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(54) LIQUID CONTAINER

FLÜSSIGKEITSBEHÄLTER

CONTENEUR POUR LIQUIDES

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Description

FIELD OF THE INVENTION

[0001] The present invention relates to a liquid container of the Intermediate Bulk Container (IBC) type.

Discussion of the related art

[0002] The manufacture of containers for transport and storage of liquids having a capacity of about 1000 liters and known as IBCs (Intermediate Bulk Containers) is known in the art. These containers have a tank within a cage, and both are supported by a pallet.

[0003] The tank is usually made of a plastic material, has an opening in its upper portion for receiving a liquid, and an opening in its lower portion for discharging the liquid via a discharge device, such as a tap.

[0004] The cage surrounds the tank along at least four sides to prevent lateral displacements when the container is moved and is typically composed of vertical and horizontal bars.

[0005] The pallet is a support element located below the cage and the tank and may be made, for example, of wood, plastic or metal. The most common type of pallet comprises parallel runners, generally three runners, with cross members mounted thereto and supporting in turn support boards. The pallet has two openings at each side, for receiving the forks of a lift truck. As the pallet and the lift truck are mutually coupled the container may be moved.

[0006] IBC liquid containers are used in logistics for efficiently and inexpensively carrying large amounts of liquids. When these containers reach their destination and before being transported, they are stored in appropriate warehouses. For more efficient use of the height of warehouses, the containers are vertically stacked, each container being placed on two parallel rails.

[0007] The containers are often disposed on the rails in side-by-side relationship, such that the rails are parallel to the short sides of the pallet, whereas the runners, parallel to the long sides of the pallet, extend from one rail to the other.

[0008] US5058747 discloses an IBC according to the preamble of appended claim 1 which consists in a plastic container surrounded by a metal cage, the whole being supported on a wooden pallet.

Prior art problem

[0009] When IBC containers are placed on the rails, the weight of the tank acts on the long sides of the pallet which, as mentioned above, rest upon the rails at the ends of the long sides. Under the weight of the tank, the wooden pallets are likely to bend at their central portion, between the distant support points.

[0010] The aforementioned warehouses may be also equipped with robotized handling systems, whose operation may require pallet bending to fall within given limits to ensure the function of such automatic systems.

SUMMARY OF THE INVENTION

[0011] The object of the present invention is to provide a liquid container having a bending-resistant pallet, in which the weight of the tank is effectively discharged at the ends of the runner whereat the container may lean on the rails.

[0012] A further object is to maintain a low cost of the pallet, and hence of the whole container, by an efficient use of the construction materials.

[0013] These objects are fulfilled by a liquid container as defined in claim 1.

BRIEF DESCRIPTION OF THE DRA WINGS

[0014] The characteristics and advantages of the present disclosure will appear from the following detailed description of a possible practical embodiment, illustrated as a nonlimiting example in the set of drawings, in which:

- Figure 1 shows a front view of a liquid container according to an embodiment of the invention,
- Figure 2 shows a top view of the pallet of the liquid container of Figure 1,
- Figure 3 shows a bottom view of the pallet of the container of Figure 1,
- Figure 4 shows a front view of the pallet of Figure 3,
- Figure 5 shows a top view of the pallet of Figure 3,
- Figure 6 shows a side view of the pallet of Figure 3,
- Figure 7 shows a front view of a detail of the pallet of Figure 3, according to a first embodiment,
- Figure 8 shows a front view of a detail of the pallet of Figure 3, according to a second embodiment.

[0015] The liquid container as shown in the accompanying figures shall be deemed to be schematically illustrated, not necessarily drawn to scale, and not necessarily representing the actual proportions of its parts.

DETAILED DESCRIPTION

[0016] Even when this is not expressly stated, the individual features as described with reference to the particular embodiments shall be intended as auxiliary to and/or interchangeable with other features described with reference to other exemplary embodiments.

[0017] Figures 1 and 2 show a liquid container of the present invention, referenced 1. In use, the container is designed to be moved, for instance, by a lift truck, and to rest upon two parallel tracks for easy storage thereof in appropriate warehouses.

[0018] The container comprises a pallet 2, a metal cage 3 and a tank 4.

[0019] Various types of bulk liquids may be stored in

the tank 4, such as edible liquids, industrial liquids or flammable liquids. Preferably the capacity of the tank 4 ranges from 500 to 1500 liters, and the most common types of tanks 4 have a capacity of 600 liters, 1040 liters or 1250 liters. The tank is made of a plastic material, preferably high-density polyethylene. This material prevents contamination of the liquid and provides adequate chemical and structural resistance.

[0020] The tank 4 comprises an upper loading opening 41 and a lower discharge device 42. The loading opening 41 is located in a top wall of the tank and may have various shapes, e.g. a circular shape. The loading opening 41 is suitably sized to receive a liquid, directly or via appropriate equipment. The loading opening 41 may be engaged by a cap to avoid accidental leakage of liquid.

[0021] The discharge device 42 is located in a lateral wall of the tank, in a lower portion thereof. The discharge device 42 consists of a fluid flow regulating device, such as a tap, and is connected to a discharge opening in the tank. Particularly, the discharge device 42 may be open to allow the liquid to flow out of the liquid container, or closed to block it.

[0022] The tank 4 is accommodated within the cage 3. The cage 3 comprises a plurality of walls 31 composed of metal bars. Preferably, the cage 3 comprises four side walls 31 to limit lateral movements of the tank 4, for example during handling of the liquid container 1. The cage 3 may comprise a top wall and/or a bottom wall. In any case, the cage 3 must be compatible with the possibility of loading and discharging the liquid from the tank 4 through the loading opening 41 and the discharge device 42.

[0023] Preferably, each wall 31 of the cage 3 comprises metal bars 32, which are parallel in a first direction, and metal bars 33, which are parallel in a second direction, perpendicular to the first direction.

[0024] The liquid container 1 preferably comprises plastic protective elements 5 accommodated within the cage 3 proximate to its lower vertices 34. The protective elements 5 protect the cage 3, preferably at its weakest points, i.e. the vertices, from impacts of the tank 4.

[0025] The cage 3 is fixed over a pallet 2 by fastener members, not shown, with the tank 4 resting on the pallet 2. The pallet 2 has two long sides 21 and two short sides 22. The long sides 21 extend in a longitudinal direction X-X, are mutually parallel and spaced from each other in a transverse direction Y-Y, orthogonal to the longitudinal direction X-X. The short sides 22 extend in the transverse direction Y-Y, and are mutually parallel and spaced from each other in the longitudinal direction X-X. In one embodiment, the long sides 21 are 1200 mm long, and the short sides 22 are 1000 mm long. In a different embodiment, which is particularly used in association with 600 liter tanks, the long sides 21 are 1200 mm long and the short sides are 800 mm long.

[0026] The pallet 2 comprises a plurality of runners 23a, 23b, cross members 24a, 24b, 24c, and support boards 25.

[0027] The runners 23a, 23b are made of wood and extend in the longitudinal direction X-X, and are mutually parallel and spaced from each other in the transverse direction Y-Y. Preferably, two lateral runners 23a are located adjacent to the long sides 21 of the pallet 2 along the entire longitudinal extent of the long sides 21, and at least one central runner 23b is interposed between the two lateral runners 23a. Preferably, three runners 23a, 23b are provided.

[0028] The runner 23a will be now described, as a reference for the characteristics of each runner 23a, 23b.

