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Amended claims in accordance with Rule 137(2) EPC.

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(54) **DISMOUNTABLE AND STACKABLE CRATE**

(57) The invention relates to a disassemblable and stackable crate comprising two longitudinal members (1, 1') opposite one another; two end members (2, 2') opposite one another; a bottom (3) and four blocks (4), each of which comprises at least one inner face (42) and two outer faces (43); and wherein the inner face (42) of each block (4) in turn comprises at least two elongated mounting holes (4a), where each of the elongated mounting

holes (4a) dimensionally corresponds with tabs (1a, 2a) of the sides (1, 1', 2, 2'); and wherein said tabs (1a, 2a) of each longitudinal member (1, 1') and each end member (2, 2') are coupled in the elongated mounting holes (4a) of the blocks (4) without needing to bend them, such that each block (4) is located outside the perimeter defined by the sides (1, 1', 2, 2').

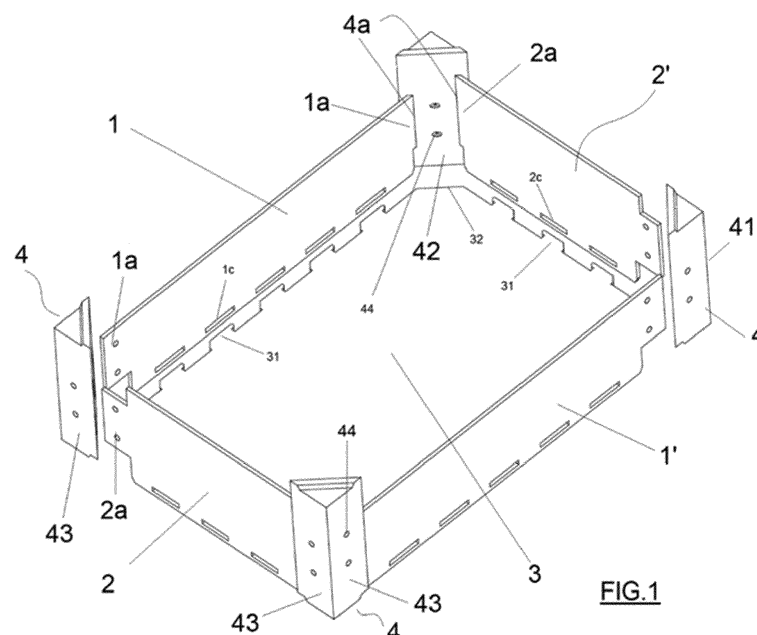


FIG.1

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Description

TECHNICAL FIELD

[0001] The present invention relates to a crate of the type built primarily from wood or MDF (medium density fiber boards) or a combination of both and sometimes from metal, with the particularity that no metal component can touch the contents.

PRIOR ART

[0002] For packaging any type of fruit and vegetable products there are cardboard box solutions that are particularly cost-effective, but they have the drawback of being extremely sensitive to moisture conditions, so to prevent them from degrading the cardboard is usually coated with plastic, making the product more expensive. In addition, to achieve a strong assembly, it is necessary to use an adhesive between the different portions making up the crate, making it necessary to use additional gluing means.

[0003] There are also crate solutions manufactured in wood or wood byproducts, such as plywood boards, medium density fiber boards or other similar types, which are formed by parts fastened to one another by means of stapling, where devices and accessories are required for stapling the crates. Furthermore, crate assembly requires heavy machinery, so the crate must necessarily be assembled in a factory; therefore even the empty crates have to be transported in their assembled position, taking up a lot of space. In the case of stapled solutions, the metal staples used are additionally bad for recycling and easily rust, and they are looked down upon or outright prohibited on many markets due to their contact with foods.

[0004] Patent document WO 2008/071813 partly solves these problems, disclosing a crate the contour of which is formed by side parts and end parts corresponding, respectively, with the larger sides and smaller sides of the rectangle forming the crate. The smaller sides have hooks coupled to blocks forming the corners of the crate. Nevertheless, in this document the blocks have wedges housing the tabs for defining the hooking members of the sides. This structure weakens the assembly, because the hooking members, according to their own definition, are configured as very weak hooks, so minimal lateral movements can lead to the hooking members breaking. Furthermore, since the outer faces have an irregular surface, these fastening elements easily break when the crates are palletized and in contact with other crates due to the dynamic loads produced by the movements generated during transport.

[0005] In addition, this structure, and due to the configuration of the blocks, makes it very difficult to stack the crates because the contact surface on the face upper of the blocks is very small.

[0006] Patent document WO 2009/060109 is also

known, which attempts to solve stacking problems in crates of this type. In fact, a structure that allows stacking a large quantity of crates to save in storage surface is sometimes needed, for which purpose this patent document defines a prolongation of the blocks or corner parts of the crates. Nevertheless, the simple prolongation, without any additional attachment means, means that the entire load is supported only on the upper surface of the block, and that for efficient vertical stacking, the crates must be perfectly aligned because otherwise they will break due to a poor load distribution.

[0007] Finally, patent document EP 2 604 541 describes a packaging or crate without blocks or corner parts which naturally have structural problems when stacking, because the load falls to the sides and the bottom of the crate, making these elements load-bearing elements when the crates are stacked vertically. Nevertheless, crates of this type have a number of elements projecting from the bottom and the sides, causing the crates to move, vibrate and ultimately break during stacking.

[0008] Generally the mentioned patent documents have two essential technical problems:

- a) During their manufacture, and so that all the parts fit together correctly, there is no choice but for the mechanical tolerances to be small, so the parts making up the crates have to be cut with precision systems (for example, by means of laser cutting), making their manufacturing process more expensive.
- b) In vertical stacking, and when they are handled, particularly when the crates are palletized for transport, the crates bounce up and down, can be subjected to sudden movements, or they simply are not correctly aligned, causing the fastening elements to break.

