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Kowalik

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[54] **CHILD PROOF CLOSURE**

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[52] **U.S. Cl.** **215/221**; 215/274

[51] **Int. Cl.** **B65d 55/02**; B65d 85/56; A61j 1/00

[58] **Field of Search** 215/9, 221, 216, 225, 274

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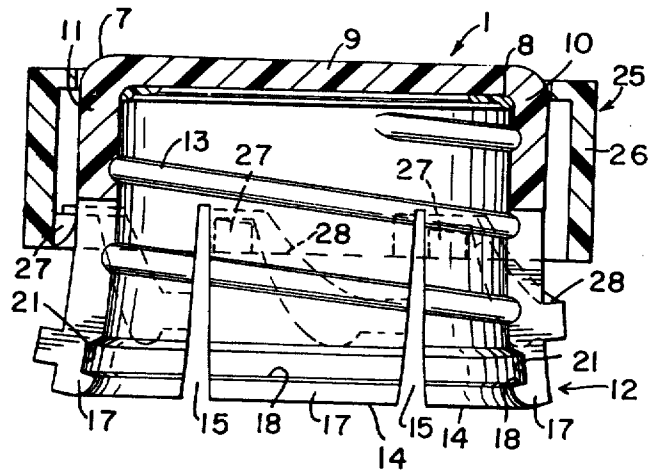
Primary Examiner—George T. Hall

Attorney, Agent, or Firm—John J. Kowalik; Joseph E. Kerwin; William A. Dittmann

[57] **ABSTRACT**

A childproof closure comprising a cap which may be threaded or snapped onto a complementary finish on a neck of a container, the cap having a flexible slotted lower skirt portion provided with inwardly projecting lugs which are adapted to snap under an annular shoulder at the lower end of the finish, the lugs lock beneath the shoulder when the cap is closed and snap out from under the shoulder when the cap is unscrewed or lifted. An auxiliary locking ring is movable and locked over the slotted skirt portion to prevent the lugs from releasing and is movable off the slotted portion to permit release of the lugs and opening of the container.

