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(54) **PLASTIC CONTAINER FOR STORING AND TRANSPORTING AGRICULTURAL PRODUCTS AND METHOD FOR STACKING CONTAINERS**

(57) Plastic container for storage and transport of agricultural products, of which structure enables to reduce significantly the container weight without decreasing its resistance and its storage volume, which is comprised by a bottom (100), longitudinal vertical walls (200) and cross-sectional vertical walls (300) which comprises: a reinforcement between each juncture of the longitudinal vertical walls with the cross-sectional vertical walls consisting of a tubular column (400) cylindrical in shape, where the lower part of each tubular column (400) is connected with a lower projection (230) which runs on a perimeter frame (110) of the container bottom; an upper perimeter edge (500) having an extension (520) on a portion of the longitudinal vertical walls (200); at least one bottom recess (430) placed in the bottom (100) of the container. The present invention also comprises a method for stacking at least two containers.

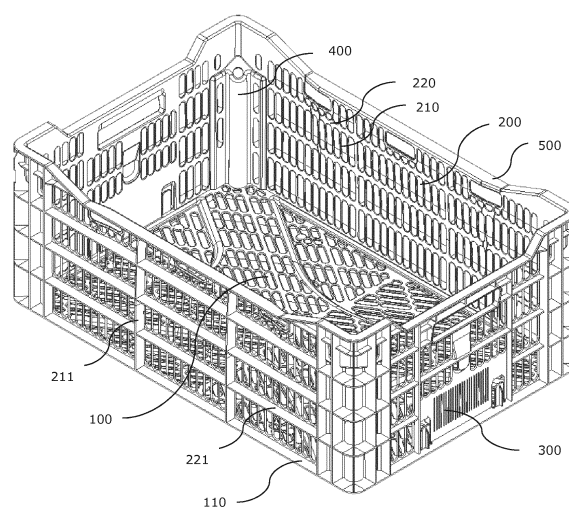


Fig. 2

Description

FIELD OF THE INVENTION

[0001] The present invention is related to the stackable plastic containers frequently used for the storage and conveyance of agricultural, industrial or any other type of products which structure allows to reduce weight significantly without reducing resistance or storage volume thereof. Additionally, the invention also relates to a method for stacking at least two plastic containers.

BACKGROUND OF THE INVENTION

[0002] In the packaging and conveyance industry, specifically horticultural products, the use of plastic containers of rectangular or square box type which are manufactured by plastic injection, is frequent.

[0003] Said containers are formed by a bottom attached to four perimeter walls wherein said bottom and said walls have a frame structure allowing the air to circulate into the container and allowing a weight decrease of the structure.

[0004] The corners of the containers often have a higher thickness and comprise reinforcing elements such as ribs to resist tensile, compressive, bending and torsional stresses, to which this type of containers are generally subjected during handling and transportation. Additionally, some wall and bottom portions also include reinforcing in order to avoid sag and to maintain stiffness of the structure.

[0005] Other feature of this type of containers is that they have media such as edges and protrusions in their corners, which allow the stacking with identical containers and thus they can be stacked for storage or transportation in pallets.

[0006] An example of this type of containers is the one disclosed in document EP 0041307, which describes a box moulded by injection for transporting fruit.

[0007] Another example of this type of containers is illustrated in Figure 1, which corresponds to a plastic container of the state of the art used for storing and transporting products such as tulip and liliun bulbs.

[0008] A disadvantage of this type of containers is its high weight of 1600 grs approximately.

[0009] Therefore, the objective of the present invention is to provide a container which by means of less amount of material used and through an improved structure achieves a significant weight reduction and less use of material compared to the state of the art containers, without reducing the container resistance and the storage volume, and at the same time it reduces production costs.

[0010] Another objective of the invention is to provide an improved container being compatible with the current containers allowing stacking in a stacked configuration.

[0011] Still another aim of the invention is to provide an improved container being compatible with fastening means of the automated production systems.

DESCRIPTION OF THE INVENTION

[0012] The present invention consists on a stackable plastic container for the storage and conveyance of agricultural, industrial or any other type of products, configured by a preferably rectangular base and by four vertical walls.

[0013] Advantageously, in the connection of the vertical walls at the inner face of the container a cylindrical tubular column is disposed, which is open at its ends and is connected to the bottom structure. Being cylindrical said column provides a great resistance to the structure and its connection to the lateral walls and with the bottom end enable the forces, to which the container is submitted, to be distributed to the four columns in order to resist said loads and to prevent deflections.

[0014] Being hollow the tubular columns allow a significant reduction in the use of material compared to the known containers and consequently, a relevant reduction of the container total weight since there is no need to use multiple ribs in the vertical walls (see Fig. 1), which increase significantly the container weight. By the other hand, the volume generated by the presence of the columns inside the container is offset by a reduction in the bottom height, thus not affecting the useful final volume inside the container.

[0015] The lower part of each tubular column is entirely connected to a vertical projection running throughout the lower frame of the container base. By means of said projection it is possible to stack the present container both with identical containers and with the containers known in the state of the art, as illustrated in Figure 1, so that the projection fits in the upper corner of the container positioned at the bottom.

[0016] Another feature enabling to avoid the loss of strength of the container structure reducing its weight is connected to the upper edge of the longitudinal container walls having an extension to provide a better sag resistance.

[0017] Moreover, the column height inside the container is selected such that it does not interfere with the operation of the machines grooves used for handling the containers in a plant, which are generally designed to operate with the standard thickness of this type of containers.

