United States Patent

[11] 3,558,022

[72] Inventor **Walter J. Zytko**
Walnut Creek, Calif.

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[45] Patented **Jan. 26, 1971**

[73] Assignee **Abbott Laboratories**
North Chicago, Ill.
a corporation of Illinois

Continuation-in-part of application Ser. No. 647,544, June 20, 1967, now abandoned.

[54] **CONTAINER SAFETY CLOSURE**
5 Claims, 15 Drawing Figs.

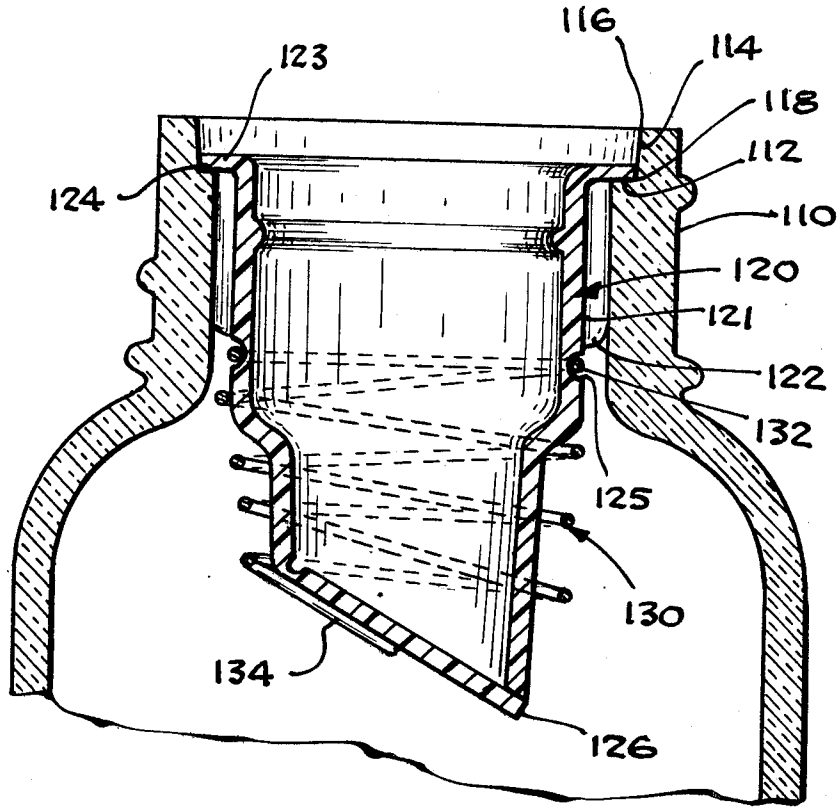
[52] **U.S. Cl.** **222/490**
[51] **Int. Cl.** **B65d 5/72**
[50] **Field of Search** ..... 141/(Bell Consulted), Inquired, 22, 23, 24, 353, 355, 380, 381; 222/490, 491, 494, 501, 511, 577, 556, 563, 547

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Primary Examiner—Samuel F. Coleman
Attorney—Robert L. Niblack

ABSTRACT: A safety closure insertable within the neck of a container and depending a short distance into the container to be used in conjunction with a dropper-dispenser for dispensing liquids from the container. The safety closure is sealed to the container with a flange compressed by the container, the closure having sidewalls depending from said flange along the neck of the container and terminating in a bottom opening and a movable closure element urged into a closed position by spring action.



