A pilferproof closure for bottles in the form of a thin metal cap with an upper threaded portion engaging the threads of the neck of the bottle and a lower safety ring which engages a counterholding ring provided on the bottle, the lower safety ring connected to the upper threaded portion by bridges separated from one another by peripheral slots and with vertical weakening notches uniformly spaced around the periphery of the lower safety ring. The peripheral slots comprise long and short slots in alternating sequence with the weakening notches being located below the short slots.

5 Claims, 3 Drawing Figures
PILFERPROOF CLOSURE WITH VERTICAL WEAKENING LINES

BACKGROUND OF THE INVENTION

The present invention relates to improvements in pilferproof closures for containers and in particular bottles having an externally threaded neck. More specifically, the invention relates to a closure that is applied to a container having an externally threaded neck preferably by a rolling process. The closure is formed from a thin ductile metal blank into the form of a cap having an upper or top panel and a depending cylindrical skirt. The depending skirt includes an upper main body portion and a lower locking band or safety ring portion engaging a counterholding ring provided on the bottle. The two portions of the depending skirt are divided by a series of peripheral slots and are connected to each other by bridges separated from one another by such slots.

The closure of the present invention is preferably applied to the neck of the container by application of a pressure block to the top portion of the closure while at the same time a thread roller deforms the upper portion of the depending cylindrical skirt into conformity to the threads of the container neck. The lower edge portion of the locking band or safety ring is turned under a rib, shoulder or counterholding ring on the container neck by means of a roller, preferably acting simultaneously with the thread rolling operation. This band when so applied acts to retain the liner compression and sealing efficiency of the closure.

In the prior art closures of this type, for example, the closure shown in Osborne and Stassen U.S. Pat. No. 3,303,955, if sufficient torque in the opening direction is exerted on the cap, the connecting bridges between the upper and lower portions will break, leaving the safety ring on the bottle neck below the counterholding ring after removal of the threaded cap. The broken bridges indicate to the consumer that the bottle has been opened or that the seal has been broken.

Closures of this type have enjoyed commercial success particularly when used with the "throw-away" or "no-return" type of containers. However, whenever the closures are employed with returnable and refillable containers or bottles, this locking band has been a source of annoyance and inconvenience in that the bands must be first removed from the containers before the containers can be reused. The removal of the bands has been a costly and tedious operation requiring additional labor and time consumption.

Kutcher U.S. Pat. No. 3,601,273 issued Aug. 24, 1971 discloses a screw closure which has distributed around the periphery of its safety ring, notches defining predetermined breaking points positioned transversely with respect to the peripheral direction. Thus, the safety ring is divided into individual segments. The slots in the row of slots are equally long, but there are differences in the width of the connecting bridges. The predetermined breaking points are not oriented in a specific sequence relative to the peripheral slots. Hence, above each segment there are a plurality of unequally distributed bridges of varying width.

When this screw closure is unscrewed, the predetermined breaking points will break and tear the safety ring into individual segments. Upon continued unscrewing and upward movement some of the narrower bridges beside the wider bridges will tear. Depending on where the wider bridges are positioned in this unoriented arrangement, segments will remain connected to the upper portion of the closure in their central regions and with the left or right hand edge flared outwardly. The wide bridges form a sort of asymmetrical torsional suspension for the segments whose ends flare outward and away from the counterholding ring of the bottle as the closure is unscrewed. The free segment end which is farthest away from the wide bridges may be rather significantly flared out.

The Kutcher closure ensures that the safety ring is removed from the bottle together with the closure. However, in practice it has become evident that the outwardly flaring segment edges, which form cutting edges particularly at the upper rims which were broken from the outer bridges, may cause injuries. This hazard is increased by the fact that peripheral forces are set free when the safety ring is broken up and the outer bridges are broken off which cause the segments to snap radially outwardly. Since in the wider end regions of the segments there is no longer any connection to the upper portion of the closure, the segments will also snap into a slightly extended position at the moment they break. At this moment the unscrewing is not yet terminated so that the hand is in the vicinity of sharp edges and points which may cause harm for example if the closure is slightly jammed and the hand slips off.

SUMMARY OF THE INVENTION

Accordingly, it is an object of this invention to provide an improved closure of the pilferproof type. It is a further object of this invention to provide a closure of the pilferproof type which will be completely removable from the container neck, such removal including the locking band, and which closure may be reapplied to the bottle for effective reclosure purposes. It is a still further object of this invention to provide a pilferproof closure which possesses all of the advantages of the aforementioned Kutcher patent and minimizes the danger to the consumer from the outwardly flaring sharp segment edges.

A more specific object of the invention is to provide a closure of the pilferproof type with a series of peripheral slots separating the upper portion of the closure from the locking band, such peripheral slots comprising long and short slots alternating in regular sequence having below each short slot a vertical weakening line positioned so that upon rotation of the closure for removal from the container the weakening lines in the locking band will rupture, thereby dividing the locking band into sectors that will be cammed into slightly outwardly flaring sectors bending on the line of the bridges.

In accordance with the present invention there is provided a screw closure of the pilferproof type for containers having a threaded neck and a counterholding ring, said closure being of the type having a shell formed of a thin ductile material providing a top portion and a depending cylindrical skirt, said skirt being formed of an upper threaded portion for engaging the threaded neck of the container and a lower safety ring portion which engages the counterholding ring of the container, the lower safety ring portion being connected to the upper threaded portion by a series of bridges separated from one another by a series of peripheral slots, such peripheral slots comprising alternating long and short slots, and lower safety ring including...
below the short slots and positioned uniformly about the periphery of the safety ring, vertical weakening notches.

