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(54) **Improved crate for agricultural and horticultural produce**

(57) The invention provides a crate (1) for agricultural and horticultural produce, comprising a rectangular bottom plate (2), upright support beams (3) arranged in each corner of the bottom plate, and lower and upper side boards (4, 6) arranged on each side face of the crate. The support beams have an height of 17,0-19,0 cm. The crate is provided with at least one of the following reinforcements. A first reinforcement, wherein at least one

upper side board (4) is arranged with its upper edge at a distance of 15,0-17,0 cm above the bottom plate, whereas the remaining upper side boards are arranged with their upper edge at a distance of at most 14,0 cm above the bottom plate. A second reinforcement, wherein at least one of the side boards (4, 6) has a width in the range of 6,1-8,0 cm, whereas the remaining side boards have a width in the range of at most 6,0 cm.

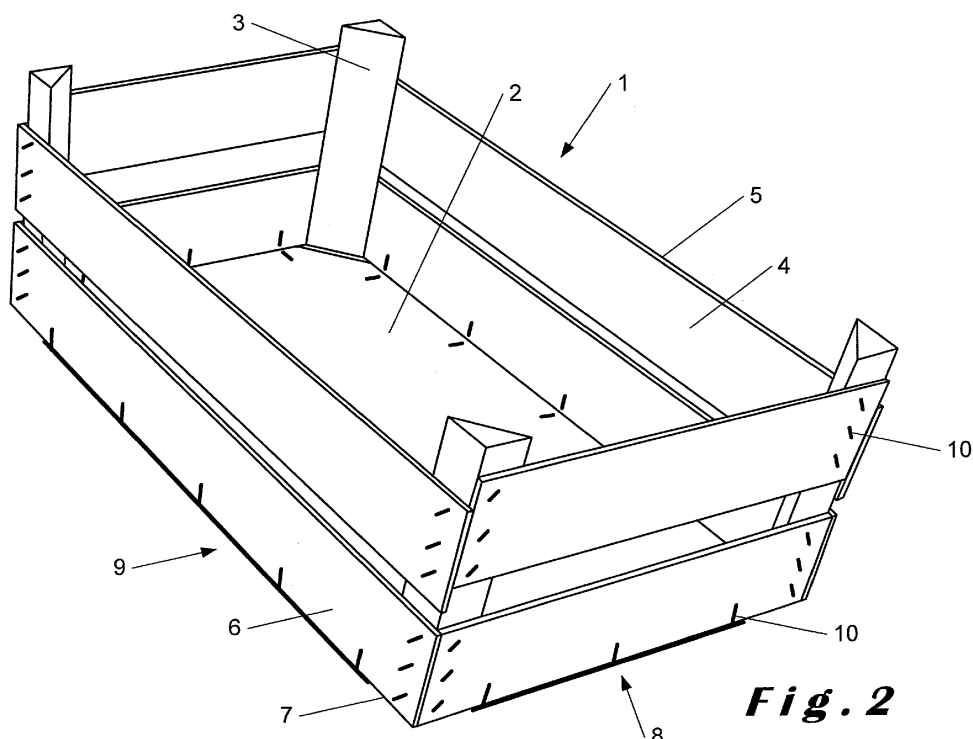


Fig. 2

Description

Technical field

[0001] The present invention relates to crates for agricultural and horticultural produce, such as for example fruit, vegetables, flower bulbs, etc.

Background art

[0002] A commonly used type of wooden crate for storing and transporting agricultural and horticultural produce, as can be seen in Figures 1 and 3, is composed of a bottom plate arranged at the bottom side of the crate, four support beams each arranged in one of the four corners of the crate, and eight side boards arranged per two on each of the four side faces of the crate. The side boards and the bottom plate enclose a storage space for storing agricultural and horticultural produce therein, which agricultural and horticultural produce may be introduced and removed from the crate through an opening at the top side of the crate.

[0003] The support beams extend upwards from the bottom plate in a direction generally perpendicular to the bottom plate, and have an height of approximately 20 cm. Normally, the support beams have a right-angled triangular cross section with the right angles arranged in the corners of the crate. However, the support beams can also have other shapes such as for example a square cross section. The support beams are provided for supporting one or more crates stacked on top of the crate.

[0004] The two side boards on each side face of the crate extend in their longitudinal direction between the support beams arranged at the edges of each of the side faces, and are arranged with their width direction along the height direction of the crate. At their ends the side boards are attached to the support beams, for example by means of staples. The two side boards on each side face are arranged substantially parallel to each other and spaced apart from each other. The lowest one of the two side boards on each side face of the crate, thus the lower side board, is arranged with a lower edge near the bottom plate of the crate, and preferably touching the bottom plate with said lower edge. The lower side boards are attached to the bottom plate, for example by means of staples. The highest of the two side boards on each side face of the crate, thus the upper side board, is positioned such that an upper edge of the upper side board is located at a distance of at most 14,0 cm from the bottom plate.

[0005] The side boards all have the same width in the range of 5,0-6,0 cm, a length approximately equal to the length of the side face they are arranged on, and a thickness in the range of 3,0-4,0 mm. All of the lower side boards are arranged at approximately the same distance from the bottom plate, and likewise for the upper side boards. Usually, the side boards are manufactured from wood veneer.

[0006] The bottom plate has a rectangular shape with

a length of approximately 50 cm, a width of approximately 30 cm and a thickness of approximately 3 mm. Usually, the bottom plate is manufactured from hardboard.

[0007] With the support beams having a height of approximately 20 cm and the upper side boards having their upper edge positioned at a distance of at most 14,0 cm from the bottom plate, there remains a relatively large empty space above the storage space of the crate which is not used for storing agricultural and horticultural produce therein. The agricultural and horticultural produce in the crate may protrude from the storage space into this space, but only to a limited extent, otherwise the agricultural and horticultural produce could fall out of the crate. Thus, with an height difference of at least 6,0 cm between the top sides of the support beams and the upper edges of the upper side boards, approximately 30% of the volume of the crate is mostly not used for storing agricultural and horticultural produce therein.

[0008] When the crates are transported by means of a truck, this relatively large amount of unused space is less of a problem, because mostly the trucks are already loaded up to their maximum weight or load capacity when filled completely with crates which are filled with agricultural and horticultural produce. Nowadays, however, more and more of the transport of agricultural and horticultural produce is done with intermodal containers on boats, trains, trucks for intermodal containers, etc. With these intermodal containers, the large amount of empty space is a disadvantage, because the intermodal containers can carry more weight. Thus, even when completely filled with crates containing agricultural and horticultural produce, the intermodal containers are not filled up to their maximum weight capacity. Hence, with the crates the available storage space in transportation means such as intermodal containers, trucks, etc. is not efficiently used.

[0009] When using support beams with a lower height, more crates can be stacked on top of each other. This, however has the disadvantage that the crates at the bottom of the stack of crates are not able to carry the weight of the additional crates stacked on top of them, which causes them to collapse, thereby damaging the agricultural and horticultural produce stored therein. The collapse of the crates at the bottom of the stack may also cause the collapse of the entire stack of crates, thereby damaging all agricultural and horticultural produce stored in the crates of the stack, and thereby possibly also damaging the people and objects in the surroundings of the stack of crates.

