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(54) Nestable and stackable container

(57) The invention concerns a box (100) to contain articles, intended to be stacked on a further box (200) of the same type. The box comprises a frame (1) substantially parallelepiped, having a bottom (2) and lateral walls (3.6) and is characterized in that at least two of said lateral walls are provided with blocking and sliding means (12-15, 16-18; 40-70) intended to work with further blocking and sliding means associated to the further box. The boxes can take on a first configuration wherein said means and said further means are mechanically coupled to stack the boxes, blocking sliding of the box into the further box or vice-versa, and a second configuration wherein said means and said further means are coupled to enable sliding of the box into the further box or vice-versa so as to insert one box into the other.

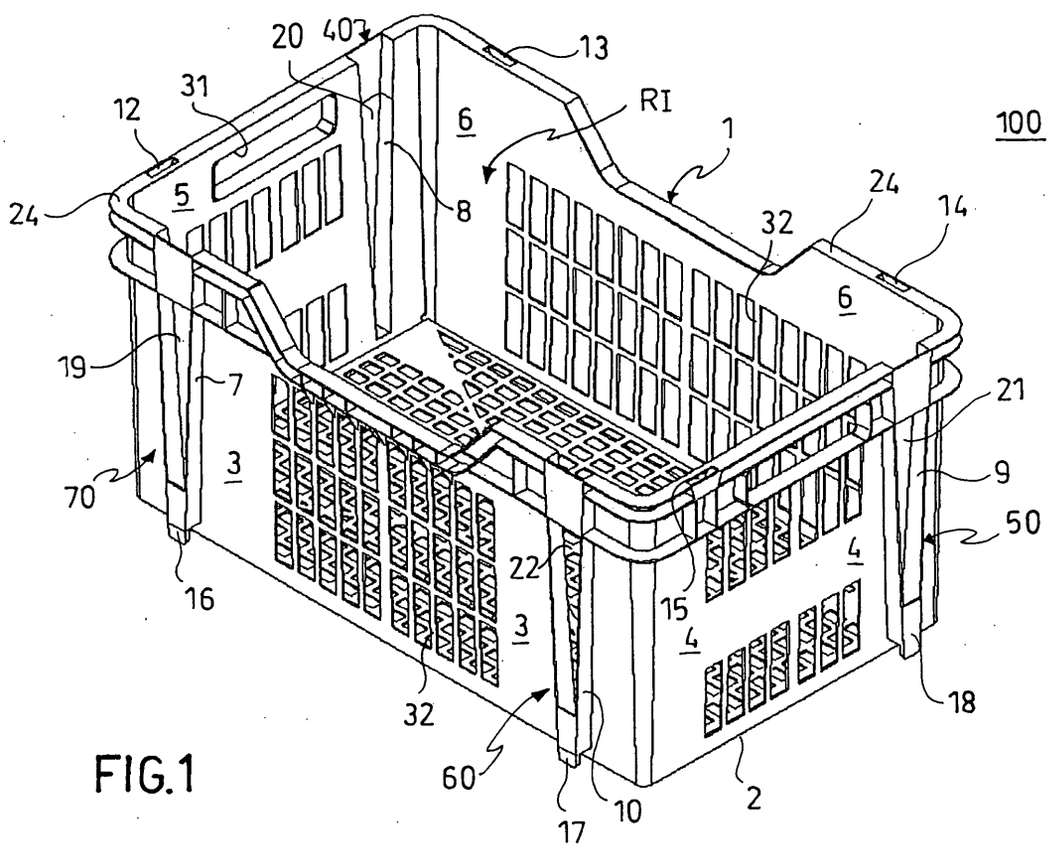

FIG.1

EP 1 604 906 A1

Description

[0001] The present invention refers to boxes to contain articles such as, for example, fruit and vegetables, which can be stacked one on top of the other.

[0002] Boxes produced, typically, in plastic material and used to contain fruit and vegetables which, when filled with goods, are placed one on top of the other (both for transportation and for display) forming a stack are well-known in the art.

[0003] Some types of said boxes, having a parallelepiped shape, are provided with a projecting element at the corners and upper edge which runs towards the inside of the box and serves as support for another box which is placed on top of the first. Furthermore, these conventional boxes are provided with several horizontal ribs around the external perimeter which confer adequate mechanical resistance to the structure, making it possible to stack the full boxes. To stack the boxes, the internal projecting elements of the lower box engage with the external ribs nearest to the bottom of the upper box, in such a way as to support it.

[0004] These conventional boxes have the disadvantage that a plurality of empty boxes occupy substantially the same overall volume as that occupied by the same boxes filled with goods. The effect of this disadvantage is that the boxes used to transport the goods to the place of sale are destroyed after sales and cannot be transported again to a place where they could be refilled. In fact, the cost to transport empty boxes is excessive and, therefore, it is cheaper to destroy the empty boxes at the place where the goods are sold and produce more boxes near the place where the goods to be sold are present.

[0005] This situation constitutes a serious limitation to the development of companies producing boxes, since they are practically obliged to work only near the places where the goods are present and make the price of the boxes relatively high. At the same time, repeated destruction of plastic boxes leads to evident negative consequences on the environmental conditions of the territories involved.

[0006] This problem is not easily solved also in consideration of the fact that, in many cases, it is not possible to modify the shape or size of the conventional boxes because the market using them (such as, fruit and vegetable market) has standardized them and would not tolerate significant modifications.

[0007] Object of the present invention is to supply a box to contain articles which does not have the above-mentioned limitations with reference to the known state of the art.

[0008] Said object is reached by means of a box as defined in the attached claim 1. Preferred embodiments of the box are defined in the independent claims.

