



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
21.03.2018 Bulletin 2018/12

(51) Int Cl.:
B65D 41/04 (2006.01) B65D 51/22 (2006.01)

(21) Application number: **17191694.3**

(22) Date of filing: **18.09.2017**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
MA MD

(30) Priority: **20.09.2016 EP 16189723**
20.09.2016 EP 16189722
29.11.2016 EP 16201198

(71) Applicant: **Tetra Laval Holdings & Finance S.A.**
1009 Pully (CH)

(72) Inventors:
• **DANIELSSON, Anders**
242 91 Hörby (SE)
• **ROSBURG, Robert**
242 34 HÖRBY (SE)
• **JOHANSSON, Göran**
241 75 STEHAG (SE)
• **OLSSON, Leif**
268 72 Teckomantorp (SE)
• **PETERSSON, Viktor**
245 64 Hjärrup (SE)

(74) Representative: **Tetra Pak - Patent Attorneys SE**
AB Tetra Pak
Patent Department
Ruben Rausing's Gata
221 86 Lund (SE)

(54) **A CAP AND NECK ASSEMBLY FOR A FOOD PACKAGE**

(57) A cap and neck assembly for closing an upper end of a package (10) is provided. The neck (20) is formed by a tubular member (110) being provided with external threads (22), and an upper tubular portion (120) extending from the tubular member (110) and being releasably attached to a membrane (150) closing an upper end of said upper portion (120). The cap has a lower portion (31) being provided with internal threads (32) for engagement with the threads (22) of the neck (20), and an upper portion (33) being provided with at least one cutting element (50) configured to separate the membrane (150) from the neck (20). When the cap (30) is threaded onto the neck (20) to its axial end position for the first time prior to separating the membrane (150) from the neck (20), the axial distance between a cutting edge (54) of the cutting element (50) and the membrane flange (170) is less than 1 mm.

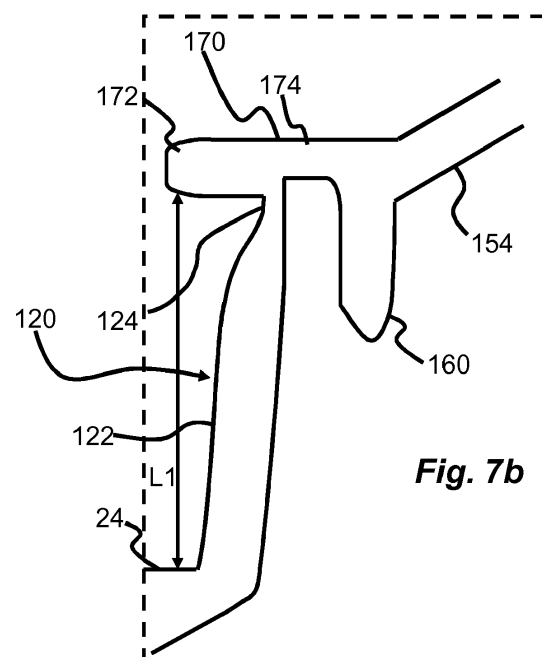


Fig. 7b

Description

Technical Field

[0001] The present invention relates to a cap and neck assembly for a food package. In particular, the present invention relates to a cap and neck assembly, of which the neck has a membrane sealing an open end of said neck.

Background

[0002] Food packages are generally provided with an opening device in order to facilitate discharging of the enclosed food product. The opening device may either be an irreversible opening, i.e. once the package is opened it may not be closed, or a recloseable opening device. In order to extend the shelf-life and quality of the food product the latter is often desired. A common way of providing a recloseable opening device is to arrange a threaded neck including a pouring spout on the upper part of the package. The threaded neck is designed such that it may receive a cap, having internal threads such that the cap is capable of being unscrewed from the neck. Since the cap covers the open spout of the neck, the enclosed food product is protected from the outer environment and the quality of the product may thus be preserved during some time.

[0003] Although the above solution provides an improvement over the irreversible openings which always remain open, it is still possible for polluted media to enter the interior of the package via the neck/cap interface, e.g. via the threads. Hence, further improvements have been proposed for sealing the open spout of the neck when the package is stored.

[0004] In WO2011144569 a solution is described in which the spout is provided with a membrane. The membrane, which initially is connected to the spout leaving the spout perfectly closed, is cut from the spout during an opening action, i.e. when the cap is unscrewed from the neck.

[0005] Based on the same general concept, WO2013072475 describes a cap and neck assembly having a membrane for sealing the food package. The membrane is shaped such that it is angled at an outer end towards the inner sidewalls of the spout thereby allowing for improved re-sealing of the food package when the cap is screwed onto the neck.

[0006] In SE1650567-9 a yet further solution is disclosed, providing additional advantages to resealing of the spout. The invention is based on the provision of a tubular member, at one end connected to the membrane at a position radially inwards of the sidewalls of the neck, which tubular member is used to seal against the sidewalls of the neck. The free end of the tubular member has an angled surface for sliding the membrane on the inner walls of the neck when sealing and/or re-sealing.

[0007] Although the above-mentioned solutions pro-

vide well-proven and reliable re-sealing of packages, it has been realized that further improvements are desirable especially in terms of the cutting action, i.e. when the membrane is initially cut loose from the spout. If the membrane is not cut properly re-sealing may be affected negatively. This is particularly important when considering necks of different materials. High-density polyethylene is normally used as a base material for the neck of the package, however specific neck materials will give rise to different physical properties of the final neck. For example, while one material type may provide a comparatively stiff and brittle neck another material type may provide a more flexible and rubbery neck. While different types of packages may require different neck materials, it would still be advantageous to use the same cap. As is easily realized, the cutting action of the cap will then not be the same for different neck materials.

[0008] Thus, there is a need for a neck which allows for enhanced cutting action.

Summary

[0009] It is, therefore, an object of the present invention to overcome or alleviate the above described problem.

[0010] According to a first aspect, the solution is provided by a cap and neck assembly for closing an upper end of a package, The assembly comprises a neck forming part of an upper end of a package, the neck comprising a tubular member being provided with external threads, and an upper tubular portion extending from the tubular member and being releasably attached to a membrane closing an upper end of said upper portion, the membrane having a membrane flange protruding radially outside the tubular member. The assembly also comprises a cap in the form of a tubular body having a lower portion being provided with internal threads for engagement with the threads of the neck, and an upper portion forming a closed upper end, the upper portion being provided with at least one cutting element configured to separate the membrane from said tubular member of the neck. When the cap is threaded onto the neck to its axial end position for the first time prior to separating the membrane from the neck, the axial distance between a cutting edge of the cutting element and the membrane flange is less than 1mm.

