Jan. 15, 1963 E. GREENE 3,073,470

INSERTABLE, SELF-LOCKING AND NON-REFILLABLE CLOSURE FOR BOTTLES

Filed Nov. 23, 1960

Fig. 1.

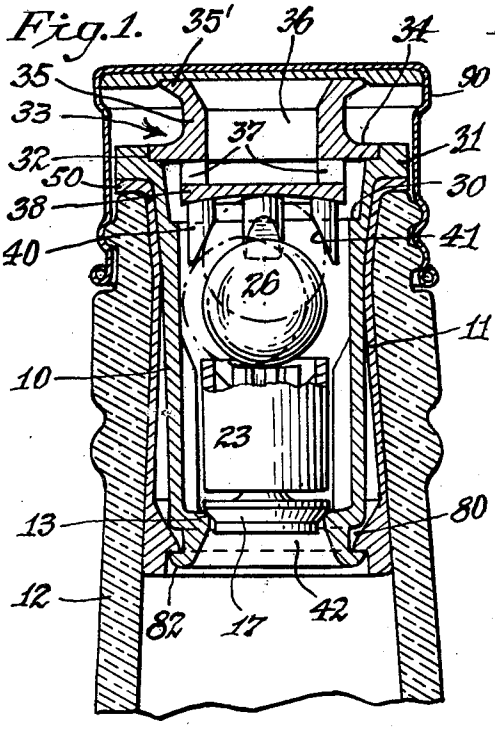


Fig. 2.

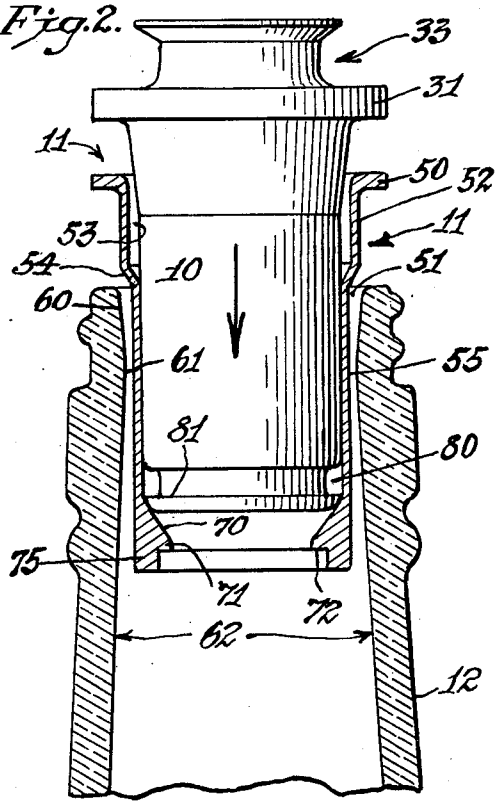


Fig. 5.

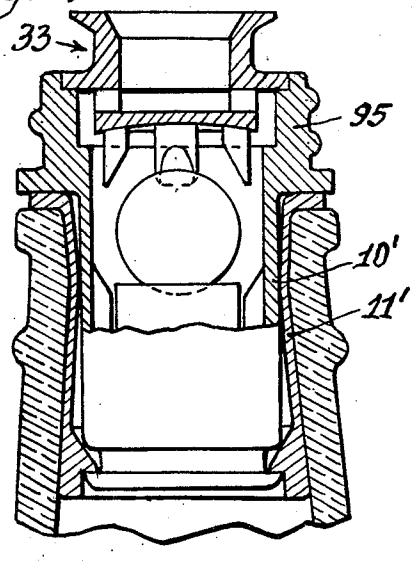


Fig. 3.

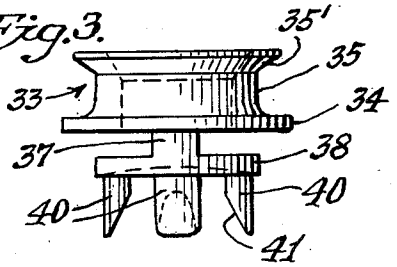
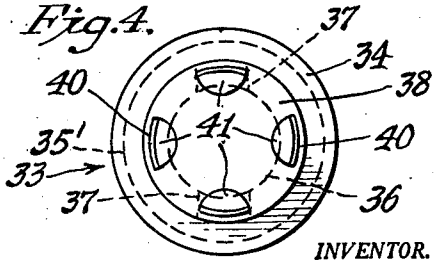


Fig. 4.



