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(54) **COLLAPSIBLE CRATE**

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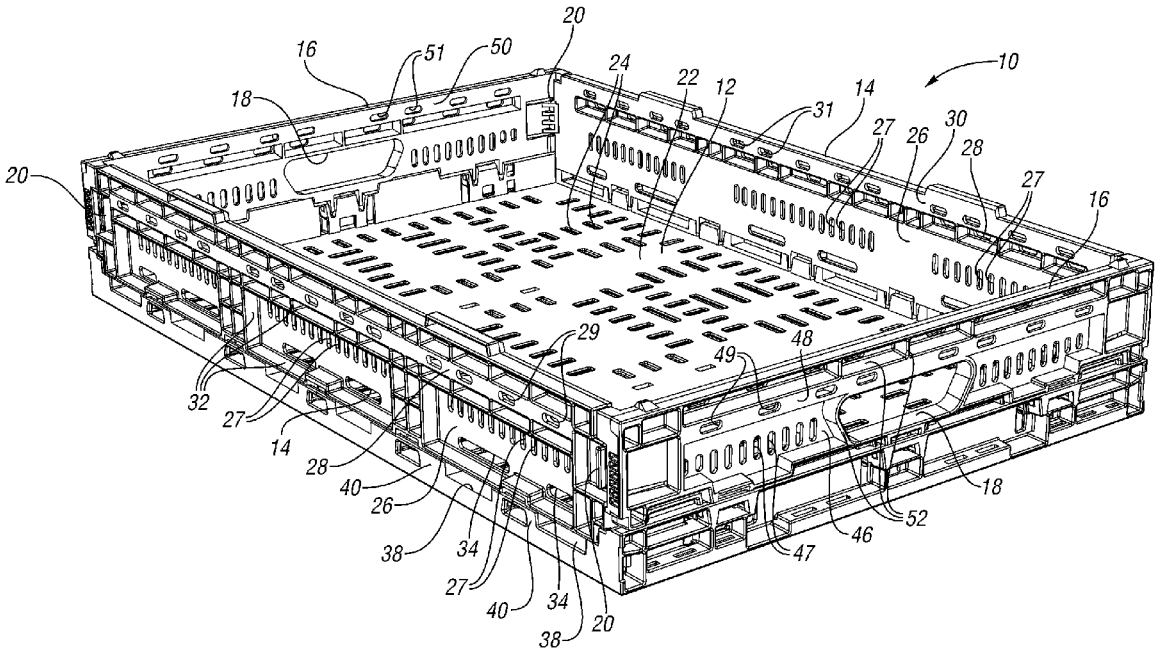
CPC ***B65D 11/1833*** (2013.01)

(57) **ABSTRACT**

A crate includes a base, a pair of opposed side walls extending upward from the base and a pair of opposed end walls extending upward from the base. The base includes a plurality of container support areas each defined by a rectangular perimeter defined by a plurality of vents.



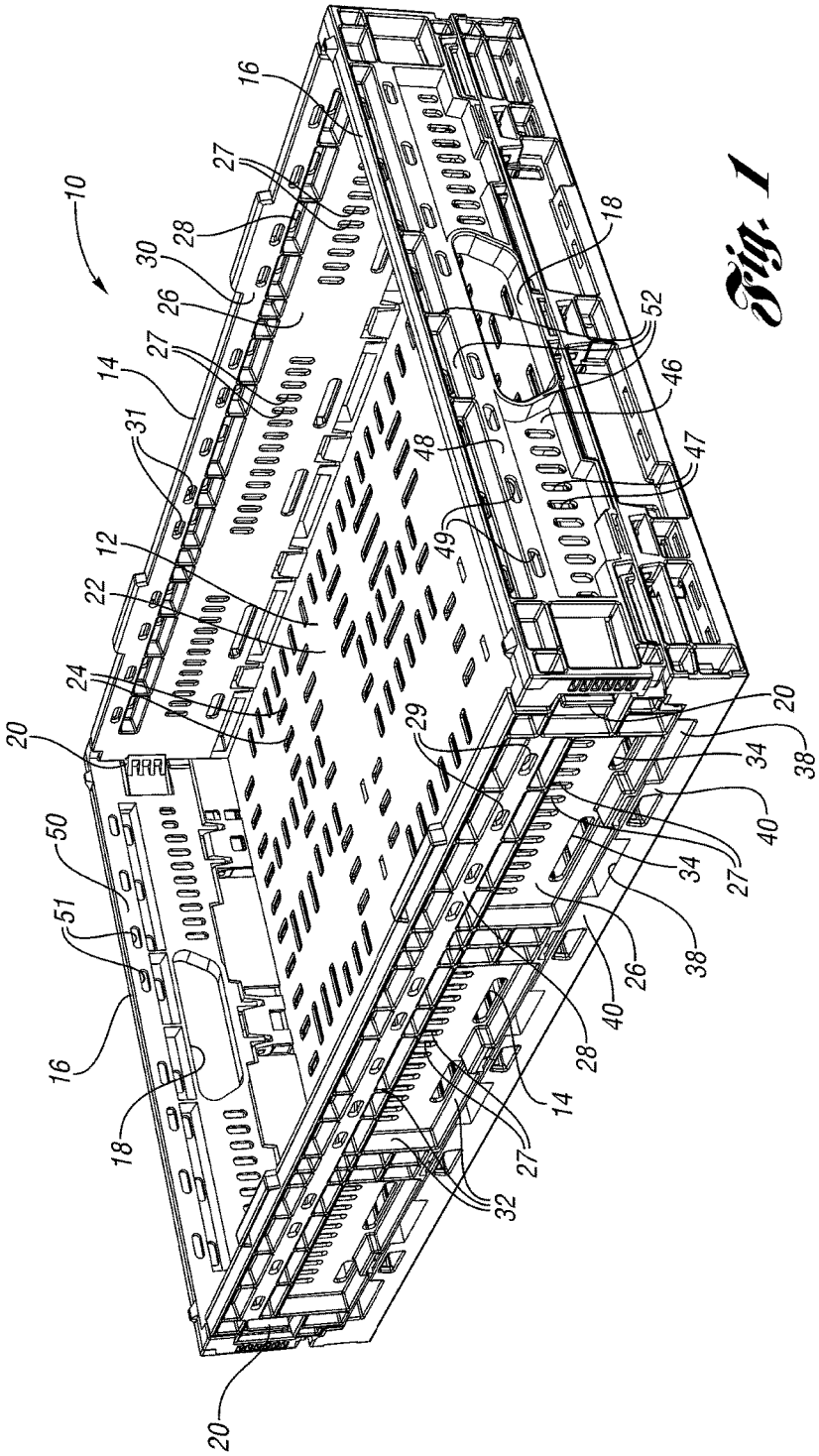

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Fig. 1

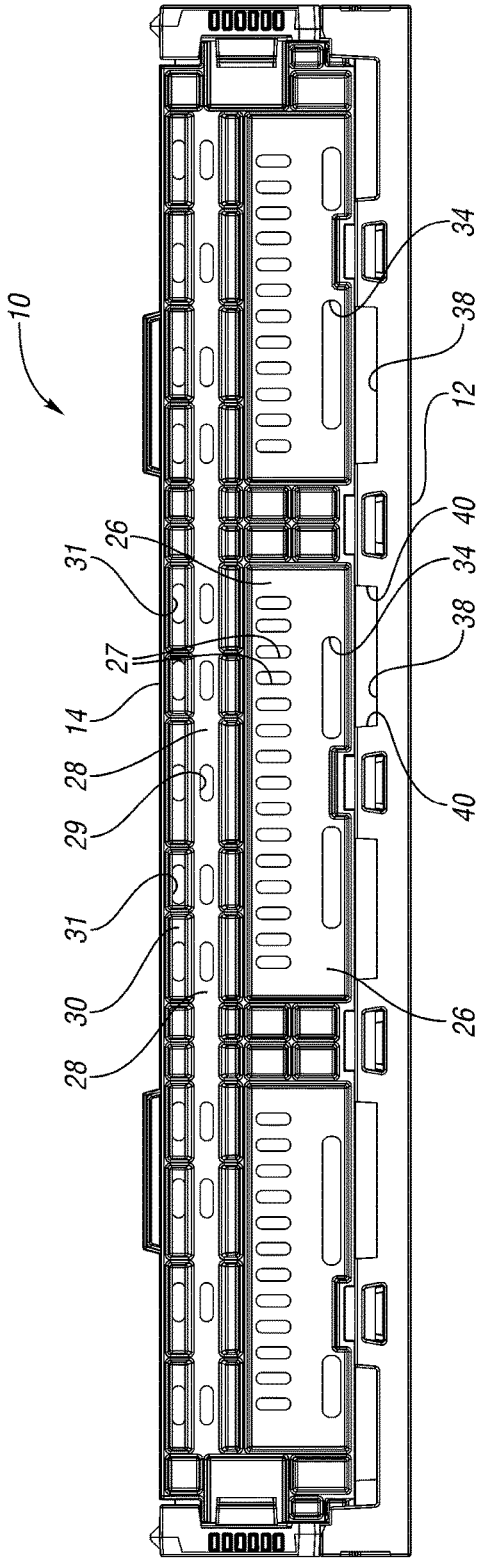
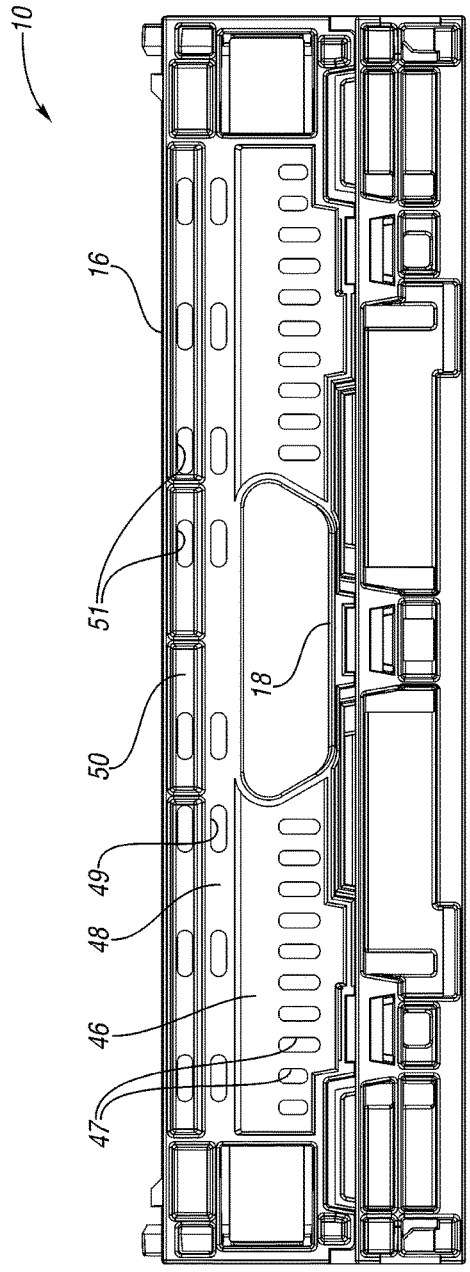


