United States Patent

[11] 3,612,322

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[21] Appl. No. **848,834**
[22] Filed **Aug. 11, 1969**
[45] Patented **Oct. 12, 1971**

[54] **CONTAINER CAP**
13 Claims, 20 Drawing Figs.

[52] **U.S. Cl.** **215/9,** 215/40, 215/95, 215/99, 220/38.5, 220/60
[51] **Int. Cl.** **A61j 1/00,** B65d 45/30, B65d 55/02
[50] **Field of Search** ..... 215/41, 9, 95, 99; 220/60, 60 A, 38.5, 40

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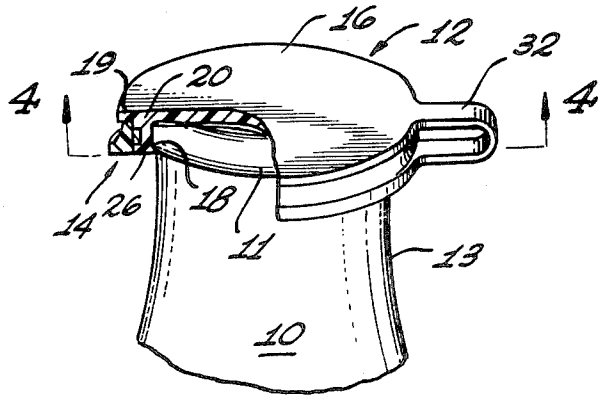
ABSTRACT: An improved bottle cap comprising a closure member adapted to snap over the mouth of a bottle having a peripheral lip, and a locking ring releasably surrounding the closure member to secure it in place. The closure member and the locking ring are provided with cooperating safety lock surfaces which positively lock the two members together. The locking ring may also be provided with radial projections which frictionally engage the bottle neck when the locking ring is released from engagement with the closure member and pushed thereoff.



