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(54) **INTERMEDIATE BULK CONTAINER**

(57) The present invention concerns a container (1) for the transport and storage of, especially liquid or granulated, goods, more particular an intermediate bulk type container, comprising a fillable internal bag or tank (2) and a supporting structure (3.1, 3.2) at least partially enclosing said bag or tank. According to the underlying inventive idea, the supporting structure (3.1, 3.2) comprises at least two shell-like housing components (3.1, 3.2), which can be releasably connected to enclose the bag or tank (2) at least partially, preferably from all sides, more preferably completely.

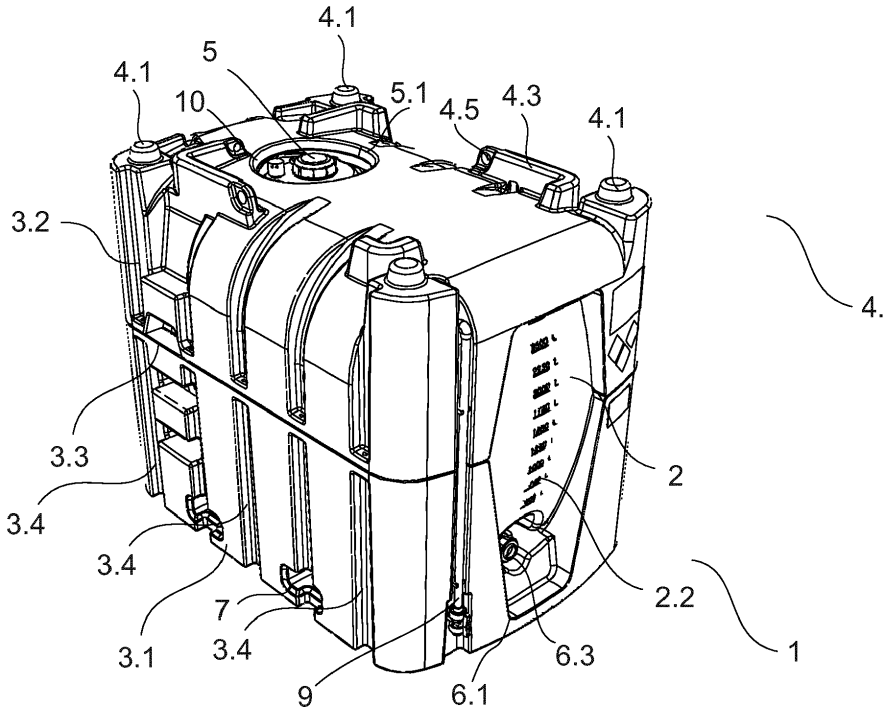

Fig. 1

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Description

[0001] The invention relates to a container for the transport and storage of, especially liquid or granulated, goods, more particular an intermediate bulk container, comprising a fillable internal tank or bag and a supporting structure enclosing the internal tank or bag.

State of the art

[0002] In the state of the art, various types of bulk containers are known for the transport and storage of (viscous) liquids, pastes, powders, granulates and the like. Oftentimes, so called Intermediate Bulk Containers (IBC) are used for this purpose. These usually comprise a fillable internal liner bag or tank and a supporting structure enclosing said tank or bag, thereby providing support and shielding to the tank or bag. Often, the supporting structure is implemented as a wire mesh cage, bar frame or the like. Intermediate bulk containers are generally stackable containers mounted on a pallet designed to be moved using a forklift or a pallet jack and often have a cuboid shape in order to maximally utilize the fill-volume that can be fitted on top of a standardized pallet.

[0003] The known supporting and shielding structures made of metal have numerous disadvantages such as the incomplete shielding because of the gaps in between the single wires/tubes or the susceptibility to corrosion, especially when transporting aggressive substances. Furthermore, such metal IBCs are laborious in their construction, since they have to be pieced together out of numerous single metal bars or tubes.

[0004] Further, foldable IBCs made of polymer are known to the state of the art. These have the disadvantage that they consist of a large number of single parts (multiple foldable walls), which results in a high number of necessary assembly operations.

Disclosure of the invention

[0005] Because of the above stated disadvantages in known IBCs, the present invention is directed towards providing a container for the transport and storage of liquids, pastes, powders, granulates and the like, with a simple construction and a reduced number of assembly steps.

[0006] The above stated problem is solved by a container according to the preamble of independent claim 1. Advantageous embodiments are object of the subordinate claims.

[0007] In accordance with the invention there is provided a container for the transport and storage of, especially liquid, granulated, powdered, viscous or paste-like, goods comprising an internal fillable tank of bag and a supporting structure at least partially surrounding/enclosing/encompassing said tank or bag. According to the invention, said supporting structure comprises at least two shell-like (cupped) housing components, which can be (releasably) connected to enclose/encase the bag or tank at least partially, preferably from all sides, more preferably completely. Within the scope of this document, the term shell-like shall be defined such that each of the two housing components encompasses more than one side of the internal tank or bag. In other words, each of the at least two housing components is curved (bent) or angled in such a manner that it can support or shield at least two sides of the internal tank or bag. The shell-like structure of the housing components poses the advantage that the amount of housing components necessary to provide sufficient enclosure can be reduced, since each single housing component can shield and support multiple sides of the internal tank or bag. Further, the shell-like structure facilitates the positioning of the housing components relative to the tank or bag.

[0008] Preferably the tank or bag and/or at least one of the housing components may be made of a plastic/polymer e.g. polyethylene or polypropylene. It is preferred, that the tank or bag and/or at least one of the housing components are manufactured in a molding process.

[0009] According to one aspect of the invention, both of the shell-like housing components can each cover at least 20%, preferably at least 30%, more preferably at least 40%, of the outer surface of the tank or bag. In other words, in a preferred embodiment the two shell-like housing components can almost completely encompass/encase (in a closed manner) the tank or bag with the exception of few functionally necessary recesses/windows (breakthroughs) and thereby provide more complete protection than common wire mesh cages.

