(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
24 April 2003 (24.04.2003)

PCT

(10) International Publication Number
WO 03/033375 A1

(51) International Patent Classification[7]: B65D 71/00, 21/04

(21) International Application Number: PCT/US02/32878

(22) International Filing Date: 15 October 2002 (15.10.2002)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
09/977,636 15 October 2001 (15.10.2001) US

(71) Applicant *(for all designated States except US)*: **REHRIG PACIFIC COMPANY** [US/US]; 4010 East 26th Street, Los Angeles, CA 90023 (US).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **APPS, William, P.** [US/US]; 225 Lake Heights Drive, Alpharetta, GA 30022 (US). **GRUBER, Robert, V.** [US/US]; 2126 Loma Drive, Hermose Beach, CA 90254 (US).

(74) Agent: **DIAMOND, Konstantine, J.**; Rehrig Pacific Company, 4010 East 26th Street, Los Angeles, CA 90023 (US).

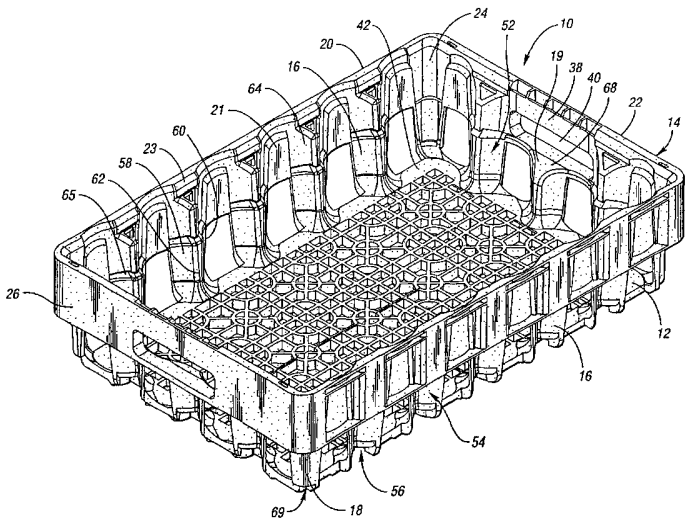
(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZM, ZW.

(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report*

[Continued on next page]

(54) Title: NESTABLE CRATE FOR CONTAINERS



(57) Abstract: A nestable crate (10) for bottles includes a floor portion (12) having a floor top surface, a floor bottom surface and a plurality of bottle support areas. A wall structure (20, 22) is connected to the floor portion and forms a containment area therewith. The wall structure has a periphally extended upper band portion (14) with an interior surface (24) and an exterior surface (24), and also has a single-walled lower wall construction comprising adjacent column members (16) which extend between the upper band the and floor portion. The wall structure includes sidewalls (20) and end walls (22), and adjacent column members (16) have curved facing surfaces (21) extending inwardly into the containment area. The inner surface of the upper band portion, one of the plurality of bottle support areas, and the facing surfaces define a plurality of bottle receiving pockets extending around the periphery of the wall structure.

WO 03/033375 A1

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

NESTABLE CRATE FOR CONTAINERS

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a nestable crate for transporting and storing containers, and particularly bottles.

2. Background Art

Bottles, particularly those used to contain soft drinks and other beverages, are often transported and stored in crates having a bottom surrounded by four sidewalls. These crates generally are configured to be stacked on top of each other both when empty and when loaded with bottles. These crates are known in the art generally as full-depth and half-depth crates. Half-depth crates are shorter than full-depth crates, thus providing for greater visibility of the crates' contents.

Full-depth and half-depth crates are not designed to nest with one another and do not significantly stack, and thus do not store efficiently when. They typically have vertical exterior surfaces from top to bottom, and minimal wall stock, for providing a minimal overall length and width to allow for as much bottle density and as little crate structure as possible, in order to provide for pallet optimization, with little or no pallet overhang. The bottom of these crates extends downwardly and inwardly offset from the sidewalls defining a crate footprint. The stacking feature of such crates is typically limited to this bottom footprint, which is received within the rim of a like container to achieve more stable stack. One design is shown in U.S. Design Patent No. D 361,663.

These crates are designed to balance many factors, including the need for structure and strength against having a footprint appropriately sized to provide pallet optimization. However, to achieve significant degree of nesting with such crates, beyond that described above, would require a larger footprint, a more significant

sidewall structure and more taper in the walls, and therefore detracts from the aforementioned pallet optimization.

On the other hand a third type of crate, low-depth crates, have generally been designed for bottles having a straight, cylindrical body with tapering tops. Unlike their half-depth and full-depth counterparts, low-depth crates typically have a led construction with tapered sidewalls -- thus leading to greater pallet overhang – in order to provide for a nesting height of typically 50% between like crates. Bottles placed in low-depth and half-depth crates extend above the sidewalls of the crates. Thus, when loaded with bottles and in a stacked orientation, containers in such crates must be able to support the weight of other cases stacked on top of them. Once loaded with bottles, crates are typically stacked on top of each other in layers on top of a pallet, which is then lifted and moved about by forklifts. However, many low depth nestable crates may lack the features for maintaining loaded bottles in a substantially vertically upright position to bear the compressive load of crates stacked thereon.

Further, it is common for entire layers of crates to be lifted and moved about by way of an automated product lifting and handling device which can be installed on a conventional forklift and enables the lifting of an entire layer of product from a pallet. Briefly, such devices typically grabs each side of a layer of crates and use compressive loads to keep the layer intact, transferring forces from the sidewalls of the crate to the bottles therein, to the sidewalls of an adjacent crate, and so on. Unfortunately, some crates may not provide sufficient surface area or vertical sidewall construction, which would hinder or prevent the use of the automatic handling machinery. The often tapered sidewalls of a low-depth crate is just one example.

Thus, there is a need for an improved crate for storing and transporting containers, and particularly beverage containers. Such crate should be nestable to provide for more efficient storing and handling of the crates when emptied. Further, such crates should maintain bottles stored therein in a generally upright position. The crates should also be able to nest with various types of crates, including similar crates and non-similar half-depth and full-depth crates. Moreover, when similar crates are in

a layered orientation, such crates should be capable of being lifted by automated lifting machinery.

SUMMARY OF THE INVENTION

Accordingly, it is an object according to the present invention to provide a low-depth crate, which is nestable with other similar crates when empty in order to provide more efficient storage.

It is another object according to the present invention to provide a low-depth crate, which is nestable within empty crates of similar construction and half-depth crates.

Another object according to the present invention is to provide a low-depth nestable crate, which maintains containers, stored therein in a substantially upright position.

Yet another object according to the present invention is to provide a low-depth nestable crate which, when oriented in a layer with similar crates, is able to be lifted by automated lifting machinery.

In accordance with the objects and teachings of the present invention, provided is a nestable crate for bottles having a floor portion with a floor top surface and a floor bottom surface. The floor top surface has a plurality of bottle support areas for supporting bottles. Also included is a low-depth wall structure connected to the floor portion and forming a containment area therewith. The wall structure has a peripherally extending upper band portion having an interior surface and an exterior surface. The wall structure further has a single-walled lower wall construction comprising adjacent column members which extend between the upper band the and floor portion. The wall structure includes sidewalls and end walls. A plurality of bottle receiving pockets extends around the periphery of the wall structure for maintaining bottles in a vertically upright manner. Each pocket is defined by the inner surface of the upper band portion, one of the plurality of bottle support areas, and a pair of facing

surfaces disposed on adjacent column members extending inwardly from the upper band portion into the containment area to secure bottles therein in an upright manner. The pair of facing surfaces preferably have a concave shape. Further the upper band member has an inner surface with a plurality of nesting members aligned with corresponding column members, such that an outer surface of the column members are configured to receive the nesting members of a like crate when in a nesting orientation. The nesting members have a double-walled construction. The band also includes a bottle contact surface that has a curvature corresponding to the pair of facing surfaces.

In another embodiment, the band includes a plurality of single-walled upright concave inner surfaces which are arranged in an alternating manner with the columns and are positioned to correspond to the bottles. The inner surface of the upper band portion includes a bottle contact surface adjacent the bottle receiving pocket. The upper band portion and facing surfaces define a window therebetween which is disposed below the top band.

Also provided is a low-depth nestable crate for holding bottles which has a low-depth wall structure having sidewalls and end walls, and a floor member having a floor top surface and a floor bottom surface. It also has a band extending around the periphery of the crate and spaced above the floor member for preventing the bottles from tipping. The band has spaced-apart interior nesting projections. Also included is a plurality of columns which are disposed along the sidewalls and end walls for connecting the band member and the floor member. The columns are spaced apart and have a nesting window disposed therebetween. The columns have an interior surface and an exterior surface and project inwardly from the band such that an adjacent pair of columns defines a bottle receiving area for containing one of the bottles therein. The interior surface of each column has a pair of opposed members meeting at a centrally disposed surface. The exterior surface of the column has a recess to matingly receive corresponding interior nesting projections from a similar crate nested therebelow. The interior surfaces of the columns preferably have a cylindrically concave surface extending from a lower column edge to an upper column edge. The band may also include a plurality of upright concave inner surfaces arranged in an alternating manner with the columns and positioned to correspond to the bottles.

The cylindrically concave surface and its adjacent upright concave inner surface have a similar curvature radius.

Any of the crates disclosed herein are preferably arranged to nest within a lower bottle crate having a generally vertical wall structure having an upper surface, outer surface and inner surface, as well as a floor attached to the wall structure and defining a compartment therewith. When nested, the exterior surface of the upper wall member of the upper bottle crate disclosed herein is generally co-planar with the outer surface of the wall structure of the lower bottle crate.

The above objects and other objects, features, and advantages of the present invention are readily apparent from the following detailed description of the best modes for carrying out the invention when taken in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGURE 1 is a perspective view of a first embodiment of a nestable bottle crate according to the present invention;

FIGURE 2 is a top plan view of the crate of Figure 1;

FIGURE 3 is a front side elevational view of the crate of Figure 1, the rear side elevational view being a mirror image thereof;

FIGURE 4 is a left end elevational view of the crate of Figure 1, the right end elevational view being a mirror image thereof;

FIGURE 5 is a bottom plan view of the crate of Figure 1;

FIGURE 6 is a bottom perspective view of the crate of Figure 1;

FIGURE 7 is a perspective sectional view of the crate of Figure 1 nested within a first prior art half-depth crate;

FIGURES 8a and 8b show, respectively, a perspective view and a cross-sectional view, of a second embodiment of a crate according to the present invention nested within a second prior art straight-walled half-depth crate;

FIGURE 9 is a perspective view of a third embodiment of a nestable bottle crate according to the present invention;

FIGURE 10 is a top plan view of the crate of Figure 9;

FIGURE 11 is a bottom plan view of the crate of Figure 9;

FIGURE 12 is a front side elevational view of the crate of Figure 9, the rear side elevational view being a mirror image thereof;

FIGURE 13 is a left end elevational view of the crate of Figure 1, the right end elevational view being a mirror image thereof;

FIGURE 14 is a sectional view taken along the lines 14-14 of Figure 10;

FIGURE 15 is a sectional view taken along the lines 15-15 of Figure 10;

FIGURE 16 is a sectional view taken along the lines 16-16 of Figure 10;

FIGURE 17 is a sectional view taken along the lines 17-17 of Figure 10;

FIGURE 18 is a sectional view taken along the lines 18-18 of Figure 10.

