

Jan. 7, 1969

A. H. FRATER ET AL

3,420,402

STACKABLE AND NESTABLE CONTAINER

Filed May 22, 1967

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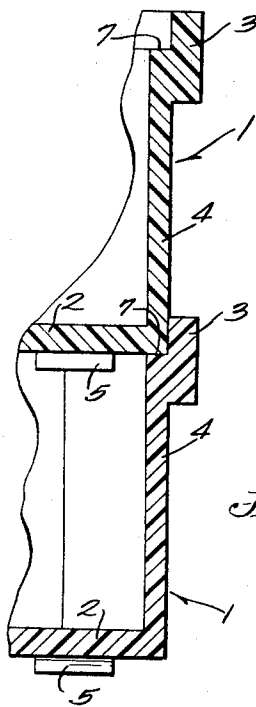
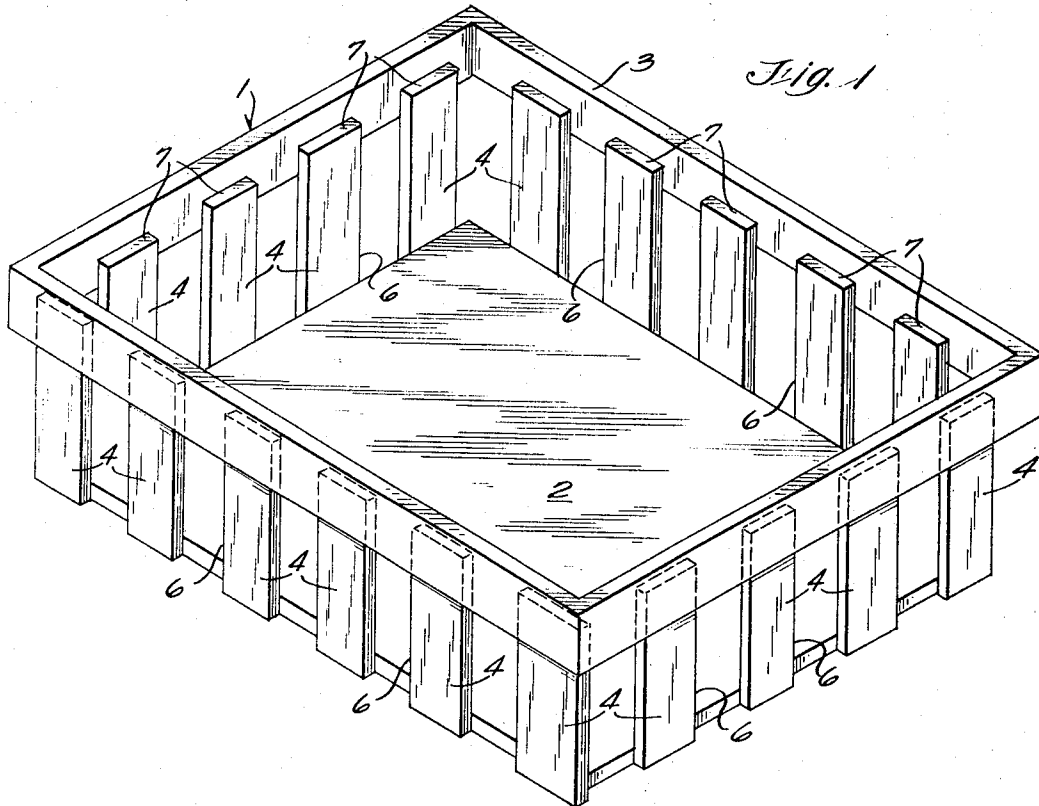
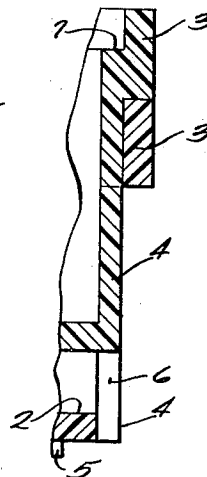


