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(54) CONTAINER FRAME

(57) The present invention relates to a container frame (1) for forming a container (100) to be loaded on a truck by a skip loader, hooklift, chainlift or cable lift system, the frame comprising:
- a floor (10), configured to support a load arranged in or on the container, and
- two longitudinal frame bars (20), arranged underneath the floor to support the floor and each comprising a frame rib (21), herein the frame bars extend parallel to each other and downwardly protrude from the floor, for example in a direction perpendicular to the plane of the floor, the frame bars and the floor are integral with each other and formed from a flat sheet (F), wherein the floor is formed from a central part (C) of the flat sheet, and wherein the frame bars are formed by opposed side parts (S) of the flat sheet, which are bent downward, for example perpendicular relative to the central part.

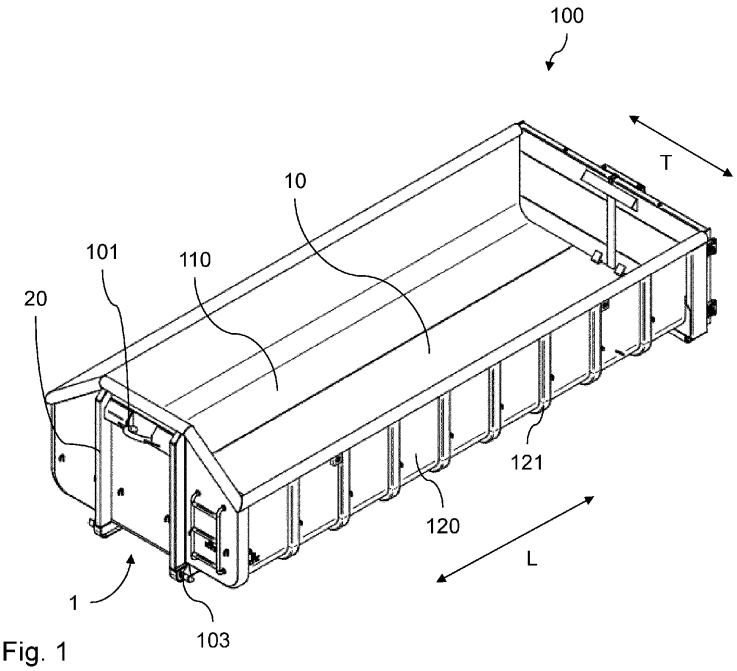

Fig. 1

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Description

Field of the invention

[0001] The present invention relates to a container frame for forming a container to be loaded on a truck by a skip loader, hooklift, chainlift or cable lift system. The present invention further relates to a container and to a method of manufacturing a container frame.

State of the art

[0002] At present, containers are widely used to transport loads. On the one hand, shipping containers are known, which comprise locking means at their corners with which they can be secured and with which they can be handled in a horizontal orientation. On the other hand, containers are known, which are solely transportable by trucks or trailers and which can be loaded with an integrated lifting system of the truck. These containers typically comprise a floor and two frame bars underneath. For loading and unloading these container, one side of the container, i.e. a front side is typically lifted and pulled on the truck in an angled orientation.

[0003] The trucks with lifting systems or the trailers are typically made by various different manufacturers, having different securing systems for securing the container on the truck or trailer. These securing systems generally interlock with the frame bars, for example comprising a plurality of movable clamping claws. The frame bars of the container typically, in cross-section, have the shape of an inverted T, a U-profile on its side or an I-profile.

[0004] The frame bars of different makes of containers may not always be compatible with the securing systems, for example because their frame bars cannot be clamped by the claws. The claws thereby typically interlock with a horizontal bottom part of the profiles, either transversely from the inside out or from the outside in. This may give the drawback that some containers cannot be secured on the truck or trailer and thus cannot be transported safely.

[0005] Furthermore, this also gives the drawback that manufacturing of containers is relatively cumbersome, as the shape of the frame needs to be accurately adapted to the truck or trailer on which it is intended to be used. The different types of frames also make automated manufacturing, i.e. by means of robots, more difficult.

[0006] In BE 1 020 684 A5, a container is disclosed, which comprises a pre-formed floor tunnel and two opposed side panels, which are assembled together. Each of the tunnel and the side panels comprises a profiled frame plate, shaped as a C, which are assembled together face-to-face, to obtain longitudinal frame bars each composed of two plates having an I-shape in cross-section.

[0007] DE 20 2013 102973 U1 discloses a similar container, also comprising C-shaped profiled frame plates, which are nested together during assembly. As such, the frame bars have a C-shape, with the open sides facing each other, with a thickness double that of the individual frame plates.

[0008] Finally, BE 1 021 486 B1 discloses a modular container, formed of separate frame bars, bottom plates and floor plates, which are all welded together in a disadvantageous manner described above.

Object of the invention

[0009] It is therefore an object of the invention to provide a container frame or a container that can be transported more safely and/or that can be manufactured more conveniently, or to provide an alternative container frame or container.

Detailed description

[0010] The present invention provides a container frame for forming a container to be loaded on a truck by a skip loader, hooklift, chainlift or cable lift system, the frame comprising:

- a floor, configured to support a load arranged in or on the container, and
- two longitudinal frame bars, arranged underneath the floor to support the floor and each comprising a frame rib,

wherein the frame bars extend parallel to each other and downwardly protrude from the floor, for example in a direction perpendicular to the plane of the floor, characterized in that, the frame bars and the floor are integral with each other and formed from a flat sheet, wherein the floor is formed from a central part of the flat sheet, and wherein the frame bars are formed by opposed side parts of the flat sheet, which are bent downward, for example perpendicular relative to the central part.

[0011] The present container may form a modular basis for a container, onto which different types of floors and/or sidewalls can be attached, to obtained different containers. This offers the benefit that the container frame can be made in large batches, without requiring adaptation to the final container that is to be made from it.

[0012] According to the present invention, the frame bars support the floor from underneath in a manner similar to existing containers. The frame bars thereto at least comprise a frame rib that extends downward from the floor, for example perpendicular to the floor. The frame ribs may have a height, i.e. a so-called tunnel height, that is sufficiently large to allow sufficient clearance between the frame bars and underneath the floor, but sufficiently low to prevent the container from becoming too high, for example having a height in the range between 140 mm and 165 mm.

[0013] The present frame bars are integral with the floor, being made from the same sheet, e.g. a metallic sheet, that is bent to define the ribs. This differs from the

frame bars of existing containers, that typically comprise complete profiles as frame bars that are welded to the floor. In the container frame according to the present invention, the floor itself becomes part of the load-bearing construction. Hence, no separate profile with a horizontal top part, like the I-profile or U-profile on its side, is welded underneath the floor. Instead, the integral, bent connection between the floor and the frame ribs may obtain a sufficient strength and rigidity already.

[0014] The bent frame ribs according to the present invention have the benefit that the frame ribs can be manufactured simultaneously with the floor in a universal manner. The type of securing system does not influence the shape of the bent ribs, since the vertical frame ribs may be compatible with all types of securing system. The bottom parts of the frame ribs can be manufactured separate from the frame ribs, which may provide the benefit that only the bottom part of the frame bars needs to be adjusted to the type of securing system.

[0015] The bending of the flat sheet into the floor and the opposed frame ribs may provide the benefit that the connection between the floor and the frame bars can be made stronger than with existing containers, which typically relied on a welded connection between them.

[0016] The floor and the frame ribs are made of the same sheet, all having the same thickness. This typically differs from existing containers, with distinct floor and frame bars. In existing containers, the floor typically has a thickness in the range between 2 mm and 6 mm and the frame ribs typically have a thickness of about 10 mm. One would expect it to be a drawback that the floor and the frame ribs, being made from the same flat sheet, would have to have the same thickness. Hence, the flat sheet may have a thickness in the range between 6 mm and 8 mm, which could imply that the floor must now be provided somewhat thicker than existing floors and that the frame ribs must be provided somewhat thinner than the frame bars in existing containers.

[0017] However, the present inventors have surprisingly found that this equal thickness may not be a drawback after all, since the overall weight of the container frame can become lower than that of existing container frames. This may provide that the floor itself may be sufficiently strong to support loads, e.g. without requiring transverse struts underneath.

[0018] Even more, the thicker floor might be more resilient during filling of the container, resulting in fewer damages when heavy materials, like steel, gravel or rubble, are dumped in the container. In addition, the thicker floor may be less prone to wear during unloading, e.g. tipping of the container. Finally, the unloading of the container may be improved, since the thicker and thus stronger floor may end up having fewer dents over its lifetime, resulting in less accumulation of material therein during unloading, e.g. tipping of the container.

[0019] Meanwhile, the equal thickness of the flat sheet may yield that the frame ribs can be provided somewhat thinner than the frame bars in existing containers, due to the improved strength of the bent, integral connection between the frame ribs and the floor. This smaller thickness may result in a lower weight, whilst remaining sufficiently strong.

