United States Patent

Linkletter

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[45] **Sept. 26, 1972**

[54] **SAFETY CLOSURE CAP**

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[52] **U.S. Cl.** **215/9,** 215/95, 215/41

[51] **Int. Cl.**.....**A61j 1/00**

[58] **Field of Search** 215/9, 95, 41, 40; 220/60

[56] **References Cited**

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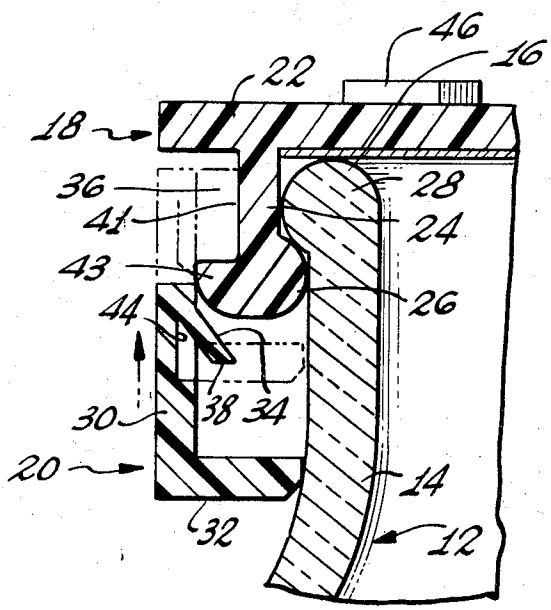
Primary Examiner—George T. Hall

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[57] **ABSTRACT**

A safety closure having a snap-on cap which is held in place on a container by a rotary safety ring and which cannot be removed without first removing the ring from the cap. The ring is locked to the cap by a plurality of flexible fingers which prevent the ring from being removed from the cap unless the ring is first precisely aligned in a preselected position relative to the cap, but which allows the ring to be repositioned around the cap and locked thereto without first prepositioning the ring in any particular rotary position relative to the cap.

16 Claims, 6 Drawing Figures



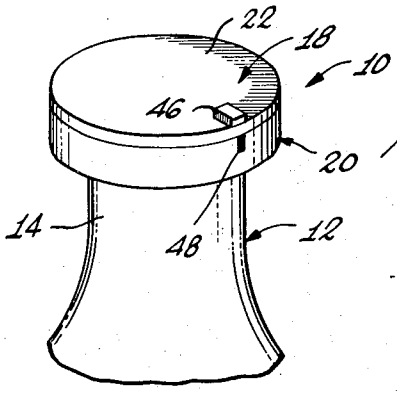
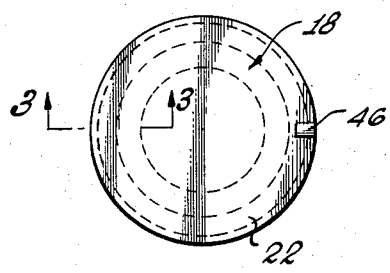