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INSERTABLE, SELF-LOCKING AND NON-REFILLABLE CLOSURE FOR BOTTLES

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This invention relates to closures for bottles or similar containers for the purpose of preventing fraudulent refilling thereof, and is particularly concerned with a type of closure that may be locked within the bottle neck by simply pressing it downwardly therein.

The closure thus applied not only "corks" the bottle neck effectively but, due to having a part that is expanded permanently at its lower end, prevents the closure, once applied, from being again withdrawn from the bottle neck.

An outstanding advantage of the invention resides in its adaptability to standard maximum and minimum diameter tolerances required by the glass container industry. Another important advantage of the invention lies in its practicability for use in prevailing high-speed bottling lines since the method of attaching the closure disclosed herein is so simple and inherently rapid.

The closure may be used with inside valve parts and weighted means such as are shown in Patent 2,497,599 issued to me February 14, 1950, and these parts are shown herein and operate in a similar manner. This, or other valve mechanism, is protected against tampering by a novel form of combined cover and guard for the closure that is molded integrally, and includes a terminal pouring spout which extends beyond the top of the bottle neck so as to pour cleanly and be sealed by a screw cap.

For a better understanding of the invention, reference is directed to the accompanying drawings, in which drawings:

FIG. 1 is a longitudinal sectional view, partly in elevation, of a preferred form of the invention, showing the new closure locked in place within a bottle neck having a terminal screw cap applied thereto;

FIG. 2 is a somewhat similar view showing the appearance of the closure when partially inserted in a bottle neck prior to the locking operation;

FIG. 3 is a side elevation of the combined cover, guard and pouring spout, before its attachment to the closure;

FIG. 4 is a bottom plan view of the same; and

FIG. 5 is a view similar to FIG. 1 but showing a modified form of the invention.

Referring now to the drawings, the closure in the form shown in FIG. 1 includes a generally cylindrical valve casing **10** made of rigid material, such as the plastic known as polystyrene, which is dimensioned to fit snugly throughout approximately the lower half of its length, within a locking sleeve **11** made of a plastic material such as polyethylene. Sleeve **11** and casing **10** are of suitable configuration to be inserted in the neck **12** of a bottle when in the assembled relation shown in FIG. 2. For the purpose of locking casing **10** to the inner wall of the bottle neck, its lower end is of a particular outer formation, as will be presently understood.

Casing **10** is provided internally with a valve seat **13**. and contains a main valve **17**, an air valve **23**, and a ball weight **26**, all such parts being shown in the patent previously referred to, and are similarly operative. Casing **10** is relatively long and is formed with an upper internal shoulder **30**, and a top flange **31** designed to overlie the top of the bottle neck. Flange **31** is rabbeted at **32** to provide a seat for a cover member **33** constituting a combined guard and pouring spout, and which is formed with a base flange **34** that fits within the rabbet **32** and is

cemented thereto after insertion of the valve mechansm, by the use of the solvent known as M E K.

Member **33** has an upper circular pouring spout **35** with a lip **35'** for clean cut-off. Spout **35** is flat on top for sealing purposes, and has a central through-opening **36** for the egress of the liquid contents of the bottle. A plate **38** is integrally connected to cover member **33** by a pair of lugs **37**, and is formed as a disc greater in diameter than opening **36**. When the cover **33** and casing **10** are in assembled relation, as in FIG. 1, they form a securely closed valve housing unit.

Plate **38** lies in a plane parallel to the bottom surface of base flange **34** and is located approximately midway between shoulder **30** and base flange **34** with its perimeter spaced from that part of the inner wall of casing **10** extending above shoulder **30**. This construction provides a passageway leading from the interior of casing **10** to outlet opening **36** while at the same time forming an effective barrier for preventing the introduction of a wire to intercept the valve mechanism.

Integrally formed therewith and depending from plate **38** is a plurality of spaced cylindrical lugs **40** between which liquid may flow to an around plate **38**. Lugs **40** are chamfered at **41** along their lower inner opposed surfaces to form a pocket for ball **26** when the bottle is tilted to pour. When the bottle is in a horizontal position inclined surfaces **41** causes the ball to fall out of the pocket and push the valve parts into a closed position to seal an opening **42** in the bottom of casing **10** surrounded by seat **13**.

It will now be understood that the one-piece construction of part **33** not only constitutes a guard and cover member for casing **10**, and a pouring spout, but also operates to impart the necessary movement to the ball axially of the bottle in order to close opening **42** as above explained. This valve housing construction provides a cheap two-piece structure since an additional separate guard part is eliminated.