Fig. 2



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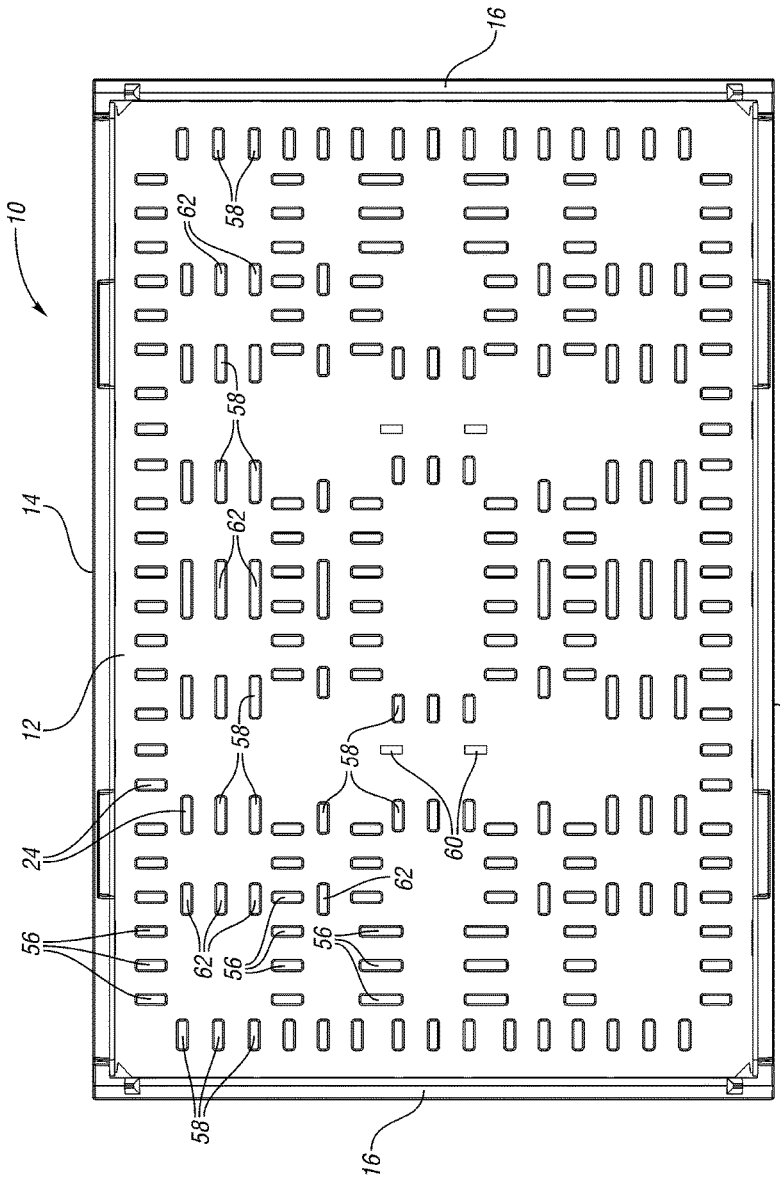

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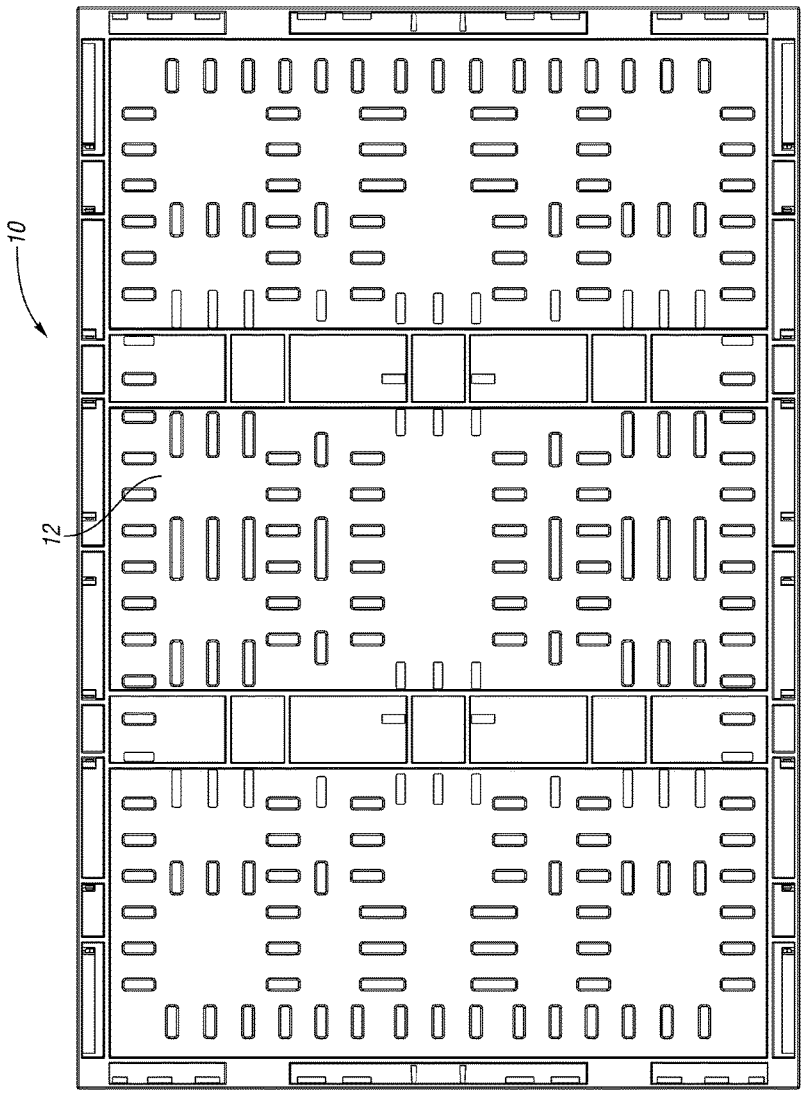

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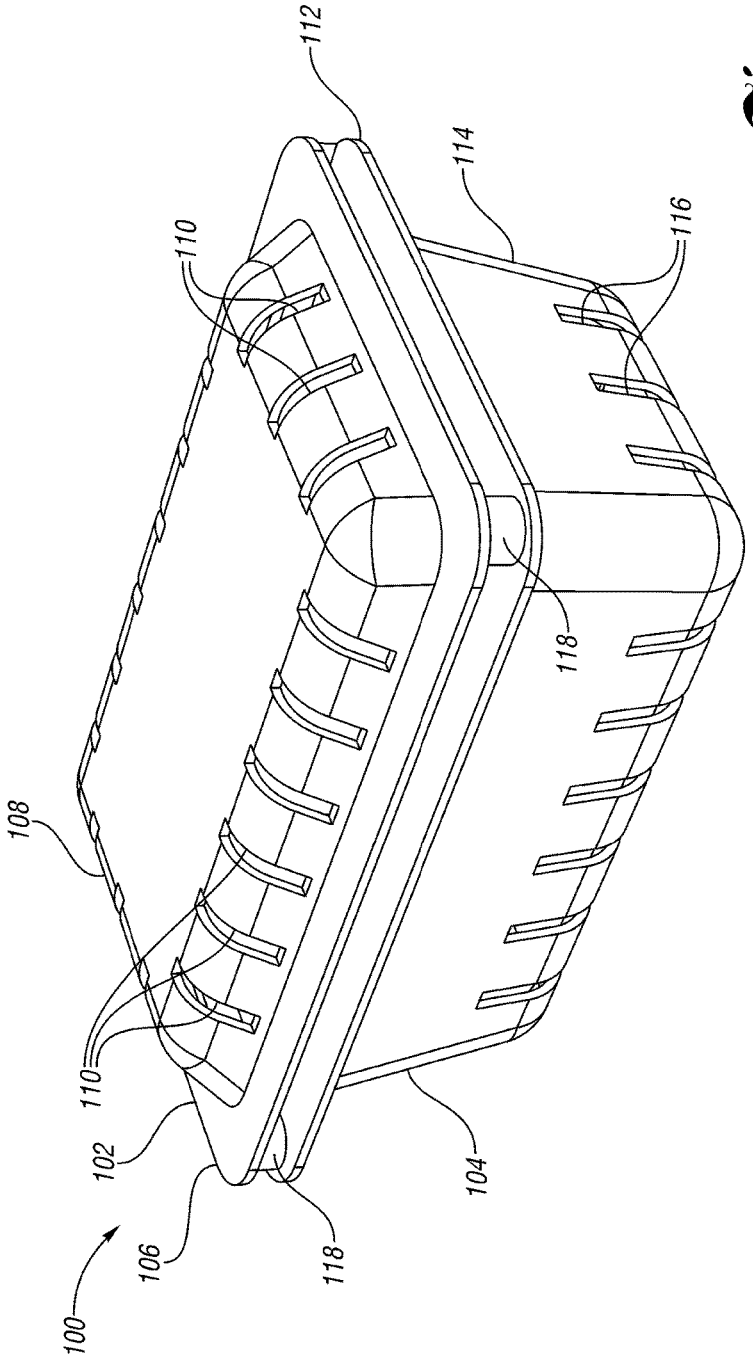

