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(54) **A container assembly and a lid**

(57) A container assembly (1) comprises an outer box (2) including a bottom (3) and a circumferential side wall (4), and an inner bag (8) for containing a liquid. The assembly also comprised a rigid lid (9) which fits inside the circumferential side wall (4) of the outer box (2) for covering the upper side of the inner bag (8) in a filled condition thereof at least in a circumferential region thereof adjacent to the side wall (4) of the outer box (2), and a fixation member (11) for keeping the lid (9) on the inner bag (8) in its filled condition, which fixation member (11) is attachable to at least one of the inner bag (8) and the outer box (2) at different vertical locations of the lid (9) with respect to the outer box (2).

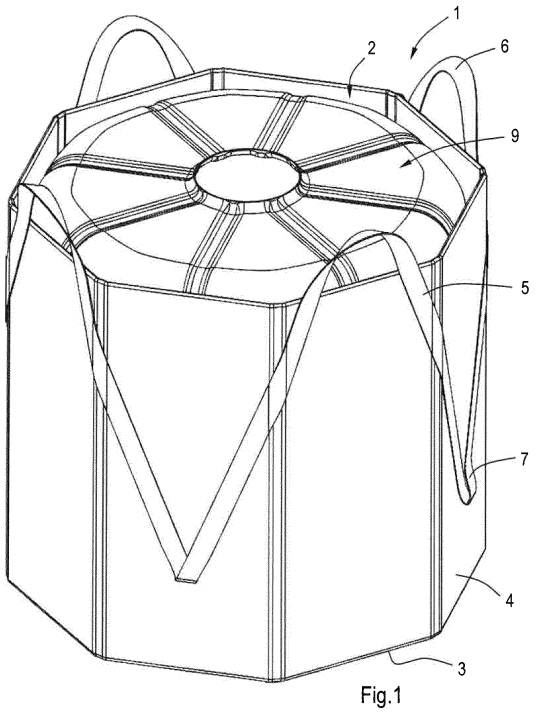

Fig.1

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Description

[0001] The present invention relates to a container assembly, comprising an outer box including a bottom and a circumferential side wall, and an inner bag for containing a liquid.

[0002] Such a container assembly is known in the art and often called a bag-in-box. The inner bag or liner may be suitable for containing and conserving a perishable liquid. The outer box may create a predefined shape of the container assembly and protect the inner bag against any damaging impact from outside. When the inner bag is filled with a liquid its walls will be pressed against the bottom and the upright circumferential side wall of the outer box, whereas the upper side of the filled inner bag will form a horizontal surface. A disadvantage of the known container assembly is that in a filled condition the liquid at the upper side of the filled inner bag moves back and forth when transported over a bumpy road surface. As a consequence, a transition region of the inner bag that extends between an inner bag portion that is pressed against the side wall of the outer box and the upper portion of the filled inner bag vibrates together with the liquid. Under severe conditions this leads to minor damages at the transition region of the inner bag, known as flex crack failure, allowing air into the inner bag and possibly causing contamination of the liquid.

[0003] Free motion of the upper portion of a filled inner bag can be reduced by covering the upper side. For example, in case of an inner bag which is filled such that its upper side is flush with the upper edge of the outer box, a net or cloth or the like can be stretched over the outer box.

[0004] It is an object of the present invention to provide an improved container assembly.

[0005] This is achieved by the container assembly according to the invention, which comprises a rigid lid which fits inside the circumferential side wall of the outer box for covering the upper side of the inner bag in a filled condition thereof at least in a circumferential region thereof adjacent to the side wall of the outer box, and a fixation member for keeping the lid on the inner bag in its filled condition, which fixation member is attachable to at least one of the inner bag and the outer box at different vertical locations of the lid with respect to the outer box.

[0006] Due to this feature the rigid lid can contact the upper side of the inner bag in its filled condition and retained thereon independent from the filling level of the inner bag with respect to the outer box. In other words, the fixation member is adapted such that at each filling level of the inner bag the lid can be placed onto the inner bag and fixed to at least one of the inner bag and the outer box. As a consequence, oscillation of the liquid and the upper side of the inner bag with respect to the outer box can be minimized under rough transport conditions at an arbitrary filling level. The fixation member prevents the lid from loosing contact with the filled inner bag. It is noted that in practice it is difficult, and often impossible, to fill the inner bag up to the same height level. The rigid lid may be slightly flexible, for example when it is made of a relatively thin plastic sheet material, but it is always more rigid than the inner bag. The fixation member may press the lid against the upper side of the inner bag firmly so as to further suppress the freedom of oscillation of the liquid.

[0007] It is noted that the outer box may be rigid or semi-rigid.

[0008] The lid has an inner surface to be directed to the inner bag in its filled condition. It is advantageous when the inner surface is conical at the circumference of the lid, since it appears that a smaller vertical force is required for keeping the lid on the inner bag than in case of a planar inner surface. Besides, a conical inner surface at the circumference of the lid creates an angle between the conical portion and a central portion of the lid as seen in cross section of the lid, which angle is larger than 90° hence minimizing any sharp transition, which might cause damage to the inner bag.