11 Claims, 11 Drawing Figures



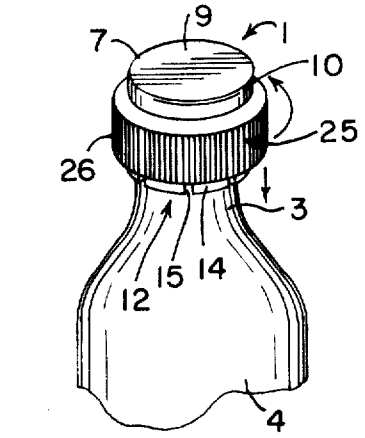


FIG-1

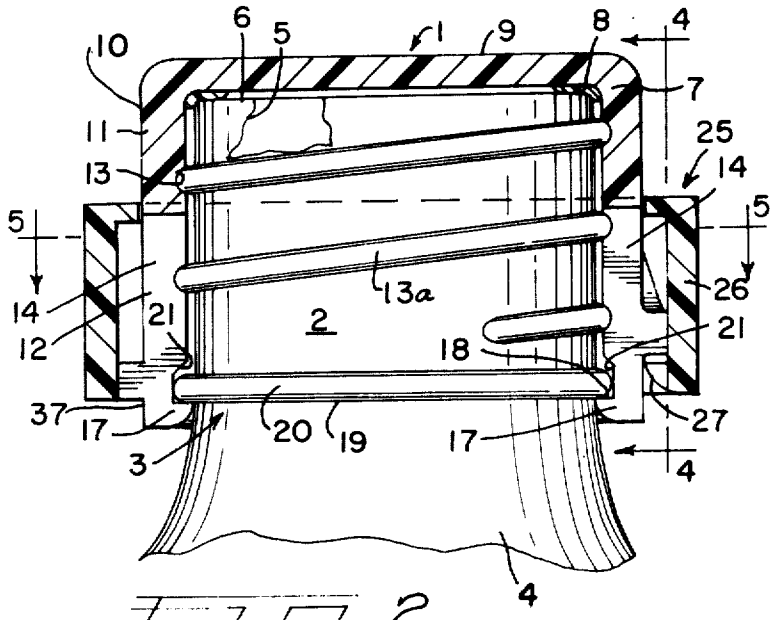


FIG-2

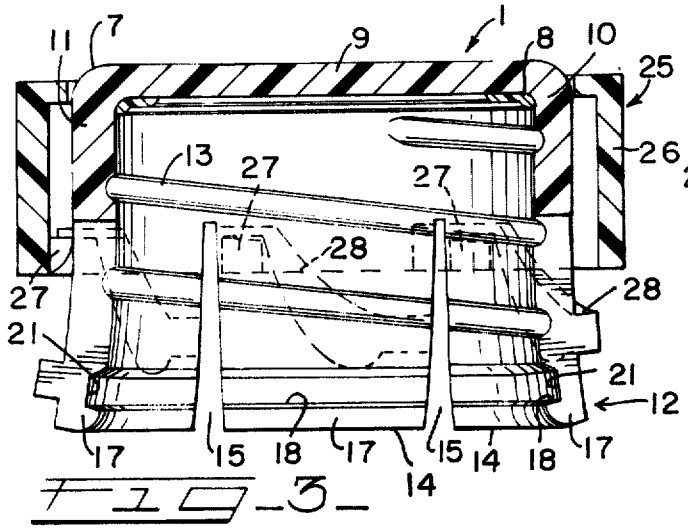


FIG-3

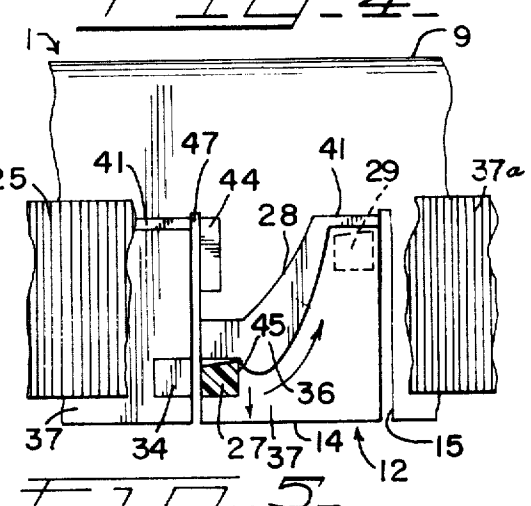


FIG-4

FIG-5

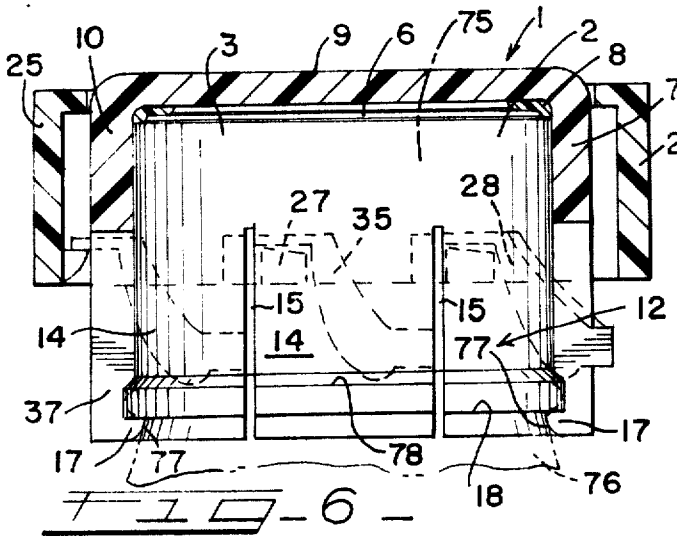
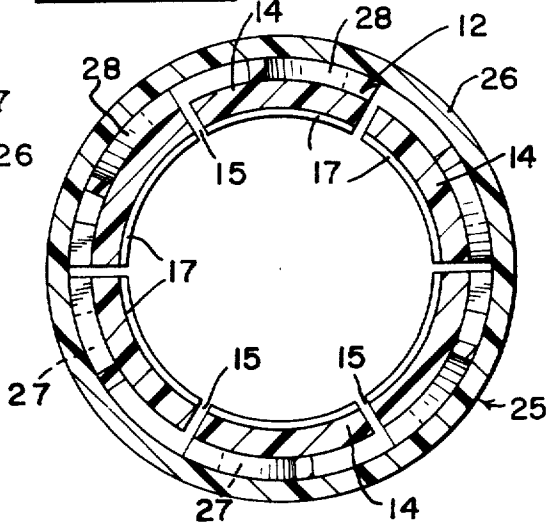


