CHILD RESISTANT CLOSURE FOR COLLAPSIBLE TUBE


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References Cited
UNITED STATES PATENTS
3,698,584 10/1972 Miller ......................... 215/216


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ABSTRACT

A closure for collapsible tubes wherein the tube has lugs on its shoulder, and the cap which threads onto the neck of the tube has flexible spokes which engage with the abutments when the cap is screwed closed, to provide a lock. The cap is unlocked from the tube by lifting the spokes out of engagement, by means of a ring, with the lugs.

4 Claims, 8 Drawing Figures
CHILD RESISTANT CLOSURE FOR COLLAPSIBLE TUBE

BACKGROUND OF THE INVENTION

As is well known, children, and particularly very young children, are attracted to containers, and to opening containers. Where such containers have toxic or otherwise dangerous contents, injury and even death can result should the child gain access to, and consume or otherwise expose himself to, the container contents.

Numerous different closures have been developed in an effort to prevent children from opening containers. These past efforts appear to be primarily directed to relatively rigid containers, such as glass and plastic bottles.

The present invention is concerned with collapsible tubes of the standard, common types, including those of aluminum, tin, lead and plastic.

SUMMARY OF THE INVENTION

A standard common type of collapsible tube, having a body, shoulder and threaded neck portion, is made in the usual, prior art way with standard machines. However, the shoulder of the tube is modified by forming raised lugs at circumferentially spaced, radially disposed positions, on the shoulder surface. In producing the collapsible tube, the die is altered to provide such a result.

A conventional tube cap of the screw-on type is modified to include integrally with the cap, and extending radially therefrom, spokes joined at their outer end by a ring. The spokes are flexible in a direction longitudinal of the tube, but relatively rigid against rotation with respect to the threaded cap.

To lock the cap on the tube, the cap is threaded down on the tube until the spokes come into engagement with each of the lugs, which have a beveled portion thereon. The spokes flexibly ride up the bevels and over the lugs.

When the cap is fully screwed on the neck of the collapsible tube, the spokes engage the lugs preventing unscrewing of the cap.

The features of the invention described above can be made with standard collapsible tube machinery, including standard dies and standard molds. No special material is needed for either the tube or cap; presently used material can be continued to be used. The tube can continue to be automatically capped on standard equipment, as in the present practice.

To unlock the cap, the spokes are lifted out of engagement with the lugs by means of the ring, and the cap unscrewed.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of the closure of the invention, showing the cap locked on the tube.

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

FIG. 3 is an isometric view of the closure of FIGS. 1 and 2, showing the cap removed from the tube.

FIG. 4 is a longitudinal sectional view of the closure of FIGS. 1 to 3, showing the cap in seated position on the tube.

FIGS. 5 through 7 show an alternative embodiment of the invention.

FIG. 5 is a perspective view of the closure of FIGS. 5 to 7.

FIG. 6 is a top plan view of the closure of FIGS. 5 to 7.

FIG. 7 is a longitudinal sectional view of the closure of FIGS. 5 to 7.

FIG. 8 is a perspective of the cap being removed from the tube in the closure of the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Reversing the drawings, a standard, flexible, collapsible tube 20, of any suitable material, such as tin, lead, plastic, or aluminum, has a wall 21 of circular cross section, with a suitable bottom seam or other closure 22, as seen in FIG. 8. At the top thereof, tube 20 has a shoulder 23, integral with wall 21, formed at a suitable, sloping angle to the wall, for instance 120°. The shoulder 23 rises to integrally join with an externally threaded neck 25, adapted to receive an internally threaded cap 26. Cap 26 is formed of a suitable plastic, such as low density polyethylene.

The components described so far are conventional, mass produced, collapsible tube containers of the type well known, and used for instance for toothpaste, ointments, creams, and other relatively viscous liquids.

In the present invention the shoulder 23 of the tube 20 is modified by forming therein raised lugs 27 at circumferentially spaced positions, radially disposed, on the shoulder surface. In producing the collapsible tube, the die is altered to provide for such a result.

Lugs 27 include an inclined, or beveled portion 28, on the counterclockwise side of the lug, when viewed from above, and a vertical, or abrupt side surface 30, on the clockwise side of the lug 27, when viewed from above. The lug 27 also has a flat top 31, and ends 32, as best seen in FIG. 3.

