No. 649,998. Patented May 22, 1900.

E. A. SPERRY.

ELEMENT FOR STORAGE BATTERIES.

(Application filed Sept. 30, 1899.)

(No Model.)

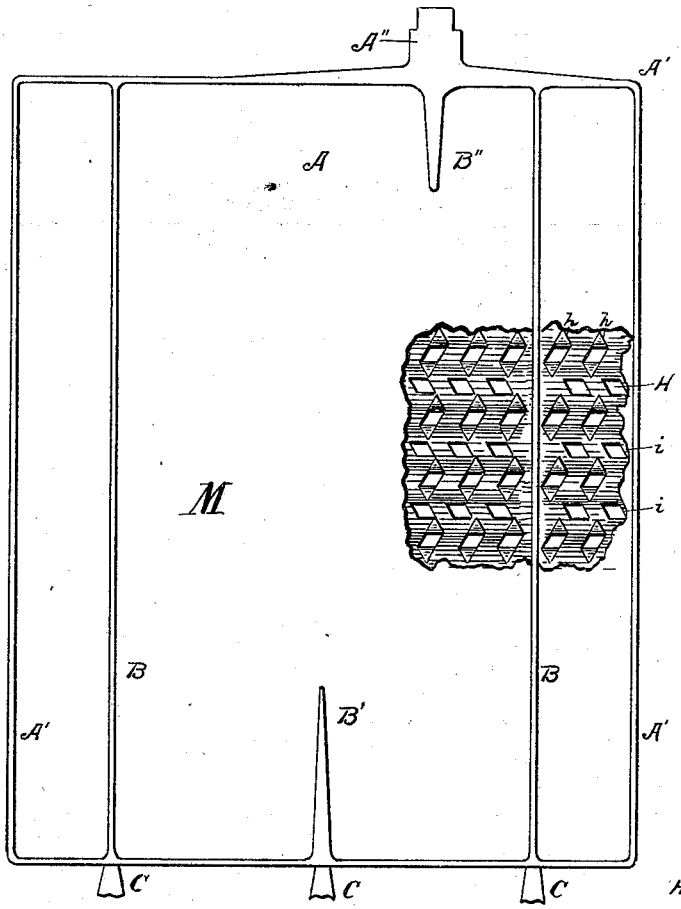

Fig. 1

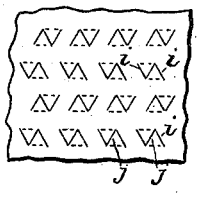

Fig. 2

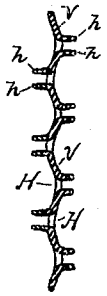

Fig. 3

Fig. 4

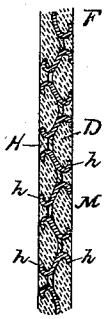

Fig. 5

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ELEMENT FOR STORAGE BATTERIES.

SPECIFICATION forming part of Letters Patent No. 649,998, dated May 22, 1900.

Application filed September 30, 1899. Serial No. 732,147. (No model.)

To all whom it may concern:

Be it known that I, ELMER A. SPERRY, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Elements for Storage Batteries, of which the following is a specification.

This invention relates to elements for storage batteries; and it consists in a novel arrangement and construction of a grid or supporting-plate for the element constructed of suitable material—such, for instance, as lead or rich lead alloy. This grid or plate is illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation. Fig. 2 is a diagram of the cut portions of the perforations. Figs. 3 and 4 show the perforations with the lips turned in two stages of their development. Fig. 5 shows a section of the completed plate.

I have found that for the longest life with the least weight of cell, and especially for plates handling large currents, the plate should be more or less corrugated and at the same time should have certain strengthening-ribs at the edges and through the plate, especially over the points of support, (indicated at C C C.) These may extend throughout the plate, as at B in Fig. 1, or from the supporting-points up into the plate, as shown at B′. The edge A′ of the plate at the top should be thickened from the ends toward the terminal lug A″ for the purpose of better conductivity and also to strengthen the plate, and I have found it preferable to drop from this top raised portion an additional rib B″, extending into the body of the plate from the under side of the upper horizontal rim or edge A′. The plate may be corrugated at any angle or vertically; but I prefer a horizontal corrugation, and when perforated I prefer to punch the holes H in the bottom or concave side of the perforations, allowing the lip or lips *h* resulting from the perforation to protrude from the convex side *v* of the corrugations in rows. These perforations I prefer to make polygonal, each alternate side of the polygon being cut, as shown at *i i*, and bent, as shown at *h h*, the bent portions forming the extended lips being plainly seen in Figs. 1, 3, 4, and 5 after being punched. At first these lips stand as seen in Fig. 3. This is the result of punching a trapezoidal hole, which is cut across its nearest diagonal corners on line *j*, as is plainly seen in Fig. 2. The lips stand off in parallel rows from alternate sides of the web, standing out parallel at first, as seen in Fig. 3, afterward being forced apart by the stylus S or otherwise, so that they stand inclined away from each other and covering the convex portion or depression D of the adjacent corrugation. Thus it will be seen when the active material M is applied to the plates it occupies the depressions and is held, grasped, or riveted in place by the ends of the prongs *h h*, which are turned over upon the masses. The riveting action thus takes place on the thickest mass, lying, as it does, in the trough or depressed part D of the corrugation on either side, the bottom portion of the mass being naturally riveted by itself through the perforations H in the web of the plate. It will be seen in Fig. 5 that the ends of these lips are really turned back to a position parallel with the general plane of the plate. This is usually accomplished by the pressure employed in forcing the active material upon and into the grid. It will also be seen to be below or upon a level with the outer face F of the plate, as seen in Fig. 5.