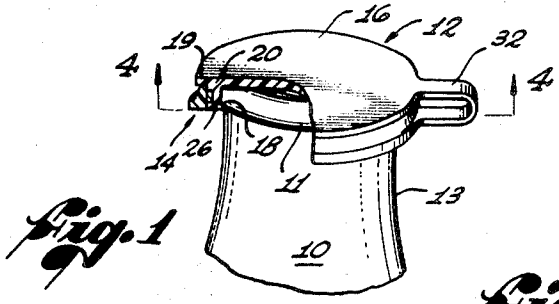


Fig. 1

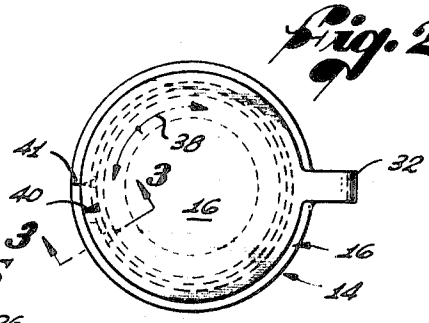


Fig. 2

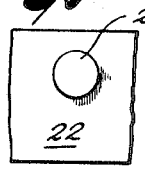


Fig. 5

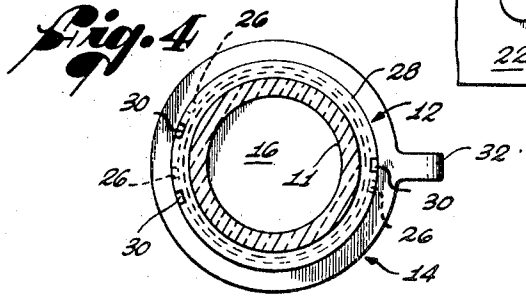


Fig. 4

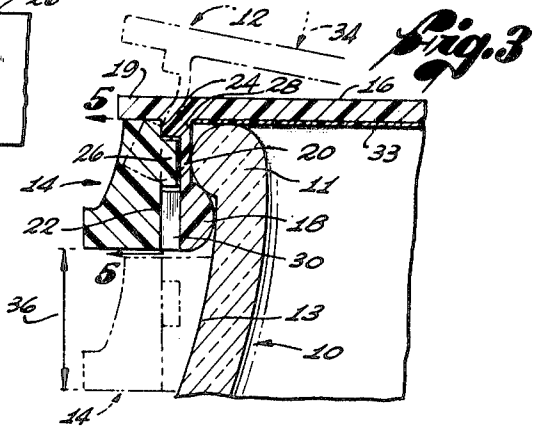
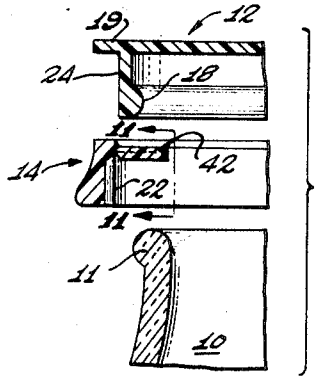


Fig. 3



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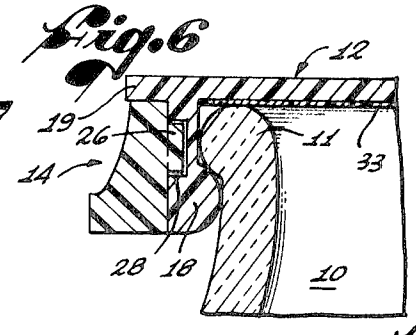


Fig. 6

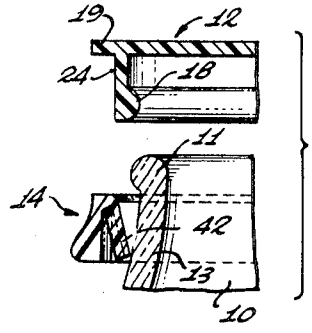
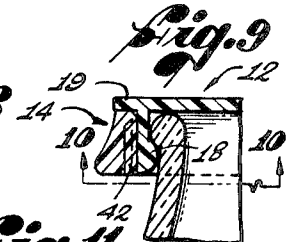


Fig. 8



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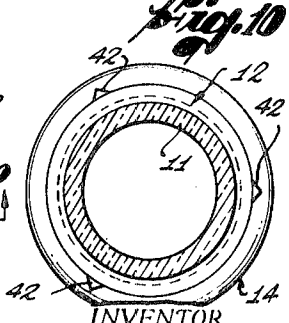

Fig. 10

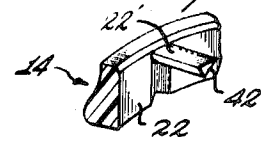

Fig. 11

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Fig. 12

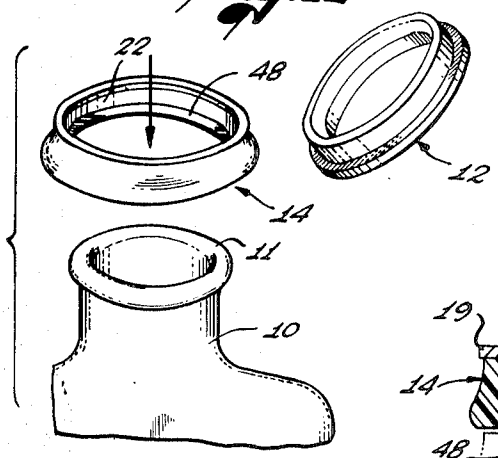


Fig. 13

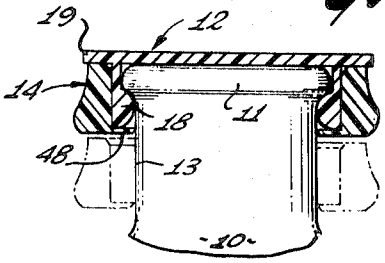
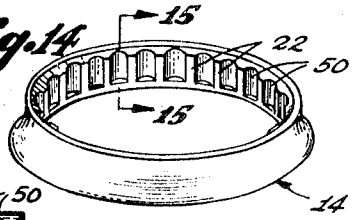


Fig. 14



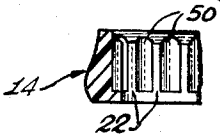
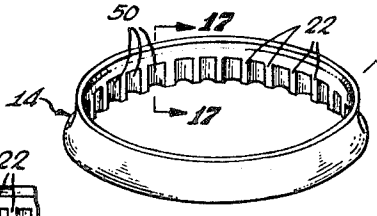