[0020] The container frame may extend over the entire length of the container that is to be manufactured from the container frame. In the transverse direction, perpendicular to the longitudinal direction, the container frame may have a width that is smaller than the width of the container that is to be manufactured. Instead, the container frame may have a width corresponding to the loading system, for example in the range between 1000 mm and 1100 mm for a hooklift, chainlift or cable lift container and in the range between 850 mm and 950 mm for a skip loader container. To form the container, side floor parts may be attached to opposite sides of the floor to obtain the desired width for the container.

[0021] The opposed side parts of the flat sheet are defined relative to the longitudinal direction of the container frame. Accordingly, the flat sheet can be bent over the entire length of the flat sheet, seen in the longitudinal direction, to obtain the frame ribs on opposite sides of the central floor, which extend over the entire length of the container frame.

[0022] In an embodiment, the thickness of the frame bars is substantially equal to the thickness of the floor. This may be provided since both the frame bars and the floor are made from the same flat sheet, which may have a constant thickness. This especially applies for the downwardly-bent side portions of the flat sheet, since the additional support flanges and/or support strips may have a thickness different from that of the frame bars and the floor.

[0023] For a skilled person, it may not be obvious to provide both the frame bars and the floor at the same thickness. Hence, conventional containers are typically welded together from distinct components, e.g. steel plates and two longitudinal frame bars, i.e. sleepers, having thicknesses that match the required strength. This is not possible according to the present invention, since the frame bars and the floor are made of a unitary flat sheet. Likewise, the prior art publications cited above also teach that the thickness of the frame bars should be larger than that of the floor, by providing two sheets against each other when the container is built. Such a construction has a relatively large weight.

[0024] The present inventors have surprisingly that a single thickness for the frame bars and the floor may reach a desirable balance between strength and weight.

[0025] In a further embodiment, the frame bars are formed by a single sheet. This means that when the container is built from the container frame, no further sheets are attached to the downwardly-bent side portions of the flat sheets.

[0026] In particular, the frame bars may only formed by the flat sheet, and not of other sheets or plates attached to it in a co-planar manner. This especially applies for the downwardly-bent side portions of the flat sheet,

since the additional support flanges and/or support strips may have formed by other sheets than that of the frame bars and the floor.

[0027] In an embodiment, the frame bars each further comprise a bottom flange at the lower ends of their frame ribs, the bottom flanges extend parallel to the floor, wherein the frame ribs and their respective bottom flanges are integral with each other, in the absence of a welded connection in between them, and wherein the bottom flanges are bent horizontally, for example perpendicular relative to their respective frame ribs, being formed from opposed outer ends of the side parts of the flat sheet.

[0028] According to this embodiment, the frame ribs are provided with a lower support underneath them, being formed by the bottom flanges. The bottom flanges increase the footprint of the frame bars, since the bottom flanges are relatively wide in the transverse direction, compared to the frame ribs. The larger footprint may improve the stability for the container frame resting on the ground and may reduce the pressure on the ground

[0029] The bottom flanges are made from the same flat sheet as the floor and the frame ribs, to be all integral with each other. The bottom flanges are bent relative to the frame ribs, so that they come to extend parallel to the floor, i.e. in a plane parallel to the transverse direction. The bottom flanges are formed of the outer ends of the side parts, seen in the transverse direction.

[0030] When loaded on a truck or a trailer, the container frame will be supported by a lower surface of the bottom flange, which may come to rest on the lifting system or the trailer frame. The truck or the trailer may comprise a securing system with a number of movable claws that are able to interlock with the frame ribs or the bottom flange, for example clamping on an upper surface of the bottom flanges.

[0031] In a further embodiment, the bottom flanges of the opposed frame bars are bent towards each other. According to this embodiment, the frame bars may have a C-shape in cross-section, wherein the open sides of the C face towards each other.

[0032] This embodiment may be compatible with securing systems in which the claws are located in between the frame bars, seen in the transverse direction, so that the claws can clamp the bottom flanges outwardly towards the sides.

[0033] In an alternative embodiment, the bottom flanges of the opposed frame bars are bent away from each other. According to this embodiment, the frame bars may have a C-shape in cross-section, wherein the open sides of the C face away from each other.

[0034] This alternative embodiment may be compatible with securing systems in which the claws are located outside the frame bars, seen in the transverse direction, so that the claws can clamp the bottom flanges inwardly towards the centre of the container frame.

[0035] In an embodiment, the container frame further comprises an additional support flange for each of the frame bars, wherein the additional support flanges are welded to the bottom flanges and/or the frame ribs to extend co-planar with the bottom flanges at an opposite side of their respective frame ribs.

[0036] The additional support flanges may serve the purpose of further increasing the footprint of the frame bars, to further improve the stability for the container frame resting on the ground and to reduce the pressure on the ground. The additional support flanges are arranged co-planar with the bottom flanges, so that they together form a single plane.

[0037] Seen in the transverse direction, the additional support flanges are arranged at a side of the frame rib that is opposite to the side where the bottom flange is located. When the bottom flanges are bent towards each other, the additional support flanges face outwardly in the transverse direction. Similarly, the additional support flanges face inwardly in the transverse direction when the opposed bottom flanges are bent away from each other. The additional support flanges thus form a continuation of the bottom flanges at the other side of the frame ribs.

[0038] In an alternative embodiment, the container frame further comprises a support strip for each of the frame bars, which are attached, e.g. welded to the lower end of the respective frame ribs, wherein the support strips extend parallel to the floor.

[0039] The support strips may be located centrally underneath the frame ribs, extending parallel to the floor. This container frame is, compared to the earlier embodiment with the bottom flanges and optionally the additional support flanges, free of bent flanges. Instead, this container frame has the support strip welded to it for increasing the footprint of the frame bars.

[0040] This embodiment may offer the benefit that the support strip can be made of a different material than the floor and the frame ribs, which are made from the single flat sheet. The support strips can, for example, have a thickness different from the thickness of the floor and the frame ribs and/or can be made of a different metal alloy.

[0041] In an embodiment, the container frame further comprises two stiffening plates, each of which is welded to a respective frame bar to stiffen the frame bars. The stiffening plates are attached to the frame bars to improve the resilience of the frame, against deformation during lifting on the truck or trailer. Hence, the containers are lifted into an angled orientation, which may subject the container frame to stresses that are relatively large. The stiffening plates contribute in withstanding the stresses during lifting.

[0042] The stiffening plates may each be welded to a frame rib, for example at the inner surfaces or the outer surfaces of the frame ribs, seen in the transverse direction. Alternatively, the stiffening plates may be spaced at a distance from the frame ribs, in the transverse direction. As such, the stiffening plates may, for example, extend between the floor and respective ones of the bottom flanges, the additional support flanges or the support strips.

[0043] In an embodiment, the container frame further comprises a plurality of pre-made apertures in the frame ribs for receiving side struts. The pre-made apertures may be provided in the flat sheet prior to bending, for example by means of laser cutting or water jet cutting. The pre-made apertures may provide the benefit that the alignment of the side struts can be more accurate, by placement in the apertures.

[0044] In an embodiment, the container frame is free of transverse struts underneath the floor, in between the frame bars. This may improve the clearance between the frame bars and may provide that the tunnel height can be provided lower as compared to when transverse struts need to be present.

[0045] The absence of the transverse struts is made possible due to the fact that the bent, integral connection between the floor and the frame is stronger than the welded connection in existing containers. Furthermore, the floor itself can be made of a thicker material than the floor in existing containers, allowing the present floor itself to have an improved strength.

[0046] In an additional embodiment, the container frame may comprise spacer elements in between the frame bars, which are much smaller than the regular struts and which serve the purpose of contributing to the shape retention of the frame bars. These spacer elements are relatively thin or narrow, in order to minimize the influence on the minimum height of the frame ribs.

[0047] In an embodiment, the container frame may comprise a headboard at a frontal end of the floor, wherein the headboard comprises a head wall and two stopper bars, wherein the headboard is attached to and extending upward from the floor, and wherein the headboard is made from the same flat sheet as the floor and the frame ribs are made of.

[0048] The head wall may be formed by the central part of the flat sheet and the stopper bars may be formed by the opposed side parts of the flat sheet, which are bent relative to the central part. The head wall, with the stopper bars integrally attached to it, may be bent upwardly relative to the floor, in order to delimit the interior of the container from the front. To allow for the bending of the head wall, the opposed side parts fo the flat sheet may have been cut, to be subdivided into the frame ribs and the stopper bars.

[0049] According to a second aspect, the present invention provides a container that is loadable on a truck by a skip loader, hooklift, chainlift or cable lift system, the container comprising:

- the container frame as disclosed herein, and
- a lift system attachment, provided at an end of the frame and configured to be gripped by the lift system upon loading and unloading of the container.

[0050] The container according to the second aspect may comprise one or more of the features and/or benefits disclosed herein in relation to the present container frame, for example as recited in the claims.

[0051] In an embodiment, the container further comprises two side floor parts, which are attached, e.g. welded to the floor and/or the frame bars on opposite sides of the floor, wherein the side floor parts at least partially extend co-planar with the floor of the frame.

[0052] The side floor parts form an elongation of the floor of the frame, to form the floor of the container together. As such, the overall container floor has a larger width than the frame floor alone, due to the additional width from the side floor parts.