[0010] According to a preferred embodiment of the invention the supporting and shielding structure can comprise only (exactly) two shell-like housing components. By this means, the supporting structure can consist of a minimum amount of components, while still encompassing and supporting/shielding the tank or bag from all sides. Preferably, the two shell-like housing components have a cup-shape or an open box-shape and can be releasably joined together at their respective rims to enclose/encase the bag or tank.

[0011] According to a further aspect of the invention, the two shell-like housing components can be an upper housing component and a lower housing component, preferably designed to be moved using a forklift or a pallet jack. For this purpose, the lower housing component can comprise at least two (parallel) forklift slots, recesses, receivers or the like. It is preferred that the forklift slots are only arranged in the back and the lateral sides of the container - not in the front side - in order to reduce the chances of damaging the vulnerable front side with a forklift or pallet jack. Preferably the forklift slots are integral, more particular molded into, with the lower housing component.

[0012] According to a preferred embodiment, the lower housing component can comprise a (at least partially) circumferential wall which extends in an upwards direction no more than two thirds, preferably no more than

one half, of the tank or bag's height. Because of the (at least partially) circumferential wall of the shell-like shape of the lower housing component, the tank or bag can be positioned and centered more easily thereon, when compared to a common pallet. Afterwards the upper housing component need only be placed on top and be (releasably) fixed to an upper rim constituted by said circumferential wall.

[0013] According to a further aspect of the invention, the two shell-like housing components can constitute an essentially cuboid or cylindrical shape, when joined together. In other words, the two shell-like housing components can preferably produce a cuboid outer shape of the container when connected around the tank or bag.Preferably the joined housing can have a cuboid shape in order to maximally utilize the fill-volume that can be fitted on top of a the pallet-like section of the lower housing component and in order to improve stackability of the containers.

[0014] According to a further preferred embodiment of the invention, the tank can have an essentially cylindrical or cylinder-like shape. Such design can improve resilience of the tank to pressure loads.

[0015] According to an even more preferred aspect of the invention, the tank can have an essentially cylindrical or cylinder-like shape, while the supporting structure has an essentially cuboid shape to the outside and an at least partially complementary cylindrical shape to the inside.

[0016] According to a preferred embodiment of the invention, an inner surface of the lower housing component can be essentially complementary to an outer surface of the tank or bag, such that the tank or bag lies fittingly in (at least a segment of) said inner surface. In a further preferred embodiment, there remains a gap between an inner surface of the upper housing component and the outer surface of the tank or bag, while the tank or bag lies fittingly in the inner surface of the lower housing component. Through such design it can be achieved, that the lower housing component supports the weight load of the tank or bag through a fitting bearing, while at the same time loads which occur due to the stacking of multiple containers are not transferred into the tank or bag because of the (slight) gap between the inner surface of the upper housing component and the outer surface of the tank or bag.

[0017] According to a further aspect of the invention, stacking devices can be provided to the supporting structure (housing). The stacking devices may preferably be molded integrally with the two housing components. More preferably the stacking devices may be arranged in proximity to the corners of the top and bottom surfaces of the assembled housing. In such an embodiment, the vertical edges (vertical edge sections) of the supporting structure (housing) can be reinforced (e.g. through local material reinforcement), in order to better transfer stacking loads. Through such design, transfer of the stacking loads through the vertical edges of the supporting structure (housing) can be improved, thereby bypassing the tank or bag.

[0018] Preferably, the tank or bag can comprise at least one inlet opening, more particular an inlet opening located on or near/adjacent to an upper side of the tank or bag. According to an additional aspect, the tank or bag may comprise at least one outlet opening, more particular an outlet opening located near/adjacent to a lower side of the tank or bag. It is further preferred that the supporting structure (housing) comprises windows/recesses/breakthroughs corresponding to at least one of said inlet or outlet openings thereby making the same accessible to external operation.

[0019] According to a preferred embodiment, the tank may be positioned (held/suspended) at an angle inside the supporting structure (housing), such that a decline towards the outlet opening is formed. Preferably, this is achieved by declining the inner surface of the lower housing component, which is formed complementary to the bag or tank and serves as a bearing therefor. By providing a decline of the tank or bag towards the outlet opening, complete emptying of the tank or bag can be facilitated.

[0020] According to a further aspect of the invention, the outlet opening of the tank or bag can be provided with an outlet tap (e.g. valve, spigot, or faucet). In such an embodiment, the window/recess/breakthrough in the supporting structure exposing the outlet opening can be configured to support the outlet tap from below with its lower edge. In other words it can be designed such that it forms a bearing for said outlet tap. Put differently, the lower edge of the window/recess/breakthrough exposing the outlet opening, can form a base supporting the lower side of the outlet tap. It is a long standing problem in intermediate bulk containers that the outlet taps break under the load of connecting tubes or pipes. Through the above mentioned design of the window/recess/breakthrough exposing the outlet opening, the outlet tap can be supported by an integral bearing without necessitating any additional components or manufacturing steps.

[0021] According to a further aspect of the invention, the tank or bag can be at least partially transparent and comprise a fill-level indicator. Preferably said fill-level indicator can be positioned above the outlet opening, such that the fill-level can be checked during any operation of the outlet tap. The supporting structure (housing) can preferably comprise a corresponding window/recess/breakthrough exposing the fill-level indicator. More preferably, the window/recess/breakthrough in the supporting structure (housing) exposing the outlet opening can be designed such that it also exposes a fill-level indicator located above the outlet opening. Preferably said exposing window/recess/breakthrough in the supporting structure (housing) can be drawn upwards (be designed in its upward dimension), such that it is formed by complementary windows/recesses/breakthroughs in both the lower housing component and the upper housing component.

[0022] According to a further aspect of the invention, an integral ladder section may be formed in at least one

wall section of the supporting structure (housing). Preferably the integral ladder section can be constituted by a number of footholds, e.g. recesses, horizontal edges, horizontal ribs or similar structures, which are arranged vertically above one another and preferably spaced apart equidistantly. Even more preferred, at least one hand rail, e.g. in the form of a vertical rib, may be provided adjacent to the footholds. The footholds may preferably be coated or treated to provide an anti-slip surface. The integral ladder section provides easy accessibility to the functional units (e.g. inlet opening) located on the top side of the container without necessitating any additional parts or manufacturing steps.

