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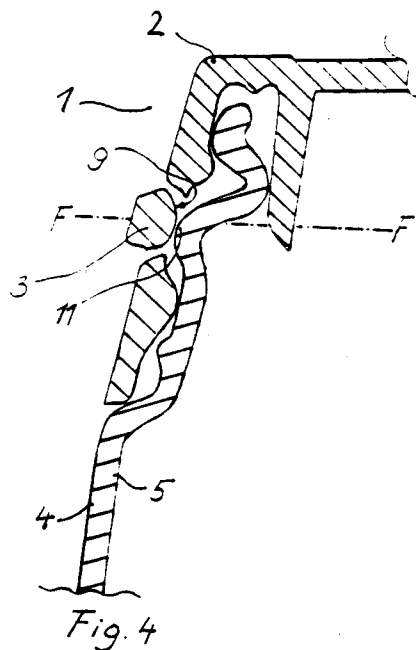
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(54) **Container closure with tear-off seal.**

(57) A closure (1) for a container (5) made of resilient flexible plastic material comprises a lid portion (2), a retaining ring portion (4) and a sealing strip (3) connected along a major part of its circumferential extension to the lid portion (2) and the retaining portion (4) by bridge sections of plastic material having score lines. The closure (1) is manufactured in a closed and sealed state and is mounted in this state on the container (5) filled with its contents. The hemispherical sealing strip (3) has a bulge with a convex profile (9) on its inside and close to one end of the strip (3). In an unmounted state, the sealing strip (3) is about hemispherical in form. When the closure (1) is in a state mounted on the container (5) as shown in the Figure, the bulge is displaced by a toroidal portion (11) on the neck of the container (5), thereby forming gripping means for gripping and tearing off the sealing strip (3). Also disclosed is a process for manufacture of a sealed container closure (1) with gripping means formed when the closure (1) is mounted in the container (5).

**EP 0 564 755 A1**

The invention relates to a sealed closure for container, comprising a retaining portion for retaining the closure on a container, a lid portion connected to the retaining portion by hinge means, and a tear-off sealing element connecting the retaining portion and the lid portion in an initial sealed state and provided at its one end portion with gripping means to facilitate removal of the sealing element through tearing-off. The invention also relates to a process for manufacture of a container having such closure.

A closure of this kind made of resilient plastic material is known from EP-A2- 0 320 475. The known closure is intended for use with, at its neck portion, a rotationally symmetric container filled with its contents, for example, a plastic container filled with a pharmaceutical composition in form of tablets. Both in a sealed and an unsealed state, the lid portion at its circumference is connected to a retaining ring by a thinner strip of plastic material functioning like a hinge, allowing the container lid to be opened and closed after removal of a sealing strip extending in an unbroken state between the lid portion and the retaining portion along part of the circumference of the container.

To facilitate gripping when being torn off by hand, the sealing strip is provided with a gripping tab arranged at and integral with one end portion of the sealing strip. When manufacturing the closure, the gripping tab has to be fastened to the sealing strip by welding, this requiring a separate production step and thus entailing extra cost. The finished closures have to be sorted and transported to the site where they are put onto the containers, and the containers have to be sorted, labelled and packed. In this connection, the relatively bulky gripping tags extending beyond the circumference of the containers sometimes become entangled. This necessitates human interference in an otherwise automated production line and adds further cost.

The present invention provides a sealed closure for containers, comprising a retaining portion for retaining the closure on the container, a lid portion connected to the retaining portion by hinge means, and a tear-off sealing element connecting the retaining portion and the lid portion in an initial sealed state and provided at its one end portion with gripping means to facilitate removal of the sealing element through tearing-off, which closure is lacking the aforementioned drawbacks connected with the known closure.

More specifically, the present invention provides a sealed closure that prior to its mounting on the container does not have any gripping means extending peripherally therefrom, in that such gripping means are produced by the action of the container on the closure only when the closure is being mounted onto the container.

Preferably, the gripping means according to the invention comprise one end portion of the tear-off sealing element, which end portion in an unmounted state of the closure extends along the circumference of the closure and between the lid portion and the retaining portion, essentially in the same way as the rest of the tear-off sealing element. In a state where the closure is mounted onto the container, said end portion of the tear-off sealing element extends peripherally of the circumference of the closure, thereby providing gripping means enabling the sealing element to be gripped and torn off.