[0053] The side floor parts are welded to the frame floor to provide a strong and durable connection between them. Departing from the floor of the frame, the side floor parts at least partially extend co-planar with the frame floor. The side floor parts may extend co-planar over their entire width or may, for example, curve upwards towards the side, to obtain a gradual transition towards sidewalls for the container.

[0054] In a further embodiment, the container further comprises two rows of side struts, which are attached, e.g. welded to the frame bars on opposite sides of the frame, wherein the side struts sidewardly extend away from the frame in opposite directions perpendicular to the frame bars, and wherein each row of side struts is arranged underneath a respective side floor part, configured to support that side floor part.

[0055] The side struts serve the purpose of supporting the widened floor of the container. As such, the side floor parts may be manufactured from a thinner, e.g. less rigid sheet of material. Hence, the side struts support the side floor parts, which implies that the strength of the side floor parts may be less than that of the floor of the container frame, which needs to be self-supportive. Accordingly, the overall weight of the container can be reduced.

[0056] Alternatively, the container may be free of side struts, so that the side floor parts themselves become load-bearing, without requiring additional strengthening from side struts or the like.

[0057] In a further or alternative embodiment, the container further comprises:

- two opposed sidewalls, each of which is attached, e.g. welded to a respective side floor part, and
- at least two opposed sidewall struts, each extending parallel to a respective sidewall and each attached, e.g. welded to at least one of the side struts.

[0058] According to this embodiment, the container additionally comprises sidewalls, which define an interior of the container, together with the floor of the container, i.e. the floor of the container frame and the side floor parts. The sidewalls are supported by sidewall struts, which may form an upward continuation of the horizontal side struts underneath the side floor parts.

[0059] Alternatively, the container may comprise sidewalls in the absence of sidewall struts, so that the sidewalls themselves have a structural function, without re-

quiring strengthening from struts.

[0060] As a further alternative, the sidewalls may be integral with their respective side floor parts, for example each being formed of a single curved sheet. This embodiment may be free of side struts and/or sidewall struts, so that the integral floor and sidewall are load-bearing by themselves.

[0061] According to a further aspect, the present invention provides a method of manufacturing a container frame, comprising the steps of:

- providing a flat sheet, comprising a central part and two opposed side parts,
- downwardly bending the side parts relative to the central part, so that the central part forms a floor of the container frame and that the opposed side parts form opposed frame bars of the container frame, which are all integral with each other.

[0062] The method according to the invention may comprise one or more of the features and/or benefits disclosed herein in relation to the present container frame or the container, for example as recited in the claims. The present method may concern the manufacturing of the container frame recited in the claims.

[0063] According to the present invention, a container frame is manufactured of which the frame bars support the floor from underneath in a manner similar to existing containers. The frame bars thereto at least comprise a frame rib that extends downward from the floor, for example perpendicular to the floor. The floor and the frame ribs are made from a single, flat sheet e.g. a metallic sheet, that is bent to define the ribs. This differs from the manufacturing of the frame bars of existing containers, that typically concern complete profiles as frame bars that are welded to the floor. According to the present method, no separate profile with a horizontal top part, like the I-profile or U-profile on its side, is welded underneath the floor. Instead, the integral, bent connection is provided between the floor and the frame ribs, which may obtain a sufficient strength and rigidity already.

[0064] The method according to the present invention offers the benefit that the frame ribs are manufactured simultaneously with the floor in a universal manner, irrespective of the securing system with which the container is to be secured, since only the bottom part of the frame bars needs to be adjusted to the type of securing system.

[0065] The bending of the flat sheet into the floor and the opposed frame ribs may provide the benefit that the connection between the floor and the frame bars can be made stronger than with existing containers, which typically relied on a welded connection between them.

[0066] The opposed side parts of the flat sheet are thereby defined relative to the longitudinal direction of the container frame. Accordingly, the flat sheet can be bent over the entire length of the flat sheet, seen in the longitudinal direction, to obtain the frame ribs on opposite sides of the central floor, which extend over the entire length of the container frame.

[0067] In an embodiment of the method, each of the side parts comprises a bottom flange at their opposed outer ends, and the method further comprises the step of bending the bottom flanges relative to the frame bars, such that the bottom flanges extend parallel to the floor of the container frame.

[0068] According to this embodiment, the frame ribs are provided with a lower support underneath them, being formed by the bottom flanges. The bottom flanges are made from the same flat sheet as the floor and the frame ribs, to be all integral with each other. The bottom flanges are bent relative to the frame ribs, so that they come to extend parallel to the floor, i.e. in a plane parallel to the transverse direction. The bottom flanges are formed of the outer ends of the side parts, seen in the transverse direction.

[0069] In a further embodiment of the method, the bottom flanges of the opposed frame bars are bent towards each other. According to this embodiment, the frame bars may have a C-shape in cross-section, wherein the open sides of the C face towards each other.

[0070] In an alternative embodiment of the method, the bottom flanges of the opposed frame bars are bent away from each other. According to this embodiment, the frame bars may have a C-shape in cross-section, wherein the open sides of the C face away from each other.

[0071] In an embodiment, the method further comprises the step of attaching, e.g. welding an additional support flange to each of the bottom flanges, wherein the additional support flanges extend co-planar with the bottom flanges at an opposite side of their respective frame bars.

[0072] The additional support flanges may serve the purpose of further increasing the footprint of the frame bars, to further improve the stability for the container frame resting on the ground and to reduce the pressure on the ground. The additional support flanges are arranged co-planar with the bottom flanges, so that they together form a single plane.

[0073] Seen in the transverse direction, the additional support flanges are arranged at a side of the frame rib that is opposite to the side where the bottom flange is located. When the bottom flanges are bent towards each other, the additional support flanges face outwardly in the transverse direction. Similarly, the additional support flanges face inwardly in the transverse direction when the opposed bottom flanges are bent away from each other. The additional support flanges thus form a continuation of the bottom flanges at the other side of the frame ribs.

[0074] In an alternative embodiment, the method further comprises the step of attaching, e.g. welding a support strip to a lower end of each of the frame bars, wherein the support strips extend parallel to the floor.

[0075] The support strips may be located centrally underneath the frame ribs, extending parallel to the floor. This container frame is, compared to the earlier embod-

iment with the bottom flanges and optionally the additional support flanges, free of bent flanges. Instead, this container frame has the support strip welded to it for increasing the footprint of the frame bars.

[0076] This embodiment may offer the benefit that the support strip can be made of a different material than the floor and the frame ribs, which are made from the single flat sheet. The support strips can, for example, have a thickness different from the thickness of the floor and the frame ribs and/or can be made of a different metal alloy.

Brief description of drawings

[0077] Further characteristics of the invention will be explained below, with reference to embodiments, which are displayed in the appended drawings, in which:

Figure 1 schematically depicts an embodiment of the container according to the present invention,
Figure 2 shows a bottom view on the frame of the container of figure 1,
Figure 3 schematically depicts an embodiment of the container frame and method according to the invention,
Figures 4A and 4B schematically depict another embodiment of the container frame and method according to the invention,
Figures 5A and 5B schematically depict yet another embodiment of the container frame and method according to the invention, and
Figure 6 schematically depicts another embodiment of the container frame and method according to the invention.

[0078] Throughout the figures, the same reference numerals are used to refer to corresponding components or to components that have a corresponding function.

Detailed description of embodiments

[0079] Figure 1 schematically depicts an embodiment of the container according to the present invention, to which is referred with reference numeral 100. The container 100 is configured t to be loaded on a truck by a skip loader, hooklift, chainlift or cable lift system and comprises a frame 1, a first a lift system attachment and a second lift system attachment, both connected to the frame. The first lift system attachment is a loop 101 at a front end of the frame 1 for engagement with a hooklift system and the second lift system attachment comprises cable anchors 102 and cable guides 103, which are located underneath the frame 1.

[0080] The container frame 1 comprises a floor 10, configured to support a load arranged in or on the container 1, and two longitudinal frame bars 20, arranged underneath the floor 10 to support the floor, extending in a longitudinal direction L and each comprising a frame rib 21. The frame bars 20 extend parallel to each other and downwardly protrude from the floor 10 in a direction perpendicular to the plane of the floor 10.

[0081] The frame bars 20 and the floor 10 are integral with each other and are formed from a flat sheet F, wherein the floor 10 is formed from a central part C of the flat sheet F, as is best shown in figures 3-6. The frame bars 20 are formed by opposed side parts S of the flat sheet F, which are bent perpendicular relative to the central part C.

[0082] The container frame 1 extends over the entire length of the container 100, seen in the longitudinal direction L. In a transverse direction T, perpendicular to the longitudinal direction L, the container frame 1 has a width that is smaller than the width of the entire container 100.

[0083] The container 100 further comprises two side floor parts 110, which are welded to the floor 10 and the frame bars 20 on opposite sides of the floor 10. The side floor parts 110 at partially extend co-planar with the floor 10 of the frame 1, so that the side floor parts 110 form an elongation of the frame floor 10. Further towards the side of the container 100, the side floor parts 110 upwards, to obtain a gradual transition towards sidewalls 120 for the container.

