

[54] BOTTLE CLOSURE

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[51] Int. Cl. B65d 39/00

[58] Field of Search 215/63, 64, 72, 99, 232;
53/39; 156/64, 69, 73

[56]

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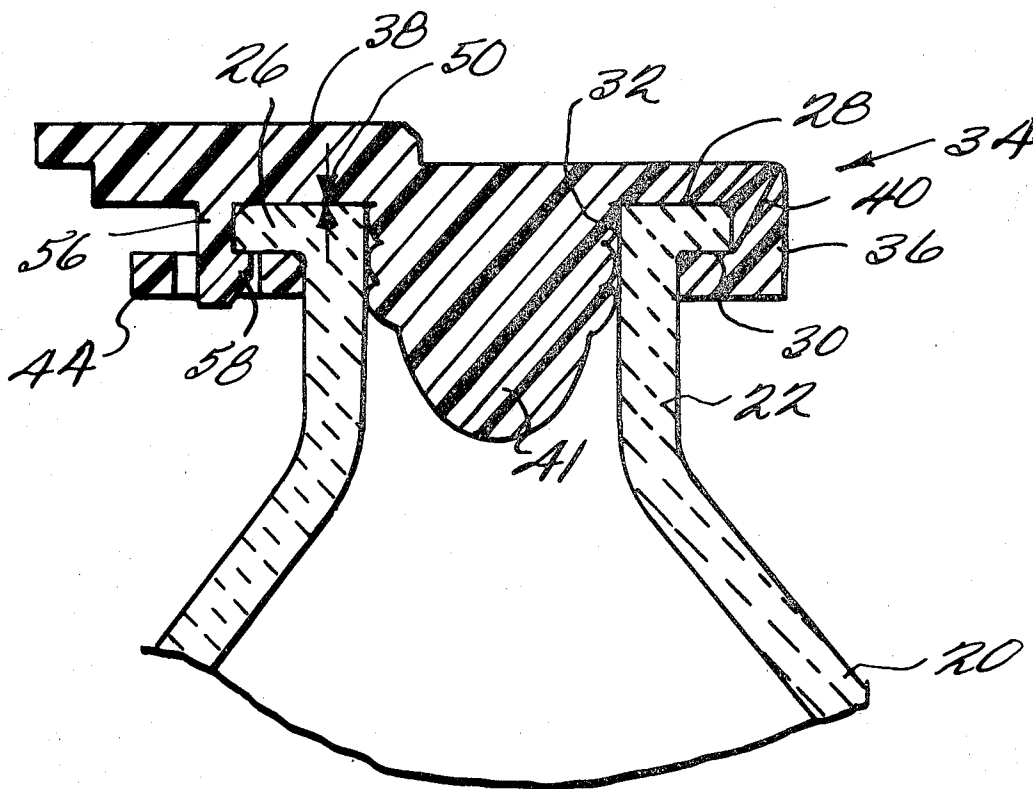
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[57]

ABSTRACT

A bottle closure having a stopper which extends into the bottle opening to seal (and/or hermetically seal) the same and a collar or cap attached to the stopper and also sonically welded to the flange of the bottle extending about the opening so as to effect a vacuum seal (or partial seal) for volatiles and perishables and also to insure the integrity of the package against tampering for all types of seals where in the weld can be easily checked by application of torque to the cap collar.

