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71 Applicant: **Johnsen & Jorgensen Plastics Limited**
Grinstead House Grinstead Road
London SE8 5AB(GB)

72 Inventor: **Ward, Patrick Nigel Eugene**
26, Holmleigh Avenue
Dartford, DA1 5AS(GB)
Inventor: **Butler, Martin Richard**
21 Dalewood Road
Orpington Kent BR6 0BY(GB)

74 Representative: **Wilson, Joseph Martin et al**
WITHERS & ROGERS 4 Dyer's Buildings
Holborn
London EC1N 2JT(GB)

54 Improvements in and relating to tamper-resistant closures.

57 A closure with a cap part (1) with a top (2) and a depending skirt (3) and a tamper-resistant safety band (5) connected to the skirt (3) by frangible means (4) wherein the tamper-resistant band (5) is provided with a number of openings (10) into which inwardly and upwardly inclined resilient lugs (12) formed on the band (5) project in such a way that when the closure is first applied to the neck of a standard container body the lugs (12) are deflected so as to pass over the neck ring (11) on the body and then, due to their resilience, the lugs (12) snap back inwardly to their original position so that the upper end or the top of each lug (12) is disposed below the lower surface of the neck ring (11).

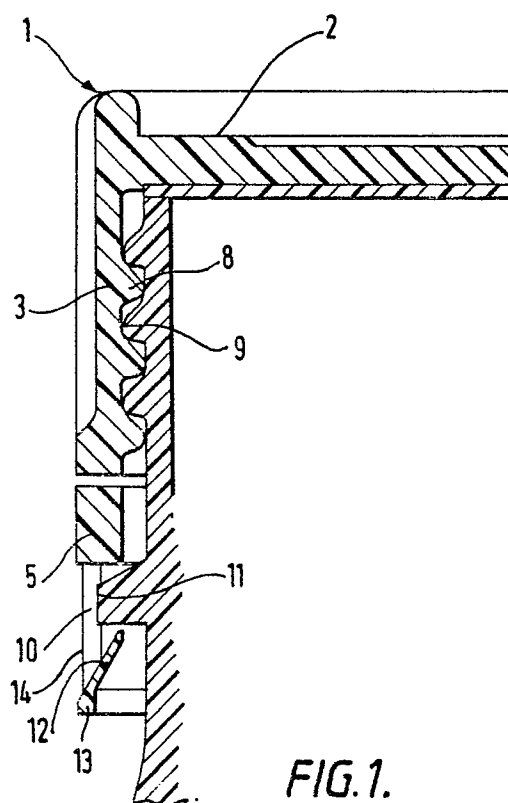


FIG.1.

EP 0 355 949 A1

IMPROVEMENTS IN AND RELATING TO TAMPER-RESISTANT CLOSURES

This invention is concerned with the provision of an improved tamper-resistant and tamper-evident container body and closure assembly. The invention also includes an improved closure for application to the neck of a container body.

A standard form of container body has a mouth at the top and an external annular bead around the neck of the body below the mouth and such container bodies are hereinafter referred to simply as standard container bodies and the external bead around the neck is hereinafter called a neck ring.

Manufacturers already have a very substantial investment in moulds and machines for making such standard container bodies which are made in millions in several sizes and a demand has grown up to provide an improved tamper-resistant capability for assemblies using such standard container bodies. In this connection it has already been proposed in our European Patent No.0080846 to provide a closure comprising a cap part and a tamper-resistant safety band connected to the cap part by frangible means and provided with an internal annular bead around the inside of the band so that the bead on the band snaps over the neck ring on the body when the closure is first applied to the body whereby the closure cannot be removed from the body to open the mouth until the band is torn away leaving the cap part free for removal. An arrangement as described above in general works very well but we have found that the moulding tolerances are sometimes unduly exacting in the sense that if either the bead on the band or the neck ring or both is/are oversize difficulty may be experienced in applying the closure to the body without breaking the frangible means.

In recent years more and more products have been offered for sale in tamper-resistant assemblies because of high product value or risk of adulteration and a demand has grown up for a simple, relatively inexpensive and effective closure for application to the neck of standard container bodies, whatever the product contained, so that the product can be offered for sale in tamper-resistant assemblies, using standard container bodies. In accordance with a feature of this invention we provide a closure comprising a cap part with a top and a depending skirt and a tamper-resistant safety band connected to the skirt by frangible means characterised in that the tamper-resistant band is provided with a plurality of windows hereinafter simply called openings into which inwardly and upwardly inclined resilient lugs formed on the band project in such a way that when the closure is first applied to the neck of a standard container body the lugs are deflected so as to pass over the neck

ring on the body and then, due to their resilience, the lugs snap back inwardly to their original position so that the upper end or the top of each lug is disposed below the lower surface of the neck ring.