Fig. 5



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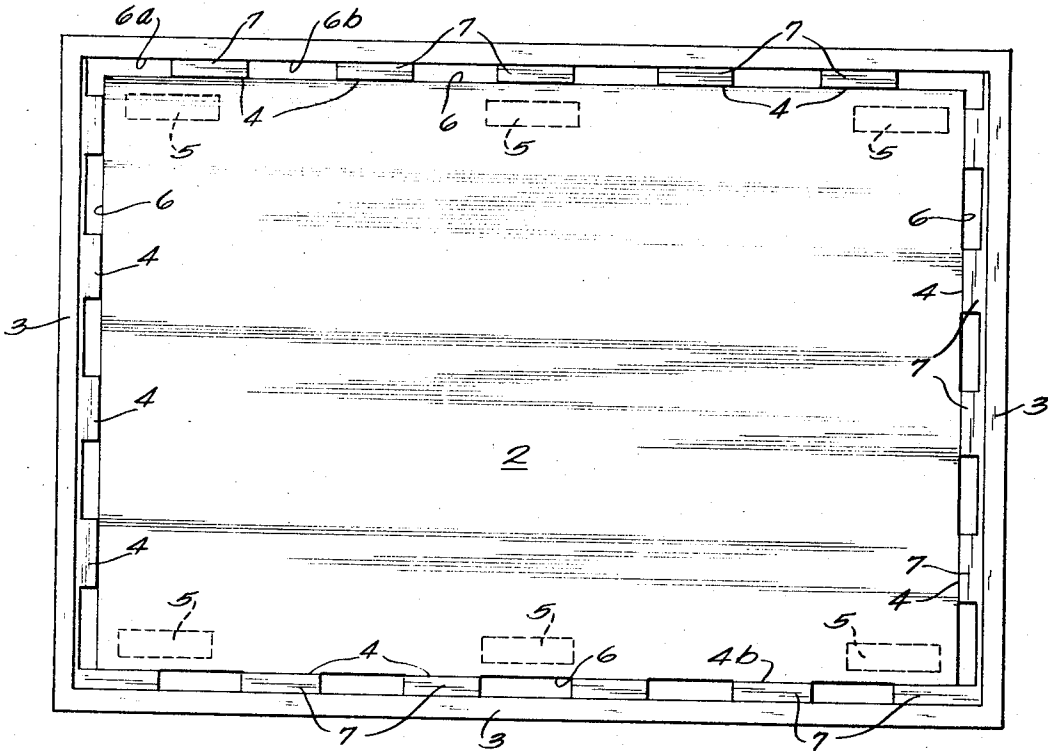


