

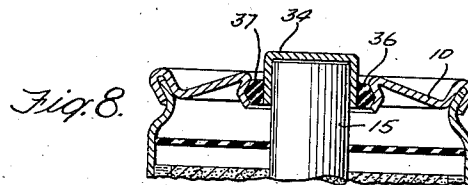
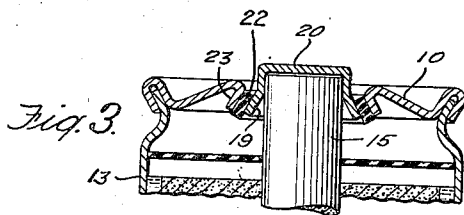
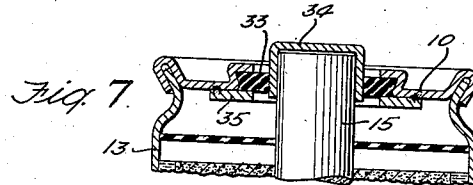
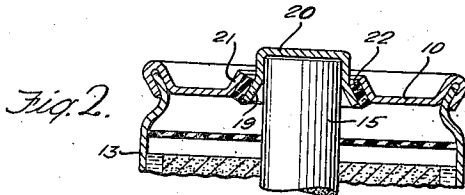
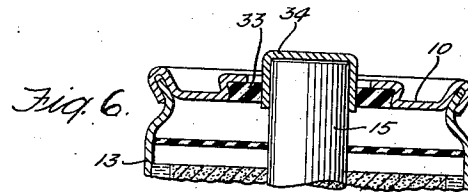
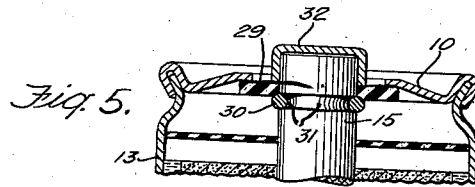
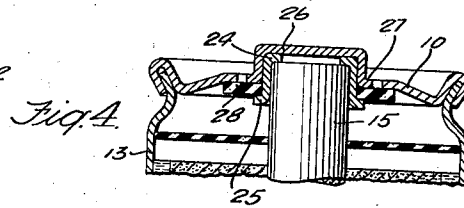
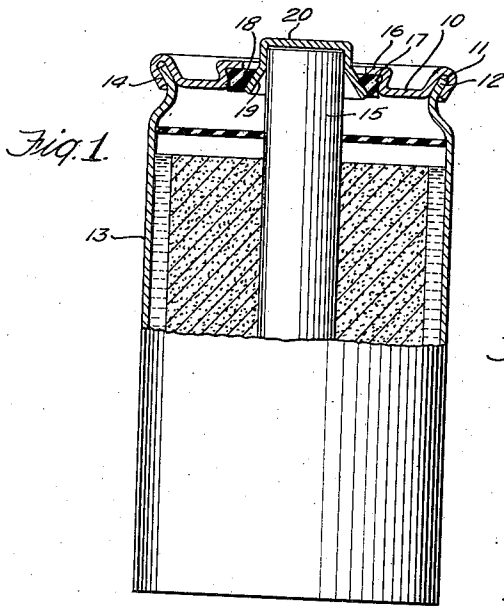
Nov. 17, 1936.

P. DRUMMOND
CLOSURE FOR DRY CELLS

2,060,799

Filed Nov. 30, 1932

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

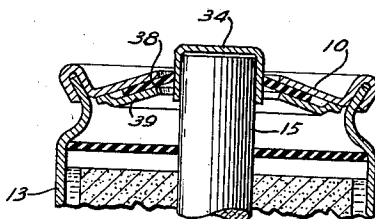


Fig 9

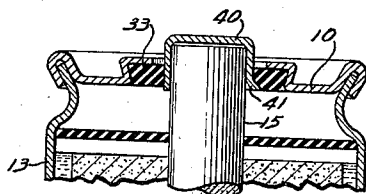


Fig 10

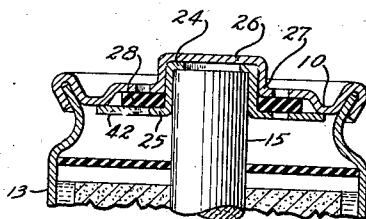


Fig 11

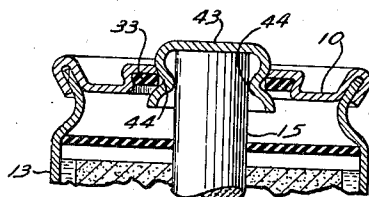


Fig 12

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UNITED STATES PATENT OFFICE

2,060,799

CLOSURE FOR DRY CELLS

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National Carbon Company, Inc., a corporation
of New York

Application November 30, 1932, Serial No. 645,008

1 Claim. (Cl. 136—133)

The invention pertains to the portion of a dry cell that joins the upper end of the zinc can to the upper end of the carbon electrode and forms the final closure.