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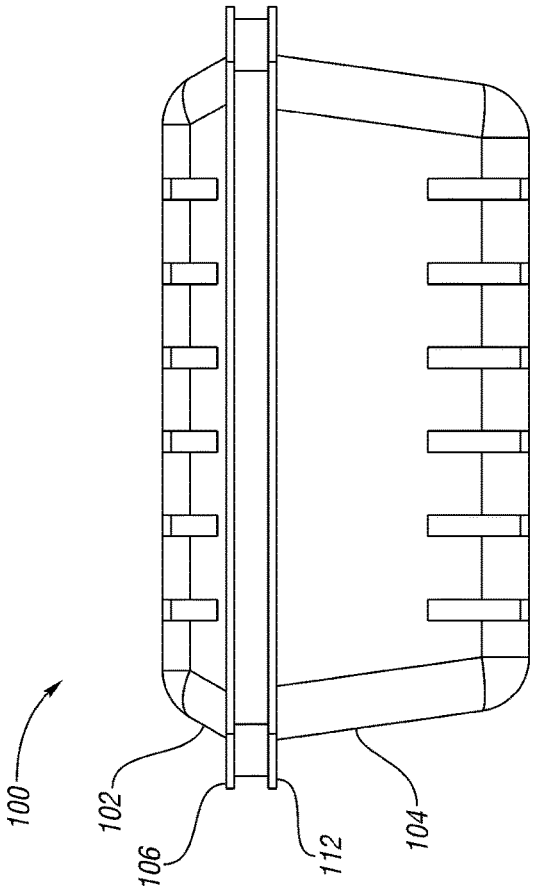

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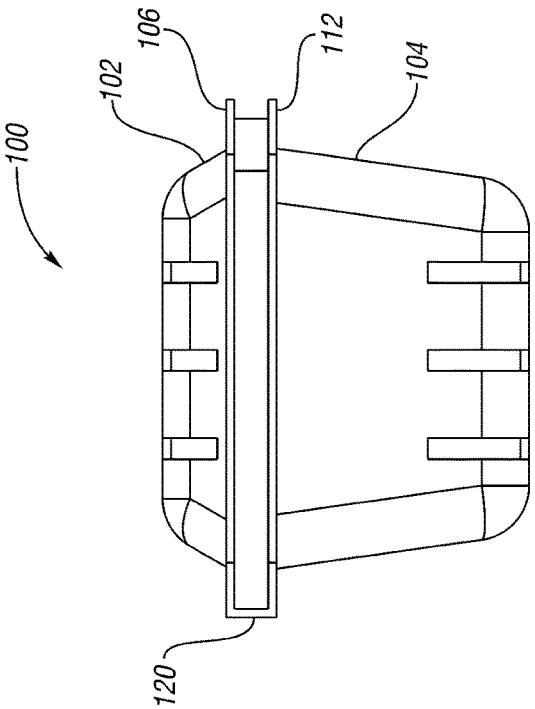