Fig. 2

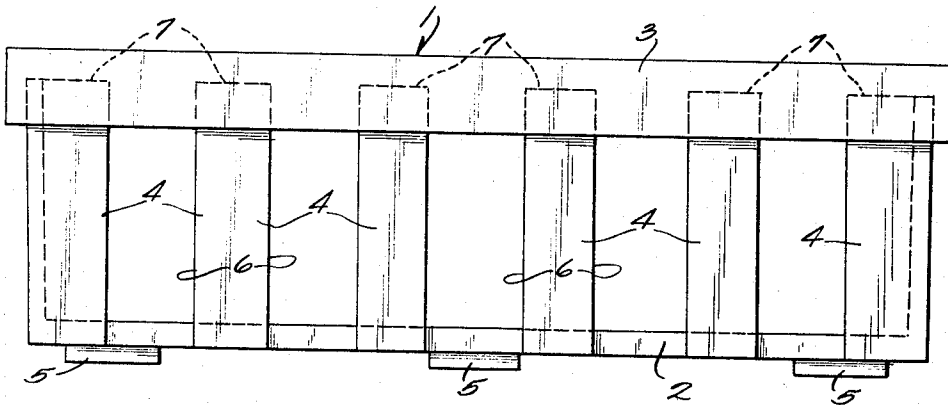


Fig. 3

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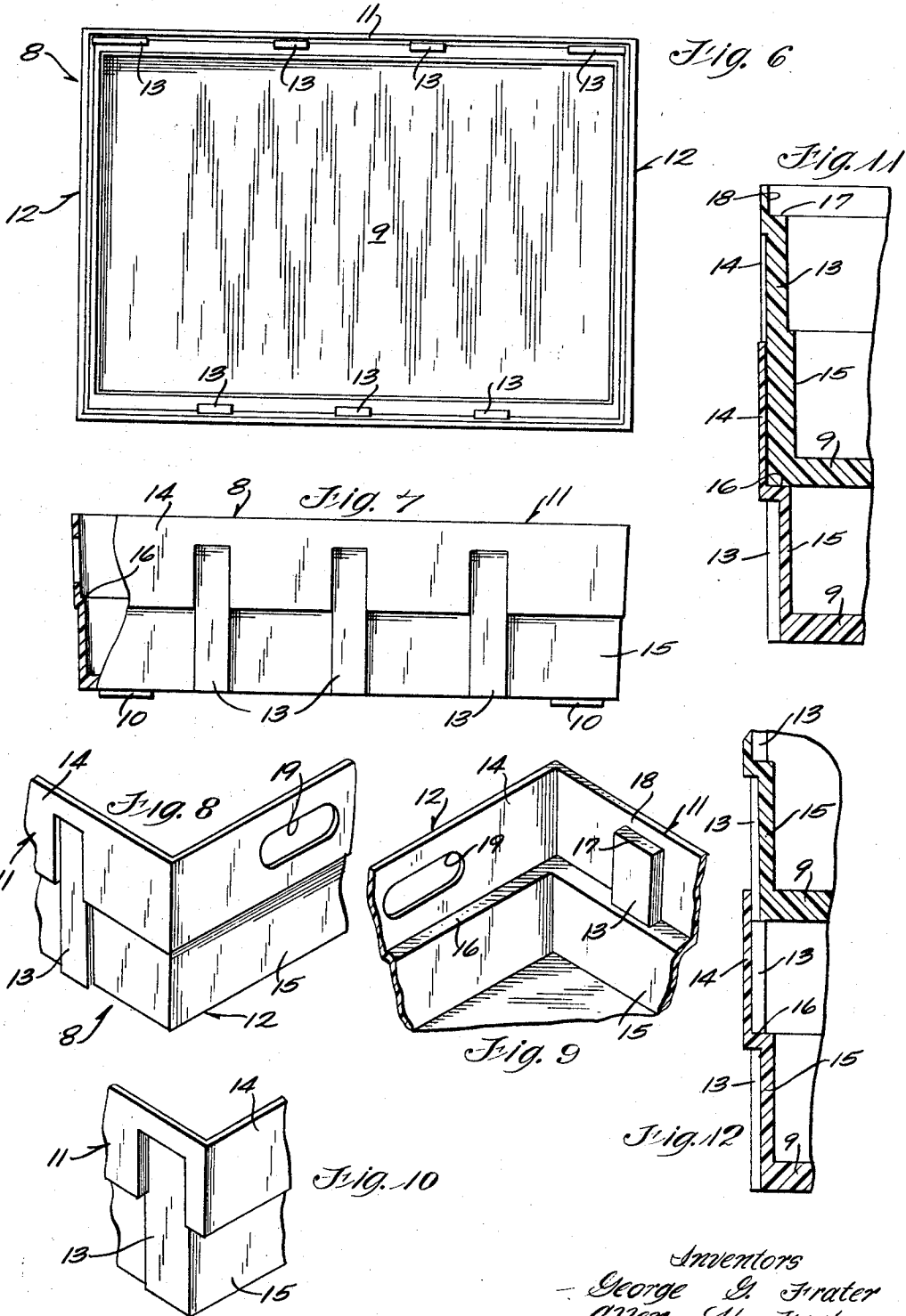
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**STACKABLE AND NESTABLE CONTAINER**

