

[54] NESTABLE CONTAINER

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[51] Int. Cl. B65d 21/02

[58] Field of Search 220/97 C, 97 F, 72;
229/1.5 B**References Cited****UNITED STATES PATENTS**

3,303,964	2/1967	Luker.....	220/97 C
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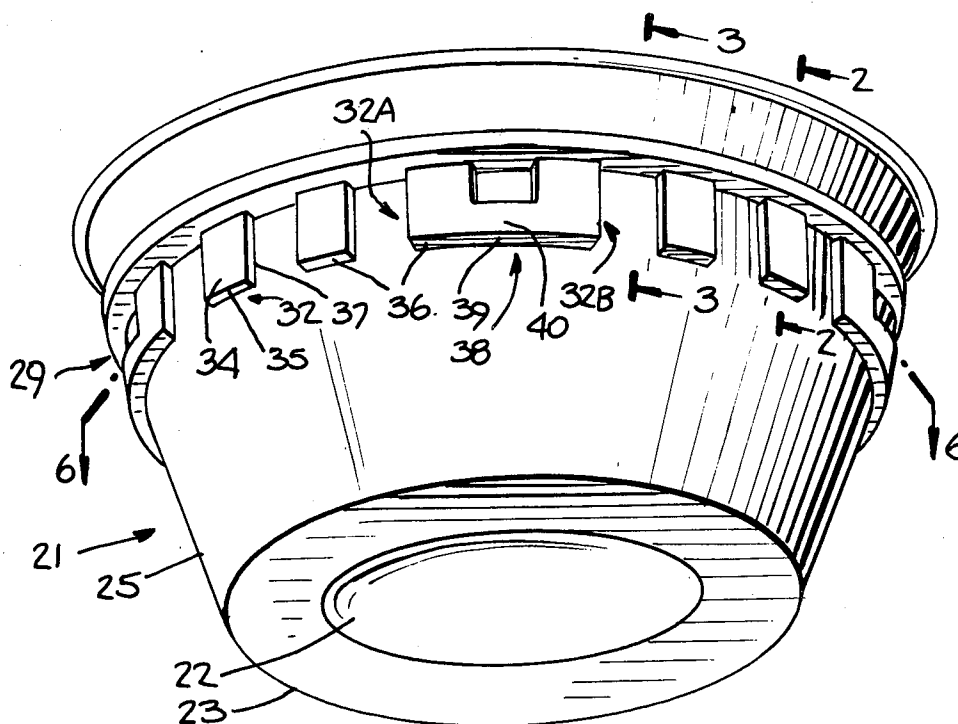
FOREIGN PATENTS OR APPLICATIONS