[0011] According to a second aspect, the solution is provided by a package comprising a cap and neck assembly mentioned earlier as the first aspect of the solution.

Brief Description of the Drawings

[0012] The above, as well as additional objects, features, and advantages of the present invention, will be better understood through the following illustrative and nonlimiting detailed description of preferred embodiments of the present invention, with reference to the appended drawings, wherein:

Fig. 1 is a schematic view of a package having a cap and neck assembly according to an embodiment;
 Fig. 2a is a cross-sectional view of a cap for use with a neck according to various embodiments;
 Fig. 2b is a cross-sectional view of a neck according to an embodiment;
 Fig. 2c is a top view of a cutting element for separating a membrane from a neck according to an embodiment;
 Figs. 3-6 are cross-sectional views of an assembly comprising a neck and cap during closing of the spout;
 Fig. 7a is a cross-sectional view of a neck according to an embodiment;
 Fig. 7b is an enlarged section of a part of the neck shown in Fig. 7a;
 Fig. 8 is a cross-sectional view of parts of a cap and neck assembly according to an embodiment; and
 Fig. 9 is a diagram showing decapping according to an embodiment.

Detailed Description

[0013] With reference to Fig. 1 an example of a food package 10 is schematically shown. The food package 10 has a shape of a bottle formed by a body portion 11, which may preferably be made of a carton-based laminate and a top portion 12, which may preferably be made of plastic. The top portion 12 is provided with a neck 20 forming the upper part of the plastic top portion 12. The neck 20 may be integrally formed with the top portion 12, such that the entire top portion 12, including the neck 20, may be manufactured as a single piece.

[0014] A cap 30 is arranged onto the neck for sealing a spout 100 (see e.g. Fig. 2b) forming the upper end of the neck 20. The cap 30 may optionally be provided with a tamper ring 40 as is well known in the art. The cap 30 and neck 20 together forms a cap and neck assembly.

[0015] The package 10 may be manufactured by first forming a sleeve of the carton-based laminate, i.e. a tubular body extending between two open ends. In a second step, performed before, after, or in parallel with the sleeve forming, the plastic top portion 12 is manufactured by molding. The plastic top portion 12 may, as is shown in Fig. 1, comprise a shoulder section 13 arranged below the neck 20 and to which the tubular body is later attached. The shoulder section 13 is thus arranged to connect the sleeve, which forms basis for the body portion 11, to the neck 20. The neck 20 is preferably provided with threads for engaging with corresponding threads of the cap 30 including the tamper ring 40. As previously explained, the neck 20 and the shoulder section 13 may be provided as one piece, or as two separate pieces which are molded together.

[0016] After the cap 30 is screwed onto the top portion 12 the sleeve is filled with food content. Preferably, this is done by turning the sleeve and the top portion 12 assembly upside down, such that the remaining open end

of the sleeve is facing upwards. After being filled the open end of the sleeve may be sealed and folded to a flat bottom as illustrated in Fig. 1.

[0017] Alternatively, the cap 30 is screwed onto the top portion 12 after the package 10 is filled. This may e.g. be the case if the neck 20 is provided with a membrane 150 (see Fig. 2b and onward) sealing the spout 100 of the neck 20, which will be described in more detail below.

[0018] Now turning to Figs. 2a and 2b details of the neck 20 and cap 30, i.e. the cap and neck assembly, will be described further. The cap 30, including the tamper ring 40, is shown in Fig. 2a. The cap 30 has a lower portion 31 being provided with internal threads 32. The threads 32 are configured to engage with corresponding threads 22 of the neck 20 (see e.g. Fig. 2b). The lower portion 31 extends into an upper portion 33 which forms the closed upper end of the cap 30. The interior of the upper portion 33 is provided with means for separating the membrane 150 from the neck 20, as well as for retaining the cut-off membrane 150.

[0019] For this purpose, following the threads 32 cutting elements 50 are arranged. The purpose of the cutting elements or knives 50 is to penetrate a section of the neck 20, immediately below the membrane 150, and to separate the membrane 150 from the rest of the neck 20. After that step, the cutting elements 50 serve the purpose of securing the membrane 150 in an axial position (i.e. along the A-axis in Fig. 2A) between the cutting elements 50 and the interior of the top part of the upper portion 33. This will reduce the amount of litter generated, yet the main technical reason is that the membrane 150 serves an important purpose when resealing the closure. There are a number of cutting elements 50 distributed around the perimeter of the upper portion 33. In the present embodiment there are five. The exact number of cutting elements 50 will depend on several factors, yet one important factor is the rising of the threads 32. The cutting action is effected when unscrewing the cap 30 for the first time, and the cutting elements 50 will follow the rotational motion of the cap 30 as well as the axial movement thereof, all relative to the neck 20. This implies that the cutting action, or "removal action" to be more general, have to be finalized within a certain turning angle since otherwise the axial movement will move the cutting element 50 out of reach from the area to be cut. Hence, the steeper the rising of the threads, the more cutting elements 50 are needed.

[0020] On the other hand, each cutting element 50 will generate a torque resistance when the cap 30 is unscrewed the first time, and in order to reduce the opening torque to acceptable levels it is not wise to have too many cutting elements 50. Hence, for the present embodiment five cutting elements 50 have been used, yet it is up to the skilled person to deduce a suitable number. In general, one cutting element 50 is sufficient to perform the cutting action in order to separate the membrane 150 from the neck 20. However, it has been found that at least three cutting elements 50 are necessary to perform the

cutting and the membrane 150 retaining action, after the membrane 150 has been cut off from the neck 20.

[0021] At about the same axial position as the cutting elements 50 stop elements 60 are arranged. In the present embodiment the stop elements 60 are realized by stop ledges, i.e. flanges extending from the top part of the upper portion 33 down to a specific axial position, and a small distance radially inwards. It should be noted that within the context of this specification, all references to "axial" or "radial" should be interpreted as shown by the dashed arrows in Fig. 2a. The axial direction is indicated by the letter "A", while the radial direction is indicated by the letter "R".

[0022] In the present embodiment there are a total of five stop ledges 60 and they are dimensioned so as to allow for the membrane 150 to fit between them. The purpose of the stop elements 60 is to prevent the cap 30 from being screwed too far down (i.e. in a closing direction) onto the neck 20, and thus to prevent damage to the membrane 150 during resealing the closure after initial opening. The stop elements 60 of the cap 30 cooperate with a counter element 24 of the neck 20 (see Fig. 2b). In this embodiment the counter element 24 is represented as a shoulder extending radially outwards.

