



(51) International Patent Classification:

B65D 47/10 (2006.01) **B65D 51/22** (2006.01)
B65D 47/36 (2006.01)

(21) International Application Number:

PCT/EP2018/064109

(22) International Filing Date:

29 May 2018 (29.05.2018)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

17173997.2 01 June 2017 (01.06.2017) EP

(71) Applicant: **TETRA LAVAL HOLDINGS & FINANCE S.A.** [CH/CH]; 70, Avenue Général-Guisan, CH-1009 PULLY (CH).

(72) Inventor: **STILLERUD, Lennart**; Uardavägen 115, 224 71 Lund (SE).

(74) Agent: **TETRA PAK - PATENT ATTORNEYS SE**; AB Tetra Pak, Patent Department Ruben, Rausingsgata, 22186 Lund (SE).

(81) Designated States (*unless otherwise indicated, for every kind of national protection available*): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM,

(54) Title: A SPOUT FOR A FOOD PACKAGE

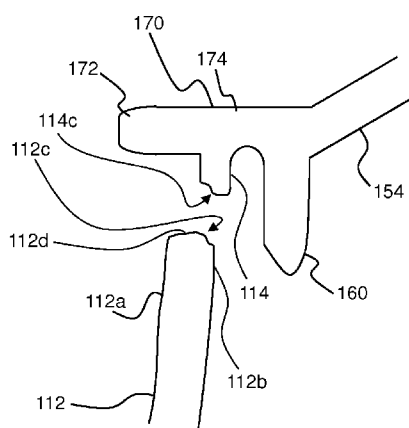


Fig. 7c

(57) Abstract: A spout (100) forming part of a neck (20) of a package (10) is provided. The spout (100) comprises a membrane (150), and a tubular member (110) having a main body (112) and an end portion (114) extending axially from the main body (112), the tubular member (110) being releasably attached to said membrane (150). The end portion (114) is arranged radially inwards of the main body (112).



TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW,
KM, ML, MR, NE, SN, TD, TG).

Published:

— *with international search report (Art. 21(3))*

A SPOUT FOR A FOOD PACKAGE

Technical Field

The present solution relates to a spout for a food package. In particular, the
5 present solution relates to a spout having a membrane sealing an end of said spout.

Background

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
10 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, including
15 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.

Although the above solution provides an improvement over the irreversible
20 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.

In WO2011144569 a solution is described in which the spout is provided with a
25 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.

Based on the same general concept, WO2013072475 describes a cap and
neck assembly having a membrane for sealing the food package. The membrane is
30 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.

Although the above-mentioned solutions provide well-proven and reliable re-
sealing of packages, the cutting action required to separate the membrane from the
35 spout may leave a rough or uneven surface at the upper end of the spout. Packages
having these kinds of recloseable openings are manufactured in various sizes and with
various content, and some consumers are actually drinking directly from the package.

As the rough surface will then be in contact with the lips of the consumer there is a need for improvements in order to improve the drinking experience from the container, i.e. removing possible rough surfaces around the edge of upper end of the spout.

5 Summary

It is, therefore, an object of the present solution to overcome or alleviate the above described problems.

According to a first aspect, the solution is provided by a spout forming part of a neck of a package which comprises a membrane and a tubular member having a main body and an end portion extending axially from the main body where the tubular member is releasably attached to the membrane and wherein the end portion is arranged radially inwards of the main body.

The advantage of this solution is that the radial position of the end portion in relation to the main portion provides sealing of the neck, while at the same time allowing any separation action where the membrane is separated from the neck to be acting on the end portion radially inward from the main body. This will facilitate the formation of a smoother edge of a resulting spout after the membrane is separated.

According to a second aspect, the solution is provided by a spout forming part of a neck of a package which comprises a tubular member having a main body provided with a cut surface after separating a membrane from the neck. The spout includes a tubular end portion initially extending axially from the main body from the tubular member where the cut surface extends radially inwards and downwards from an upper free end of the main body.

The advantage of such a cut surface is that it is located inward towards the center of the spout, while leaving a relatively smoother edge on the main body of the spout radially outwards from the cut surface. This facilitates drinking directly from the such a spout as opposed to spouts with a sharp cut surface which is contact with the consumer's lips.