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Filed May 22, 1967, Ser. No. 640,209

U.S. Cl. 220-97

20 Claims

Int. Cl. B65d 21/00

**ABSTRACT OF THE DISCLOSURE**

This invention relates to a stackable and nestable container of a type in which an upper container will stack upon an identical and indentially oriented lower container, and when the upper container is rotated, it will nest within the lower container for storage. The container of the invention includes a bottom wall, and a series of generally vertical side walls extend upwardly from the bottom wall, with opposed side walls including a plurality of spaced, vertical columns. In a stacking position, the columns of an upper container rest on the top of the columns of the lower container, and by rotating the upper container with respect to the lower container, the columns of the upper container are received within the spaces between the columns in the lower container to provide a nesting position.

Stackable and nestable containers are constructed so that in one position an upper container will nest within an indentially oriented lower container for storage purposes and when the upper container is rotated with respect to the lower container, it will stack vertically on the lower container. With containers of this general type, the side walls normally slope downwardly and inwardly so that the upper container will nest within the lower container. As the wall thickness of the container is increased, the draft or slope of the walls must be correspondingly increased to provide the desired nesting characteristics. Thus, in the past, it has not been practical to use relatively thick, high modulus materials for the walls of a stackable and nestable container for the resulting increased slope or draft of the walls would minimize the useable storage volume of the container.

The present invention is directed to a stackable and nestable container in which the side walls are vertical, without any appreciable draft or slope, thereby increasing the effective storage volume of the container and enabling more rigid materials to be used in the wall sections to increase the column strength of the containers for stacking purposes. According to the invention, the container comprises the generally rectangular base or bottom wall and a series of generally vertical side walls extend upwardly from the edges of the bottom wall. The side walls include a plurality of vertical columns that are spaced apart, and the lower ends of the columns extend outwardly from the bottom wall so that the spaces between the lower ends of the columns provide slots or recesses for the reception of columns of an upper container when the containers are in a nested position.

In the stacked position, the containers are similarly oriented and the lower ends of the columns of the upper container rest on the upper ends of the columns of the lower container to support the containers in the stacked position. For nesting, the upper container is rotated with respect to the lower container so that the columns of the upper container are received within the matching spaced between columns of the lower container to thereby enable the containers to be nested for storage purposes.

In one form of the invention the areas in the side walls between the vertical columns are open, and a container of this type, having openings in the side walls, is adapted

to be used for handling and storing larger objects. In a second form of the invention, the side walls are enclosed and a container of this type can be used with both large and small sized objects.

With the container of the invention, no draft or slope is required for the vertical side walls and this enables the container to have a more effective storage space than the conventional stackable and nestable container using sloping walls.

As no draft or slope is required for the vertical columns or side walls, the columns can be fabricated of more rigid materials, such as foam plastic, and this increases the columnar strength of the containers for stacking purposes.

As a further advantage, in nesting, the bottom surface of the upper container can rest either on the bottom surface of the lower container or on a nesting stop and there is no problem of jamming of the nested containers due to the fact that the vertical columns or side walls do not have draft or slope.

The container of the invention is also less expensive to fabricate for given loading characteristics than the conventional stackable and nestable container.

Other objects and advantages will appear in the course of the following description.

The drawings illustrate the best mode presently contemplated of carrying out the invention.

In the drawings:

FIG. 1 is a perspective view of the container of the invention;

FIG. 2 is a plan view of the container;

FIG. 3 is a side elevation of the container;

FIG. 4 is a vertical section showing two containers in the stacked position;

FIG. 5 is a vertical section showing two containers in the nested position;

FIG. 6 is a plan of a modified form of the container of the invention;

FIG. 7 is a side elevation of the container of FIG. 6 with parts broken away in section;

FIG. 8 is a fragmentary perspective view of an outside corner of the container of FIG. 6;

FIG. 9 is a view similar to FIG. 8 showing an inside corner of the container;

FIG. 10 is a view similar to FIG. 8 showing a second outside corner of the container;

FIG. 11 is a vertical section showing two containers of the type shown in FIG. 6 in the nested position; and

FIG. 12 is a view similar to FIG. 11 showing the containers in the stacked position.

