(No Model.)

P. SCHOOP.

CONTAINING CELL FOR SECONDARY BATTERIES.

No. 402,484. Patented Apr. 30, 1889.

Fig: 1

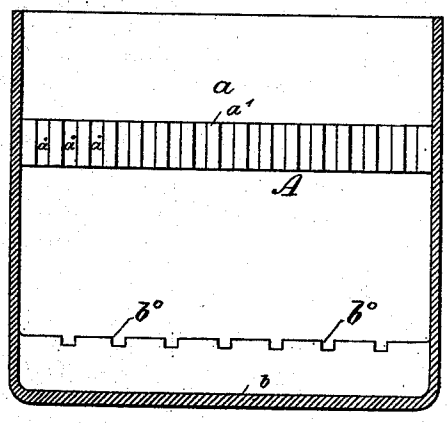


Fig: 2

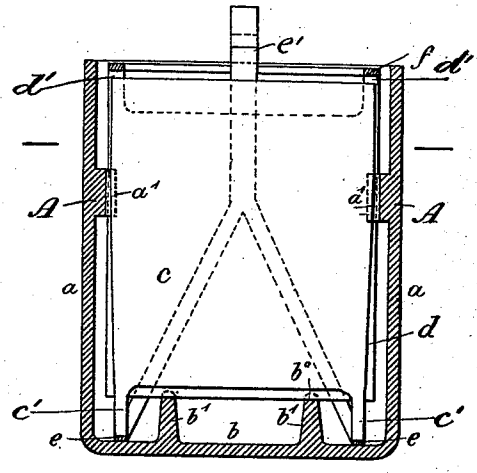


Fig: 3

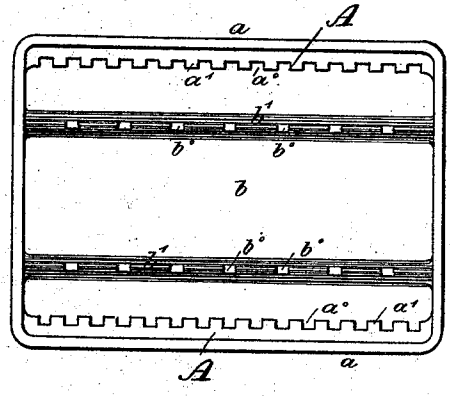
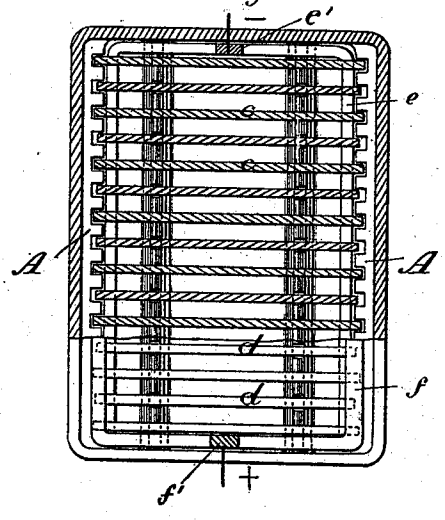


Fig: 4



Witnesses:
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Bennett S. Jones.

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Paul Schoop,
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UNITED STATES PATENT OFFICE.

PAUL SCHOOP, OF ZURICH, SWITZERLAND.

CONTAINING-CELL FOR SECONDARY BATTERIES.

SPECIFICATION forming part of Letters Patent No. 402,484, dated April 30, 1889.

Application filed December 19, 1888. Serial No. 294,073. (No model.) Patented in England October 30, 1888, No. 15,626, and in France October 30, 1888, No. 193,821.

To all whom it may concern:

Be it known that I, PAUL SCHOOP, a citizen of the Republic of Switzerland, residing at Zurich, in the Republic of Switzerland, have invented certain new and useful Improvements in an Isolating-Cell for Secondary Batteries, (for which I have obtained patent rights in Great Britain, No. 15,626, bearing date October 30, 1888, and in France, applied for October 30, 1888, No. 193,821,) of which the following is a specification.

This invention has relation to the cells or elements of electric batteries, and refers more particularly to the elements of so-called "secondary" or "storage" batteries or "accumulators."