[0084] The container 100 further comprises two rows of side struts 111, which are welded to the frame bars 20 on opposite sides of the frame 1. The side struts 110 sidewardly extend away from the frame 1 in opposite directions perpendicular to the frame bars 20 and in the transverse direction T. Each row of side struts 110 is arranged underneath a respective side floor part 110, configured to support that side floor part 110.

[0085] The container 100 further comprises two opposed sidewalls 120, each of which is welded to a respective side floor part 110. The container 100 further comprises a plurality of opposed sidewall struts 121, extending parallel to their respective sidewall 120 and each welded to a side strut 111, so that the sidewall struts 121 form an upward continuation of the horizontal side struts 111 underneath the side floor parts 110. The sidewalls 121 define an interior of the container 100, together with the floor of the container frame 1 and the side floor parts 110.

[0086] In the embodiment of the container 100 shown in figures 1 and 2, the sidewalls 120 are connected to their respective side floor parts 110 via a single curved sheet, to obtain a smooth transition between them.

[0087] It is best visible in figure 2 that the container frame 1 further comprises two stiffening plates 4, each of which is welded to a respective frame bar 20 to stiffen the frame bars 20. The stiffening plates 4 are spaced at a distance from the frame ribs 21, in the transverse direction T. As such, the stiffening plates 4 extend between the floor 10 and respective ones of the additional support flanges 23.

[0088] The container frame 1 is free of transverse struts underneath the floor 10, in between the frame bars 20, but rather comprises spacer elements 5 in between

the frame bars 20, which are much smaller than the regular struts and which serve the purpose of contributing to the shape retention of the frame bars 20.

[0089] Figures 3-6 display cross-sectional views in a plane perpendicular to the longitudinal direction on various embodiments of the container frame 1 and method according to the invention. Figures 3, 4A, 5A and 6 show that every container frame 1 is made from a flat sheet F, which has a central part C and two opposed side parts S. The sheet F is made of a steel alloy.

[0090] The side parts S are bent relative to the central part C to obtain the frame ribs 21, which downwardly extend from the frame floor 10, extending in a direction perpendicular to the plane of the floor 10. An integral bent connection 6 is thereby obtained between the frame ribs 21 and the floor 10.

[0091] In the embodiments in figures 4A and 5A, a wider sheet F is bent, comprising a central part C, two opposed side parts S and an outer end E of each side part S. The frame 1 in this embodiment additionally comprises a bottom flange 22 at the lower ends of each frame rib 21. The frame ribs 21 and their respective bottom flanges 22 are integral with each other, in the absence of a welded connection in between them. Instead, the bottom flanges 22 are bent perpendicular relative to their respective frame ribs 21 at a second integral bent connection 7. The bottom flanges are thereby formed from the opposed outer ends E of the side parts S of the flat sheet F. The bottom flanges 22 thereby come to extend parallel to the floor 1, i.e. in a plane parallel to the transverse direction T.

[0092] In the embodiment shown in figure 4A, the bottom flanges 22 of the opposed frame bars 20 are bent towards each other. In this embodiment, the frame bars 20 have a C-shape in cross-section, wherein the open sides of the C face towards each other.

[0093] In the embodiment shown in figure 5A, the bottom flanges 22' of the opposed frame bars 20 are bent away from each other. In this embodiment, the frame bars 20 have a C-shape in cross-section, wherein the open sides of the C face away from each other.

[0094] Figures 4B and 5B show that an additional support flange 23 can be attached to the bottom flanges 22 and the frame ribs 21 of each frame bar 20. The additional support flanges 23 extend co-planar with the bottom flanges 22 at an opposite side of their respective frame ribs 21, so that they together form a single plane. The connection between the additional support flanges 23 is obtained by means of a first welded connection 8 with the frame ribs 21 and the bottom flanges 22.

[0095] Seen in the transverse direction T, the additional support flanges 23 are arranged at a side of the frame rib 21 that is opposite to the side where the bottom flange 22 is located. If the bottom flanges 22 are bent towards each other, in the embodiment in figures 4A and 4B, then the additional support flanges 23 face outwardly in the transverse direction T. Similarly, the additional support flanges 23' face inwardly in the transverse direction T when the opposed bottom flanges 22' are bent away from each other. The additional support flanges 23 thus form a continuation of the bottom flanges 22 at the other side of the frame ribs 21.

[0096] Figure 6 depicts an embodiment alternative to the embodiment in figures 4 and 5, in which the container frame 1 further comprises a support strip 24 for each of the frame bars 20. The support strip 24 are attached to the lower ends of the respective frame ribs 21 with a second welded connection 9.The support strips 24 are located centrally underneath the frame ribs 21, extending parallel to the floor 10.

[0097] The present invention is further illustrated by means of the following embodiments:

Embodiment 1

[0098] Container frame for forming a container to be loaded on a truck by a skip loader, hooklift, chainlift or cable lift system, the frame comprising:

- a floor, configured to support a load arranged in or on the container, and
- two longitudinal frame bars, arranged underneath the floor to support the floor and each comprising a frame rib,

wherein the frame bars extend parallel to each other and downwardly protrude from the floor in a direction perpendicular to the plane of the floor,
characterized in that,
the frame bars and the floor are integral with each other and formed from a flat sheet, wherein the floor is formed from a central part of the flat sheet, and
wherein the frame bars are formed by opposed side parts of the flat sheet, which are bent downward relative to the central part
wherein, preferably, the thickness of the frame bars is substantially equal to the thickness of the floor.

Embodiment 2

[0099] Container frame according to embodiment 1, wherein the frame bars each further comprise a bottom flange at the lower ends of their frame ribs,

wherein the bottom flanges extend parallel to the floor,
wherein the frame ribs and their respective bottom flanges are integral with each other, in the absence of a welded connection in between them, and
wherein the bottom flanges are bent horizontally, for example perpendicular relative to their respective frame ribs, being formed from opposed outer ends of the side parts of the flat sheet.

Embodiment 3

[0100] Container frame according to embodiment 2,

wherein the bottom flanges of the opposed frame bars are bent towards each other.

Embodiment 4

[0101] Container frame according to embodiment 2, wherein the bottom flanges of the opposed frame bars are bent away from each other.

Embodiment 5

[0102] Container frame according to any of the embodiments 2-4, further comprising an additional support flange for each of the frame bars,
wherein the additional support flanges are welded to the bottom flanges and/or the frame ribs to extend co-planar with the bottom flanges at an opposite side of their respective frame ribs.

Embodiment 6

[0103] Container frame according to embodiment 1, further comprising a support strip for each of the frame bars, which are attached, e.g. welded to the lower end of the respective frame ribs, wherein the support strips extend parallel to the floor.

Embodiment 7

[0104] Container frame according to any of the preceding embodiments, further comprising two stiffening plates, each of which is welded to a respective frame bar to stiffen the frame bars.

Embodiment 8

[0105] Container frame according to any of the preceding embodiments, further comprising a plurality of premade apertures in the frame ribs for receiving side struts.

Embodiment 9

[0106] Container frame according to any of the preceding embodiments, wherein the container frame is free of transverse struts underneath the floor, in between the frame bars.

Embodiment 10

[0107] Container that is loadable on a truck by a skip loader, hooklift, chainlift or cable lift system, the container comprising:

- the container frame according to any of the preceding embodiments, and
- a lift system attachment, provided at an end of the frame and configured to be gripped by the lift system upon loading and unloading of the container.

Embodiment 11

[0108] Container according to embodiment 10, further comprising two side floor parts, which are attached, e.g. welded to the floor and/or the frame bars on opposite sides of the floor, wherein the side floor parts at least partially extend co-planar with the floor.

Embodiment 12

[0109] Container according to embodiment 11, further comprising two rows of side struts, which are attached, e.g. welded to the frame bars on opposite sides of the frame,

wherein the side struts sidewardly extend away from the frame in opposite directions perpendicular to the frame bars, and
wherein each row of side struts is arranged underneath a respective side floor part, configured to support that side floor part.

Embodiment 13

[0110] Container according to embodiment 12 or 13, further comprising:

- two opposed sidewalls, each of which is attached, e.g. welded to a respective side floor part, and
- at least two opposed sidewall struts, each extending parallel to a respective sidewall and each attached, e.g. welded to at least one of the side struts.

Embodiment 14

[0111] Method of manufacturing a container frame, preferably of manufacturing the container frame according to any of the embodiments 1 - 9 and/or of manufacturing the container frame of the container according to any of the embodiments 10 - 13, comprising the steps of:

- providing a flat sheet, comprising a central part and two opposed side parts,
- downwardly bending the side parts relative to the central part, so that the central parts forms a floor of the container frame and that the opposed side parts form opposed frame bars of the container frame, which are all integral with each other.

Embodiment 15

[0112] Method according to embodiment 14, wherein each of the side parts comprises a bottom flange at their opposed outer ends, and
wherein the method further comprises the step of bending the bottom flanges relative to the frame bars, such that the bottom flanges extend parallel to the floor.

Embodiment 16

[0113] Method according to embodiment 15, wherein the bottom flanges of the opposed frame bars are bent towards each other.

