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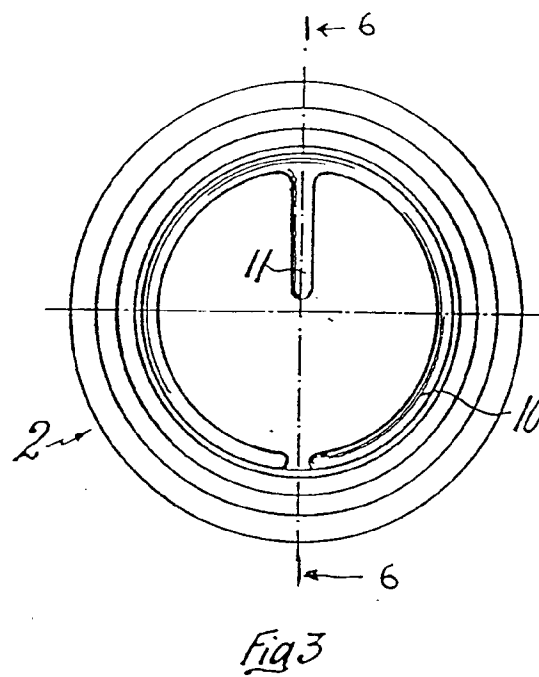
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(54) **Method of emptying a flask and a stoppering element designed for its implementation.**

(57) The present invention concerns a method of emptying a flask closed by a liquidtight removable stoppering element (2), obtained from a single material which can be recycled, comprising at least one closure sheet fixed to a lateral skirt for mounting the said stoppering element (2) on the spout of the said flask, for example by screwing, emptying being effected by tipping onto a perforation means disposed inside an emptying orifice, characterised in that emptying is effected directly through the closure sheet of the said stoppering element (2) held in the closed position on the spout of the flask, after tearing on the projection on the said means of perforating the said sheet, the said tearing causing the opening of the said sheet over the entire cross section of the said spout.

The invention also concerns a stoppering element (2) implementing the method.



The present invention concerns a method of emptying flasks containing specific products, such as in particular products intended for photographic development, and a stoppering element designed for its implementation.

Certain chemical products must, prior to their use, be specially mixed with other products of the same nature. For shelf-life reasons or so that the product will be "fresh", it is often important for the mixing to be carried out just before use; this is particularly the case with chemical products in photographic processing. At the present time, each product forming part of such a combination is stored in a plastic flask closed by a liquidtight stopper having on the inside a metallised (aluminium) cap and, between the top part of the stopper and the said cap, an insulating washer, made from cardboard for example, which, through its compressible nature, ensures that the stopper is liquidtight. The flask can therefore, because of its liquidtight stopper, be opened and closed as many times as desired before it is used for carrying out the mixing.

When the mixing is carried out, the flask, once filled and stoppered, is then subjected to heating by induction, which has the effect of heating the metallised cap, the part of which in contact with the top of the spout of the flask is thus welded because of the heating whilst the insulating washer prevents welding to the fabric of the stopper. All that needs to be done then is to unscrew the stopper, revealing the welded cap, the latter affording a temporary seal sufficient to be able to tip up the flask. In this position, the flask can then be used by means of a known emptying support including an orifice fitted on the inside with a pyramidal element which, simply by pressure, pierces the metal cap. The flask, once totally emptied, is then removed and is generally recycled, as is increasingly obligatory in many countries.

This stopping solution has many drawbacks: first of all, the stopper as described below is relatively expensive, since it includes at least three parts, the body of the stopper itself, the insulating washer and the metal cap. In addition, it is relatively expensive to utilise since it requires the use of an induction heating device. Finally, and above all, the flask cannot be recycled easily with plastic materials because of the metallised cap attached to its spout.

The present invention aims to remedy these drawbacks by affording an inexpensive emptying method which is simple to implement and, especially, which allows easily recycling, not only of the flask but also of the stoppering element implementing it, the latter being moulded in a single piece and therefore simple to manufacture.

To this end, the invention concerns a method of emptying a flask closed by a liquidtight removable stoppering element, obtained from a single material which can be recycled, comprising at least one closure sheet fixed to a lateral skirt enabling the said

stoppering element to be mounted on the spout of the said flask, for example by screwing, the emptying being effected by tipping over onto a perforation means disposed inside an emptying orifice, characterised in that the emptying is effected directly through the closure sheet of the said stoppering element held in the closed position on the spout of the flask, after tearing on the projection on the said means of perforating the said sheet, the said tearing causing the opening of the said sheet over the entire cross section of the said spout. The present invention also concerns a stoppering element implementing the method. This element may consist of a single-piece plastic stopper, allowing repeated stoppering and unstoppering of a flask whilst providing a perfect seal.

