

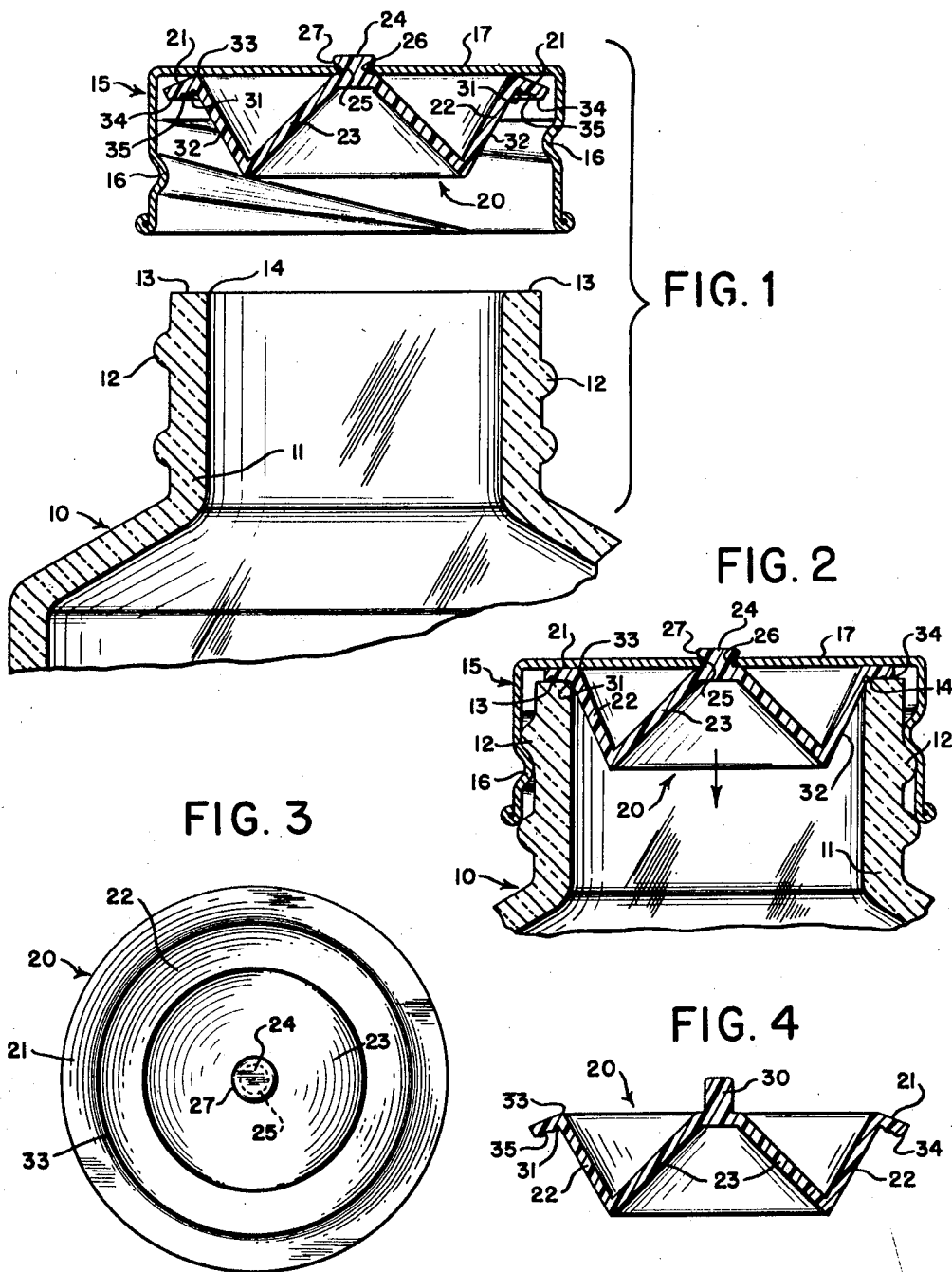
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S. LOWEN
BOTTLE CLOSURE

