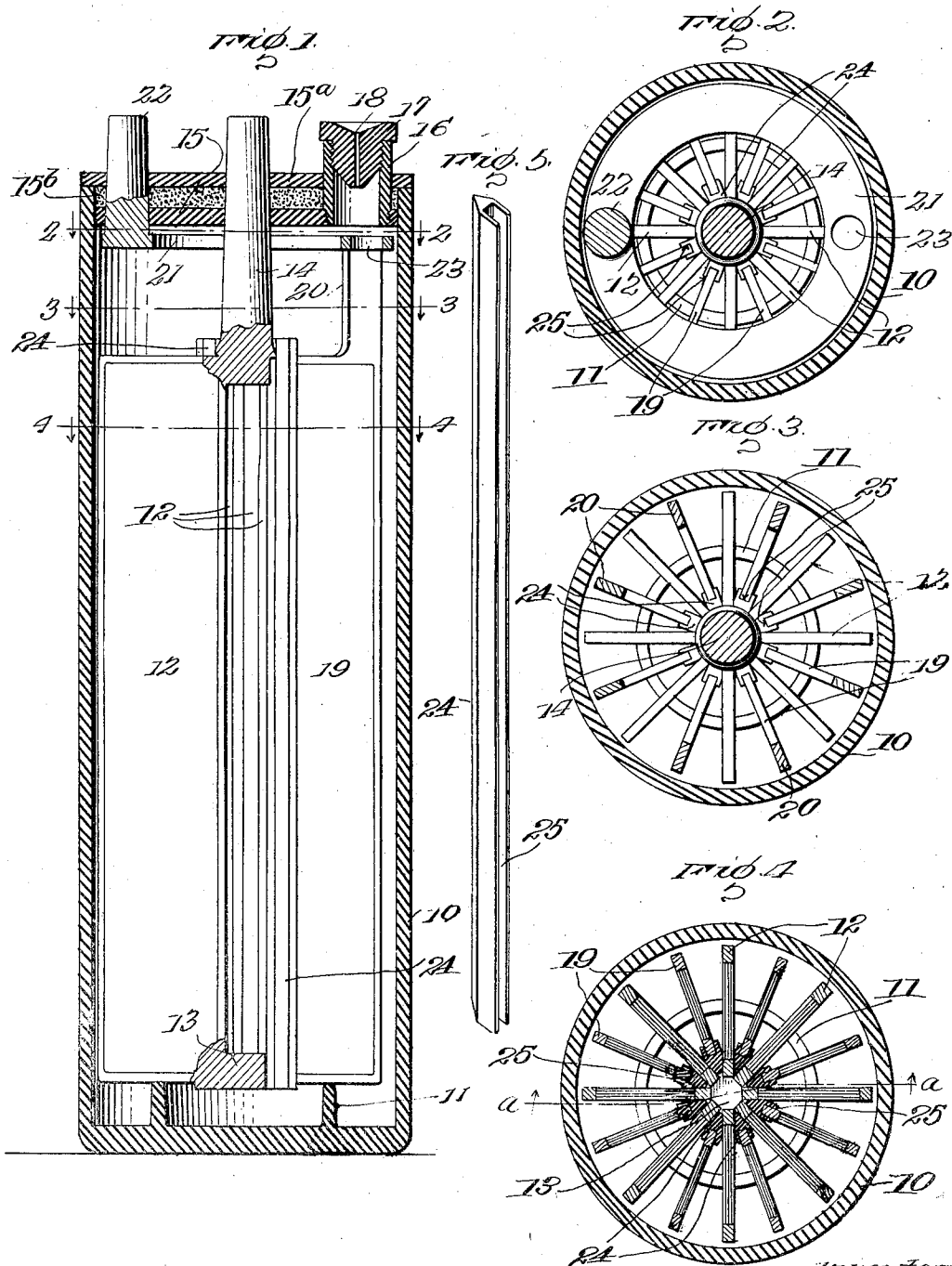


R. DRAMBOURG.
STORAGE CELL.

APPLICATION FILED NOV. 27, 1918. RENEWED NOV. 17, 1919.

1,333,295.

Patented Mar. 9, 1920.



