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P. G. WALKER ET AL

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BOTTLE CAP

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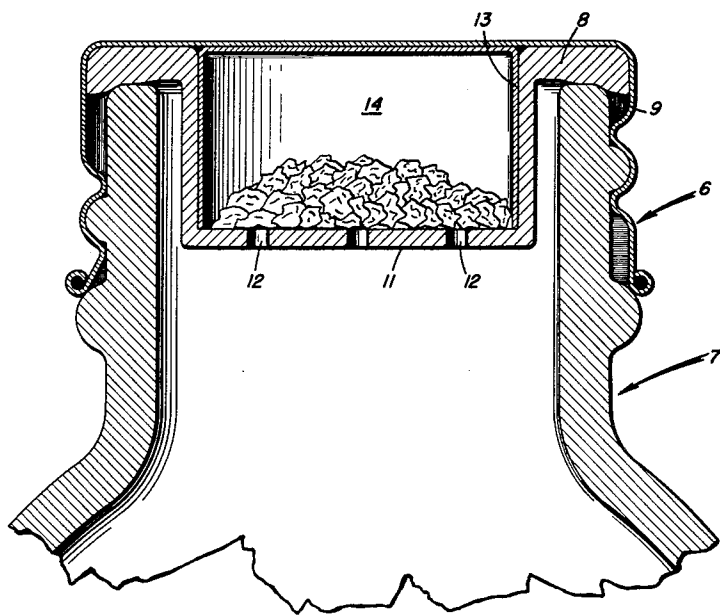


FIG. 1.

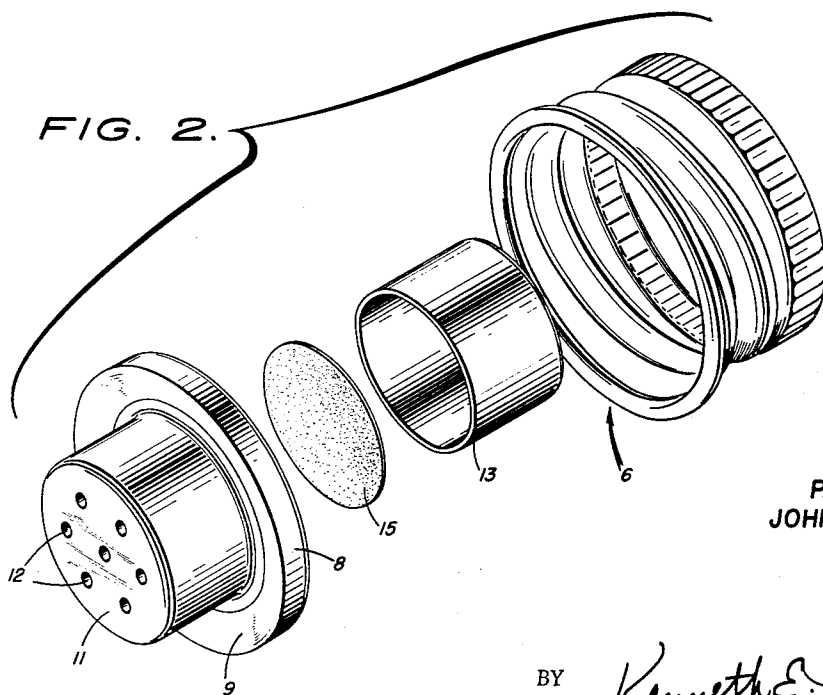


FIG. 2.

P. G. WALKER
JOHN D. BROWN
INVENTORS

BY

Kenneth E. Prince

ATTORNEY

1

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BOTTLE CAP

Percy G. Walker, Elkton, and John D. Brown, Baltimore, Md.; said Brown assignor to W. R. Grace & Co., New York, N.Y., a corporation of Connecticut
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This invention relates to a bottle closure of novel construction having a desiccant disposed therein for maintaining a low relative humidity within the bottle. In one specific aspect it relates to a device for disposing a desiccant in the empty space in a bottle out of contact with the contents thereof.