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2 Sheets-Sheet 1



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FIG. 5

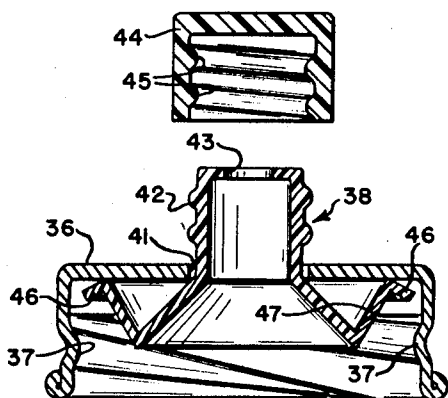


FIG. 6

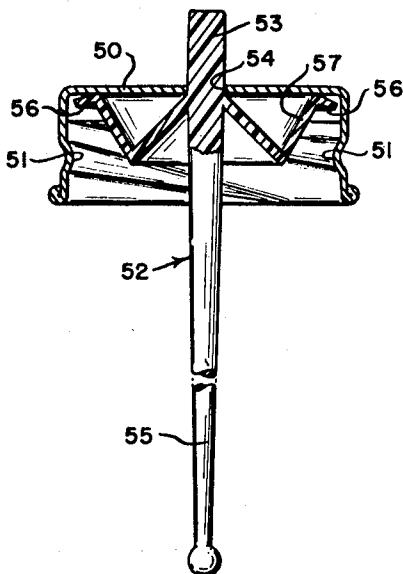


FIG. 8

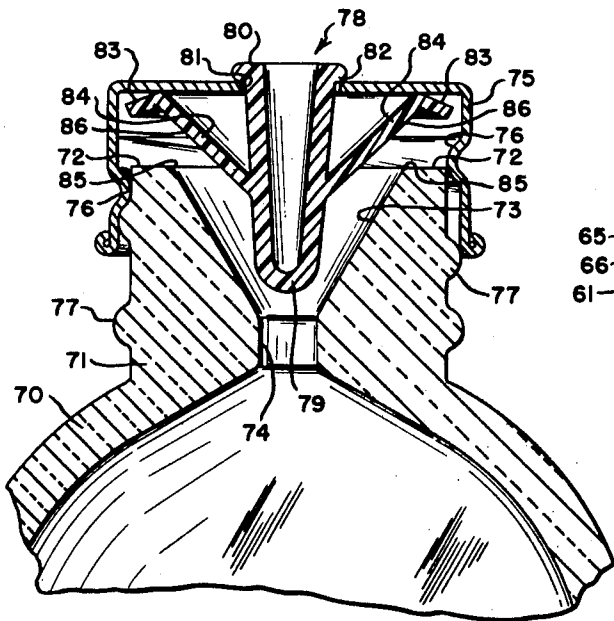
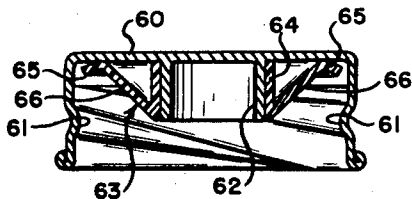


FIG. 7



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BOTTLE CLOSURE

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This invention relates to bottle closures and more particularly to a sealing element generally interposed between a bottle and the cap therefor.

Innumerable liquid commodities are today packaged in bottles of glass, organic plastic, or other materials. The liquid commodity, after manufacture, is loaded into the bottle, a closure then being applied to the bottle to prevent escape of the liquid during transportation and storage. In ever popular closure means is a threaded cap which engages threads on the bottle itself. A major virtue of such closure, is that it is readily removable when the container reaches the ultimate consumer who wishes to dispense the contents.

The desired characteristics for a closure are fairly obvious. It should effectively seal the contents of the bottle therein so that during the transportation of the bottle, the contents are held securely therein despite vibration, agitation, and shaking of the bottle. Since all liquids are more or less volatile, during storage as well as during transportation, no escape through evaporation of the liquid should occur. Furthermore, it is desirable that the closure not present too great difficulties to the user who wishes to remove it from the bottle in order to get at the contents.