For a better understanding of the characteristics and advantages of the present invention, some nonlimiting embodiments thereof are described below, with reference to the appended drawings, wherein:

- figure 1 is a view in perspective of an embodiment of a box produced according to the invention;
- figure 2 is a plan of said box;
- figure 3 is a lateral view of a small side of said box;
- figure 4 is a lateral view of a small side of said box;
- figure 5 is a view in perspective of another box substantially identical to that in the previous figures which can be stacked on/inserted into the box in figure 1;
- figure 6 shows a plan of a box produced according to an alternative embodiment of the present invention.

[0009] In figures from 1 to 4, a box according to the present invention is generally indicated with the reference 100.

[0010] The box 100 is made, preferably, in plastic material (for example, polypropylene PP) but can also be produced in other material such as, for example, metallic material. For production in plastic material, molding techniques known to the skilled in the art can be applied.

[0011] Furthermore, said box 100 can advantageously be used to contain articles such as, preferably, fruit (for example, oranges, lemons) and vegetables or fish products.

[0012] The box 100 comprises a frame 1 having a bottom wall 2 (typically with a rectangular shape) connected to two larger lateral walls 3 and 6 and to two smaller lateral walls 4 and 5. The lateral walls 3-6, connected to each other, define an upper edge 24 and, together with the bottom wall 2, define a region RI inside the box 2.

[0013] It should be observed that, according to a preferred embodiment of the invention, the frame 1 (even though it has a certain conical shape) is substantially of a parallelepiped shape and, that is, it has the lateral walls 3-6 inclined relative to a vertical axis (perpendicular to the bottom wall 2) in such a way as to have an inclination which is not inexistent but negligible and, for example, inferior to 5% or, preferably, inferior to 3%. In particular, said negligible inclination, also due to needs connected to molding techniques, has no disadvantages in terms of reduction of the internal volume RI of the frame available to contain the articles.

[0014] With reference to the particular solution illustrated in figures 1-4, the smaller lateral wall 5 comprises a first blocking element associated to the upper edge 24. Advantageously, said first blocking element is a first opening 12 (opening on a corresponding hollow region) made in the upper edge 24. According to the particular embodiment illustrated, a second and a third opening 13 and 14 are made in the upper edge 24 of the larger wall 6 and a fourth opening 15 is made in the upper edge of the smaller lateral wall 4.

[0015] The box 100 is further provided with other blocking elements and made, for example, in the shape of protuberances or teeth 16, 17, 18 associated to an

external face of the larger lateral wall 3 (teeth 16 and 17) and of the smaller lateral wall 4 (tooth 18). A further tooth 18', associated to the smaller wall 5 and specular to the tooth 18, is visible in figure 3. With reference only to the tooth 16 (figure 3) of the larger lateral wall 3 (but similar considerations are valid also for the other teeth), it is hook-shaped and has one end connected to the larger lateral wall 3 in a region near the bottom wall 2, and it extends downwards (i.e. towards the bottom wall) substantially parallel to the wall 3 itself. Said tooth 16 has one free end 16' which, advantageously, does not protrude below the bottom wall 2. It should be observed that the blocking elements, including the openings 12-15 and the teeth 16-18 and 18', are substantially configured in such a way as not to occupy the internal region RI and they develop externally to the box.

[0016] As will be better explained below, each of these teeth 16-18 and 18' is intended to be inserted into openings identical to the openings 12-15 present in another box (identical to the box 100) to be placed under box 100.

[0017] It should be observed that, advantageously, at least two opposite lateral walls of the box 100 have a respective tooth and respective opening aligned in a direction parallel to the longitudinal axis of the box. For example, the larger lateral walls 3 and 6 have a tooth 16 and the second opening 13 aligned in a direction parallel to the transversal axis.

[0018] The smaller lateral walls 5 and 4 are respectively provided with a first sliding guide 40 and a second sliding guide 50 and the larger lateral wall 3 is provided with further sliding guides 60 and 70, substantially identical to each other. According to the embodiment given in figures 1-4, the larger lateral wall 6 is not provided with sliding guides.

[0019] With reference, for the sake of brevity, only to the sliding guide 60 in the larger lateral wall 3, it should be observed that this guide includes a hollow region 22 in the same lateral wall which faces a corresponding opening in the internal region RI. As will be better explained below, the hollow region 22 is such as to house the similar ribbing of the guide of another box intended to be inserted into the box 100 and the ribbing 10 is such as to be inserted into a hollow region of a further box into which the box 100 is to be inserted.

[0020] According a particular embodiment of the invention, the ribbing 10 goes from an upper region of the larger lateral wall near the edge 24 towards a lower region near the bottom wall 2 and, for example, is such as to give the hollow region 22 a truncated cone cross-section.

[0021] The other guides 40, 50, 70 include hollow regions 20, 21, 19 and ribbing 8, 9, 7 respectively, being identical to the guide 60. Each of the guides 40, 50, 60 and 70 is such as to couple mechanically with a guide (placed in the same position) which another box is provided with (of the same type as box 100, that is, substantially identical to it) in such a way as to enable reciprocal sliding of the boxes so that one box is inserted into the other. Furthermore, the ribbing of each guide 40-70 has the advantage of providing greater mechanical resistance to the frame 1 of the box 100.

[0022] Advantageously, the teeth 16, 17, 18, 18' described above are arranged in such a way that they are substantially aligned vertically with the guides 70, 40, 50 and 60 respectively. In other words, each tooth is aligned with a guide in a vertical direction parallel to the vertical axis at right angles to the bottom wall 2.

[0023] In greater detail, and with reference (for simplicity) only to tooth 16, this is anchored to the external face of the larger lateral wall 3 and to an inferior portion (i.e. near the bottom) of the guide 70, so being aligned to it.