Disclosure of the invention

[0010] It is an aim of the present invention to provide an improved crate for storing and transporting agricultural and horticultural produce with a lower height which is suitable for carrying more weight.

[0011] This aim is achieved according to the invention with a crate for agricultural and horticultural produce

showing the technical characteristics of the characterising part of the first claim.

[0012] Therefore, the present invention provides a crate for agricultural and horticultural produce, the crate comprising:

- a bottom plate which has a generally rectangular shape, which is arranged at the bottom side of the crate, which has a width in the range of 20-40 cm, preferably in the range of 25-35 cm, more preferably in the range of 28-32 cm, even more preferably in the range of 29-31 cm and yet even more preferably of approximately 30 cm, and which has a length in the range of 40-60 cm, preferably in the range of 45-55 cm, more preferably in the range of 48-52 cm, even more preferably in the range of 49-51 cm and yet even more preferably of approximately 50 cm;
- an upright support beam arranged in each corner of the bottom plate, extending upwards from the bottom plate in a direction generally perpendicular to the bottom plate, and provided for supporting other crates stacked onto the crate;
- a lower side board, which is arranged on each side face of the crate and positioned such that a lower edge of the lower side board is located near the bottom plate, and wherein each lower side board is attached, preferably at its ends along its length direction, to the support beams on the corresponding side face; and
- an upper side board, which is arranged on each side face of the crate above and generally parallel to the lower side board arranged on the corresponding side face, and wherein each upper side board is attached, preferably at its ends along its length direction, to the support beams on the corresponding side face, preferably at least at an attachment position close to the upper edge of the upper side board, and more preferably at a plurality of attachment positions distributed along the width direction of the upper side board;

wherein the support beams have a height in the range of 17,0-19,0 cm, preferably in the range of 17,5-18,5 cm, more preferably in the range of 17,8-18,2 cm, even more preferably in the range of 17,9-18,1 cm and yet even more preferably of approximately 18,0 cm, and wherein the crate is further provided with at least one of the reinforcements selected from:

- a first reinforcement, wherein at least one of the upper side boards is positioned such that an upper edge of the at least one of the upper side boards is located at a distance from the bottom plate in the range of 15,0-17,0 cm, preferably in the range of 15,5-16,5 cm, more preferably in the range of 15,8-16,2 cm, even more preferably in the range of 15,9-16,1 cm and yet even more preferably of approximately 16,0 cm, and wherein the remaining upper side boards,

if there are any remaining upper side boards besides the at least one of the upper side boards, are positioned such that the upper edges of the remaining upper side boards are located at a distance from the bottom plate of at most 14,0 cm, and

- a second reinforcement, wherein at least one side board selected from all the upper side boards and all the lower side boards has a width in the range of 6,1-8,0 cm, preferably in the range of 6,2-7,6 cm, more preferably in the range of 6,3-7,4 cm, even more preferably in the range of 6,4-7,2 cm, and yet even more preferably in the range of 6,5-7,0 cm, and wherein the remaining side boards, if there are any remaining side boards besides the at least one side board selected from all the upper side boards and all the lower side boards, have a width of at most 6,0 cm.

[0013] By decreasing the height of the support beams of the crate of the present invention to an height in the range of 17,0-19,0 cm or to an height in any one of the other preferred ranges, the height of the crate of the present invention is also decreased. This has the advantage that more of the crates of the present invention can be stacked on top of each other, compared to a stack of crates known from the state of the art, wherein both stacks have approximately the same height. Hence, with the crate of the present invention, the available storage space in a storage and transportation means for crates, such as for example an intermodal container, is used more efficiently such that the storage and transportation means for crates may be filled up to maximum weight capacity.

[0014] By providing the crate of the present invention with at least one of the reinforcements selected from the first reinforcement and the second reinforcement, the crate is reinforced and thereby provided with additional strength. This has the advantage that the crate of the present invention is able to support the extra weight of additional crates stacked thereon, without the risk of collapsing and thereby possibly damaging the agricultural and horticultural produce stored in the crate or any objects or persons in the surroundings of the crate. Hence, the at least one reinforcement provides a more rigid and sturdy crate.

[0015] Because the crate of the present invention is used for stacking several of the crates on top of each other, each crate thereby supporting on the support beams of the crate below it, the weight of the crates and the agricultural and horticultural produce stored in the crates has to be carried by the support beams. Most of the forces of this weight are exerted on a top side of the support beams located at the top side of the crate and at a bottom side of the support beams located at the bottom side of the crate. The inventors found that at the bottom side of the support beams, these forces are transferred beneficially along the lower side boards which are attached close to the bottom side of the support beams,

thereby reducing the load on the support beams. From this beneficial position close to the bottom side of the support beams, the lower side boards also prevent the support beams to which they are attached from being pulled apart as a result of the forces on the bottom side of the support beams. In the crate of the state of the art, however, there are at the top side of the support beams no means such as the lower side boards to reduce the load on the support beams and to prevent the support beams from being pulled apart.

[0016] Therefore it is beneficial to position at least one of the upper side boards with its upper edge at a larger distance from the bottom plate, hence closer to the top side of the support beams, such as described for the first reinforcement. Thereby, the support beams which are arranged at the side face of the crate where the at least one upper side board is arranged are held together at a position closer to the top side of the support beams. This is advantageous for reducing the load on the support beams resulting from forces at the top side of the support beams, and for preventing the support beams from being pulled apart. For this reason it is also advantageous that the upper side boards are attached to the support beams at least at an attachment position close to the upper edge of the upper side boards, such that the upper side boards hold the support beams together at a position as close as possible to the top side of the support beams.

[0017] In the positioning of the upper edge of the at least one upper side board, however, the inventors have found that a trade-off has to be made between a first requirement of further reinforcing the crate by moving the upper edge of the at least one upper side board closer to the top side of the support beams and a second requirement of preventing agricultural and horticultural produce from falling out of the crate through the gap between the at least one upper side board and the lower side board below the at least one upper side board by limiting the size of the gap, thus reducing the distance between the at least one upper side board and the lower side board below the at least one upper side board. The inventors have found that by positioning the upper edge of the at least one upper side board at a distance from the bottom plate in the range of 15,0-17,0 cm or in any of the other preferred ranges, an optimal and beneficial trade-off is reached between said two requirements.

[0018] Not positioning the upper edge of the at least one upper side board all the way at the top side of the support beams, also has the advantage that the agricultural and horticultural produce inside the crate is more readily accessible from all sides of the crate, without thereby being hindered by the at least one upper side board.

[0019] Providing the crate of the present invention with the first reinforcement, also has the advantage that no additional material is needed to provide the crate with additional strength. In comparison with the crate of the state of the art, the crate of the present invention even uses less material because of the lower height of the

support beams. Therefore, the crate of the present invention is more economical and ecological to manufacture.

[0020] Providing the crate with at least one side board of the upper side boards and the lower side boards with a larger width as the remaining side boards, such as described for the second reinforcement, has the advantage that the bending modulus of the at least one side board is increased. This makes the at least one sideboard stronger and suitable to withstand the forces on the support beams, which forces are transferred to the at least one side board and the remaining side boards. Hence, the second reinforcement provides a stronger crate by providing the at least one side board with an increased strength.

