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Bottom of a Container that Optimizes the Use of Material

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(56) Related Art
US 2008/0023426 A1
US 4731014 A
US 8640912 B2
US 6179156 B1

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Abstract

Bottom of a container for produce that optimizes the use of material to distribute the stresses to which it is subjected, thereby reducing the final weight of the container without losing strength, said bottom being formed by a bottom frame attached to a bottom base, wherein said bottom base comprises ribs of variable height.

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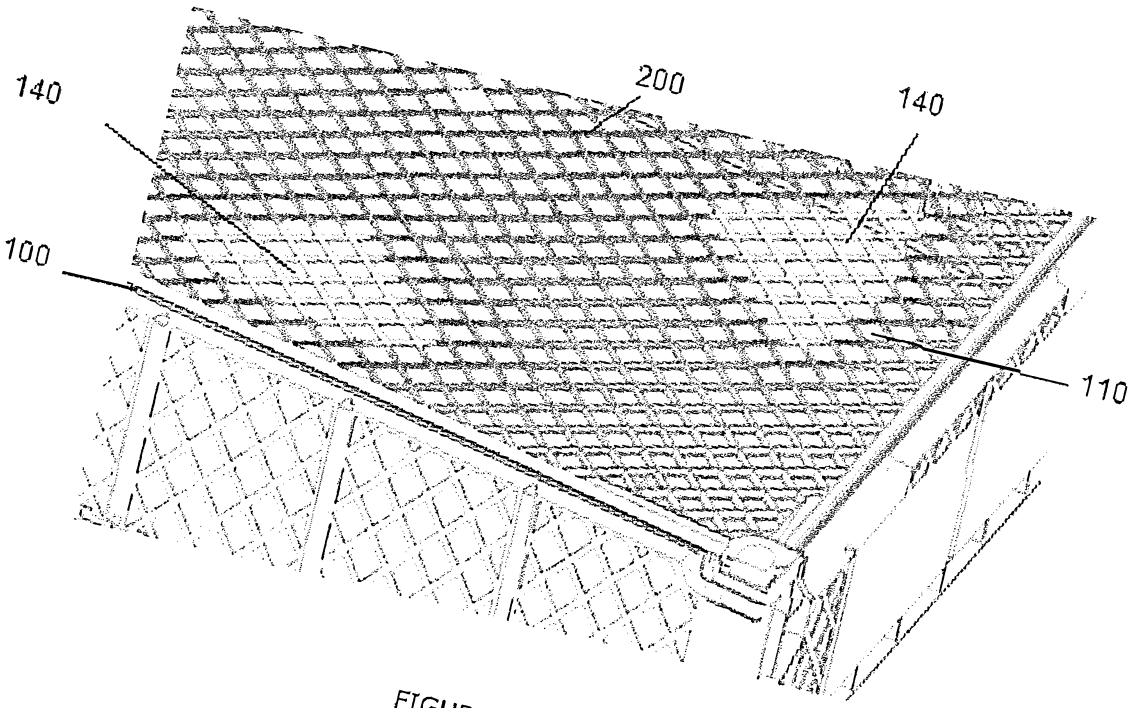

FIGURE 5

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BOTTOM OF A CONTAINER THAT OPTIMIZES THE USE OF MATERIAL

TECHNICAL FIELD

The present disclosure relates containers with deformable bottoms made of plastic material such as those that may be used for transport and storage of vegetable and fruit products.

The present disclosure may also relate to the container manufacturing process that incorporates the bottom of the present disclosure.

BACKGROUND

Currently, in the packaging industry there may be several types of containers for storage and transportation of products, e.g., vegetable and fruit products during harvesting, these may be manufactured of different materials, shapes and sizes according to the requirements of the product to be stored and/or transported.

Nowadays, the containers used for storage and transportation of fruits during harvesting such grapes, cherries, blueberries among others, may preferably be made of plastic material and may be mainly configured from a bottom in connection with lateral walls, forming an inner volume in which vegetable and fruits products to be stored and transported are placed.

It may also be common in this type of containers that both the walls and the bottom of the box are formed from a structural framework that may allow a significant reduction in the weight of the container, in this way achieving less manufacturing costs and an improved handling.

An example of the previously mentioned is disclosed by the CL patent application No. 0671-1990 which describes a multi box, squared based, whose walls and bottom have a regular rhomboidal framework, with four elongated hollows.

It may also be common in this type of containers to have collapsible walls, which may provide a significant increase in the space availability during transport and handling of said containers when they are not being used for storing products therein.

An example of this is disclosed by the CL patent application No. 0289-1998 which describes a folding box made of plastic, having sidewalls folding inwardly on the bottom wall of the box and which also provides elements of insertion that fit into projection insertions in said side walls .

A common problem in this type of containers may be that as the collapsible sidewalls may not be completely fixed, when such containers are filled with the products therein, the force exerted by these on the junction points of the side walls and bottom may cause the container to deform that means a risk to the integrity of the container and especially to the products inside of the container.

Nowadays, solutions may be available in the state of the art that seek to increase the stiffness of the structure as disclosed by the CL patent application No. 1075-2009, which describes a handle of one piece connectable to a harness, to be installed in a plastic box for the harvest of fruits and vegetables, comprising a metal bar of the type of wire to be inserted by pressure on each side of the box.

Meanwhile, the CL patent application No. 0187-2013, describes a plastic container for the storage and transport of fruit and vegetables, which has elements that reinforce the structure of the mentioned box or container allowing a better stress distribution, wherein said elements that reinforce the structure correspond tensor straps system consisting of a pair of thin plastic straps with terminals at their ends, which are arranged on two sides of the mentioned box.