Fig. 7

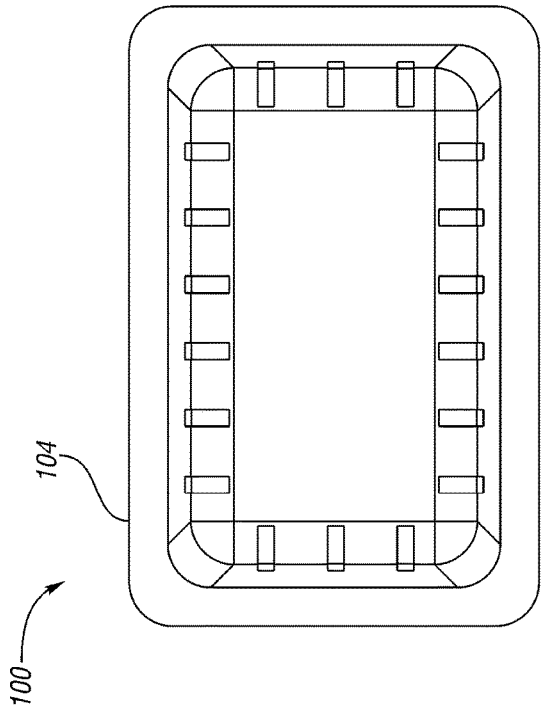


Fig. 10

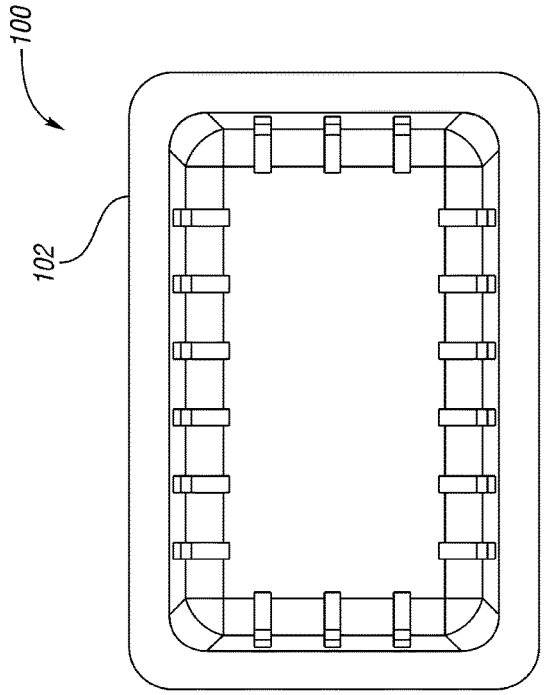


Fig. 9

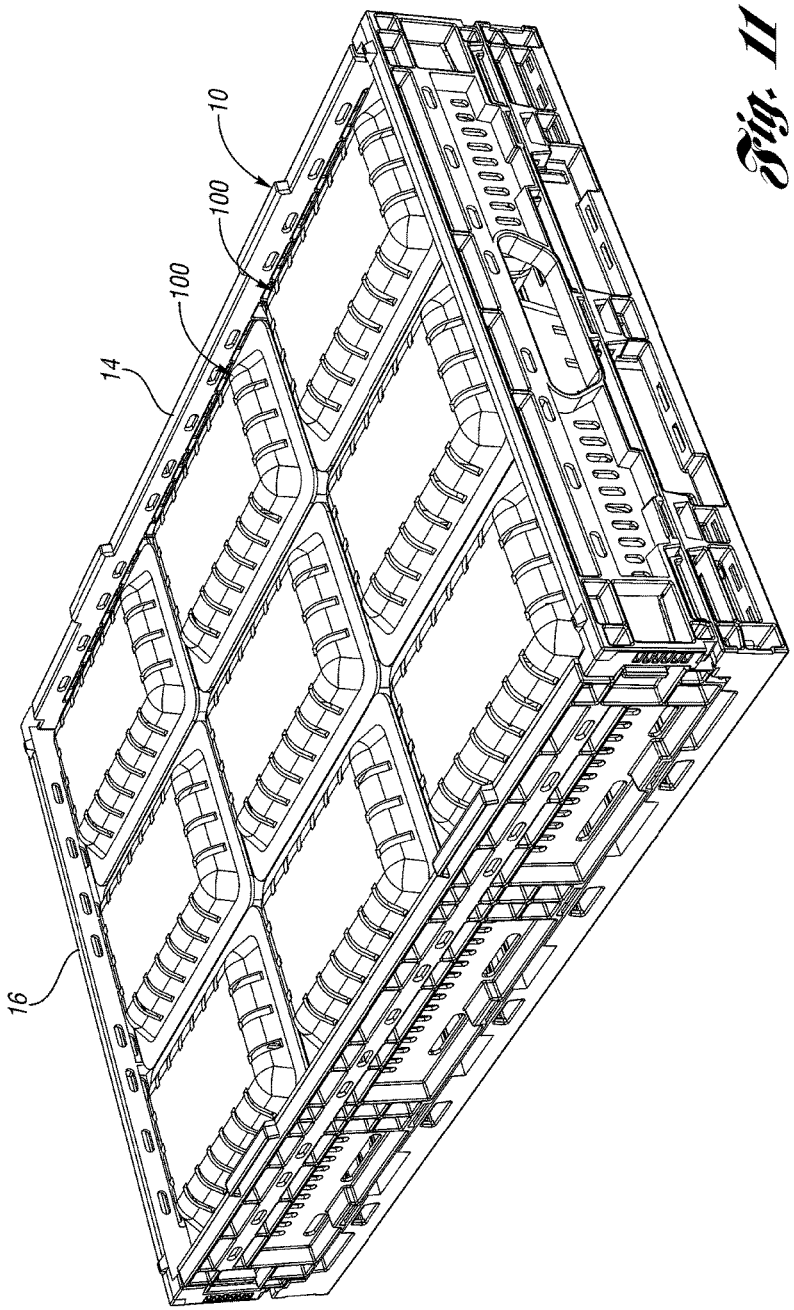


Fig. 11

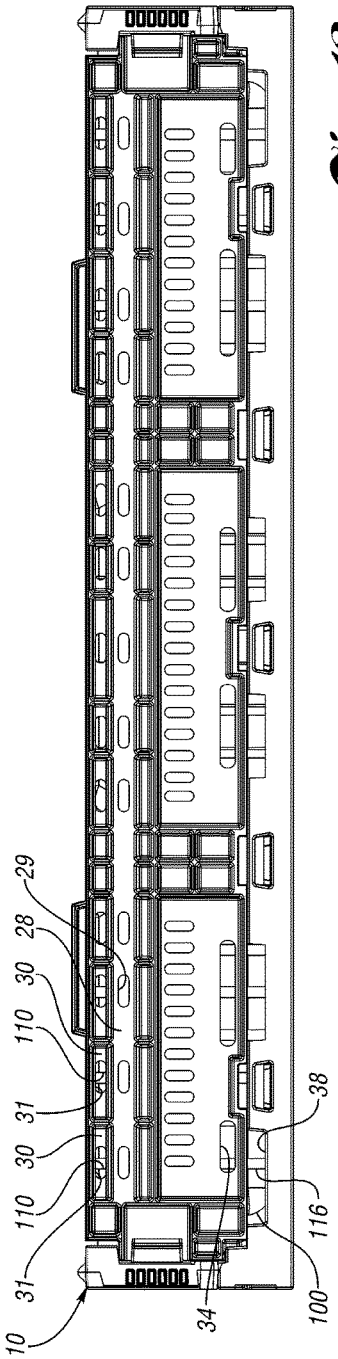
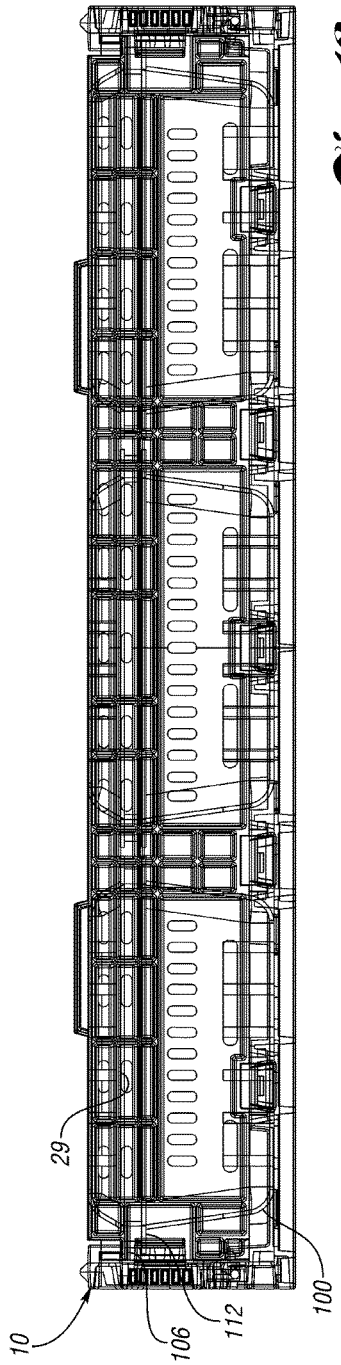


Fig. 12



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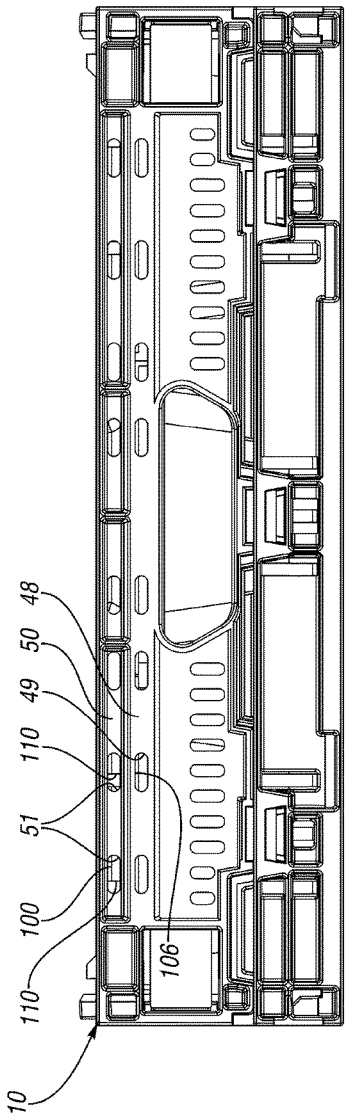
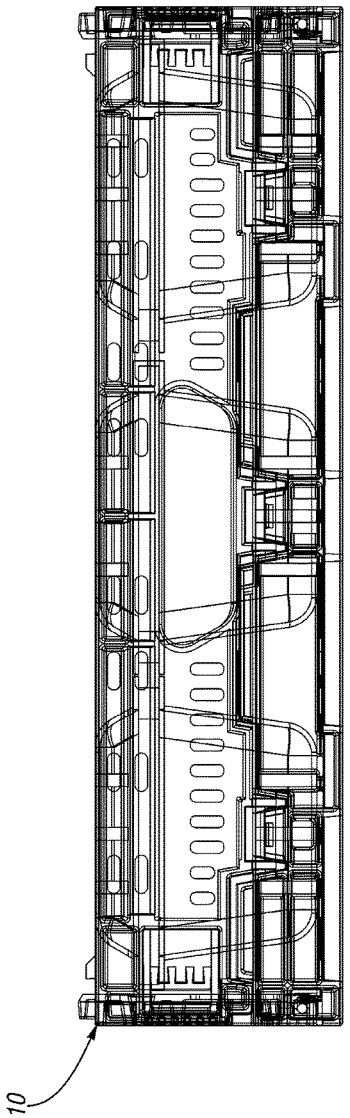


Fig. 14



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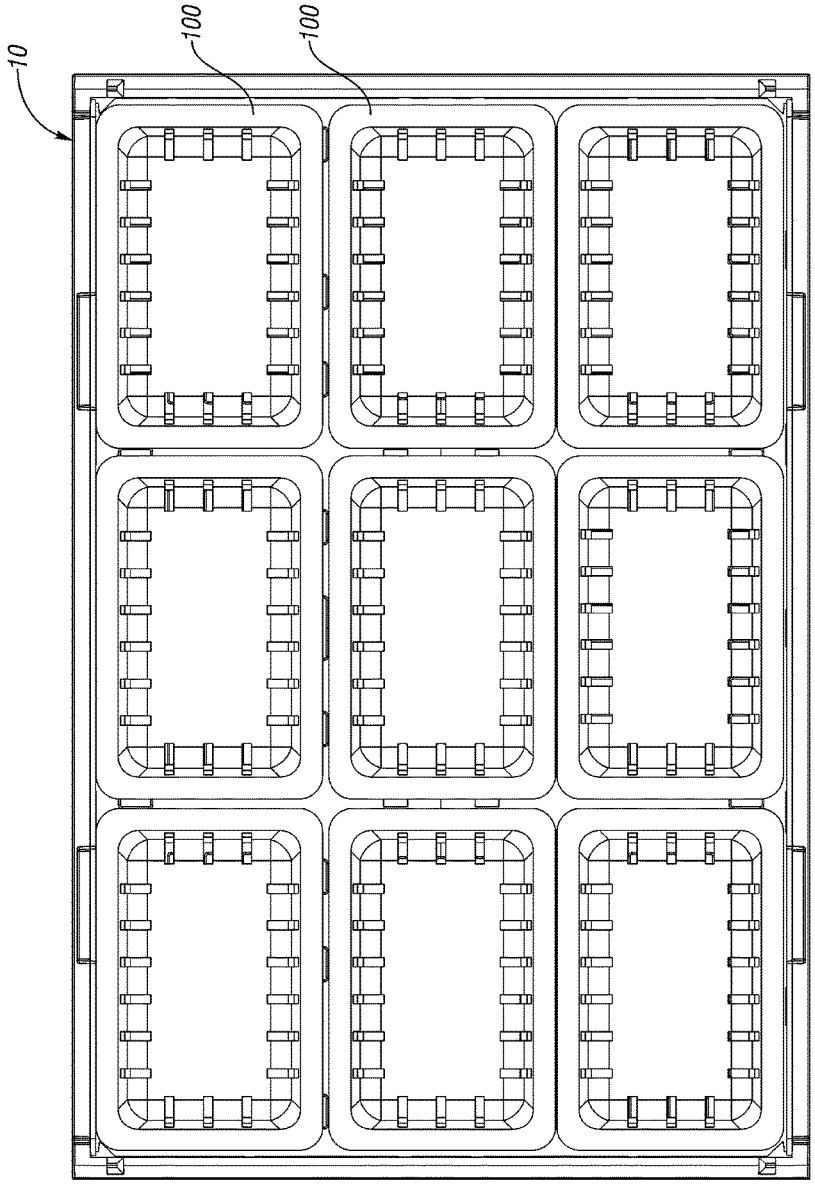