[0029] Each runner 23a extends between a front end 231 and a rear end 232, which are spaced from each other in the longitudinal direction X-X. Preferably, in each runner 23a, the front end 231 is the end that it closer to the discharge device 42 of the tank 4. As used hereinafter, the terms front and rear shall be related to the longitudinal direction X-X and to the orientation defined for the front 231 and rear 232 ends of the runners 23a, 23b.

[0030] In one embodiment, each runner 23a comprises a base board 233 having a rectangular plan shape and a plurality of blocks 234a, 234b, 234c, preferably in the number of three, fixed over the base board 233.

[0031] In one embodiment, the blocks 234a, 234b, 234c for each base board 233 are arranged as a front block 234a, adjacent to the front end of the runner 23a, a rear block 234b adjacent to the rear end of the runner 23a and at least one intermediate block 234c, preferably only one. Each block 234a, 234b, 234c extends between a front end and a rear end, which are spaced from each other in the longitudinal direction X-X.

[0032] In one embodiment, each base board 233 has a longitudinal extent of 1200 mm, a transverse extent of 145 mm and a thickness of 22 mm. Each block 234a, 234b, 234c has a transverse extent that is equal to the transverse extent of the respective base board 233 and a thickness of 78 mm. Furthermore, the rear blocks 234b and the intermediate blocks 234c have a square base, whereas each front block 234a has a rectangular base and a longitudinal extent that is lower than its transverse extent, e.g. 230 mm.

[0033] The pallet 2 comprises a plurality of wooden cross members 24a, 24b, 24c. The cross members 24a, 24b, 24c are placed over the runners 23a, 23b, extend in the transverse direction Y-Y and are mutually parallel and spaced from each other in the longitudinal direction X-X and are fixed over the runners 23a, 23b. Thus, the cross members 24a, 24b, 24c are raised relative to the base boards 233. When the liquid container 1 rests upon a surface or rails, the cross members 24a, 24b, 24c are raised relative to such surface or such rails.

[0034] The pallet 2 comprises at least one forking way. Preferably, each forking way is interposed between two successive runners 23a, 23b and is located below the cross members 24a, 24b, 24c. Each forking way is an opening that is adapted to receive a lifting element, such as a fork of a lift truck. The liquid container 1 may be lifted and handled by application of an adequate force by the

forks from bottom to top.

[0035] Each cross member 24a, 24b, 24c comprises a plurality of fixing portions. Each fixing portion of a cross member 24a, 24b, 24c is located over a different runner 23a, 23b and each cross member 24a, 24b, 24c is fixed to each runner 23a, 23b at one fixing portion.

[0036] Preferably, three cross members 24a, 24b, 24c are provided, having a rectangular plan shape. Each cross member 24a, 24b, 24c is fixed over three blocks 234a, 234b, 234c, each of the latter being associated with a different runner 23a, 23b, defining a front cross member 24a, fixed to the front blocks 234a, a rear cross member 24b fixed to the rear blocks 234b, and an intermediate cross member 24c fixed to intermediate blocks 234c. Each cross member 24a, 234b, 234c extends between a front edge and a rear edge, which are spaced from each other in the longitudinal direction X-X.

[0037] In one embodiment, the rear cross member 24b is adjacent to a short side 22 of the pallet along the entire transverse extent of the short side 22. All the cross members 24a, 24b, 24c have the same transverse extent. The rear cross member 24b and the intermediate cross member 24c have a longitudinal extent that is equal to the longitudinal extent of each block 234b, 234c upon which they are fixed. The front cross member 24a is adjacent to the rear ends of the front blocks 234a, and has a longitudinal extent that is smaller than the longitudinal extent of the front blocks 234a, e.g. 95 mm. Thus, the front cross member 24a is longitudinally spaced from the front ends of the front blocks 234a, and no portion of the cross members 24a, 24b, 24c is located below the discharge device 42.

[0038] In one embodiment, the cross members 24a, 24b, 24c have a thickness of 25 mm.

[0039] The pallet 2 comprises a plurality of wooden support boards 25 located over the cross members 24a, 24b, 24c. The support boards 25 extend in the longitudinal direction X-X, are mutually parallel, are spaced from each other in the transverse direction Y-Y and are fixed over the cross members 24a, 24b, 24c. Preferably, the support boards 25 are offset from the runners 23a, 23b.

[0040] Preferably, the support boards 25 have a rectangular plan shape and comprise a bottom surface 251 and a top surface 252. Each top 252 and bottom 251 surface of a support board 25 is coplanar with the top 252 and bottom 251 surfaces of the other support boards 25 respectively. The support boards 25 are fixed to the cross members 24a, 24b, 24c at their bottom surfaces 251.

[0041] In one embodiment, the support boards 25 have a thickness of 22 mm.

[0042] The liquid container 1 comprises a plurality of sheet metal reinforcement members 6a, 6b. Each reinforcement member 6a, 6b extends in the longitudinal direction X-X and is placed above a respective runner 23a, 23b. As mentioned above, the longitudinal direction X-X is the direction in which the long sides 21 of the pallet 2 extend, i.e. the direction in which bending is more likely to occur.

[0043] Each reinforcement member is also placed above the fixing portions of the cross members 24a, 24b, 24c that are fixed to their respective runner 23a, 23b and is fixed to these fixing portions of the cross members 24a, 24b, 24c.

[0044] Preferably, each reinforcement member 6a, 6b has a transverse extent that is lower than or equal to the transverse extent of its respective runner 23a, 23b and a longitudinal extent that is lower than or equal to the longitudinal extent of its respective runner 23a, 23b. Each reinforcement member 6a, 6b has a rectangular projection on the plane formed by the longitudinal direction X-X and the transverse direction Y-Y.

[0045] In one embodiment, each of two lateral reinforcement members 6a, corresponding to the lateral runners 23a has the same longitudinal extent as its respective lateral runner 23a, whereas a central reinforcement member 6b corresponding to the central runner 23b has a longitudinal extent that is lower than the longitudinal extent of its respective central runner 23b.

[0046] Here, the reinforcement member 6b corresponding to the central runner 23b extends in the longitudinal direction, for example, from the rear edge of the rear cross member 24b to the front edge of the front cross member 24a, and preferably has a longitudinal extent of 1065 mm. Thus, no portion of the cross members 24a, 24b, 24c and no portion of the reinforcement elements 6a, 6b are located below the discharge device 42, and a space is provided for collection of the liquid that flows out of the tank 4, when the discharge device 42 is open.

[0047] The reinforcement members 6a, 6b can increase the deflection resistance of the runners 23a, 23b by reducing bending at the runners. Preferably, the reinforcement members 6a, 6b do not project out of their respective runners 23a, 23b in either the longitudinal X-X or transverse Y-Y direction. Therefore, only the material required to obtain the desired rigidity is used, and the liquid container 1 may be maintained at a low cost.

[0048] The reinforcement member 6a will be now described, as a reference for the characteristics of each reinforcement member 6a, 6b. In this embodiment, each reinforcement member 6a, 6b is made of a metal sheet with a thickness ranging from 1 mm to 5 mm.

[0049] Each reinforcement member 6a comprises a plurality of lower portions 61, upper portions 62, and connecting portions 63 between the upper portions 62 and the lower portions 61 perpendicular to the upper portions 62 and the lower portions 61. The upper 62, lower 61 and connecting 63 portions extend in the longitudinal direction X-X along the entire longitudinal length of the reinforcement member 6a, 6b. Preferably, these portions 61, 62, 63 have a rectangular plan shape.