FIGURE 19 is a cross-sectional view showing two crates of Figure 9 nested and with a bottle disposed in the upper crate; and

FIGURE 20 is a top plan view of the crate of Figure 9 with bottles disposed therein.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT(S)

In accordance with the present invention, provided in Figures 1-7 is a first embodiment of a nestable bottle crate 10 which is suitable for holding containers 5 (shown as bottles in Figures 19-20) therein. Crate 10 is preferably formed from a plastic material, such as high density polyethylene (HDPE), by an injection molding or other suitable plastic molding process. Crate 10 is also preferably formed as a unitary member with all components integrally connected. Containers 5 may be used for beverages and have a generally cylindrical shape. Referring to Figure 1, crate 10 includes a floor member 12, and also includes a wall structure that has a top band 14 (or upper wall member) and a plurality of columns 16 (or lower wall member) extending around the periphery of the floor member 12 for connecting floor member 12 to top band 14. Columns 16 are arranged along the sides of crate 10. Crate 10 also includes corner column members 18 at each of the corners of crate 10. The wall structure includes sidewalls 20 and end walls 22. Crate 10 may have a rectangular or square shape. A compartment is defined by the wall structure and the floor member.

As shown in Figure 1, top band 14 extends around the periphery of crate 10 and includes a sidewall 20 having a plurality of bottle contact areas 21 which are illustrated as single-walled, while having a double-walled construction 23 between adjacent bottle contact areas 21. In addition, end walls 22 are illustrated as having a double-walled construction, but may also be formed with single wall portions. Top band 14 has an interior surface 24 and an exterior surface 26. Top band 14 is oriented generally perpendicular to floor member 12 and is spaced above floor member 12 a sufficient height to prevent bottles stored therein from tipping. As illustrated in a later embodiment of Figures 19-20, bottles 5 stored within crate 10 along the side and end walls 20, 22, are disposed adjacent their corresponding bottle contact surfaces. Figure 2 shows that interior surface 24 has a curved or cylindrically shaped bottle contact surface 21, but it is contemplated that it may also be a flat surface.

Top band 14 provides the desired strength and rigidity to crate 10, while allowing for a relatively lighter weight crate by its partial single-walled construction. Exterior surface 26 of top band is generally vertically disposed.

A handle portion 38 is also included in the band member 14 of end walls 22 by which a user may grasp crate 10. An opening 40 is disposed below handle member 38 through which a user's fingers may extend for handling crate 10 in association with handle 40. The central end wall columns define an inwardly extending nesting ledge 68, which provides an additional stop during nesting.

Floor member 12 has an open lattice pattern that provides for a relatively lightweight crate and allows drainage. Floor member 12 is generally flat and planar and includes support areas 42 arranged in rows and columns to define one or more arrays. In the embodiment shown, a 4x6 array accommodates 24 20-oz bottles. Of course, this is by example and not limitation as the crate may be designed to support various quantities and sizes of bottles, without departing from the teachings herein. As shown in Figure 9, upper surface 244 of floor 212 may also include a plurality of relatively low profile ribs 46,48 extending upwardly and across upper surface. Such ribs help provide stiffness to bottom 212.

As shown in Figures 5-6, floor bottom surface 45 has recesses below each receiving area 42 for receiving the tops of bottles 5 disposed in a crate stacked therebelow. The recesses are defined by downstanding rib members 49 that impede crate 10 from freely sliding along the top of bottles 5 beneath it, and makes it less likely that the bottles in a lower crate will tip.

The various embodiments of the crate according to the present invention are nestable with similar crates, as illustrated in Figure 19, which shows a cross-section of crates 210 and 210' nested together and holding a bottle 5. When in a nested arrangement, upper crate 210 fits into lower crate 210' so that the lower edge 235 of top band 214 rests upon the upper edge 231' of top band 214'.

With reference again to Figures 1-6, columns 16 along walls 20 and 22 of crate 10 that connect floor member 12 to band 14 are positioned between adjacent support areas 42 along the periphery of floor member 12. The wall structure has window openings 50 between columns 16, adjacent support members 42 and below band 14. Window openings 50 allow for visibility into crate 10, and also receive surface 21 of a lower crate when nested. The height of column 16 is sufficient to prevent containers 5 from tipping when transported, and allow the tops of containers 5 to extend above top band 14. Columns 16 have a generally single-walled construction, and have an interior surface 52 and a corresponding exterior surface 54. Exterior surface 54 of column 16 includes a centrally disposed recessed area 56 which, when nested with a similar crate, receives the corresponding inwardly disposed inner surface 64 of top band 14 disposed above and in vertical alignment with column 16 and have a common centerline therewith. Surfaces 64 provide nesting support and bottle stability.

Interior surface 52 of column 16 is generally vertical and includes angled bottle surfaces 58 and 60 which meet at a centrally oriented, vertically disposed, inwardly directed lower surface or edge 62. In a preferred embodiment, bottle contact surface 21 is cylindrically planar with column surfaces 58, 60. Upper inner surface 64 is disposed slightly outward from column inner surface 52, to provide a transition ledge 65 therebetween. Top band 14 is offset outwardly from columns 16 such that nesting is achieved, both with similar crates (Figure 19) and non-similar half-depth crates 400 with a similar footprint and which has a generally vertically wall structure, as previously described (Figures 8a-8b).

Columns 16 should also be strong enough to support the band 14 should containers 5 push against band 14. Columns 16 are generally defined by two arcuate faces 58, 60 intersecting at a central edge 62, and may have a relatively larger area and cross-section at their bottoms, thus being more robust in their connection with floor member 12. Opposed surfaces 58,60 of column 16 have a curvature generally mirroring that of adjacent bottles 5, such that the adjacent facing surfaces 58 of one column and 60 of an adjacent column cradle the bottles 5 therein.

With reference to Figures 1-2, corner columns 18 do not project inwardly into crate 10, but remain peripherally disposed, thereby providing a more secure corner pocket for a bottle stored therein. The degree of containment of corner bottle support area 42a results from the adjacent end and side columns 16a,16b, as shown in Figure 2.

Figures1, 6 and 7 illustrate another feature of crate 10 according to the present invention. As shown, the bottom surface of corner columns 18 and floor 12 define a recessed corner nesting area 69. Thus, as shown in Figure 7, when crate 10 is nested within a prior art half-depth crate 500 that has a corner projection 503, nesting area 69 receives a portion of corner projection 503 to enhance the stackability and nestability of such containers.

As previously noted, typical half-depth crates may only stack (not nest) with similar half-depth crates due to their construction, while low-depth crates typically are nested within similar low-depth crates. Thus, crates according to this invention provide for dual application in that it may nest within similar container 210' (Figure 19), and it also nests within a half-depth crate 400 of different construction (Figures 8a-8b), as illustrated by second embodiment of crate 110. Accordingly, crates according to the present invention provide efficient bottle containment having an optimally sized footprint similar to a non-nestable half-depth crate, while allowing for nestability both with similar crates and with non-nestable half-depth cases having a similar footprint. As shown in Figure 8b, the outer surface of top band 114 is vertically disposed and co-planar with the outer surface of half-depth crate 400.

Figures 9-20 illustrate a third embodiment of a crate 210 according to the present invention. Features similar to those of the first embodiment have a corresponding reference number with a "2" prefix. Crate 210 includes a sidewall 220 and end wall 222 construction having a top band 214 with an interior surface 224 and an exterior surface 226. Exterior surface 226 of top band 214 is defined by a plurality of ribbed members projecting therefrom, which includes a plurality of horizontally disposed ribbed members which are oriented generally parallel to each other and designated as upper rib portion 230, intermediate rib portion 232, and lower rib portion

234. Upper and lower rib portions 230 and 234 define, respectively, the upper edge 231 and lower edge 233 of band member 214. Exterior surface 226 also includes a plurality of vertically disposed rib portions 236 extending around the perimeter of band member 214. Exterior surface 226 is vertically disposed and has little or no taper associated therewith.

Ribs 230-236 enhance the strength of crate 210 while using relatively less material and are particularly advantageous when used in association with automate lifting devices. When crates 210 are stacked upon a pallet in layers, these ribs define a generally planar surface by which the lifting device may grasp crates efficiently. Upon gripping, a compressive force is distributed among the crates and ribs 230-236 may serve to catch onto corresponding ribs of an adjacent crate to enhance the support of adjacent crates and impede the separation and translation down of crates in a layer. When adjacent crates 210 are in a layer of crates being lifted, should one crate begin to slip, it is contemplated that, for example, upper horizontal rib 230 of crate 210 may cooperate with ribs 232 and 236 of the adjacent crate to impede slippage.

Columns 216 that define side pockets 267 of crate 210 provide significant containment and wrap-around for bottles adjacent sidewalls 220 and end walls 222, as well as in the corners. This provides for more bottle surface contact and thus better bottle and load stability.

While embodiments of the invention have been illustrated and described, it is not intended that these embodiments illustrate and describe all possible forms of the invention. Rather, the words used in the specification are words of description rather than limitation, and it is understood that various changes may be made without departing from the spirit and scope of the invention.

WHAT IS CLAIMED IS:

1. A nestable crate for bottles, said crate comprising:

a floor portion having a floor top surface and a floor bottom surface, the floor top surface including a plurality of bottle support areas for supporting bottles; and

a low-depth wall structure connected to the floor portion and forming a containment area therewith, the wall structure having a peripherally extending upper band portion having an interior surface with bottle contact portions and an exterior surface, the low-depth wall structure further having a single-walled lower wall construction comprising adjacent column members which extend between the upper band the and floor portion, the wall structure including sidewalls and end walls, and adjacent column members having concave facing surfaces extending inwardly into the containment area,

wherein the bottle contact portions, bottle support areas, and the facing surfaces define a plurality of bottle receiving pockets extending around the periphery of the wall structure for maintaining bottles in a vertically upright manner.

2. The crate of claim 1, wherein the upper band member has an inner surface with a plurality of nesting members aligned with corresponding column members, such that an outer surface of the column members are configured to receive the nesting members of a like crate when in a nesting orientation.

3. The crate of claim 2, wherein the nesting members have a double-walled construction.

4. The crate of claim 1, wherein the bottle contact portion has a concave shape.

5. The crate of claim 4, wherein the bottle contact portion has a curvature corresponding to the facing surfaces.

6. The crate of claim 1, wherein the bottle contract portion has a single-walled construction.

7. The crate of claim 1 wherein the upper band member and each adjacent pair of columns define a window therebetween which is disposed below the upper band portion.

8. A low-depth nestable crate for holding bottles, said crate having a low-depth wall structure having sidewalls and end walls, said crate comprising:

a floor member having a floor top surface and a floor bottom surface;

a band extending around the periphery of the crate and spaced above the floor member for preventing the bottles from tipping, the band further having spaced-apart interior projections; and

a plurality of columns disposed along the sidewalls and end walls for connecting the band member and the floor member, the columns being spaced apart and having a nesting window disposed therebetween, the columns having an interior surface and an exterior surface, the columns projecting offset inwardly from the band such that adjacent pair of columns define a bottle receiving area for containing one of the bottles therein, the interior surface of each column having a pair of opposed surfaces meeting at a centrally disposed surface, the exterior surface of the column having a recess to matingly receive corresponding projections from a similar crate nested therebelow.