Fig. 16

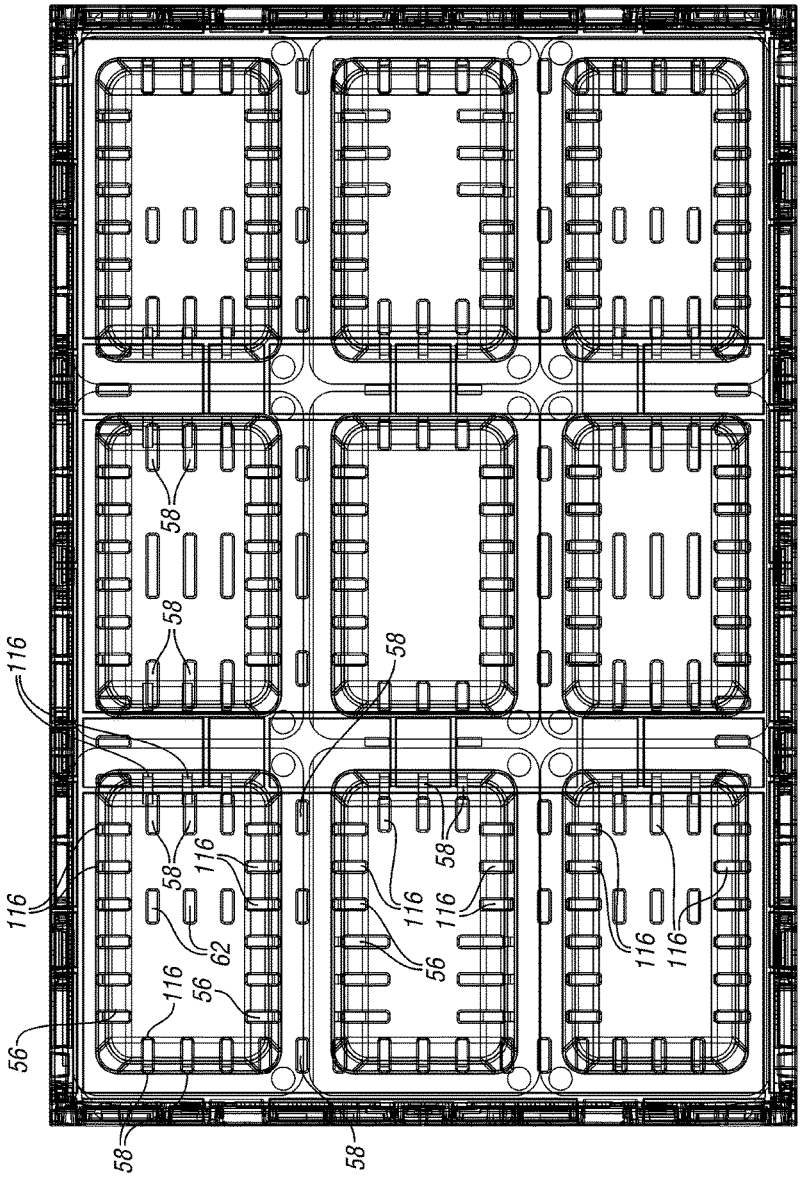


Fig. 17

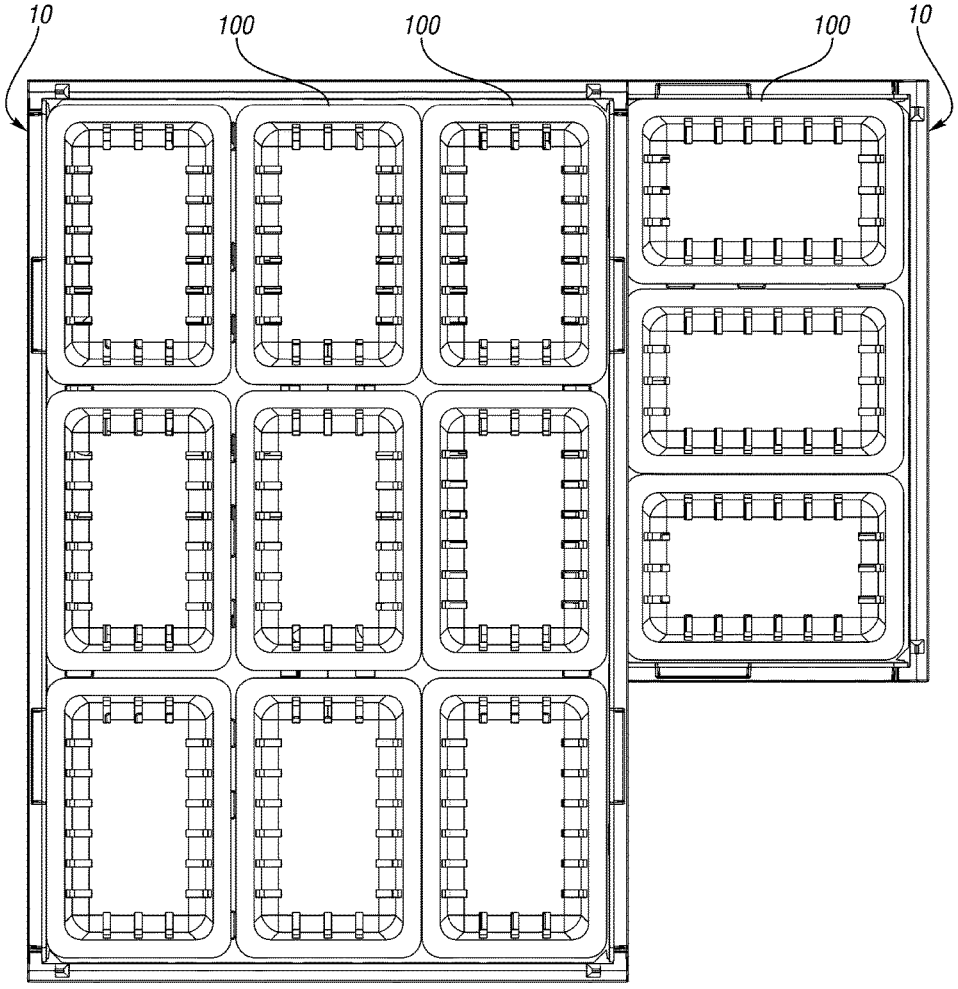
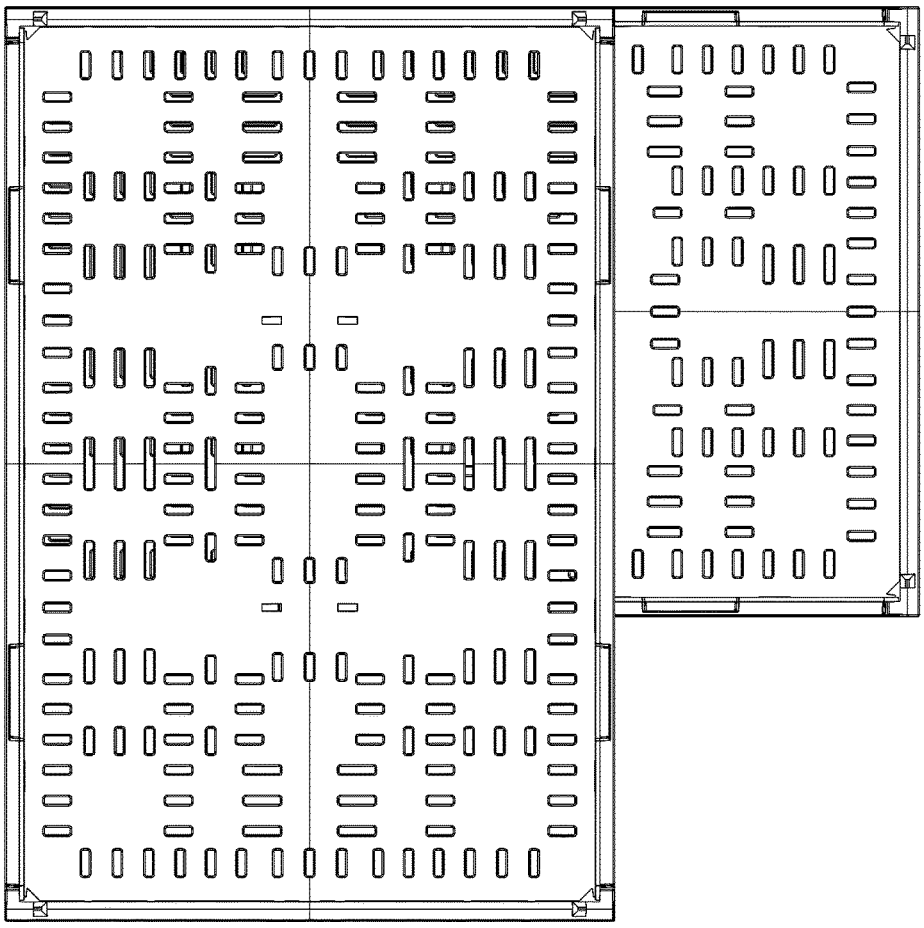


Fig. 18



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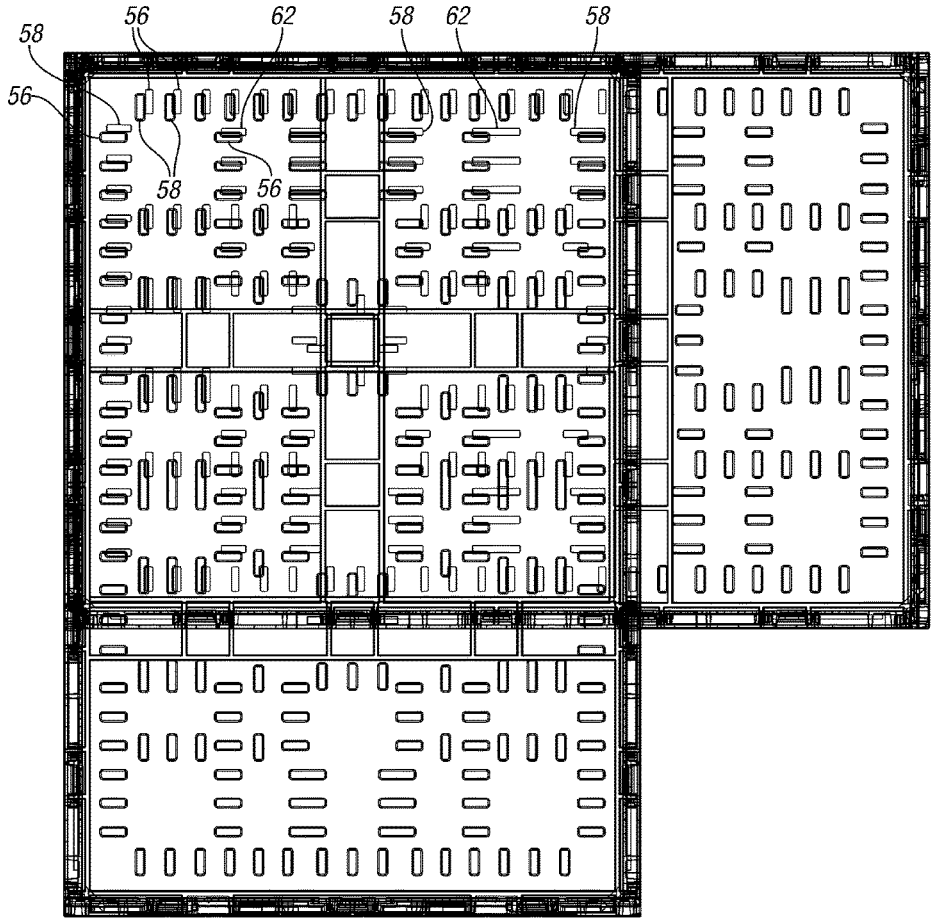