[0009] This last problem means that the crates are subjected to more stress than what was calculated during the design, meaning that they can even break. Furthermore, most crates have a number of protrusions which magnifies the stacking problem, making vertical stacking much more difficult and the crate easier to break (break is to be interpreted as not only breaking *per se*, but also the crate becoming out-of-square).

DISCLOSURE OF THE INVENTION

[0010] The object of the present invention is a disassemblable and stackable crate comprising four triangular blocks forming the corners of the crate, having a conventional rectangular structure, with two larger sides (referred to as longitudinal members) and two smaller sides (referred to as end members) each one being individually attached to each block, in addition to a board forming the bottom of the crate. In the present description, the terms "sides" and "walls" correspond with the assembly formed by the two longitudinal members and the two end mem-

bers, i.e. the assembly of the sides forming the crate.

[0011] As mentioned, the blocks have a triangular configuration, and preferably a right isosceles triangular configuration (i.e. with one right angle and the two sides forming the catheti of the triangle equal). In the present description, it is understood that any reference to the "triangle" of the block must be understood as referring to the triangular configuration of the block. Therefore, the hypotenuse of the triangle refers to the larger side of the triangle forming the configuration of the block and is perpendicular to the diagonal of the crate joining the right angles of two opposite blocks. Therefore, it can also be understood that the hypotenuse of the block is the inner face of the block, whereas the catheti of the block, therefore, are the sides or outer faces of each of the blocks.

[0012] The inner face of the block comprises respective slots or elongated mounting holes, one for housing the adjacent longitudinal member and the other one for housing the adjacent end member. The lateral tabs of the longitudinal members and end members will be housed in the slots, and more slots or elongated mounting holes can be provided depending on the number of parts that are going to form the longitudinal member or the end member. This structure therefore means that the blocks are located outside the perimeter defined by the sides, unlike in the crates known in the current state of the art. As a result of this structure, therefore, the attachment zones between longitudinal member and end member are being protected.

[0013] The following is achieved as a result of this structure: (i) the use of staples for fastening the crate is avoided; and (ii) the crate is structurally reinforced because the block prevents the sides from opening (i.e. from coming out-of-square) since they are inserted inside each block.

[0014] In addition, another object of the invention is that the disassemblable crate object of the present invention is readily stackable. To that end, the block comprises a recess in the upper and lower faces of the blocks, where said recesses are complementary to one another, such that when the crates are stacked one on top of the other, the blocks fit together perfectly. Likewise, these recesses have inclined walls, thereby making it easier to stack the crates and providing better positioning. Furthermore, this system stacking is complemented with bevels made in the lower corners of the sides, forming a type of false trapezoid. It must furthermore be noted that the length of the blocks is greater than the height of the sides, so neither the bottom nor the sides of the crate are in contact with the sides or bottom of the crate immediately above or below it. With this structure, the contact surface in the blocks increases and allows the weight of the crates to be transmitted directly to the ground through the blocks, which act like columns or posts of any structure, without the walls or the bottom of the crate having to contribute in any way for that purpose, as indicated.

[0015] One object of the invention is for the crate to be readily assemblable and disassemblable. To that end,

there are two main and two secondary assembly directions, a pair of blocks from opposite corners being assembled first, an intermediate point being found with the other pair of blocks. Therefore, the assembly direction coincides with the longitudinal member and end member bisector.

[0016] Furthermore, in order to make said assembly easier, the bottom of the crate comprises a plurality of retaining bayonet-type fasteners in each of its sides, the bayonet-type fasteners being oriented towards the primary assembly directions.

[0017] Finally, the bottom of the crate has retaining faces in the corners. These retaining faces (having a beveled shape) abut with the inner wall of the block, such that when the crate is assembled they help to prevent the crate from becoming disassembled, unlike conventional crates, in which the bottom is assembled on a plane under the block, which has the drawback of turning the bottom into a load-bearing element when stacked, weakening the structure thereof in the long-term.

[0018] In conclusion, all the indicated elements, regardless of their particular advantages and technical effects, synergistically contribute to maintaining the isostatic properties of the crate once it is assembled, both considering the crates individually and stacked vertically. Therefore, the position of the blocks, the inclusion of longitudinal members and end members in slots made therein, combined with the recesses, and also the mentioned structural configurations make assembly and use of the crate of the invention more advantageous than what is described in the prior art.

[0019] Throughout the description and claims the word "comprises" and variants thereof do not intend to exclude other technical features, additions, components or steps. For those skilled in the art, other objects, advantages and features of the invention will be deduced in part from the description and in part from putting the invention into practice. The following examples and drawings are provided by way of illustration, and they are not intended to restrict the present invention. Furthermore, the present invention covers all the possible combinations of particular and preferred embodiments herein indicated.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] A set of drawings that help to better understand the invention and expressly related to an embodiment of said invention, presented as a non-limiting example thereof, are very briefly described below.

Figure 1 shows an exploded view of the disassemblable and stackable crate object of the present invention, showing its main elements.

Figure 2 shows a plan view of the crate of the Figure 1, in which the assembly directions of the crate object of the invention are indicated.

Figure 3 shows a detail view of the attachment of the longitudinal members with the blocks of their respective corners and the bottom of the crate object of the invention.

Figure 4 shows a detail view of the attachment of the end members with the blocks of their respective corners and the bottom of the crate object of the invention.

Figure 5 shows a perspective view of two vertically stacked crates according to what is proposed by the present invention.

Figure 6 shows a detail view of the blocks of the vertically stacked crates, as shown in Figure 5.

PREFERRED EMBODIMENT OF THE INVENTION

[0021] As can be seen in the attached drawings, the crate object of the present invention has a rectangular configuration that is conventional in products of this type and comprises two longitudinal members (1, 1') opposite one another; two end members (2, 2') opposite one another; a bottom (3) and four blocks (4) located in each of the corners forming the crate.

