

Description

[0001] The present invention relates to a tethered closure element for containers and to a related container comprising such a closure element.

[0002] There is currently a great need to reduce the environmental impact of plastic. In particular, in the area of containers, such as bottles or vials, there is a need to prevent the respective caps from being dispersed in the environment.

[0003] For this reason, they should preferably be disposed of together with their container.

[0004] Currently, also in compliance with recent environmental protection regulations, a variety of technical solutions are therefore being developed to address the problem of keeping the cap attached to its container.

[0005] Many of the technical solutions proposed to date involve connecting elements between the cap and the safety ring. These connecting elements consist, for example, of partly pre-cut annular bands which, when the cap is unscrewed from the neck of the container, stretch out, allowing the cap to be removed from the neck while keeping it attached to the container via the safety ring.

[0006] Patent document WO 2021146080 A1 describes a tethered type closure that has a cap, designed to couple with the neck of a container, and a safety ring, connected to the cap and engaged with a rib in the neck of the container, known in jargon as a lip. In particular, in order to connect the cap to the safety ring, the closure has two annular bands obtained cutting the safety ring itself, giving rise to two deformable arms. When the cap is opened, these arms extend and twist, thus allowing the cap to be tipped, which remains attached to the neck.

[0007] Disadvantageously, the closure element described in WO 2021146080 A1 has a rigid structure that results in poor handling of the closure element by a user.

[0008] The main task of the present invention is to realise a tethered closure element for containers that overcomes the drawbacks of the above-mentioned known technique. In particular, it is the purpose of the present invention to make available a tethered closure element for containers that is flexible and can be easily manoeuvred by an end user. It is the purpose of the present invention to also make available a container, comprising such a closure element, which can be easily opened.

[0009] In the context of this task, a further aim of the present invention is to realise a tethered closure element for containers, and a container comprising this closure element, that are simple and inexpensive to manufacture, while still complying with the environmental guidelines for single-use plastics.

[0010] Another purpose of the invention is to realise a tethered closure element for containers, and a related container, that is resistant.

[0011] The aforementioned task and purposes, and others that will appear more clearly later, are achieved by a tethered closure element for a container as well as

container for liquids, as set out in the appended independent claims.

[0012] Other features are provided in the dependent claims.

[0013] Further characteristics and advantages will become apparent from the description of a preferred but not exclusive embodiment of a tethered closure element for containers, illustrated only by way of non-limiting example with the aid of the accompanying drawings, in which:

- figure 1 shows a side view of a closure element in a first embodiment according to the present invention, in a closing configuration;
- figure 2 shows the closure element of figure 1 in a front view;
- figure 3 shows the closure element of figures 1 and 2 in a side view;
- figure 4 shows the closure element of figures 1-3 in a perspective view;
- figure 5 shows a further perspective view of the closure element of figures 1-4 applied to a container;
- figure 6 shows the closure element of figures 1-5 in a top view;
- figure 6a shows the closure element of figures 1-5, sectioned along the line B-B of figure 6;
- figure 7 shows a perspective view of a container neck with an associated closure element in a second embodiment according to the present invention, in a closing configuration;
- figure 8 shows the container neck with the associated closure element of figure 1 in a front view;
- figure 9 shows the container neck with the associated closure element of figures 1 and 2 in an opening configuration, in a side view;
- figure 10 shows the container neck with the associated closure element of figure 3 in a top view;
- figure 11 shows the container neck of figures 9 and 10 in a perspective view;
- figure 12 shows the container neck with the associated closure element of figures 7-8 in a top view;
- figure 12a shows a side view of the container neck with the associated closure element of figure 12, sectioned along line A-A;
- figure 12b shows an enlargement of a portion of figure 12a;
- figure 13 shows a front view of the closure element of figures 7-12b in a closing configuration;
- figure 13a shows the closure element of figure 13 sectioned along the line H-H.

[0014] With reference to the above-mentioned figures, a closure element 1 for containers 100 forms part of the present invention. In particular, the closure element 1 described below is of the type tethered to the container 100.

[0015] In particular, a first embodiment of the closure element 1 according to the present invention is shown in

figures 1-6a.

[0016] A second embodiment of the closure element 1 according to the present invention is shown in Figures 7-13a.

[0017] The closure element 1 for containers 100 comprises a cap 2 comprising a substantially cylindrical inner wall 20. The inner wall 20 is threaded and is configured to couple with an externally threaded portion 101 of a neck 102 of a container 100.

[0018] The closure element 1 further comprises a safety ring 3 configured to fit around the neck 102 and shaped to be retained below a lip 103 of the neck 102 of the container 100. Specifically, in the present description, the term lip refers to an abutment of the neck 102 of the container 100, which is radially projecting outwards, located below the externally threaded portion 101.

[0019] The safety ring 3 and cap 2 are spaced apart from each other.

[0020] It should be noted that, in accordance with the present invention, the safety ring 3 has a slot 30 extending through a first arc of circumference.

[0021] In particular, the first arc of a circumference is intended with reference to the circumference of the safety ring 3, i.e. it is an arc of circumference defined as a part of the entire circumference on which safety ring 3 develops.

[0022] Preferably, the first arc of circumference subtends an angle greater than 180° and less than 270°.

[0023] The slot 30 extends mainly along a circumferential development direction K, shown for simplicity only in figures 2 and 7-8. The slot 30 also extends along a direction perpendicular to the plane in which the circumferential development direction K lies.

[0024] In other words, the slot 30 is a through-hole formed on the safety ring 3.

[0025] In particular, the slot 30 partially subdivides the safety ring 3 into a lower band 31 and an upper band 32 separated from the lower band 31. In particular, the upper band 32 is distanced from the lower band 31 by the presence of the slot 30, which is interposed between the upper band 32 and the lower band 31.

[0026] In more detail, the upper band 32 defines, with the slot 30, two arms 33 connected to the cap 2.

[0027] Note that the cap 2 is configured to switch between a closing configuration in which it is coupled to the neck 102 of the container 100 and an opening configuration in which it is uncoupled from the neck 102.

[0028] In other words, the internal threaded wall 20 of the cap 2 is not engaged with the externally threaded portion 101 of the neck 102 in the opening configuration, while it is engaged with the externally threaded portion 101 of the neck 102 in the closing configuration.

[0029] The closure element 1 in the closing configuration is shown in figures 1-8 and 12-13a.

[0030] The closure element 1 in the opening configuration is shown in figures 9-11.

[0031] In particular, the slot 30 is configured to allow a deformation of the two arms 33 to allow coupling and/or

uncoupling of the cap 2 with/from the neck 102 in the passage from the closing configuration to the opening configuration and vice versa.

[0032] Advantageously, the presence of the slot 30 increases the mobility of the arms 33, giving them greater flexibility. This allows a user to easily manoeuvre the cap 2 between the closing configuration and the opening configuration and vice versa.

[0033] Preferably, in the closing configuration the arms 33 extend along two respective arcs of circumference belonging to the same circumference, as can be seen in figures 8 and 13.

