July 20, 1948. E. GREENE ET AL 2,445,395

BOTTLE CLOSURE

Filed Oct. 7, 1941

Fig.1.

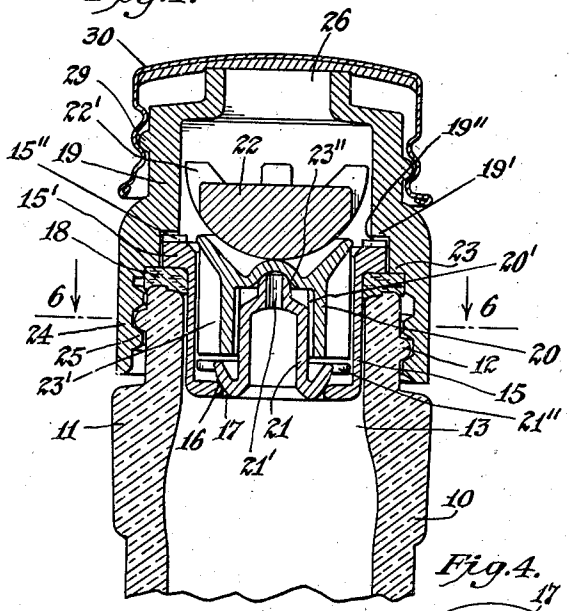


Fig.2.

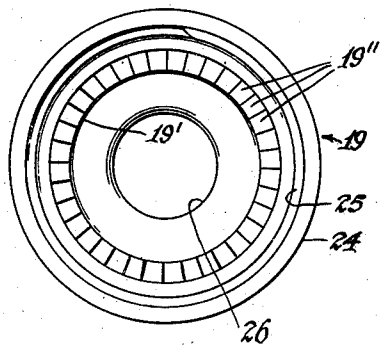


Fig.3.

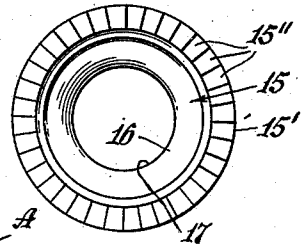


Fig.4.

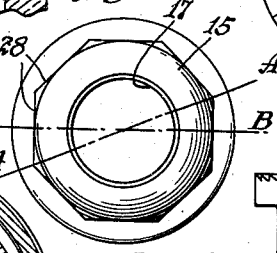


Fig.5.

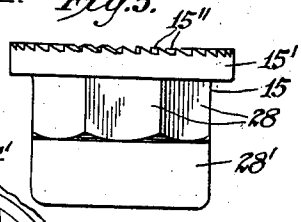


Fig.6.

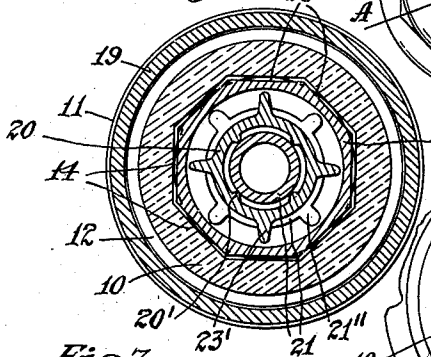


Fig.9.

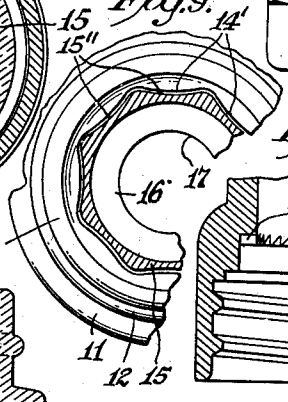


Fig.8.