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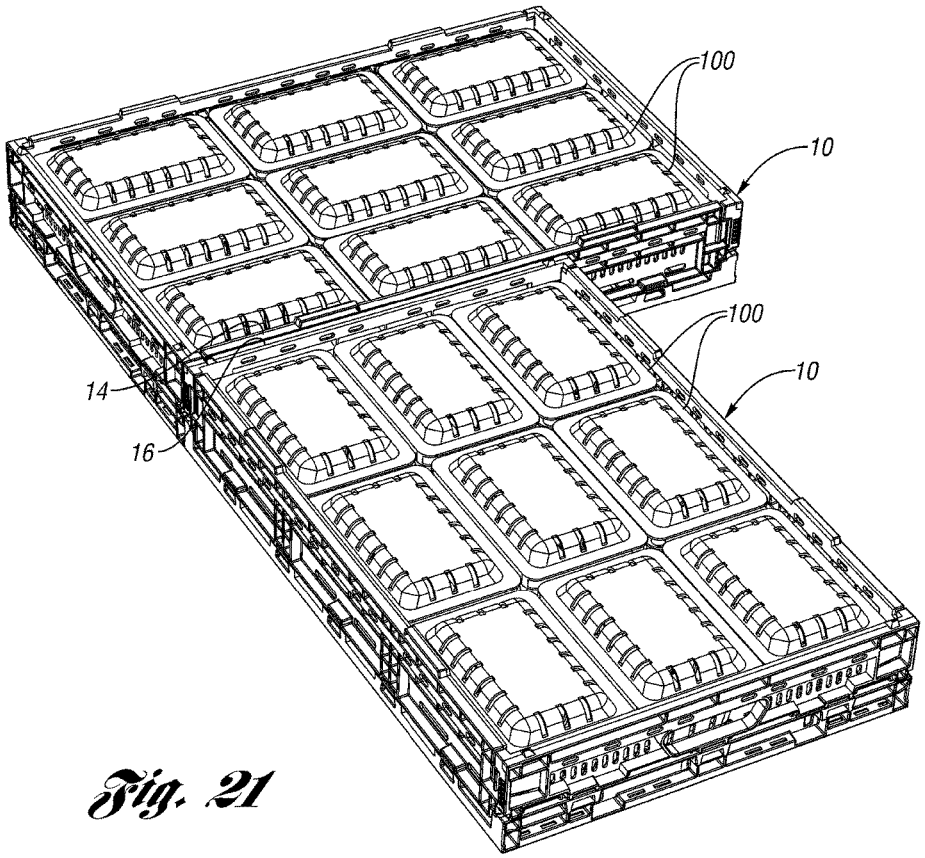
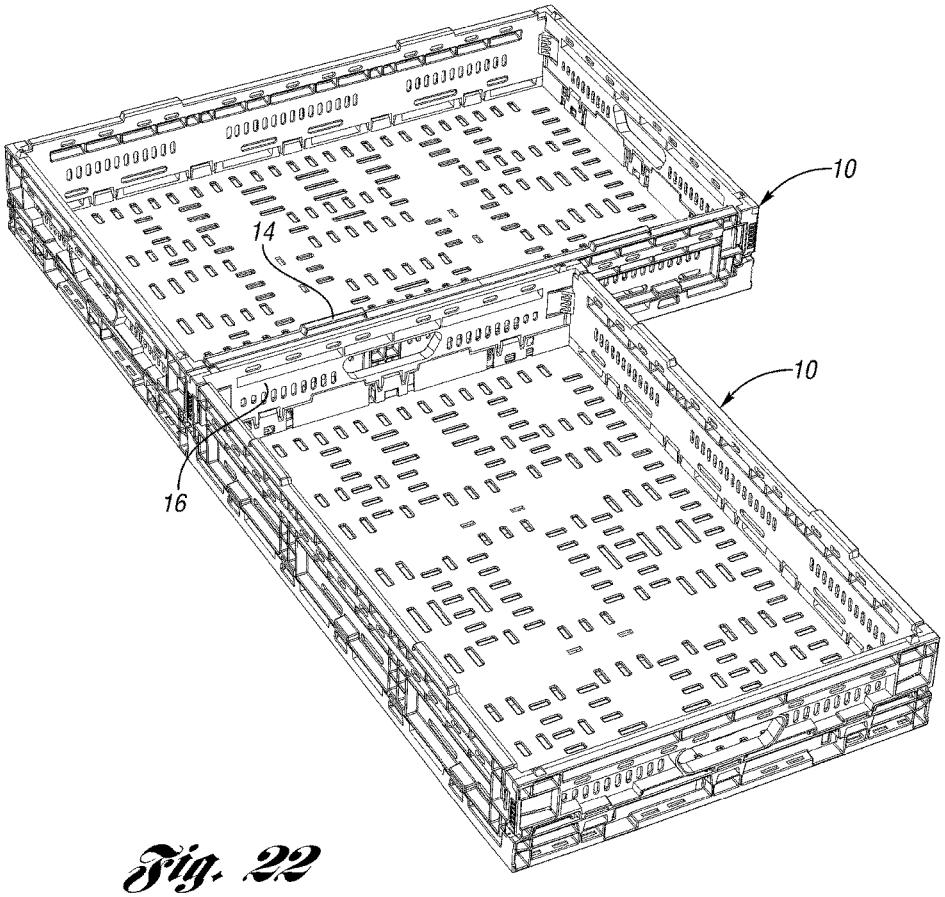


Fig. 21



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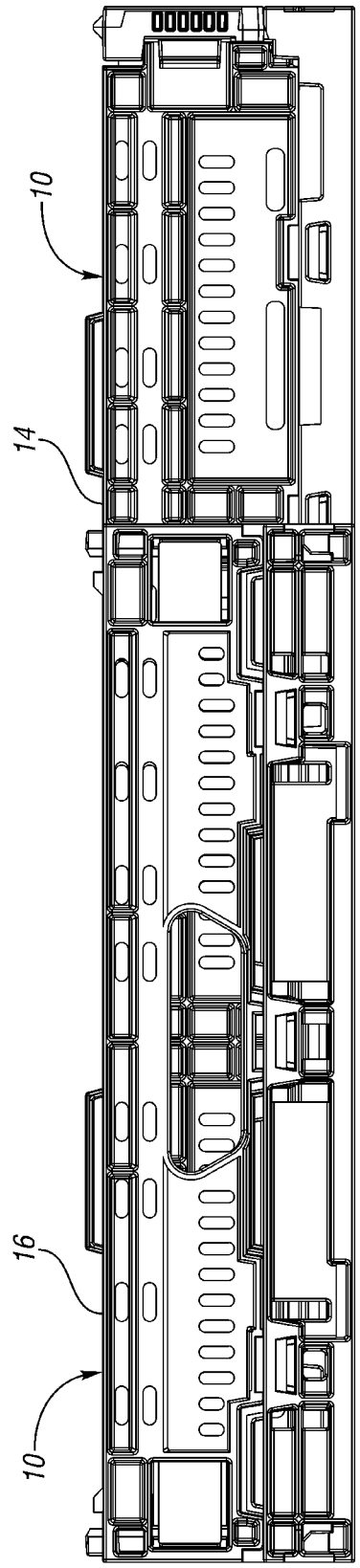
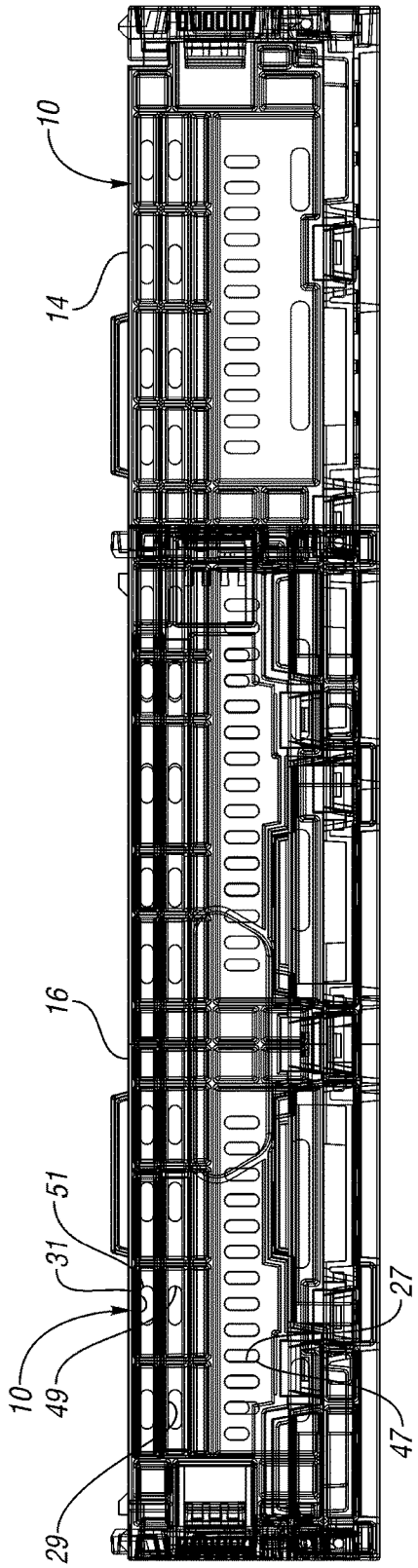