Fig. 15

Fig. 16



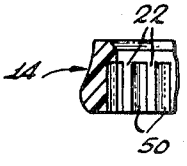
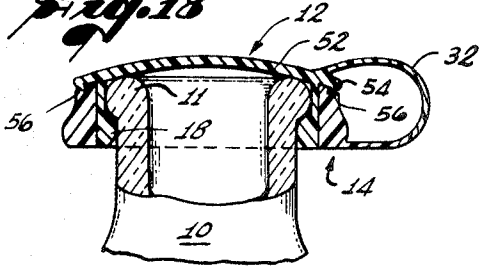


Fig. 17

Fig. 18



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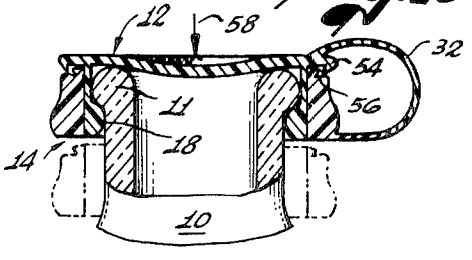

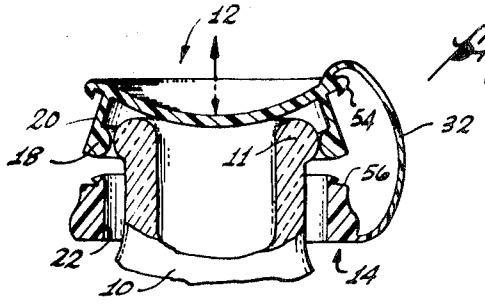

Fig. 20

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CONTAINER CAP

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to a novel cap for closing a bottle having a neck, a mouth, and a lip surrounding the mouth of a type which is adapted to snap over the bottle mouth and lip and be locked in place.

2. Description of the Prior Art

The present invention constitutes an improvement over the invention set forth in the issued U.S. Pat. No. 3,407,956, granted Oct. 29, 1968, entitled BOTTLE CAP. While snap-type closures have long been known in the art, the invention of the aforesaid patent discloses a bottle cap for closing a bottle which has solved many of the problems inherent in such snap-type closures, such as ease of operation, ease and economy of manufacture including the elimination of tolerance problems, and prolonged shelf life. While the aforesaid invention has met with substantial success, it has become desirable, with the advent of new safety requirements for medicine bottles and the like, to include a safety lock means for positively securing the closure member to the locking member to thereby prevent the cap from being removed without some preliminary unlocking of the two members. Further, it has become desirable to include some means for retaining the locking member around the bottleneck when the locking member has been released and pushed off of the closure member to thereby prevent the locking member from readily sliding off the bottleneck. The present invention has solved the above problems by incorporating a positive safety lock means between the closure member and the locking member, and by providing frictional means adapted to engage the bottleneck to prevent the locking member from readily sliding off the bottle when it has been disengaged from the closure member.

3 SUMMARY

The subject invention provides a radially extending projection which is adapted to engage a cooperating recess to positively lock the locking member around the depending flange portion of the closure member to thereby prevent the locking member from being pushed off the closure member. In the locked position, the closure member is securely clamped to the lip surrounding the bottle mouth such that it may not be removed without first unlocking the radial projection from engagement with the cooperating groove and subsequently sliding the locking member off of the closure member and onto the bottleneck. By providing a safety lock of this type, with the closure member and the locking member in engagement around the bottle mouth and lip so that a pull on the cap section will not result in opening of the cap, a simple push on the locking member will not release it from engagement with the closure member unless the safety lock has first been moved to a release position. Thus, it is impossible for a child to open the bottle cap without first knowing how to release the safety lock means.

An additional feature of the present invention provides radial projections on the locking member which are adapted to engage the neck of the bottle upon disengagement with the closure member such that the locking member will retain its position around the bottleneck and not simply slide off the neck when the bottle is tilted to remove the contents thereof. The radial projections carried by the locking member are designed such that they do not hinder the normal closing and locking operation between the closure member and the locking member, and come into play only when the locking member has been released from engagement with the closure member.