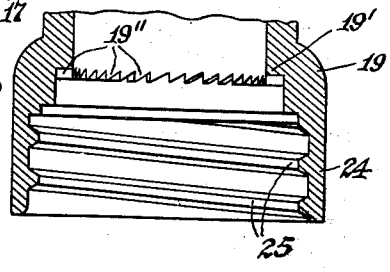
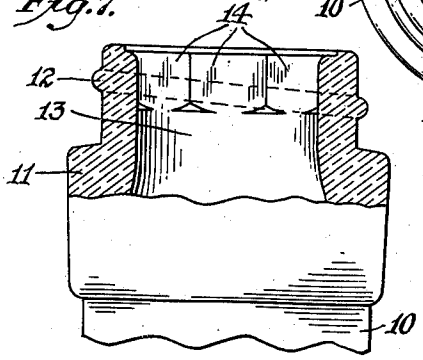


Fig.7.



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BOTTLE CLOSURE

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10 Claims. (Cl. 215—22)

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This invention relates to bottle closures of the type designed to discourage fraudulent refilling of bottles for profit.

An object of the invention is to provide an assembled closure unit primarily for use on whiskey bottle tops of standard diameters, and particularly those in common use having external threads for the application of ordinary screw caps, but in this instance such bottles having in addition a novel configuration of the walls of the bore through the neck effective, as a contributing factor, to prevent the removal of the closure from the bottle unless destroyed or otherwise visibly mutilated.

Another object of the invention resides in the provision of simplified valve parts within the closure, yet sufficiently effective for the purpose set forth without exceeding in cost the price range held to be commercially feasible by the trade.

A further object of the invention is to provide a bottle closure of this character that can be applied by the bottler with the same general type of machinery at present employed to apply screw caps, thus avoiding the necessity and added expense of special machinery, and also the difficulty arising from any disturbance of existing transportation facilities through the bottling plant.

Yet another object of the invention is to provide a special bottle finish suitable for locking this closure to the glass, that is practical to manufacture and without added expense. Further objects of the invention are hereinafter set forth.

Heretofore it has been the common practice to apply bottle closures of this type by the use of a metal ferrule which is spun over suitable beads on the glass finish with special machines. This involves an added expense for the ferrule together with the potentiality of its removal and fraudulent substitution. Another serious objection of the bottling industry to this practice is that a double inventory of bottles is required, as bottles with finishes for spun-on ferrules are not suitable for use with either corks or screw caps. The bottle finish of this invention however possesses the advantage of equal adaptability to standard screw caps, and without interference with the special locking feature of the finish hereinafter to be described.

The closure of the invention consists of a two-piece housing for enclosing the valve parts, the outer member of which is rotatable, and the inner member of which is locked to the glass

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finish so as not to be rotatable. A circular row of ratchet teeth formed on the respective housing members in opposed relation, coact to provide for the rotation of the outer member when screwed onto the threads of the bottle finish, but to prevent counter rotation thereof, since the inner member is held in a fixed position by the special configuration of the walls of the bore through the top finish of the bottle.

The invention further consists of certain buoyant valve parts constructed to nest together compactly, and with provision for the release of adventitious vacuums to facilitate the pouring of the contents of the bottle to which the closure is applied.

The invention will be more fully understood by reference to the drawings forming a part of this specification, and in which,

Fig. 1 is a vertical section of the closure of this invention showing the same attached to a bottle top having the special finish referred to.

Fig. 2 is a bottom plan view of the outer member of the housing of the closure.

Fig. 3 is a top plan view of the inner member thereof.

Fig. 4 is a bottom plan view of the same.

Fig. 5 is a side elevation thereof.

Fig. 6 is a horizontal section taken on the line 6—6 of Fig. 1.

Fig. 7 is an elevation, partly in section, showing the top of a bottle neck with a finish in accordance with this invention.

Fig. 8 is a sectional detail view of the lower portion of the outer housing member of the closure shown in Fig. 1, and,

Fig. 9 is a fragmentary top plan view of a modified form of bottle finish, and showing in section a conforming outer configuration of the inner member of the closure.

