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(71) Applicant: **D.W. Plastics NV**
3740 Bilzen (BE)

(72) Inventor: **Isenborghs, Francis**
3740, Bilzen (BE)

(74) Representative: **Benech, Frédéric**
146-150, Avenue des Champs-Elysées
75008 Paris (FR)

(54) **Process for strengthening containers for liquids, strengthening ring and containers with a strengthening ring**

(57) The invention relates to a process for strengthening a container (1) for liquids, said container comprising a bowl (3) and at least one cylindrical skirt (51, 53) extending from the bowl, said skirt having a rim portion (51a, 53a), characterized by the fact that it comprises positioning a strengthening ring (100) within said skirt perpendicular to the axis of said skirt (51). The invention deals also with the strengthening ring (100).

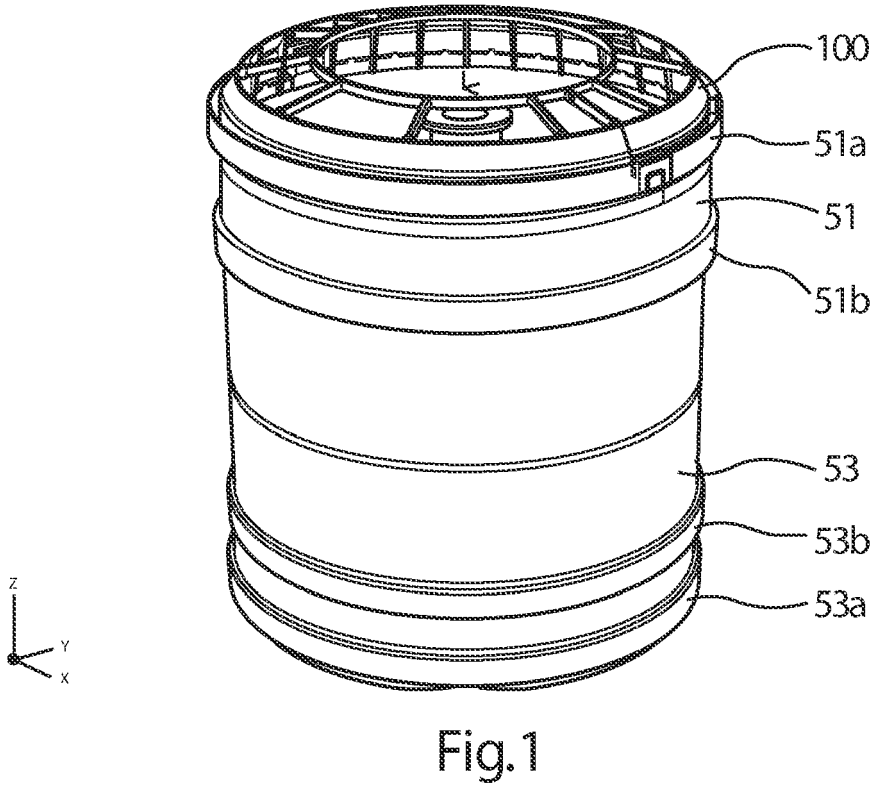

Fig.1

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Description

[0001] The present invention deals with a means to strengthen containers said containers comprising at least a skirt usually two skirts, such as beer kegs or the like.

[0002] For the packaging of beverages such as beer or other soft drink beverage provided to consumers, beverage companies or distributors, containers, usually metallic, are used that have a capacity such as 20 litres or more. These containers are globally cylindrical and enclose a bowl with two rounded surfaces forming a lower dome and an upper dome, the domes being surrounded by cylindrical skirts. Peripheral ribs are arranged appropriately around the outer surface and provide reinforcement against crushing and shocks.

[0003] The container rests on the bottom skirt that is capable of withstanding the weight of the liquid it contains and a stack of several containers. The upper skirt includes lateral openings, these openings forming gripping means.

[0004] Such containers are metallic and strong enough, but with so called one-way kegs that are designed for single use, to be filled and used only once and that are not refilled, they are made with a lightweight material e.g. a rather thin metal sheet. This material is determined to resist normal loads which the container is likely to be subjected to during transport overseas but not more.

[0005] It appears that such one-way kegs are rather fragile, when they are stacked one on the top of the other, and they tend to collapse if submitted to heavy loads. The skirts in particular are prone to distortion and damage when they are subjected to shocks or not so severe constraints.

[0006] In order to limit the risk for the skirts to lose their shape and the kegs to collapse or to be difficult to manipulate, such kegs are usually stacked with intermediate layers. For instance for transport or storage, it is common to place pallets between superposed layers of kegs in order to protect them. This solution although efficient is not satisfactory because it involves many manipulations and the kegs with the pallets occupy a significant volume, increasing the cost of transportation and storage.