FIG-6



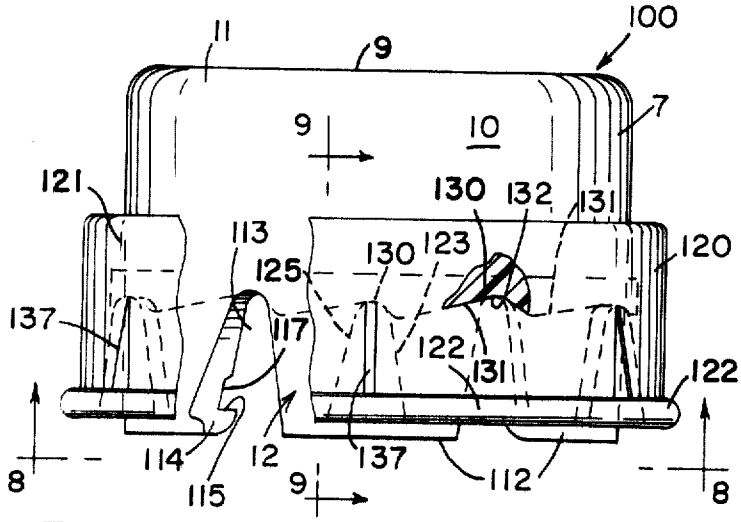


FIG-7

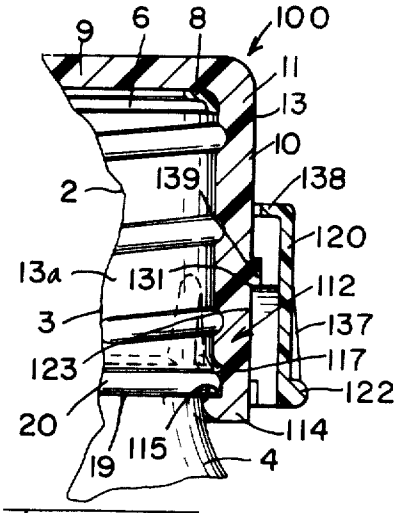


FIG-9

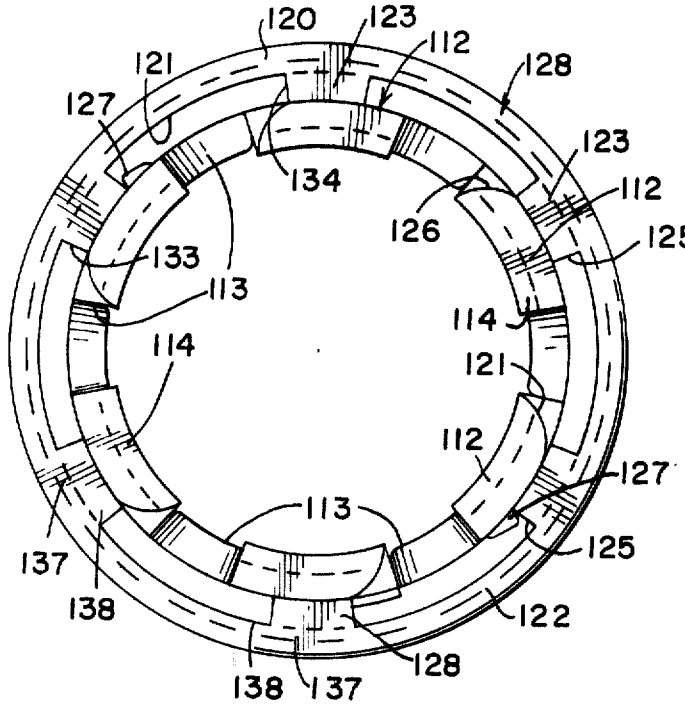


FIG-8

FIG-10

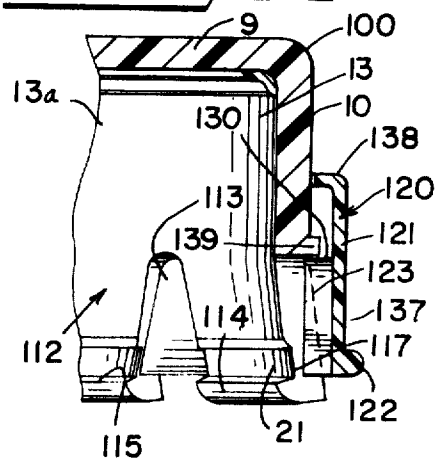
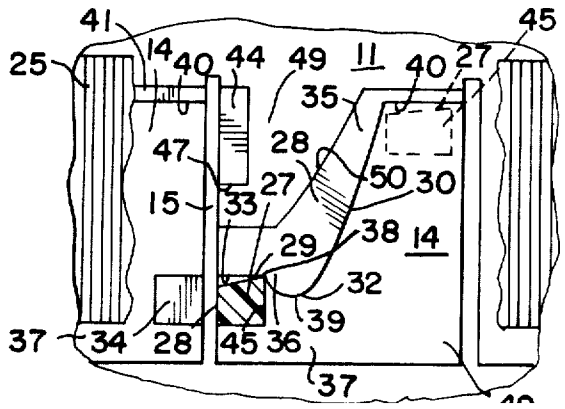


FIG-4A



CHILD PROOF CLOSURE

DISCUSSION OF THE PRIOR ART

Various forms of childproof closures have been devised requiring that several pieces of a cap be displaced to permit opening. However, those known to applicant provide a part which is attached to the neck of the bottle and the cap then fits onto such part. One of the problems with such a structure is that the entire cap assembly rotates on the neck and thus a good seal cannot be maintained particularly for isotropic contents. Furthermore, in the multiple piece constructions it is usually necessary for the user to hold one part while manipulating the other so that it is either tedious or impossible to close or open by the infirm.

SUMMARY OF THE INVENTION

This invention is directed to a novel cap which is relatively easily closed and opened by an adult, but which would frustrate a young child.

An object of the invention is to provide a novel closure cap assembly having an inner cap portion and an outer locking ring portion which is adapted to be selectively positioned in locking or unlocking position to the cap portion.

A different object of the invention is to provide a cap assembly which has means for interlocking with the bottle finish and releasable supplementary means are provided to hold the interlocking means in locking position.

More specifically the invention comprehends the provision of a cap assembly having an inner radially spreadable screw-on or snap-on portion for mounting of the bottle finish and a locking member which sleeves over the inner portion in one position preventing spreading and in another position permitting the inner portion to spread and release from the finish.

A still further object is to provide a novel cap structure in which a locking ring is sleeved over a cap and the locking ring and cap are so constructed that the user may with one hand apply or remove the cap with respect to the container by applying suitable forces to the locking ring.