[0018] The present invention also comprises a method for stacking plastic containers for the storage and transport of agricultural products, wherein said method comprises the following steps:

- a. To have at least two containers as the one described hereinafter.
- b. To place a first container supporting the lower projection in a surface.
- c. To place a second container onto the first container arranging its lower projection within the upper perimeter edge of the lower container, connecting the outer face of the lower projection of the upper container

respectively with the inner face of the upper perimeter edge of the lower container.

d. To support the vertexes of the perimeter frame of the upper container on the flat vertexes of the lower container.

BRIEF DESCRIPTION OF THE FIGURES

[0019]

- Figure 1 illustrates a container of the state of the art.
- Figure 2 illustrates an isometric view of the container of the invention.
- Figures 3 and 4 illustrate details of the column of the container of the invention.
- Figure 5 illustrates a detail of the lower projection and its connection to the column of the container of the invention.
- Figure 6 illustrates a detail of the upper edges and the bottom of the container of the invention.
- Figure 7 illustrates a configuration of two stacked containers.
- Figure 8 illustrates a corner cutting of two stacked containers.

DETAILED DESCRIPTION OF THE FIGURES

[0020] According to Figure 2, there is a container which comprises a bottom 100, longitudinal vertical walls 200 and cross-sectional vertical walls 300, wherein the attachment of each longitudinal vertical wall 200 to the cross-sectional vertical wall 300 is reinforced by means of a tubular column 400 cylindrical in shape.

[0021] According to a preferred embodiment of the invention, the container walls have columns 210 and beams 220 preferably flat, which support vertical reinforcements 211 and horizontal reinforcements 221 which are perpendicularly connected. Moreover, the vertical walls comprise an upper perimeter edge 500 running throughout the container upper perimeter.

[0022] On the other hand, the bottom 100 is configured from a perimeter frame 110 (see Fig. 5) which encloses a grid structure arranged on T shaped ribs preferably and diagonally connected to each other.

[0023] According to Figures 3 and 4, the tubular column 400 is vertically extended inside the container at each corner up to a height preferably less than the upper end height, where the upper perimeter edge 500 is disposed. Moreover, said tubular column 400 is attached to two perpendicular plates 412 by the inside of the container, which in turn are attached to the vertical walls forming a single piece.

[0024] Advantageously, the portion of the column positioned inside the container comprises a recess 410 and in the upper face a hole 411 is configured. Said recess 410 together with the vertex formed by the upper perimeter edge 500 allows stacking with a container stacked at the top and it does not interfere with the grooves of the automated machines.

[0025] According to Figure 5, the tubular column 400 has a lower extension 420 cylindrical in shape, being said lower extension 420 attached to a lower projection 230 consisting of a bottom perpendicular element protruding from the perimeter frame 110 at the bottom, and which connects the lower part of each tubular column 400.

[0026] According to the embodiment illustrated in Figure 6, the container has its maximum height in the vertexes in order to promote the stacking of said points with other containers in a stack. Near the upper vertexes the upper perimeter edge 500 is tilted, in order to form then a flat vertex 510 protruding above the recess 410 of the tubular column 400. Moreover, advantageously the upper perimeter edge 500 has an extension 520 on a portion of the longitudinal vertical walls 200 providing a higher resistance to the structure avoiding the walls sag.

[0027] Still on Figure 6, it can be seen that the bottom 100 has bottom recesses 430 generated by the decrease of the bottom ribs height wherein according to a preferred embodiment, said bottom recesses 430 are positioned in the portion in contact with the vertical walls, thus forming an "X" shaped bottom structure 100.

[0028] The stacking method of two containers according to the invention and in reference to Figures 7 and 8, consists of placing a first container supporting the lower projection 230 in the soil surface, of a pallet, etc. The second container to be stacked in the lower part of said first lower container, is placed such that the lower projection 230 of the second container is arranged within the upper perimeter edge 500 of the first container, so that the outer face of the lower projection of the second container contacts the inner face of the upper perimeter edge of the first container.

[0029] By means of the above mentioned, the vertexes of the perimeter frame 110 of the upper container are supported on the flat vertexes 510 of the lower container, maintaining the walls (200, 300) aligned and consequently the tubular columns 400.

[0030] According to Figure 8, the stresses produced by the upper container weight are transferred by the perimeter frame 110 towards the flat vertexes 510 of the upper perimeter edge of the lower container and subsequently they are resisted by the tubular columns 400 which distribute the load towards the vertical reinforcements, to the horizontal reinforcements 221 and to the bottom ribs 120. By means of this configuration, all the stresses are distributed to all the container dimensions and channeled to the lower extension (420) of the container placed further down.

[0031] According to an example of the present invention, a container with the same size of the state of the art

containers, was constructed, this is 600 mm in length, 400 mm wide and 240 mm high. It was observed that due to the elements forming the structure of the container of the invention, a reduction of 20% of the weight was achieved without significant loss of resistance and enabling to form a containers stack comprising a combination of containers from the state of the art and from the present invention.

Claims

1. Plastic container for storage and transport of agricultural products, of which structure enables to reduce significantly the container weight without reducing its resistance and its storage volume, which is formed by a bottom (100), longitudinal vertical walls (200) and cross-sectional vertical walls (300), **CHARACTERIZED in that** it comprises:

- a reinforcement between each junction of the longitudinal vertical walls with the cross-sectional vertical walls consisting of a cylindrical shaped tubular column (400) where the lower part of each tubular column (400) is connected to a lower projection (230) running in a perimeter frame (110) of the container bottom;
- an upper perimeter edge (500) having an extension (520) on a portion of the longitudinal vertical walls (200);
- at least a bottom recess (430) positioned in the container bottom (100).

