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2,149,169

DRY CELL

Filed Nov. 30, 1934

FIG.1.

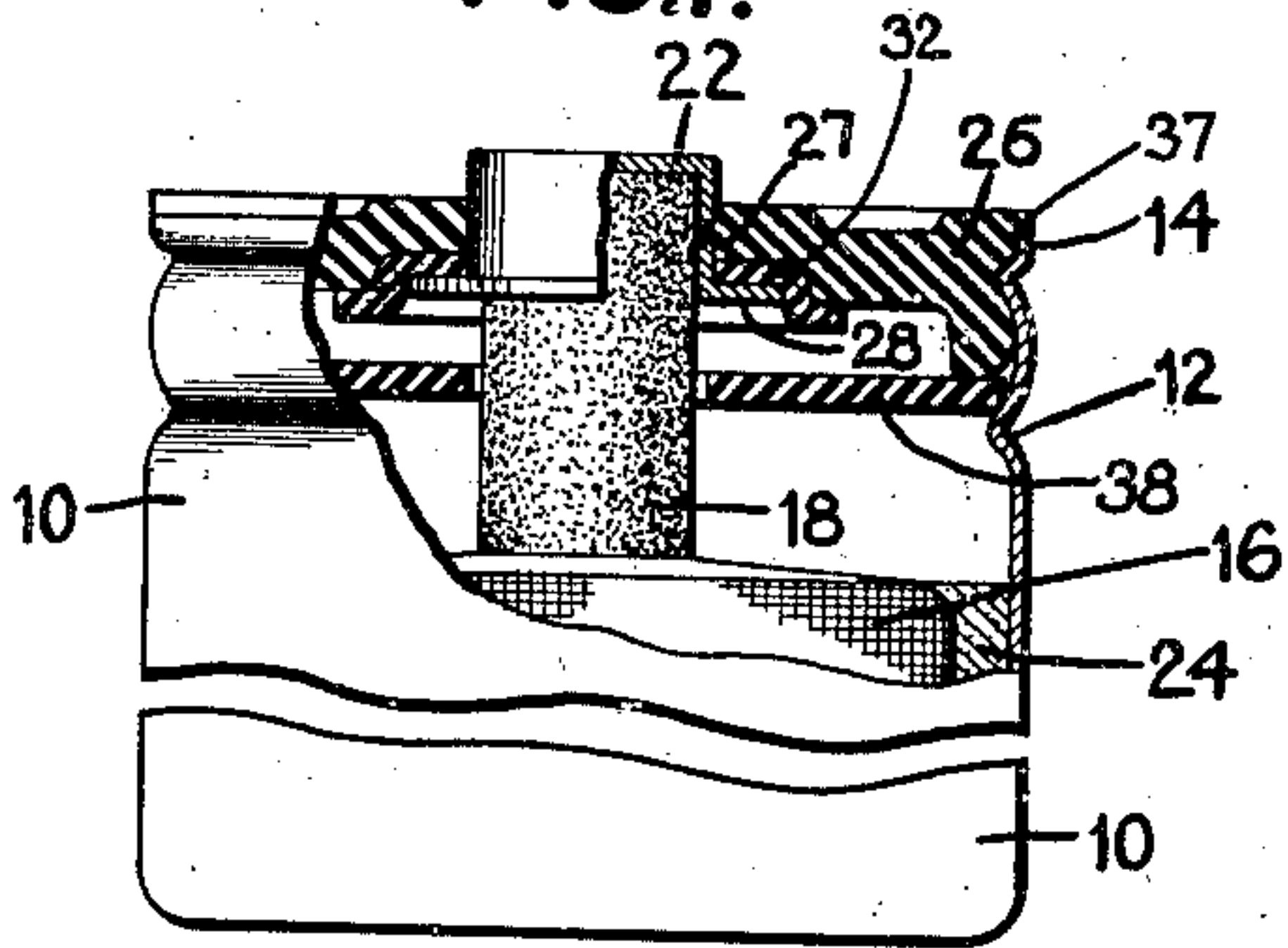


FIG.4.

