

[54] SAFETY CAP FOR MEDICINE
CONTAINERS AND THE LIKE

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[58] Field of Search.....215/9, 52, 49

[57] ABSTRACT

A safety cap for protecting children from contact with the contents of medicine bottles or containers of poison features a screw-threaded cap on the neck of a bottle or container which cannot be completely removed until an associated plunger is depressed to cause releasing of a locking means in the neck of the bottle or other container.

[56] References Cited

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15 Claims, 11 Drawing Figures

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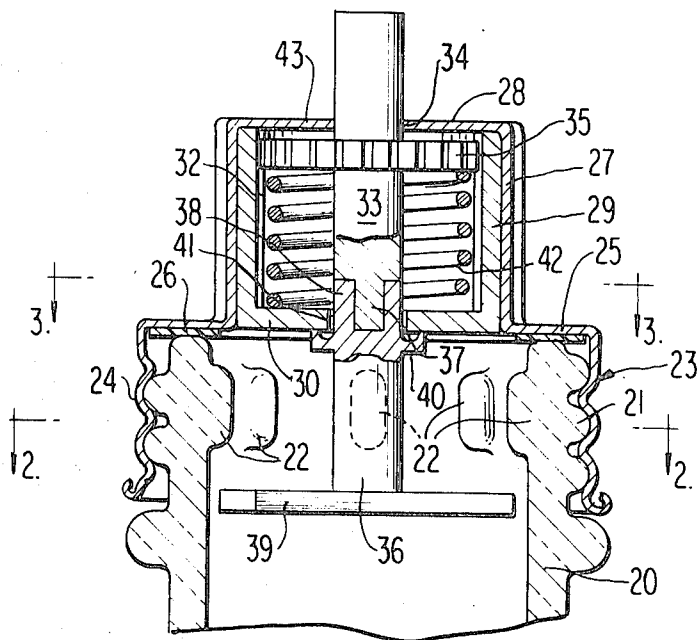