According to a third aspect, the solution is provided a package for containing liquid foodstuffs therein comprising a neck assembly with a spout according one of the embodiments above, where the package further comprises a cap which is configured to close the spout. The cap comprises at least one cutting element configured to separate the membrane from the tubular member of the spout (100).

The advantage of such a container is that it provides both for a satisfactory sealing and resealing of the spout as well as a more pleasant drinking experience due to a

smoother edge of the spout after the membrane sealing the spout has been cut off through the opening action of the cap.

5 Brief Description of the Drawings

The above, as well as additional objects, features, and advantages of the present solution, will be better understood through the following illustrative and non-limiting detailed description of preferred embodiments of the present solution, with reference to the appended drawings, wherein:

10 Fig. 1 is a schematic view of a package having a spout according to one embodiment;

Fig. 2a is a cross-sectional view of a cap for use with a spout according to various embodiments;

15 Fig. 2b is a cross-sectional view of a neck, including a spout 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;

20 Fig. 7a is a cross-sectional view of a spout according to an embodiment;

Fig. 7b is an enlarged view of parts of the spout shown in Fig. 7a; and

Fig. 7c is a cross-sectional view of the spout shown in Figs. 7a-b where the membrane has been cut from the spout.

25 Detailed Description

Starting with a description relating to Figs. 1-6, some general comments on the principle of a cap and spout assembly will be given.

30 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.

35 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 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, which may be moulded on top of the tubular body. The shoulder section 13 is thus arranged to connect the sleeve, which forms the 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 through moulding, or as two separate pieces which are moulded together.

After the cap 30 is screwed onto the top portion 12 the sleeve is filled with food content. Preferably, this is done after the top portion 12 has been moulded onto the sleeve and the package is orientated upside down, such that the remaining open end of the sleeve is facing upwards. After filling the open end of the sleeve may be sealed and folded to a flat bottom as illustrated in Fig. 1.

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.

Now turning to Figs. 2a and 2b details of the neck 20 and cap 30 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 spout 100, as well as for retaining the cut-off membrane 150.

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 spout 100, immediately below the membrane 150, and to separate that membrane 150 from the rest of the spout 100. 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 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 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, 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. So, the steeper the rising of the threads, the more cutting elements 50 are needed. 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 spout 100. 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 spout 100.

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".

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 application of the cap 30 or when 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.

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 rising of the threads 22 of the neck 20 preventing further rotation of the cap 30. 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 and providing a distinct stop.

5 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. 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
10 inner perimeter of the cap 30.

The region 54 is the cutting region of the cutting element 50, and in this region the thickness of the cutting element 50 is reduced to form a cutting edge 54. The cutting edge 54 may be rectilinear, as in the present embodiment.

15 The free end 56, remote to the hinged attachment may preferably be blunt, and may preferably be 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 spout 100 when it is not supposed to. This may e.g. be important when the cap 30 is arranged on the spout 100 for the first time.

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

Starting in Fig. 3, the cap 30 is 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 (i.e. in a direction towards the contents of the package 10 in Fig. 1) when the cap 30 is unscrewed from the neck 20, whereby the
25 cutting elements 50 will be urged inwards (i.e. in the direction toward the neck) and thus cut off the membrane 150 from the neck 20.

Preferably, after the membrane 50 is separated from the neck 20, the cutting elements 50 are subject 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
30 extends 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.

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
35 unscrewed from the neck 20 such that the membrane 150 has been separated from the neck 20.

Starting with Fig. 4, the cap 30 has been screwed back 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 spout 100 of the neck 20. Hence, as is shown in Fig. 4, the

5 membrane 150 will rest on the spout 100 while the cap 30 moves down the neck due to the provision of the threads, converting a rotational movement to a vertical movement.

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.

When the cap 400 is screwed further downwards, as is shown in Fig. 5, the

10 closed end of the cap 30 will interact with the membrane 150. 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 spout 100.

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

15 been subjected to an increased flexing. Hence, the sealing lip 160 is urged radially outwards until it contacts the interior wall of the spout 100 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 locks in the desired sealing position. The membrane 150 thus seals the spout 100 of the neck 20 such that the outer environment is unable to affect the

20 food product enclosed within a package equipped with the neck spout 100, including the membrane 150, and the cap 30.