In the invention, the cap 26 is modified by integrally extending therefrom spokes 36, and a ring 37. Spokes 36 are formed to lie, when relaxed, in a direction which conforms to the slope of the shoulder 23 of tube 20 when cap 26 is screwed on to neck 25.

The spokes 36 are of a relatively thin cross section in the direction longitudinal of the tube, so that they can flex upward with respect to the cap, but relatively wide in the direction of rotation of the cap with respect to the tube.

The ring 37 is relatively thick and extends upwardly to provide a grasping portion for the user. The ring 37 is in effect a flexible ring which seeks disposition in a given plane, thus positioning the spokes 36 in the direction longitudinal of the tube 20, while permitting the spokes 36 to be flexed out of the given plane when desired.

As will be seen, if one point on ring 37 is lifted out of its plane of disposition, and allowed to relax, it will return to its original plane.

The cap 26, spokes 36 and ring 37 are all integral, and formed of a suitable plastic. Cap 26, as well known, is rigid, whereas spokes 36, and ring 37 are flexible in certain directions by virtue of the indicated relatively thin dimensions.

It should be noted that ring 37 is endless, and continuous, and this is a factor in the ring returning to a disposition in a certain plane, even after having been displaced, at circumferentially spaced positions, out of the plane.

In the embodiment of FIGS. 1 through 4, there are eight spokes 36 extending integrally from the cap 26.
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and joined to ring 37. Spokes 36 form eight rectangular openings 38 as shown. Eight lugs 27, of the type described earlier, are circumferentially spaced, and radially disposed on shoulder 23, so that they correspond with openings 38 when the cap 26 is fully threaded onto neck 25.

In use, cap 26 is initially threaded onto neck 25 of the tube 20 in the usual manner, by standard automatic capping machines or by hand. The structure of the invention does not interfere with the use of such machines, or hand capping, since, in the invention, the basic prior art tube and cap are not changed.

During capping, as the cap 26 becomes increasingly threadedly engaged with the neck, the spokes begin to interfere with lugs. Since the cap 26 is being threaded on the tube in a clockwise direction, the spokes 36 engage bevel 28 of the lugs 27 during such interference. The spokes 36 being flexible in a direction longitudinal of the tube, individually ride up the bevel and then return to their downward position after they pass over the lug under their own bias, and from the effect of ring 37. Ring 37 is selectively distorted out of its relaxed plane during such engagement of the spokes 36 and lugs 27, but returns to its given plane when the interference is past.

When the cap is screwed fully onto neck 25, as shown for instance in FIGS. 1 to 3, spokes 36 extend along shoulder 23, being held in such position by the stiffness of the spokes themselves, as well as by the effect of ring 37.

In this position, wherein cap 26 is screwed closed onto neck 25, the cap 26 cannot be opened by merely rotating the cap in a counterclockwise direction from the container, because spokes 36 come into engagement with abrupt surface 30 on lugs 27. Since the spokes 36 are relatively wide, they do not yield against the force seeking to remove the cap 26 from the tube 20, thus preventing the uncapping of the container.

In order to unscREW the cap from the container, it is necessary for the user to proceed as shown in FIG. 8. The user must grasp the tube 20 with one hand 40, and support the tube. The user, with the fingers 41 of his other hand, then grasps ring 37 formed on cap 26, and lifts the ring away from shoulder 23, in at least two, and desirably three, circumferentially spaced positions. In so lifting ring 37, the user also lifts spokes 36 out of interference with lugs 27, thus permitting cap 26 to be unscrewed in a counterclockwise direction. When the cap is sufficiently unscrewed, the user may allow ring 37, and spokes 36 to return to their relaxed position, out of any further interference with lugs 27. The cap 26 can then be unscrewed and removed in its normal way.

Cap 26 may be subsequently threaded onto the tube, and removed, repeatedly. When grasping the cap 26 with the fingers, for insertion onto the tube 20, the fingers abut against the ring 37, and tend to force the ring 37 toward the shoulder 23 of the tube 20, so that any tendency for the ring 37 to distort away from the shoulder 23 is overcome.

Spokes 36, if necessary, may have increased thickness where they are joined to the cap 26, to further flexibility position the spokes in a relaxed position which conforms to the slope of shoulder 23.