[0024] Furthermore, it should be observed that, advantageously, there is at least one opening (for example, the third opening 14) in the box 100, facing and aligned with a guide and, therefore, with a tooth (for example, the guide 60 and the tooth 17) made in the opposite lateral wall. For example, in the box 100 there is at least one guide with relative tooth, for example the guide 70 and the tooth 16, made in a lateral wall (such as the larger lateral wall 3) facing another wall (wall 6) without guides which are aligned with the above-mentioned guide (i.e., according to the embodiment, guide 70) in a direction perpendicular to the two facing walls. In particular, in the box 100 there are at least two guides with relative teeth not in line with the axis or axes perpendicular to the relative lateral walls (the guide 70 and the guide 60 are not in line with guide 50). For example, in the box 100 there is at least one opening, for example the opening 13, made in a lateral wall (such as the larger lateral wall 6) facing another wall (wall 3) without openings which are aligned with the above-mentioned opening (i.e., according to the embodiment, opening 13) in a direction perpendicular to the two facing walls. In particular, in the box 100 there are at least two openings not aligned with the axis or axes perpendicular to the relative lateral walls (the opening 13 and the opening 14 are not aligned with the opening 12).

[0025] The box 100 is also provided with handle-openings 31 made in the smaller lateral walls to enable grasping of the box itself and with window openings 32 made in several regions of the frame 1 through which it is possible to observe, from the outside, the goods present inside the box and which consent reduction in the material used for manufacture without compromising the mechanical performance of the frame 1.

[0026] Figure 5 illustrates another box 200 on which it is possible to stack the box 100 and into which said box can be inserted, or vice-versa. The box 200 is of the same type as the above-described box 100 and the structural elements similar to those of box 100 are indicated in figure 5 with the same numerical references followed by the letter "I".

[0027] The box 100 and the further box 200 can take on two reciprocal configurations: one inserting configu-

ration and another configuration where they are stacked, i.e. placed one on top of the other.

[0028] To insert box 100 into the other box 200 (empty), reference should be made to figures 1 and 5. In order to obtain said configuration, the box 100 is placed on top of box 200 in such a way that the guides 40, 50, 60 and 70 are aligned with guides 40I, 50I, 60I and 70I respectively. The ribbing 7, 8, 9 and 10 of the guides of the top box 100 slide into the hollow regions 19I, 20I, 21I and 22I of the bottom box 200 in such a way that the top box 100 is at least partially inserted into the internal region RI-I of the bottom box 200. In this configuration, the teeth 16-18 and 18' are mechanically uncoupled from the openings 12I-15I, since they are not aligned and superimposed on them.

[0029] It is possible to operate in such a way that the top box is inserted into the bottom box for a value greater than 70% of its volume and, for example, equal to 80% of its volume.

[0030] In the case, for example, that the boxes 100 and 200 are full, it is possible to stack them one on top of the other without one occupying the internal region of the other. In order to obtain the stacking configuration, the box 100 must be turned 180° relative to the inserting configuration and placed on top of box 200. In this case, the teeth 16, 17, 18 and 18' of the box 100 are inserted into the openings 14I, 13I, 12I and 15I of the box 200 respectively. In this stacking configuration, the bottom 2 of the box 100 is placed on the edge 24I of the box 200 and the teeth 16, 17, 18 and 18' make it possible to block any undesired insertion of the box 100 into the box 200 due to the weight of the top box and, advantageously, they impede reciprocal horizontal sliding of the two superimposed boxes. In the stacking configuration, the sliding guides 40-70 are mechanically uncoupled from the sliding guides 40I-70I, since they are not aligned and superimposed on them.

[0031] The ribbing associated to the guides 40, 50, 60, 70 provides considerable mechanical resistance which enables stacking several full boxes. For example, up to fifteen boxes made in plastic material can be stacked, having a weight of 350 g each and each containing goods for a weight equal to approximately 5 kg.

[0032] It should be observed that, according to the present invention, it is possible to make boxes with a number and reciprocal arrangement of guides, teeth and openings different from that illustrated in figures 1-5. With regard to this, figure 6 shows a plan of a box 300 which has a different arrangement of guides and openings from that illustrated until now. In this variation, the guides 40V, 50V, 60V and 70V (identical to those described previously and provided with a respective tooth in the lower part) are arranged in couples and distanced on the two larger lateral walls and they each face a respective opening 12V-15V made in the opposite lateral wall.

[0033] It should be noted that the box according to the invention can be produced with other suitable blocking means, different from the above-described teeth and openings. For example, instead of the teeth, slightly protruding horizontal flaps can be used and, instead of openings, cavities can be made in the edge to house said flaps or, alternatively, teeth or other projections can be made on the upper edge 24 of the box to engage with openings made in the side edge of the bottom wall of the top box. Furthermore, as an alternative to the above-described guides and ribbing, sliding means can be used of a type different from the one illustrated, for example, projecting tongues and corresponding grooves.

[0034] In the case the box 100 is used to contain fruit and vegetables, some examples of dimensions are: 40 cm by 30 cm by 16 cm; 40 cm by 30 cm by 18 cm; 50 cm by 30 cm by 16 cm ; 50 cm by 30 cm by 13 cm.

[0035] The teachings of the present invention are particularly advantageous. In fact, it is possible to insert the boxes into each other quickly and easily (reducing considerably the total volume occupied by a plurality of empty boxes) without having to reduce the volume of the internal region of the box, contrary to what would happen in the case of boxes with a clearly conical shape.