Now turning to Figs. 7a-c details of the spout 100 will be described. As explained earlier the spout 100 is defined as the upper part of the neck 20 through which the package content is discharged. Prior to opening of the package the spout

25 100 thus comprises the membrane 150. However, once opened, the membrane 150 is separated from the spout 100. In Figs. 7a-b the spout 100 is shown prior to opening of the package, i.e. the membrane 150 forms part of the spout 100. As indicated by the dashed box in Fig. 7a, the spout 100 forms the upper part of the neck 20, approximately starting from the shoulder 24 and extending upwards.

30 The spout 100 is formed by a tubular member 110 extending from the shoulder 24 of the neck and upwards. The tubular member 110 has a main body 112 and an upper end portion 114 which forms the connection to the membrane 150. During opening, the cutting elements 50 of the cap 30 will cut through the upper end portion 114 of the spout 100 such that the membrane 150 is separated from the main body 112

35 of the tubular member 110, as will be further explained with reference to Fig. 7c.

The membrane 150, forming a circular closure of the spout 100, 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.

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 facilitate 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, the sealing lip 160, initially projecting downwards, will be urged towards the inner sidewalls of the main body 112 of the tubular member 110.

In Fig. 7b the connection between the tubular member 110 and the membrane 150 is shown in further detail. The membrane flange 170 is formed by two adjoining parts; an outer portion 172 which extends radially outside the end portion 114 of the tubular member 110, and an inner portion 174. The end portion 114 of the tubular member 110 is attached to the interface between the inner and outer portions 172, 174 of the membrane flange 170.

The end portion 114 of the tubular member 110 thus extends from the upper end of the main body 112 to the interface between the inner and outer portions 172, 174 of the membrane flange 170. To give some general values suitable for liquid food packages, the axial length of the end portion 114 may e.g. be in the range of 0.1-0.4 mm.

As can be seen in Figs. 7a-b the position of the end portion 114 is radially offset the main body 112. More particularly the end portion 114 has a first thickness, or radial width, while the main body 112 has a second thickness, or radial width. These widths may or may not be the same. The end portion 114 has an outer surface 114a which is connected to the main body 112 at a position being arranged radially inwards of the outer end 112a of the main body 112. An inner surface 114b of the end portion 114 is not flush with an inner surface 112b of the main body 112 but instead the inner surface 114b of the end portion 114 is arranged radially inwards of the inner surface 112b of the main body 112.

In Fig. 7b the dashed line 115 indicates the cutting line when the membrane 150 is separated from the spout 100 for the first time. As can be understood the cutting action caused by the cutting elements 50 will be directed downwards and inwards, such that the cutting elements 50 will cut from the position where the outer surface 114a of the end portion 114 meets with the main body 112 to the position where the inner surface 112b of the main body 112 meets with the end portion 114. As can be

seen in Fig. 7b, the distance required to cut through is actually the shortest possible such that the cutting action is performed on a minimum material thickness.

The separation of the membrane 150 from the spout 100 is shown in Fig. 7c. The end portion 114, which now is cut loose from the main body 112, is left with a cut surface 114c. This surface 114c may be provided with a certain roughness but since it is connected to the membrane 150 rather than to the spout 100 the potentially rough surface 114c will not risk coming into contact with the lips of a consumer.

The main body 112 is also provided with a cut surface 112c. Also this surface 112c may be rough to some extent. However, this surface 112c will now mainly be arranged at the inner surface 112b of the main body 112 which normally not will come into contact with the lips of the consumer. After separating the membrane 150 the spout will thereby have a main body 112 of which the upper free end 112d will be provided with a cut surface 112c extending radially inwards and downwards. Preferably, the cut surface 112c does not extend radially outwards to a position where the upper free end 112d connects with the outer surface 112a of the main body 112.

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.

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.