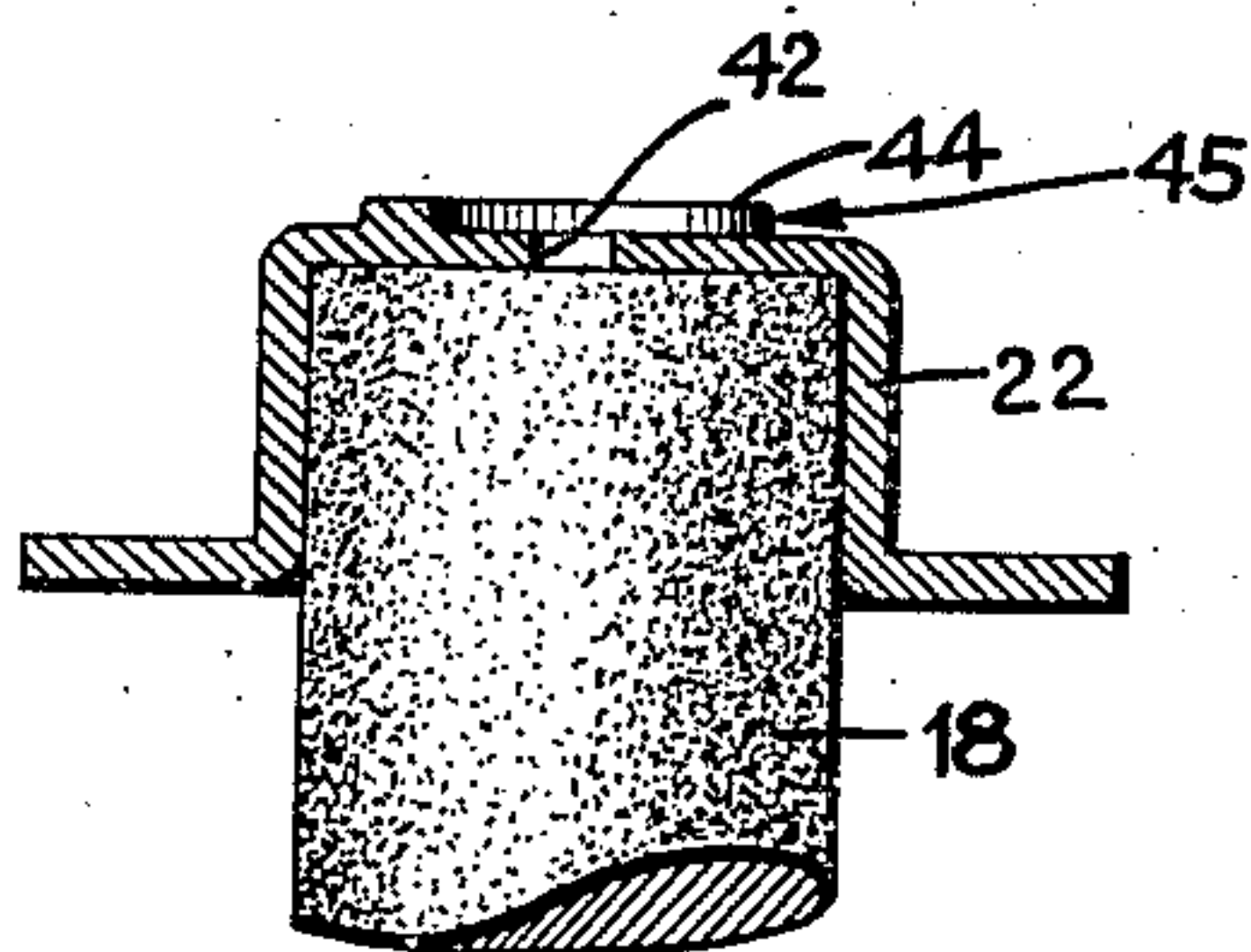


FIG.2.

