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H. W. WILLIAMS

3,025,988

NON-REMOVABLE CLOSURE

Filed July 20, 1959

Fig. 1

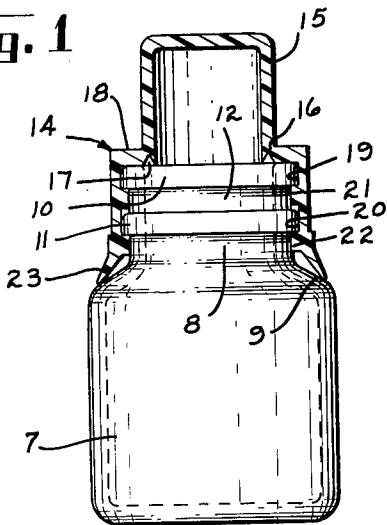


Fig. 2

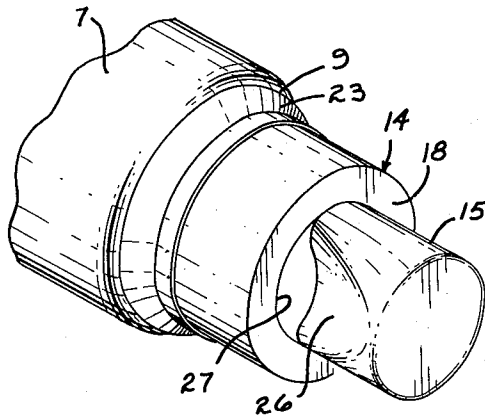


Fig. 3

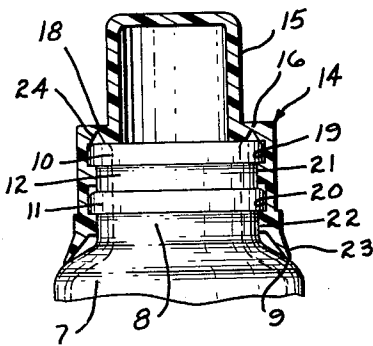


Fig. 4

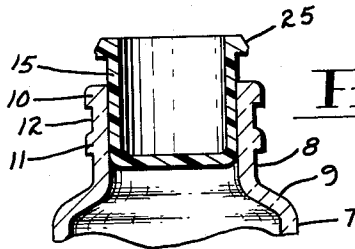


Fig. 6

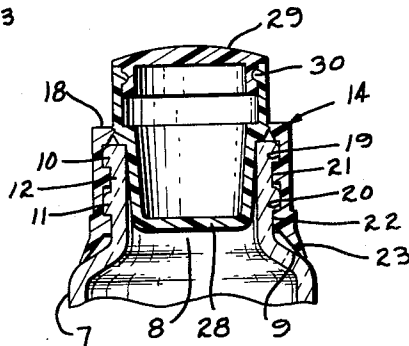
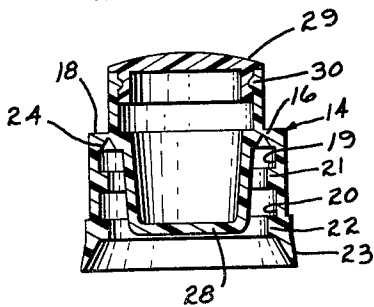


Fig. 5



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NON-REMOVABLE CLOSURE

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My invention relates to closures for containers such as the small glass bottles widely used in the drug and other industries, and more particularly to a closure which may not be removed from the container without at least partially destroying the same. It may thus be termed a non-removable or tamper-proof closure.

An object of the invention is to provide an improved tamper-proof closure which can be molded from a plastic material that has characteristics long recognized as being desirable for a bottle closure for consideration other than tamper-proofness, one such commonly used material being polyethylene.

A further object is to provide such a closure which can be economically molded in one piece, and which can be easily assembled to the bottles by automatic machinery, if desired.

Another object is to provide an improved tamper-proof closure with a frangible or break-away element without an interruption in the smooth overall appearance of the closure, which element may be easily and quickly removed to afford direct access to the contents of the bottle.

Still another object is to provide an improved closure of the above type wherein the element which is broken away to open the bottle may be used as a replacement closure such as a stopper.

Other objects and advantages of the invention will hereinafter more fully appear. In the accompanying drawings I have shown for purposes of illustration three embodiments which my invention may assume in practice.

In these drawings:

FIG. 1 is a vertical sectional view showing my improved tamper-proof closure attached to a bottle;

FIG. 2 is a perspective view showing how the top portion may be broken away to provide access to the contents of the bottle;

FIG. 3 is a sectional view showing a variation or modification;

FIG. 4 illustrates how the top part of FIG. 2 which has been broken away may be inverted and used as a stopper;

FIG. 5 is a vertical section showing a modification where the closure consists of two pieces; and

FIG. 6 shows how the stopper of FIG. 5 may be used after having been broken away.