9. The crate of claim 8, wherein the interior surfaces of the columns have a cylindrically concave surface.

10. The crate of claim 9, wherein the cylindrically concave surface extends from a lower column edge to an upper column edge.

11. The crate of claim 8 wherein the band includes a plurality of upright concave inner surfaces, said concave inner surfaces arranged in an alternating manner with the columns and being positioned to correspond to the generally cylindrical bottles.

12. The crate of claim 11, wherein the cylindrically concave surface and its adjacent upright concave inner surface have a similar curvature radius.

13. The crate of claim 8 wherein at least a portion of the band has a single wall construction.

6

14. The crate of claim 8 further comprising upwardly recessed bottle top receiving areas on the floor bottom surface.

10 15. The crate of claim 8 wherein the crate has corner columns connecting the corner of the band to the floor member.

16. The crate of claim 8 wherein the interior projections of the band and adjacent columns have a common vertical centerline.

15

17. A low-depth nestable bottle crate comprising:

a floor member having a top surface and a bottom surface, the top surface having a plurality of bottle support areas for supporting an array of bottles in an upright manner;

20 a generally upright band member spaced apart from the floor member and extending around the periphery of the crate, the band member having an upper surface, a lower surface, an exterior surface, and an interior surface, the interior surface having a single walled bottle contact area corresponding to the bottle support areas of the floor member; and

25 a plurality of spaced-apart nesting columns connecting a periphery of the floor member with the lower surface of the band member, the columns including first and second opposed inner surfaces defining a corresponding vertical recess on the column outer surface, wherein the first inner surface of one of the plurality of columns, an adjacent second inner surface from an adjacent column, one of the bottle support 30 areas and bottle contact areas define a bottle receiving pocket for supporting a bottle in an upright orientation.

18. The crate of claim 17 wherein the bottle contact areas are define by arcuate surfaces on the band member interior surface which are arranged in an alternating manner with the columns and are positioned to correspond to the generally cylindrical bottles.

19. The crate of claim 17 wherein the first and second opposed inner surfaces and their adjacent bottle contact areas have a similar radius of curvature.

20. The crate of claim 17 wherein the columns are arranged in an alternating pattern with windows disposed therebetween and below the band member.

21. The crate of claim 17 wherein the band member includes side wall portions and end wall portions, and wherein the side wall portions of the band member include a handle opening formed therein.

22. The crate of claim 17 wherein the corner bottle support area is configured such that more than half of the bottle circumference is contained within the bottle support area.

23. A low-depth nestable bottle crate comprising:

a floor member having a top surface with a plurality of bottle support areas for supporting an array of bottles thereon;

an upper wall member spaced apart from the floor member and extending around the periphery of the crate, the upper wall member having an exterior surface, and also having an interior surface with spaced apart inwardly extending projection members, and bottle contact surfaces between the projection members; and

a lower wall portion disposed along a plane offset inwardly from the projection members and having a plurality of support members for connecting a periphery of the floor member with a lower surface of the upper wall member, the support members aligned with the nesting projections of the upper wall member, the support members including first and second opposed inner surfaces defining a corresponding recess on the column outer surface for receiving the nesting projection

of a like crate when nested, the lower wall structure having a window disposed between adjacent support members.

24. A nestable bottle crate comprising:

a floor member having a top surface with a plurality of bottle support areas for supporting an array of bottles thereon;

an upper wall member spaced apart from the floor member and extending around the periphery of the crate, the upper wall member having an upper edge, a lower edge, an exterior surface, and also having an interior surface with spaced apart inwardly extending nesting projections, and concave bottle contact surfaces between the nesting projections; and

a lower wall structure inwardly offset from the upper wall member and having a plurality of support members for connecting the floor member with a lower surface of the band member, the support members vertically aligned with the nesting projections of the upper wall member, the support members including first and second opposed concave inner surfaces defining a corresponding recess on the column outer surface for receiving the nesting projection of a like crate when nested, the lower wall structure having a window disposed between adjacent support members.

25. A nestable crate assembly comprising:

(a) a first bottle crate comprising:

a floor having a top surface with a plurality of bottle support areas for supporting an array of bottles thereon;

an upper wall member spaced apart from the floor member and extending around the periphery of the crate, the upper wall member having an upper edge, a lower edge, an exterior surface, and also having an interior surface with spaced apart inwardly-extending portions, and bottle contact surfaces between the inwardly-extending portions; and

a lower wall structure inwardly offset from the upper wall member and having a plurality of support members for connecting a periphery of the floor member with the upper wall member, the support members vertically aligned with the inwardly-extending portions of the upper wall member, the support members including first and second opposed inner surfaces defining a corresponding recess on the column outer

surface for receiving inwardly-extending portions of a like crate when nested, the lower wall structure having a window disposed between adjacent support members; and

(b) a second bottle crate comprising:

a plurality of generally vertical sidewalls defining a wall structure having an upper surface, outer surface and inner surface;

a floor attached to the wall structure and defining a compartment therewith,

wherein when the first bottle crate is nested within the compartment of the second bottle crate, the lower wall structure of the first bottle crate is disposed within the compartment of the second bottle crate such that the lower edge of the upper wall member of the first bottle crate rests upon the upper surfaces of the sidewalls of the second bottle crate, and wherein the exterior surface of the upper wall member of the first bottle crate is generally co-planar with the outer surface of the wall structure of the second bottle crate.