[0023] According to a further preferred embodiment, the tank/bag and/or the upper and lower housing component may be made of plastic/polymer and be manufactured in a rotational molding process. The rotational molding process provides a higher tolerance against pressure and impact loads when compared to e.g. injection molding.

[0024] According to a further aspect of the invention, designated surfaces for (adhesive) labels may be provided on both of the shell-like housing components.

[0025] According to a preferred embodiment of the invention, the minimum wall strength of the assembled housing may be in the range of 150 to 200 mm, preferably 175 mm. Preferably, the walls of the housing components can be constructed as hollow core walls in order to reduce the weight and the material necessary for production of the housing while maintaining good mechanical qualities.

[0026] In summary, one could say that a core concept of the present invention is to provide a packaging concept based in three (rotational molded) plastic pieces/components: a cover part (upper housing component), a pallet part (lower housing component) and a fillable internal tank or bag.

[0027] Embodiments of the invention will now be described by way of example and with reference to the accompanying drawings, in which:

Fig. 1 is a perspective view of a container according to a preferred embodiment of the invention;

Fig. 2 is a frontal view of the container according to the preferred embodiment of the invention;

Fig. 3 is a bottom view of the container according to the preferred embodiment of the invention;

Fig.4 is a top view of the container according to the preferred embodiment of the invention;

Fig.5 is a first sectional view of the container according to the preferred embodiment of the invention;

Fig.6 is a second sectional view of the container according to the preferred embodiment of the invention;

Fig.7 is a side view of the container according to the preferred embodiment of the invention; and

Fig.8 is a back view of the container according to the preferred embodiment of the invention.

[0028] Fig. 1 shows a perspective view of a container 1 according to a preferred embodiment. The depicted container 1 is of the intermediate bulk container type. As such, the shown container 1 is classified as bulk container for liquids and viscous liquids and typically has a fill-volume between 500 liters and 4000 liters, preferably around 3000 liters. IBC type containers are usually mounted on top of a pallet or comprise a pallet-like (forklift compatible) lower section. Compared to the classical transport of liquid or granulated goods in steel barrels stacked on top of a pallet, IBCs provide the advantage of optimally utilizing the fill-volume provided by the pallet-format and reducing the net weight of the packaging. Furthermore, with typical 200 liter barrels, 15 working steps are necessary to withdraw the same amount of goods, when compared to one working step to withdraw 3000 liters from the depicted IBC. The depicted container 1 of the preferred embodiment has a length of approximately 2385 mm, a width of approximately 1570 mm and a height of approximately 1870 mm.

[0029] Fundamentally, the depicted container 1 is structured such that it comprises an internal tank 2, which is encompassed/enclosed by two shell-shaped (bowl-shaped/cup-shaped) housing components 3.1, 3.2, more particular a lower housing component 3.1 and an upper housing component 3.2, which form a cuboid housing when assembled together. When assembling the shown container unit, the internal tank 2 is placed onto the lower housing component 3.1 and into the circumferential wall formed by the same. This way, the circumferential wall of the shell-shaped lower housing component 3.1 helps in positioning and centering the substantially cylindrical tank 2 and also provides some stability, even without the upper housing component 3.2. Subsequently, the upper housing component 3.2 is placed on top of the lower housing component 3.1, such that its vertical walls sit flush with the vertical walls of the lower housing component 3.1. In other words, both housing components 3.1, 3.2 comprise circumferential vertical wall sections, which form circumferential edges 3.3. The upper and lower housing components 3.1 and 3.2 are assembled with said edges 3.3 facing each other and forming an assembly interface 3.3, where the two housing components 3.1 and 3.2 can be releasably connected, e.g. through a bolt, screw, snap or similar connection. In the depicted container 1 the side walls of the upper and lower housing components 3.1, 3.2 are each provided with vertical grooves (beads) 3.4 respectively, which help improving the stiffness of the housing 3.1, 3.2. Where the vertical grooves 3.4 meet the interface 3.3 between the two housing parts 3.1, 3.2, flange-like fastening sections 3.5 are formed, which are provided with through bores in the de-

picted example. The through bores serve for screwing/bolting or otherwise fastening the two housing parts 3.1, 3.2 together. The indented positioning of the fastening sections 3.5 inside the vertical grooves 3.4 helps to prevent an accidental damaging of the utilized fasteners.

[0030] The provision of a supporting structure (housing) 3.1, 3.2 enclosing/encompassing the internal tank 2, is important for supporting the tank 2 against deformation under the load of its contents and for shielding/protecting the tank 2 against external impacts or loads. This is especially important, since IBCs are often used for the transport of hazardous materials. A further function of the housing 3.1, 3.2 is enabling multiple containers 1 to be stacked, in particular in an empty state. This stacking function can preferably be implemented such that the stacking devices 4.1 (here: stacking cones) are arranged in the corners of the top surface of the housing 3.1 3.2, thereby enabling the flow of stacking forces to bypass the internal tank 2 and to be led through reinforced (pillar-like) vertical edges of the housing 3.1, 3.2 instead. The stacking devices 4.1 can be received by stacking recesses 4.2 formed on the bottom side of the lower housing component 3.1. As the skilled person will appreciate any other pairing of complementary shapes will fulfill the same function as the exemplary depicted cones 4.1 and recesses 4.2. The conical shape of the stacking devices 4.1 facilitates the threading of the stacking devices 4.1 into the stacking recesses 4.2. Additionally, the upper housing component 3.2 comprises a stacking frame 4.3 on its top surface, which interacts with a corresponding recess 4.4 on the bottom side of the lower housing component 3.1 and serves as an additional point of force introduction. The stacking frame 4.3 is further provided with eyebolts 4.5, which allow an operator to fix hooks of safety jackets therein.