Witnesses
Arthur L. Chace
M. J. Jones

Inventor
Rudolphe Drambourg
 by *J. Richard Jones*,
 his Attorney

UNITED STATES PATENT OFFICE.

RUDOLPHE DRAMBOURG, OF BROOKLYN, NEW YORK, ASSIGNOR, BY MESNE ASSIGNMENTS, TO FEDERAL BATTERY MANUFACTURING CORPORATION, OF WASHINGTON, DISTRICT OF COLUMBIA, A CORPORATION OF DELAWARE.

STORAGE-CELL.

1,333,295.

Specification of Letters Patent.

Patented Mar. 9, 1920.

Application filed November 27, 1918, Serial No. 264,344. Renewed November 17, 1919. Serial No. 338,536.

To all whom it may concern:

Be it known that I, RUDOLPHE DRAMBOURG, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Storage-Cells, of which the following is a specification.

This invention relates to storage batteries and a major object is to provide a storage cell in which each element comprises a series of plates arranged radially or otherwise at an angle to each other and substantially in the area of a cylinder to increase the electrical capacity and efficiency of operation.

Another object of the invention is to provide a storage cell embodying a central or positive element having a series of angularly disposed plates connected at their inner edges adjacent their base by the fusion of a plug thereto, and at said inner edges adjacent the top by the fusion of a post thereto which serves as a binding post or distributor of the current.

Still another object of the invention is to provide a storage cell embodying a negative element composed of a series of angularly disposed plates each having an upstanding lug connected as by fusion to a ring or connector common to all of them which serves as a binding post or distributor of the current.

A further object of the invention is to provide a battery jar having an upstanding supporting bead for the elements, preferably unconnected to the wall of the jar and also preferably being curved so as to permit and facilitate play of the sediment which forms and reduce the chances of its formation in masses which short-circuit the battery.

A still further object of the invention is to provide a novel separator means to prevent contact between the positive and negative plates of the element and to reduce the chances of buckling thereof, and a form specifically cooperating with interfitting radial plates to receive a plate of one polarity and be braced against one or more plates of the opposite polarity.

Another object is to provide the elements of such a construction that one of them will be supported by the other in assembly, to facilitate their handling.

Again an object is to provide an endless or ring connector for one series of plates and a connector for the other series of plates adapted to extend through the ring connector in spaced relation thereto.

In addition to the foregoing, it is an aim to provide the additional specific improvements which will become apparent as the following description progresses in relation to accompanying drawings.

In these drawings, similar and corresponding parts are designated by the same characters of reference throughout the views in which they appear, and

Figure 1 is a view in vertical section of a storage cell constructed in accordance with my invention and taken on the line *a-a* of Fig. 4;

Figs. 2, 3 and 4 are transverse sections respectively taken on the lines 2-2, 3-3 and 4-4 of Fig. 1, and

Fig. 5 is a view in perspective of the novel form of separator employed.

With reference to the drawings, 10 indicates the containing jar, of hard rubber, glass or other suitable material, which is preferably cylindrical, open at the top and formed with the side or cylindrical wall, the bottom wall and with an upstanding rib or riser 11, integral with each other or in one piece.

One element of the battery has a plurality of radial plates 12 preferably arranged to substantially occupy the area of a cylinder being preferably spaced from each other at the inner side edges, except at their base where a plug 13 is fused thereto and at their upper ends where a post 44 is fused to them. It is understood, however, that said plates may be connected together for their entire lengths, if desired, or their grids made integral. Post 14 stands upwardly through and beyond central openings in an inner cover plate 15 and an outer cover plate 15^a, sealed together and to the jar by a rubber or other fusible compound 15^b to form a closure for the jar. In prac-

tice I prefer that this be the positive element, although it is obvious that it may be of opposite polarity if considered desirable.

Referring now to the other element of the battery, it also consists of a series of radial plates arranged substantially in the area of a cylinder. These plates are designated 19 and each one is provided at its upper end adjacent the outer side edge with an up-
 10 standing, preferably integral, fusible lug 20, and the lugs 20 are all connected together by means of a fusible ring 21. A post 22 integral with the ring extends through an opening in the cover plates 15 and 15^a. This
 15 element I prefer to form of negative polarity.

