United States Patent [19]

Lynn et al.

[11] **3,901,401**

[45] **Aug. 26, 1975**

[54] **CONTAINER AND SAFETY CLOSURE THEREFOR**

[75] Inventors: **Edwin W. Lynn**, Acton; **Hervey L. Tardiff; Paul Judge**, both of Fitchburg, all of Mass.

[73] Assignee: **Brockway Glass Company, Inc.**, Brockway, Pa.

[22] Filed: **Oct. 12, 1973**

[21] Appl. No.: **406,017**

[52] **U.S. Cl.** **215/223**; 215/224; 215/317

[51] **Int. Cl.**[2] **B65D 55/02**

[58] **Field of Search** 215/223, 224, 237, 320, 215/238, 305, 317, 321, 337, 339, 272, 293, 318

[56] **References Cited**

UNITED STATES PATENTS

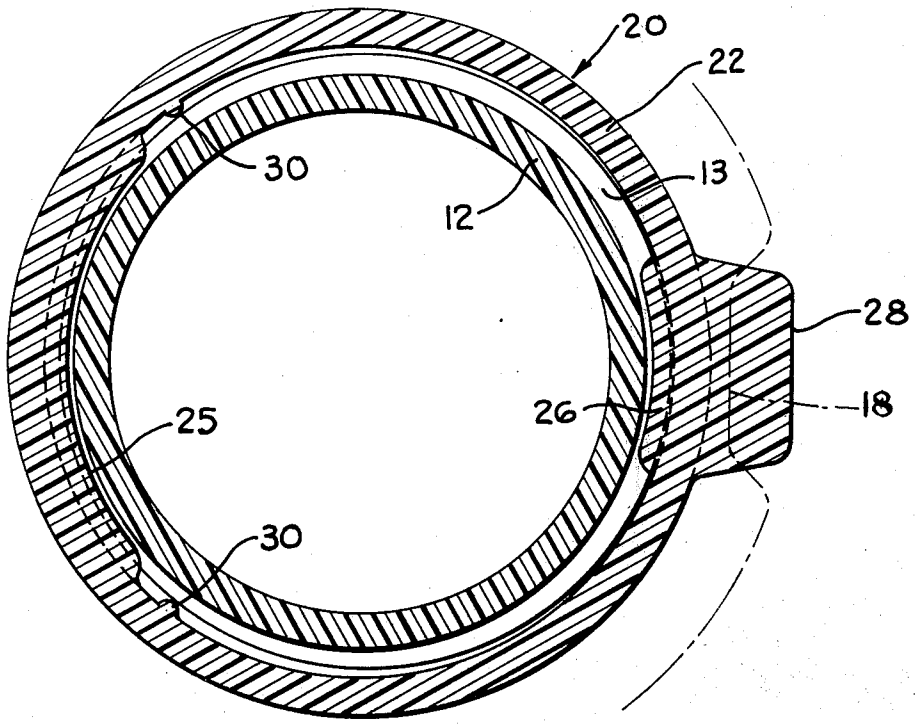
2,765,960	10/1956	Soffer	215/317
3,085,705	4/1963	Varney	215/317
3,170,585	2/1965	O'Donnell	215/9
3,285,452	11/1966	Maloney	215/293
3,393,816	7/1968	Grimm	215/223
3,432,058	3/1969	Burgess	215/224
3,627,160	12/1971	Horvath	215/223
3,741,423	6/1973	Acton	215/318

Primary Examiner—William I. Price
Assistant Examiner—R. E. Hart
Attorney, Agent, or Firm—Christel & Bean

[57] **ABSTRACT**

A safety closure for containers wherein the neck of the container has a continuous encircling rib and the closure has an internal bead formation which snaps over the rib. The rib on the container has a portion of reduced radius to facilitate snapping the closure off of the container. The container has a flange which lies below the closure and has a notched portion which defines the release position of the closure. The closure has a tab which is not accessible due to the presence of the flange on the container excepting when the tab is in alignment with the notch. There are protuberances on either the continuous rib of the container or the interior of the closure which take up the slack in a radial direction normally present due to manufacturing tolerance.