2. The container according to claim 1, **CHARACTERIZED in that** the tubular column (400) is vertically extended inside the container at each corner, up to a height less than the upper perimeter edge 500.
3. The container according to claim 1 or 2, **CHARACTERIZED in that** said tubular column (400) is attached to two perpendicular plates (412) by the interior of the container, which in turn are attached to the vertical walls (200, 300) forming a single piece.
4. The container according to any of the precedent claims, **CHARACTERIZED in that** the portion of the column placed inside the container comprises a recess (410).
5. The container according to any of the precedent claims, **CHARACTERIZED in that** the upper face of the column comprises a hole (411).
6. The container according to any of the precedent claims, **CHARACTERIZED in that** the lower part of each tubular column (400) consists of a lower extension (420) cylindrical in shape.

7. The container according to any of the precedent claims, **CHARACTERIZED in that** the lower projection (230) consists of a perpendicular element at the bottom protruding from the perimeter frame (110) in the lower part.
8. The container according to any of the precedent claims, **CHARACTERIZED in that** the bottom recesses (430) are placed in the portion in contact with the vertical walls.
9. The container according to any of the precedent claims, **CHARACTERIZED in that** the bottom recesses (430) form an "X" shaped structure.
10. The container according to any of the precedent claims, **CHARACTERIZED in that** near its upper vertexes, the upper perimeter edge (500) is tilted and comprises a flat vertex (510) protruding from the tubular column (400).
11. The container according to any of the precedent claims, **CHARACTERIZED in that** the perimeter frame (110) encloses a grid structure arranged over ribs (120).
12. The container according to claim 12, **CHARACTERIZED in that** said ribs (120) are T shaped.
13. The container according to claim 12 or 13, **CHARACTERIZED in that** said ribs (120) are diagonally connected to each other.
14. The container according to any of the precedent claims, **CHARACTERIZED in that** the walls (200, 300) of the container have columns (210) and beams (220) connected to vertical reinforcements (211) and horizontal reinforcements (221) perpendicularly connected in turn.
15. The container according to any of the precedent claims, **CHARACTERIZED in that** it has its maximum height in the vertexes.
16. A method for stacking plastic containers for the storage and transport of agricultural products, of which structure enables to reduce significantly the container weight without decreasing its resistance and storage volume, **CHARACTERIZED in that** it comprises the following steps:
 - a. To have at least two containers comprising:
 - a bottom (100);
 - longitudinal vertical walls (200) and cross-sectional vertical walls (300);
 - a reinforcement between each juncture of the longitudinal vertical walls with the cross-

sectional vertical walls consisting of a tubular column (400) cylindrical in shape, where the lower part of each tubular column (400) is connected to a lower projection (230) running on a perimeter frame (110) of the container bottom; 5

- an upper perimeter edge (500) having an extension (520) on a portion of the longitudinal vertical walls (200);
- at least a bottom recess (430) placed in the container bottom (100); 10

b. to place a first container supporting the lower projection (230) in a surface; 15

c. to place a second container over the first lower container arranging the lower projection (230) within the upper perimeter edge (500) of the lower container connecting the outer face of the lower projection (230) of the upper container respectively with the inner face of the upper perimeter edge (500) of the lower container. 20

d. to support the vertexes of the perimeter frame (110) of the upper container over the flat vertexes (510) of the lower container. 25

17. The method according to claim 16, **CHARACTERIZED in that** it comprises to transfer the stresses produced by the upper container weight by means of the perimeter frame (110) towards the flat vertexes (510) of the upper perimeter edge (500). 30

18. The method according to claim 17, **CHARACTERIZED in that** it comprises to distribute the stresses by means of the tubular columns (400) towards vertical stresses (211), to horizontal reinforcements (221) and to ribs (120) of the container. 35