It will be understood therefore that in our continuing quest to find tamper-resistant closures for application to standard container bodies with a neck ring below the thread, we have in accordance with this invention designed an improved closure that includes all the required features namely:

1. It has a smooth line exterior profile.

2. It is moulded using 'conventional' splits and thread forms that are 'bumped off' the core pins so special moulding techniques are not needed.

3. It can be screwed onto the container body or applied axially using conventional capping machines with no secondary operations or special purpose equipment.

4. It will fit the neck of a standard container body with no special features required on the neck ring.

5. The frangible nibs will not break during application of the closure but will break when the closure is first removed.

To achieve this we have produced for the first time a safety band which incorporates all the break nibs and driving ratchet/teeth/dog features on its upper part with a smooth interior while the locking lugs, which may be formed with the same pair of splits, are on a lower part. The locking lugs preferably consist of 2 or 3 pairs of lugs angled inwards and upwards from near the bottom edge of the break ring skirt and adapted to bend readily out of the way when passing the thread and/or neck ring of the container. However, once the lugs have clicked past the neck ring into the normal recess below the ring, the lugs will work like a spring and revert to their original horizontal top edge so that they become locked beneath the horizontal 'roof' above them formed by the neck ring and no amount of 'fiddling' will move all the lugs clear of the neck ring, and the ring must break off whilst unscrewing the closure. The precise shape of the lugs is not important and they may be produced using mould side wall openings and the shape of the opening is not important either. Suffice to say that the openings may be formed by 'conventional splits' in e.g. one, two or three opposing pairs. The lugs preferably have a 'radial' arrangement in plan view simply for ease of application to standard container bodies despite the fact that the lugs are preferably formed by plain opposing splits meeting an inner core pin at 180 to each other.

Preferably the lower horizontal edge of each

opening is slender, so that each lug can swivel readily about its pivot point. Otherwise, it will be appreciated that the lower edge of a lug may jam against the neck ring as the lug passes the ring whilst swivelling.

In order that the invention may be more clearly understood, reference is now directed by way of example to the accompanying drawings in which:

Figure 1 is a part section through a closure according to the invention and a standard container body forming an assembly according to the invention.

Figure 2 is a part side elevation, part longitudinal section of the closure.

Figure 3 is a part cross-section on A-A part plan of the closure.

Referring to the drawings it will be noted that the closure has a cap part 1 with a top 2 and a depending skirt 3, the lower edge of which is connected by frangible tongues 4 to the upper edge of a tamper-resistant band 5. Teeth 6 are provided on the lower edge of the skirt 3 for engagement with teeth 7 on the upper edge of the band 5 to push the band 5 round with the cap part 1 when the closure is being screwed on for the first time. The cap part 1 has an internal screw thread 8 for engagement with an external screw thread 9 on the neck of an associated container body.

The band 5 is provided with openings 10 in the lower part 14 of the band 5, see e.g. Figure 1.

An inwardly and upwardly inclined lug 12 is formed on the band 5 along the lower edge 13 of each opening 10 and each lug 12 may be shaped as shown to avoid sharp pointed corners that might hinder correct positioning of the lugs as the closure is being screwed on.

In operation the closure is initially screwed down on to a filled container body until the lugs 12 on the band 5 engage with the neck ring 11 on the container body. Further screwing on causes the resilient lugs 12 to be deflected from their inclined position into a substantially vertical position as they move past the neck ring 11. Finally as soon as the top of each lug 12 has moved past the bottom of the neck ring 11 each lug snaps back into its normal inclined position as shown in Figure 1, so that each lug 12 then projects into the associated opening 10 with the top of each lug 12 immediately below the neck ring 11. The closure is now in its tamper-resistant position because the closure cannot be removed from the container body without mutilation of the lugs and/or other parts of the closure. For example, an attempt to unscrew the closure from the body will cause the cap part 1 to rise but the band 5 cannot rise very far with the cap part 1 because the top of each of the lugs will abut against the underside of the neck ring 11 and this will lead to the breaking of the frangible

tongues 4.

It will be understood that a screw-on, screw-off cap has been described as an example. A push on, push off cap may also be provided in accordance with the invention in which case on removal of the closure, the band 5 would be separated from the cap part 1 by breaking of the frangible nibs which would make it immediately evident that tampering or opening had occurred.

