[54] SAFETY CLOSURE FOR CONTAINERS

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[56] References Cited

UNITED STATES PATENTS

3,019,931 2/1962 Thornton 215/9


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[57] ABSTRACT

A safety closure for containers includes a locking ring mounted to the neck of a container in such a manner as to prevent relative rotation thereto. A tab is connected to and extends away from the body of the mounting ring and includes at least one locking tooth for engagement with locking elements on the closure. A cut away portion is provided between the tab and locking ring body to form a hinged connection for the tab so that the tooth may be moved up and down into and out of engagement with the closure locking elements.

15 Claims, 20 Drawing Figures
SAFETY CLOSURE FOR CONTAINERS

BACKGROUND OF INVENTION

This invention relates to a safety closure arrangement to prevent accidental opening of a container such as by children. Various devices exist, as exemplified in U. S. Pat. Nos. 2,980,275; 3,019,931; 3,153,427; 1,918,786; 2,462,689; 2,045,388; 2,414,420; 1,747,205 and 2,827,193 which are intended to provide positive locking means for various types for closures. Various approaches are taken in these patents. In U. S. Pat. No. 2,980,275, for example, a locking ring is provided which includes teeth engageable with serrations on the closure or cap. When it is desired to remove the cap it is necessary to grasp the ring by an outwardly provided tab and pull the ring outwardly to distort its shape and thus disengage its teeth from the teeth or serrations on the cap.

Despite the various approaches noted above there is a need for a safety closure which might be used, for example on medicine bottles or other containers wherein the contents thereof are poisonous or otherwise dangerous. An ideal safety closure should be easily opened by authorized users while at the same time being extremely difficult to open by unauthorized users particularly children.

SUMMARY OF INVENTION

An object of this invention is to provide a safety closure which fulfills the above needs.

A further object of this invention is to provide a safety closure which incorporates a new and novel locking ring.

A still further object of this invention is to provide such a safety closure and locking ring which can be easily assembled on a container so as to lend itself to rapid manufacturing techniques.

In accordance with this invention a safety closure for containers includes a locking ring mounted to the neck of a container in such a manner as to prevent relative rotation therebetween. A tab is connected to and extends away from the body of the mounting ring and includes at least one locking tooth for engagement with locking elements on the closure. A cut away portion is provided between the tab and locking ring body to form a hinged connection for the tab so that the tooth may be moved up and down into and out of engagement with the closure locking elements.

In one form of the invention the tab may be part of an offset extension with the cut away portion being a pair of slits on opposite sides of the tab so that the tab may be connected to the extension at only one end thereof. In an alternative form the slits may be on adjacent sides of the tab. In a still further form of the invention the tab may be an integral offset extension of the ring body with the cut away portion being along one side of the tab.

THE DRAWINGS

FIG. 1 is a side view in elevation of a safety closure in accordance with this invention;
FIG. 2 is a top plan view of the safety closure shown in FIG. 1;
FIG. 3 is a front elevation view of the safety closure shown in FIGS. 1–2;
FIG. 4 is a top plan view partly broken away of the locking ring used in the safety closure of FIGS. 1–3;
FIG. 5 is a cross-sectional view taken through FIG. 2 along the line 5–5;
FIG. 6 is a bottom plan view of a cap or closure utilized in the embodiment of the invention shown in FIGS. 1–5;
FIG. 7 is a cross-sectional view in elevation taken through FIG. 6 along the line 7–7 with the locking ring and container indicated in phantom;
FIG. 8 is a top plan view of a locking ring in accordance with another embodiment of this invention with the container and closure shown in phantom;
FIGS. 9–11 are side, rear and front elevation views, respectively, of the locking ring shown in FIG. 8;
FIG. 12 is a bottom plan view of the locking ring shown in FIGS. 8–11;
FIG. 13 is a side elevation view similar to FIG. 9 with the closure and container shown in phantom;
FIG. 14 is a cross-sectional view in elevation taken through FIG. 8 along the line 14–14;
FIG. 15 is a side elevation view of still another embodiment of this invention;
FIG. 16 is a top plan view of the embodiment of the invention shown in FIG. 15;
FIG. 17 is a front elevation view partly broken away of the embodiment of the invention shown in FIGS. 15–16;
FIG. 18 is a top plan view of the locking ring shown in FIGS. 15–17;
FIG. 19 is a cross-sectional view in elevation taken through FIG. 16 along the line 19–19; and
FIG. 20 is a side elevation view partly broken away showing the unlocking procedure for the arrangement of FIGS. 16–19.

