

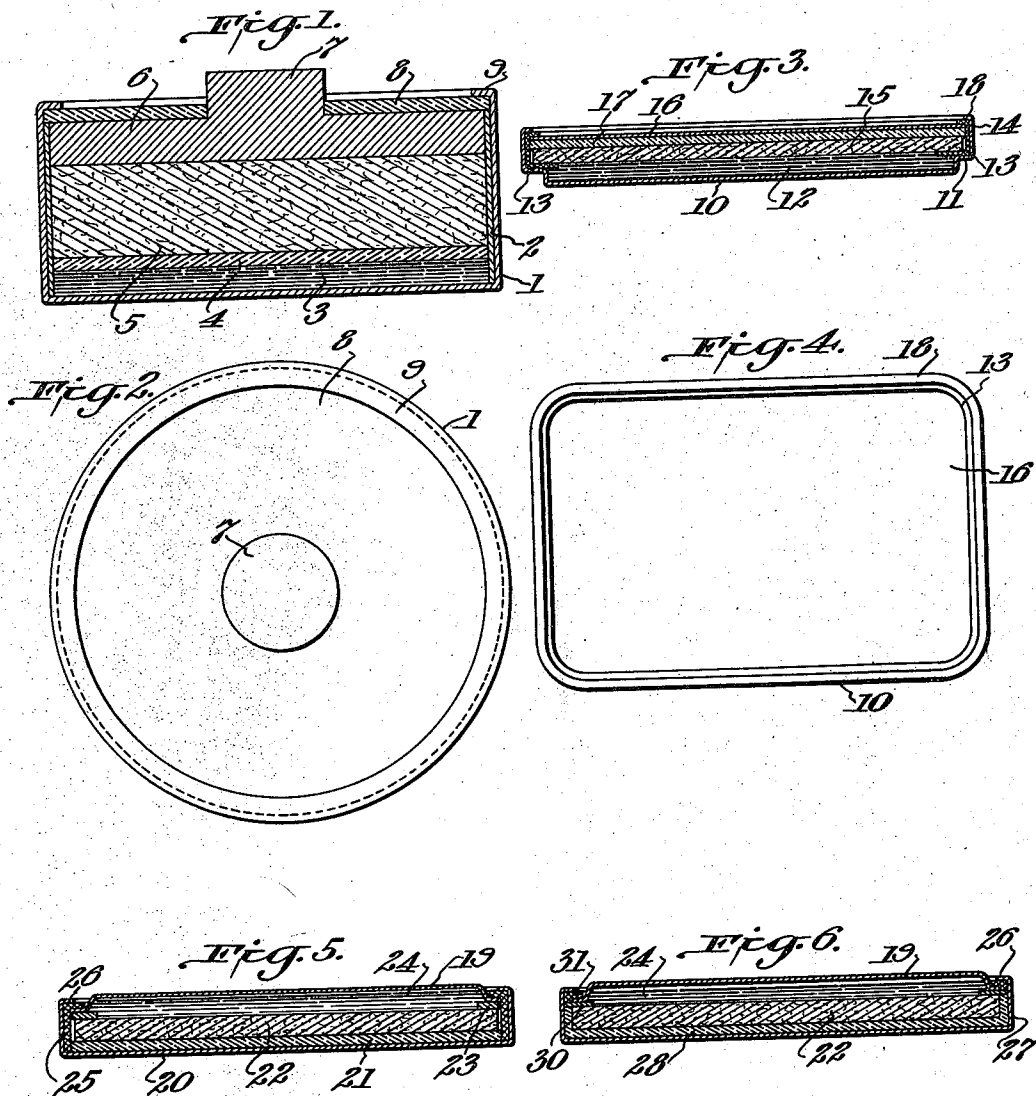
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DRY CELL AND PROCESS OF MAKING THE SAME

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UNITED STATES PATENT OFFICE.

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DRY CELL AND PROCESS OF MAKING THE SAME.

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This invention relates to dry cells of the flat type embodying a shallow container which forms one electrode of the cell. A principal object of the invention is to provide improved and simplified means for holding the parts of the cell together, preferably under compression.

Various forms of cells constructed as indicated generally above have heretofore been devised. These cells ordinarily comprise separate elements adapted to cooperate with the container electrode in retaining the other parts of the cell. Such elements may be a top fitting upon the container electrode, a wrapping of fabric, an incrustation of a plastic, such as celluloid, and other special securing means. Frequently separate provision is made for placing the cell under compression, by screws, wedges, or equivalent devices.

In accordance with our invention, the advantages of the type of cells referred to are obtained with marked simplification of structure by utilizing an inturned portion of the wall of the container electrode to hold the assembly together. In a preferred form, the wall of the container electrode is crimped inwardly at its upper margin upon an insulated portion of a plane electrode of opposite polarity, which forms a closure for the container.

The invention will be described in detail in connection with the accompanying drawings, in which—

Fig. 1 is a vertical section through a cell having the improved closure;

Fig. 2 is a top plan view of the cell;

Fig. 3 is a vertical section through a modified form of cell;

Fig. 4 is a top plan view of the same;

Fig. 5 is a vertical section through a cell similar to that shown in Fig. 3, but having the position of the electrodes reversed; and

Fig. 6 is a view similar to Fig. 5, showing a modified form of insulating means.

Referring to Figs. 1 and 2, reference numeral 1 denotes a cylindrical zinc cup lined with bibulous paper 2, or the like, and containing a layer 3 of electrolyte paste upon its bottom. A disc 4 of suitable material, such as pulp board, separates the electrolyte paste from depolarizing mix 5. A carbon plate 6, preferably having a protruding portion 7, rests upon the mix. An insulat-

ing collar 8, impervious to electrolyte, is fitted over the portion 7 and extends to the circumference of the cell.