[0050] Each lower portion 61 contacts the cross members 24a, 24b, 24c, particularly the fixing portions of the cross members 24a, 24b, 24c, as particularly shown in Figure 4. Each upper portion 62 is spaced from the lower portions 61 and does not directly contact the cross mem-

bers 24a, 24b, 24c. Preferably, the upper portions 62 of the reinforcement members 6a define flat support surfaces coplanar with the top surfaces 252 of the support boards 25, and the lower portions 61 of the reinforcement members 6a define flat support surfaces, coplanar with the bottom surfaces 251 of the support boards 25.

[0051] As shown in Figure 1, the tank 4 rests upon the support boards 25 and the reinforcement members 6a, 6b, particularly upon the top surfaces 252 of the support boards 25 and the top surfaces 62 of the reinforcement members 6a, 6b. The tank 4 may directly rest thereupon, or with the interposition of other elements. For example, at the vertices of the cage, the tank 4 may rest on the reinforcement members 6a, 6b with the interposition of the protective elements 5.

[0052] Preferably, the cage 3 is fixed at least to the reinforcement members. More preferably, the cage 3 is also fixed to the support boards 25.

[0053] Referring to Figures 7 and 8, each connecting portion 63 is adjacent to an upper portion 62 and a lower portion 61. Each connecting portion 63 contacts the adjacent upper 62 and lower 61 portions at a fold line 64 of the reinforcement member 6a. Each fold line 64 is straight and extends in a longitudinal direction X-X along the entire longitudinal length of the reinforcement member 6a.

[0054] The particular geometry of the reinforcement members 6a, 6b provides an increased bending resistance to the runners 23a, 23b, when the container 1 rests on two rails.

[0055] Each reinforcement member 6a extends between two opposite edges 65 which are spaced from each other in the transverse direction Y-Y. In the span from one edge 65 to the opposite edge 65 of each reinforcement member 6a, 6b, the reinforcement member 6a has a serially repeated sequence, the sequence being composed, in this order, of a lower portion 61, a connecting portion 63, an upper portion 62 and a further connecting portion 63.

[0056] Preferably, both edges 65 of each reinforcement member 6a are adjacent to lower portions 61. Therefore, the connecting portions 63 are twice as many as the upper portions 62 and the lower portions are as many as the upper portions 62 plus one. In the two different embodiment as shown in the annexed figures, each reinforcement member 6a is respectively composed either of four lower portions 61, three upper portions 62 and six connecting portions 63, or five lower portions 61, four upper portions 62 and eight connecting portions 63.

[0057] The presence of a great number of lower 61, upper 62, connecting 63 portions of the reinforcement members 6a, 6b further increases the rigidity of the reinforcement members 6a, 6b. As the number of upper 62, lower 61 and connecting 63 portions increases, a given rigidity may be obtained with reinforcement elements 6a, 6b formed with thinner sheet metal. For example, in the embodiment characterized by three upper portions 62, the thickness of the sheet metal is set to 1.5 mm, whereas in the embodiment with four upper portions 62 a thickness of 1.2 mm is selected.

[0058] Those skilled in the art will obviously appreciate that a number of changes and variants as described above may be made to fulfill particular requirements, without departure from the scope of the invention, as defined in the following claims.

Claims

1. A liquid container (1) comprising a pallet (2), a metal cage (3) fixed over the pallet (2), and a plastic tank (4) accommodated in the cage (3) and resting on the pallet (2), said tank (4) comprising an upper loading opening (41) and a lower discharge device (42), wherein said pallet (23) has two long sides (21) extending in a longitudinal direction (X-X) mutually parallel and spaced from each other in a transverse direction (Y-Y) orthogonal to the longitudinal direction (X-X) and two short sides (22) extending in the transverse direction (Y-Y), mutually parallel and spaced from each other in the longitudinal direction (X-X), said pallet (2) comprises:

- a plurality of wooden runners (23a, 23b), extending in the longitudinal direction (X-X), mutually parallel and spaced from each other in the transverse direction (Y-Y),
- a plurality of wooden cross members (24a, 24b, 24c), placed over the runners (23a, 23b), said wooden cross members (24a, 24b, 24c) extend in the transverse direction (Y-Y) and are mutually parallel and spaced from each other in the longitudinal direction (X-X) and are fixed over the runners (23a, 23b),
- a plurality of wooden support boards (25) placed over the cross members (24a, 24b, 24c), said support boards (25) extend in the longitudinal direction (X-X), are mutually parallel and spaced from each other in the transverse direction (Y-Y) and are fixed over the cross members (24a, 24b, 24c),

characterized in that it comprises a plurality of sheet metal reinforcement members (6a, 6b) wherein each reinforcement member (6a, 6b) extends in the longitudinal direction (X-X), is placed above a respective runner (23a, 23b) and over portions of cross members (24a, 24b, 24c) fixed to said respective runner (23a, 23b) and is fixed to said portions of cross members (24a, 24b, 24c), and wherein each reinforcement member (6a, 6b) comprises:

- a plurality of lower portions (61) contacting the cross members (24a, 24b, 24c),
- a plurality of upper portions (62) spaced from the lower portions (61),

- a plurality of connecting portions (63) between the upper portions (62) and the lower portions (61) perpendicular to the upper portions (62) and to the lower portions (61), and wherein said upper (62), lower (61) and connecting (63) portions extend in the longitudinal direction (X-X) along the entire longitudinal length of the reinforcement members (6a, 6b).

2. A liquid container (1) as claimed in claim 1, wherein:

- the support boards (25) comprise a top surface (252) and a bottom surface (251),
- the upper portions (62) of the reinforcement members (6a, 6b) define flat support surfaces coplanar with the top surfaces (252) of the support boards (25),
- the lower portions (61) of the reinforcement members (6a, 6b) define flat support surfaces coplanar with the bottom surfaces (251) of the support boards (25).

3. A liquid container (1) as claimed in any of the preceding claims wherein:

- each connecting portion (63) of a reinforcement member (6a, 6b) is adjacent to an upper portion (62) and a lower portion (61),
- each connecting portion (63) contacts the adjacent upper (62) and lower (61) portions at a fold line (64) of the reinforcement member (6a, 6b), and
- each fold line (64) is straight and extends in the longitudinal direction (X-X) along the entire longitudinal length of the reinforcement member (6a, 6b).

4. A liquid container (1) as claimed in any of the preceding claims, wherein each reinforcement member (6a, 6b) has a transverse extent that is lower than or equal to the transverse extent of its respective runner (23a, 23b), and a longitudinal extent that is lower than or equal to the longitudinal extent of its respective runner (23a, 23b).

5. A liquid container (1) as claimed in any of the preceding claims, wherein each reinforcement member (6a, 6b) comprises three upper portions (62), four lower portions (61) and six connecting portions (63).

6. A liquid container (1) as claimed in any of claims 1 to 4, wherein each reinforcement member (6a, 6b) comprises four upper portions (62), five lower portions (61) and eight connecting portions (63).

7. A liquid container (1) as claimed in any of the preceding claims, wherein each reinforcement member (6a, 6b) is made of a metal sheet with a thickness ranging from 1 mm to 5 mm.

8. A liquid container (1) as claimed in any of the preceding claims, wherein the tank (4) rests on the support boards (25) and on the reinforcement members (6a, 6b).