More specifically, the invention pertains to means for closing the annular opening in partially completed dry cells between the upper end of a cylindrical zinc container, outer electrode, or anode, having a closed bottom, and the upper end of a central, inner, or axial carbon electrode or cathode.

One of the objects of the invention is to provide a closure having component parts that may be both preformed and assembled to the cell by machine.

Another object is to provide a closure wherein the size and character of the opening for venting cell gas may be more accurately predetermined and controlled.

Other objects are to provide a closure that is lighter in weight, more rugged in structure, less liable to damage, lower in cost, occupies less space, and is both distinctive and better in appearance.

These and any other objects and novel features will appear in the following specification and the accompanying drawings, in which:

Fig. 1 is an enlarged view partly in section along a vertical plane, of a cell embodying one example of an application of my invention, and,

Figs. 2 to 12 are enlarged sectional views along a corresponding plane of the upper ends of similar cells embodying other examples of applications of my invention.

The closure comprises a conductive top for a dry cell and means for effecting a suitable junction or joint between the top and the zinc can and between the top and the carbon electrode.

The closure may also comprise a conductive electrode cap of usual or special form on the carbon electrode, and both the electrode cap and the zinc can may interfit with other parts of the closure to provide suitable joints of which at least one holds the closure in place, at least one comprises a dielectric, and one may provide a vent for the escape of gas from within the cell, or both joints may be substantially gas tight. The cap may form part of the inner electrode and the top form part of the outer electrode.

One of the junctions may be a joint of compression normally held closed by resilient pressure of one member upon another, but adapted to have the pressure removed or decreased by gas pressure within the cell on one of the members to open the joint and provide a vent for the escape of gas.

Either one or both of the junctions may be still further sealed by the application of a suitable sealing material such as a covering, coating, or filling, of varnish, lacquer, cement, resin, asphaltum, or thermoplastic material.

The cells may also be provided with a vent already known in the art such as one through a porous dielectric washer disclosed and claimed in application No. 456,172 filed by R. R. Smith and assigned to the assignee of this application, or one through the carbon electrode and electrode cap covered by Patent 1,836,903 granted to N. K. Chaney and also assigned to the assignee of this application.

The form, structure, and relative arrangement of the component parts of the closure, and especially the joint between the metal top and the central electrode is deemed novel.

The examples of embodiments of the invention shown in the drawings may be grouped into three classes or species according to their characteristics with respect to venting cell gas.

In the examples shown in Figs. 1, 2, 3, 4, and 5, the closure is provided with a joint of compression that is normally closed but is adapted to be opened by pressure of gas within the cell on the closure to provide a vent through which the gas may escape to relieve the pressure.

In the examples shown in Figs. 6, 7, 8, 9, and 10, the closure is provided with a joint of compression having one member which is adapted to be moved with respect to the other by the pressure of gas within the cell on the closure, and this relative movement maintains sufficient opening through the joint to provide a vent for the escape of cell gas.

In the examples shown in Figs. 11 and 12, gas may escape through either a porous dielectric washer or porous carbon electrode.

In all of the examples the closure comprises an annular top of relatively thin resilient sheet metal such as steel, iron, or brass, between .010 and .030 inch in thickness having the outer margin thereof rigidly secured to the upper edge or end of the zinc can or container electrode, and a preformed annular, rigid, dielectric sealing washer between the inner margin thereof and the inner carbon electrode, or a metal electrode cap thereon, to electrically separate the electrodes and normally provide a substantially gas tight closure for the annular opening between the upper end of the can and the outer surface of the upper end of the carbon electrode. The zinc can and metal top secured thereto may be considered together as the outer electrode or container, and the car-

bon rod and metal cap thereon may be considered together as the inner electrode so that the dielectric washer may be considered as extending between the outer electrode or container and the inner electrode in all cases.

The interior of the cell, to which the closures are applied, is already known in the art and comprises a central, or axial, cylindrical carbon electrode 15 that extends upward a short distance above the upper end of can 13. The rest of the interior structure is not specifically defined as it forms no part of the invention.