The drawings illustrate a stackable and nestable container 1 comprising a generally rectangular bottom wall 2, and a rim 3 of corresponding rectangular shape is connected to the bottom wall by a series of spaced, generally vertical columns 4. The columns 4 define the end walls and side walls of the container.

The container is adapted to be supported above a floor or other supporting member by a series of feet 5 which are molded integrally with the bottom wall 2 or are attached to the bottom wall by suitable connecting members.

As best shown in FIG. 1, the columns 4 project outwardly beyond the edges of the bottom wall 2 so that the spaces between the columns provide slots or throughways 6 which are generally greater in width than the width of the columns. The upper portions of the columns 4 are attached to the inner surface of the rim 3 with the upper end of the rim projecting upwardly beyond the upper ends 7 of the columns 4.

The container 1 is adapted to be stacked with a second container in a like position, and by rotating the upper container 180°, the upper container will nest within the lower container. To provide this nesting relationship, the

columns 4 of the upper container will be received within the spaces between the columns in the lower container. For example, as shown in FIG. 2, in the stacked position the column 4a of the upper container will rest on the column 4a of the lower container, and likewise, the column 4b of the upper container will rest on the column 4b of the lower container. To nest the containers, the upper container is rotated 180° so that the column 4a of the upper container is received within the slot 6a, of the lower container, and the column 4b is received within slot 6b.

With the container shown in the drawings, the opposed short walls each have the same number of columns 4 and spaces 6, with the columns 4 in each short wall being directly opposite to a column 4 of the opposite wall. In contrast to this, each of the opposed long walls does not have the same number of columns and spaces, and the columns 4 of one of the long walls is opposite a space or slot 6 in the opposite long wall. Thus the number and positioning of the columns 4 is not critical, other than that the columns 4 and spaces 6 of one wall must be arranged with respect to the columns and spaces of an opposed wall or adjacent wall, depending on whether the upper container is to be rotated 180° or 90° for nesting, so that the columns of the first wall will be received within the corresponding spaces in the opposed or adjacent wall when the upper container is rotated to the nesting position.

While the drawings illustrate the columns 4 as being generally vertical with substantially parallel side edges, it is contemplated that the columns 4 can also have tapered side edges, or any desired configuration as long as the width of the columns 4 is less than the corresponding spaces 6 between columns in the opposed walls or adjacent walls, depending on whether the containers are to be rotated 180° or 90° for nesting purposes.

Moreover, the width of the columns can vary, with some columns being of substantially greater width than other columns as long as the spaces within which the columns are received for nesting are of sufficient width to accommodate the width of the corresponding columns.

While the drawings illustrate a substantial number of columns 4 and spaces 6 along each side of the container, it is contemplated that to achieve the desired stacking and nesting relationship, one of the sides of the container must have at least two columns and an adjacent or opposite side of the container must have two spaces to accommodate the two columns when the upper container is rotated to the nesting position.

The height of the columns 4 should be substantially equal along all sides of the container. As illustrated, the columns 4 are not only of equal height, but the upper and lower ends of the columns terminate in substantially the same planes. This relationship is not essential and in some cases the upper ends of the columns may be staggered in height, meaning that the top surfaces 7 can be at different levels, as long as the overall length or height of all the columns is substantially equal.

As the end loads on the container are normally greater than the loads along the sides of the container, the columns 4 which are located adjacent the corners of the container can be either thicker or wider to accommodate the increased loads in these areas. Moreover, the columns 4 can have any desired cross sectional configuration as long as the columns can be received within the corresponding spaces or slots 6 in the nesting position. For example, the columns are shown to be rectangular in cross section, but the columns can have a circular, oval or polygonal cross section as well. Furthermore, the columns can be solid, hollow or recessed, as desired.