In addition, the flask closed by the stopper according to the invention in question may, after stoppering, be tipped over onto a suitable perforation means disposed at the centre of an emptying orifice. The closure sheet providing the seal on the stopper will then be perforated by the means disposed at the centre of the orifice.

The emptying method according to the invention in question therefore does indeed provide the functions as the one using a stoppering element including a metal cap, but is much less expensive since it makes it possible to use a stoppering element consisting of a single piece obtained by moulding which does not require any sealing joint, and it requires no special equipment for its use. In addition handling is simplified since it is no longer necessary to remove the stoppering element before carrying out the emptying. Finally, this method allows easy recycling of the flask from which any dissimilar material has thus been removed. A particularly advantageous form of recycling of the flask then consists purely and simply of reuse of the said flask after cleaning.

A preferential embodiment of the present invention will be described below, by way of non-limitative example, with reference to the accompanying drawing in which:

- Figure 1 is a view in axial section of the stoppering element according to the invention,
- Figure 2 is a plan view of the inside of a first variant of the stoppering element according to the invention,
- Figure 3 is a plan view of the inside of a second variant of the stoppering element according to the invention,
- Figure 4 is a schematic view in partial section of an installation allowing mixing of the products contained in two flasks closed off by stoppering elements according to the invention,
- Figure 5 is a plan view of the installation shown in Figure 3, on which a single flask is depicted,
- Figure 6 is a section view along line 6-6 of figure 3 for another embodiment of the stoppering element according to the invention.

The emptying method according to the invention uses a flask 1 closed by a stoppering element 2 comprising at least one closure sheet 3 fixed to a lateral skirt 4 for mounting the said stoppering element on the spout of the said flask 1, by any means known to persons skilled in the art, for example by screwing. Emptying is obtained by tipping the flask 1 onto a perforation means 5 disposed inside an emptying orifice 6. An installation for mixing the contents of the two flasks 1 closed with the stoppering elements 2 according to the invention in question is shown in Figures 4 and 5. In these figures, the emptying orifices 6 are shown fitted with perforation means 5, pyramidal in shape. It is clear that any other equivalent perforation device 5 would also be suitable.

The two flasks 1 are tipped over and fitted into troughs 7 of corresponding shape. After perforation of the stoppering elements 2 on each flask 1, the liquids contained in the said flasks 1 flow through the emptying orifices 6 into the mixing tank 8.

The method according to the invention is therefore characterised in that the emptying is effected directly through the closure sheet 3 of the stoppering element 2 held in the closed position on the spout of the flask 1. It is therefore no longer necessary to remove the stoppering element 2 in order to effect the emptying of the flask 1. It is the tearing of the closure sheet 3 on the projection on the said perforation means 5 which causes the opening of the said sheet 3 over the entire cross section of the spout of the flask 1. According to a preferential variant, the rupture of the closure sheet 3 is initiated at at least one point in the weakened area by puncturing on the projection on the perforation means 5 and this rupture is propagated by tearing along the said area, thus causing the opening of the spout over the entire cross section of the said closure sheet 3. A stoppering element 2 implementing this variant is shown in Figure 1; it is preferentially obtained by moulding from a single recyclable material and its closure sheet 3 has at least one weakened area. The said element 2 has an internal skirt 9 concentric with the lateral skirt 4 extending from the closure sheet 3 in order to bear, during stoppering, on the peripheral lip of the spout of the flask 1.

According to a preferential variant, the weakened area of the closure sheet 3 has radial or peripheral lines of lesser thickness or a combination of the two. These lines of lesser thickness are obtained by forming grooves preferably situated on the internal face of the stoppering element 2, so as to maximise the stresses causing the rupture of the closure sheet 3 during puncturing by the puncturing means 5. This weakened area may then extend to the periphery of the closure sheet 3 on the stoppering element 2 in the general shape of an open ring 10 connected to the centre of the said sheet 3 by a radial line 11 of lesser thickness. If the opening in the ring 10 is diametrically

opposite the radial line 11 of lesser thickness, as depicted in Figure 3, the tear, when the closure sheet 3 is punctured by the perforation means 5, will propagate from the centre, along the radial line 11 of lesser thickness, and continue along the part of the weakened area in the form of an open ring 10, thus opening the entire cross section of the closure sheet 3. The latter will be attached to the body of the stoppering element 2 by means of the part of the said closure sheet 3 corresponding to the opening in the ring 10, which will then fulfil the role of a hinge.

