No. 835,642.

PATENTED NOV. 13, 1906.

P. SCHMITT & C. FABRE.

ELECTRIC ACCUMULATOR.

APPLICATION FILED NOV. 6, 1902.

Fig. 1.

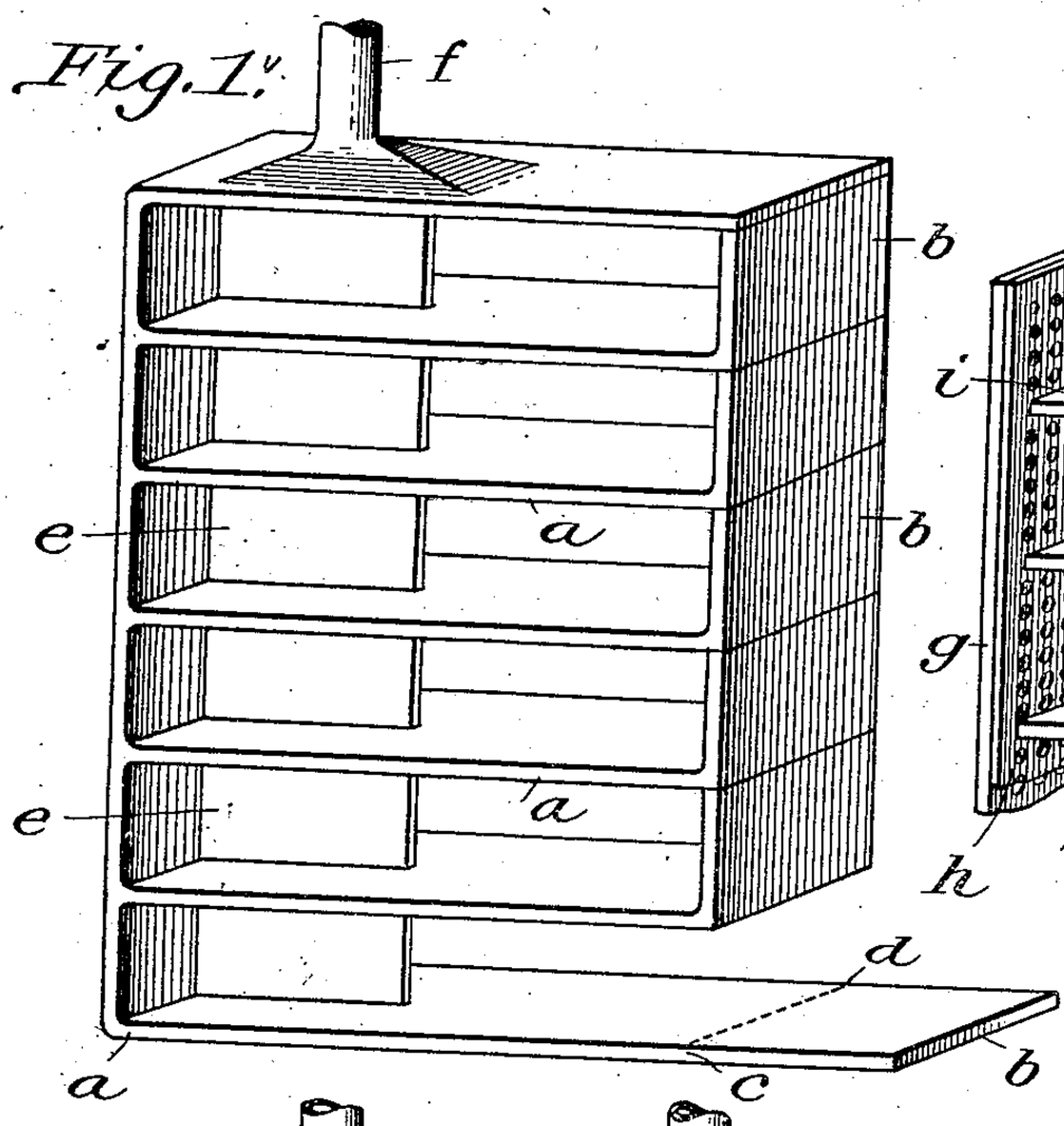
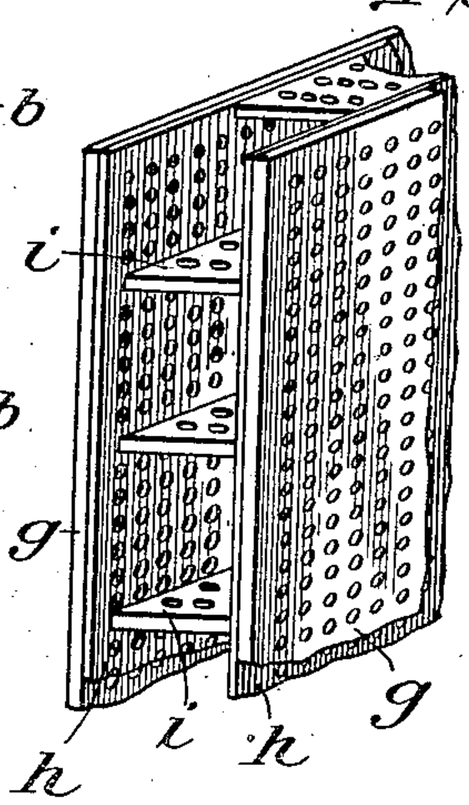


