

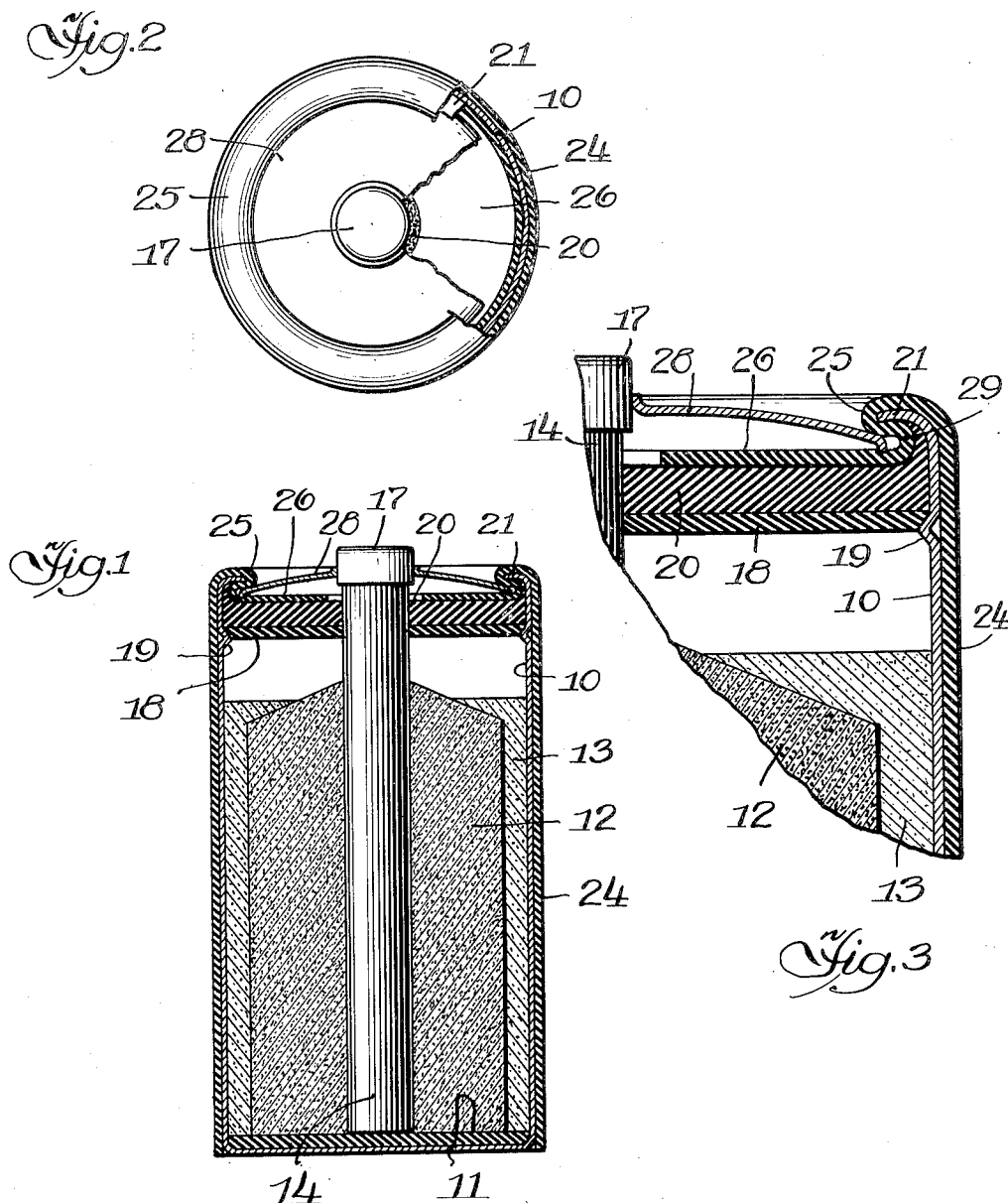
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DRY CELL SEAL CLOSURE

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DRY CELL SEAL CLOSURE

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1

This invention relates to improvements in dry cells and particularly dry cells of the type commonly used in flashlights in which an open-top metal cup serves as the negative electrode. The invention is directed to the provision of an improved seal closure for such a cell.