The plates used are preferably of the Faure or pasted grid type, and they may be manufactured and assembled in accordance
 20 with my constructions and processes set forth in co-pending applications filed November 27th, 1918, and bearing Serial Numbers 264,345; 264,346, and 264,347, respectively. In disposing the plates of the two
 25 elements in substantially cylindrical formation and alternately of different polarity, the elements are placed with their longitudinal centers in alinement but with the plates disalined and the base of the negative ele-
 30 ment opposite the top of the positive element, and the elements are then moved longitudinally toward each other. As the negative plates are connected merely by means of the ring, their base ends are separated and
 35 free to slide between the positive plates. Since the positive plates underlap the said ring, they will engage the ring at their upper ends, as the positive element is lifted, say by the post thereof, which is ad-
 40 vantageous in assembly. By way of example, the parts of the element are made of lead. As usual too, the elements are electrically "charged" and are submerged in an electrolyte, say dilute sulfuric acid, contained in
 45 the jar.

The rib or riser 11 previously referred to supports the active elements at a distance, say one-half of an inch from the base or bot-
 50 tom of the jar as the lower end edges of the plates 12 and 19 rest directly on the rib. This rib is unconnected to the sides of the jar and hence it does not form an abutment which will permit the formation of sediment in such a mass as to contact with the
 55 plates and cause short-circuiting. Moreover, this rib is preferably annular so that all of its surfaces presented to the sediment will be curved and will thus further serve to keep the sediment in motion in the electrolyte.

60 In the ring 21, an opening 23 is provided directly below or in alinement with the opening of a thimble 16 which may pass removably through the cover plate 15^a and screw into the plate 15 as shown. A plug 17 is
 65 carried by the thimble 16 and has a vent

opening 18 for the escape of gases from the jar. Plug 17 is screwthreaded to the thimble so that it may be removed to permit a syringe or the like to pass through thimble 16 and opening 23 to withdraw electrolyte
 70 for testing purposes in addition to permitting the jar to be filled with water or electrolyte when necessary.

Located in each space between the plates 12 and adjacent their hub or inner edges, is
 75 an improved separator of the construction detailed in Fig. 5. This separator is hard rubber or other suitable material which is preferably of a much higher degree of resistance to conductivity than the plates.
 80 One longitudinal edge thereof is beveled from opposite sides or otherwise made wedge or V-shaped as at 24 to snugly fit between and contact with the walls of the plates 12. In the opposite longitudinal edge, a groove
 85 or slot 25 is provided to receive the inner longitudinal edges of the plates 19 of the negative element as clearly shown in Fig. 4. The separator thus not only prevents contact between the plates of opposite polarity
 90 but it also serves to securely hold the negative plates rigid to prevent buckling thereof. Further the plates hold the separators fixed against any chance of displacement and the different plates and separators mutually
 95 brace each other whereby the entire active structure is rigidified and held substantially in the form of a cylinder.

It will be obvious by arranging the plates of the positive element equidistantly and
 100 directly connecting them to the post 14 or point of delivery of the current, practically direct conductivity of the current ensues, which accordingly reduces resistance, while with the negative element all of its plates
 105 are securely held against buckling and the path of travel of the current to its post has been reduced and made more direct. As a result of this development of the principle of direct conductivity, I am enabled to ob-
 110 tain higher voltage and greater capacity from a cell of given active surface, or plate area, than is obtainable from cells of the present standard type.

Since merely the preferred embodiment of
 115 the invention has been illustrated and described, it is to be understood that changes in the details of construction may be made within its spirit and scope as defined by appended claims.

I claim:

1. In a storage cell, a positive element having radial active plates, and a negative element having radial active plates disposed
 125 alternately with respect to the first mentioned plates.

2. In a storage cell, an element having active plates disposed at an angle to each other, and an element of opposite polarity having active plates disposed alternately be-
 130

tween and with respect to the first mentioned plates.

3. In a storage cell, a positive element, a negative element, said elements having alternate plates occupying substantially the area of a cylinder.