It is therefore an object of the present invention to provide an improved snap-type bottle cap which includes a closure member comprising a cap section and a depending flange section, and a locking member adapted to surround and engage the flange section of the closure member, which is provided with a positive safety lock means for locking the closure member in engagement with the locking member, such that it may not be readily released without first unlocking the lock means.

It is another object of the present invention to provide frictional means carried by the locking member which engage the neck of the bottle upon disengagement with the closure member to thereby restrain the locking member from sliding off of the bottle upon tilting of the bottle to discharge its contents.

While the term "bottle" is used throughout the specification for simplicity, the term is used to include not only glass bottles, but also similar containers, such as molded plastic containers and metal containers, which have a peripheral lip surrounding an open mouth and a neck portion extending downwardly from the peripheral lip.

The many features and advantages of the present invention will be pointed out in the following detailed description and claims, and illustrated in the accompanying drawings, which disclose, by way of example, the principles of the invention in the best mode which has been contemplated of applying these principles.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view, partly in cutaway section, disclosing one embodiment of the lock means of the subject invention with the closure member locked to the locking member.

FIG. 2 is a top plan view of the bottle cap of FIG. 1.

FIG. 3 is a sectional view of a portion of the bottle cap if FIG. 1, taken along the lines 3—3 of FIG. 2.

FIG. 4 is a bottom plan view of the bottle cap of FIG. 1, taken along the lines 4—4 of FIG. 1.

FIG. 5 is a view of the locking projection of the bottle cap of FIG. 1, taken along the lines 5—5 of FIG. 3.

FIG. 6 is a sectional view of the bottle cap of FIG. 1, illustrating the positive safety lock in the locked position.

FIG. 7 is a sectional view of the closure cap of the present invention before assembly, illustrating one embodiment of the radial projections carried by the locking member which engage the bottleneck when the locking member is pushed off the closure member.

FIG. 8 is a sectional view similar to FIG. 7, showing the locking member assembled in position on the bottleneck with the radial projections in engagement therewith.

FIG. 9 is a sectional view of the closure cap of FIG. 7, showing the locking member assembled in engagement with the closure member.

FIG. 10 is a bottom plan view of the closure cap of FIG. 7, taken along the lines 10—10 of FIG. 9.

FIG. 11 is a portion of a perspective view, partly in section, of the locking member of FIG. 7, taken along the lines 11—11 of FIG. 7.

FIG. 12 is a perspective view of an additional embodiment of the subject invention before assembly, showing another form of radial projection extending from the locking member for engagement with the bottleneck.

FIG. 13 is a sectional view of the closure cap of FIG. 12, with the closure member assembled in engagement with the locking member.

FIG. 14 is a perspective view of a modified form of the locking member of the subject invention.

FIG. 15 is a portion of a perspective view, partly in section, of the locking member of FIG. 14, taken along the lines 15—15 of FIG. 14.

FIG. 16 is a perspective view of an additional modified form of the locking member of the subject invention.

FIG. 17 is a perspective view, partly in section, of the locking member of FIG. 16, taken along the lines 17—17 of FIG. 16.

FIG. 18 is a side elevation, partly in section, illustrating another embodiment of the subject invention for locking the closure member to the locking member.

FIG. 19 is a side elevation, partly in section, illustrating the unlocked condition of the lock means of the closure member of FIG. 18.

FIG. 20 is a side elevation, partly in section, illustrating the removal of the closure member from the bottle mouth lip upon disengagement of the locking member of the embodiment illustrated in FIG. 18.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. 1 of the drawings illustrates a container or bottle **10** having a peripheral lip **11** surrounding the open mouth thereof, and an outwardly flared neck portion **13** extending therefrom. A closure member **12** includes a cap section **16** having an outwardly directed radial flange **19** and a downwardly directed depending flange **20**. At the base of the depending flange **20** is a radially inwardly directed lip portion **18** which is adapted to underlie the bottle lip **11**.