[0023] There are other means for preventing the cap 30 from rotating any further once it has reached a certain position on the neck 20. Examples include various stop arrangement in the thread 32, may it be a physical block at the end of the threads 22 of the neck 20 which the threads 32 cannot override, or a change in the rising of the threads 22 of the neck 20 preventing further rotation of the cap 30. As the skilled reader realizes there are more options available. The solution used in the present embodiment is simple, straightforward, does not involve any other operational parts of the cap 30 or neck 20, as well as being predictable, straightforward and providing a distinct stop.

[0024] An example of a cutting element 50 is shown in further details in Fig. 2c. In this drawing the cutting element 50 is shown from above. As is clearly shown the cutting element 50 is attached to the inner perimeter of the cap 30, at an axial position indicated in Fig. 2a. Importantly the cutting element 50 is allowed to pivot by means of a hinge connection with the inner perimeter of the cap 30. The hinge connection is in this embodiment realized by a reduced thickness at an area 52 immediately adjacent to the inner perimeter of the cap 30.

[0025] Each cutting element 50 may be provided with a cutting edge 54 and a free end 56. The free end 56 is located remote to the hinged attachment 52 and it may preferably be blunt, and less sharp than the cutting region 54. The result is the benefit that the free end 56 is not prone to damage the connection region between the membrane 150 and the rest of the neck 20 when it is not supposed to. This may e.g. be important when the cap 30 is arranged on the neck 20 for the first time.

[0026] Now turning to Figs. 3-6 a description of the engagement between the cap 30 and the neck 20 will be

given.

[0027] Starting in Fig. 3, the cap 30 is assumed to be screwed onto the neck 20 for the first time, i.e. when the membrane 150 is attached to the neck 20. As can be understood by Fig. 3, the cutting elements 50 will bend downwards when the cap 30 is unscrewed from the neck 20, whereby the cutting elements 50 will be urged inwards and thus cut off the membrane 150 from the neck 20 once the cap is unscrewed from the neck 20.

[0028] Preferably, the cutting elements 50 are biased to an idle position in which they protrude over a radially outer part of the membrane 150, more specifically a free end of the cutting elements 50 extend past a circumferential edge of the membrane 150. Hence, the cutting elements 50 will retain the membrane 150 within the cap 30 after the cap 30 has been completely unscrewed from the neck 20.

[0029] Now turning to Figs. 4-6, a closing sequence of a cap and neck assembly is shown. Prior to such sequence, it is assumed that the cap 30 has once been unscrewed from the neck 20 such that the membrane 150 has been separated from the neck 20, while still being retained at the inner upper portion of the cap 30 by means of the cutting elements 50.

[0030] Starting with Fig. 4, the cap 30 has been screwed onto the neck 20. As the cutting elements 50 are retaining the membrane 150 initially, the cutting elements 50 will however be disengaged from the membrane 150 when the membrane 150 is reaching the open end of the neck 20. Hence, as is shown in Fig. 4, the membrane 150 will rest on the open end of the neck 20 while the cap 30 moves down the neck 20 due to the provision of the threads, converting a rotational movement to a vertical movement.

[0031] In Fig. 4, the membrane 150 is on its upper side in contact with the closed end of the cap 30, while it rests on the open spout 100 of the neck 20 on its lower side.

[0032] When the cap 400 is screwed further downwards, as is shown in Fig. 5, the closed end of the cap 30 will interact with the membrane 150 thus pressing it downwards. Hence, the membrane 150 will flex such that its diameter increases, whereby a sealing lip 160 of the membrane 150 moves towards the interior side of the upper end of the neck 20.

[0033] This procedure is continued as the cap 30 is further rotated down the neck 20. In Fig. 6 the cap 30 is tightly screwed onto the neck 20, and the membrane 150 has been subjected to an increased flexing. Hence, the sealing lip 160 is urged radially outwards until it contacts the interior wall of the neck 20. At the same time, the upper end of the spout 100 engages with a membrane flange 170 such that the membrane 150 is arranged in the desired sealing position. The membrane 150 thus seals the open end of the neck 20 such that the outer environment is unable to affect the food product enclosed within a package equipped with the neck 20, including the membrane 150, and the cap 30.

[0034] Now turning to Figs. 7a-b details of the neck 20

will be described. Prior to opening of the package the neck 20 comprises the membrane 150, however once opened the membrane 150 is separated from the neck 20. In Fig. 7a the neck 20 is shown prior to opening of the package, i.e. the membrane 150 forms part of the neck 20. As indicated in Fig. 7a, the neck 20 extends from the shoulder section 12 and upwards.

[0035] The neck 20 is formed by a tubular member 110 extending from the shoulder 24 of the neck and upwards. The tubular member 110 is provided with the threads 22, and its axial end position is defined as coinciding with counter element 24. From here, the neck 20 extends further upwards by means of an upper portion 120 forming a main body 122 and an upper end portion 124. The upper end portion 124 forms the connection to the membrane 150. During opening, the cutting elements 50 of the cap 30 will cut through the upper end portion 124 such that the membrane 150 is separated from the upper portion 120.

[0036] The membrane 150, forming a circular closure of the neck 20, comprises a central circular disc member 152 and an outer annular disc member 154. The outer annular disc member is arranged radially in between the central circular disc member 152 and a membrane flange 170.

[0037] As can be seen in Fig. 7a the outer annular disc member 154 is connected to the central circular disc member 152 at an angle α , and the membrane flange 170 is connected to the outer annular disc member 154 at an angle β . These angles facilitates the flexing of the membrane 150 during re-sealing, such that the entire diameter of the membrane 150 may increase as the angles α , β increases due to a downward pressing action at the centre of the membrane 150. Upon such increase of the membrane's 150 diameter, a sealing lip 160 will be urged towards the inner sidewalls of the upper portion 120. In an idle position where no downward force is applied to the membrane 150 the sealing lip 160 is projecting downwards.

[0038] In Fig. 7b, showing an enlarged portion of the neck 20, the connection between the upper portion 120 and the membrane 150 is shown in further detail, as well as details of the upper portion 120 of the neck 20. The membrane flange 170 is formed by two adjoining parts; an outer portion 172 which extends radially outside the upper end portion 124 of the upper portion 120, and an inner portion 174. The upper end portion 124 of the upper portion 120 is attached to the interface between the inner and outer portions 172, 174 of the membrane flange 170.

[0039] The upper portion 120 has a certain axial length L1. The axial length L1 is preferably defined as the distance between the counter element 24 and the membrane flange 170. In a preferred embodiment, the axial length L1 is between 5mm and 5,5mm.

