

[54] **NESTABLE AND STACKABLE
CONTAINER**

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[51] Int. Cl. **B65d 21/04**

[58] Field of Search **220/97 D; 211/126**

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[57] **ABSTRACT**

An open top integral container capable of being either nested or stacked with another similar container. The container has a substantially horizontal bottom and four substantially upright sides. Each of the sides are connected to the bottom and to two other of the sides. First means are formed on the interior surfaces of the sides to support the similar container when the similar container is received within the container in either a nested or a stacked position. Second means are formed along the exterior surfaces of the sides for being contacted by the similar container to support the container when the container is received within the similar container in either a nested or a stacked position. Thickened reinforcing means are located at strategic positions on the container structure to reinforce the container against damage caused by both externally originating impacts occurring during container handling and by loading forces caused when the containers are stacked with high weight density loads or are nested many times high in large load producing columns.

9 Claims, 13 Drawing Figures

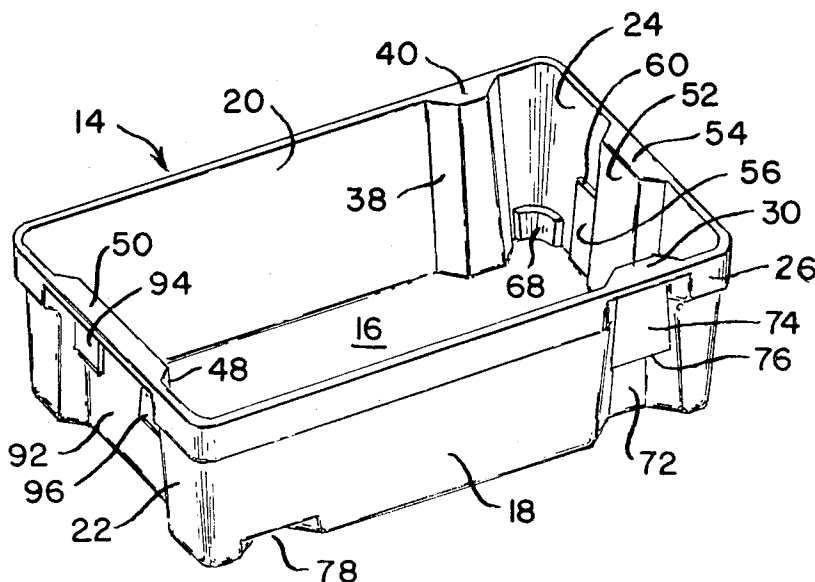


Fig. 1.

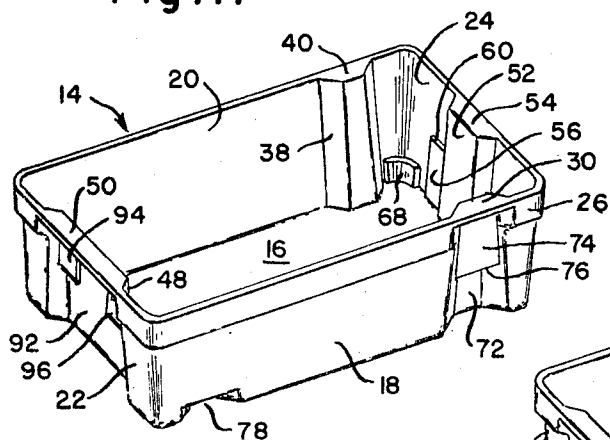


Fig. 3.

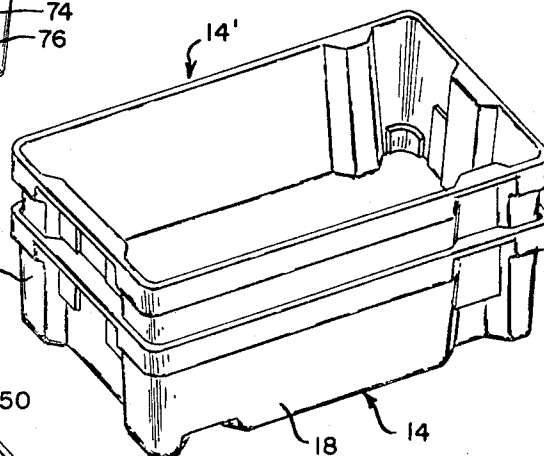


Fig. 2.