These and other objects and advantages inherent in the invention will become more apparent from the specification and the drawings wherein:

FIG. 1 is a perspective view of a portion of a bottle with the novel cap structure applied thereto;

FIG. 2 is an enlarged axial sectional view of the cap structure shown applied to a bottle neck finish with the parts in locked position;

FIG. 3 is a view similar to FIG. 2, showing the parts in unlocked position removed from the container;

FIG. 4 is a fragmentary side elevational view partly broken away and showing the parts in locked position taken substantially on line 4 of FIG. 2.

FIG. 4A is an enlargement of a portion of FIG. 4.

FIG. 5 is a transverse sectional view taken substantially on line 5—5 of FIG. 2;

FIG. 6 is a view similar to FIG. 3 showing another embodiment of the invention;

FIGS. 7 – 10 show a still further embodiment;

FIG. 7 being a side elevational view partly broken away;

FIG. 8 being a bottom view;

FIG. 9 being a fragmentary axial sectional view taken substantially on line 9 — 9 of FIG. 7, showing the parts in locked position; and

FIG. 10 being a view similar to FIG. 9 showing the parts in reclosed position.

DESCRIPTION OF THE EMBODIMENT OF FIGURES 1 – 5

The novel cap structure of generally designated 1 is shown in association with a more or less standard bottle finish 2 on a neck portion 3 of a bottle or container 4. The neck is cylindrical and has an upper end opening 5 defined by an annular lip 6 which in the closed position of the inner portion or cap 7 of the closure structure is engaged by a seal 8 on the interior of the top wall 9 of the cap.

The cap 7 is provided with a cylindrical skirt 10 integral with the top wall 9 and the skirt has a rigid upper portion 11 and a slotted lower portion 12. An internal thread 13 is provided on the skirt which threads onto a mating thread 13a formed on the finish. The slotted lower portion of the skirt comprises a plurality of circumferentially spaced flexible fingers 14 which in static condition as best seen in FIG. 3 are spread out to facilitate removal and application of the cap structure with respect to the neck of the container. The cap structure (including the locking ring hereinafter described) are made of suitable plastic such as nylon, polyethylene or polypropylene or copolymers of these materials. Such material has inherent resiliency particularly in the finger portions which are adapted to flex radially with respect to the axis of the cap.

Each finger as best seen in FIG. 5 is of arcuate cross-section and adjacent fingers define axially elongated slots 15 — 15. Each finger has, at its lower end, an inwardly directed locking lug 17, which provides an upper locking edge 18 which in the locked position as seen in FIG. 2 is generally normal to the axis of the neck and engages or locks under a flat bottom edge 19 of an annular shoulder 20 formed on the container at the base of the neck, the shoulder being dimensioned to fit into a groove 21 formed in the finger above the leg 17. The skirt is molded in such a manner that the upper portion thereof is relatively rigid and the lower portion flexible with the fingers normally in spread position as shown in FIG. 3.

After the cap is threaded onto the finish it is locked by a supplementary plastic locking ring generally designated 25 which is sleeved over the skirt and comprises a cylindrical body section 26 with a plurality of circumferentially spaced deflectible locking lugs 27, one for each ramp 28 formed on the exterior sides of the fingers. Each locking lug 27 is of quadrilateral shape in cross-section as seen in FIG. 4A and has a forward guide edge 28 and an upper diagonal cam edge 29. The guide edge is adapted to engage with the rear cam edge 30 on the adjacent ramp and attendant to turning of the ring guide the ring to move downwardly while closing the fingers about the neck to grasp the locking shoulder on the neck, whereupon the lower locking lugs 17 engage under the shoulder.

The ring which is made of suitable plastic material such as polyethylene or polypropylene and the like is further rotated until the upper cam edge 29 of each lug 27 deflects and passes under a detent 32 formed at the lower end of the associated ramp and then enters into a locking notch 33 formed in the ramp ahead of the de-

tent. A bayonet type interlock is effected between the ring and the skirt preventing the rotation of the ring except when the ring is rotated with sufficient force in a counterclockwise direction (FIG. 5). Clockwise rotation of the ring is limited by stops **34** formed on the fingers and engageable with the locking lug **29** therebehind.