9. A liquid container (1) as claimed in any of the preceding claims wherein:

- each reinforcement member (6a, 6b) extends between two opposite edges (65) which are spaced from each other in the transverse direction (Y-Y), and
- in the span from one edge (65) to the opposite edge (65) of a reinforcement member (6a, 6b), the reinforcement member (6a, 6b) has a serially repeated sequence, the sequence being composed, in this order, of a lower portion (61), a connecting portion (63), an upper portion (62) and a further connecting portion (63).

10. A liquid container (1) as claimed in claim 9, wherein:

- both edges (65) of each reinforcement member (6a, 6b) are adjacent to lower portions (61),
- the connecting portions (63) are twice as many as the upper portions (62), and
- the lower portions (61) are as many as the upper portions (62) plus one.

Patentansprüche

1. Ein Flüssigkeitsbehälter (1), umfassend eine Palette (2), einen Metallkorb (3), der über der Palette (2) befestigt ist, und einen Kunststofftank (4), der in dem Korb (3) untergebracht ist und auf der Palette (2) ruht, wobei der Tank (4) eine obere Füllöffnung (41) und eine untere Ablassvorrichtung (42) umfasst, wobei die Palette (23) zwei lange Seiten (21) aufweist, die sich in einer Längsrichtung (X-X) erstrecken, parallel zueinander, und in einer Querrichtung (Y-Y) voneinander beabstandet sind, orthogonal zur Längsrichtung (X-X), und zwei kurze Seiten (22), die sich in der Querrichtung (Y-Y) erstrecken, parallel zueinander, und in der Längsrichtung (X-X) voneinander beabstandet sind, wobei die Palette (2) Folgendes umfasst:

- mehrere hölzerne Läufer (23a, 23b), die sich in der Längsrichtung (X-X) erstrecken, parallel zueinander, und in der Querrichtung (Y-Y) voneinander beabstandet sind,
- mehrere hölzerne Querelemente (24a, 24b, 24c), die über den Läufern (23a, 23b) angeordnet sind, wobei sich die hölzernen Querelemente (24a, 24b, 24c) in der Querrichtung (Y-Y) er-

strecken und zueinander parallel liegen und in der Längsrichtung (X-X) voneinander beabstandet und über den Läufern (23a, 23b) befestigt sind,
- mehrere hölzerne Stützbretter (25), die über den Querelementen (24a, 24b, 24c) angeordnet sind, wobei sich die Stützbretter (25) in der Längsrichtung (X-X) erstrecken, zueinander parallel liegen und in der Querrichtung (Y-Y) voneinander beabstandet und über den Querelementen (24a, 24b, 24c) befestigt sind,

dadurch gekennzeichnet, dass er mehrere Blechverstärkungselemente (6a, 6b) umfasst, wobei sich jedes Verstärkungselement (6a, 6b) in der Längsrichtung (X-X) erstreckt, über einem entsprechenden Läufer (23a, 23b) und über Abschnitten von Querelementen (24a, 24b, 24c) angeordnet ist, die an dem entsprechenden Läufer (23a, 23b) befestigt sind, und an den Abschnitten von Querelementen (24a, 24b, 24c) befestigt ist, und wobei jedes Verstärkungselement (6a, 6b) Folgendes umfasst:

- mehrere untere Abschnitte (61), die mit den Querelementen (24a, 24b, 24c) in Kontakt stehen,
- mehrere obere Abschnitte (62), die von den unteren Abschnitten (61) beabstandet sind,
- mehrere Verbindungsabschnitte (63) zwischen den oberen Abschnitten (62) und den unteren Abschnitten (61), die zu den oberen Abschnitten (62) und den unteren Abschnitten (61) senkrecht liegen, und wobei sich die oberen (62), unteren (61) sowie die Verbindungsabschnitte (63) entlang der gesamten längsgerichteten Länge der Verstärkungselemente (6a, 6b) in der Längsrichtung (X-X) erstrecken.

2. Ein Flüssigkeitsbehälter (1) nach Anspruch 1, wobei:

- die Stützbretter (25) eine Scheitelfläche (252) und eine Grundfläche (251) umfassen,
- die oberen Abschnitte (62) der Verstärkungselemente (6a, 6b) ebene Stützflächen definieren, die mit den Scheitelflächen (252) der Stützbretter (25) koplanar liegen,
- die unteren Abschnitte (61) der Verstärkungselemente (6a, 6b) ebene Stützflächen definieren, die mit den Grundflächen (251) der Stützbretter (25) koplanar liegen.

3. Ein Flüssigkeitsbehälter (1) nach einem der vorhergehenden Ansprüche, wobei:

- jeder Verbindungsabschnitt (63) eines Verstärkungselements (6a, 6b) an einen oberen Abschnitt (62) und einen unteren Abschnitt (61) grenzt,
- jeder Verbindungsabschnitt (63) an einer Faltlinie (64) des Verstärkungselements (6a, 6b) mit dem angrenzenden oberen (62) und dem angrenzenden unteren Abschnitt (61) in Kontakt steht und
- jede Faltlinie (64) gerade ist und sich entlang der gesamten längsgerichteten Länge des Verstärkungselements (6a, 6b) in der Längsrichtung (X-X) erstreckt.

4. Ein Flüssigkeitsbehälter (1) nach einem der vorhergehenden Ansprüche, wobei jedes Verstärkungselement (6a, 6b) eine Quererstreckung aufweist, die geringer als die oder gleich der Quererstreckung seines entsprechenden Läufers (23a, 23b) ist, und eine Längserstreckung, die geringer als die oder gleich der Längserstreckung seines entsprechenden Läufers (23a, 23b) ist.

5. Ein Flüssigkeitsbehälter (1) nach einem der vorhergehenden Ansprüche, wobei jedes Verstärkungselement (6a, 6b) drei obere Abschnitte (62), vier untere Abschnitte (61) und sechs Verbindungsabschnitte (63) umfasst.

6. Ein Flüssigkeitsbehälter (1) nach einem der Ansprüche 1 bis 4, wobei jedes Verstärkungselement (6a, 6b) vier obere Abschnitte (62), fünf untere Abschnitte (61) und acht Verbindungsabschnitte (63) umfasst.

7. Ein Flüssigkeitsbehälter (1) nach einem der vorhergehenden Ansprüche, wobei jedes Verstärkungselement (6a, 6b) aus einem Metallblech mit einer Dicke im Bereich von 1 bis 5 mm besteht.

8. Ein Flüssigkeitsbehälter (1) nach einem der vorhergehenden Ansprüche, wobei der Tank (4) auf den Stützbrettern (25) und auf den Verstärkungselementen (6a, 6b) ruht.

9. Ein Flüssigkeitsbehälter (1) nach einem der vorhergehenden Ansprüche, wobei:

- sich jedes Verstärkungselement (6a, 6b) zwischen zwei gegenüberliegenden Rändern (65) erstreckt, die in der Querrichtung (Y-Y) voneinander beabstandet sind, und
- das Verstärkungselement (6a, 6b) in der Spanne von einem Rand (65) zum gegenüberliegenden Rand (65) eines Verstärkungselements (6a, 6b) eine sich fortlaufend wiederholende Abfolge aufweist, wobei die Abfolge in dieser Reihenfolge aus Folgendem besteht: einem unteren Abschnitt (61), einem Verbindungsabschnitt (63), einem oberen Abschnitt (62) und einem weiteren Verbindungsabschnitt (63).