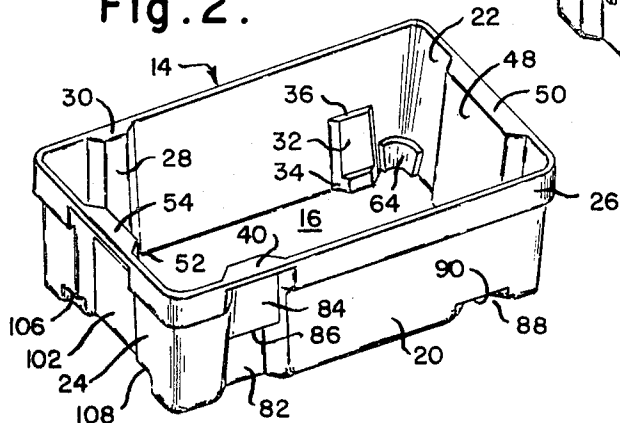
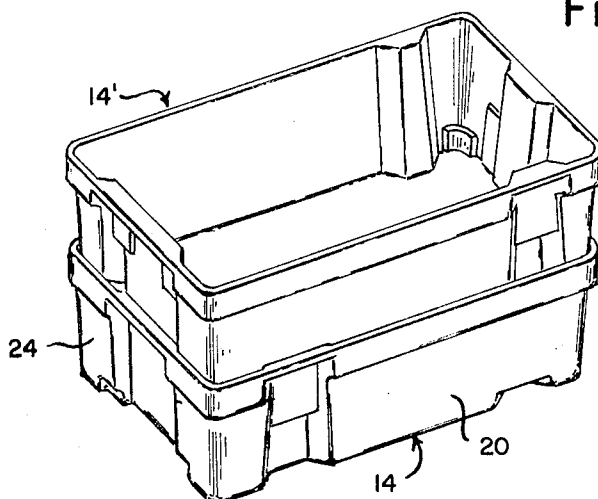


Fig. 4.



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Fig. 5.

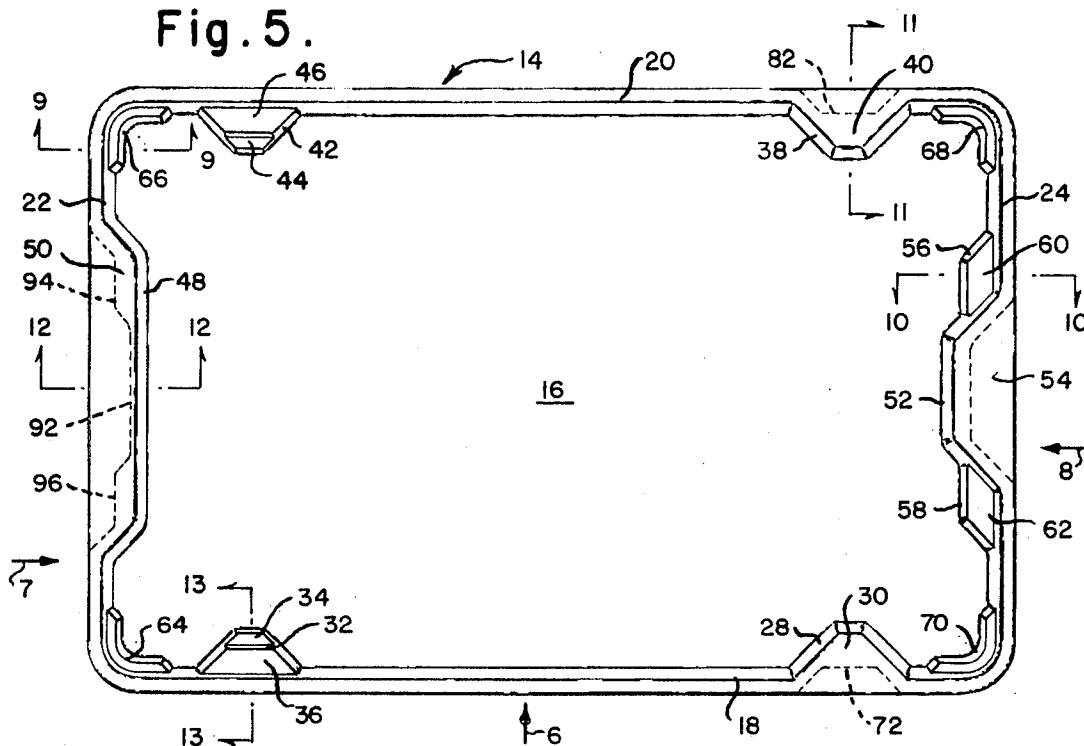


Fig. 6.