[0034] The two arms 33 are deformed when cap 2 is in the opening configuration.

[0035] Preferably, the deformation of the two arms 33 is at least partly elastic.

[0036] In particular, due to the presence of the arms 33, the cap 2, although uncoupled from the neck 102, remains constrained to the neck 102.

[0037] As mentioned above, when the cap 2 is in the opening configuration, the arms 33 are deformed, especially twisted and extended, and thus enable the cap 2 to be tilted.

[0038] In accordance with the present invention, the lower band 31 extends for an arc of circumference equal to the first arc of circumference.

[0039] Also in accordance with the present invention, the arms 33 extend for a second arc of circumference having a length less than the length of the first arc of circumference. In other words, the second arc of circumference subtends a smaller angle than that subtended by the first arc.

[0040] The safety ring 3 also has a side band 6 that extends seamlessly from the upper band 32 and the lower band 32 for a third arc of circumference complementary to the first arc.

[0041] In particular, the side band 6 has a height that is substantially equal to the sum of the heights of the lower band 31, the slot 30 and the upper band 32, i.e. of the arms 33.

[0042] The slot 30 has a height that can be constant or greater in some sections and lesser in others. With reference to figure 1, preferably, the slot 30 has a maximum height H1 that is comprised between 5% and 40% of the height H2 of the safety ring 3. More preferably, the slot 30 has a maximum height H1 that is between 10% and 30% of the height H2 of the safety ring 3. Still preferably, the slot 30 has a maximum height H1 that is equal to 20% of the height H2 of the safety ring 3.

[0043] For example, for a safety ring 3 with a height H2 of 5 mm, the maximum height H1 of the slot 30 is 1 mm.

[0044] In the opening configuration, the cap 2 is away from the side band 6 of the safety ring 3.

[0045] To open/close it, the cap 2 is unscrewed/screwed by rotation in relation to its central axis J.

[0046] In particular, in the unscrewing rotation, once the cap 2 is separated from the externally threaded por-

tion 101 of the neck 102, as explained below, the cap 2 pulls the safety ring 3 with it by means of the arms 33, which deform and extend.

[0047] In the passage of the cap 2 from the closing configuration to the opening configuration, the safety ring 3 rises upwards until it abuts with the lip 103 below, remaining retained around the neck 102.

[0048] In particular, the cap 2 can be unscrewed from the neck 102 of the container 100 in such a way that the safety ring 3 still remains engaged with the lip 103, and in such a way that the cap 2 is not separated from the container 100, due to the presence, in the retaining ring 3, of abutment elements 300 configured to engage with the lip 103 at the bottom.

[0049] The abutment elements 300, as for example shown with reference to the first embodiment, can take the form of a circumferential rib 310, visible in figure 6a, which extends seamlessly around the entire circumference of the safety ring 3 to generate an undercut.

[0050] Alternatively, as for example shown with reference to the second embodiment, the safety ring 3 comprises a plurality of internal tabs 320, visible in figures 12a, 12b and 13a.

[0051] These tabs 320 extend upwards and inwards from the lower band 31, along the entire circumference of the safety ring 3.

[0052] Specifically, each tab 320 comprises a heel 301 configured abut against the lip 103.

[0053] The tabs 320 are partly facing the slot 30.

[0054] The cap 2 preferably has a symmetrical structure with respect to a plane passing through its central axis J.

[0055] Preferably, the cap 2 comprises a tooth 21 that extends below the inner wall 20.

[0056] The tooth 21 extends, preferably circumferentially, away from the inner wall 20.

[0057] In particular, the tooth 21 is interposed between the two arms 33.

[0058] The tooth 21 is configured to abut against the externally threaded portion 101 of the neck 100 when the cap 2 is in the opening configuration.

[0059] Thus the tooth 21 defines a maximum opening angle α of the cap 2, where this maximum opening angle α is less than 180° . In particular, the maximum opening angle α is defined by the inclination of the base of the cap 2 with respect to a plane K' parallel to the plane in which the circumferential development direction K lies, as shown in figure 9.

[0060] Preferably, the upper band 32 comprises for each arm 33 a junction bridge 34 between the end of the respective arm 33 and the cap 2.

[0061] The cap 2 therefore always remains connected to the neck 102 of the container 100 via bridges 34, and therefore arms 33.

[0062] In particular, each bridge 34 is connected to the cap 2 laterally to the tooth 21, if provided.

[0063] The arms 33 and the bridges 34 ensure that the cap 5 is never separated from the container 100, keeping

it constrained to the neck 102 by the safety ring 3.

[0064] Advantageously, it is possible to keep the container 100 and the closure element 1 connected even when the cap 2 is in the opening configuration.

[0065] Preferably, the junction bridges 34 are separated from the tooth 21 by two respective gaps 35.

[0066] Preferably, the bridges 34 extend transversally to the plane in which the circumferential development direction K lies when the cap 2 is in the closing configuration.

[0067] Still preferably, the bridges 34 extend substantially orthogonally to the plane in which the circumferential development direction K lies when the cap 2 is in the closing configuration.

[0068] Still preferably, the gaps 35 partly define the slot 30. In agreement, the slot 30 and the gaps 35 form, when the cap 2 is in the closed configuration, a single space that is enclosed between the base of the cap 2, the tooth 21, the arms 33 and the lower band 31.

[0069] Due to the presence of the gaps 35, the mobility of the arms 33 is further improved.

[0070] Preferably, the closure element 1 comprises first frangible joining elements 4 placed at the slot 30.

[0071] The first frangible joining elements 4 are in particular connecting the upper band 32 and the lower band 31 and are configured to break at a first passage of the cap 2 from the closing configuration to the opening configuration.

[0072] Preferably, the first frangible joining elements 4 are placed transversely to the plane in which the development direction K lies and are configured to break on a first passage of the cap 2 from the closing configuration to the opening configuration.

[0073] Still preferably, the first frangible joining elements 4 are placed substantially orthogonally to the plane in which the development direction K lies.

[0074] Preferably, the closure element 1, in addition to the first frangible joining elements 4, comprises second frangible joining elements 5.

[0075] The second frangible joining elements 5 are a connection between the cap 2 and the safety ring 3 and are configured to break on a first passage of the cap 2 from the closing configuration to the opening configuration.

[0076] Preferably, the second frangible joining elements 5 are placed transversely to the plane in which the development direction K lies.

[0077] More preferably, the second frangible joining elements 5 are placed substantially orthogonally to the plane in which the development direction K lies.

[0078] The second frangible joining elements 5 are preferably arranged evenly between the cap 2 and the safety ring 3, above the arms 33, except at the bridges 34.

[0079] Basically, prior to a first opening, the cap 2 is connected at the bottom to the safety ring 3 by means of both the second frangible joining elements 5 and the bridges 34.

[0080] After an initial opening, the cap 2 is connected

to the safety ring 3 exclusively via the bridges 34.