[0007] There is thus a need to

strengthen the kegs to prevent them from collapsing under loads, strengthen the kegs without significantly increasing weight,

protect and strengthen the skirt of the kegs, in particular against impacts, facilitate stacking kegs and form stable stacked layers of kegs,

in particular allow stacking of one-way kegs without the use of intermediate layers e.g. pallets, and allow an easy and efficient stacking of kegs without increasing the outside dimensions of the group of kegs, e.g. for reason of reduced space in transport trucks,

[0008] According to the invention the problem is solved with a process for strengthening a container for containing fluids, said container comprising a bowl and at least one cylindrical skirt extending from the bowl, said skirt having a rim portion, characterized by the fact that it comprises positioning a strengthening ring inside of said skirt perpendicular to the axis of said skirt,

[0009] The strengthening ring may preferably be positioned internally along the rim of it.

[0010] Positioning a ring inside of the skirt has the advantage of using an empty and available space without increasing the outside dimensions of the container.

[0011] A strengthening ring is optimal as to the weight added to the container. It provides a maximum of strength for a minimum of weight.

[0012] In the case the skirt is only lightly damaged it will generally be possible to install the strengthening ring and reinforce the container from collapsing.

[0013] The strengthening ring also prevents small weak spots in the skirt caused by damages dents.

[0014] The strengthening ring of the invention presents the following additional features, alone or in combination, that optimize the capability of strengthening the container:

- It comprises at least one annular wall but according to the strength required it can comprise two or three concentric annular walls separated by radial spacers or even more.
- It comprises an annular wall extending outside the edge of the skirt and forming a guiding wall for the rim of a skirt of another container to be placed against said rim.
- the skirt is shaped so as to form an annular rib along its rim with a radial portion between said rib and the skirt, and the strengthening ring is in contact with said radial portion.
- The two skirts are arranged so that the rim of a skirt of a first container supports the rim of a skirt of another container, and the rim of the skirt of the other container comprises an annular centering wall that is placed inside the rim of the skirt of said first container.

[0015] The invention refers also to the strengthening ring for implementing the process with the following features taken alone or in combination:

- It is composed of at least two sectors.
- It comprises at least one annular wall or two or more concentric annular walls separated by radial spacers.
- It comprises reinforcing axial ribs along the internal surface of the internal annular circular wall of said concentric annular walls.
- It comprises a guiding wall extending from the internal annular circular wall, said guiding wall being tapered.
- It comprises radial beams extending from said guiding wall, said radial beams being connected together and forming a reinforcing structure for the strength-

ening ring.

[0016] The invention is also about a container for holding liquids, said container comprising a bowl with two cylindrical skirts extending from the bowl, each skirt having a rim portion, said container being strengthened with a strengthening ring.

[0017] The container supports another container stacked on it, a strengthening ring being interposed between said two containers.

[0018] Additional objects and advantages will become obvious from the following detailed description of the invention with accompanying drawings.

Figure 1 is a perspective view of a container with a strengthening ring according to the invention,

Figure 2 is a perspective view of a strengthening ring alone,

Figure 3 is a perspective view of a cross section of a detail of the strengthening ring from outside the ring;

Figure 3a and 3b are two variants of the strengthening ring, the first comprising only one annular wall, the second comprising three concentric annular walls;

Figure 4 is a perspective view of a cross section of a detail of the strengthening ring from inside the ring;

Figure 5 shows a container with a strengthening ring as in figure 1 but with a part of the cylindrical envelope of the container missing,

Figure 6 shows a detail of the contacting surface of two stacked containers without the strengthening ring;

Figure 7 shows a detail of the contacting surface of two stacked containers with the strengthening ring.

[0019] A container for containing liquids, such as a one-way beer keg, that is to be strengthened according to the invention comprises a bowl and at least a skirt attached to the bowl and surrounding a dome surface of it. In the exemplified embodiment, see figures 1 and 5, it is a beer keg 1 with a bowl 3 enclosed in a cylindrical envelope 5 defining two skirts 51 and 53. The bowl 3 presents a cylindrical middle surface 3 between two hemispherical or pseudo hemispherical surfaces forming domes 31 and 33. At least one of the domes is pierced with a hole closed with a stopper, for removing or transferring liquids from or into the bowl. The skirts of the envelope are shaped so as to present reinforcing peripheral ribs. There are, in this embodiment, two ribs 51 a and 51 b resp. 53a and 53b for each skirt, one of the ribs, 51 a resp. 53a, being located along the rim of the skirt. The edge of the rims 51 a resp. 53a is rounded; see 51a1 on figures 6 and 7. It is noted that the domes 31 and 33 of the bowl 3 are enclosed in the skirts and surrounded by them, the cylindrical middle surface 32 being in contact with the envelope between said two skirts. When the container rests on the rim of one skirt, the dome does not touch the soil.