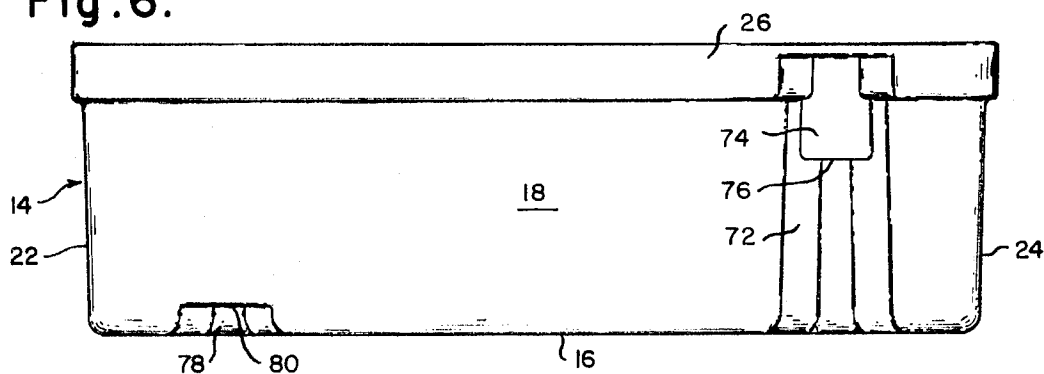
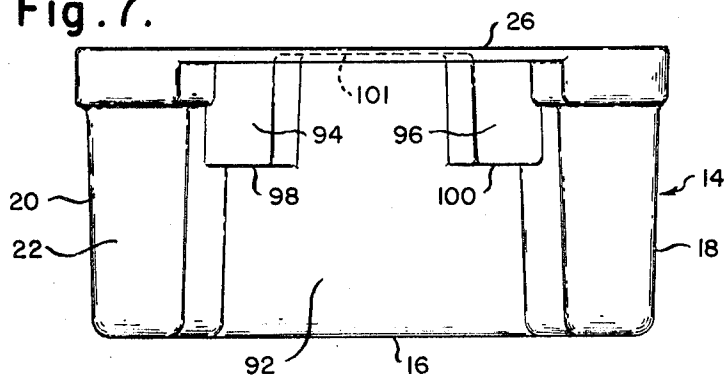


Fig. 7.



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Fig. 8.

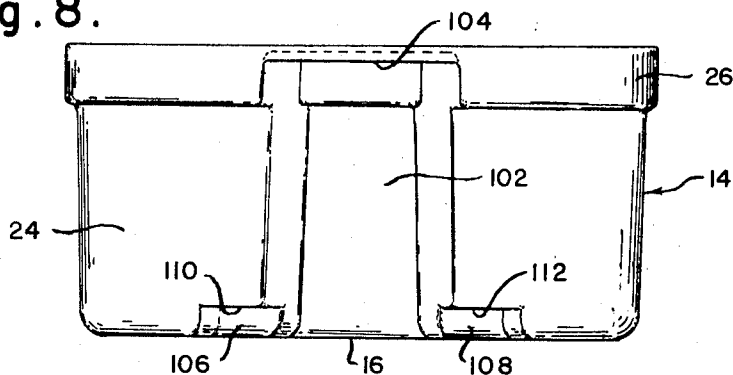


Fig. 9.

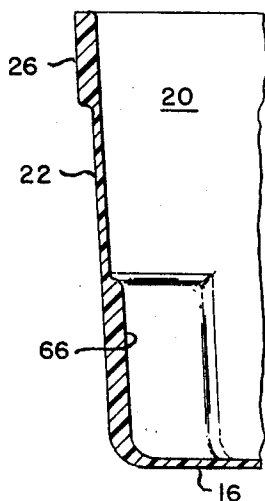


Fig. 10.

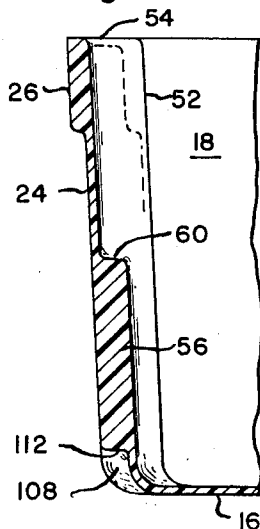


Fig. 11.