Fig. 4.



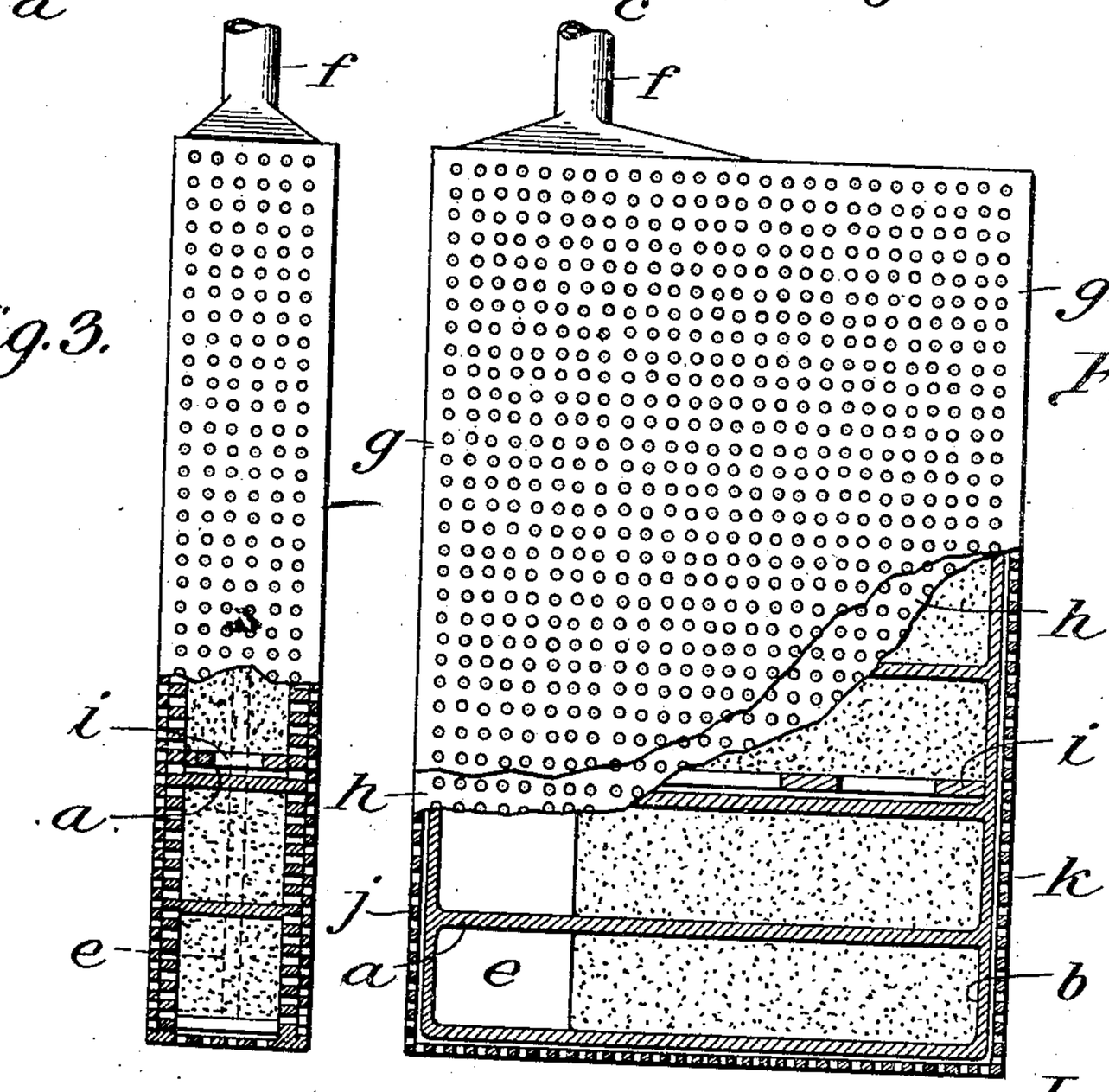


Fig. 3.

Fig. 2.

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UNITED STATES PATENT OFFICE.

PAUL SCHMITT AND CHARLES FABRE, OF PARIS, FRANCE.

ELECTRIC ACCUMULATOR.

No. 835,642. Specification of Letters Patent. Patented Nov. 13, 1906.

Application filed November 6, 1902. Serial No. 130,313.

To all whom it may concern:

Be it known that we, PAUL SCHMITT, engineer, and CHARLES FABRE, manufacturer, both in Paris, France, have invented certain new and useful Improvements in Electric Accumulators; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The object of this invention is to provide a cheap accumulator of great capacity capable of rapid charging and discharging and that will not deteriorate in working. The accumulator-plates do not form a compact mass like those in existing accumulators.

In the accompanying drawings, Figure 1 is a perspective view of the plate or support for the active material. Figs. 2 and 3 are side and end sectional elevations, respectively, of the complete electrode; and Fig. 4 is a fragmentary view of the cheeks of the electrode.

According to this invention each accumulator-plate consists of a vertical strip *e* of lead from seven to twenty millimeters wide. To one of the sides of this strip horizontal sheets or strips *a* of antimonid of lead are soldered. These sheets are superposed and separated from one another by spaces of 0.01 meter.