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

CLAIMS

1. A spout (100) forming part of a neck (20) of a package (10), comprising a membrane (150), and
- 5 a tubular member (110) having a main body (112) and an end portion (114) extending axially from the main body (112), the tubular member (110) being releasably attached to said membrane (150),
- wherein the end portion (114) is arranged radially inwards of the main body (112).
- 10 2. The spout (100) according to claim 1, wherein the end portion (114) has an outer surface (114a), the main body (112) has an outer surface (112a), and wherein the outer surface (114a) of the end portion (114) is arranged radially inwards of the outer surface (112a) of the main body (112).
- 15 3. The spout (100) according to claim 1 or 2, wherein the end portion (114) has an inner surface (114b), the main body (112) has an inner surface (112b), and wherein the inner surface (114b) of the end portion (114) is arranged radially inwards of the inner surface (112b) of the main body (112).
- 20 4. The spout (100) according to claim 2 and 3, wherein the radial distance between the inner surface (112b) and the outer surface (112a) of the main body (112) is greater than the radial distance between the inner surface (114b) and the outer surface (114a) of the end portion (114).
- 25 5. The spout (100) according to claim 2 and 3, wherein the radial distance between the inner surface (112b) and the outer surface (112a) of the main body (112) is equal to the radial distance between the inner surface (114b) and the outer surface (114a) of the end portion (114).
- 30 6. The spout (100) according to any one of the preceding claims, wherein axial length of the end portion (114) is between 0.1 and 1.0 mm, preferably between 0.1 and 0.5 mm.
- 35 7. A spout (100) forming part of a neck (20) of a package (10), comprising a tubular member (110) having a main body (112) being provided with a cut surface (112c) after separating a membrane (150) from the neck (20), the spout

including a tubular end portion (114) initially extending axially from the main body (112), from the tubular member (110),

wherein the cut surface (112c) extends radially inwards and downwards from an upper free end (112d) of the main body (112).

5

8. The spout (100) according to claim 7, wherein the cut surface (112c) is arranged at a distance from a position where the upper free end (112d) connects with the outer surface (112a) of the main body (112).

10

9. A neck assembly, comprising a spout (100) according to any one of the preceding claims, and a cap (30), said cap (30) being configured to close said spout (100), wherein the cap (30) comprises at least one cutting element (50) configured to separate the membrane (150) from said tubular member (110) of the spout (100).

15

10. A package (10) for containing liquid foodstuffs therein comprising a neck assembly with a spout according to any of the claims 1-8 and a cap (30), said cap (30) being configured to close said spout (100), wherein the cap (30) comprises at least one cutting element (50) configured to separate the membrane (150) from said tubular member (110) of the spout (100).