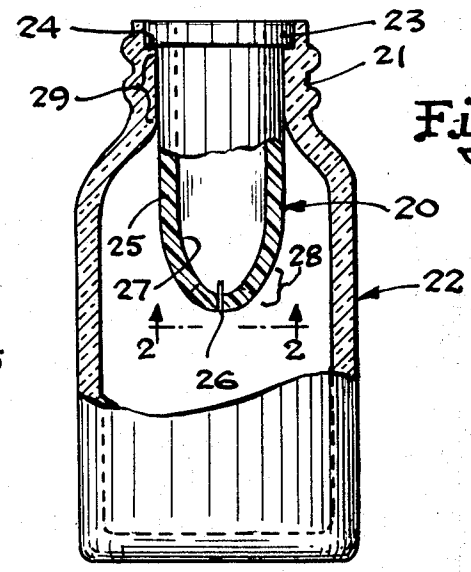


Fig. 1

Fig. 2

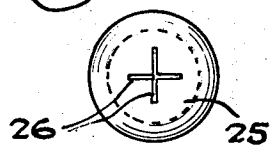


Fig. 5

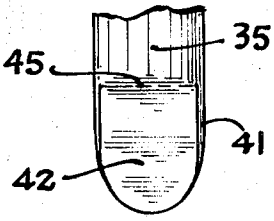


Fig. 3

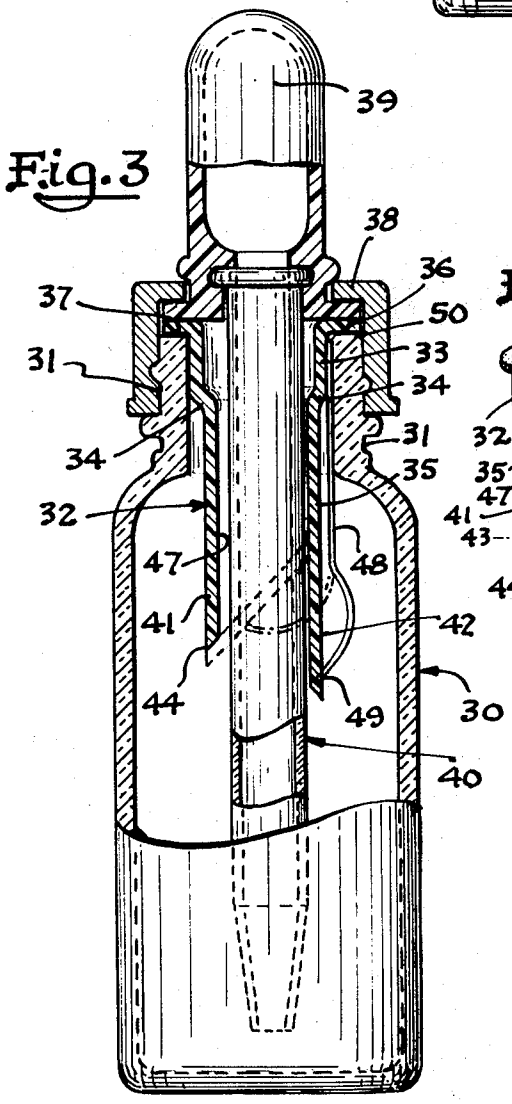
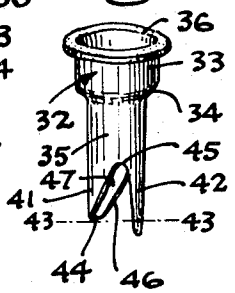