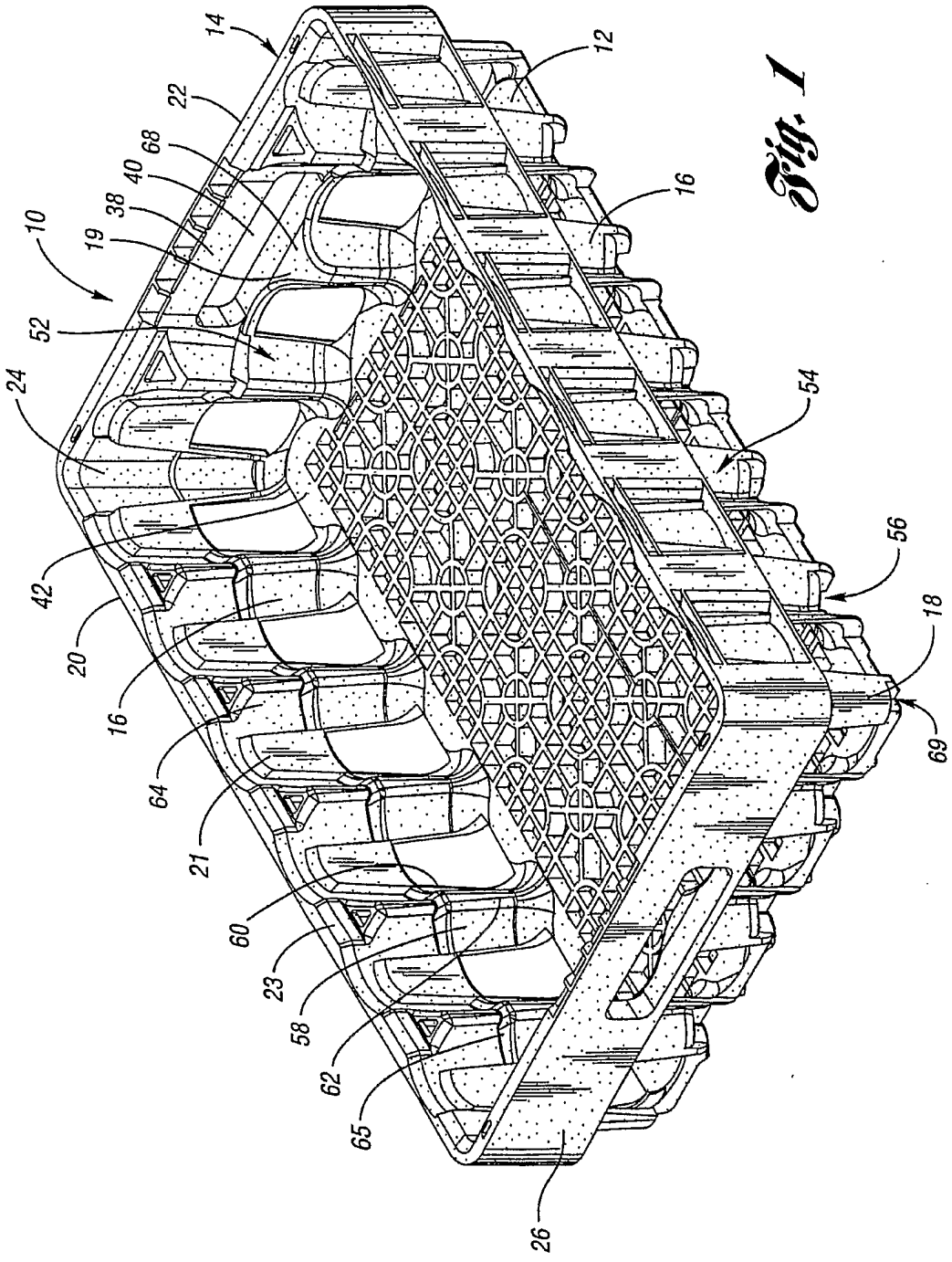

14
12
22
68
40
38
19
10
52
24
16
54
56
18
42
20
16
64
21
60
23
58
62
65
26
69

Fig. 1

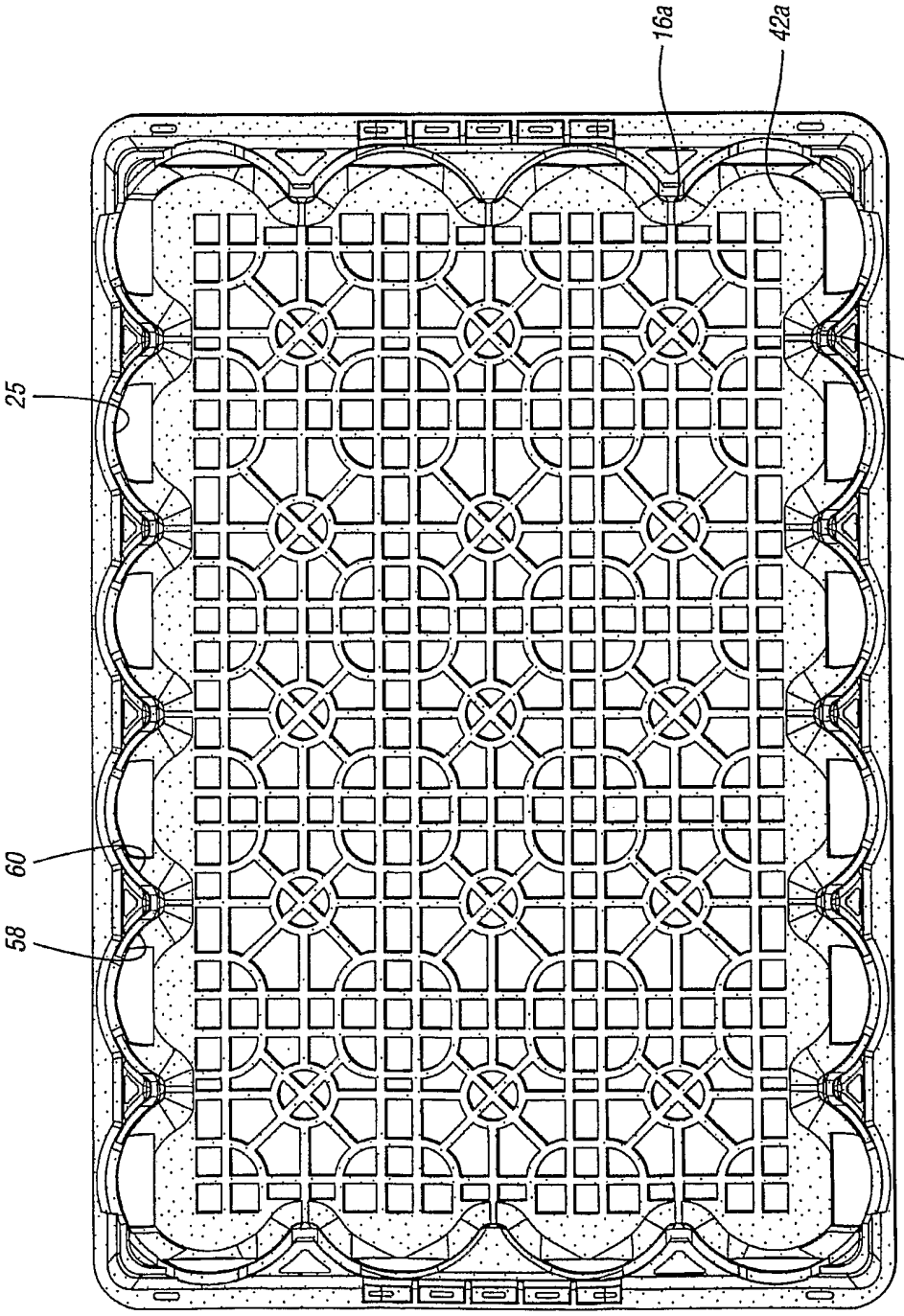


Fig. 2

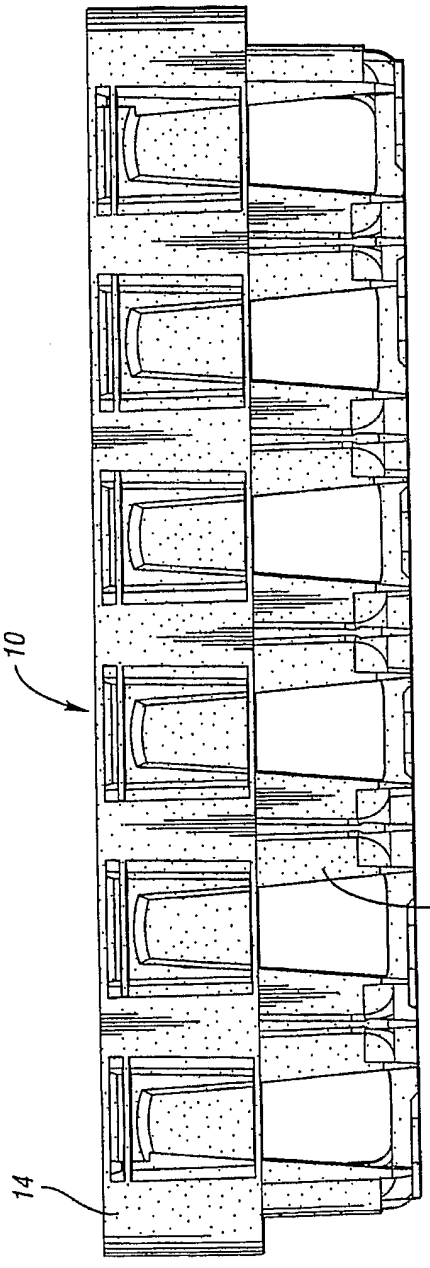


Fig. 3