The corrugation will be found to be valuable in allowing for the expansion of the material and in directing this expansion into vertical rather than horizontal or lateral lines, there being room above, but not always room laterally at the edges of the plate. The ribs B and edges A′ are made sufficiently light, so that they will stretch during this process of expansion.

It will be readily understood that while it is designed to use the above parts in the relation shown, yet some may be used without the others, and the invention extends to such use. It will furthermore be readily understood that while the detailed construction has been described with more or less minuteness, yet the invention should be in no wise restricted to the exact methods and details described, but rather should be limited only in scope as indicated in the claims.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. An element for a battery, consisting of a

thin plate provided with raised edges, vertical ribs within the plate, the top raised edge increasing in thickness from each end toward an intermediate point, a terminal lug formed from the said edge at this point and an additional rib extending a short distance into the plate from the under side of the said raised edge opposite the terminal.

2. An element for a battery, consisting of a thin plate provided with raised edges, two vertical ribs within the plate, the top raised edge increasing in thickness from each end toward an intermediate point, a terminal lug formed from the said edge at this point and an additional rib extending a short distance from the bottom of the plate up into the body of the plate, located intermediate between the vertical ribs.

3. In an element for a storage battery, a thin, corrugated plate, perforated with rows of holes, forming lips or projections, each alternate row of lips extending from the opposite sides from the convex surface and in the central portion of the corrugation.

4. In an element for storage batteries, a thin, corrugated plate, perforated with rows of holes, forming lips or projections, each alternate row of lips extending from opposite sides from the convex surface and in the central portion of the corrugation, the sides of each perforation being alternately sheared and bent.

5. In an element for storage batteries, a thin, corrugated plate, perforated with rows of holes, forming lips or projections, each alternate row of lips extending from opposite sides from the convex surface and in the central portion of the corrugation, the sides of each perforation being alternately sheared and bent, the bent parts forming the lips lying substantially at right angles to the adjacent portions of the corrugations.

6. In an element for storage batteries, a thin, corrugated plate, perforated with rows of holes, forming lips or projections, each alternate row of lips extending from opposite sides from the convex surface and in the central portion of the corrugation, the sides of each perforation being alternately sheared and bent, the holes being disposed in parallel lines and the lips bent so as to form substantially-parallel lines.

7. In an element for storage batteries, a thin, corrugated plate, perforated with rows of holes, forming lips or projections, each alternate row of lips extending from opposite sides from the convex surface and in the central portion of the corrugation, the sides of each perforation being alternately sheared and bent, leaving projecting portions in the convex ridges of the corrugations.

8. In an element for storage batteries, a thin, corrugated plate, perforated with rows of holes, forming lips or projections, each alternate row of lips, extending from opposite sides from the convex surface and in the central portion of the corrugation, the sides of each perforation being alternately sheared and bent, the bent lips slanting away from each other and covering the concave portion of the adjacent corrugation.

9. In an element for storage batteries, a thin, corrugated plate, perforated with rows of trapezoidal holes, forming lips or projections, each alternate row of lips extending from opposite sides from the convex surface and in the central portion of the corrugation, a slit connecting the closest diagonal corners of the hole, the lips so formed being bent outwardly in pairs.

10. In an element for storage batteries, a thin, corrugated plate, perforated with rows of holes, forming lips or projections, each alternate row of lips extending from opposite sides from the convex surface and in the central portion of the corrugation, the sides of each perforation being alternately sheared and bent, the lips slanting away from each other, covering the convex portion of the adjacent corrugation and active material within the convex portions of the corrugations and adapted to be held by the projection.

11. In an element for storage batteries, a thin, corrugated plate, perforated with rows of holes, forming lips or projections, each alternate row of lips extending from opposite sides from the convex surface and in the central portion of the corrugation, the sides of each perforation being alternately sheared and bent, the lips slanting away from each other, covering the convex portions of adjacent corrugations and curved back, parallel with the plane of the plate.

12. In an element for storage batteries, a thin, corrugated plate, perforated with rows of holes, forming lips or projections, each alternate row of lips extending from opposite sides from the convex surface and in the central portion of the corrugation, the sides of each perforation being alternately sheared and bent, the lips slanting away from each other, covering the convex portions of the adjacent corrugations, the outer ends being curved back parallel with the plane of the plate and active material within the depression, having a surface on the level with the outer surfaces of the bent portions of the lips.

13. An element for a battery, consisting of a comparatively-thin web, provided with raised edges and strengthening-ribs, the web punched with trapezoidal holes in rows, forming lips, each alternate set of lips being formed on the opposite side of the web, two sides of the perforation being cut, the lips being formed from the other sides and bent outwardly, in combination with a cell connecting the diagonal corners of the perforation.

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