[0020] When the container is made of a lightweight material the mechanical resistance of its walls is rather limited. In particular the envelope is fragile because it is made of a single sheet of material e.g. a thin sheet of metal. The rims of the skirts are particularly exposed to deformation.

[0021] According to the invention, a strengthening ring 100 is positioned inside of the rim of a skirt of the container.

[0022] The figures 2, 3 and 4 show an embodiment of the strengthening ring 100.

[0023] The strengthening ring 100 comprises two concentric cylindrical walls 101 and 103; wall 101 is internal and wall 103 is external. The diameter of the outer wall 103 corresponds to the diameter of the internal surface of the rim 51 a in which the strengthening ring is to be positioned. Both cylindrical walls 101 and 103 are connected to each other by radial spacers 105 distributed around the axis of the strengthening ring.

[0024] Internal axial ribs 107 distributed around the axis of the strengthening ring are integrated to the internal surface of the inner cylindrical wall 101. These ribs 107 contribute to strengthening the ring.

[0025] On one side of the strengthening ring 100, the internal cylindrical wall 101 is axially extended with an annular wall 109 that is tilted toward the axis of the ring with respect to the wall 101. That wall 109 forms a tapered guiding wall. Beams 111 extend in the radial direction along the periphery of this tapered guiding wall 109 and they are connected to an internal ring. The function of this structure of beams 111 is also to reinforce the strengthening ring, to increase its rigidity and to press the ring under load of an upper container, against the rim of the container.

[0026] On the other side of the ring 100, an annular centering wall 113 extends axially, downwardly with regard to figure 2. The diameter of it is smaller than the diameter of the external annular wall 103; here it is also greater than the diameter of the internal cylindrical wall 101. In fact the diameter of the annular centering wall 113 corresponds to the internal diameter of the skirt to be reinforced. The profile between both walls 103 and 113 prevents any downward movement.

[0027] The strengthening ring 100 is preferably made of a plastic material such as a synthetic resin and manufactured by injection moulding. The different elements of the strengthening ring are preferably made in one piece. The strengthening ring itself can be divided in two or more sectors that are connected together before or during mounting in the skirt.

[0028] Figures 3a and 3b show two variants of the strengthening ring. The first variant 100' comprises only one annular wall and it corresponds to the outer wall of the embodiment of figure 3. The second variant 100" shown in figure 3b comprises three concentric walls with two inner annular walls 101'.

[0029] In order to reinforce and strengthen the contain-

er 1, one positions the strengthening ring 100 inside of the rim 51 a as seen in figures 1, 5 and 7. The dimensions of the strengthening ring have been determined in order the ring 100:

fits against the internal face of the rim 51 a,
the upper edge of the external wall 103 is at the level of the edge of the rim 51 a when the lower edge of the external wall 103 rests on the radial portion 51 a2 of the rim 51 a,
the annular centering wall 113 fits to the internal face the skirt 51.

[0030] This arrangement allows the strengthening ring to help absorb shocks or stresses applied to the skirt.

[0031] The arrangement permits also stable stacking of another container 1' on said container 1, named first container. The rim 53'a of the skirt 53', being the lower skirt of the container 1', is presented on the rim 51 a of the skirt 51, being the upper skirt of the first container 1. the 53'a of the skirt 53' is guided by the tapered guiding wall 109 until the lower edge of the rim 53'a of the skirt 53' rests on the upper rim 51 a of the skirt 51 of the first container 1, see figure 7.

[0032] In this embodiment the lower rim 53'a of the skirt 53' of the container 1' comprises an annular centering wall 53'a3. it is the same for the first container 1. The diameter of it is smaller than the diameter of the lower rim 53'a. The annular centering wall 53'a3 of the other container 1' rests on the radial spacers 105 of the strengthening ring 100 and is contributing to the stability of the stacked containers 1 and 1'.

[0033] The assembly of the ring and the rim of the container has a significant higher strength to withstand the vertical forces of the stacked containers. Light damages of the container rim have a lower impact on the strength of the stacked containers. The stacked weight can therefore be increased.

[0034] The pressure of the container 1' on the inner wall of the ring 100 pushes the entire strengthening ring outwards, so it is pressed against the rim, increasing thus the strength and rigidity of the rim. The vertical forces are partially diverted to the rim. The beams structure 111 of the strengthening ring 100 presses the ring under load of the upper container 1' against the rim of the container 1.