Fig. 3A



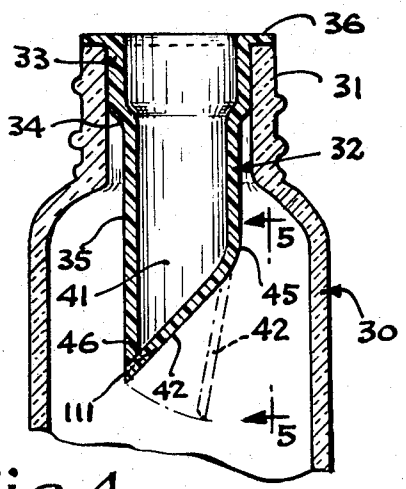


Fig. 4

Inventor
Walter J. Zytko
By David E. Dameron
Attorney

Fig.6

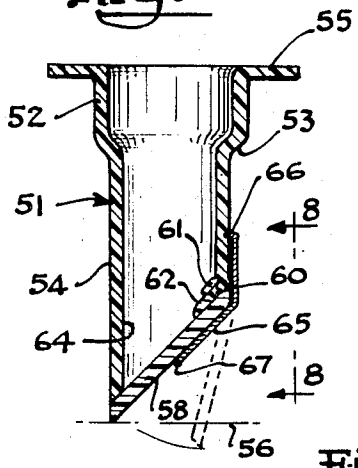


Fig.8

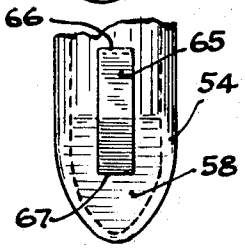


Fig.9

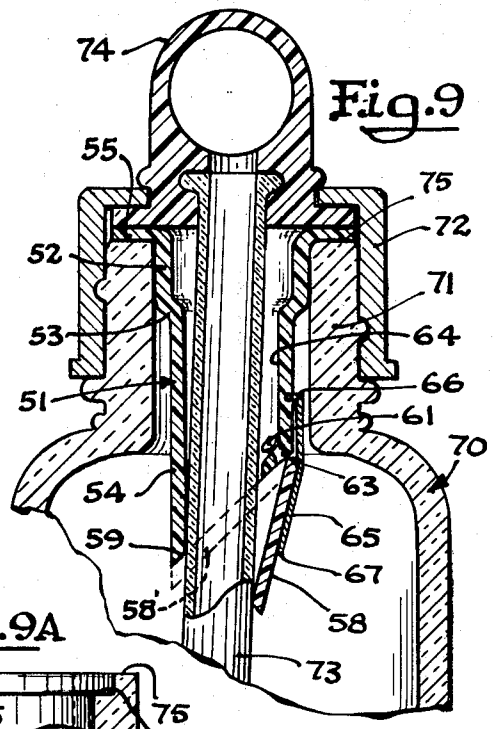


Fig.6A

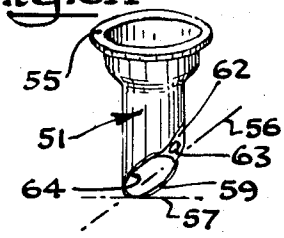


Fig.7

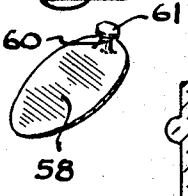
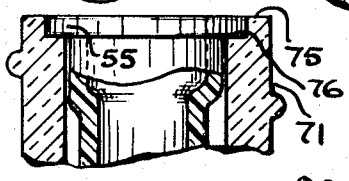


