



(11) **EP 3 259 195 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
30.10.2019 Bulletin 2019/44

(21) Application number: **16752029.5**

(22) Date of filing: **11.02.2016**

(51) Int Cl.:
B65D 19/18 (2006.01)

(86) International application number:
PCT/IL2016/050165

(87) International publication number:
WO 2016/132348 (25.08.2016 Gazette 2016/34)

(54) **HEAVY-DUTY FOLDABLE STORAGE BIN**

HOCHBELASTBARER FALTBARER LAGERBEHÄLTER

BAC DE STOCKAGE PLIABLE TRÈS RÉSISTANT

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

(30) Priority: **16.02.2015 IL 23726715**

(43) Date of publication of application:
27.12.2017 Bulletin 2017/52

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Description**Field of the Invention**

[0001] The present invention relates to the field of material handling. More particularly, the invention relates to a heavy-duty foldable storage bin.

Background of the Invention

[0002] Foldable storage bins for shipping and inventory maintaining purposes are well known in the prior art. These rectilinear bins are stackable in both folded and upright conditions for good utilization of the available space, and are generally made of thermoplastic material, such as high density polyethylene (HDPE) or polypropylene (PP), for lower manufacturing costs, reduced weight and the ability to be easily cleaned.

[0003] A foldable storage bin comprises a stiff base and also panels that pivot with respect to the base. Interlocking means are generally provided at adjacent edges of the panels or at rigid corner columns to reinforce the panels when in an upright condition and to prevent unwanted disengagement.

[0004] A major concern of warehouse managers with respect to foldable storage bins is the transmission of vertical loads through the side panels to the floor of the bin. When the panels are connected to the base by permanent hinged connections for facilitating the angular displacement of the panels, for example by a plurality of spaced metal hinge pins each of which is mechanically joined to two angularly spaced brackets, the loads imposed on the panels are transmitted through the hinge pins and the side panels resist deflection of the base.

[0005] At times, the hinge pins shear and have to be replaced. In order to reduce the time needed to replace sheared hinge pins or brackets, often not being correctable due to the permanent connection with the storage bin, foldable storage bins have recently been equipped with releasably interengaged pivoting elements. These releasably interengaged pivoting elements also allow the panels to be detached from the base and to be more thoroughly cleaned when separated from the base.

[0006] However, the releasably interengaged pivoting elements result in a relatively weakened connection between a panel and the base. Accordingly, the vertical load is not uniformly transmitted to the base, but rather is concentrated at the hinges. The bottom center of the bin is therefore subjected to sagging or downward deflection due to the product load within in the bin, especially when supported by two opposed racks. The risk of panel sagging at a location intermediate to its end edges, leading to serious consequences, is exacerbated when the bins are stacked, often to a height of five or more stacked bins, for extended periods of time on the order of months. An end or side wall also suffers the risk of bowing due to an outward force applied by the product loaded within the bin.

[0007] Prior art foldable bins with releasably interengaged pivoting elements have been incapable to support a load of greater than 500 kg due to the limitations of thermoplastic material from which they are made and due to the configuration of the interlocking means by which adjacent panels are connected. At a greater load, the floor or panels tend to become deformed or the interlocking means tend to become detached.

[0008] The interlocking means of heavy-duty bins with releasably interengaged pivoting elements and having sufficient structural strength to support extremely heavy loads on the order of 700 kg or more, such as machine parts or frozen meat, need to be even more carefully designed to ensure rigidity of the engagement between adjacent panels when the bin is both stationary and is lifted, such as by a forklift.

[0009] US 4 591 065 describes a foldable container assembly comprising a base having a plurality of sides, at least one side wall extending vertically upwardly from each side of the base with the tops of the side walls all being aligned in a horizontal plane.

[0010] EP 0 189 301 relates to a collapsible shipping container having a rectangular base and four side walls pivotally attached to the base and foldable from an erect condition to a collapsed condition.

[0011] EP 1 840 038 describes a container, in particular a box of the type with collapsible walls, comprising a bottom wall and a plurality of side walls mounted on the bottom wall and movable between an erect, containment position and a folded, rest position.

[0012] EP 2 684 809 relates to a box pallet side wall of a box pallet that forms a hollow structure having an enclosed space therein, which is said to have a strength higher than that of a conventional one of the same weight.

[0013] DE 196 14 530 relates to a folding plastics crate for transporting heavy loads, especially automotive components, consists of a rectangular base, each side of which has a wall which is hinged at approximately mid crate-height.

[0014] AU 76608 81 relates to a box pallet side wall to be assembled on a pallet main body to construct a box pallet.

[0015] WO 2004/022455 describes a container for emptying by a forklift truck or equivalent comprising an arrangement for tipping a receptacle.

[0016] It is an object of the present invention to provide a heavy-duty storage bin provided with releasably interengaged pivoting elements and made of thermoplastic material that is configured with interlocking means that reliably prevent disengagement even when the bin is subjected to an extremely heavy load or is inverted.

[0017] It is an additional object of the present invention to provide a heavy-duty storage bin provided with releasably interengaged pivoting elements that inhibits or completely eliminates panel sagging and bowing.

[0018] Other objects and advantages of the invention will become apparent as the description proceeds.

Summary of the Invention

[0019] The present invention provides a heavy-duty foldable storage bin according to claim 1. The bin comprises a rectilinear base made of thermoplastic material, a plurality of spaced columns integrally formed with said base, and a plurality of rectangular end panels and side panels made of thermoplastic material that are foldable and erectable with respect to said base, wherein at least one of said plurality of panels is detachable from said base, wherein said plurality of columns includes one or more central columns each of which having an integral portion that protrudes upwardly from an upper surface of said base and is interlockable with a corresponding side panel of said plurality of side panels at a bottom center region of said corresponding side panel, for generating a sufficiently high sagging resisting moment.

[0020] The interlockable portion comprises a first surface that is engageable with a post of the corresponding side panel, and second and third coincident surfaces extending in two different directions, respectively, which are engageable and complementary with two edges, respectively, of the corresponding side panel, to prevent disengagement of the corresponding side panel from the base during either relative longitudinal movement or relative vertical movement.

[0021] In one aspect, the interlockable portion is coplanar with a rectangular outer face of a corresponding central column which vertically extends thereto from the upper base surface and which is considerably thinner than a central column thickness.

[0022] The third surface is a vertically extending edge of the rectangular outer face and the second surface longitudinally protrudes from the third surface.

[0023] The interlockable portion is configured as a mushroom shaped head having an upper surface that longitudinally curves from the first surface in two opposite directions until coinciding with a corresponding second surface to define a pointed edge. The mushroom shaped head is interlockable with a complementary thickened edge of a void area formed in the corresponding side panel.

[0024] The storage bin may also be provided with a second type of interlocking means. The plurality of columns includes a plurality of corner columns between two of which one or more of the central columns are interposed, each of said corner columns configured with a recess with which a longitudinally extending protrusion of the corresponding side panel is interlockable. Each of the corner columns is configured with a horizontal surface coplanar with the base upper surface, an upper protrusion facing an adjacent central column and having an undercut surface which is parallel to, and shorter than said horizontal surface, and a vertical surface extending between said horizontal and undercut surfaces.

[0025] The storage bin may also be provided with a third type of interlocking means. Coupling elements of a side panel are engageably received within corresponding

apertures formed in an aperture bearing post of an adjacent end panel. When a side wall is pivoted to an inclined position, the coupling elements are alignable with corresponding apertures formed in the post. The side wall is then fully pivotable until each of the coupling elements is received within a corresponding aperture. To prevent relative movement between the side panel and an adjacent end panel, To prevent relative movement between the side panel and an adjacent end panel, the disengagement member is manipulated so that its fixating element is introduced into the corresponding socket formed in the post.

[0026] These three interlocking means prevent disengagement of a panel from the base during different dispositions of a loaded bin, when the storage bin is reoriented or even inverted.

[0027] In one aspect, a ridge protruding from the upper base surface is engageably receivable in a complementary cavity formed at a bottomly orientable end of the corresponding side panel, to restrict unwanted movement of the corresponding side panel when set to an upright condition.

[0028] The present invention allows a method for emptying a heavy-duty foldable storage bin, comprising the steps of: providing a heavy-duty foldable storage bin comprising a rectilinear base made of thermoplastic material, a plurality of spaced central columns and corner columns integrally formed with said base, and a plurality of rectangular end panels and side panels made of thermoplastic material that are foldable and erectable with respect to said base, wherein at least one of said plurality of panels is detachable from said base, wherein each of said central columns has an integral portion that protrudes upwardly from an upper surface of said base and is interlockable with a corresponding side panel of said plurality of side panels at a bottom center region of said corresponding side panel, for generating a sufficiently high sagging resisting moment, and wherein each of said corner columns is interlockable with a longitudinally extending portion of said corresponding side panel; setting said storage bin to an upright condition; loading said bin with desired products; supporting said base with tines of a forklift; performing a material handling operation by means of said forklift; and operating a tilting device carried by said forklift to sufficiently change a disposition of said storage bin such that said loaded products are caused to be emptied while said corresponding side panel remains engaged with the central and corner columns.

[0029] In one aspect, the tilting device causes the storage device to be inverted.

Brief Description of the Drawings

[0030] In the drawings:

- Fig. 1 is a perspective view from the top and side of a heavy-duty storage bin in a folded condition, according to one embodiment of the present invention;

- Fig. 2A is enlargement of Detail A of Fig. 1, showing an arcuate projection of a corner column;
- Fig. 2B is an enlargement of Detail B of Fig. 1, showing the interaction of two prong modules with cavities formed in the base;
- Fig. 3 is a perspective view from the bottom of the storage bin of Fig. 1 in a folded condition;
- Fig. 4 is a front view of the storage bin of Fig. 1 in a folded condition;
- Fig. 5A is a perspective view from the top of the storage bin of Fig. 1 in a folded condition;
- Fig. 5B is an enlargement of Detail C of Fig. 5A, showing the inner face of a mushroom-shaped interlocking head;
- Fig. 6 is a perspective view from the top of the storage bin of Fig. 1 in a folded condition, shown without the end walls;
- Fig. 7 is a perspective view from the top of the storage bin of Fig. 1 in an upright condition;
- Fig. 8 is a front view of the storage bin of Fig. 1 in an upright condition;
- Fig. 9A is enlargement of Detail D of Fig. 8, showing the engagement of the mushroom-shaped head;
- Fig. 9B is enlargement of Detail E of Fig. 8, showing the configuration of the disengagement member;
- Fig. 10 is a vertical cross-sectional view of the storage bin of Fig. 7 in an upright condition, cut through plane A-A of Fig. 8 which coincides with an end wall;
- Fig. 11 is a method for emptying a heavy-duty foldable storage bin;
- Fig. 12 is an enlargement of Fig. 6, showing the structure of cavities formed in an end wall of the base;
- Fig. 13 is an enlarged exploded view of an end wall bottom portion of the storage bin of Fig. 7, prior to the introduction of prong modules into the cavities of Fig. 12;
- Fig. 14 is a perspective view from the interior of the storage bin of Fig. 7 in an upright condition, showing the structure of cavities formed in a side wall of the base; and
- Fig. 15 is a perspective view of the storage bin of Fig. 7, showing one of the side walls in an inclined position.