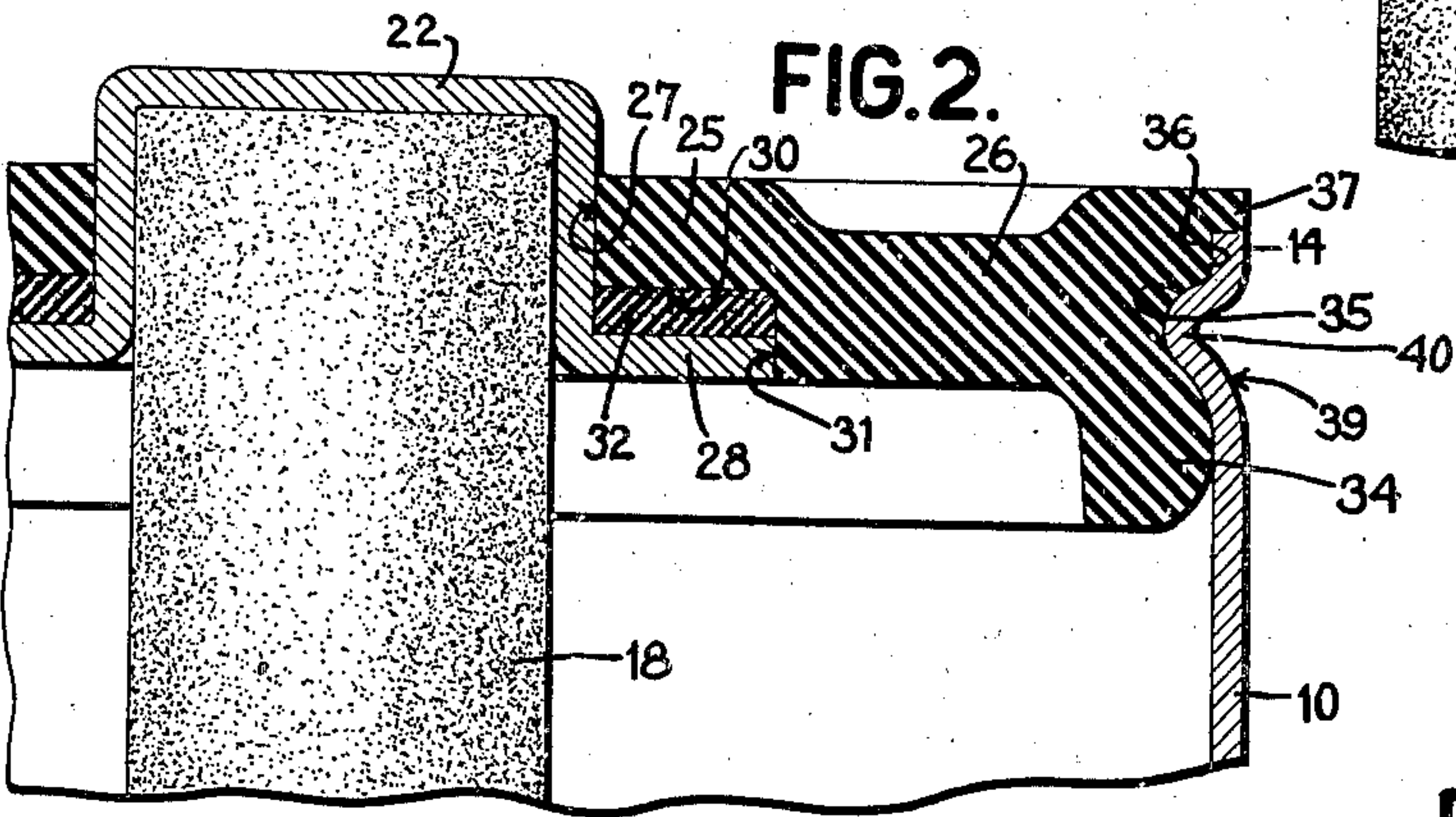


FIG.3.