In order to avoid any breaking of the horizontal sheets where they are joined to the vertical strip, a partition or web is run in below the connection *f* in the plane of the plate, in the middle of the body thereof, as shown in Fig. 1. This partition is intended to render the plate at the same time very strong and of great conductive capacity. In this manner a plate is made which has the form of a frame of seven to twenty millimeters in thickness with horizontal partitions *a*, three sides of the frame being formed by the vertical strip of lead, the upper horizontal sheet, and the lower horizontal sheet. The fourth side of the frame is formed by bending, as at *c d*, so as to render vertical the free ends *b* of the horizontal sheets. The top of the frame which is formed by the upper horizontal sheet supports the terminal for the taking off of current. Each of the large open and opposite sides of the frame, with horizontal partitions forming the plate, is furnished with a rigid wall or cheek made of celluloid, ebonite, wood treated with paraffin, or any other material which is a bad conductor, or of pure lead or antimonid of lead or any other metal not injurious to the electrolyte. These walls or cheeks are made double, and each of them is formed of two plates *g h*, perforated and placed one against the other so that the holes in the one are not opposite to the holes in the the other. This arrangement enables the liquid to pass through the rigid walls without the active material, which is placed between the partitions of the plate proper—that is to say, of the frame described—being able to pass through these walls.