[0081] In particular, at a first opening, a rotation of the cap 2 about its central axis J, in the unscrewing direction, causes a displacement of the whole closing element 1 upwards in an axial direction, until the abutment elements 300 abut with the lip 103 of the neck 102 of the container 100, retaining the safety ring 3 until the second frangible joining elements 5 are completely broken.

[0082] At the same time, the first frangible joining elements 4 located at the slot 30 also break.

[0083] In accordance with the first embodiment, the closure element 1 includes at least one dragging tooth 7. This dragging tooth 7 is connected to the cap 2.

[0084] In particular, the dragging tooth 7 protrudes axially from the cap 2 towards the safety ring 3 and is configured to abut with the safety ring 3.

[0085] When the closure element 1 is mounted on the neck 102 of the container 100, and in particular is rotated with respect to the central axis J during such mounting, the dragging tooth 7 associated with the cap 2 drags the safety ring 3 together with the cap 2. In this way, when mounting the closure element 1 on the container 100, it is possible to avoid straining the first and second joining elements 4, 5.

[0086] In particular, in accordance with this embodiment, the retaining ring 3 has a protrusion 9 projecting in an axial direction towards the cap 2, which is configured to abut with the dragging tooth 7.

[0087] The dragging tooth 7 preferably extends seamlessly from the cap 2, similarly to the tooth 21, and has a pointed shape.

[0088] Preferably, the closure element 1 comprises two or more dragging teeth 7. More preferably, the closure element 1 comprises three dragging teeth 7, two of which are located at the arms 33, as illustrated for example in figures 1, 3 and 4, and one at the tooth 21, as illustrated for example in figure 2.

[0089] In the case of the dragging tooth 7 placed at the arms 33, the safety ring 3 has a recess 8 in the upper portion of the arm 33 at the dragging tooth 7. This recess 8 defines the protrusion 9 with one of its walls.

[0090] A container 100 comprising the closure element 1 described above also forms part of the present invention.

[0091] In particular, the container 100 has a neck 102 having an externally threaded portion 101 to be coupled with the substantially cylindrical threaded inner wall 20 of the cap 2. The container 100 also has a lip 103 that retains the safety ring 3 of the closure element 1 at the bottom.

[0092] The tethered closure element 1 for containers 100 of the type tethered to the container 100 thus conceived, and the container 100 comprising such closure element 1, are susceptible to numerous modifications and variations all within the scope of the inventive concept.

[0093] Furthermore, all the details can be replaced by other technically equivalent elements.

[0094] In practice, any materials can be used according to requirements, as long as they are compatible with the specific use, the dimensions and the contingent shapes.

Claims

1. Closure element (1) for containers (100), said closure element (1) being of the tethered type and comprising:

- a cap (2) comprising a substantially cylindrical threaded inner wall (20), configured to couple with an externally threaded portion (101) of a neck (102) of a container (100);
- a safety ring (3) configured to fit on said neck (102) and shaped to be retained below a lip (103) of the neck (102) of the container (100); said safety ring (3) having a slot (30) extending for a first arc of circumference, mainly along a circumferential development direction (K); said slot (30) partially dividing said safety ring (3) into a lower band (31) and an upper band (32) separate from the lower band (31); said upper band (32) defining with the slot (30) two arms (33) connected to said cap (2);

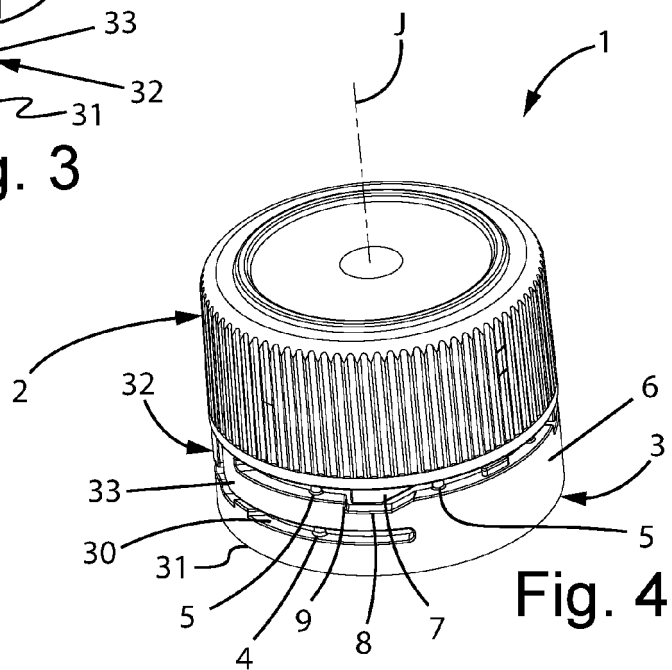
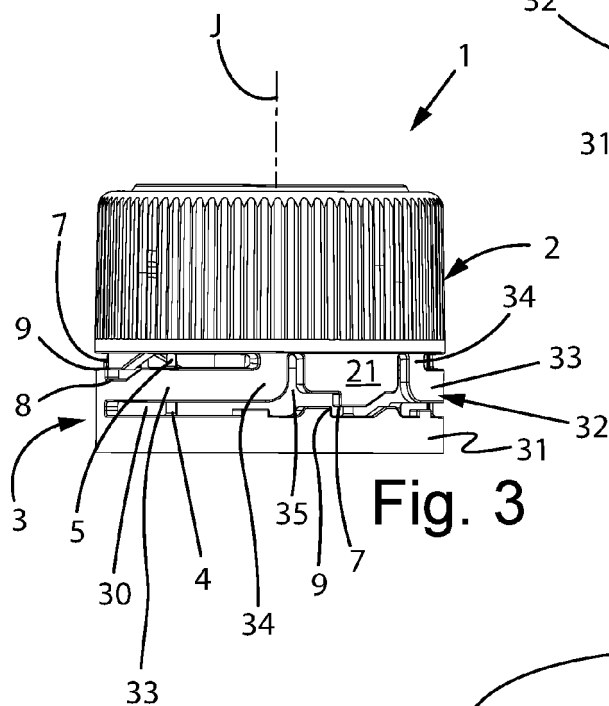
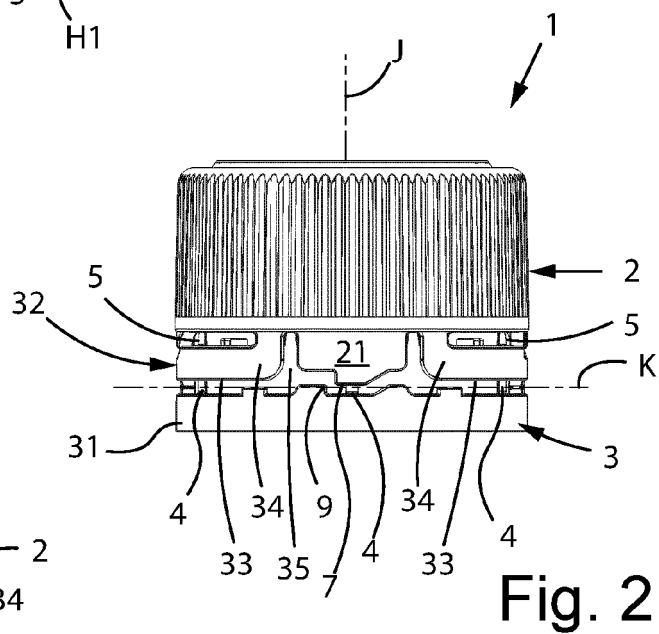
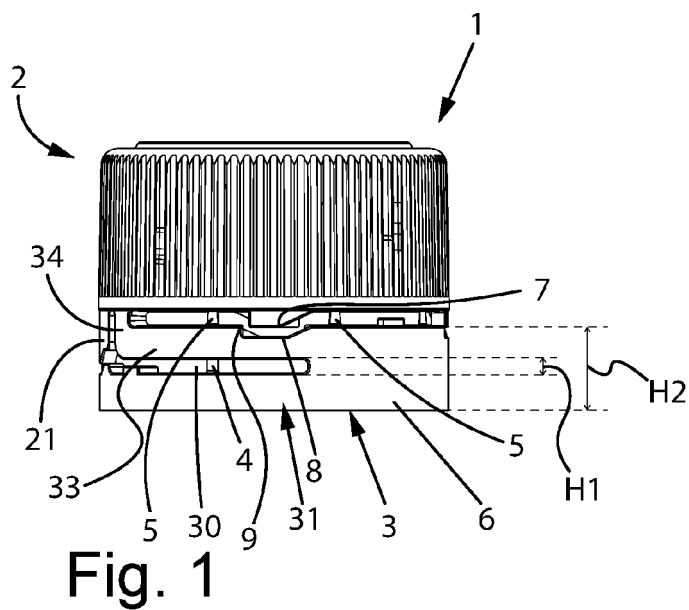
said cap (2) being configured to switch between a closing configuration in which it is coupled to the neck (102) of the container (100) and an opening configuration in which it is uncoupled from the neck (102); said slot (30) being configured to allow a deformation of said two arms (33) to allow the coupling and/or uncoupling of said cap (2) to/from said neck (102) in the passage from said closing configuration to said opening configuration and vice versa; said two arms (33) being deformed when said cap (2) is in said opening configuration.