9 Claims, 7 Drawing Figures



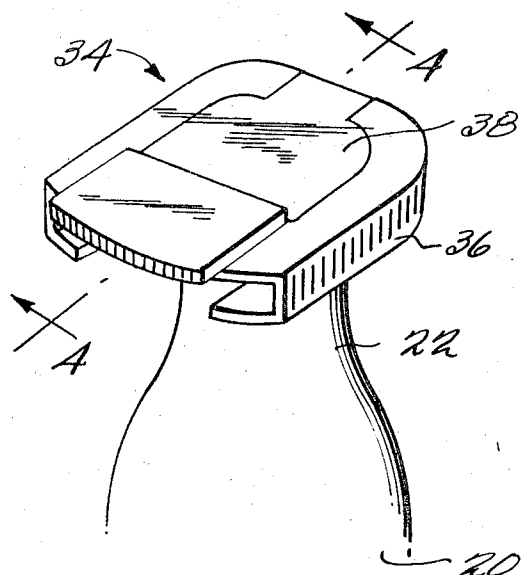


Fig. 1

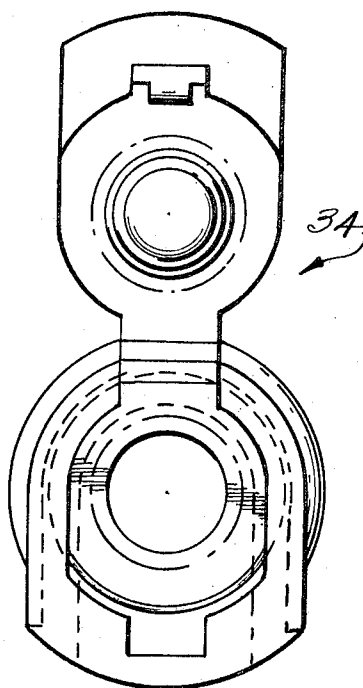


Fig. 2

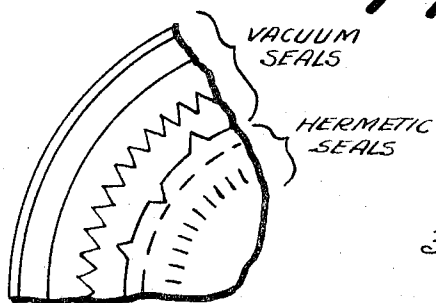


Fig. 7

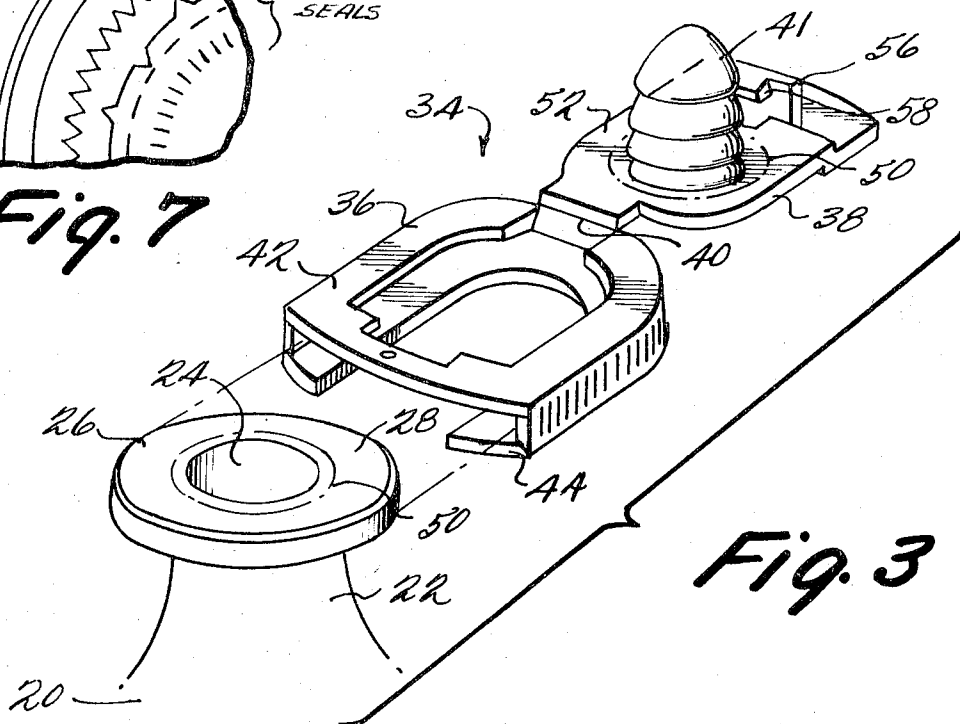


Fig. 3

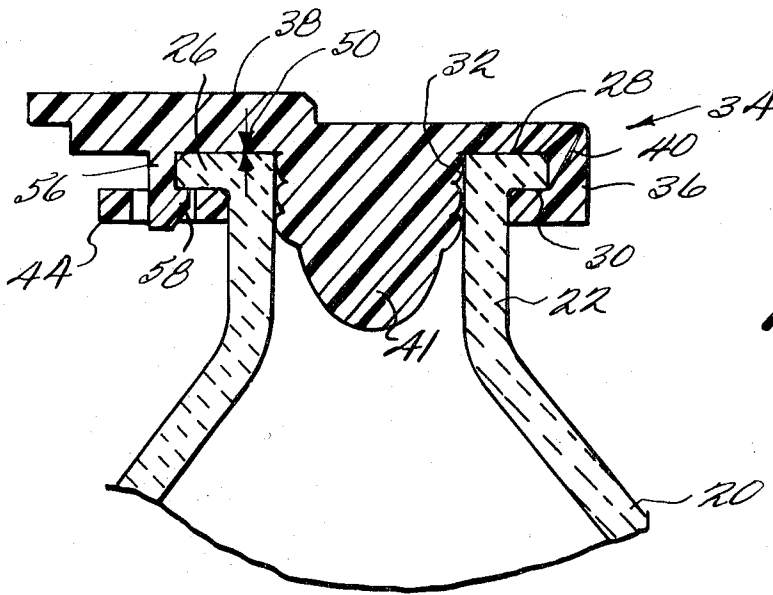


Fig. 4

Fig. 5

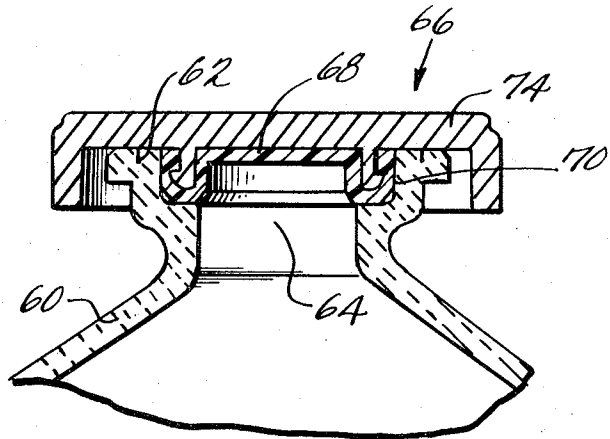
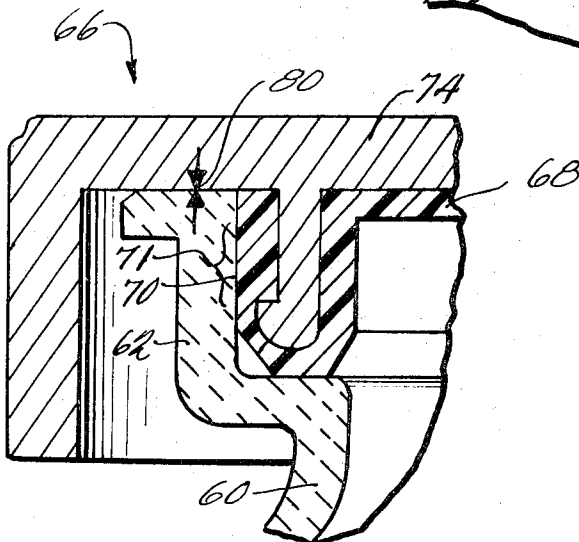


Fig. 6

BOTTLE CLOSURE

BRIEF DESCRIPTION OF THE PRIOR ART AND SUMMARY OF THE INVENTION

The invention relates to an improved closure for a bottle.

A wide variety of products are now vended in bottles which are closed by a cap at an opening thereof which terminates a neck portion. Usually, the cap is simply forced over a flange surrounding the opening of the bottle with some mechanism such as a gasket or the like providing sealing, particularly with products which are volatile or which are stored under a vacuum. Failure of the cap seal usually results in rendering the stored product worthless for its intended use. Unfortunately, it is very difficult or impossible with caps now in use to ascertain by inspection whether the seal has failed. This can be accomplished only by actually opening the product and this cannot normally be done before purchase and usually not until just before the intended use.

Caps have been suggested in the past which are altered in some physical way when the seal is broken. For example, in the patents to Leech, U.S. Pat. No. 2,961,119, and Hazard, U.S. Pat. No. 3,651,992, the closures are held in a physically fixed position with respect to the bottle so long as they are in a sealed condition. However, once the seal is broken, the caps are freely rotatable thereafter with respect to the bottle. These designs, while an improvement over simple caps as discussed above, have a number of drawbacks. First, it is not as simple as would be desired to check the physical condition of the cap. Second, the designs are too complex to be economically competitive with existing caps.

The present invention relates to a bottle closure of this type which has a very simple and effective design, and which provides quick and simple test of the sealing of the bottle which can be carried out before use and without necessarily breaking that seal.