The rim 3 is shown to be a substantially rectangular in cross section and the upper end of the rim projects upwardly beyond the upper ends of the columns 4. As shown in FIG. 4, when an upper container is stacked on the lower container, the lower ends of the columns

4 of the upper container rest on the upper ends of the columns of the lower container and the rim serves to prevent both lateral and longitudinal displacement of the upper container. The rim 3 is preferably a continuous member which extends around the entire periphery of the container and in addition to preventing displacement of the upper stacked container, also adds strength and rigidity to the container.

While in the container shown in FIGS. 1-5, the rim serves to prevent both lateral and longitudinal displacement of the upper container in the stacked position, it is contemplated that in some cases the rim may not project above the upper ends of the column and in which case, additional means can be utilized to prevent the lateral and longitudinal displacement of the upper stacked container, as for example, projections on the lower ends of the columns of the upper container can be received within recesses or receptacles formed in the upper ends of the columns of the lower container.

In the nesting position, as shown in FIG. 5, the lower end of the rim 3 of the upper container engages the upper end of the rim of the lower container and this provides a stop for nesting purposes so that the bottom wall of the upper container is spaced above the bottom wall of the lower container. The engagement of the rim of the upper container with the rim of the lower container is merely one convenient structure for providing a nesting stop and it is recognized that other nesting stop constructions can be utilized.

The drawings illustrate a stackable and nestable container which can be stacked and nested by rotating the upper container 180°. However, if square containers are utilized, the nesting and stacking relationship can be accomplished by merely rotating the upper container 90°. In this case, the position of the columns 4 of one wall of the container is correlated with the spaces between columns of an adjacent wall so that by rotating an upper container 90° the columns of the upper container will be received within the complimentary spaces between the columns in the lower container. Further, in some situations it may be possible to employ the columns 4 only on opposed walls so that the other pair of opposed walls would be free of the columns. Moreover, the vertical wall of the containers can have any number of sides or the vertical wall can be circular or oval in shape as long as the columns 4 of one portion of the vertical wall are arranged with respect to the spaces 6 between the columns of a second portion of the vertical wall so that the columns of the first portion of the wall will be received within the spaces of the second portion when the upper container is rotated through a given angular displacement.

The container of FIGS. 1-5 is particularly adaptable for use with relatively large articles which will not fall through the spaces between the columns 4, such as large machine parts, produce and the like. In some cases, an egg crate or divider member may be secured within the container which will divide the interior of the container into a series of small compartments. However, the use of the egg crate divider will not affect the basic stacking and nesting relationship of the containers.

FIGS. 6-12 illustrate a modified form of the invention in which the side walls of the container are completely enclosed. In this embodiment the container 8 includes a generally rectangular bottom 9 having a series of feet 10 which support the bottom from the floor or other supporting structure. Extending upwardly from the bottom 9 and are a pair of opposed generally vertical side walls 11 and a pair of opposed generally vertical end walls 12. The vertical side edges of the side walls 11 generally rectangular container.

As in the case of the first embodiment, each of the walls 11 includes a series of spaced, generally vertical columns 13, which extend from the bottom wall 9 upwardly to a location spaced from the upper edge of the

respective walls. In this embodiment the walls 11 and 12 are enclosed, with each wall including an upper wall section 14 and a lower wall section 15 which are connected together by a generally horizontal shoulder or shelf 16. As best shown in FIG. 9, the upper end of each column 13 projects laterally inward from the upper wall section 14 while the lower end of each column 13 projects laterally outward beyond the lower wall section 15. As best shown in FIG. 8, the wall sections 14 and 15 are vertically offset from each other and the shelf 16 provides a connection between the two offset wall sections.