Claims

1. Process for strengthening a container (1) for liquids, said container comprising a bowl (3) and at least one cylindrical skirt (51, 53) extending from the bowl, said skirt having a rim portion (51 a, 53a), **characterized by** the fact that it comprises positioning a strengthening ring (100) within said skirt perpendicular to the axis of said skirt (51).

2. Process according to claim 1 said strengthening ring being (100) positioned internally along the rim (51 a) of it.

3. Process according to claim 1 or 2, said strengthening ring comprising at least one cylindrical wall (10) or two or more concentric cylindrical walls (101, 103) separated by radial spacers (105).

4. Process according to claim 1, 2 or 3, said strengthening ring comprising an annular wall (109) extending outside the rim (51 a) of the skirt and forming a guiding wall for the rim (53'a) of a skirt (53') of another container (1') to be placed against said rim (51 a).

5. Process according to any one of the preceding claims said skirt (51) forming an annular rib along said rim (51a) with a radial portion (51a2) between said rib and the skirt (51), said strengthening ring (100) being in contact with said radial portion (51 a2).

6. Process according to claims 4 and 5, the container comprising two skirts (51, 53'), said skirts being arranged so that the rim (51 a) of a skirt of a first container (51) supports the rim (53'a) of a skirt (53') of the other container, said rim (53'a) of the skirt (53') of said other container comprising an annular centering wall (53'a3) that is positioned inside the rim (51 a) of the skirt (51) of said first container.

7. Strengthening ring (100) for implementing the process according to any of the claims being composed of at least two sectors (100a, 100b).

8. Strengthening ring (100) according to claim 7 comprising at least one cylindrical wall (101) or two or more concentric annular walls (101, 103) separated by radial spacers (105).

9. Strengthening ring (100) according to claim 8 comprising axial ribs (107) along the internal surface of the internal annular circular wall (101) of said concentric annular walls (101, 103).

10. Strengthening ring (100) according to any of the claims 7 to 9 comprising a guiding wall (109) extending from the internal annular circular wall (101), said guiding wall being tapered.

11. Strengthening ring (100) according to any of the claims 7 to 10 comprising radial beams (111) extending from said guiding wall (109), said radial beams being connected to each other.

12. Container (1) for containing fluids, said container comprising a bowl (3) with two cylindrical skirts (51, 53) extending from the bowl, each skirt having a rim portion, said container being strengthened with a strengthening ring (100) according to claims 7 to 11.

13. Container according to claim 12 supporting another container (1') stacked on it, a strengthening ring (100) according to any of the claims 7 to 11 being interposed between said two containers.