10. Ein Flüssigkeitsbehälter (1) nach Anspruch 9, wobei:

- beide Ränder (65) jedes Verstärkungselements (6a, 6b) an untere Abschnitte (61) grenzen,
- doppelt so viele Verbindungsabschnitte (63) wie die oberen Abschnitte (62) vorhanden sind und
- ebenso viele untere Abschnitte (61) wie die oberen Abschnitte (62) plus 1 vorhanden sind.

Revendications

1. Récipient à liquide (1) comprenant une palette (2), une cage métallique (3) fixée sur la palette (2) et un réservoir en plastique (4) logé dans la cage (3) et reposant sur la palette (2), ledit réservoir (4) comprenant une ouverture de chargement supérieure (41) et un dispositif d'évacuation inférieur (42), dans lequel ladite palette (23) a deux côtés longs (21) s'étendant dans une direction longitudinale (X-X) parallèles entre eux et espacés l'un de l'autre dans une direction transversale (Y-Y) orthogonale à la direction longitudinale (X-X) et deux côtés courts (22) s'étendant dans la direction transversale (Y-Y), parallèles entre eux et espacés l'un de l'autre dans la direction longitudinale (X-X), ladite palette (2) comprend :

une pluralité de patins en bois (23a, 23b), s'étendant dans la direction longitudinale (X-X), parallèles entre eux et espacés l'un de l'autre dans la direction transversale (Y-Y),
une pluralité de éléments transversaux en bois (24a, 24b, 24c) placés sur les patins (23a, 23b), lesdites éléments transversaux en bois (24a, 24b, 24c) s'étendent dans la direction transversale
(Y-Y) et sont parallèles entre eux et espacés les uns des autres dans la direction longitudinale (X-X) et sont fixés sur les patins (23a, 23b),

- une pluralité de planches de support en bois (25) placées sur les éléments transversaux (24a, 24b, 24c), lesdites planches de support (25) s'étendent dans la direction longitudinale (X-X), sont parallèles entre elles et espacées les unes des autres dans la direction transversale (Y-Y) et sont fixées sur les éléments transversaux (24a, 24b, 24c),

caractérisé en ce qu'il comprend une pluralité d'éléments de renforcement en tôle (6a, 6b) dans lesquels chaque élément de renforcement (6a, 6b) s'étend dans la direction longitudinale (X-X), est placé au-dessus d'un patin respectif (23a, 23b) et sur parties d'éléments transversaux (24a, 24b, 24c) fixées audit patin respectif (23a, 23b) et il est fixé auxdites parties d'éléments transversaux (24a, 24b, 24c), et
dans lequel chaque élément de renforcement (6a, 6b) comprend :

- une pluralité de parties inférieures (61) en contact avec les éléments transversaux (24a, 24b, 24c),
- une pluralité de parties supérieures (62) espacées des parties inférieures (61),
- une pluralité de parties de connexion (63) entre les parties supérieures (62) et les parties inférieures (61) perpendiculaires aux parties supérieures (62) et aux parties inférieures (61), et dans lequel lesdites parties supérieure (62), inférieure (61) et de liaison (63) s'étendent dans la direction longitudinale (X-X) sur toute la longueur longitudinale des éléments de renforcement (6a, 6b).

2. Récipient à liquide (1) selon la revendication 1, dans lequel :

- les planches de support (25) comprennent une surface supérieure (252) et une surface inférieure (251),
- les parties supérieures (62) des éléments de renforcement (6a, 6b) définissent des surfaces de support plates coplanaires avec les surfaces supérieures (252) des planches de support (25),
- les parties inférieures (61) des éléments de renforcement (6a, 6b) définissent des surfaces de support plates coplanaires avec les surfaces inférieures (251) des planches de support (25).

3. Récipient à liquide (1) selon l'une quelconque des revendications précédentes, dans lequel :

- chaque partie de liaison (63) d'un élément de renforcement (6a, 6b) est adjacente à une partie supérieure (62) et à une partie inférieure (61),
- chaque partie de liaison (63) est en contact avec les parties supérieure (62) et inférieure (61) adjacentes au niveau d'une ligne de pliage (64) de l'élément de renforcement (6a, 6b), et
- chaque ligne de pliage (64) est droite et s'étend dans la direction longitudinale (X-X) sur toute la longueur longitudinale de l'élément de renforcement (6a, 6b).

4. Récipient à liquide (1) selon l'une quelconque des revendications précédentes, dans lequel chaque élément de renforcement (6a, 6b) présente une étendue transversale inférieure ou égale à l'étendue transversale de son patin respectif (23a, 23b), et une étendue longitudinale inférieure ou égale à l'étendue longitudinale de son patin respectif (23a, 23b).

5. Récipient à liquide (1) selon l'une quelconque des revendications précédentes, dans lequel chaque élément de renforcement (6a, 6b) comprend trois parties supérieures (62), quatre parties inférieures (61) et six parties de liaison (63).

6. Récipient à liquide (1) selon l'une quelconque des revendications 1 à 4, dans lequel chaque élément de renforcement (6a, 6b) comprend quatre parties supérieures (62), cinq parties inférieures (61) et huit parties de liaison (63).

7. Récipient à liquide (1) selon l'une quelconque des revendications précédentes, dans lequel chaque élément de renforcement (6a, 6b) est constitué d'une tôle d'une épaisseur allant de 1 mm à 5 mm.

8. Récipient à liquide (1) selon l'une quelconque des revendications précédentes, dans lequel le réservoir (4) repose sur les planches de support (25) et sur les éléments de renforcement (6a, 6b).

9. Récipient à liquide (1) selon l'une quelconque des revendications précédentes, dans lequel :

- chaque élément de renforcement (6a, 6b) s'étend entre deux bords opposés (65) espacés l'un de l'autre dans la direction transversale (Y-Y), et
- dans la plage d'un bord (65) au bord opposé (65) d'un élément de renforcement (6a, 6b), l'élément de renforcement (6a, 6b) présente une séquence répétée en série, la séquence étant composée, dans cet ordre, d'une partie inférieure (61), d'une partie de liaison (63), d'une partie supérieure (62) et d'une autre partie de liaison (63).

10. Récipient à liquide (1) selon la revendication 9, dans lequel :

- les deux bords (65) de chaque élément de renforcement (6a, 6b) sont adjacents à des parties inférieures (61),
- les portions de liaison (63) sont deux fois plus nombreuses que les portions supérieures (62), et
- les parties inférieures (61) sont aussi nombreuses que les parties supérieures (62) plus une.