[0009] The fixation member may comprise at least two protrusions at opposite sides of the circumference of the lid, which protrusions are fixed to the inner bag and the outer box by means of clamping between the inner bag in its filled condition and the outer box. Although the protrusions are fixed to the lid in at least the assembled condition, on the one hand, and clamped between the inner bag and the outer box, on the other hand, it is possible that the protrusions are additionally attached to at least one of the inner bag and outer box if the clamping force appears to be insufficient for keeping the lid on the inner bag. The locations of the protrusions, i.e. at opposite sides of the circumference of the lid, supports the stability of keeping the lid on the filled inner bag.

[0010] In a specific embodiment the protrusions are part of a tension belt which extends over the upper side of the lid and forms said protrusions between the inner bag in its filled condition and the outer box at opposite sides of the circumferential side wall. In this case portions of the tension belt that form the protrusions are clamped between the inner bag and the outer box whereas another portion of the tension belt extends over the lid so as to pull the lid against the inner bag in its filled condition.

[0011] Preferably, the tension belt extends over the upper side of the lid in radial direction through a centre line of the lid such that the downward force onto the lid is balanced.

[0012] A plurality of protrusions-forming tension belts may extend over the lid in different directions. In case the tension belts also extend in different radial directions through a centre line of the lid the paths of the tension belts may have fixed mutual angular distances so as to create an even force distribution on the lid.

[0013] In an alternative embodiment the protrusions are part of a surrounding wall which projects from the circumference of the lid. In fact the surrounding wall comprises an infinite number of protrusions as opposite sides of the circumference of the lid.

[0014] Preferably, the surrounding wall is a rigid tubular wall since this facilitates to place the tubular wall as a unit between the inner bag and the outer box.

[0015] In an advantageous embodiment the lid and the surrounding wall are integrated, hence forming a lid comprising a central portion for at least partially covering the upper side of the inner bag in a filled condition thereof and an enveloping wall portion which projects transversely from the central portion. This means that the lid and the fixation member are integrated since the enveloping wall portion functions as the fixation member. In practice the central portion may be mainly planar having a closed circumferential region whereas the enveloping wall portion projects from its outer edge.

[0016] In case that the inner surface comprises a conical portion, as described hereinbefore, the conical portion may form a transition between the enveloping wall portion and the central portion, whereas the transition is concave. Such a gradual transition minimizes the risk of any damage to the inner bag at the mentioned transition.

[0017] In addition to the enveloping wall portion that functions as the fixation member, at least a strapping belt may extend over the upper side of the lid, which strapping belt is attachable to at least one of the inner bag and the outer box. This embodiment may be used if the enveloping wall portion provides insufficient downward force to keep the central portion of the lid on the inner bag under rough transport conditions. Preferably, the strapping belt extends between the inner bag in its filled condition and the outer box, such that its functioning is independent from any height difference between the upper side of the filled inner bag and the upper edge of the circumferential side wall of the outer box. In practice several strapping belts may be applied which extend over the lid in different directions, such as described hereinbefore in relation to the tension belt(s).

[0018] It is noted, that in case of strapping belts or tension belts a tensioner may be applied in order to increase the belt tension causing a higher pressure of the lid onto the upper surface of the inner bag.

[0019] The lid may be provided with a through-hole for providing access to an inlet of the inner bag. Nevertheless, the lid covers the upper side of the inner bag in a region adjacent to the side wall of the outer box as described hereinbefore. In practice the through-hole may be located at the centre of the central portion.

[0020] The circumferential side wall of the outer box may have a polygonal cross-section. In a particular embodiment its cross-section forms an octagon. This means that the circumferential edge of the matching lid has a corresponding shape.

[0021] The invention is also related to a lid for a container assembly as described hereinbefore. The lid comprises a central portion and an enveloping wall portion which projects transversely from the central portion, and the enveloping wall portion and the central portion form a substantially smooth inner surface, which is conical at a transition between the enveloping wall portion and the central portion. The inner surface may be textured, but it should be smooth such that the wall of the inner bag is not damaged upon contacting the lid. The conical portion may be concave as described hereinbefore.

[0022] The outer surface of the lid extending opposite to the inner surface may be provided with at least a groove for receiving a tension belt or strapping belt, which groove extends in a plane that intersects the lid in radial direction. The groove serves to keep the strapping belt in place on the lid. The groove may extend in radial direction at the central portion and in longitudinal direction of the enveloping wall portion. The enveloping wall portion may have a polygonal outer circumference in order to fit in an outer box that has a matching circumferential side wall.

[0023] The invention will hereafter be elucidated with reference to the schematic drawings showing embodiments of the invention by way of example.

