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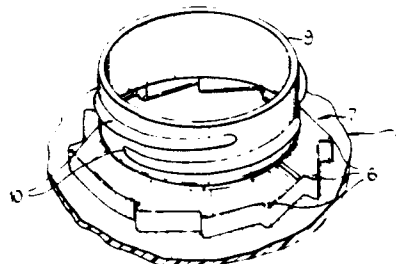
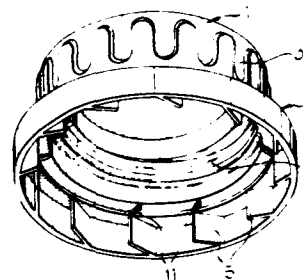
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54 **Pilferproof closure.**

57 A screw-on plastics closure for a container (8) has a cap (1) and a locking ring (4) for securing the closure to the container (8) in use to prevent unscrewing of the cap (1) from the container (8). The cap (1) is integrally connected to the locking ring (4) by means of a plurality of bridges (11) which extend from the adjacent part of the cap (1) to the ring (4) at an angle inclined in the direction of unscrewing of the cap (1).



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PLYSU LIMITED.

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PILFERPROOF CLOSURE.

The invention relates to so called "pilferproof" closures. Such closures are well known and are used extensively on containers for ensuring that when a purchaser buys a particular liquid

5. he can check that the container includes all the contents with which it was filled. Such pilferproof closures have been used on oil cans and on plastics containers containing a wide range of liquids.

10. The closures usually comprise a cap and, integrally joined to the cap by a plurality of bridges, a ring of larger diameter which is arranged to engage complementary abutments on the container in use, to prevent unscrewing of the cap from the container without breaking of the bridges. Breaking

15. of the bridges is arranged to require a predetermined torque so that accidental breaking is not normally possible. Thus, broken bridges on a closure on a container are an indication that the container has been tampered with.

20. Pilferproof closures are increasingly used on blow moulded plastics containers intended for containing a wide range of liquids including household and industrial detergents, oil and numerous other chemicals. The larger diameter ring on such closures

25. usually forms a ratchet engaging a number of abutments

on the container adjacent its spout and the bridges, which usually extend radially of the cap, are snapped-off in a circumferential direction when the cap is unscrewed. Unfortunately, with certain plastics materials, notably polypropylene, the initial slight elongation of the bridges as the cap is rotated relative to the ring, increases the strength of the bridges making it extremely difficult for a legitimate user of the liquid within the container to remove the cap initially.

Although the ring is normally provided radially externally of the cap, it may be possible for the ring to be positioned axially spaced from a closure formed as a screw-threaded plug.

According to the present invention a screw-on plastics closure for a container comprises a cap, and, integrally joined thereto adjacent an edge thereof by means of a plurality of bridges, a locking ring for securing to the container in use to prevent unscrewing of the cap from the container without breaking of the bridges, characterized in that the bridges extend from the adjacent part of the cap to the ring at an angle inclined in the direction of unscrewing of the cap.

This construction has been found, particularly with polypropylene, to provide a very clean snapping-off of the bridges, as they have to be bent, and therefore stressed, much more severely than in conventional plastics pilferproof closures. It is believed that the acute angles between the bridges and the cap and ring serve to increase the stress concentration within the plastics material to cause the bridges to snap rather than bend or elongate. The use of polypropylene plastics closures has significant advantages over other types of plastics closure, particularly those made of low

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density plastics materials, as polypropylene is not seriously affected by stress cracking agents such as detergents which, with low density plastics materials can deleteriously affect the functioning of the closure and thus cause leakage.

5. Additionally, we have found that it is advantageous to form the bridges with a depth which is greater than their width in order to increase the security of the bridges when they are subjected to loads in the axial direction of the cap, for example during transport when they may be stacked one on top of another.

10. One example of a closure constructed in accordance with the present invention will now be described briefly with reference to the accompanying drawings in which:-

15. Figure 1 is an exploded perspective view of the closure and complementary spout of a container; Figure 2 is a plan view of the spout; Figure 3 is a plan/underplan of the closure; and,

20. Figure 4 is a partly sectioned side elevation of the closure when positioned on the spout.

25. The closure is formed of polypropylene and comprises a cap 1, of approximately 38mm diameter, having an internal raised screw-thread 2 formed on the annular sidewall 3. Joined to the cap 1 by eight bridges 11 which extend outwardly, and inclined to respective radii in the direction of unscrewing (A) of the cap 1, is a ring 4 which

30. includes a number of inwardly projecting tangs 5 (in the present example 12 in number) extending inwardly inclined to respective radii of the ring in the direction of unscrewing of the closure.