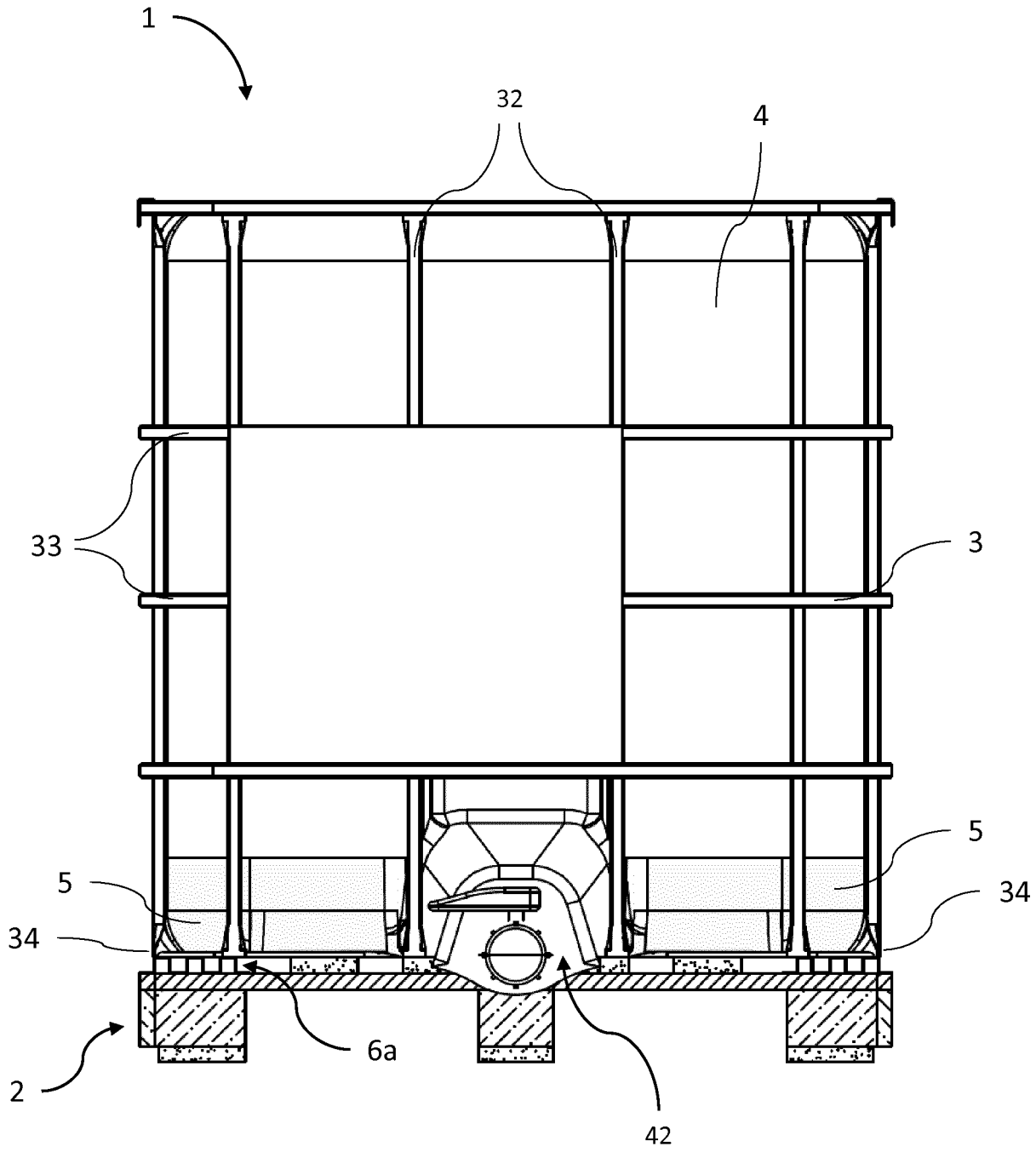

Fig. 1

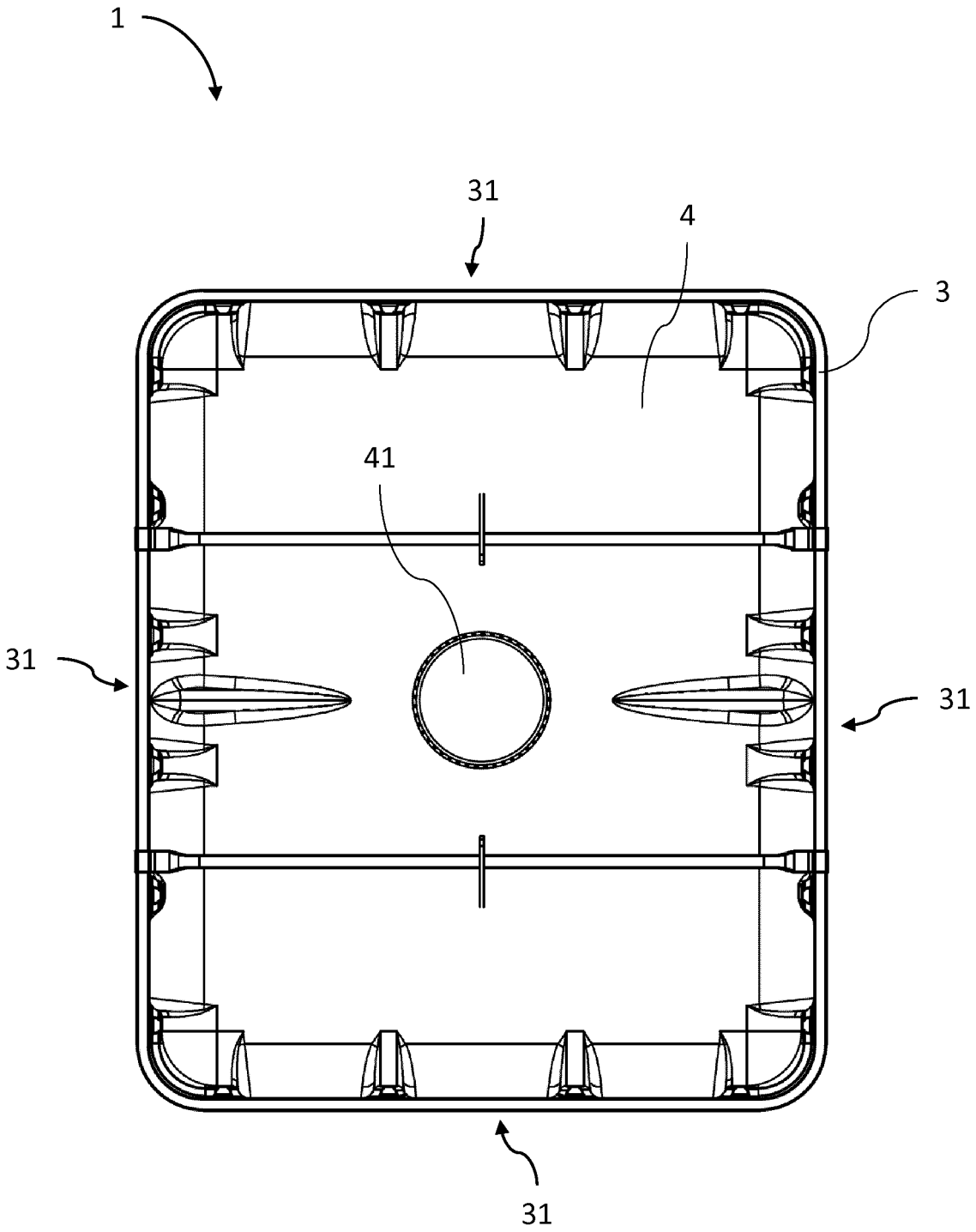

Fig. 2

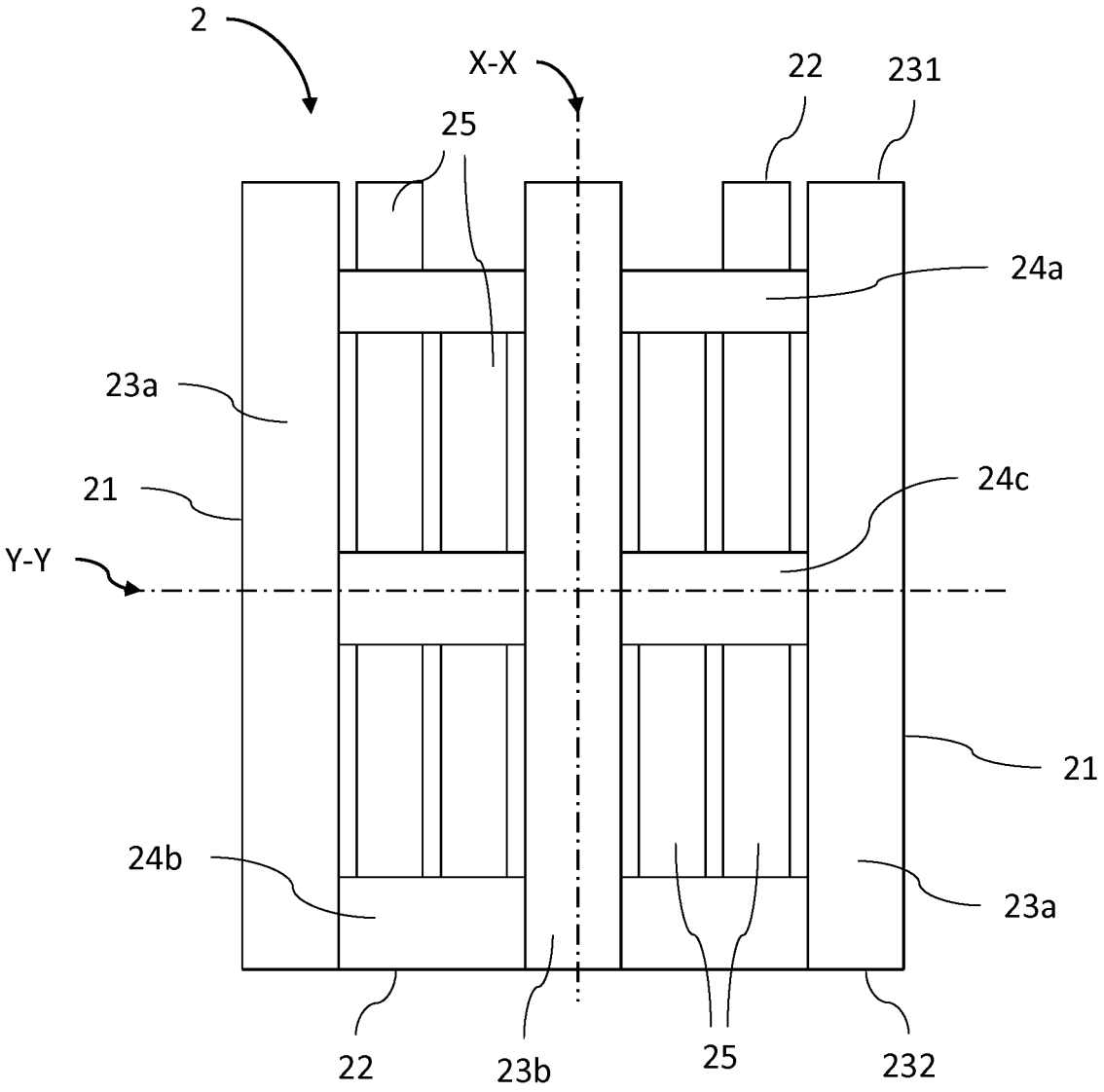
2
X-X
22
231
25
24a
23a
21
24c
Y-Y
21
24b
23a
22
23b
25
232

Fig. 3