Referring now in detail to the drawings, the top of a bottle neck is indicated at 10, having a finish above the usual annular bead or flange 11 consisting of the conventional threads 12 externally formed thereon. The bore 13 however is of particular configuration to provide one or more interruptions in the continuity of the usual circular character thereof. In this instance such interruptions consist of a plurality of surfaces 14, generally similar to the side faces of an octagonal nut, which are easily formed in the glass when the bottle is blown by first simply facing off the pin commonly used with the neck rings of the bottle mold, and which rings form the desired outside finish for corks or screw caps as the case may be. This configuration may be

molded in the glass in a practical manner, as in usual practice the neck rings are hinged together, and when opened to free the bottle, it falls away, and the pin carried by the neck ring is therefore withdrawn along a plane axially aligned with the bottle. Preferably the surfaces 14 are comparatively shallow and only extend a short distances into the bore of the bottle from the upper extremity of the finish.

The closure assembly is made up of an inner housing member 15 having a valve seat 16 and an inlet opening therethrough 17, a gasket 18, an outer housing member 19, and valve mechanism comprising a duplex valve consisting of two members 20 and 21, hereinafter referred to as the primary and secondary element respectively, and a tumbler weight member 22. These parts are held in assembly with the bottle neck in a manner to be presently described.

With the exception of the weight 22, preferably made of porcelain, and the cork gasket 18, the above parts may be made of certain types of plastics. Several varieties of these materials are now known to be sufficiently resistant to alcoholic liquors for which this closure is particularly adaptable, and may be manufactured in multiple cavity molds for large quantity production both by compression and injection molding methods.

The outer member 19 may be made of one of the cheaper plastics, such as Bakelite. Member 15 together with the valve elements 20 and 21, may be made of more expensive but highly resistant thermo-plastic material, such as polystyrene, by injection molding technique. These thermo-plastic parts are relatively small and therefore comparatively cheap to manufacture from this material.

The inner member 15 is provided with an annular flange 15' which, as shown in Fig. 1, overlies the gasket 18 which in turn rests upon the top of the bottle neck 10. The top surface of the flange 15' is provided with an upwardly projecting plurality of ratchet teeth 15'' in the form of an annulus, as shown in Fig. 3, and facing toward the left, as shown in Fig. 5. Member 19 is provided with an annular shoulder 19' on the under surface of which is formed a downwardly extending plurality of ratchet teeth 19'', but each tooth facing in a direction opposite to that of the respective teeth 15''. The number of teeth so formed on each of the members is a matter of choice, thirty-six being indicated as a suitable number for use in this example of the invention, and the purpose of which will presently appear. Member 19 is also provided with another annular shoulder 23 arranged to contact with the gasket 18 to prevent leakage from the interior of the valve housing to the exterior of the bottle neck, any internal leakage, which might otherwise bypass the valve elements, being prevented by a similar engagement of the flange 15' with the gasket 18.

Member 19 has a depending skirt portion 24 which is internally threaded at 25 for engagement with the standard threads 12 formed on the exterior of the bottle neck above the bead or flange 11. This part of the bottle neck including the bead 11, together with the bore through the top of the neck, is known as the bottle finish to those skilled in the art of bottle making.

Member 15 is provided with a plurality of surfaces 26 on its exterior immediately beneath flange 15', resembling those on a nut or bolt head, and which are complementary to the surfaces 14 of the bore of the bottle neck, and with which they cooperate to prevent rotation of element 15 within the bottle neck, except to a minor extent.

Beneath surfaces 26 the remaining portion 23' of member 15 is cylindrical and slightly less in diameter than the bore of the bottle neck below the surfaces 14, and also less than the diameter across the point of intersection of the surfaces 26 indicated by the line A—A of Fig. 4.

It will now be apparent that when members 15 and 19 of the valve housing are assembled together in the position shown in Fig. 1, with the gasket 18 pressed tightly in place, that these parts will provide a unitary bottle closure ready for application to a bottle. Also that the internally threaded skirt 24 of member 19 may engage the external threads 12 following the introduction of the cylindrical portion 23' of member 15 into the bore of the bottle neck, and that as member 19 is rotated clockwise about threads 12 with member 15 held stationary by the coacting surfaces 14 and 26, the ratchet teeth 15'' and 19'' will jump one over the other by reason of the sliding engagement of their sloping surfaces, while at the same time pressure will be built up on the gasket 18 between the top of the bottle and the shoulder 23 and flange 15', until a tight seal has been established with the teeth meshing. Because of the yieldable character of the gasket and its resiliency, the ratchet teeth on the one element are enabled to jump over those on the other element until substantially the maximum degree of compression of the gasket has been reached. The resiliency of the gasket, active against flange 15', is effective to keep the two groups of ratchet teeth in locking engagement with the upper set bottoming in the lower ones.