2. Closure element (1), according to the preceding claim, wherein in the closing configuration said arms (33) extend along two respective arcs of circumference belonging to the same circumference.
3. Closure element (1), according to claim 1 or 2, wherein said cap (2) comprises a tooth (21) extending below said inner wall (20) and away from said inner wall (20), said tooth (21) being configured to abut said externally threaded portion (101) when said cap (2) is in the opening configuration.
4. Closure element (1), according to any one of the preceding claims, wherein said upper band (32) comprises for each arm (33) a junction bridge (34) between the end of the respective arm (33) and the cap (2); each bridge (34) being connected to the cap (2) at a side of said tooth (21); said junction bridges (34)

being separate from said tooth (21) by means of two respective gaps (35) .

(20) of the cap (2), said container (100) having a lip (103) retaining at its bottom the safety ring (3) of said closure element (1).

5. Closure element (1), according to the preceding claim, wherein said gaps (35) partly define said slot (30). 5
6. Closure element (1) according to claim 4 or 5, wherein said bridges (34), when the cap (2) is in the closing configuration, extend transversely, preferably substantially orthogonally, to the plane in which said circumferential development direction (K) lies. 10
7. Closure element (1) according to any one of the preceding claims, comprising first frangible joining elements (4) placed at the slot (30), for connecting the upper band (32) and the lower band (31); said first frangible joining elements (4) being placed transversely, preferably substantially orthogonally, to the plane in which said development direction (K) lies and being configured to break at a first passage of the cap (2) from the closing configuration to the opening configuration. 15
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8. Closure element (1), according to any one of the preceding claims, wherein said safety ring (3) and said cap (2) are spaced apart from each other; said closure element (1) comprising second frangible joining elements (5) for connecting the cap (2) and the safety ring (3); said second frangible joining elements (5) being placed transversely, preferably substantially orthogonally, to the plane in which said development direction (K) lies and being configured to break at a first passage of the cap (2) from the closing configuration to the opening configuration. 25
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9. Closure element (1) according to any one of the preceding claims, wherein said safety ring (3) has a side band (6) seamlessly extending from said upper band (32) and from said lower band (32) for a third arc of circumference complementary to said first arc. 40
10. Closure element (1) according to any one of the preceding claims, comprising one or more dragging teeth (7) connected to the cap (2); the safety ring (3) having a protrusion (9) which protrudes in an axial direction towards the cap (2), said protrusion (9) being configured to abut with the dragging tooth (7). 45
11. Closure element (1) according to any one of the preceding claims, wherein said first arc subtends an angle greater than 180° and less than 270°. 50
12. Container (100) comprising a closure element (1) according to any one of the preceding claims, said container (100) having a neck (102) having an externally threaded portion (101) which can be coupled with a substantially cylindrical threaded inner wall 55