Fig. 1 is a perspective view of an embodiment of a container assembly according to the invention.
Fig. 2 is a top view of the container assembly as shown in Fig. 1.
Fig. 3 is a sectional view of the container assembly along the line III-III in Fig. 2.
Fig. 4 is a perspective view of an embodiment of a lid for a container assembly according to the invention, showing the outer side of the lid.
Fig. 5 is a side view of the lid as shown in Fig. 4.
Fig. 6 is a top view of the lid as shown in Fig. 4.
Fig. 7 is a sectional view of the lid along the line VII-VII in Fig. 6.
Fig. 8 is a similar view as Fig. 4, but showing the inner side of the lid.
Fig. 9 is a similar view as Fig. 1, but showing the container assembly including strapping belts.

[0024] Figs. 1-3 show different views of an embodiment of a container assembly 1. The container assembly 1 comprises an outer box 2 including a bottom 3 and a circumferential side wall 4. The bottom 3 is made of a flexible material such as woven textile of polypropylene or the like, and may be reinforced by a reinforcing plate. The circumferential side wall 4 of the outer box 2 has an octagonal shape, but any alternative shape having a polygonal cross-section is conceivable. The octagonal shape approaches a drum shape and appears to be advantageous in terms of efficient use of space and robustness. The circumferential side wall 4 is attached to the bottom 3 and may be made of the same material, for example a flexible material such as a cloth of plastic and reinforcing plates. Alternatively, the outer box 2 may be rigid.

[0025] The side wall 4 may be made of a double layer cloth, which is divided into lodging parts by stitches in which reinforcing plates are inserted. The reinforcing plates may comprise corrugated or foamed plastic panels or the like. The outer box 2 may be collapsible in order to save space in case of storing or transporting empty

outer boxes 2. The dimensions of the outer box 2 may be such that an inner volume of 1,000 litres is created, but smaller or larger volumes are conceivable. In the embodiment as shown in Fig. 1 the outer box 2 is semi-rigid since the circumferential side wall 4 may slightly bulge-out when bulk content is present inside the outer box 2, whereas the reinforcing plates in the side wall 4 are pivotally connected to each other.

[0026] The outer box 2 of the container assembly 1 is provided with lifting straps 5. The lifting straps 5 are attached to the outer side of the circumferential side wall 4 such that they form four loops 6 above the outer box 2. This allows the container assembly 1 to be taken up by a forklift truck by means of inserting the forks of the forklift truck through the loops 6 and lifting the container assembly 1. The lifting straps 5 are stitched to the side wall 4 in V-shapes, leaving the lifting straps 5 free from the side wall 4 at lower ends of the V-shapes so as to form fastening loops 7. Due to the presence of the fastening loops 7 at the side wall 4 of the outer box 2 a support, such as a pallet, can be attached easily to the bottom 3, for example by means of a rope which is drawn through the fastening loops 7 and holes in the support.

[0027] The container assembly 1 also comprises a liner or an inner bag 8 for containing a liquid, see Fig. 3. The inner bag 8 may be made of polyethylene or an alternative plastic. Alternatively, the inner bag 8 may comprise multi-layered walls. Fig. 3 shows the container assembly 1 in a filled condition of the inner bag 8. In this condition the content of the inner bag 8 presses the walls of the inner bag 8 against the bottom 3 and the side wall 4 of the outer box 2. It is noted that such a container assembly 1 is also called a bag-in-box type container.

[0028] The container assembly 1 may be designed such that it is stackable, i.e. such that another container assembly 1 can be placed thereon. The other container assembly 1 may be supported by the side wall 4. This means that the side wall 4 has to withstand buckling due to a downward force of another container assembly onto the side wall 4 as well as to an outward radial force exerted on the side wall 4 by the filled inner bag 8.

[0029] The container assembly 1 is provided with a rigid lid 9. The lid 9 may be made of plastic and fits inside the circumferential side wall 4 of the outer box 2. Figs. 4-8 show different views of the lid 9 of the embodiment of the container assembly 1 as shown in Figs. 1-3. Fig. 4 shows an upper side or outer side of the lid 9 and Fig. 8 shows a lower side or inner side of the lid 9. The lid 9 comprises a mainly planar central portion 10 and an enveloping wall portion 11. The enveloping wall portion 11 projects transversely from the central portion 10 and diverges slightly in outward direction for manufacturing reasons since it is made by injection moulding. The figures show that the enveloping wall portion 11 has an octagonal shape such that it matches with the interior of the circumferential side wall 4 of the outer box 2.

[0030] In case of a filled inner bag 8 as shown in Fig. 3 the central portion 10 contacts the upper side of the inner bag 8, whereas the enveloping wall portion 11 surrounds the inner bag 8 at an upper portion thereof. Due to the rigid character of the lid 9 the upper side of the inner bag 8 at a region adjacent to the circumferential side wall 4 is protected against free motion during handling of the container assembly 1, for example in severe transport circumstances.

[0031] The lid 9 has an inner surface 12 which is directed to the inner bag 8 in its filled condition as shown in Fig. 3. The inner surface 12 is concave at a transition between the enveloping wall portion 11 and the central portion 10, see Figs. 7 and 8. Such a conical portion at the circumference of the lid 9 requires relatively little downward force to keep the lid on the inner bag 2. Furthermore, the inner surface 12 is substantially smooth in order to avoid any damage to the inner bag 8.

