a paste of calcined lampblack and dilute sulphuric acid; the plate of zinc is fitted into the cloth envelope, previously moistened with dilute sulphuric acid, and this in turn is put into the copper so that the cloth projects an inch or more above and below the latter. It is necessary that the copper should firmly press upon the cloth envelope, but it must not touch the uncovered zinc plate. The couples thus arranged are packed tightly together in a wooden frame or case, with a sheet of paper saturated with paraffine between each, as shown in Fig. 1. The plates are then joined in series—the zinc of one with the copper of the next, and so on—the ears, *a*, and *b*, Fig. serving for connections. The tube P P', Fig. 1, is made of glass, or of pieces of glass tubing joined by vulcanized rubber tubing, and is connected with a reservoir D. At points *s, s, s*, along this tube, and just over the expanded ears of the projecting cloth envelopes, are arranged glass dropping tubes, so that when a liquid flows from the reservoir, D, through P P', an equal quantity of it escapes through each of these upon the cloth below. The flow of liquid from the reservoir can be controlled by the stopcocks at E and T.

The battery is operated as follows: The reservoir, D, having been filled with a solution of three-quarters of a pound of potassium bichromate and about one pound of sulphuric acid in a gallon of water, the stopcock, E, is opened, and the solution allowed to trickle slowly upon and down through the cloth envelopes, escaping at the bottom into a leaden or enamelled tray. The battery thus arranged develops a considerable electromotive force, and when the reservoir is properly adjusted, is remarkably constant. Should it become clogged up with chrome alum (and this does not often happen), or when it is not required for use, it can be cleaned without disconnecting it by allowing warm water, instead of the solution, to flow through the pipe, P P'. The zinc plates can be easily taken out without removing the envelopes. A battery of this kind of one hundred cells can be put up in a box three feet long, one foot wide, and two feet deep. It can be fed from a single reservoir, and will produce a very fair arc light.

#### ELECTRIC LAMP-LIGHTERS.

The accompanying cuts represent two forms of apparatus designed for the purpose of lighting and extinguishing lamps by electricity. The arrangement in both cases is shown in connection with the small lamps known as night lamps. Both are so constructed that the first current which passes through them lights the lamps, and the next extinguishes them. The currents can be established through several contacts, which form a galvanic circuit, in which is included the battery and the apparatus to be described.

In the base or frame on which the lamps are mounted, is placed an electro-magnet, which attracts an armature every time a current is passed through it. Attached to this armature are two straight or curved rods, which are united at their upper extremities by means of a spiral of platinum wire, which is heated to incandescence by the passing of the current.

The extinguishing arrangement of the Magnet system. Fig. 1, consists of a bellows, which blows a current of air into the flame and so extinguishes it, as often as the rods attached to the armature of the electro-magnet press upon it and cause it to close. When the current is kept closed for a little while, the bellows empties itself, and the platinum spiral, which is now directly over the wick, becomes incandescent and ignites the lamp. In extinguishing the lamp, the current should only be maintained long enough for the purpose, as otherwise the lamp would shortly be ignited again by the platinum spiral.

In the apparatus of Range, shown in Fig. 2, the flame is extinguished, not by an air current as in the arrangement above described, but by means of a cap, which is caused to come down upon the burner, and which stays in place upon it until it is desired to light it again. This device has certain advantages over the other, in that it prevents the deposition of dust upon the wick and hinders the evaporation of the oil or other burning fluid in the lamp. The rods attached to the armature carry a strip or band of steel, which, by the movement of the armature, first removes the cap from the burner and makes place for the glowing platinum spiral when the lamp is to be lighted; and when it is to be extinguished, puts the cap back again upon the burner.—*Manufacturer and builder.*

Rear-Admiral Bourgeois has been appointed by the French Government to preside over a committee requested to study the application of electricity in navigation.

#### IMPROVED ELECTRIC GENERATOR.

A great deal of attention is now given to the relief and cure of diseases without the use of drugs, and electricity is being recognized as one of the important healing agents for accomplishing this very desirable end. Hitherto it has generally been considered the prerogative of a physician to properly apply the electric current to curative purposes; but since it has been discovered that a mild continuous current is effective in the treatment of diseases, it is apparent that any one having the necessary appliances may use the electric current to advantage.

The engraving represents a very simple and compact generator or battery for creating a continuous electric current for curative purposes. It is a modification of the well known Trouvé blotting paper battery, and is capable of yielding a constant current for a long time. The inventors of this generator and its accessories state they have had batteries of this class in use yielding a current for over a year without attention, and it may be renewed at the end of that time without trouble or expense.

The rubber case contains two plates, one of zinc, the other of copper, each connected with a clamping screw extending through the cover. Flexible cords connect the binding posts with the electrodes, the latter consisting of two nickel plated disks, each having two slots for receiving a strap by which the electrode may be bound upon the affected part. The generator is carried in a pocket in the inside of one of the garments. This may be done with perfect safety, as the exciting fluid with which the generator is charged is entirely absorbed by the porous filling placed between the zinc and copper plates.

The electrodes are often worn on a belt, one being placed in front of the body, the other at the back. Fig. 2 shows the method of attaching one of the electrodes to a sponge for bathing purposes, and Fig. 3 shows its application to the hand when the current is employed to supplement frictional treatment.

There are a number of other methods of applying the current, which need not be described in detail here. Further information in regard to this invention may be obtained by addressing the Constant Current Cure Company, 207 Main street, Buffalo, N. Y.

#### BRUSH'S STORED ELECTRICITY.

Mr. Brush, whose lights make bright Scollary Square, and shine in other cities, comes to the front with his way of packing electricity for use when wanted, wasting none. Mr. Brush lives in Cleveland, O., and from the *Leader* and the *Herald* of that city the following is abstracted: Mr. Brush for a number of years past has been hard at work in this direction, overcoming first one difficulty and then another, and all the time refraining from any statements on the subject. He now for the first time makes the statement that by his methods the storage of an indefinite amount of electricity for an indefinite time, ready for use at any moment, is an easy and certain of accomplishment as the regular production of electricity by his dynamo-electric machine. Mr. Brush uses for his storage reservoirs metal plates so arranged that they are capable of receiving a very large charge of electricity and of holding it for an indefinite time. The storage reservoirs vary in size as desired, may be transported from place and used as desired. They may be put to any use of which electricity is possible. They can be taken about in wagons by day and left at the houses of citizens, like so much ice or kerosene, and used at night. Each citizen may then run his own electric lights as he pleases. The plates can be put on street cars, connected with the axles, and made to run the cars without horses. Steam cars may be ultimately run in the same way. Mr. Brush's last invention is only now a case of economy. For some uses it will be cheaper, for others more expensive, than the present methods of obtaining power. The practical character of the invention is settled. The engines can be run and electricity accumulated during the day, and then at nights two sets of lights can be run, one set by the power stored up. An indefinite amount of electricity can be stored in this way, and used as wanted. The details of the method cannot now be made public.

THE first electric railway in Upper Silesia has been erected in connection with the colliery of the Donnersmarckhütte Company, to supersede the ordinary horse-railway. The current is conveyed by wire ropes supported on poles in the same manner as telegraph-wires. On the wires run small contact carriages, connected with the locomotives by wires. The maximum speed will be eight miles per hour. The locomotive is similar to that exhibited two years ago at the Industrial Exhibition, but is somewhat smaller. The line and its accessories were constructed by Messrs. Siemens and Halske.