Detailed Description of Preferred Embodiments

[0031] The heavy-duty storage bin of the present invention, which is of the type having detachable panels, is configured with an interlocking element that is integral with the base and is interlockable with the bottom center of a side panel, to generate a sufficiently high resisting moment that counteracts the normal tendency of a prior art unreinforced side panel to sag.

[0032] Fig. 1 illustrates a heavy-duty storage bin in a folded condition, according to one embodiment of the present invention, and is generally designated by numeral 10. Storage bin 10 comprises a rectilinear base 5 that is integrally formed with a plurality of rectilinear columns,

including central columns 2, corner columns 3 and intermediate columns 7, which are integrally formed with, and downwardly extend from, base 5. Symmetric side panels 12 and 16 extending throughout the length L of the interior of base 5 (hereinafter "longitudinally extending"), are in abuttable relation with each other at edge 25 when in the illustrated folded condition, and are located beneath end panels 18 and 19 extending throughout the width W of the interior of base 5 (hereinafter "transversally extending") and which are spaced from each other in the folded condition. End panels 18 and 19, each of which is configured with a central post 22, two opposed curved end posts 48 with an integral aperture bearing post 47 and reinforcing post 51, and a plurality of ribs 41 transversally extending between a reinforcing post and the central post, are compactly folded so as to be disposed at a height below the upper surface 6 of base 5.

[0033] As shown in Fig. 3, storage bin 10 is provided with a plurality of longitudinally extending skid elements 17, each of which integrally formed with a plurality of columns, e.g. three as illustrated, at the bottom end thereof. The gap 8 that is defined between base 5 and the skid elements 17 facilitates entry therebetween of the tines of a forklift in order to perform a bin warehousing operation. Each column 3 is shown to be provided with reinforcing elements 15, which are specially configured to interface with the protuberance 1 (Fig. 1) that protrudes upwardly from the corner column and facilitates the stacking of bins in a folded condition. Base 5 is shown to be formed of openwork construction for material savings, although any other construction method is in the scope of the invention.

[0034] With reference to Figs. 2A and 4-6, central columns 2 and corner columns 3 are configured to interlock with a corresponding side panel 12 or 16, when set to an upright condition.

[0035] The upper end of each corner column 3 is formed with a rectangular recess 4 facing the corresponding central columns 2. The recess is formed below arcuate protrusion 27 having horizontal undercut 29 and above horizontal surface 33 extending to the lateral edge of corner column 3. A vertical surface 32 extends between surfaces 29 and 33.

[0036] At the upper end of each central column 2 is formed a planar mushroom shaped head 9, which is considerably thinner than the thickness of the entire column 2. The upper surface of head 9 longitudinally curves from the planar upper surface 4 in two opposite directions to define a pointed edge 11. The outer face 13 of central column 2 is rectangular such that its longitudinal edges 14, which vertically extend to mushroom shaped head 9, are narrower than pointed edge 11. A horizontal edge 21 extends from below a corresponding pointed edge 11 to the adjacent longitudinal edge 14, to define a gap 24 therebelow for facilitating interlocking with a corresponding side panel.

[0037] As shown particularly in Fig. 6, side panels 12 and 16 are rectangular, and are configured with a central

vertically orientable post 31, an end post 42, and spaced ribs 43-45A and 43-45B longitudinally extending in both directions, respectively, from central post 31. Ribs 43-44 extend to the corresponding disengagement device holder 46 which is interposed therebetween, and ribs 44-45 extend to the corresponding end post 42. The outwardly accessible surface of central post 31, end post 42, and ribs 43-45A and 43-45B are preferably coplanar.

[0038] Central post 31 extends from abutable edge 25 to a void area 23 positioned adjacent to the corresponding central column 2. Void area 23 delimited by thickened element 28 is shaped complementarily to mushroom shaped head 9, and facilitates engagement with the latter. A bottomly orientable straight edge 26 spaced from, and substantially parallel to, abutable edge 25 extends longitudinally from void area 23 towards the corresponding corner column 3, and terminates with portion 36 that longitudinally protrudes from the longitudinal edge 38 of end post 42, for interlocking with gap 34 (Fig. 4). Connected to longitudinal edge 38 are a plurality of spaced arcuate coupling elements 39 that protrude from the outwardly accessible surface of end post 42. These coupling elements 39 are engageable with corresponding apertures 49 formed in post 47 of an adjacent end panel (Fig. 1).

[0039] Fig. 7 illustrates storage bin 10 in an upright or erected condition such that thickened edge 28 of the void area is brought in engagement with mushroom shaped head 9 and the other interlocking means are also engaged. In the upright condition, backing elements 56 of corresponding prong modules projecting from a bottom edge 59 of end panel 18, and from a bottom edge of the other panels, are received in corresponding cavities formed in base 5. Also, the tongue shaped fixating element connected to disengagement member 65 is received in dedicated socket 66 of aperture bearing post 47 (Fig. 15), in order to maintain adjacent side and end panels in mutual abutting and coplanar relation.

[0040] Accordingly, central post 31 of side panel 12 is aligned with the corresponding central column 2, reinforcing post 51 of end panel 19 is aligned with the corresponding corner column 3, and central post 22 of end panel 19 is aligned with the corresponding intermediate column 7, to enable continuous transmission of vertical loads from the erected panels to the base. By virtue of the reinforcement provided at the bottom center of side panel 12 by means of the interlocked mushroom shaped head 9, floor 37 constituting the upper surface of base 5 is prevented from sagging.

[0041] As shown in Fig. 10, the stability of the storage bin in the upright condition is also assisted by the coupling of protuberance 1 protruding upwardly from a corresponding corner column 3 with a complementary recess formed in a bottom region of a reinforcing post 51 of end panel 18.

[0042] The various interlocking means used in conjunction with storage bin 10 are shown in Fig. 8, including mushroom shaped head 9 engaged with void area edge

28, longitudinally protruding portion 36 of end post 42 engaged with the undercut surface 29 and vertical surface 32 (Fig. 2A) of upper arcuate protrusion 27 of corner column 3, and coupling elements 39 of a side panel 12 engageably received within corresponding apertures 49 formed in aperture bearing post 47 of an adjacent end panel.

[0043] With respect to mushroom shaped head 9, as shown in Fig. 9A, the engagement between central post 31 of side panel 12 and planar upper surface 4 of head 9, which in turn is integral with outer face 13 of the central column, produces a path for the downwardly directed vertical load derived forces M to be transmitted to, and be diffused by, base 5. In addition, the stiff central column outer face 13 provides an upwardly directed resisting force R and a resulting resisting moment that counteract both the effects of a lateral load that would normally cause side panel 12 to outwardly bow and of the vertical load L.

[0044] The varying configuration of mushroom shaped head 9 and of the complementary thickened edge 28 of the void area prevents disengagement of side panel 12 from base 5, during either relative longitudinal movement due to contact with a longitudinal edge 14 or relative vertical movement due to contact with the horizontal edges 21. To ensure a sufficiently strong engagement between mushroom shaped head 9 and thickened edge 28 of the void area, the vertical distance J between horizontal edge 21 of head 9 and upper surface 53 of base 5, which is coplanar with intermediate horizontal surface 33 of the corner column is preferably greater than 20 mm.

[0045] The increased load bearing capacity of storage bin 10 is made possible by head 9, which generates an increased resisting moment at the bottom center of a side panel and through which the vertical load is transmitted, as described above. By virtue of the three interlocking means, namely head 9, longitudinally protruding portion 36, and coupling elements 39, disengagement of a panel from the base is prevented during different dispositions of a loaded bin. This disengagement preventing feature is of particular importance when the storage bin is loaded with frozen meat, which tends to adhere to the panels and can be removed only when the storage bin is inverted. While a panel of a prior art bin is interlocked with a corner column from the side and therefore will become disengaged when the bin is inverted and the load is above a certain weight limit, longitudinally protruding portions 36 of the present invention are engaged with the corresponding corner column 3 in two directions. Thus longitudinally protruding portions 36, as well as head 9, will remain in engagement even when storage bin 10 is re-oriented or even inverted.

[0046] As shown in Fig. 11, the storage bin is first set to the upright condition in step 72, and then is loaded with a desired product or products in step 74. In order to perform a desired material handling operation, tines of a forklift are positioned in supporting relation with the base in step 76, after which the material handling operation is performed in step 78. In order to empty the storage bin,

a forklift carried tilting device is operated in step 80 so as to suitably change the angular disposition of the bin to facilitate emptying of the loaded products in step 82. This operation is made possible by use of the interlocking means described hereinabove.

[0047] As shown in Fig. 15, end walls 18 and 19 are set to the upright condition prior to the side walls. After the illustrated side wall 12 has been pivoted to an inclined position, the coupling elements 39 are aligned with corresponding apertures 49 formed in post 47. Side wall 12 is then fully pivoted until each coupling element 39 is received within a corresponding aperture 49. To prevent relative movement between side panel 12 and one of the end panels, disengagement member 65 is manipulated so that its fixating element is introduced into the corresponding socket 66.

[0048] In Fig. 9B, flexible element 69 of disengagement member 65 is longitudinally displaced as illustrated by the arrow to cause the fixating element connected thereto to be cleared from aperture bearing post 47. Side wall 12 is then able to be downwardly pivoted while the coupling elements 39 become separated from the corresponding apertures.

[0049] Reference is now made to Figs. 2A-B, 12 and 13, which illustrates the pivoting means employed in conjunction with the storage bin of the present invention. The pivoting means are characterized by prong elements that are restrainedly displaceable within dedicated cavities formed within the base, yet are removable from the cavities while detaching, from the base, the panel with which the prong elements are integrally formed. Even though the prong elements are releasably interengaged with the cavities, the storage bin is structurally strong by virtue of the mushroom shaped head and other interlocking means described hereinabove.