2 Claims, 6 Drawing Figures



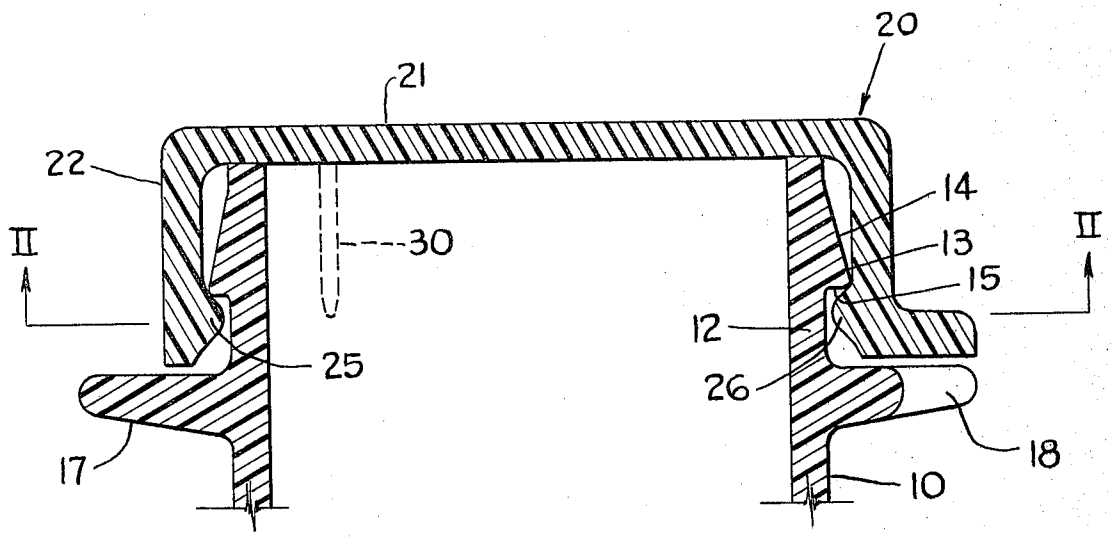

20
21
22
II
30
14
13
15
II
12
25
26
18
17
10

FIG. 1.

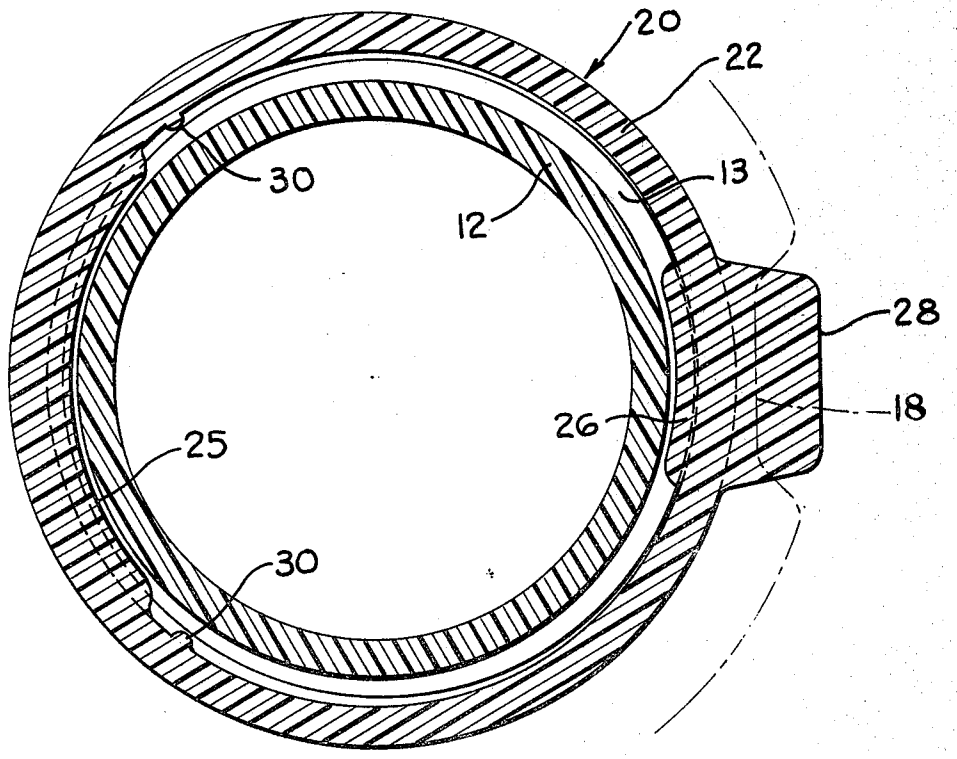

20
22
30
13
12
28
26
18
25
30

FIG. 2.