Referring now to FIG. 2, means for securing the casing **10** inside the bottle neck in a lock position will now be described. The locking sleeve **11** is generally cylindrical and formed with a top flange **50** adapted to overlie and contact the top of the bottle neck. Immediately below flange **50**, and approximately equal in length to one quarter of its full length, sleeve **11** is of somewhat greater outside diameter than the upper end of the opening **51** in the bottle neck. This part **52** of the sleeve **11** is formed with an inside diameter greater than that of the contiguous outer wall of the casing **10**, which provides a slight clearance therebetween indicated at **53** in FIG. 2. Part **52** tapers inwardly at **54** so that part **55** of sleeve **11** is of lessened diameter in order to freely enter the bottle neck, and so as to provide a sliding fit over the adjacent walls of casing **10**.

The bore or opening in the bottle neck customarily flares outwardly in an upwardly direction as indicated at **60**, and from a restricted diameter at **61**. Thence downwardly the bore flares conversely following the taper of the neck outwardly as it descends to meet the body of the bottle (not shown). This configuration naturally possesses what may be termed a minimum inside diameter zone corresponding to the bore at **61**, and a maximum inside diameter zone corresponding to a diameter below that at **61** approximately opposite the lower end of sleeve **11** when fully inserted in bore **12** and designated by numeral **62**.

With this bore shape in mind the locking principle will be clearly understood since expanding the lower end of sleeve **11** will prevent its withdrawal up the converging inner walls of the neck **12** toward zone **61**. Other means are provided operative to lock these parts together when in expanded relation. For this purpose the sleeve **11** and

casing 10 are formed in a novel manner to cooperate as both parts are lowered in the bottle neck following their relative movement after the sleeve 11 is arrested by reason of its flange 50 coming into contact with the top of the bottle neck. Sleeve 11 is open at both ends and is internally formed at its lower end with converging walls 70, their inclination being at an angle of 15 degrees with respect to the longitudinal axis of the sleeve. Walls 70 terminate in an annular lip 71 beneath which there is a shoulder 72 lying in a horizontal plane normal to said axis of the sleeve. While sleeve 11 could end at shoulder 72 it is preferred to continue its inner walls for a short distance forming a skirt part 75 which is relatively thick and the purpose of which will soon be apparent.

The particular outer formation referred to of casing 10 at its lower end consists of an annular groove 80 below valve seat 13 defining a flat upstanding shoulder 81. The bottom outer edge of casing 10 is rounded at 82 so that it will ride easily along the inclined wall 70 from the position of the parts shown in FIG. 2 to that of FIG. 1, and following which movement shoulders 81 and 72 will interlockingly engage one another. During this relative movement of these two parts the lower end of sleeve 11 will stretch and abut the adjacent inside surface of the bottle neck, while lip 71 will first compress and then react and enter groove 80 as in FIG. 1.

When the closure is fully inserted in the bottle neck, with flanges 31 and 50 engaging one another and the bottle top, it will be noted that part 52 of sleeve 11 has been distorted into a jam fit within zone 60 of the bottle neck opening thus providing a tight corklike seal in addition to the sealing properties of expanded sleeve 11.

In FIG. 1 a terminal screw cap 90 is shown which is threaded to the bottle top and seals the end of spout 35. These and above-stated features effectively prevent losses of volatiles from the liquid contents of the bottle since elastic flange 50 is also under compression when cap 90 is firmly applied.

Referring to FIG. 5, the casing 10' is extended upwardly at 95 and is threaded so as to mate with threads of a suitable screw cap (not shown). In this form of the invention the modified sleeve 11' is considerably shorter than sleeve 11, and likewise would be its terminal screw cap, reliance for tight application to the bottle depending upon the pressing engagement of sleeve 11'.

Because of the elastic nature of sleeves 11 and 11' they are expected to operate effectively in the bottle neck regardless of glass tolerances of plus and minus twenty thousandths of an inch.

Any upwardly directed force applied to the closure in attempting to withdraw it can only act to tighten its grip in the bottle neck and increase or at least maintain the overlapped relation of shoulders 72 and 81, components of such force acting radially inward, being opposed by the inner wall of skirt 75 because of its engagement with casing 10 below groove 80 and, because the skirt is relatively thick, it resists compression and thus prevents any possibility of the relatively thin lip 71 recompressing to free the closure.

Should undue force be required to expand sleeve 11 when applying the closure, it is believed the lower end of sleeve 11 could be slit at spaced intervals without interference with its locking efficiency.

It will be seen that no expensive metal ferrule for attaching the closure is needed, together with the added expense of elaborate spinning machine equipment heretofore required. Therefore, a further advantage of the invention is characterized by a substantial reduction in former objectionable costs incident to the adoption by the liquor trade of bottle closures for preventing the prevailing practice of unauthorized refilling which so plagues the industry.