[0031] The fillable internal tank 2 is provided with an inlet opening 5 and an outlet opening 6. The inlet opening is provided in a top section of the tank 2, to enable complete filling of the tank 2. The outlet opening 6 is provided in a frontal side wall of the tank 2 and in proximity to the base of the tank 2, in order to facilitate complete emptying of the tank 2. In order to provide accessibility of the inlet and outlet openings 5, 6 in the assembled state of the container 1, the upper housing component 3.2 is provided with an inlet window 5.1, which is a breakthrough in exposing the inlet opening of the tank 2. Correspondingly, the lower housing component 3.1 is provided with an outlet window 6.1, which is a breakthrough in exposing the outlet opening of the tank 2. Beneficially, a base portion 6.2 of the outlet window 6.1 forms an integral supporting structure for an outlet tap 6.3, which is operationally connected to the outlet opening 6 of the tank 2. As is best seen in Fig. 2, the outlet window base 6.2 is designed complementary to a lower section of the outlet tap 6.3, in order to maximize the supporting surface. The outlet window 6.1 in the depicted embodiment is formed as a tall, substantially rectangular, opening, which extends up into the upper housing component 3.2 in order to expose a fill-level indicator 2.2 provided in a front side of the tank 2 and arranged above the outlet opening 6. The fill-level indicator 2.2 may be integrally formed onto or engraved into tank 2. In order to provide visibility of the fill-level of the contents of the tank 2, the tank is preferably made of an at least partially transparent material, e.g. a (low crystallinity) polyethylene. The outlet tap 6.3 (and preferably also the outlet window base 6.2) is indented with respect to the outer surface of the housing 3.1, 3.2 in order to protect the outlet tap 6.3 from damage. It is advantageous, if the outlet tap is indented at least 50 mm, preferably 200 mm, in respect to the outer surface of the housing 3.1, 3.2.

[0032] As can best be seen in the sectional views of Figs. 6 and 5, the internal tank 2 has a substantially cylindrical shape, which is complementarily received by an inner surface of the housing 3.1, 3.2. More precisely, the tank 2 is fittingly received by the lower housing component 3.1, while there remains a gap 2.1 between a top section of the tank 2 and a top section of the inner surface of the upper housing component 3.2. Said gap 2.1 helps prevent the transfer of stacking forces through the tank 2 and facilitates transfer of the stacking forces through the reinforced vertical edges of the housing 3.1, 3.2 instead. As is best seen in Fig. 6, the internal tank 2 is supported by the bottom inner surface of the lower housing component 3.1 at a slight angle α. This further facilitates a complete emptying of the tank 2, since the bottom surface of the tank 2 declines towards the outlet opening 6.

[0033] In order to improve the transportability of the container 1 the lower housing component comprises 3.1 several forklift slots 7, which are arranged in pairs each and are integrally formed into the lower housing component 3.2. The forklift slots 7 are only arranged in the back sides (c.f. Fig. 8) and lateral sides (c.f. Fig. 7) of the container 1 - not in the front side (c.f. Fig. 2) - in order to reduce the chances of damaging the outlet opening 6 (especially the outlet tap) during operation of a forklift or pallet jack.

[0034] As is best seen in Figs. 7 and 8, the side walls and the back wall of the depicted IBC are provided with an integral ladder section 8 each. The ladder sections 8 are each constituted by a number of integral footholds 8.1 (recesses forming a horizontal lower edge), which are arranged vertically above one another and are spaced apart equidistantly. As can be seen in Fig. 4, the integral ladder on the back side of the container 1 is provided with vertical ribs 8.2 arranged adjacent to the footholds 8.1 and thereby framing the ladder section 8 as hand rails 8.2. Advantageously, the ladder sections 8 are arranged in line with the inlet opening 5 (when viewed in container width or length direction respectively), so as to provide easy access to the inlet opening for the operator climbing the ladder section 8. The ladder section 8 located in the back wall of the depicted container constitutes the main ladder providing access to the top of the container and being fixed to the EN ISO 14122 standard.

The second ladder section in the container side wall is intended for visual inspection only in the depicted preferred embodiment. Beneficially, the integral ladder section 8 extends over both the upper housing component 3.2 and the lower housing component 3.1. In the depicted preferred embodiment, the circumferential edge 3.3 of the lower housing component 3.1 constitutes one of the footholds 8.1. The footholds 8.1 of the preferred embodiment have a depth of 175 mm or more in order to provide stable footing to the operator.

[0035] In Figs. 1 and 2 a venting pipe 9 is depicted, which is beneficial e.g. for allowing emptying of the tank 2, while the inlet opening 5 is sealed or vice versa. Furthermore, an additional venting (relief valve) 10 is provided adjacent to the inlet opening 5, as can be seen in figures 1 and 4.

Reference signs:

[0036]

1	container (IBC)
2	tank;
2.1	gap;
2.2	fill-level indicator;
3.1	lower housing component;
3.2	upper housing component;
3.3	circumferential edge/interface;
3.4	stiffening grooves;
3.5	fastening section;
4.1	stacking devices/stacking cones;
4.2	stacking devices/recesses;
4.3	stacking frame;
4.4	recess;
4.5	eyebolts for fixing safety jacket connector;
5	inlet opening;
5.1	inlet window;
6	outlet opening;
6.1	outlet window;
6.2	outlet window base;
6.3	outlet tap;
7	forklift slots;
8	integral ladder section;
8.1	recess/foothold;
8.2	vertical rib/hand rail;
9	venting pipe; and
10	venting.

Claims

1. A container (1) for the transport and storage of, especially liquid or granulated, goods, more particular an intermediate bulk container, comprising:

   - a fillable internal bag or tank (2); and
   - a supporting structure (3.1, 3.2) at least partially enclosing said bag or tank (2),

   characterized in that,
   the supporting structure (3.1, 3.2) comprises at least two shell-like housing components (3.1, 3.2), which can be releasably connected to enclose the bag or tank (2) at least partially, preferably from all sides, more preferably completely.

2. The container (1) of claim 1, wherein the supporting structure (3.1, 3.2) comprises only two housing components (3.1, 3.1), preferably a lower housing component (3.1) and an upper housing component (3.2).

3. The container (1) of claims 1 or 2, wherein the two housing components (3.1, 3.2) each enclose at least 20%, preferably 30%, more preferably 40%, of an outer surface of the bag or tank (2).

4. The container (1) according to one of claims 1 to 3, wherein the two shell-like housing components (3.1, 3.2) produce a cuboid outer shape of the container (1) when connected.