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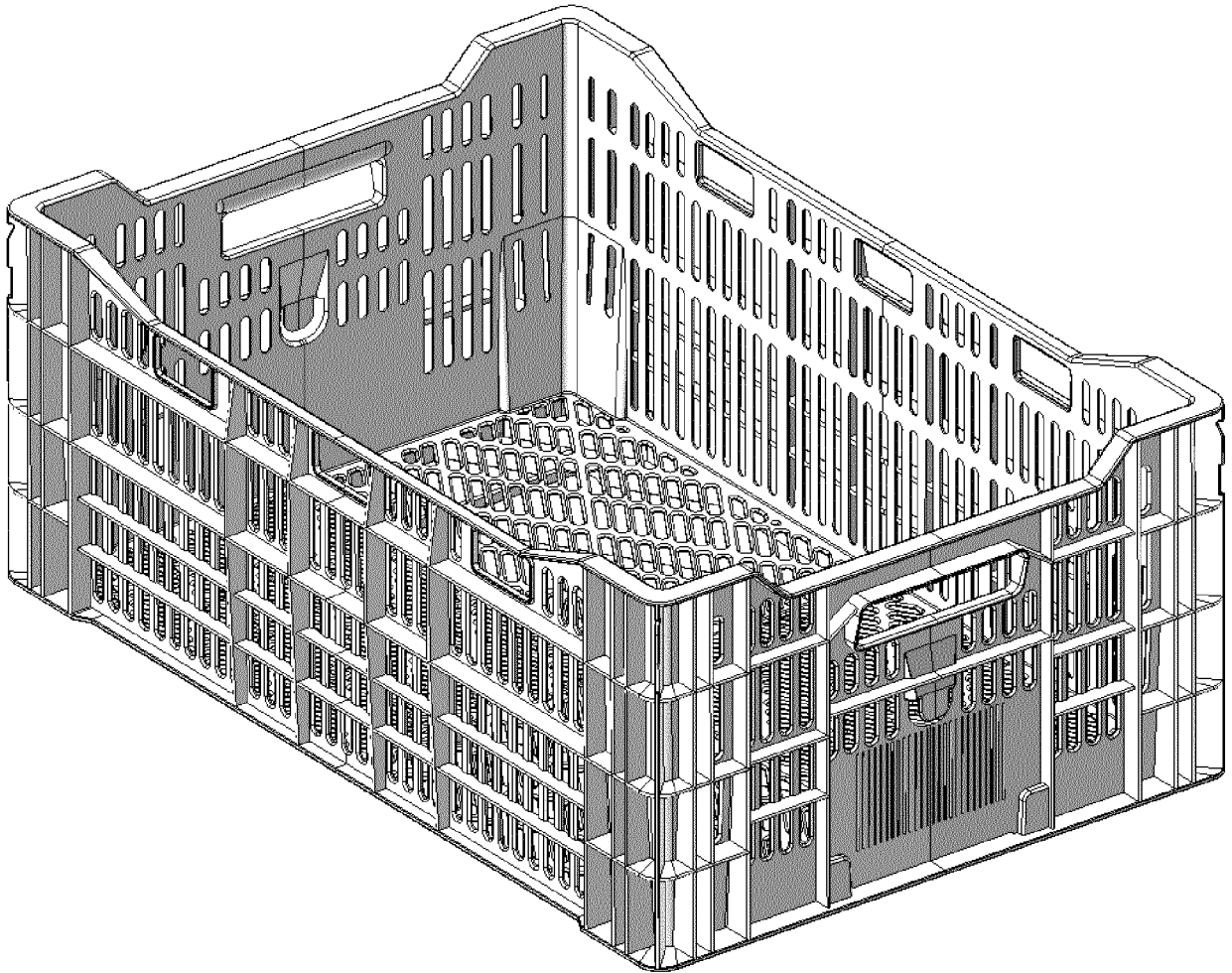


