

(No Model.)

E. P. USHER & W. F. DRAPER.
BATTERY PLATE.

No. 480,886.

Patented Aug. 16, 1892.

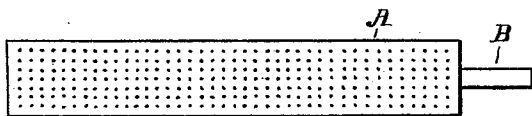


Fig. 1.

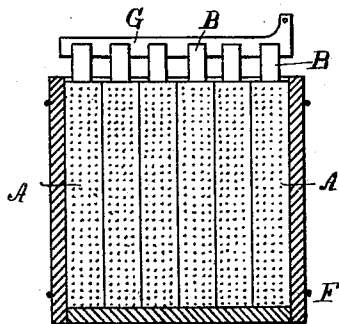


Fig. 2.

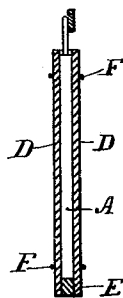


Fig. 3.



Fig. 4.

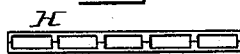


Fig. 5.

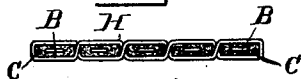


Fig. 6.

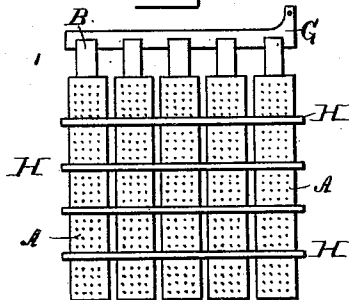


Fig. 7.

WITNESSES

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UNITED STATES PATENT OFFICE.

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BATTERY-PLATE.

SPECIFICATION forming part of Letters Patent No. 480,886, dated August 16, 1892.

Application filed February 19, 1892. Serial No. 422,072. (No model.)

To all whom it may concern:

Be it known that we, EDWARD P. USHER, of Grafton, and WILLIAM F. DRAPER, of Hopedale, both in the county of Worcester and State of Massachusetts, have jointly invented certain new and useful Improvements in Battery-Plates, of which the following, taken in connection with the accompanying drawings, is a specification.

Our improvements relate to battery-plates which are peculiar in being destitute of a skeleton or internal supporting-frame.

Our invention is embodied in a tablet or shell of finely-perforated lead-foil or the like filled with dry powdered oxide of lead and having a central longitudinal conducting-strip protruding from one end, and in a series of these tablets having their conducting-strips united transversely, and also in such series of united tablets inclosed by a frame and side plates suitably bound thereto, forming a positive plate without an internal skeleton.

Our invention is further embodied in said series of united tablets held substantially parallel by transverse perforated strips or equivalent external binders which surround the several tablets and project therefrom to insure an open space between adjacent plates and tablets for free circulation of the electrolyte. The foil wrapper is exceedingly thin, each leaf or fold being about four one-thousandths of an inch in thickness, and the powdered material inclosed is speedily transformed into a tablet or stick as the wrapper disintegrates by the action of the acid in "forming" the plate.

In the drawings, Figure 1 is a plan of one of the tablets with its protruding conducting-strip. Fig. 2 is an elevation of one of the positive plates, showing the parallel tablets with their conductors connected and the marginal frame. Fig. 3 is a transverse section of the same. Figs. 4, 5, and 6 show three forms of the transverse external binders or spacing devices for the tablets, Fig. 6 also showing the tablets and conductors in cross-section. Fig. 7 represents the negative plate with the spacing-strips in position on the tablets.

In the construction of our improved plates

we prepare a quantity of tablets as follows: 50 We take lead-foil and make a case or shell A, which may be one inch wide, five thirty-seconds of an inch thick, and six inches long. These dimensions and the others stated may of course be somewhat varied; but to secure 55 clearness we herein describe the preparation of a plate of definite size. Into these shells we insert a strip B of metallic lead or other conducting substance about one-sixteenth of an inch thick, one-fourth of an inch wide, and seven 60 inches long, seeking to place this strip as near the center of the shell as possible with one end protruding. We then fill the shell with a dry powder C, consisting of peroxide of lead, red lead or litharge, or other oxides of lead. This 65 powder we pack as firmly as possible, and when it is completed we have a firm tablet, from one end of which protrudes the strip B of metallic lead or other conducting substance. This wrapper or shell we prick as 70 full as possible of minute holes or form it of a sheet previously perforated in order to allow the acid to act upon the active material inclosed therein.