20

1/5

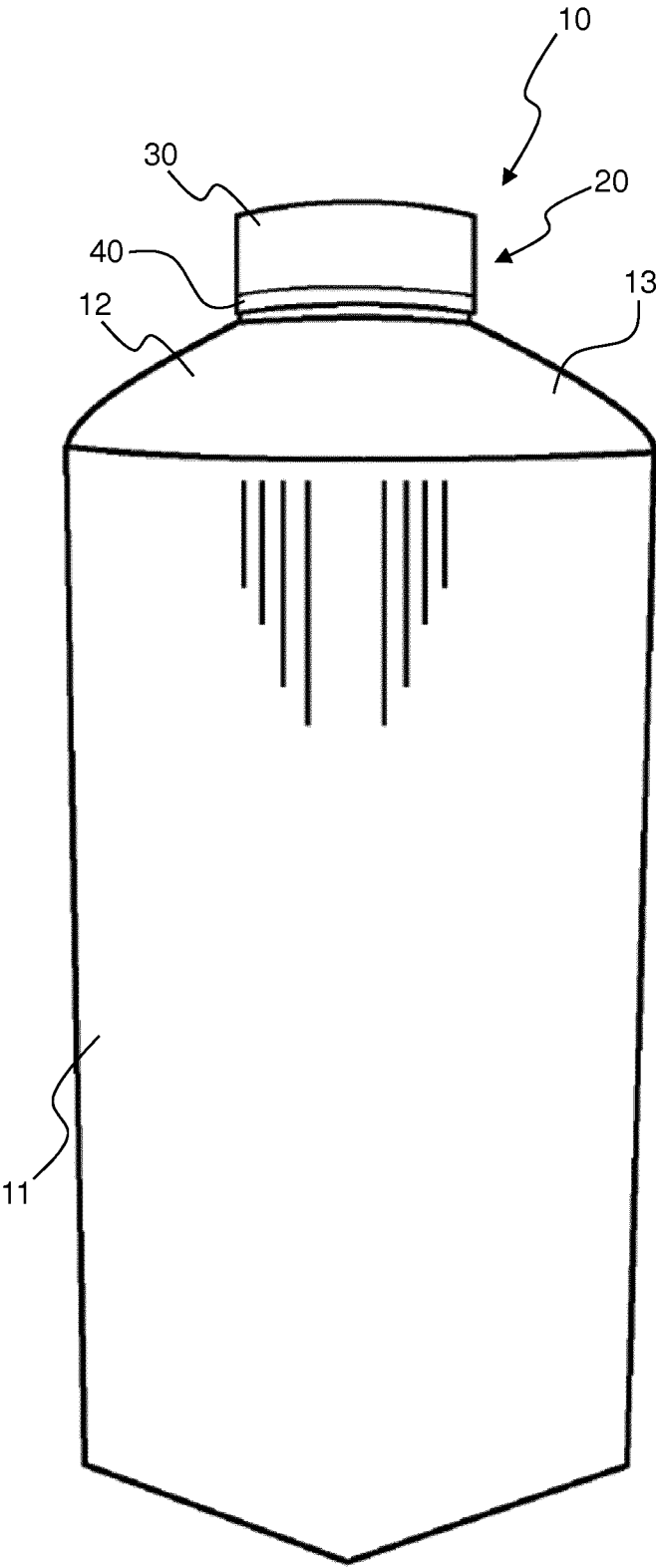


Fig. 1

2/5

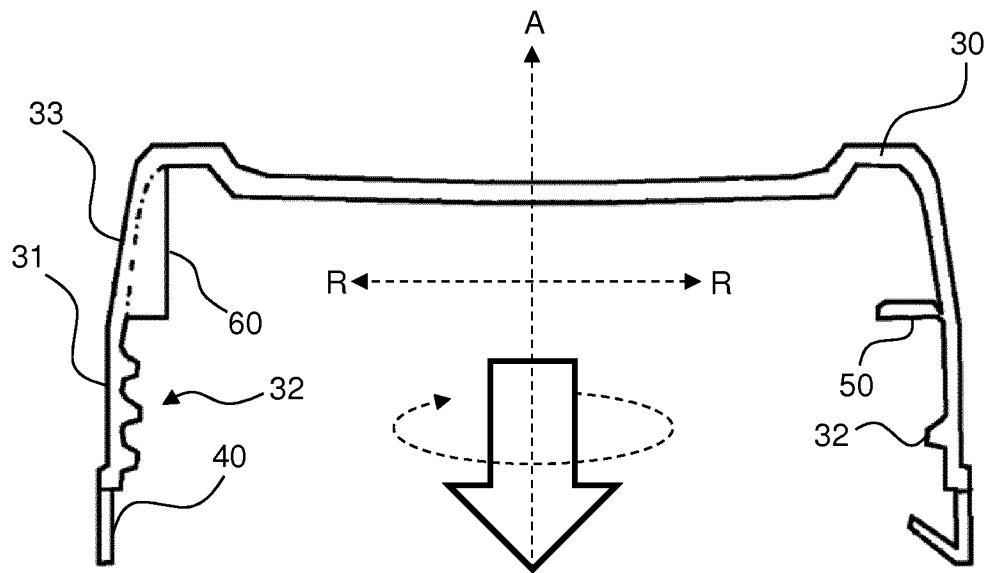


Fig. 2a

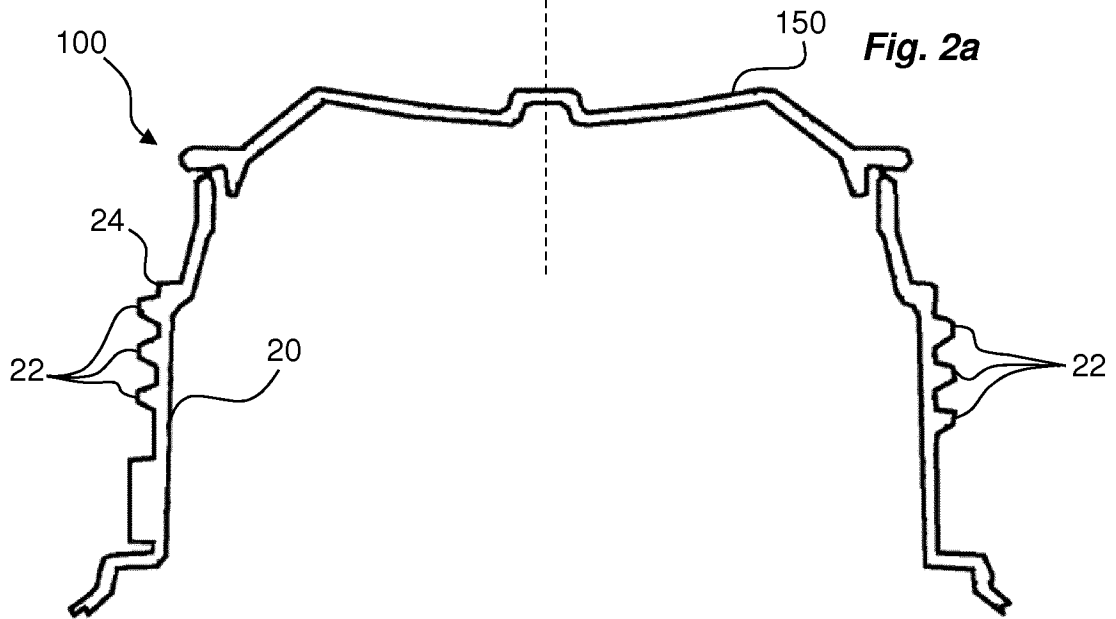


Fig. 2b