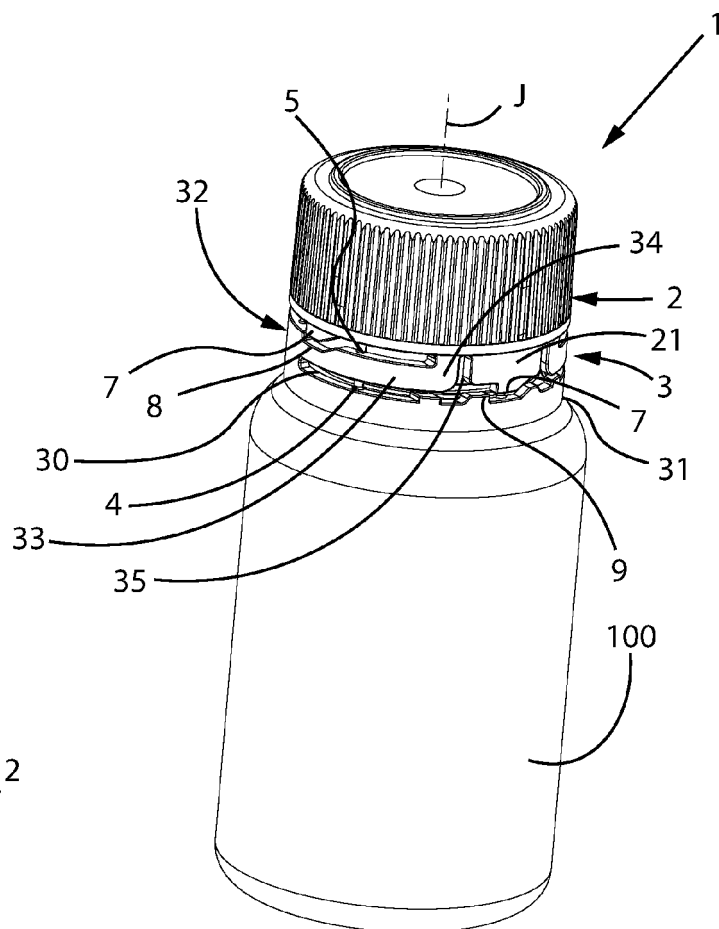


Fig. 5

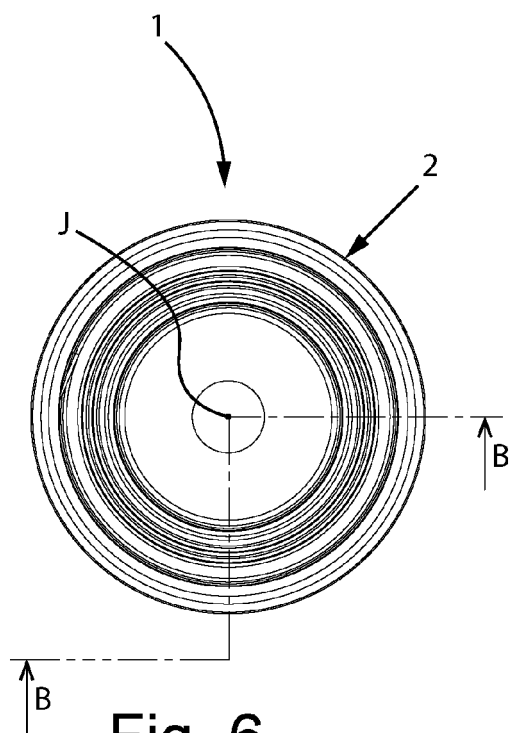


Fig. 6

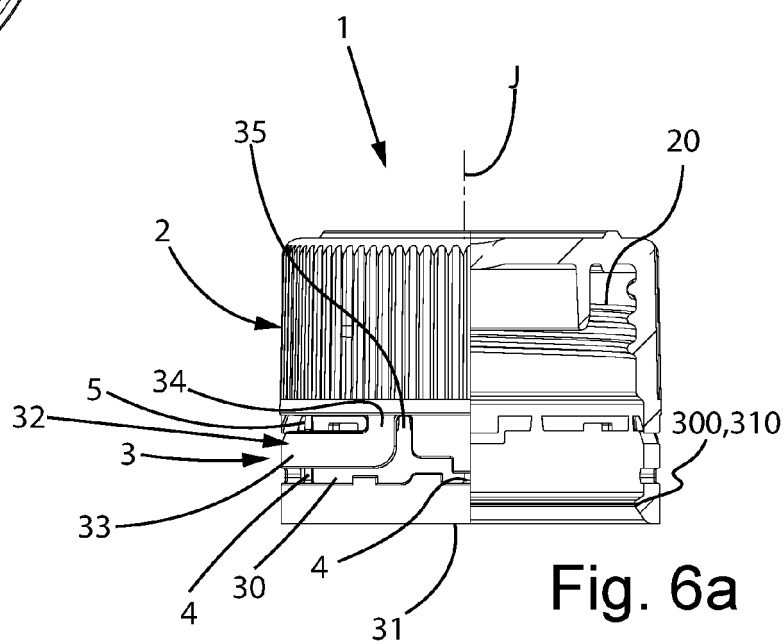