[0032] In the embodiment as described hereinbefore the lid 9 is provided with a through-hole 13 at the centre of the central portion 10. The through-hole 13 provides access to an inlet 14 of the inner bag 8, see Fig. 3. This means that in this case the lid 9 does not cover the entire upper side of the inner bag 8, but in any case a circumferential region adjacent to the side wall 4 of the outer box 2.

[0033] The enveloping wall portion 11 functions as a fixation member for keeping the central portion 10 of the lid 9 on the inner bag 8 in its filled condition, since it is clamped between the inner bag 8 and the outer box 2. Since the lid 9 fits inside the circumferential side wall 4 the enveloping wall portion 11 can be clamped below the upper side of the filled inner bag 8 at different vertical locations of the lid with respect to the outer box 2. This means that the central portion 10 of the lid 9 can be held on the inner bag 8 independent from the filling level thereof. The thickness of the enveloping wall portion 11 may be smaller than 5 mm in order to facilitate inserting between the filled inner bag 8 and the circumferential wall 4. Preferably, the lower rim of the enveloping wall portion 11 is curved in order to avoid damage to the inner bag

[0034] The embodiment as described hereinbefore may also be provided with strapping belts 15 that extend over the outer side of the lid 9. This is shown in Fig. 9. The strapping belts 15 are attached to the inner side of the circumferential side wall 4 in this case, but they may also be attached to the bottom 3 or even to the inner bag 8. Alternatively, the strapping belts 15 are only clamped between the inner bag 8 in filled condition and the circumferential side wall 4. The strapping belts 15 function as an additional pressing member or fixation member for pressing the lid 9 on the inner bag 8 in its filled condition. In order to guide the strapping belts 15 over the lid 9, its outer side is provided with grooves 16. Figs. 4-8 show that each of the grooves 16 extends radially from the surrounding edge of the through-hole 13 at the central portion 10 and in longitudinal direction of the enveloping wall portion 11 substantially parallel to a centre line of the lid 9. The grooves 16 extend at substantially flat regions of the octagonal enveloping wall portion 11 be-

tween neighbouring angles thereof. Since the strapping belts 15 extend between the inner bag 8 and the side wall 4 the distance between the upper edge of the side wall 4 and the upper side of the lid 9 does not influence the paths of the strapping belts 15 over the lid 9.

[0035] The lid 9 may be manufactured by means of injection moulding. In the embodiment as shown in the figures the inner side of the lid 9 is provided with ridges at locations where the outer surface is provided with the grooves 16. Alternatively, the inner surface may be entirely smooth.

[0036] In an alternative embodiment (not shown) the lid may lack an enveloping wall portion. In such a case, the lid may have a substantially planar central portion, and possibly a conical portion at the circumference thereof. Due to the absence of the enveloping wall portion an alternative fixation member must be present to keep the lid on the inner bag. Similar to the embodiment as described hereinbefore, tension belts may be applied over the lid and clamped between the inner bag and the outer box. This means that the tension belts can be attached at different vertical locations of the lid with respect to the outer box. Additionally, the tension belts may be fixed separately to the inner bag and/or the outer box.

[0037] It is noted that the side wall of the outer box may be configured differently than described hereinbefore. The side wall may be provided with reinforcement plates, wherein two adjacent reinforcement plates are made of a single panel that is bent along a bend axis. Thus, in case of an octagonal side wall four of such bent panels are applied. The bent panels are connected to a flexible material, for example a cloth of plastic, such that they are pivotally connected to each other. Such an outer box is independent from the inner bag or the lid as described hereinbefore. More generally, an aspect of the invention is related to a collapsible outer box for receiving a liner, which comprises a circumferential side wall of adjacent segments that are mutually angled so as to form a polygonal cross-section, wherein each two adjacent segments comprise a single reinforcement plate that is bent along a bent axis, and wherein the reinforcement plates are connected to a flexible material such that they are pivotally connected to each other. It appears that this configuration provides a robust semi-rigid outer box with limited susceptibility to bulging-out. In practice the single plate can be made by means of extrusion, wherein the bent axis extends parallel to the manufacturing direction of the extruded plate.

[0038] From the foregoing, it will be clear that the invention provides an improved container assembly which minimizes the risk of damage to the inner bag during transport under rough conditions.

[0039] The invention is not limited to the embodiments shown in the drawings and described hereinbefore, which may be varied in different manners within the scope of the claims and their technical equivalents.

Claims

1. A container assembly (1), comprising
an outer box (2) including a bottom (3) and a circumferential side wall (4), and an inner bag (8) for containing a liquid,
a rigid lid (9) which fits inside the circumferential side wall (4) of the outer box (2) for covering the upper side of the inner bag (8) in a filled condition thereof at least in a circumferential region thereof adjacent to the side wall (4) of the outer box (2), and
a fixation member (11) for keeping the lid (9) on the inner bag (8) in its filled condition, which fixation member (11) is attachable to at least one of the inner bag (8) and the outer box (2) at different vertical locations of the lid (9) with respect to the outer box (2).