The ring is shown in FIGS. **2, 4** and **5** in locked position whereat it embraces the fingers and prevents their being spread apart. Thus the lower locking lugs on the fingers are prevented from escaping from under the locking shoulder.

It will also be noted that the ramps are tapered at **35** in an upward direction as best seen in FIGS. **2** and **4A** so as to enhance the flexibility of the fingers and at the same time the thicker lower sections **36** (FIG. **4**) rigidify those regions of the fingers in proximity to the lower locking lugs **17** so as to minimize the flexibility of the section **37** of the fingers in the region of the shoulder receiving groove **21.** Furthermore, in locking position the ring lugs **27** are disposed in radial alignment with the groove **21** thus preventing the locking lugs **17** from springing out from under the shoulder **20** when the ring is in locking position and the container closed as seen in FIG. **2** when attempt is made to unscrew the cap.

To open the container, that is to remove the cap, the adult user grasps the ribbed outer surface **37***a* of the locking ring and by rotating the same in a counterclockwise direction causes the corners **38** of the lugs **27** to deflect or temporarily deform accommodating the lug **27,** with some deflection, to ride under the downwardly convexed edge **39** of the detent to a released position behind the ramp. In this position the outward bias of the fingers hold the ring in the lowered position and the user must then move the ring axially upwardly until the upper edges of the lugs **17** abut the undersides **40** of ledges **41** which are formed as circumferential continuations of the upper narrow ends of the ramps. The ring in the upper released position clears the fingers which spring outwardly as best seen in FIG. **3,** thus disengaging the locking lugs **17** from the shoulder **20.**

Rotation of the ring in a counterclockwise direction is limited by a pair of stops **44, 44** formed at diametrically opposed sides of the skirt adjacent to the fingers for abutment by the back edges **45** of the correspondingly positioned locking lugs **27** on the ring, all of said lugs **27** also abutting the ledges **41.** By turning the ring counterclockwise, the cap interlocked therewith is unscrewed, disengaging the sealing ring **8** secured to the bottom of the top wall of the cap in axial alignment with the lip **6.**

It will be observed that the ring and cap may be separated by positioning the ring approximately midway between or intermediate the top and bottom positions and aligning the locking lugs **27** with passages **47** (FIG. **4**) located between the lower edges of the stop lugs **44** and the upper edges of the lower portions **36** of the respective ramps. The ring in this position is rotated in a counterclockwise direction while the cap is held.

The locking lugs exit into guide passage **49** which are defined by forward diagonal edges **50** of the ramps and the ring is lifted up off the cap. The edge **50** serves to guide the respective lug **27** into the passage **47** during assembly of the ring with the cap which may be suitably held, whereupon the ring is rotated in a clockwise direction deforming the lug **27** through the slot **47** into assembled interlocked relation with the cap.

EMBODIMENT OF FIG. 6

The embodiment of FIG. **6** is identical with the previous embodiment except that in lieu of threads being formed on the interior of the skirt, the interior surface is cylindrical to fit on a cylindrical finish **75** of a bottle **76** whereby the cap merely snaps onto the bottle. All other parts are the same as in the previous embodiment and identical parts are identified by the same reference numerals. In this embodiment, however, it is necessary for the user to hold the cap when tightening or loosening the cap. Also in this embodiment the fingers are not formed to separate, but are formed in a cylindrical form as a continuation of the upper skirt portion, so that when the cap is forced onto the neck of the bottle the locking lugs have their lower inwardly curved edges **77** engaged with the top edge **78** of the shoulder **20** and upon further forcible downward movement of the cap the lugs spread out sliding on their edges **77** on the shoulder until the lugs **27** pass the shoulder and then snap under, thus locking the securing ring to prevent the fingers from spreading and thus completing the closure. To open, the locking ring is rotated in a counterclockwise direction and then lifted to axially displaced upper position relative to the fingers whereupon further lifting unsnaps the lugs **27** from shoulder **20** and the cap then may be easily removed.