FIG1

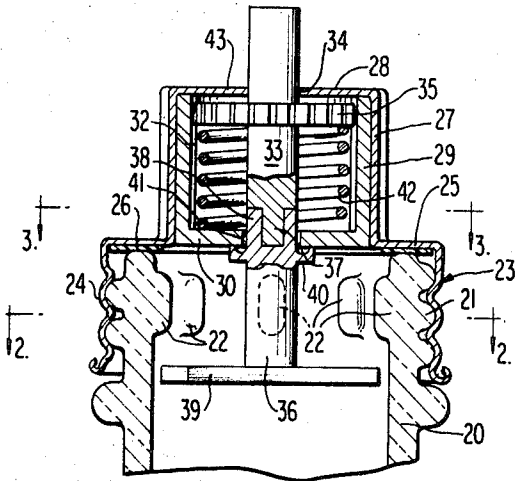


FIG4

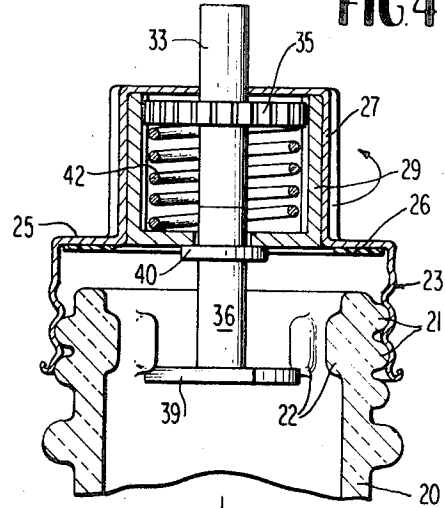


FIG2

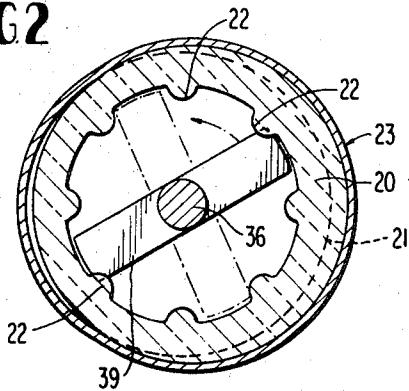


FIG5

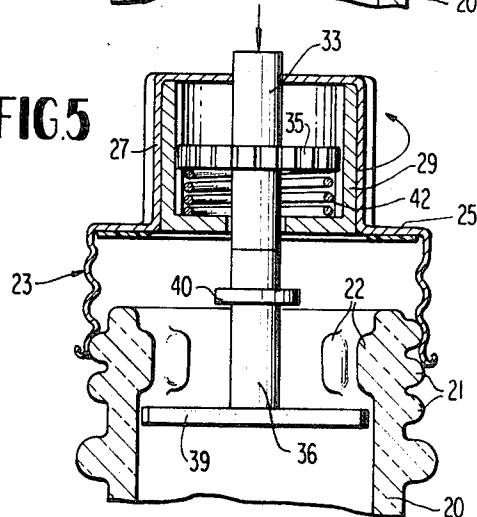
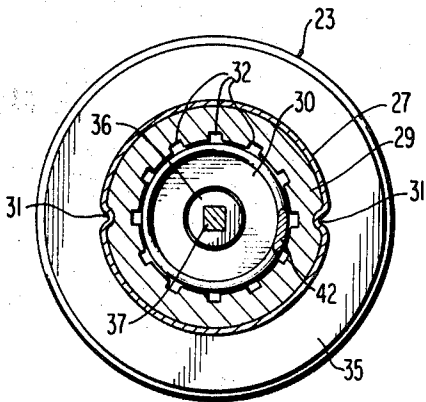