While the above-mentioned inventions may provide efficient solutions to prevent distortion and loss of rigidity of the container structure when filled with the products, there may yet be another problem for this type of containers that may not have been discussed or resolved by the current state of the art solutions.

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In particular, when a container is filled, the bottom of this container should in some embodiments be capable of withstanding, without breaking, the pressure exerted by the contents inside the container, which may depend on the weight and type of products to be stored or transported in the container. In addition, such pressure may be often variable depending on the movement to which the container is subjected, where in many cases this may correspond to sudden movements caused by the operator or machinery responsible for transporting containers which may cause a significant increase in efforts to which the bottom of the container may be subject thereof.

In this context, it may be important to consider the magnitude of the deformation of the bottom where an excessive deformation may cause the bottom of the upper box to press the content of the lower box, and which may cause unacceptable damage or marks on the boxes.

In general, current containers that are manufactured by plastic injection may be manufactured with a uniform bottom, either of the framework type, perforated or of plain bottom, where both the thickness and the height of the bottom are determined according to certain tolerance, so that the container can be used to transport products with different weights.

The strength produced by the products inside the container towards the bottom may be distributed by the same towards the frame structure of the box where reinforcing elements may be arranged which correspond to plates or ribs that may go through the bottom face of the container in a longitudinal, transversal or diagonal form.

While this type of manufacturing of a bottom container may represents a reliable form, regarding the strength to withstand stresses generated by the variable content inside the container, there may often be an excess of material in its manufacture which may be unnecessary. Significant benefits may be achieved in

terms of depletion of the final weight of the container, reduction in manufacturing materials and consequently a reduction in manufacturing costs were less material used in the bottom of a container. In this regard, ordinary containers may comprise a high percentage of its mass on the bottom, concentrating, in some cases, 41% of the mass of the container.

It may be necessary to have a container bottom, for example for products, as fruit and vegetables, which may optimize the use of material for distributing the stresses to which it is subjected, thereby achieving a reduction of the final weight of the container without loss in strength.

It is to be understood that, if any prior art publication is referred to herein, such reference does not constitute an admission that the publication forms a part of the common general knowledge in the art, in Australia or any other country.

SUMMARY

In a first aspect is disclosed a container bottom for fruits and vegetable products that optimizes the use of material to distribute the stresses to which it is subjected, thereby reducing the final weight of the container without losing strength. The bottom can be formed by a bottom frame attached to a bottom base, wherein said bottom base is formed by ribs of variable height, forming a coat whose irregular geometry and design depends to the efforts to which the container is subjected. The variable height ribs consist of a body comprising an upper portion which defines the upper face of the container's bottom and a lower portion. The lower portion has a variable height. The bottom is fixed to the base of a column configured as a hollow cylindrical body.

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In some embodiments, the upper portion of the ribs of variable height may be formed by a combination of sections of different geometry. Similarly, in some embodiments, the bottom portion may comprise a rectangular body of variable height which base may always be on the same plane.

According to the above, in some embodiments, the variable height ribs may have a "T" shape and the design of the lower portion may have a variable height, in such a way that may optimize the distribution of the stresses produced by the products arranged inside the container, and at the same time that may allow a reduction in the final weight of the bottom of the container compared with prior art containers.

In some embodiments, the variable height ribs may have their maximum height at the ends or corners of the bottom frame, in which area the largest amount of strength caused by the weight of the products inside the container may be required. Further and according to an embodiment, the bottom base may comprise areas not be reinforced by variable height ribs in which the height of the rib may be completely reduced to a minimum value. Therefore, the bottom of the container may consist of a coat of variable height with areas of different geometry specially optimized to efficiently distribute the stresses to which it may be subjected and may reduce their weight by reducing unnecessary material in its manufacture.

In some embodiments, the bottom base of the container may consist of ribs of variable height arranged in a diagonal framework, circumscribed within the bottom framework, however, different designs and/or arrangements of the ribs of variable height may be used according to the needs of transportation or storage, as well as the type of fruits and vegetables products to be contained.

According to another aspect is disclosed a container for fruit and vegetable products which optimizes the use of material to distribute the stresses to which it is subjected, thereby reducing the final weight of the container without losing strength. The container is formed at least of a bottom and sidewalls, wherein the bottom of the container has a bottom base which is formed by ribs of variable height forming a coat whose irregular geometry and design depends to the efforts to which the container is subjected. The ribs of variable height consist of a body comprising an upper portion which defines the upper face of the container's bottom and a lower portion. The lower portion has a variable height. The container is provided with collapsible walls which are joined together by a bonding system comprising at least a closing device and a fixed column to one of the structures or faces. The column is configured as a hollow cylindrical body, composed of at least one closure means and fixed to the bottom of the container.

In some embodiments, the container may further comprise collapsible walls which are joined together by a junction system that may comprise at least a closing device and a column fixed to one side of the faces, wherein said column is configured as a hollow cylindrical body. In some embodiments, the hollow cylindrical body may have a circular section. In some embodiments any other suitable shape may be used, such as either elliptical, square, rectangular, triangular, etc., integrated into at least one of the closing means.

In some embodiments, the column of the junction system of the container may comprise a base which is fixed to the bottom of the container, and which may comprise stacking means to facilitate latching with other containers.

