

No. 627,494.

Patented June 27, 1899.

W. P. FREEMAN.
STORAGE BATTERY.

(Application filed June 8, 1898.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 2

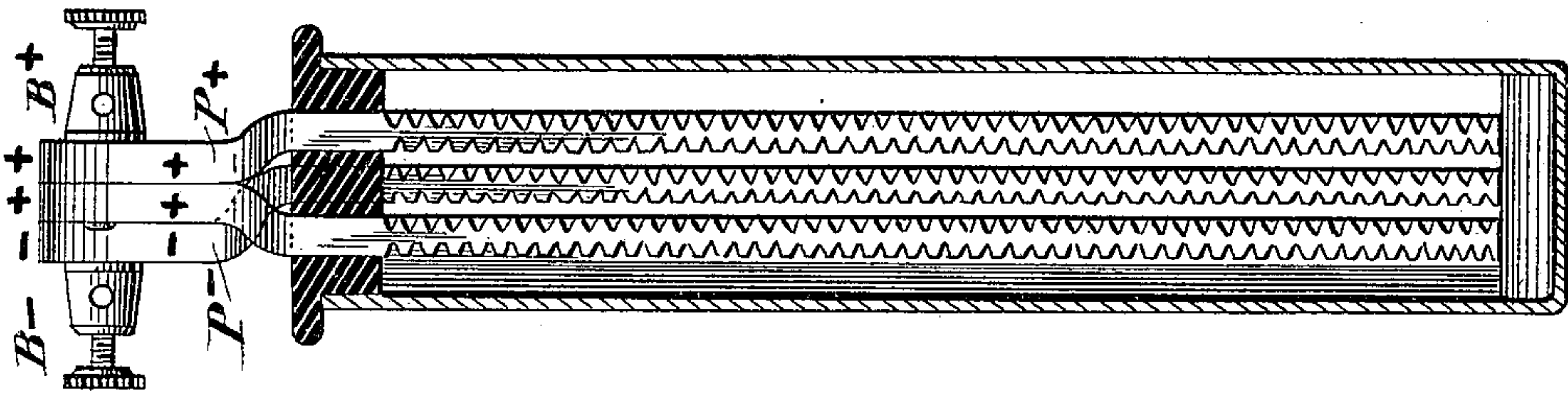
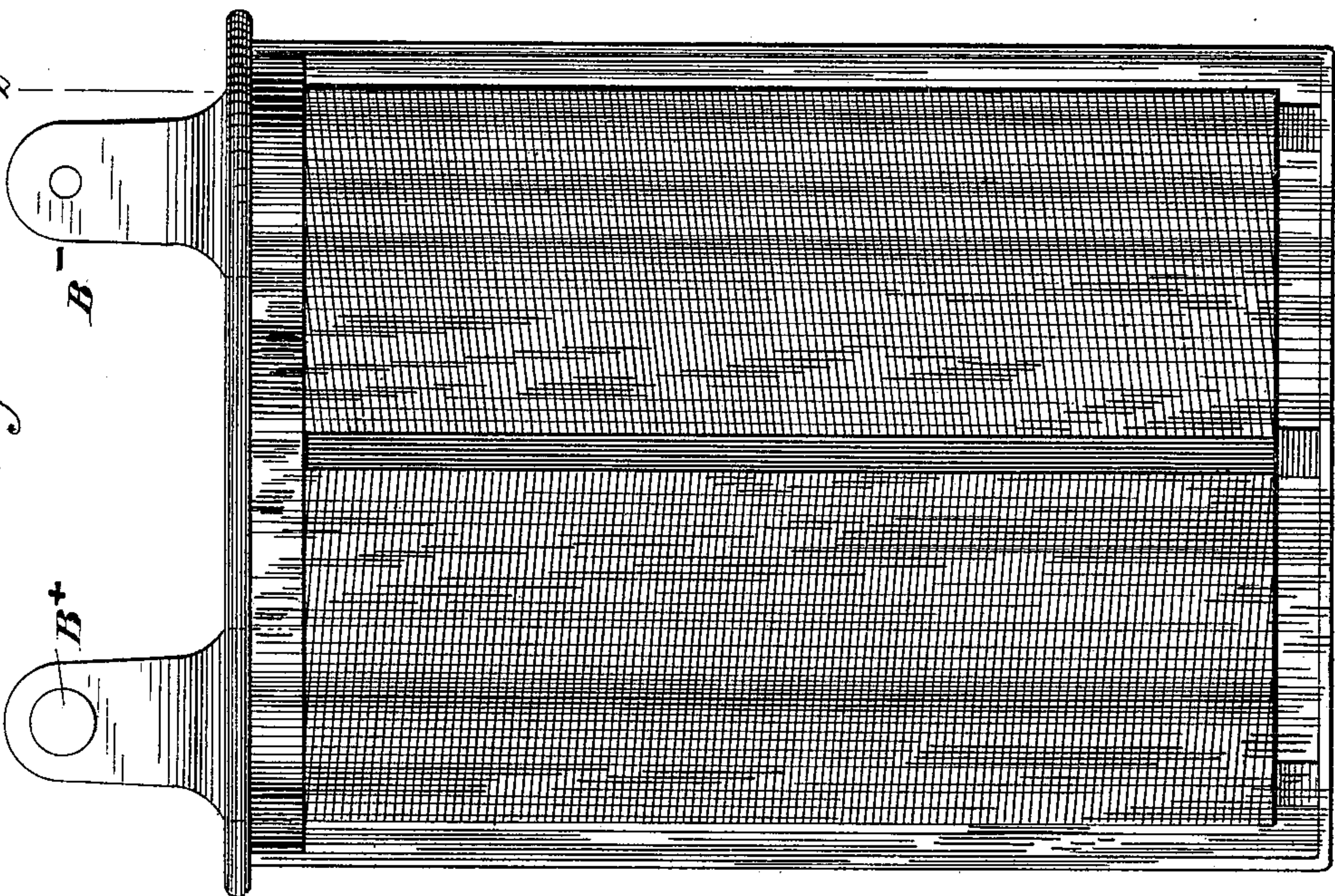