FIG3

FIG6

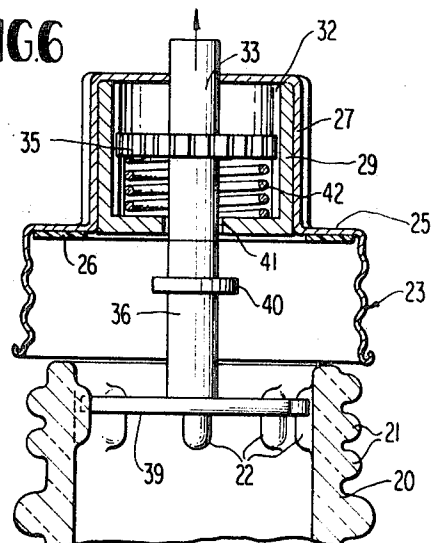


FIG 7

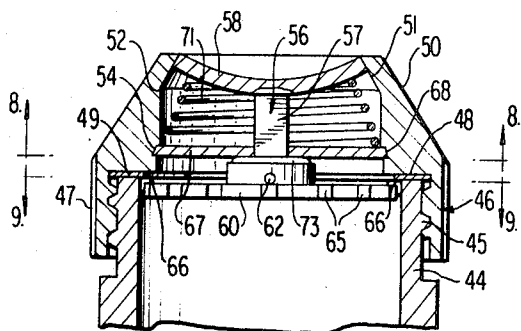


FIG 8

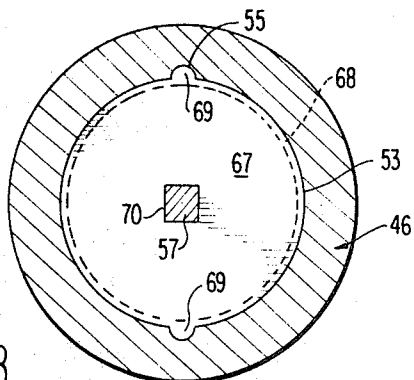


FIG 9

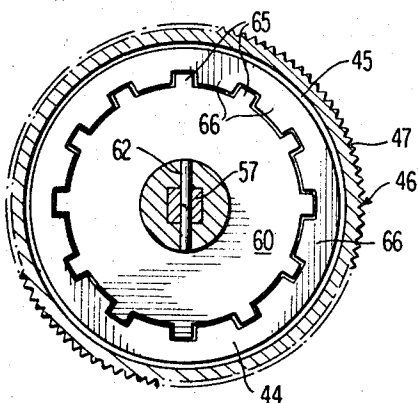
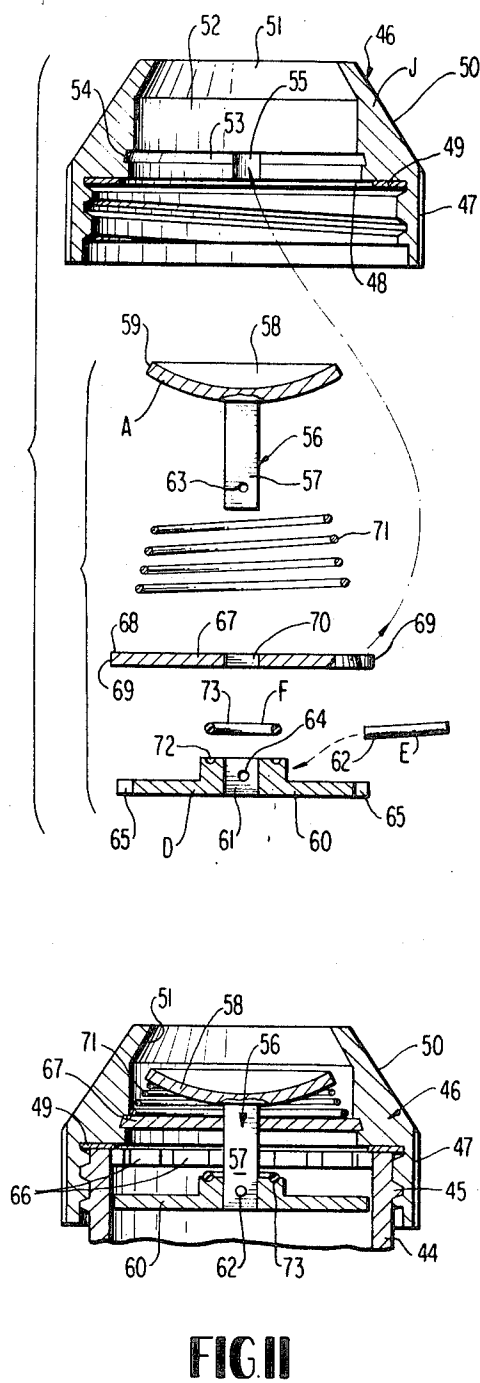


FIG 10



SAFETY CAP FOR MEDICINE CONTAINERS AND THE LIKE

BACKGROUND OF THE INVENTION

There is a recognized need for a simple, reliable and reasonably economical safety closure for medicine and poison containers including such common household medicines as aspirin tablets, blood pressure pills and tranquilizers. As the use of such drugs by adults continues to increase, it is more and more vital to protect young children from contact with the same. While this need has been recognized for some time and certain proposals to satisfy the need have been made in the prior art, the need has become much more urgent recently in view of certain Government regulations pertaining to medicine containers and closures for such containers expected to come into being in the very near future.

With the above in mind, the objective of this invention is to provide a practical, reliable and economical safety cap of the above type which will be sufficiently difficult to remove from the medicine container to confuse young children so that they will cease in their efforts to open the container and will thus be protected from harm. At the same time, the container closure will be sufficiently simple to operate by adults so as not to seriously impede access to the medicine in the container in the event of an urgent need for such medicine.

Basically, the safety closure embodying the invention comprises a screw-threaded cap for engagement over exterior screw-threads on the neck or outlet of the container, and an internal axially movable spring-urged locking plunger on the cap including a part capable of having positive locking engagement with projections on the interior of the container neck so as to resist complete removal of the cap from the container except when the plunger is properly depressed to overcome the force of the spring and to be displaced away from said projections.

The safety closure possesses a number of additional features and advantages over the prior art which will become apparent during the course of the following detailed description.

BRIEF DESCRIPTION OF DRAWING FIGURES

FIG. 1 is a central vertical section taken through a safety cap for medicine containers and the like embodying the invention, the cap being shown in the completely closed position on the container.

FIG. 2 is a horizontal section taken on line 2—2 of FIG. 1.

FIG. 3 is a similar section taken on line 3—3 of FIG. 1.

FIG. 4 is a sectional view, similar to FIG. 1, showing the safety cap in a locked position preventing its complete removal from the container.

FIG. 5 is a similar view showing the locking plunger depressed to release the screw-threaded cap for further turning in order to completely remove the cap.