Fig. 1

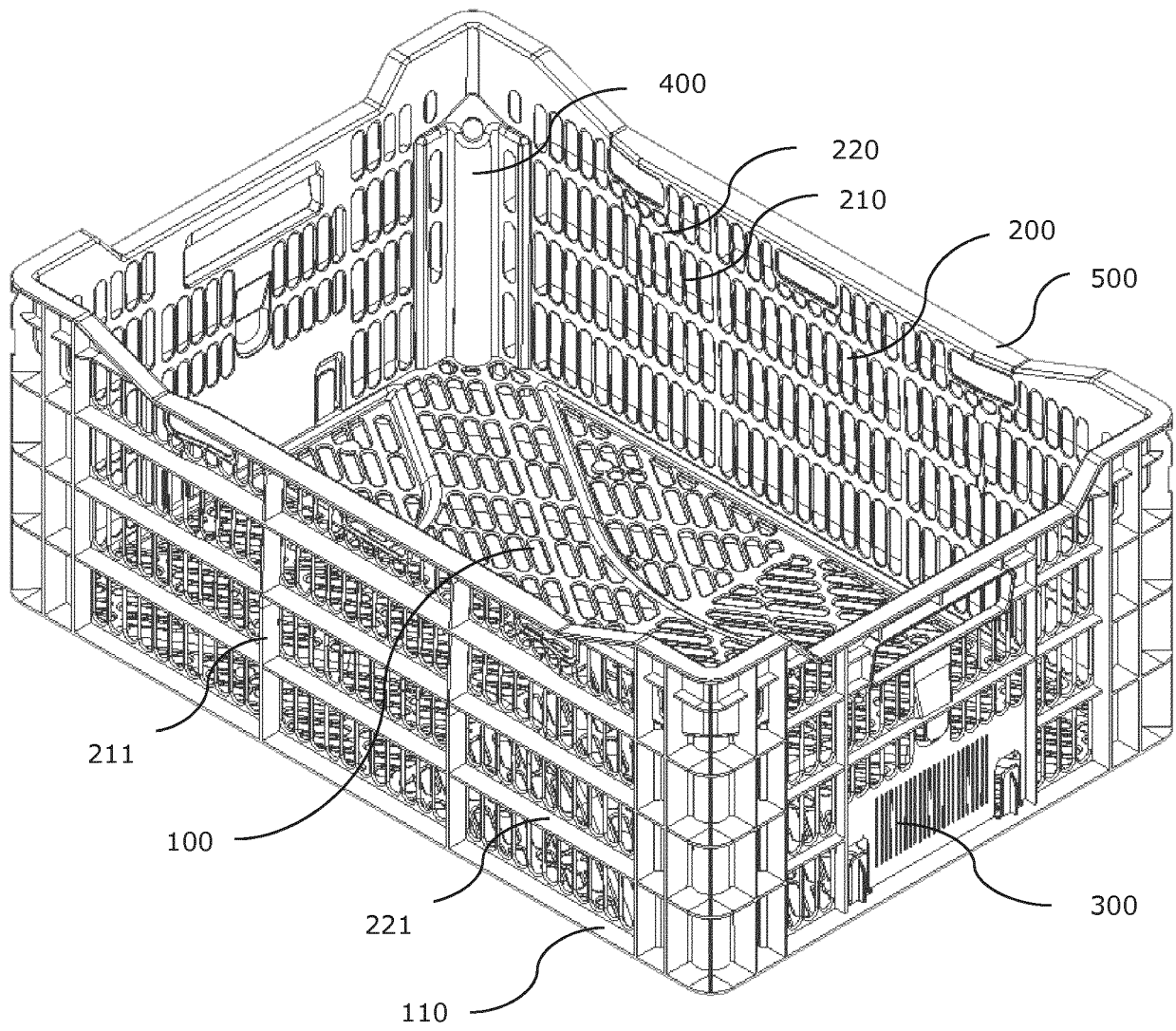


Fig. 2

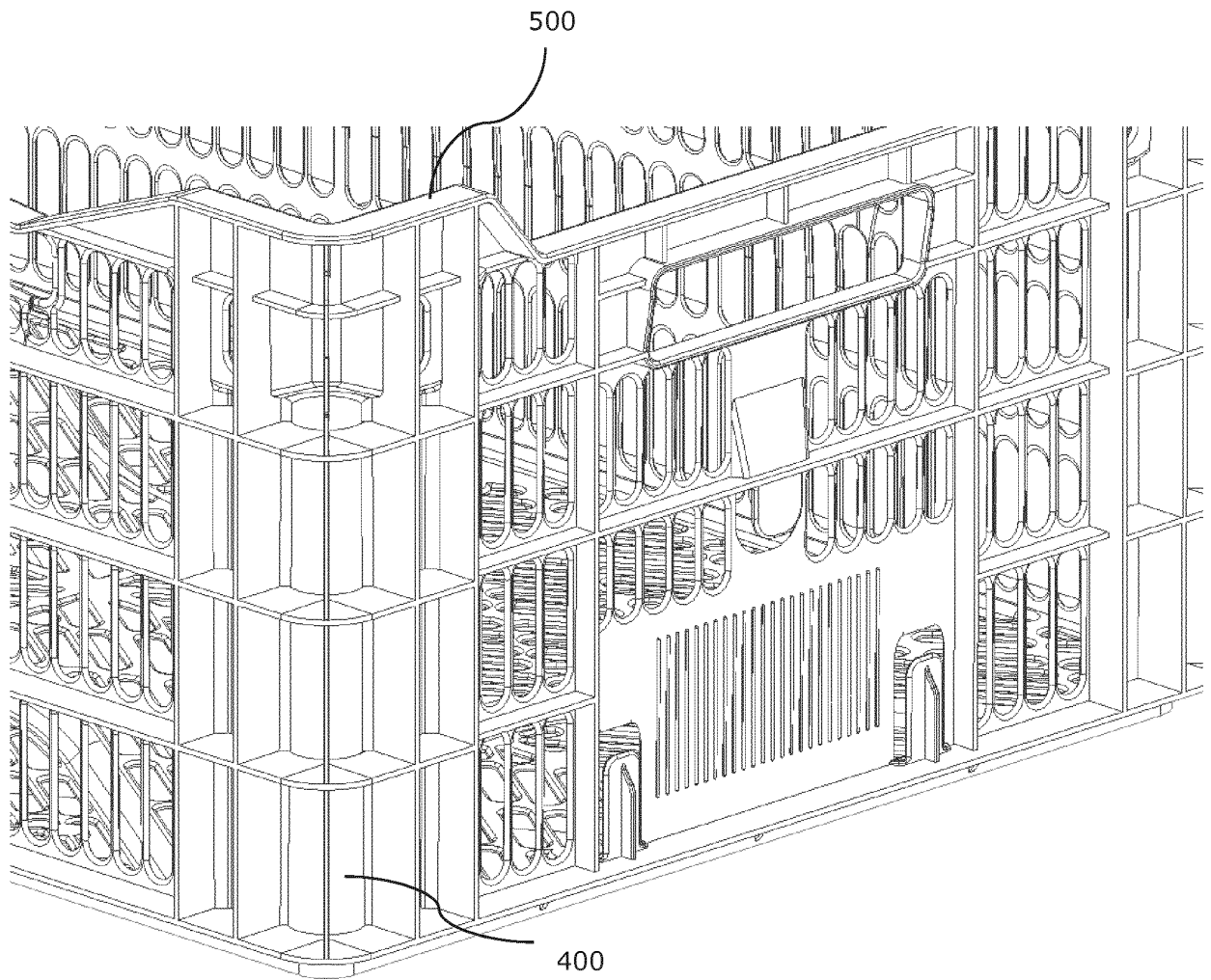


Fig. 3

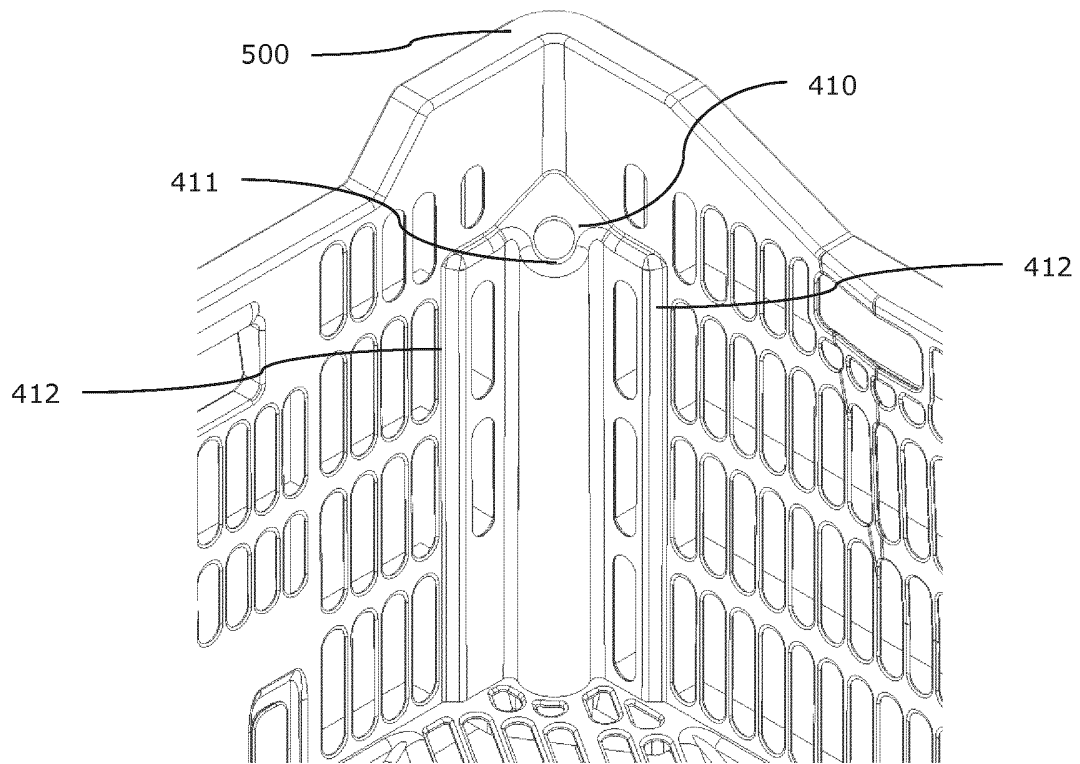


Fig. 4

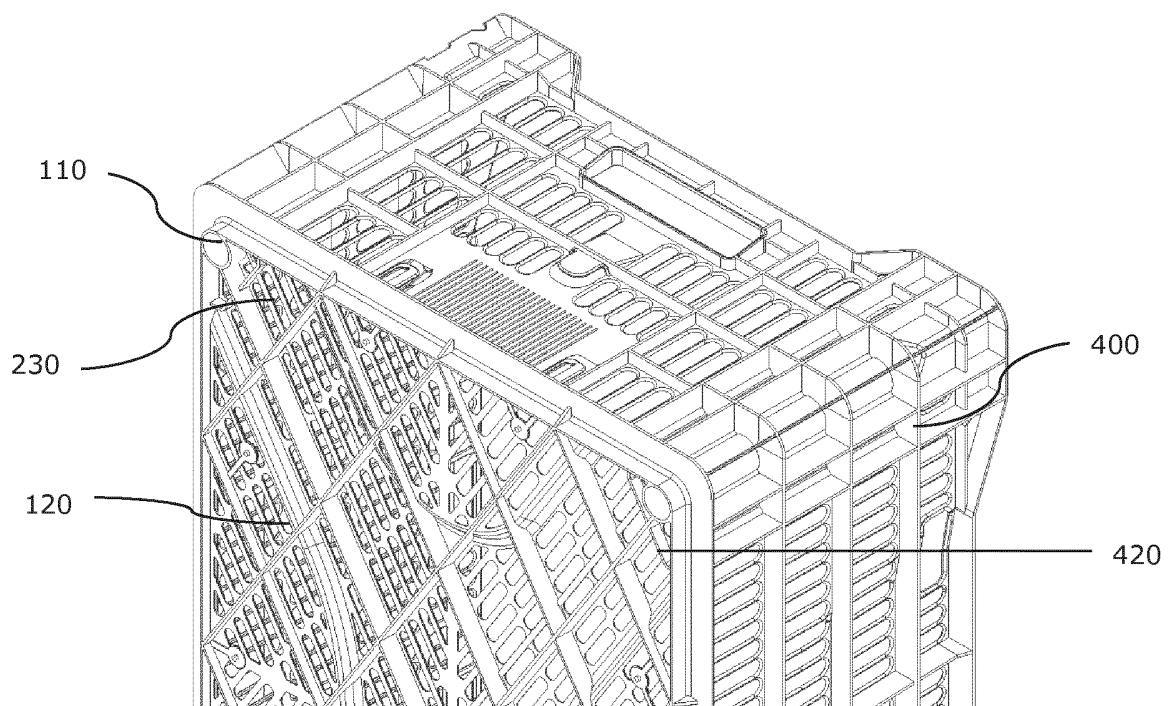


Fig. 5

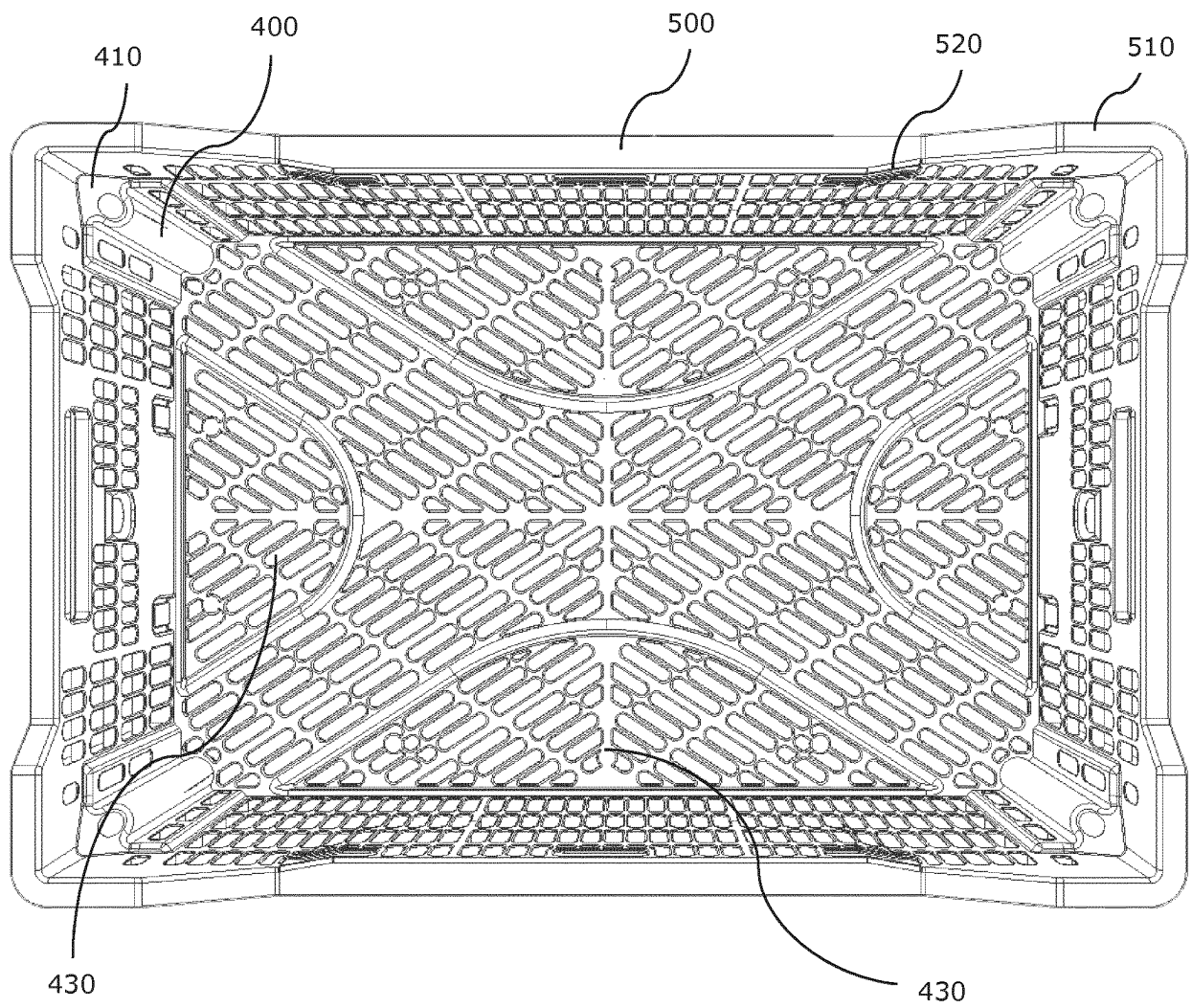


Fig. 6

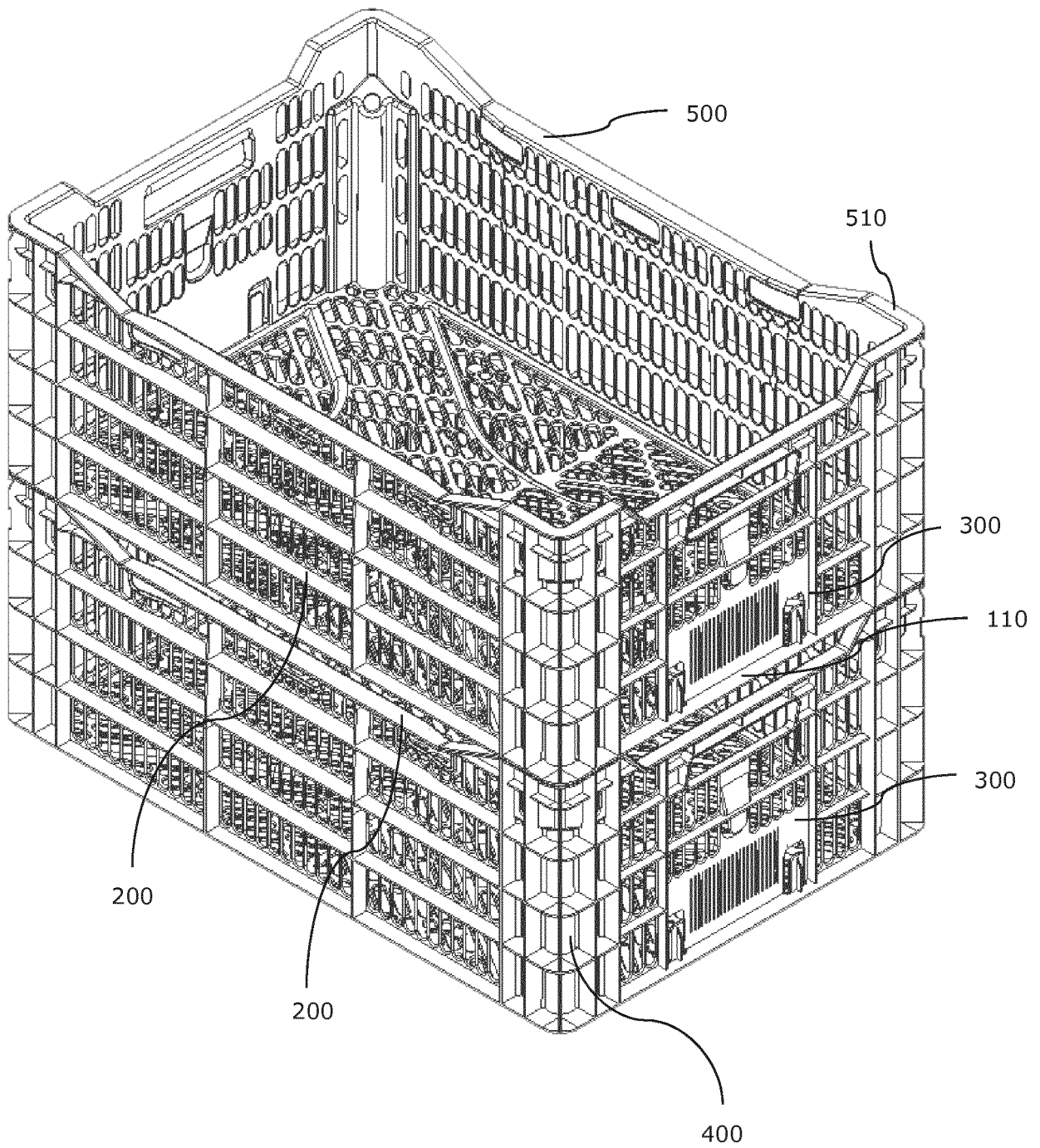


Fig. 7

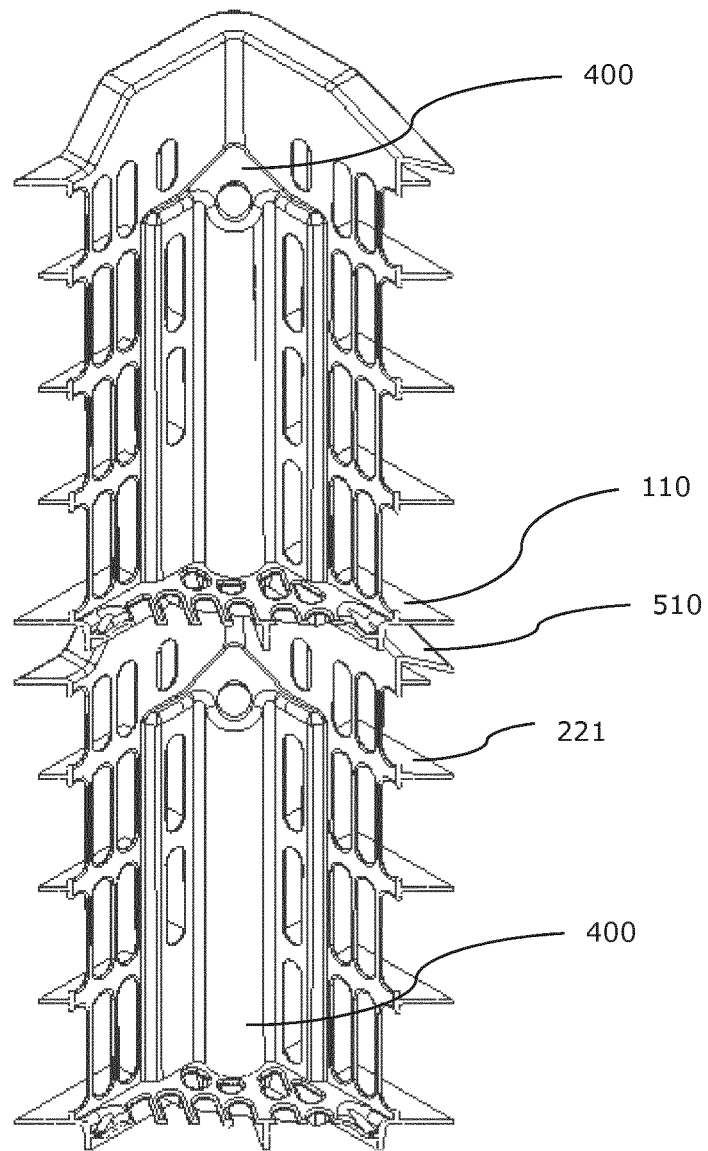


Fig. 8

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CL2017/050017

A. CLASSIFICATION OF SUBJECT MATTER

B65D1/00, 1/22, 1/38, 1/40, 1/42, 1/46, B65D21/00, 21/02, B65D85/00, 85/34 (2017.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

(CIP) B65D1/00, 1/22, 1/38, 1/40, 1/42, 1/46, B65D21/00, 21/02, B65D85/00, 85/34

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

Esp@cenet, Thomson, Google Patents, INAPI

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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Y	EP1604906A1 (RANDIS, F.) 14 DEC 2005 (14.12.2005), abstract, paragraphs 0012, 0025, figures 1 and 2	1-7, 10, 11, 13-18
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☐ Further documents are listed in the continuation of Box C.
 ☒ See patent family annex.

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"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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Date of the actual completion of the international search 02 JUN 2017 (02.06.2017)	Date of mailing of the international search report 23 JUN 2017 (23.06.2017)
Name and mailing address of the ISA/ INAPI, Av. Libertador Bernardo O'Higgins 194, Piso 17, Santiago, Chile Facsimile No.	Authorized officer HORMAZABAL ZUBICUETA, Raul 56-2-28870551 56-2-28870550 Telephone No.

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INTERNATIONAL SEARCH REPORT

Information on patent family members

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REFERENCES CITED IN THE DESCRIPTION

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