Circumferentially surrounding the depending flange portion **20** of the closure member **12** is a cylindrical locking member or ring **14**. The inner surface of the locking ring **14** is provided with a contact surface **22**. The outer surface of the depending flange **20** forms a contact surface **24** which is engaged by the inner contact surface **22** of the locking ring **14**. The diameters of the two surfaces are such as to provide a close fit therebetween. With the locking ring **14** seated around the closure member **12**, the depending flange **20** is restrained from outward movement and is therefore securely locked to the bottle **10**.

The locking ring **14** is provided with a radially inwardly directed projection **26** which is seated within a groove **28** carried by the depending flange portion **20** of the closure member **12**. The radial projection **26** and groove **28** serve as a positive lock for securing the closure member **12** to the locking ring **14**.

A thin flexible strap member **32** may be provided for holding the closure member **12** to the locking member **14**. The flexible strap **32** functions to prevent the closure member **12** from being misplaced or becoming contaminated by falling on the floor, etc., when the closure member **12** has been removed from the bottle **10**. Further, as illustrated in FIGS. **3** and **6**, a liner or seal element **33** may be provided on the underside of the cap section **16** within the surrounding depending flange **20**. Such a seal may be provided whenever it is desirable to have a more positive fluid seal between the upper surface of the mouth of bottle **10** and the closure member **12**. Although a disc-type seal **33** is illustrated, it is apparent that other types of liners or seals can equally be used.

In the preferred construction, the entire closure member **12** and locking ring **14** are molded from a single resilient material, such as rubber or plastic. However, the material utilized in the construction of the locking ring **14** need not be the same as that used for the closure member **12**.

As illustrated by the phantom lines of FIG. **4**, the groove **28** carried by the depending flange **20** of the closure member **12** may be in the form of a continuous annular groove extending radially inwardly from the outer surface of the depending flange portion **20**. Alternatively, the groove **20** can be in the form of one or more small arcuate sections in the depending flange rather than a continuous annular groove. As illustrated by FIG. **3**, an axial slot **30** communicates between the lower surface of the depending flange portion **20** of the closure member **12** and the groove **28** so as to form a T-shaped bayonet-type slot. The function of the slot **30** is to allow the radial projection **26** carried by the locking ring **14** to slide therethrough for communication with the groove **28** carried by the closure member **12**.

As illustrated by the phantom lines of FIG. **3**, when it is desired to place the closure cap **12** onto the bottle **10**, the locking ring **14** is located about the neck portion **11** of the bottle, and the closure cap **14** is pushed downwardly, as illustrated by the arrow **34**, until it assumes the position as shown by the solid lines of FIG. **3**. Upon seating of the closure member **12** about the mouth of the bottle **10**, the radially projecting lip **18** is fully seated below the bottle lip **11**. At this time, the locking ring **14** is aligned such that the radial projection **26** carried thereby is axially aligned with the axial slot **30** carried thereby by the closure member **12**, and is then moved upwardly, as illustrated by the arrow **36**, until the upper portion of the locking member **14** abuts the outwardly directed flange **19** of the closure member **12** and assumes the position illustrated by the solid lines. At this time, the closure member **12** is rotated relative to the locking ring **14** so that the radial projection **26** moves along the groove **28** and out of alignment with the axial slot **30**. This results in the complete locking of the closure member **12** with the locking ring **14**, and the locking ring **14** may not be pushed off of the closure member **12** without again realigning the radial projection **26** with the axial slot **30**. The locking sequence is illustrated by the arrow **38** of FIG. **2**, and the resultant position is illustrated by FIG. **6** of the drawings, which shows the locking ring **14** engaged with the closure member **12** and the projection **26** seated fully within the groove **28**.

As further illustrated by FIG. **2**, an arrow **40** or other means may be imprinted or carried on the top of the closure member **12** with a corresponding mark **41** carried by the locking member **14** to indicate at which rotational point the axial slot **30** will be aligned with the radial projection **26**. As illustrated by FIGS. **2** and **4**, the locking ring **14** will preferably include a plurality of circumferentially spaced projections **26** and a corresponding number of axial slots **30** carried by the closure member **12**. By providing a plurality of radial projections **26** and axial slots **30**, the locking ring **14** is securely locked to the closure member **12** at several points around the circumference and may not be readily unlocked without some knowledge of the precise alignment necessary to align the radial projections **26** with the axial slots **30**.

