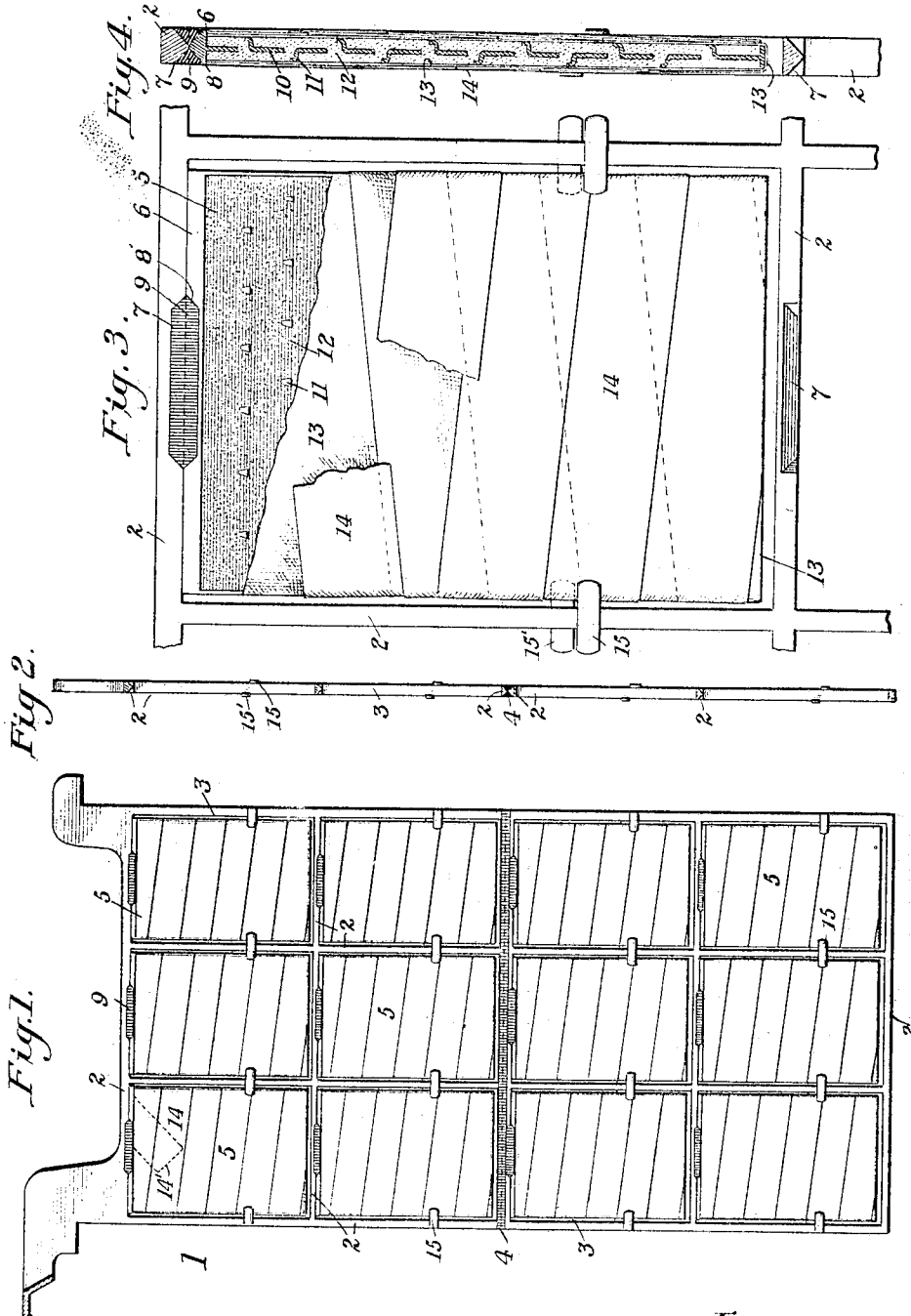


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E. A. SPERRY.  
STORAGE BATTERY ELECTRODE.

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Witnesses:  
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# UNITED STATES PATENT OFFICE.

ELMER A. SPERRY, OF CLEVELAND, OHIO, ASSIGNOR TO NATIONAL BATTERY COMPANY, OF BUFFALO, NEW YORK, A CORPORATION OF NEW YORK.

## STORAGE-BATTERY ELECTRODE.

SPECIFICATION forming part of Letters Patent No. 781,795, dated February 7, 1905.

Application filed January 27, 1904. Serial No. 190,878.

*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 Storage-Battery Electrodes, of which the following is a specification.

This invention relates to electrodes of the class in which a grid or support carries a body of active material, such as lead-oxid, and especially to the large electrodes which are used in central stations. Such electrodes are subject to rapid deterioration on account of the change in volume of the active material which bends and distorts the grid or support.

The improved electrode consists of a frame having rectangular openings containing separate electrode-sections, each of which is secured to the frame at its upper edge only, leaving spaces between its side and bottom edges and the frame. Each section is preferably inclosed in an envelop of a pyroxylin fabric and is retained in the frame-opening by lugs which extend from the frame.

Referring to the accompanying drawings, Figure 1 is a side elevation of the electrode. Fig. 2 is a transverse vertical section of the electrode-frame. Fig. 3 is an enlarged side elevation of one of the electrode-sections and the surrounding frame, and Fig. 4 is a transverse vertical section of the parts shown in Fig. 3.