2. A container assembly (1) according to claim 1, wherein the lid (9) has an inner surface to be directed to the inner bag (8) in its filled condition, wherein the inner surface is conical at the circumference of the lid (9).

3. A container assembly (1) according to claim 1 or 2, wherein the fixation member comprises at least two protrusions (11) at opposite sides of the circumference of the lid (9), which protrusions (11) are fixed to the inner bag (8) and the outer box (2) by means of clamping between the inner bag (8) in its filled condition and the outer box (2).

4. A container assembly (1) according to claim 3, wherein the protrusions are part of a tension belt which extends over the upper side of the lid (9) and forms said protrusions between the inner bag (8) in its filled condition and the outer box (2) at opposite sides of the circumferential side wall (4).

5. A container assembly (1) according to claim 4, wherein the tension belt extends over the upper side of the lid (9) in radial direction through a centre line of the lid (9).

6. A container assembly (1) according to claim 4 or 5, wherein a plurality of protrusions-forming tension belts extend over the lid (9) in different directions.

7. A container assembly (1) according to claim 3, wherein the protrusions are part of a surrounding wall (11), which projects from the circumference of the lid (9).

8. A container assembly (1) according to claim 7, wherein the surrounding wall is a rigid tubular wall (11).

9. A container assembly (1) according to claim 7 or 8, wherein the lid and the surrounding wall are integrat-

ed, hence forming a lid (9) comprising a central portion (10) for at least partially covering the upper side of the inner bag (8) in a filled condition thereof and an enveloping wall portion (11) which projects transversely from the central portion (10).

10. A container assembly (1) according to claim 2 and 9, wherein the conical portion forms a transition between the enveloping wall portion (11) and the central portion (10), which transition is concave.

11. A container assembly (1) according to one of the claims 8-10, wherein at least a strapping belt (15) extends over the upper side of the lid (9) which is attachable to at least one of the inner bag (8) and the outer box (2), which strapping belt (15) preferably extends between the inner bag (8) in its filled condition and the outer box (2).

12. A container assembly (1) according to one of the preceding claims, wherein the lid (9) is provided with a through-hole (13) for providing access to an inlet (14) of the inner bag (8).

13. A container assembly (1) according to one of the preceding claims, wherein the circumferential side wall (4) of the outer box (2) has a polygonal cross-section, preferably forming an octagon.

14. A lid (9) for a container assembly (1) according to one of the preceding claims, which comprises a central portion (10) and an enveloping wall portion (11) which projects transversely from the central portion (10), wherein the enveloping wall portion (11) and the central portion (10) form a substantially smooth inner surface (12), which is conical at a transition between the enveloping wall portion (11) and the central portion (10).

15. A lid (9) according to claim 14, wherein an outer surface extending opposite to the inner surface (12) is provided with at least a groove (16) for receiving a strapping belt (15), which groove extends in a plane that intersects the lid (9) in radial direction.