[0021] Providing the crate with both the first reinforcement and the second reinforcement has the advantage that the contribution of the first reinforcement to the strength of the crate and the contribution of the second reinforcement to the strength of the crate are combined, resulting in a stronger crate which is able to support larger loads.

[0022] It should be clear to the person skilled in the art that the width of the upper side boards and the lower side boards and the position of the upper side boards and the lower side boards along the height direction of the support beams and with respect to each other, should be chosen such that there is no overlap between the upper side boards and the lower side boards at the different side faces of the crate.

[0023] The side faces of the crate which are oriented along the width direction of the crate, are referred to in this document as the short side faces of the crate, whereas the side faces of the crate which are oriented along the length direction of the crate, are referred to in this document as the long side faces of the crate.

[0024] In an embodiment of the crate according to the present invention the upper side boards and the lower side boards are attached to the support beams at a plurality of attachment positions distributed along the width direction of the side boards.

[0025] Attaching the lower side boards and the upper side boards to the support beams at a plurality of attachment positions which are distributed along the width direction of the side boards, has the advantage that the transfer of the forces on the support beams to the side boards is divided over the plurality of attachment positions. This beneficially reduces the load on the individual attachment means provided at each attachment position for attaching the side boards to the support beams, such that said attachment means are less likely to break the connection between the side boards and the support beams.

[0026] The attachment positions being distributed along the width direction of the side boards, has the advantage that the side boards are holding the support beams together over the entire width direction of the side boards, thereby further preventing any movement of the

support beams with respect to each other and with respect to the side boards, and thus further preventing the support beams from being pulled apart as a result of the forces on the support beams. When the crate is provided with the second reinforcement, this effect is even increased for the at least one side board having a larger width than the remaining side boards, because it is attached to a larger part of the support beams compared to the remaining side boards.

[0027] In an embodiment of the crate according to the present invention the crate is provided with the first reinforcement.

[0028] In an embodiment of the crate according to the present invention the crate is provided with the first reinforcement in such a way that two of the upper side boards are positioned such that the upper edges of said two upper side boards are located at a distance from the bottom plate in the range of 15,0-17,0 cm, preferably in the range of 15,5-16,5 cm, more preferably in the range of 15,8-16,2 cm, even more preferably in the range of 15,9-16,1 cm and yet even more preferably of approximately 16,0 cm, and said two upper side boards are arranged on opposing side faces of the crate.

[0029] Providing the crate of the present invention according to this embodiment, has the advantage that two opposing side faces of the crate are reinforced according to the first reinforcement, while it is still possible to stack two of the crates upside down on top of each other without increasing the height of the stack compared to a similar stack of crates of the state of the art.

[0030] Normally, empty crates are not stacked on top of each other by supporting each crate with its support beams on the support beams of the crate below. For stacking empty crates, the empty crates are paired by two, and each pair of crates is oriented such that the two crates are facing each other, hence with one of the crates oriented up side down with respect to the other and with the support beams aligned with each other. Then, the crates are shifted with respect to each other in the length direction of the crates, such that the crates can be slid into each other with the support beams arranged at one of the short side faces of each crate positioned outside the other crate, and with the support beams arranged at the opposing short side face positioned inside the other crate. In this case the two crates support onto each other with the upper side boards arranged on the long side faces of the crates. Another possibility is to shift the crates with respect to each other in the width direction of the crates, such that the crates can be slid into each other with the support beams arranged at one of the long side faces of each crate positioned outside the other crate, and with the support beams arranged at the opposing long side face positioned inside the other crate. In this case the two crates support onto each other with the upper side boards arranged on the short faces of the crates. Finally, all the paired crates which are slid into each other are then stacked on top of each other.

[0031] In each case, the total height of the two crates

which are slid into each other is determined by the distance from the bottom plate of the upper edge of the upper side boards with which the two crates are supporting onto each other. Hence, if only the upper side boards on two opposing side faces of the crate are positioned such that their upper edge is located at a larger distance from the bottom plate as the upper side boards on the other side faces, it is still possible to slide two of the crates upside down into each other, either by shifting in the length direction or by shifting in the width direction, without increasing the total height of the stack.

[0032] Not positioning the upper edge of the upper side boards arranged on the other side faces at a larger distance from the bottom plate, also has the advantage that the agricultural and horticultural produce inside the crate is still readily accessible from those side faces of the crate, without thereby being hindered by the upper side boards arranged on those side faces.

[0033] In an embodiment of the crate according to the present invention the two upper side boards are arranged on short side faces of the crate, which short side faces are the side faces of the crate along the width direction of the crate.

[0034] Positioning the upper edge of the upper side boards arranged on the short side faces at a larger distance from the bottom plate while the upper edge of the upper side boards arranged on the long side faces are arranged at a smaller distance from the bottom plate, has the advantage that the agricultural and horticultural produce inside the crate is still readily accessible from the longest of the side faces of the crate, without thereby being hindered by the upper side boards arranged on those side faces. This also has the advantage that the agricultural and horticultural produce inside the crate is better visible from the longest of the side faces of the crate, which is for example beneficial for inspecting the agricultural and horticultural produce in stacked crates.

[0035] In an embodiment of the crate according to the present invention the crate is provided with the second reinforcement.

[0036] In an embodiment of the crate according to the present invention the crate is provided with the second reinforcement in such a way that all the side boards have a width in the range of 6,1-8,0 cm, preferably in the range of 6,2-7,6 cm, more preferably in the range of 6,3-7,4 cm, even more preferably in the range of 6,4-7,2 cm, and yet even more preferably in the range of 6,5-7,0 cm.

[0037] Providing all the side boards of the crate of the present invention with a larger width, as compared to the width of the side boards of the crate of the state of the art, has the advantage that all the side boards are provided with an increased strength, such that all side boards add to the total strength of the crate of the present invention.

[0038] Providing all the side boards of the crate of the present invention with a larger width, as compared to the width of the side boards of the crate of the state of the art, has the advantage that the gap between the upper

side board and the lower side board on all side faces of the crate is reduced in size because of the larger width of the side boards, such that agricultural and horticultural produce is prevented from falling out of the crate through those gaps.

[0039] In an embodiment of the crate according to the present invention the crate is provided with both the first reinforcement and the second reinforcement.

[0040] Providing the crate with both the first reinforcement and the second reinforcement has the advantage that the contribution of the first reinforcement to the strength of the crate and the contribution of the second reinforcement to the strength of the crate are combined, resulting in a stronger crate which is able to support larger loads.

[0041] In an embodiment of the crate according to the present invention the at least one upper side board which is provided according to the first reinforcement and the least one side board which is provided according to the second reinforcement are arranged on the same side face of the crate.

[0042] The at least one upper side board provided according to the first reinforcement and the least one side board provided according to the second reinforcement being arranged on the same side face of the crate, has the advantage that the gap between the upper side board and the lower side board on said side face is reduced in size because of the larger width of the at least one side board provided according to the second reinforcement, such that agricultural and horticultural produce is prevented from falling out of the crate through the gap.