It is preferred to provide said end portion of the tear-off sealing element with inner actuating means for radial displacement of said end portion by contact with a toroid bead portion on the outside of the neck of the container. Preferably said actuating means form an integral part of said end portion.

It is also preferred that the actuating means for radial displacement of said end portion are arranged at a distance from the end of said end portion; it is even more preferred that said actuating means include a bulge or cambered portion arranged at the interior surface of said end portion, said bulge or cambered portion extending in direction of the center of the closure.

Preferably, said end portion of the tear-off sealing element may be provided, wholly or partially, with a surface or shape that facilitates gripping. Specifically, it may, for example, be provided with grooves or ripples or be corrugated or roughened in some other way.

It is also preferred that the tear-off sealing element, at its end portion or a part thereof extending from the end, in an unmounted state is neither joined to the retaining portion of the closure nor to the lid portion.

It is possible but not preferred to arrange the actuating means for radial displacement of said end portion of the tear-off sealing means at the neck portion of the container, while keeping the profile of the interior wall of the sealing means about constant over the entire length of the sealing means. Such an arrangement necessitates, however, a careful alignment of the actuating means for radial displacement on the container and said end portion of the tear-off sealing means during the process of mounting.

The present invention also provides a process for manufacture of a container having a sealed closure that prior to its mounting on the container does not have any gripping means extending peripherally therefrom, which gripping means are produced in the process by the action of the container on the closure when the closure is being mounted onto the container.

It is preferred for the process according to the invention to comprise the following steps:

- a) manufacture of a sealed container closure comprising an at least interiorly rotationally symmetric retaining portion for retaining the closure on the container, a lid portion connected to the retaining portion by hinge means, and a tear-off sealing element connecting the retaining portion and the lid portion and having an end portion, said end portion being interiorly provided with actuating means for radial displacement of said end portion,
- b) manufacture of a container having an essentially rotationally symmetric neck portion and bead means arranged exteriorly on the neck portion,
- c) filling the container with its contents,
- d) aligning the rotational axes of the retaining portion of the container closure and the container, respectively, with the retaining portion of the closure facing the container neck portion,
- e) displacing the container closure along its rotational axis in the direction of the container, while holding the container in a fixed position,
- f) radially displacing said end portion of the sealing means by abutting and displacing action of said bead means on said activating means and thereby forming gripping means for gripping the end portion of the sealing means when tearing it off, while simultaneously locking the container closure on the container and thereby closing and sealing the container.

Further advantages and distinguishing features of the invention will become apparent from a preferred but not limiting embodiment with the help of which the invention will now be described in more detail with reference to drawings, in which are shown

- Fig. 1 a partial view of a preferred embodiment of a closure according to the invention, in axial section A - A, (Fig. 3),
- Fig. 2 another partial view of the closure in Fig. 1, in axial section B - B (Fig. 3),
- Fig. 3 a partial view of the closure in Fig. 1, in horizontal section C - C (Figs. 1 and 2),
- Fig. 4 a partial view of the closure of Fig. 1 mounted on a container, in axial section D - D (Fig. 6),
- Fig. 5 another partial view of the assembly in Fig. 3, in axial section E - E (Fig. 6) and
- Fig. 6 a partial view of the assembly of Fig. 4, in horizontal section F - F (Figs. 3 and 4).

A closure 1 made of resilient flexible plastic material, similar to the closure described in EP-A2

0 320 474, is shown in Figs. 1 - 3 in an unmounted state, and in Figs. 4 - 6 mounted on a container 5. The closure 1 comprises a lid portion 2, a sealing element or strip 3, and a retaining ring portion 4 with a rotationally symmetric inner surface. For the major part of its extension along the circumference of the closure 1, the sealing element 3 which has about the form of a ring segment is joined to the lid portion 2 and to the retaining portion 4 via bridge sections of the same plastic material having score lines 13, 14 that can be easily broken by tearing the sealing element 3 in the circumferential direction of the closure 1. In respect of closure 1, "inner" refers to surfaces which, when the closure 1 is mounted on a container, are facing the container 5, while "outer" refers to other surfaces; "outwards" refers to a direction from an outer surface, while "inwards" refers to a direction from an inner surface.