[0022] Each of the blocks (4) has a triangular configuration, specifically a right isosceles triangle in the preferred embodiment. Therefore, each block (4) comprises a vertex (41), an inner face (42), and two outer faces (43), wherein said faces (42, 43) correspond respectively with the projection of the hypotenuse and of the catheti of the triangle forming the configuration of the block (4).

[0023] In the inner face (42) of each block (4) there are two elongated mounting holes (4a) perpendicular to one another, wherein each elongated mounting hole (4a) dimensionally corresponds with tabs (1a, 2a) of the sides (1, 1', 2, 2') of the crate.

[0024] Therefore, the tabs (1a, 2a) of each longitudinal member (1, 1') and each end member (2, 2') are coupled in the elongated mounting holes (4a) of the blocks (4). The elongated mounting holes (4a) are therefore defined as slots configured for coupling the tabs (1a, 2a) of each side (1, 1', 2, 2').

[0025] To correctly fit into the elongated mounting holes (4a) of the blocks (4), the tabs (1a, 2a) have a length (1x, 2x) that is less than the length of the outer faces (43) of the blocks (4). Likewise, the height (1y, 2y) of the tabs (1a, 2a) in this particular embodiment is about equal to or greater than half the height of the corresponding longitudinal members (1, 1') or end members (2, 2'). In any case, it must be taken into account that the greater the height (1y, 2y) of the tab (1a, 2a), the larger the contact surface with the block (4), and therefore the better the features of the mentioned attachment.

[0026] With the described structure, the block (4) is located outside the perimeter defined by the sides (1, 1', 2, 2'), such that the generated walls provide better resist-

ance against stresses generated in the direction perpendicular to said walls.

[0027] The blocks comprise additional fastening means (44) essentially consisting in a mechanical element for fixing the position of the sides. Generally, these fastening means (44) consist of a plurality of through holes between the outer faces and the sides, in some cases being able to pass through to the inner face and in other cases the fastening elements being concealed by said inner face. These holes can be manufactured beforehand or they can be made at the same time the mechanical element is introduced, depending on the chosen solution. In another embodiment, it must also be possible for there not to be any holes, as in the case of metal nails. The main function of these fastening means (44) is to reinforce the isostatic properties of the crate once it is formed, preventing pressure from the products it houses from being able to actually separate the sides (1, 1', 2, 2') from their respective blocks (4).

[0028] In a particular embodiment, the blocks further comprise holes on their outer faces, perpendicular to them and passing through to the inner face, coinciding with other holes on the sides, wooden adapter fittings being placed in these holes and thereby providing for a crate structured from a single type of material and being completely disassemblable.

[0029] As best seen in Figure 2, there are two primary assembly directions (200, 201) and two secondary assembly directions (202, 203). The assembly sequence begins by assembling two blocks (4) in opposite corners with their respective sides (1, 1', 2, 2'). Main direction (200) coincides with the bisector formed by the longitudinal member (1) and end member (2), and main direction (201) coincides with the bisector formed by the longitudinal member (1') and the end member (2'). At the same time, secondary direction (202) coincides with the bisector formed by the longitudinal member (1) and the end member (2'), and secondary direction (203) coincides with the bisector formed by the longitudinal member (1') and the end member (2). The crate object of the invention has the particularity of comprising a single assembly direction.

[0030] Furthermore, as can be seen in the different figures, the bottom (3) comprises a plurality of fastening elements (31) in the form of bayonet-type fasteners, coinciding in number with the slots (1c, 2c) of the longitudinal members (1, 1') and end members (2, 2').

[0031] These slots (1c, 2c) are configured as quadrangular openings aligned and parallel with the lower side of each of the longitudinal members (1, 1') and end members (2, 2'). The fastening elements (31) have the particularity that they have positioning walls parallel to the primary assembly direction (200, 201). Therefore, as best seen in Figure 2, the retaining fastening elements (31) of the first longitudinal member (1) are oriented towards one side in favor of primary assembly direction (200), whereas the retaining fastening elements (31) of the second longitudinal member (1') are likewise oriented in pri-

mary assembly direction (201), which in this case is the direction opposite the assembly of the first longitudinal member (1).

[0032] Likewise, the retaining fastening elements (31) of the first end member (2) are oriented in favor of assembly direction (200), whereas the retaining fastening elements (31) of the second end member (2') are likewise oriented in favor of assembly direction (201), and therefore in the direction opposite that of the retaining fastening elements (31) of the first end member (2).

[0033] This arrangement of the fastening elements (31) oriented in parallel with their assembly direction (200, 201) makes it easier to fix said elements (31) into the slots (1c, 2c), and once assembled, the forces that may be produced on one of sides are cancelled out or compensated for by the forces generated in the opposite direction on the opposite side, the assembly being kept static. Furthermore, and for the same reason, to make it easier to fit the fastening elements (31) in, each of said fastening elements (31) comprises a prolongation of the outer edge (31 a) configured for being housed in the slots (1c, 2c) of the longitudinal members (1, 1') and end members (2, 2').

[0034] Furthermore, the bottom (3) has retaining faces (32) coinciding with the inner walls (42) of the blocks (4) such that they abut with each of the blocks (4), also preventing the crate from becoming disassembled once it has been assembled due to the forces parallel to the bottom that may act on the crate. The lower corners of longitudinal members (1, 1') and end members (2, 2') are therefore beveled (1b, 2b) to also abut with the blocks (4).