In the example shown in Fig. 1 the inner margin 16 of metal top 10 is offset upward and outward to provide an annular recess 17 in which dielectric washer 18 is held by a joint of horizontal compression that is substantially gas tight. The inner edge of washer 18 is at an angle to the axis of the cell and conforms in shape with the upper side of a flared annular rim 19 at the lower margin of electrode cap 20 upon the upper end of electrode 15.

The joint between washer 18 and rim 19 is one of vertical compression that is held closed by resilient pressure of top 10 on rim 19, but may be opened when the pressure is relieved or removed by gas pressure within the cell on the under side of the top to provide a vent through which the gas may escape.

In the example shown in Fig. 2 the inner margin 21 of top 10 is conical and parallel to rim 19 of electrode cap 20, from which it is separated by conical dielectric washer 22. The vertical compression joints between this washer and both margin 21 and rim 19 are held closed by resilient pressure of the top on the rim of the cap.

This closure operates the same as that shown in Fig. 1 with the exception that gas may escape between the washer and either the top or cap as the washer is not independently secured to either.

In the example shown in Fig. 3 the operation of the closure is the same as that shown in Fig. 2 and the structure is also the same with the exception that the inner margin 23 of top 10 extends downward and outward parallel to rim 19.

In the example shown in Fig. 4, electrode 15 is provided with an inner cap 24 having an out-turned flange 25 at the lower edge thereof, and an outer cap 26 having a similar flange 27 spaced a short distance above flange 25. The inside of inner cap 24 conforms in shape closely to the upper end of electrode 15 and it may be a press fit thereon, and outer cap 26 similarly conforms to inner cap 24 upon which it is rigidly held by a joint of compression. The inner margin of a dielectric washer 28 is held under compression between flanges 25 and 27 and the inner margin of top 10 rests upon the outer margin of washer 28 with sufficient resilient pressure to provide a gas tight joint. The operation of this closure is the same as that shown in Fig. 1.

The example shown in Fig. 5 is similar to that shown in Fig. 4 with the exception that the inner margin of dielectric washer 29 is held under compression between spring ring 30 seated in groove 31 in electrode 15 and the lower end of electrode cap 32 upon the upper end of electrode 15 to which it is held by compression. The operation of this closure is the same as that shown in Fig. 1.

The example shown in Fig. 6 is similar to that shown in Fig. 1 with the exception that the joint between washer 33 and cap 34 is one of horizontal compression maintained by the pressure of the inner edge of the washer against the outside of the cap.

The example shown in Fig. 7 is similar to that shown in Fig. 6 with the exception that the outer margin of washer 33 is supported from below by the inner margin of a metal washer or support 35 having the outer margin thereof secured to the under side of top 10 by a fusion weld.

The example shown in Fig. 8 is similar to that shown in Fig. 6 with the exception that the inner margin of top 10 is provided with a recess 36 with which the outer edge of washer 37 conforms.

The example shown in Fig. 9 is similar to that shown in Fig. 7 with the exception that a conical washer 38 is held under compression between the under side of the conical inner margin of top 10 and the inner margin of an annular conical support 39 having the outer margin thereof offset upward and secured to the under side of top 10 by a fusion weld.

The example shown in Fig. 10 is similar to that shown in Fig. 6 with the exception that the lower edge of cap 40 is provided with scallops or a plurality of outwardly flared portions 41 that support the inner edge of washer 33.

The example shown in Fig. 11 is similar to that shown in Fig. 4 with the exception that the inner margin of top 10 is offset upward just outside of washer 28, and the outer margin of this washer is supported from below by the inner margin of metal washer or support 42 having the outer margin thereof secured to the underside of top 10 by a fusion weld.

The example shown in Fig. 12 is similar to that shown in Fig. 6 with the exception that cap 43 is provided with an annular exterior groove 44 in which the inner edge of washer 33 is securely held.

The outer margin of the metal top may be provided with an annular recess in which the upper edge of the can is securely held, and the joint may be flared to facilitate assembly and still further prevent relative displacement. An alternative form of this joint may comprise a similar recess in the upper edge of the can in which the outer margin of the metal top is secured.

The dielectric sealing washer may be of paper, rubber, fiber, pulpboard, or any similar or equivalent material, and when of porous material the pores may be either partially or entirely filled with a water-repellent material such as a mixture of equal parts of rosin and paraffin.