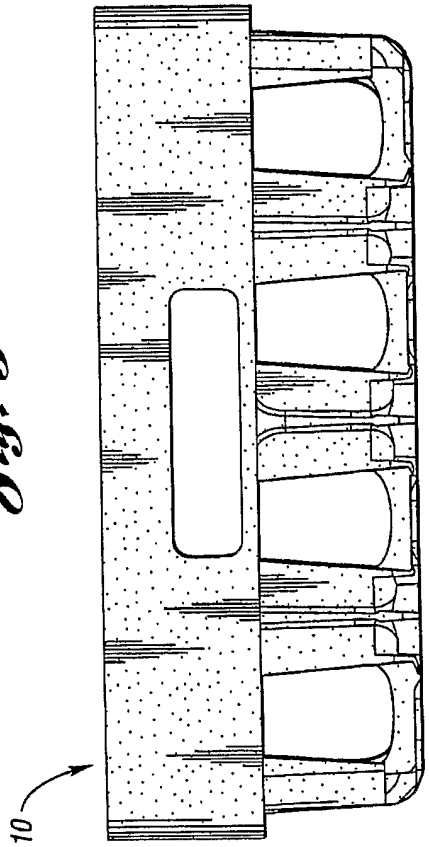


Fig. 4

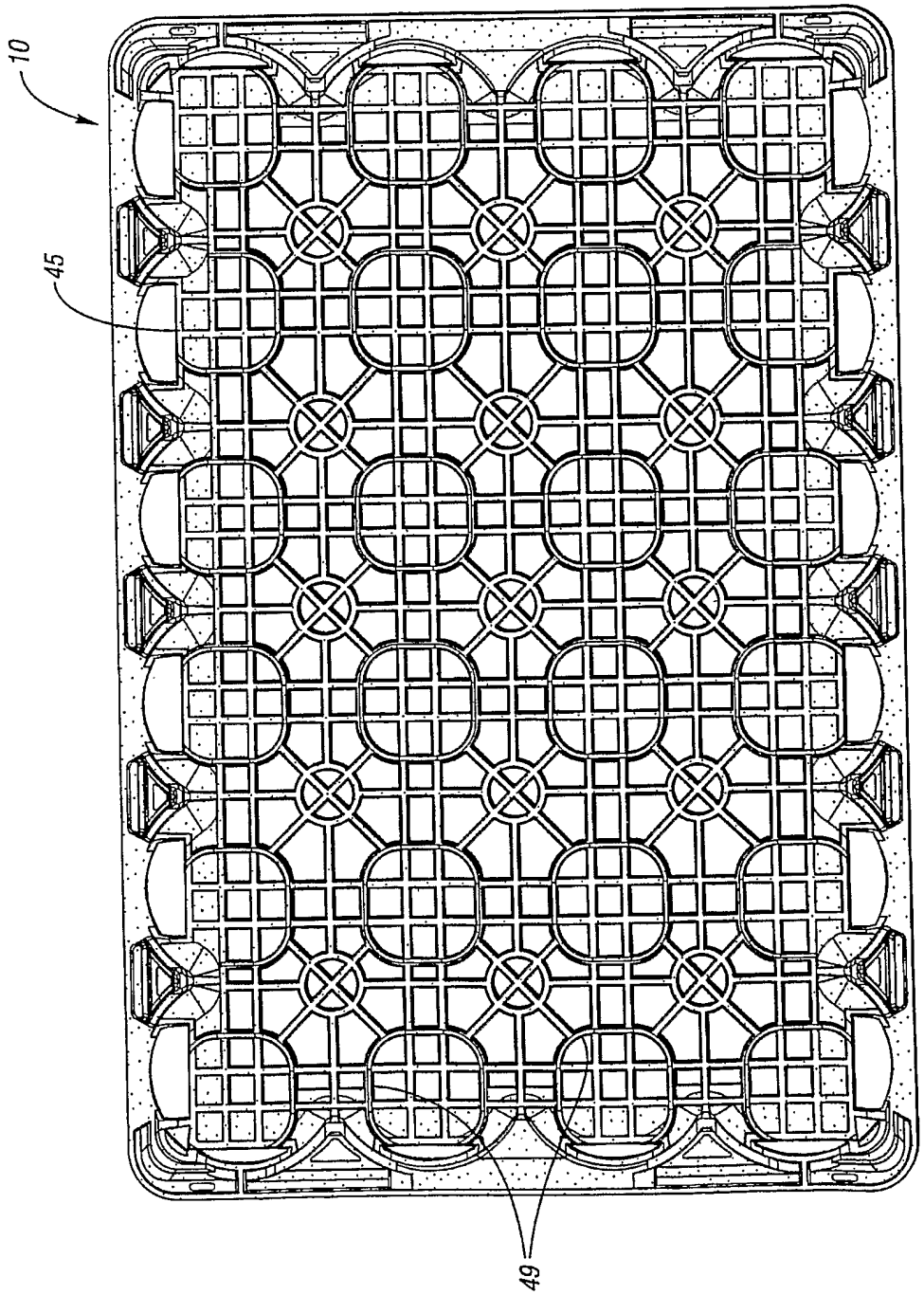


Fig. 5

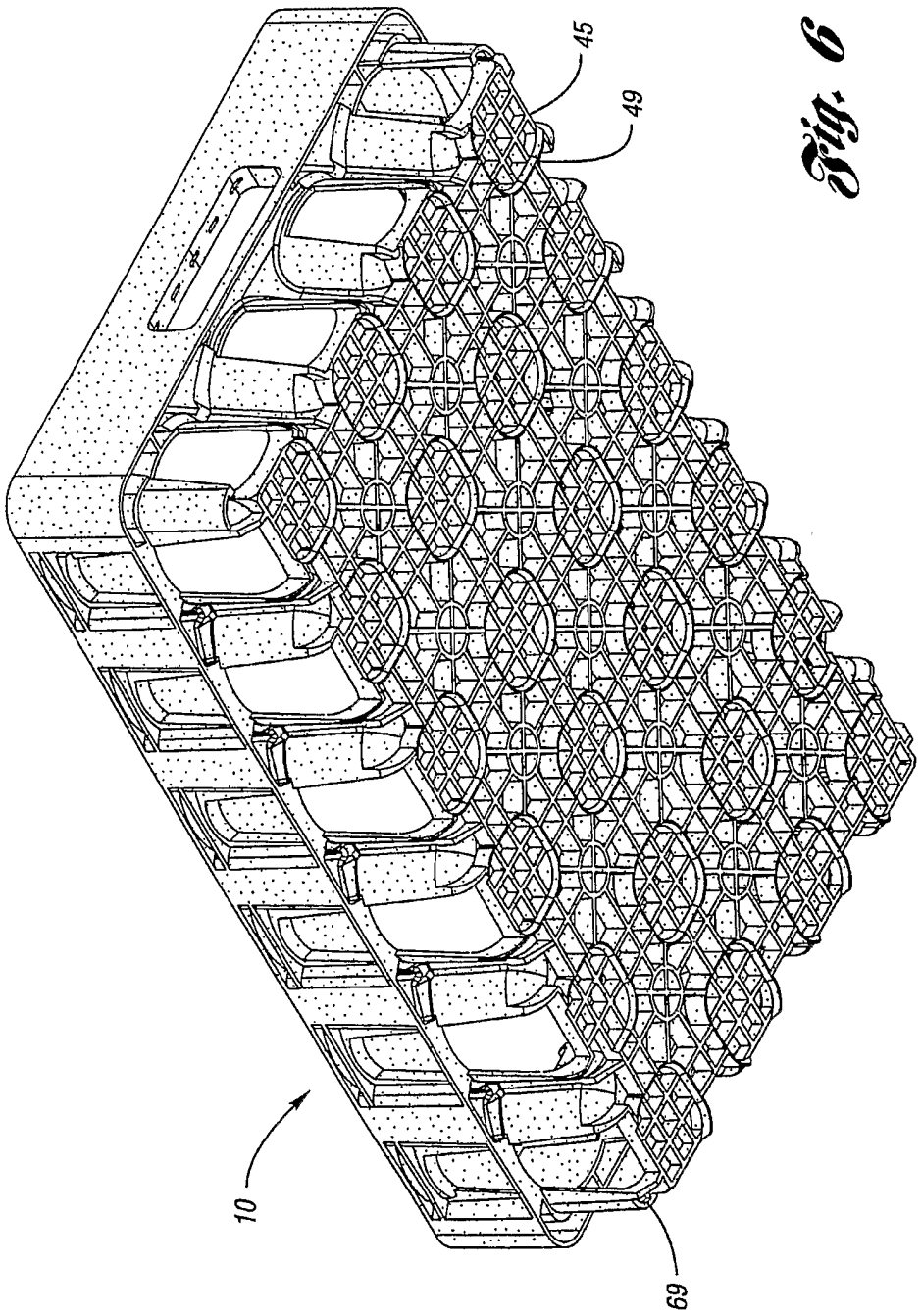


Fig. 6

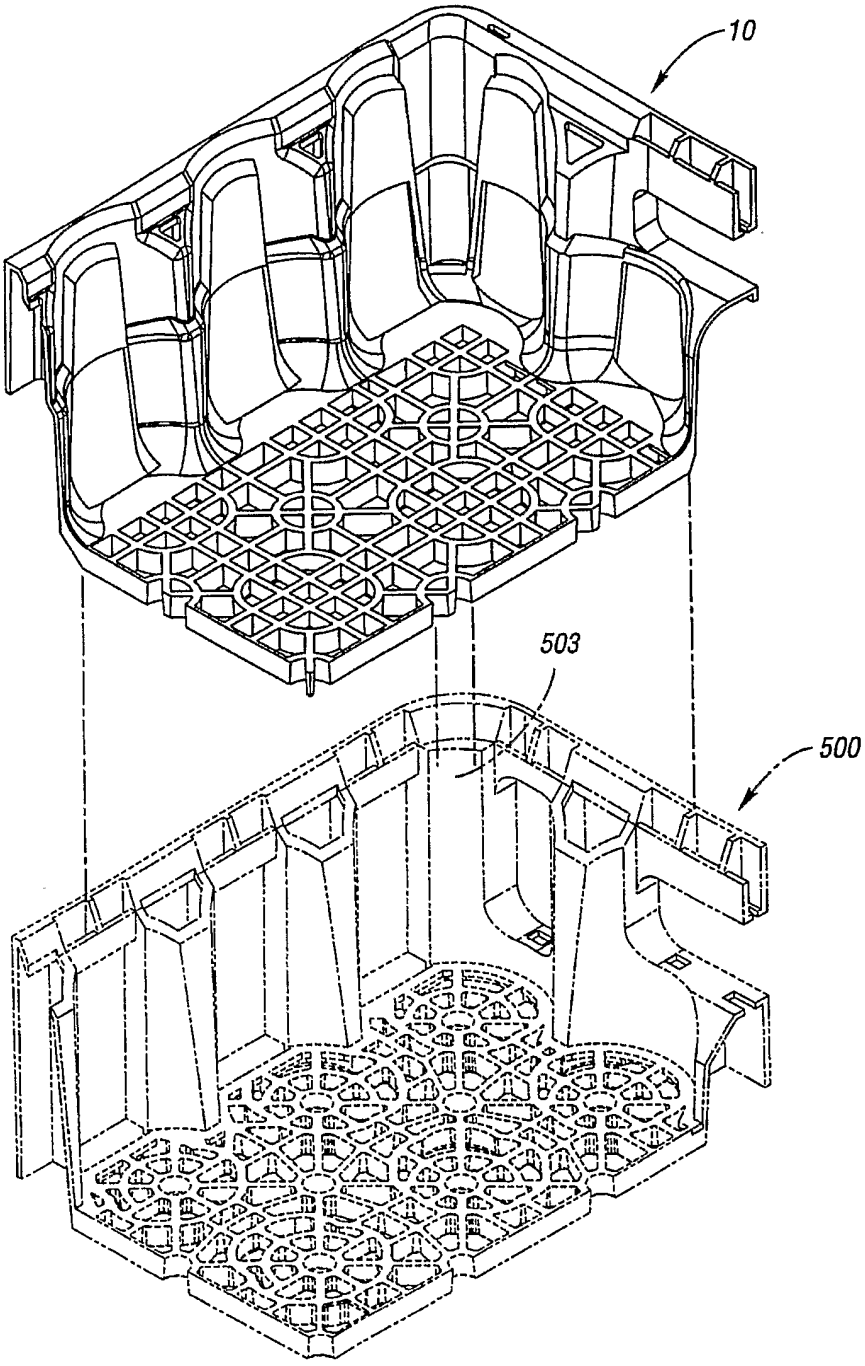


Fig. 7

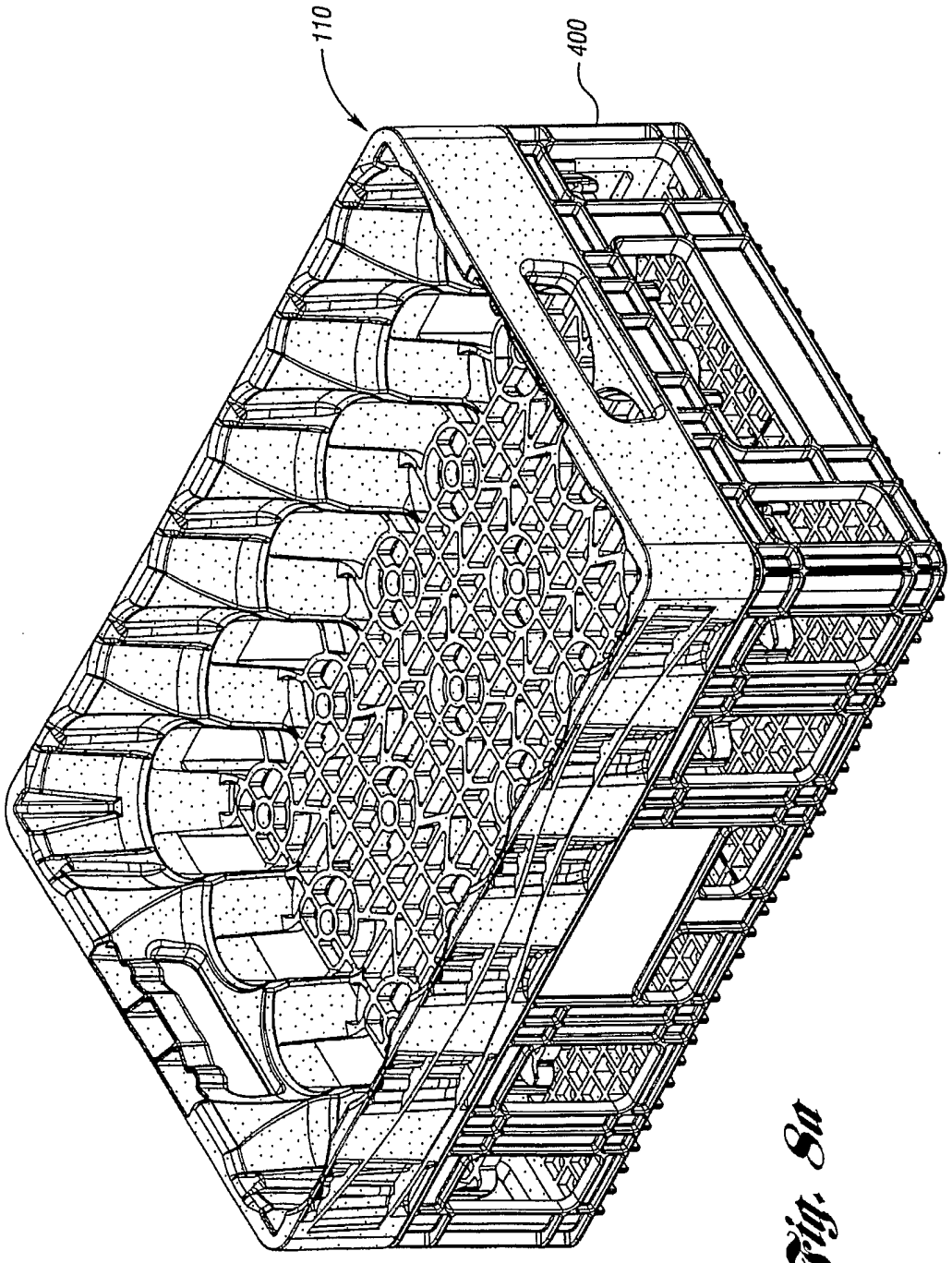