[0043] In an embodiment of the crate according to the present invention the crate is provided with the first reinforcement in such a way that two of the upper side boards are positioned such that the upper edges of said two upper side boards are located at a distance from the bottom plate in the range of 15,0-17,0 cm, preferably in the range of 15,5-16,5 cm, more preferably in the range of 15,8-16,2 cm, even more preferably in the range of 15,9-16,1 cm and yet even more preferably of approximately 16,0 cm, said two upper side boards are arranged on opposing side faces of the crate, and the crate is provided with the second reinforcement in such a way that all the side boards have a width in the range of 6,1-8,0 cm, preferably in the range of 6,2-7,6 cm, more preferably in the range of 6,3-7,4 cm, even more preferably in the range of 6,4-7,2 cm, and yet even more preferably in the range of 6,5-7,0 cm.

[0044] In an embodiment of the crate according to the present invention the crate is provided with the first reinforcement in such a way that two of the upper side boards are positioned such that the upper edges of said two upper side boards are located at a distance from the bottom plate in the range of 15,0-17,0 cm, preferably in the range of 15,5-16,5 cm, more preferably in the range of 15,8-16,2 cm, even more preferably in the range of 15,9-16,1 cm and yet even more preferably of approximately 16,0 cm, said two upper side boards are arranged on short side

faces of the crate, which short side faces are the side faces of the crate along the width direction of the crate, and the crate is provided with the second reinforcement in such a way that all the side boards have a width in the range of 6,1-8,0 cm, preferably in the range of 6,2-7,6 cm, more preferably in the range of 6,3-7,4 cm, even more preferably in the range of 6,4-7,2 cm, and yet even more preferably in the range of 6,5-7,0 cm.

[0045] In embodiment of the crate according to the present invention the bottom plate, the support beams, the upper side boards and the lower side boards comprise a material selected from the list consisting of wood and plastic, and preferably wood.

[0046] The bottom plate preferably comprises hardboard, but may also comprise wood veneer, triplex, Medium-Density Fibreboard (MDF), or other wood based boards known by the person skilled in the art.

[0047] The upper side boards and the lower side boards preferably comprise wood veneer, but may also comprise hardboard, triplex, MDF, sawn wood, or wood based boards known by the person skilled in the art.

[0048] The present invention also provides a method for manufacturing the crate for agricultural and horticultural produce of the present invention, the method comprising the steps of:

- providing the bottom plate, the support beams, the upper side boards and the lower side boards;
- attaching the lower side boards and the support beams to each other;
- attaching the upper side boards and the support beams to each other;
- attaching the bottom plate and the lower side boards to each other; and
- optionally, attaching the support beams and the bottom plate to each other.

Brief description of the drawings

[0049] The invention will be further elucidated by means of the following description and the appended figures.

Figure 1 shows a perspective view of a crate for agricultural and horticultural produce of the state of the art.

Figure 2 shows a perspective view of a crate for agricultural and horticultural produce according to an embodiment of the present invention.

Figure 3 shows a side view of the crate for agricultural and horticultural produce of Figure 1.

Figure 4 shows a side view of the crate for agricultural and horticultural produce of Figure 2.

Figure 5 shows a side view of two of the crates for agricultural and horticultural produce of Figure 1, which are stacked upside down onto each other.

Figure 6 shows a side view of two of the crates for agricultural and horticultural produce of Figure 2,

which are stacked upside down onto each other.

Modes for carrying out the invention

[0050] The present invention will be described with respect to particular embodiments and with reference to certain drawings but the invention is not limited thereto but only by the claims. The drawings described are only schematic and are non-limiting. In the drawings, the size of some of the elements may be exaggerated and not drawn on scale for illustrative purposes. The dimensions and the relative dimensions do not necessarily correspond to actual reductions to practice of the invention.

[0051] Furthermore, the terms first, second, third and the like in the description and in the claims, are used for distinguishing between similar elements and not necessarily for describing a sequential or chronological order. The terms are interchangeable under appropriate circumstances and the embodiments of the invention can operate in other sequences than described or illustrated herein.

[0052] Moreover, the terms top, bottom, over, under and the like in the description and the claims are used for descriptive purposes and not necessarily for describing relative positions. The terms so used are interchangeable under appropriate circumstances and the embodiments of the invention described herein can operate in other orientations than described or illustrated herein.

[0053] The term "comprising", used in the claims, should not be interpreted as being restricted to the means listed thereafter; it does not exclude other elements or steps. It needs to be interpreted as specifying the presence of the stated features, integers, steps or components as referred to, but does not preclude the presence or addition of one or more other features, integers, steps or components, or groups thereof. Thus, the scope of the expression "a device comprising means A and B" should not be limited to devices consisting only of components A and B. It means that with respect to the present invention, the only relevant components of the device are A and B.

[0054] Figures 1, 3 and 5 show a crate 1 known from the state of the art. Figure 1 shows the crate 1 in a perspective view from above, Figure 3 shows the crate 1 in a side view looking at one of the short side faces 8 of the crate 1, and Figure 5 shows two of the crates 1 stacked upside down on top of each other.

[0055] Figures 2, 4 and 6 shows a crate 1 according to an embodiment of the present invention. Figure 2 shows the crate 1 in a perspective view from above, Figure 4 shows the crate 1 in a side view looking at one of the short side faces 8 of the crate 1, and Figure 6 shows two of the crates 1 stacked upside down on top of each other.

[0056] It should be noted that the dimensions of the crates shown in these figures are not completely accurate, but nonetheless the figures clearly show the important differences between the crate known from the state

of the art and the crate of the present invention.

[0057] As can be seen in Figures 1-4, both the crate 1 known from the state of the art and the crate 1 according to an embodiment of the present invention comprise one bottom plate 2, four support beams 3, four upper side boards 4 and four lower side boards 6.

[0058] The bottom plate 2 has a rectangular shape and is arranged at the bottom side of the crate 1. The support beams 3 are arranged in the corners of the bottom plate 2, thereby extending upwards from the bottom plate 2 in a direction perpendicular to the bottom plate 2.

[0059] The lower side boards 6 are arranged on the side faces 8, 9 of the crate 1, with their lower edge 7 located near the bottom plate 2. At their lower edge 7, the lower side boards 6 are attached to the bottom plate 2 by means of attachment means 10, more specifically staples 10, at a plurality of attachment positions distributed along the length direction of the lower side boards 6. At their ends along their length direction, the lower side boards 6 are attached to the support beams 3 which are arranged on the same side face 8,9 on which the lower side board 6 is arranged. Thereby, the lower side boards 6 are attached to the support beams 3 by means of attachment means 10, more specifically staples 10, at a plurality of attachment positions distributed along the width direction of the lower side boards 6.

[0060] The upper side boards 4 are arranged on the side faces 8, 9 above the lower side boards 6 and parallel to the lower side boards 6. At their ends along their length direction, the upper side boards 4 are attached to the support beams 3 which are arranged on the same side face 8,9 on which the upper side board 4 is arranged. Thereby, the upper side boards 4 are attached to the support beams 3 by means of attachment means 10, more specifically staples 10, at a plurality of attachment positions distributed along the width direction of the upper side boards 4.