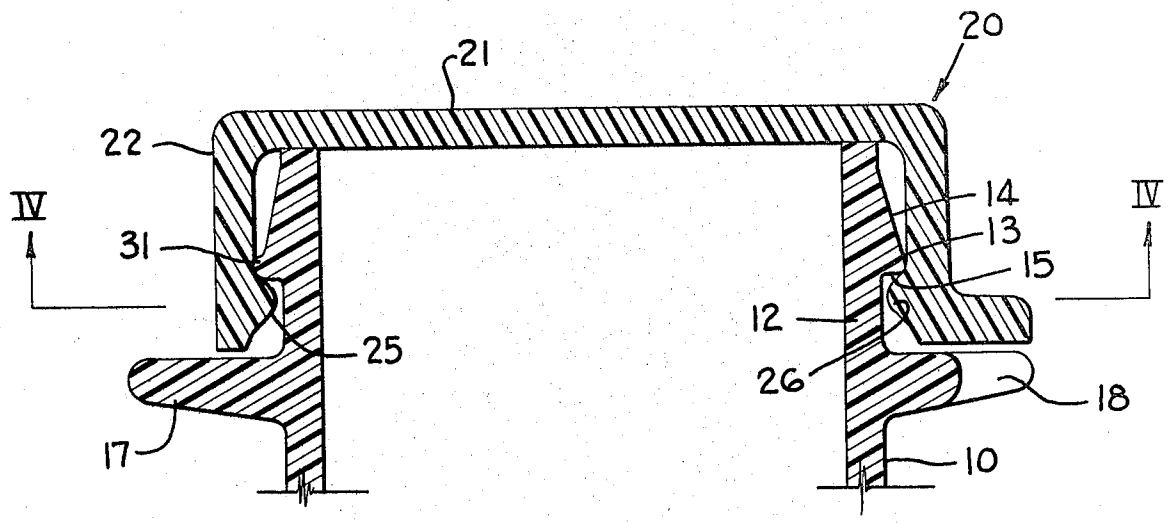


FIG. 3.

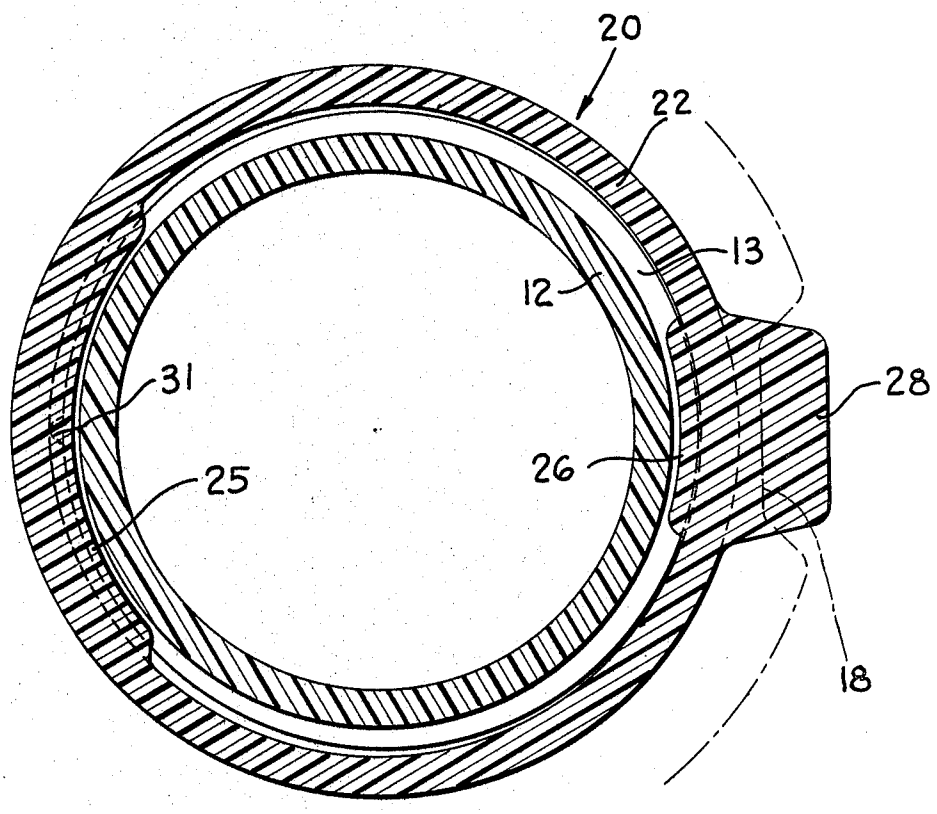


FIG. 4.