[0050] Fig. 12 illustrates a plurality of cavities 76 and 77 arranged in pairs that are recessed from the inner face 71 of a base end wall 75 and are downwardly recessed from the base upper surface 6. In plan view, each cavity is substantially U-shaped such that its outer cavity edge 73, i.e. located closer to the outer face 87 of base end wall 75, transversally extends to a downwardly extending, thickened prong retainer 79, which is interposed between, and contiguous with, a pair of cavities 76 and 77. Each cavity is delimited by a portion 86 of inner face 71 that transversally protrudes from the transversal extremity 83 of the cavity which is opposite prong retainer 79. A partition 85 constituting the division between two cavity pairs longitudinally extends from inner face 71 to outer face 87, defining another cavity protruding portion 88.

[0051] A cavity divider 81 considerably thinner than prong retainer 79 downwardly extends from prong retainer 79 to the cavity floor 84. A stopper 89 for limiting downward prong displacement is positioned in abutting relation with divider 81, for example facing extremity 83.

[0052] A prong module 55 shown primarily in Figs. 2B and 13 is used to interact with the walls of a cavity. Prong module 55, which longitudinally extends from bottom ori-

entable edge 59 of the illustrated end panel 18, comprises a plurality of transversally spaced prongs 54 and a backing element 56 that transversally extends the entire length of prong module 55. An abutting element 57 protrudes from the longitudinal orientable end of backing element 56. A transversally extending positioning element 64 protrudes from a terminal element 63 that is longer than the other prongs 54, for example in a direction towards arcuate protrusion 27.

[0053] A prong module 55 is lowered into a pair of cavities 76 and 77 in the manner shown in Fig. 13. Positioning element 64 serves to suitably direct prong module 55 into the cavities by contacting the transversal cavity extremity 83 (Fig. 12). When prong module 55 is fully lowered into the cavities such that abutting element 57 contacts stopper 89, prong retainer 79 is received in the longitudinally recessed portion that is formed in the center of prong module 55 and between two adjacent prongs 54. Significant longitudinal displacement of prong module, and consequently of end panel 18, is prevented due to contact with cavity protruding portions 86 and cavity outer wall 73. Ridge 91 protruding from surface 6 and engageable with a complementary aperture 94 formed at the end of central post 22 (Fig. 1) also assists in increasing the end panel stability when the end panel is in an upright position.

[0054] When end panel 18 is in a folded position, as shown in Figs. 2A and 2B, two prongs 54 are positioned between prong retainer 79 and cavity protruding portion 88, and one prong 54 and terminal element 63 are positioned between prong retainer 79 and cavity protruding portion 86. Contact between abutting element 57 and prong retainer 79, which may be chamfered, prevents significant upward and longitudinal displacement. As the transversal dimension of prong module 55 is substantially equal to that of the gap between cavity protruding portions 86 and 88, transversal displacement of prong module 55 is consequently prevented.

[0055] End wall 18 may be freely pivoted from the folded position by virtue of the gap between cavity outer wall 73 and prong module 55 and of the chamfered prong retainer 79. During a pivoting operation, positioning element 64 may contact cavity extremity 83 and a prong 54 may contact cavity outer wall 73. At a certain angle of end wall, cavity protruding portion 86 ceases to interfere with positioning element 64, and end wall 18 may be removed from base 5, as shown in Fig. 15. Of course, the pivoting operation may continue in order to set end wall 18 in the upright condition.

[0056] A similar arrangement of prong modules and cavities is provided in the base side walls 93, as shown in Fig. 14.

[0057] Fig. 14 also shown a ridge 96 that protrudes from base upper surface 53, for being received in a complementary cavity 97 formed at the bottomly orientable end of end post 42 (Fig. 15) when the latter is set to the upright position. The engagement of ridge 96 within cavity 97 prevents the bowing of side panel 12 due to an

outward force applied by the product loaded within the bin, or to restrict any other type of movement. A similar ridge may protrude upwardly from mushroom shaped head 9 and be received in a complementary cavity formed within void area edge 28.

[0058] While some embodiments of the invention have been described by way of illustration, it will be apparent that the invention can be carried out with many modifications, variations and adaptations, and with the use of numerous equivalents or alternative solutions that are within the scope of persons skilled in the art, without exceeding the scope of the claims.

Claims

1. A heavy-duty foldable storage bin (10), comprising:

- a) a rectilinear base (5) made of thermoplastic material;
- b) a plurality of spaced columns (2, 3, 7) integrally formed with said base; and
- c) a plurality of rectangular end panels (18, 19) and side panels (12, 16) made of thermoplastic material that are foldable and erectable with respect to said base,

wherein; said plurality of columns includes one or more central columns (2) each of which having an integral portion that protrudes upwardly from an upper surface of said base and is interlockable with a corresponding side panel of said plurality of side panels at a bottom center region of said corresponding side panel, for generating a sufficiently high sagging resisting moment,

characterized in that at least one of said plurality of panels is detachable from said base, and **in that** said interlockable portion comprises a first surface (4) that is engageable with a post (31) of the corresponding side panel (12,16), and second and third coincident surfaces extending in two different directions, respectively, which are engageable and complementary with two edges, respectively, of the corresponding side panel, to prevent disengagement of the corresponding side panel from the base during either relative longitudinal movement or relative vertical movement, wherein a longitudinal movement is a movement that takes place along the length of said side panel;

wherein the third surface is a vertical edge (14) of a rectangular outer face of the central column (2) and the second surface is a horizontal edge (21) protruding from the third surface, and wherein the interlockable portion is configured as a mushroom shaped head (9) having an upper surface that longitudinally curves from the first surface (4) in two opposite directions until coinciding with a corresponding second surface to define a pointed edge (11), said mush-

room shaped head being interlockable with a complementary thickened edge (28) of a void area formed in the corresponding side panel.

2. The heavy-duty storage bin according to claim 1, wherein the interlockable portion is coplanar with the rectangular outer face (13) of the corresponding central column (2) which vertically extends thereto from the upper base surface and which is considerably thinner than a central column thickness.

3. The heavy-duty storage bin according to claim 1, wherein the plurality of columns includes a plurality of corner columns (3) between two of which one or more of the central columns are interposed, each of said corner columns configured with a recess with which a longitudinally extending protrusion of the corresponding side panel is interlockable.

4. The heavy-duty storage bin according to claim 3, wherein each of the corner columns (3) is configured with a horizontal surface coplanar with the base upper surface, an upper protrusion facing an adjacent central column (2) and having an undercut surface which is parallel to, and shorter than said horizontal surface, and a vertical surface extending between said horizontal and undercut surfaces.

5. The heavy-duty storage bin according to claim 1, wherein a ridge (96) protruding from the upper base surface is engageably receivable in a complementary cavity (97) formed at a bottomly orientable end of the corresponding side panel (12,16), to restrict movement of the corresponding side panel when set to an upright condition.

Patentansprüche

1. Faltbarer Hochleistungslagerbehälter (10), umfassend:

- a) eine geradlinige Basis (5), gefertigt aus einem thermoplastischen Material;
- b) eine Vielzahl von beabstandeten Säulen (2, 3, 7), die integral mit der Basis gebildet sind; und
- c) eine Vielzahl von rechteckigen Endwandflächen (18, 19) und Seitenwandflächen (12, 16), aus einem thermoplastischen Material gefertigt, die in Bezug auf die Basis faltbar und aufrichtbar sind,

wobei die Vielzahl von Säulen eine oder mehrere zentrale Säulen (2) beinhaltet, von denen jede einen integralen Abschnitt aufweist, der aufwärts von einer oberen Oberfläche der Basis übersteht und mit einer entsprechenden Seitenwandfläche der Vielzahl von Seitenwandflächen in einer unteren zentralen Regi-

on der entsprechenden Seitenwandfläche verrastbar ist, um ein ausreichend hohes Durchbiegewiderstandsmoment zu erzeugen,

dadurch gekennzeichnet, dass mindestens eine der Vielzahl von Wandflächen von der Basis lösbar ist, und dadurch, dass der verrastbare Abschnitt eine erste Oberfläche (4) umfasst, die in einen Balken (31) der entsprechenden Seitenwandfläche (12, 16) einsetzbar ist, und sich zweite und dritte übereinstimmende Oberflächen jeweils in zwei unterschiedliche Richtungen erstrecken, die jeweils in zwei Kanten der entsprechenden Seitenwandfläche einsetzbar und ergänzend sind, um einem Auskuppeln der entsprechenden Seitenwandfläche von der Basis entweder während einer relativen Längsbewegung oder relativen Vertikalbewegung vorzugbeugen, wobei eine Längsbewegung eine Bewegung ist, die entlang der Länge der Seitenwandfläche stattfindet; wobei die dritte Oberfläche eine vertikale Kante (14) einer rechteckigen Außenseite der zentralen Säule (2) ist und die zweite Oberfläche eine horizontale Kante (21) ist, die aus der dritten Oberfläche übersteht, und wobei der verrastbare Abschnitt als ein pilzförmiger Kopf (9) konfiguriert ist, der eine obere Oberfläche aufweist, die sich längs von der ersten Oberfläche (4) in zwei entgegengesetzte Richtungen krümmt, bis er mit einer entsprechenden zweiten Oberfläche übereinstimmt, um eine spitze Kante (11) zu definieren, wobei der pilzförmige Kopf mit einer ergänzend verdickten Kante (28) eines leeren Bereiches verrastbar ist, der in der entsprechenden Seitenwandfläche gebildet wird.

2. Hochleistungslagerbehälter nach Anspruch 1, wobei der verrastbare Abschnitt mit der rechteckigen Außenseite (13) der entsprechenden zentralen Säule (2), die sich von der oberen Basisoberfläche vertikal dorthin erstreckt, und die wesentlich dünner als eine Dicke der zentralen Säule ist, komplanar ist.
3. Hochleistungslagerbehälter nach Anspruch 1, wobei die Vielzahl von Säulen eine Vielzahl von Ecksäulen (3) beinhaltet, wobei zwischen zwei von diesen eine oder mehrere der zentralen Säulen eingefügt sind, wobei jede der Ecksäulen mit einer Aussparung konfiguriert ist, mit der ein sich längs erstreckender Überstand der entsprechenden Seitenwandfläche verrastbar ist.
4. Hochleistungslagerbehälter nach Anspruch 3, wobei jede der Ecksäulen (3) mit einer horizontalen Oberfläche, die komplanar mit der oberen Oberfläche der Basis ist, konfiguriert ist, wobei ein oberer Überstand einer angrenzenden zentralen Säule (2) zugewandt ist und eine hinterschnittene Oberfläche, die parallel zu, und kürzer als die horizontale Oberfläche ist, und

eine vertikale Oberfläche aufweist, die sich zwischen der horizontalen und hinterschnittenen Oberfläche erstreckt.