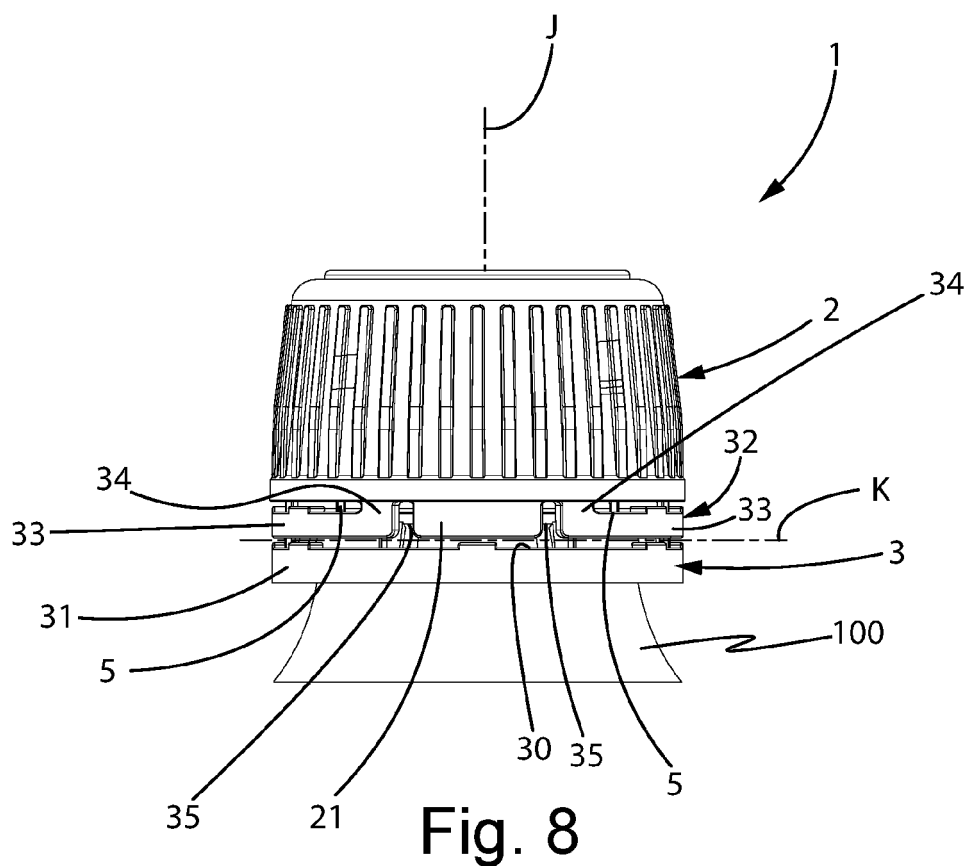
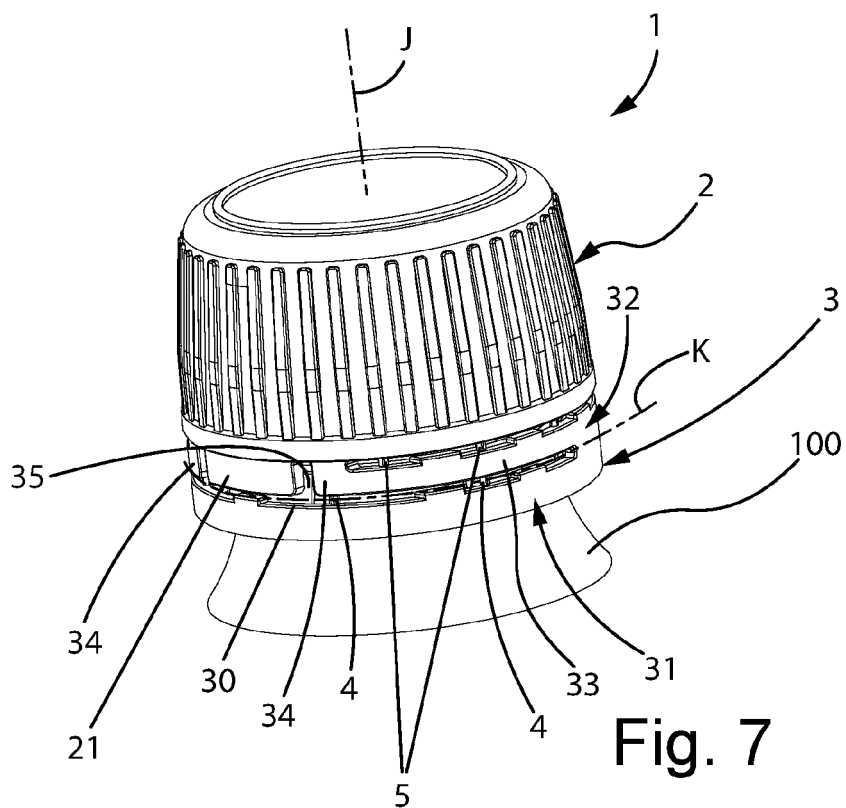
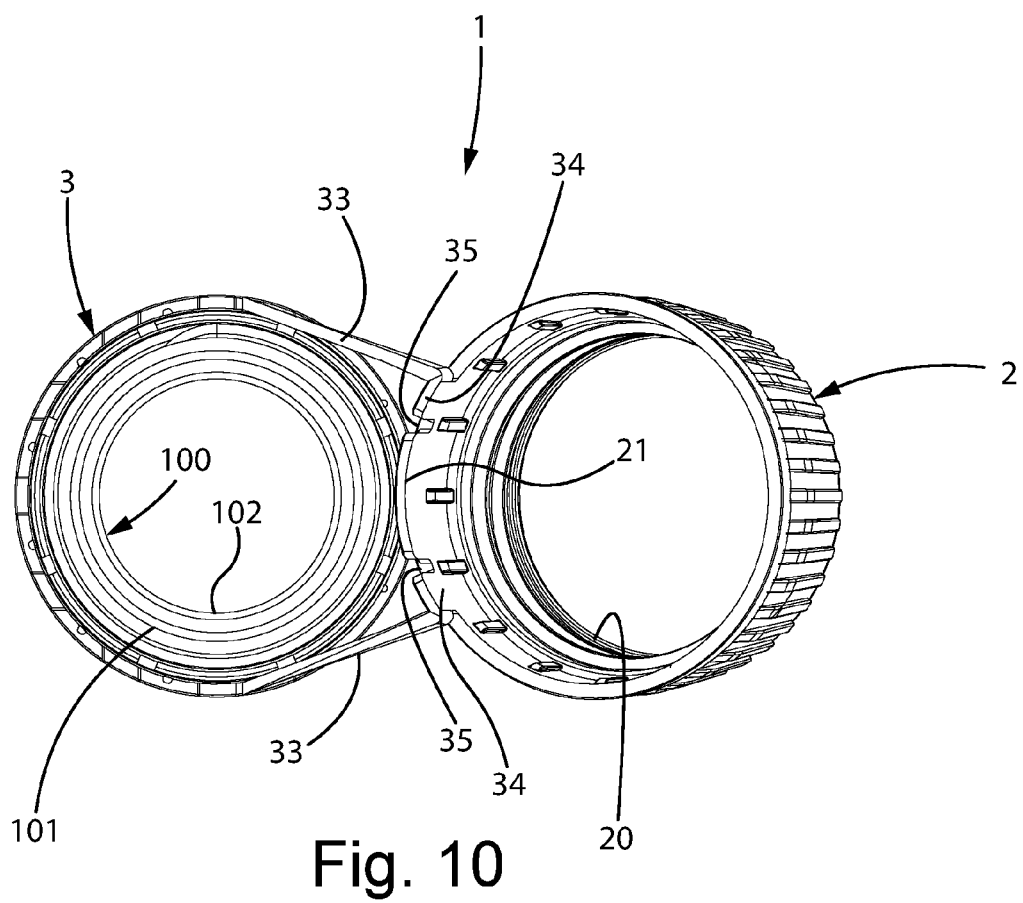
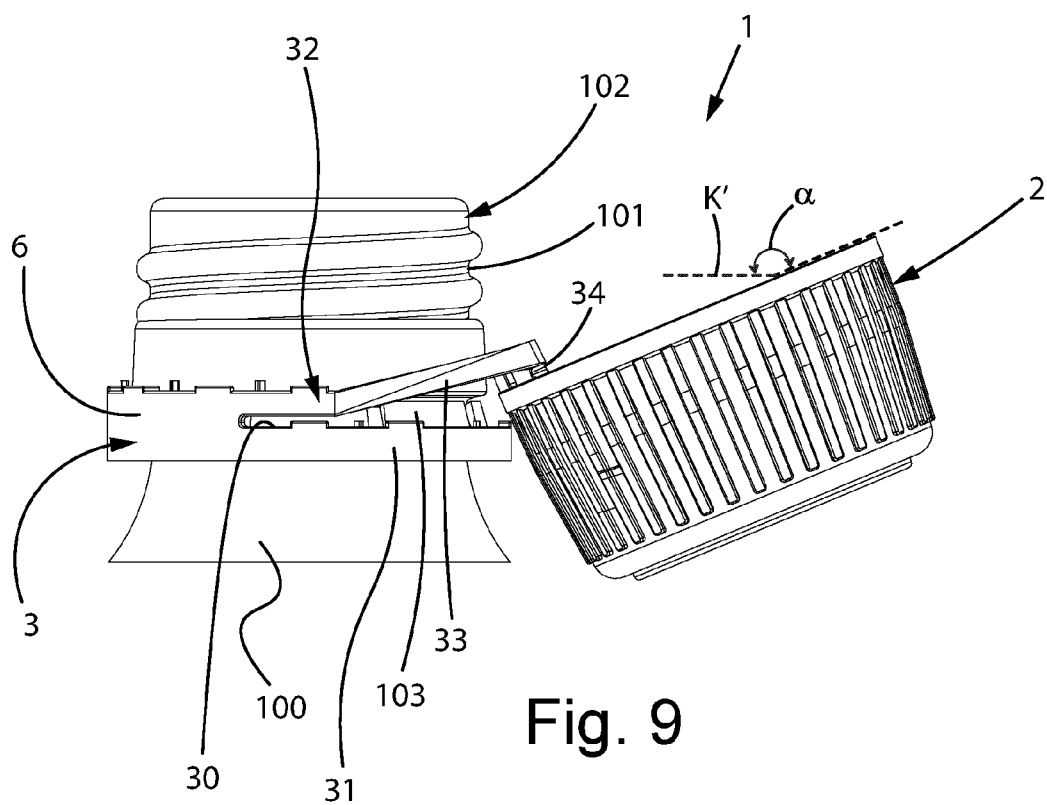
