

(No Model.)

G. A. JOHNSON.  
PLATE FOR SECONDARY BATTERIES.

No. 420,234.

Patented Jan. 28, 1890.

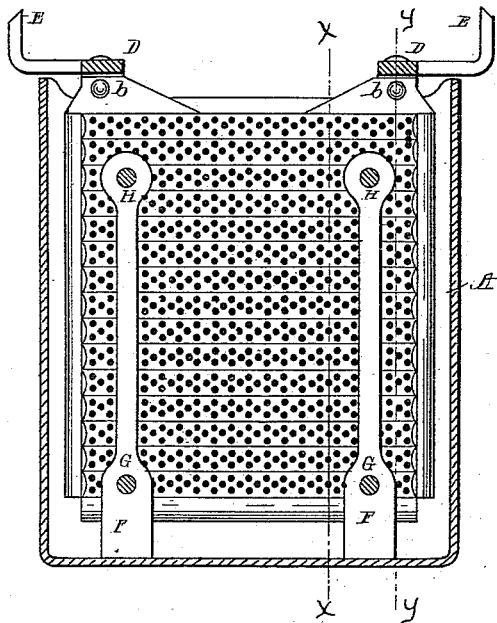


Fig. 1-

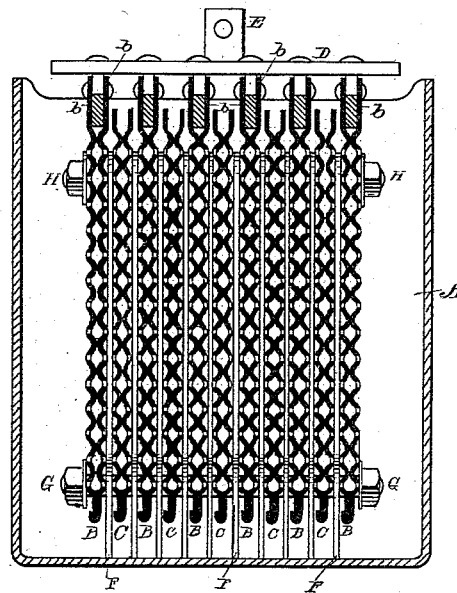


Fig. 2-

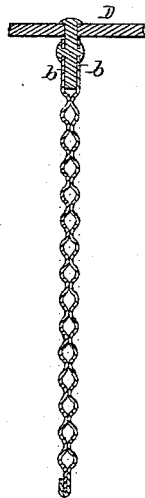


Fig. 4-

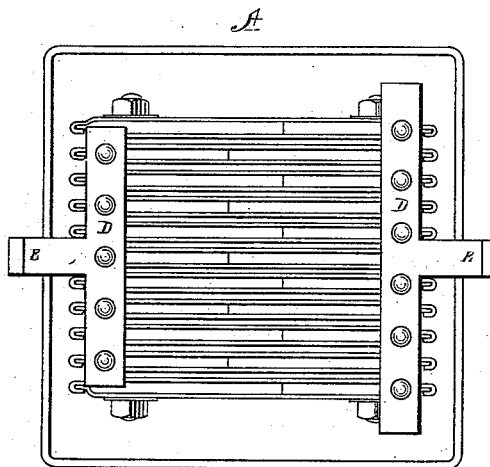


Fig. 3-



Fig. 5-

WITNESSES.

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# UNITED STATES PATENT OFFICE.

GEORGE A. JOHNSON, OF BOSTON, MASSACHUSETTS.

## PLATE FOR SECONDARY BATTERIES.

SPECIFICATION forming part of Letters Patent No. 420,234, dated January 28, 1890.

Original application filed August 15, 1888, Serial No. 282,812. Divided and this application filed November 10, 1888. Serial No. 290,466. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE A. JOHNSON, of Boston, in the county of Suffolk and State of Massachusetts, a citizen of the United States, have invented a new and useful Improvement in Plates for Storage-Batteries, of which the following is a specification sufficient to enable those skilled in the art to make and use my said invention.