5. Hochleistungslagerbehälter nach Anspruch 1, wobei ein Grat (96), der aus der oberen Basisoberfläche übersteht, in einem ergänzenden Hohlraum (97) eingreifend aufnehmbar ist, der in einem nach unten ausrichtbaren Ende der entsprechenden Seitenwandfläche (12, 16) gebildet wird, um eine Bewegung der entsprechenden Seitenwandfläche einzuschränken, wenn sie in einen aufrechten Zustand gesetzt wird.

Revendications

1. Bac de stockage pliable pour charges lourdes (10), comprenant :

- a) une base rectiligne (5) réalisée en matériau thermoplastique ;
- b) une pluralité de colonnes espacées (2, 3, 7) formées d'un seul tenant avec ladite base ; et
- c) une pluralité de panneaux d'extrémité rectangulaires (18, 19) et de panneaux latéraux (12, 16) réalisés en matériau thermoplastique qui sont pliables et déployables par rapport à ladite base,

dans lequel ladite pluralité de colonnes comporte une ou plusieurs colonne(s) centrale(s) (2) ayant chacune une partie intégrante qui fait saillie vers le haut depuis une surface supérieure de ladite base et peut se verrouiller avec un panneau latéral correspondant de ladite pluralité de panneaux latéraux au niveau d'une région centrale de fond dudit panneau latéral correspondant, pour générer un moment de résistance à l'affaissement suffisamment élevé,

caractérisé en ce qu'au moins l'un de ladite pluralité de panneaux est détachable de ladite base, et **en ce que** ladite partie verrouillable comprend une première surface (4) qui peut s'engager avec un montant (31) du panneau latéral correspondant (12, 16), et des deuxième et troisième surfaces coïncidentes s'étendant dans deux directions différentes, respectivement, qui peuvent s'engager et sont complémentaires avec deux bords, respectivement, du panneau latéral correspondant, pour empêcher le désengagement du panneau latéral correspondant de la base soit pendant un mouvement longitudinal relatif soit pendant un mouvement vertical relatif, où un mouvement longitudinal est un mouvement qui a lieu sur la longueur dudit panneau latéral ; où la troisième surface est un bord vertical (14) d'une face externe rectangulaire de la colonne centrale (2) et la deuxième surface est un bord horizontal (21)

faisant saillie à partir de la troisième surface, et où la partie verrouillable est configurée sous forme d'une tête en forme de champignon (9) ayant une surface supérieure qui se courbe longitudinalement à partir de la première surface (4) dans deux directions opposées jusqu'à ce qu'elle coïncide avec une deuxième surface correspondante pour définir un bord pointu (11), ladite tête en forme de champignon pouvant se verrouiller avec un bord épaissi complémentaire (28) d'une zone de vide formée dans le panneau latéral correspondant.

2. Bac de stockage pour charges lourdes selon la revendication 1, dans lequel la partie verrouillable est coplanaire avec la face externe rectangulaire (13) de la colonne centrale correspondante (2) qui s'étend verticalement à celle-ci depuis la surface de base supérieure et qui est considérablement plus mince qu'une épaisseur de colonne centrale.
3. Bac de stockage pour charges lourdes selon la revendication 1, dans lequel la pluralité de colonnes comporte une pluralité de colonnes cornières (3) entre deux desquelles une ou plusieurs des colonnes centrales est/sont interposée(s), chacune desdites colonnes cornières est configurée avec un évidement avec lequel peut se verrouiller une saillie s'étendant longitudinalement du panneau latéral correspondant.
4. Bac de stockage pour charges lourdes selon la revendication 3, dans lequel chacune des colonnes cornières (3) est configurée avec une surface horizontale coplanaire avec la surface supérieure de base, une saillie supérieure faisant face à une colonne centrale adjacente (2) et présentant une surface de contre-dépouille qui est parallèle à, et plus courte que ladite surface horizontale, et une surface verticale s'étendant entre lesdites surfaces horizontale et de contre-dépouille.
5. Bac de stockage pour charges lourdes selon la revendication 1, dans lequel une crête (96) faisant saillie depuis la surface de base supérieure peut être reçue par engagement dans une cavité complémentaire (97) formée au niveau d'une extrémité orientable au fond du panneau latéral correspondant (12, 16), pour limiter le mouvement du panneau latéral correspondant lorsqu'il est mis en position droite.

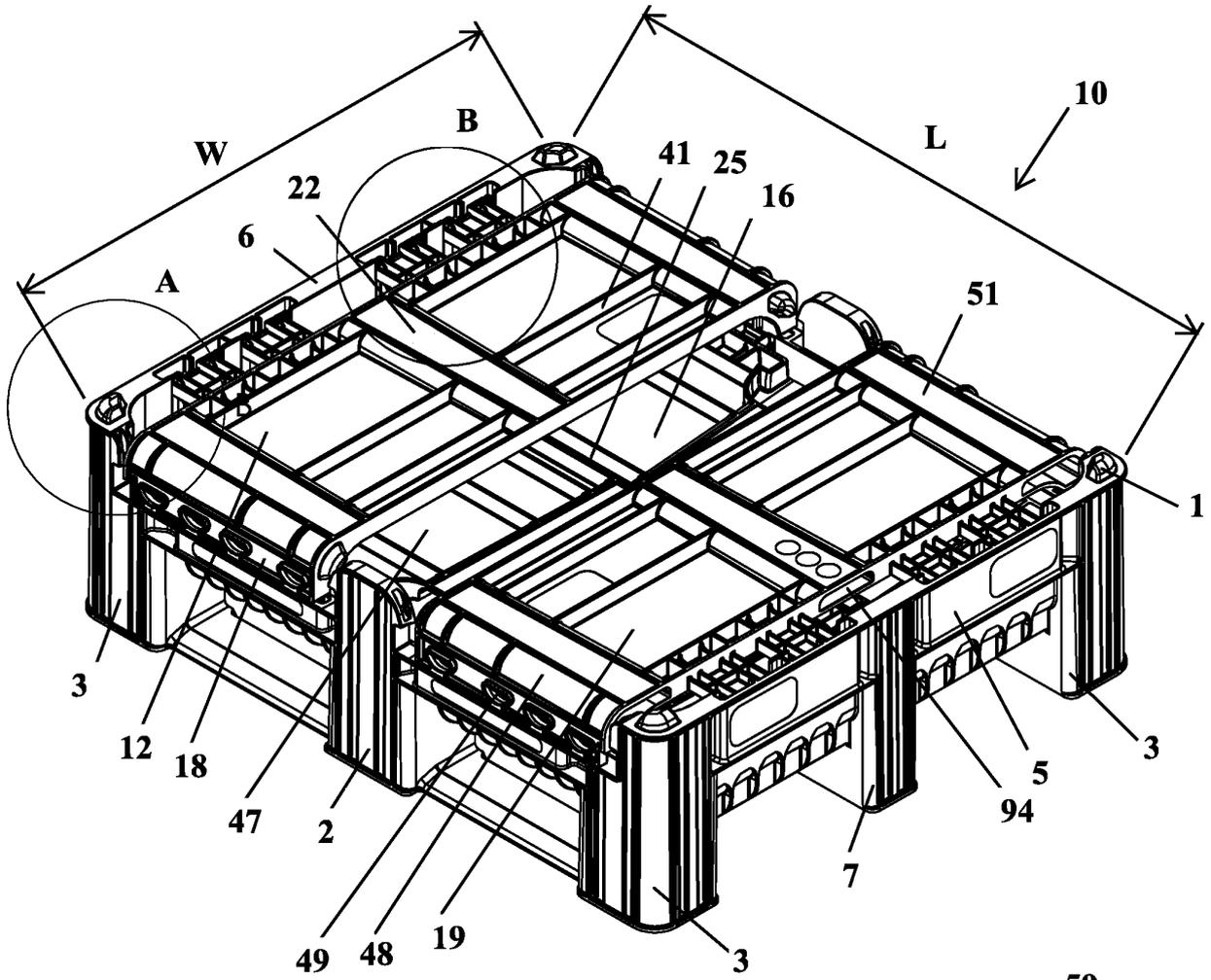
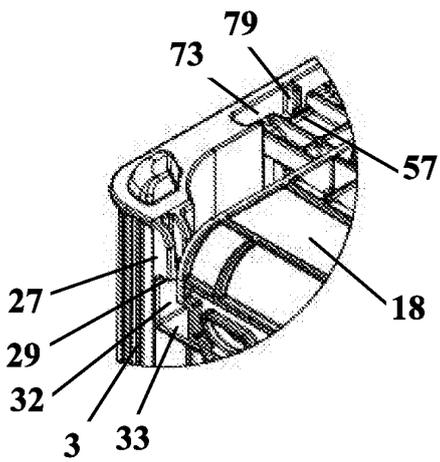
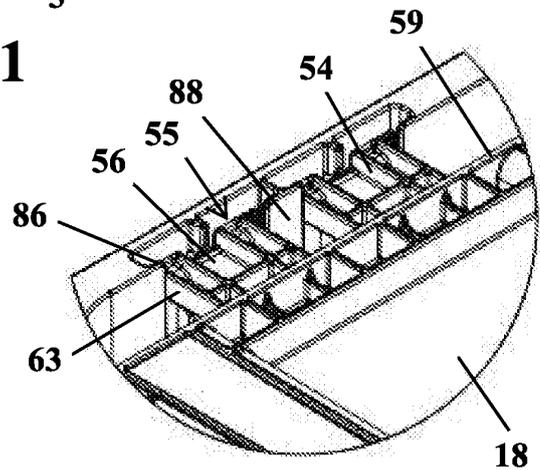