Fig. 1

Fig. 2



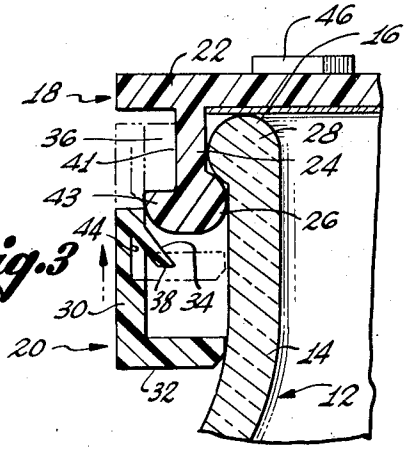


Fig. 3

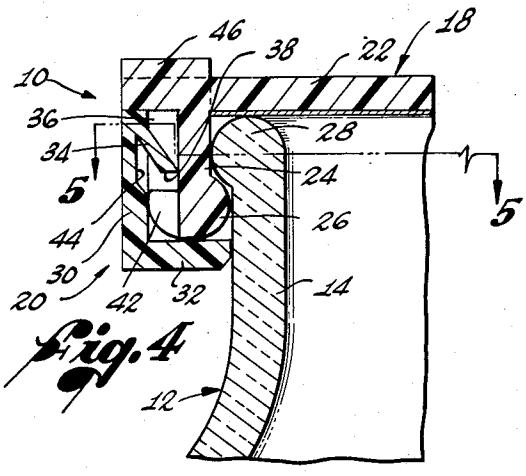


Fig. 4

Fig. 5

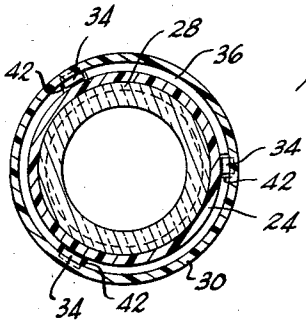
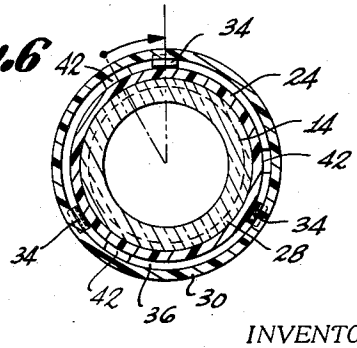


Fig. 6



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SAFETY CLOSURE CAP

BACKGROUND OF THE INVENTION

This invention relates to safety closures and has particular reference to a new and improved snap-on cap and safety ring therefor.

Various safety closures are presently available for use with containers of toxic or otherwise harmful substances. One such safety closure is that disclosed in U.S. Pat. No. 3,450,290 and another is that disclosed in the present applicant's co-pending application Ser. No. 848,834, filed Aug. 11, 1969, now U.S. Pat. No. 3,612,322.

Each of these safety closures relates to a two-component closure comprising a snap-on cap held in place on a container by a rotatable safety ring which must be removed from the cap before the cap can be taken off the container. The safety ring is locked to the cap by a plurality of rigid projections formed on either the cap or the ring and locking in a groove formed in the other component. In each case, the ring must be aligned with the cap in a preselected position, both for removal of the ring from the cap and the cap from the container and for reclosing and locking of the closure.

While such closures have met with some success, one problem which has limited their acceptability is the requirement that the ring must first be precisely positioned relative to the cap before it can be moved into and out of the locking position around the cap. Because of this difficulty, it has been found that many users do not attempt to reposition the ring in the locking position after each use. This, of course, defeats the purpose of the safety closure and enables small children to readily open the containers simply by pulling off the cap.

SUMMARY OF THE INVENTION

The present invention provides a safety closure of the foregoing general character with at least one flexible finger which seats in a groove to lock the ring and cap together so that the ring must be precisely aligned in one preselected position relative to the cap in order to remove the ring from engagement with the cap, and the cap from the container, yet which allows the ring to be repositioned in engagement with the cap, and locked thereto, without requiring any prealignment of the ring and cap.

The finger projects laterally and axially into the groove which has means for longitudinally wedging the finger to hold the ring in position around the cap and prevent release of the cap for removal from the container. Means are also provided to allow the finger to be released from the groove when the ring is in one preselected rotary position relative to the cap, thereby to permit release of the cap.

More specifically, the flexible finger, in this instance formed on the inner side of the ring, projects into a groove around the outer side of the cap to lock the ring to the cap. In the locked position, the ring cannot be removed from the cap and holds the cap securely on the container so that the container cannot be opened without first releasing the cap by removal of the ring. To release the cap for removal, the ring first is disengaged from the cap by aligning the finger with a slot in the cap extending from the groove to the lower end of the cap. Then the finger slides through the slot as the ring is slipped off the cap, thus releasing the cap for opening of the container.

To relock the cap in the closed position, however, the ring is slipped back into the cap and the flexible finger yields to pass over the cap and back into the groove, even though the finger may not be aligned with the slot. When the ring is in the fully seated position, the finger is aligned with the groove and snaps back to its locking position within the groove, thereby relocking the ring and cap together.