In the embodiment of FIGS. 5 through 7, in order to permit a locking effect without having to turn the cap unduly beyond its initial seating position, there are more openings between the spokes than there are lugs. For instance, there are shown ten openings 38 and five lugs 27.

To provide a more adequate grasp of the cap 26, when necessary, the cap may be lengthened as shown at 45, in FIGS. 5 and 7. The upper segment 45 of the cap may have a seal-puncturing spike as at 46, as well known. The cap, however, should not be of such length that the fingers will not be somewhat in abutment with the ring 37, since such abutment tends to force the ring 37 and spokes 36 against the shoulder 23 to secure firm locking.

As seen for instance in FIG. 7, it is further desirable that the diameter of the ring 37 be somewhat smaller than the outside diameter of the tube 20, so that it is somewhat unwieldy to grasp and lift the ring 37 when unlocking and unscrewing the cap 26.

It should be further noted that, as illustrated in FIG. 8, in unlocking the cap 26, and removing, it is necessary for the user to grasp the collapsible tube 20 with one hand, and hold the tube in a supporting position. This, of course, is equally applicable to a child, so that by the very nature of the container, one hand of the child is immobilized.

The invention will offer resistance to a child opening a collapsible tube container since the child will, where he is seeking to remove the cap in a conventional manner, attempt to turn the cap 26 either clockwise, or counterclockwise. Obviously a clockwise movement will not permit removal, since the cap 26 becomes further engaged. A counterclockwise twist by the child will be resisted by the engagement of the spokes 36 with the lugs 27. Notwithstanding that the spokes 36 are flexible in a direction longitudinal of the tube, they are most rigid in opposing a counterclockwise twist since their dimension in the flat plane is a substantial one, and thus a flat twist will be resisted. Additionally, the spokes 36 are given further rigidity against movement which permits turning, by the interlocking feature of the ring 37 with the spokes 36.

In order for the cap 26 to be removed by turning in a counterclockwise direction, it is necessary to lift the spokes 36 out of engagement with the interfering lugs 27. To do this, it is necessary to lift the ring 37 from its normal or relaxed position wherein the spokes 36 are engaged with the lugs 27. However, the ring 37, being flexible, but nevertheless somewhat stiff, is of such a particular nature that by lifting at one point, the entire ring is not lifted.

It is necessary to lift the ring 37 in at least two points and for best results, in at least three points.

The ring 37 along with the cap 26 is then twisted counterclockwise to disengage the cap 26 from the tube 20. The ring 37 must be held by the fingers until the cap 26 is sufficiently unscrewed so that when the ring 37 is released, there is no longer interference with the lugs 27.

The cap removal as explained is sufficiently intricate to generally foil a child of approximately four and one-half, or younger, while permitting a relatively convenient use for the general population.

What I claim is:

1. In a collapsible container having
   a. a flexible, collapsible tube closed at the bottom,  
   b. a shoulder on top of the tube,  
   c. an externally threaded neck extending from the shoulder, and
d. an internally threaded cap adapted to be threaded on the neck;

a child resistant closure comprising

a. lugs at circumferentially spaced positions on the shoulder, and integral therewith, wherein the lugs
   1. are beveled on one side thereof, and abrupt on the side opposite the beveled side, and
   2. are radially disposed,

b. radially disposed spokes extending integrally from the cap, and conforming to the shoulder of the tube when the cap is threadedly and fully engaged on the neck, said spokes being relatively thin and flexible in a direction longitudinal of the tube, and relatively wide and stiff in a direction rotationally of the tube, and a flexible ring surrounding and integrally secured to the spokes at the bottom of the ring,

wherein when the cap is screwed onto the neck of the tube the spokes flexibly come into contact with the lugs on the beveled side and ride over the lugs, and when the cap is unscrewed from the tube the spokes come into contact with the lugs on the abrupt side, whereby the cap is prevented from rotating, unless the spokes are lifted out of interfering engagement with the lugs.

2. The closure of claim 1, wherein the spokes form openings therebetween, and there are more openings than lugs.

3. The closure of claim 1, wherein the diameter of the ring is somewhat smaller than the diameter of the tube.

4. The closure of claim 1, wherein the fingers of a user, when grasping the cap, tend to come into interference with the ring.

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