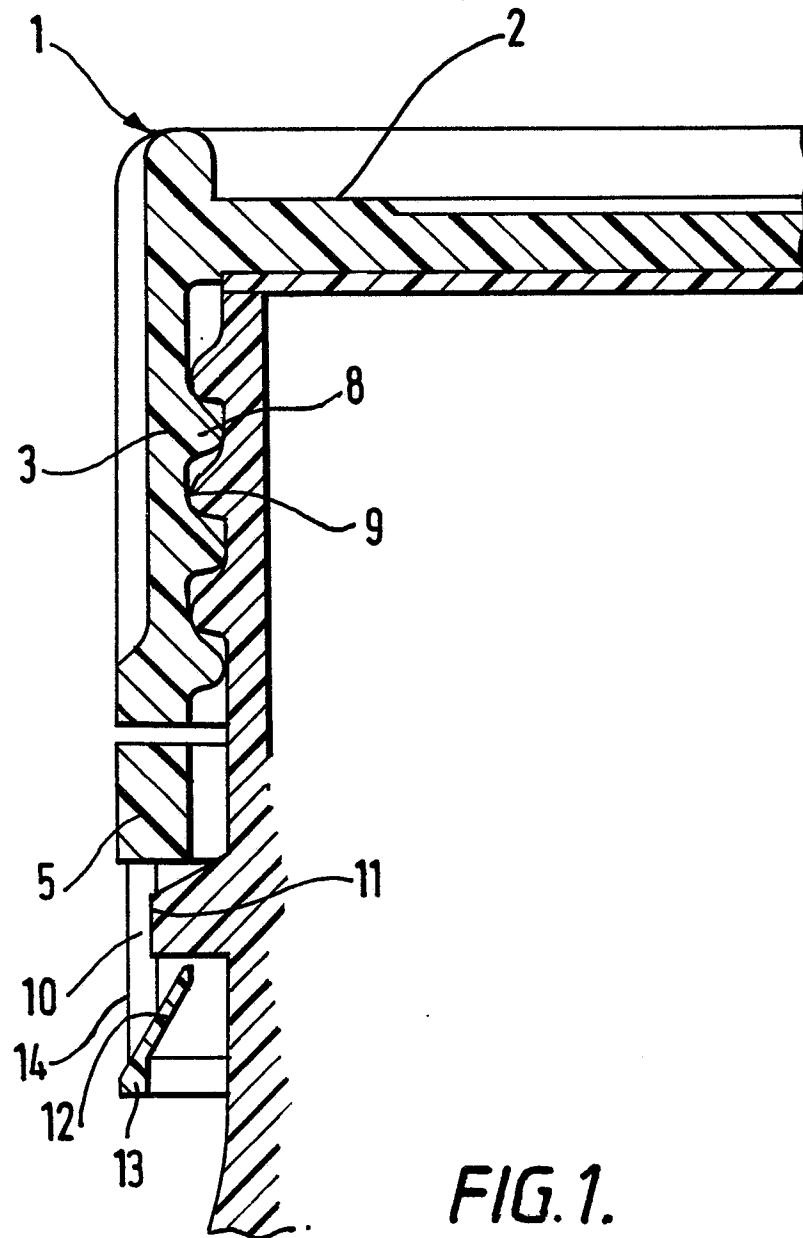
Claims

1. A closure comprising a cap part with a top and a depending skirt and a tamper-resistant safety band connected to the skirt by frangible means characterised in that the tamper-resistant band is provided with a plurality of openings into which inwardly and upwardly inclined resilient lugs formed on the band project in such a way that when the closure is first applied to the neck of a standard container body the lugs are deflected so as to pass over the neck ring on the body and then, due to their resilience, the lugs snap back inwardly to their original position so that the upper end or the top of each lug is disposed below the lower surface of the neck ring.

2. A closure for application to a standard container body with a projecting neck ring wherein the closure has a top, a depending skirt and a tamper-resistant safety band connected to the skirt by frangible means characterised in that the tamper-resistant band is provided with a plurality of openings arranged around the band and disposed in an upper part thereof and further characterised in that a lower part of the band is provided with a plurality of inwardly and upwardly inclined resilient lugs formed on the band in such away that when the closure is first applied to the neck of a standard container body the lugs are deflected so as to pass over the neck ring on the body and then, due to their resilience, the lugs snap back inwardly to their original position so that the upper end or the top of each lug is disposed below the lower surface of the neck ring.