35. The tangs 5 are moulded so as to have sufficient

resilience to enable them to ride over ratchet-like projections 6 formed on the spout 7 of the container 8 during screwing-on of the closure, but, when an attempt is made to remove the cap the tangs 5. are compressed substantially longitudinally by engagement against the projections 6 and prevent rotation of the ring in the unscrewing direction (A) (in this case anti-clockwise).

The spout 7 has an upstanding rim 9  
10. on the exterior of which are formed a number of part helical screw-thread projections 10 for engagement with the screw-thread 2 on the cap 1. The ratchet projections 6 are ten in number and are provided  
15. in two sets of five in diametrically opposite halves of the spout with a slight gap between them. This is done so as to reduce the torque which is necessary to screw on the cap, only some of the tangs 5 engaging completely respective projections 6 by  
20. virtue of the oval shape of the envelope of the projections 6.

It will, be appreciated that in order to remove the cap 1 from the container 8 the bridges 11 are stressed to breaking point, such stressing tending to snap-off the bridges 11 at their points  
25. of juncture with either the ring 4 or the cap 1.

The bridges 11 have, of course, to provide for sufficient flow of plastics material during moulding from the cap 1 to the ring 4 and as such have a cross-sectional area of  $0.465\text{mm}^2$ .  
30. In order to provide strength against forces acting on the closure in the axial direction the bridges 11 have a depth of 0.93mm which thus enables the required cross-section area to be provided by a width of 0.50mm. The closure shown is moulded  
35. in polypropylene, but this is not essential and it is envisaged that the mould necessary to produce the

above closure could be used to produce closures in various other plastics materials as well.

- Although in the example shown the bridges are inclined radially outwardly in the direction of unscrewing, it will be appreciated that if the ring were axially spaced from the cap the bridges would still be inclined, but only axially. Alternatively were the ring to lie radially inwardly of the cap, the bridges would extend inclined radially inwardly in the direction of unscrewing of the cap.
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CLAIMS.