In Figs. 1 and 2, the unmounted closure is shown in two axial sections differing in one respect that is, the profile of the inner surface of the sealing strip 3. Whereas this profile 8 is about flat and forms a depression between bulge 6 at the lid portion 2 and bulge 7 at the retaining ring portion 3, as shown in the representation of axial section B - B (see Fig. 3) in Fig. 2, the respective profile 9 in the representation of axial section A - A (see fig. 6) in Fig. 1 is highly convex and bulging, thus forming a protuberance or bulge 10 (Fig. 3). As can be seen in Fig. 3, the major part of the inner surface of the sealing strip 3 has rather flat profile 8 extending on both sides of the bulge 10 along the sealing strip. The bulge 10 is arranged at a rather short distance from one end of the sealing strip 3, preferably about 1,5 to 2 cm.

Figs. 4 and 5 show two axial sections (B - B, E - E; see Fig. 6) corresponding to those illustrated in Figs. 1 and 2, respectively, but with the closure 1 mounted on the container 5. The container 5 is made of plastic material similar to that used for the closure 1, but can be made of a wide range of materials, including glass. The profile of the neck portion of the container 5 is provided with bulges and recesses at points where it faces surfaces of the closure 1 in such a way that closure 1 can be snapped onto the container 5 in the mounting process and be retained in locked position on the container, and that the lid portion 2, after removal of the sealing strip 3, can be opened and closed at will. However, in the present context only the toroid portion 11 is of interest; the horizontal section F - F shown in Figs. 2 and 5 dissects the toroid portion 11 at a point where its distance from the axis of container 1 is at maximum.

At points where the inner surface of the sealing strip 3 has a rather flat profile 8, the toroid portion 11 is in abutting contact with this inner surface or

at a short distance from it, depending on the exactness of fit and manufacture of the respective parts, but is not affecting said inner surface in a way that would displace it outwards; cf. Figs. 5 and 6.

At points where the inner surface of the sealing strip 3 is bulging inwards and has the convex profile 9 shown in Figs. 1 and 4, the toroid portion 11, by reason of the comparatively high rigidity of the neck of the container 5 and the comparatively low rigidity of the sealing strip 3, displaces the sealing strip 3 outwards, as shown in Figs. 5 and 6. The score lines 13 and 14 extend along the major part of the sealing ring 3. However the sealing ring 3 is not coined to the lid portion 2 and the retainer ring 4 in an the area where the bulge 10 is arranged. The score line-free portion of the sealing strip 3 extends at both directions from the bulge 10, that is, in the one direction, from the bulge 10 to the end of sealing strip 3 at closest distance from it and, in the other direction, for a short distance only. Arrow 12 in Fig. 3 indicates the point from which the score lines 13 and 14 are extending counter-clockwise. The portion of the sealing strip 3 freed during the mounting process and intended to be gripped when the sealing strip 3 is torn off, is provided with shallow transverse grooves (not shown) at its outer and inner surfaces for better gripping.

It is entirely feasible to have the score lines 13 and 14 extend for a longer distance than shown in this embodiment, for example from the bulge 10 to the end most distant from it or over the entire length of the sealing strip 3. In the latter case it is important for sealing strip 3 rigidity and score line fragility to be properly matched, so as to ensure that the score lines 13,14 extending between the end of the sealing strip 3 closest to the bulge 10 and the bulge 10 are broken and the freed end portion of the sealing strip 3 is displaced outwards. It is also entirely feasible to provide the sealing strip 3 with a number of bulges similar to bulge 10 arranged in short intervals and extending from one end of the sealing strip 3 for a distance in the direction of its other end; in this case, there is no need to carefully balance the fragility of the score lines 13,14 against the rigidity of the sealing strip 3. Instead of such multiple bulge arrangement in intervals, the sealing strip 3 may also be provided with a continuous bulging profile extending over a distance from one end of it.

Claims

1. A sealed closure (1) for containers made of resilient flexible plastic material, comprising a retaining portion (4) for retaining the closure (1) on the container (5), a lid portion (2) connected to the retaining portion (4) by hinge means,

and a tear-off sealing element (3) connecting the retaining portion (4) and the lid portion (2) in an initial sealed state and provided at its one end portion with gripping means to facilitate removal of the sealing element through tearing-off, **characterized** in that the closure (1) prior to its mounting on the container (5) does not have any gripping means extending peripherally therefrom and in that such gripping means are produced by the action of the container on the closure (1) when the closure (1) is being mounted onto the container.