Drugs and chemicals of hygroscopic nature are usually bottled in an atmosphere of very low humidity to avoid inclusion of moisture within the container. However, each time the bottle is opened by the consumer for removal of a portion of the contents, atmospheric air is admitted to the container. This results in an increase in humidity within the bottle and eventual deterioration of the contents. In order to maintain a moisture-free atmosphere within the bottle after it has been opened, packagers frequently place therein a pill of desiccant material or a moisture-permeable capsule containing a desiccant. However, the danger always exists that the consumer may inadvertently take the desiccant pill or capsule. Since these desiccants often contain a cobalt salt to indicate exposure to humid atmospheres, ingestion of such materials can result in discomfort or serious illness.

The most satisfactory method of maintaining air within a bottle at a relatively low humidity would seem to be to attach desiccant material to the bottle cap in a manner which prevents its becoming readily detached. In fact, attempts have been made to develop a satisfactory cap of this type. Others have tried a cap having a perforated top adapted to receive a separate detachable desiccant chamber thereabove. All of said prior methods employ multi-component cap structures wherein the desiccant chamber consists of a separate unit mechanically integrated with the complete cap.

Some of these prior art structures have been structurally sound and would be operative for the desired purpose. However, they have not been accepted by the drug and chemical packaging houses because they involve the use of caps of extra size or shape. Their use would entail considerable expense and trouble in adapting present machinery to accommodate them and in making and handling cartons in which the bottles of packaged material are packed. The inconvenience of such change is of such magnitude that the present cap structures have not been acceptable.

In accordance with the present invention, there is now provided a cap structure having a desiccant chamber formed in a central portion of the liner and a desiccant material retained therein by means of a closure member. Thus, there is provided a combination liner and desiccant chamber which can be used with conventional bottle caps.

It is, therefore, an object of the present invention to provide an improved desiccant-containing closure cap for bottles.

It is another object to provide a simple means of maintaining a desiccant material in contact with the interior of a bottle without permitting its becoming admixed with the contents of the bottle.

With the foregoing and other objects in view which will appear as the description proceeds, the present invention now provides in combination a cap structure and unitary liner and desiccant container. The details of construction are hereinafter described and claimed.

In the drawings:

FIGURE 1 is a cross-sectional view of a bottle cap of

2

the present invention shown in association with a bottle. FIGURE 2 is an exploded view of the bottle cap of the present invention.

Referring to the drawings, the novel closure of the present invention includes a cap shown generally at 6, and adapted for association with the mouth of a bottle shown generally at 7. The seal between the bottle and the cap 6 is made by means of an annular gasket or liner 8 adapted to replace the conventional liner and having formed on its face at the outer edge thereof a bead 9. This liner is made of resilient material such as polyethylene or the like so that pressure exerted at the lip of the bottle adjacent the bead 9 will deform the liner 8 to produce a perfect seal. Integral with and depending from annular liner 8 at its inner edge is a cup-shaped member 11 adapted to be received within the neck of bottle 7 and having perforations 12 in a least a lower portion thereof. At least an upper portion of cup 11 is of uniform diameter so that closure cup 13 fits snugly into depending cup 11 to form therewith a closed chamber 14 into which desiccant may be received.

The bottle closure 6 is a conventional bottle cap and may be of plastic or metal as desired but does not include the usual paper liner. Resilient liner 8 is preferably of elastomeric material such as polyethylene, so that the liner, bead, and depending desiccant container may be molded as an integral part.