[0061] In this configuration, the upper side boards 4, the lower side boards 6 and the bottom plate 2 of the crate 1 together enclose a storage space for storing agricultural and horticultural produce therein. At the top side of the crate 1, an opening for inserting and removing agricultural and horticultural produce in/from the crate 1 is formed between the support beams 3 and the upper side boards 4.

[0062] The bottom plate 2 is a rectangular hardboard with a length of approximately 50 cm, a width of approximately 30 cm and a thickness of approximately 3 mm.

[0063] The upper side boards 4 and the lower side boards 6 are boards of wood veneer with a thickness of approximately 3-4 mm. The side boards 4, 6 have approximately the same length as the length of the side face 8,9 of the crate 1 on which they are arranged. Thus, the side boards 4, 6 which are arranged on the short side faces 8 of the crate 1 have a length of approximately 30 cm, and the side boards 4, 6 which are arranged on the long side faces 9 of the crate 1 have a length of approximately 50 cm.

[0064] The side boards 4, 6 of the crate 1 known from the state of the art all have a width of approximately 5,5 cm, whereas the side boards 4, 6 of the crate 1 according to an embodiment of the present invention all have, according to the second reinforcement of the present invention, a larger width preferably in the range of 6,5-7,0 cm. The larger width provides the side boards 4, 6 with a larger bending modulus and thus a larger strength, such that the strength of the crate 1 according to an embodiment of the present invention is increased.

[0065] The lower side boards 6 are arranged with their lower edge 7 near the bottom plate 2, as described above, and thereby all lower side boards 6 are located at the same distance from the bottom plate 2. In the crate 1 known from the state of the art, all the upper side boards 4 are located with their upper edge 5 at a distance from the bottom plate of approximately 14 cm. In the crate 1 according to an embodiment of the present invention, however, only the upper side boards 4, which are arranged on the long side faces 9 of the crate 1, are located with their upper edge 5 at a distance from the bottom plate 2 of approximately 14 cm, whereas the upper side boards 4, which are arranged on the short side faces 8 of the crate 1, are located, according to the first reinforcement of the present invention, at a larger distance from the bottom plate 2 of approximately 16 cm. This has the advantage that the support beams 3 are held together by the upper side boards 4 at a position closer to the top side of the support beams 3, where the upper side boards 4 are more suitably positioned to reduce the load on the support beams 3 caused by forces acting on the support beams 3, and where the upper side boards are more suitably positioned to prevent the support beams 3 from being pulled apart by said forces.

[0066] The support beams 3 are wooden beams with a right-angled triangular cross section of which the legs, i.e. the sides adjacent to the right angle, have a length of approximately 3 cm. The support beams 3 are positioned in the corners of the bottom plate 2, such that the right angle of the cross section of the support beams 3 is located in the corners of the bottom plate 2. The support beams 3 of the crate 1 known from the state of the art have a height of approximately 20 cm, whereas the support beams 3 of the crate according to an embodiment of the present invention have a lower height of approximately 18 cm.

[0067] The lower height of the support beams 3 of the crate 1 according to an embodiment of the present invention has the advantage that more of the crates 1 can be stacked on top of each other with each crate 1 supporting on the support beams 3 of the crate 1 below it, as compared to a stack of the crates 1 known from the state of the art, which is stacked in a similar way, and which has approximately the same height. For example, in a standard intermodal container it is possible to stack twelve of the crates 1 according to an embodiment of the present invention on top of each other, whereas with the crates 1 known from the state of the art it is only possible

to stack eleven crates 1 on top of each other.

[0068] As mentioned above, Figures 5 and 6 respectively show how two empty crates 1 known from the state of the art and two empty crates 1 according to an embodiment of the present invention are stacked upside down on top of each other.

[0069] Hereby, the two crates 1 are oriented upside down with respect to each other, thus oriented such that the top sides of the two crates 1 are facing each other. In the width direction, the two crates 1 are aligned with each other such that the side boards 4, 6 on the long side faces 8,9 of the two crates are located in the same plane. In the length direction, the two crates 1 are shifted with respect to each other, such that the support beams 3 arranged at one of the short side faces 8 of each crate 1 are positioned just outside the other crate 1, and such that the support beams 3 arranged at the opposing short side face 8 are positioned just inside the other crate 1. In this configuration, the two crates 1 support onto each other with the upper side boards 4 arranged on the long side faces 9 of the two crates 1.

[0070] Comparing Figure 5 with Figure 6, clearly shows that the total height of the two empty crates 1 stacked upside down on top of each other, is the same for the two crates 1 known from the state of the art and the two crates 1 according to an embodiment of the present invention.

List of references:

[0071]

- | | |
|----|--------------------------|
| 1 | crate |
| 2 | bottom plate |
| 3 | support beam |
| 4 | upper side board |
| 5 | upper edge of side board |
| 6 | lower side board |
| 7 | lower edge of side board |
| 8 | short side face crate |
| 9 | long side face crate |
| 10 | staple |

Claims

1. A crate (1) for agricultural and horticultural produce, the crate (1) comprising:
 - a bottom plate (2) which has a generally rectangular shape, which is arranged at the bottom side of the crate (1), which has a width in the range of 20-40 cm, and which has a length in the range of 40-60 cm;
 - an upright support beam (3) arranged in each corner of the bottom plate (2), extending upwards from the bottom plate (2) in a direction generally perpendicular to the bottom plate (2),

and provided for supporting other crates stacked onto the crate (1);

- a lower side board (6), which is arranged on each side face (8, 9) of the crate (1) and positioned such that a lower edge (7) of the lower side board (6) is located near the bottom plate (2), and wherein each lower side board (6) is attached to the support beams (3) on the corresponding side face (8, 9); and

- an upper side board (4), which is arranged on each side face (8, 9) of the crate (1) above and generally parallel to the lower side board (6) arranged on the corresponding side face (8, 9), and wherein each upper side board (4) is attached to the support beams (3) on the corresponding side face (8, 9) at least at an attachment position close to the upper edge (5) of the upper side board (6);

characterised in that the support beams (3) have a height in the range of 17,0-19,0 cm, and **in that** the crate (1) is further provided with at least one of the reinforcements selected from:

- a first reinforcement, wherein at least one of the upper side boards (4) is positioned such that an upper edge (5) of the at least one of the upper side boards (4) is located at a distance from the bottom plate (2) in the range of 15,0-17,0 cm, and wherein the remaining upper side boards (4), if there are any remaining upper side boards (4), are positioned such that the upper edges (5) of the remaining upper side boards (4) are located at a distance from the bottom plate (2) of at most 14,0 cm, and

- a second reinforcement, wherein at least one side board (4, 6) selected from all the upper side boards (4) and all the lower side boards (6) has a width in the range of 6,1-8,0 cm, and wherein the remaining side boards (4, 6), if there are any remaining side boards (4, 6), have a width of at most 6,0 cm.

2. The crate (1) according to claim 1, wherein the crate (1) is provided with the first reinforcement.

3. The crate (1) according to claim 1 or 2, wherein the crate (1) is provided with the first reinforcement in such a way that two of the upper side boards (4) are positioned such that the upper edges (5) of said two upper side boards (4) are located at a distance from the bottom plate (2) in the range of 15,0-17,0 cm, and wherein said two upper side boards (4) are arranged on opposing side faces (8, 9) of the crate (1).