1. A screw-on plastics closure for a container, the closure comprising a cap (1) and, integrally joined thereto adjacent an edge thereof by means of a plurality of bridges (11), a locking ring (4) for securing to the container (8) in use to prevent unscrewing of the cap (1) from the container (8) without breaking of the bridges (11), characterized in that the bridges (11) extend from the adjacent part of the cap (1) to the ring (4) at an angle inclined in the direction of unscrewing of the cap.
5. 2. A closure according to claim 1, wherein the ring (4) has a larger diameter than the cap (1), the bridges (11) extending radially outwardly in the direction of unscrewing (A) of the cap (1).
10. 3. A closure according to claim 1 of claim 2, wherein the bridges (11) have a larger dimension in the axial direction of the closure than in the direction of their width.
15. 4. A closure according to any of claims 1 to 3, which is moulded in polypropylene.
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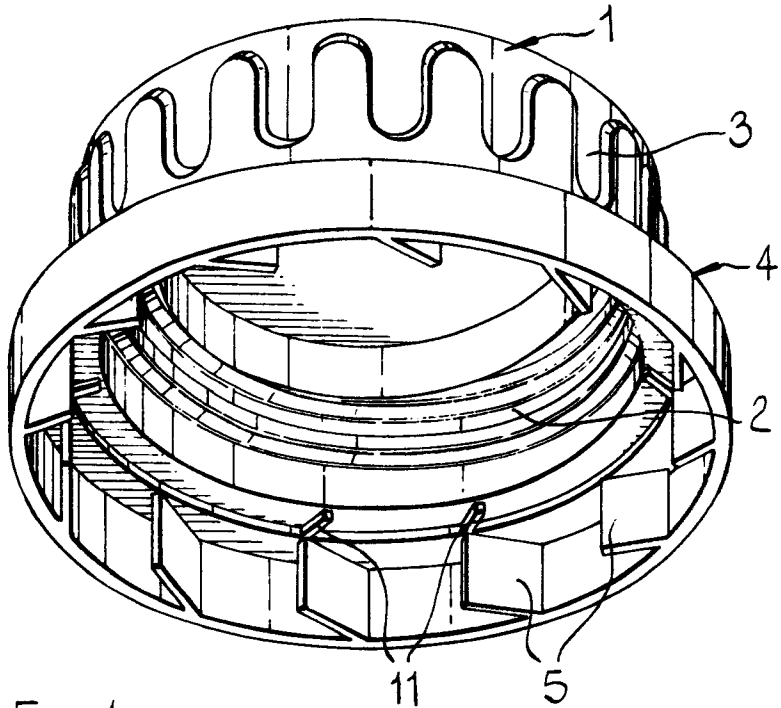