EMBODIMENT OF FIGS. 7 – 10

In this embodiment, parts identical with those of the previous embodiments will be similarly numbered. The cap **100** comprises a top wall **9** with a sealing gasket **8** on its underside for sealing with the lip **6** of the bottle **4** fragmentarily shown in FIG. **9.** The cap comprises a cylindrical skirt generally indicated **10** which has internal threads **13** for mating engagement with complementary threads **13***a* on the finish of the neck **3** of the bottle.

The rigid upper portion of the skirt is continuous circumferentially and the lower portion **12** flares outwardly downwardly in static condition and comprises a plurality of circumferentially spaced fingers **112, 112** with intervening inverted V-shaped notches **113, 113.**

Each finger is provided with an inwardly directed locking lug **114** which has a top locking edge **115** adapted to engage the bottom edge **19** of shoulder **20** of the bottle in locked position as herein after explained. The fingers have a groove **117** receiving the shoulder or annulus **20** therein in closed position.

The cap is adapted to be threaded onto the neck **3** until the gasket tightly seals against the lip. At this time the grooves **117** align radially with the annulus **20** and the locking lugs **114** are below the annulus but spaced outwardly therefrom.

In order to lock the cap onto the container a locking ring **120** is provided which is sleeved over the lower finger portion of the skirt. The ring has a cylindrical body portion **121** with a reinforcing or stiffening edging or bead **122** along its lower edge. Internally the body is provided with a plurality of circumferentially spaced locking lugs **123** which are generally triangular in side elevation and dimensioned to fit into the inverted V-shaped slots or apertures **113,** there being one slot for each lug. The lugs **123** are equally spaced as are the slot **113** and are adapted in the released position to fit into respective slots whereby the fingers are free to spring outwardly and release the lugs **114.**

To lock the ring from released position, the ring is rotated clockwise (FIG. 8) while the cap is tight on the neck. The leading edges **125** of the lugs **123** slide over the leading cam surfaces **126** on the fingers causing the fingers to swing inwardly engaging the lugs **114** thereon under the shoulder **20.** Rotation of the ring is stopped by stops **127** on diametrically opposite fingers engaging the leading edges of the respective lugs **123.** The apical edges **130** of the lugs **123** ride under a toothed profile **131** having downwardly directed teeth with forward catch surfaces **132** against which the back edges **133** of the upper apical portion of the lugs are engaged. These are held in engaged position by the spreading action of the fingers which tend to wedge the ring upwardly.

It will be noted that the securing ring is formed with an external reinforcing bead **122** at its lower edge and the bead is integrated with a series of gussets **137** which merge with the external periphery **136** of the body portion of the ring. These gussets taper upwardly so as to preserve the resiliency of the fingers and also provide an interrupted surface contour with abutments to prevent the fingers of the user from slipping around the peripheral surface during turning of the ring.

The ring has an inturned upper flange **138** abuttable with an annulus **139** formed on the external peripheral surface of the cap skirt fingers intermediate the top and bottom of the cap above the fingers to prevent the ring from accidentally slipping off downwardly when not in use and upward release is prevented by the locking lugs being trapped in the respective slots as best seen in FIG. **10.** To assemble the ring with the cap, the locking lugs of the ring are merely forced over the flange **138** deflecting the same.

Having described several forms of the invention, it will be noted that various embodiments will now become apparent and within the scope of the appended claims.