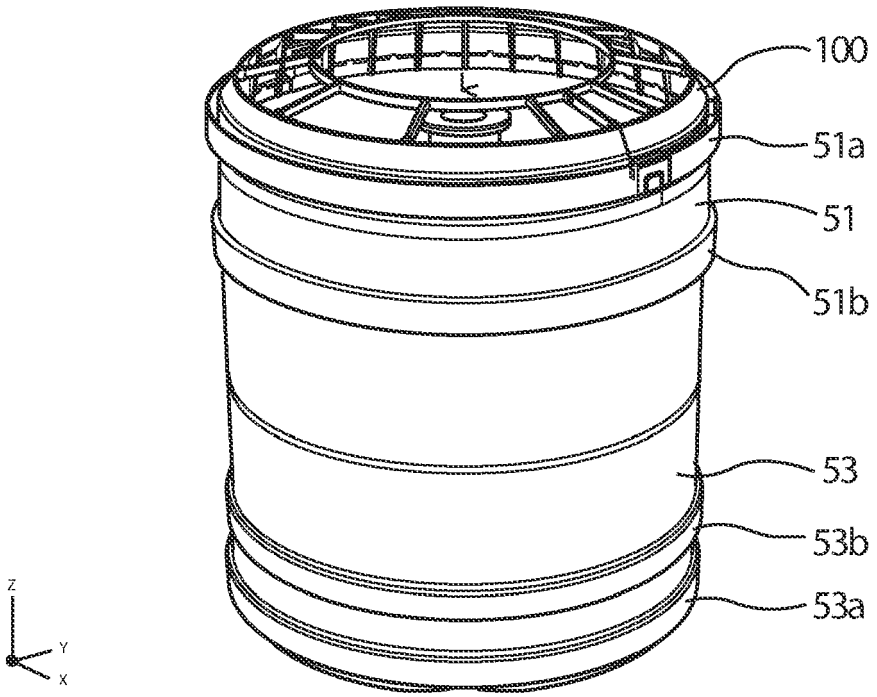
100
51a
51
51b
53
53b
53a
Z
Y
X

Fig.1

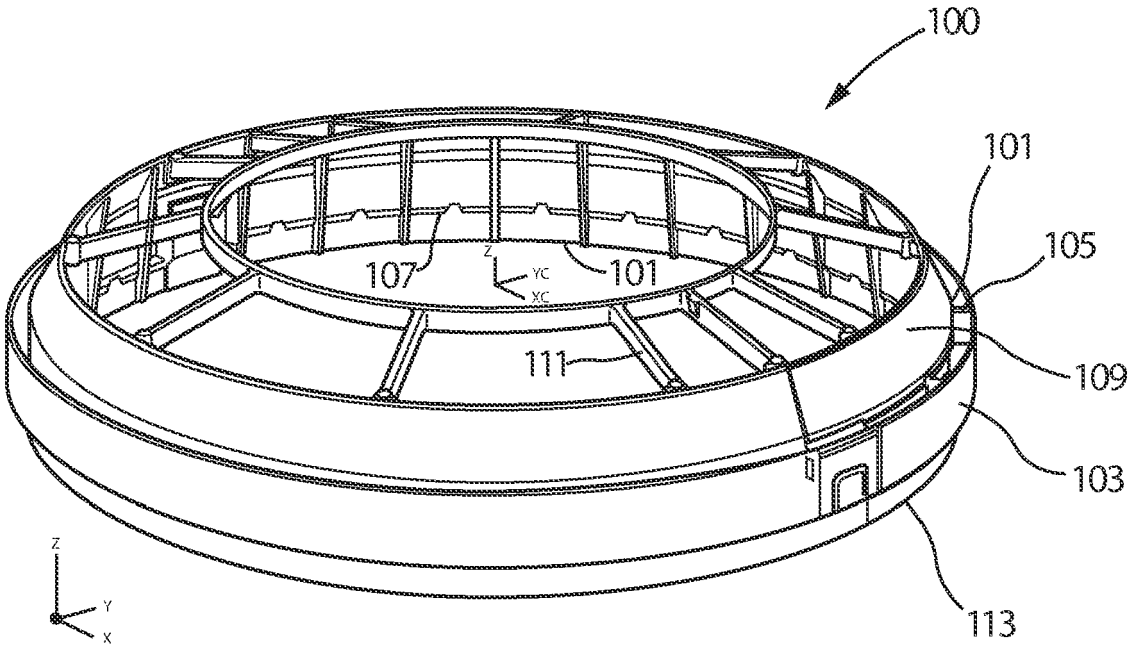
100
101
105
107
101
109
111
103
113
Z
Y
X