In a further aspect is disclosed a method of manufacturing a container which optimizes the use of material to distribute the stresses to which it is subjected, thereby reducing the final weight of the container without losing strength. The method comprises the steps of:

- defining the shape of the bottom of the container according to the height of the ribs of variable height that form a coat whose irregular geometry and design depends to the efforts to which the container is subjected, wherein the ribs of variable height consist of a body comprising an upper portion which defines an upper face of the container's bottom and a lower portion, wherein said lower portion has a variable height, and wherein the bottom is fixed to a base of a column configured as a hollow cylindrical body;

- Manufacturing a mold of the container based on the shape of the bottom;

- Injecting plastic material into the {} mold, wherein said mold comprises a form of ribs of variable height determined for the bottom of the container;

- Cooling the structure manufactured inside of the mold by heat transfer from said structure into the mold;

- Opening the mold for the extraction of the manufactured structure; and

- Closing the mold to start a new manufacturing cycle;

wherein the step of determining the shape of the bottom of the container allows to optimize the use of the material to distribute the stresses to which the container is subjected.

BRIEF DESCRIPTION OF THE DRAWINGS

The following figures are incorporated by reference and represent a preferred embodiment of the container, however other embodiments in accordance with the description which are not represented in these figures may be available.

Figures 1 to 3 illustrates examples of the types of bottoms of container according to the prior art.

Figure 4 illustrates in detail a container bottom rib according to the prior art.

Figure 5 illustrates a preferred embodiment of the bottom of the container.

Figure 6 illustrates in detail a container bottom rib.

Figure 7 illustrates in detail an alternative embodiment of the container bottom rib.

Figure 8 illustrates a superior plan view of the bottom of the container.

Figure 9 illustrates the results of comparative tests of deformation carried out to the bottom of the container of the prior art.

DETAILED DESCRIPTION

According to Figures 1 to 3, the bottoms of the container for fruits and vegetables products moulded by plastic injection are generally formed by a bottom frame (100) attached to a bottom base (110), wherein according to Figure 1, this bottom base (110) may be a framework formed by plastic ribs (120) orthogonal to the bottom edges of the frame (100), which may further include reinforcing ribs (130) intersecting diagonally the bottom frame for providing greater strength to the structure. Alternatively and as seen in Figure 2, the bottom base (110) can also be formed from a diagonal framework in which rhomboid hollows may be formed.

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According to Figure 3, the bottom base (110) can also consist of a rigid perforated sheet surface, optionally including reinforcing ribs (130) supported on the lower face and diagonally crossing or in some other direction of the bottom frame.

The design and type of the bottom base used in the containers for fruit and vegetable products is nowadays subjected to the features of shape, size and weight of the products to be stored, being evident that for smaller products, a smaller framework space will be required in order that those products do not pass through the container walls. Similarly, heavier products require to be transported in containers with bottoms that include reinforcing ribs or bottom bases of the type of rigid surface.

According to Figure 4, a reinforcing rib (130) as those used in the containers of fruit and vegetable products of the prior art, which are generally comprised of a structure in a "T" form comprising a horizontal rectangular portion (131) and a vertical rectangular portion (132), wherein the top face (133) of the horizontal rectangular portion (131) is faced to the inside of the container as part of the surface where the products stored in the container are supported as shown in Figure 1 .

Similarly, the reinforcing rib (130) is attached to the frame base bottom (110) by end means (134) in a way that the force caused by the weight of the products stored inside the container is transmitted from any point of the reinforcing rib (130) towards the base frame, and due to the greater contact surface area provided between the frame and said ends (134) given by the vertical rectangular portion (132), it will be avoided that the horizontal rectangular portion (131) be bulged offering more resistance to traction, bending and twisting of the container bottom.

According to Figure 5, disclosed is a container bottom for fruits and vegetable products comprised of a bottom frame (100) attached to a bottom base (110), where in a preferred embodiment, said bottom base (110) consists of a diagonal framework comprised of variable height ribs (200). The bottom frame (100) can completely or partially surround the container.

Variable height ribs, and according to that illustrated in Figure 6, consists of a body comprising an upper portion and a lower portion, wherein said lower portion which is located outward to the container has a variable height in the extension of the rib, wherein the of said lower portion of all the ribs of the bottom of the container are in the same plane. Meanwhile, the upper portion is configured as a body which is adapted to the variable height of the lower portion.

In the embodiment illustrated by Figure 6 the rib of variable height (20) has a "T" shape, being formed by an upper portion (210) and a lower portion (220). The upper portion (210) of rectangular section with an upper face (230) and uniform thickness, is configured adapting to the height of the lower portion (220) that has a rectangular section of variable height and uniform thickness. In this sense, the variable height rib (200) is configured in such a way that in the ends (240) of the nerve which are in contact with the frame base, the lower portion (220) reaches its maximum height, which in a preferred embodiment becomes progressively decreased toward the central part of the rib of the bottom container, where the mentioned bottom portion (220) has its minimum height, where along the entire length of the rib of variable height (220) the base of the lower portion (220) is located on the same plane.

Notwithstanding the above, the upper and lower portions may also be of a trapezoidal or oval form or any other type of form, so that its geometry is not a limitation.

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Figure 7 illustrates another example of the variable height rib (200), wherein the upper portion (210) is formed by a combination of sections to be adaptable to the variable height of the lower portion (220) setting an upper face (230) with curves, wherein said upper portion may be formed by a rectangular, trapezoidal or a combination of any type of section to be adaptable to the variable height of the lower portion (220).

According to the above and once more, in reference to Figure 5, the bottom of the container is formed of a botttom base (100) formed by a framework of variable height ribs (200), providing a bottom of variable height, in which according to the illustrated example, the bottom base (100) can comprise unreinforced areas (130) in which the rib height is completely reduced to a minimum value, wherein the base of the lower portion is in the same plane.

The above configuration allows an important depletion in the final weight of the containers, which is essentially achieved due to the depletion of material that can be obtained through the ribs of variable height, while achieving at the same time a balance and transmission of optimized efforts.

In the top plan view of the bottom of the container bottom shown in Figure 8, a bottom base is shown, in which variable areas (141, 142, 143) may be observed, that represent changes in the height of the ribs of the container or changes in form. Thus, the areas closer to the bottom frame (100) have a greater height than the ones in the central area (143).

