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3,074,579

COMBINATION CLOSURE CAP AND STOPPER

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Fig. 1.

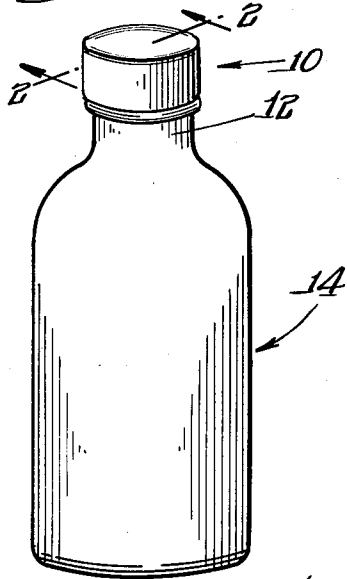


Fig. 2.

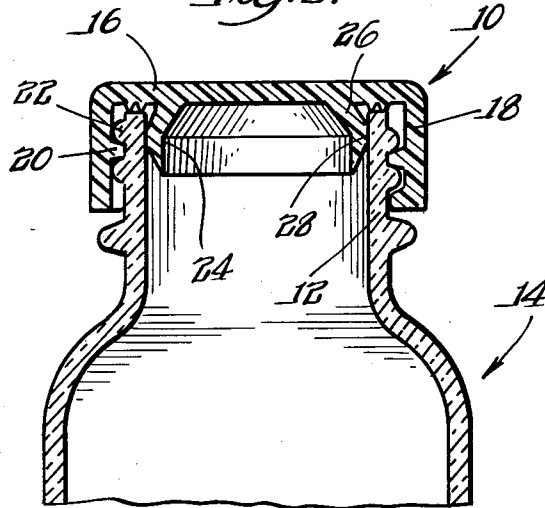


Fig. 3.

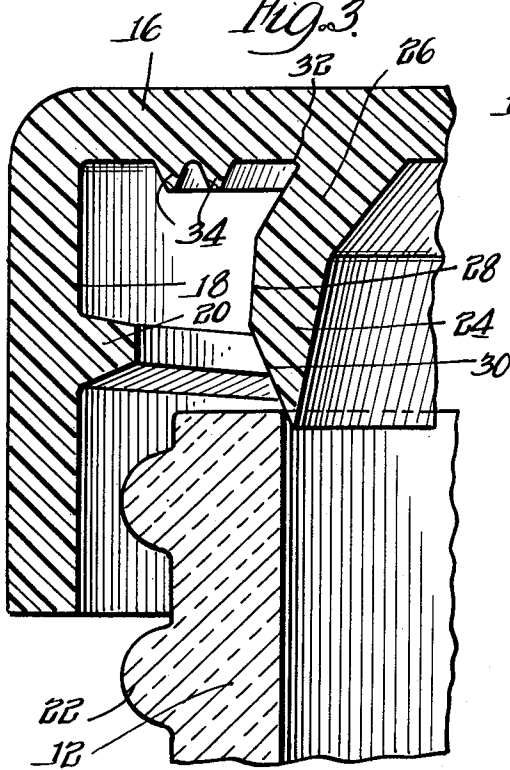
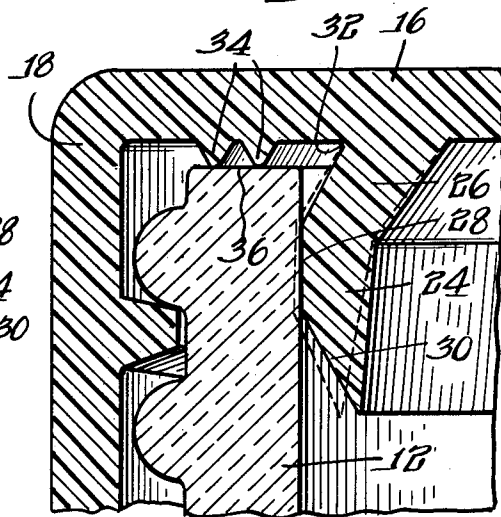


Fig. 4.



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COMBINATION CLOSURE CAP AND STOPPER
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This invention relates generally to closure caps for bottles and other necked containers and especially to a combination closure cap and stopper.