Fig. 8a

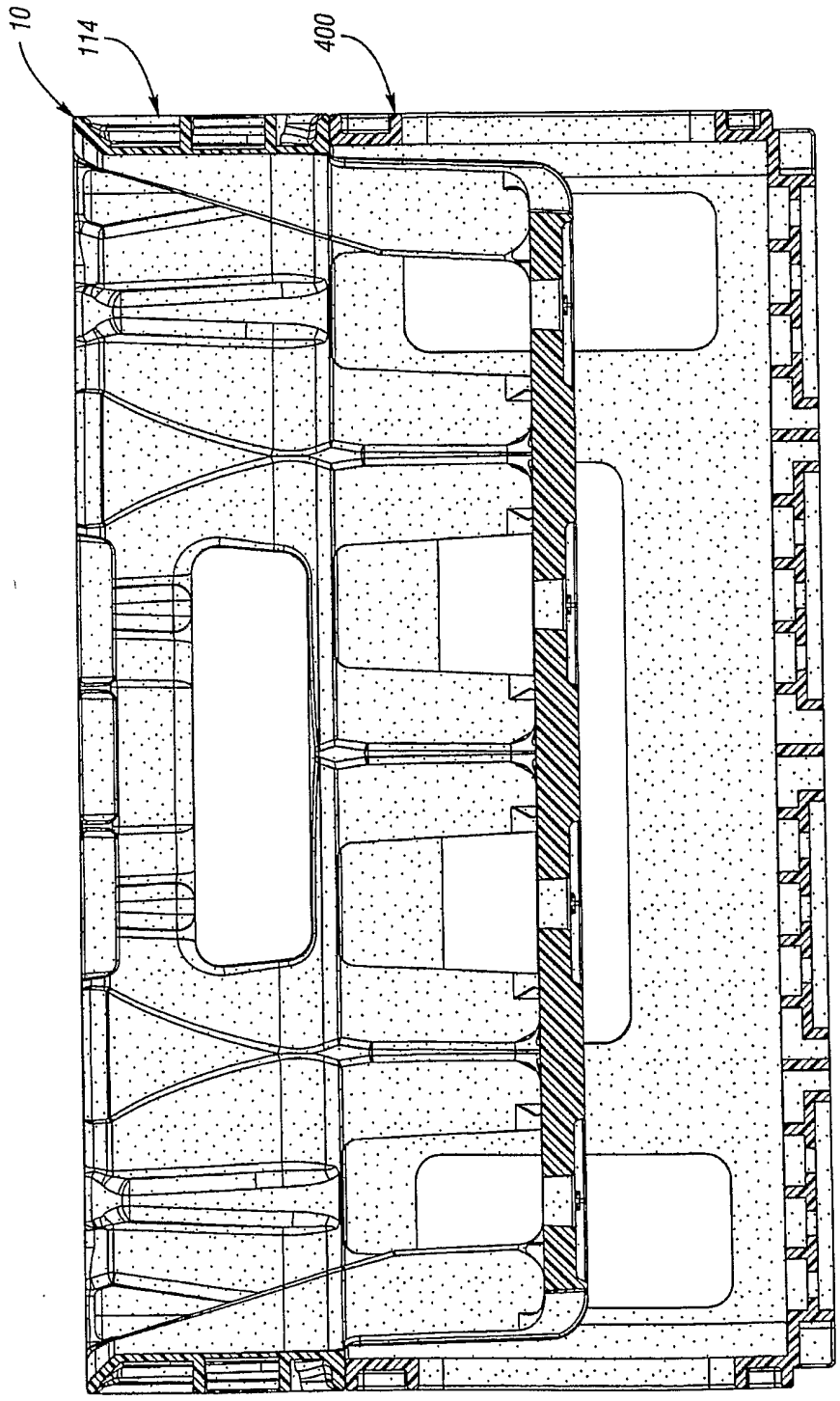


Fig. 8b

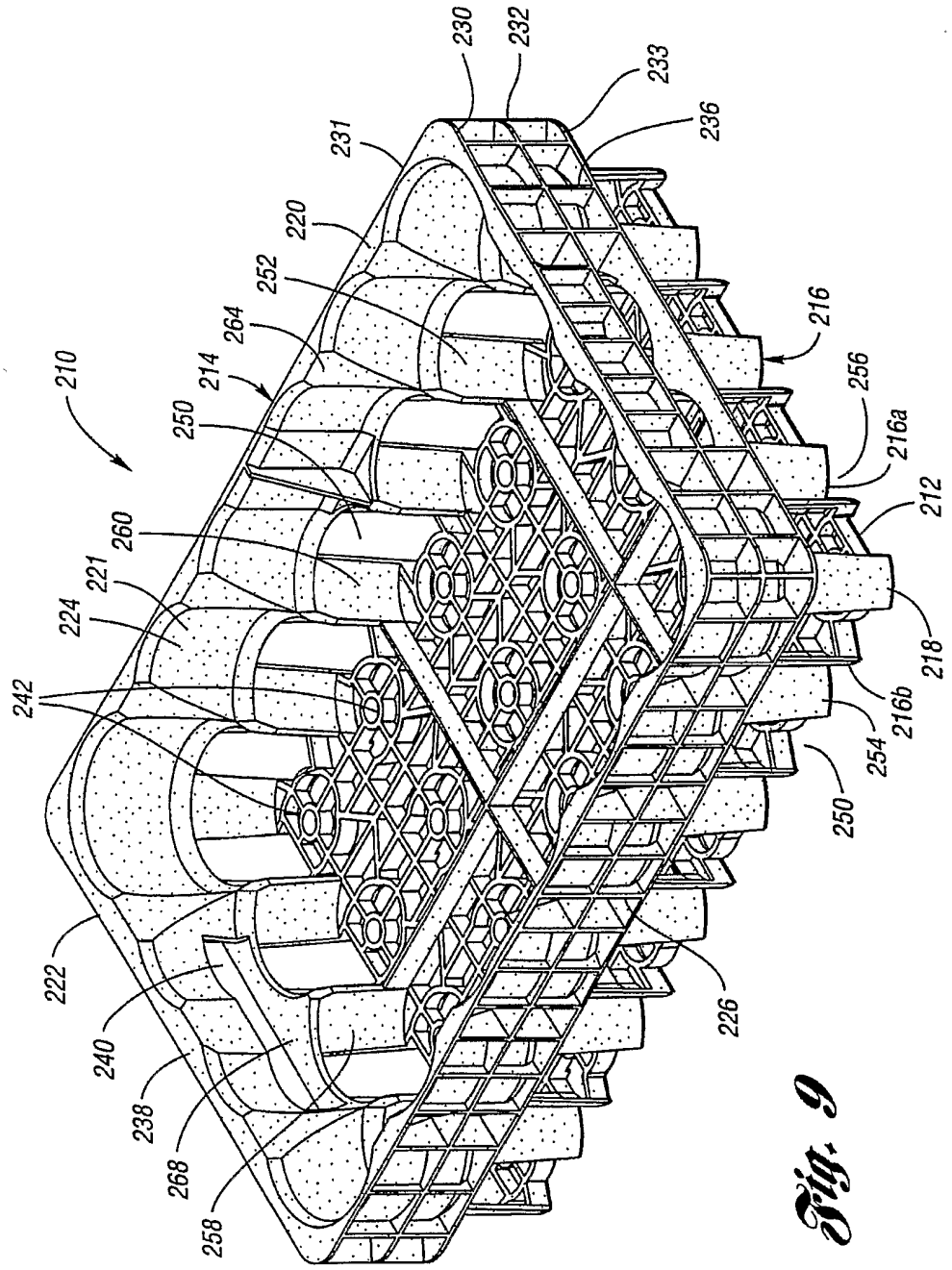

230
232
233
236
231
220
252
264
214
210
250
216
256
216a
212
260
221
224
218
242
216b
254
250
222
226
240
238
268
258