As illustrated in FIG. **5**, the radial projection **26** carried by the locking ring **22** may be in the form of a cylindrical projection, although it is apparent that any other geometric configuration could readily be used as an equivalent thereof. Further, although the specific illustration of this embodiment utilizes a radial projection carried by the locking ring **14** and the groove **28** and slot **30** carried by the closure member **12**, the parts can be reversed so that the radial projection is outwardly extending from the depending flange portion **20** of the closure member **12**, and the axial groove extends from the upper surface of the locking ring **14** to a circumferential outwardly directed groove carried by the inner surface of the locking ring **14**.

Turning to FIG. **7** of the drawings, the locking ring **14** may also be provided with a radially inwardly projecting member **42** which may, in one form, be a cutout portion of the inner wall **22** of the locking ring **14**. As illustrated in FIG. **8**, with the locking ring **14** in its disengaged position adjacent the bottleneck **13**, the projection **42** extends radially inwardly and frictionally engages the bottleneck **13**. The locking ring **14** may be initially inserted over the bottle lip **11** by merely holding the radial projection **42** flush with the inner surface **22** of the locking ring **14** and slipping it over the bottle lip **11**. When the bottle closure member **12** is snapped onto the bottle **10**, the locking ring **14** may then be moved upwardly to its seated position illustrated in FIG. **9**. In this position, the radial projections **42** are forced radially outwardly into the inner surface **22** of the locking ring **14** so that the inner surface **22'** is flush with the contact surface **22**. Upon pushing the locking ring **14** downwardly out of engagement with the closure member **12**, the inherent resiliency of the projection **42** will cause it to flex radially inwardly to again contact the bottleneck **13**. By providing a plurality of such radial projections spaced around the locking ring **14**, sufficient frictional force may be developed to hold the locking ring in position on the neck **13** of bottle **10** when the bottle is tipped to empty the contents therefrom.

As illustrated in FIG. **10**, three such projections **42** have been provided in the preferred embodiment, although it is ap-

parent that any number or geometrical configuration can be utilized.

The locking ring 14 of FIGS. 7–11 will preferably be provided with radial projections 26 as discussed above with reference to FIGS. 1–6. The radial projections 26 can extend from the contact surface 22 at points circumferentially spaced from the flexible radial projections 42 so as not to interfere therewith. In this manner, the closure cap is provided not only with a positive safety lock means, but the locking ring 14 also includes frictional projections 42 which engage the neck 13 of the bottle 10 after disengagement with the closure member 12.

FIG. 12 illustrates the second embodiment of the radial projection carried by the locking ring 14 for frictionally engaging the bottleneck 13 upon release of the closure member 12 from the locking ring 14. In this embodiment of the invention, the radial projection may take the form of an inwardly directed cylindrical flange 48 extending from the bottom portion of the locking ring 14. The flange 48 may be molded integral with the lower portion of the locking ring 14 or, alternatively, can be formed from a separate piece of material secured to the lower portion of the locking ring 14. This embodiment of the frictional gripping means is preferable for use with a bottle 10 having a neck 13 of constant diameter, as shown in FIG. 13, although it can be used in conjunction with a bottle 10 having a neck 13 of variable diameter, as shown in FIG. 7, by using a more flexible material for the flange 48.

As is the case with the multiple projection frictional holding means 42 discussed in conjunction with FIGS. 7–11, the locking ring 14 and cap member 12 of the embodiment of FIGS. 12–13 may be provided with safety lock means for securely locking the members together when engaged.

FIGS. 14–17 illustrate a modification of the locking ring 14 which decreases the amount of material utilized in its manufacture, hence decreasing the cost thereof, and which allows the locking ring to be substantially lighter in weight. As illustrated in FIG. 14, the locking ring 14 is provided with a series of recess portions 50 machined or molded into the inner surface of the locking ring 14. As illustrated in FIGS. 14 and 15, the recesses 50 may be formed to extend from the upper surface of the locking ring 14 to a point adjacent the lower surface thereof, or, alternatively, as illustrated in FIGS. 16 and 17, the recesses 50 may be machined from the lower surface of the locking ring 14 to a point slightly below the upper surface thereof. It has been found that these recesses 50 do not substantially detract from the strength of the locking ring as the flush contact surfaces 22 provide adequate engagement with the corresponding contact surface 24 of the depending flange 20 of the closure member 12.