[0036] For example, with reference to the reduction in the total volume occupied by a plurality of empty boxes, it was noted that, thanks to the teachings of this invention, the volume occupied by approximately 3900 fruit boxes of the same size and produced according to the known art (i.e. that cannot be inserted one into another) is occupied by approximately 18000 boxes which can inserted one into another and produced according to the invention.

[0037] This considerable reduction in the volume occupied by the empty boxes makes it convenient to reuse the empty boxes with evident advantages not only in economic terms both for the user and manufacturer but also in terms of reduction in environmental pollution.

[0038] As already pointed out, the teachings of the invention make it possible to insert one box into another without reducing the total volume available for the goods compared to that of the boxes known in the art and, therefore, to use the box according to the invention in those markets (such as the fruit and vegetable market) where the dimensions (and, therefore, the quantity of goods therein contained) are established by standards laid down by law or by deep-rooted habit.

[0039] Naturally, in order to satisfy contingent and specific requirements, a person skilled in the art may apply to the box according to the present invention, many modifications and variations, all of which, however, are included within the scope of protection of the invention as defined by the following claims.

Claims

1. A box (100) for containing articles, intended to be stacked on top of a further box (200) of the same type, said box comprising a frame (1) having a bot-

tom (2) and lateral walls (3-6), **characterized in that** at least two of said lateral walls are provided with blocking and sliding means (12-15, 16-18; 40-70) intended to cooperate with further blocking and sliding means associated with the further box, the boxes being able to take on a first configuration where said means and said further means are mechanically coupled to stack the boxes, blocking sliding of the box inside the further box or vice-versa, and a second configuration where said means and said further means are coupled to permit sliding of the box into the further box or vice-versa in such a way as to insert one box into the other.

2. A box (100) according to claim 1 wherein, starting from the first configuration, the second configuration is taken on by means of rotating, particularly at 180°, one of the two boxes relative to the other, and vice-versa.

3. A box according to claim 1 or 2, wherein said blocking and sliding means extend outside the box so as not to reduce the volume of an internal region (RI) of the box defined by the lateral walls (3-6) and the bottom (2).

4. A box (100) according to claim 2 or 3, wherein the blocking and sliding means comprise at least a first blocking element (13) and at least a second blocking element (16) arranged on respective facing lateral walls (6, 3) of the box, being aligned to each other in a direction parallel to an axis of symmetry of the frame; in the first configuration, said first at least second blocking element (16) engaging with a further first blocking element (14I) associated to the further box (200) and, in the second configuration, the at least second blocking element (16) and the further first blocking element (14I) being uncoupled.

5. A box (100) according to claim 4, wherein said at least first blocking element is an opening (13) made in the upper edge (24) of a lateral wall (6) and said at least second blocking element is a tooth (16) associated to an external face of a second lateral wall (3) of the box; said further first blocking element being another opening (14I) made in the upper edge of a further box (200) intended to house said second blocking element (16I) made by means of a further tooth of a box to be superimposed.

6. A box (100) according to claim 5, wherein said tooth (16) is outside the box (100), has one end connected to the first lateral wall in an area near said bottom (2) and extends towards the bottom and substantially parallel to the first lateral wall (3), having a second end free to be inserted into a further first blocking element (14I) associated to the further box (200) and having the shape of an opening.

7. A box (100) according to at least one of the above claims, wherein said blocking and sliding means further comprise at least a first sliding guide (70); in the second configuration, said at least first sliding guide (70) being engaged with a further guide (70I) associated to the further box so as to enable insertion of the further box into the internal region (RI) of the box; in the second configuration, the at least first guide (70) and the further guide (70I) being uncoupled.

8. A box (100) according to claim 7, wherein said at least first guide (70) includes a hollow region (19) made in the corresponding lateral wall (3) which faces at least inside the respective box, said hollow region being limited by ribbing (7) which extends along the external face of the respective lateral wall without engaging the internal region (RI) of the box; the ribbing (7) of the at least first guide is intended to be housed in the hollow region of a further guide (70I) of the further box in order to obtain reciprocal sliding of the corresponding guides and so as to favor insertion of one box into another.

9. A box (100) according to claims 4 and 7, wherein said at least first guide (70) and said second blocking element (16) are arranged on the same lateral wall and in such a way as to be aligned in a direction at right angles with the bottom (2).

10. A box (100) according to claim 8, wherein said ribbing (7) extends from the upper region of the respective lateral wall near the edge (7) towards a lower region of the respective lateral wall near the bottom, said ribbing providing, moreover, mechanical resistance to the corresponding box.

11. A box (100) according to at least one of the above claims, wherein said tooth (16) of the second blocking element is made in an area near the bottom of said at least first guide (70).

12. A box (100) according to at least one of the above claims, wherein said frame is substantially parallelepiped and has lateral walls inclined relative to a vertical axis with an inclination of less than 5% or, preferably, less than 3%.

13. A box (100) according to at least one of the above claims, made in metallic material or in plastic material such as, preferably, polypropylene.

14. Use of the box (100) according to at least one of the above claims to contain food products, such as fish or, preferably, fruit and/or vegetables.