I claim:

1. A closure for a container having a neck, comprising a casing adapted to be inserted in said neck, and a cover

member cooperating with the outer end of said casing to form a valve housing having inlet and outlet openings provided respectively at opposite ends thereof, valve means and spherical weighted means freely movable in said housing, and means for securing the housing to the container neck, said cover member being formed to include a guard plate greater in diameter than said outlet opening, and being attached to but spaced from the under surface of the cover member and from the surrounding inner walls of the casing, to provide for the passage of the liquid contents of the container around the edge of said plate and between the plate and the cover member, and on through said outlet opening, a plurality of lugs depending from said guard plate having their opposed inside surfaces inclined outwardly in a direction away from said plate and toward the bottom of said casing, the cover member, the plate, and the lugs being integrally formed as a one-piece structure, and the lugs being relatively positioned in spaced relation to define a pocket for receiving the spherical weighted means when the container is inverted.

2. A closure for a container having a neck formed outwardly with means for engaging a terminal cap for sealing said closure, and having a minimum inside diameter zone adjacent its top, and a substantially greater inside diameter zone below the upper one, said closure comprising a casing insertable in said neck and having a top flange adapted to overlie the top of the container neck, and a cover member secured to said casing to form a valve housing with inlet and outlet openings provided at its opposite ends, valve means and spherical weighted means freely movable in said housing, said cover member being constructed to include a guard plate greater in diameter than said outlet opening, and attached to but spaced from the under surface of the cover member and from the surrounding inner walls of the casing to provide for the passage of the liquid contents of the container around the outer edge of said plate and between the plate and the said under surface of the cover member leading to said outlet opening, a circular series of lugs located entirely below and depending from said guard plate having their opposed inside vertical surfaces inclined outwardly in a downward direction away from said plate, the cover member, the plate, and the lugs, being all molded integrally of plastic material and constituting a one-piece structure with the lugs defining a pocket for receiving the spherical weighted means when the container is inverted, and means for securing said housing within the container neck comprising an expandable outer locking sleeve made of elastic material and slidably associated with said casing, and having a top rim part adapted to overlie and engage the top of the container neck between the same and said casing flange when the casing and sleeve are forced downwardly within said neck and slide relatively, the said sleeve being provided with an inside surface at its lower end converging inwardly and downwardly to define a minimum diameter zone normally less than the outer diameter of the engaging lower end of the casing, and with a downwardly facing surface formed beneath said zone, and the lower end of the casing being formed with an annular groove in its outer surface defining an upstanding surface engageable with said downwardly facing surface of the sleeve, and so that upon said relative sliding movement of the sleeve and casing, the lower end of the sleeve will expand into said greater diameter zone of the neck, and said casing and sleeve will interlockingly engage each other so as to be non-slidable oppositely into a removable position from the container neck.

3. A closure for a container having a neck with its inside annular wall formed to provide a minimum diameter zone adacent the top of said neck, and with said wall flaring outwardly above and below said zone, the combination of a casing insertable in said neck having a smooth outer annular wall, and a terminal top flange

adapted to overlie the top of the container neck, a cover member secured to said casing to form a valve housing provided with inlet and outlet openings at its opposite ends, valve means freely movable in said housing, and said cover member being constructed to include a guard plate spaced from the under surface of the cover member and from the surrounding inner wall of the casing to provide for the passage of the liquid contents of the container around the outer edge of said plate and between the plate and said under surface of the cover member leading to said outlet opening, and means for locking said housing within the container neck comprising an expandable outer sleeve member made of elastic material and freely mounted as a unitary part of the closure on the outside of the casing member so as to be relatively slidable thereon in a direction lengthwise thereof, and having a rim part adapted to overlie and engage the top of the container neck and be engaged by said rim part of the casing when both the casing and the sleeve are forced downwardly within said neck and slide relatively, the said sleeve being provided with an inside surface at its lower end shaped to converge inwardly and downwardly and define a minimum diameter zone normally less than the outer diameter of the engaging lower end of the casing, and with a downwardly facing surface formed beneath said zone, and the outside lower end of the casing being shaped to provide an upstanding surface, said surfaces being normally disengaged, and whereby, upon said relatively sliding movement of casing and sleeve, the lower end of the sleeve below the minimum diameter zone of the container neck, will be caused to expand and said downwardly facing and upstanding surfaces to simultaneously snap past and operatively engage one another to prevent a return relative movement of casing and sleeve for the purpose of removing the closure from the container neck.

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