A glass bottle 7 has a neck 8 joined to the bottle by a rounded or sloping shoulder 9. Extending around the neck of the bottle are two circular beads 10 and 11 spaced apart so as to provide a groove 12 between them. The upper outer corners of these beads are beveled or rounded as indicated at 13 while the bottom outer corners are square for a definite reason which will soon be appreciated.

The tamper-proof closure itself in its more commonly used form is a one-piece molding of a plastic material which is flexible or pliable especially in the thin walled sections but not particularly stretchable in the sense that rubber is thought of as being stretchable. Polyethylene has the physical properties that are desired and the closure can be molded economically and satisfactorily from this material.

The closure is in the form of a cap generally designated 14 with a hollow flexible extension or dome 15. This extension is adapted to be broken away from the cap since it is joined to the cap only by a thin section 16 which results from the V-shaped recess 17 on the inner

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side of the top wall 18 of the cap. The extension or dome 15 may also sometimes be called a break-away element. The cylindrical side wall of the cap has a pair of internal circular grooves 19 and 20 and the square cornered internal ribs 21 and 22. The cylindrical wall has a thin extension or skirt 23 which tapers to a thin edge so that it fits very snugly against the sloping or rounded shoulder 9 when the closure is assembled with the bottle.

The closure may be readily put in place on the bottle by lining up the closure with the bottle and applying endwise pressure on the top wall 18 around the hollow extension 15. Due to the rounded corners 13 and the pliability of the cap, the internal ribs 21 and 22 will pass over and snap into place behind the beads 10 and 11 on the bottle with the tapered skirt bearing tightly on the glass surface of the rounded shoulder 9. The square corners at the bottom of the beads 10 and 11 however will preclude removal if any attempt were made to pull the cap off the bottle. Furthermore if an attempt be made to pry the closure away from the bottle by a tool inserted under the edge of the cap, even if the tool can be inserted behind the first rib and groove without noticeable damage to the cap, it will necessarily approach the second rib on the cap at such an angle that the tool could not be made to enter behind the second rib so as to pry it away from the square shoulder on the upper glass bead 10. Any attempt to move such a tool to a wide enough angle (with relation to the bottle) to put it into prying position under the second or upper rib of the cap will necessarily tear the thin extended side wall or skirt 23 or otherwise deform the cap so that it might be easily detected.

Accordingly when it is desired to obtain access to or dispense the contents of the bottle it is necessary to break away the cap extension or dome 15. This is most easily accomplished by squeezing the dome near the top wall 18 of the cap as indicated in FIG. 2 by the indent 26, so as to exert a tensile stress on the thin section 16 to break it away from the top wall of the cap along line 27. When broken in one place the dome may be easily torn away from the cap. The ability to start the break by applying tensile force to the thin section 16 in a radial direction where the top wall of the cap is solidly held by the bottle against inward radial movement, is important in bottles of the size largely used by the drug industry. Otherwise, breaking by an outward pull or tilting action tends to flex the top wall 18. However in small bottles where only a small access opening is required, as for a hypodermic needle, the opening may be obtained by breaking away a solid plug extension with a tilting action, since due to the size, no great amount of flexing of the top wall of the cap will occur.

FIGS. 3 and 4 illustrate a modification where the thin frangible section 24 is set back from the mouth of the bottle and the hollow extension or dome can be used in inverted fashion as a stopper as seen in FIG. 4. In this case the flange 25 serves to stiffen somewhat the upper part of the stopper. In FIG. 4 the cap which would normally remain on the bottle has been omitted so as better to show the shape of the neck of the bottle.

FIGS. 5 and 6 show a further modification with a downwardly extending conical stopper 28 molded integrally with the break-away section which is otherwise similar to the other forms except that it is open at the top to receive a rigid plastic insert 29. The insert 29 is interlocked with the hollow upward extension by a snap action rib and groove connection 30 in a manner well understood in the art. The stopper may be used to close the bottle after being broken away from the cap as seen in FIG. 6, and when so used it will be easier to handle and present a better appearance than the stopper in FIG.

4. The stopper also serves as an additional sealing means before it is broken away from the cap.

As a result of my invention it will be apparent that a very satisfactory and efficient tamper-proof closure is made available at low cost for the many small bottles used in the drug and other industries.