Fig. 9

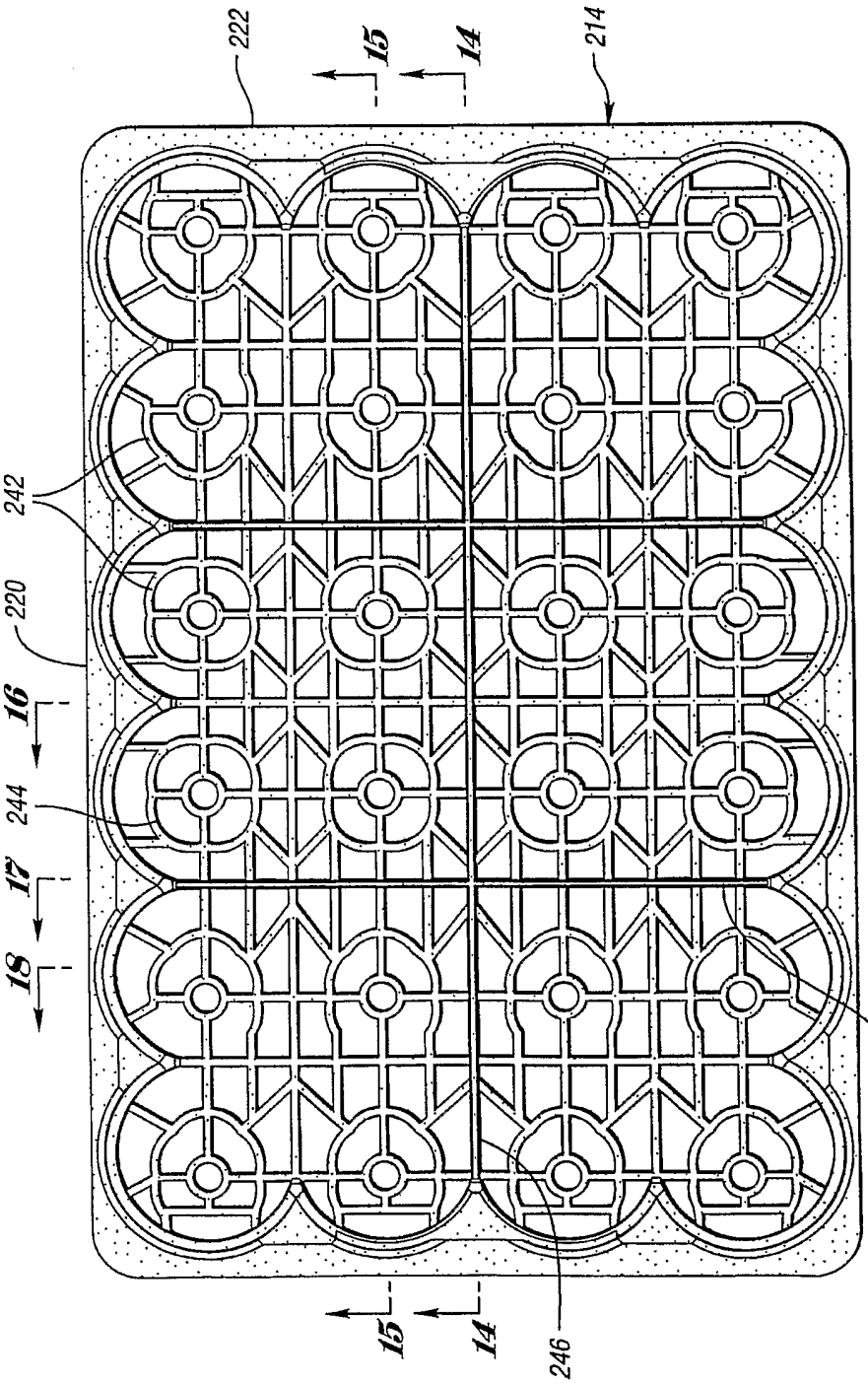


Fig. 10

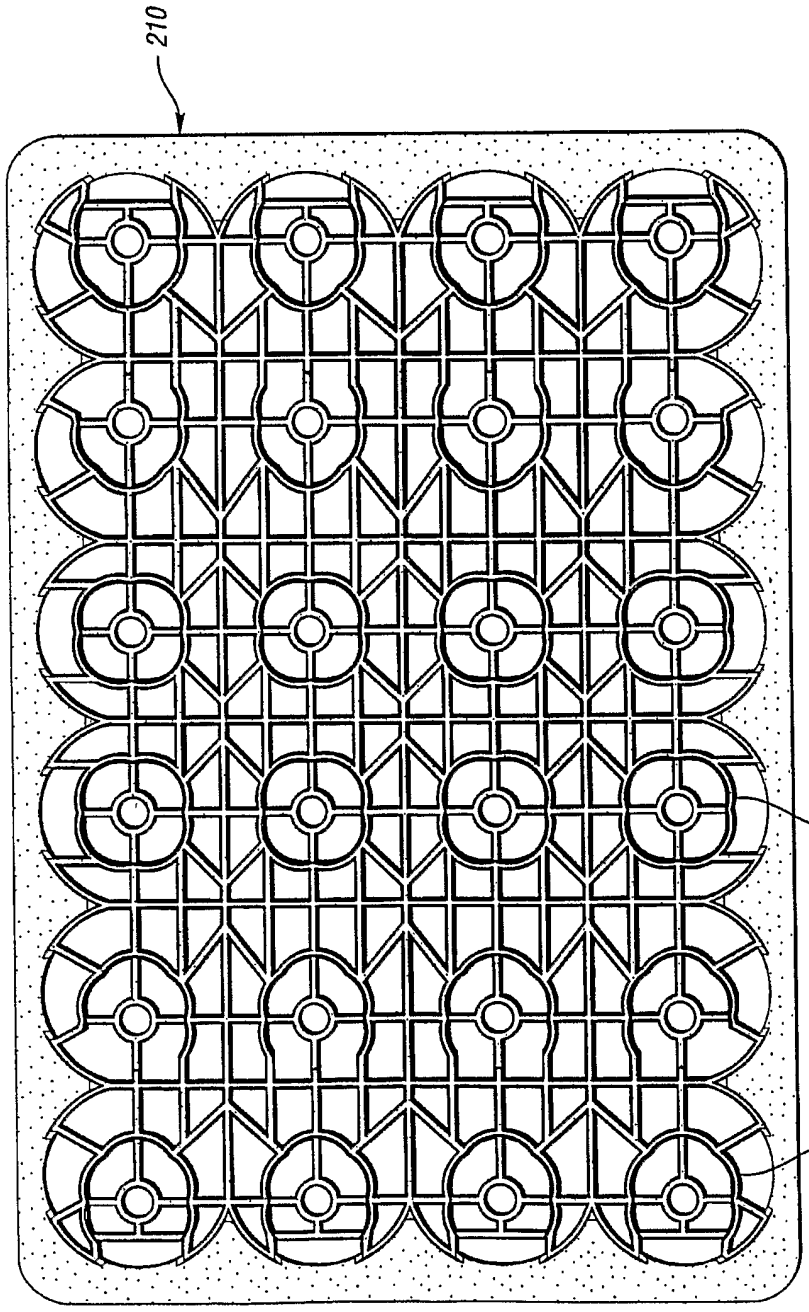


Fig. 11

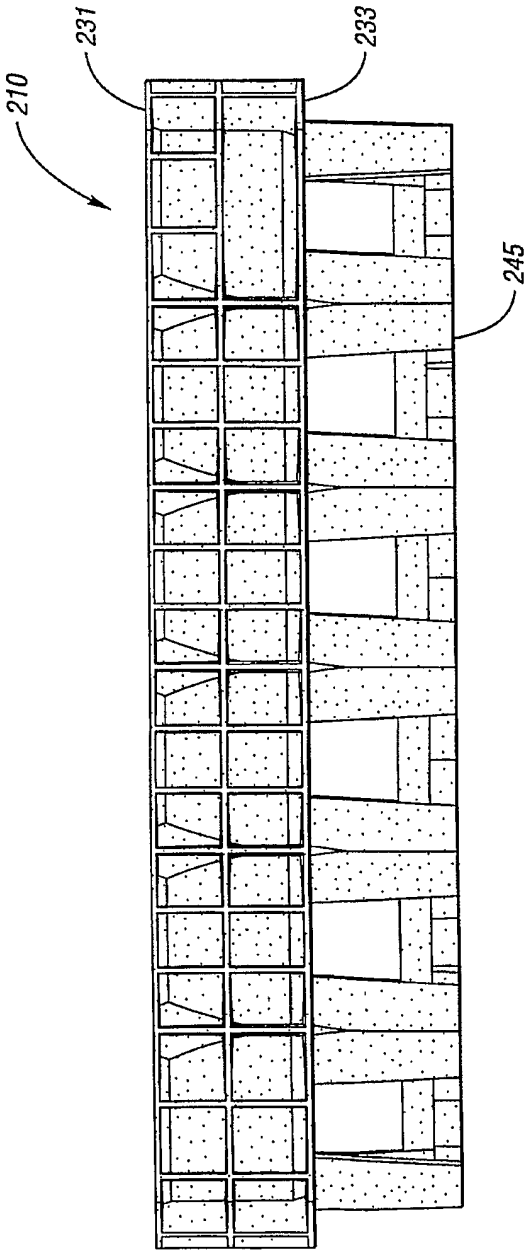


Fig. 12

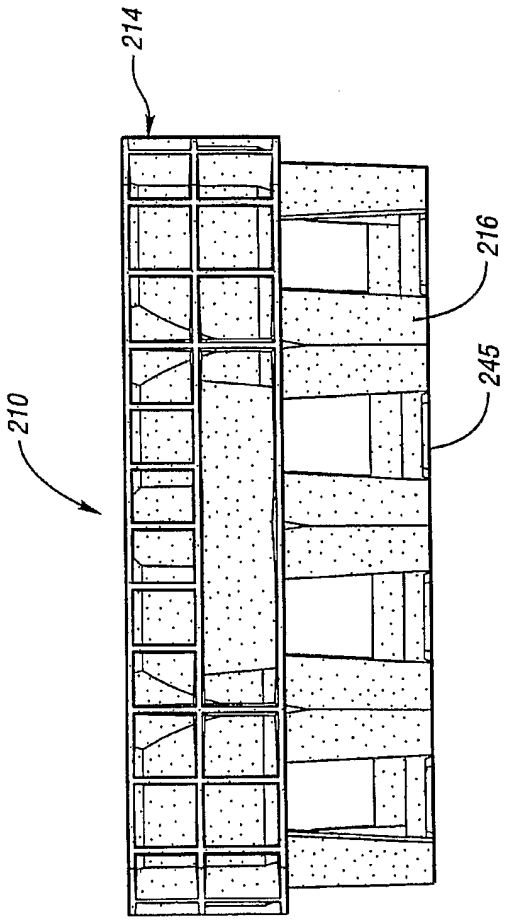


Fig. 13

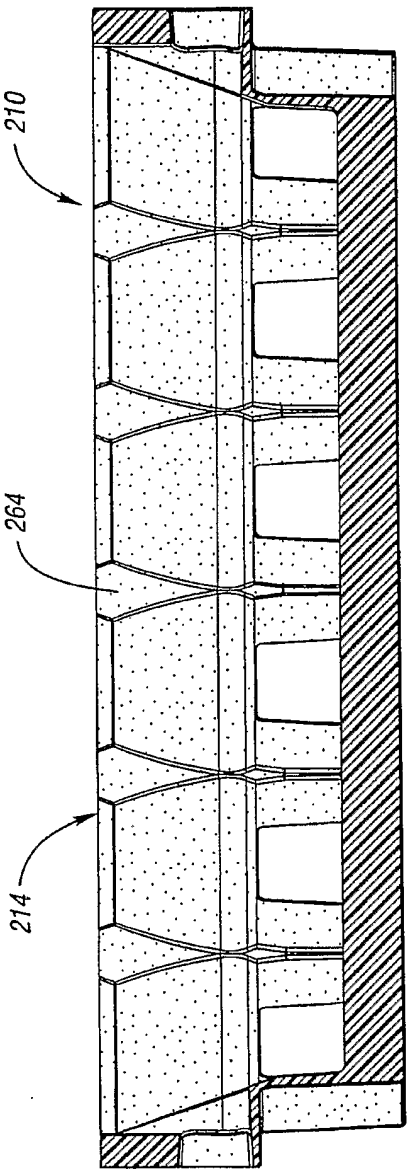


Fig. 14

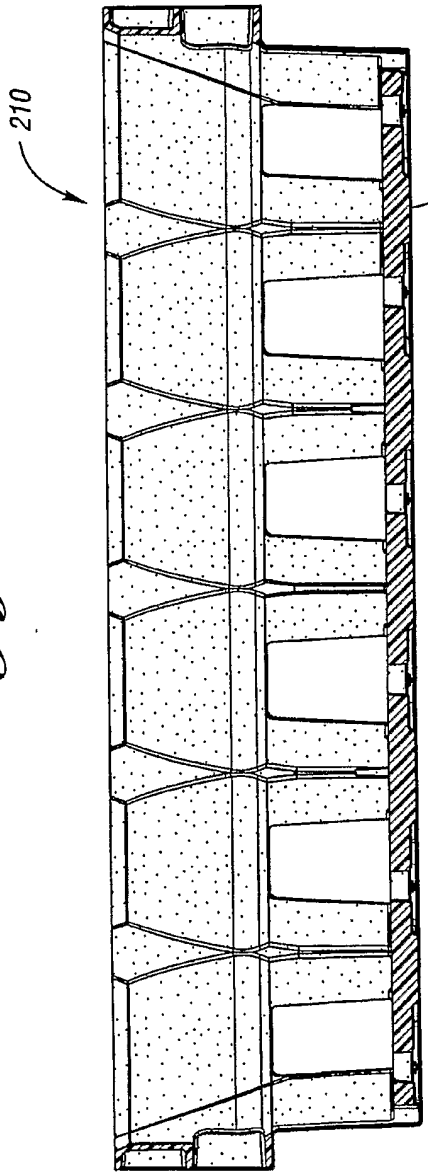


Fig. 15

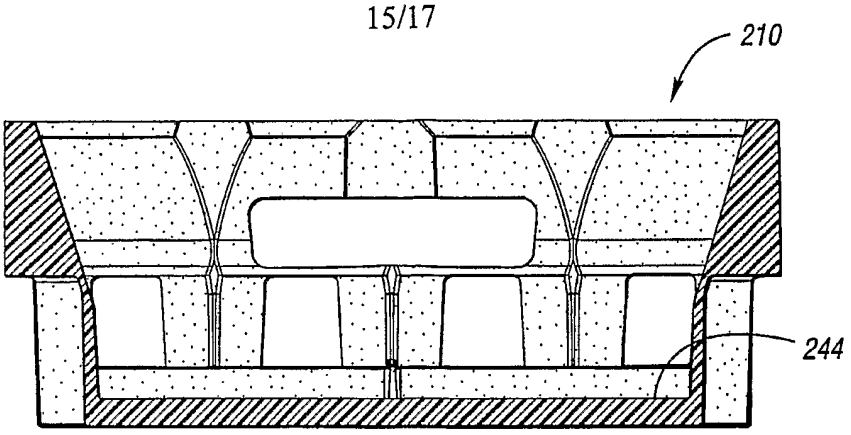


Fig. 16

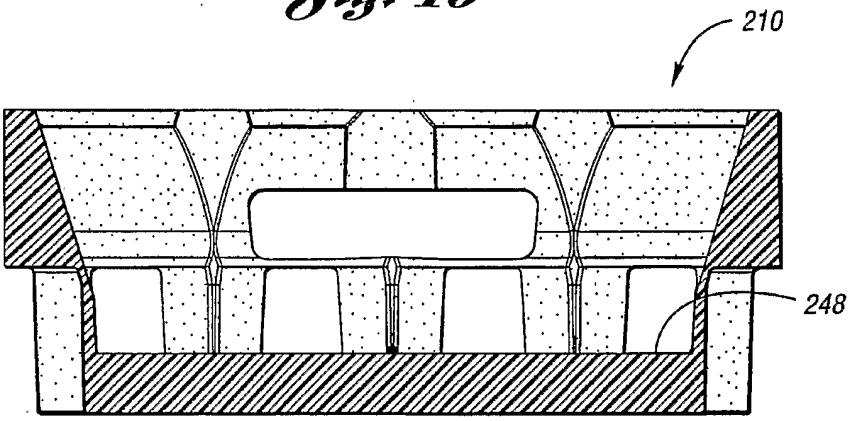


Fig. 17

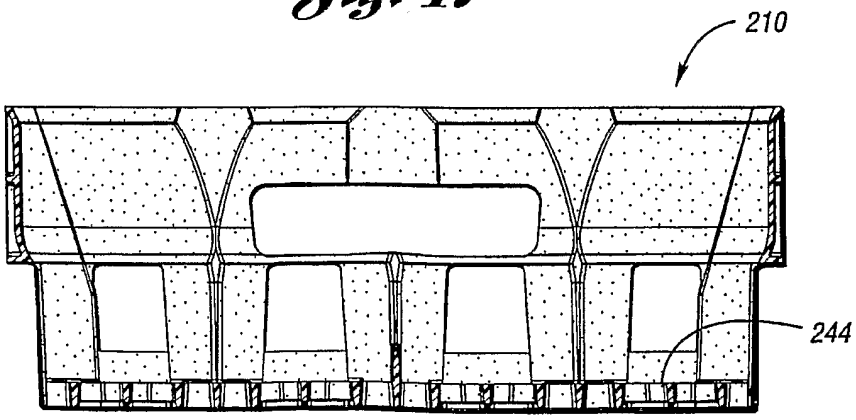


Fig. 18

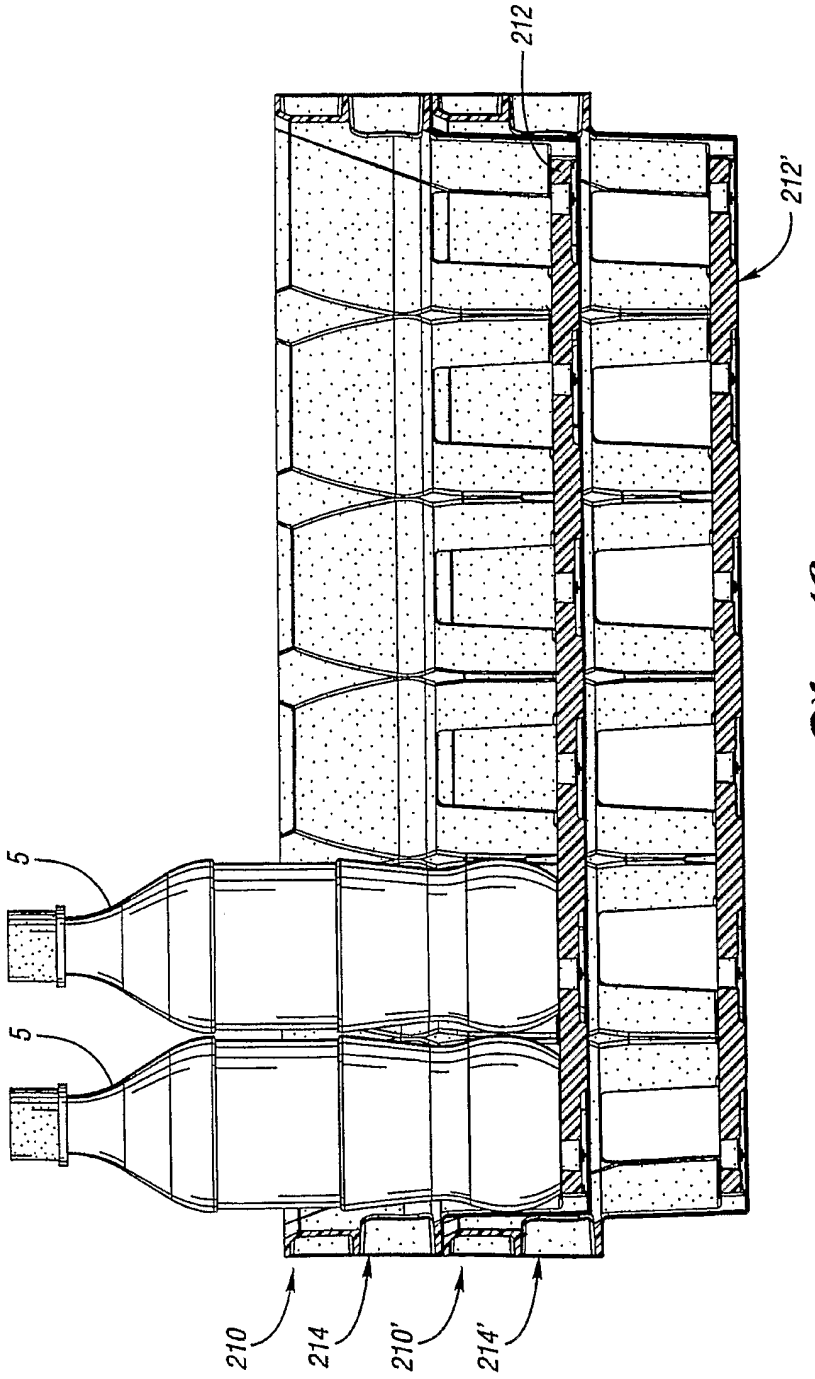


Fig. 19

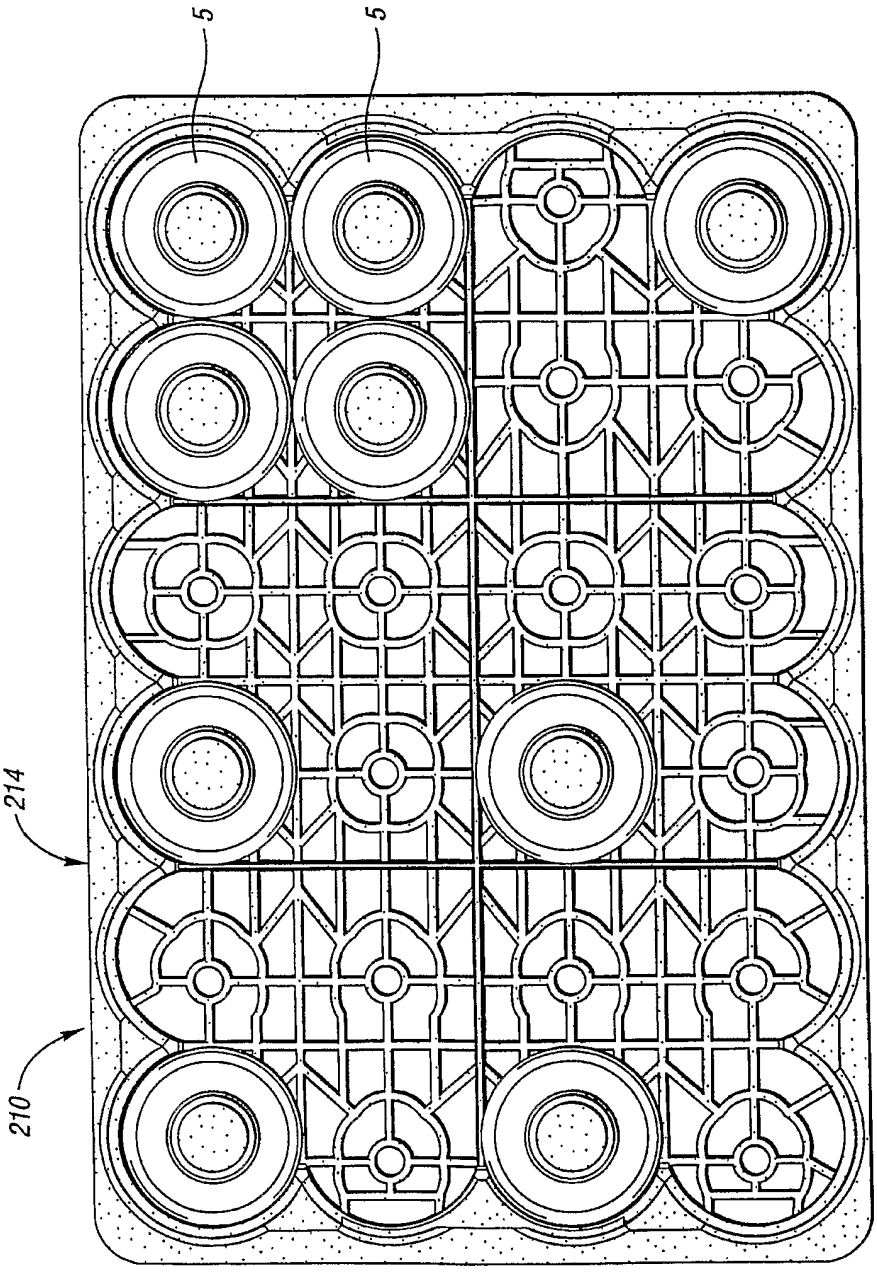


Fig. 20

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 02/32878

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B65D71/00 B65D21/04

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 B65D

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

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	US 5 230 601 A (APPS WILLIAM P ET AL) 27 July 1993 (1993-07-27) the whole document	1,2, 4-20,22 3,21,23, 24
Y	WO 95 10455 A (REHRIG PACIFIC CO) 20 April 1995 (1995-04-20) figure 1	3
Y	US 6 047 844 A (MCGRATH PATRICK JAMES) 11 April 2000 (2000-04-11) column 6, line 57 - line 62	21
Y	WO 01 02261 A (KOEFELDA GERALD R ;REHRIG PACIFIC CO (US); APPS WILLIAM P (US); MU) 11 January 2001 (2001-01-11) page 13, line 12 - line 23; figures 1,6	23,24

