C. W. BENDER.

BATTERY PLATE.

APPLICATION FILED APR. 18, 1908.

915,063. Patented Mar. 16, 1909.

FIG. 1.

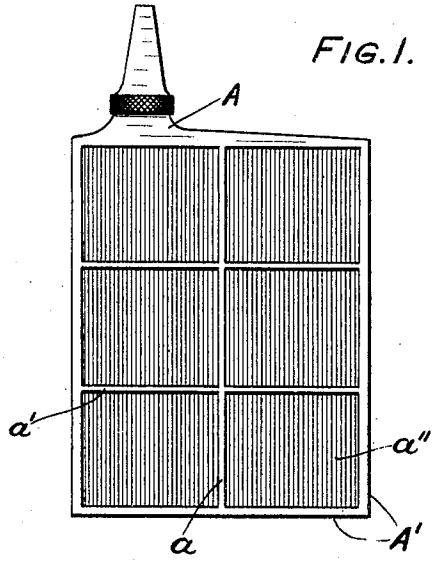
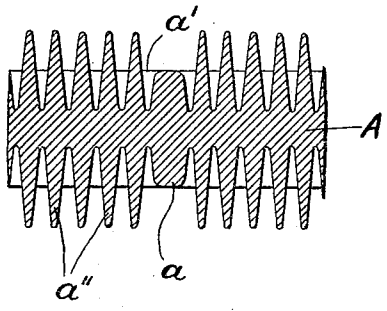


FIG. 2.



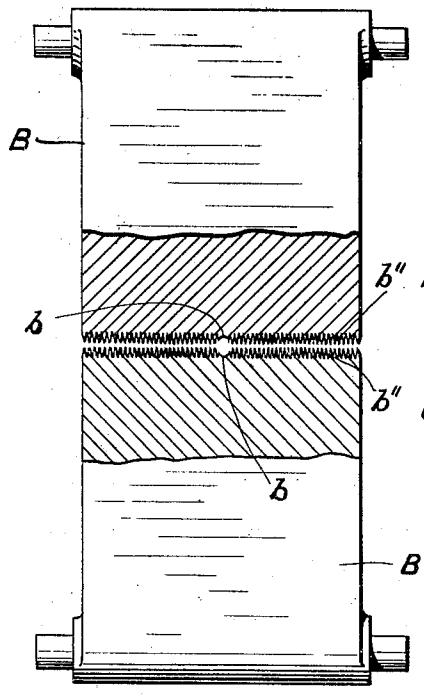


FIG. 3.

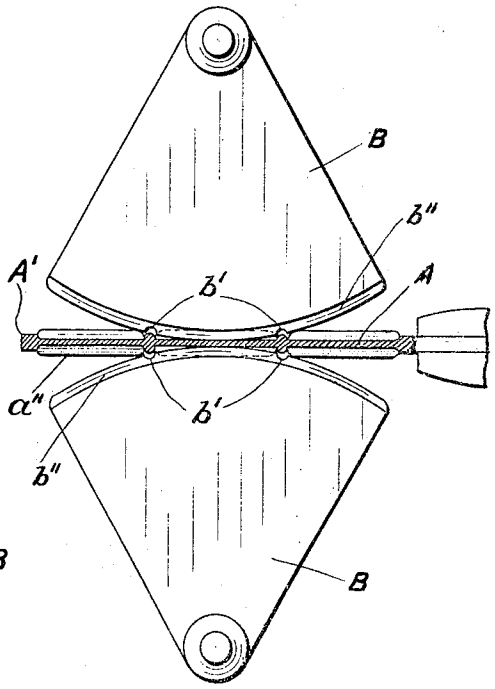


FIG. 4.

WITNESSES:

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CLAUDE W. BENDER, OF ALTOONA, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO J. RICHARD SLOAN, OF ALTOONA, PENNSYLVANIA.

BATTERY-PLATE.

No. 915,063. Specification of Letters Patent. Patented March 16, 1909.

Application filed April 18, 1908. Serial No. 427,830.

To all whom it may concern:

Be it known that I, CLAUDE W. BENDER, a citizen of the United States, residing in the city of Altoona, county of Blair, and State of Pennsylvania, have invented certain Improvements in Battery-Plates.

My improvements have for their leading purpose the production of a secondary battery plate having a structure consolidated in a uniform manner, without drawing, tearing or crowding the metal as has been usual in forming such surfaces, and as a consequence of which the metal has heretofore been subject to ready local attack and destruction by the solution used therewith.

In practicing my invention the surfaces of the plates are subjected to successive rolling operations in reverse directions so that the metal is not stretched, but packed by repeated pressures producing uniform density over the entire surface formed.

The characteristic features of the invention are illustrated by the accompanying drawings, in which—

Figure 1 represents a form of plate that may be produced, Fig. 2 represents a sectional view thereof on an enlarged scale, Fig. 3 represents a sectional elevation of the dies employed, and Fig. 4 represents an elevation of the dies transverse to the view shown in Fig. 3, a section of a plate being shown between them.

In the form illustrated, the plate A has the bordering ribs A′ and the interior ribs a and a', which are of the approximate thickness of the original blank, and within the sections produced thereby are formed straight, parallel ribs a'' providing the plate with deeply corrugated sectional surfaces, the elevations of such corrugated surfaces lying above and the depressions below the levels of the border A′ and the ribs a and a'.

The sectoral dies B are provided with transversely extending channels b and b', corresponding to the ribs a and a', and the parallel, circular ribs b'' corresponding to the grooves between the ribs a''; the area of the sectional, corrugated surfaces to be formed by forming the ribs a'' corresponding to the area of the like sectional surfaces formed by the ribs b'' for producing the former. The plate A and the dies B may be held and operated in any manner convenient for either passing the plate back and forward between the dies, which are thus caused to oscillate, or by rolling the dies back and forth upon the plate, which may be held stationary.

The reciprocating actions of the curved corrugations of the dies exert pressure, approximately vertical, traveling back and forth along the plate until the desired surface of the latter is finally formed and rendered compact, the highest and lowest as well as the intermediate parts of the surfaces being rendered thoroughly compact by the repeated actions with insufficient force to disrupt the uniform relation or disturb the equal distribution of the particles of the metal. The slightly angular character of the pressure in each direction of movement is opposed to that of the reverse direction so that the surface is worked and the particles are restored to their original positions by the reverse movements. The outer stratum of the metal is not strained, torn or crowded so as to produce weak places and irregular conditions, as in forming the plates by passing the blanks through rolls always traveling in the same direction or having a rate of movement greater than that of the plate, or displacing the metal by other usual operations.

The consolidating, refining and toughening effect of the work to which the outer stratum of the lead composing these plates is subjected has been found to prolong the period during which they can be used so as to effect great saving in the operation of storage batteries.

Having described my invention, I claim:

1. A battery plate having an irregular surface with an outer stratum composed of metal that has been subjected to work effecting a substantially uniform consolidation of the particles thereof over the whole of said surface.

2. A battery plate having a corrugated surface produced and consolidated by repeated pressures insufficient to disrupt the surface material and extending over the whole of said surface.

3. A battery plate having a surface shaped and consolidated throughout by repeated rolling pressures alternately in reverse directions at such angles as to work the metal without disrupting it.

4. A battery plate having a surface shaped, toughened and consolidated by rolling operations in reverse directions exerting pressures limited in force and direction so that the metal of said surface is not disrupted.

In witness whereof I have hereunto set my name this 13th day of April, A. D. 1908, in the presence of the subscribing witnesses.

CLAUDE W. BENDER.

Witnesses:

J. R. SLOAN,

ANNIE K. MILLER.