Liners have heretofore been provided for use inside sealing caps. One widely used is a pulp and vinyl liner, commonly known in the trade as a "pv" liner. This liner is a flat disc in configuration, generally produced by a simple stamping operation from a sheet of the material. The liner is simply deployed against the top of a bottle cap and held there by an adhesive. Upon engagement of the bottle and the cap, the liner will contact the top edge of the bottle to effect a seal. But use of the "pv" liner presents distinct disadvantages. A major disadvantage is that in order to achieve an effective seal, especially as may be necessary where the liquid is quite volatile, considerable force in screwing the cap down onto the bottle may be employed. The resulting condition is known as a "hard lock," and the significance of this is that the user may find it quite difficult to remove the cap. Moreover, in stamping such liners, frequently an incomplete disc or partial liner results, as where the end of a sheet of material is reached. Automatic machinery is generally employed in disposing liners within caps, and therefore it is an expectable consequence that a partial liner may be used within a cap. Obviously, an inadequate seal will result. Furthermore, a partial liner, or shavings from the stamping operation, can drop into the bottle and adversely affect its contents.

The primary object of the present invention is to provide a novel sealing element for use in sealing bottles which element fulfills the conditions above enumerated as desirable in such application. That is, such element will be unusually effective in its sealing action, and yet not require a "hard lock" to achieve such effectiveness.

Another object herein is to provide means for retaining a sealing element within a cap which does not require application of an adhesive. From such provision distinct advantages flow. If such retention can be achieved without the use of an adhesive, there is no danger that the packaged liquid will dissolve the adhesive to cause loss of the liner. Nor can an adhesive contaminate the contents of the bottle. Dispensing with the need for an adhesive also solves the problem which may be presented where no adhesive is available for the particular ma-

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terials from which the cap and liner are formed. In achieving this object in the manner here provided, in addition, a ready means is presented to assure the presence of a sealing element within each cap.

How these and many other objects are to be implemented will become clear through a consideration of the accompanying drawings wherein:

FIG. 1 shows in section, a bottle cap having a novel sealing element conforming to the present invention therein, the cap and element being situated above the opening of a bottle as would be the case preparatory to sealing the bottle;

FIG. 2 is a view similar to that of FIG. 1 in which the bottle cap and bottle are in engagement;

FIG. 3 is a plan view of the sealing element alone which is shown in section in FIG. 1;

FIG. 4 shows in section alone an alternative form for a sealing element to that shown in FIG. 1;

FIG. 5 shows in section a second embodiment of the present invention;

FIG. 6 shows in section a third embodiment of the present invention;

FIG. 7 shows in section a fourth embodiment of the present invention; and

FIG. 8 shows in section a fifth embodiment of the present invention.

In FIG. 1 is shown a bottle 10 in section, having a neck portion 11 with thread 12 thereon. While a top view of the bottle is not shown, it will be apparent by reason of the prescription of threads on the neck 11 that the neck is circular. At the top of the neck is a surface 13 having an internal circular edge 14, the surface 13 at the top of the neck defining an opening into the bottle.

A cap 15 having a threading 16 is engageable with neck portion 11 of the bottle 10. Since, engageable, it will be understood that the cap, while shown in section, is also circular in configuration. The cap 15 has a top portion 17.

Disposed within the cap 15 is a sealing element, generally designated 20. Such sealing element is shown in section in FIGS. 1 and 2 and a plan view thereof is seen in FIG. 3. Such sealing element 20 may advantageously be made of a resilient organic plastic material such as polyethylene. Peripherally bounding such sealing element 20 is a lip 21. It will be observed, particularly in FIG. 1, that the normal disposition of such lip 21 is downwardly inclined when the sealing element is not in contact with the bottle to be sealed. Extending from the lip 21 is a downwardly conical wall 22. Rising or extending upwardly from a juncture with downwardly conical wall 22 is a further conical wall 23 at the apex of which occurs a button 24 undercut at 25.