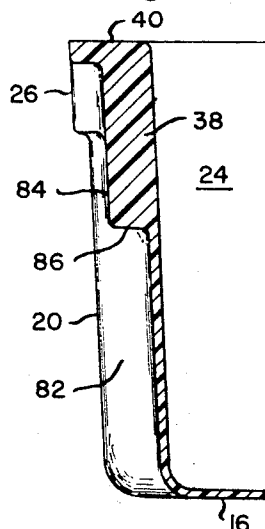


Fig. 12.

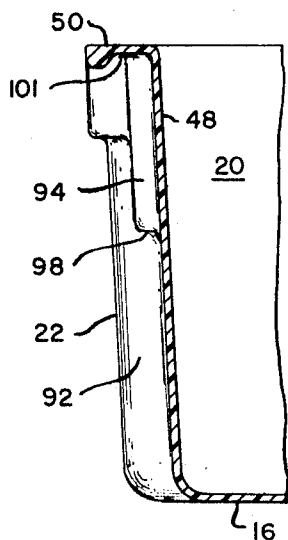
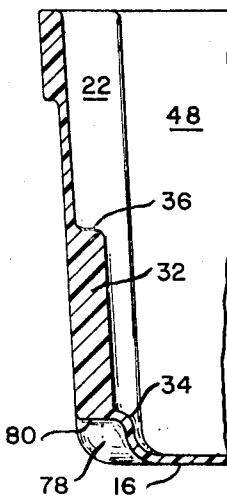


Fig. 13.



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NESTABLE AND STACKABLE CONTAINER

BACKGROUND OF THE INVENTION

This invention is concerned with containers and seeks particularly to provide a container having a substantially box-like configuration and that is adapted either to be nested or stacked with a similar container depending on the relative orientation of the two containers. Known containers of this type generally are formed with recesses, projections and other irregular profiles in both the interior and exterior side wall surfaces.

These features, while yielding the capability of nesting or stacking the containers, limit the structural strength characteristics of the containers due to the inclusion of wall portions having reduced thicknesses and the creation of areas subject to impact damage during handling. Such container handling commonly is automated and accomplished by a conveyor type apparatus upon which containers are moved quite rapidly and impacted into stops and other containers. Also, irregular profiles formed on the exterior side walls of the containers, especially in the form of projections from normally flat surfaces, contribute negatively to the efficiency with which the containers can be handled by conveyor.

It is, therefore, an object of this invention to provide a nestable and stackable container of integral design wherein irregularities in the container side walls necessary to provide nesting and stacking capabilities do not deleteriously affect container strength characteristics. In addition, the container design of this invention includes thickened wall portions at critical locations serving to reinforce the containers while secondarily cooperating with other container features to promote the desired nesting and stacking.

A further object of this invention is to provide a nestable and stackable container of a design especially adapted for automated handling as by conveyor. This design includes means within the container for supporting a similar container in both the nesting and stacking position, which means are in the form of projections from the interior walls of the container sides. This feature eliminates the need for projections from the generally flat exterior surfaces of the side walls that are interrupted only by recessed ledges formed for contact with the supporting internal projections of a similar container.

SUMMARY OF THE INVENTION

An open top integral container constructed in accordance with this invention is capable of being either nested or stacked with another similar container. The container has a substantially horizontal bottom and four substantially upright sides, each of which are connected to the bottom and to two other of the sides. First means are formed on the interior surfaces of the sides to support the similar container when the similar container is received within the container in either a stacked or a nested position. Second means are formed along the exterior surfaces of the sides for being contacted by the similar container to support the container when the container is received within the similar container in either a stacked or a nested position. The first means comprise projections from the interior of the walls of the sides that terminate in upwardly facing ledges. Thickened reinforcing means are located at critical positions on the container structure to reinforce

the container against damage caused by both externally caused impacts occurring during container handling and by loading forces caused when the containers are stacked with high weight density loads or are nested many times high in large load producing columns.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is an isometric view of an open top nestable and stackable container constructed in accordance with this invention;

FIG. 2 is a view similar to FIG. 1 but showing the container turned 180° from the orientation of FIG. 1;

FIG. 3 is an isometric view of two containers, similar to the container illustrated in FIGS. 1 and 2, shown in the nested orientation;

FIG. 4 is a view similar to FIG. 3, but showing the containers in the stacked orientation;