Other features and advantages of the invention will become apparent from the following detailed description taken in conjunction with the drawings which illustrate, by way of example, the principles of the invention.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a fragmentary perspective view of the closure of the invention as applied to a container and showing the cap and ring positioned for removal of the ring;

FIG. 2 is a top plan view of the closure of FIG. 1;

FIG. 3 is an enlarged fragmentary cross-sectional view taken substantially along the line 3—3 of FIG. 2, with the ring disengaged from the cap;

FIG. 4 is a cross-sectional view similar to FIG. 3 with the ring moved to the locked position;

FIG. 5 is a horizontal sectional view of the full closure and container, in the scale of FIGS. 1 and 2, and taken along line 5—5 of FIG. 4; and

FIG. 6 is a sectional view similar to FIG. 5 but showing the ring rotated to the locked position.

DETAILED DESCRIPTION

As shown in the exemplary drawings, the present invention is embodied in a new and improved safety closure **10** for a container **12** having a neck **14** and a rim **16** defining an open mouth. The closure **10** generally comprises a flexible, snap-on cap **18** covering the mouth of the container and held releasably in place on the container **12** by a rotary safety ring **20** encircling the cap and selectively movable relative thereto between locked and unlocked positions.

As best seen in FIGS. **1**, **3** and **4**, the cap **18** has a top **22** overlying the rim **16** of the container **12**, and a depending flange **24** which projects downwardly from the top and surrounds an upper portion of the neck **14**. At the lower end of the depending flange **24** is a circumferential bead **26** which projects inwardly and engages the neck **14** below an annular lip **28** projecting outwardly around the rim of the container **12**. The cap **18** is applied to the container **12** by pressing the cap downwardly over the rim **16**, the depending flange **24** flexing outwardly to allow the circumferential bead **26** to slip over the lip **28** of the container and then to snap back and seat in the engaged position around the neck **14** below the lip.

The safety ring **20**, normally surrounds the depending flange **24** to block outward flexing of the depending flange, and thereby prevents the circumferential bead **26** from slipping over the lip **28** when a lifting force is applied to the cap **18**. Herein, the ring **20** has a generally L-shaped vertical cross section formed by a cylindrical sidewall **30** and an inwardly projecting bottom wall **32** which extends to the neck **14** of the con-

tainer 12. The sidewall 30 encircles the flange 24 of the cap when the closure is locked, and the bottom wall 32 strengthens the sidewall and assists in positioning the ring on the container.

To release the cap 18 for removal from the container 12, the ring 20 first is moved from its position around the depending flange 24 by slipping it downwardly off the cap and onto the neck 14 of the container. Then the cap 18 can be lifted off the container 12, the flange 24 now being free to flex outwardly and permit the bead 26 to slip around the lip 28. When the container 12 is to be reclosed, the cap 18 is pressed back onto the neck 14 and the ring 20 is raised back into the locked position around the flange 26.

In accordance with the present invention, the ring 20 must be accurately and precisely aligned in a preselected rotary position relative to the cap 18 to permit the ring to be slipped off the cap for removal thereof, yet the ring need not be positioned in any particular rotary alignment with the cap to permit the ring to be moved into engagement with the depending flange 24 for resecuring the cap on the container 12.

Toward these ends, the ring 20 has at least one, and preferably several resiliently flexible projections or fingers 34 which extend inwardly and seat in a circumferential locking groove 36 formed around the depending flange 24 of the cap 18 to lock the ring in position around the cap. These fingers 34 and the groove 36 are formed in a special manner to positively prevent axial movement of the fingers out of the groove in one direction, except in one angular position of the ring 20 on the cap 18, thus limiting the release of the cap to that one position, and to permit free relative movement in the other axial direction, in any angular position of the ring, thus permitting the ring to be returned to the locked position regardless of whether the ring is in the position in which it is removable from the cap.