Similarly, an area may also contain differences in height between the ribs of variable height that form the area, as for example the area (142) may have a spherical shape and thus the ribs located in the central portion of said area could have a higher height than those arranged in the peripheral portions, and at the same time, the area (141) could be formed by ribs whose lower portion changes in height while maintaining a uniform base in the same plane.

Therefore, the different configuration of areas with different shapes and variables heights cause that the upper face (230) of the bottom of the container looks like a coat whose irregular geometry and design will depend exclusively to the efforts to which the container is subjected, associated to the weight, size and shape of the content to be stored, which can be determined for example by results obtained by test of modeling and computational simulation.

The fact that the greater height of the ribs is concentrated on the point of contact with the frame in the ends of the base, is related to that such points are receiving the maximum strength of traction, bending and cutoff generated by the weight of the products inside the container, thus being well distributed the efforts of the bottom towards said points through the ribs that go through the frame, it is possible to disregard the material of the lower portion of the rib of variable height without losing resistance.

A test was performed to measure the directional deformation in the Z axis of the bottom of the container in relation to one of the types of the bottoms used in the prior art which is illustrated in Figure 9.

The bottoms of the containers shown are marked in areas, where area 1 corresponds to that area closest to the vertex of the frame to which the bottom is attached and the area VI corresponds to the area closest to the center of the bottom of the container.

The table below shows the results of the test applied to the bottom of the box to be compared.

Zone	Deformation background prior art [mm]	Deformation background of the present disclosure[mm]
Max	0,020132	0,035269
I		
	-1.7996	-1.7563
II		
	-3.6193	-3.5478
III		
	-5.4389	-5.3394
IV		
	-7.2586	-7.1309
V		
	-9.0783	-8.9225
VI		
	-10.898	-10.714
VII		
	-12.718	-12.506
VIII		
	-14.537	-14.297
IX		
Min	-16.357	-16.089

From the results of the trial it was found that the deformation of the bottom of the container bottom of the prior art was 16,357 mm versus the background of the present disclosure was 16,089 mm, showing even a reduction of almost 2% in the bottom deformation according to the implementation of the bottom of the disclosure. In addition, implementation of the bottom of the disclosure resulted in a weight difference of 35.89 gr in the bottom, which represents a depletion of 24.63 % from the weight of the bottom of the container of the prior art.

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This weight reduction may be of great advantage from the point of view of production because it reduces the use of materials for manufacturing, thereby also decreasing manufacturing costs in addition to improvements associated with the handling of products.

Despite the above, the present disclosure is not limited only to the type of bottom base tested, i.e., using a diagonal framework and may also be formed by a framework of ribs with variable height orthogonal to the bottom frame or a rigid perforated base and reinforced with ribs of variable height according to containers currently used.

Thus, the present disclosure also relates to a fruit and vegetable product container which comprises a bottom formed by ribs of variable height according to the embodiments described in the preceding paragraphs, allowing to optimize the use of material to distribute the stresses to which the container is subjected, thereby achieving a significant reduction of the weight thereof and without loss in strength.

In a preferred embodiment the fruit and vegetable products container has collapsible walls, which are joined together by a junction system located at the free ends of said walls, comprising at least one closing device, preferably of the clip type, having at least a pair of closing means, a male closing means and another female closing means, wherein said closure means joins at least two structures or to two adjacent sides of a container for fruit and vegetable products, preferably the side faces being fixed to them.

According to an embodiment, the junction system comprises a column fixed to one of said structures or faces, wherein said column is configured as a hollow cylindrical body, preferably of circular section, which in turn is integrated to at least one of the closing means. Preferably, the column is configured as a straight hollow

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cylinder whose cross section is a circle. In alternative embodiments the cross section of the cylindrical body can also be oval, polygonal, with open or closed "U" forms, or any shape which allows to be configured as a hollow cylindrical body.

Additionally, the column comprises a base which is fixed to the bottom of the container, so that when the side faces joining together the column are mounted on said base forming a continuous structure together with the junction of the side faces.

According to a preferred embodiment, the base of the column also comprises means of stacking which latch with the stacking means of the column that another container has at the upper portion, in order that a first structure or container for fruit and vegetable products can safely be stacked over a second structure or container.

Those skilled in the subject matter will understand that the container for fruit and vegetable products with variable height bottoms of the present disclosure is not limited to a certain size, shape or only to the type of collapsible walls, being also able to be of the type formed by fixed side walls comprising openings or only solid walls and also include a cap or not, etc.

The present disclosure also relates to the manufacturing process of the bottom of the containers, in particular a collapsible container incorporating such bottom, being relevant to indicate that said procedure consists of injection molding, which comprises employing a mold with the shape of the container and injecting material, preferably plastic into said mold. In addition, the manufacturing process allows the manufacture of a container with a bottom that optimizes the use of the material to distribute the stresses to which it is subjected, thereby achieving a reduction of the final weight of the container without loss in strength.

In general terms the injection procedure considers the following steps:

Injecting plastic into a closed mold;

Cooling the manufactured structure into the mold;

Opening the mold for extracting the manufactured structure; and

Closing the mold to start a new manufacturing cycle.

In this context, the present disclosure includes an additional step to the manufacturing processes of the prior art that consists in determining the shape of the bottom of the container based on the height of the ribs that form said base and its own form, which allows to obtain a bottom container design that is optimally adapted to the needs of effort to which it is subjected, while at the same time minimizing the weight of the bottom and consequently the final weight of the container. In this context, shape or geometry determined to the bottom of the container is used for the manufacture of molds that form the container and in particular, the bottom of it, so that the features possessed by the mold will be printed on all containers made with such molds.