Storage-batteries, as is well known, depend for their action upon the presence of oxide of lead, or sponge lead, upon their respective plates, and in order to hold this friable material in proper position and at a proper distance one part from the other a great variety of constructions of lead plates have been contrived.

In the drawings, Figure 1 is a section of the battery, showing in elevation one of the plates with its insulating appliances, and also showing another plate partly concealed by the first one. Fig. 2 is a transverse section upon the line  $x x$  of Fig. 1. Fig. 3 is a top plan of the cell and plates. Fig. 4 is a section on the line  $y y$  of Fig. 1; and Fig. 5 is a modified form of plate which can, if desired, be used for the end plate of a cell.

In order to make this battery, I take plates of lead shaped into rectangular form and corrugated in their central sections, leaving all round the plate a plain border. Each of the plates thus produced is half of one of the battery-plates. These corrugations are pierced with a great number of small holes. In my judgment the corrugations should be about three-eighths of an inch wide and one-eighth of an inch deep, and the perforations should be about one-sixteenth of an inch in diameter and should be spaced apart about from a sixteenth of an inch to an eighth of an inch. Two of these half-plates are taken and the plain edges folded over each other on the bottom and the two sides. A plate will then be produced having the appearance in section of the plate shown in Figs. 2 and 4, which will be provided with a considerable number of separate horizontal cavities of somewhat oval cross-section, which cells will be in communication with the interior of the battery-cell A through the numerous small holes shown in Fig. 1. These cavities are to

be filled by forming up the plate by the material for sensitizing the plate—as, for instance, with more or less compressed sticks of lead oxide or of lead sponge, or of any proper composition for the work of a storage-battery or accumulator. These plates are marked in Fig. 2 alternately B and C. The positive and negative plates are counterparts of each other. In order to attach these plates to the poles, an ear  $b$  is formed on the corner of each of the half-plates, by which ear the complete plate B or C is united by a rivet to the suspension-post D, which suspension-post D unites the plates to the connection E, from which the wires are carried. To insulate and support these plates in the cells A, the standards F, made of proper insulating material, are interposed between each pair of plates. These are shown in elevation in Fig. 1 and in transverse section in Fig. 2. The plates are bored through from side to side, as shown in Fig. 2, and two insulating-stems G H are passed through the plates and standards from side to side and bind together the plates and standards firmly. The end plate may, if desired, be made with one of its sides plain, not corrugated, as shown in Fig. 5.

In the use of this battery it has been found that the action upon the plates is principally, if not wholly, an action upon the inclosed prepared material contained in the cavities formed by the corrugations, and as the approach to these cavities is only through the small perforations in the corrugations there is very little, if any, destruction of the plates themselves.

I do not claim in this application the apparatus for supporting and insulating the plates, except so far as it is connected and combined with this particular form of plates, the invention being otherwise embraced by my application, Serial No. 282,812, filed August 15, 1888, of which this application is a division.

The plates thus formed are practically a corrugated lead netting, inclosing in separate interior cells the sensitive or polarizable material susceptible to chemical action. They will be very slightly acted on, except in the inclosed preparation, until the value of that is exhausted, and as it is always intended to have this sensitive preparation in excess the

plates formed on this method are very durable and constant.

I claim as my invention, and desire to secure by Letters Patent, in a storage-battery—

- 5 1. The composite plate formed of two plates corrugated horizontally and placed face to face, with their convexities and concavities facing each other, whereby comparatively small rod-like cavities are formed across and  
10 within the body of each composite plate, said plates being perforated with numerous small holes over each of said cavities and inclosing in said cavities the sensitive preparation necessary to electric action, said plates being  
15 seamed together upon their sides and bottom and provided with suitable attachments to

the poles of the battery, substantially as described.

2. The combination of corrugated plates provided with cavities for inclosing lead oxide or lead sponge within the body of the plate, and inclosing in said cavities lead oxide or lead sponge, and perforated, as described, over the cavities, with each other, and with the inclosing-cell A, and with the insulating-standards F and insulating-stems G H, substantially as and for the purpose described. 25

GEORGE A. JOHNSON.

Witnesses:

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