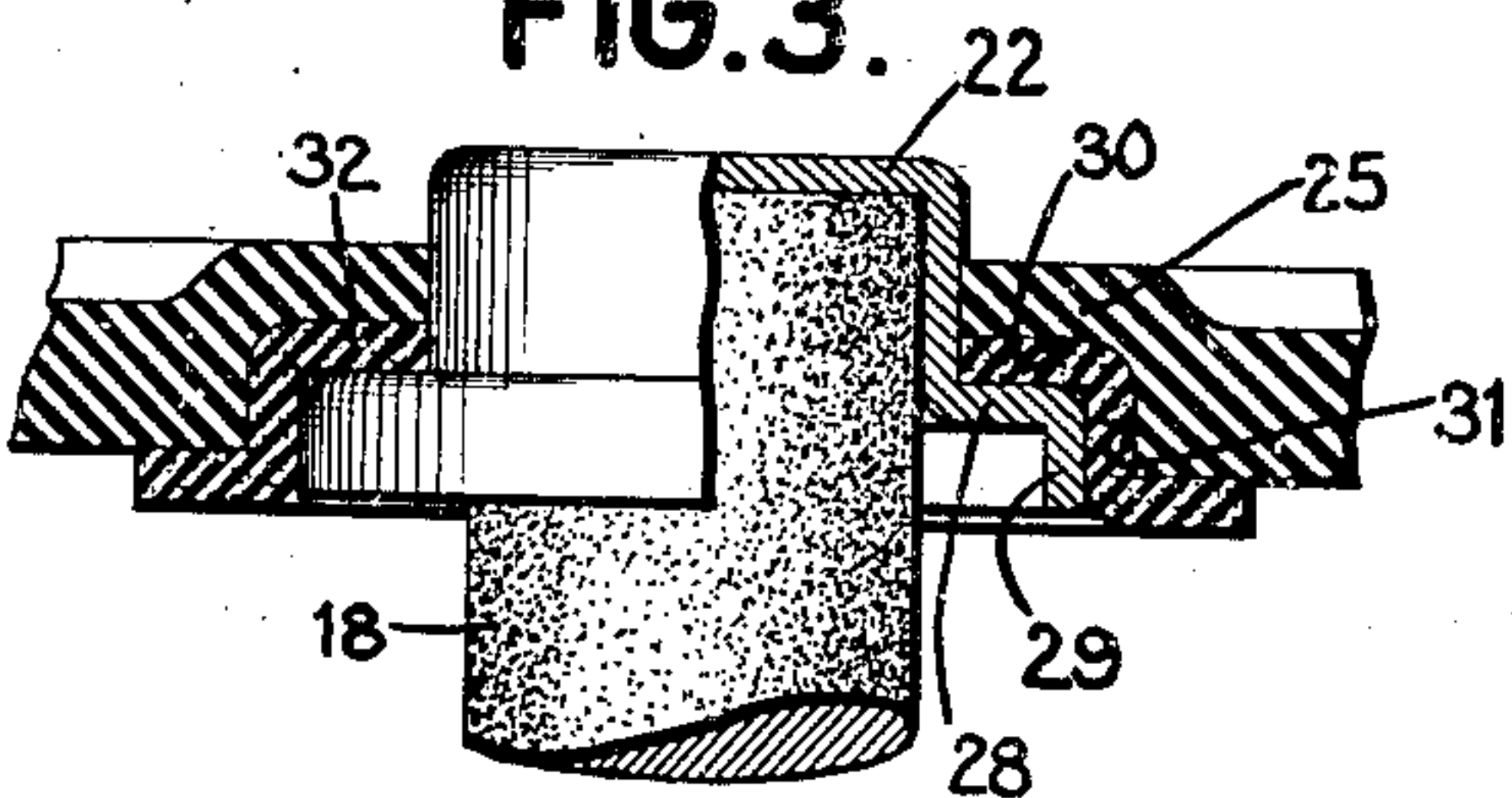
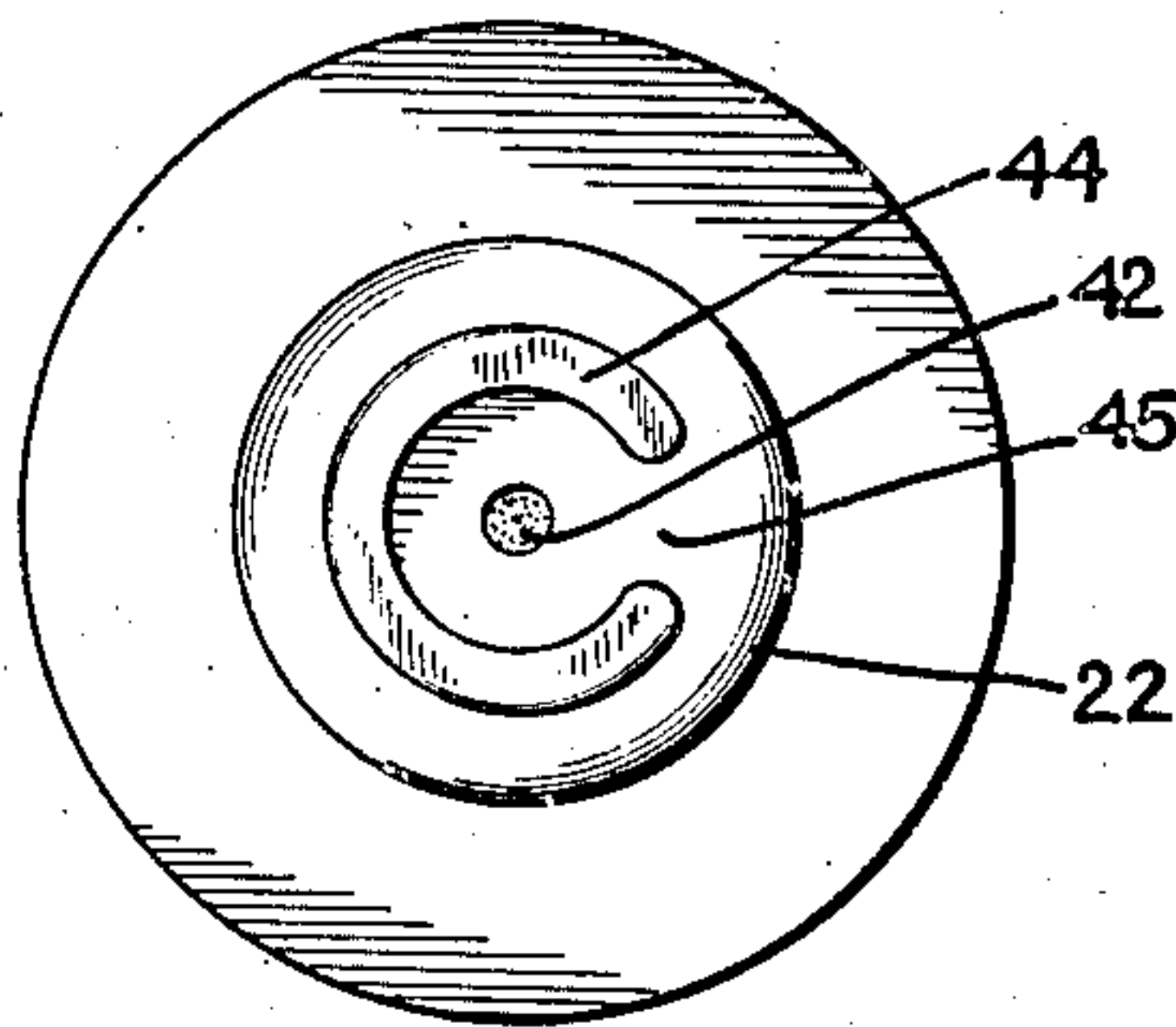