Numerous closures have been devised for bottles and similar necked containers. Various arranged caps have been employed in certain situations while stoppers have been used in others. Attempts have also been made to form a closure cap with an integral stopper in order to increase the sealing efficiency of the resultant unit.

In one conventional type of combined closure cap and stopper, a threaded cap is used to drive a tapered, integral stopper into the neck of a bottle. However, tight engagement of such a stopper frequently causes the top of the cap to bulge in an unsightly manner; and the presence of such a bulge has led many consumers to question the quality of products thus contained.

In another conventional type of combined closure cap and stopper, a stopper element having cylindrical side-walls is incorporated; and the sealing efficiency of a closure so arranged has been found to be dependent upon obtaining a press fit of the stopper in the bottle neck. Manufacturers of glass bottles, in particular, do not maintain close tolerances on the inside diameter of the bottle neck; and even under special circumstances, a tolerance of as much as 0.010 inch has been observed. It will be recognized that such dimensional variations seriously effect the efficiency of the seal which can be secured and maintained by the prior art closure cap and stopper combinations incorporating a cylindrical stopper.

Accordingly, an important object of the present invention is to provide a new and improved closure cap which overcomes the limitations of the prior art by being more adaptable to dimensional variations in the neck of the container.

Another object of the invention is to provide a combined closure cap and stopper which possesses little tendency to bulge the top of the cap when the stopper engages the inside of the neck of a container.

Yet another object of the invention is to provide a closure cap which displays improved sealing efficiency.

A further object of the invention is to provide a closure cap which is resistant to being popped out by expansion of the contained product.

Additional objects and features of the invention pertain to the particular structure and arrangements whereby the above objects are attained.

A structure in accord with the invention includes cup means adapted to engage the exterior surface of the neck of a bottle, skirt means disposed concentrically within the cup means and having a bearing portion adapted to engage the interior surface of the neck resiliently, and a frusto-conical collar joined between the cup means and the skirt means so as to define a tapering, annular relief at the juncture of the collar and the cup means.

The invention, both to its structure and mode of operation, will be better understood by reference to the following disclosure and drawing forming a part thereof wherein:

FIG. 1 is a perspective view of a bottle closed by means of a cap constructed in accordance with the present invention;

FIG. 2 is an enlarged view taken through the section 2-2 of FIG. 1;

FIG. 3 is a fragmentary, further enlarged view of the bottle and cap of FIG. 1, showing the skirt means entering the neck of the bottle; and

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FIG. 4 is a fragmentary, cross-sectional view similar to the showing of FIG. 3, illustrating the cap completely closing the bottle.

One important use of the closure cap of the invention is in the art of glass bottles; and hereinafter, such art will be used for purposes of explanation and illustration without intending to limit the application and uses of the invention in any way. It is to be recognized that the closure cap of the invention may be equally well used with plastic bottles, necked metal containers and other similar receptacles.

Referring now in detail to the drawing wherein a single embodiment of the invention is shown, a closure cap indicated generally at 10 will be seen closing off the neck 12 of a glass bottle illustrated generally at 14.

The closure cap 10 includes a cup made up of a disc 16 and a cylindrical wall 18 fixed to the edge of the disc. The interior of wall 18 may be provided with threads 20 for engaging cooperating threads 22 provided on the exterior surface of the neck 12.

The closure cap 10 also includes a flexible skirt 24 which is connected to the disc 16 by a frusto-conical collar 26. Skirt 24 is arranged concentrically within and spaced-apart from the cylindrical wall 18 in order that a cylindrical bearing portion 28 can engage the interior surface of the neck 12.

In accordance with a feature of the invention, the diameter of the bearing portion 28 is arranged to exceed the internal diameter of the neck 12. Accordingly, it has proved advantageous to incorporate a bevel 30 at the free end of skirt 24 for leading the skirt into the neck 12. As will be recognized, the skirt 24 is radially compressed by entering into the neck 12.

As is shown in the several figures, the innermost surfaces of skirt 24 and collar 26 are arranged to exceed, in total area, the surface of bevel 30. Accordingly, product expansions occasioned, as for example by exposure to elevated temperatures, tend to force the bearing portion 28 more tightly against the interior surface of neck 12. The closure cap 10 is thus rendered resistant to being popped out or off by such product expansions.