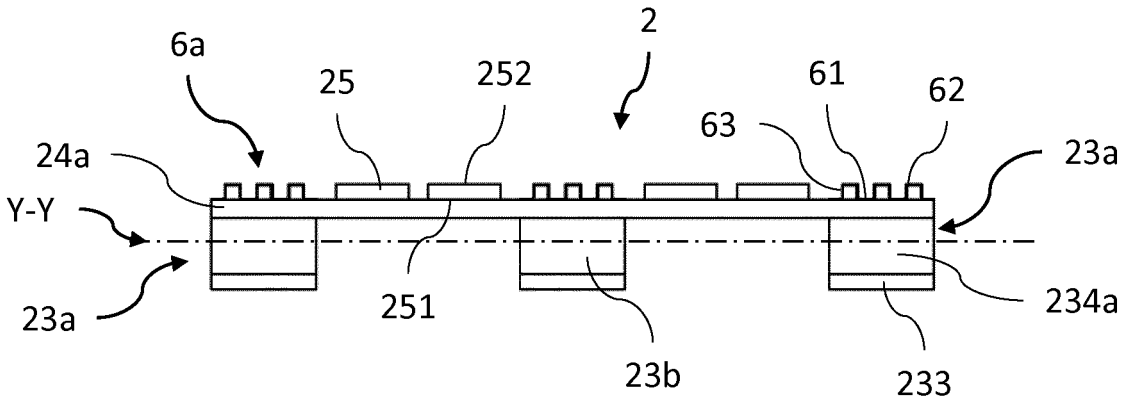
6a
2
25
252
61
62
63
24a
23a
Y-Y
23a
251
234a
23b
233

Fig. 4

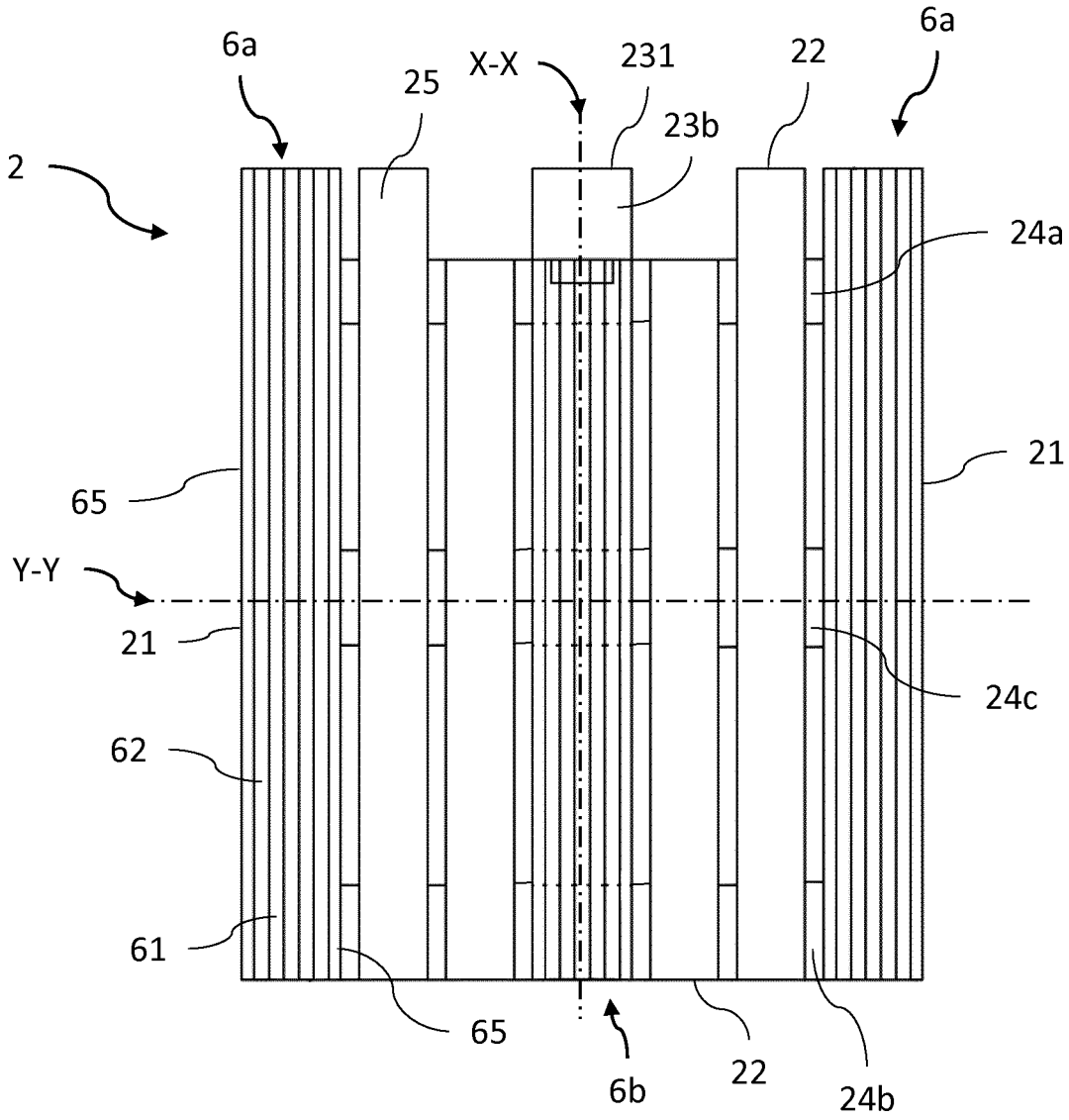
6a
25
X-X
231
22
6a
23b
2
24a
21
65
Y-Y
21
24c
62
61
65
6b
22
24b