FIG. 5 is a top view of the container of FIGS. 1 and 2;

FIG. 6 is a side elevation view of the container of FIG. 5 taken along the line of sight represented by the arrow 6 in FIG. 5;

FIG. 7 is an end view of the container of FIG. 5 taken along the line of sight represented by the arrow 7 in FIG. 5;

FIG. 8 is a view similar to FIG. 7 but taken along the line of sight represented by the arrow 8 in FIG. 5;

FIG. 9 is a partial section view taken along the line 9—9 of FIG. 5;

FIG. 10 is a partial section view taken along the line 10—10 of FIG. 5;

FIG. 11 is a partial section view taken along the line 11—11 of FIG. 5;

FIG. 12 is a partial section view taken along the line 12—12 of FIG. 5; and

FIG. 13 is a partial section view taken along the line 13—13 of FIG. 5.

DETAILED DESCRIPTION OF THE INVENTION

Referring now in detail to the drawings, and in particular to FIGS. 1, 2 and 5 to 13 thereof, the numeral 14 refers generally to a nestable and stackable container constructed in accordance with this invention. Container 14 has a substantially flat, horizontal bottom 16 and four generally upright sides 18, 20, 22 and 24. All of the sides are connected to bottom 16 and to at least two other of the sides. As best may be seen from FIGS. 6 and 7, each of the container sides is sloped from the vertical at a slight angle outwardly away from the bottom 16, thus enabling a container telescopically to receive or telescopically be received by a similar container of like configuration. A thickened rim 26 is formed about the uppermost periphery of the container sides. Rim 26 adds structural rigidity to the generally rectangular box, and, because rim 26 projects outwardly from the outer surfaces of the four container sides, reduces the possibility of containers riding in tandem along a conveyor belt "riding up" over the sides of one another when the conveyed containers are brought to a sudden stop.

As best may be seen by reference to FIGS. 2 and 5, the inner surface of side 18 is formed with a vertical pillar 28 projecting therefrom and extending from bottom 16 to the top of side 18. The top surface of pillar 28 is designated by the reference numeral 30 and is flush with the top of rim 26. Also projecting from the interior surface of side 18 is a vertical pillar 32 extending from

bottom 16 to a point substantially midway between bottom 16 and the top of side 18. The base of pillar 32 proximate bottom 16 projects further into the interior space of container 14 than the main body of the pillar for a reason that will be explained below. The top surface of pillar 32 is an upwardly facing ledge and is designated by the reference numeral 36. The precise configuration of pillar 32 easily may be appreciated by reference to FIG. 13 of the drawings.

A substantially vertical pillar 38 extends from the interior surface of side 20 from bottom 16 to the top of side 20. Pillar 38 is located directly across the container bottom from pillar 28 and is identical in configuration, this configuration best being seen by reference to FIGS. 1 and 11 of the drawings. The top of pillar 38 that is flush with the top surface of rim 26 is identified by the reference numeral 40. Also projecting from the interior surface of side 20 is a vertical pillar 42 identical to and located directly opposite from pillar 32. Pillar 42 has a projecting bottom portion 44 and a top surface 46. Pillar 42 best may be seen by reference to FIG. 5 of the drawings.

Referring to FIGS. 2, 5 and 12 of the drawings, it may be seen that the interior surface of side 22 is formed with a substantially vertical pillar 48 projecting therefrom. Pillar 48 has a height equal to the height of side 22 and has a top surface 50 formed flush with the top surface of rim 26.

From FIGS. 1, 5 and 10, it can be seen that the interior surface of side 24 is formed with a centrally located pillar 52 extending therefrom and having a height equal to the height of the side 24. The top of pillar 52 is identified by the reference numeral 54. Located on either side of pillar 54 and immediately adjacent pillar 54 are a pair of pillars 56 and 58 extending from bottom 16 to a level spaced somewhat from the top of side 24. The top surfaces of pillars 56 and 58 are identified by the reference numerals 60 and 62 respectively.

At this point in the description of the container 14, it is important to point out that, as may be seen from FIG. 5 of the drawings, each of the pillars 28, 32, 38, 42, 48, 52, 56 and 58 are tapered somewhat as they are broader at their bases proximate bottom 16 than they are at their uppermost extremities. Also, it should be noted that the top surfaces 36, 46, 60 and 62 of pillars 32, 42, 56 and 58 respectively, all are located at the same distance from the bottom 16.