It has for its object to increase the durability of elements of that type and render them more efficient; and with these objects in view it consists in the peculiar arrangement and combination of the containing cell or vessel and the electrodes, as will be hereinafter more fully described and claimed.

In the accompanying drawings, Figure 1 is a sectional view, on a longitudinal vertical plane, of the cell or container of one of my improved elements with the inside plates or electrodes removed. Fig. 2 is a vertical cross-section through an element, showing the electrodes inserted and in their operative position. Fig. 3 is a top or plan view of the cell or container with the electrodes removed; and Fig. 4 is partly a top or plan view and partly a horizontal sectional view of the complete element ready for use.

Like letters of reference denote corresponding parts in all the figures.

The vessel or container (shown at *a*) is by preference of an oblong rectangular shape, as shown on the drawings, having rounded corners, and may be made of glass, earthenware, gutta-percha, ebonite, or any other material adapted for the purpose, glass being preferable, however, as the condition of the electrodes may then readily be inspected through the walls of the cell without removing them. On the inside this cell is provided on opposite sides with two inwardly-projecting shoulders or flanges, A A, facing each other and having parallel vertical protuberances *a'*, whereby intermediate parallel recesses or notches, a^0, are formed, running up and down and equidistant from one another. These notched racks or flanges may either be integral with the cell-body *a*, or they may be made separate therefrom (of suitable material) and cemented or otherwise fastened to the inner sides of the cell-body.

In the bottom *b* of the cell, a suitable distance from and parallel to the sides of the same, are two parallel ribs, *b' b'*, cut away at equidistant points to form transverse notches b^0. These ribs or raised supports may also either be in one piece with the bottom *b*, or they may be made separately and removably therefrom, in which case they are made of suitable insulating material.

The electrodes consist of the usual positive (anode) plates, *d*, and the negative (cathode) plates *c*. The latter are provided with downwardly-projecting legs or supports *c'*, one on each side, of sufficient height to enable the bottom edge of the plate to clear the bottom ribs, *b'*, and resting with their lower ends upon the parallel lead strips *e e*, the ends of which are connected, as shown in dotted lines in Fig. 2, to form the negative pole or cathode *e'* of the complete element. Similarly the positive (anode) plates *d* are provided with upwardly-projecting arms or extensions *d'*, one on each side, which are connected by lead strips or conductors *f f*, one on each side, the ends of which are also united or coupled together to form the positive pole or anode *f'*.

As will be seen by reference to Fig. 4 of the drawings, the positive and negative electrodes are inserted into the vessel so as to alternate with one another, and are held in position therein and prevented from touching one another by the notched racks A in conjunction with the notched bottom ribs, *b'*, which, as we have seen, support the positive electrodes *d*, while the intermediate negative plates, *c*, are supported upon the bottom of the cell by their feet *c'*, resting upon the conducting-strips *e*.

By this construction and arrangement of the cell-body or container and the electrodes the latter may be readily removed when necessary, and the power or intensity of the ele-

ment may be varied simply by varying the number of plates from a few pairs only to the full capacity of the cell; and this may be done in a moment's time and without disarranging or disconnecting the remaining plates. The electrodes being entirely submerged, their entire field is utilized in the production of the current, (or in accumulating it in charging the element as a secondary battery,) so that there is no waste of active material.

Having thus described my invention, I claim and desire to secure by Letters Patent of the United States—

1. The rectangular cell-body for secondary batteries, provided on its inner sides and bottom with parallel notched side racks and parallel upwardly-extending bottom racks, substantially as described.

2. The combination, in an element for secondary batteries, of the cell-body provided on its inner sides and bottom with the parallel side racks, A, and bottom racks, b', the positive electrode-plates having upwardly-projecting arms and resting with their lower edges in the notches of the bottom racks, the negative electrode-plates having legs or supports straddling the bottom racks, and the strips f and e, whereby the positive and negative electrodes are respectively connected to one another and to their respective poles f' and e', substantially as and for the purpose set forth.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

PAUL SCHOOP.

Witnesses:
EMIL BLUM,
WILLIAM SCHNEIDER.