Fig.9A



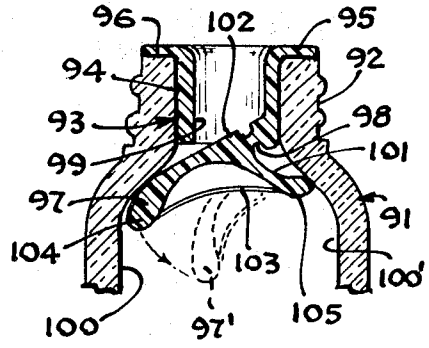


Fig.11

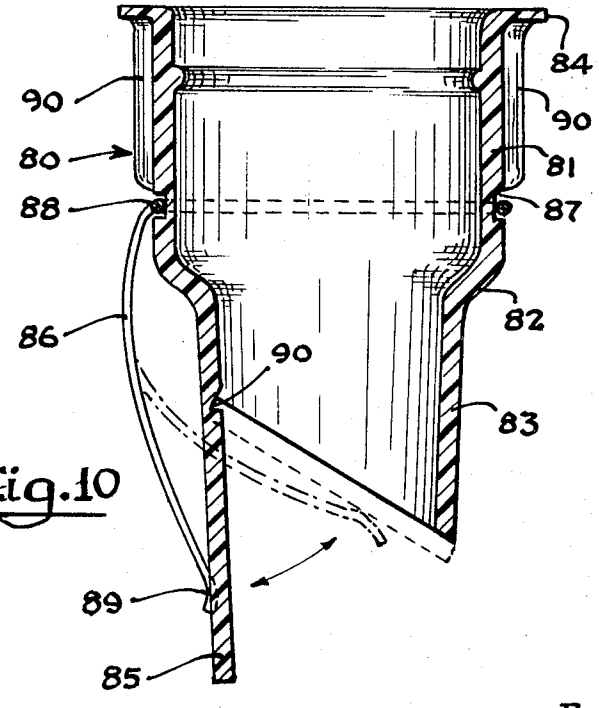


Fig.10

Inventor
Walter J. Zyko
By Basil E. Demeur
Attorney

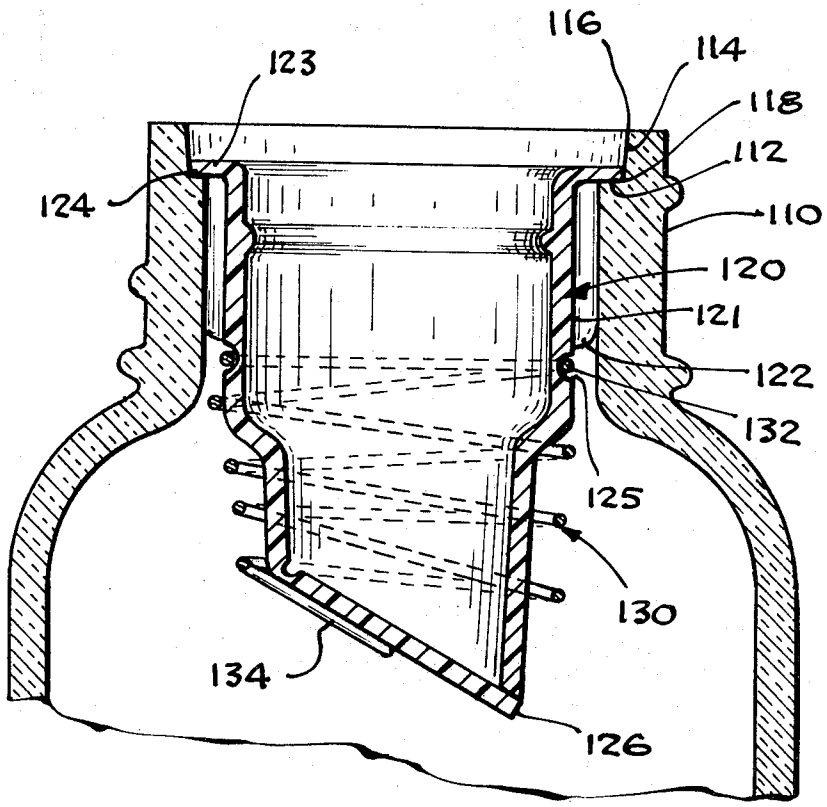


Fig. 12

CONTAINER SAFETY CLOSURE

This application is a continuation-in-part of Application Ser. No. 647,544, filed June 20, 1967, and now abandoned.

BACKGROUND OF THE INVENTION

Various types of medicaments and other liquids are provided in containers such as bottles, to be dispensed by a dropper-dispenser having a squeeze bulb at the top end thereof. In the usual form, the dropper-dispenser and squeeze bulb are made integrally with the closure cap of the container such that to dispense liquid from the bottle, the bulb is manually compressed and released, drawing liquid into the dropper, and the cap unscrewed to remove the dropper from the bottle. Once the cap and dropper assembly is removed, however, the container is open, exposing the liquid contents to possible contamination from the air and to the danger of loss due to spillage. In addition, screwcap closures are generally very easily removable by children, presenting the danger of ingestion of the contents by children.

The object of this invention is to provide a safety closure plug for a container, such as a bottle, which allows the dropper-dispenser access to the contents when inserted into the bottle but closes off access when the dropper is removed. The plug is inserted into the neck portion of the bottle and is engaged there by a tight friction fit or by such other means as to make removal of the plug from the bottle extremely difficult.