Four thickened, corner reinforcing projections 64, 66, 68 and 70 are formed in the interior of container 14 and are located at the four corners of the container, proximate the bottom 16. Thus reinforcing projection 64 is positioned at the corner where sides 18 and 22 meet, projection 66 is positioned at the corner where sides 20 and 22 meet, projection 68 is located at the corner where sides 20 and 24 meet, and projection 70 is located at the corner where sides 18 and 24 meet. The four reinforcing projections are identical in shape and configuration and best may be seen in FIG. 5 of the drawings. In FIG. 9 of the drawings, the details of projection 66 are illustrated to a large scale. As may be seen from FIG. 9, the reinforcing portions 64, 66, 68 and 70 provide for a portion of thickened material at each of the four corners of the box proximate the bottom of the box. This thickened material is approximately triple the thickness of the ordinary container side walls and serves to protect the container against damage at the four corners, the points on the container

most likely to be damaged by impact forces during rough manual handling of the containers or automated container handling as by conveyor belt. Each of the reinforcing projections 64, 66, 68 and 70 has an upward extremity comprising a generally upwardly facing ledge. These ledges are not numbered on the drawings for purposes of clarity.

As will be explained in detail below, the eight pillars that project from the interior surfaces of the container side walls, together with the four reinforcing projections located in the corners of the container, together provide support means for supporting another container, identical to container 14, in both a nested and a stacked position. The nested position of two identical containers is illustrated by FIG. 3 of the drawings while the stacked position is illustrated by FIG. 4. In FIGS. 3 and 4, the container identical to container 14 and supported thereby is designated by the reference numeral 14'. In the nested configuration of FIG. 3, identical container 14' has been turned 180° from its orientation in the stacked position shown in FIG. 4. In both the orientations of FIG. 3 and FIG. 4, identical container 14' is supported wholly by the projections extending from the interior surfaces of the side walls of container 14. It should be understood, however, that the containers 14 and 14' could be reversed with the latter supporting the former. The precise relationship of these two containers will be discussed in detail below.

As described above, interior projections formed on the container 14 provide wholly for the support of an identical container in either a nested or stacked position. As will be described below, the container 14 has formed on the exterior surfaces of its four side walls means by which the container 14 may be supported in either a nested or stacked position by a second identical container. These means formed on the outer surfaces of the container sides consist of a plurality of recesses, projections and downwardly facing ledges adapted to mate with the interior pillars and projections of another identical container. It is important to note, however, that the supportable means formed on the exterior surfaces of the container side walls in no case project beyond the outermost side wall surfaces. This is made possible since the recesses formed in the exterior surfaces of the container side walls register with the projections from the interior surfaces of the container side walls with each configuration that forms an external recess corresponding to and forming an internal projection. This relationship will be explained in detail below relative to the external supportable means formed on the container.

Referring now to FIGS. 1, 5 and 6, the exterior surface of side wall 18 has formed therein a large recess 72 that extends from the bottom of the container to a point spaced a small distance from the top of thickened rim 26. Recess 72 registers with the vertical pillar 28 projecting from the interior surface of side wall 18. Within the confines of recess 72, a projection 74 is formed having a downwardly facing bottom surface 76. Also formed in the exterior surface of side 18 is a small recess 78 that registers with the bottom projection 34 of interior pillar 32. Recess 78 has a downwardly facing top surface 80 as best may be seen in FIGS. 6 and 13.

As may be seen from FIGS. 5 and 11, the exterior surface of side 20 has a configuration identical to the exterior surface of side 18 in that it is formed with a large recess 82 having a projection 84 formed therein

with a downwardly facing bottom surface 86. Also formed on the exterior of side 20, as may be seen in FIG. 2, is a small recess 88 at the bottom of this side having a downwardly facing upward surface 90 that registers with the enlarged projection 44 at the base of interior pillar 42.

The exterior surface of side 22 is formed with a large recess 92 registering with interior pillar 48 and extending from the bottom of the container to a point spaced a small distance from the top of the rim 26. As best may be seen in FIGS. 7 and 12, recess 92 extends a small distance behind the lowermost surface of the rim 26 to form a cutaway portion behind a part of rim 26. This cutaway portion behind rim 26 is identified by the reference numeral 101 and provides a convenient place for container 14 to be gripped manually at side 22. Located proximate the top of recess 92 at either side of the recess are a pair of projections 94 and 96 terminating at their bottoms in downwardly facing surfaces 98 and 100 respectively.