The closure of this invention includes a stopper which extends down into the opening of the bottle and provides a seal for the same which can be reinserted after some of the contents have been removed from the bottle. The closure also includes a collar or cap which is attached to the stopper and which has a surface extending circumferentially for at least a portion of the circumference about the flange surrounding the bottle opening, so that the collar or cap is freely rotatable with respect to the bottle. An extending surface of the bottle closure engages a surface of the flange and is sonically welded over at least part of its surface to the flange so that the sonic seal can be tested by applying a torque to the collar or cap. The sonic seal can provide either a hermetic or vacuum seal. If the collar or cap freely rotates in whole or part, then the sonic seal is no longer effective, and the seal of the closure can be considered to have been broken.

In one embodiment, as discussed in detail below, the collar and stopper are formed in a unitary plastic or other construction with the collar having surfaces engaging the upper and lower surfaces of the flange for at least a portion of the circumference of the flange so that the bottle can, if desired, be carried by the closure without the closure being vertically pulled from the opening. The stopper includes a surface extending

about the portion which fits down into the opening and a ring about this portion extending down into the opening is sonically welded to the upper surface of the flange to provide the desired seal. The construction also preferably includes a latch member on the stopper portion which engages the under surface of the flange for providing an effective re-seal of the cap following initial use.

According to a second embodiment of the invention, as also discussed in detail below, the closure includes a grommet of latex or other flexible material which extends into the opening, engaging in preferably hermetic seal the interior surface of the flange and a cap which is fixed to the grommet but rotatable with respect thereto. A surface of the cap extends in contact with the upper surface of the flange and is at least in part sonically welded to that upper surface for providing a seal so that the integrity of the closure can be readily ascertained by the application of a torque. If the upper cap is rotatable, then the sonic seal has been broken.

Many other objects and purposes of the invention will be clear from the following detailed description of the drawing.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 shows a perspective view of one embodiment of the invention of this application in use on a bottle.

FIG. 2 shows a top view of the closure of this invention in the open position.

FIG. 3 shows a perspective view of the closure of this invention illustrating the manner in which the closure can be applied to a bottle having a flange about its opening.

FIG. 4 illustrates a cut-away view of the closure of FIG. 1 along the lines 4—4.

FIG. 5 illustrates a cut-away view of a further embodiment of the invention of this application.

FIG. 6 illustrates a close-up of a portion of the embodiment of FIG. 5.

FIG. 7 shows a number of different vacuum and hermetic seal configurations.

DETAILED DESCRIPTION OF THE DRAWINGS

Reference is now made to FIGS. 1—4 which illustrate one embodiment of the invention of this application. As can be seen best in FIGS. 1, 3 and 4, this embodiment is designed particularly for use with a bottle 20 having a neck 22 terminating in an opening 24 which is surrounded by a flange 26 having an upper surface 28, a lower surface 30 and an interior surface 32.

The closure 34 is of unitary construction, preferably of plastic such as polypropylene or styrene acrylonitrile, and is composed of a collar 36 and a stopper 38 which are pivotably connected together at a hinge 40 according to well known techniques in the art of forming plastic structures of this type.

Stopper 38 includes a portion 41, having a number of circumferential rings, which extends into opening 24 engaging the interior surface 32 of flange 26 to provide a good seal. If desired a grommet of latex or other material providing a hermetic seal can also be employed about stopper 38. Collar 36 includes an upper surface 42 and a lower surface 44 which respectively engage the upper and lower surfaces 28 and 30 of flange 26 about a substantial portion of the periphery as can be

seen best in FIG. 3, so that collar 36 cannot be removed by application of a vertical force. Thus, bottle 20 can be safely carried by closure 34.

As discussed above, the integrity of the seal of the embodiment of FIGS. 1-4 can be easily ascertained by applying a torque to the periphery of collar 36. If the collar rotates in whole or part or is in any way loose, then the integrity of the seal has been broken and the tester should avoid that bottle. This seal is preferably provided by an ultrasonic weld ring 50 which is provided between the surface 52 of stopper 38 surrounding portion 41, and the upper surface 28 of flange 26. It has been found that a sonic rib having a height of 0.006 inches satisfactorily seals the bottle and can be broken by a reasonable torqueing force.

FIG. 7 shows a number of seal configurations for weld ring 50. For perishables a hermetic ring, which is preferably not continuous, may be employed. For maintaining a vacuum or preventing escape of volatiles one of the vacuum seals is preferred.