Fig. 1



Detail A

Fig. 2A



Detail B

Fig. 2B

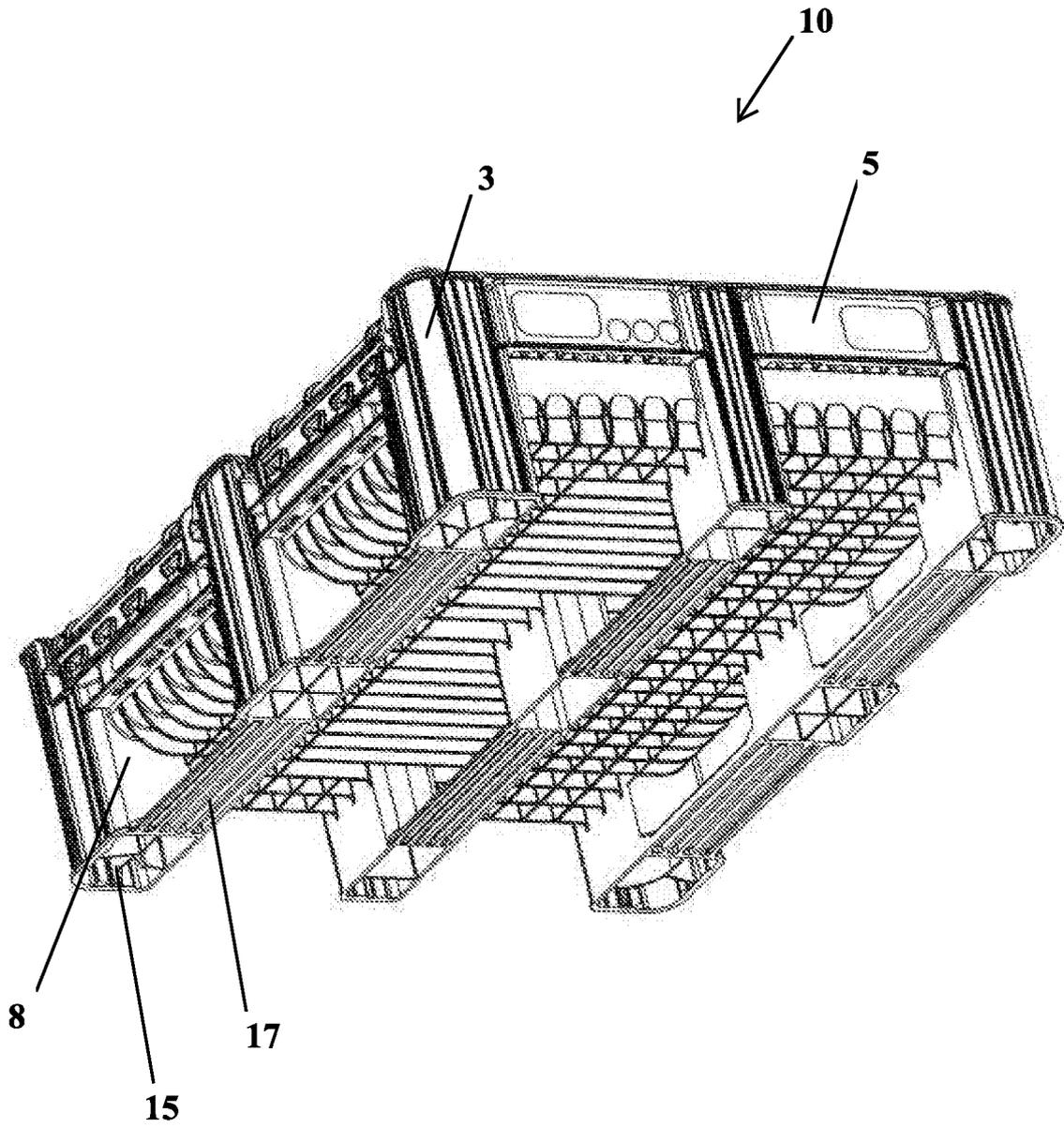


Fig. 3

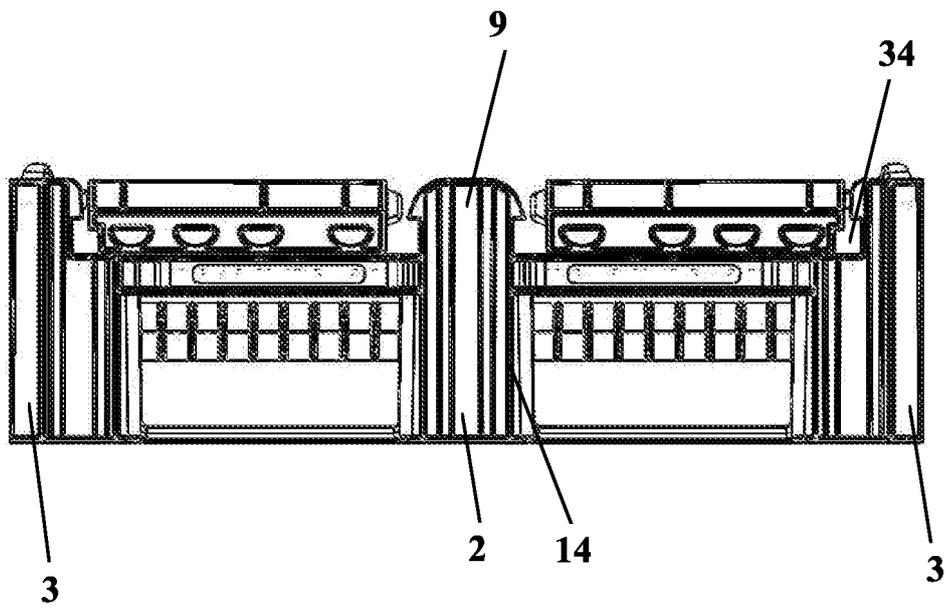


Fig. 4

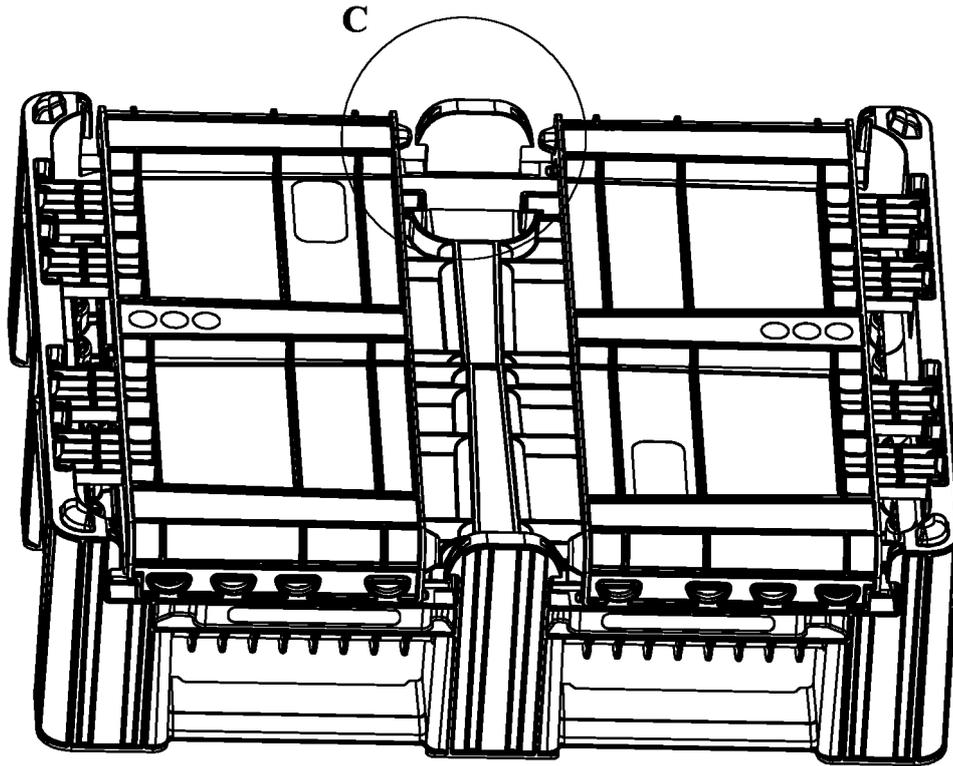
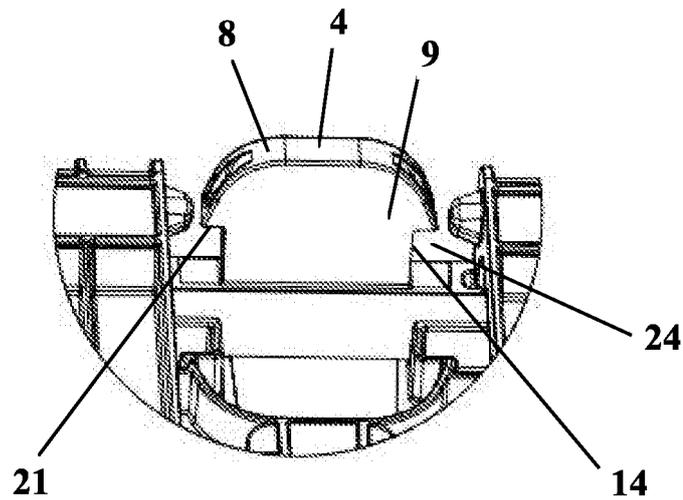