To secure the parts in position, the rim of the zinc cup is turned inwardly upon the insulating collar 8, forming a retaining flange 9. The collar should be made of material capable of resisting the compressive force applied. Tough fiber board impregnated with paraffin is a suitable material. The cell should be compressed to secure the most efficient contact between the reactive elements, and the flange 9 should be formed while the cell is so compressed. In this way the desired degree of contact will be permanently maintained.

In the cell shown in Figs. 3 and 4, the means for securing the parts is essentially the same as that previously described, but the cell arrangement is modified. The zinc container electrode 10 is formed with a shoulder 11 extending inwardly from its walls and bounding a paste receptacle 12 in the container bottom. An electrolyte-proof insulating lining 13 conforms to the container wall 14 and overlies the shoulder 11. A coherent block of depolarizer 15 rests upon the lining of the shoulder. A "duplex" electrode, consisting of a metal plate 16 with a conductive carbonaceous coating 17, is placed upon the depolarizer, the coating 17 being in contact therewith.

The upper portion 18 of wall 14 is turned inwardly and presses the lining against the duplex electrode. The lining should extend farther over the duplex electrode than does the crimped portion of the wall. In this way contact between the zincs of adjacent cells is prevented and the cells are properly centered when stacked to make series connection between the duplex electrodes and the zinc containers.

In the form of the invention shown in Fig. 5, a zinc electrode 19 forms the top of the cell. The cathode is a sheet metal container 20 provided with a conductive carbonaceous layer 21 upon its bottom. A depolarizer mass 22 rests upon the layer 21 and is spaced from the zinc electrode 19 by a marginal insulating strip 23. The central area of the zinc electrode is elevated with respect to the margin to provide a chamber for electrolyte paste 24. An insulating strip 25 conforms to the walls of the

container 20 and when these are crimped inwardly, as at 26, the strip spaces the walls from the zinc.

The conductive layer upon the bottom of the container may be extended upwardly on the side walls, replacing the insulating strip 25. This form of cell is illustrated in Fig. 6, wherein 27 denotes a sheet metal container having its bottom and walls lined with an impervious conductive material 28. This should extend to a point adjacent the zinc electrode 19 and is an effectual protection against corrosion of the side walls. Annular insulating strips 30 and 31 are placed below and above the margin of the zinc electrode to space it respectively from the mix 22 and the flange 26. The paste 24 may only partially fill its chamber, leaving room for expansion.

It is preferred to use duplex electrodes, because of their superior conductivity, strength, flexibility, and space economy. They may be made as described in the application of R. C. Benner, Serial No. 534,509, filed February 6, 1922; that is by coating zinc or other sheet metal on one surface with a graphite-containing plastic adapted to harden upon the metal. Other suitable methods may be adopted, such as forcing graphite particles into a plastic applied to the metal, or suspending graphite in a volatile liquid and brushing or spraying the suspension on a metal backing. Paraffin may be used as a binder for the graphite particles.

In some cases juxtaposed plates of carbon and metal are the equivalent of the duplex electrode. Carbon plates alone may be used, as in the cell of Figs. 1 and 2. The carbon plates should generally be rather thick, to guard against breakage.

As an incident to the improved means for securing the cell elements in assembled relation under the proper amount of compression, there is the important advantage of securing an electrolyte-proof seal for the cell. No liquid escapes between the cell cover and the retaining flange formed by the crimped container wall, since the insulating material compressed between these parts forms an impervious packing. The seal is ordinarily hermetic. This is permissible when the cells are to be used in low drain work, as for example in radio B batteries, since there is no large evolution of gas. If the cells are to be subjected to heavy current drain, a gas vent should be provided. This may be formed by making a perforation in the cover, or in other suitable ways. Or a portion of the cell may be left vacant to serve as an expansion chamber, as shown in one form in Fig. 6.

We are aware that insulating covers have

been secured to cells by crimping, spinning, or punching the metal of the container electrode to engage the cover. Such constructions are not applicable to cells in which an electrode is used as the closure. The present invention provides a practical way of simultaneously securing, compressing, and sealing the elements of cells of this latter type. The embodiments described are illustrative only, and various modifications may be made within the scope of the appended claims.

We claim:

1. A dry cell comprising a container electrode, electrolyte and depolarizer therein, said container electrode having its walls crimped inwardly at the top, a second electrode forming a closure for the container electrode, and an insulating member conforming to the walls of the container electrode and spacing the crimped portion of the same from the said second electrode, said insulating member also serving to completely space the depolarizer mix from contact with metallic parts of the container.

2. A dry cell having a metallic container serving as one electrode and a closure for the container serving as the other electrode, electrolyte and depolarizer therein, insulating means lining the container and spacing the depolarizer and closure therefrom.

3. A dry cell having a metallic container serving as one electrode and a closure therefor serving as the other electrode, active material therein, and suitable lining means spacing the active material and closure from the container.

4. A dry cell having a metallic container serving as the anode and a closure therefor serving as the cathode, electrolyte and depolarizer therein, a lining for the container spacing the cathode and depolarizer therefrom, and a seal comprising material impervious to electrolyte compressed between an upper crimped-in portion of the container and the closure.

5. In a dry cell, a metallic container serving as an electrode, a closure serving as the other electrode, electrolyte and depolarizer therein, and insulating means within the container and spacing the depolarizer and closure therefrom, said container having a circular boss on the bottom thereof and being folded over at the top over the closure and insulating means, said insulating means extending beyond the folded over portion of the container.

In testimony whereof, I affix my signature.

RAYMOND C. BENNER.

In testimony whereof, I affix my signature.

HOMER W. JONES.