As shown in FIGS. 3 through 6, the illustrative ring 20 has three fingers 34 spaced around the inside of the sidewall 30, the fingers in this instance having generally rectangular cross sections and being formed integrally with the ring as cutouts in the sidewall which are attached to the ring at their upper ends near the top of the sidewall. The fingers 34 are inclined downwardly and radially inwardly from the sidewall 30 of the ring 20, and are dimensioned to have a length approximately equal to the axial width of the circumferential groove 36 formed in the depending flange 24 which herein encircles the cap 18 immediately below the top 22 thereof.

With reference primarily to FIG. 4, it will be seen that the fingers 34 project radially inwardly into the groove 36 when the ring 20 is in place around the depending flange 24, and have free ends 38 which overlie an upwardly facing shoulder 40 constituting the lower sidewall of the groove 36, closely adjacent the outwardly facing wall 41 forming the inner extent or bottom of the groove. Herein, the groove 36 is shown as an axially elongated recess which extends from the underside of the top 22 of the cap 18 downwardly to a point opposite the inwardly projecting bead 26, the lower sidewall 40 defining the upper end of an outwardly directed circumferential bead 43. If a downward force is applied to the ring 20 while the fingers 34 are disposed above the shoulder 40, the resulting downward motion of the fingers relative to the shoulder wedges the free ends 38 of the fingers inwardly into the corner between the shoulder 40 and the bottom 41 of the groove 36.

This wedging action, in effect, traps the fingers 34 in the groove 36 and places them under longitudinal compression so that further downward motion of the ring 20 can occur only if the fingers buckle longitudinally. Since the fingers 34 are inclined and wedged between the groove 36 and the ring 20, an extremely large force is necessary to cause buckling to an extent sufficient to slip the ring off the cap 18. Accordingly, the fingers 34 form a substantially positive lock against removal of the ring 20 from the cap 18, and correspondingly hold the cap positively in place when the ring is in this position.

To allow the fingers 34 to move out of the groove 36 when the ring 20 is to be unlocked for removal of the cap 18, three axially extending release grooves 42 are formed in the outer side of the depending flange 24 between the groove 36 and the lower end of the flange, to be aligned with the fingers in one angular position of the ring. Each of the release grooves 42 is slightly larger than its associated finger 34, and when properly aligned with the finger, will allow it to slide from the groove 36 through the release grooves and free of the cap 18. Preferably, the fingers 34 and associated release grooves 42 are of different sizes so that the ring 20 is releasable in only one angular position.

A raised tab 46 on the top 22 of the cap 18 and a recess 48 formed in the outside of the sidewall 30 of the ring 20 can be provided to give a visual indication of the proper alignment of the ring and cap. When the tab 46 and recess 48 are vertically aligned, the fingers 34 and the release grooves 42 are properly aligned so that the ring 20 can be slipped downwardly out of engagement with the cap 18.

Once the ring 20 has been slipped off the cap 18, the cap can be pulled from the container 12 to allow dispensing of its contents. To replace the cap 18 and lock it in position on the container 12, the cap is snapped over the rim 16, and the ring 20 is pushed upwardly into position around the depending flange 24. Since the fingers 34 are flexible and inclined inwardly and downwardly, no prealignment of the fingers and the release grooves 42 is necessary.

As shown by the phantom lines of FIG. 3, when the ring 20 is moved upwardly with the fingers 34 out of alignment with their release grooves 42, the outwardly directed bead 43 of the depending flange 24 deflects the fingers outwardly into the cutout recesses 44 in the sidewall 30 from which the fingers were initially formed. Then, as the ring 20 reaches the fully seated position in which the top of the sidewall 30 abuts against the underside of the top 22 of the cap 18, the fingers 34 are aligned with the groove 36 and then snapped inwardly to their normal, extended positions within the groove 36, thereby locking the ring 20 to the cap 18, and, therefore, the cap to the container 12.

Thus, even though the ring 20 is not precisely aligned with the cap 18 so that the fingers 34 can slip back through the release grooves 42, the ring can be seated around the cap and locked thereto. However, to remove the cap 18, the ring 20 must be in one preselected angular position before it can be disengaged from the cap for removal of the cap from the container 12.