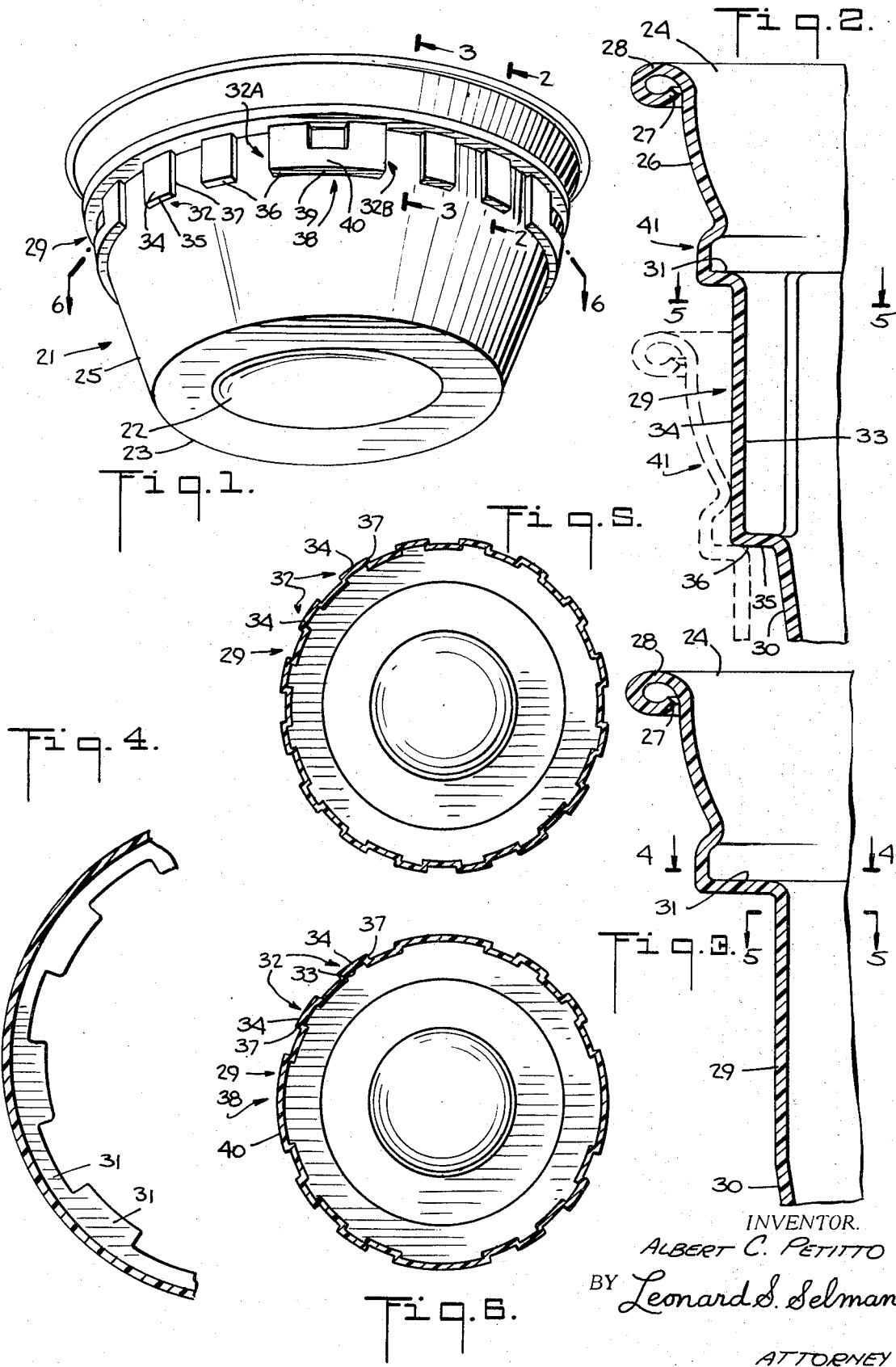
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Primary Examiner—George E. Lowrance