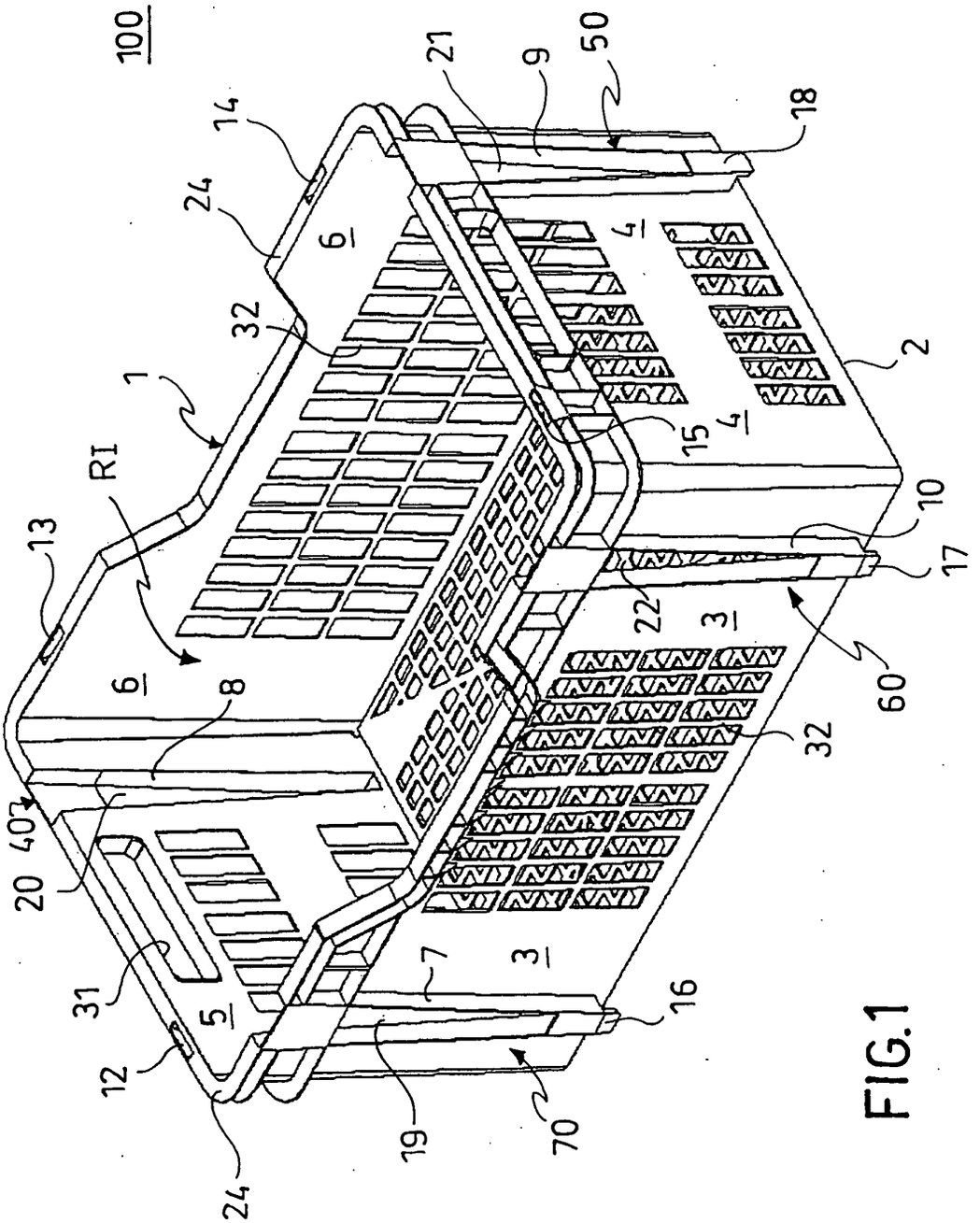
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FIG.1