The distinguishing feature of the invention is that the active material placed between the partitions and retained between the perforated cheeks is in the form of grains lying one on the other without being bound or soldered together. The horizontal sheets on which these grains are placed act as current-conductors.

In order that the cheeks placed against the plate may be held parallel, a number of perforated partitions *i* are arranged in the frame forming the plate parallel to the sheets of antimonid of lead supporting the active material.

The active material or paste for the positive-pole plates, which may be of any known kind, such as lead oxid, is finely powdered and kneaded in a leaden vessel with fifteen per cent. of distilled water, forty per cent. of glycerin, and forty-five per cent. of sulfuric acid. The negative-pole electrode is made in a similar manner.

The kneading having been finished, the paste is run into thin layers on lead plates, where it is dried under cold process. It is then compressed in a hydraulic press and subsequently powdered and sifted. The grains employed are about the size of a sphere, with a diameter of seven-tenths of a millimeter.

In order to set up the electrode, the conductive plate formed by the frame with horizontal partitions is introduced between the two cheeks, and the side formed by the vertical strip of the accumulator-plate is covered by a small plate *j*. Through the opening opposite to this side the active material is introduced in the form of grains, the ends of the partitions of the frame forming the accumulator-plate and turned back and a covering effected by means of a small plate *k*. The accumulator-plate is thus finished, and, as will be seen, this plate proper is inclosed in a rigid casing formed by the perforated cheeks and small plates. This arrangement produces perfect distribution of the electro-

lytic action and allows of the making of plates of a thickness of fifteen to twenty millimeters, reducing more than one-half at the same time as the hand-labor the number of separating-spaces, which are so many useless spaces, adding to the bulk of ordinary accumulators with thin electrodes forming a compact body. Moreover, the arrangement indicated prevents any deformation of the electrode under the influence of the increase in volume. The conductive strips, in fact, joined at one end only can extend without any inconvenience. Their mechanical strain on the sides of the conductive cage is almost *nil*, causing only a slight encroaching of the ends of the lower sheets on the bend of the upper sheet. The grains of material follow the movements of the sheets. These grains may likewise increase in volume without being disintegrated, merely reducing the free spaces left between them. No active material is pushed out through the holes in the walls, even in case of any excessive charge or discharge. The gases produced easily ascend through the small passages left between the grains and pass through the holes in the walls.

What we claim, and desire to secure by Letters Patent, is—

1. In an electric accumulator or secondary battery, a conductive frame or support for the active material, comprising a vertical metal strip forming one side of the frame, and horizontal strips or partitions each connected at one end to the vertical strip and having their free ends bent to form the opposite side of the frame, substantially as described.

2. In an electric accumulator or secondary battery, a conductive frame or support for the active material, comprising a vertical metal strip forming one side of the frame, horizontal strips or partitions each connected at one end to the vertical strip and having their free ends bent to form the opposite side of the frame, and a strengthening web or partition fixed at the point of junction of the horizontal strips with the vertical strip.

3. In an electric accumulator or secondary battery, a conductive frame or support for the active material, comprising a vertical metal strip forming one side of the frame, horizontal strips or partitions each connected at one end to the vertical strip and having their free ends bent to form the opposite side of the frame, and perforated walls or cheeks adapted to prevent the passage of the active material while allowing liquid to pass freely therethrough.

4. In an electric accumulator or secondary battery, a conductive frame or support for the active material, comprising a vertical metal strip forming one side of the frame, horizontal strips or partitions each connected at one end to the vertical strip and having their free ends bent to form the opposite side of the frame, granular active material supported between the strips of the frame, and perforated walls or cheeks adapted to prevent the passage of the active material while allowing liquid to pass freely therethrough.

In testimony whereof we have affixed our signatures in presence of two witnesses.

PAUL SCHMITT.
CHARLES FABRE.

Witnesses:
HENRI BOETTCHER,
EUGÉNE PROYARD.