In the top portion 17 of the cap 15 is an aperture 26 which aperture is of slightly lesser diameter than the overhang 27 which appears in the button 24 by reason of the presence of the undercut 25. Thus, the sealing element 20 can be molded as described in a unit and then assembled into a cap 15 by forcing the resilient button 24 through aperture 26, whereupon the sealing element will be retained within the cap. It should be pointed out that retention can also be achieved with substantially the same ultimate appearance as is shown in the drawings in FIGS. 1 and 2 particularly by providing a sealing element as shown in FIG. 4 in which in place of a button a short rod 30 extends upwardly at the apex of upwardly conical wall 23. Such rod 30 would be of smaller diameter than that of the aperture 26, so that the rod could pass freely therethrough. Then after assembly into a bottle cap, such rod 30 could be swaged by hot or cold processes to achieve an appearance similar to that of button 24 in FIGS. 1 and 2, whereby retraction of the rod 30 through the aperture

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26 would be prevented, and the sealing element would be retained within the bottlecap.

It will be understood from the foregoing description that closure for the bottle 10 is provided by cap 15 whose threads interengage with those on the neck portion 11 on the bottle 10 so that the cap can be screwed down on the neck. The maximum diameter of downwardly conical wall 22 occurs at the point 31 where such wall 22 joins lip 21. The sealing element is formed so that the maximum diameter of the downwardly conical wall 22 is greater than that of the internal circular edge 14 of the surface 13 atop neck 11 of the bottle. Thus, when the cap 15 is screwed down on the bottle 10 internal circular edge 14 will come into contact with downwardly conical wall 22 of the sealing element 20 at a point lying on the surface 32 of downwardly conical wall 22. As the cap 15 is screwed downwardly on the bottle, its top portion 17 will exert pressure at point 33 of the sealing element 20. Because the downwardly conical wall 22 is specified to be resilient, it may deform to provide a seal along internal circular edge 14 of the bottle. In this manner sealing in a first mode is provided. But the sealing element shown has a double sealing action.

The further sealing action results from engagement of lip 21 with the surface 13 at the top of neck portion 11 of the bottle. It will be understood that as the cap is screwed down onto the neck of the bottle, the top portion 17 exerting pressure at 33 of the sealing element 20, the downmost edge 34 of downwardly inclined lip 21 will make contact with surface 13 at the top of the bottle. Again, because the lip is specified to be resilient, as the screwing down of the cap proceeds, the lip will deform, and with increasing pressure on the sealing element under surface 35 of lip 21 will make increasing contact as to area with the top surface 13 of the bottle. An illustration of a bottle where both described modes of sealing are operative in accordance with the foregoing description, is depicted in FIG. 2.

It will be understood that the present invention can be used in embodiments other than that shown in FIGS. 1 and 2, and FIGS. 5 through 8 are illustrative of further embodiments. Of course, such further embodiments are purely illustrative and are by no means to be construed as limitations on the present invention. No bottle is illustrated in connection with the embodiments shown in FIGS. 5, 6, and 7, and it will be understood that such illustrations of closure and sealing means are for use with bottles having necks similar to the bottle 10 of FIGS. 1 and 2.

In FIG. 5 is shown a cap 36 having threading 37, an intermediate element generally designated 38 being associated with cap 36 and disposed in part therein. Extending upwardly through aperture 41 in the cap 36 is a threaded portion 42 in which occurs a hole 43 of restricted size by reference to the opening of the bottle with which the present embodiment is to be employed. An auxiliary cap 44 having threads 45 provides closure means for the restricted hole 43. The intermediate element 38 has a resilient sealing portion disposed within the cap 36. Such sealing portion has a downwardly inclined lip 46 and a downwardly conical wall 47, which lip 46 and downwardly conical wall 47 provide for double action sealing in the manner heretofore described in connection with the first embodiment illustrated. It will be understood that the present second embodiment is for use as a unit to convert a relatively wide mouthed bottle for restricted dispensation of the contents of the bottle as by sprinkling.

In the embodiment of FIG. 6, the third embodiment, appears a cap 50 having threads 51 therein. Again there is present an intermediate element, generally designated 52. Such intermediate element 52 has a grip portion 53 extending upwardly through an aperture 54 in the cap 50. Retention of the intermediate element 52 within the cap 50 may conveniently be provided by utilizing a friction fit between grip portion 53 and aperture 54. Extending

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downwardly in the intermediate element 52 is an applicator portion 55, which obviously will enter the liquid contents of the bottle with which the cap 50 is engaged, for dispensation of the contents thereof. The intermediate element 52 has, extending radially from the grip and applicator portions, a resilient sealing portion within the cap. Such sealing portion has a lip 56 and a downwardly conical wall 57 which will serve to seal the bottle with which the cap 50 is engaged in the manner heretofore described in connection with the first embodiment illustrated above.