FIG. 6 is a similar view depicting how the safety cap is completely separated from the container by an axial movement.

FIG. 7 is a central vertical cross section taken through a cap and container in accordance with a modification of the invention.

FIG. 8 is a horizontal section taken on line 8—8 of FIG. 7.

FIG. 9 is a similar section taken on line 9—9 of FIG. 7.

FIG. 10 is an exploded cross sectional view through the safety closure shown in FIG. 7.

FIG. 11 is a central vertical section showing the cap or closure conditioned for release from the container by depression of the plunger means.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Referring first to FIGS. 1 through 6 showing one embodiment of the invention, wherein like numerals designate like parts, the numeral 20 designates the neck of a medicine bottle or the like, such as a bottle for aspirin tablets. The form of the invention shown in FIGS. 1—6 is particularly suitable for aspirin or other pill containers. The container neck 20 is formed with external screw-threads 21 near its open end and a plurality of circumferentially equidistantly spaced locking lugs or projections 22 is formed on the interior of the neck 20 near and below its open end and projecting radially into the bore or outlet passage of the neck. While eight of the projections 22 are shown, a lesser number may be employed in some instances but at least two locking projections will always be required for proper operation of the safety cap.

The invention further comprises an internally screw-threaded closure cap 23 adapted to be applied over the screw-threads 21 by turning in the usual manner. The cap 23 is illustrated as a metal cap but a molded plastic cap or bakelite cap is also suitable for use in the invention. Above the screw-threaded skirt 24 of the cap 23, a right angular annular shoulder 25 opposes the end of the bottle neck 20 and a suitable compressible gasket 26 is preferably provided on this shoulder to seal the mouth of the container when the cap 23 is fully closed. The cap 23 further comprises an elevated cylindrical crown portion 27 of somewhat reduced diameter including a top wall 28 spaced substantially above the shoulder 25 and the open end of the bottle neck.

Fixedly secured within the crown portion 27 is a cup-like element 29, open at the top and having a lower end wall 30 flush with the shoulder 25. Relative rotation between the cup 29 and cap 23 is prevented by crimping the side wall of the crown portion 27 as at 31, FIG. 3, into recesses formed at the same location in the cup 29. The interior of the cup 29 is provided with a plurality of splines or keyways 32 extending from the open top of the cup down to the wall 30.

The safety cap additionally comprises a plunger assembly which includes a central axial pin or shaft 33, the upper end of which extends slidably through a central opening 34 in the top wall 28 of the cap crown portion. The upper end of the pin 33 is thus positioned conveniently to be depressed axially by the thumb or finger of the user. The plunger assembly further comprises a splined disc 35 on the pin 33 and rigid therewith. The marginal teeth or splines of this disc are received slidably in the keyways 32 so as to allow ready reciprocation of the plunger assembly while preventing rotation thereof relative to the cup 29 and cap 23. The plunger assembly further comprises a lower pin or shaft section 36 separate from the section 33 and coupled therewith through a square projection 37 on the lower end of pin section 33 which is received snugly in a square socket opening 38 formed in the upper end of section 36 of the plunger pin or shaft. The components

37 and 38 may be press-fitted or adhesively secured in assembled relationship.

The lower end of pin section 36, FIG. 1, extends below the locking projections 22 when the plunger assembly is elevated and a rigid transverse locking bar 39 is fixedly secured to the lower end of the extension 36 by any suitable means and extends equidistantly radially on opposite sides of the plunger pin or shaft. The length of the locking bar 39 is slightly less than the bore diameter of the neck 20 so that the bar 39 may revolve within the bore with slight radial clearance as shown in FIG. 2. The projections 22 are of a sufficient size to block upward movement of the bar 39 with the plunger assembly when the bar is positioned to interfere with a pair of the projections as illustrated in FIG. 2. However, there is sufficient circumferential space between each pair of projections 22 to allow the bar 39 to pass upwardly when properly oriented relative to the locking projections 22, as illustrated in FIG. 6.