Fig.2

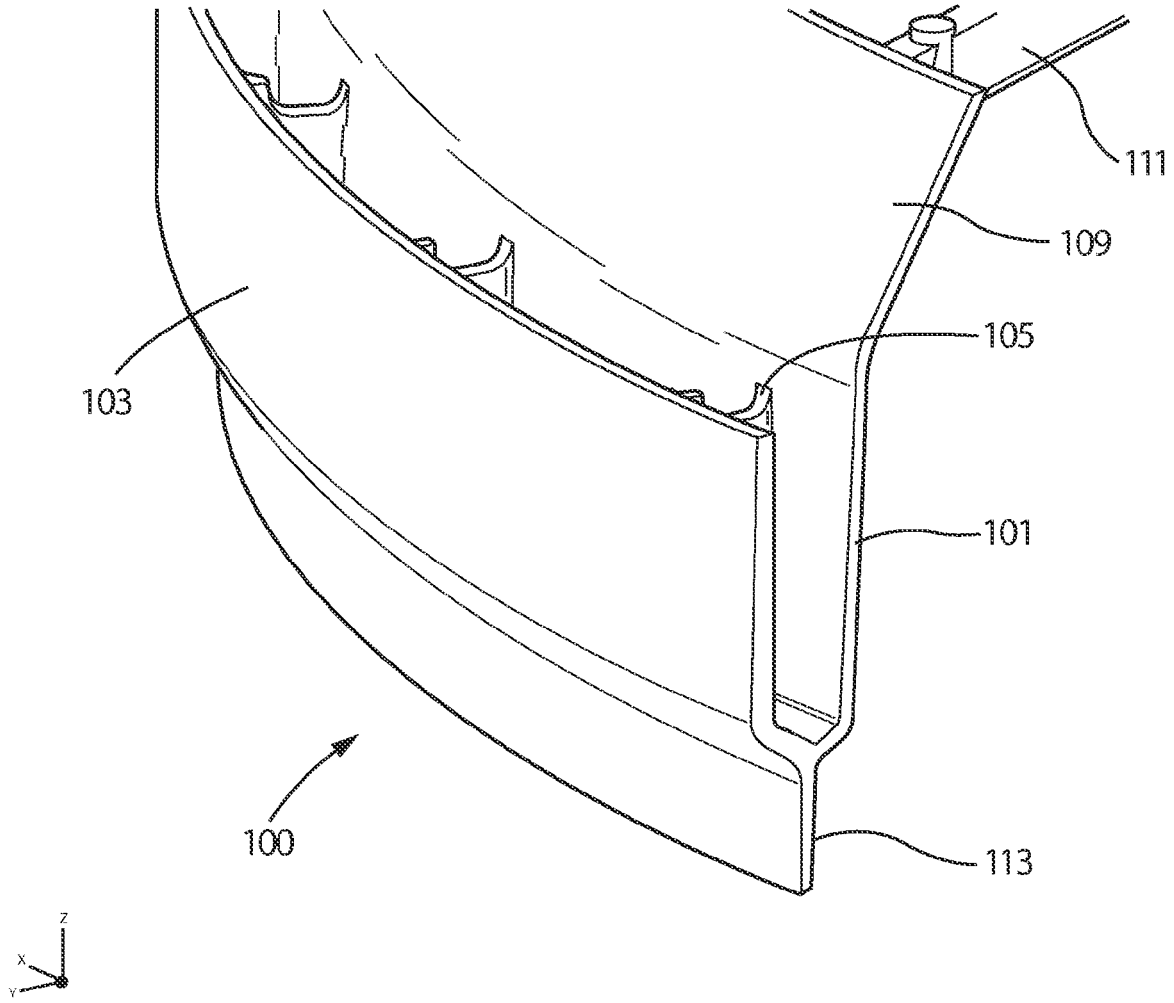

Fig.3

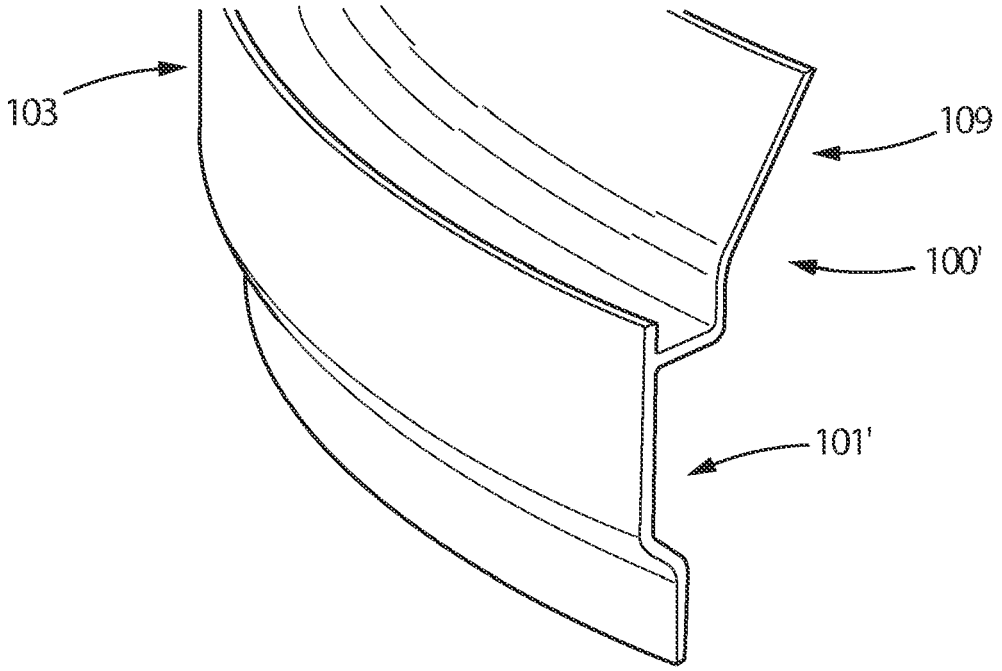

Fig.3a

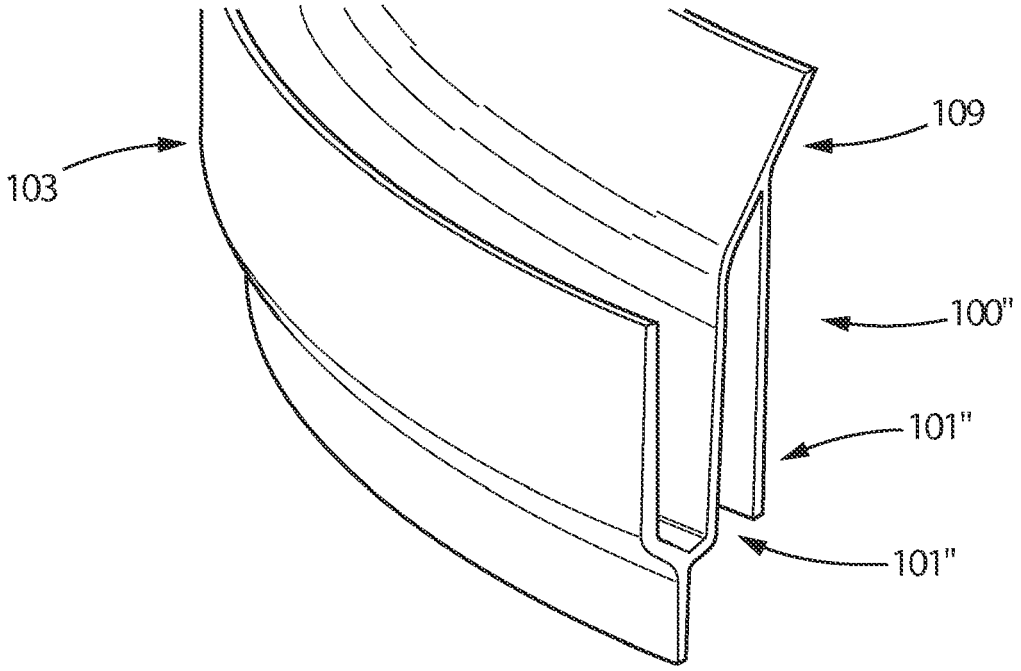

Fig.3b

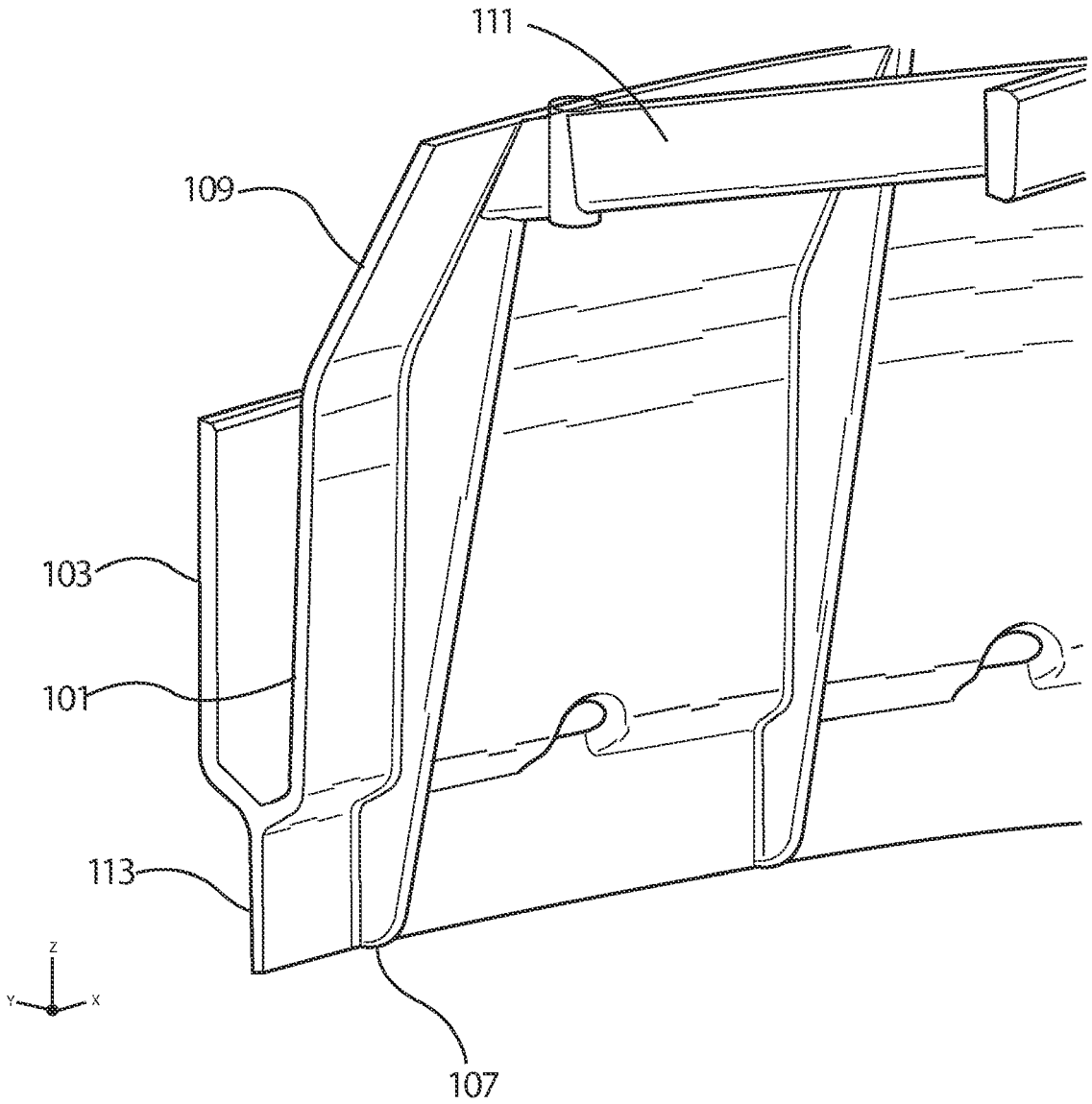

Fig.4

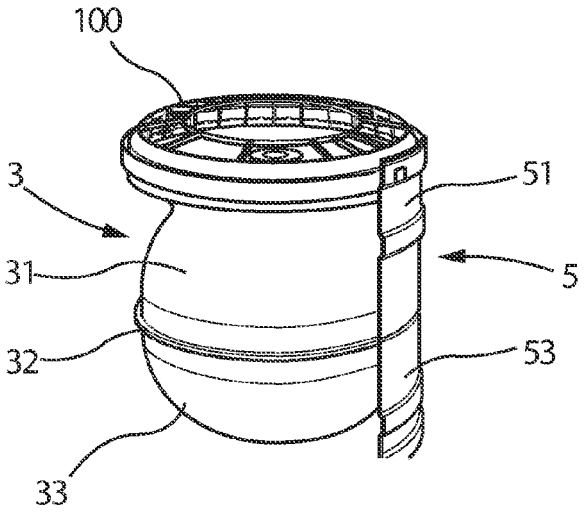

Fig.5

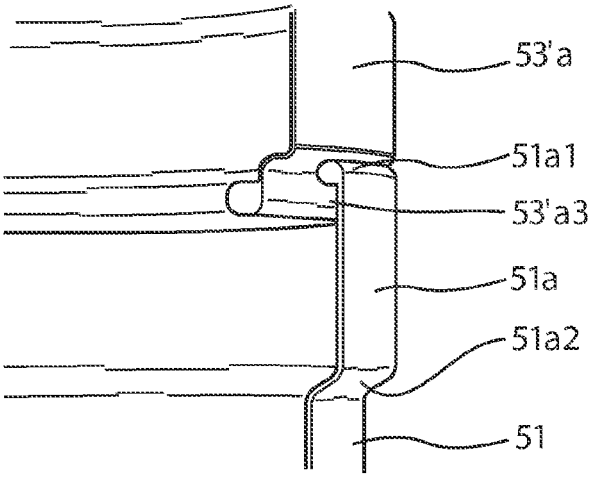