[0040] The inventors have surprisingly found that the dimensions of the upper portion 120, i.e. the axial length L1, is an important feature in order to improve the robustness of the opening action of the cap/neck assembly.

Especially, the axial length L1 determines the position of the cutting elements 50 relative the membrane 150 when the cap 30 is initially screwed onto the neck 20. By reducing the axial length L1 to approximately 5-5,5mm, the cutting elements 50 will be positioned closer to the membrane 150 which means that an extended opening angle is achieved. This means that the cutting elements 50 will engage sooner with the membrane 150, thus reducing the risk for an unfinished cutting action when the threads 22, 32 disengage.

[0041] In Fig. 8 the relationship between the cutting elements 50 and the membrane 150 is shown in further detail. In Fig. 8 the position of the cap 30 corresponds to a fully capped position, i.e. the tamper ring 40 prevents further downward rotation of the cap 30. At this position, the cutting elements 50 are positioned below the membrane flange 170, such that the axial distance D1 between the cutting edge 54 of the cutting elements 50 and the membrane flange is below 1 mm. In the shown example, the axial distance D1 is approximately 0,7mm. The threads 22, 32 are preferably configured such that the axial end position of the cap 30, for the first time prior to separating the membrane 150 from the neck 20, is reached after rotating the cap 30 between 300° and 315°.

[0042] The axial length D2 of the upper portion 33 of the cap 30 measured from the inside surface of the recessed portion 34 of the cap 30 until the end 62 of the stop elements 60 is for this purpose selected to be between 5mm and 6mm, such that the neck 20 fits within the cap 30. D2 should be chosen such that the force exerted by the cap 30 onto the membrane 150 should not be too high, since this may cause the membrane to arch in the direction of the interior of the package thus moving the membrane flange 170 and the sealing lip 160 away from neck portion 100 of the container. Such a movement may result in a local loss of sealing between the sealing lip 160 and the neck portion 100. Moreover, another parameter that may be adjustable in order to achieve an optimal resealing result is the axial length D3 between the inner surface of protruding portion 35 of the cap 30 and the inner surface of the recessed portion 34 of the cap. D3 should be chosen such that the membrane flange 170 has sufficient space to move during re-sealing of the cap 30, when the membrane 150 arches towards the inside of the container. The cutting elements 50 are provided at the lower end of the upper portion 33.

In Fig. 9 the opening action is shown from a position at which the cap 30 is screwed onto the neck 20 for the very first time, i.e. when the membrane 150 is formed integral with the neck 20. Initially a rather high torque is required for breaking the tamper ring 40 from the neck 20. The torque then decreases until the cap 30 has been rotated approximately 50-60°, corresponding to an axial movement sufficient to allow the cutting elements 50 to engage with the neck/membrane interface. Once this occurs the torque again increases until the membrane 150 is separated from the neck 20. This is effected approximately 200-220° from the initial position.

[0043] Although the above description has been made with reference to a food packages, it should be readily understood that the general principle of the neck and cap could be applied to all sorts of packages provided with opening devices.

[0044] Further, the invention has mainly been described with reference to a few embodiments. However, as is readily understood by a person skilled in the art, other embodiments than the ones disclosed above are equally possible within the scope of the invention, as defined by the appended claims.

[0045] All references to "upper", "lower", "upwards", "downwards" etc. are made with respect to a package standing upright.

Claims

1. A cap and neck assembly for closing an upper end of a package (10), said assembly comprising a neck (20) forming part of an upper end of a package (10), the neck (20) comprising a tubular member (110) being provided with external threads (22), and an upper tubular portion (120) extending from the tubular member (110) and being releasably attached to a membrane (150) closing an upper end of said upper portion (120), the membrane (150) having a membrane flange (170) protruding radially outside the tubular member (110), and a cap (30) in the form of a tubular body having a lower portion (31) being provided with internal threads (32) for engagement with the threads (22) of the neck (20), and an upper portion (33) forming a closed upper end, the upper portion (33) being provided with at least one cutting element (50) configured to separate the membrane (150) from said tubular member (110) of the neck (20), wherein when the cap (30) is threaded onto the neck (20) to its axial end position for the first time prior to separating the membrane (150) from the neck (20), the axial distance between a cutting edge (54) of the cutting element (50) and the membrane flange (170) is less than 1mm.
2. The cap and neck assembly according to claim 1, wherein the axial distance between the cutting edge (54) of the cutting element (50) and the membrane flange (170) is between 0,5mm and 1mm.
3. The cap and neck assembly according to claim 1, wherein the axial distance between the cutting edge (54) of the cutting element (50) and the membrane flange (170) is between 0,6mm and 0,75mm.
4. The cap and neck assembly according to any one of the preceding claims, wherein the axial length (L1) of the upper tubular portion (120) of the neck (20) is between 5mm and 5,5mm.
5. The cap and neck assembly according to any one of the preceding claims, wherein the axial length of the upper portion (33) of the cap (30) is between 5mm and 6mm, and wherein the at least one cutting element (50) is provided at the lower end of said upper portion (33).
6. The cap and neck assembly according to any one of the preceding claims, wherein the threads (22, 32) are configured such that the axial end position of the cap (30), for the first time prior to separating the membrane (150) from the neck (20), is reached after rotating the cap (30) between 300° and 315°.
7. The cap and neck assembly according to any one of the preceding claims, wherein the threads (22, 32) are configured such that upon decapping for the first time, the cutting edge (54) will engage the neck (20) after a rotational movement of the cap (30) between 40° and 60°.
8. The cap and neck assembly according to any one of the preceding claims, wherein the threads (22, 32) are configured such that upon decapping for the first time, the membrane (150) will be separated from the neck (20) after a total rotational movement of the cap (30) between 150° and 220°.
9. A package, comprising a cap and neck assembly according to any one of the preceding claims.