The principal object of the invention is to provide a seal closure which affords a superior seal against leakage of liquid from the cell and at the same time provides increased strength to resist damage which may be occasioned by shock or rough handling.

Another object of the invention is to provide a seal construction which lessens the danger of accidental short circuits between the positive and negative electrodes of the cell.

Another object of the invention is to provide an improved seal closure which is simple and easily constructed and economical in cost.

More specifically, it is the object of the invention to provide a dry cell having an open-top metal cup and a terminal, such as a carbon rod terminal, within the cup and spaced therefrom and a closure of sealing composition for the open top of the cup, in which the top portion of the cup projects above the seal closure and a non-conductive layer is folded over the projecting edge of the cup and extends downwardly against both the interior and exterior surfaces of the cup and inwardly from the cup in contact with the top surface of the seal closure. A stiff cover, which may be of metal, covers the sealing composition. The projecting portions of the cup and the non-conductive layer are turned inwardly to form an inwardly opening fold of the layer, and the outer portion of the stiff cover extends into the last mentioned fold and is held in position by the intumed portions of the cup and the layer.

Other objects and advantages will become apparent as the following description progresses. A preferred embodiment of the invention is illustrated in the accompanying drawing, in which:

Fig. 1 is an elevational view in section of the improved cell of the invention;

Fig. 2 is a plan view of the cell of Fig. 1 with a portion broken away, and

Fig. 3 is a fragmental enlargement of the view shown in Fig. 1.

In the dry cell illustrated, the metal negative electrode 10 is in the form of an open-top cup which may be composed of zinc. Upon the bottom of the cup is a layer 11 of non-conductive material such as pulpboard, paperboard or the like. Located centrally within the cup 10 and

2

resting upon layer 11 is the body 12 of depolarizing mix which may be composed of finely divided manganese dioxide and carbon moistened with electrolyte. Between the mix body 12 and the interior surface of the cup 10 is the body of electrolyte 13 which may be composed of an aqueous solution of ammonium chloride and zinc chloride substantially immobilized by a suitable substance such as gelatinized starch. Imbedded within the mix body 12 and projecting upwardly therefrom is a carbon rod positive electrode 14 which may have the conductive terminal cap 17 of metal such as brass fitting upon the top thereof. Spaced above the mix 12 and electrolyte 13 is the washer 18 of non-conductive material such as cardboard which fits against the surfaces of the cup and carbon rod 14 and may be supported by the inwardly projecting bead 19 formed in the cup 10. Upon the washer 18 is a relatively thick layer 20 of fusible sealing composition, which is preferably composed of a material which is plastic at ordinary temperature, such as pitch or asphalt, but may also be composed of a suitable wax. The sealing composition 20 is poured in the molten condition upon the washer 18 and makes adhesive sealing engagement with the cup 10 and carbon rod 14 to form a seal closure for the open top of the cup 10.

In accordance with the present invention, the top portion 21 of the cup 10 projects above the sealing composition 20. A jacket 24 of strong electrolyte-resistant, non-conductive material which is preferably liquid-impervious covers the exterior side wall of the cup 10 and fits snugly thereupon. The jacket 24 serves to protect the cell during handling and use and also to reduce leakage of liquid from the cell. It may be composed of a suitable strong material such as paper, paperboard or pulpboard, which may be impregnated with wax or may have an adherent coating or a separate thin covering of a material which is preferably liquid impervious. Suitable materials for the coating or covering are rubber, rubber hydrochloride, polyvinyl chloride, polyvinyl acetate, the copolymer of vinyl chloride and vinyl acetate, polyethylene, cellulose nitrate, cellulose acetate and the like.

The upper portion of jacket 24 extends beyond the top edge of the cup 10 and is folded at 25 down over said edge and against the interior surface of the projecting portion 21 of the cup. At the surface of the sealing composition 20 the said portion 25 of jacket 24 is turned inwardly for a substantial distance to form a seal reinforcing layer or extension 26 which rests in con-

3

tact with the upper surface of the sealing composition 20. The plastic asphalt or pitch composition 20 adheres to the extension 26 and the seal for the open top of the cup 10 is thereby reinforced against leakage of liquid from the cell.