DETAILED DESCRIPTION

FIGS. 1–7 show one embodiment of this invention wherein the safety closure 10 includes a locking ring 12 for positively locking cap or closure member 14 to the neck 16 of bottle or container 18. As indicated therein locking ring 12 includes a body comprising an upper substantially annular rim 20 and a depending skirt 22 connected to the periphery of rim 20. The inner surface of skirt 22 is notched or serrated as indicated by the reference numeral 24 for engagement with teeth 26 on the neck 16 of bottle 18. Teeth 26 are, for example, integrally molded on the container 18 at diametrically spaced portions of neck 16 so that the ring 12 can be snapped into place prior to the filling of container 18. Since serrations 24 are provided around substantially the entire inner surface or annular portion of skirt 22 it is not critical to position the ring in any special orientation with respect to the container during assembly thereof as is necessary with various conventional arrangements. By the engagement of serrations 24 with teeth 26 ring 12 is thus mounted in place and held against relative rotation with respect to the container. Preferably ring 12 is made of material which is resilient enough to tightly snap over teeth 26 but stiff enough to resist any tendency to be dislodged therefrom. A suitable material for this purpose is a polycarbonate commercially available and Lexan (reg. T.M. of G.E. Co.).

The body of ring 12 includes an integral offset extension 28 which likewise includes the peripheral skirt 22. A tab 30 is hinged to extension 28 by a pair of slits 32 cut out away portions whereby the tab is secured to the extension 28 at only one end 34 thereof. At least one locking tooth 36 is provided at the edge of tab 30. As
shown in Figs. 3, 10 and 17 tooth 36 includes a substantially vertical edge 35 and an inclined edge 37. The cap or closure 14 is of generally cylindrical construction with a closed top wall 38 and with integral screw threads 40 or other means for securing the closure to the neck 16 of container 18. As shown in Fig. 5 if desired a liner 42 may be provided in the cap or closure 14 between upper wall 38 and the top wall of neck 16. As best shown in Fig. 7 the lower edge of cap 14 includes ratchet teeth 44 around the entire periphery thereof. Advantageously these ratchet teeth are provided at the inner surface of skirt or flange 46 so that the outer surface is smooth and continuous for purposes later described. Teeth 44 are constructed for engagement with tooth 36 by the inclusion of vertical faces 50 and sloping faces 48 so that during such engagement cap 14 can rotate in only one direction.

For use of the arrangement 10 cap 14 is screwed onto the neck 16 of container 18 with the ratchet teeth 44 eventually riding over locking tooth 36. During the later stages of rotating movement hinged tab 30 moves up and down as each ratchet tooth contacts locking tooth 36 until the top wall 38 rests snugly against the top of neck 16. Locking tooth 36 is then trapped between pairs of teeth 44. As illustrated in Figs. 7 and previously indicated ratchet teeth 44 are so designed that when locking teeth 36 is engaged therewith cap 14 can completely rotate in only one direction. Thus when locking tooth 36 is between adjacent teeth 44 the cap can rotate backwards only by a distance less than the spacing between a pair of adjacent teeth 44. Accordingly, the locking action is such that if there is a slight back up the container would still not leak. There is further assurance of preventing the container from leaking by, for example, the provision of sealing liner 42.

Tab 30 is also provided with an upward lug 52 for accommodating the finger of a user. In this respect when it is desired to remove cap 14 the user depresses the pressing downwardly against lug 52 which in turn causes locking tooth 36 to be moved below ratchet teeth 44 so that the cap can freely rotate in the reverse direction. The provision of skirt 46 acts to shield ratchet teeth 44 as well as locking tooth 36, thus providing an aesthetically more attractive safety closure as well as adding to its effectiveness. In this respect, for example, a child would be less likely to determine how the ring 12 and cap 14 are locked together when the engaged locking elements are not visible.

Figs. 8-14 show a further embodiment of this invention wherein the tab 54 has as its cut away portion a pair of slits 56, 58 on opposite sides of the tab so that the tab is hinged at one end 60 to offset extension 62. As with the previous embodiment tab 54 includes an upward lug 52 and locking tooth 36 for engagement with cap 14 shown in phantom in Fig. 13.