The above-discussed modifications can be readily adapted to the locking rings 14 of FIGS. 1–13 in order to provide a positive lock between locking ring 14 and the closure member 12, and/or provide radial contact surfaces for engaging the neck 13 of the bottle 10 when the locking ring 14 is disengaged from the closure member 12.

In FIGS. 18–20, a modified form of the safety lock means for locking the closure member 12 to the locking ring 14 is illustrated. In this embodiment, the locking ring 14 is provided with a groove 56 which has an undercut lip adjacent the upper outer surface thereof. The closure member 12 is provided with a radial projection 54 extending radially inwardly and downwardly from the outer periphery of the cap portion 52. The projection 54 is adapted to engage the groove 56 of the locking ring 14 to thereby lock the closure member 12 to the locking ring 14.

As best seen in FIG. 18, the cap portion 52 is slightly convex when seated over the mouth of bottle 10. With the closure member 12 locked to the locking ring 14, should internal pressure be developed within the bottle, the cap section 52 will tend to flex outwardly and hence draw the radial projection 54 tighter within the groove 56, thus preventing the closure member from coming off. In order to unlock the radial projection 54 from engagement with the groove 56, in order to release the locking ring 14 so that it may be pushed off the closure member 12, it is necessary to depress the cap portion 52 as illustrated in FIG. 19 of the drawings. Upon depressing the cap portion 52, as illustrated by the arrow in FIG. 19, the radial projection 54 moves outwardly and upwardly to disengage from the undercut lip of groove 56. The locking ring 14 is then free to be pushed downwardly as illustrated by the phantom lines of FIG. 19, and the closure member 12 may then be removed from the top of the bottle 10.

In order to reseal the bottle, the closure member 12 is positioned over the opening of bottle 10, and pressure is applied to the center of the cap section 52 as the depending flange 20 and the associated projecting lip 18 snap into place under the bottle lip 11. The locking ring 14 is then moved upwardly over the depending flange 20 until it is fully seated therearound. Thereupon, the pressure is released from the center of the cap portion 52, allowing the cap portion 52 to flex outwardly and bring the radial projection 54 into engagement with the groove 56 to thereby positively lock the two members together.

The locking ring 14 may be readily provided with inwardly directed radial projections, similar to that set forth in conjunction with the discussion above of FIGS. 7–13, and can also be provided with cutout portions as discussed in conjunction with FIGS. 14–17, for the purpose of decreasing cost of manufacture and weight. If it is desired to have a multiple lock means for securing the closure cap in position on the bottle, the safety lock means of FIGS. 1–6 can also be incorporated into the cap structure of FIGS. 18–20.

From the foregoing, it will be seen that the safety lock means of FIGS. 1–6 or FIGS. 18–20 provide a positive lock for preventing removal of the closure cap without first unlocking the closure member from the locking ring. Further, if it is desired to have a double-lock feature, the safety lock means of FIGS. 1–6 can be combined with the safety lock means of FIGS. 18–20. With this lock structure, two unlocking operations would be necessary. It would first be necessary to depress the convex top portion 52 of the closure member 12 to release the radial projection 54 from the groove 56 of the locking ring 14, then align the radial projection 26 carried by the locking ring 14 with the axial slot 30 carried by the depending flange 20 of the closure member 12, and then subsequently push the locking ring 14 downwardly out of engagement with the closure member 12.

Further, by incorporating radial projections such as illustrated in the embodiments of FIGS. 7–11, or embodiments illustrated in FIGS. 12–13 in the locking ring 14, the locking ring may be retained on the bottleneck 13 after disengagement with the closure member 12 to thereby prevent the locking ring 14 from sliding off the bottle 10 when it is tipped to discharge its contents.

In order to provide economy of manufacture and reduction of closure cap weight, the modified locking ring structure of FIGS. 14–17 may also be employed.