[0035] Figures 5 and 6 show in detail the features that allow the crates object of the invention to be stackable in a very advantageous manner. Indeed, Figure 5 depicts two crates like those described for Figures 1 to 4, stacked vertically such that the load of the crates is transmitted directly and exclusively to the four blocks (4) forming the corners of the crates. This is a considerable advantage given that it prevents the sides (1, 1', 2, 2') or the bottom (3) of the crates from being subjected to a load when the crates are stacked. Indeed, the upper and lower faces of the blocks (4) comprise, respectively, an upper step (45) and a lower step (46), complementary to one another (see Figure 6) and wherein the outer face thereof is inclined to make it easier to stack the crates. Furthermore, the height of the block (4) makes it possible for neither the bottom (3) nor the sides (1, 1', 2, 2') to be in contact with the crate immediately above or below it, so loads are transmitted exclusively by the blocks (4) to the ground, like columns, thereby preventing the walls from bearing the load of the assembly.

[0036] Finally, as a result of the crate that has been described, according to the solution chosen for the assembly of blocks (4) and longitudinal members (1, 1') and end members (2, 2'), the assembly provides the possibility of readily assembling and disassembling the assembly.

Claims

1. A disassemblable and stackable crate comprising two longitudinal members (1, 1') opposite one another; two end members (2, 2') opposite one another; a bottom (3) and four blocks (4), each of which comprises at least one inner face (42) and two outer faces (43) and **characterized in that** the inner face (42) of each block (4) in turn comprises at least two elongated mounting holes (4a), where each of the elongated mounting holes (4a) dimensionally corresponds with tabs (1 a, 2a) of the sides (1, 1', 2, 2'); and where said tabs (1 a, 2a) of each longitudinal member (1, 1') and each end member (2, 2') are coupled in the elongated mounting holes (4a) of the blocks (4) without needing to bend them, such that each block (4) is located outside the perimeter defined by the sides (1, 1', 2, 2').
2. The crate according to claim 1, wherein the upper and lower faces of the blocks (4) comprise, respectively, upper stacking means (45) and lower stacking means (46), complementary and coupleable to one another, coinciding with the inner face of the block (4).
3. The crate according to claim 2, wherein the upper and lower stacking means (45 and 46) have an inclined outer face to make the stacking operation easier.
4. The crate according to any of the preceding claims, wherein the bottom (3) comprises a plurality of fastening elements (31) distributed around the perimeter and coinciding in number with slots (1 c, 2c) of the longitudinal members (1, 1') and end members (2, 2').
5. The crate according to claim 4, wherein each of the fastening elements (31) comprises a prolongation of the outer edge (31 a) configured for being housed in the slots (1 c, 2c) of the longitudinal members (1, 1') and end members (2, 2').
6. The crate according to any of claims 4 to 5, wherein the fastening elements (31) comprise a positioning face parallel to a primary assembly direction (200, 201).
7. The crate according to any of claims 1 to 6, wherein the lower corners of longitudinal members (1, 1') and end members (2, 2') are beveled (1b, 2b) for abutting with the blocks (4) such that it makes correct stacking of the upper crates easier.
8. The crate according to any of claims 1 to 7, comprising fastening means (44) located on the outer faces (43) of the blocks and passing through to the tabs of

the longitudinal members and end members.

Amended claims in accordance with Rule 137(2) EPC.

1. A disassemblable and stackable crate comprising:

four sides (1,1',2,2') consisting of two longitudinal members (1,1') opposite one another and two end members (2,2') opposite one another; a bottom (3); and four blocks (4) located in each of the corners forming the crate;

wherein each of the blocks (4) comprises a vertex (41), an inner face (42), and two outer faces (43), wherein said faces (42, 43) correspond respectively with the projection of the hypotenuse and of the sides of a triangle forming the configuration of the block (4);

characterized in that

the bottom (3) comprises a plurality of bayonet-type fastening elements (31) distributed around the perimeter of the bottom (3); wherein each fastening element (31) is correspondent with a slot (1c,2c) of the sides (1,1',2,2'); and wherein each slot (1c,2c) is configured as a quadrangular opening aligned in parallel with the lower side of each side (1,1',2,2'); and wherein each fastening element (31) comprises: a positioning wall parallel to a primary assembly direction (200,201) of the crate; and a prolongation of the outer edge (31a) configured for being housed in the slots (1c,2c) of the sides (1,1',2,2').

2. The crate of claim 1 wherein the inner face (42) of each block (4) there are two elongated mounting holes (4a) perpendicular to one another arranged as slots configured for coupling and fitting a corresponding tab (1a,2a) of each side (1,1',2,2'); and wherein each tab (1a, 2a) has a length (1x, 2x) that is less than the length of the outer face (43) of the corresponding block (4).

3. The crate of claim 1, wherein the upper and lower faces of each block (4) comprise, respectively, upper stacking means (45) and lower stacking means (46), complementary and coupleable to one another, coinciding with the inner face (42) of each block (4); wherein said upper and lower stacking means (45,46) have an inclined outer face; and wherein the lower corners of the sides (1,1',2,2') are beveled (1b, 2b).

4. The crate of claim 1 wherein the bottom (3) comprises retaining faces (32) coincident with the inner walls (42) of each block (4).

1. A disassemblable and stackable crate comprising:

four sides (1,1',2,2') consisting of two longitudinal members (1,1') opposite one another and two end members (2,2') opposite one another; a bottom (3); and four blocks (4) located in each of the corners forming the crate;

wherein each of the blocks (4) comprises a vertex (41), an inner face (42), and two outer faces (43), wherein said inner and outer faces (42, 43) correspond respectively with the projection of the hypotenuse and of the sides of a triangle forming the configuration of the block (4);

characterized in that

the inner face (42) of each block (4) there are two elongated mounting holes (4a) perpendicular to one another arranged as slots configured for coupling and fitting a corresponding tab (1a,2a) of each side (1,1',2,2'); and wherein each tab (1a, 2a) has a length (1x, 2x) that is less than the length of the outer face (43) of the corresponding block (4).

2. The crate of claim 1, wherein the upper and lower faces of each block (4) comprise, respectively, upper stacking means (45) and lower stacking means (46), complementary and coupleable to one another, coinciding with the inner face (42) of each block (4); wherein said upper and lower stacking means (45,46) have an inclined outer face; and wherein the lower corners of the sides (1,1',2,2') are beveled (1b, 2b).