Now if an attempt is made to unscrew member 19, the same will be prevented by the engaging vertical faces of the teeth, the resulting twisting components being transmitted to member 15. But since the diameter across line A—A is greater than across line B—B, and which is also true of the configuration defined by the surfaces 14, the points across line A—A of member 15 will immediately engage said surfaces 14 because of the diminished diameter of the latter on line B—B, and member 19 cannot therefore be rotated in a counterclockwise direction to remove same, and in consequence thereof the valve housing unit cannot be removed from the bottle without breakage occurring.

The valve parts within the housing may be of any desired character commercially effective to prevent refilling of the bottle through the closure without removal of the latter, but those shown and described herein are adaptable to bottle closures of restricted diameters, to fit within whiskey bottles of standard sizes, and without loss of the pouring capacity demanded. They nest together compactly in order to keep within reasonable limits as to closure depth, thereby cheapening and at the same time avoiding undesirably long extensions within the bottle neck, or ungainly lengths above the same, or both. The material from which the valve parts are made possesses a low specific gravity rating (1.5 to 1.7), and is therefore light enough in weight to be very sensitive to the influence of liquids when moving in a direction toward said valve seat. Furthermore both of the valve elements are made hollow, not only for compactness in assembly, but so as to float in a boat-like manner when the bottle is in an inverted posi-

tion and liquid is introduced. The tumbler weight functions to hold the primary and secondary valve elements in seated relation to each other and to the seat 16 of member 15 when the bottle is upright, and to also quickly move the elements from an open to a closed position when the bottle is on its side.

Should climatic vacuums develop within the bottle due to atmospheric temperature changes, it can still be poured despite the tight seating of the parts, because such vacuums can be readily broken when the bottle is inverted, as the secondary element may then fall away from the primary element and momentarily uncover a relatively small air-vent opening 21' through the primary element. This is because such vacuums are negligible in extent over such a small area. As soon as air pressures thus become equalized at opposite ends of the primary element, the latter will also fall away from the seat 16 under the influence of gravity, or the hydrostatic pressure of the contents of the bottle, and the resulting flow will be continuous until the bottle is emptied.

The areas of the pouring passageways from the valve seat toward the final opening 26 at the top of member 19, should be of a progressively increasing nature to ensure continuous pouring without back pressure tending to reseat the valve elements, and particularly the passageway above and about the weight 22 should be ample.

The configuration of the face of the primary element and the seat 16 is such as to provide a line contact with each other to effect a tight joint. Also the top of the primary element and the contiguous wall 23'' of the secondary element 20, are likewise of a particular configuration for a similar purpose, and in both instances to minimize any adhesion therebetween tending to impede their desired movements when wet. Ribs 23' extend radially outward from the cylindrical wall of the secondary element 20, to provide passageways for the egress of liquid, and are also effective to guide this element during its movement within the member 15. Lugs 22' on the tumbler 22 provide pouring passageways for the liquid contents of the bottle, both between the tumbler and the side as well as the top walls of member 19.

Member 19 may be provided with external threads 29 for the application of the usual 28 mm. metal cap shown at 30, which is adapted to seat on the annular rim of the outlet opening 26. However the upper end of member 19 may be smooth, and a disk of wood or other material, with cork attached thereto, may be employed as a terminal seal instead of a screw cap. In either instance a suitable contour will be provided to facilitate the application of the revenue stamp commonly used on bottles containing alcoholic beverages.