Thus, the present invention provides an improved closure cap for use with the bottle having a neck portion terminating in an outwardly directed bottle lip, which will prevent removal of the closure cap by one unfamiliar with its operation. Further, the present invention provides means for insuring that the locking ring will retain its position on the bottle, even though the bottle is turned 180° from the vertical. While the particular discussion above has been directed to the preferred embodiments of this invention, it is obvious that modifications and variations therein may be effected without substantially departing from the spirit and scope of the novel concepts of this invention as set forth by the following claims.

I claim:

1. A container cap for closing a container having a mouth with a surrounding rim that includes a peripheral lip and a depending neck, said container cap comprising:

a closure member including a cap section overlaying the mouth of the container, and having a convex curvature and an outwardly projecting radial flange, a depending

flange projecting downwardly from said cap section, a lip projecting inwardly from one side of said depending flange, and a contact surface on the outside of said depending flange;

an annular locking member including an inner contact surface so proportioned and arranged as to surround said depending flange so that the contact surfaces engage each other and hold said lip of said depending flange inwardly laterally beneath the lip of the container, said outwardly projecting radial flange extending radially beyond said inner contact surface of said annular locking member;

and a positive safety lock means releasably locking said members together against relative axial movement when in engagement, said lock means including a groove adjacent the upper outer surface of said locking member, and a projection extending radially inwardly from the peripheral edge of said outwardly projecting radial flange of said cap section and engaging said groove to couple said closure member with said locking member, said closure member being releasable by applying downward pressure to said cap section to move said radial projections outwardly and release from engagement with said groove to unlock said lock means, and pushing the locking member downwardly off the closure member and onto the neck of the container.

2. A container cap as in claim 1 wherein said locking member is provided with a radial flange on its inner periphery adapted to frictionally engage the neck of said container when said member is pushed off said closure member.

3. A container cap as in claim 2 wherein said radial flange comprises at least one yieldable projection forming a portion of said contact surface when said closure member is engaged with said locking member and adapted to flex radially inwardly upon disengagement.

4. A container cap as in claim 2 wherein said radial flange comprises a radially inwardly directed annular lip adjacent the lower surface of said locking member.

5. A container cap as in claim 1 wherein said safety lock means further comprises at least one radially extending projection carried by said locking member and a recess carried by said closure member adapted to receive said projection.

6. A container cap as in claim 5 wherein at least two circumferentially spaced radial projections are carried by said locking member and at least two cooperating bayonet slots are carried by said closure member.

7. A container cap as in claim 6 wherein said locking member is provided with a radial flange adapted to frictionally engage the neck of said container when said member is pushed off said closure member.

8. A container cap as in claim 7 wherein said locking member is modified by a plurality of recessed portions formed around the contact surface thereof.

9. A container cap as in claim 1 wherein a flexible member interconnects said closure member and said locking member and a seal element is carried by said cap section on the underside thereof.

10. In a container cap for closing a container having a mouth with a surrounding rim that includes a peripheral lip and a depending neck of the type comprising:

a closure member including a cap section adapted to overlay the mouth, a depending flange projecting from the cap section, a lip projecting inwardly from one side of the depending flange, and a contact surface on the other side of the flange;

and an annular locking member including an inner contact surface so proportioned and arranged as to surround the neck and the depending flange so that the contacting surfaces engage each other and hold the lip of the depending flange inwardly laterally beneath the lip of the container, the cap being releasable by pushing the locking member off the closure member and onto the neck of the bottle, the improvement comprising:

a plurality of circumferentially spaced yieldable projections extending from said contact surface of said locking member such that said projections form a portion of said contact surface when said closure member is engaged with said locking member, and flex radially inwardly upon disengagement of said members thereby to frictionally engage the neck of said container when said member is pushed off of said closure member.

11. An improved container cap as in claim 10 wherein said locking member is modified by a plurality of recessed portions formed around the contact surface.

12. An improved container cap as in claim 11 wherein said recesses extend axially from the lower face of said member to a point below the upper face thereof.

13. An improved container cap as in claim 11 wherein said recesses extend axially from the upper face face thereof.