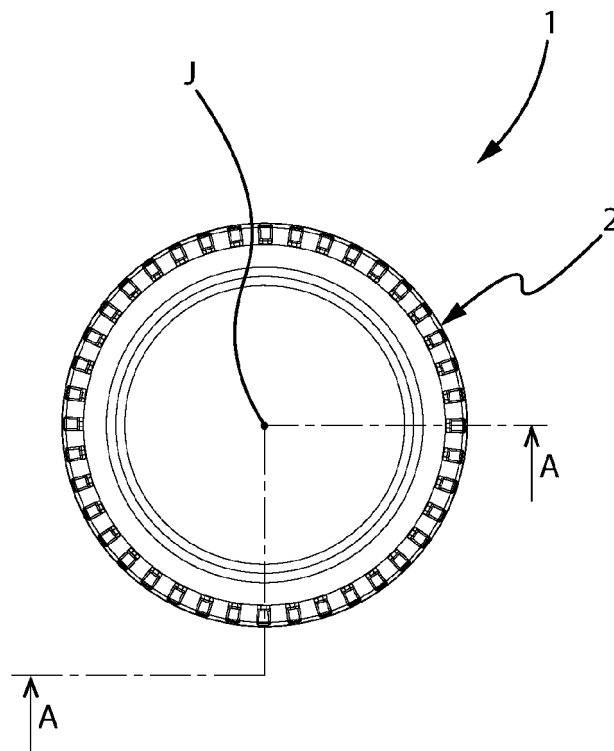
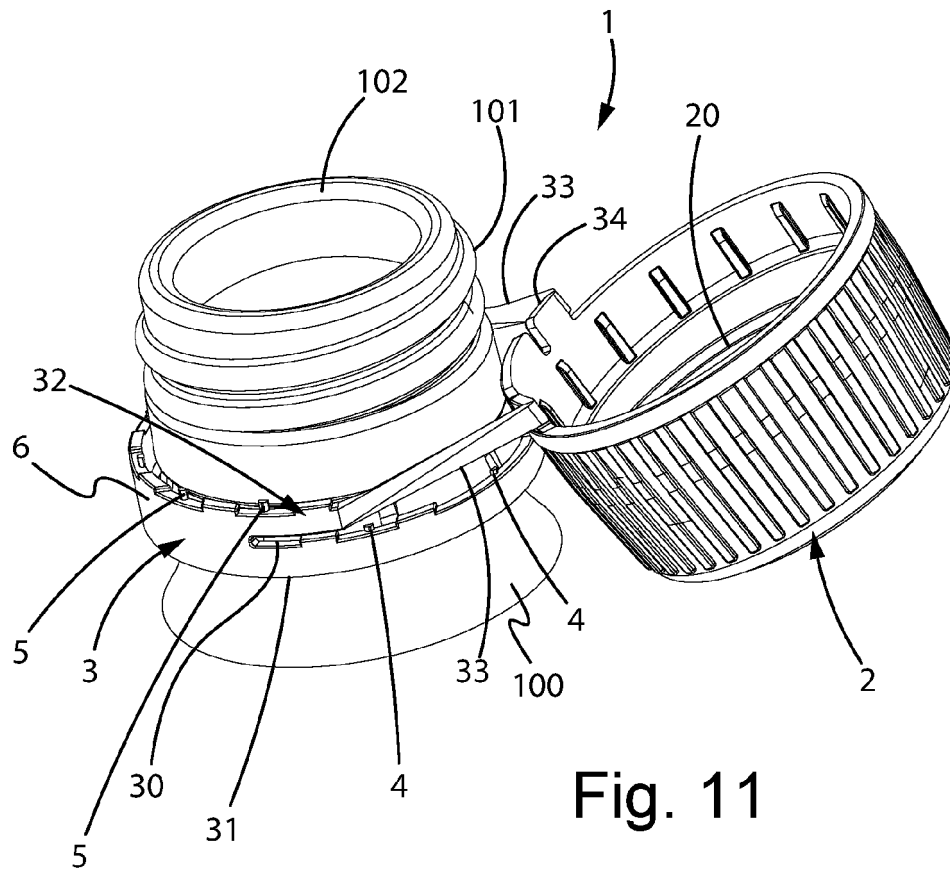
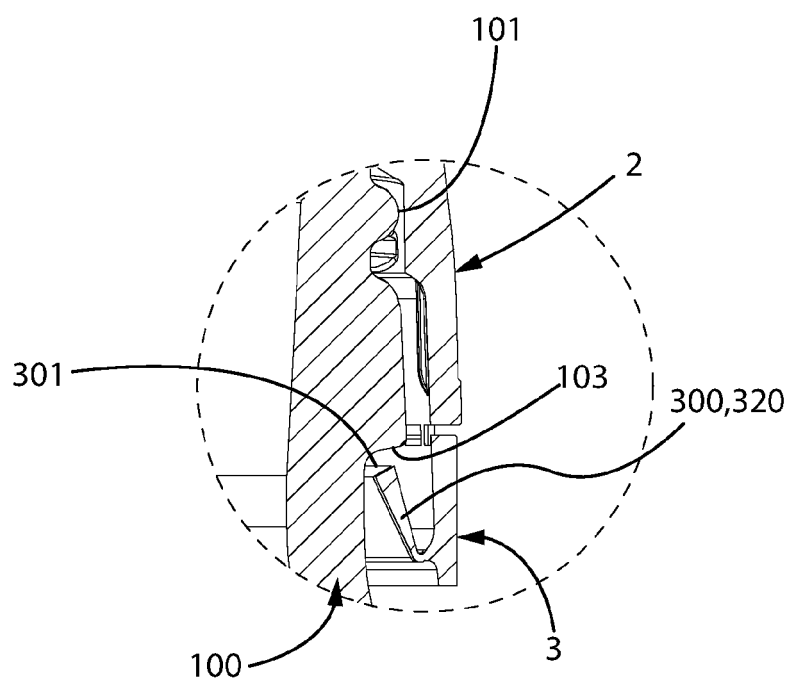
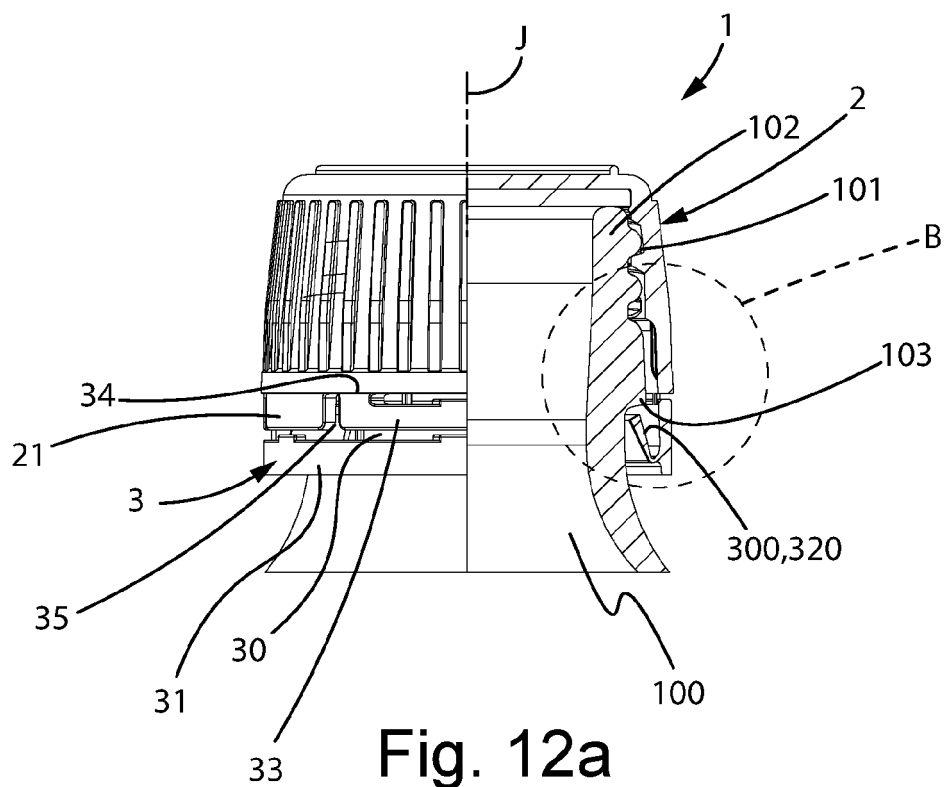