Closure cup 13 is preferably formed from a malleable metal, such as aluminum. This permits this member to be drawn very thin and still retain sufficient rigidity to be inserted into the upper portion of cup 11. However, closure cup 13 may be molded from relatively hard plastic. The outer diameter of closure cup 13 is substantially the same as the inner uniform diameter of the upper portion of cup 11 so that a snug fit results. The assembly is usually made by filling closure cup 13 in upright position with the desiccant and cup 11, with or without a dust liner 15, is slipped over cup 13. This prevents overfilling of cup 11 and presents less interference in assembling cups 11 and 13. The entire assembly is inserted in bottle cap 6, or the assembly may be inserted in the bottle mouth and cap 6 placed thereon. The outside diameter of cup 11 is such that it fits readily into the neck of the bottle to which the cap is applied.

Any suitable desiccant material, such as silica gel, activated alumina, magnesia, desiccating clays, or mixtures thereof, may be used in the present invention. If the desiccant has a tendency to dust, it is desirable to use a porous dust liner 15 in cup 11 to permit the passage of air but prevent dust from passing through perforations 12.

It is within the contemplation of the present invention to use a cap of any desirable material or shape. Thus, while the drawings show a metal interiorly threaded cap, other materials of construction may be used and it may be mechanically associated with the bottle by means other than threads.

It is readily seen from the drawings and the foregoing description that the present invention provides a bottle closure of conventional shape and size which may be used without interference with the normal filling and capping operations employed in the packaging of the materials. The combination cap-liner and desiccant chamber may be filled and assembled elsewhere and shipped to the user who only has to alter his operations to the extent of keeping the closure assemblies away from moist air. If the packaging operation is carried out in a relatively low humidity, the desiccant cap assemblies can be used in the same manner employed with conventional closures. Alternatively, the entire closure assembly may be preassembled and shipped to the user. Obviously the desiccant-filled assembly must be stored out of contact with moist air.

3

While the desiccant cup 11 is shown with a conventional shape of cylindrical sidewalls and a flat bottom, the cup may be formed with a rounded bottom. It is essential, however, that the upper portion of the desiccant cup 11 have a uniform interior diameter so that it forms a snug fit with cup 13. Cup 13 should have a flat bottom and its sidewalls should be no higher than the interior height of sidewalls of cup 11. This insures a good fit when the assembly is associated with cap 6.

We claim:

1. The combination with a threaded bottle cap of a resilient annular liner having a flat upper face, and a trigonal bead at the outer edge of the lower surface forming a dished under-surface, said bead being adapted to overhang the mouth of a bottle to which it is applied and to be deformed under compression to form a seal between the threaded cap and bottle, a perforate-bottomed cup integral with and depending from the inner edge of said annular liner, and an inverted cup telescopically associated with said depending cup to form therewith a desiccant chamber in communication with the atmosphere only through the perforations in the bottom of said depending cup.

2. The combination with a threaded bottle cap of an annular resilient liner, a perforate-bottomed cylindrical cup depending from the inner periphery of said annular liner and formed integral therewith, said liner having an upper flat surface for maximum contact with the inside of said cap and an underside in the form of an outwardly extending flange adjacent said cup adapted to cover the mouth of a bottle to which said cap is applied and having a generally trigonal peripheral bead with its greatest

4

thickness at the periphery of said liner whereby initial contact between said liner and the top of a bottle to which it is applied is on said bead, said liner being adapted for deformation under compression to form an airtight seal, a dust-proof porous diaphragm in the bottom of said cup, and an inverted cup associated with said depending cup to form a desiccant chamber communicating with the interior of said bottle by means of the perforations in the bottom.

3. In combination with a bottle and a screw cap closure therefor, a resilient annular liner having a perforate-bottomed cup depending from its inner peripheral edge, a flat upper surface for contact with the inner surface of said cap, and a lower surface having an annular flat portion extending outwardly from the side wall of said cup and merging at its outer edge with a peripheral bead of trigonal cross-section adapted for initial contact with the outer rim of the mouth of said bottle and for deformation under pressure to form a perfect seal between the said cap and said bottle, and an inverted cup telescopically associated with said depending cup forming therewith a desiccant chamber closed except for said perforations.

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