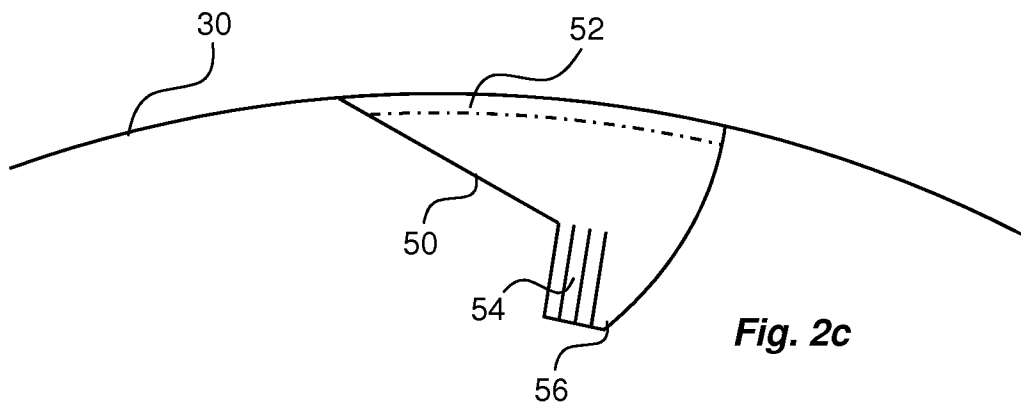


Fig. 2c

3/5

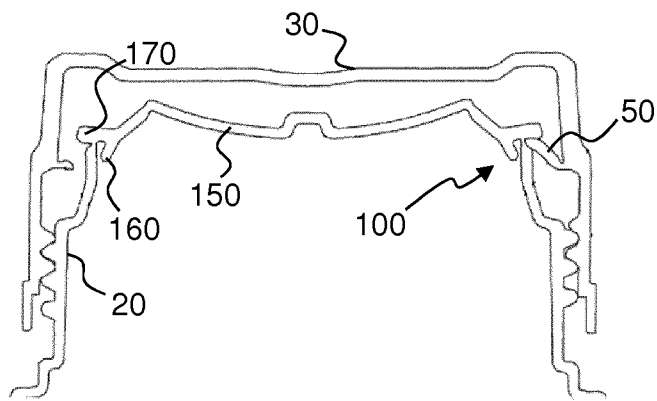


Fig. 3

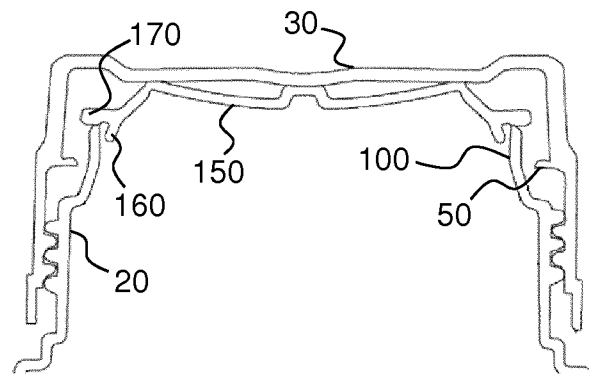


Fig. 4