The radial and peripheral lines of lesser thickness may also define angular sectors 12 attached at the periphery to the body of the stoppering element 2 by attachment areas 13. A particular example of a closure sheet 3 having three angular sectors 12 defined by three radial lines 14 of lesser thickness and three peripheral lines 15 of lesser thickness, and attached by three attachment areas 13, is shown in Figure 2. In this case, the tear propagates from the centre of the closure sheet 3 along radial lines 14 of lesser thickness and then along the peripheral lines 15 of lesser thickness so as to open the said closure sheet 3 over its entire cross section, the angular sectors 12 remaining attached to the stoppering element 2 by means of the attachment areas 13. The peripheral lines of lesser thickness 15 could be either an arc of a circle or an arc of an ellipse or an arc of a parabola or an arc of a hyperbola. The radial lines of lesser thickness 11, 14 could be either straight or curved. In the preferred embodiment, the attachment areas 13 provides hinge of a length in the range of 3mm to 10mm.

In another more preferred embodiment, the closure sheet, instead of being flat as represented on fig 1, takes a conical shape as shown on fig 6. This specific configuration permits to lessen the force to be applied for rupturing the stoppering element. The angle at the apex of the conical shape is advantageously comprised in the range of 120° to 160° and preferably about 140°.

The stoppering element according to the invention could be made of any polymer materials or mixture of them. Polymer materials could comprise polyacrylamid, polypropylene, polycarbonate and high or low density polyethylene. In a preferred embodiment the stoppering element is made of a mixture of 80% of HDPE and 20% of LDPE. The lines of lesser thickness presents a thickness in the range of 0.1mm to 0.3mm and preferably of 0.2mm. A stoppering element manufactured according to the more preferred characteristics and having a flat closure sheet requires a force in the range of 17 daN to 20 daN to be ruptured. The same stoppering element with a conically shaped closure element requires a force in the range of 9.5 daN to 13 daN.

The stoppering element 2 according to the invention is in particular applicable to flasks 1 containing

photographic products.

Claims

1. Method of emptying a flask (1) closed by a liquid-tight removable stoppering element (2), obtained from a single material which can be recycled, comprising at least one closure sheet (3) fixed to a lateral skirt (4) enabling the said stoppering element (2) to be mounted on the spout of the said flask (1), for example by screwing, the emptying being effected by tipping over onto a perforation means (5) disposed inside an emptying orifice (6), characterised in that the emptying is effected directly through the closure sheet (3) of the said stoppering element (2) held in the closed position on the spout of the flask (1), after tearing on the projection on the said means (5) of perforating the said sheet (3), the said tearing causing the opening of the said sheet (3) over the entire cross section of the said spout.

2. Method of emptying a flask (1) closed by a stoppering element (2) according to claim 1, characterised in that the tearing is facilitated by at least one weakened area provided on the internal and/or external face of the said closure sheet (3).

3. Method of emptying a flask (1) closed by a stoppering element (2) according to claim 1 or 2, characterised in that the rupture of the sheet (3) is initiated at at least one point in the weakened area by puncturing on the projection on the perforation means (5) and in that the said rupture is propagated by tearing along the said area, thus causing the opening of the said sheet (3) over the entire cross section of the spout.

4. Liquidtight and removable stoppering element (2) for a flask (1), comprising at least one closure sheet (3) fixed to a lateral skirt (4) for mounting the said stoppering element (2) on the spout of the said flask (1), for example by screwing, characterised in that the stoppering element (2) is obtained by moulding from a single material which can be recycled and in that the closure sheet (3) of the said stoppering element (2) is provided on its internal and/or external face with at least one weakened area.

5. Stoppering element (2) according to claim 4, characterised in that the weakened area includes radial (11, 14) or peripheral (10, 15) lines of lesser thickness or a combination of the two.

6. Stoppering element (2) according to claim 4, characterised in that the weakened area extends

to the periphery of the closure sheet (3) of the stoppering element (2) in the general shape of an open ring (10) connected to the centre of the said sheet (3) by a radial line (11) of lesser thickness.

7. Stoppering element (2) according to claim 6, characterised in that the opening in the ring (10) is diametrically opposite the radial line (11) of lesser thickness.

8. Stoppering element (2) according to Claim 5, characterised in that the radial (14) and peripheral (15) lines of lesser thickness define angular sectors (12) attached at the periphery to the body of the stoppering element (2) by attachment areas (13).