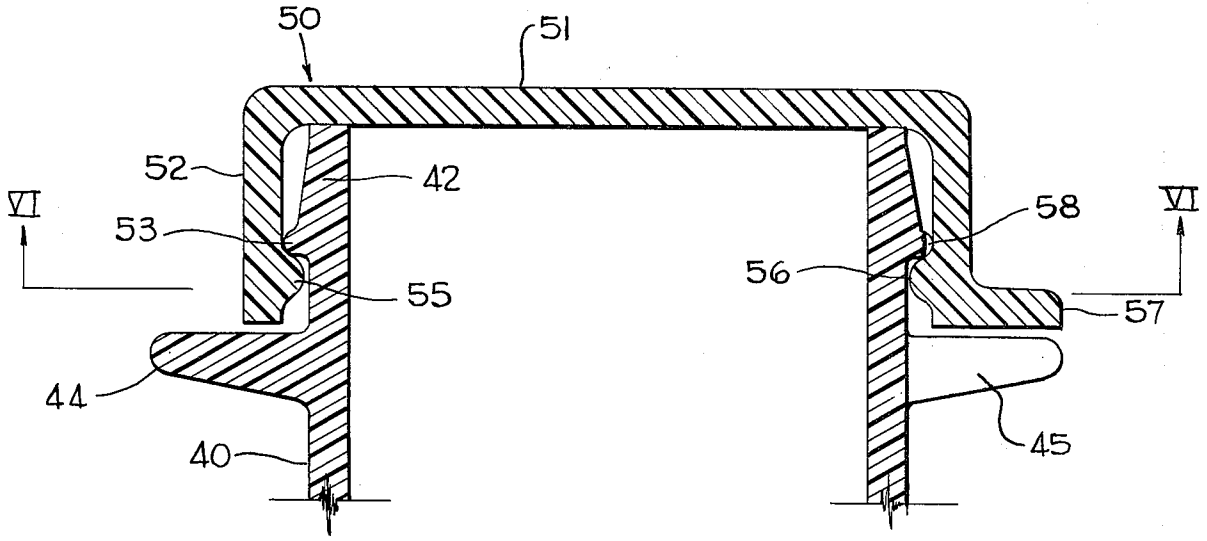

50
51
52
42
VI
53
55
58
VI
56
57
44
45
40

FIG. 5.