4. In a storage cell, a central electrode having a plurality of angularly disposed plates with portions thereof integrally connected together, and a second electrode having a plurality of plates, one of said latter plates being arranged between each pair of plates of the first mentioned electrode and in spaced relation therefrom.

5. A battery having an element provided with a plurality of plates and a second element having a plurality of plates, the plates of the second element being disposable between the plates of the first element by movement of the second element as an entirety relatively to the first element.

6. A battery having an element provided with a plurality of plates and a second element having a plurality of plates, the plates of the second element being disposable between the plates of the first element by movement of the second element as an entirety relatively to the first element, the plates of one of the elements being separated at one end of the element to permit the said movement.

7. A battery having an element provided with a plurality of plates and a second element having a plurality of plates, the plates of the second element being disposable between the plates of the first element by movement of the second element as an entirety relatively to the first element, the plates of one of the elements being separated at one end of the element to permit the said movement, and means to position the separated ends of the last mentioned plates.

8. A battery having elements capable of relative movement, and means on one element to support the other element therefrom when lifted.

9. A battery having an element comprising a plurality of plates, means joining said plates, another element having a plurality of plates, and means joining the last mentioned plates extending through the first mentioned means.

10. A battery having an element provided with a plurality of plates, a ring member joining said plates, another element provided with a plurality of plates, the last mentioned plates having a lug joining them and said lug extending through said ring.

11. A battery having an element provided with a plurality of plates, a ring member joining said plates, another element provided with a plurality of plates, the last mentioned plates having a lug joining them and said lug extending through said ring,

in spaced relation to the ring, and the last mentioned plates underlapping a ring whereby the ring will be engaged to lift the first element through lifting movement of the second element.

12. A battery having an element provided with a plurality of angularly disposed plates, a post joining said plates and extending above the same, a second element having a plurality of plates, the plates of the second element being disposed between the plates of the first element, a ring joining the plates of the second element, the post of the first element extending through and in spaced relation to said ring, a post extending from said ring, said plates of the second member being unconnected at the end opposite to the ring whereby they may move between the plates of the first member through sliding movement, means to secure the plates in rigid relation, and the plates of the first mentioned member underlapping the ring whereby through movement of the first element, the second element will be moved therewith.

13. In a storage battery, an element having angularly disposed plates, plates of opposite polarity to the first mentioned plates disposed between the first mentioned plates and means to position the second mentioned plates for coöperation with the first mentioned plates and the electrolyte.

14. In a storage battery, an element having radial plates, a second element having radial plates arranged one between each pair of plates of the first element, and means associated with the first element to position the plates of the second element.

15. In a storage battery, an element having plates extending outwardly from a center, a second element having plates arranged between the plates of the first element, and a separator to engage a plate of the first element and a plate of the second element.

16. In a storage battery, an element having plates extending at an angle, a second element having plates arranged between the plates of the first element, a separator to engage a plate of the first element and means on the separator to coöperate with a plate of the other element to prevent buckling thereof.

17. In a storage battery, an element having plates disposed at an angle, a second element having plates arranged between the plates of the first element, a separator for said plates, and said separator being engageable with a plurality of plates of one of the elements.

18. In a storage battery, an element having plates disposed at an angle, a second element having plates arranged between the plates of the first element, a separator disposed between a pair of plates of the first element, and opposite an edge of a plate of

the other element, whereby it is mounted against displacement.

19. A separator for battery plates having a body provided with an inclined surface for the purpose specified.

20. A separator for battery plates having a body provided with an inclined abutting surface to engage a plate of one polarity and having means to engage a plate of the opposite polarity.

21. A separator for battery plates having a body provided with an inclined abutting surface to engage a plate of one polarity and having means for interengagement with a plate of the opposite polarity.

22. A separator for battery plates having a body provided with a plate-receiving groove extending inwardly from one wall

and having a wall for engagement with a plate of opposite polarity to said plates extending inwardly from said wall.

23. A separator for battery plates having a body provided with a groove extending inwardly from one wall to receive a plate and having walls extending inwardly from said wall and on opposite sides thereof and toward each other for the purpose specified to engage plates of opposite polarity to said plate.

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

RUDOLPHE DRAMBOURG.

Witnesses:

WM. ZEAMAN,
G. PETRINO.