CONTAINER CLOSURE HAVING FRANGIBLE SKIRT

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ABSTRACT

A pilferproof closure of the type having a security band attached to the skirt of the closure by a series of spaced bridges in a peripheral slit line characterised in that the security band is split vertically at at least two positions, the portion of the security band between two adjacent vertical splits being joined to the skirt by at least one relatively strong bridge arranged at or near the middle of such portion, a relatively weak bridge in close proximity to the vertical split at each end of said portion and spaced from the strong bridge.

9 Claims, 4 Drawing Figures
CONTAINER CLOSURE HAVING FRANGIBLE SKIRT

The present invention relates to closures of the pilfer-proof type which have a thin aluminium shell and to the manufacture of such closures. Pilfer-proof closures, comprising a top and a skirt, to which a security band is attached by means of a series of spaced bridges arranged in a peripheral slit line, have long been known. The lower margin of the security band is, during the application of the closure to a bottle, engaged under a rib on the bottle neck by a rolling operation, usually performed simultaneously with the formation of thread in the skirt by a rolling operation. Although it is known to pre-thread closures of the pilferproof type it is usual to thread the skirt of the closure by the aforementioned thread rolling operation whilst the shell is in position over the mouth of the bottle or other externally threaded container. During the thread rolling operation the top of the closure is subjected to substantial downward pressure to bed down the gasket against the top surface of the bottle around its mouth. When the closure is required to maintain pressure within the bottle, it is preferred to redraw a short length of the top end of the skirt so as to form a portion of reduced diameter and to compress an annular portion at the edge of the gasket between the reduced diameter portion of the shell and a cylindrical sealing surface above the thread on the container neck, as described in our British Pat. No. 975,739. It is, therefore, the preferred practice to form a thickened portion of the gasket at the angle between the top and the start of the closure shell, although a flat thermoplastic disc may be employed. A thickened portion may be achieved by flowing in a viscous gasket composition into the shell and rotating the shell. Alternatively an inserted thermoplastic disc or deposit of gasket composition may be reformed by a punch.

With the original form of pilferproof closure, as described in our British Pat. No. 369,494, the security band remained in position on the container neck when the closure was unscrewed to break the bridges which connect the threaded skirt to the security band. When pilferproof type closures were applied to reusable bottles for carbonated beverages, the presence of the severed security bands on the bottle necks was very objectionable because of the high cost of removing them before the bottles could be reused.

The original pilferproof closures were employed as a visible guarantee that the contents of the bottle had not been tampered with; for example to guarantee that the contents of a bottle of spirits had not been partially abstracted and replaced by water. Where a pilferproof closure is used on carbonated beverages it is employed principally as a lock to prevent accidental loosening of the closure and consequent loss of carbonation, particularly during the processing, such as pasteurisation, which takes place before despatch from the bottling plant. Particularly when the gasket material is in a softened condition as a result of being heated during a pasteurisation treatment, the opening torque required to open a newly-filled bottle is relatively low.

For the purpose of carbonated beverages it is more important that the security band shall act as a lock to prevent accidental loss of carbonation pressure than it should act as a guarantee that the contents have not been adulterated after despatch from the bottling plant.

Since this is the position, attention can now be paid to ease of removal of the security band from the bottle at the possible expense of the absolute security of the contents against deliberate tampering.

Various forms of pilferproof closure have already been proposed in which the security band is vertically split, with the intention that it shall separate automatically from the bottle on unscrewing of the closure. Such closures have relied on the security band remaining attached to the threaded part of the closure by one or more bridges, whilst the remainder of the bridges break. In such pilferproof closures there is no appreciable bending of the unbroken bridge or bridges.

The present invention is concerned with a pilferproof closure in which the security band is split vertically at two or more positions and is arranged so that, on unscrewing, the portion of the security band, between two splits, hinges outwardly, whilst remaining secured to the threaded portion of the skirt by one or more unsevered bridges. This arrangement relies on the camming action of the rib on the bottle, under which the lower margin of the security band is engaged.

It has already been proposed to make pilferproof closures in this way. In several instances it has been proposed that the split or splits in the security band shall not extend through the metal of the security band and shall, in fact, be a score line. Owing to the difficulty of forming score lines to a constant depth, the opening torque necessary to burst the security band along one of the score lines tends to be rather variable. However, unless the splits have been formed as score lines (and thus are not true splits) difficulty has been experienced in applying a pilferproof closure of this type to a bottle without causing some gaping of the security band at one or more of the splits.