Fig. 5A



Detail C
Fig. 5B

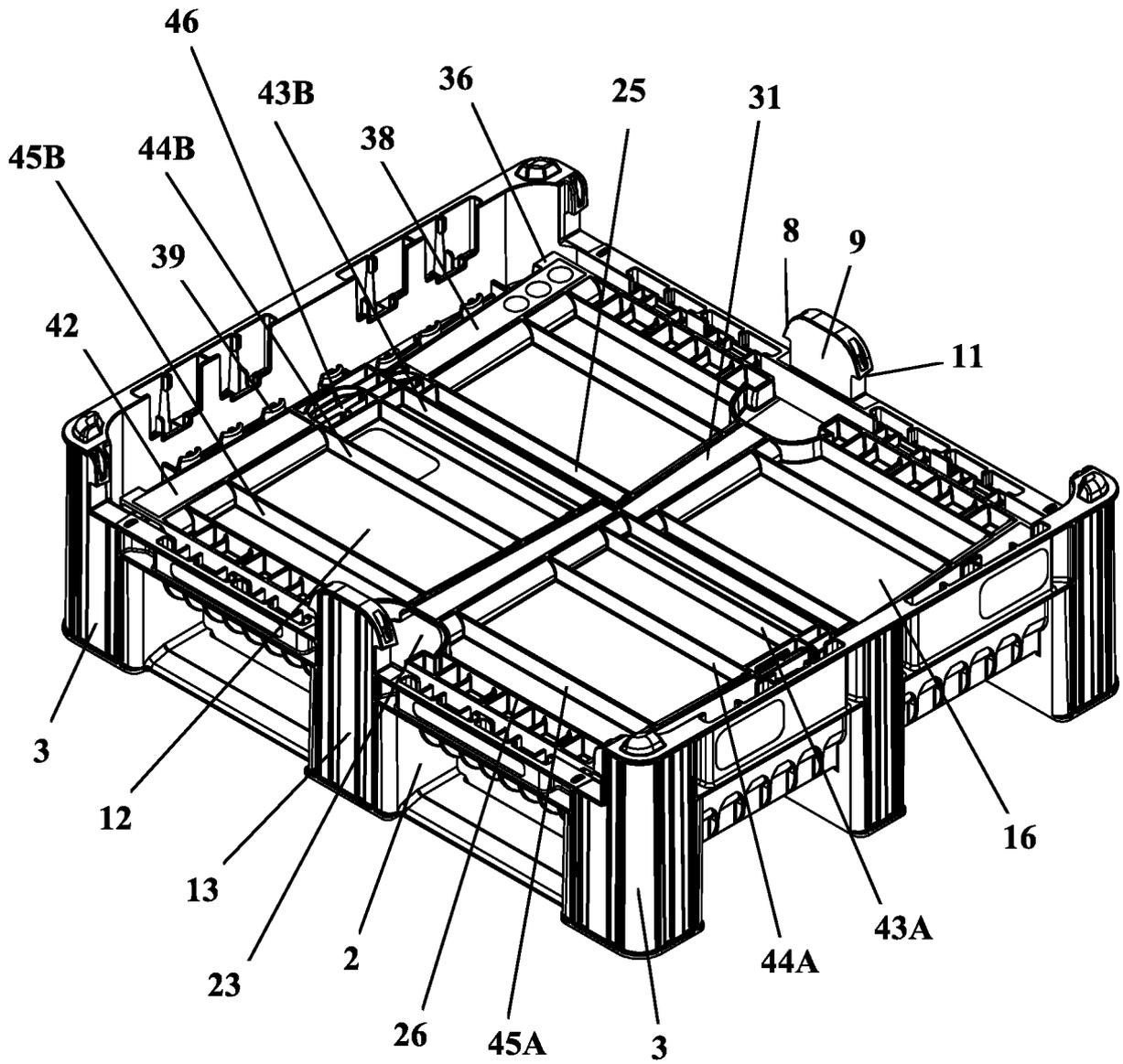


Fig. 6

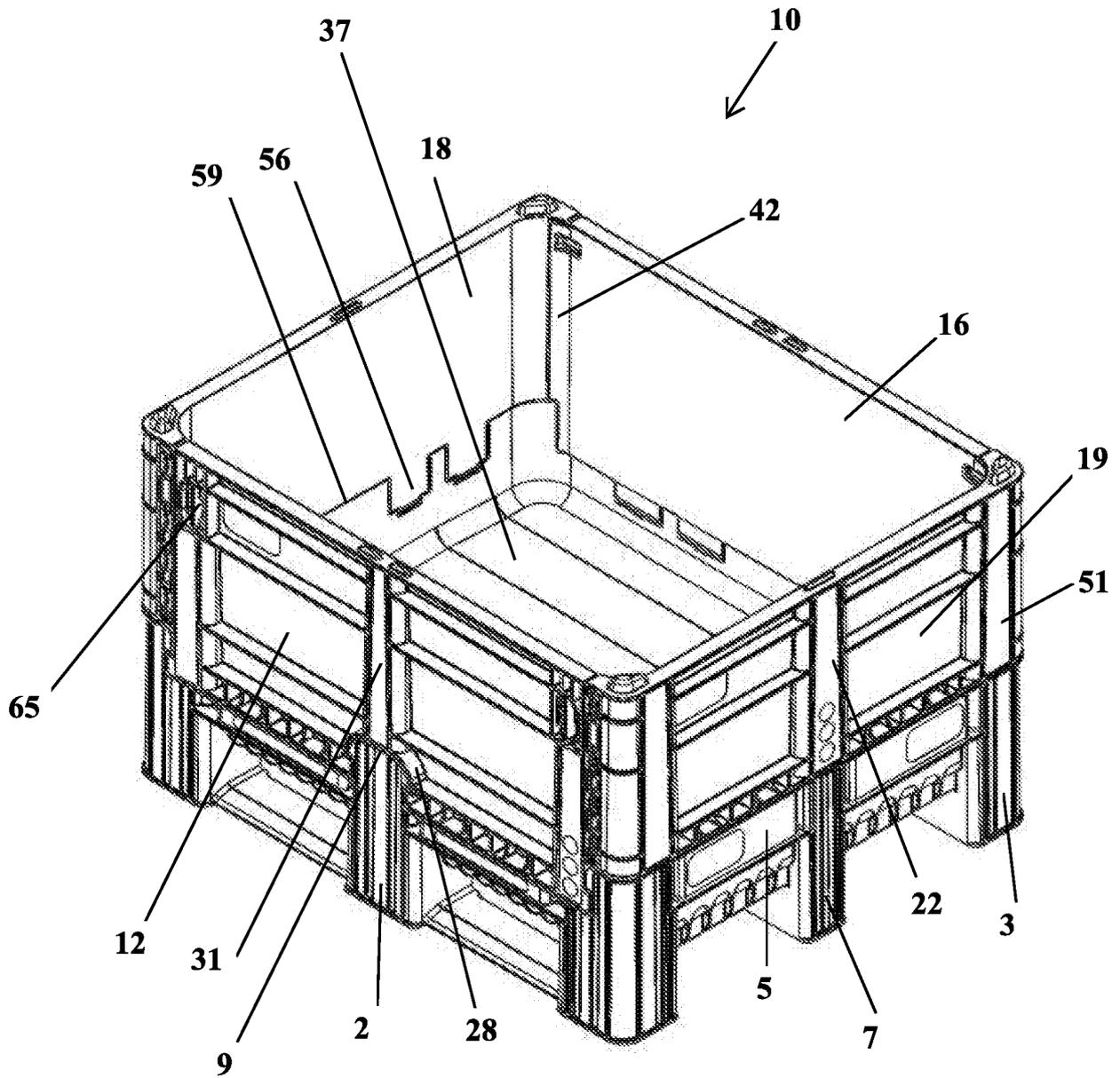


Fig. 7

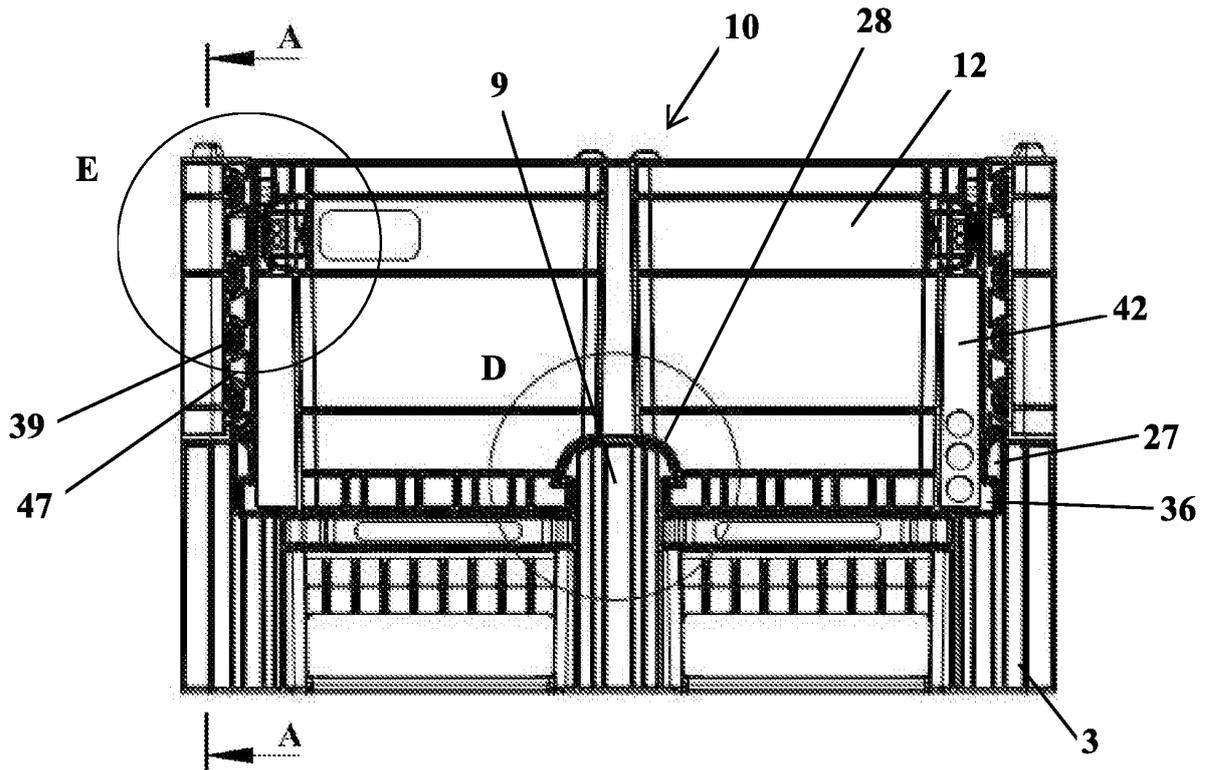
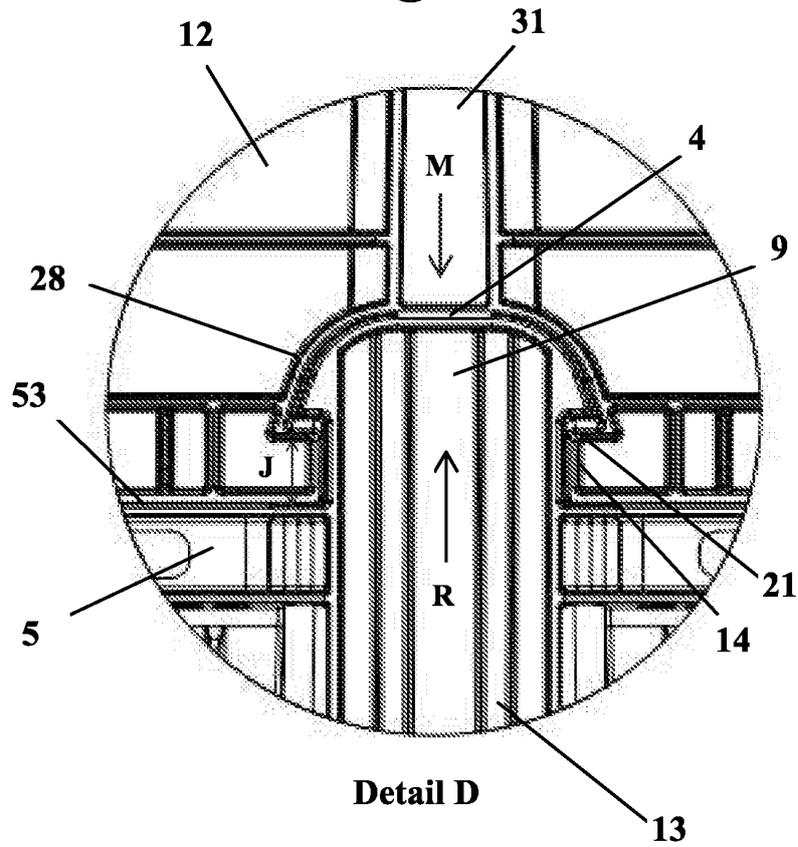
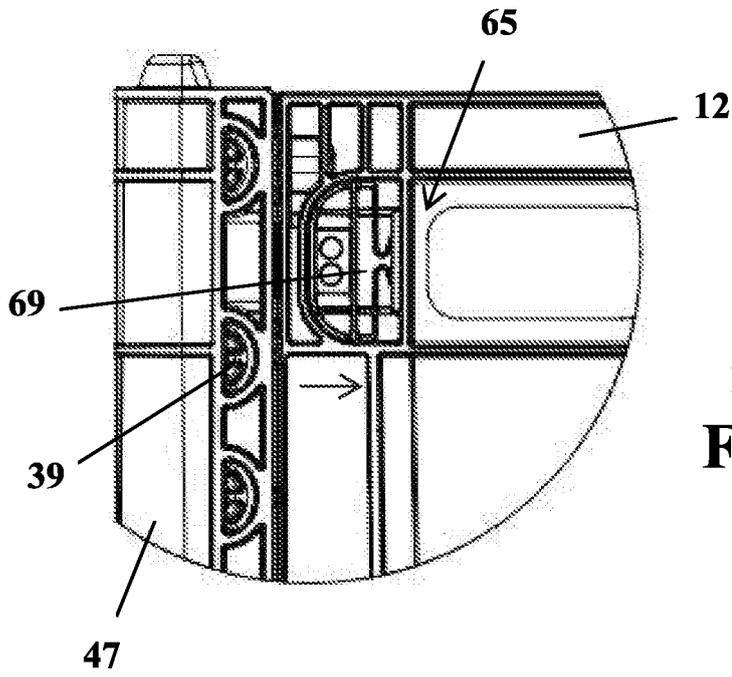