Fig.6

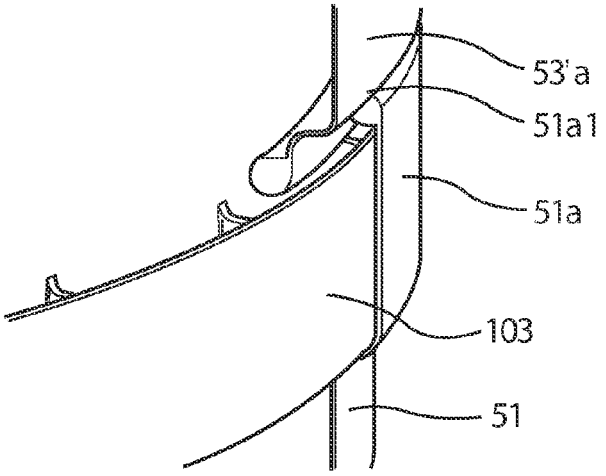

Fig.7

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EUROPEAN SEARCH REPORT

Application Number
EP 10 17 3764

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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X	US 5 657 871 A (WATERS ROBERT E [US] ET AL) 19 August 1997 (1997-08-19) * column 2, line 55 - column 5, line 10; figures 1-3 *	1-10,12, 13	
			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
Munich	11 November 2010	Lämmel, Gunnar

CATEGORY OF CITED DOCUMENTS

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