5. The container (1) of claim 4, wherein the tank (2) is cylindrical or cylinder-like and the outer shape of the housing (3.1, 3.2) is cuboid in order to improve the stackability of the container (1) and wherein an inner surface of the housing (3.1, 3.2) is at least partially shaped complimentarily to the tank (2).

6. The container (1) according to one of claims 1 to 5, wherein the housing (3.1, 3.2) comprises stacking devices (4.1, 4.2), preferably arranged in the corners of a top and a bottom surface of the housing (3.1, 3.2).

7. The container (1) according to one of claims 1 to 6, wherein the bag or tank (2) comprises at least one inlet opening (5), preferably located in or adjacent to an upper side of the bag or tank (2) and at least one outlet opening (6), preferably located in or adjacent to a lower side of the bag or tank (2) and
   the housing (3.1, 3.2) forms complementary windows (5.1, 6.1) exposing said inlet opening (5) and outlet opening (6) in the assembled state of the container (1).

8. The container (1) according to one of claims 1 to 7, wherein an outlet tap (6.3) is arranged at the outlet opening (6) of the bag or tank (2) and the complementary outlet window (6.1) of the housing (3.1, 3.2), which exposes the outlet opening (6) of the bag or tank (2), is configured to support the outlet tap (6.3) from below with its lower edge.

9. The container (1) according to one of claims 1 to 8, wherein an integral ladder section (8) is formed in at least one wall section of the housing (3.1, 3.2), preferably a ladder section formed by multiple integral

footholds (8.1) arranged vertically above one another.

10. The container (1) according to one of claims 1 to 9, wherein the tank (2) and /or at least one of the housing components (3.1, 3.2) are manufactured in a rotational molding process.

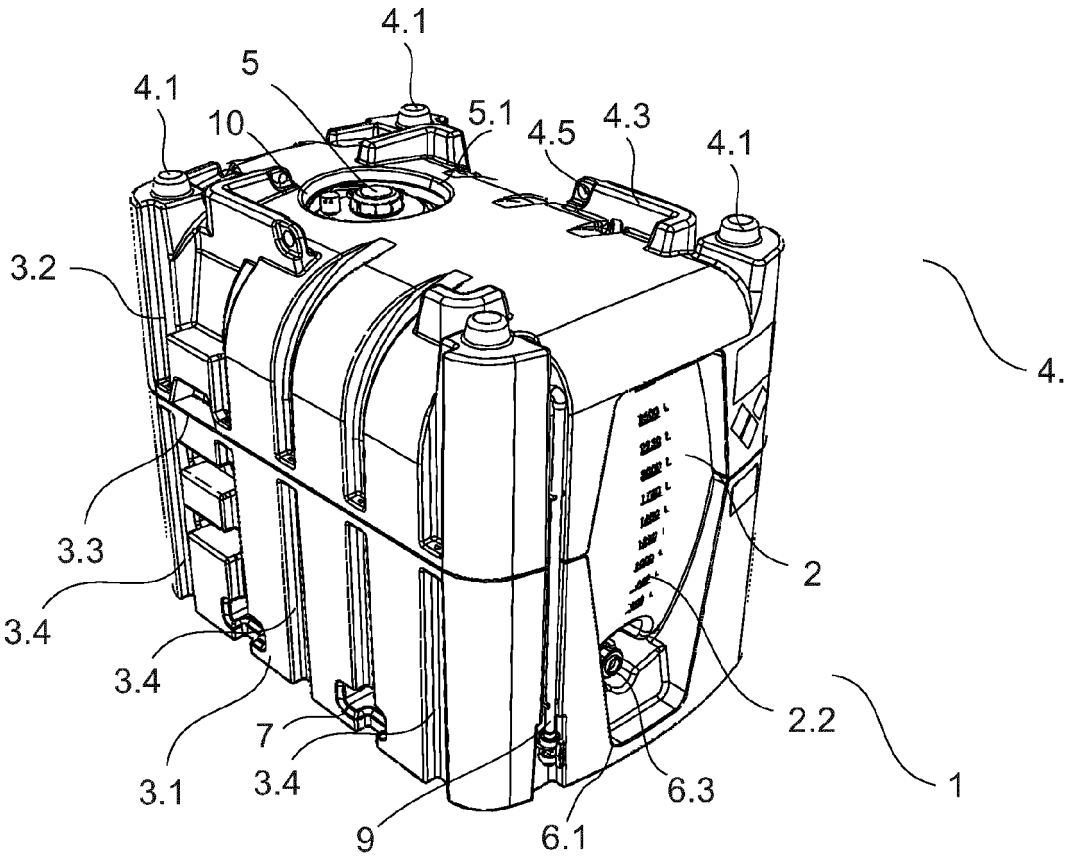
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Fig. 1

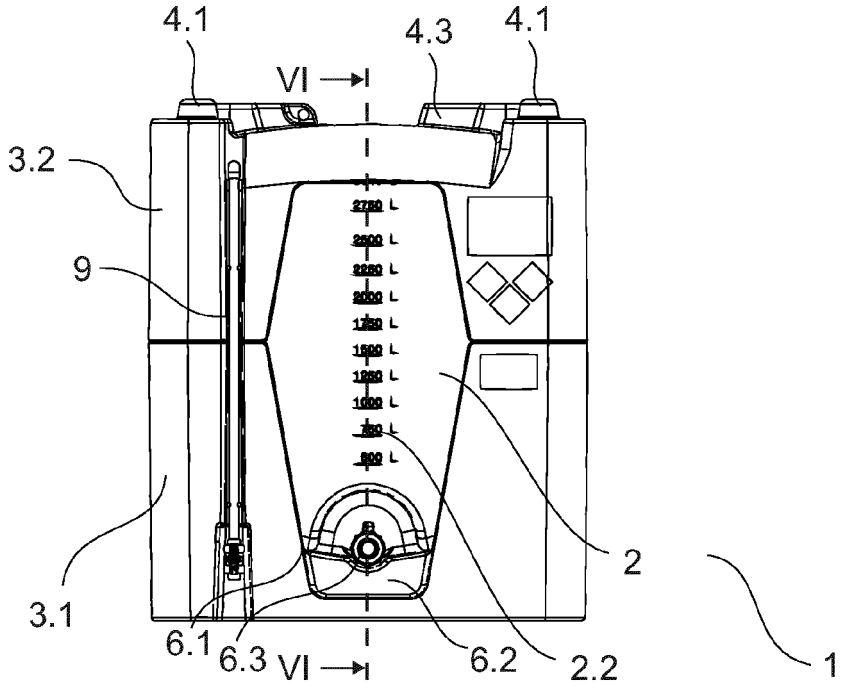
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Fig. 2