The step of determining the shape of the bottom of the container based on the height, shape and distribution of ribs of variable height depend exclusively on the content itself, since the size, shape and weight of the products to be stored within the container are those that ultimately affect the efforts to which the structure is subjected. Therefore, the bottom of the container must be able to support them, so the type of product is crucial to the design of the bottom so that efforts be optimally distributed through the ribs of variable to the bottom frame.

In a preferred embodiment, the step of determining the shape of the bottom of the container is performed by a computer program which yields the optimum geometry of the bottom of the container according to the size, material, type and shape of the container to use as well as based on the characteristic of the products to be stored and/or transported.

According to the step aforementioned it is possible to obtain infinite configurations for the bottom of the container, resulting in a coat inside the frame bottom, formed by the ribs of variable height that form a structure of variable geometry which allows distributing stresses by using less material and without loss of strength, which finally results in a significant reduction in weight and manufacturing costs.

Those skilled in the art will understand that involved optimal design of the container bottom is not limited to a single technique of the computational type, but also other methods, such as trial and error may also be applied among others.

While the container has been described in reference to its preferred embodiments, it is to be understood that the words which have been used are words of description rather than limitation and that changes may be made without departing from its scope as defined by the appended claims.

In the claims which follow and in the preceding description, except where the context requires otherwise due to express language or necessary implication, the word "comprise" or variations such as "comprises" or "comprising" is used in an inclusive sense, i.e. to specify the presence of the stated features but not to preclude the presence or addition of further features in various embodiments.

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CLAIMS

1. Bottom of a container for vegetable and fruit products that optimizes the use of material to distribute the stresses to which it is subjected, thereby reducing the final weight of the container without losing strength, said bottom being formed by a bottom frame attached to a bottom base, wherein said bottom base is formed by ribs of variable height forming a coat whose irregular geometry and design depends to the efforts to which the container is subjected, wherein the ribs of variable height consist of a body comprising an upper portion which defines the upper face of the container's bottom and a lower portion, wherein said lower portion has a variable height, and wherein the bottom is fixed to the base of a column configured as a hollow cylindrical body.

2. Bottom of a container according to claim 1, wherein the upper portion is a body of constant thickness with an upper face adapted to the variable height of the lower portion that is a rectangular body with a base arranged in a single plane.

3. Bottom of a container according to any one of claims 1 or 2, wherein the upper portion is formed by a combination of sections of different geometry and height according to the variation in height of the lower portion.

4. Bottom of a container according to any of the preceding claims, wherein the variable height ribs have a "T" shape.

5. Bottom of a container according to any of the preceding claims, wherein the variable height ribs have its maximum height at each end.

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6. Bottom of a container according to any of the preceding claims, wherein the bottom base comprises non-reinforced areas in which the rib height is reduced to a minimum value, said base being arranged in the same plane.

7. Bottom of a container according to any of the preceding claims, wherein the variable height ribs are distributed on the bottom forming an upper face of variable height with different geometry areas.

8. Bottom of a container according to any of the preceding claims, wherein the bottom base is formed by the ribs of variable height arranged in a diagonal framework, circumscribed within the bottom frame.

9. Bottom of a container according to any of the preceding claims, wherein the bottom base is formed by ribs of variable height arranged orthogonally to the bottom frame.

10. Bottom of a container according to any of the preceding claims, wherein the bottom base consists of a rigid base punctured reinforced with the ribs of variable height.

11. Container for fruit and vegetable products that optimizes the use of material to distribute the stresses to which it is subjected, thereby reducing the final weight of the container without losing strength, which is formed at least of a bottom and sidewalls, wherein the container bottom is provided with a bottom base

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which is formed by ribs of variable height forming a coat whose irregular geometry and design depends to the efforts to which the container is subjected, wherein the ribs of variable height consist of a body comprising an upper portion which defines the upper face of the container's bottom and a lower portion, wherein said lower portion has a variable height, and wherein the container is provided with collapsible walls which are joined together by a bonding system comprising at least a closing device and a fixed column to one of the structures or faces, wherein the column is configured as a hollow cylindrical body, composed of at least one closure means and fixed to the bottom of the container.

12. Container according to claim 11, wherein said closing device corresponds to a clip type, comprising at least a pair of closing means, wherein said closing means connect at least two structures or two adjacent faces of the container.

13. Container according to any one of claims 11 or 12, wherein the column has a circular section and may be elliptical, square, rectangular, triangular or any suitable shape.

14. Container according to any one of claims 11 to 13, wherein the base of the column comprises stacking means.

15. Container according to any one of claims 11 to 14, wherein the side walls are fixed.

16. Container according to any one of claims 11 to 15, wherein the container consists of a structure comprising openings.

17. Container according to any one of claims 11 to 16, wherein the container consists of a solid structure.

18. Container according to any one of claims 11 to 17, wherein the container further comprises a lid.

19. Method of manufacturing a container, which optimizes the use of material for distributing stresses to which it is subjected, thereby reducing the final weight of the container without losing resistance, the method comprising the steps of:

- defining a shape of a bottom of the container according to a height of ribs of variable height that forms a coat whose irregular geometry and design depends to the efforts to which the container is subjected, wherein the ribs of variable height consist of a body comprising an upper portion which defines an upper face of the container's bottom and a lower portion, wherein said lower portion has a variable height, and wherein the bottom is fixed to a base of a column configured as a hollow cylindrical body;

- Manufacturing a mold of the container based on the shape of the bottom;

- Injecting plastic material into the mold, wherein said mold comprises a form of ribs of variable height determined for the bottom of the container;

- Cooling a structure manufactured inside of the mold by heat transfer from said structure into the mold;

- Opening the mold for the extraction of the manufactured structure; and

- Closing the mold to start a new manufacturing cycle;

wherein the step of determining the shape of the bottom of the container allows to optimize the use of the material to distribute the stresses to which the container is subjected.