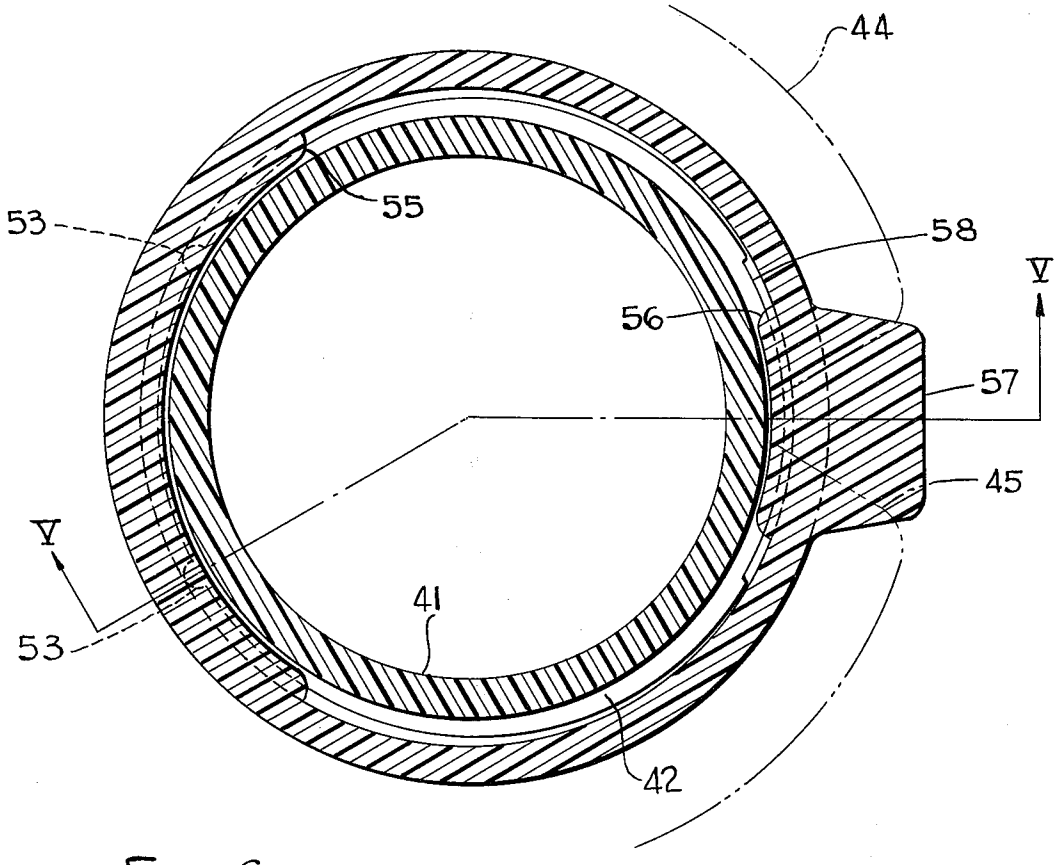

44
53
55
58
V
56
57
45
V
41
53
42

FIG. 6

CONTAINER AND SAFETY CLOSURE THEREFOR

BACKGROUND OF THE INVENTION

This invention relates to a new and improved safety closure for bottles or similar containers particularly for pills and medicines to make access to the contents of the containers difficult for children. Such closures are generally referred to as child-resistant container closures.

The prior art closures of this general type which most nearly resemble the closures of the present invention are disclosed in O'Donnell U.S. Pat. No. 3,170,585, dated Feb. 23, 1965; Grimm U.S. Pat. No. 3,334,763 dated Aug. 8, 1967; Grimm U.S. Pat. No. 3,393,816 dated July 23, 1968; and Horvath U.S. Pat. No. 3,627,160 dated Dec. 14, 1971. In all of these patents the closure has an internal rib which engages over an external end or rib or projection on the container and the closure is released by rotating the same to a predetermined index position.

SUMMARY OF THE INVENTION

The container and closure combination of the present invention includes a container having a continuous annular rib thereon so that complementary rib or bead formations at the interior of the closure engage beneath such container rib in all angular positions of the closure relative to the container and the relationship is such that the cap is snapped on to the container in any relative angular position.

In the container and closure combinations of the present invention the internal diameter of the closure is larger than the greatest external diameter of the container neck to provide radial manufacturing tolerance but either the interior of the closure or the exterior of the container neck is provided with one or more protuberances which engage the other member to take up the slack introduced by reason of the radial manufacturing tolerance.

In one form of the container and closure combination of the present invention the external bead or rib on the container is reduced in radial extent at the release position but is still present at such position to an extent sufficient to retain the closure in effectively closing position until sufficient upward force thereon resiliently releases the closure from the container.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a vertical cross-sectional view through the upper end of a container illustrating one form of the container and cap combination of the present invention;

FIG. **2** is a cross-sectional view on the line II—II of FIG. **1**;

FIG. **3** is a vertical cross-sectional view through the upper end of another embodiment of the container and cap combination of the present invention;

FIG. **4** is a cross-sectional view on the line IV—IV of FIG. **3**;

FIG. **5** is a vertical cross-sectional view through the upper end of another embodiment of the container and cap combination of the present invention;

FIG. **6** is a cross-sectional view on the line VI—VI of FIG. **5**.

DESCRIPTION OF THE ILLUSTRATED EMBODIMENTS

Referring to FIGS. **1** and **2**, the numeral **10** designates a container body of glass or a relatively rigid plastic material having a circular neck portion **12.** An annular locking rib **13** encircles neck **12** and is of constant cross section and constant radius throughout. The upper side of rib **13** is inclined to present a camming surface **14** and the lower face lies in a generally radial plane to provide a secure locking surface **15** for the cap, as will presently appear.

The neck portion of the container is further provided with an external annular flange **17** which is spaced below the locking rib **13.** Flange **17** has an indentation **18** therein for finger or thumb clearance in removing a cap, as will be described more fully later herein.

The cap member of the present embodiment is designated generally by the numeral **20** and is preferably of plastic material having sufficient elastic resilience for snap fitting over the locking rib **13** of the container. Cap **20** has an end wall **21** and a skirt portion **22.** The skirt portion **22** has an internal diameter which is fractionally larger than the diameter of the locking rib **13** of the container to provide normal manufacturing tolerance.