The plunger assembly further includes on the pin section 36 a radially projecting annular seal 40 adapted to abut the lower face of cup wall 30 so as to form a seal around the central opening 41 which receives the plunger shaft slidably. The entire plunger assembly is biased upwardly by a compressible coil spring 42 held within the cup 29 and having its top end engaging the splined disc 35. This spring maintains positive contact between the seal 40 and the cup wall 30 except when the plunger assembly is depressed manually relative to the cup and threaded cap 23. A sufficient clearance space 43 is provided between the cap top wall 28 and disc 35 to assure proper seating of the seal 40 under influence of the spring.

The mode of operation of the safety cap can be readily understood by reference to FIGS. 1 and 4 through 6. FIG. 1 shows the cap 23 fully applied to the container with the sealing gasket 26 under compression and the reciprocatory plunger assembly elevated by the spring 42 so that the seal 40 is seated against the cup wall 30. The locking bar 39 is now spaced considerably below the lugs 22.

In the particular embodiment illustrated, it requires two full turns of the cap 23 to separate the threaded cap from the neck of the container. This factor is a variable in the invention as is the length of the plunger pin 33-36 establishing the spacing of the bar 39 from the projections 22 in FIG. 1. In the illustrated arrangement, it is believed that it will be more confusing and frustrating to a young child to be able to partially remove the cap and then find it locked against complete removal in comparison to having the cap positively locked initially. However, it is entirely possible to construct the invention as shown in FIGS. 1-6 so that a lesser amount of turning of the cap 23 is required to separate it from the container and also the locking bar 39 can be positioned so that the cap will be locked with respect to the lugs or projections 22 when the cap is fully closed, FIG. 1.

It requires approximately three-fourths of a turn to one turn of the cap 23 to elevate the bar 39 into interfering or locking engagement with a pair of the lugs 22, as indicated in FIG. 4. Remembering that the cap 23 is locked at 31 to the cup 29 and the cup is locked or splined to the disc 35 of the plunger assembly, there can be no further rotation of the cap assembly in FIG. 4 without first depressing the plunger assembly and therefore the child is unable to completely separate the

threaded cap from the threaded container by turning the cap and the child will not realize that a second non-rotary operation is required to release the cap.

An adult, on the other hand, after turning the cap to the locked position of FIG. 4 will merely depress the top of the pin section 33 of the plunger assembly against the force of spring 42, FIG. 5, and this will shift the locking bar 39 downwardly in the neck of the container to an elevation sufficiently below the lugs 22 to allow cap 23 to be turned the remaining $1\frac{1}{4}$ turns, approximately, necessary to completely separate the threaded cap from the threaded container. When the threaded cap is thus released from the container, the user simply manipulates the cap assembly until the locking bar 39 finds a location between pairs of the lugs 22 where it can be elevated with respect to the lugs 22 and completely removed from the neck of the container by an axial movement, as depicted in FIG. 6.

To reapply the safety cap to the container, it is necessary to hold the plunger assembly in the depressed position, FIG. 5, and to insert the locking bar 39 below the lugs 22 and to continue holding the plunger assembly depressed relative to the cap during at least the first $1\frac{1}{4}$ turns of the threaded cap onto the threaded neck of the container. This will bring the parts back to their relative positions shown approximately in FIG. 4 where it is no longer necessary to depress the plunger assembly and the cap may be turned down to its fully closed position of FIG. 1.

In FIGS. 7 through 11, there is shown a modification of the invention which embodies the same general principle of operation but which is somewhat more compact in construction and requires only a single turn of the cap to release the same from the container. Also, in the modification, the cap is locked against release turning from the start.

Referring to FIGS. 7 through 11, a container neck 44 has external screw-threads 45 which are engaged by the internal screw-threads of a cap 46 which is preferably serrated as shown at 47. Above the screw-threads of the cap 46, an internal annular shoulder 48 is formed to abut the open end of the container neck. A suitable sealing gasket 49 is also provided at this point. Above the shoulder 48, the cap 46 may be externally tapered at 50 and the upper end of the cap has an opening defined by a conically tapered bore portion 51 leading to a cylindrical bore 52. Immediately below the bore portion 52, the cap has an internal shallow groove 53, the peripheral wall 54 of which is conically tapered upwardly. At diametrically opposite points, the cap is further provided with internal locking recesses 55 which intersect the annular groove 53 and extend below the same so as to open through the annular shoulder 48, FIG. 10.