Referring again to the valve elements, additional means are provided for guiding and aligning them in respect to their relative movement, and to their movement jointly within member 15 respecting valve seat 16. For such purposes ribs 20' are effective in the first instance, and in the second instance lugs 21'' projecting radially from the annular walls of the primary element adjacent the segmental spherical lower end thereof constituting a valve face, serve to support and guide, and align this element with seat 16, particularly when the bottle is in a horizontal position.

The foregoing description is merely illustrative

and not intended as limiting the invention thereto.

We claim:

1. A closure for locking attachment to a bottle having an externally threaded neck, comprising an outer and an inner element, the former consisting of an internally threaded cap for rotatable engagement with said bottle threads, and the latter being adapted for assembly within said cap, and fashioned so as to also extend within the bore of a bottle neck, means forming an integral part of the exterior walls of the inner element adapted to engage the walls of said bore and thereby prevent the inner element from being rotated, a flange carried by the inner element adapted to overlie the top of a bottle neck, a compressible gasket beneath said flange for effecting a joint between th same and a bottle top when the closure is tightened on said threads, and means above said gasket forming a part of each of the said elements cooperatively effective to prevent counter-rotation of the outer element following the tight application of the closure to a bottle.

2. A bottle closure for locking attachment to a bottle having an externally threaded top finish with a bore therethrough leading to the interior of said bottle, comprising a valve housing with inlet and outlet openings at opposite ends thereof respectively, and consisting of a cover member, and a body member, valve-means in said housing, the body member having a flange at its upper end adapted to overlie the top of a bottle, and a part beneath said flange adapted to extend within said bottle bore, said part being fashioned externally to engage the walls of said bore and prevent the body member from being rotated therein, a compressible gasket beneath said flange of greater diameter than the flange, the cover member of said housing having an internally threaded depending skirt portion surrounding the body member for engaging the said external bottle threads, and having an internal shoulder surrounding said flange, the shoulder and the flange being adapted to jointly engage said gasket, ratchet teeth formed on respective contiguous surfaces of said members above said gasket, whereby when said cover member is screwed onto a bottle top the body member will be held against rotation, the ratchet teeth will slidingly engage as compression of the gasket progresses, and counter-rotation of the cover member will be prevented upon meshing of said teeth following the tight application of the closure to said bottle.

3. The combination comprising a bottle having an externally threaded top finish, a plurality of annularly disposed surfaces formed on the walls of the bore of said bottle neck and all being at the upper extremity of said neck, and a closure for said bottle comprising a valve housing with inlet and outlet openings at opposite ends thereof respectively, and consisting of a cover member, and a body member, valve-means movable in said housing, a flange at the upper end of said body member adapted to overlie the top of said bottle, and having a part thereof beneath said flange adapted to extend within said bottle bore, said part being fashioned externally to provide a plurality of surfaces substantially complementary to said surfaces of the bottle neck, and adapted to coact therewith to prevent said body member from being rotated within said bottle neck, a compressible gasket beneath said flange of greater diameter than the flange, the cover

member of said housing having an internally threaded depending skirt portion surrounding the body member in spaced relation thereto for engaging the said external bottle threads, and also having an internal shoulder surrounding said flange, the shoulder and the flange being adapted to jointly engage said gasket, ratchet teeth formed on respective contiguous surfaces of said members above said gasket, whereby when said cover member is screwed onto the bottle top the body member will be held against rotation, the ratchet teeth will slidingly engage as compression of the gasket progresses, and counter-rotation of the cover member will be prevented upon meshing of said teeth following the tight application of the closure to said bottle.

4. A closure of the non-refillable type for a bottle having an externally threaded top finish, comprising a housing consisting of two members, valve-means loosely enclosed within said housing, a compressible gasket for sealing said closure to said bottle top, one of said housing members being rotatably engageable with said threads, and the other non-rotatably engageable with the inner wall of the bottle neck when said closure is being applied to said bottle, and means forming a part of each of the said members cooperatively effective to prevent counter-rotation of either of said members following the tight application of the closure to the bottle.