The construction of FIGS. 1-4 includes as a portion of stopper 38, a latching member 56 having a hook portion 58 of latch 56 which engages the under surface 30 of flange 26 to hold portion 41 in the opening 24 as can be best seen in FIG. 4. If desired latching member 56 can engage some other portion of the cap. Thus, the cap is removable and easily replaceable after the initial removal in part or whole of the contents of bottle 20 as shown. Flange 26 is preferably chamfered.

Closure 34 can be easily and quickly sealed onto bottle 20 after placing closure 34 in place on the bottle as shown in FIG. 1. A metal shim can be placed under flange 26, and a conventional sonic welding device employed to generate the ring of weld 50. The stopper and latch may require coating to prevent ultrasonic fusion.

Reference is now made to FIGS. 5 and 6 which illustrate a further embodiment of the invention of this application. In the embodiment of FIGS. 5 and 6, as in the embodiment of FIGS. 1-4, bottle 60 is provided with a flange 62 about its opening 64. Closure member 66 is comprised of a grommet or gasket 68 which may be made of latex, rubber or other suitable material and which serves to extend into opening 64 and engage the interior surface 70 of flange 62 in a sealing relation. Preferably, the surface of grommet 68 engaging the surface 70 of flange 62 has a conventional construction providing a hermetic seal along region 71. There are many such hermetic seal constructions which are widely used, and any which provide a satisfactory hermetic seal can be employed. A cap 74 of plastic or other similar material is attached to grommet 68 and is preferably rotatable with respect to that grommet. As can be best seen in FIG. 6, cap 74 is sonically welded by a ring 80 to the upper surface of flange 62, so that as in the previous embodiment, of FIGS. 1-4, the integrity of the weld ring 80 can be easily ascertained by applying a torque to the periphery of cap 74. If the cap turns or is loose, the circumferential welding seal provided for vacuum and volatile materials has been ruptured. In this embodiment, however, once the sonic seal has been ruptured, the hermetic seal remains effective and the cap can be removed by applying a vertical pressure to pull grommet 68 from opening 64. One of the disadvantages of the arrangement of FIGS. 5 and 6 is that bottle 60 cannot be carried vertically by means of closure member 66.

Many changes and modifications in the above described embodiments of the invention can be carried out without departing from the scope of the invention. Accordingly, that scope is intended to be limited only by the scope of the appended claims.

What is claimed is:

1. A closure for a bottle having a neck portion terminating in an opening and a flange circumferentially extending about the opening comprising a collar with portions for engaging the upper and lower surfaces of said flange about a substantial portion of said flange part of the circumference to permit said collar to be freely rotated about said flange and a stopper pivotably attached to said collar with portions of said stopper engaging said upper surface of said flange and at least in part welded to said upper surface and having a portion for extending into said bottle opening to seal said opening.

2. In combination as in claim 1 wherein said portions of said stopper engaging said upper surface of said flange are at least in part sonically welded to said upper surface.

3. In combination as in claim 1 wherein said weld is a vacuum weld.

4. In combination as in claim 1 wherein said collar and stopper are plastic.

5. In combination as in claim 1 wherein said stopper has a tab portion extending beyond said collar when said stopper portion is in said opening.

6. In combination as in claim 1 wherein said stopper has a latch portion for engaging a portion of said flange.

7. In combination:

a bottle having an opening for receiving and dispensing and a flange extending circumferentially about said opening, and

a closure for said opening having a collar engaging the upper and lower surfaces of said flange about a substantial part of the circumference of said flange so that said collar is freely rotatable about said flange, and a stopper pivotably attached to said collar for movement between a position sealing said opening and a position permitting dispensing from said opening, said stopper having a closing portion extending down into said opening and an extending surface about said closing portion in contact with the upper surface of said flange and at least in part welded to said flange so that the integrity of the weld can be checked by applying torque to said collar.

8. A method of closing a bottle having an opening for receiving and dispensing and a flange extending circumferentially about said opening comprising:

placing a collar of a collar member about said flange engaging the upper and lower surfaces of said flange about a substantial part of the circumference of said flange so that said collar is freely rotatable about said flange,

placing in said opening a stopper pivotably attached to said collar for movement between a position sealing said opening and a position permitting dispensing from said opening, said stopper having a closing portion extending down into said opening and an extending surface about said closing portion in contact with the upper surface of said flange and welding at least part of said extending surface to said flange so that the integrity of the weld can be checked by applying torque to said collar.

9. A method as in claim 8 further including the step of applying torque to said flange to check the integrity of the weld.

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