4. The crate (1) according to the preceding claim, wherein the two upper side boards (4) are arranged on short side faces (8) of the crates, which short side

faces (8) are the side faces (8) of the crate (1) along the width direction of the crate (1).

5. The crate (1) according to any one of the preceding claims, wherein the crate (1) is provided with the second reinforcement.

6. The crate (1) according to any one of the preceding claims, wherein the crate (1) is provided with the second reinforcement in such a way that all the side boards (4, 6) have a width in the range of 6,1-8,0 cm.

7. The crate (1) according to anyone of the preceding claims, wherein the crate (1) is provided with both the first reinforcement and the second reinforcement.

8. The crate (1) according to the preceding claim, wherein the at least one upper side board (4) which is provided according to the first reinforcement and the least one side board (4, 6) which is provided according to the second reinforcement are arranged on the same side face of the crate (1).

9. The crate (1) according to claim 6, at least in combination with claim 3.

10. The crate (1) according to claim 6, at least in combination with claim 4.

11. The crate (1) according to any one of the preceding claims, wherein the bottom plate (2), the support beams (3), the upper side boards (4) and the lower side boards (6) comprise a material selected from the list consisting of wood and plastic, and preferably wood.

12. A method for manufacturing the crate (1) for agricultural and horticultural produce according to any one of the preceding claims, the method comprising the steps of:

- providing the bottom plate (2), the support beams (3), the upper side boards (4) and the lower side boards (6);

- attaching the lower side boards (6) and the support beams (3) to each other;

- attaching the upper side boards (4) and the support beams (3) to each other;

- attaching the bottom plate (2) and the lower side boards (6) to each other; and

- optionally, attaching the support beams (3) and the bottom plate (2) to each other.