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
6 December 2002	16/12/2002

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Lawder, M

1

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/US 02/32878

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5230601 A	27-07-1993	US 4932532 A	12-06-1990
		AT 107256 T	15-07-1994
		AT 170487 T	15-09-1998
		AU 4510789 A	12-06-1990
		AU 4651289 A	12-06-1990
		CA 1330315 A1	21-06-1994
		CA 2002417 A1	15-05-1990
		CN 1045953 A	10-10-1990
		DE 68916262 D1	21-07-1994
		DE 68916262 T2	05-01-1995
		DE 68928804 D1	08-10-1998
		DE 68928804 T2	11-03-1999
		EP 0444076 A1	04-09-1991
		EP 0587254 A1	16-03-1994
		HK 1014701 A1	14-07-2000
		US 5316172 A	31-05-1994
		WO 9005675 A1	31-05-1990
		WO 9005679 A1	31-05-1990
		US 5277316 A	11-01-1994
		US 5285899 A	15-02-1994
		US 5575390 A	19-11-1996
		US 5267649 A	07-12-1993
		ZA 8908676 A	29-08-1990
		ZA 8908677 A	29-08-1990
		AU 4347289 A	08-01-1991
		CA 1332717 A1	25-10-1994
		CA 2019582 A1	21-12-1990
		CN 1048197 A	02-01-1991
		EP 0481992 A1	29-04-1992
		WO 9015758 A1	27-12-1990
		US 5184748 A	09-02-1993
WO 9510455 A	20-04-1995	US 5495945 A	05-03-1996
		AU 7922594 A	04-05-1995
		WO 9510455 A1	20-04-1995
US 6047844 A	11-04-2000	US 5823376 A	20-10-1998
		US 6006912 A	28-12-1999
WO 0102261 A	11-01-2001	AU 5908700 A	22-01-2001
		WO 0102261 A1	11-01-2001