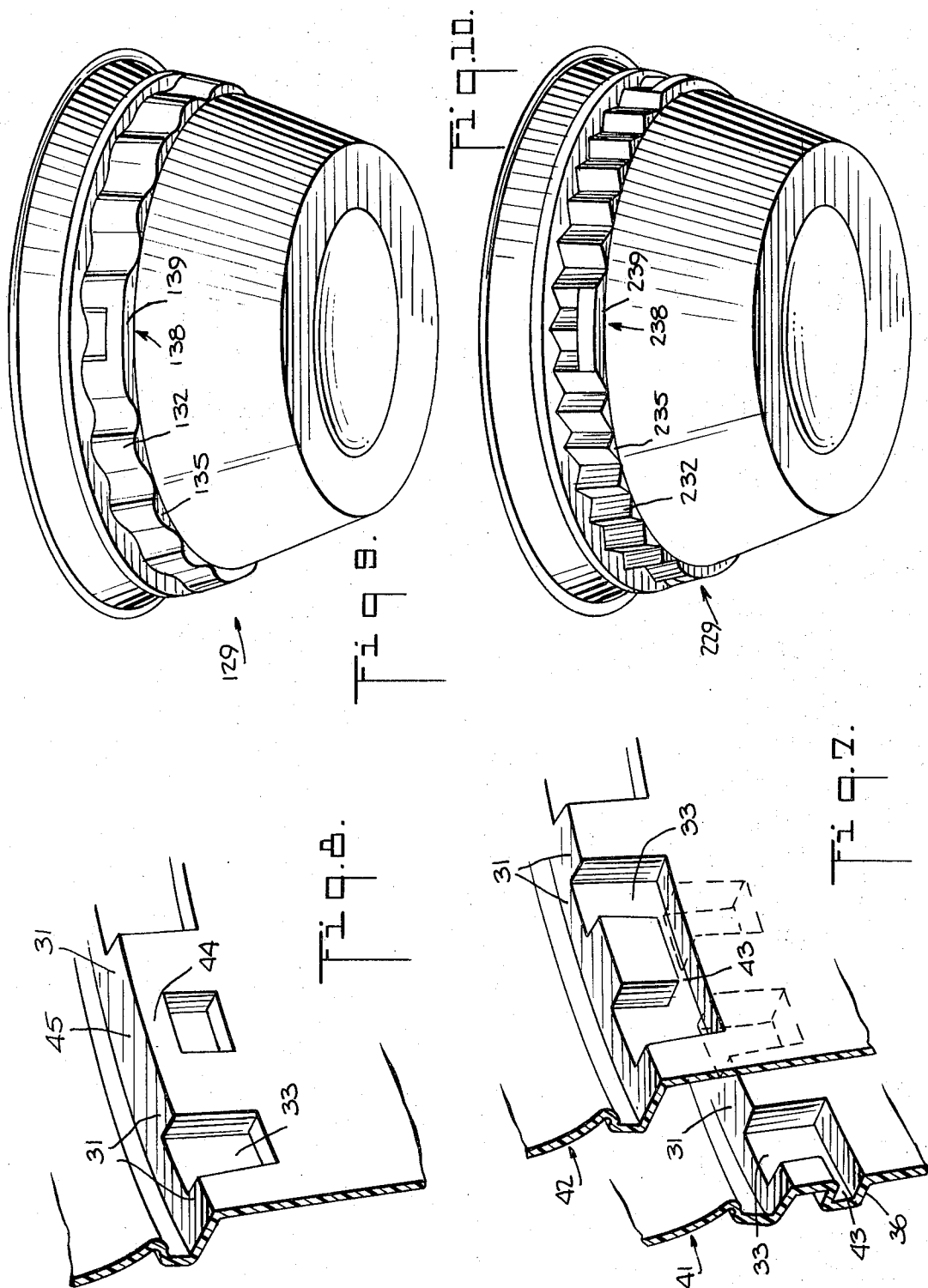
[57] **ABSTRACT**

The subject matter is a container adapted for nesting with containers of like shape and configuration which will not jam into an adjacent nested container. The container is provided with a novel stacking skirt having a plurality of stacking lugs spaced around its circumference and offset radially outwardly. The lugs may be of various shapes, e.g. rectangular or sinusoidal. The skirt and stacking lugs terminate at their upper ends in an internal upper stacking shelf. The bottom portions of the lugs form an interrupted external stacking shelf on each container which engage the internal stacking shelf of a container below in a stack of such containers. To provide positive resistance against jamming, additional stacking shelf members on the skirt alter the configuration of either or both of the internal or external stacking shelves and provide additional constantly available stacking surface at selected portions of said stacking shelves.

8 Claims, 10 Drawing Figures



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NESTABLE CONTAINER

This is a continuation of application Ser. No. 58,483, filed July 27, 1970 now abandoned.

This invention relates to nestable containers, and more particularly to nestable containers having improved stacking means which are adapted to prevent the telescopic wedging of adjacent containers when stacked one upon another.