Fig. 8



Detail D

Fig. 9A



Detail E
Fig. 9B

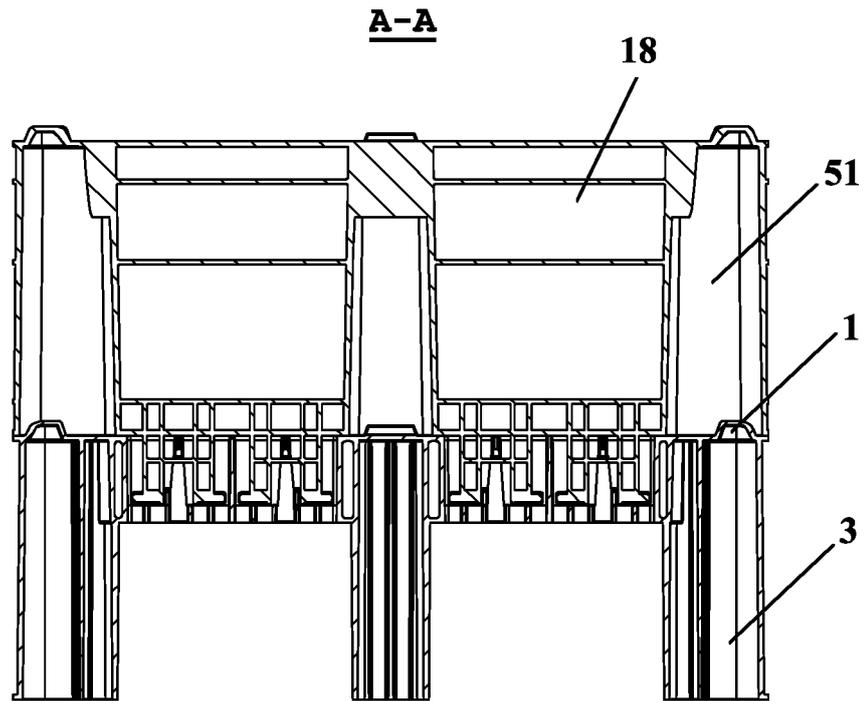


Fig. 10

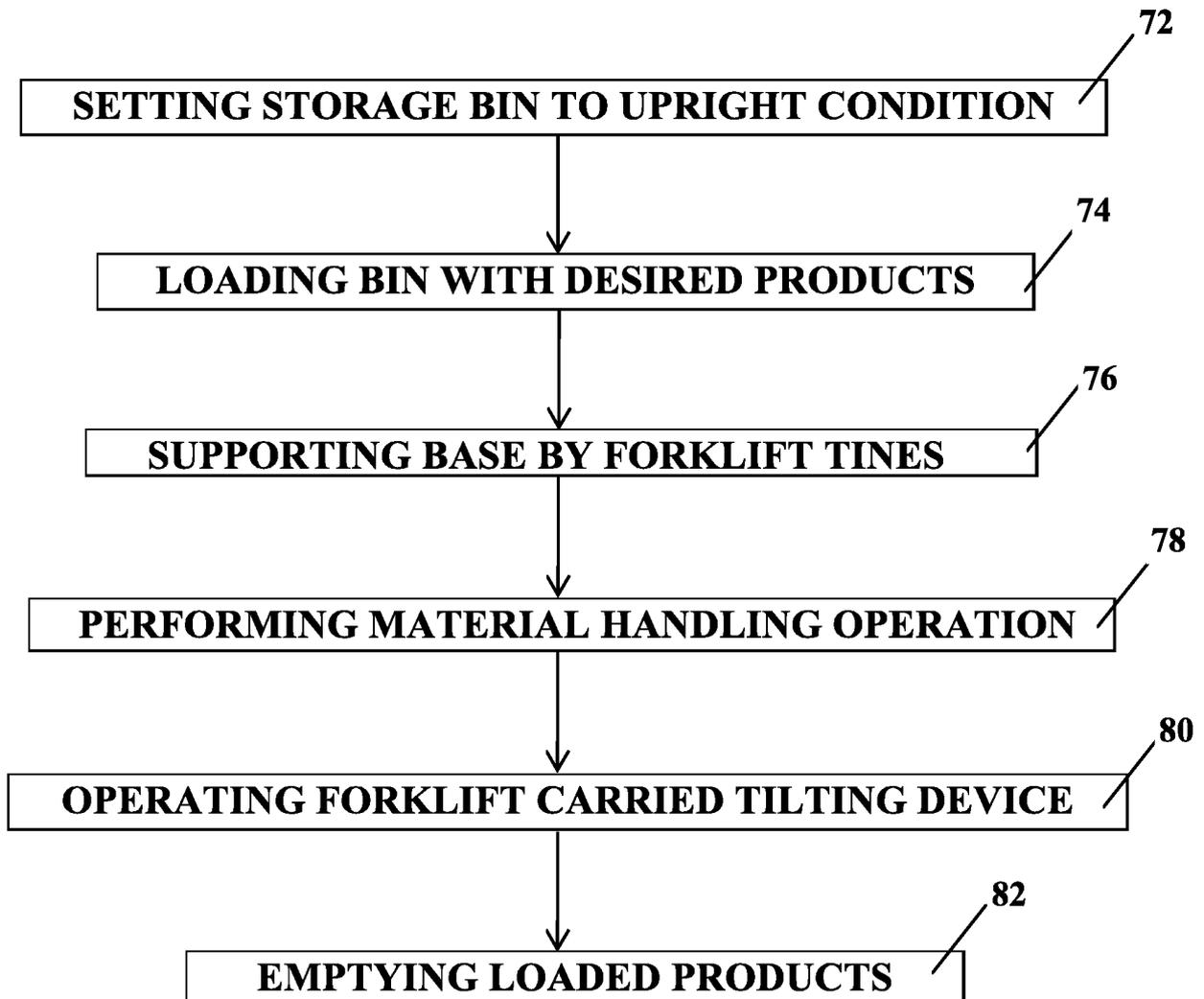


Fig. 11

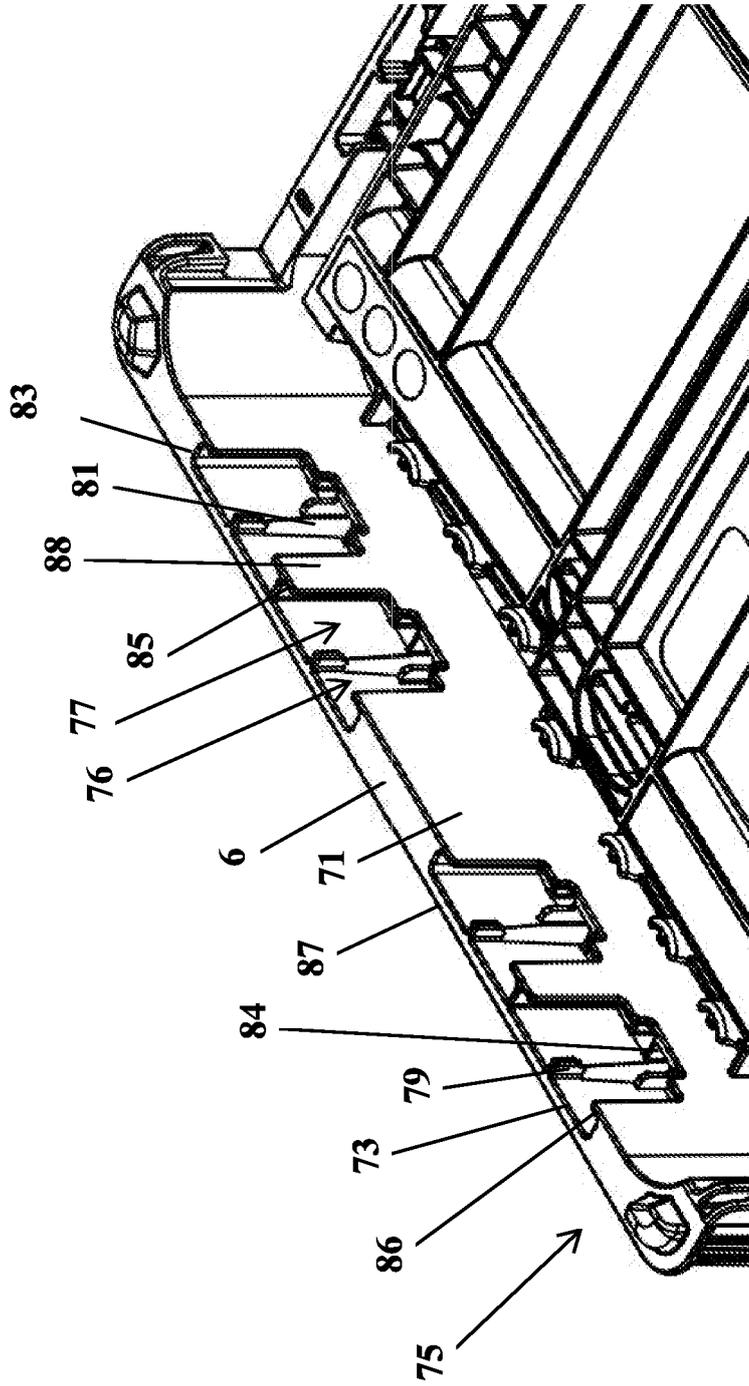


Fig. 12