Embodiment 17

[0114] Method according to embodiment 16, wherein the bottom flanges of the opposed frame bars are bent away from each other.

Embodiment 18

[0115] Method according to any of the embodiments 15 - 17, further comprising the step of attaching, e.g. welding an additional support flange to each of the bottom flanges,
wherein the additional support flanges extend co-planar with the bottom flanges at an opposite side of their respective frame bars.

Embodiment 19

[0116] Method according to embodiment 14, further comprising the step of attaching, e.g. welding a support strip to a lower end of each of the frame bars,
wherein the support strips extend parallel to the floor.

Claims

1. Container frame for forming a container to be loaded on a truck by a skip loader, hooklift, chainlift or cable lift system, the frame comprising:

   - a floor, configured to support a load arranged in or on the container, and
   - two longitudinal frame bars, arranged underneath the floor to support the floor and each comprising a frame rib,
   wherein the frame bars extend parallel to each other and downwardly protrude from the floor in a direction perpendicular to the plane of the floor,
   wherein the frame bars and the floor are integral with each other and formed from a flat sheet,
   wherein the floor is formed from a central part of the flat sheet, and
   wherein the frame bars are formed by opposed side parts of the flat sheet, which are bent downward relative to the central part,
   characterized in that,
   the thickness of the frame bars is substantially equal to the thickness of the floor.

2. Container frame according to claim 1, wherein the frame bars are formed by a single sheet, e.g. only formed by the flat sheet.

3. Container frame according to claim 1 or 2, wherein the frame bars each further comprise a bottom flange at the lower ends of their frame ribs,

   wherein the bottom flanges extend parallel to the floor,
   wherein the frame ribs and their respective bottom flanges are integral with each other, in the absence of a welded connection in between them, and
   wherein the bottom flanges are bent horizontally, for example perpendicular relative to their respective frame ribs, being formed from opposed outer ends of the side parts of the flat sheet.

4. Container frame according to claim 3, wherein the bottom flanges of the opposed frame bars are bent away from each other.

5. Container frame according to any of the claims 2-4, further comprising an additional support flange for each of the frame bars,
   wherein the additional support flanges are welded to the bottom flanges and/or the frame ribs to extend co-planar with the bottom flanges at an opposite side of their respective frame ribs.

6. Container frame according to any of the preceding claims, further comprising:

   - two stiffening plates, each of which is welded to a respective frame bar to stiffen the frame bars, and/or
   - a plurality of pre-made apertures in the frame ribs for receiving side struts.

7. Container frame according to any of the preceding claims, further comprising a headboard at a frontal end of the floor,

   wherein the headboard comprises a head wall and two stopper bars,
   wherein the headboard is attached to and extending upward from the floor, and
   wherein the headboard is made from the same flat sheet as the floor and the frame ribs are made of.

8. Container that is loadable on a truck by a skip loader, hooklift, chainlift or cable lift system, the container comprising:

   - the container frame according to any of the preceding claims, and
   - a lift system attachment, provided at an end of the frame and configured to be gripped by the lift system upon loading and unloading of the container.

9. Container according to claim 8, further comprising two side floor parts, which are attached, e.g. welded to the floor and/or the frame bars on opposite sides of the floor, wherein the side floor parts at least partially extend co-planar with the floor.

10. Container according to claim 9, further comprising two rows of side struts, which are attached, e.g. welded to the frame bars on opposite sides of the frame,

wherein the side struts sidewardly extend away from the frame in opposite directions perpendicular to the frame bars, and
wherein each row of side struts is arranged underneath a respective side floor part, configured to support that side floor part.

11. Container according to claim 9 or 10, further comprising:

- two opposed sidewalls, each of which is attached, e.g. welded to a respective side floor part, and
- at least two opposed sidewall struts, each extending parallel to a respective sidewall and each attached, e.g. welded to at least one of the side struts.

12. Method of manufacturing a container frame, comprising the steps of:

- providing a flat sheet, comprising a central part and two opposed side parts,
- downwardly bending the side parts relative to the central part, so that the central part forms a floor of the container frame and that the opposed side parts form opposed frame bars of the container frame, which are all integral with each other.

13. Method according to claim 12, wherein each of the side parts comprises a bottom flange at their opposed outer ends, and
wherein the method further comprises the step of bending the bottom flanges relative to the frame bars, such that the bottom flanges extend parallel to the floor.

14. Method according to claim 13, wherein the bottom flanges of the opposed frame bars are bent away from each other.

15. Method according to any of the claims 12 - 14, further comprising the step of attaching, e.g. welding an additional support flange to each of the bottom flanges, wherein the additional support flanges extend coplanar with the bottom flanges at an opposite side of their respective frame bars.