Fig. 23



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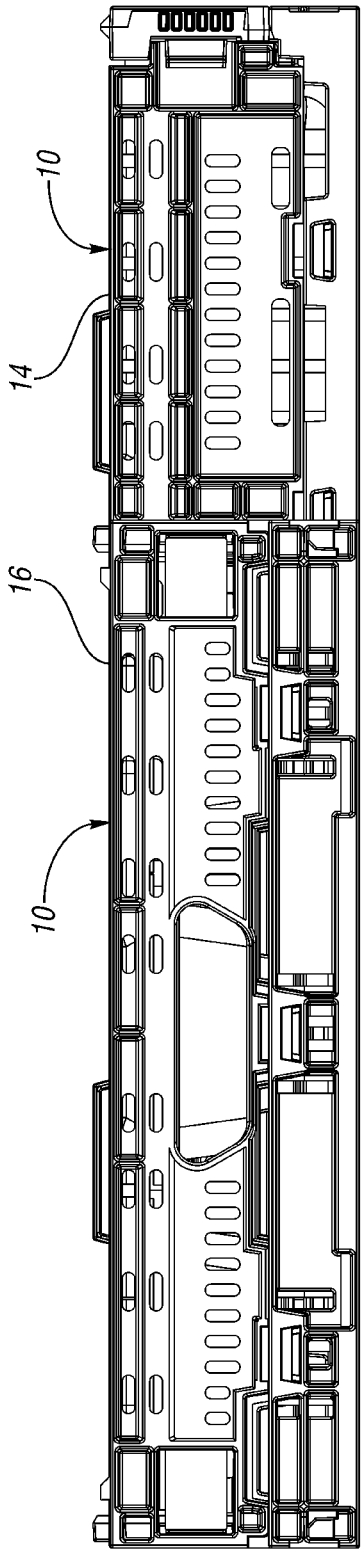

Fig. 25

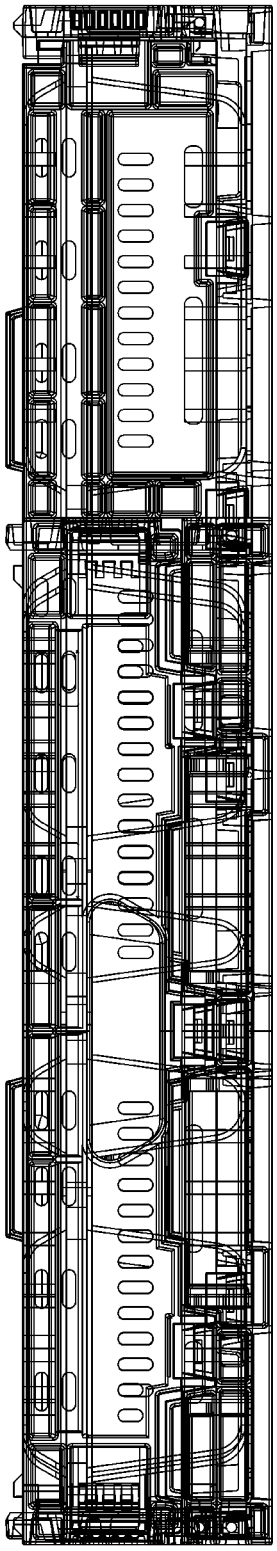

Fig. 26

COLLAPSIBLE CRATE

[0001] This application is a continuation of U.S. application Ser. No. 13/469,183, filed on May 11, 2012, which claims priority to U.S. Provisional Application Ser. No. 61/485,116, filed May 11, 2011.

BACKGROUND

[0002] Crates for produce may include a base having a pair of opposed side walls and a pair of opposed end walls extending upward therefrom. The side walls and end walls may be pivotably connected to the base, such that they can be collapsed onto the base when the crate is empty.

[0003] A clamshell container is a known plastic container often used for shipping and selling fruit, such as strawberries, or other items that require refrigeration. The clamshell container includes an upper portion hingeably connected to a lower portion, such as by a living hinge. The upper portion includes a rim portion extending around a periphery of a lid portion. A plurality of upper ventilation openings are formed through tapered side walls and an upper wall of the lid portion. The lower portion includes a rim portion extending around a periphery of a base. A plurality of lower ventilation openings are formed through tapered side walls and a lower wall of the base. A plurality of connectors connect the rim portion of the upper portion to the rim portion of the lower portion. The connectors also space the upper portion from the lower portion to provide additional ventilation.

SUMMARY

[0004] A crate includes a base, a pair of opposed side walls extending upward from the base and a pair of opposed end walls extending upward from the base. The base includes a plurality of container support areas each defined by a rectangular perimeter defined by a plurality of vents.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] FIG. **1** is a perspective view of one example crate according to the present invention.

[0006] FIG. **2** is a side view of the crate of FIG. **1**.

[0007] FIG. **3** is an end view of the crate of FIG. **1**.

[0008] FIG. **4** is a top view of the crate of FIG. **1**.

[0009] FIG. **5** is a bottom view of the crate of FIG. **1**.

[0010] FIG. **6** is a perspective view of a clamshell container.

[0011] FIG. **7** is an end view of the container of FIG. **6**.

[0012] FIG. **8** is a side view of the container of FIG. **6**.

[0013] FIG. **9** is a top view of the container of FIG. **6**.

[0014] FIG. **10** is a bottom view of the container of FIG. **6**.

[0015] FIG. **11** is a perspective view of a plurality of the containers of FIG. **6** in the crate of FIG. **1**.

[0016] FIG. **12** is a side view of the crate and containers of FIG. **11**.

[0017] FIG. **13** is a wireframe side view of the crate and containers of FIG. **11**.

[0018] FIG. **14** is an end view of the crate and containers of FIG. **11**.

[0019] FIG. **15** is a wireframe end view of the crate and containers of FIG. **11**.

[0020] FIG. **16** is a top view of the crate and containers of FIG. **11**.

[0021] FIG. **17** is a bottom wireframe view of the crate and containers of FIG. **11**.

[0022] FIG. **18** is a top view of the crate and containers of FIG. **11** cross-stacked on identical crate and containers.

[0023] FIG. **19** is a bottom view of the stack of FIG. **18**.

[0024] FIG. **20** is a wireframe bottom view of the stack of FIG. **18**.

[0025] FIG. **21** is a perspective view of the crates and containers of FIG. **18** arranged end-to-side.

[0026] FIG. **22** shows the crates of FIG. **21** without the containers.

[0027] FIG. **23** is an end view of the crates of FIG. **22** without the containers.

[0028] FIG. **24** is a wireframe end view of the crates of FIG. **23**.

[0029] FIG. **25** is an end view of the crates of FIG. **21** with the containers.

[0030] FIG. **26** is a wireframe end view of the crates of FIG. **25**.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

[0031] A crate **10** according to one embodiment of the present invention is shown in FIG. **1**. The crate **10** includes a base **12**, a pair of opposed side walls **14** and a pair of opposed end walls **16**. The side walls **14** and end walls **16** are collapsible onto the base **12**. The end walls **16** may include handles **18**. Latches **20** selectively connect the side walls **14** to the end walls **16** to maintain the walls in the upright, use position.

[0032] The base **12** includes an upper panel **22** having a plurality of openings or vents **24** formed therein.

[0033] Referring to FIGS. **1** and **2**, the side walls **14** each include a lower panel portion **26** on an inner surface of the side wall **14**, an outer panel portion **28** at an outer surface of the side wall **14** and above the lower panel portion **26**, and an upper panel portion **30** at an inner surface of the side wall **14** and above the outer panel portion **28**. A plurality of ribs **32** extend outward from the lower panel portion **26** and upper panel portion **30** and inward from the outer panel portion **28**.

[0034] Vertically-oriented vents **27** are formed in the lower panel portion **26**. Horizontally-oriented vents **29** are formed in the outer panel portion **28**. Horizontally-oriented vents **31** are formed in the upper panel portion **30**. Horizontally-oriented lower vents **34** are formed in the lower panel portion **26** below the vertically-oriented vents **27**.

[0035] The base **12** includes a plurality of spaced-apart upstanding side portions **40** defining lower openings **38**. The side wall **14** is pivotably connected to the upstanding side portions **40**.

[0036] Referring to FIGS. **1** and **3**, the end walls **16** each include a lower panel portion **46** on an inner surface of the end wall **16**, an outer panel portion **48** at an outer surface of the end wall **16** and above the lower panel portion **46**, and an upper panel portion **50** at an inner surface of the end wall **16** and above the outer panel portion **48**. A plurality of ribs **52** extend outward from the lower panel portion **46** and upper panel portion **50** and inward from the outer panel portion **48**.

[0037] Vertically-oriented vents **47** are formed in the lower panel portion **46**. Horizontally-oriented vents **49** are formed in the outer panel portion **48**. Horizontally-oriented vents **51** are formed in the upper panel portion **50**.

[0038] FIG. **4** is a top view of the crate **10**. The base **12** includes a plurality of vents **24**. The vents **24** include a plurality of rows of vents **56** in which the rows extend parallel to the side walls **14** (in this example, there are six rows of vents **56**). The vents **56** are elongated in a direction parallel to the end walls **16**. The vents **24** further include a plurality of columns of vents **58**, wherein the columns extend parallel to the end walls **16** (in this example, there are six columns of vents **58**) and the vents **58** are elongated generally parallel to the side walls **14**. The vents **24** further include three columns of offset vents **62** (the vents **62** elongated in a direction generally parallel to the side walls **14**) between the first and second columns of vents **58**, the third and fourth columns of vents **58** and fifth and sixth columns of vents **58**. Vents **60** are formed between the second and third columns of vents **58** and fourth and fifth columns of vents **58**. The arrangement of vents can also be viewed as a 3×3 array of container support surfaces, each having a rectangular perimeter of elongated vents that are oriented perpendicular to the perimeter. FIG. **5** is a bottom view of the crate **10**.

[0039] The spacing and arrangement of the vents **24** in the base **12** is further explained with reference to clamshell containers **100** shown in FIGS. **6-10**. The clamshell container **100** is a known plastic container often used for shipping and selling fruit, such as strawberries, or other items that require refrigeration. The clamshell container **100** includes an upper portion **102** and a lower portion **104**. The upper portion **102** includes a rim portion **106** extending around a periphery of a lid portion **108**. A plurality of upper ventilation openings **110** are formed through tapered side walls and an upper wall of the lid portion **108**. The lower portion **104** includes a rim portion **112** extending around a periphery of a base **114**. A plurality of lower ventilation openings **116** are formed through tapered side walls and a lower wall of the base **114**. A plurality of connectors **118** connect the rim portion **106** of the upper portion **102** to the rim portion **112** of the lower portion **104**. The connectors **118** also space the upper portion **102** from the lower portion **104** to provide additional ventilation.