In accordance with a further aspect of this invention means are provided to assure the user that there has been no tampering with the container such as by removing a portion of the contents prior to sale. In this respect one or more strips 64 may be integrally molded across the cut away portion of sufficiently flexibility to permit the hinged tab to move up and down during assemblage of the cap whereby the strips will not rupture during assembly. In order to remove the cap, however, when a user would completely depress the tab the strips 64 would become ruptured thus indicating that an attempt has been made to remove the cap. Accordingly, as long as the strip is intact the user has some assurance that there has been no tampering with the container. It is to be understood that although the strips are illustrated only in the embodiment of Figs. 8-14 the provision of the strips is also possible in other embodiments by disposing the strips across the slits.

Figs. 15-20 show still a further embodiment of this invention wherein the locking ring 65 is generally disc shaped including an annular body 66 with a depending peripheral skirt 67 having an offset extension 68 which is radially displaced from the skirt with a locking tooth 70 thereon. In this embodiment the cut away portion is a slit 72 along one side of the tab so that the extension or tab itself is hinged to the body at one end 74.

As illustrated in Fig. 20 with the embodiment shown in Figs. 15-20 a user simply depresses the tab itself to disengage tooth 70 from the serrations in cap 14 while simultaneously turning the cap in the same manner as with the previous embodiments. Locking ring 65 may be secured to container 18 in any suitable manner. For example as illustrated in Figs. 15-20 the inner surface of body 66 include serrations 76 which extend completely therearound for mating engagement with teeth 26 on container 18.

To provide further assurance against accidental opening a stationary or rigid lug or other stop means may be provided adjacent offset extension 68 whereby it would be necessary for the user to precisely position his finger on the tab or extension to disengage the locking tooth 70. Thus if a child were to press downwardly in the general area of the tab the rigid lug would prevent the tab from moving downwardly a sufficient amount for disengagement. In this respect ring 65 would operate in a manner analogous to the previous embodiments where the stop means are provided on the offset extension itself around the hinged tab. If desired the stop means for tab 68 may be integral with the container or may be thickened or rigid extensions of ring 65.

It is to be understood that other means of securement may be used for locking ring 65 as well as for locking rings 10. Thus, for example, the container may have a undercut molded thereon and the locking ring may snap over the undercut. Similarly, particularly where plastic containers are used the locking rings may incorporate teeth which bite into the container. Additionally, the ring may be provided with teeth which mate the gaps provided on the container or vice versa, or various camming surfaces may be provided between the ring and container. If desired it is also possible to utilize the concepts of this invention by making the locking means integral with the container to assure retention of the hinged tab to the container.

As previously indicated the locking ring is preferably made from a hard stiff material. In this respect it is desirable that the locking tooth be made of a material which is strong enough to withstand repeated use particularly without rounding off the corners of the tooth. It is possible, however, to utilize the concepts of this invention with materials that range from the very pliant to the very hard, although varying degrees of effectiveness would thereby be attained.

What is claimed is:

1. A locking ring for container closures comprising a body for fitting on the neck of a container, mounting means on said body for preventing relative rotation between said body and the container, a tab connected to
and extending away from body, at least one locking tooth on said tab for engagement with locking elements on the closure, and a cut away portion between adjacent portions of said tab and said body to comprise a hinged connection of said tab to said body whereby said tooth may be moved up and down into and out of engagement with the locking elements on the closures, said body including a rim portion, said rim portion being made of a stiff non-pliable material which is maintained stationary when affixed to the neck of the container, said rim being less than a full circle having spaced ends disposed near each other, said tab being integral and co-planar with said rim, and said tab being disposed between said open ends of said rim and said tab whereby said rim and tab together extend substantially 360° around the container neck.

2. A locking ring as set forth in claim 1 wherein a depending skirt is connected at the periphery of said rim, a plurality of serrations on the inner surface of said skirt, and said serrations comprising said mounting means.

3. A locking ring as set forth in claim 2 wherein said tab includes an upstanding lug for accommodating the finger of a user.