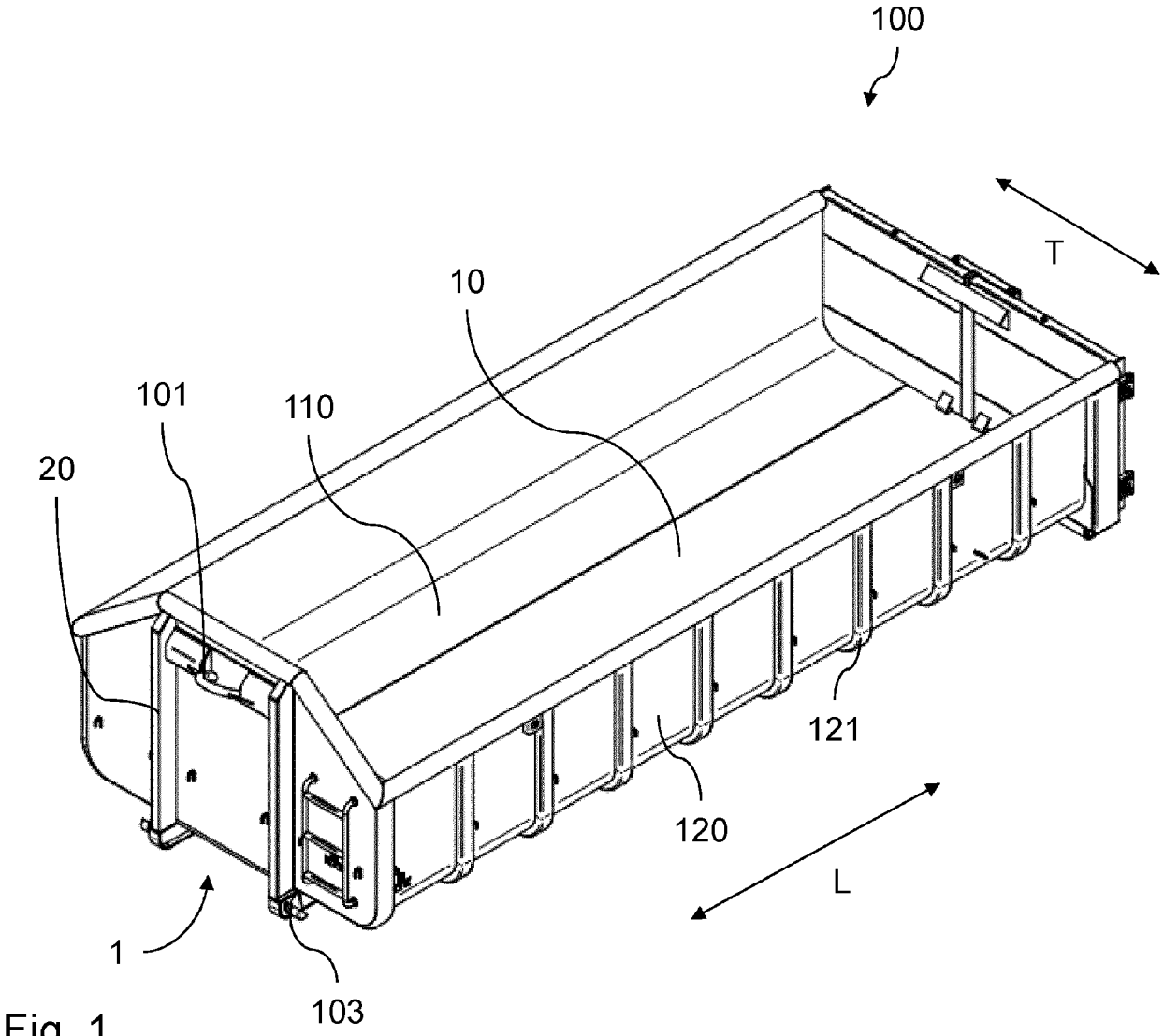

Fig. 1

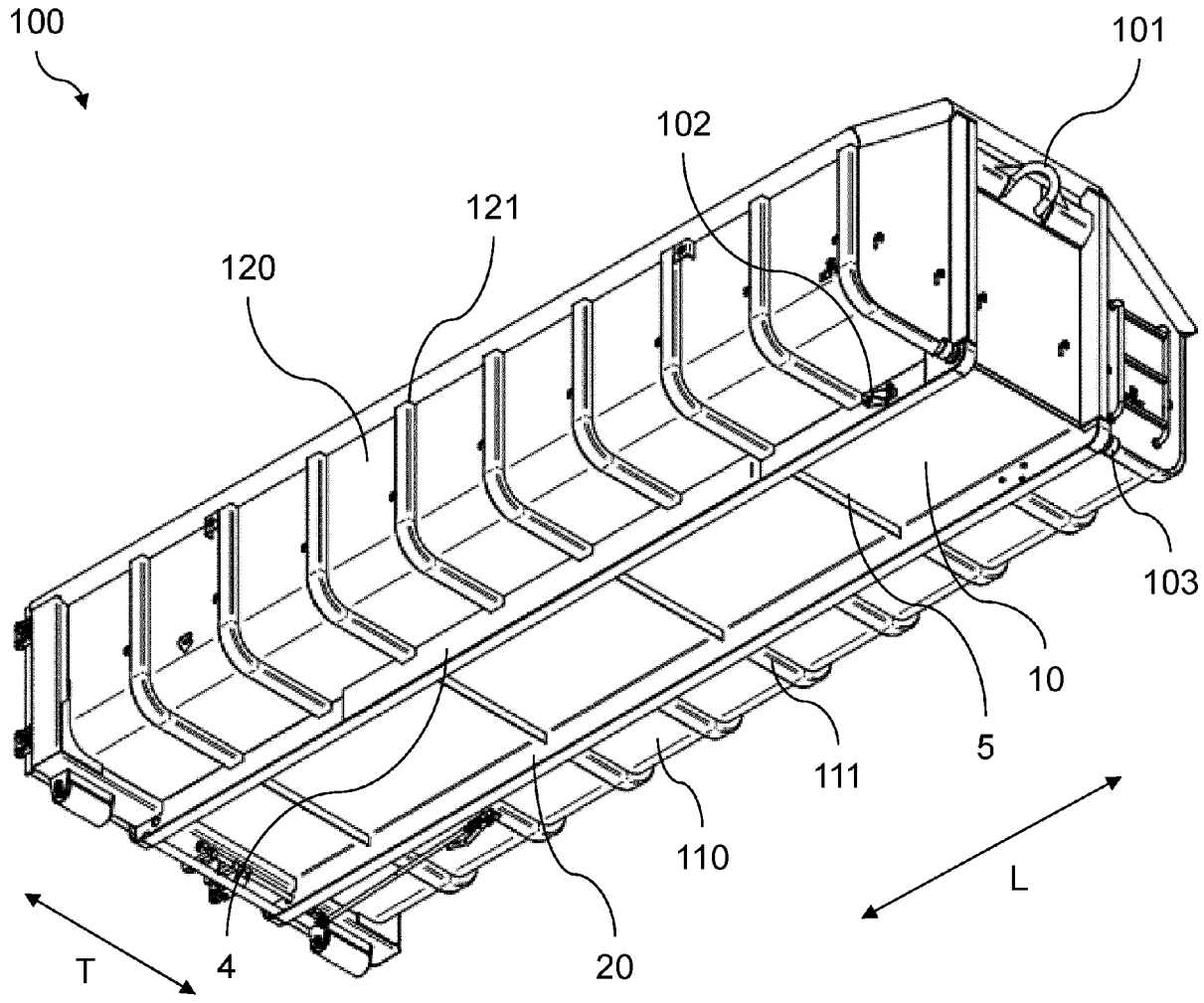

Fig. 2

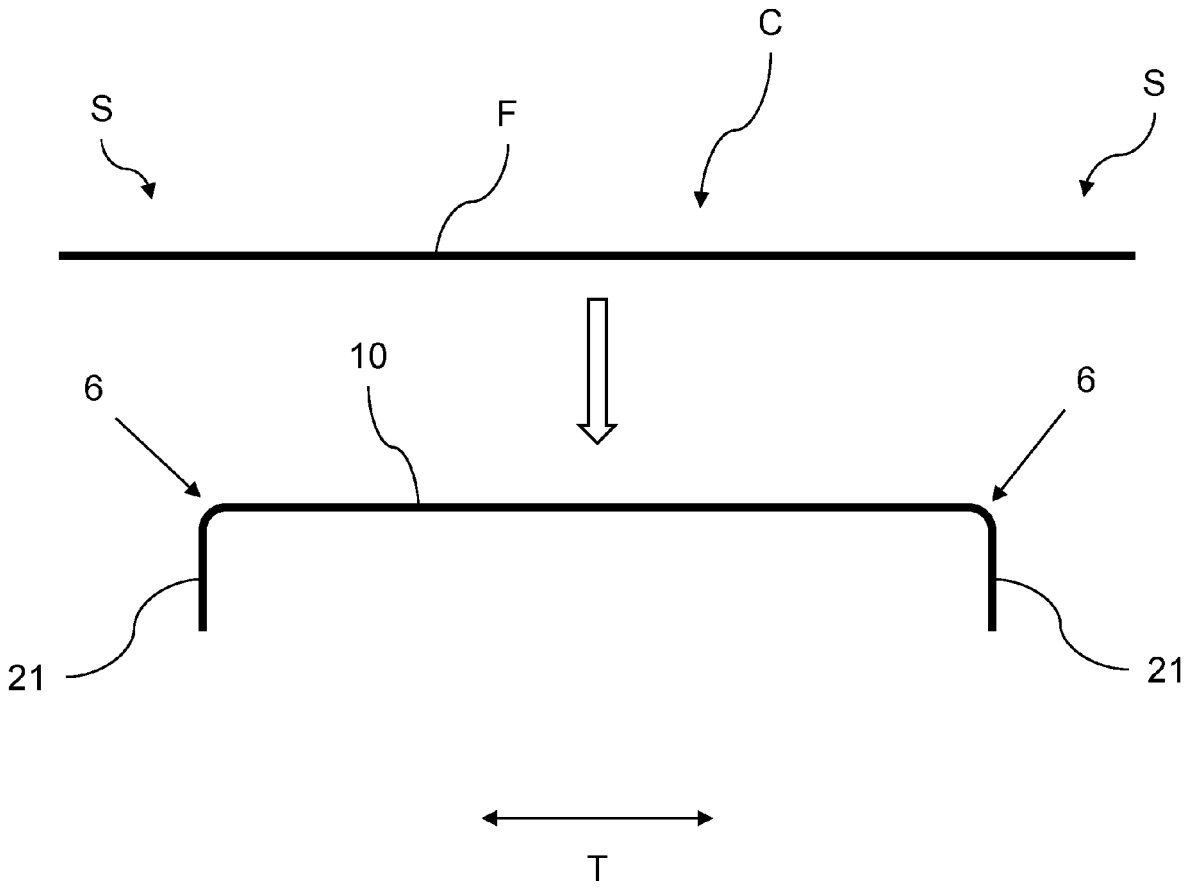

Fig. 3

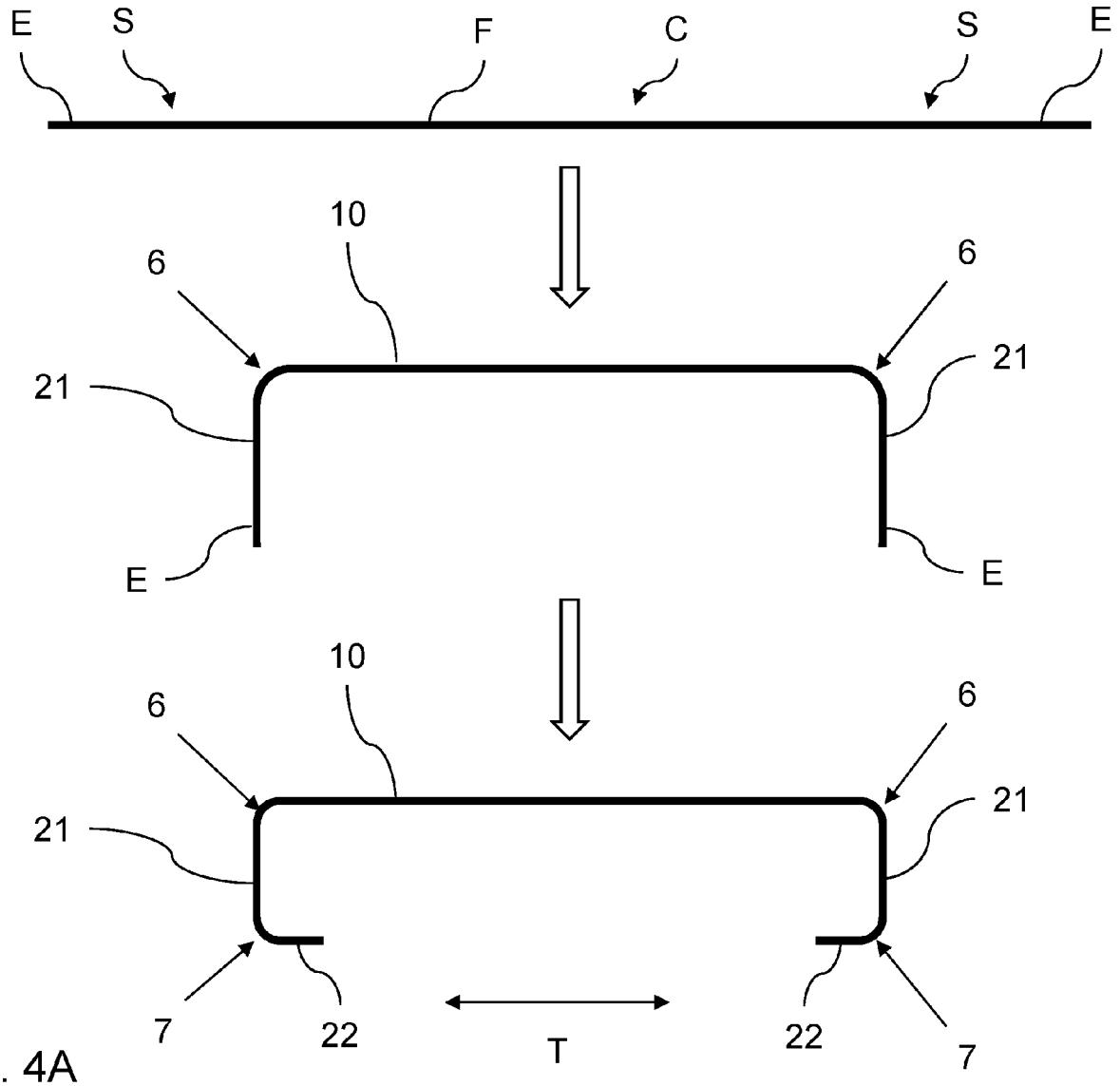

Fig. 4A

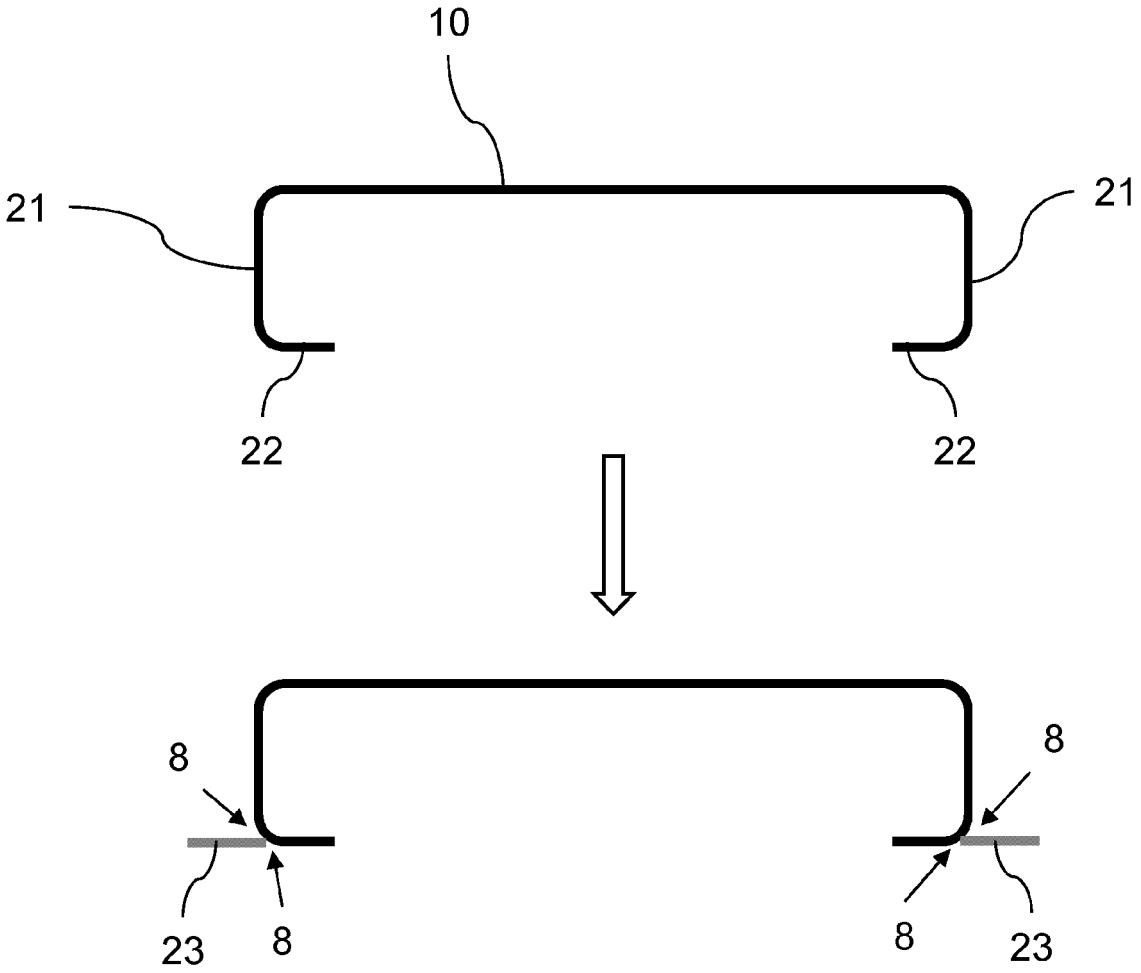

Fig. 4B

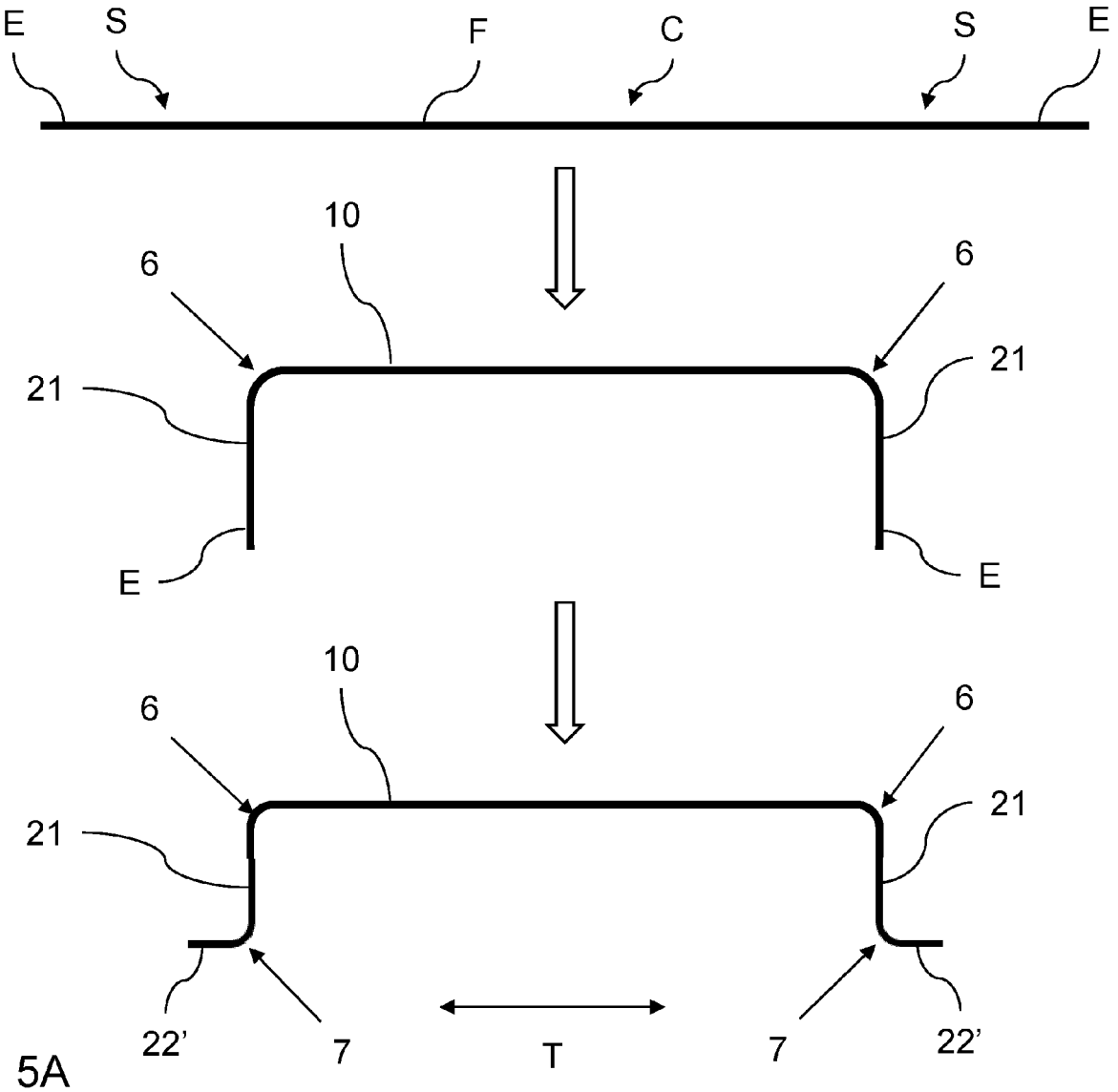

Fig. 5A

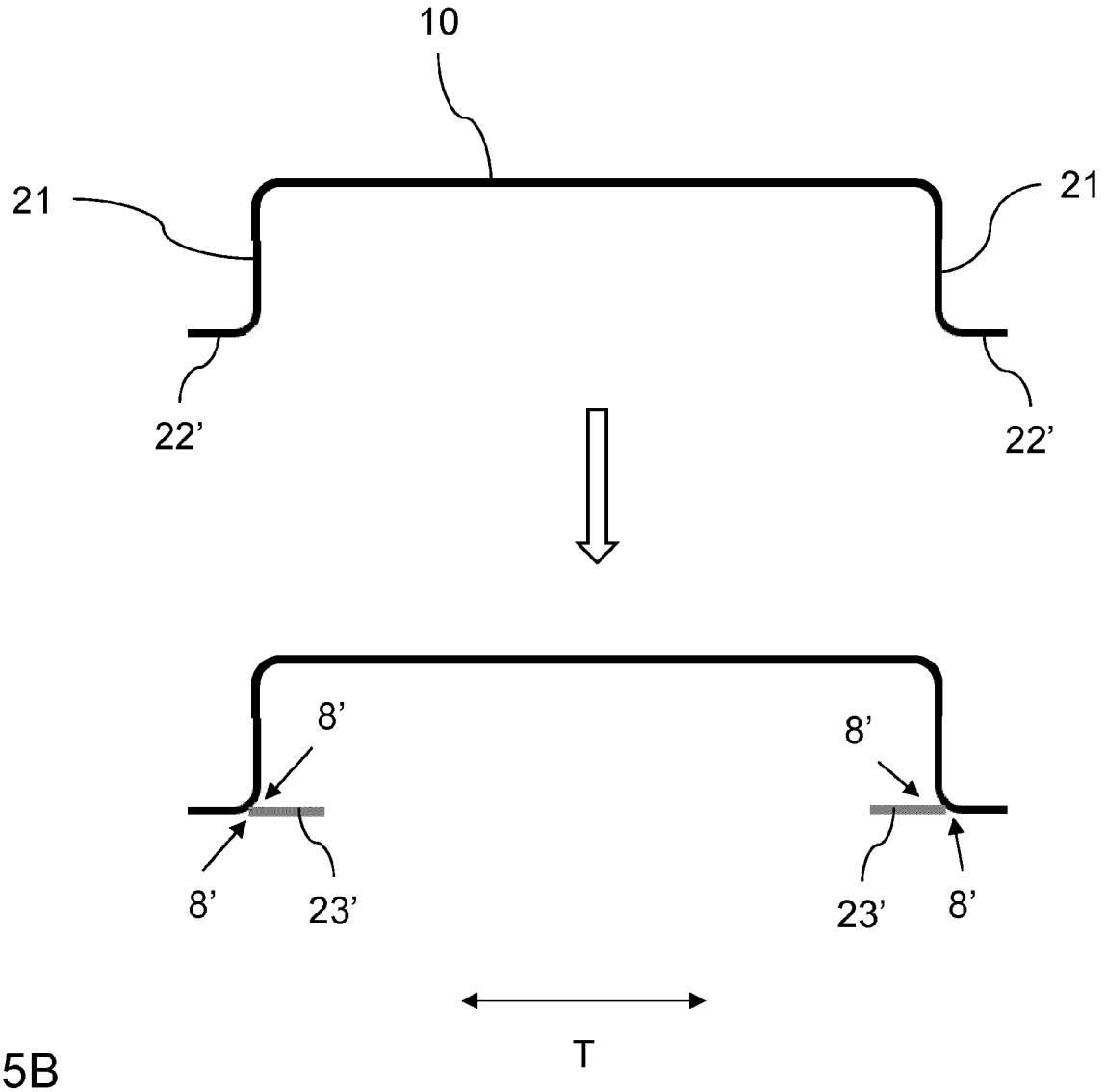

Fig. 5B

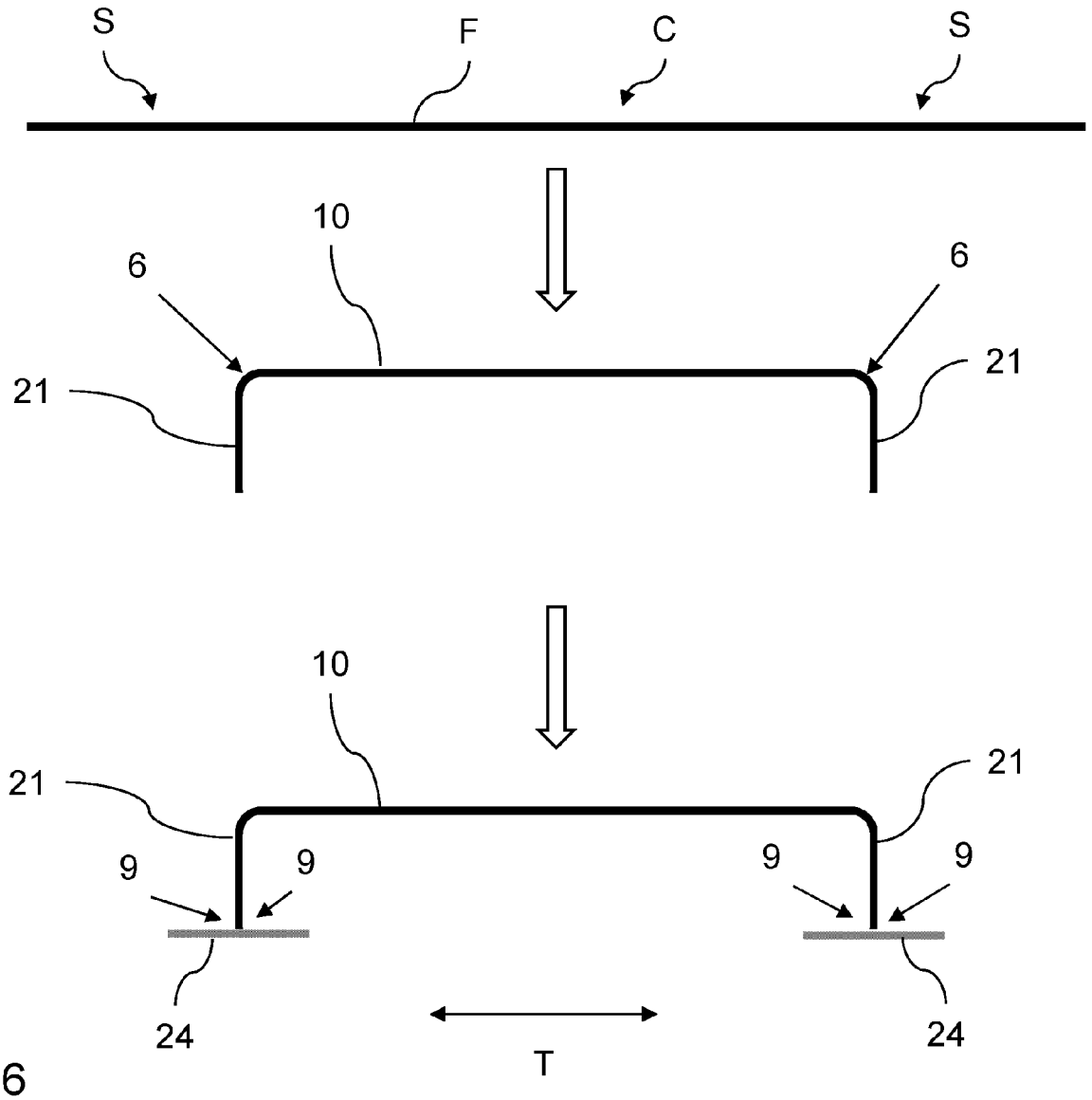

Fig. 6

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EUROPEAN SEARCH REPORT

Application Number
EP 23 20 3215