The dielectric sealing washer may be secured to the metal top or to the electrode cap or both. Also it may be held between the metal top and the electrode cap or carbon electrode and additional means may be provided to prevent relative movement between the washer and one or both of the electrodes. The dielectric washer may be flat, flared or conical to fit cooperating faces of a similar form on the metal top or electrode cap, or it may be formed to fit retaining recesses in either the top or cap or both.

As the metal top is resilient, gas pressure within the cell upon the under side of the metal top will move the inner margin upward unless it is securely held. When the joint between the washer and one of the electrodes is one of vertical compression, gas pressure within the cell will remove or reduce the closing pressure and provide an opening through which the gas within the cell may escape. It is not necessary to separate either of the surfaces from the washer to provide an opening to vent the cell gas as a reduction or partial removal of the closing pressure or compression is usually sufficient.

When the joint between the washer and one

of the electrodes is one of horizontal compression, gas pressure within the cell will cause relative movement between the surfaces under compression and provide sufficient opening for the escape of cell gas, as this gas when under pressure will escape through a very small opening.

The closures may be considered as the entire upper end of a cell comprising an insulated conductor for transmitting electric current there-through. In this case the dielectric washer is the insulator and the electrode cap is the conductor, and the entire closure comprises the metal top, dielectric washer, electrode cap, and any other means provided for supporting, restraining, or confining, the washer. Where no means is provided for the escape of cell gas through one of the joints of the closure, a different vent may be provided such as one of those already enumerated and acknowledged as known in the art.

The additional means provided to prevent relative movement between adjacent parts of the closure may be a flat annular member or ring secured to the metal top, a cup similar to the electrode cap, or both may be employed. The ring may have one margin, such as the outer, offset to provide space for the washer, or the electrode cap and the restraining cup may be provided with flanges between which one margin of the washer is held. The restraining means may also be a split resilient member, or spring ring, seated in an annular groove in the carbon electrode.

When the dielectric washer is held between the metal top and the electrode cap by a joint of horizontal compression, vertical movement of the washer with respect to the metal top may be prevented by providing the inner margin of the metal top with an annular groove or recess in which part or all of the outer edge of the washer is retained. Otherwise, the inner margin of the metal top may be provided with an annular rib that is embedded in the outer edge of the washer by the compression pressure of the joint.

Likewise, relative vertical movement between the washer and the metal top may be prevented by similar or equivalent expedients, and both may be employed to prevent relative vertical movement between the metal top and the electrode cap.

The drawings show the specific structure of a number of closures each embodying an example of the application of my invention to a dry cell.

While the invention may be applied to dry cells of any size, it is especially adapted to flashlight cells such as sizes C, D, E, and F, defined in Table I of the Circular of the Bureau of Standards, No. 390.

In all of the examples shown in Figs. 1 to 12, a metal top 10 is provided with an annular flared recess 11 in which a similarly flared upper end or edge 12 of a zinc can or container electrode 13 is securely held by a joint of compression, formed by crimping, rolling, or forming the outer margin 14 of the metal top 10 to the upper end 12 of can 13 to close the recess 11 thereon. In order not to increase the diameter of the cell the flared upper end 12 is offset inward so that the outer edge of the metal top does not project beyond the outer surface of the cylindrical can 13.

Various changes in shape, form, and relative arrangement of the component parts may be made so long as the function is retained, and other similar and equivalent materials may be employed without departing from the range of the invention or the scope of the claim.

I claim:

In a dry cell, an inner electrode comprising a carbon rod and a conductive cap on said carbon rod; an outer electrode comprising a zinc can and a conductive top having the outer margin thereof secured to said zinc can and the inner margin adjacent said inner electrode; and a preformed rigid dielectric washer having the inner margin thereof forming a compression joint with only said inner electrode and the outer margin thereof forming a compression joint with only said outer electrode.

PRICE DRUMMOND.

4

CERTIFICATE OF CORRECTION.

Patent No. 2,060,799.

November 17, 1937

PRICE DRUMMOND.

It is hereby certified that the name of the assignee in the above numbered patent was erroneously described and specified as "National Carbon Company, Inc.", whereas said name should have been described and specified as Union Carbide and Carbon Corporation, a corporation of New York, as assignee by mesne assignments, as shown by the records of assignments in this office; and page 3, second column, line 39, in the claim, for the words "adjacent said inner electrode" read thereof spaced outwardly from the outer surface of said cap; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 12th day of January, A. D. 1937.

Henry Van Arsdale

(Seal)

Acting Commissioner of Patents