3. A disassemblable and stackable crate comprising:

four sides (1,1',2,2') consisting of two longitudinal members (1,1') opposite one another and two end members (2,2') opposite one another; a bottom (3); and four blocks (4) located in each of the corners forming the crate;

wherein each of the blocks (4) comprises a vertex (41), an inner face (42), and two outer faces (43), wherein said inner and outer faces (42, 43) correspond respectively with the projection of the hypotenuse and of the sides of a triangle forming the configuration of the block (4);

and wherein the outer faces (43) of each block (4) are located outside the perimeter defined by the sides (1,1',2,2');

characterized in that

the bottom (3) comprises a plurality of bayonet-type fastening elements (31) distributed around the perimeter of the bottom (3); wherein each fastening element (31) is correspondent with a slot (1c,2c) of the sides (1,1',2,2'); and wherein each slot (1c,2c) is configured as a quadrangular opening aligned in parallel with the lower side of each side (1,1',2,2'); and wherein each fastening element (31) comprises: a positioning wall parallel to a primary assembly direction

(200,201) of the crate; and a prolongation of the outer edge (31a) configured for being housed in the slots (1c,2c) of the sides (1,1',2,2').

4. The crate of claims 1 or 3 wherein the bottom (3) comprises retaining faces (32) coincident with the inner walls (42) of each block (4).