The exterior surface of side 24, as may be seen from FIGS. 5, 8 and 10, is formed with a recess 102 that registers with pillar 54 and extends upwardly under rim 26 at 104 to provide a convenient place to grip manually container 14 at side 24. In communication with recess 102 at either side thereof along the bottom 16 of container 14 are a pair of small recesses 106 and 108 having downwardly facing upper surfaces 110 and 112 respectively.

It may be seen from the foregoing that the various recesses and projections and downwardly facing surfaces formed in the exterior walls of the container 14 in no way project beyond the normal outer profile of the sides of the container. It is these configurations formed on the exterior of the container that are adapted to cooperate with interior projections formed on an identical container for the support of the container in either a nested or stacked position relative to the identical container. The interrelationship between the interior and exterior configurations of the container 14 and an identical container are discussed in detail below. For purposes of clarity and this description, the identical container 14' used for purposes of description will have its parts described by the same reference numerals utilized above in the description of container 14.

With the containers 14 and 14' in the nested position shown in FIG. 3 of the drawings, interior pillars 72 and 82 of container 14 are received within recesses 72 and 82 respectively of container 14' with surfaces 30 and 40 of container 14 abutting surfaces 76 and 86 respectively of container 14'. In like manner, interior pillar 48 is received within recess 92 of the upper container with surfaces 98 and 100 being contacted at two spaced apart points along top surface 50 of pillar 48 to support the uppermost container. Pillar 54 is received within groove 102. Pillars 58 and 60 of the bottom container are received within grooves 106 and 108 respectively of the upper container with tops 60 and 62 of pillars 56 and 58 contacting surfaces 110 and 112 of the upper container. It thus may be seen that the upper container is contacted by the lower container at six points of support, that is, at the interfaces of the surfaces 30-76, 40-86, 36-80, 46-90, 60-112 and 62-110. In addition to these six points of contact, four additional points of contact occur between the outer corners of the container 14' and the tops of the reinforcing projections 64, 66, 68 and 70 of the lower container 14. Thus these

reinforcing corner projections serve the dual purpose of both reinforcing the corners against impact damage as well as supporting a container nested within the container on which they are formed.

It thus may be seen that a total of 10 points of support and contact between the two containers are provided. This large number of contact points is sufficient to provide adequate support for a large number of empty containers nested in an extremely high column. In such a column, the weight on the bottom container can be quite large, but this bottom container is capable of bearing this weight because of the many points of contact between it and the container immediately atop it.

With the containers 14 and 14' in the stacked position shown in FIG. 4 of the drawings as these containers would be oriented if loaded with industrial parts or other items, substantial entry of the upper box within the lower box is prevented since the internal pillars 28, 38, 48 and 52 of the lower box are received within the exterior recesses 88, 98 and 106-108. In this orientation, the lower container supports the upper container due to contact at the following surface interfaces: 30-90, 40-80, 50-110 and 50-112. These four points of contact all occur at locations on both boxes where the material thickness is greater than the normal thickness of the container side walls and thus the container at these thickened points is capable of bearing the large loads that would be present when loaded containers are stacked one upon the other.

From the foregoing, it may be seen that this invention provides a nestable and stackable container wherein the side wall configurations allowing the nesting and stacking features do not deleteriously affect the overall strength characteristics of the container, and wherein the container is suitably reinforced at points where high static loadings are likely to occur. In addition, this container especially is adapted to withstand impact blows as may occur during manual and automated handling of the container as by conveyor equipment. The container also is provided with a thickened reinforcing rim around its upper outer periphery that extends outwardly beyond the normal side wall profile and thus prevents "riding up" of one container on another when the containers are handled by automated equipment. Furthermore, all the configurations formed on the container of this invention for supporting another like container are projections from the interior surfaces of the container side walls. On the other hand, the configurations provided on the container allowing it to be supported by another container below it in either the nested or stacked position are recesses, projections and downwardly facing surfaces formed on the exterior surfaces of the container side walls that do not project beyond the normal outer profiles of the container side walls.