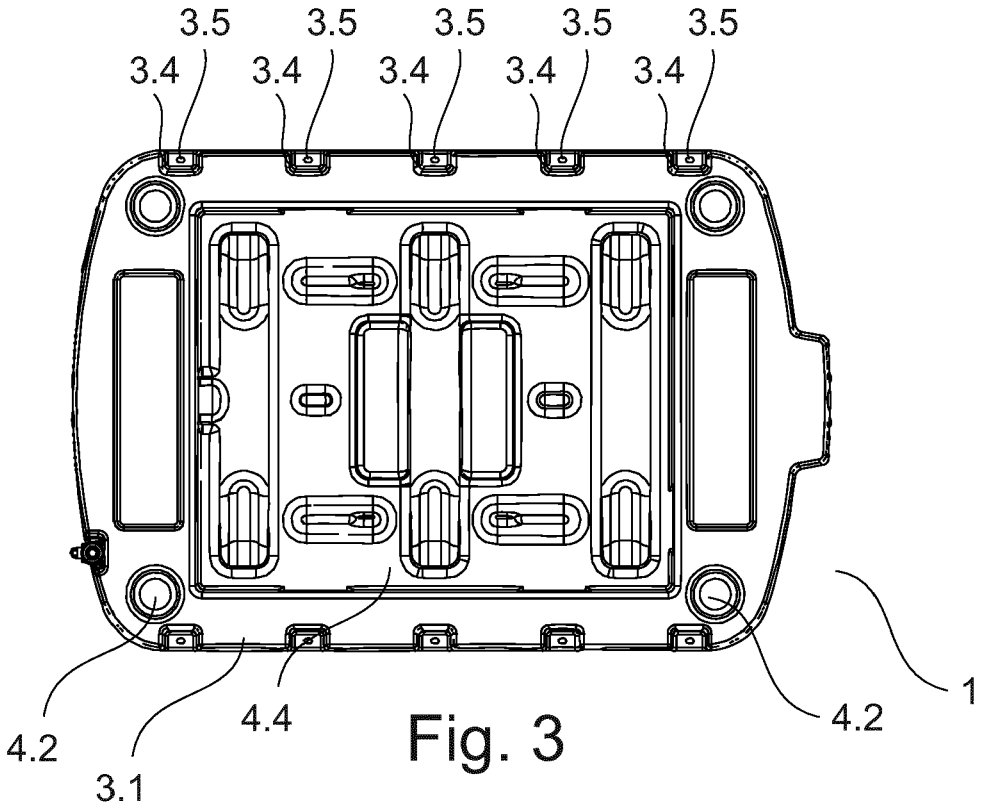

Fig. 3

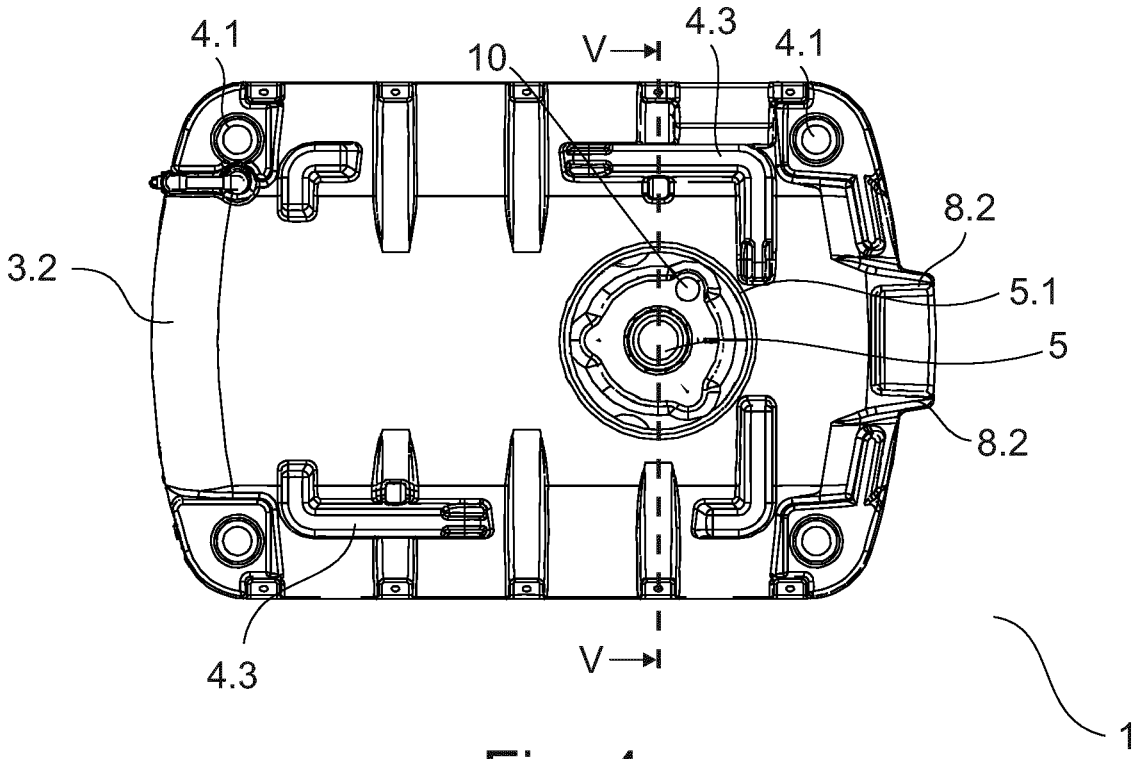

Fig. 4

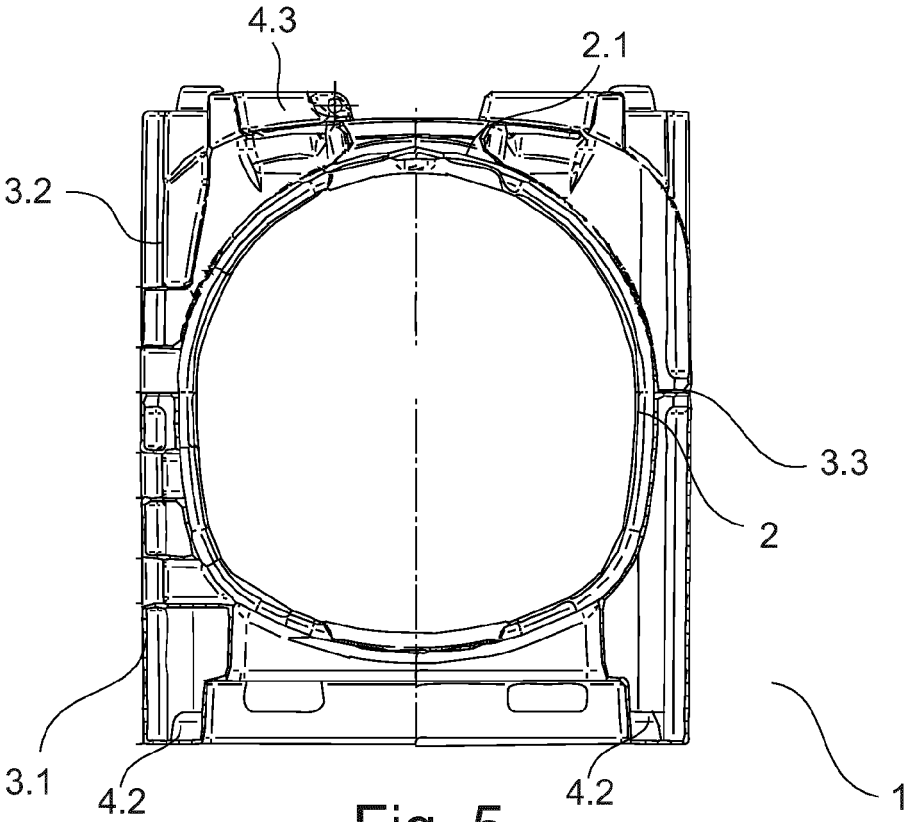

Fig. 5

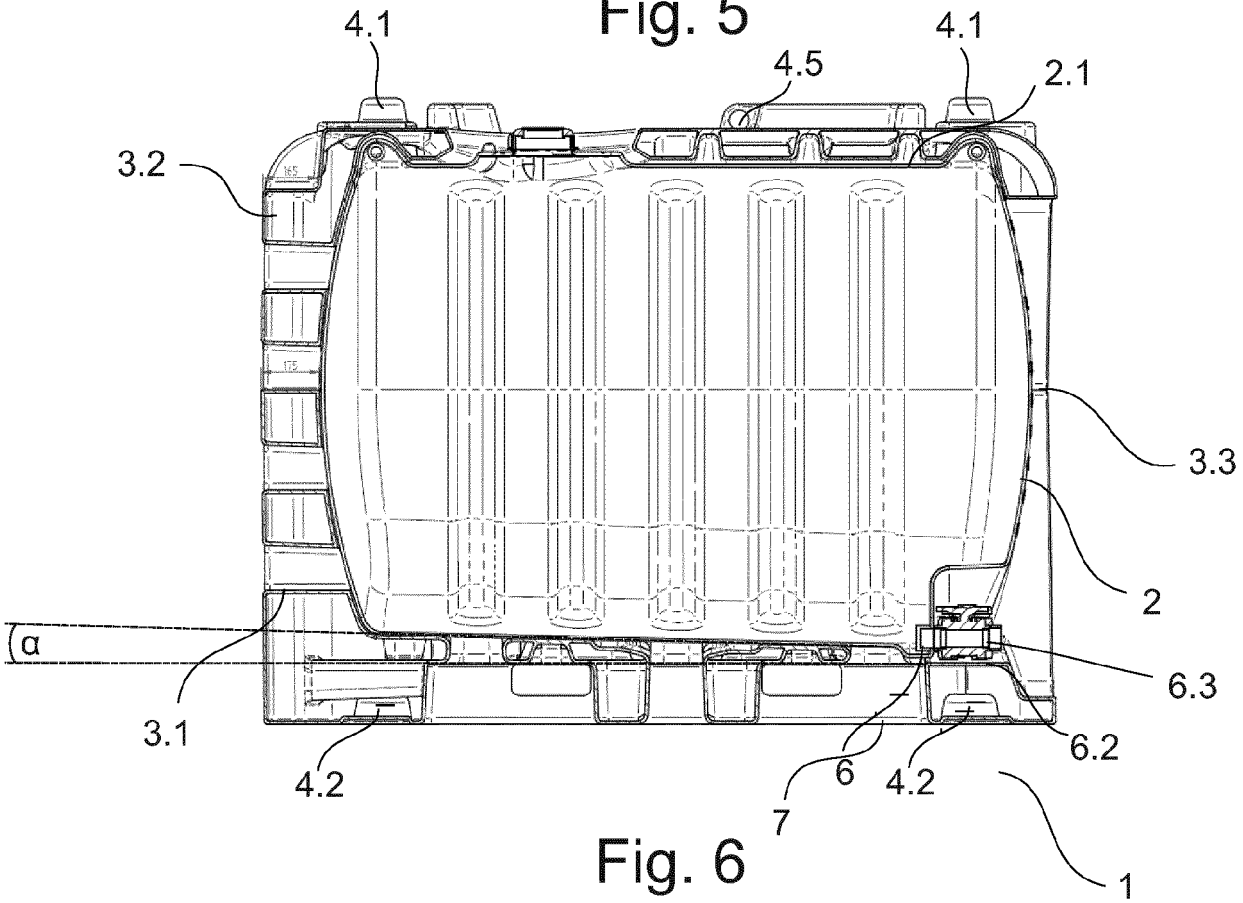

Fig. 6

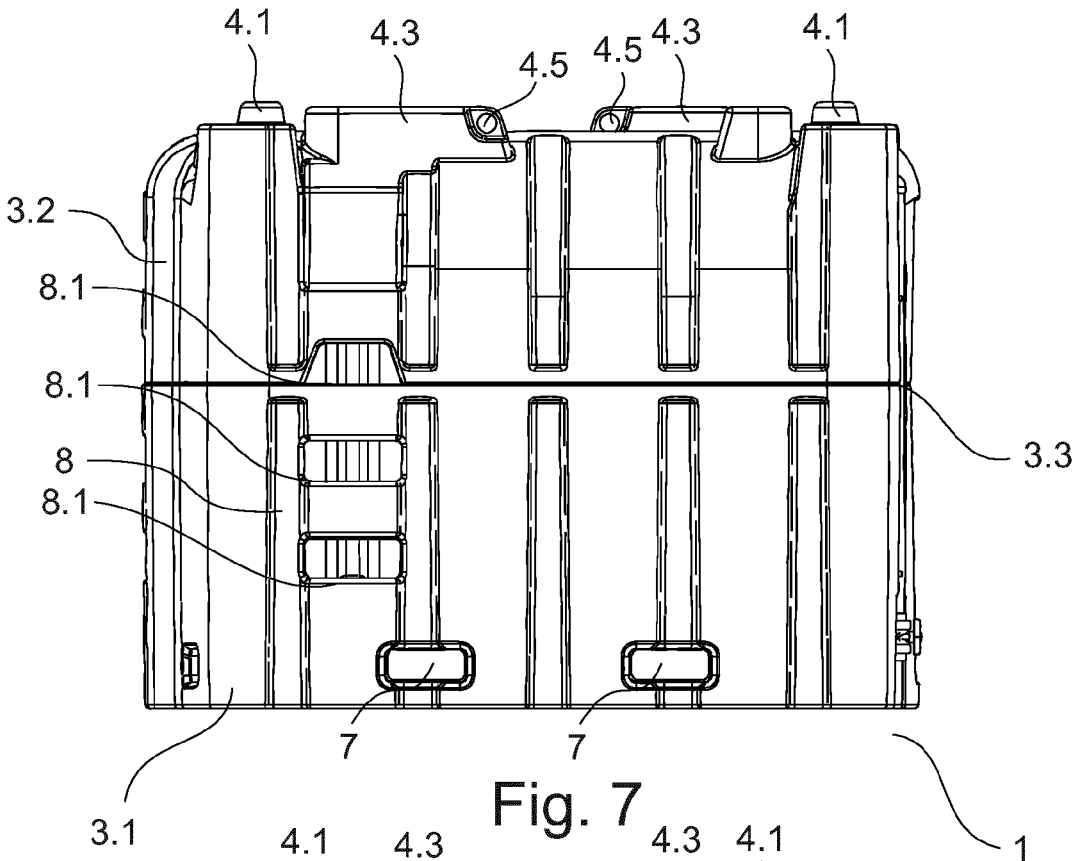