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20. Method of manufacturing a container according to claim 19, wherein the height, shape and distribution of the ribs of variable height obtained by the step of determining the shape of the bottom of the container depends on the size, material, type and shape of the container and the features of the product(s) to store and/or transport.

21. Method of manufacturing a container according to any one of claims 19 or 20, wherein the step of determining the shape of the bottom of the container is performed by a computer program that yields an optimum geometry of the bottom of container.

22. Method of manufacturing a container according to any one of claims 19 or 21, wherein the step of determining the shape of the bottom of the container is carried out by trial and error techniques.

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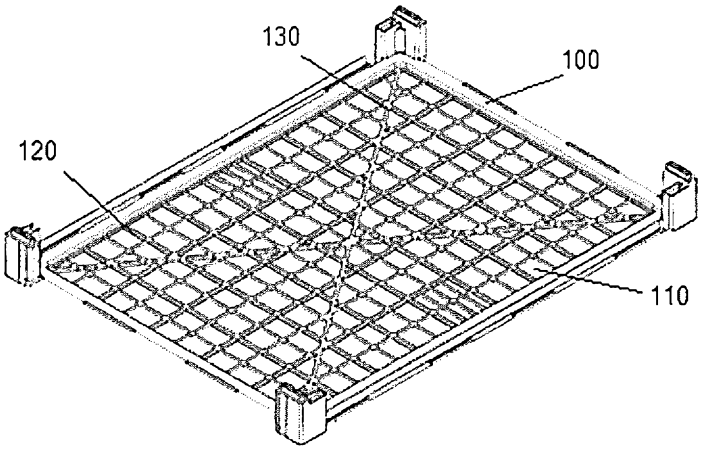

FIGURE 1
(Prior Art)

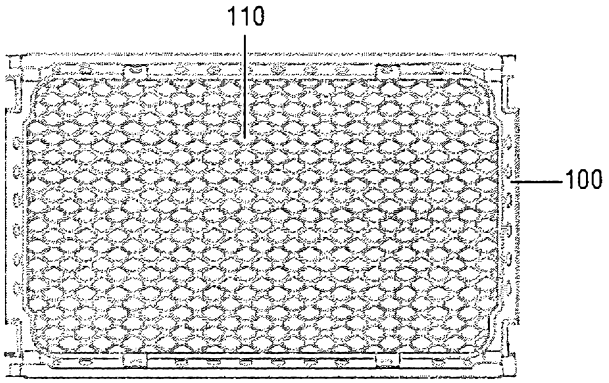

FIGURE 2
(Prior Art)

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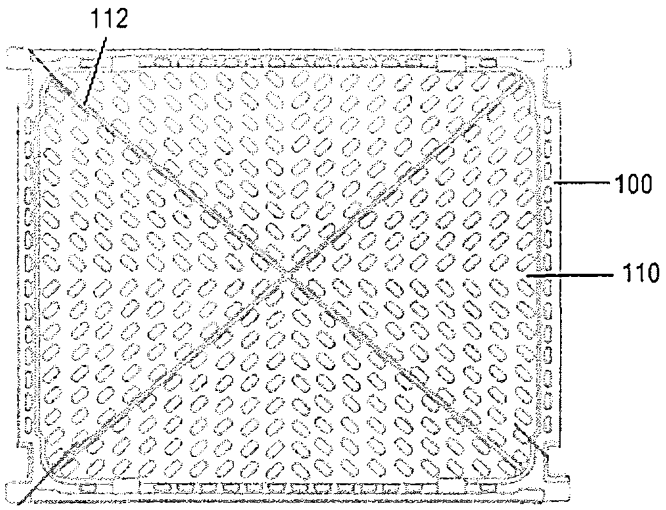

FIGURE 3
(Prior Art)

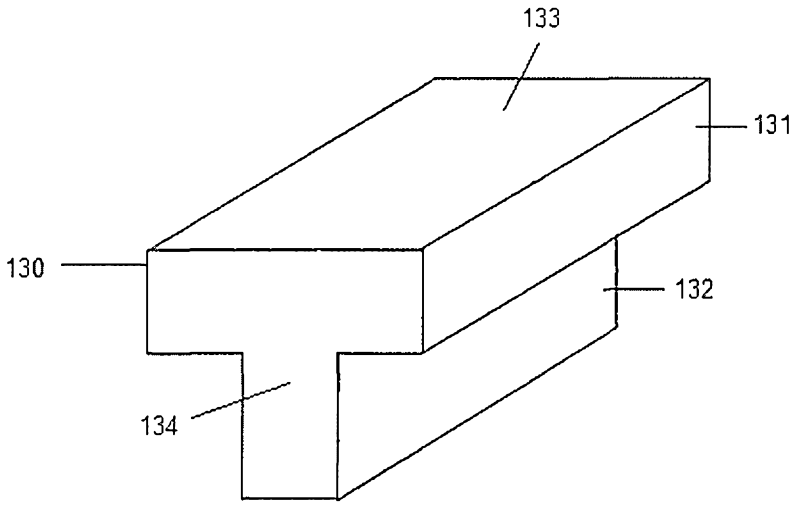

FIGURE 4
(Prior Art)