In accordance with a further feature of the invention, the collar 26 is arranged to be frusto-conical in shape and is directed to possess a major diameter which coincides with the diameter of skirt 24 so as to define a tapering, annular relief 32 at the juncture of disc 16 and collar 26. The relief 32 cooperates in rendering the skirt 24 flexible for ready entrance into the neck 12 and for resilient engagement therewith.

It has also proved advantageous to include one or more annular sealing ribs 34 concentrically on the disc 16 between wall 18 and skirt 24. The ribs 34 are appropriately arranged to abut the end surface 36 of neck 12 when the closure cap 10 completely closes the bottle 14. Ribs 34 may take triangular cross-sectional shape, as shown, or any other advantageous shape.

The desired flexibility of the closure cap of the invention has been found to be enhanced by fabricating the unit from a resiliently deformable, resinous plastic material, such as for example high-pressure process polyethylene. However, other polyolefins, nylon and other similarly flexible materials may also be employed. When such materials are used, the closure cap of the invention can be readily formed in an integral unit by molding.

Having thus described one construction of the invention, it is important now to state how the illustrated embodiment operates. Referring first to FIG. 3, it will be seen that, when the cap 10 is placed over the neck 12, the bevel 30 of skirt 24 will readily enter the neck 12. Then as the threads 20 are directed into engagement with the threads 22, the skirt 24 will be led into the neck 12.

Eventually, the bearing portion 28 will engage the in-

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terior surface of the neck 12; and since the skirt 24 is of greater diameter than the inside diameter of neck 12, the bearing portion 28 will wedgedly engage the interior surface of neck 12. It is important to point out that the flexure occasioned by the provision of collar 26 permits skirt 24 to engage the neck 12 resiliently and thereby effectively to seal bottles whose inside neck diameter varies slightly from a standard dimension. Thus, the seal afforded by cap 10 is not seriously effected by variations in the inside diameter of the neck 12. As will be recognized, the resiliency of skirt 24 also tends to compensate for any out-of-roundness of the interior of neck 12.

After the bearing portion 28 has been led into engagement with the interior surface of the neck 12, continued turning of the cap 10 will finally result in ribs 34 engaging the end surface 36 of neck 12. This arrangement is illustrated in FIG. 4 which also shows the engagement of bearing portion 28 and neck 12 in solid outline and the normal disposition of skirt 24 in broken outline.

Due to the resilient nature of the material from which the cap 10 is fabricated, the closing torque employed in affixing the closure cap 10 will result in slight axial compression of the ribs 24 and concomitant distortion in order to attain additional sealing properties.

The specific example herein shown and described is illustrative only. Various changes in structure will, no doubt, occur to those skilled in the art; and these changes are to be understood as forming a part of this invention insofar as they fall within the spirit and scope of the appended claims.

The invention is claimed as follows:

1. A closure cap comprising: cup means adapted to receive the discharge end of a necked container including a disc and an annular wall fixed to the disc; flexible skirt means depending from said cup means and spaced radially inwardly of and disposed concentrically with said an-

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nular wall; said skirt means including a generally cylindrical bearing portion initially of greater outside diameter than the inside diameter of the neck of the container and connected to the disc by a collar portion merging into said disc at an acute angle facing outwardly and having a major diameter which coincides with a diameter of said bearing portion to define a tapering annular relief between said bearing portion and said disc; said generally cylindrical bearing portion terminating in a relieved free end portion facilitating entry of the skirt means into the neck of the container with the bearing portion engaging the neck of the container throughout an annular area of contact of substantial vertical extent; and annular rib means raised from said disc and disposed concentrically between said annular wall and said skirt means for sealingly abutting the end surface of said container, said disc cooperating with said collar portion to define force-transmitting means acting between said rib means and throughout the annular area of contact between the neck of the container and said bearing portion whereby forces acting between said end surface and said rib means tend radially to expand said bearing portion against said neck throughout the said annular area of contact and forces acting between said bearing portion and said neck tend to urge said rib means against said end surface.

2. A closure cap as claimed in claim 1, wherein said cup means, said skirt means and said rib means are formed as an integral unit from a resiliently deformable resinous plastic material.

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