As illustrated in FIG. 9, the upper end 17 of each column 13 is spaced beneath the upper edge of the upper wall section 14, so that the portion of the wall section 14 projecting above the end 17 of the columns provides a rim 18 which is similar in function to rim 3 of the container shown in FIGS. 1-5.

The columns 13, as well as the wall sections 14 and 15, are vertical without appreciable slope or draft. In the stacked position, as shown in FIG. 12, the lower ends of the columns 13 of the upper container rest on the upper ends 17 of the columns of the lower container, and the upper portion of wall section 14 or rim 18 serves to prevent both lateral and longitudinal displacement of the upper container.

To nest the containers, the upper container is rotated 180° with respect to the lower container. In the nested position, the lower end of each of the columns 13 of one wall 11 of the upper container rests on the horizontal shelf 16 of the opposite wall 11 of the lower container to provide a nesting support for the containers. Due to the fact that the walls of the container 8 are vertical and are completely enclosed by the wall sections 14 and 15, the degree of nesting as shown in FIG. 11 is approximately the maximum degree of nesting which can be obtained with this container.

The columns 13 of each wall are arranged with respect to the columns of either an opposite or adjacent wall, depending on whether the container is nested and stacked with a 180° or 90° degree rotation, so that a column 13 of the upper container will lodge or be received within a recess or space between the columns of the lower container when the containers are in the nesting position. This relationship is the same as that described with respect to the first embodiment.

To enable the containers 8 to be more easily handled and transported, the walls 12 can be provided with hand holes 19.

The container 8 is illustrated as having columns 13 only in the opposed side walls 11. However, the columns 13 can instead be located in the end walls 12, or in both the side walls 11 and end walls 12, and the stacking and nesting relationship will be the same. Further, as in the case of the first embodiment, the columns 13 can be arranged so that the containers nest by rotating the upper container either 90° or 180°, or both.

The container of both the embodiment of FIGS. 1-5 and the embodiment of FIGS. 6-12 are shown as having vertical side walls. However, to facilitate molding or fabrication of the containers, the side walls can be provided with a slight degree of slope or draft, but it should be emphasized that the slope or draft is not necessary in order for the containers of the invention to achieve their stacking and nesting characteristics. The term "generally vertical" wall as used in the description and claims is therefore intended to mean a wall that is vertical as well as that which may have a slight slope or draft. Moreover, as previously mentioned, the vertical wall of the container can have any number of sides or it can be circular or oval. Thus the term vertical "wall" as used in the description and the claims is intended to mean a vertical wall of any shape, such as polygonal, circular, oval, etc.

The present invention provides a stackable and nestable

container having vertical side walls without any appreciable draft or slope which thereby increases the effective storage volume of the container and also enables more rigid materials such as foam plastic to be used in the wall sections to increase the column strength of the containers for stacking purposes. Furthermore, the container of the invention differs from the traditional stackable and nestable container, in that the container of the invention stacks on an identically oriented container, while the traditional container nests within an identically oriented container.

We claim:

1. A container adapted to stack and nest with a container of identical size and shape, comprising a bottom, and a generally vertical wall extending upwardly from the bottom, said wall including a series of spaced generally vertical columns, said columns being arranged so that in the stacking position the lower ends of the columns of an upper container will be supported by the upper ends of the columns of an identically oriented lower container and said columns being arranged so that by rotating the upper container with respect to the lower container each column of the upper container is received within a space between adjacent columns in the non-identically oriented lower container to provide a nesting position.

2. The container of claim 1, in which the horizontal width of the upper end of each column is less than the horizontal width of the lower end of the corresponding space within which the column is received.

3. The container of claim 1, and including means connected to the container for engaging an upper stacked container to prevent horizontal displacement of said upper stacked container.

4. The container of claim 1, wherein said wall includes, a rim extending upwardly beyond the upper ends of the columns, and being substantially coextensive with said wall.