BRIEF SUMMARY OF THE INVENTION

The safety plug contemplated by this invention includes top side body walls having a peripheral flange around the the top circumference of said body walls. To receive the peripheral flange, the inlet of the container has a tapered portion, the lower edge of which has a smaller diameter than the flange, and terminates in a shoulder. When seated against the shoulder, the flange is held in compression. A portion of the lower end of the body wall is provided with movable means for allowing access to the contents of the bottle by a dropper-dispenser when inserted into the bottle through the plug, which means is urged shut when the dispenser is removed. The plug is designed to fit the bottle neck so that the only access to the contents is through the plug assembly. In this manner, once the dispenser is removed the plug is closed and the contents are prevented from spilling out or otherwise being removed from the bottle.

BRIEF DESCRIPTION OF THE DRAWINGS

In order to better understand this invention, reference is made to the attached drawings, wherein:

FIG. 1 is a side elevational cross section view of a bottle having one embodiment of a safety plug engaged within the neck portion thereof;

FIG. 2 is a view of the bottom portion of the plug taken along line 2–2 in FIG. 1;

FIG. 3 is a side elevational cross section view of a bottle having another embodiment of a safety plug engaged within the neck portion thereof and having a dropper-dispenser cap mounted to the threaded neck portion of the bottle, the dropper extending downward through the plug;

FIG. 3A is a perspective view, showing a safety plug molded as a unitary piece;

FIG. 4 is a side elevational cross section view partially cut away, illustrating a plug engaged within the neck portion of a bottle, the plug being in the closed position;

FIG. 5 is a fragmented view of the jaw assembly taken along line 5–5 in FIG. 4;

FIG. 6 is a side elevational cross section view of a plug molded as a two-piece unit and having a spring for urging the jaw into a normally sealed position against the body wall;

FIG. 6A is a perspective view of the plug embodiment of FIG. 6 lacking the jaw member;

FIG. 7 is a perspective view of the jaw member including attachment means for fitment with the plug of FIG. 6A;

FIG. 8 is a side elevational fragmented view of the portion of the plug taken along line 8–8 of FIG. 6;

FIG. 9 is a partially cutaway side elevational cross section view of the plug of FIG. 6 engaged within the neck portion of a bottle and having a dropper-dispenser inserted through the plug body;

FIG. 9A is a partially cutaway side cross section view of the plug engaged within the upper rim of the neck portion of a bottle;

FIG. 10 is a side elevational cross section view of another embodiment of a plug molded as a unitary piece and having a biased spring to urge the jaw into a normally sealed position;

FIG. 11 is a partially cutaway side elevational cross section view of still another embodiment of a safety plug engaged within the neck portion of a bottle.

FIG. 12 is partially cutaway side elevational, cross section view of an additional embodiment of a safety plug engaged within the neck portion of a bottle.

DETAILED DESCRIPTION OF THE INVENTION

Referring now to FIG. 1, there is shown one embodiment of a safety plug **20** engaged within the neck **21** of a bottle **22**. The plug **20** generally consists of a body wall **25** surrounding a cavity **27**. Slits **26** transversing the body wall **25** are provided at the lower end **28** of said body wall. The upper end **29** of plug **20** includes a peripheral flange **23** which tests on a peripheral shoulder **24** provided along the top ridge of the bottle neck **21**. The plug **20** may be made of a substantially resilient material such as rubber or a plastic such as polyethylene, polymethyl methacrylate, and polyvinyl chloride, among others, such that the slits **26** form a tight seal when in the normally closed position by virtue of the resiliency of the material. The upper end **29** of body wall **25** has an external diameter the same or slightly larger than the internal diameter of the neck **21** such that a tight seal is maintained between the body wall **25** and the interior of the bottle neck **21**. Access to the contents of the bottle is only achieved by forcing the slits **26** apart, as by inserting the dropper-dispenser **40** (FIG. 3) through said slits **26**. When the dropper **40** is removed, the natural resiliency of the body wall **25** draws the slits **26** into a tight seal thereby preventing any further removal of contents from the bottle regardless of how the bottle is positioned or handled.