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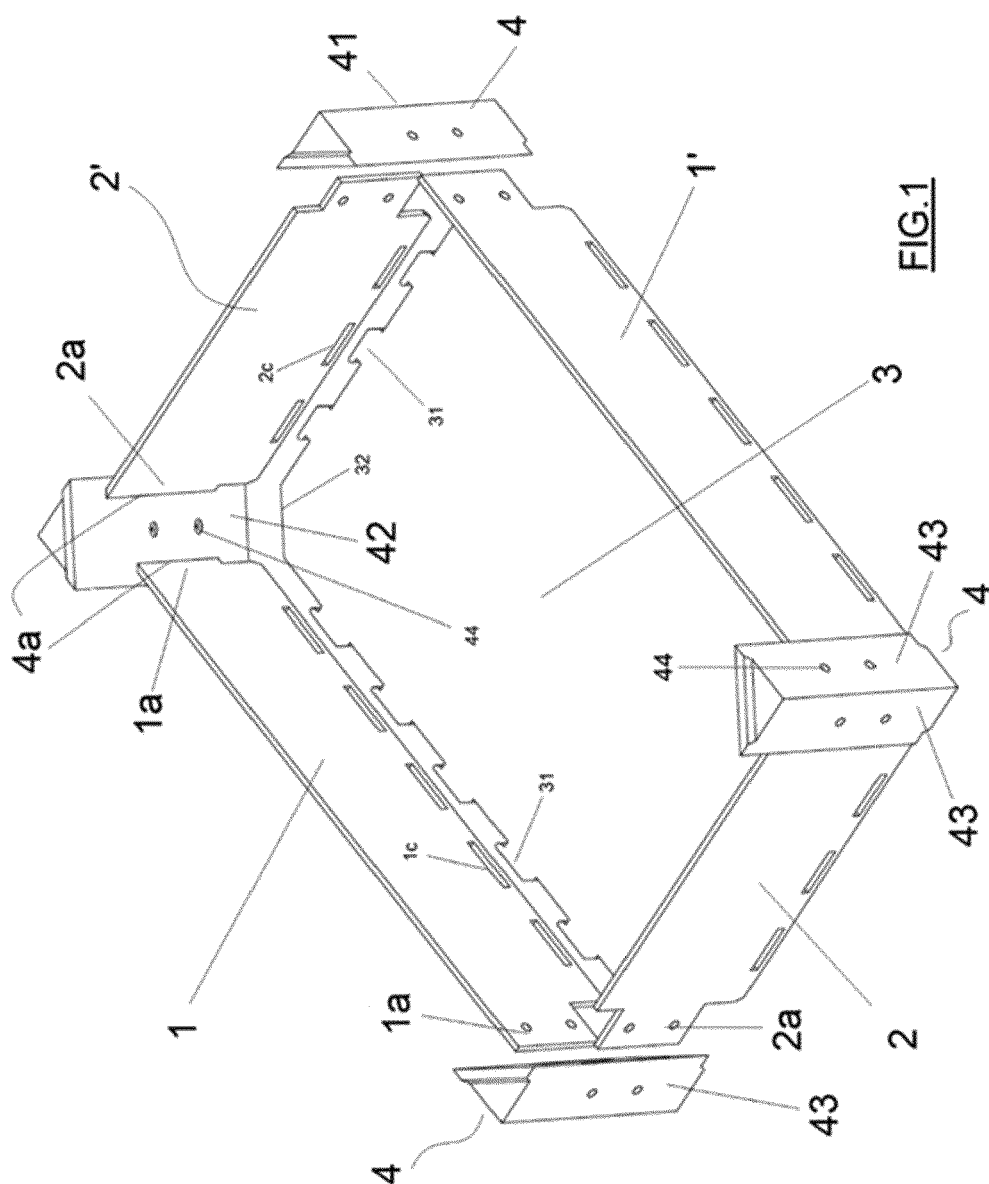
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