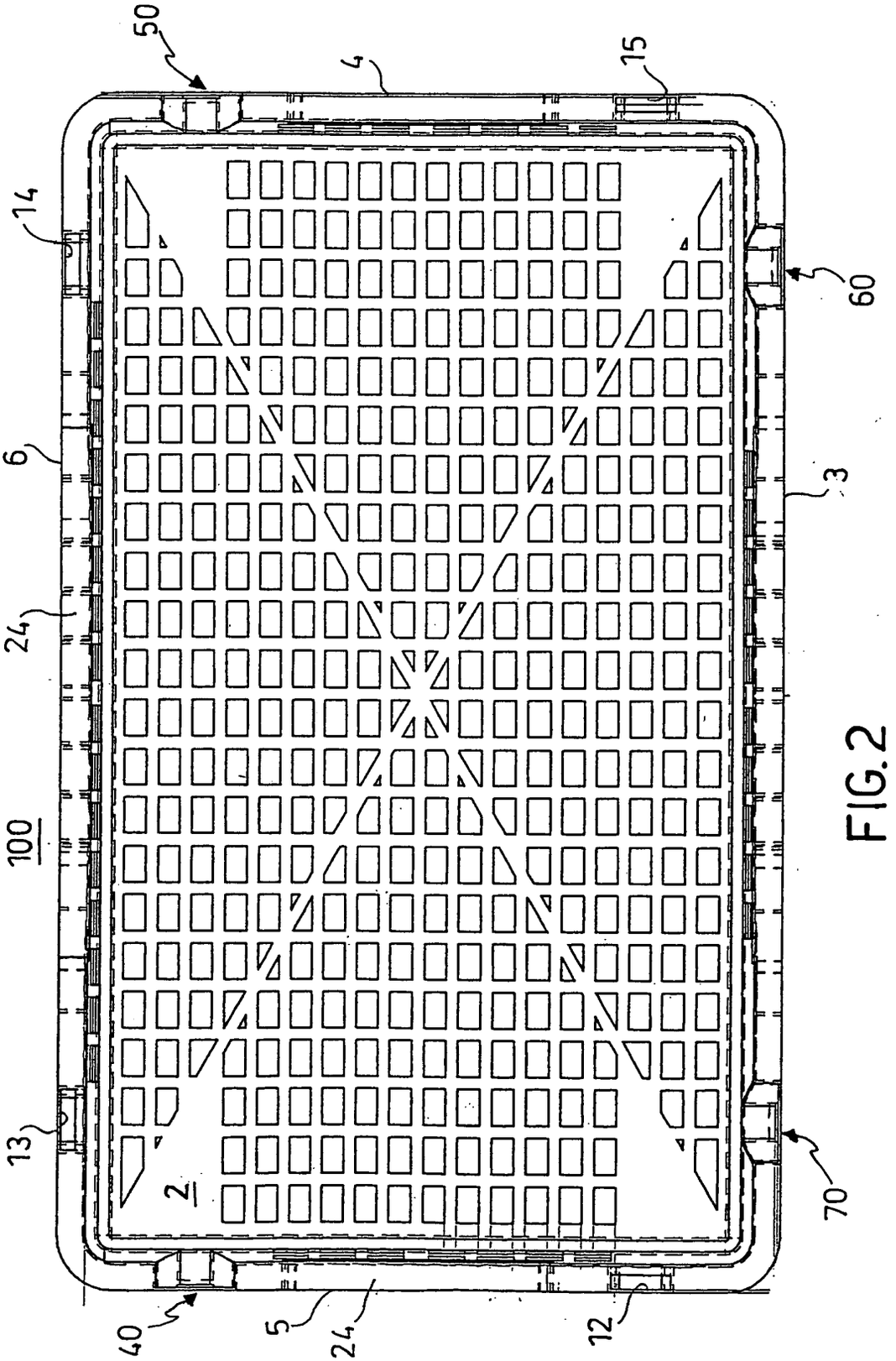

FIG.2

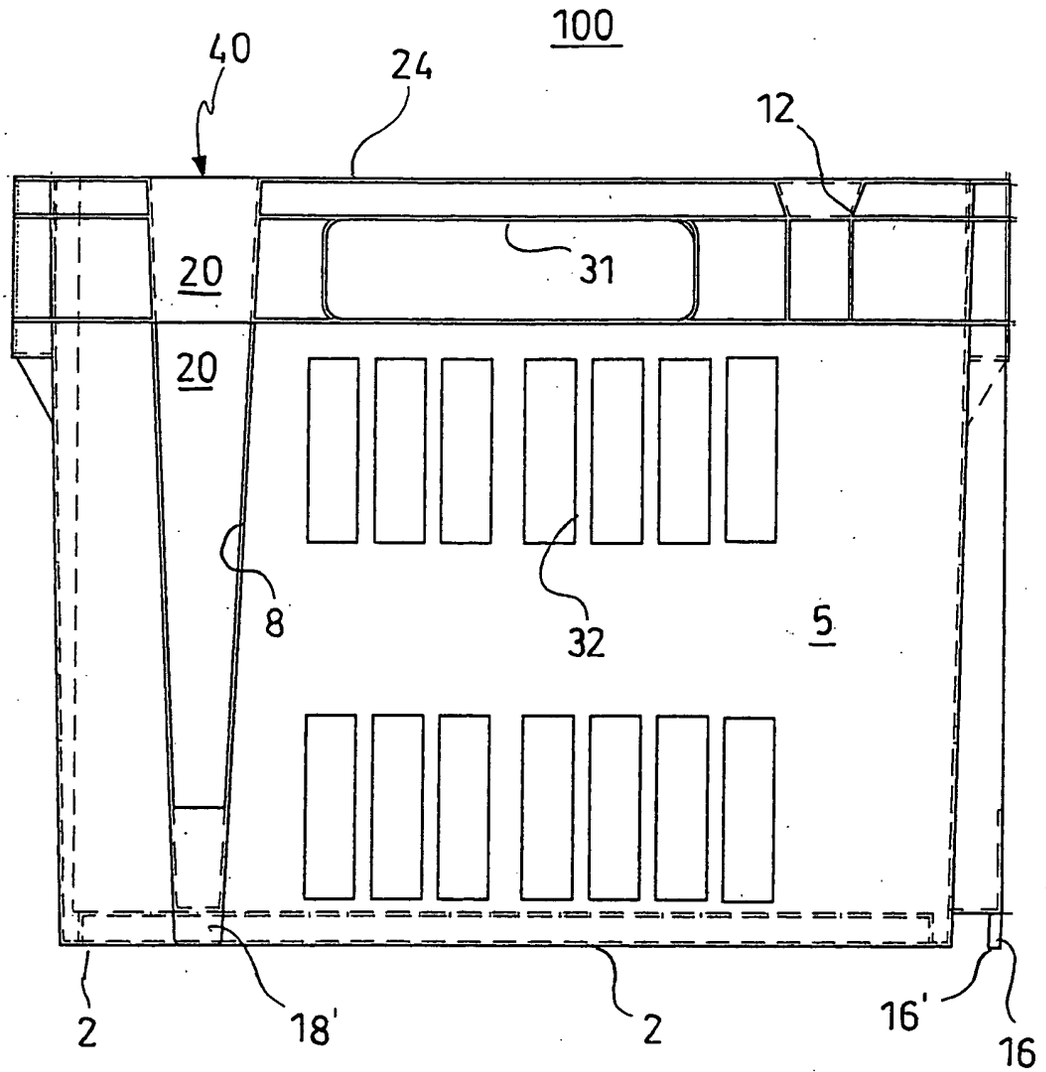

FIG. 3

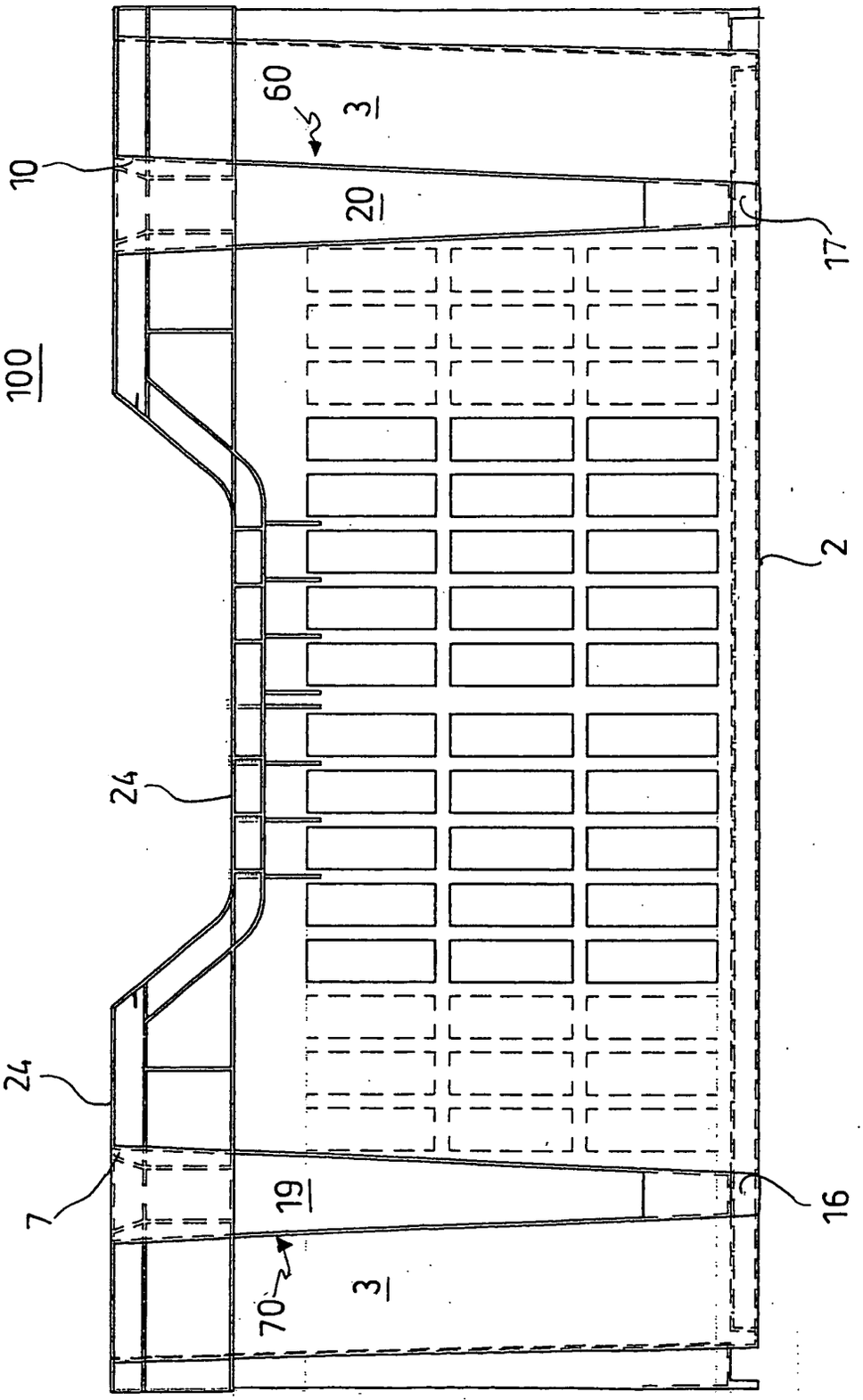