3. A closure according to claim 1 or 2 wherein the lugs are shaped substantially as shown in Figure 1.

4. A container body and closure assembly comprising a closure as claimed in claim 1 or 2 and a standard container body.



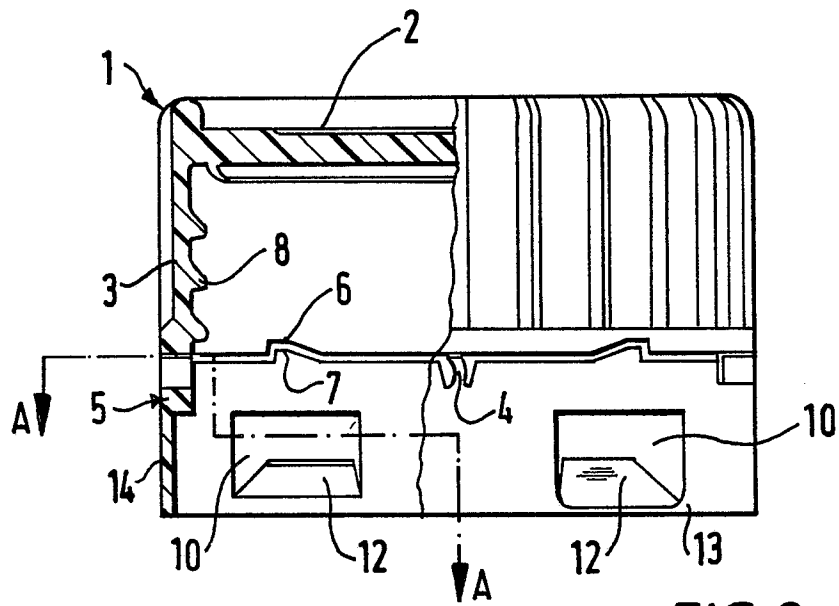


FIG. 2.

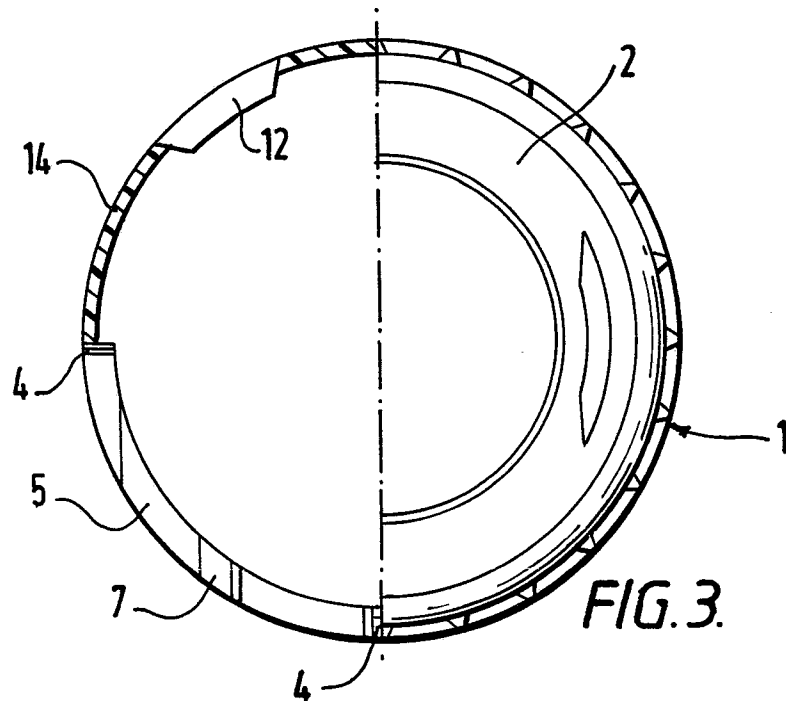


FIG. 3.



DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	FR-A-2 411 770 (METAL CLOSURES GROUP) * Page 8, line 33 - page 9, line 35; figures 1-6 * ---	1,2,4	B 65 D 41/34
X	US-A-4 153 174 (KEELER) * Column 2, lines 26-43; column 3, line 46 - column 4, line 23; column 6, line 49 - column 7, line 14; figures 1,2,9,10 * ---	1,2,4	
X	US-A-4 751 036 (BARRIAC) * Column 3, line 37 - column 4, line 54; column 5, lines 42-49; figures 1-15 * ---	1,2,4	
X	WO-A-8 300 674 (PEHT) * Page 5, line 16 - page 6, line 5; page 6, line 26 - page 7, line 8; figures 1-4 * ---	1,2,4	
X	WO-A-8 304 402 (CONTINENTAL WHITE CAP) * Page 4, line 25 - page 5, line 28; figures 1-6 * ---	1,2,4	TECHNICAL FIELDS SEARCHED (Int. Cl.5)
X	DE-A-3 202 226 (BAVNSFELT) * Page 7, line 14 - page 8, line 2; figures 2,3 * -----	1	B 65 D
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 03-11-1989	Examiner BERRINGTON N.M.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			