Expendable containers made of easily-shaped material, such as sheets of plastic or impregnated or coated paper, have found wide commercial use. For economical storage and shipment and convenience of handling, such containers are often made with tapered sides and are stored or shipped in a stacked arrangement. Generally they are dispensed at the time of use from a storage cylinder in which a large number of such containers are stacked. An individual container should be readily separated from the next adjacent container in the stack without the use of much force and, in some situations, merely by the pull of gravity against the weight of the container next in line for removal from the stack.

A common drawback of nested tapered containers is that they tend to become telescopically wedged together, particularly when dropped or subjected to somewhat rough handling. This is known as jamming. Further, nested containers tend to resist ready separation during dispensing because of a relatively airtight seal formed between adjacent nested containers. Such a seal tends to prevent the admission of air between adjacent containers, thus hindering separation.

The foregoing tends to result in the jamming of adjacent nested containers, causing malfunction of the dispensing equipment, either by failure to dispense a container or in dispensing a plurality of containers simultaneously. This reduces the efficiency of the dispensing operation and increases the cost thereof, either because more than one container is used unnecessarily or because of additional labor required to separate the telescoped containers by hand and to clear or restore to normal operation the handling equipment.

Another deficiency frequently noticed in handling nestable containers is the inherent lack of rigidity of a stack of such containers and the consequent susceptibility of the stack to axial and radial distortion and misalignment during handling in manual and automatic equipment for filling, sealing, packaging and/or transporting them.

A number of container designs have been proposed which relate to various desirable characteristics of, or difficulties in handling, nestable containers. These include, illustratively, U.S. Pat. Nos. 3,045,887, 3,091,360, 3,139,213, 3,441,173, 3,353,707 and 3,485,412.

It is an object of the invention to provide a nestable container having intrinsic structural characteristics substantially preventing telescoping thereof when nested with containers of like design, even if adjacent containers become vertically aligned.

An additional object is to provide a plastic nestable container having an anti-telescoping configuration which also imparts stiffness and rigidity to the container, thereby increasing the geometric stability thereof.

Another object is to provide a container of the foregoing type capable of being fabricated of thin seamless plastic sheets by conventional thermoforming processes.

A further object is to provide such a container capable of being formed in a unitary mold and having reliable and relatively foolproof design of simple yet rugged configuration.

The nestable container of the invention comprises a container having a closed bottom, tapered side walls extending upwardly from the bottom, and an enlarged open upper end. The container is preferably made of seamless plastic, although it may be made of coated or impregnated paper. The stacking means is formed integrally with the side wall and is disposed between the ends of the container, generally near the upper open end, although it may be near the bottom end of the container. The stacking means comprises a substantially vertical peripheral stacking skirt having its outer surface disposed radially outwardly with respect to the tapered side walls.

The skirt includes a plurality, generally four or more, of circumferentially spaced stacking lugs which project radially and outwardly from the skirt. The stacking lugs have bottom portions which are utilized during the nesting operation to prevent telescoping. These bottom portions of the stacking lugs are in a common plane extending outwardly from the side wall and from the axis of the container, and define the lower portion of the stacking skirt. They form an interrupted external stacking shelf having reduced width between the lugs or between those portions of them having the greatest external diameter, thus providing a defined outer circumferential outline of the external stacking shelf. When viewed from the side, the lugs may be of a variety of shapes, such as rectangular, sinusoidal, or in a prismatic or serrated configuration.

At the top of the stacking skirt there is an internal upper stacking shelf lying in a plane into which the tops of the lugs merge. The surface of the internal upper shelf extends inwardly toward the axis of the container forming a bearing surface or shelf utilized for stacking, which has a defined inner circumferential outline. The stacking shelf is wider in those circumferential portions between the lugs or where the outside radius of the lugs is reduced, thus affording substantial bearing surface for stacking engagement by the bottom edges of the lugs of a nested container of like configuration when a plurality of containers are in nested relationship.