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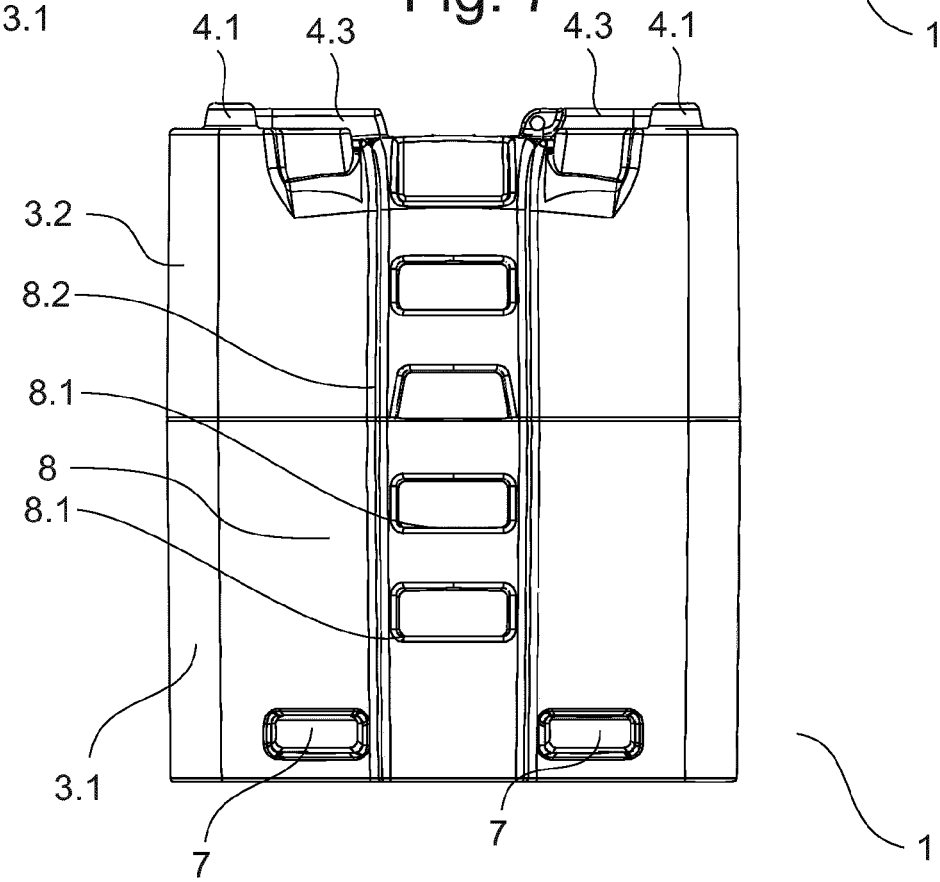
Fig. 7


4.1
4.3
4.3
4.1
3.2
8.2
8.1
8
8.1
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7
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1

Fig. 8

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EUROPEAN SEARCH REPORT

Application Number
EP 17 17 7074

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Place of search	Date of completion of the search	Examiner
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