Oct. 29, 1968 R. P. LINKLETTER ETAL 3,407,956

BOTTLE CAP

Filed Nov. 14, 1966

FIG. 1

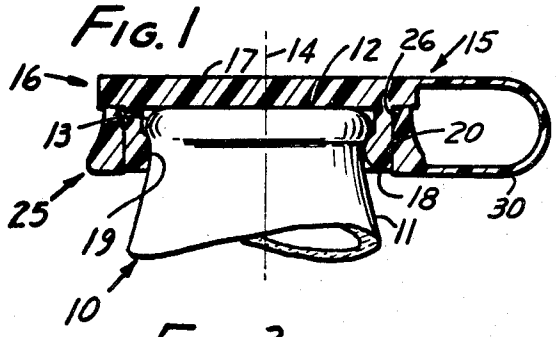


FIG. 2

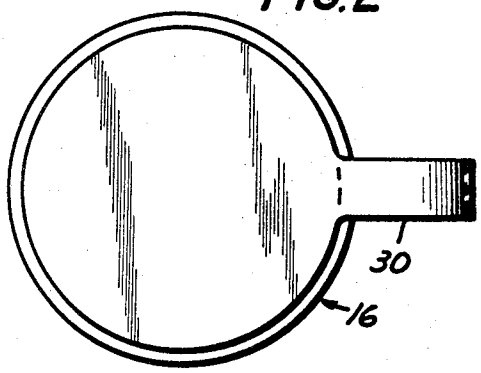


FIG. 3

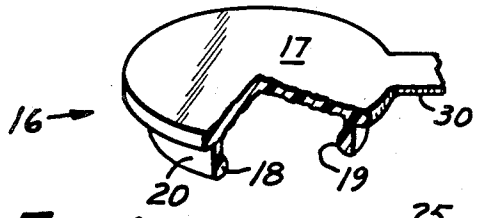


FIG. 4

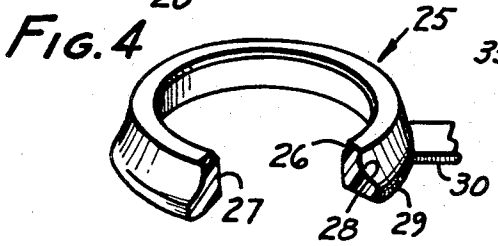


FIG. 5

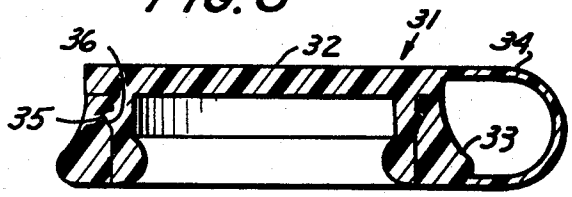


FIG. 6

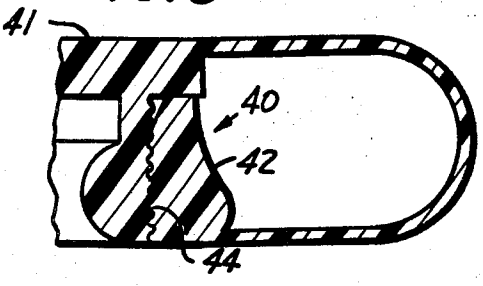


FIG. 8

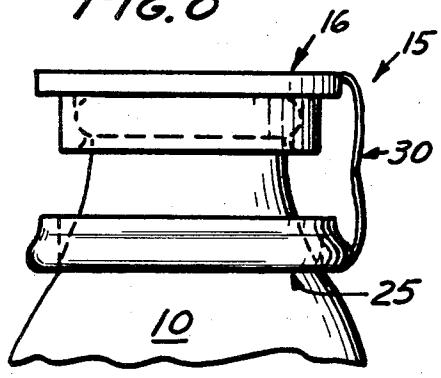
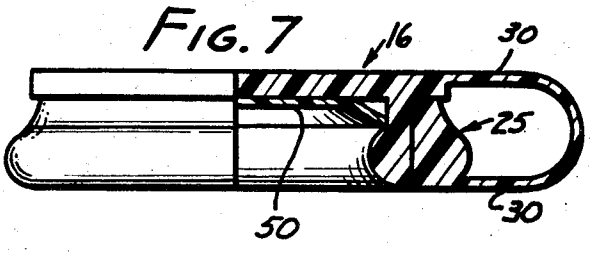


FIG. 7



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BOTTLE CAP

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ABSTRACT OF THE DISCLOSURE

This invention relates to a removable and replaceable bottle cap for closing a bottle having a mouth with a surrounding lip on a neck. The bottle cap includes a closure member that has a cap section to overlay the mouth, a depending flange with a lip adapted to engage the lip of the bottle, and an annular locking member which includes an inner surface adapted to embrace the flange of the closure member so as to hold it in a closed position. According to an optional feature, flexible means interconnects the two members. To open the cap, the locking ring is forced downwardly off the closure member where it rests around the neck of the bottle. The closure member may then be snapped off the top of the mouth. To close the bottle, the process is reversed.