The plug **20** may be molded as a unitary piece or as two or more pieces. In FIGS. 3, 4, and 5, a unitary plug is generally illustrated. In FIG. 3, there is shown a bottle **30** having a neck **31** containing a plug **32**. The plug **32** is molded as a unitary piece having an upper body wall **33**, an inwardly tapered portion **34**, and a lower body wall **35**. The exterior diameter of the upper body wall **33** is the same or slightly larger than the interior diameter of bottle neck **31** such that a fluidtight seal is maintained therebetween. A peripheral flange **36** is provided which is coextensive with the upper body wall **33**, said flange resting on the top surface **37** of the bottle neck **31**. The flange **36** cooperates with the bottle cap **38** to provide a tight seal when the cap **38** is threadably mounted on the neck **31**. The cap **38** is adapted to contain a dropper-dispenser **40** having a squeeze bulb **39** at the top portion thereof. In practice, the dropper-dispenser **40** and the cap **38** are semipermanently fastened together such that they cooperate as a unitary piece.

The plug **32** has a cylindrical lower body wall portion **35** consisting essentially of opposed body wall portions **41** and **42** at the bottom of the lower body wall portion **35**. Opposed body wall portions **41** and **42** are formed by a partial cutaway segment of the lower body wall **35** in a plane oblique to the horizontal plane **43** of the plug and extending from the bottom end **44** of the body wall **35** to an apex **45**, as generally shown in FIG. 3A. The result of such a configuration is that body wall portion **42** constitutes a jaw member hinging about apex **45** to sealingly engage the lip **46** formed by the cutaway segment and close off the cavity **47**. The plug may be molded as a unitary piece as illustrated in FIG. 4, and when so molded, the jaw

member 42 is molded in the closed position. To remove liquid contents from the bottle, the dropper-dispenser 40 is inserted into the plug 32 forcing the jaw 42 to open as illustrated by the phantom lines in FIG. 4. Once liquid has been drawn into the dropper 40, it is removed from the bottle, and the natural resiliency of the body wall material urges the jaw 42 into sealing engagement with the lip 46 of the opposing body wall portion 41.

If desired, and to further improve the efficiency of the plug assembly, the plug 32 may be equipped with a spring element 48 to insure a tight seal between the jaw 42 and the lip 46. The spring 48 is attached at its one end to the jaw member 42 and at its other end to the body wall portion 35 by appropriate means. In FIG. 3, the spring 48 is shown to be imbedded in the body wall of the jaw 42 at its one end 49 and sandwiched between the peripheral flange 36 of the upper body wall 33 and the top surface 37 of the bottle neck 31 at its other end 50. The particular points of attachment of the spring element are unimportant so long as one end of the spring engages the jaw 42 and the other end engages some other portion of the plug 32 or the bottle 30 providing sufficient tension to maintain a tight seal between the jaw 42 and the lip 46 of the lower body wall portion 35. The spring may be composed of any suitable material such as steel, aluminum, or other metal or plastic capable of providing tension between the appropriate elements.

As previously mentioned, the plug assembly may consist of more than a unitary molded piece. In FIGS. 6 and 7, there is illustrated a plug 51 having an upper body wall portion 52, an inwardly tapered portion 53, a lower body wall portion 54, and a peripheral flange 55 coextensive with the upper body wall 52. The lower body wall 54 is cut away at the end thereof in a plane 56 oblique to the horizontal plane 56 oblique to the horizontal plane 57 of the plug 51, as illustrated in FIG. 6A. The jaw member 58 is a separate piece molded as a flat sheet of plastic or other such suitable material, shaped to the contour of the lip 59 formed by the cut along the oblique plane 56 in the lower body wall 54. The jaw 58 includes an upstanding rib 60 having a slightly enlarged head 61 to serve as the attachment means of the jaw 58 to the plug 51, as shown in FIG. 7. The plug 51 includes a shoulder 62 sloped inwardly along the line of cut of the oblique plane 56 through the lower body wall 54, said shoulder 62 having an aperture 63 adapted to receive the head 61 of the upstanding rib 60 in a snap-fitting engagement such that the jaw 58 is hingedly mounted to the plug 51 to close off the cavity 64 of the plug 51. The jaw 58 is held in a tight liquid seal by a spring element 65 mounted at its one end 66 to the plug body wall 54 and at its other end 67 to the jaw 58 such that tension is provided between the jaw 58 and the lip 59 of the lower body wall 54. The spring 65, jaw 58, and the body wall 54 assembly is generally shown in FIG. 8.