A stiff, sheet-form cover 28, which is in the general form of a washer, fits tightly against the skirt portion of terminal 17 and has its outer portion resting upon the extension 26 of the jacket 24. The projecting portion 21 of cup 10 and the portion 25 of jacket 24 which is folded thereover are turned inwardly to form a second fold 23 in the jacket, which fold opens inwardly and receives the outer portion of the cover 28. Adequate radial clearance between the periphery of the cover and the inner extremity of the fold is provided to allow for tolerant eccentricity of the terminal 17. Such clearance avoids shifting of the terminal during the closure finishing operation. The cover is held firmly in position by the inturned projection 21 of the cup, the arrangement being such that the cover is clamped between the material of the jacket on the opposite sides of the cover. While the cover 28 is preferably composed of metal such as steel, it may also be composed of other suitable stiff, strong material, such as phenol-formaldehyde resin or other synthetic resin.

It has been found that the described construction provides superior resistance against leakage from the cell and at the same time provides high structural strength. It combines the advantages of a tight seal such as is provided by a plastic sealing composition such as asphalt with a strong protective cover such as is provided by metal. It also provides a strong, non-conductive top shoulder which increases the resistance against damage during handling and use and also minimizes the likelihood of short circuits between the positive and negative electrodes. The shoulder serves as a cushion against shock, and the recessed position of the plastic seal 20 with respect to the top edge of the cell also reduces the likelihood of damage to the seal due to rough handling. In addition, the folding of the jacket material at the top edge of the cup 10 serves to interlock the jacket with the cup and minimizes the likelihood of the jacket being displaced. The turning inward of the cup and jacket serves to lock the cover 28 in place and the jacket extension 26, being in adhesive contact with the top surface of the sealing composition 20, increases the resistance of the top closure against creepage of liquid to the outside of the cell.

While but a single embodiment of the invention has been illustrated and described, the invention is not limited thereto but embraces such departures as may be obvious to those skilled in the art, and is to be limited only in accordance with the scope of the appended claims.

What is claimed is:

1. In a dry cell having an open-top metal cup, an electrode within said cup and spaced therefrom, and a closure of sealing composition for the open top of said cup and making sealing engagement with said cup and said electrode, the improvement which comprises; the top portion of said cup projecting above said closure and being turned inwardly, a stiff apertured sheet-form cover for said closure through which said elec-

4

trode projects, means for holding said cover in fixed position comprising a non-conductive layer folded around and enclosing the outer peripheral edge portion of said cover and extending inwardly between said closure and said cover, said peripheral edge portion and said folded layer being pinched between said closure and said inwardly extending top portion of said cup.

2. A dry cell as claimed in claim 1 in which the outer peripheral edge of the cover is spaced inwardly from the interior surface of the non-conductive layer at the outer extremity of the fold thereof to provide edgewise latitude of position of said cover within said fold.

3. In a dry cell having an open-top metal cup, an electrode within said cup and spaced therefrom, and a closure of sealing composition for the open top of said cup and making sealing engagement with said cup and said electrode, the improvement which comprises; the top portion of said cup projecting above said closure and being turned inwardly, a stiff apertured sheet-form cover for said closure through which said electrode projects, means for holding said cover in fixed position comprising a non-conductive layer folded around and enclosing the outer peripheral edge portion of said cover and extending inwardly between said closure and said cover, said peripheral edge portion and said folded layer being pinched between said closure and said inwardly extending top portion of said cup, said layer extending continuously from said fold thereof between said cover and said inwardly extending top portion of said cup and thence around the top edge of said cup and downwardly upon the exterior of said cup to form a jacket for said cup.

4. In a dry cell having an open-top metal cup, an electrode within said cup and spaced therefrom, and a closure of sealing composition for the open top of said cup and making sealing engagement with said cup and said electrode, the improvement comprising; the top portion of said cup projecting above said closure and being turned inwardly, and a stiff sheet-form cover for said closure and making engagement with said electrode, means for holding said cover in fixed position comprising a non-conductive layer folded around and enclosing the outer peripheral edge portion of said cover and extending inwardly between said closure and said cover, said peripheral edge portion and said folded layer being pinched between said closure and said inwardly extending top portion of said cup.

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