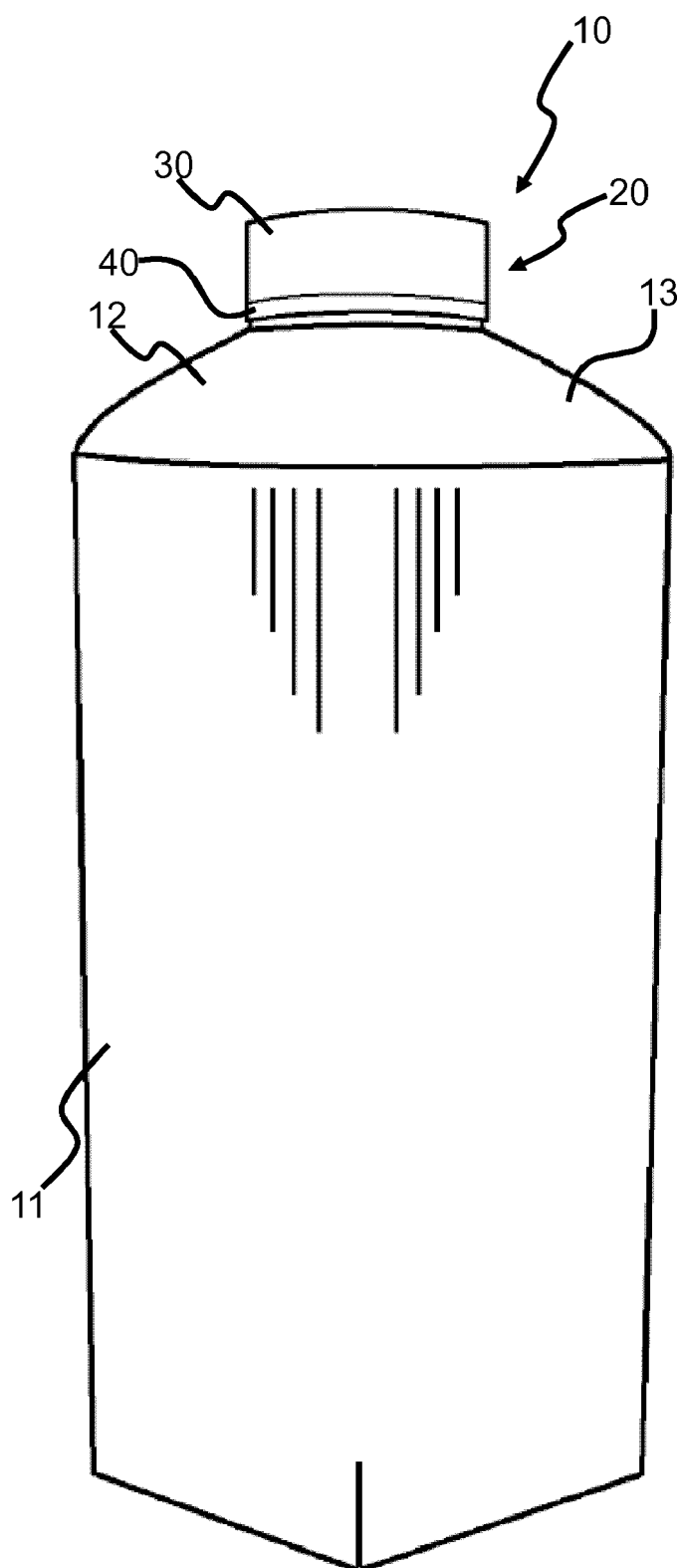
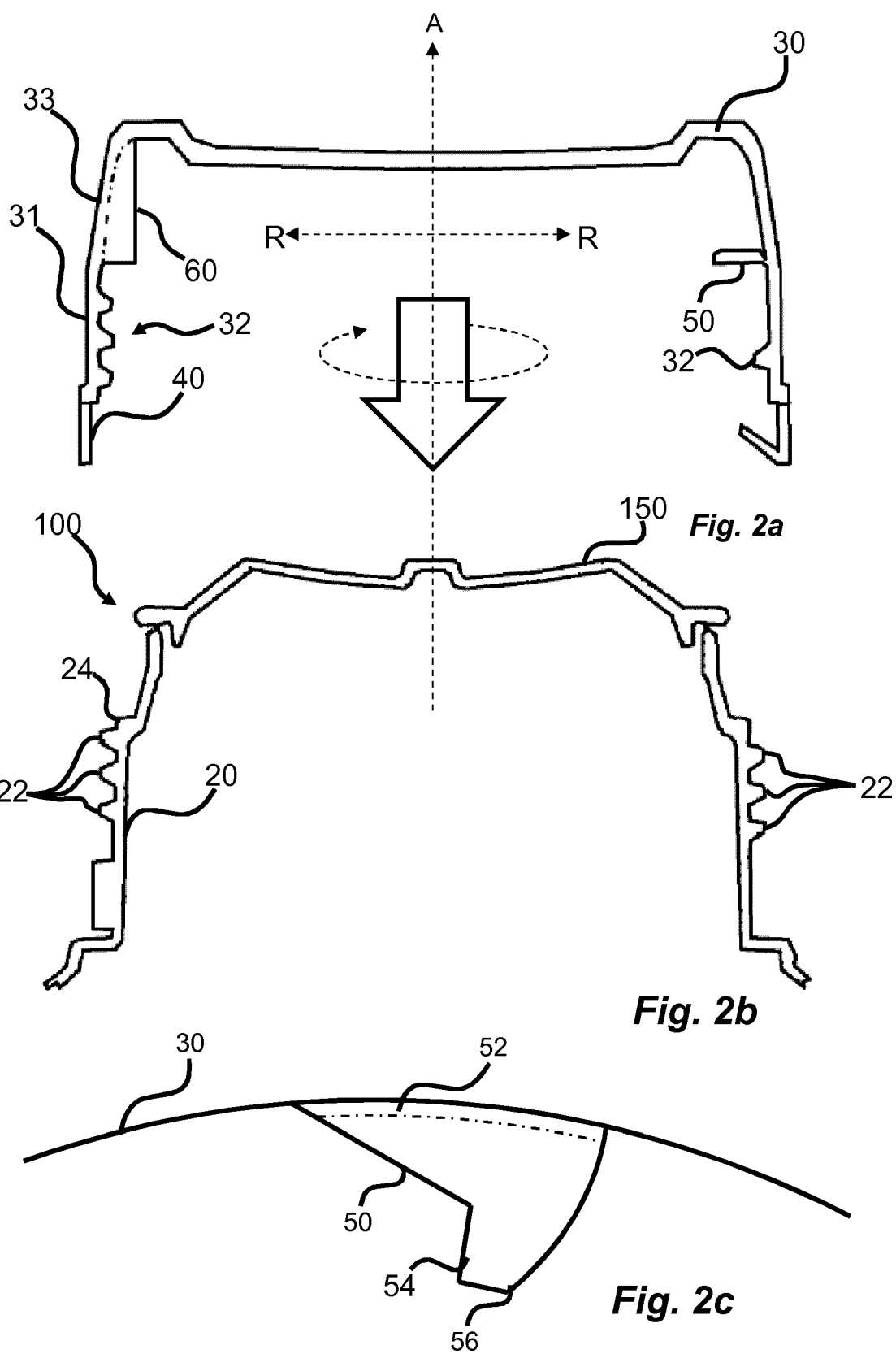