[0040] As shown in FIG. **11**, a plurality of clamshell containers **100** can be placed in the crate **10** (in this example, nine). FIG. **12** is a side view of the crate **10** and containers **100** of FIG. **11**. FIG. **13** is a wireframe view of FIG. **12**. Referring to FIGS. **12** and **13**, the lower ventilation openings **116** of the containers **100** align with the lower openings **38** and lower vents **34** of the crate **10**. The vents **29** in the outer panel portion **28** of the crate **10** align with the gap between the upper portion **102** and the lower portion **104** of the container **100**. The vents **31** in the upper panel portion **30** of the crate **10** align with the upper ventilation openings **110** of the containers **100**.

[0041] FIG. **14** is an end view of the crate **10** and containers **100** of FIG. **11**. FIG. **15** is a wireframe view of FIG. **14**. Referring to FIGS. **14** and **15**, the vents **49** in the outer panel portion **48** of the crate **10** align with the gap between the upper portion **102** and the lower portion **104** of the container **100**. The vents **51** in the upper panel portion **50** of the crate **10** align with the upper ventilation openings **110** of the containers **100**.

[0042] FIG. **16** is a top view of the crate **10** and containers **100** of FIG. **11**. FIG. **17** is a bottom wireframe view of the crate **10** and containers **100** of FIG. **16**. The lower ventilation openings **116** along the long wall of the container **100** align with the rows of vents **56**. The lower ventilation openings **116** along the short wall of the container **100** align with the columns of vents **58**. Some of the vents **58** align between containers **100**, as do some of the offset vents **62** and vents **60**. Each of the containers **100** is received on a container support surface defined by the perimeter of elongated vents, such that the elongated lower ventilation openings **116** of the container **100** are aligned with the elongated vents along the perimeter of each container support surface.

[0043] The alignment of vents on the crate **10** and containers **100** provides improved flow of cold air into the containers **100** when the crate **10** and containers **100** are placed in refrigeration.

[0044] The crate **10** can stack on an identical crate **10** either in an aligned orientation (not shown) or in a cross-stacked orientation, as shown in FIG. **18** (as part of a cross-stacked stack of crates **10**, in a known arrangement). As shown, the upper crate **10** is rotated ninety degrees relative to the lower crate **10**, so that two thirds of the crates **10** overlap (if the crate's **10** width is two-thirds of its length). FIG. **19** is a bottom view of the crates **10** of FIG. **18**. As shown, in the cross-stacked orientation, the vents **56** of the upper crate **10** align with the vents **58** of the lower tray **10**, and vice versa. The offset vents **62** also align with vents **56**. This would also mean that the vents in the base **12** of the upper crate **10** are aligned with the upper ventilation openings **110** of the containers **100** (just as the vents in the base **12** aligned with the lower ventilation openings **116** of the containers **100**, because the upper ventilation openings **110** are aligned with the lower ventilation openings **116**).

[0045] FIG. **21** shows the crates **10** and containers **100** aligned with the end wall **16** of one crate **110** adjacent one edge of a side wall **14** of the other crate **10**. This is part of a lower layer of crates **10**, where another layer would be stacked thereon, as in FIGS. **18** and **19**. As shown in FIG. **24**, the vents **29**, **49** align, the vents **31**, **51** align and the vents **27**, **47** align.

[0046] The crate **10** is thus designed to provide good ventilation when cross stacked with identical crates. Also, the crate **10** and the containers **100** in combination provide improved ventilation. This permits more rapid, even cooling of the produce (e.g. strawberries) in the containers **100**.

[0047] In accordance with the provisions of the patent statutes and jurisprudence, exemplary configurations described above are considered to represent a preferred embodiment of the invention. However, it should be noted that the invention can be practiced otherwise than as specifically illustrated and described without departing from its spirit or scope.

What is claimed is:

1. A crate comprising:

a base including a generally horizontal panel;

a pair of opposed side walls extending upward from the base, generally perpendicular to the panel;

a pair of opposed end walls extending upward from the base, generally perpendicular to the panel, a handle opening formed through each of the opposed end walls; and

the panel of the base including a plurality of rectangular container support areas of the same size each having four sides, one of the plurality of rectangular container support areas positioned between two others of the plurality of rectangular support areas, wherein the container support areas are arranged in a 3×3 array

substantially completely occupying the generally horizontal panel of the base from one of the side walls to the other of the side walls and from one of the end walls to the other of the end walls, each side intersected by a plurality of elongated vents each elongated along an axis perpendicular to the each side, the elongated vents formed through the panel of the base, one row of the elongated vents arranged adjacent each side wall, one column of the elongated vents arranged adjacent each end wall.

2. The crate of claim **1** wherein the side walls and the end walls are hingeably connected to the base.

3. The crate of claim **1** wherein a plurality of containers are disposed on the base, each of the containers supported on one of the container support areas, each of the containers having a plurality of lower ventilation openings aligned with the vents of the respective container support area.

4. The crate and containers of claim **3** wherein the plurality of lower ventilation openings are formed through tapered side walls and a lower wall of a base of each of the containers.

5. The crate of claim **1** wherein the side walls each include a lower panel portion, an outer panel portion above the lower panel portion, and an upper panel portion above the outer panel portion, wherein the lower panel portion and the upper panel portion are disposed in an inner plane and the outer panel portion is disposed in an outer plane spaced outward of the inner plane.

6. The crate of claim **5** wherein a plurality of ribs extend outward from the lower panel portion and upper panel portion to the outer plane and inward from the outer panel portion to the inner plane.

7. The crate of claim **5** wherein vertically-oriented vents are formed in the lower panel portion, horizontally-oriented vents are formed in the outer panel portion, and horizontally-oriented vents are formed in the upper panel portion.

8. The crate of claim **7** wherein a plurality of containers are disposed on the base, each of the containers supported on one of the container support areas, each of the containers having an upper portion hingeably connected to a lower portion, the upper portion including a rim portion extending around a periphery of a lid portion, a plurality of connectors connecting the rim portion of the upper portion to the rim portion of the lower portion and defining a gap between the rim portions, wherein the vents in the outer panel portion of the crate align with the gap between the upper portion and the lower portion of the container.

9. The crate of claim **8** wherein the lower portion of each of the containers has ventilation openings aligned with the vents of the respective container support area.

10. The crate of claim **9** further including horizontally-oriented lower vents formed in the lower panel portion below the vertically-oriented vents.

11. The crate of claim **1** wherein the side walls and the end walls include vents that are arranged such that when one of the end walls of the crate is placed against one of the side walls of an identical crate, the vents in the one of the end walls are aligned with the vents in the one of the side walls of the identical crate.

12. The crate of claim **1** wherein a plurality of identical containers are disposed on the base, each of the containers supported on one of the container support areas, each of the containers having a plurality of lower ventilation openings aligned with the elongated vents on each of the four sides of the respective container support area.

13. The crate and containers of claim **12** wherein the containers are arranged in a 3×3 arrangement on the base of the crate.

14. A crate comprising:

a base;

a pair of opposed side walls extending upward from the base;

a pair of opposed end walls extending upward from the base, each of the end walls including a handle opening therethrough; and

the base including a plurality of container support areas of the same size each defined by a rectangular perimeter having four sides, a plurality of vents arranged along each of the sides of each of the perimeters, wherein the plurality of vents are each elongated along an axis perpendicular to its respective side of the respective perimeter, wherein the container support areas are arranged in a 3×3 array substantially completely occupying the base from one of the side walls to the other of the side walls and from one of the end walls to the other of the end walls.

15. A crate comprising:

a base;

a pair of opposed side walls extending upward from the base;

a pair of opposed end walls extending upward from the base; and

wherein the side walls each include a lower panel portion extending from one end wall to the other end wall, an outer panel portion above the lower panel portion, and an upper panel portion above the outer panel portion, wherein an inner surface of each of the side walls is defined by the lower panel portion and the upper panel portion, and wherein the inner surface circumscribes the outer panel portion, wherein the outer panel portion is spaced outwardly of the upper panel portion and the lower panel portion, wherein lower vents are formed in the lower panel portion, outer vents are formed in the outer panel portion, and upper vents are formed in the upper panel portion, wherein the lower vents are elongated in a vertical direction, the outer vents are elongated in a horizontal direction and the upper vents are elongated in a direction generally parallel to the outer vents.

16. The crate of claim **15** wherein a plurality of ribs extend outward from the lower panel portion and upper panel portion and inward from the outer panel portion.

17. The crate of claim **15** wherein the vents of the side walls and the end walls are arranged such that when one of the end walls of the crate is placed against one of the side walls of an identical crate, the vents in the one of the end walls would be aligned with the vents in the one of the side walls of the identical crate.

18. The crate of claim **15** wherein the lower panel portion and the upper panel portion are disposed in an inner plane and wherein the outer panel portion is disposed in an outer plane, spaced outward of the inner plane.

19. The crate of claim **18** wherein a first plurality of ribs extend outward from the lower panel portion to the outer plane.

20. The crate of claim **19** wherein a second plurality of ribs extend inward from the outer panel portion to the inner plane.

21. The crate of claim **20** wherein a third plurality of ribs extend outward from the upper panel portion to the outer plane.

22. A crate comprising:

a base having opposed side edges and opposed end edges;

a pair of opposed side walls extending upward from the side edges of the base;

a pair of opposed end walls extending upward from the end edges of the base, a handle opening formed through each of the pair of opposed end walls; and

the base including a plurality of first vents adjacent each of the side edges, the first vents elongated along axes perpendicular to the side edges, the base including a plurality of second vents adjacent each of the end edges, the second vents elongated along axes perpendicular to the end edges, the base including a plurality of third vents arranged in a plurality of rows parallel to the side edges, wherein the third vents are elongated along axes perpendicular to the side edges, the base including a plurality of fourth vents arranged in columns parallel to the end edges, wherein the fourth vents are elongated along axes perpendicular to the end edges.

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