FIG.5.



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## UNITED STATES PATENT OFFICE

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## DRY CELL

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Application November 30, 1934, Serial No. 755,387

4 Claims. (Cl. 136—133)

This invention relates to dry cells and more particularly to small dry cells such as are used in connection with electric flashlights and hand lanterns, although not so limited.

The invention has for one of its objects a closure for the upper end of the dry cell cup.

Another object of the invention is a closure which shall prevent short circuit of the cell by the plane surface of a conductive member bridging the central terminal of the cell and the edge of its cup. Accordingly, the closure is so formed that its periphery overlies the rim of the cup so that a straight line tangent to the central terminal and to the edge of the cup will pass through material of the closure.

It is also an object of the invention to provide an effective seal for the flashlight cell irrespective of variations in the height of the carbon electrode. To this end, a gasket may be provided between the metallic cap on the end of the electrode and the closure and said gasket may, if desired, be so formed as to underlie the edge of the aperture in the closure through which the terminal passes so that irregularities in the height of the carbon electrode may be compensated for.

In one of its aspects, the invention contemplates, as an additional seal, a bushing or disc of insulating material of substantially the same diameter as the closure to be clamped with the closure on an inwardly directed shoulder on the cup wall.

The invention also seeks a dry cell having effective means for preventing either inward or outward displacement of the closure member and, if desired, also preventing outward displacement of the central carbon electrode.

Yet another object of the invention is the provision of a closure or sealing means for dry cells which is practical from the standpoint of ease and cheapness of manufacture and convenience, durability and reliability in use.

These and other objects of the invention and the means for their attainment will be more apparent from the following detailed description taken in connection with the accompanying drawing illustrating various embodiments by which the invention may be realized, and in which:

Figure 1 is a view showing a dry cell to which the invention is applied, parts being broken away and sectioned to illustrate details of construction;

Figure 2 is a fragmentary view on an enlarged scale, in vertical section, of the upper end of a dry cell to which the invention is applied;

Figure 3 is a detail view showing a modified form of seal for the central electrode;

Figure 4 is a detail view showing a metal cap formed with a vent for the central electrode, in cross section; and

Figure 5 is a plan view showing the cap of Figure 4.