The safety cap further embodies a plunger assembly 56 which is movable axially relative to the cap 46 but locked against rotation relative to the cap, as will be described. The plunger assembly comprises a preferably square shaft 57 having rigidly secured to its top end a concave push button 58 having a conical peripheral edge 59 for seating against the conical bore 51, FIG. 7. A gear-like locking disc 60 has a center square opening 61 formed through its hub receiving the lower end of the shaft 57 and attached thereto by a cross pin 62 which enters registering openings 63 and 64 of the shaft 57 and locking disc 60. The periphery of the locking disc 60 has plural circumferentially equidistantly

spaced splines or teeth 65 for interlocking engagement between internal projections or lugs 66 formed in the container neck 44 at the mouth of the neck. The diameter of the disc 60 is such that it will easily enter the bore of the neck 44 with some clearance. The spacing of the teeth 65 and lugs 66 is such that when proper alignment is obtained, as shown in FIG. 9, the locking disc 60 can be withdrawn axially from the container neck. However, the interengagement of the teeth and lugs will prevent rotation of the disc 60 relative to the container. As described above, the plunger assembly 56 is a unit consisting of the elements 57, 58, 60 and 62.

In order to lock the plunger assembly 56 against rotation relative to the threaded cap 46, an additional disc or plate element 67 is provided having a conically tapered peripheral edge 68 which aids the disc in snapping readily into the groove 53. The disc 67 has two diametrically opposite radial detent elements 69 which enter the locking recesses 55 to lock the disc 67 against rotation when seated in the groove 53. The disc 67 has a center square opening 70 receiving the square shaft 57 and locking it against rotation relative to the disc 67 and cap 46. Thus it may be seen that the entire plunger assembly 56 is held against rotation relative to the cap 46 by the disc 67 and associated elements and the disc 60 locks the cap 46 and plunger assembly against rotation relative to the container neck when the teeth 65 and projections 66 are interengaged, as shown in FIGS. 7 and 9.

In order to maintain the plunger assembly 56 normally elevated and in the locking position relative to lugs 66, a preferably conical coil spring 71 is interposed between the concave push button or plate 58 and the locking disc 67 which is fixed in the groove 53. Due to the beveled nature of the periphery of disc 67 and the corresponding taper of the groove at 54, there is never any tendency for the disc to disengage the groove 53 when the plunger assembly is depressed, because any flexure of the disc 67 will only tend to seat it more firmly in the groove.

The hub of locking disc 60 has an annular groove 72 in its top face adapted to receive an O-ring seal 73 which forms a seal with the bottom face of disc 67 surrounding the square shaft 57 when the plunger assembly is in the up or locked position.

Referring to FIG. 7, with the parts arranged as shown, the cap 46 when fully closed is locked against rotation from the beginning by the interengagement of teeth 65 and lugs 66 and the cap cannot be turned for opening the container without first depressing the plunger assembly 56. Full depression of the plunger assembly 56 to allow opening of the container is illustrated in FIG. 11. This can easily be accomplished by the thumb or finger of an adult but would be difficult for small children and very confusing. The locking disc 60 is now shifted downwardly and out of engagement with the fixed locking lugs 66 of the container neck and the entire safety cap assembly can now be turned the necessary amount, approximately one full turn in the illustrated embodiment, to completely separate the cap 46 from the container. When the screw-threads are completely separated, the toothed disc 60 can be removed from the neck of the container by a simple axial lifting movement, the teeth 65 passing through the spaces between the lugs 66. To reapply the safety cap to the container, the plunger assembly 56 is held de-

pressed until the cap is screwed onto the container and is then released to re-establish the locked condition shown in FIG. 7.

The terms and expressions which have been employed herein are used as terms of description and not of limitation, and there is no intention, in the use of such terms and expressions, of excluding any equivalents of the features shown and described or portions thereof but it is recognized that various modifications are possible within the scope of the invention claimed.