What I claim as new and desire to secure by Letters Patent is:

1. A non-removable closure for a bottle of the type having a plurality of external circular beads near the mouth of the bottle, the bottom outer corners of said beads being substantially square, said closure consisting of pliable plastic material and comprising a cap having a top wall, a cylindrical wall embracing the bottle, a plurality of circular ribs on the inner surface of the cylindrical wall the inside diameter of which is substantially less than the outside diameter of the beads on the bottle the upper corners of said ribs being substantially square whereby when the cap is forced on the bottle, each of the ribs on the closure will move over and snap into interlocking engagement with one of the beads on the bottle, and a break-away element integrally joined to the top wall of the cap by a relatively thin frangible section.

2. For a bottle of the type having a neck with a shoulder joining the neck to the bottle and a pair of external circular beads extending around said neck providing a groove between the beads and a second groove between the lower groove and said shoulder, said beads having sharply angled outer bottom corners and upper portions which slope inwardly toward the mouth of the bottle, a non-removable closure consisting of a one-piece cap of pliable plastic material having a top wall and a cylindrical wall adapted to surround the neck of the bottle, a pair of ribs on the inner surface of said cylindrical wall, said ribs being spaced and dimensioned so as to be complementary to said grooves on the bottle with sharply angled upper corners adapted to fit under the bottom corners of said beads, whereby said ribs may be forced over said beads and interlock behind the same in assembling the cap to the bottle, a break-away element extending upwardly from the cap, and a relatively thin frangible section which normally integrally connects said break-away element with the top wall of the cap.

3. For a bottle as described in claim 2, a closure as defined in claim 2, wherein said break-away element is a hollow dome-like extension adapted to be squeezed by the fingers to place said thin frangible section under sufficient tensile stress to break the same.

4. For a bottle as described in claim 2, a closure as defined in claim 2, wherein said thin frangible section results from a circular groove on the inner surface of said top wall.

5. For a bottle as described in claim 2, a closure as defined in claim 2, wherein said break-away element is a hollow dome-like extension of a size to fit into the mouth of the bottle and wherein said thin frangible section is along a circular line in the top wall of the cap spaced somewhat from the dome-like extension, whereby when the latter is broken away it may be inverted and used as a bottle stopper.

6. For a bottle as described in claim 2, a closure as defined in claim 2, and a downward extension from said break-away element adapted to serve as a bottle stopper both before and after said element is broken away from the cap, and a rigid piece of plastic material attached to the top of said upwardly extending break-away element.

7. For a bottle as described in claim 2, a closure as

defined in claim 2, and a downward extension from said break-away element adapted to serve as a bottle stopper both before and after said element is broken away from the cap.

8. In combination with a bottle having a neck, a sloping shoulder joining the neck to the bottle, a pair of circular beads around the neck providing one groove between the beads and a second groove between the lower bead and said shoulder, the upper outer corner of each bead being beveled or rounded and the lower outer corners of the beads being substantially square; a non-removable or tamper-proof closure consisting of a one-piece cap of pliable plastic material having a top wall and a cylindrical wall adapted to surround the neck of the bottle, a pair of ribs on the inner surface of said cylindrical wall, said ribs being spaced and dimensioned so as to be complementary to said grooves on the bottle with square upper corners adapted to fit under the bottom corners of said beads, whereby said ribs may be forced over said beads and interlock behind the same in assembling the cap to the bottle, a break-away element extending upwardly from the cap, and a relatively thin frangible section which normally integrally connects said break-away element with the top wall of the cap.

9. The combination defined in claim 8 wherein the cylindrical wall of the closure has a bottom skirt extension which tapers to a thin edge so that it fits snugly against said sloping shoulder on the bottle.

10. In combination with a bottle having a neck, a sloping shoulder joining the neck to the bottle, a pair of circular beads around the neck providing one groove between the beads and a second groove between the lower bead and said shoulder, the bottom surfaces of said beads being angled inwardly to provide substantially sharp outer lower corners while the upper portions of the outer surfaces of the beads slope inwardly toward the mouth of the bottle; a tamper-proof closure consisting of a single piece of pliable plastic material having a cylindrical wall surrounding the neck of the bottle, a stopper fitting inside the bottle mouth to prevent leakage of the bottle contents, a top wall overlying the lip or edge of the bottle mouth, a portion of which is sufficiently thin as to be frangible thus providing an annular break line permitting separation of the stopper from the outer portion of the closure, the inner surface of said cylindrical wall having a pair of ribs spaced and dimensioned so as to be complementary to said grooves on the bottle, said ribs having sharply angled upper surfaces interlocking under the angled bottom surfaces of said beads, and a bottom skirt extending from said cylindrical wall and tapering to a thin edge which bears snugly against said sloping shoulder on the bottle.

11. The combination defined in claim 10, and means extending upwardly from an integrally joined to said stopper inside said break line, which means may be employed in breaking the stopper away from the outer portion of the closure and for thereafter manipulating the stopper.

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