4. A locking ring as set forth in claim 2 wherein said tab is disposed within an integral offset extension of said rim.

5. A locking ring for container closures comprising a body for fitting on the neck of a container, mounting means on said body for preventing relative rotation between said body and the container, a tab connected to and extending away from body, at least one locking tooth on said tab for engagement with locking elements on the closure, a cut away portion between adjacent portions of said tab and said body to comprise a hinged connection of said tab to said body whereby said tooth may be moved up and down into and out of engagement with the locking elements on the closures, said body including a substantially annular rim, a depending skirt connected at the periphery of said rim, a plurality of serrations on the inner surface of said skirt, said serrations comprising said mounting means, said tab being disposed within an integral offset extension of said rim, said cut away portion including a pair of slits on opposite sides of said tab, and said tab being connected to said offset extension at only one end of said tab.

6. A locking ring for container closures comprising a body for fitting on the neck of a container, mounting means on said body for preventing relative rotation between said body and the container, a tab connected to and extending away from body, at least one locking tooth on said tab for engagement with locking elements on the closure, a cut away portion between adjacent portions of said tab and said body to comprise a hinged connection of said tab to said body whereby said tooth may be moved up and down into and out of engagement with the locking elements on the closures, said body including a substantially annular rim, a depending skirt connected at the periphery of said rim, a plurality of serrations on the inner surface of said skirt, said serrations comprising said mounting means, said tab being disposed within an integral offset extension of said rim, said cut away portion including a pair of slits on adjacent sides of said tab, and said tab being connected to said offset at only one end of said tab.

7. A locking ring as set forth in claim 1 including at least one tamperproof strip connected across said cut away portion.

8. A locking ring for container closures comprising a body for fitting on the neck of a container, mounting means on said body for preventing relative rotation between said body and the container, a tab connected to and extending away from body, at least one locking tooth on said tab for engagement with locking elements on the closure, a cut away portion between adjacent portions of said tab and said body to comprise a hinged connection of said tab to said body whereby said tooth may be moved up and down into and out of engagement with the locking elements on the closures, said tab being an integral offset extension of said body terminating in a location radially outwardly displaced from said body, said cutaway portion being a slit along one side of said tab, and said tab being connected to said body at one end of said tab.

9. A locking ring as set forth in claim 2 wherein said serrations being around substantially the entire inner surface of said skirt.

10. A locking ring as set forth in claim 1 in combination therewith, a closure, said closure being of generally cylindrical shape with a top wall, the lower edge of said having ratchet teeth therearound to comprise said locking elements, and said serrations being on the inner surface of a closure skirt which shields said ratchet teeth and said locking tooth.

11. The combination of claim 10 wherein said closure skirt is of about the same diameter as said ring body, each of said ratchet teeth including an inclined edge and a substantially vertical edge, and said locking tooth having a corresponding inclined edge and a substantially vertical edge.

12. The combination of claim 11, in further combination therewith, a container having a neck, coupling means on said neck and said closure, a plurality of mounting teeth on said container, said ring body including a plurality of peripheral serrations engaged with said mounting teeth, and said peripheral serrations being said mounting means.

13. A locking ring as set forth in claim 1 including stop means adjacent said hinged tab.

14. A locking ring as set forth in claim 1 in combination therewith, a container having a neck, and said body of said ring being integral with said container neck to comprise said mounting means therefor.

15. In combination therewith, a container having a neck from which the contents of the container may be discharged, a closure for said container neck, said closure having a downwardly extending rim for engaging said container, first ratchet-pawl means fixedly mounted on said container, second ratchet-pawl means mounted on said rim of said closure for locking engagement with said first ratchet-pawl means, tab means on one of said container and said closure, one of said ratchet-pawl means being incorporated on said tab means, a hinged connection between said tab means and said one of said container and said closure for permitting said tab means to rotate in a generally vertical direction to control the engagement and disengagement of said first and said second ratchet-pawl means, said tab means being exposed to permit ready manipulation of said hinged connection by means of an engageable threaded means being on said neck and said closure, upstanding finger accommodating means on said tab means, said finger accommodating means including a concave generally vertical surface disposed laterally beyond said rim of said closure, and said closure and tab means being made of a plastic material.
UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,744,655 Dated July 10, 1973

Inventor(s) Frank Mixdorff, Jr.

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 5, lines 14-15, delete "and said tab"

Column 6, line 26, before "having" insert --- closure ---

Column 6, line 27, delete "serrations" and insert --- ratchet teeth ---

Signed and sealed this 16th day of July 1974.

(SEAL)

Attest:

McCoy M. Gibson, Jr. C. Marshall Dann
Attesting Officer Commissioner of Patents