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	BE 1 020 684 A5 (VALVAN CONTAINERS & MILIEUTECHNIEK NV [BE]) 4 March 2014 (2014-03-04)	1-3,5,6, 8-13,15	INV. B65D88/12
A	* page 2, line 10 - page 3, line 16 * * page 4, lines 19-27 * * page 6, lines 30-31 * * page 7, line 17 - page 10, line 16 * * figures 1-10 *	4,7,14	
X	DE 20 2013 102973 U1 (FERRO UMFORMTECHNIK GMBH & CO KG [DE]) 22 July 2013 (2013-07-22)	1-6,8-15	
A	* paragraphs [0001], [0007] - [0010], [0016] - [0019]; figures 1-2 *	7	
A	BE 1 021 486 B1 (VALVAN CONTAINERS & MILIEUTECHNIEK NV [BE]) 2 December 2015 (2015-12-02) * page 4, paragraph 3; figures 1-3 *	1,6,10, 11	
			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	7 March 2024	Leijten, René

CATEGORY OF CITED DOCUMENTS

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 23 20 3215

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07-03-2024

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
BE 1020684 A5	04-03-2014	NONE	
DE 202013102973 U1	22-07-2013	NONE	
BE 1021486 B1	02-12-2015	BE 1021486 B1	02-12-2015
		FR 3026096 A1	25-03-2016

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- BE 1020684 A5 **[0006]**
- DE 202013102973 U1 **[0007]**
- BE 1021486 B1 **[0008]**