Fig. 1



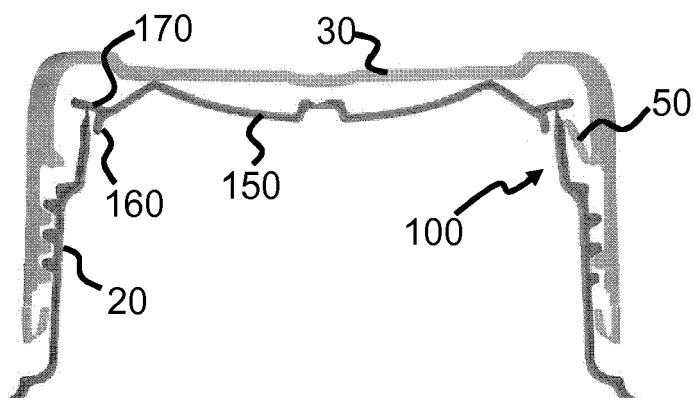


Fig. 3

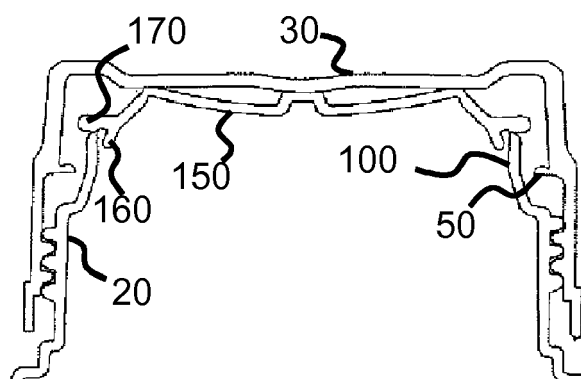


Fig. 4

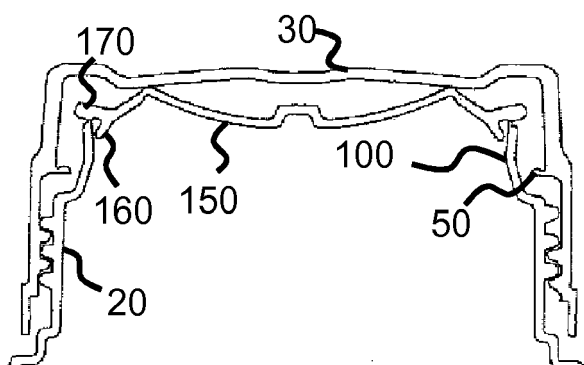


Fig. 5

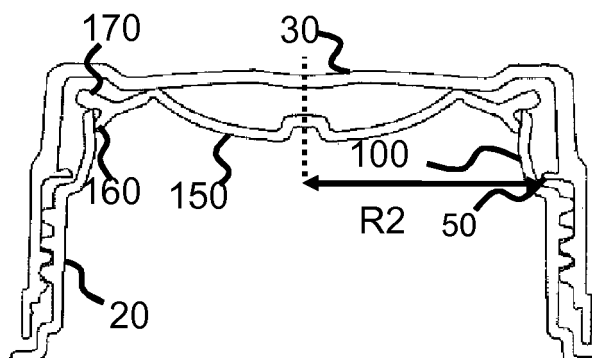
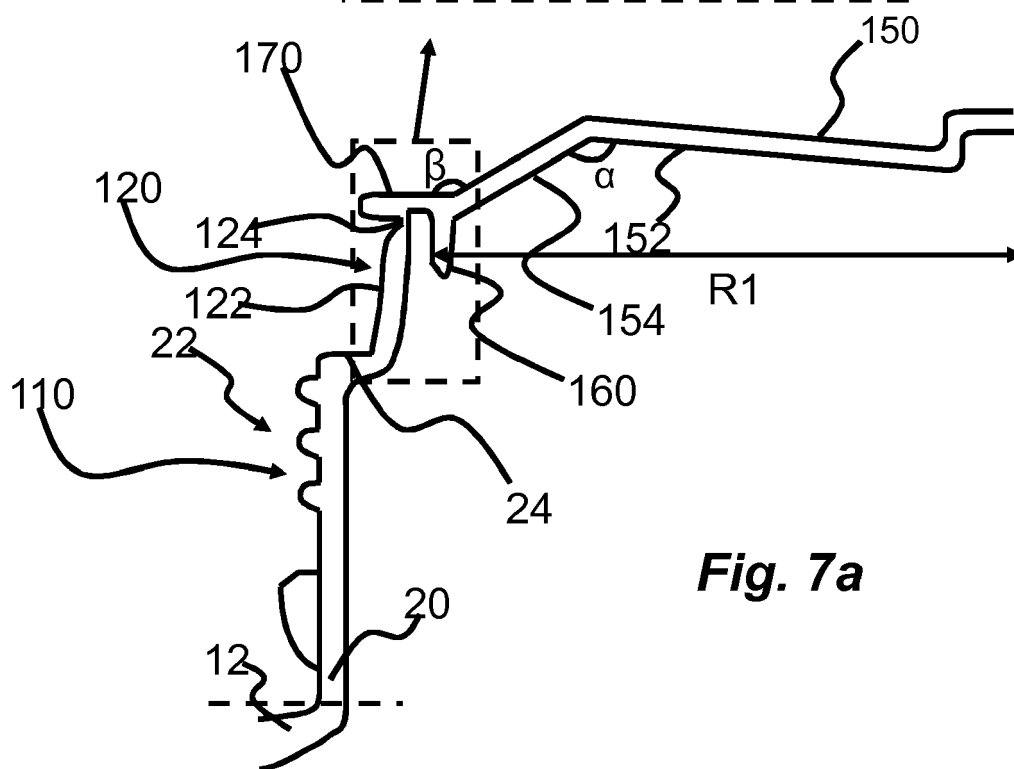
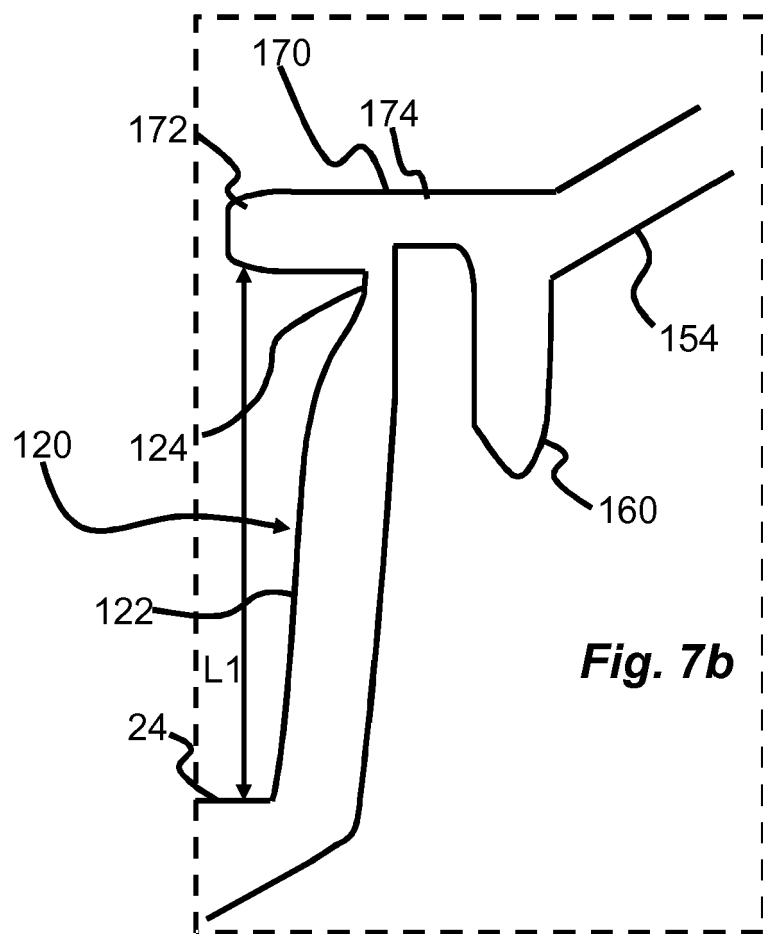