This invention relates to a bottle cap for closing a bottle having a neck, a mouth, and a lip surrounding the mouth. Snap-type closures have long been known in the art, and many of them have included means for rendering the respective devices more readily usable. All of them have heretofore included problems relating to shelf life as well as to ease of operation and have also had inherent within them considerable manufacturing problems, because when they were made of a plurality of prices, it was difficult economically to make large quantities of devices from batches of randomly selected parts.

It is an object of this invention to provide a readily usable cap which provides long storage life and which in some of its embodiments maintains its parts in association from the time they are formed in a simple die, thereby to provide for permanent association of individual parts and thus to eliminate the problem of tolerances which arises when a large number of cavities are utilized to make batches of randomly associated parts for the device.

A bottle cap according to this invention includes a closure member that has a cap section adapted to overlay and close the mouth. A depending flange projects from the cap section with a lip on its free end, which lip is adapted to snap over the lip on the bottle. An annular locking member is adapted to surround the neck and also to embrace, and thereby to press, the flange against the neck of the bottle so as to maintain it in the locked condition. It may be forced downwardly around the neck and off the flange in order to unlock the cap.

According to a preferred but optional feature of the invention, flexible means is provided which connects the two members and in the preferred embodiment of the invention is integrally and simultaneously cast with these members.

The above and other features of this invention will be fully understood from the following detailed description and the accompanying drawings, in which:

FIG. 1 is a side elevation partly in cutaway cross-section showing the presently preferred embodiment of the invention in its locked condition;

FIG. 2 is a top view of FIG. 1;

FIGS. 3 and 4 are perspective views partly in cutaway cross-section of two members of the device of FIG. 1;

FIGS. 5, 6 and 7 are fragmentary elevations partly in cutaway cross-section showing alternate embodiments of the invention; and

FIG. 8 shows the device of FIG. 1 in its unlocked condition.

FIG. 1 shows a bottle **10** having a neck **11** with a mouth **12**, the mouth having a rim with a peripheral lip **13** surrounding it. The opening has a central axis **14**.

A bottle cap **15** according to the invention is shown in its locked condition on the bottle. This cap includes a closure member **16** with a cap section **17** that overlays the mouth when the device is in its closed condition. This cap section will ordinarily be imperforate. However, it may instead be perforate or even porous if a liner is provided for it. Such liners will be imperforate and constitute a portion of the cap section when used. However, liners and the like are optional, and may be used with imperforate cap sections. Liners, such as cork, Pliofilm, polyethylene and the like, can provide additional sealing reliability.

A flange **18** projects downwardly from the cap section and includes an inwardly projecting lip **19**. The flange shown is a continuous peripheral flange, although it may be in the form of peripherally spaced-apart and separate collet fingers, if preferred. The flange has on its outside a contact surface **20** which will be arcuate and preferably cylindrical. The flange is resilient so that it can be snapped over the lip of the bottle.

A locking member **25** is generally annular or ring-shaped and includes a chamfer **26** to assist the initial engagement of the members. The locking member includes a contact surface **27** on its inside adapted to surround the bottle neck and to embrace the contact surface of the flange or flanges. The dimensions of the contact surfaces are such as to provide an interference fit when the closure member is snapped onto the bottle. For example, when polyethylene is used for two members with continuous peripheral cylindrical contact surfaces, the interference fit may be approximately 0.001 inch on the radius; that is, the radius of the contact surface on the closure member will be about 0.001 inch smaller than the radius of the contact surface on the locking member.

The outer surface **28** of the locking member is of indeterminate shape, although preferably it may include a slight shoulder **29** which is easy to grasp with the fingers. Preferably, the upper region of the locking member is somewhat thinner radially than the lower region, thereby facilitating initial stretching of the upper edge of the locking member over the depending flange but providing a stronger and less resilient portion adjacent to the lip where stronger backing and locking actions are desirable.