9. Stoppering element (2) according to Claim 5, characterised in that the closure sheet is conically shaped.

10. Stoppering element (2) according to any one of Claims 4 to 9, characterised in that the seal is provided by an internal skirt (9) concentric with the lateral skirt (4) and extending from the closure sheet (3) in order to bear, during stoppering, on the top lip of the spout of the flask (1).

11. Application of the stoppering element (2) according to any one of Claims 4 to 10 to flasks (1) containing photographic products.

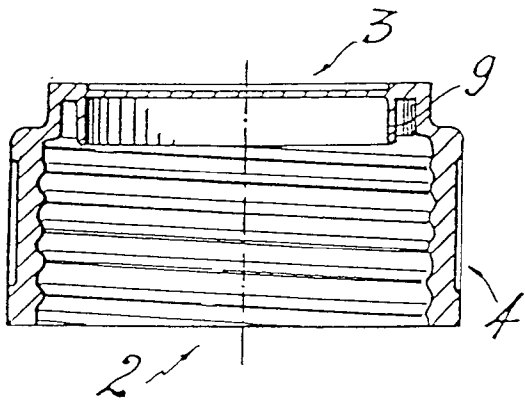


Fig 1

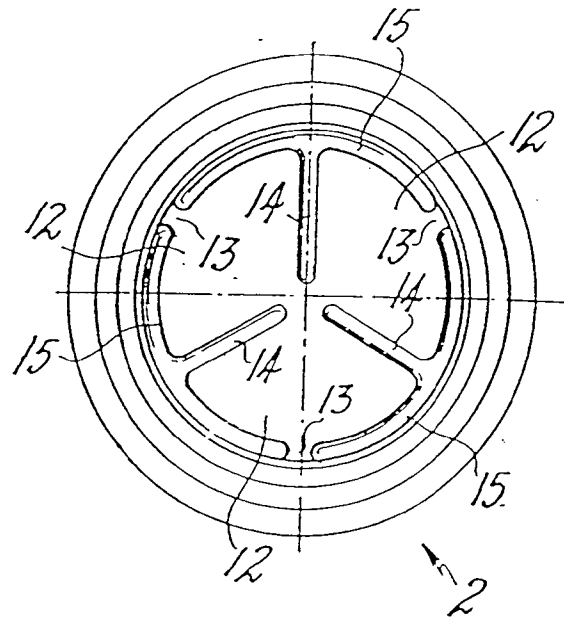


Fig 2

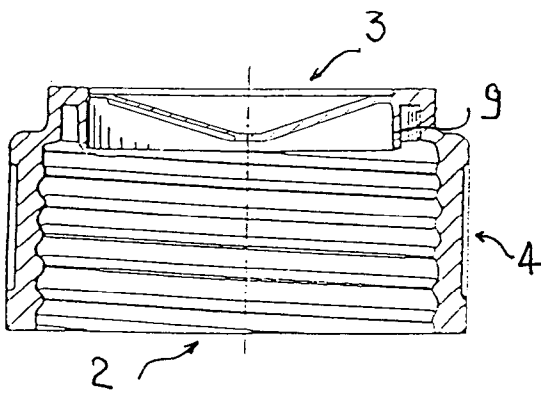


Fig 3

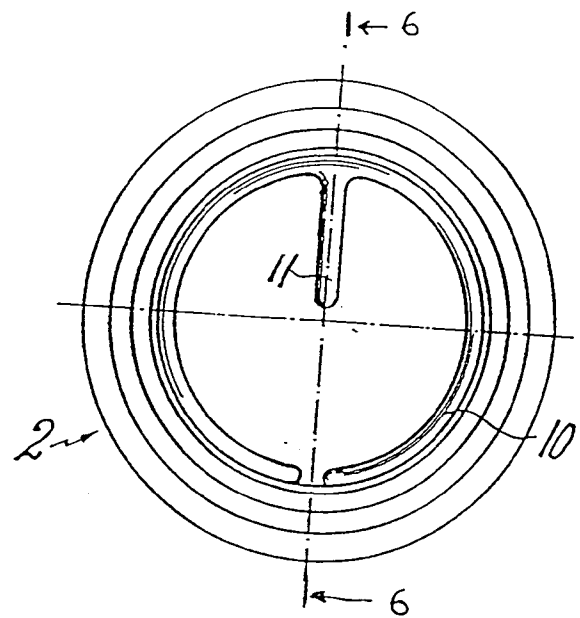
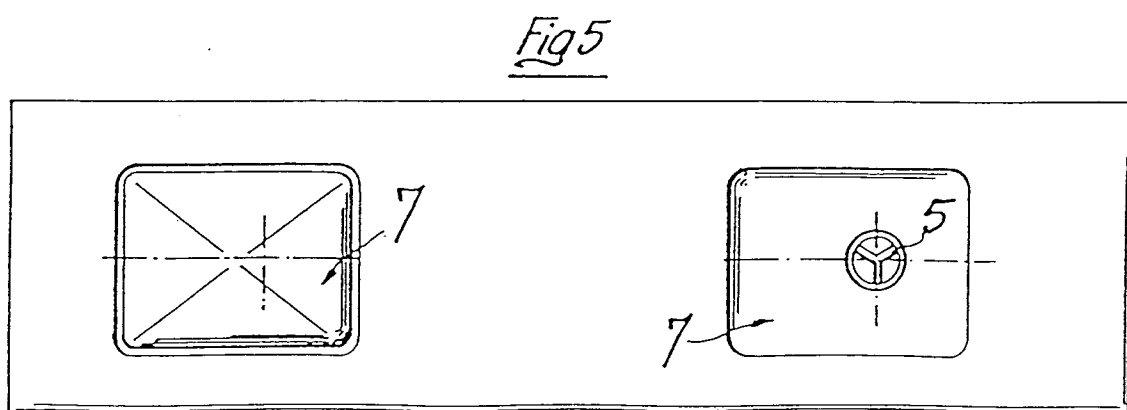
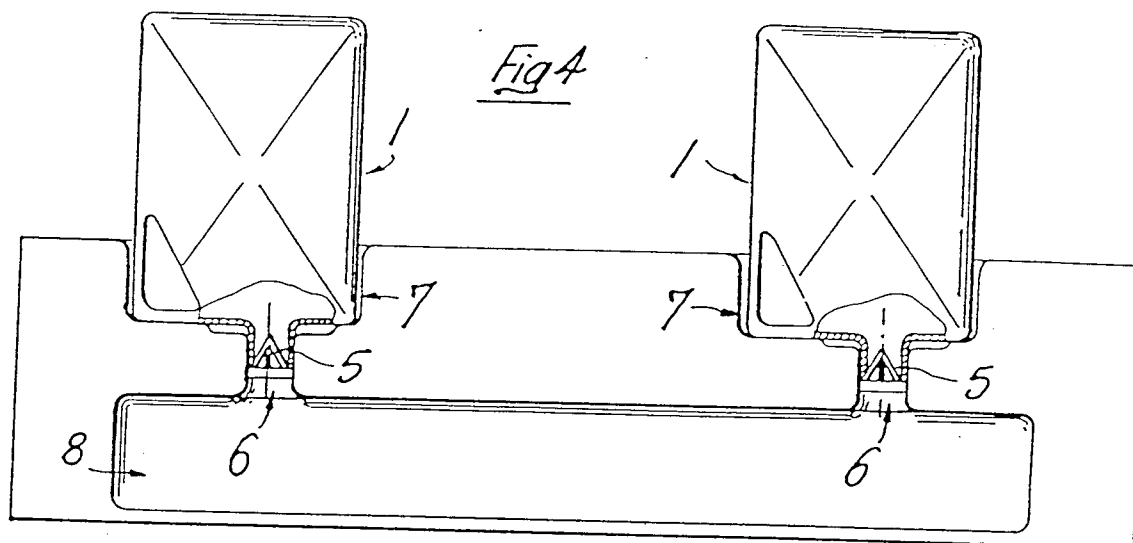


Fig 4





European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 95 42 0095

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.6)
X	AU-D-1 225 176 (MACGILL)	4, 5, 10	B65D41/50 B67B7/86
Y	* the whole document *	1-3	

Y	US-E-33 338 (SEDAM) * column 4, line 47 - column 5, line 27; figures 1, 4 *	1-3	

X, P	DE-A-43 18 311 (EGLI) * column 5, line 16 - line 22; figures 4A, 4B *	4, 5, 8	
A	US-A-4 972 976 (ROMERO) * column 3, line 22 - line 45; figures 5-7 *	1, 3	TECHNICAL FIELDS SEARCHED (Int.Cl.6)
A	FR-A-2 198 866 (ALUMINUM COMPANY OF AMERICA) * the whole document *	4	
A	DE-A-37 33 696 (HENKEL) * the whole document *	4	
The present search report has been drawn up for all claims			B65D B67B
Place of search		Date of completion of the search	Examiner
THE HAGUE		3 August 1995	Leong, C
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