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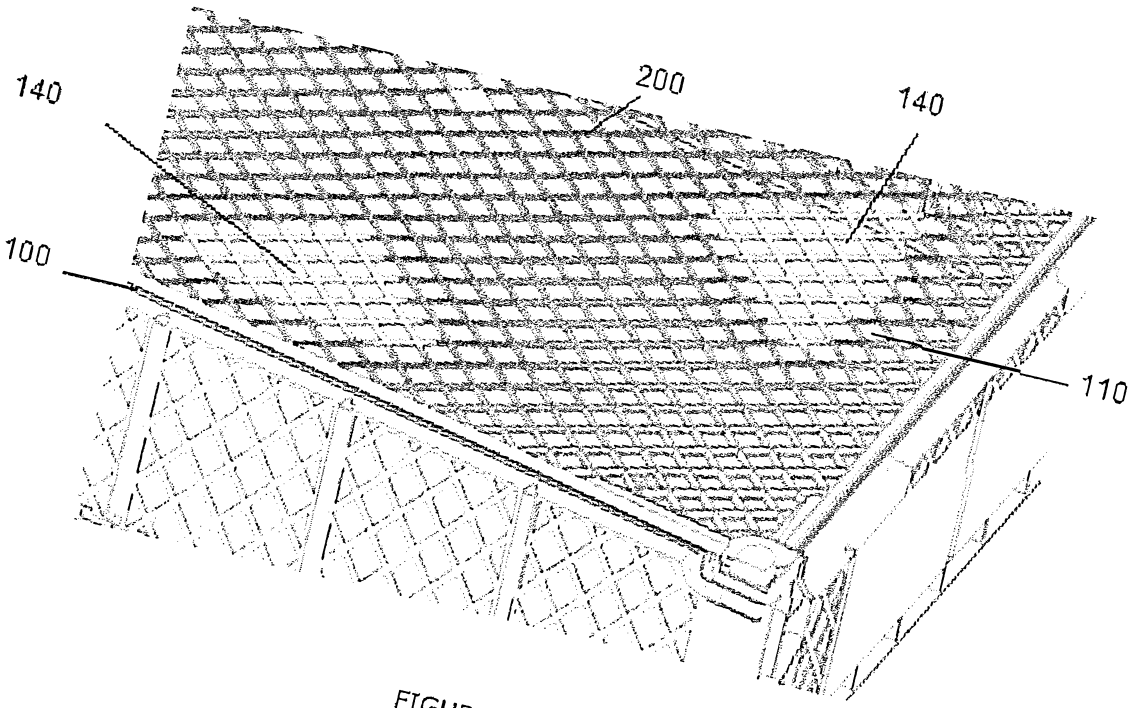

FIGURE 5

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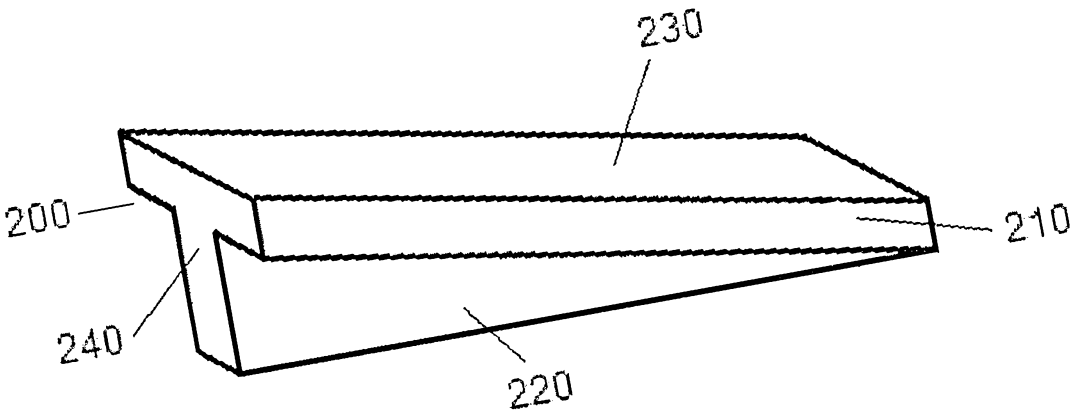