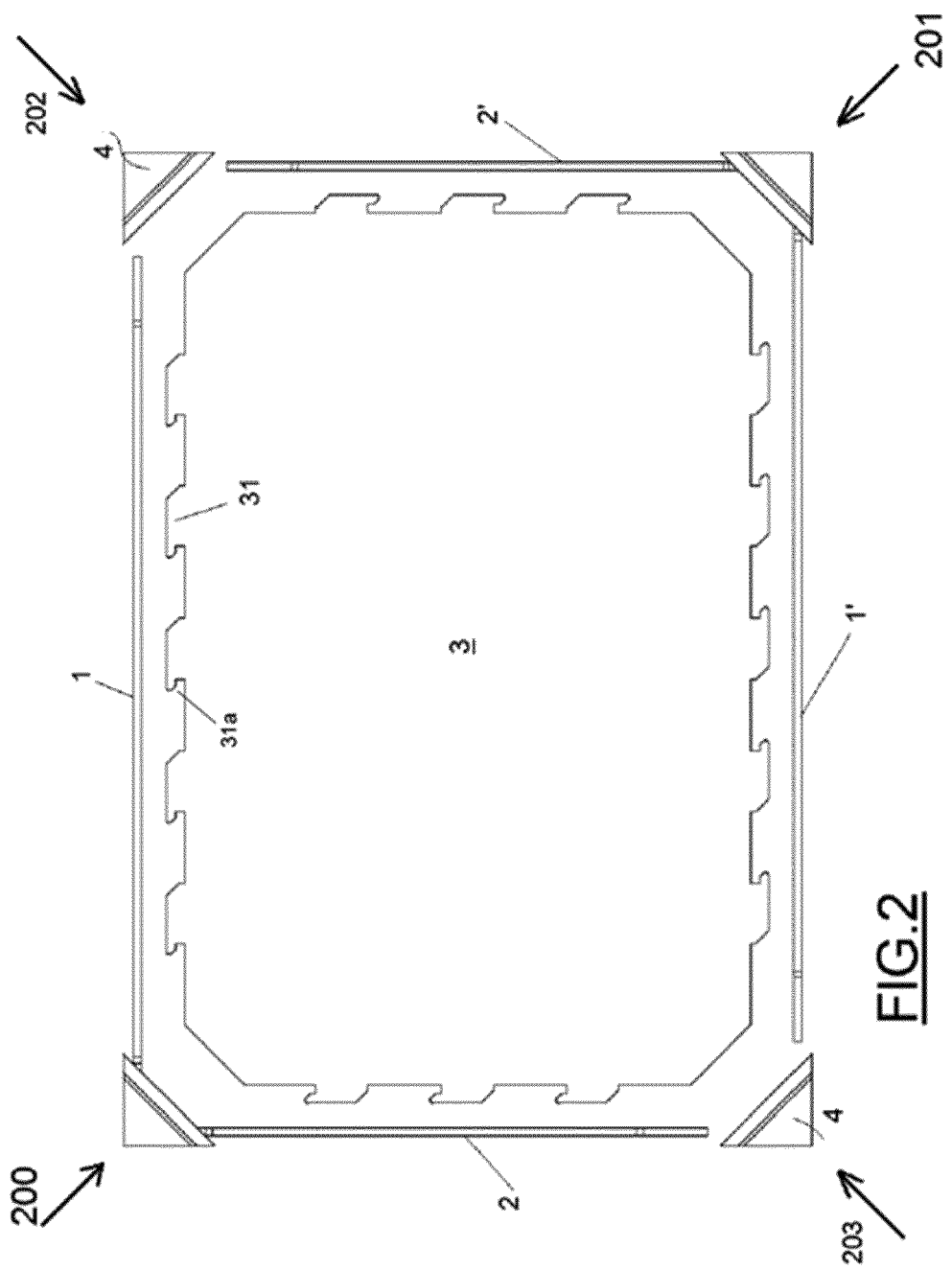
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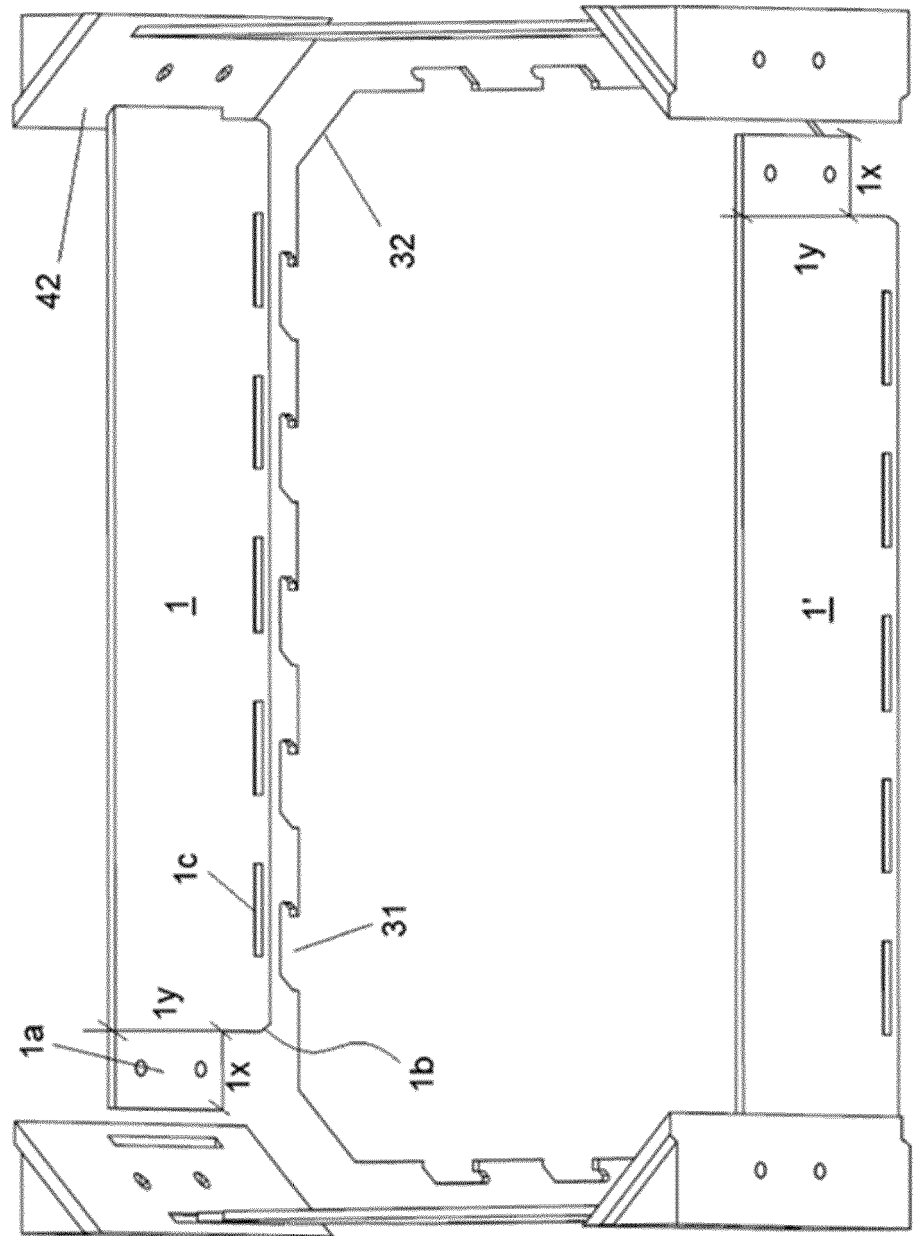
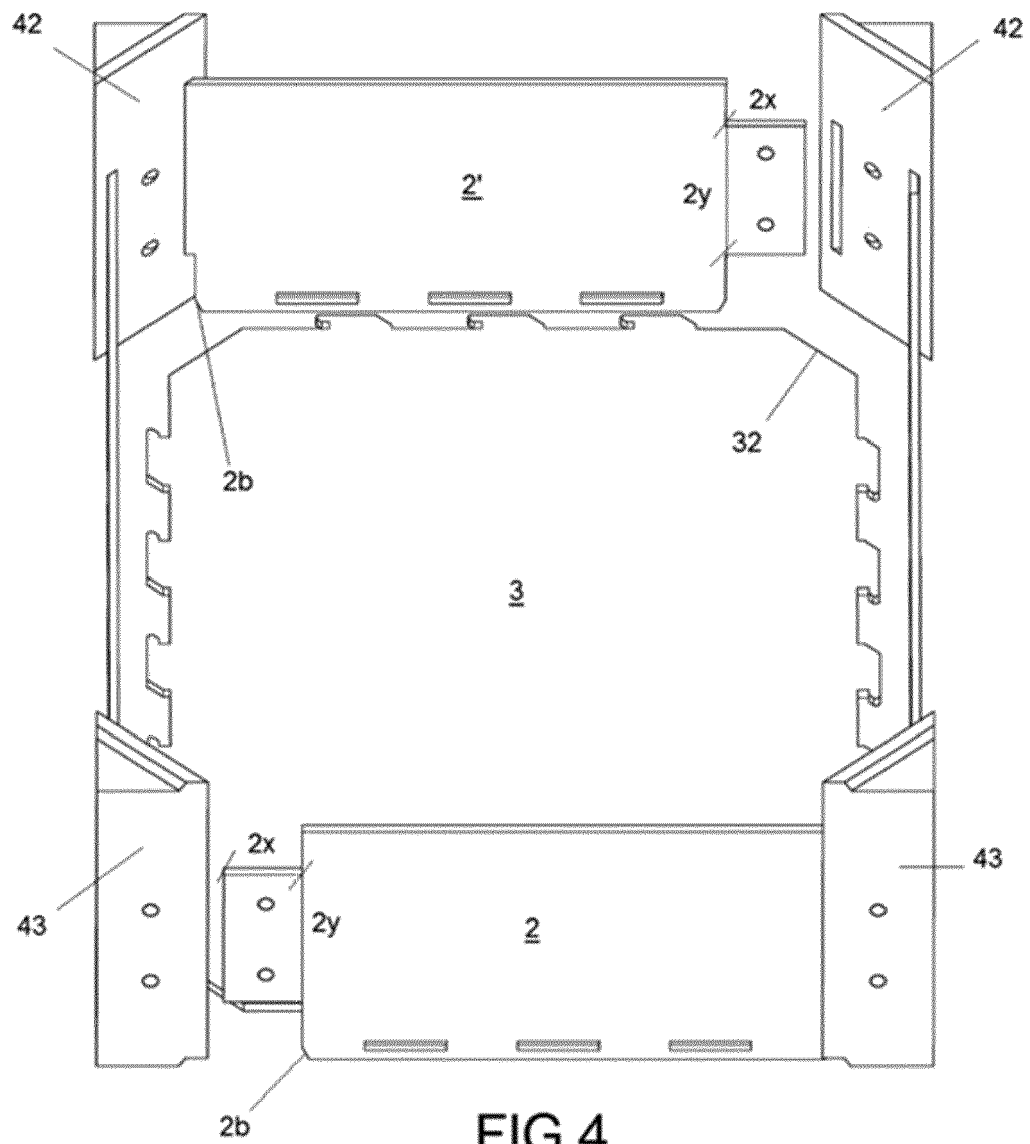