5. A closure for locking attachment to a bottle having an externally threaded neck, comprising an outer and an inner element, the former consisting of an internally threaded cap for rotatable engagement with said bottle threads, and the latter being adapted for assembly within said cap, and fashioned so as to also extend within the bore of a bottle neck, means effective to prevent the inner element from being rotated in said bottle neck comprising a non-circular surface on said inner element adapted to contact with a cooperating surface on said bottle neck, a flange carried by the inner element adapted to overlie the top of a bottle neck, a compressible gasket beneath said flange for effecting a joint between the same and a bottle top when the closure is tightened on said threads, and means above said gasket forming a part of each of said elements cooperatively effective together with said first-mentioned means to prevent counter-rotation of the outer element following the tight application of the closure to a bottle.

6. A closure of the non-refillable type for a bottle having an externally threaded top finish, comprising a valve housing consisting of two members, a compressible gasket for sealing said closure to said bottle top constituting both sealing-means and spring-means, one of said housing members being rotatably engageable with said bottle threads, and the other in non-rotatable engagement in and with the neck of said bottle, and ratchet-means forming a part of each of said members cooperatively effective to assist in preventing counter-rotation of either of said members following the tight application of the closure to the bottle, and being responsive to said gasket spring-means during the application of said closure to the bottle.

7. A closure of the character set forth for a bottle having a neck having external closure attaching means thereon and an opening of non-circular cross-section through the neck, comprising a housing consisting of two members, one of said members having attaching means cooperating with the aforesaid attaching means for drawing the member tightly down upon the end of the neck upon being rotated relatively thereto, the other of said members being insertable into the neck opening and having external means engageable with the inner surface of the neck opening and preventing rotation of the inner member in said opening, a resiliently compressible gasket for sealing said closure to the end of the neck disposed between said last named member and the end of the neck, and cooperating rigid parts on the members acting, upon rotation of the rotatable member, to cause the non-rotatable member to press the gasket against the end of the neck and preventing counter-rotation of the rotatable member relative to the non-rotatable member following tight application of the closure to the bottle.

8. The combination comprising a bottle having an externally threaded top finish, a plurality of annularly disposed convex surfaces formed on the inner surface of the neck of said bottle and all being at the upper extremity of said neck, and a closure for locking engagement with said bottle comprising an outer and an inner element, the former consisting of an internally threaded cap for rotatable engagement with said bottle threads, and the latter element being adapted for assembly within said cap, and having a flange at its upper end adapted to overlie the top of said bottle, and a part beneath said flange fashioned to extend within said bottle neck, the exterior walls of said part having a plurality of concave surfaces substantially complementary to said convex surfaces of the bottle neck, and adapted to coact therewith to prevent the inner element from being rotated when in the neck of said bottle, a resiliently compressible gasket between said flange and the bottle top of greater diameter than the flange, the said outer member having an internal shoulder surrounding said flange, the shoulder and the flange being adapted to jointly engage said gasket, and engageable ratchet teeth formed on the respective contiguous surfaces of said outer and inner elements above said gasket cooperatively effective to prevent counter-rotation of the outer element following the tight application of the closure to said bottle.

9. A bottle closure for locking attachment to a bottle top with external closure attaching threads thereon, said closure comprising an inner member and an outer member, the outer member having internal threads cooperating with said external threads of the bottle top for drawing the outer member tightly down upon the bottle top, the outer member being rotatable relatively to the inner member when the parts are assembled and applied to the bottle top, and the inner member being at all times non-rotatable relatively to the bottle top; a resiliently compressible gasket in position when compressed to seal both members of the closure to the bottle mouth and to each other, and means forming a part of said inner and outer members respectively for causing the gasket to be compressed in such sealing relations when relative rotation between the inner and outer members occurs, and cooperatively effective also to permit such relative rotation between said members during the application of the closure to the bottle top, but to prevent counter relative rotation between them following the tight application of the closure to the bottle.

10. The combination set forth in claim 9, in which the gasket compressing means includes peripheral shoulders on both the inner and outer

members, said shoulders normally lying substantially in the same plane.

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