FIG. 4

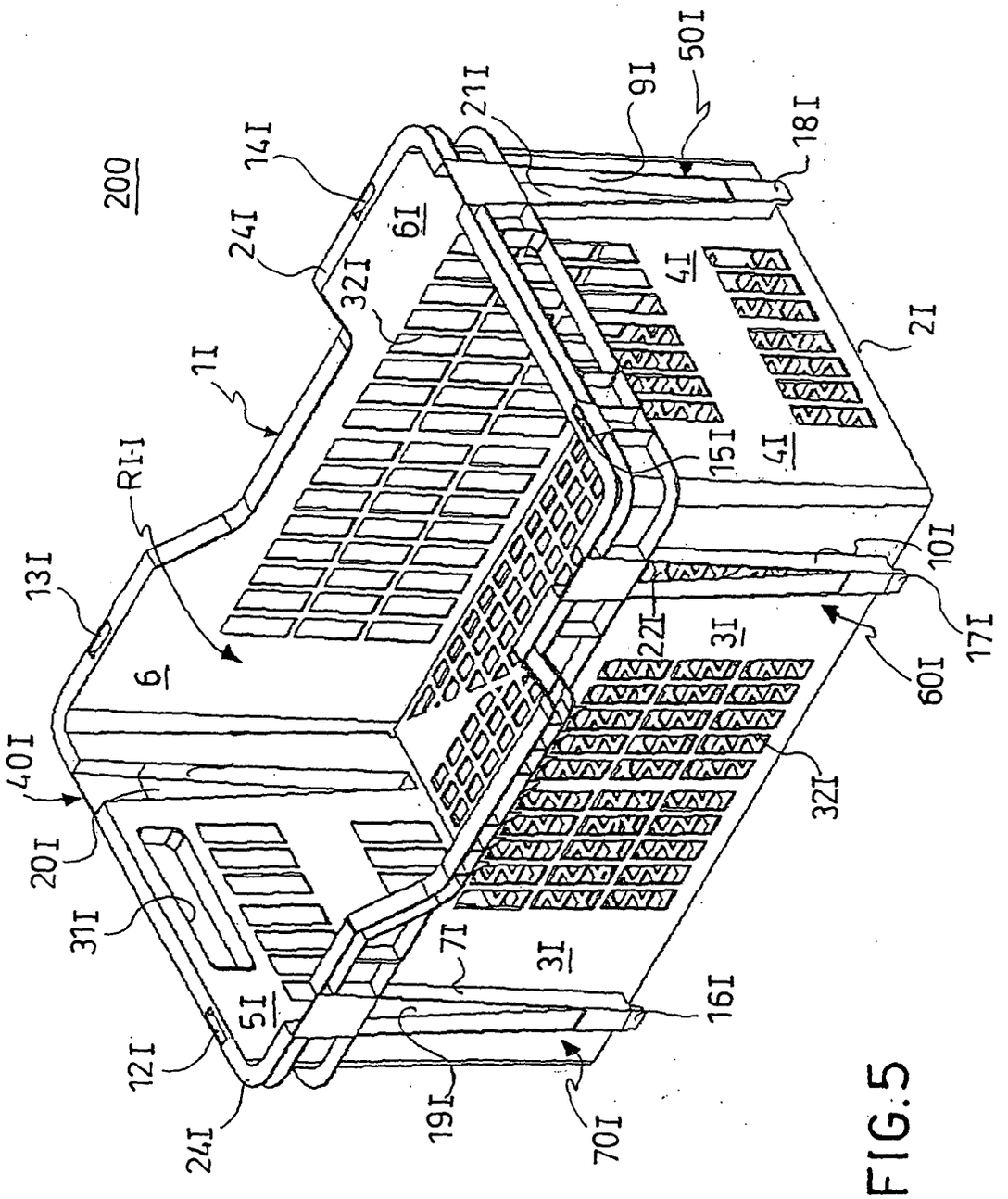
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FIG.5