I claim:

1. A safety closure for medicine containers and the like comprising a screw-threaded closure cap engageable with external threads on a container, said container having internal locking projections, a reciprocatory locking plunger unit for the safety closure movable axially relative to said closure cap but held against rotation relative thereto, said plunger unit having a manually depressable part at the top of the cap and having a rigid locking part at the bottom of the plunger unit entering the container, said rigid locking part adapted to interlock with said internal projections of the container to resist rotation of the closure cap and plunger unit relative to the container, and a spring engaging the plunger unit and holding it in an undepressed position relative to said closure cap.

2. The structure of claim 1, and a first means locking said plunger unit against rotation relative to the closure cap, and a second means on said plunger unit engageable with said internal locking projections and locking the plunger unit against rotation relative to said container.

3. The structure of claim 2, and said first means comprising a disc on the plunger unit movable therewith and having splined engagement with an interior part of the closure cap, and the second means comprising a transverse member on the lower end of the plunger unit and extending into the neck of the container and being rotatable and axially movable therein when disengaged from said internal projections.

4. The structure of claim 3, and said closure cap including an elevated crown portion above the mouth of said container forming a housing for said disc and said spring, said spring bearing on the bottom of said disc and urging said plunger unit outwardly relative to the container mouth, said crown portion having an opening rendering the top of the plunger unit accessible for manually depressing said unit against the force of said spring.

5. The structure of claim 4, and a cup element in the interior of said crown portion and secured therein against rotation and having a splined bore slidably receiving the splined disc for axial movement, the cup element having a bottom wall forming a support for one end of said spring, and a seal carried by the plunger unit and having sealing engagement with said bottom wall when the plunger unit is in its normal outward position under the biasing influence of said spring.

6. The structure of claim 2, and said first means comprising an internal transverse member locked to said closure cap and held against rotation relative to the cap and slidably engaging the plunger unit to allow axial reciprocation thereof while locking the plunger unit against rotation relative to the closure cap, said second means comprising another member on the lower end of the plunger unit extending transversely thereof and being disposed in the neck of the container and being

rotatable therein with said cap when released from engagement with said internal projections by depression of said plunger unit.

7. The structure of claim 6, and said internal transverse member locked to said closure cap comprising a disc seated in an internal groove of the closure cap and held against rotation in said groove, said disc having an opening with at least one straight edge portion, and the plunger unit including a shaft member received slidably by said disc opening and having the same cross sectional shape as the disc opening, whereby the shaft member is movable axially in said opening but is non-rotatable therein.

8. The structure of claim 7, and a push button element on the top end of said shaft member engageable manually for depressing said plunger unit, said closure cap having a top opening adjacent the push button element, and a compression spring mounted inside of the closure cap between the push button element and said disc, said spring serving to maintain said another member on the lower end of the plunger unit in interlocking engagement with said internal projections but releasable therefrom by manual depression of the plunger unit.

9. The structure of claim 6, and said second means comprising a toothed disc on the lower end of the plunger unit and the teeth of said disc having circumferential interfitting engagement with said internal projections of the container.

10. The structure of claim 9, and said internal projections comprising a plurality of circumferentially equidistantly spaced teeth-like projections in the bore of the container neck substantially at the mouth of said neck.

11. The structure of claim 8, and said push button element comprising a depressed concave plate element having a conical periphery, said cap having a conical bore portion opening through its top and forming a seat for said push button element.

12. The structure of claim 1, and said closure cap having an annular lateral shoulder above the screw-threads of the cap adapted to abut the open end of the container when the cap is completely engaged therewith.

13. The structure of claim 2, and said first means comprising a disc on the plunger unit movable therewith and having axial moving engagement with an interior part of the closure cap, and the second means comprising a transverse member on the lower end of the plunger unit and extending into the neck of the container and being rotatable and axially movable therein when disengaged from said internal projections.

14. The structure of claim 13, and said closure cap including an elevated crown portion above the mouth of said container forming a housing for said disc and said spring, said spring bearing on the bottom of said disc and urging said plunger unit outwardly relative to the container mouth.

15. The structure of claim 14, and a cup element in the interior of said crown portion and secured therein against rotation and having a splined bore slidably receiving the disc for axial movement, the cup element having a bottom wall forming a support for one end of said spring, and a seal carried by the plunger unit and having sealing engagement with said bottom wall when the plunger unit is in its normal outward position under the biasing influence of said spring.

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