A pair of oppositely disposed arcuately extending bead formations **25** and **26** are provided at the interior of cap **20.** These beads are, in the illustrated instance of similar cross section and are disposed to snap fit over the rib **13** of container **10** and engage securely thereunder. The bead formation **26** is of less angular extent than bead **25** and serves as a resiliently releasable latch which may be forced up over rib **13** when the cap is in a given angular position on container **10.**

The exterior of skirt **22** of cap **20** is generally cylindrical excepting for a radially projecting tab formation **28.** Flange formation **17** of the container prevents one from engaging a finger beneath skirt **22** to release the cap and the only position of the cap in which upward releasing force of a user's fingers or thumb can effectively be applied thereto is when tab **28** is in registry with the indentation **18** of flange **17** as illustrated in FIGS. **1** and **2.** In this position the tab **28** may be firmly grasped between the fingers and lifted to release bead **26** from beneath rib **13** or finger pressure may merely be applied beneath tab **28** to raise the same and release the cap. During this release operation the side wall portions of skirt **22** which lie between the ends of bead formations **25** and **26** flex to permit bead **26** to move upwardly out of the plane of bead **25** which is still engaged beneath rib **13** until bead **26** has been moved upwardly sufficiently to permit slight lateral movement of the opposite portion of cap **20** to release bead **25** from locking engagement beneath rib **13.**

Because of the above-mentioned manufacturing tolerance as between the internal diameter of cap **20** and the diameter of locking rib **13,** and to avoid lateral shifting of the cap on the container incidental thereto, a pair of vertical bead formations **30** are provided at the interior of cap **20** in the present embodiment. It will be noted in FIG. **2** that such lateral shifting is prevented by the engagement of beads **30** against locking rib **13.**

The embodiment illustrated in FIGS. **3** and **4** is identical to that previously described with respect to both the container and the cap, with a single exception. Accordingly, the description of the general structures of

the container and cap will not be repeated here and the parts in FIGS. 3 and 4 are identified by the same numerals as in the case of FIGS. 1 and 2 with the single exception noted above. This exception consists in the fact that the beads 30 at the interior of the skirt 22 of cap 20 are omitted in FIGS. 3 and 4 and in place thereof a rounded protuberance 31 is formed at the periphery of annular rib 13 of the container at a point diametrically opposite to the indentation 18 of the flange 17 thereof. This protuberance 21 serves the same purpose as the beads 31 of FIGS. 1 and 2.

The beads 30 of FIGS. 1 and 2 and the protuberance 31 of FIGS. 3 and 4 in effect take up the play in a radial direction which would otherwise be present due to the tolerance between the outside diameter of rib 13 and the inside diameter of skirt 22 of cap 20. This does not negative the necessary tolerance since variations which tend to take up a part of this manufacturing tolerance will merely cause a slight non-circular distortion of the skirt 22 of cap 20.

The embodiment illustrated in FIGS. 5 and 6 is generally similar to that of the preceding embodiments but includes certain modifications which will become apparent from a consideration of FIGS. 3 and 4 and the following description of the embodiment there illustrated.

In FIGS. 5 and 6 the numeral 40 designates a container body having a circular neck portion 41 and, as in the previous embodiments, a locking rib 42 of generally uniform cross section encircles neck 41. As in the previous embodiments, the upper side of rib 42 presents an inclined camming surface and the lower face thereof is flat to provide a locking surface.

An annular flange 44 encircles the container 40 at a point spaced below locking rib 42 which is similar to and for the same purpose as the flange 17 in each of the preceding embodiments. In FIGS. 5 and 6 a notch 45 to provide a finger space is provided in flange 44 and in this instance the notch 45 extends inwardly to the side wall of container 40 and is of the general contour illustrated in FIG. 6.

The cap member of the present embodiment is designated generally by the numeral 50 and comprises an end wall 51 and a skirt portion 52. Here again the internal diameter of skirt portion 52 is larger than the diameter of locking rib 42 by an amount sufficient to provide manufacturing tolerance.