The invention is shown as applied to so-called small dry cells of the type commonly employed in connection with electric hand lamps and flashlights, but is applicable in whole or in its several aspects to any dry cell. A metallic cup 10, conveniently of zinc, such as shown in Figures 1 and 2, has a groove rolled in the wall to form an inwardly directed bead or shoulder 12 proximate the rim 14 or mouth of the cup 10. Within the cup is disposed the cartridge 16 formed of a suitable matrix composition conveniently molded about an upwardly projecting carbon rod electrode 18. The cartridge is wrapped with suitable bibulous material which is fastened in position in any convenient manner, or it may be the so-called unwrapped bobbin. A metallic cap 22, say of brass, is placed on the upper or protruding end of the carbon electrode with a snug fit interposed between the side surface of the cartridge 16 and the side wall of the cup 10 is a suitable paste electrolyte 24. Obviously any other construction of dry cell is equally applicable in this conception.

After the cartridge has been inserted and, if desired, sealed in the cup, a closure member is applied thereto. In the illustrated embodiment, the closure member takes the form of a disc or top 26 of insulating material, say, of a synthetic resinoid composition, of material thickness and substantially inflexible. This closure 26 is formed with a central aperture 27 of a diameter such as to snugly receive and fit down over the metallic cap 22. As shown, the cap 22 is formed with a laterally extending flange 28 at its lower end on which the rim of the aperture 27 may rest, which flange may, in the embodiment of Figure 3, be provided with a downwardly depending annular cylindrical flange 29 for a purpose to be brought out hereinafter.

As shown, the closure is rabbeted therebeneath to form a cylindrical downwardly directed recess 30—31 formed by the horizontal surface 30 and the cylindrical wall 31 about the aperture 27 of a diameter sufficient to receive the flange 28 of Figures 1 and 2 or the flange 28 and cylindrical portion 29 of Figure 3, and while the portion of reduced thickness proximate the rim of the aperture 27 rests in effect on the flange of the cap, there is disposed therebetween a gasket 32 of suitable insulating and preferably elastic material to seal the joint. This gasket may, as shown in



Figure 3, be of a diameter greater than the cylindrical recess 30, 31 in the closure and be flexible so that it may be distorted when the closure is placed on the cap as shown in Figures 1 and 3 to seal not only the space beneath the surface 30 between the flange 28 and the rim of aperture 27, but also the space between the cylindrical wall 31 of the recess and the cylindrical or depending flange 29 on the cap. This flange 29 may actually depend as in Figure 3 or its equivalent, to a degree, may be formed in the edge of flange 28 as shown in Figure 1.

As shown, the closure is of relatively greater thickness proximate its periphery or it has what may be considered a depending peripheral flange 34, the lower end of which preferably rests upon the shoulder 12 on the inner wall of the cup as an additional seal. Obviously, the entire closure may have the thickness of the part 34. Above the lower edge of flange 34, and in its peripheral surface, the part 34 is circumferentially grooved, as at 35, and is formed outwardly with what may be considered its peripheral surface 36 equal in diameter to the interior diameter of the cup with an outwardly directed flange portion 37 in the plane of the upper surface of the top 26 extending outwardly a suitable distance and adapted to overlie the rim 14 of the cup. Preferably the periphery of flange 37 lies in the cylindrical plane of the container 10, as shown. When the closure is inserted within the cup, it may rest directly upon the bead 12 or, if desired, upon a gasket 38 resting upon the bead (Figure 1) and thereby sealing the joint more effectively in some situations. Obviously, the bead 12 may be dispensed with, in some situations, as shown in Figure 2.

After the top 26 is inserted in place on the shoulder, the cup is formed with a groove 39 which forces material of the wall into the form of an inwardly directed bead 40 into the peripheral groove 35 of the closure 26 to firmly lock the closure within the cup. This also serves as a seal. Where the closure is of a material such as contemplated in this application, the locking of the closure is most effective in producing a practical cell. Obviously, the groove 35 need not extend completely around the periphery of the closure but may be interrupted as desired and may, in effect, constitute one or a plurality of depressions of desired shape.

The groove 39 need not be preformed in the closure 26 but where the top is of flexible or distortable material the groove or other indentations may be rolled or otherwise formed in the wall of the cup after the closure is in place and material of the cup wall is pressed into the distortable closure as a shoulder 35 to lock it in place.