Fig. 1.



WITNESSES

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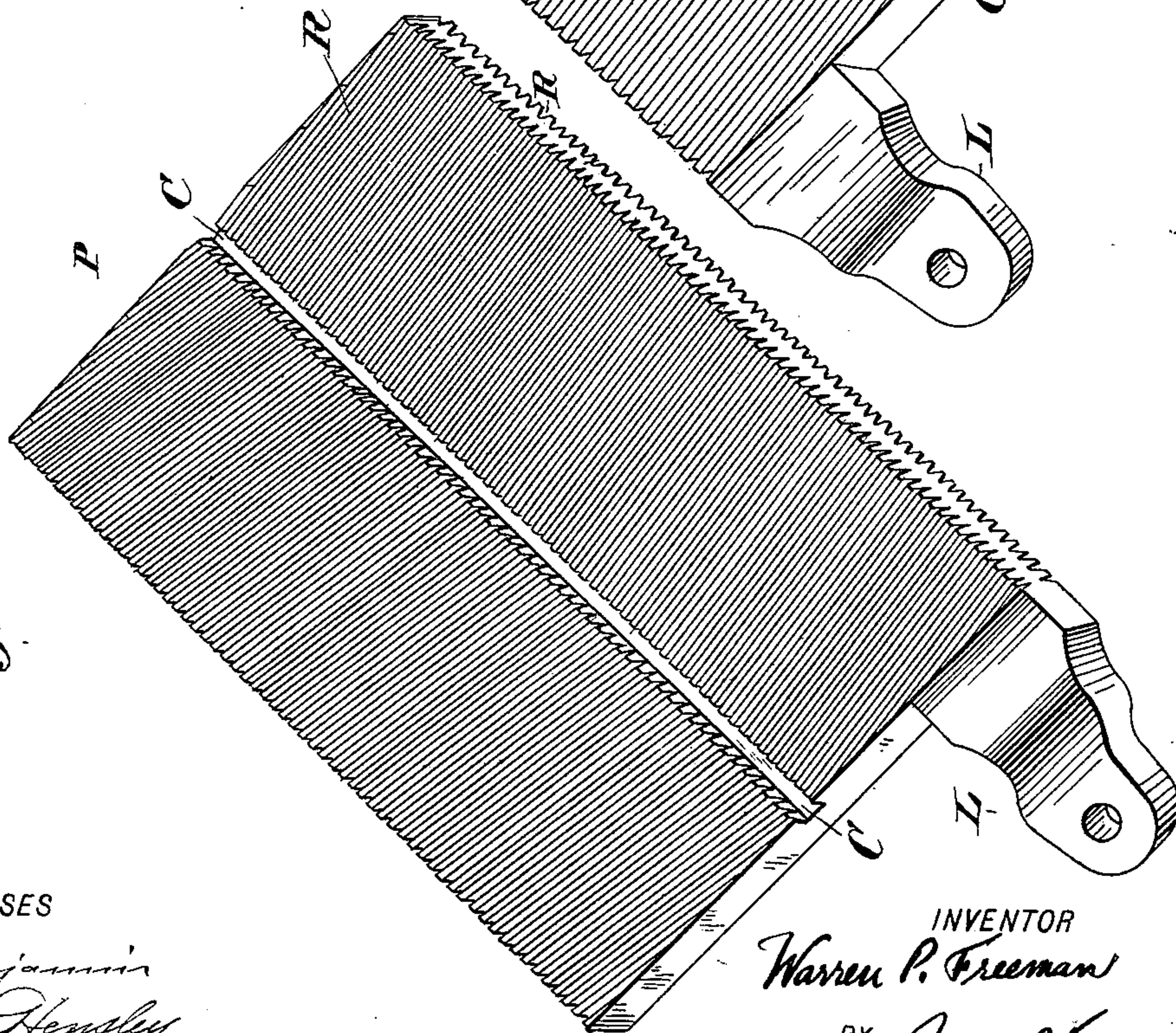
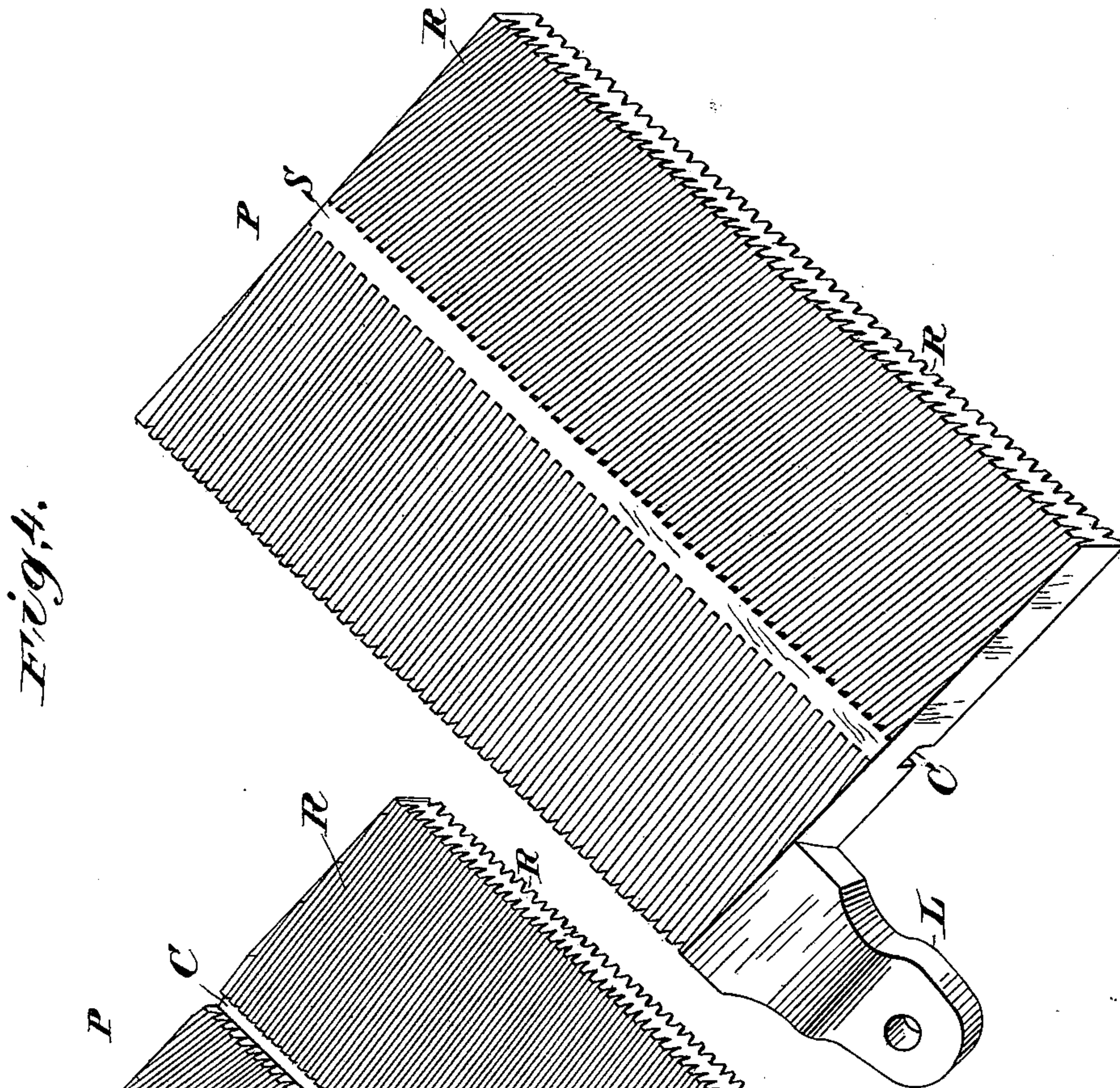
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WITNESSES

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UNITED STATES PATENT OFFICE.