FIG. 9 illustrates the embodiment of the plug of FIG. 6 as inserted in the neck 71 of a bottle 70 and having a cap 72, including a dropper-dispenser 73 and squeeze bulb 74 assembly, threadably mounted to the neck 71. When the dropper-dispenser 73 is inserted through the plug 51 into the bottle 70, the jaw 58 is forced into the open position as shown by the solid lines. When the dispenser is removed, the spring 65 urges the jaw 58 into the closed position as illustrated by the phantom jaw 58' in FIG. 9. The outside diameter of the upper body wall 52 is the same or slightly larger than the the inside diameter of the neck 71 such that a tight liquid seal is maintained therebetween. The peripheral flange 55 rests on the top surface 75 of the neck 71 to provide an additional airtight seal when the cap 72 is screwed onto the bottle 70. Alternatively, the peripheral flange 55 may rest in a peripheral step 76 provided along the upper periphery of the neck 71 as shown in FIG. 9A. In this embodiment, the cap 72 when screwed onto the bottle 70 would rest flush with the flange 55 and the top surface 75 of the neck 71.

FIG. 10 illustrates a modified embodiment of the unitary piece safety plug. The plug 80 includes an upper body wall 81, an inwardly tapered portion 82, a lower body wall portion 83, and a peripheral flange 84 coextensive with the upper body wall 81. The jaw 85 is molded as a portion of the lower body wall 83 as previously described and illustrated in FIGS. 3, 3A, and 4. A spring member 86 is provided to maintain a liquid-tight seal between the jaw 85 and opposing body wall. A circumferential groove 87 is provided in the upper body wall portion 81 to receive and hold the upper end 88 of the spring 86, which is in the form of a ring. The lower end 89 of the spring 86 is attached to the jaw 85 preferably by imbedding same in the jaw material. To facilitate the movement of the jaw 85, a notched groove 90 is provided to serve as a hinge element. To provide additional support, a series of ribs 90 is positioned around the upper body wall portion 81.

Various other embodiments and modifications of this device are possible without departing from the scope of the inventive concept. In FIG. 11, there is shown one such possible embodiment. A bottle 91 having a neck 92 is shown to contain a safety plug 93. The plug 93 includes a body wall 94 and a peripheral flange 95 coextensive with the body wall 94 for resting against the top surface 96 of the neck 92. An arcuately-shaped jaw member 97 depends from a portion of the body wall 94 by a hinge element 98, said hinge element consisting of a constriction in a portion of the body wall 94. The jaw member 97 extends across the open cavity 99 of the plug 93 and contacts the interior surface 100 of the bottle 91 thereby functioning as a closure for the plug 93. In order to insure a tight liquid seal between jaw 97 and the bottle surface 100, a finger projection 101 is provided depending from the base 102 of the jaw member 97 contacting the opposed interior surface 100' of the bottle 91. A tension spring 103 is positioned between the end 104 of the jaw 97 and the end 105 of the finger projection 101. To gain access to the contents of the container, a dropper-dispenser (not shown) is inserted into the plug cavity 99 until it contacts and forces the jaw 97 into the open position, as illustrated by phantom jaw 97'. When the dropper is removed, the tension spring 103 urges the jaw member into the closed position.