The flange 37, resting on the edge of the cup 10 effectively prevents simultaneous contact of a plane surface with both the central electrode 22 and the rim of the cup. By so forming the closure 26, short-circuiting of the cell by a plane surface is prevented and, when one cell is superimposed upon another in a flashlight (and these cells generally fit loosely within the flashlight) should the superimposed cell be displaced slightly, that is, should its axis lie at an angle with respect to the axis of the cell upon which it rests, the bottom of the cell will contact with the central electrode and with the non-conducting top and it will not touch the rim of the cup to short circuit the cell. This same advantage is obtained, for instance, when cells are carried loosely in the

pocket or in a tool box. This is an important advantage because dry cells in flashlights are frequently short-circuited and caused to leak by reason of the bridging of the electrode and the zinc cup.

A construction such as described will effectively seal the cell and prevent escape of all gases. It is contemplated, however, in some situations that the gases generated within the cell and which pass upwardly through the somewhat porous central carbon electrode 18 may escape through the brass cap. It has heretofore been proposed to perforate the brass cap to permit the escape of such gases, but when the cell is in use and the bottom of a superimposed cell rests on the brass cap 22, the aperture is effectively closed. To overcome such sealing of the aperture 42, a shoulder or raised portion 44 is formed on the cup of an area sufficient to form adequate electrical contact with the terminal of the cell thereabove but which is interrupted, as at 45, so that gases escaping from the aperture 42 within the raised portion 44 may escape through the gap 45 formed by interrupting the raised portion 44.

It will thus be seen that a dry cell has been provided which is easily and cheaply manufactured and which has advantages not found in prior constructions.

Various modifications will occur to those skilled in the art in the composition, configuration and disposition of the component elements going to make up the invention as a whole as well as in the selection and/or combination of the several component features in a dry cell, and no limitation is intended by the phraseology of the foregoing description or illustrations in the accompanying drawing except as indicated in the appended claims.

What is claimed is:—

1. In a dry cell, in combination, a metallic cup and a cartridge therein having an upwardly projecting substantially centrally disposed electrode, a metallic cap thereon formed with a laterally extending flange, a preformed closure comprised wholly of non-metallic material formed with a central aperture to receive the cap and a cylindrical recess in its surface the diameter of which is substantially equal to the diameter of the cap flange to receive the flange and a sealing gasket the diameter of which is substantially equal to the diameter of the cylindrical recess disposed between the upper surface of the flange and a surface of the recess.

2. In a dry cell, in combination, a metallic cup and a cartridge therein having an upwardly projecting substantially centrally disposed electrode, a metallic cap thereon formed with a laterally extending flange, a preformed closure comprised wholly of non-metallic material formed with a central aperture to receive the cap and a cylindrical recess in its surface the diameter of which is substantially equal to the diameter of the cap flange to receive the flange and a sealing gasket of substantially yielding material, the diameter of which is substantially equal to the diameter of the cylindrical recess, disposed between the upper surface of the flange and a surface of the recess.

3. In a dry cell, in combination, a metallic cup and a cartridge therein having an upwardly projecting substantially centrally disposed electrode, a metallic cap thereon formed with a laterally extending annular portion formed at its periphery with a downwardly extending cylindrical portion, a preformed closure comprised wholly



of non-metallic material formed with a central aperture to receive the cap and a cylindrical recess in its lower surface the diameter of which is in excess of the diameter of the downwardly extending cylindrical portion of the cap flange to receive the downwardly extending cylindrical portion and a sealing gasket, the diameter of which is in excess of the diameter of the cylindrical recess, disposed between the upper surface of the laterally extending portion and the outer surface of the cylindrical portion and the walls of the recess in the closure and to underlie at least a portion of the lower surface of the closure to seal the joint therebetween.

4. In a dry cell, in combination, a metallic cup and a cartridge therein having an upwardly projecting substantially centrally disposed electrode, a metallic cap thereon formed with a laterally extending annular portion formed at its periph-

ery with a downwardly extending cylindrical portion, a preformed closure comprised wholly of non-metallic material formed with a central aperture to receive the cap and a cylindrical recess in its lower surface the diameter of which is in excess of the diameter of the downwardly extending cylindrical portion of the cap flange to receive the downwardly extending cylindrical portion and a sealing gasket of substantially flexible material, the diameter of which is in excess of the diameter of the cylindrical recess, disposed between the upper surface of the laterally extending portion and the outer surface of the cylindrical portion and the walls of the recess in the closure and to underlie at least a portion of the lower surface of the closure to seal the joint therebetween.

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