To prepare a positive plate, we take a given 75 number of these tablets—say six—and lay them side by side and close together on a thin wooden plate D, Fig. 3, which is somewhat larger on the sides and bottom than the space occupied by the six tablets. We then place 80 upon the margins of this wooden plate and so as to surround the tablets on three sides a frame E, which is made of wood, rubber, or other suitable substance. This frame is one-fourth of an inch wide and five thirty-seconds 85 of an inch thick, or thereabout. (See Fig. 2.) Over these tablets and frame we lay another wooden plate and bind the whole together with two or more rubber bands F. The pieces B, protruding from the six tablets, we connect 90 together transversely by a horizontal bar G, as in Fig. 2, to which they may be soldered or joined by the bar being cast or molded to them.

To prepare our negative plate, we take a given number of the tablets—say five—perhaps four properly-recessed strips H, made 95 seven thirty-seconds of an inch wide, six and one-half inches long, and one-eighth of an

inch thick. These strips may be made of rubber or lead or any rigid or semi-rigid substance. (See Figs. 4 and 5.) The recesses in the strips H are to be of such size as to permit a tablet being pushed through them. We take the tablets and push each one through a recess in each of the four strips, which thus connect and hold them together, with a slight space between adjacent tablets, the strips being distributed at equal distances on the tablets, as shown in Fig. 7. The recessed strips H may be formed in halves, as indicated in Fig. 5, in which case they are brought together laterally to embrace the several tablets instead of introducing the tablets endwise through the openings. Rubber cords or other flexible binders may be passed around and sinuously between the several tablets, as in Fig. 6, in lieu of the recessed strips H, these binders in either form projecting beyond the face of the several tablets and leaving space between them, thus promoting a free circulation. We then connect the pieces B protruding from the tablets with a bar G, as in the case of a positive plate. Between each tablet and the next on a negative plate there will be an open space, which materially aids circulation of the electrolyte.

We disclaim as a wrapper metallic sheet-lead of even the thinnest known grades and distinguish between it and the light, limp, and exceedingly-thin tissue known as "lead-foil," which readily disintegrates in the acid. We also disclaim an electrode having an internal grid or frame for supporting the active material and a foil wrapper inclosing it.

Having prepared the plates, we arrange them together in the manner usual for secondary cells.

We claim as our joint invention—

1. A unit of active material for battery-plates, consisting of a tablet of lead oxide or

its equivalent formed of a wrapper of lead-foil and a filling of dry powder, with a conducting-strip embedded therein and protruding therefrom, substantially as set forth.

2. A battery-plate consisting of a series of connected tablets A, each composed of a wrapper of lead-foil and a filling of oxide of lead as active material and each having a protruding conducting-strip B, united to a transverse strip or bar G, substantially as set forth.

3. A battery-plate having a series of tablets, each composed of a wrapper of lead-foil and a filling of oxide of lead as active material and each furnished with a protruding conducting-strip B, united to a transverse bar G, such tablets having the transverse binders or spacing-strips H, substantially as set forth.

4. A battery-plate composed of a series of parallel tablets of active material inclosed in a wrapper of perforated lead-foil, with a conducting-strip protruding from each tablet, and a transverse connecting-bar, in combination with wooden separators at each side of the series of tablets and a marginal frame, substantially as set forth.

5. A battery-plate composed of a series of parallel tablets, each composed of a wrapper of lead-foil and a filling of oxide of lead as active material and each having a protruding conducting-strip, said tablets being firmly held with an open space between each tablet and the next one on said plate, substantially as set forth.

In testimony whereof we have signed our names to this specification, in the presence of two subscribing witnesses, on this 16th day of February, A. D. 1892.

EDWARD P. USHER.
WILLIAM F. DRAPER.

Witnesses:

WILLIAM E. ROGERS,
ALBERT G. MORSE.