2. A sealed closure according to claim 1, **characterized** in that the gripping means comprise one end portion of the tear-off sealing element (3), which end portion in an unmounted state of the closure (1) extends along the circumference of the closure and between the lid portion (2) and the retaining portion (4), essentially in the same way as the rest of the tear-off sealing element (3).
3. A sealed closure according to claim 1 or 2, **characterized** in that, in a state where the closure (1) is mounted onto the container (5), said end portion of the tear-off sealing element (3) extends peripherally of the circumference of the closure (1), thereby providing gripping means enabling the sealing element (3) to be gripped and torn off.
4. A sealed closure according to claim 2 or 3, **characterized** in that said end portion of the tear-off sealing element (3) is provided with inner actuating means (10) for radial displacement of said end portion by contact with an toroid bead portion (11) on the outside of the neck of the container (5).
5. A sealed closure according to claim 4, **characterized** in that said actuating means (11) form an integral part of said end portion.
6. A sealed closure according to claim 4 or 5, **characterized** in that said actuating means (11) for radial displacement of said end portion are arranged at a distance from the end of said end portion.
7. A sealed closure according to any of claims 4 to 6, **characterized** in that said actuating means (11) include a bulge or cambered portion arranged at the interior surface of said end portion, said bulge or cambered portion extending in direction of the center of the closure (1).

8. A sealed closure according to any of claims 2 to 7,
characterized in that said end portion of the tear-off sealing element (3) may be provided, wholly or partially, with a surface or shape that facilitates gripping. 5
9. A sealed closure according to any of claims 1 to 8,
characterized in that, in an unmounted state, the tear-off sealing element (3) at its end portion or a part thereof extending from the end is neither joined to the retaining portion of the closure (4) nor to the lid portion (2). 10
10. A sealed closure according to any of claims 1 to 9,
characterized in that said end portion is provided with one or several inner bulges facing, in a mounted state, the neck of the container (5). 15 20
11. A sealed closure according to any of claims 1 to 9,
characterized in that said end portion is provided with an inner convex profile (9) arranged for outwards displacement by bulge means (11) arranged on the outside of the container (5). 25 30
12. A sealed closure according to claim 11,
characterized in that said bulge means (11) are of toroidal form.
13. A closure according to any of claims 1 to 12,
characterized in that the sealing ring (3) is joined to the lid portion (2) and to the retaining portion (4) by bridge sections having score lines (13,14) extending in circumferential direction along a major part of the sealing ring except for said end portion or a part of said end portion. 35 40
14. A process for manufacture of a container (5) having a sealed closure (1) that prior to its mounting on the container (5) does not have any gripping means extending peripherally therefrom, which gripping means are produced in the process by the action of the container (5) on the closure (1) when the closure (1) is being mounted onto the container (5), **characterized** in that it comprises the following steps: 45 50
- a) manufacture of a sealed container closure (1) comprising an at least interiorly rotationally symmetric retaining portion (4) for retaining the closure (1) on the container (5), a lid portion (2) connected to the retain-

ing portion (4) by hinge means, and a tear-off sealing element (3) connecting the retaining portion (4) and the lid portion (2) and having an end portion, said end portion being interiorly provided with actuating means (10) for radial displacement of said end portion,