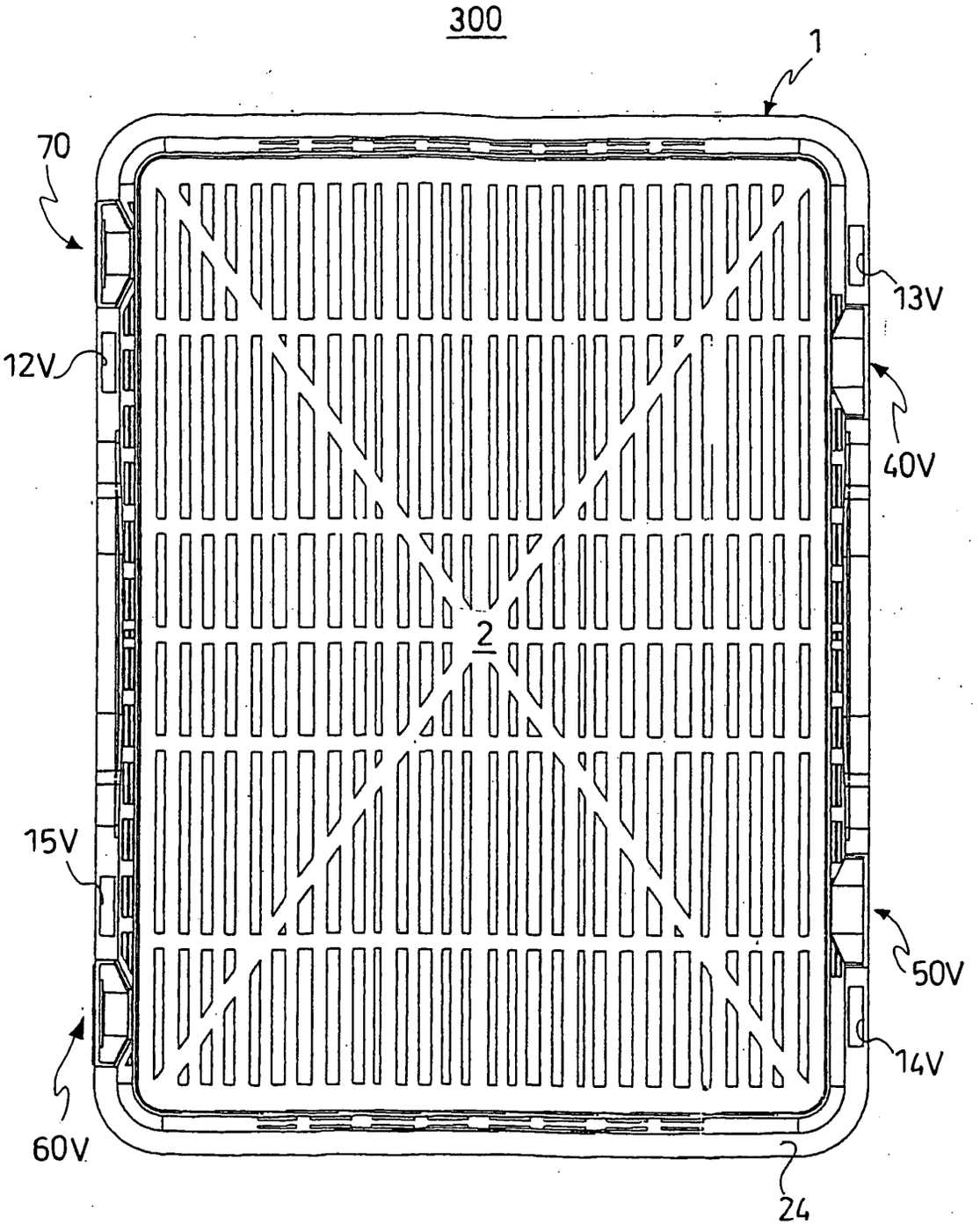

FIG. 6

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EUROPEAN SEARCH REPORT

Application Number
EP 04 42 5432

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	22 November 2004	Newell, P

CATEGORY OF CITED DOCUMENTS

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