FIGURE 6

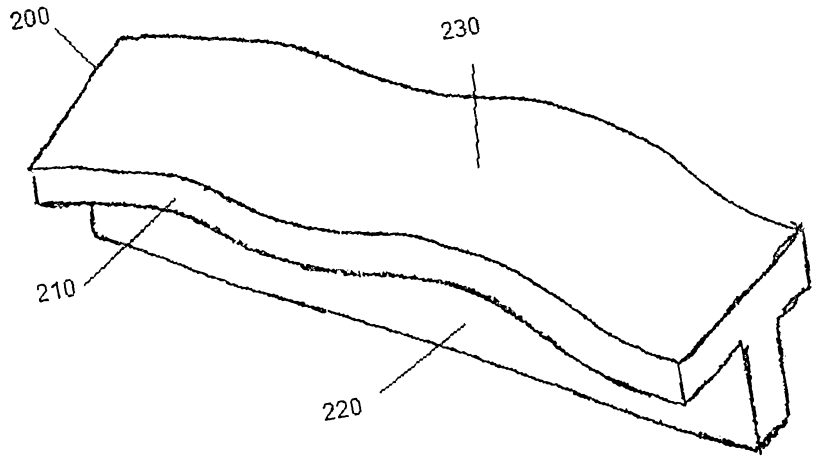

FIGURE 7

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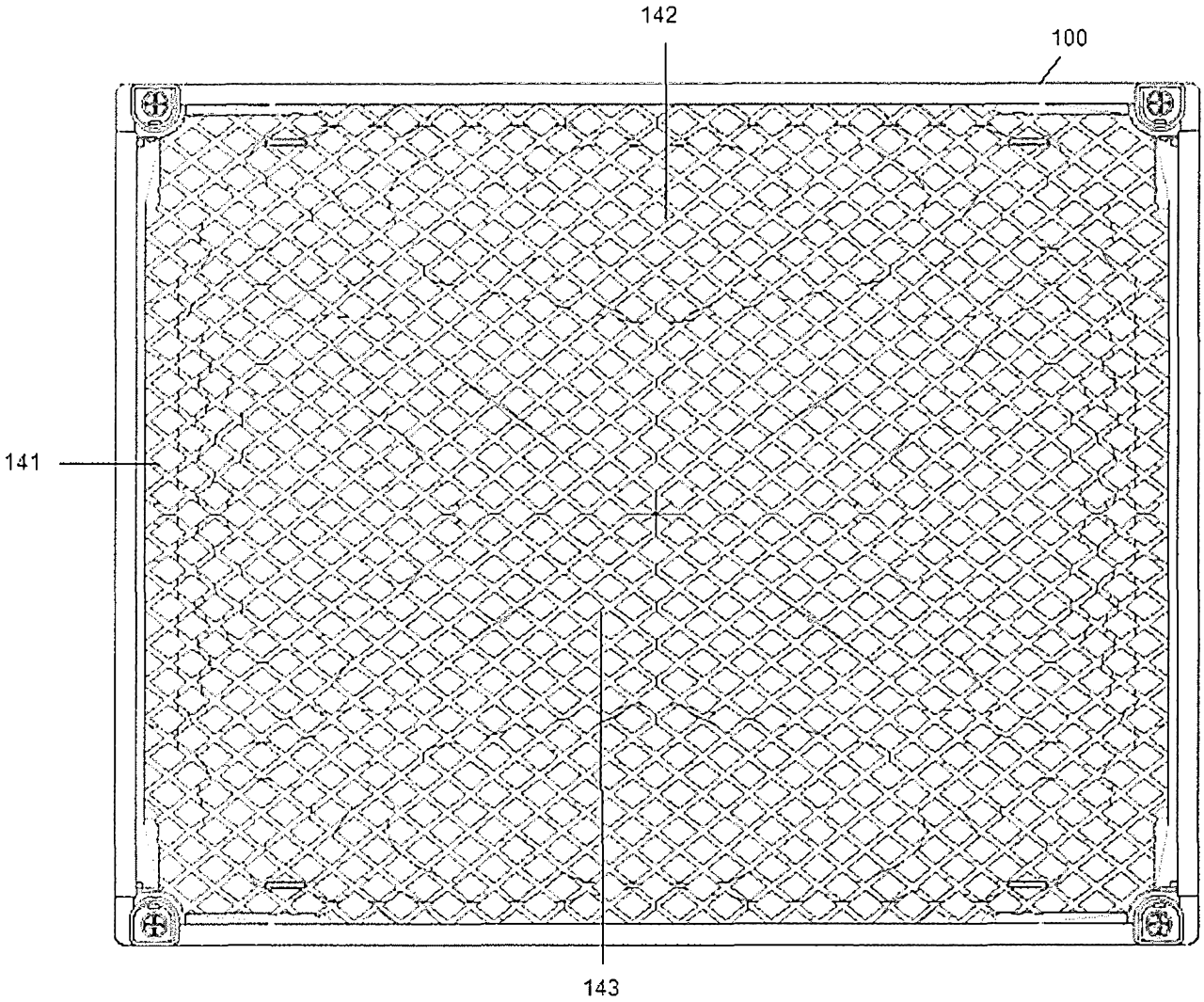

FIGURE 8

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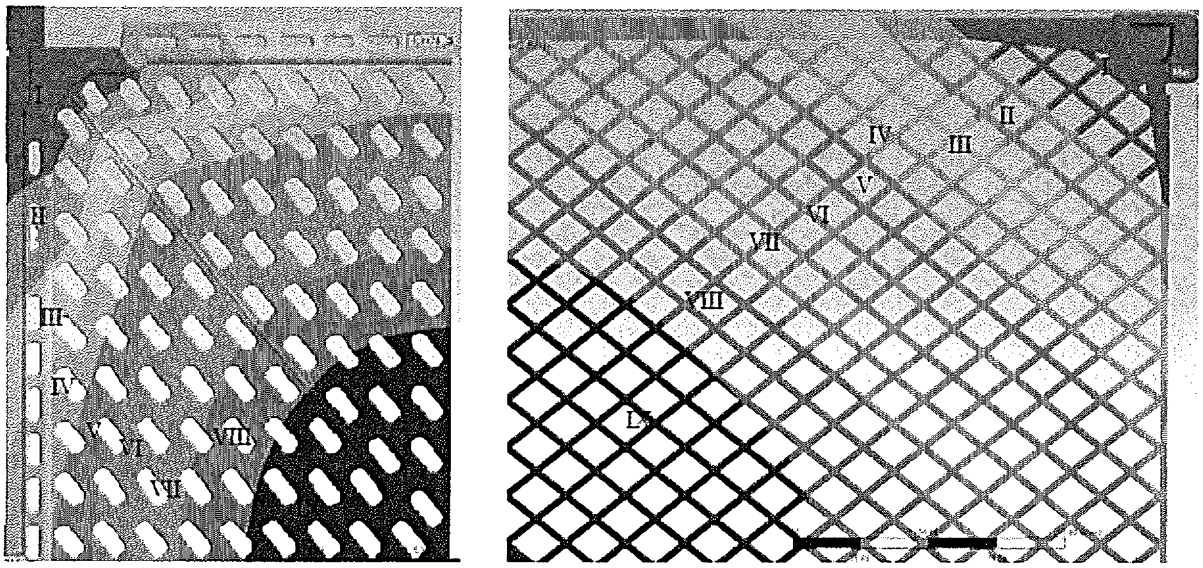

FIGURE 9