What is claimed is:

1. A childproof plastic closure for a container having a neck and a locking shoulder at the base of the neck comprising:

a cap having a skirt with an upper cylindrical portion and splayed fingers forming the lower portion;

means on the fingers for interlocking engagement with the shoulder;

holding means mounted on the cap and movable to release and locking positions and in said locking position closing the fingers about the neck and thereby forcing said interlocking means into locking relation with the shoulder to prevent removal of the cap from the associated container;

and supplementary means for releasably securing said locking means in locking and unlocking positions with the cap, said holding means comprising a ring sleeved over the skirt and movable axially and circumferentially thereon over and off said fingers;

said supplementary means comprising interengaging cam means on the ring and the external sides of said fingers, said cam means on the fingers extending diagonally axially and circumferentially of the cap, and means axially spaced of the cap and being disposed at the ends of the cam means on the fingers and offset circumferentially from each other, said cam means effective to guide said ring into and out of locking position attendant to rotation of the ring in conventional manner to lock and unlock the closure.

2. The invention according to claim **1** and said interlocking means comprising inwardly directed lugs at the lower ends of said fingers.

3. The invention according to claim **1** and said supplementary means comprising a bayonet-type lock on the ring and at least certain of said fingers.

4. The invention according to claim **1** and said cap having neck-thread engaging threads in said skirt.

5. The invention according to claim **1** and said fingers defining slots therebetween, and lugs on the ring spaced on the order of said slots and attendant to rotation of the ring adapted to enter respective slots in release position and in locked position to be positioned in backing relation to respective fingers.

6. The invention according to claim **5** and said ring having teeth overlying the lugs for engagement by the lugs to selectively releasably hold the same in locked and release positions.

7. The invention according to claim **1** and said fingers being inherently resilient and biased radially outwardly of the skirt for holding said supplementary means in locking and in locked positions.

8. The invention according to claim **1** and said supplementary means comprising a band encircling said skirt and movable axially thereof to an upper release position whereat said fingers are spread outwardly and to a lower locking position moving said fingers inwardly to locking position.

9. A childproof container closure comprising:

a cap having a top wall and an integral skirt including a cylindrical upper portion and a lower portion comprising a plurality of radially deflectible fingers depending from said skirt;

container-lip engaging sealing means within said cap on the bottom of said top wall;

securing means on the fingers projecting inwardly thereof for engagement with a locking shoulder of an associated container; and

releasable locking means disposable in locking embracing relation to said fingers to hold the same from deflecting outwardly and disengaging said securing means;

said locking means comprising a ring sleeved over said skirt and movable axially on said skirt between said upper and lower portions of said skirt;

said ring movable circumferentially on the cap between said locking position and an unlocking position displaced from said fingers;

said locking means comprising cam ribs spiraled about said lower portion and projecting outwardly from respective fingers, lugs on the interior of the ring cooperatively associated with respective ribs, a set of latching means at the axial ends of said ribs, one set being adjacent the cylindrical portion for interlocking engagement with respective lugs for holding said ring in elevated position out of engagement with the fingers and the other set located for securing the ring in locking position of the fingers.

10. A childproof container closure comprising:

a cap having a top wall and an integral skirt including a cylindrical upper portion and a lower portion comprising a plurality of radially deflectible fingers depending from said skirt;

container-lip engaging sealing means within said cap on the bottom of said top wall;

securing means on the fingers projecting inwardly thereof for engagement with a locking shoulder of an associated container; and

releasable locking means disposable in locking embracing relation to said fingers to hold the same from deflecting outwardly and disengaging said securing means;

said locking means including a ring movable circumferentially on the cap between said locking position and an unlocking position displaced from said fingers;

said locking ring having a plurality of inverted V-shaped locking elements therein, one for each finger, said fingers defining slots therebetween of complemental shape to said locking elements for receiving the same in the unlocked position of the ring whereby the fingers may spring outwardly between said locking elements, the apical ends of said elements and slots being disposed adjacent to said cylindrical portion.

11. The invention according to claim 10 and said skirt having a toothed means formed thereon for locking engagement with the apical ends of respective locking elements in the locked position thereof for releasably constraining the ring against rotation.

* * * * *