5. The container of claim 1, in which the lower ends of the columns project outwardly beyond the peripheral edge of the bottom and the lower ends of the spaces are located at the underside of the bottom.

6. The container of claim 4, in which the upper portion of the rim is disposed laterally outward of said columns to prevent horizontal displacement of an upper stacked container.

7. The container of claim 1, in which all of said columns have substantially the same height.

8. The container of claim 1, wherein the columns are generally rectangular in horizontal cross section.

9. The container of claim 4, wherein the lower ends of the columns project laterally outward beyond the bottom and said rim projects laterally outward beyond the upper ends of the columns.

10. The container of claim 1, wherein said spaces are openings in said wall.

11. The container of claim 1, wherein the wall is rectangular and includes a pair of opposed first wall members and a pair of opposed second wall members, said columns being located in said first wall members with one of said columns being located adjacent a vertical side edge of one of said first walls and a second column being located directly opposite said first column adjacent a vertical side edge of the opposite first wall member.

12. The container of claim 1, wherein said wall includes an upper wall section connecting the upper end portions of said columns and a lower wall section connecting the lower end portions of said columns, said lower wall section being offset laterally inward from said upper wall section and said wall including a horizontal connecting section connecting the lower end of the upper wall section and the upper end of said lower wall section.

13. The container of claim 12, wherein the upper ends of the columns project laterally inward from said upper

wall section and the lower ends of the columns project laterally outward from said lower wall section.

14. The container of claim 12, wherein the spaces between the upper ends of the columns comprise first recesses and the spaces between the lower ends of the columns comprise second recesses, said first recesses have open upper ends to receive the lower ends of columns of an upper nested container and said second recesses have open lower ends to receive the upper ends of columns of a lower nested container.

15. The container of claim 14, wherein the upper edge of the upper wall section projects upwardly beyond the upper ends of the columns.

16. The container of claim 12, wherein the horizontal connecting section defines a shelf to support the bottom of an upper nested container.

17. The container of claim 1, wherein the wall is generally rectangular in shape and includes a pair of opposed first wall members and a pair of opposed second wall members, one of said columns being located along a vertical side edge of one of said first walls and the diagonally opposite vertical side edge of the opposed first wall being provided with a recess to receive said column when the containers are nested.

18. A generally rectangular container adapted to be stacked and nested with a container of identical size and shape, comprising a generally rectangular bottom, a pair of opposed generally vertical first wall sections extending upwardly from opposite side edges of said bottom, a pair of opposed generally vertical second wall sections extending upwardly from opposed side edges of said bottom and joined along their side edges to said first wall sections to provide a generally rectangular container, said first wall sections including a series of generally vertical spaced columns and said first wall sections having a series of recesses between adjacent columns, said columns being arranged so that in a stacking position the lower ends of the columns of an upper container are supported by the upper ends of the columns of an identically oriented lower container and said columns being arranged so that

by rotating the upper container 180° with respect to the lower container each column of the lower container is received within a recess in the upper container to provide a nesting position, the horizontal width of the upper end of each column being less than the horizontal width of the lower end of the corresponding recess, and means connected to the container for engaging an upper stacked container to prevent horizontal displacement of said upper stacked container with respect to said lower container.

19. In a container adapted to be stacked and nested with a container of identical size and shape, a bottom wall, and a series of spaced, generally vertical columns, extending upwardly from the peripheral edge portion of said bottom wall, said columns being arranged so that the lower ends of the columns of an upper container are supported on the upper ends of the columns of a lower identically oriented container to provide a stacking position, and said columns being arranged so that when the upper container is in a non-oriented position with respect to the lower container each column of the upper container is received within a space between adjacent columns in the lower container to provide a nesting position.

20. The container of claim 19, and including a rim portion connecting the upper end portions of the columns together and disposed laterally outward of the upper ends of said columns and projecting upwardly beyond the upper ends of said columns, said rim portion serving to prevent horizontal displacement of the upper container when the containers are in the stacking position.

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