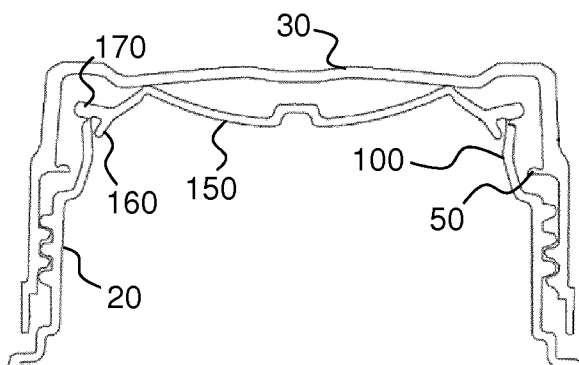


Fig. 5

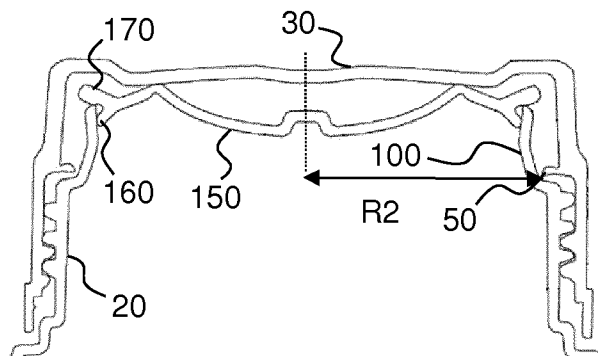
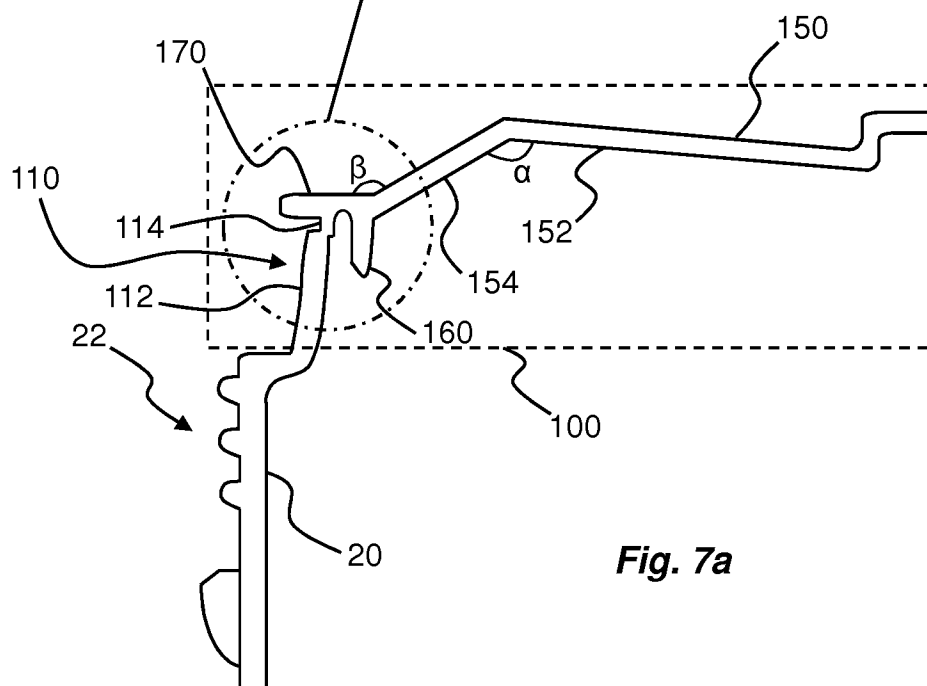
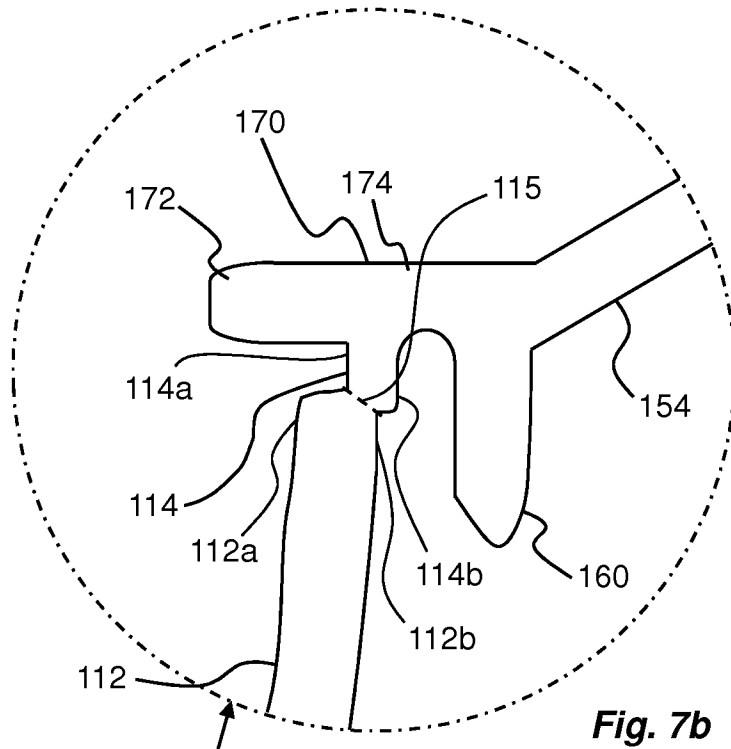