In the present embodiment the means for normally preventing horizontal shifting of the cap on the container which might occur due to the aforesaid manufacturing tolerance comprises a pair of rounded protuberances 53 formed at the periphery of rib 42. Protuberances 53 are spaced arcuately and lie generally diametrically opposite to notch 45 of container flange 44. Arcuate bead formations 55 and 56 of FIG. 6 correspond in construction and function to the bead formations 25 and 26 of the previously described embodiments. Also, the skirt 52 of cap 50 of the present embodiment is provided with a tab formation 57 corresponding to the tab formation 28 of the present embodiments.

In the several embodiments the beads 30, the protuberance 31, and the protuberances 53 all tend to hold the cap up tight in a radial direction to produce a controlled frictional resistance or "drag" when the cap is rotated relative to the container.

In the embodiment of FIGS. 5 and 6 the locking rib 42 of the container is provided with an arcuate recess 58 which facilitates disengagement of bead formation 56 from the locking rib 42 when the parts are in the illustrated position with tab 57 of the cap in registry with notch 45 of the container flange 44. The recess 58 may be of greater or lesser depth to vary the disengagement resistance in accordance with varying conditions and desirabilities, but in any event only an outer peripheral portion of rib 42 is removed to form recess 58 so that the essential continuity of rib 42 prevails and the bead formation 56 continues its engagement beneath rib 42 when the parts are rotated to the position of FIG. 6 until the tab 57 is manipulated to release the closure from the container.

A preferred embodiment of the present invention has been described herein and shown in the accompanying drawings to illustrate the underlying principles of the invention but it is to be understood that numerous modifications may be made without departing from the broad spirit and scope of the invention.

We claim:

1. In combination, a container and a removable closure therefor, said container having a circular neck portion defining an access opening, a continuous annular rib encircling said neck, the upper surface of said rib being sloped to provide a camming surface and the lower surface of said rib having at least a portion thereof lying in a substantially radial plane to provide a locking surface, said closure comprising an end wall portion and a generally cylindrical skirt extending marginally therefrom, said skirt having a pair of arcuate bead formations of rounded cross section disposed diametrically opposite to each other and lying in a common radial plane, one of said bead formations being of substantially shorter arcuate extent than the other whereby said shorter bead comprises a latch element and the longer bead comprises a retaining element, said cap being sufficiently resilient to permit said arcuate bead formations to snap over said annular rib for applying and removing said cap, said closure having a tab formation extending radially outwardly from the lower edge of said skirt, an annular flange on said container disposed beneath said closure and extending radially outwardly beyond said tab and having a notch therein for permitting lifting movement against said tab when the latter is aligned with said notch, the interior diameter of the said closure being larger than the external diameter of said annular rib of the container neck to provide manufacturing tolerance between the interior surface of said closure and the exterior surface of said rib, and protuberance means at the exterior surface of said rib to engage the other of said surfaces to prevent radial movement of said closure with respect to the container due to said tolerance, said protuberance means being disposed generally diametrically opposite to the initial release point of the closure.

2. In combination, a container and a removable closure therefor, said container having a circular neck portion defining an access opening, a continuous annular rib encircling said neck, the upper surface of said rib being sloped to provide a camming surface and the lower surface of said rib having at least a portion thereof lying in a substantially radial plane to provide a locking surface, said closure comprising an end wall portion and a generally cylindrical skirt extending marginally therefrom, said skirt having a pair of arcuate bead formations of rounded cross section disposed diametrically opposite to each other and lying in a com-

mon radial plane, one of said bead formations being of substantially shorter arcuate extent than the other whereby said shorter bead comprises a latch element and the longer bead comprises a retaining element, said cap being sufficiently resilient to permit said arcuate bead formations to snap over said annular rib for applying and removing said cap, said closure having a tab formation extending radially outwardly from the lower edge of said skirt, an annular flange on said container disposed beneath said closure and extending radially outwardly beyond said tab and having a notch therein for permitting lifting movement against said tab when the latter is aligned with said notch, the interior diameter of the said closure being larger than the external diameter of said annular rib of the container neck to provide manufacturing tolerance between the interior surface of said closure and the exterior surface of said rib, and protuberance means at the exterior surface of said rib to engage the other of said surfaces to prevent radial movement of said closure with respect to the container due to said tolerance, said continuous annular rib having a notch therein less than the full radial depth thereof whereby the notched portion normally retains the closure by engagement with its bead formations in any angular position of the closure with respect to the container but whereby the shorter bead formation may be flexed over said notched rib in a closure removal operation, and said protuberance means being disposed generally diametrically opposite to the notch in said annular flange of the container.

* * * * *