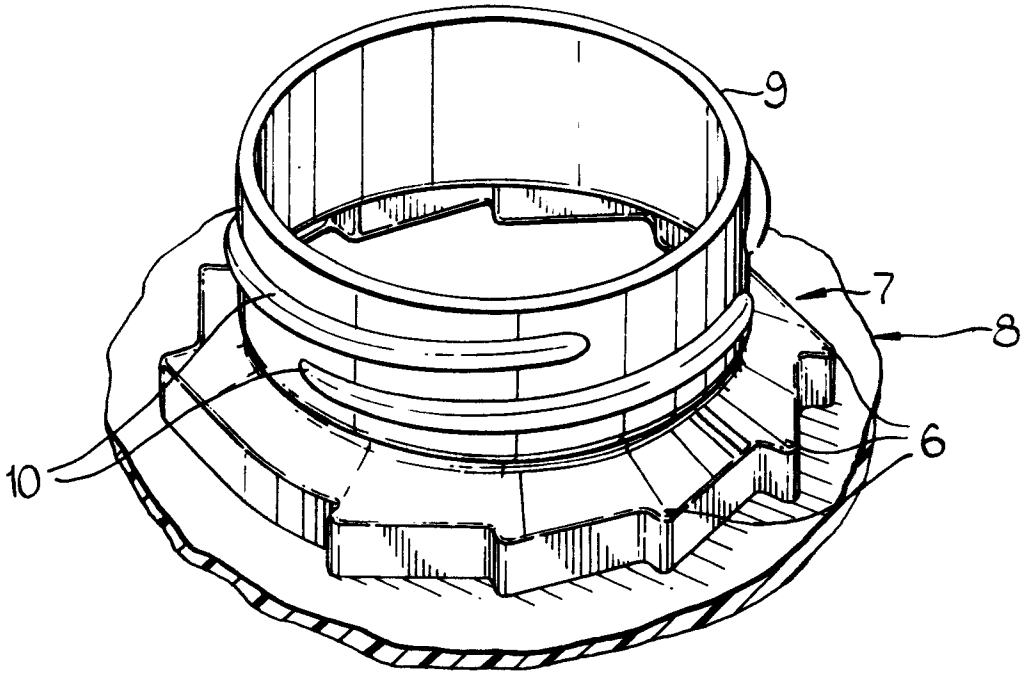
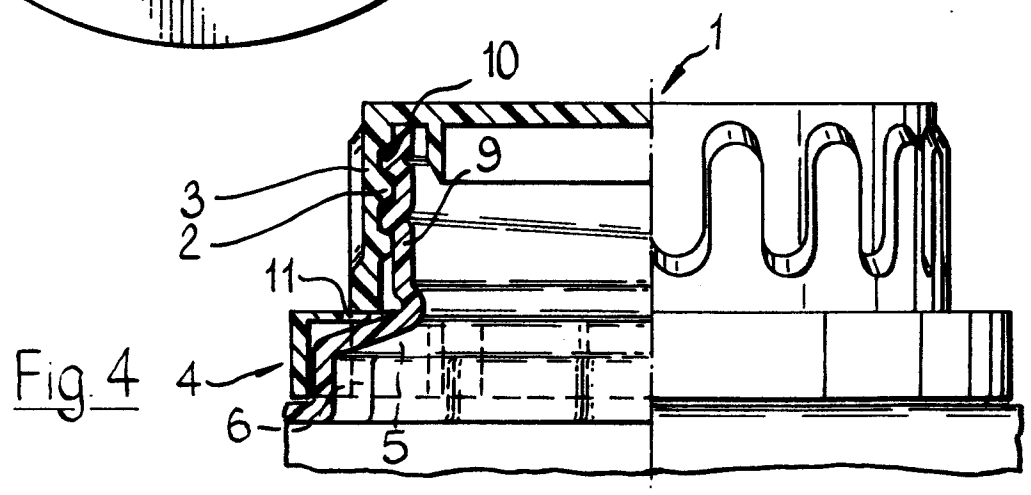
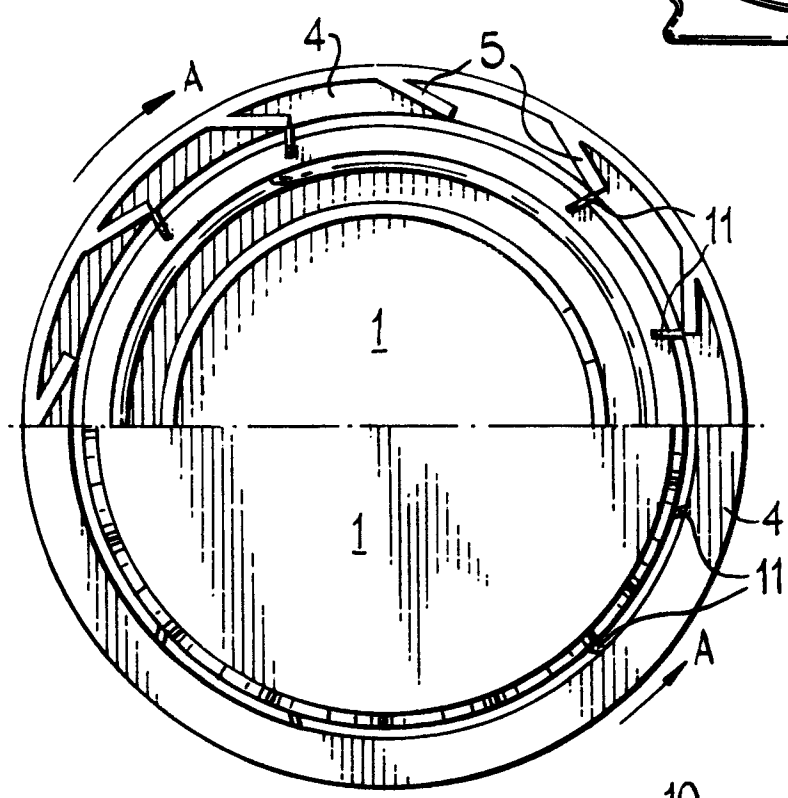
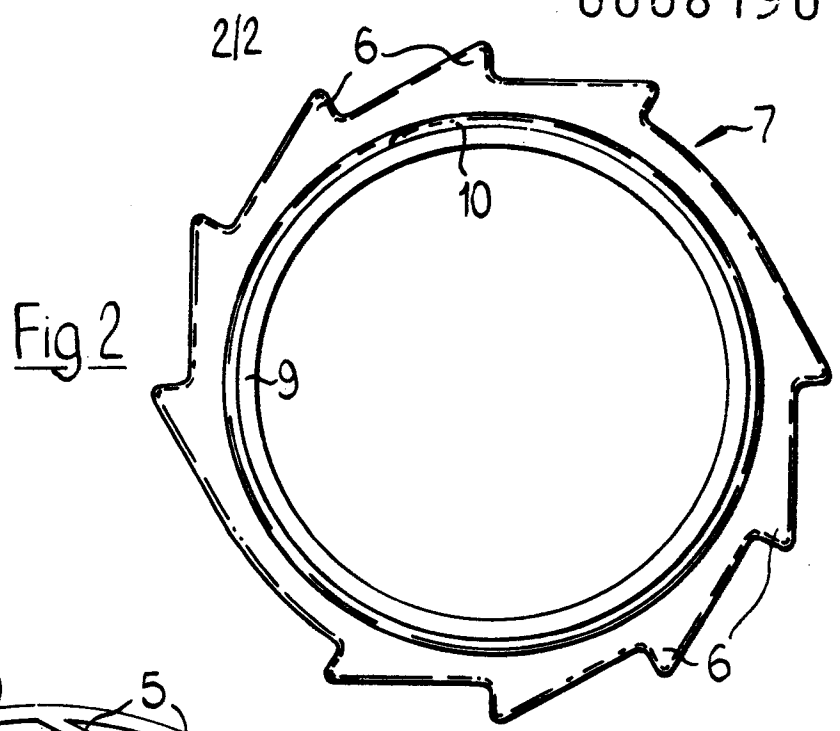


Fig. 1









DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl. 3)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
X	<u>FR - A - 2 298 255 (ASTRA)</u> * Patent specification * --	1,2	B 65 D 41/34
X	<u>DE - B - 1 154 369 (FISCHBACH)</u> * Patent specification * --	1,2	
X	<u>FR - A - 2 259 025 (HIDDING)</u> * Patent specification * --	1,2	
	<u>US - A - 3 259 233 (BEEMAN)</u> * Patent specification * ----	2-4	
			TECHNICAL FIELDS SEARCHED (Int.Cl. 3)
			B 65 D
			CATEGORY OF CITED DOCUMENTS
			X: particularly relevant A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention E: conflicting application D: document cited in the application L: citation for other reasons
			&: member of the same patent family. corresponding document
<p><i>h</i> The present search report has been drawn up for all claims</p>			
Place of search	Date of completion of the search	Examiner	
The Hague	26-10-1979	VANTOMME	