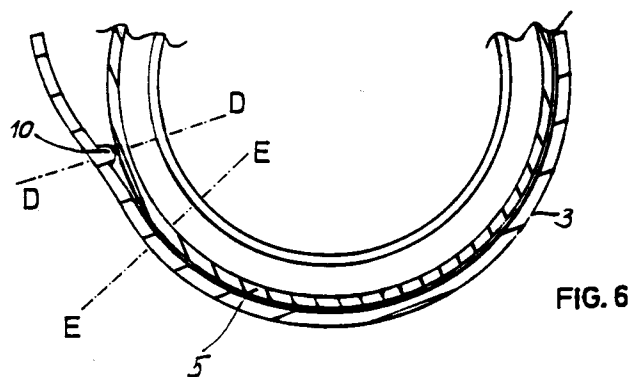
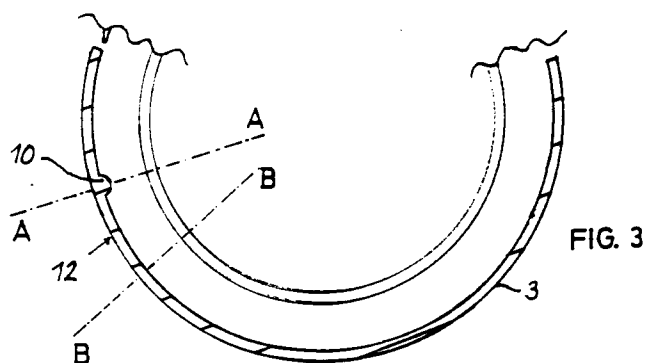
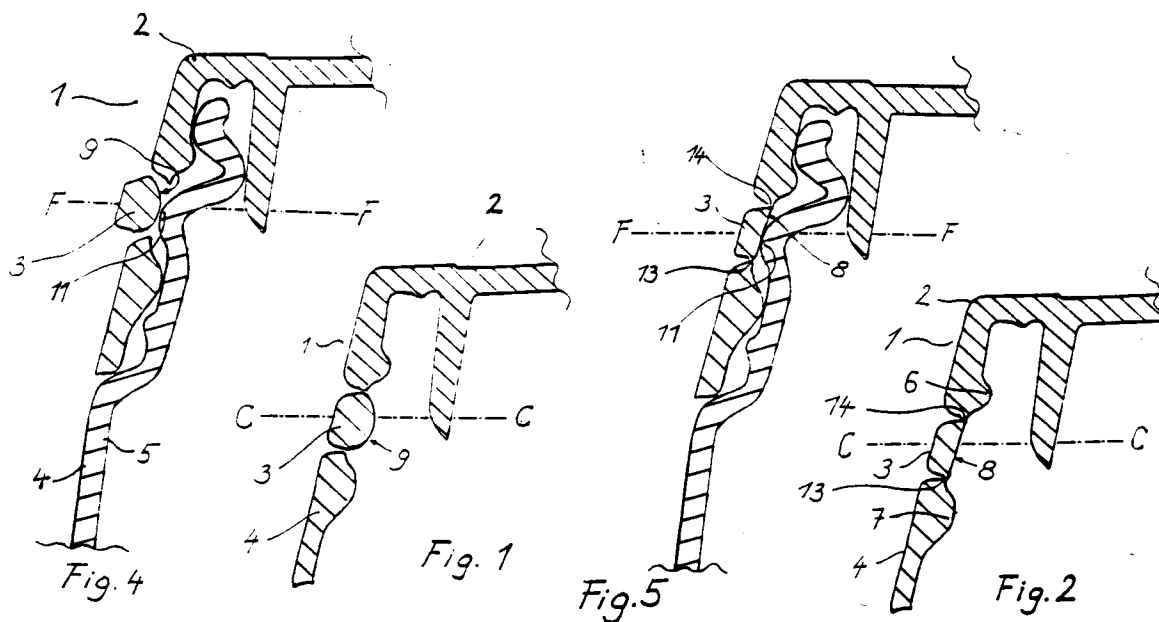
b) manufacture of a container (5) having an essentially rotationally symmetric neck portion and bead means (11) arranged exteriorly on the neck portion,

c) filling the container (5) with its contents,

d) aligning the rotational axes of the retaining portion (4) of the container closure (1) and the container (5), respectively, with the retaining portion (4) of the closure (1) facing the container (5) neck portion,

e) displacing the container closure (1) along its rotational axis in the direction of the container (5), while holding the container (5) in a fixed position,

f) radially displacing said end portion of the sealing means (3) by abutting and displacing action of said bead means (11) on said activating means (10), and thereby forming gripping means for gripping the end portion of the sealing means (3) when tearing it off, while simultaneously locking the container closure (1) on the container (5) and thereby closing and sealing the container (5).





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EUROPEAN SEARCH REPORT

Application Number

EP 92 85 0080

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)
Y	FR-A-1 422 230 (BOUSCARY) * page 1, right column, line 24 - page 2, left column, line 24; figures 1-3 * ---	1-14	B65D41/32 B65D41/48
Y,D	EP-A-0 320 475 (DUMA) * the whole document * ---	1-14	
A	US-A-4 798 301 (BULLOCK) * figures 4,5 * -----	11,12	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			B65D
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 08 DECEMBER 1992	Examiner NEWELL P.G.
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			