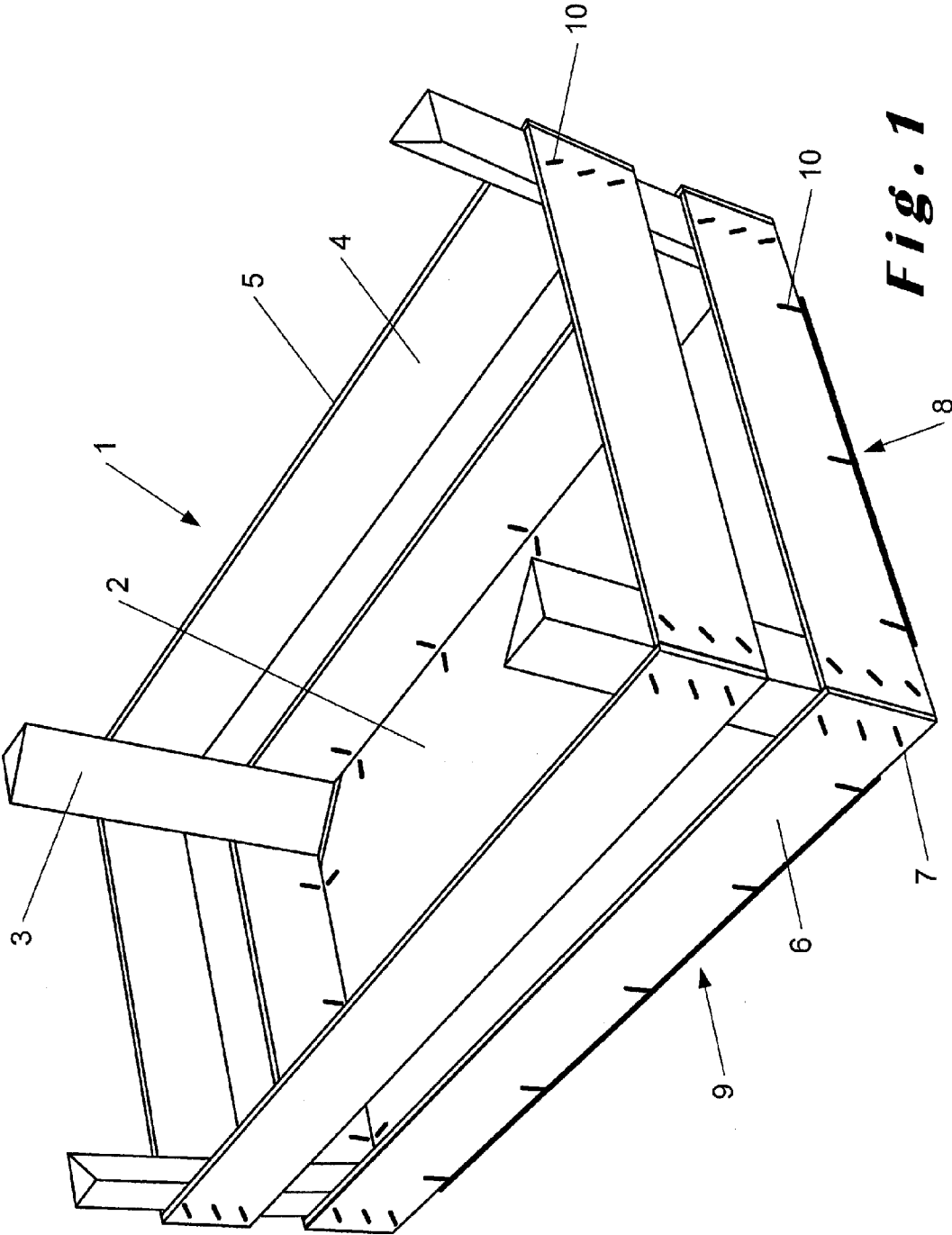


Fig. 1

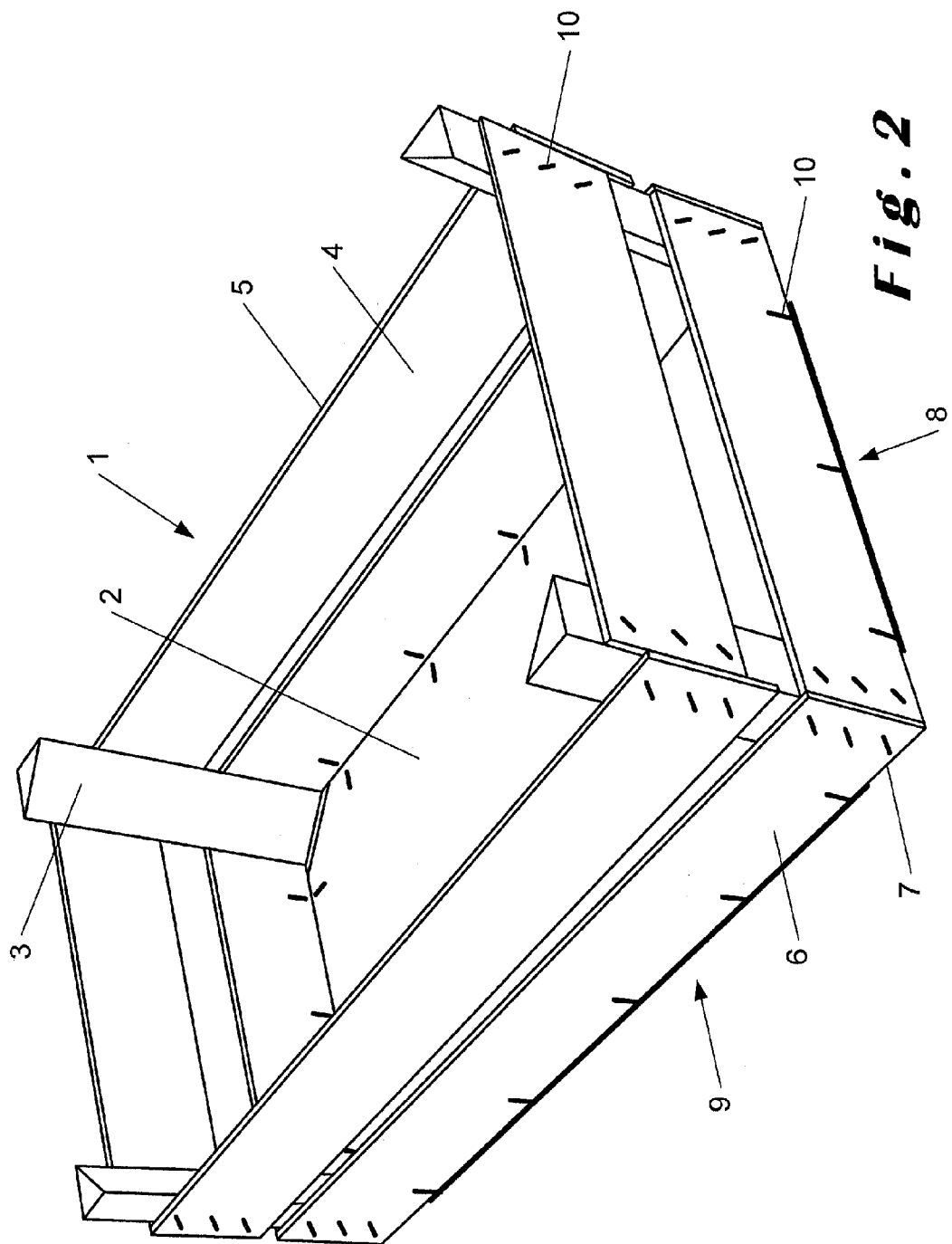
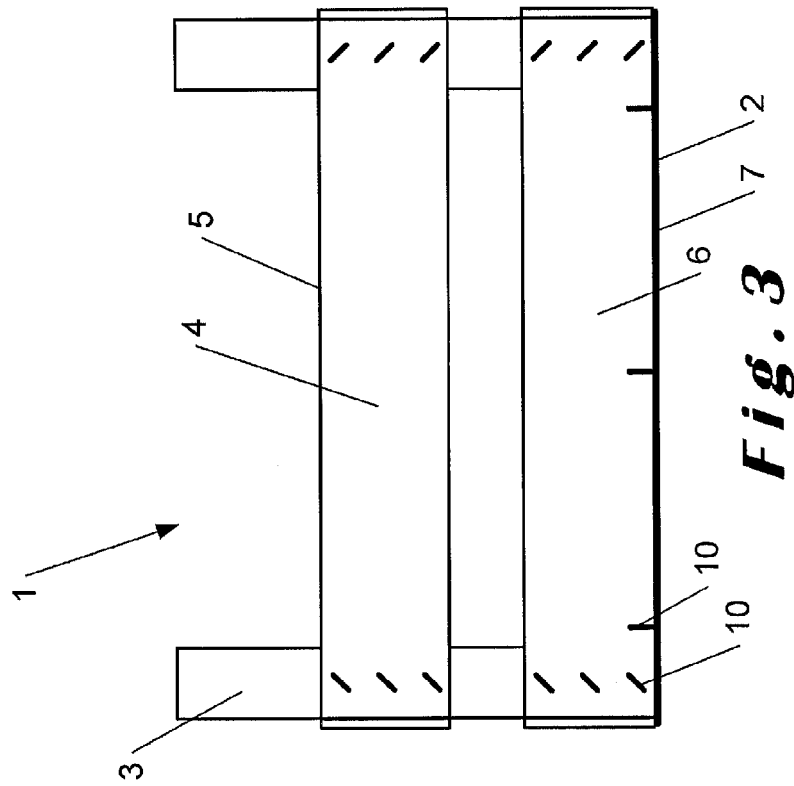
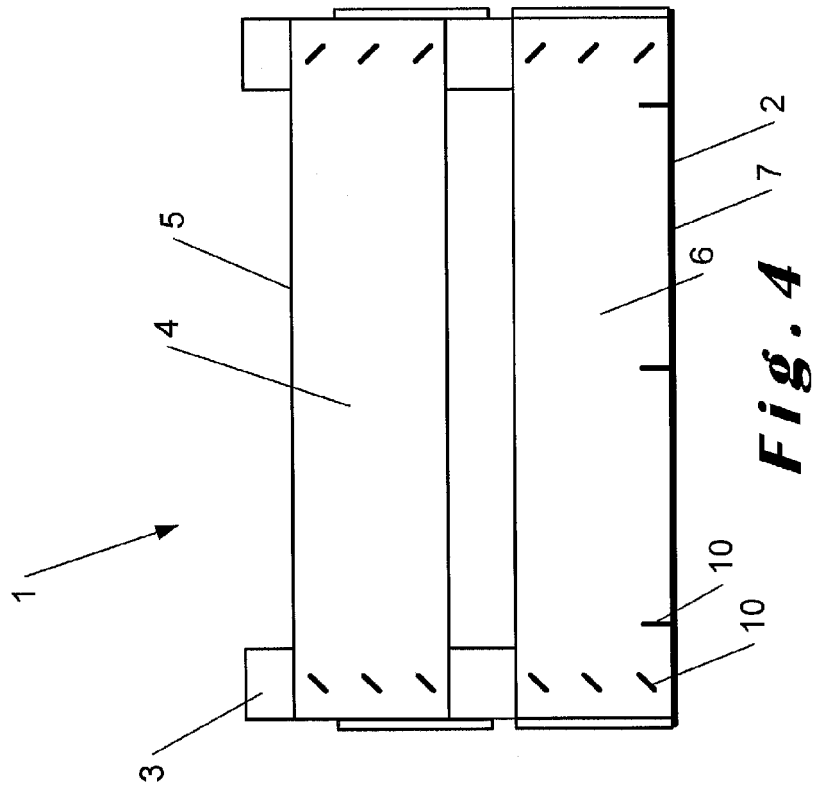
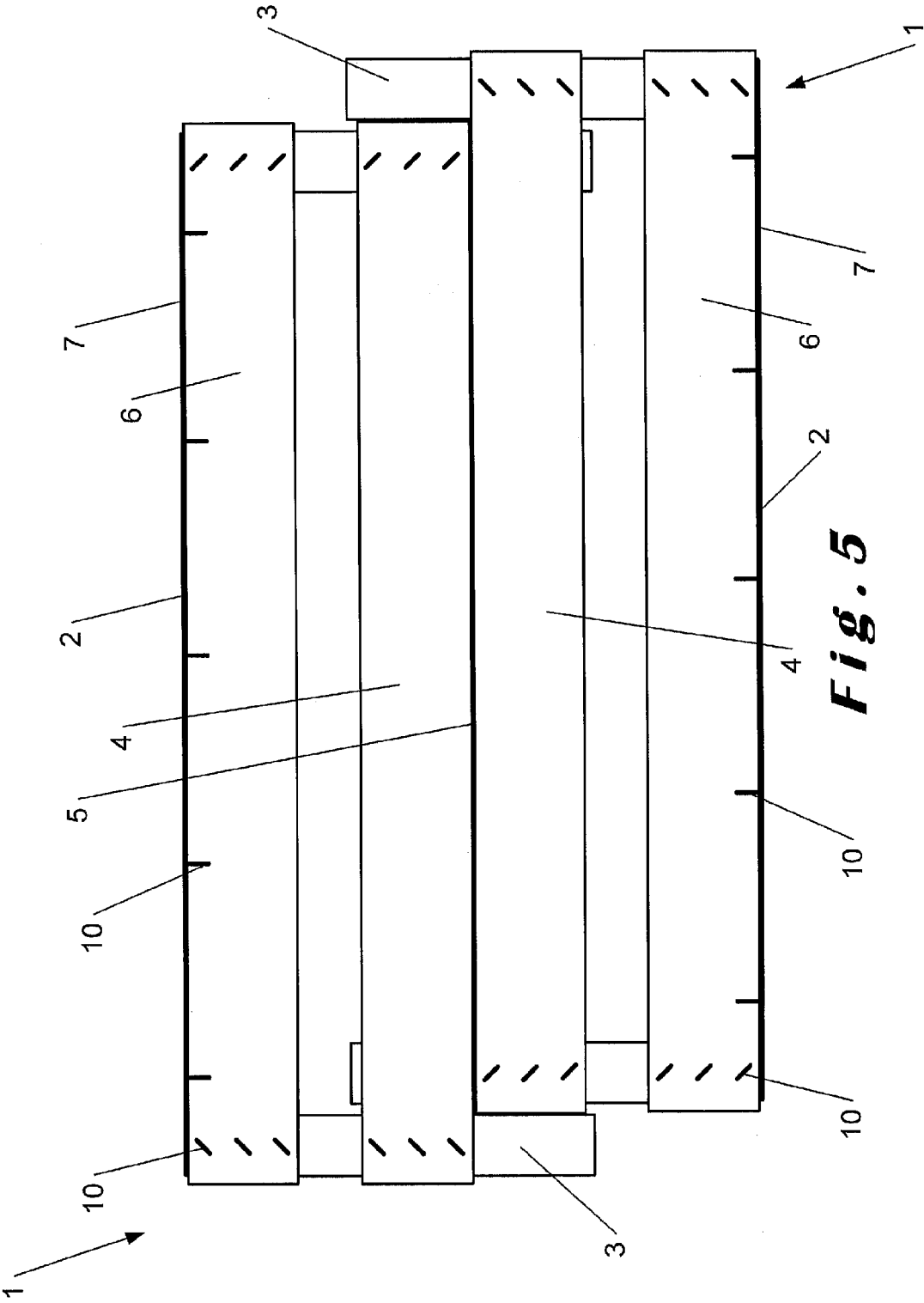
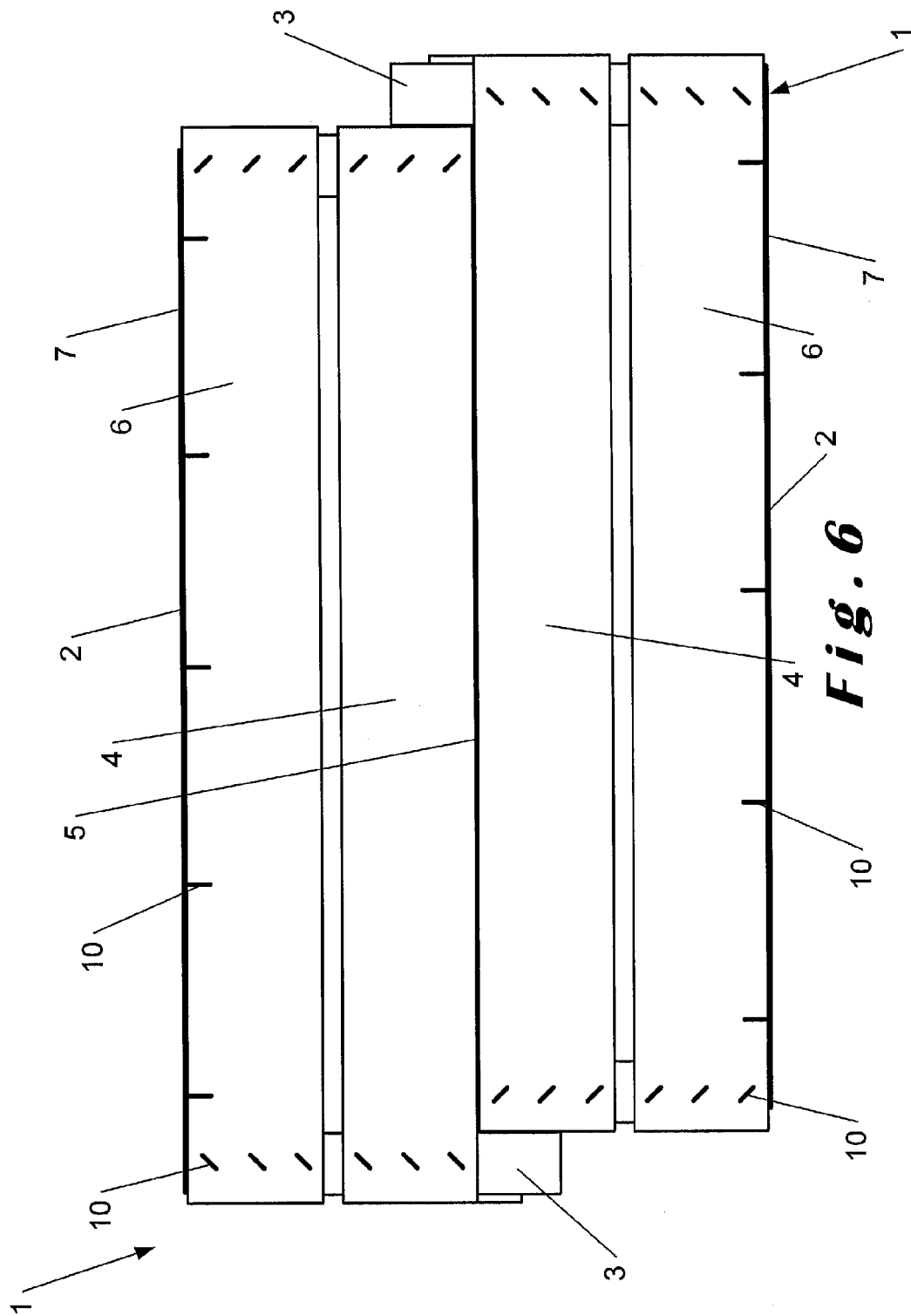


Fig. 2









EUROPEAN SEARCH REPORT

Application Number
EP 14 19 0700

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Place of search		Date of completion of the search	Examiner
Munich		28 April 2015	Segerer, Heiko
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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