It should be evident that, although the above description discloses fingers **34** formed on the ring **20** and the cooperating grooves **36** and **42** formed in the cap **18**, the fingers can be formed on the cap and the grooves in the ring. In this latter situation, the fingers **34** will be inclined outwardly and upwardly from the cap **18** and the release grooves **42** will extend from the locking groove **36** upwardly to the upper end of the sidewall **30** of the ring. In either case, the fingers **34** can be formed and set in the extended condition by conventional plastic molding techniques.

Further, while a particular form of the invention has been illustrated and described, it will be apparent that other modifications can be made without departing from the spirit and scope of the invention.

I claim:

1. A safety closure for a container having a rim defining an open mouth and a peripheral lip around the rim, said closure comprising:

a cap having a top overlying said mouth and said rim and a depending annular flange projecting below said top, said flange having an inwardly directed circumferential bead engaged below said lip, and an outwardly directed circumferential bead spaced below said top and cooperating therewith to define a circumferential locking groove extending around the outer side of said flange;

a rotary safety ring having an annular sidewall surrounding said flange and overlying said locking groove and said outwardly directed bead in closely spaced relation therewith to hold said inwardly directed bead in engagement with said lip and prevent removal of said cap;

a plurality of angularly spaced fingers on the inner side of said sidewall projecting into said locking groove and overlying the bottom wall thereof to prevent downward movement of said ring along said cap, said fingers being inclined inwardly and downwardly into said locking groove and having free inner ends positioned to be wedged against the bottom of the locking groove to prevent free flexing of the fingers as the ring is pulled downwardly relative to the cap, thereby normally preventing axial movement of said ring out of overlying relation with said locking groove;

a plurality of axially extending release grooves in said outwardly directed bead, spaced and sized to permit movement of said fingers through said outwardly directed bead in one angular position of said ring about said cap, thereby to permit axial movement of said ring away from the cap for removal of the latter from the container in said one angular position;

and said fingers being relatively freely yieldable to pass upwardly over said outwardly directed bead as the ring is moved back upwardly into overlying relation with said locking groove.

2. A safety closure as defined in claim **1** in which said fingers are of different sizes, and said release grooves are of correspondingly different sizes, to permit axial movement of said ring in only one angular position.

3. A safety closure as defined in claim **1** in which said fingers are integrally joined to said ring at their upper ends, and further including a plurality of recesses in said sidewall aligned with said fingers to receive them substantially flush with the sidewall as the ring is moved back upwardly onto said cap.

4. A safety closure as defined in claim **3** in which said fingers are cutouts from said sidewall, and said recesses are the spaces from which the fingers were cut.

5. A combination with a container having a rim defining an open mouth, a cap having a top wall overlying said mouth and said rim and a depending annular flange member telescoped over the rim, interfitting means on said flange member and said rim normally holding the cap on said rim but releasable upon movement of said flange member outwardly away from the rim to permit removal of the cap, and a rotary locking ring member normally encircling said flange member to hold the latter against the rim, said ring member being movable downwardly away from said top wall to release said flange member for removal of the cap, the improvement comprising:

means defining a locking groove in one of said members opening laterally toward the other member and having an axially facing shoulder along one side of the locking groove;

at least one resiliently flexible finger connected at one end to said other member and inclined laterally and axially therefrom to project the other end of said finger into said groove and into abutting relation with said shoulder;

and means longitudinally wedging said finger between said members upon initial downward movement of said ring thereby to hold said ring in its position around said flange and prevent release of said flange.

6. The improvement as defined in claim **5** in which said wedging means include the bottom wall of said groove which is dimensioned to restrict lateral movement of said finger and hold said finger against said shoulder.

7. The improvement as defined in claim **6** wherein at least one axially extending release groove is formed in said one member and extends from said locking groove through said shoulder to the axial end of said one member adjacent said shoulder, said release groove being spaced and sized to permit movement of said finger therethrough in one angular position of said ring about said cap, thereby to permit downward movement of said ring away from said flange to release said cap for removal from the container.