Fig. 6



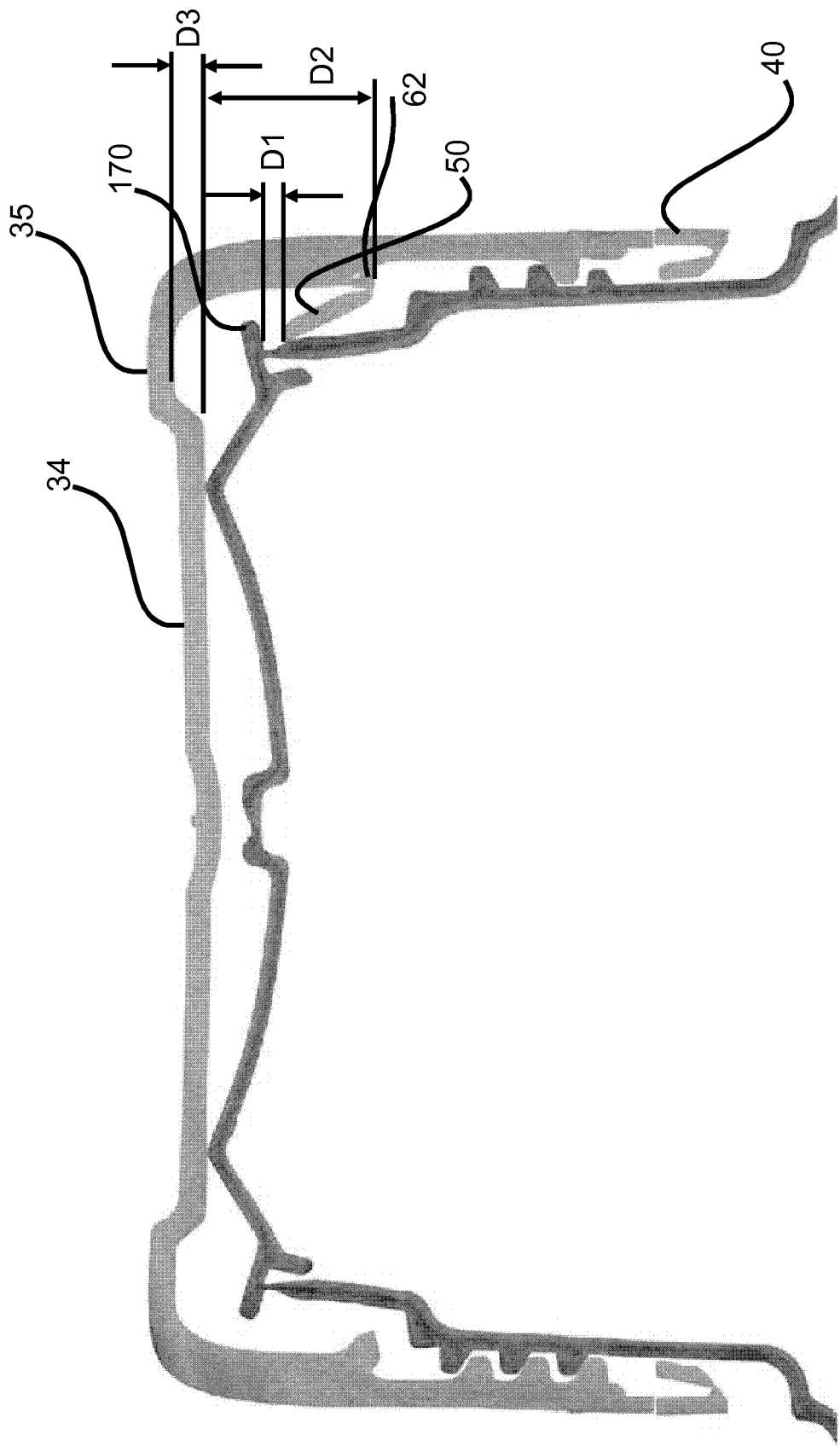


Fig. 8

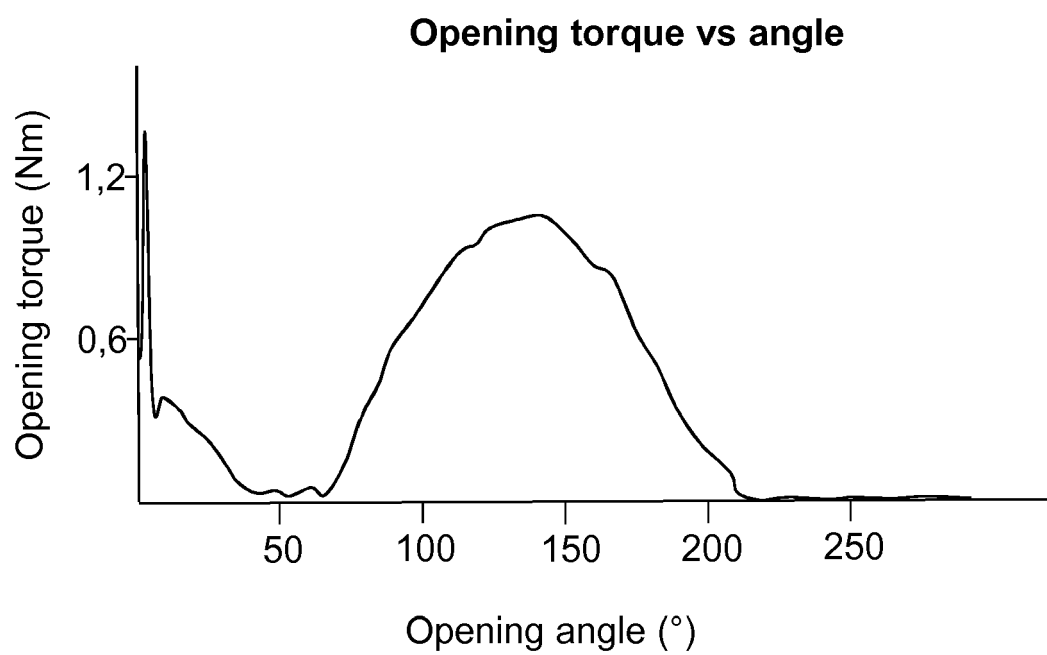


Fig. 9



EUROPEAN SEARCH REPORT

Application Number
EP 17 19 1694

5

10

15

20

25

30

35

40

45

50

55

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 89/00534 A1 (WAVERLEY PHARMA LTD [GB]) 26 January 1989 (1989-01-26) * the whole document *	1,9	INV. B65D41/04 B65D51/22
A	WO 2014/202518 A1 (TETRA LAVAL HOLDINGS & FINANCE [CH]) 24 December 2014 (2014-12-24) * the whole document *	1-9	
A,D	WO 2011/144569 A2 (TETRA LAVAL HOLDINGS & FINANCE [CH]; DAHL GOERAN [SE]; HAAKANSSON BENG) 24 November 2011 (2011-11-24) * the whole document *	1-9	
A,D	WO 2013/072475 A1 (TETRA LAVAL HOLDINGS & FINANCE [CH]) 23 May 2013 (2013-05-23) * the whole document *	1-9	
A	US 2011/155687 A1 (AMMANN RAINER [DE]) 30 June 2011 (2011-06-30) * the whole document *	1	TECHNICAL FIELDS SEARCHED (IPC)
A	WO 2008/148764 A2 (SACMI [IT]; PARRINELLO FIORENZO [IT]; PUCCI FABRIZIO [IT]; LARSSON B0) 11 December 2008 (2008-12-11) * the whole document *	1	B65D
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 8 January 2018	Examiner Leijten, René
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	

EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 17 19 1694

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

08-01-2018

10

15

20

25

30

35

40

45

50

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 8900534 A1	26-01-1989	AT 82218 T	15-11-1992
		DE 3875950 T2	01-04-1993
		EP 0326592 A1	09-08-1989
		US 5007546 A	16-04-1991
		US 5090581 A	25-02-1992
		WO 8900534 A1	26-01-1989
WO 2014202518 A1	24-12-2014	AU 2014283458 A1	21-01-2016
		CA 2915758 A1	24-12-2014
		CN 105324317 A	10-02-2016
		EP 3010818 A1	27-04-2016
		ES 2628162 T3	01-08-2017
		JP 2016522128 A	28-07-2016
		KR 20160022880 A	02-03-2016
		PT 3010818 T	20-06-2017
		RU 2016101397 A	24-07-2017
		US 2016152386 A1	02-06-2016
		US 2017349337 A1	07-12-2017
		WO 2014202518 A1	24-12-2014