WARREN P. FREEMAN, OF NEW YORK, N. Y., ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO THE EMPIRE ELECTRICAL MACHINERY COMPANY, OF NEW JERSEY.

STORAGE BATTERY.

SPECIFICATION forming part of Letters Patent No. 627,494, dated June 27, 1899.

Application filed June 8, 1898. Serial No. 682,962. (No model.)

To all whom it may concern:

Be it known that I, WARREN P. FREEMAN, of the city of New York, N. Y., have invented certain new and useful Improvements in and Relating to Storage Batteries, of which the following is a description, referring to the accompanying drawings, which form a part of this specification.

The objects of the invention are to improve the construction of storage batteries, particularly the plates thereof, and to combine strength, stiffness, and lightness of construction.

The invention is such that it will be best understood from a description of a preferred embodiment shown in the accompanying drawings.

In the drawings, Figure 1 is an elevation of a complete battery, the plates being seen through the glass. Fig. 2 is a section of the same on the plane 2 2 of Fig. 1, and Figs. 3 and 4 are perspective views of one of the plates as seen from its respective sides.

Throughout the drawings like letters of reference indicate like or similar parts.

The plates P are shown of rectangular outline, though the outline is not part of my invention. Each plate is provided with a connecting-lug L, offset from the central plane of the plate a distance somewhat greater than the thickness of the plate, so that when two such plates having oppositely-offset lugs are secured together by a binding-post B, as shown in Fig. 2, they will be separated by a space which is somewhat greater than the thickness of one of the plates. Any number of plates may be thus connected in pairs, and between them may be inserted other plates forming the other electrode of the cell. In Figs. 1 and 2 I indicate the positive and negative plates by the signs + and -. In Fig. 2 two positive plates are shown secured together by the positive binding-post B, and one negative plate is shown inserted between them. This construction of the connecting-lugs L forms one part of my invention.

Another part of my invention resides in the construction of the active surfaces of the plates. The plates are preferably provided

with a vertical channel C on one side. On the other side of the plate, opposite the channel C, the surface of the plate is left solid, as at S, Fig. 4. On either side of the channel C and of the solid rib S extend inclined recesses or grooves R. These grooves or recesses incline slightly upward or downward, respectively, as they approach the channel C or rib S on the respective sides of the plate. This facilitates the escape of bubbles formed by the action of the battery and also causes a circulation of the liquid induced by the tendency of the bubbles to rise and of the solution wherever more heavily charged with salt or acid to sink. Furthermore, as the grooves on the two sides of the plates extend crosswise of each other a much stiffer structure is produced than if they were parallel. Furthermore, the recesses extend inward less than half the thickness of the plate and converge as they penetrate into the plate, so as to form V-shaped recesses between ribs which are broadest at their roots. In this way the surface of the plate is vastly increased and, at the same time, a considerable solid portion of the plate is left in the vicinity of the medial plane. In the broader aspects of my invention I do not mean to limit myself to plates in which the active material is formed by electrolytic action out of the lead of the plate itself, though the plate is peculiarly fitted for the formation of active material from its own substance. When several such plates are associated together, as shown in Figs. 1 and 2, the channels C form vertical channels between adjacent plates, and as the plate is not weakened by the presence of these channels owing to the solid rib S no resultant weakness is produced.

It must not be understood in the following claims that I mean to imply in any one claim restrictive expressions present in the other claims, but purposely omitted from it.

I claim as my invention, and desire to secure by Letters Patent, the following:

1. A plurality of storage-battery plates provided with offset lugs L coupled together and holding apart the adjacent plates a distance somewhat greater than their thickness, in

combination with one or more similar plates provided with similar lugs and interposed between the first said plates, each of the said plates being provided with V-shaped grooves of depth less than one-half the thickness of the plate and inclining downward toward the center of the plate, and with a vertical channel C on one side of the plate and a solid rib S on the other side opposite to the said channel C, substantially as set forth.

2. A storage-battery plate provided with a vertical channel C on one side and a solid rib S on the other side, with a series of V-shaped grooves or recesses extending transversely to the channel and rib, substantially as set forth.

3. A storage-battery plate provided with a vertical channel C on one side and a solid rib S on the other side, with a series of V-shaped grooves or recesses oppositely inclined to the vertical on the two sides of the plate and extending transversely to or toward the said channel and the said rib on the respective sides of the said plate, substantially as set forth.

In testimony whereof I have hereunto set my hand, at the city of New York, N. Y., this 31st day of March, 1898.

WARREN P. FREEMAN.

Witnesses:

WENDELL FRANCIS BECKER,
HAROLD BINNEY.