When the screw closure of the invention is unscrewed the weakening notches will tear so that individual ring segments are freed. Each segment end is connected to the upper cap portion over one bridge and each bridge is symmetrically positioned relative to the predetermined breaking notch. As the closure is further unscrewed, the segments will turn about the external bridge hinges so that the segment symmetry is virtually undisturbed. The relatively short segment ends positioned beside the bridges are slightly shifted downwardly and outwardly while the upper edges are screened inwardly behind the adjacent cap ring. The segments do not flare outwardly, as in prior art devices since the migration path is substantially the same for all segment ends. The segment ends disposed vertically with respect to the peripheral direction are not mutually offset. The upper segment edges disposed between the bridges and formed by the respective elongated slots migrate into the protective inner space of the cap ring so that the possibility of contacting the hand of the person opening the container is significantly reduced and this significantly reduces the chance of injuries.

**BRIEF DESCRIPTION OF THE DRAWINGS**

The above-mentioned features and objects as well as other features and advantages of this invention will be more clearly understood by reference to the following detailed description read in conjunction with the accompanying drawings, wherein:

FIG. 1 is an elevational view of a closure according to the present invention applied to a container in the form of a bottle;

FIG. 2 is an enlarged drawing of the safety ring of FIG. 1; and

FIG. 3 is a view of the closure of FIG. 1 after it has been removed from the container illustrating the uniformly flared sections of the locking band.

**DETAILED DESCRIPTION OF THE INVENTION**

In the preferred embodiment of the invention the screw closure 3 consists of a knurled rim 2, an upper threaded portion 3 for engaging the threaded portion of the container, cap ring 4 which in this embodiment bulges away from the outer bottle wall to form an interior annular cavity and lower safety ring or sealing ring 5 which is rolled into engagement with a counterholding ring (not shown) on the bottle neck 9. Between the cap ring 4 and the lower safety ring or sealing ring 5 is a series of long slots 6 and short slots 11 alternating in regular sequence around the periphery of the closure. Formed between the slots 6 and 11 there are bridges 7 which secure the sealing ring 5 to the upper cap portion 3 and the cap ring 4.

As may best be seen from FIG. 2, weakening notches 10 are provided below each short slot 11 in its center and are oriented perpendicularly to the peripheral direction of the slots. This ensures an equal space between the bridges 7 and the respective notch 10. In this embodiment the predetermined breaking notches 10 divide the safety ring 5 into five individual ring segments 8 in the illustrated example. The line of the vertical predetermined breaking notches 10 is discontinued in the vicinity of the lower rim of the ring or the lower edge of the segments 8. This provides bridges 12 which prevent unintentional flaring of the safety ring 5, and thus interlocking of the closures in the magazine.

The weakening notches 10 can extend up to the short slots 11; however, it is sufficient to let them end in the vicinity of slots 11. Likewise, the bridge 12 may be placed at the lower edge of the segments 8 so that the line of the weakening notches 10 commences shortly above the segment edge and ends shortly below the respective short slot.

Rolling of the segments 8 below the counterholding ring of the bottle renders the segments 8 relatively stiff so that they hardly undergo a change in cross section as the closure 1 is unscrewed. From FIG. 3 it may be seen that the safety ring 5 has broken up into the individual segments 8 after unscrewing. However, after having been turned outwardly, said segments 8 are secured by bridges 7 to the cap ring 4. In turned-out position of the segments 8 of the safety ring 5 the segment ends are shifted downwardly and outwardly, while the upper segment edge is turned into the free space of the cap ring 4. To facilitate the turning motion in the bridges 7 by higher elasticity, the bridges 7 may slightly bulge outwardly.

While the present invention has been explained and described with reference to specific embodiments of structure, it will be understood that numerous modifications and variations may be made. Included in such modifications could be means alternative to threads on the container and closure, such as cam surfaces, angled lugs, or the like, which upon rotation of the closure would impart vertical translation of the closure on the container to remove the closure therefrom. Accordingly, it is not intended that this invention be limited except as indicated in the appended claims.

1. A screw closure of the pilferproof type for containers having a threaded neck and a counterholding ring, said closure being of the type having a shell formed of a thin ductile material providing a top portion and a depending cylindrical skirt, said skirt being formed of an upper threaded portion for engaging the threaded neck of the container and a lower safety ring portion which engages the counterholding ring of the container, the lower safety ring portion being connected to the upper threaded portion by a series of bridges separated from one another by a series of peripheral slots, such peripheral slots comprising alternating long and short slots, the lower safety ring including below the short slots and in vertical alignment therewith and positioned uniformly about the periphery of the safety ring, vertical weakening notches.

2. The screw closure of claim 1 wherein the vertical weakening notches are discontinued adjacent the lower edge of the safety ring.

3. The screw closure of claim 1 wherein the weakening notches are discontinued intermittently the space between the lower edge of the safety ring and the alternating slots.

4. The screw closure of claim 1 wherein there are provided five vertical weakening notches.

5. The screw closure of claim 1 wherein the bridges between the alternating long and short slots bulge slightly outwardly.

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