WO 2011144569 A2	24-11-2011	BR 112012027936 A2	16-08-2016
		CN 102905986 A	30-01-2013
		EP 2571779 A2	27-03-2013
		JP 2013526462 A	24-06-2013
		RU 2012155346 A	27-06-2014
		US 2013062305 A1	14-03-2013
		WO 2011144569 A2	24-11-2011
WO 2013072475 A1	23-05-2013	BR 112014011914 A2	16-05-2017
		CN 103946120 A	23-07-2014
		EP 2780250 A1	24-09-2014
		EP 2902336 A1	05-08-2015
		JP 6177791 B2	09-08-2017
		JP 2015501763 A	19-01-2015
		RU 2014124712 A	27-12-2015
		US 2014319142 A1	30-10-2014
US 2011155687 A1	30-06-2011	WO 2013072475 A1	23-05-2013
		AT 482891 T	15-10-2010
		AU 2005259424 A1	12-01-2006
		CA 2572379 A1	12-01-2006
		CN 101001791 A	18-07-2007
		CY 1111657 T1	07-10-2015
		DE 102004032100 A1	27-04-2006
		EP 1768916 A1	04-04-2007
		ES 2358878 T3	16-05-2011

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

55

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 17 19 1694

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

08-01-2018

10

15

20

25

30

35

40

45

50

55

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		JP 4981666 B2	25-07-2012
		JP 2008504176 A	14-02-2008
		NO 339274 B1	21-11-2016
		RU 2346869 C2	20-02-2009
		US 2008083694 A1	10-04-2008
		US 2011155687 A1	30-06-2011
		WO 2006002922 A1	12-01-2006

WO 2008148764 A2	11-12-2008	BR PI0812493 A2	16-06-2015
		CN 101711215 A	19-05-2010
		CN 103144840 A	12-06-2013
		EP 2170720 A2	07-04-2010
		EP 2511191 A2	17-10-2012
		ES 2392371 T3	10-12-2012
		ES 2523133 T3	21-11-2014
		HR P20120839 T1	30-11-2012
		JP 5474773 B2	16-04-2014
		JP 2010528946 A	26-08-2010
		JP 2014141304 A	07-08-2014
		KR 20100035695 A	06-04-2010
		PT 2170720 E	31-10-2012
		RU 2009149169 A	20-07-2011
		RU 2012120646 A	27-11-2013
		TW 200911636 A	16-03-2009
		UA 96631 C2	25-11-2011
		US 2010258563 A1	14-10-2010
		US 2013200032 A1	08-08-2013
		WO 2008148764 A2	11-12-2008
		ZA 200908570 B	25-08-2010

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- WO 2011144569 A [0004]
- WO 2013072475 A [0005]
- SE 16505679 [0006]