Fig. 6

4/5



5/5

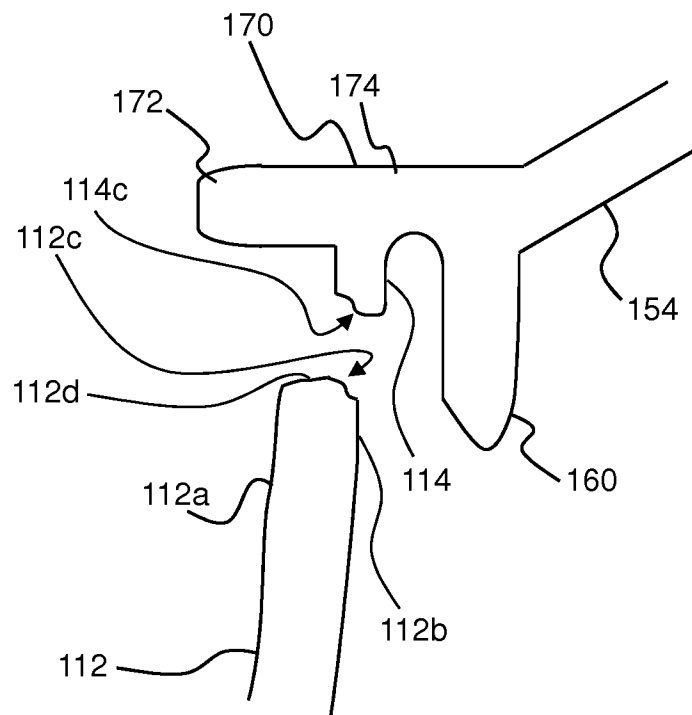


Fig. 7c

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2018/064109

A. CLASSIFICATION OF SUBJECT MATTER

INV. B65D47/10 B65D47/36 B65D51/22
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2013/072475 A1 (TETRA LAVAL HOLDINGS & FINANCE [CH]) 23 May 2013 (2013-05-23) cited in the application	1,2,6,9, 10
A	page 5, line 10 - page 6, line 27; figures -----	3-5,7,8
X	EP 3 020 651 A1 (TOKAN KOGYO CO LTD [JP]) 18 May 2016 (2016-05-18)	7,8
A	paragraph [0029]; figures 1-3,7 -----	1-6,9,10



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

30 August 2018

Date of mailing of the international search report

07/09/2018

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
Fax: (+31-70) 340-3016

Authorized officer

Serrano Galarraga, J

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2018/064109

Patent document cited in search report	Publication date	Patent family member(s)	Publication date	
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
			MX 350199 B	30-08-2017
			RU 2014124712 A	27-12-2015
			US 2014319142 A1	30-10-2014
			WO 2013072475 A1	23-05-2013
			ZA 201402896 B	25-11-2015

EP 3020651	A1	18-05-2016	CN 105263815 A	20-01-2016
			EP 3020651 A1	18-05-2016
			KR 20150143815 A	23-12-2015
			US 2016244224 A1	25-08-2016
			WO 2015004802 A1	15-01-2015