Fig. 5

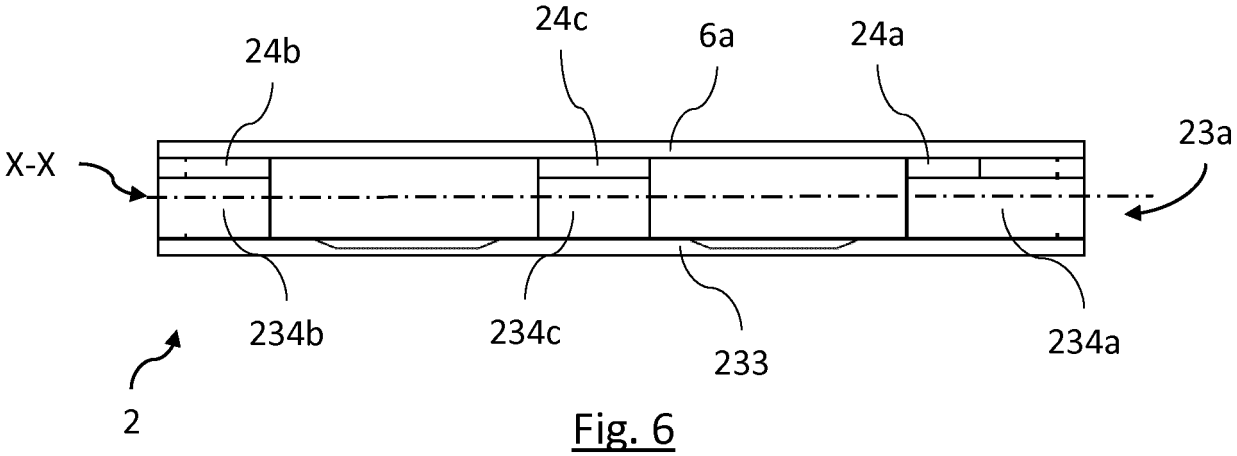
24b
24c
6a
24a
X-X
23a
234b
234c
233
234a
2

Fig. 6

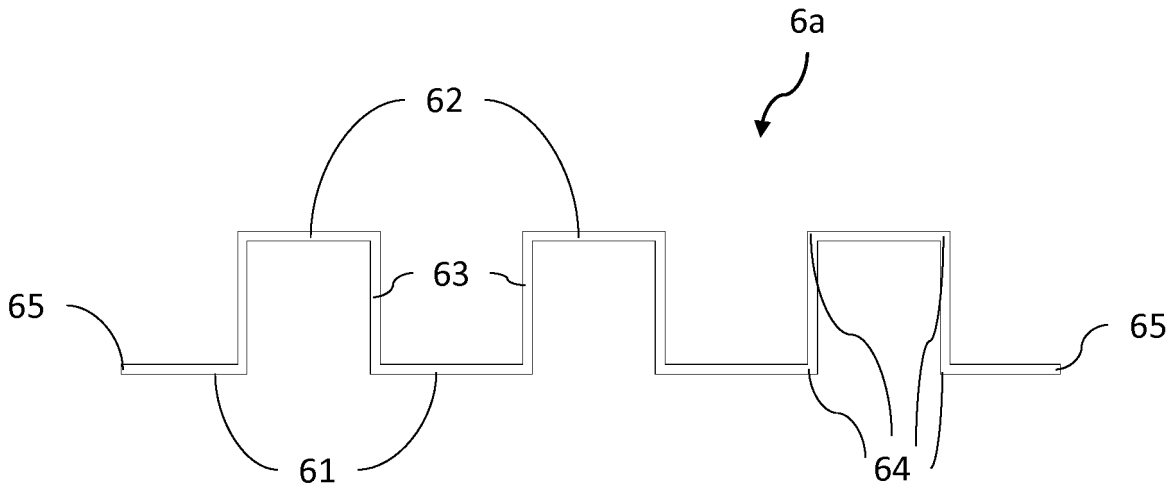

Fig. 7

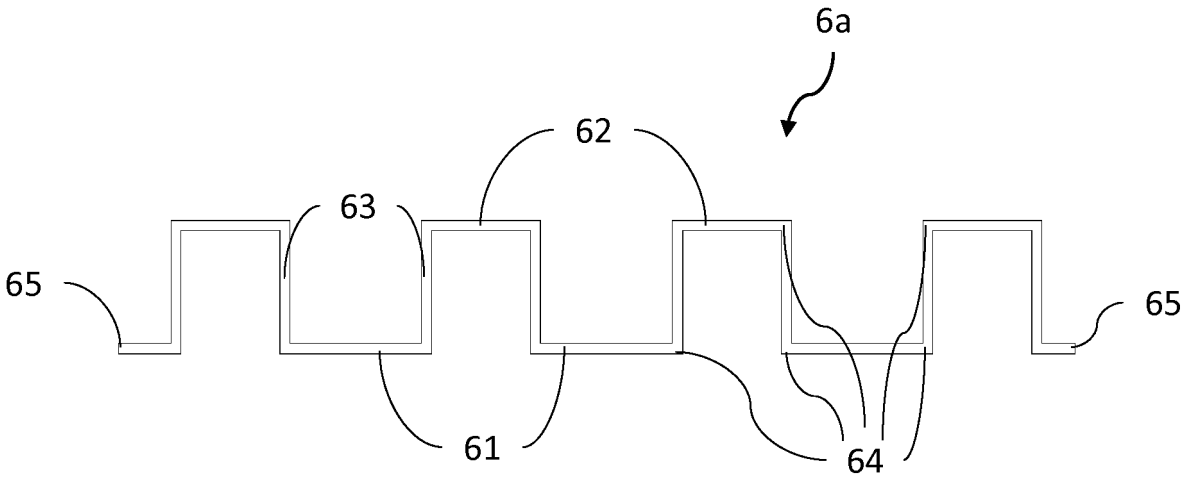

Fig. 8

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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