FIG. 12 illustrates still another embodiment of the safety plug. In this modification, the bottle neck 110 is provided with an interior peripheral shoulder 112 near its outlet. The interior of the neck between the shoulder and the bottle outlet comprises a truncated cone, the tapered wall 114 joining the top edge of the bottle 116 to the shoulder edge 118, said shoulder edge having a smaller diameter than the bottle outlet.

Located within the bottle neck is a safety plug 120 whose tubular wall 121 is positioned within the bottle neck by a series of ribs 122 parallel to the longitudinal axis of said plug. A flange 123 surmounts said plug, the diameter of the flange normally being somewhat larger than the shoulder edge 118 so that when the flange 123 is seated against the shoulder 112, the flange is held under compression thus maintaining a very tight seal at the outer edge of the flange 124. The plug is preferably of a resilient material such as polyethylene, rubber, and the like.

Beneath the ribs 122 is circumferential groove 125 about the exterior of the plug body. A jaw member 126, which may be molded integral with said plug body, is positioned to seal the bottom of said plug.

Pressing the jaw 126 into a closed position is a helical spring 130 which has its upper turn 132 seated in the groove 125. Other turns of this spring surround the plug body and may be spaced slightly from it. A final turn 134 of this spring abuts the surface of the jaw 126 and urges it into a sealing location. This combination provides a convenient method of securing the spring 130 while at the same time providing a centering action so that the force exerted by the dropper-dispenser in opening the jaw member will not displace the spring from its operative location. The final turn, lying flat against the exterior of the jaw 126, provides a broad bearing surface for secure engagement of that member which supplies a more reliable response against accidental displacement.

Various other modifications and designs may be employed based upon this disclosure to accomplish the same objective. The body walls of the plug may be shaped into any suitable form such as cylindrical, rectangular, hexagonal, octagonal, and other such designs so long as a liquid seal is maintained as between the plug member and the bottle. Although the plug devices illustrated in this disclosure generally show an inwardly tapered body wall portion such a design is not critical. This design merely functions to provide air space and room for the spring attachment. However, it is to be understood that such a design is not critical to the operation of this invention.

Furthermore, the plug assemblies illustrated herein may include a tamperproof jaw closure, especially where the plug is molded as a unitary piece. For example, with reference to FIG. **4**, the plug could be molded to include a weakened portion at the point of juncture of the jaw member to the opposed body wall as indicated at point **111**. The weakened portion would function as a tearline which is torn open the first time the dropper-dispenser is pushed against the jaw member. Hence, once the plug assembly has been used, it will be visibly apparent.

Others may practice this invention in any of the numerous ways which will be suggested to one skilled in the art upon reading this disclosure. All such practice of the invention is considered to be covered hereby provided it falls within the scope of the appended claims.

I claim:

1. A safety plug for a container having a neck opening to admit a dropper-dispenser assembly, said plug comprising:

a. a tubular member having:

1. a first end suitable for sealing engagement with said neck opening;
2. a circumferential groove about its exterior and adjacent said first end; and
3. a second end locatable within said container;

b. movable means hingedly mounted to the tubular member at said second end for sealing engagement therewith; and

c. a helical spring encircling said tubular member and having:

1. a terminal turn seated in said groove; and
2. a single turn bearing on said movable means and urging it against said second end and into sealing engagement therewith.

2. A plug according to claim **1** wherein said single turn is of a smaller diameter than other turns of said spring.

3. A safety plug according to claim **1** wherein said movable means has a substantially planar exterior surface and said single turn bears on said surface.

4. A safety plug for a container having a neck opening and an adjacent interior surface; said plug comprising a tubular member having a first end engageable with said neck opening and a second end locatable within said container; a jaw member of larger diameter than said neck opening hinged to said second end and adapted to engage said container surface in sealable relation.

5. A safety plug of claim **4** including a spring transverse said jaw member to urge said jaw into sealing position.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,558,022 Dated January 26, 1971

Inventor(s) Walter J. Zytko

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 2, line 1 after the word "the" please insert --bottom--

Signed and sealed this 15th day of June 1971.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

WILLIAM E. SCHUYLER, JR.
Commissioner of Patents