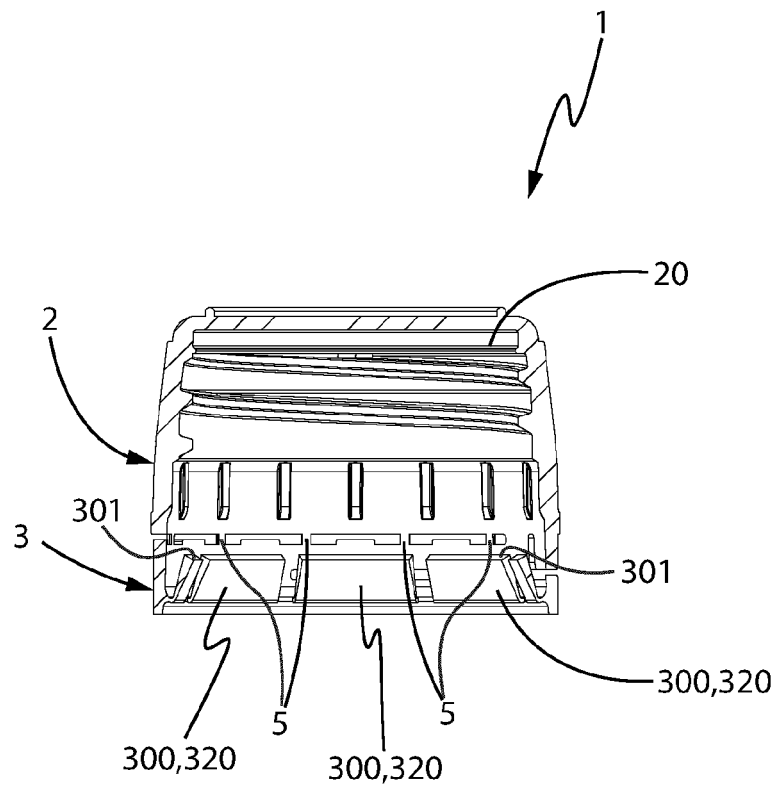
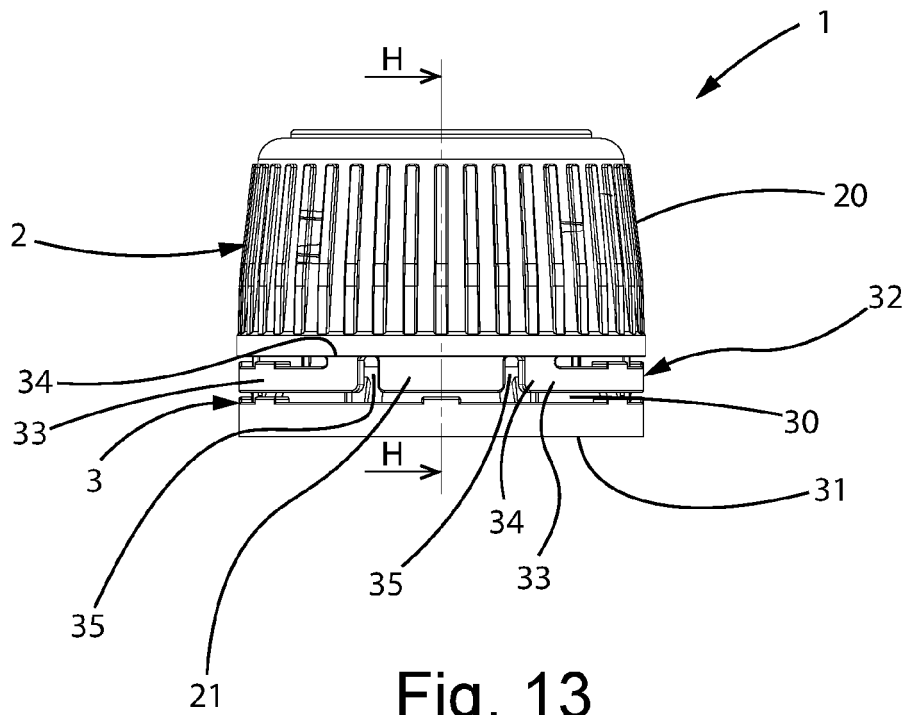
Fig. 6a













EUROPEAN SEARCH REPORT

Application Number

EP 23 18 1899

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	WO 2021/013370 A1 (OBRIST CLOSURES SWITZERLAND [CH]) 28 January 2021 (2021-01-28) * abstract; figures 1,3,7 * * page 3, line 35 - line 37 * -----	1-9, 11, 12	INV. B65D41/34 B65D55/16
X	DE 20 2021 101375 U1 (UNITED CAPS FRANCE [FR]) 22 June 2021 (2021-06-22) * abstract; figures 1,5,6 * -----	1-9, 12	
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A	US 5 402 901 A (CARVALHEIRO JOSE [FR] ET AL) 4 April 1995 (1995-04-04) * abstract; figure 1 * -----	1-12	
			TECHNICAL FIELDS SEARCHED (IPC)
			B65D
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		5 July 2023	Tempels, Marco
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	

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ANNEX TO THE EUROPEAN SEARCH REPORT
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5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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