It is an object of the present invention to overcome this difficulty and to provide a pilferproof closure in which the torque required to burst open the security band from the rib or band on the bottle is reasonably constant and which is easy to apply to a bottle without causing objectionable gaping at the vertical splits.

According to the present invention a pilferproof closure is characterised by a security band, which is split vertically at least two positions, the portion of the security band between two adjacent vertical splits being joined to the skirt by at least one relatively strong bridge or a pair of relatively strong bridges spaced from each other, arranged at or near the middle of such portion, a relatively weak bridge in close proximity to the vertical split at each end of said portion and spaced from the strong bridge or bridges. These relatively weak bridges support the ends of the security band portions and prevent drag down of the ends of such portions through the action of the application rolls, when the security band is engaged under the rib on the bottle. This permits a fully split security band to be turned under the bottle rib without substantial risk of unsightly gaping at the splits.

Although the splits in the security band are preferably perpendicular to the peripheral split line, they may be somewhat inclined, say at 70° or more. Whilst the splits are cut right through the metal of the security band, each split preferably includes a small bridge near the lower end. In order to ensure that this small bridge is of substantially constant size (and strength) it is preferably located at a small distance inwardly from the bottom end of the split. The purpose of this small
bridge is to prevent deformation of the security band before application to a bottle under the light forces to which it may be subjected in, for example, the hopper of a closure seal-applying machine.

When there are two strong bridges supporting a portion of the security band, these are arranged symmetrically in relation to the mid-point of such portion.

When there are two splits in the security band of a closure of the present invention, it is preferred to employ a pair of strong bridges with an additional relatively weak bridge between them. When there are more splits (and in consequence the strong bridges of each pair are closer to one another) such intermediate weak bridges are preferably omitted. The pair of spaced strong bridges may be replaced by a single strong bridge.

In a preferred method of producing pilferproof closures in accordance with the present invention all slits, knurling, ribs and grooves in the shell are formed by rolling a deep drawn shell between an internal mandrel and an external drum of larger diameter, on which are located all the necessary formations for the operations to be performed on the shell. Any operation, such as knurling or formation of ribs or grooves in proximity to the peripheral slit line, must be performed before the peripheral slit line is cut: after the slit line is cut there is risk of damage to the bridges and the cutting of the slit line is therefore preferably the last operation in this sequence. It is common practice to form a rib or bead near the top edge of the security band to protect these bridges. According to a further feature of this invention such bead is interrupted at positions corresponding to the vertical slits. This permits these slits to be formed by straight-edged cutters and thus simplifies the tooling used for the production of the closures.

One form of closure made in accordance with the present invention is illustrated in the accompanying drawings, wherein:

FIG. 1 is a side view of the closure, partly in section,
FIG. 2 is a section on the peripheral slit line,
FIG. 3 is a side view partly in section illustrating the application of a closure to a bottle, and
FIG. 4 is a section on the peripheral slit line of a modified form of closure.

The closure comprises a top 1, a skirt 2 and a security band 3. A gasket 4 is formed of flowed-in material, covering the inside of the top and forming a thickened annulus 5 at the angle between the skirt 2 and top 1.

The skirt 2 has a plain portion 6, in which thread is formed when the closure is applied to a bottle. Above the portion 6 is an inwardly directed groove 7, which forms a support at the bottom edge of a band 8 of outwardly pressed knurling. The knurling 8 is formed by knurling projections on the internal rolling mandrel, which press metal outwardly into corresponding recesses in the drum in the roll-forming operation described above. A small plain portion 9 is provided above the knurling 8 to permit redrawing and diameter reduction during application to a bottle, as previously mentioned and as illustrated in FIG. 3.

Below the plain portion 6 the skirt 2 is provided with a bead 10, which is formed with knurling 11 having the same pitch as the knurling 8. At the top edge of the security band a bead 12 is provided. This bead is in fact in the form of a plurality of elongated knurled teeth 14, separated by flats 15. The number of teeth 14 bears a whole number relationship to the number of teeth in the bands 8 and 11. The number of flats 15 in turn bears a whole number relationship to the number of vertical slits 16 in the security band: in this instance there are three slits 16, twelve flats 15 and 48 teeth in the bands of knurling 8 and 11. Each slit 16 is in register with a flat 15 and is provided with a small bridge 17 near its bottom end. The bridge 17 is smaller than any of the bridges in the peripheral slit line and is frequently fractured during application of the closure to a bottle. The flats 15 may, however, be omitted.