The electrode 1 consists of a framework of vertical and horizontal bars 2, which intersect at right angles and provide rectangular openings 3. The frame is preferably cast of antimonial lead in upper and lower half-sections, the adjacent edges of which are beveled and burned together or connected by lines of solder 4, fused into the depressions between the beveled edges. Within each opening 3 is suspended an electrode-section 5, which is secured to the frame at its upper edge only. The adjacent edges of the frame-bar 2 and the upper edge 6 of the electrode-section are beveled at their middle for a distance equal to one-third the length of the section to provide recesses 7 8. The section is secured to the

frame by bodies of solder 9, fused into the depressions at each side. The electrode-sections may consist of any grid or support carrying active material. The sections shown comprises a thin lead web 10, with marginal flanges 6. Spurs 11 to retain the active material 12 are punched out of the web. Each section is preferably inclosed in a cover of fabric. The cover shown consists of a broad piece 13 of a pyroxylin fabric which is folded over the bottom edge and up the sides of the section and a strip 14 of pyroxylin fabric which is doubly wound over the piece 13, beginning and ending at the top. The free end 14' of the strip is secured by inserting it beneath the piece 13. Each electrode-section, with its cover, is narrower and shorter than the rectangular opening in which it hangs, so that narrow spaces are left between its side edges and the frame and a somewhat wider space between its bottom edge and the frame. Pairs of lateral retaining-lugs 15 15' extend from the frame over each edge of the sections. The lugs are preferably located two-thirds the distance from the top to the bottom of the openings, and the lugs of each pair are out of vertical alinement to facilitate insertion of the sections.

Each of the electrode-sections being connected to the frame along the middle of its upper edge only is free to buckle without bending the frame-bars 2. This is an important improvement over electrodes in which the sections are rigidly attached to the frame along their entire upper edge or at two points on the edge at a considerable distance apart, since the expansion, contraction, and buckling of sections which are thus connected invariably warp the entire electrode even when a heavy frame is employed. Furthermore, the location of the retaining-lugs 15 15' is such that the bending of each electrode-section produces the minimum deviation. For example, if any section be assumed to bend in a circular curve from its upper to its lower end the deflection of the lower edge of the lower third of the section from its true position will be equal to the greatest deflection

of the upper two-thirds at its middle. The long burned or soldered union 9 between the frame-bar and the upper edge of the section materially strengthens both the frame and the section, tending to prevent transverse buckling of either. The length of the union, however, is such that the frame-bar is not unduly stretched by transverse expansion of the section.

- 10 The fabric cover of each section not only prevents adjacent electrodes from coming in contact, but serves as a cushioning means for the section as it becomes expanded by use. As the section expands, the fabric at the side
- 15 edges begins to bear against the adjacent frame-bars; but as there are several thicknesses of fabric along these edges the pressure on the frame-bars is a yielding one. This cushioning action is important in portable batteries and permits the use of a lighter
- 20 frame and one containing a higher percentage of antimony, and which is therefore brittle, although more resistant to oxidation.

I claim—

- 25 1. A storage-battery electrode, consisting of a frame having openings containing electrode-sections, each section comprising a support carrying active material secured to said frame by a rigid union along the middle of
- 30 its upper edge but free at its ends, as set forth.

2. A storage-battery electrode, consisting of a frame having rectangular openings containing electrode-sections, each section comprising a support carrying active material and
- 35 secured to said frame by a rigid union along the middle of its upper edge for a distance equal to about one-third the length of said edge, as set forth.

3. A storage-battery electrode, consisting
- 40 of a frame having rectangular openings containing electrode-sections, each section comprising a support carrying active material and secured to said frame by a rigid union along the middle of its upper edge, and lateral retaining-lugs extending from said frame over
- 45 said sections, as set forth.

4. A storage-battery electrode, consisting of a frame having rectangular openings containing electrode-sections, each section comprising a support carrying active material and
- 50 secured to said frame at the middle of its upper edge, and lateral retaining-lugs extending from said frame over said sections, said lugs being located at about two-thirds the distance
- 55 from the top to the bottom of said openings, as set forth.

5. A storage-battery electrode, consisting of a frame having rectangular openings containing electrode-sections, said sections being
- 60 secured to said frame at their upper edges

with spaces between their side and bottom edges and said frame, the spaces at the sides being narrower than those at the bottom, and lateral retaining-lugs extending from said frame over said sections, as set forth. 65

6. A storage-battery electrode, consisting of a frame having rectangular openings, an electrode-section hung loosely in each opening, and means for preventing the lateral edges of each section from moving out of the plane of
- 70 said frame in either direction, as set forth.

7. A storage-battery electrode consisting of a frame having rectangular openings, pairs of lateral retaining-lugs one on each side of said electrode, and an electrode-section hung
- 75 loosely in each opening and held at each lateral edge by a pair of lugs, as set forth.

8. A storage-battery electrode, consisting of a frame having rectangular openings, pairs of lateral retaining-lugs one on each side of said electrode, the lugs of each pair being vertically out of alinement, and an electrode-section secured in each opening and held by a pair of lugs, as set forth. 80

9. A storage-battery electrode, consisting of a frame having rectangular openings, an electrode-section in each opening and secured to said frame at its upper edge, with spaces between its side and bottom edges and said frame, the side spaces being narrower than
- 90 the bottom space, and cushioning means in said spaces, the cushioning means being thicker at the side than at the bottom, as set forth.

10. A storage-battery electrode, consisting of a frame having rectangular openings containing electrode-sections, each section comprising a support carrying active material and secured to said frame, the adjacent edges of said frame and support being beveled to provide depressions, and bodies of metal fused in
- 100 said depressions and serving to unite said frame and support, as set forth.

11. A storage-battery electrode, consisting of a frame having rectangular openings containing electrode-sections, each section comprising a support carrying active material and secured to said frame at the middle of its upper edge, the adjacent edges of said frame and support being beveled along the middle third of the section to provide depressions, and
- 110 bodies of metal fused in said depressions and serving to unite said frame and support, as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

ELMER A. SPERRY.

Witnesses:

JOHN H. SIGGERS,  
EUGENE A. BYRNES.