Furthermore, to aid in retention, thereby providing for more reliable shelf life, the contact surfaces can, instead of being true cylinders with their generators of revolution parallel to the axis, be given a slight draft angle on the order of one or two degrees flaring downwardly and outwardly as they depart from the cap section.

Flexible means **30** such as a strap joins the two members together. It will be appreciated that in the course of manufacture, the two members and the flexible means may be formed at the same time in the same set of cavities and therefore the devices will be unitary and continuous and also specifically selected for each other, which result is not attainable in other forms of manufacture where large batches of the same parts are made in a plurality of dies and then are joined in pairs of members, which members are selected at random, unless very accurate and expensive dies are used. With the use of means such as a strap joining together two members which were made in two cavities of a single die, which cavities were initially dimensioned so as to produce parts distinctly intended for each other, the tooling and production tolerances are

greatly relieved, and less expensive tooling can be utilized.

The device of FIG. 1 uses friction as the retention means between the two contact surfaces. FIG. 5 shows another means wherein a bottle cap **31** includes a closure member **32**, a locking member **33**, and a flexible means **34**. It includes a peripheral ridge **35** on the outside of the flange and a peripheral groove **36** on the inside of the locking member. This provides a snap action which supplements the frictional force in holding the two members together, but which can be overcome simply by distortion of the ridge as the locking member is pushed downwardly. Apart from the ridge and groove, the device is identical to that of FIG. 1.

FIG. 6 shows another cap **40** with a closure member **41**, locking member **42** and flexible means **43** with a plurality of matching serrations **44** on the flange and on the inside of the locking member. Otherwise the device is the same as that in FIG. 1.

FIG. 7 shows the device of FIG. 1 modified to include a liner **50** to make a more reliable seal with the top of the bottle. This liner will be a flexible and resilient piece of impermeable material which can permit the remainder of the device to be made of less expensive and perhaps even permeable material.

The device of this invention is readily cast from common plastic materials, polyethylene being the presently preferred substance.

The use of the device is best indicated in FIGS. 1 and 8. In FIG. 1, the closure member has been snapped over the mouth of the bottle and the locking member has been pulled up so as to surround the closure member and press the lid into intimate contact with the bottle, thereby overlapping the lips and closing the mouth. In FIG. 8 the locking member has been pushed down around the neck of the bottle, thereby freeing the closure member and it may simply be snapped off. It will now be noted that the device is held to the bottle when means **30** is used, but may readily be removed simply by lifting the unlocking member up off the neck.

The flange will be made relatively flexible and resilient so that it may snap over the lip while the locking ring may be made of such dimensions and configurations as to be somewhat more rigid to do an effective job of holding the flange locked against the bottle.

The other embodiments operate in the same manner, the additional features serving to make more positive the closing action or the locking action.

This invention is not be limited by the embodiments shown in the drawings and described in the description which are given by way of example and not of limitation, but only in accordance with the scope of the appended claims.

We claim:

1. A bottle cap for closing a bottle having a mouth with a surrounding rim that includes a peripheral lip, said bottle cap comprising: a closure member including a cap section adapted to overlay the mouth, a depending flange projecting from the cap section, a lip projecting inwardly from one side of the depending flange, and a contact surface on the outside of the flange; and an annular locking member including an inner contact surface so proportioned and arranged as to surround the neck and the depending flange so that the contacting surfaces engage each other and press the lip of the depending flange inwardly laterally beneath the lip of the bottle, the cap being releasable by pushing the locking member off the closure member and onto the neck of the bottle.

2. A bottle cap according to claim **1** in which flexible means is attached to both members and holds them together as a pair.

3. A bottle cap according to claim **2** in which both contact surfaces are fully peripheral.

4. A bottle cap according to claim **2** in which both contact surfaces are fully peripheral and substantially cylindrical.

5. A bottle cap according to claim **4** in which the locking member has an upper region which is thinner than its lower region.

6. A bottle cap according to claim **5** in which one of the contact surfaces is modified by a peripheral ridge and the other by a groove engageable by the ridge to assist in holding the members together.

7. A bottle cap according to claim **5** in which the contact surfaces are modified by mutually engaging serrations.

8. A bottle cap according to claim **2** in which an impermeable liner is retained within the flange adjacent to the cap section.

9. A bottle cap according to claim **2** in which the two members and the flexible means are unitary.

10. A bottle cap according to claim **9** in which the outer diameter of the contact surface on the peripheral flange is greater than the inner diameter of the contact surface on the locking member.

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