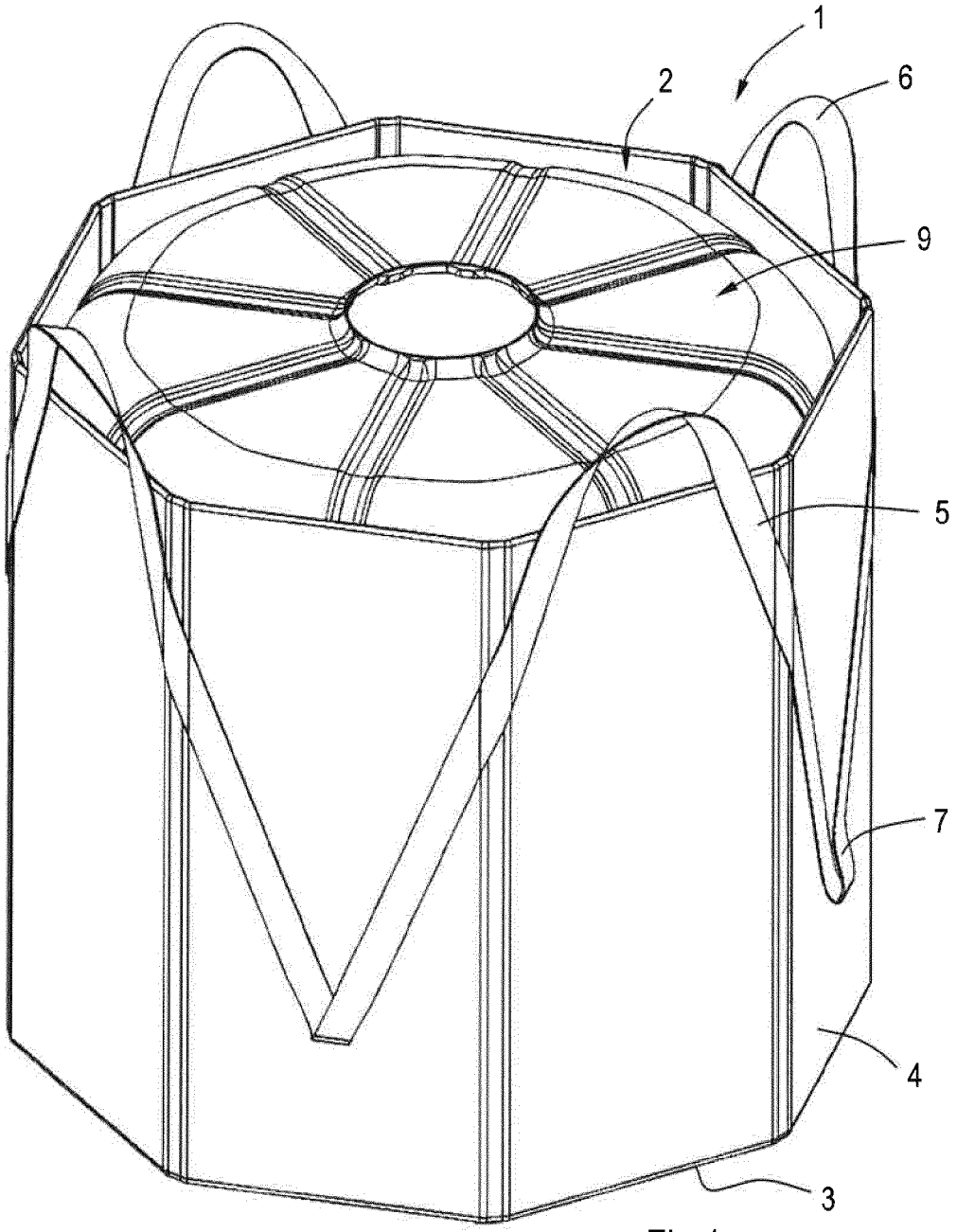

Fig.1

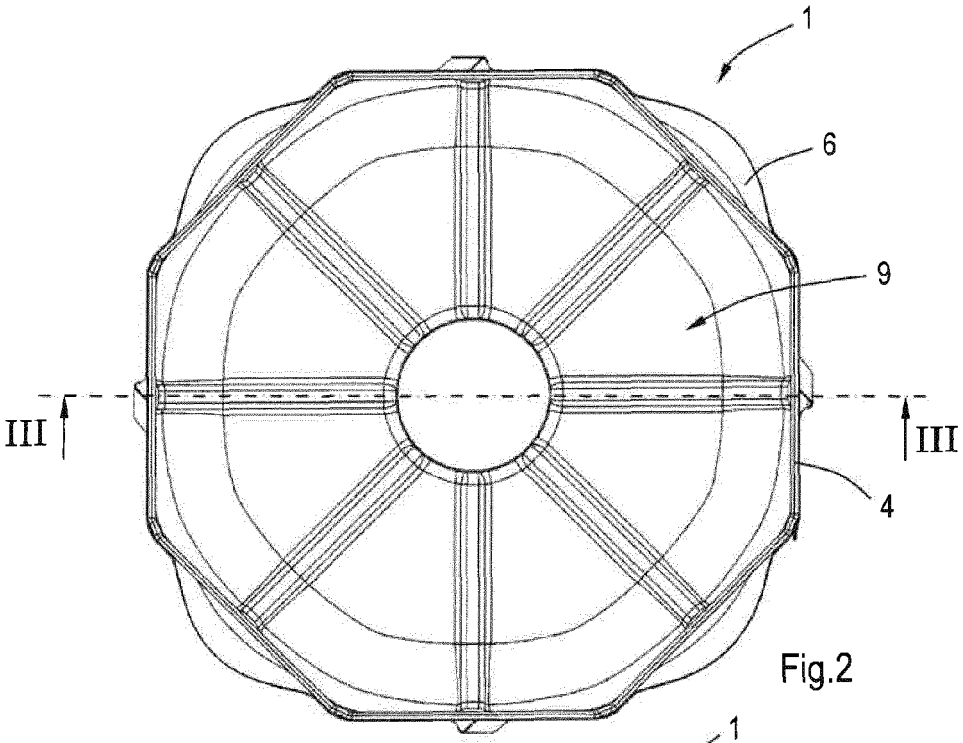

Fig.2

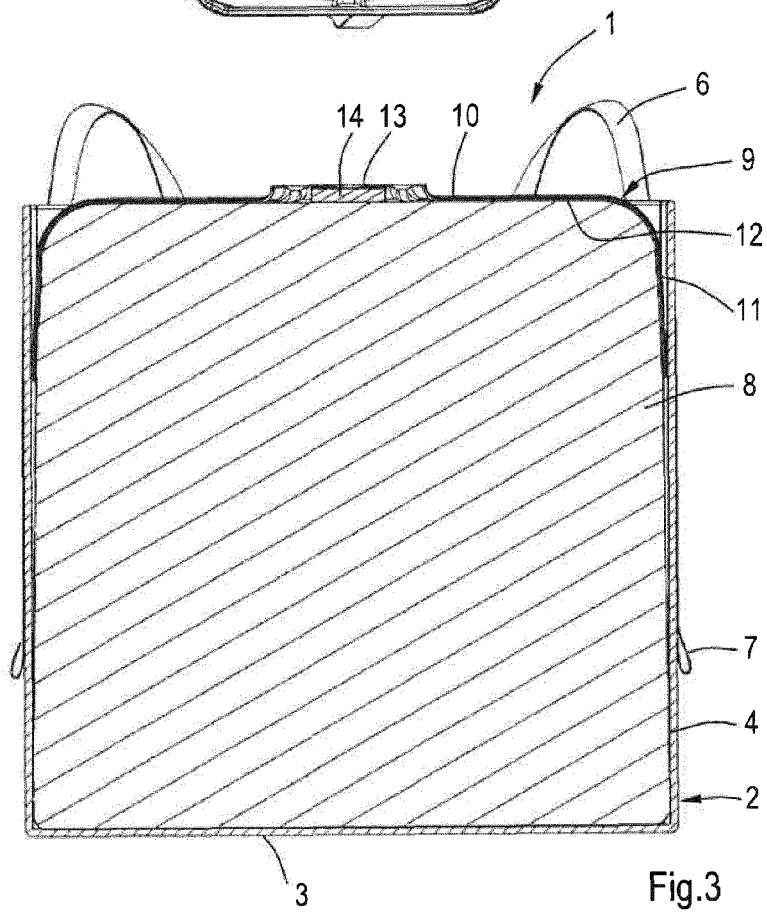

Fig.3

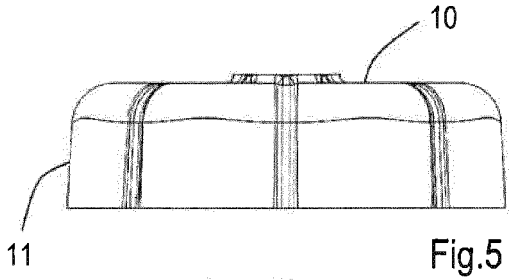

Fig.5

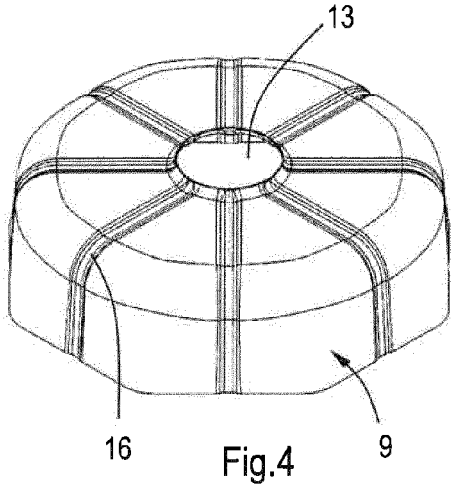

Fig.4

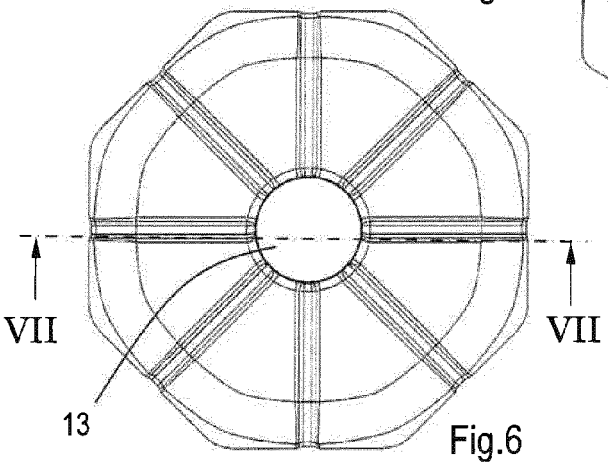

Fig.6

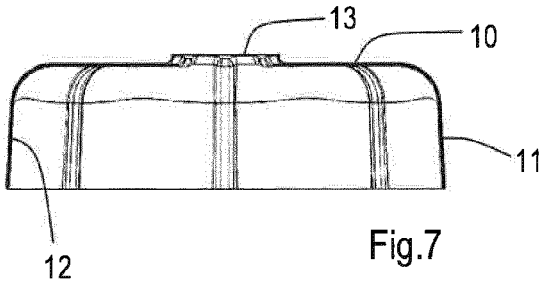

Fig.7

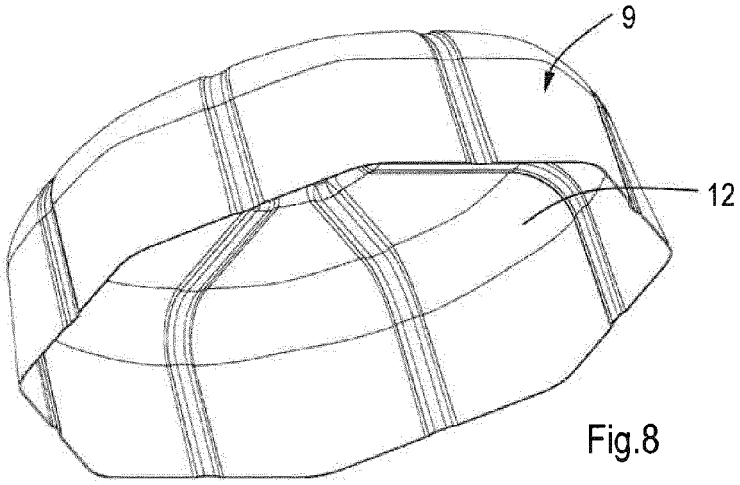

Fig.8

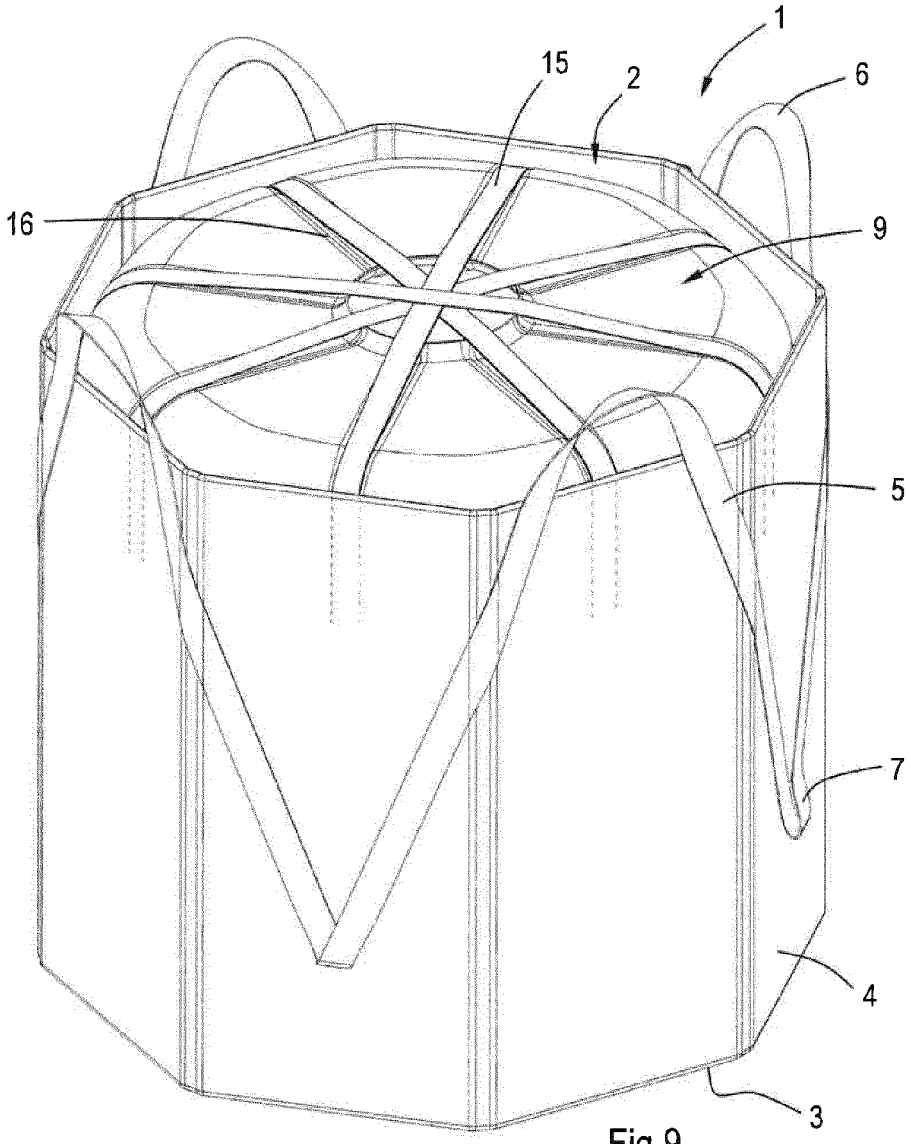

Fig.9

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EUROPEAN SEARCH REPORT

Application Number
EP 13 18 2600

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	US 5 192 134 A (POLETT WALTER J [US]) 9 March 1993 (1993-03-09) * column 4, line 58 - column 8, line 32; figures 1-7 *	1-5,7-9, 11-15	INV. B65D88/16
X	WO 01/98157 A1 (COMPOSITE CONTAINER CORP L L C [US]) 27 December 2001 (2001-12-27) * page 7, line 2 - page 16, line 11; figures 1-17 *	1-5,7-9, 11-13	
X	DE 600 26 712 T2 (BAG CORP [US]) 31 May 2007 (2007-05-31) * paragraph [0029] - paragraph [0055]; figures 1-9 *	1-5,7-9, 11-15	
X	US 1 228 652 A (DAUGHERTY CHARLES L [US]) 5 June 1917 (1917-06-05) * page 1, line 41 - page 1, line 96; figures 1-3 *	1-5,7-9, 11-15	
			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	9 January 2014	Lämmel, Gunnar

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 13 18 2600

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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