FIG. 3



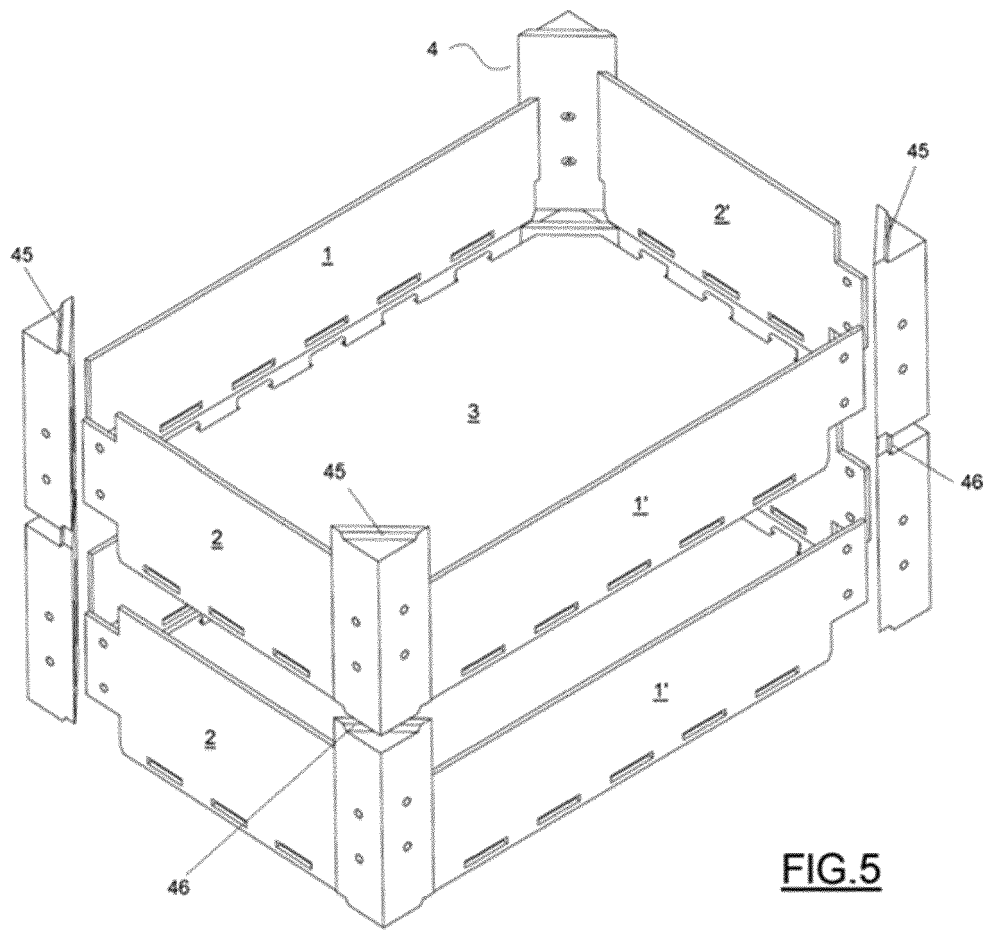
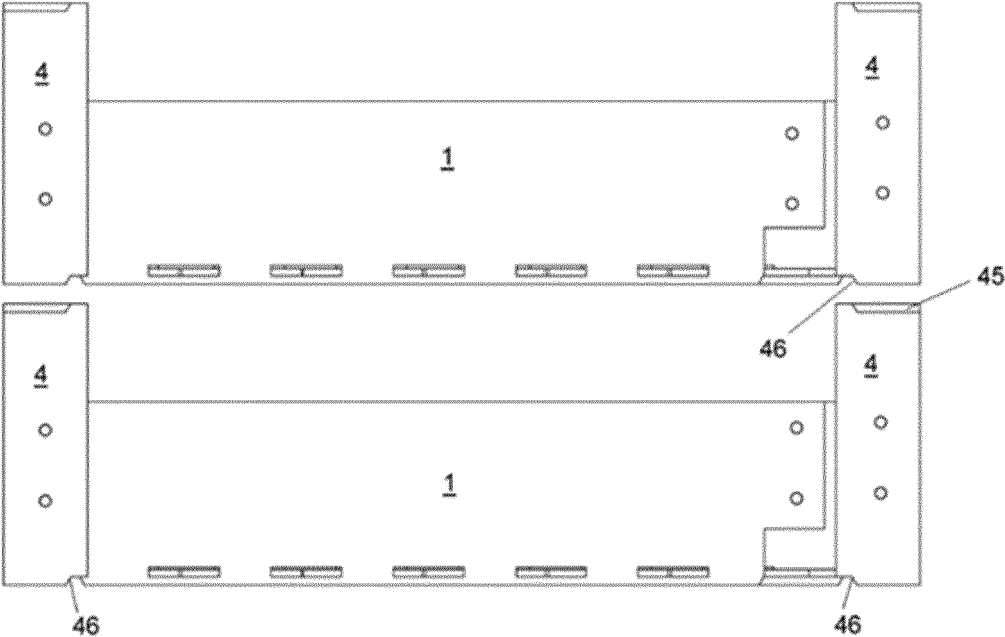


FIG.5





EUROPEAN SEARCH REPORT

 Application Number
 EP 16 38 2470

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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	CH 589 542 A5 (PLASTICS DESIGNERS & CONSULTAN) 15 July 1977 (1977-07-15)	1	INV. B65D6/04
Y	* column 1, line 33 - column 3, line 50; figures 1-8 *	2-6	B65D6/24 B65D21/032

X	WO 2016/059440 A1 (MAKRI LEMONIA [GR]) 21 April 2016 (2016-04-21)	1,2,7	
Y	* page 1 - page 3; figures 1-7 *	2-6,8	

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	* page 2, column 2, line 2 - line 12 *		
	* figures 2-6 *		

Y	EP 2 110 334 A1 (SIST S Y PROCESOS DE EMBALAJE [ES]) 21 October 2009 (2009-10-21)	4-6	
	* paragraph [0022] - paragraph [0045] *		
	* figures 1-19 *		

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	* paragraph [0046] - paragraph [0089] *		
	* figures 1-9 *		

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	* page 1, line 35 - line 37 *		
	* page 2, line 27 - line 32 *		
	* figures 1-3 *		

A	US 1 403 981 A (SMITH CHARLES H) 17 January 1922 (1922-01-17)	1-8	
	* page 1, line 57 - page 2, line 72 *		
	* figures 1-4 *		

The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 23 February 2017	Examiner Fitterer, Johann
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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