8. The improvement as defined in claim **7** wherein a plurality of flexible fingers and release grooves are provided.

9. The improvement as defined in claim **7** in which said one member is said flange member and said other member is said ring; and a plurality of flexible fingers are formed on said ring and a plurality of release grooves are formed on said flange; and in which said axially facing shoulder is an upwardly facing shoulder and said release grooves extend downwardly from said locking groove.

10. The improvement as defined in claim **7** in which said one member is said ring member and said other member is said flange member, and a plurality of fingers are formed on said flange and a plurality of release grooves are formed in said ring; and in which said axially facing shoulder is a downwardly facing shoulder and said release grooves extend upwardly from said locking groove.

11. In combination with a container having a rim defining an open mouth, a cap having a top overlying

said mouth and a depending flange member telescoping with said rim, interfitting means on said flange member and said rim normally holding the cap on said container but releasable upon movement of said flange member away from the rim to permit removal of the cap, and a rotary locking ring member normally telescoped with said flange member on the side thereof opposite said rim to hold the flange member against the rim, said ring member being movable axially in one direction away from the flange member to release the latter for removal of the cap, the improvement comprising:

means defining a locking recess in one of said members opening laterally toward the other member, said recess having an abutment on one side facing axially away from said one direction;

at least one resiliently flexible projection on said other member extending laterally therefrom into said locking recess and engageable with said wall upon movement of said ring member in said one direction while the projection is in overlying relation with said wall;

an axially extending passage through part of said abutment and aligned with said projection in one angular position of said ring member to permit the projection to pass through the abutment, said passage being misaligned with said projection in other angular positions of the ring member to hold the latter in telescoped relation with said flange member and block removal of said cap;

and means preventing normal flexing of said projection when the latter is engaged with said abutment during movement of said ring member in said one direction, said means being inoperable during movement of said ring member in the opposite direction, thereby preventing movement of said ring member in said one direction out of telescoped relation except when said projection is aligned with said passage, but permitting movement of the ring member back in the opposite direction into telescoped relation, regardless of the alignment of said projection and said passage.

12. The improvement as defined in claim **11** in which said projection is an elongated, resiliently flexible finger inclined away from said other member and in said one direction, and said means preventing normal flexing including means associated with said abutment for wedging said finger in said recess and causing the finger to act longitudinally in resisting movement in said one direction.

13. The improvement as defined in claim **12** in which said ring member is telescoped over the outer side of said flange member, said flange member is telescoped over the outer side of said rim, said finger is formed on the inner side of said ring member and inclined inwardly and in said one direction therefrom, and said locking recess is a groove in said flange member having a sidewall forming said abutment and a bottom wall for wedging against said finger.

14. In a safety closure of the type comprising:

a cap having a top overlying the mouth of a container and a depending flange projecting below said top and having an inwardly directed circumferential bead engaging below an outwardly projecting lip around the mouth of the container, and having a circumferential locking groove in the outer side of said flange and at least one axially directed release groove extending between said locking groove and the bottom of said flange;

and a safety ring engaging around said flange and locked to said cap, thereby to hold said bead below said lip and prevent removal of said cap, the improvement including:

at least one flexible finger formed on the inside surface of said ring, said finger normally projecting inwardly and into said locking groove thereby to lock said ring in engagement with said cap, said ring being removed from engagement with said cap only by aligning said finger with said release groove and pushing said ring downwardly out of engagement with said flange, and being repositioned in locked engagement with said cap simply by moving said ring upwardly and around said flange even though said finger is not aligned with said release groove whereby said finger is flexed outwardly by said flange to pass over said flange as said ring is moved upwardly and on continuing to move said ring upwardly, said finger flexes inwardly to its normal extended position in said locking groove when said ring reaches its fully seated position.

15. The improvement as defined in claim **14** in which a plurality of release grooves are provided between said locking groove and the bottom of said flange, and a plurality of fingers are formed on said ring, said fingers being alignable with said grooves only when said ring is in one preselected rotary position relative to said cap.

16. A safety closure as defined in claim **15** in which said ring has a generally L-shaped vertical cross section and said fingers are formed as cutouts of said inside surface of said ring.

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