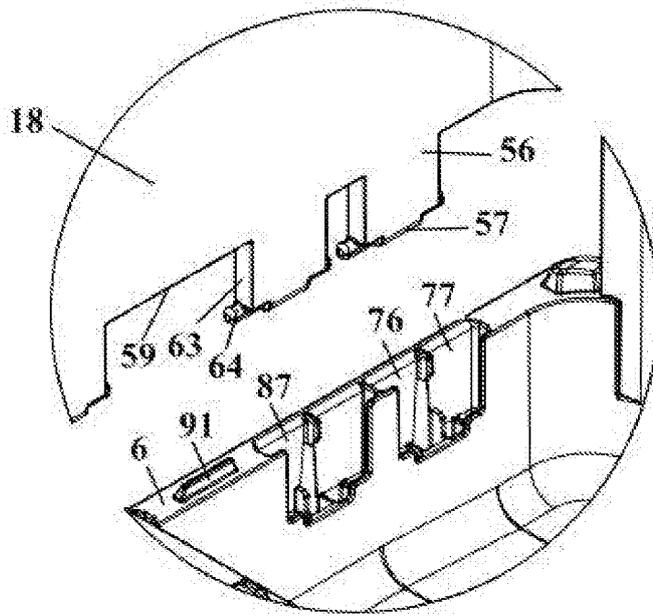


Fig. 13

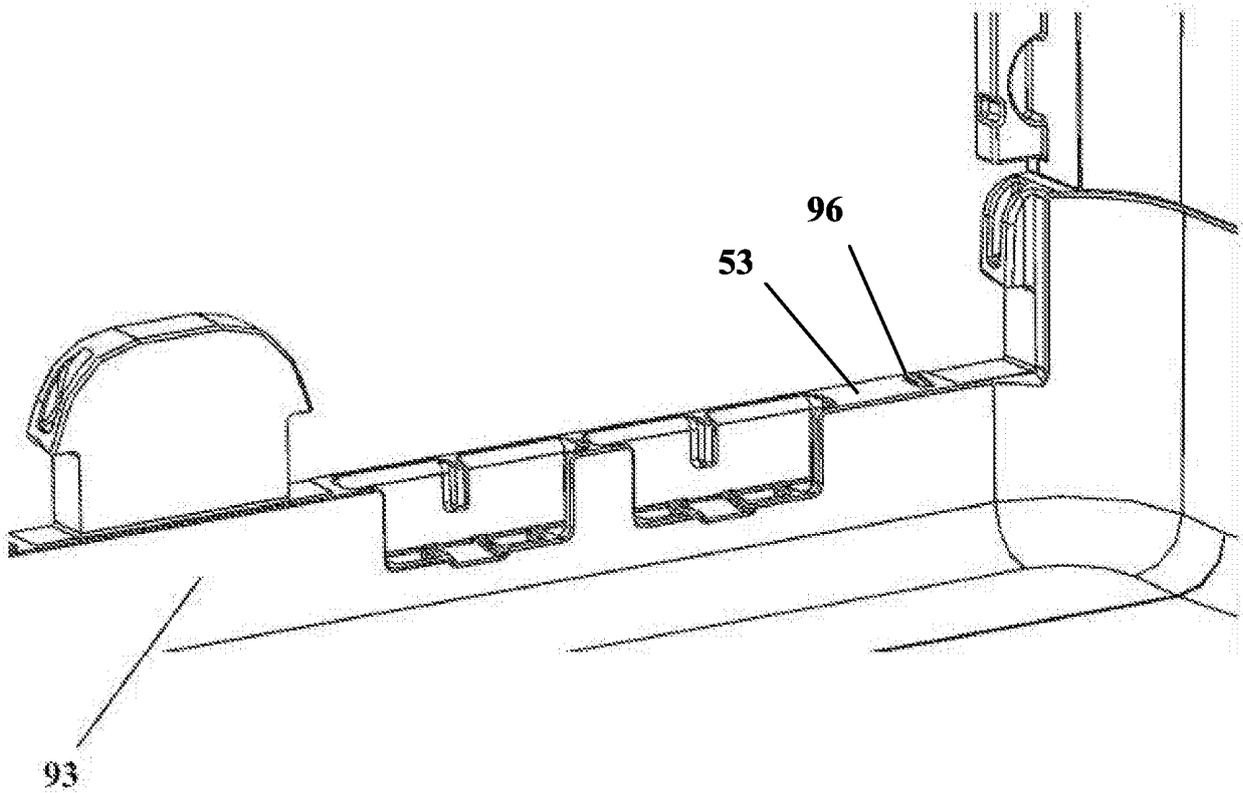


Fig. 14

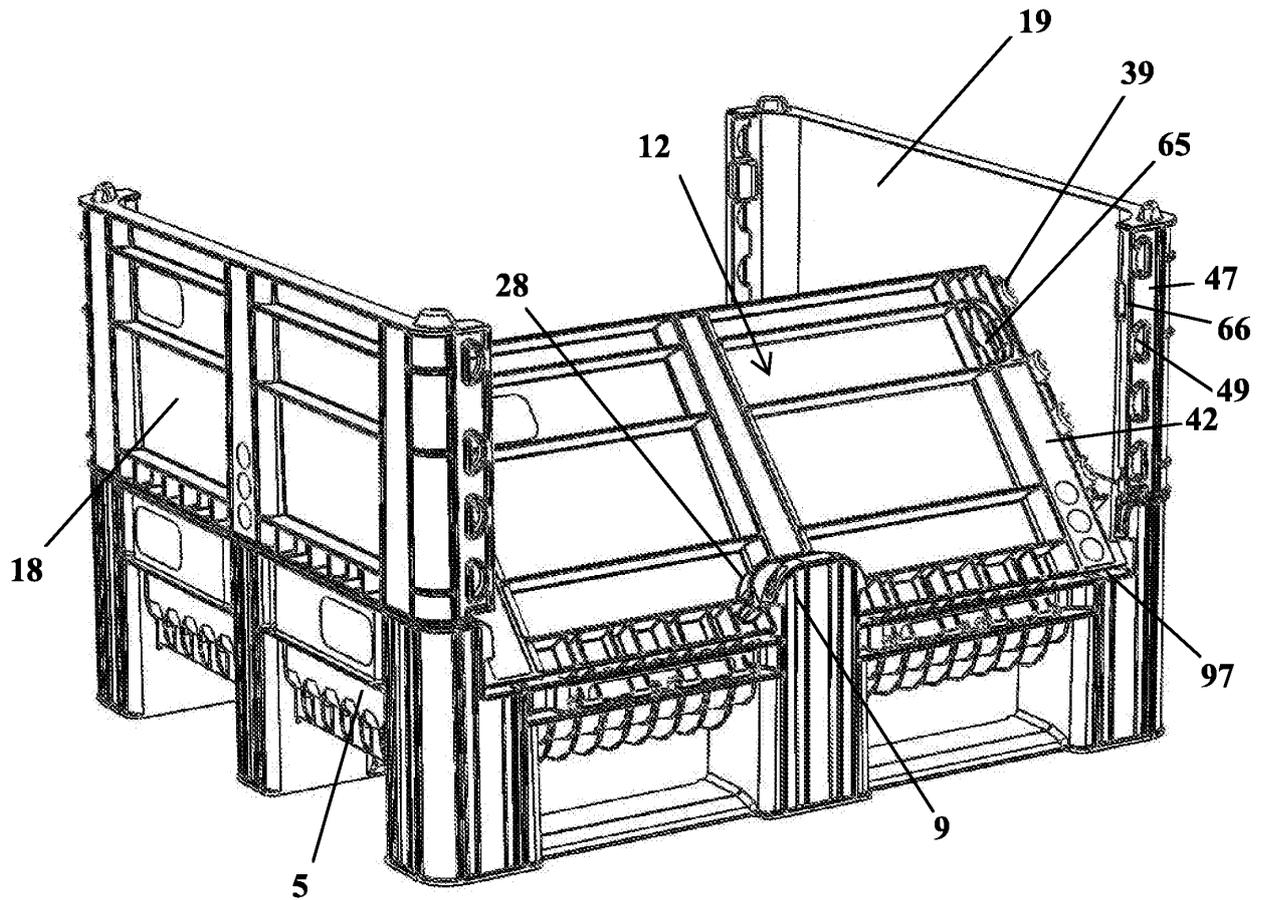


Fig. 15

REFERENCES CITED IN THE DESCRIPTION

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