I claim:

1. An open top integral container capable of being either nested or stacked with another similar container, said container having a substantially horizontally extending bottom interconnecting four substantially upright sides, at least one of said sides extending angularly outward away from said bottom, a first of said sides having a substantially vertical first pillar extending from the inner surface thereof for the height of said first side and a second pillar extending from the inner surface thereof from said bottom to a point spaced from the top of said first side, the top of said second pil-

lar comprising an upwardly facing first ledge, a second of said sides opposite said first side having an inner surface formed as the mirror image of the inner surface of said first side and including third and fourth pillars similar to the first and second pillars respectively and located opposite therefrom and second ledge on said fourth pillar, a third of said sides having a substantially vertical fifth pillar extending from the inside surface thereof for the height of said third side, the fourth of said sides being opposite said third side and having a substantially vertical sixth pillar extending from the inside surface thereof for the height of said fourth side and substantially vertical seventh and eighth pillars extending from the inner surface thereof on opposite sides of said fourth pillar from said bottom to points spaced from the top of said second side, the tops of said seventh and eighth pillars comprising upwardly facing third and fourth ledges respectively, the top surfaces of said first, third, and fifth pillars supporting said similar container when said similar container is supported by said container in a stacked position, and said first, second, third and fourth ledges supporting said similar container when said similar container is received in said container in a nested position.

2. The container of claim 1, further including a thickened rim extending about the periphery of said container at the top of said sides and projecting outwardly from the outer surfaces of said sides.

3. The container of claim 1, further including a thickened corner reinforcing portion located at each of the four corners whereat said side walls meet, each of said reinforcing portions projecting from the inner surface of at least two of said sides and extending upwardly from said bottom.

4. The container of claim 1, wherein the outer surface of said first side is formed with a first downwardly facing ledge positioned opposite said first pillar and a second downwardly facing ledge positioned opposite said second pillar and spaced from said bottom a distance less than the distance from said first downwardly facing ledge to said bottom, said second side being formed with a third downwardly facing ledge positioned opposite said third pillar and a fourth downwardly facing ledge positioned opposite said fourth pillar and spaced from said bottom a distance less than the distance of said third downwardly facing ledge from said bottom, the outer surface of said third side being formed with spaced apart fifth and sixth downwardly facing ledges, the outer surface of said fourth side being formed with spaced apart seventh and eighth downwardly facing ledges spaced from said bottom a distance less than the distance of said fifth and sixth downwardly facing ledges from said bottom, said first, third, fifth and sixth downwardly facing ledges being contacted by said similar container to support said container when said container is received within said similar container in a nested position, said second, fourth,

seventh and eighth downwardly facing ledges being contacted by said similar container to support said container when said container is placed upon said similar container in a stacked position.

5. The container of claim 4, wherein said first, third, fifth and sixth ledges are positioned equidistant from said bottom and said second, fourth, seventh and eighth downwardly facing ledges are positioned equidistant from said bottom.

6. An open top integral container capable of being either nested or stacked with another similar container, said container having a substantially horizontally extending bottom interconnecting four substantially upright sides at least one of said sides extending angularly outwardly away from said bottom, a first of said sides being formed with an outer surface having a first downwardly facing ledge and a second downwardly facing ledge spaced from said first ledge and located from said bottom a distance less than the distance from said first ledge to said bottom, a second of said sides being formed with an outer surface having a third downwardly facing ledge and a fourth downwardly facing ledge spaced from said first ledge and located at a distance from said bottom less than the distance from said third ledge to said bottom, a third of said sides being formed with an outer surface having spaced apart fifth and sixth downwardly facing ledges, the fourth of said sides having an outer surface formed with spaced apart seventh and eighth downwardly facing ledges positioned at a distance from said bottom less than the distance of said fifth and sixth ledges from said bottom, said first, third, fifth and sixth downwardly facing ledges being contacted by said similar container to support said container when said container is received within said similar container in a nested position, and said second, fourth, seventh and eighth downwardly facing ledges being contacted by said similar container to support said container when said container is placed upon said similar container in a stacked position.

7. The container of claim 6, further including a thickened rim extending about the periphery of said container at the top of said sides and projecting outwardly from the outer surface of said sides.

8. The container of claim 6, further including a thickened corner reinforcing portion located at the inside of each of the four corners whereat said side walls meet, each of said reinforcing portions projecting from the inner surface of at least two of said sides and extending upwardly from said bottom along a portion of the height of said sides.

9. The container of claim 6, wherein said first, third, fifth and sixth ledges are positioned equidistant from said bottom and said second, fourth, seventh and eighth downwardly facing ledges are positioned equidistant from said bottom.

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