A fourth embodiment appears in FIG. 7, such fourth embodiment employing cap 60 having threads 61 therein, for engagement with a bottle. There is an interiorly depending wall 62 within cap 60, such wall 62 in the embodiment shown being integrally formed with the cap 60. Disposed within the cap is an intermediate element generally designated 63. Such intermediate element 63 has a wall portion 64 surrounding the interiorly depending wall 62, and in frictional engagement therewith. In addition, the intermediate element 63 has a lip 65 and downwardly conical wall 66 for sealing a bottle when cap 60 is engaged therewith, in the manner heretofore described in connection with the embodiment of FIGS. 1 and 2. The interengagement of interiorly depending wall 62 and wall portion 64 of intermediate element 63 can be resorted to as an alternative means for retaining a sealing element within a cap. However, further utility for this embodiment is possible by mounting a brush or other applicator within the hollow defined by interiorly depending wall 62, which brush or applicator would extend downwardly into the bottle when the cap 60 is engaged therewith. A force fit or other convenient expedient could be employed to hold such brush or applicator within wall 62.

Unlike the foregoing embodiments, that shown in FIG. 8 is for use in connection with a bottle of specialized form. The bottle 70 has a neck portion 71 with threads 77. At the top of neck 71 is a top surface 72 and inclining downwardly from top surface 72 is sloping surface 73, the net effect of the presence of such sloping surface 73 being to provide a restricted opening 74 into the bottle 70. For sealing such bottle, a cap 75 is provided having threads 76 for interengagement with threads 77 on neck 71 of the bottle. Disposed substantially entirely within cap 75 is an intermediate element 78 which has a plug portion 79 adapted to enter and obstruct opening 74 into the bottle, when the cap is engaged with the bottle. The intermediate element 78 in addition has a retainer portion 80 extending upwardly through aperture 81 in the cap 75, such retainer portion 80 having an overhang 82 of greater diameter than that of aperture 81, whereby once the overhang 82 is forced through aperture 81 the intermediate element 78 is secured within cap 75. Finally, the intermediate element 78 has a lip 83 and a downwardly conical wall 84, together comprising a resilient sealing portion in such intermediate element. It will be observed in FIG. 8 that the angle of slope of sloping surface 73 is steeper than is true for downwardly conical wall 84. Therefore, when cap 75 is screwed down upon neck 71 of the bottle, internal circular edge 85 at the juncture between top surface 72 and sloping surface 73 in the bottle will strike on under-surface 86 of downwardly conical wall 84, while lip 83 moves into engagement with the top surface 72 of the bottle 70, to provide double action sealing means in all respects as effective as that provided for the foregoing embodiments.

I claim:

1. In the combination of a container having an opening formed therein and an annular flat sealing surface surrounding said opening, a closure member engageable with said container for covering said opening, a sealing element disposed between said closure member and said

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surface, said sealing element having a portion thereof adapted to extend into the container opening, said portion having an upwardly inclined wall terminating adjacent the underside of the closure member at a point above the inner edge of the container surface, an initially downwardly inclined sealing lip extending from said inclined wall and contacting said flat annular sealing surface, said line of juncture of said lip and said inclined wall forming a fulcrum point whereby the closure member pressing against said fulcrum point will flatten said lip into engagement with the container sealing surface and form a seal at said inner edge, the inner edge of said annular sealing surface contacting the upper portion of said inclined wall.

2. A sealing element as claimed in claim 1 wherein said closure member has an aperture therethrough, and said sealing element includes aperture engaging means in engagement with said aperture, whereby said sealing element is held within said closure member.

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3. A sealing element as claimed in claim 1 wherein said closure member has an aperture therethrough, and said sealing element includes a resilient undercut button, said button engaging and extending through said aperture in said closure member, whereby said sealing element is held within said closure member.

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