As may be seen from FIG. 2, the security band 3 is formed as virtually three separate sections 18, separated from each other by the slits 16. Each section 18 is joined to the skirt 2 by a pair of strong bridges 19, whilst a pair of relatively weak bridges 20 are positioned close to the upper end of the slits 16. Whilst adjacent bridges 20 are shown as separated from each other by a short horizontal slit 21, it is possible for the weak bridges 20 to be separated from each other by no more than the vertical slit 16. However the illustrated construction is preferred since it is easier in that way to control the width of the individual weak bridges. When the illustrated closure is applied to a bottle, the bottom margin of the security band is engaged under a rib on the bottle and the portion 6 is brought into threaded engagement with the bottle thread in the conventional way. When the closure is unscrewed the camming action of the bottle rib tends to bend the security band outwardly at the same time as the bridges 19 and 20 are subjected to shear and tension. It is found that during unscrewing some or all of the relatively weak bridges 20 are broken and that the sections 18 hinge about the strong bridges 19. The ends of sections 18 move away from each other at the slit lines 17, thus both indicating that the closure has been unscrewed and allowing the security band 3 to be removed from the bottle with the thread cap, formed by top 1 and skirt 2.

In the modified construction illustrated in FIG. 4, the shell is the same as in FIGS. 1 and 2, except for the differences indicated below. In place of three vertical slits 16, the security band is divided into six portions by six vertical slits 16. The pairs of bridges 19 are replaced by a single strong bridge 19' at the middle of each security band portion. Thus each security band portion is bounded by a pair of vertical slits 16 and is connected to the threaded upper part by a single strong bridge 19' and by a pair of weak bridges 20, one at each end of the portion.

Other arrangements of slits in the security band may be provided without departing from the present invention, but the number of slits 16, the number of flats 15 and the number of teeth in the knurling 8 and 11 preferably always bear a whole number relationship to each other. For example, there might be five slits 16, 10 flats 15 and 50 teeth in each of the bands of knurling 8 and 11.

I claim:
1. A pilferproof closure of the type having a security band attached to the skirt of the closure by a series of spaced bridges in a peripheral slit line, the security band being split vertically at least two positions, the portion of the security band between two splits being arranged to hinge outwardly during removal of the closure while remaining secured to the skirt by one or more unsevered bridges, characterized in that the portion of the security band between two adjacent vertical
splits is joined to the skirt by at least one relatively strong bridge arranged at or near the middle of such portion, a relatively weak bridge in close proximity to the vertical split at each end of said portion and spaced from the strong bridge.

2. A pilferproof closure according to claim 1 further characterised in that there are a pair of strong bridges located substantially symmetrically in relation to the middle of each portion of the security band.

3. A pilferproof closure according to claim 2 further characterised in that a weak bridge is arranged between the pair of strong bridges.

4. A pilferproof closure according to claim 1 further characterized in that the splits are cut completely through the security band except for a bridge near, but spaced from, the lower end of the split, and smaller than the bridges joining the security band to the skirt of the closure.

5. A pilferproof closure of the type having a security band attached to the skirt of the closure by a series of spaced bridges in a peripheral slit line, the security band being split vertically in at least two positions, the portion of the security band between two splits being arranged to hinge outwardly during removal of the closure while remaining secured to the skirt by one or more unsevered bridges, characterized in that the portion of the security band between two adjacent vertical splits is joined to the skirt by at least one relatively strong bridge arranged at or near the middle of such portion, a relatively weak bridge in close proximity to the vertical split at each edge of said portion and spaced from the strong bridge, and a bead formed near the upper margin of the security band, the said bead being flattened in register with each vertical slit, whereby the vertical slits may be easily formed after formation of the bead.

6. A pilferproof closure according to claim 5 further characterised by a first band of knurling at a position close to the upper margin of the skirt, a second band of knurling at a position immediately above said peripheral slit line and a series of flats in said bead in said security band, the number of teeth in said bands of knurling and the number of flats formed in said bead bearing a whole number relationship with each other.

7. A pilferproof closure according to claim 5 further characterized in that there are a pair of strong bridges located substantially symmetrically in relation to the middle of each portion of the security band.

8. A pilferproof closure according to claim 7 further characterized in that a weak bridge is arranged between the pair of strong bridges.

9. A pilferproof closure according to claim 5 further characterized in that the splits are cut completely through the security band except for a bridge near, but spaced from, the lower end of the split, and smaller than the bridges joining the security band to the skirt of the closure.

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