As thus far described, the inner circumferential outline of the internal stacking shelf at the top of the skirt is complementary in configuration to the circumferential outline of the external stacking shelf. It has been found that if the lugs in a pair of nested containers should be vertically aligned the bottom portion of the lugs may be forcibly wedged into the complementary narrowed portions of the internal stacking shelf, thus increasing the possibility of forcible jamming of the containers. To provide positive resistance to such forcibly jamming a plurality of stacking shelf-members are provided on the stacking skirt. These shelf-members have surfaces which are positioned in selected portions, and lie substantially in the plane, of either the external or internal stacking shelves to alter the circumferential outline of at least one of those selected shelf portions. They provide additional bearing surface constantly available between said shelves even when the lugs of two nested containers become vertically aligned by at least partially eliminating the reduction in width in such selected portions of at least one of either the external or internal stacking shelves. It should be noted that if

selected portions of both the external and internal stacking shelves of a single container are altered, these selected portions on both shelves will not be vertically aligned with one another.

The provision of the lugs and the interrupted peripheral contour of the skirt allows for free air communication between adjacent nested containers, thus preventing the development of suction between the stacked containers. Suction, if permitted to develop, tends to prevent the separation of a single container from the bottom of a stack of nested containers during the dispensing operation.

Thus, in a nestable container having a stacking skirt comprising a plurality of stacking lugs radially offset from said skirt, the improvement has been provided of including in the skirt at least one stacking shelf-member connecting portions of at least two adjacent lugs and having a surface in essentially the same plane as the bottom surface of the adjacent lugs. The bottom surfaces of the lugs and the stacking shelf-member provide at least a minimum of constantly available stacking shelf surface for engagement with another stacking shelf surface of an adjacent container in a stack of such containers.

In a more specific embodiment of the container of this invention, the container comprises an overall frusto-conical configuration in which the stacking means is disposed near the top or open end of the container. The lugs, which are essentially rectangular when viewed from the side, are disposed around the stacking skirt at uniform distances, with the outer vertical surfaces of the lugs being substantially concentric with the vertical axis of the container. Three or four stacking shelf-members are located equidistantly around the periphery of the skirt, each shelf-member having a surface coplanar with and joining the bottom portions of a pair of adjacent lugs.

Other objects and features will become apparent in the following description and claims, and in the drawings, in which:

FIG. 1 is a perspective view of one embodiment of the invention;

FIG. 2 is an enlarged fragmentary elevation view of the upper portion of a container of the invention taken along line 2—2 of FIG. 1 and illustrating the cross section of the stacking skirt at the location of a stacking lug;

FIG. 3 is an enlarged fragmentary view taken along line 3—3 of FIG. 1 and illustrating the cross section of a stacking skirt at a location where there is no stacking lug;

FIG. 4 is a fragmentary top plan view of the container of FIG. 1 taken along line 4—4 of FIG. 3 showing the internal stacking shelf at the top of the stacking skirt;

FIG. 5 is a sectional plan view taken along lines 5—5 of FIGS. 2 and 3;

FIG. 6 is a sectional plan view taken along line 6—6 of FIG. 1;

FIG. 7 is an enlarged fragmentary sectional perspective view of two nested containers;

FIG. 8 is an enlarged fragmentary sectional perspective view of a container illustrating another embodiment of the invention;

FIG. 9 is a perspective view of another embodiment of a container of the invention, illustrating a stacking skirt having a sinusoidal outer surface; and

FIG. 10 is a perspective view of a fourth embodiment of a container of the invention illustrating a stacking skirt having a prismatic (or saw-tooth) outer surface.

Referring now to the drawings, particularly FIGS. 1—7 inclusive, a seamless plastic container of uniform thickness exemplifying one embodiment of the invention is shown and designated generally by reference 21. The container 21 has a closed bottom 22 with an outer perimeter 23. The container has a frusto-conical overall shape including open end or mouth 24 and side wall 25 tapering generally outwardly and upwardly from bottom 22 towards open end 24. The flared upper portion 26 of the container terminates in an edge 27 which is rolled outwardly and under to provide a lip 28.

Stacking skirt 29 is formed in the side wall 25 and is of greater height than the flared portion 26 above it and extending to lip 28, and preferably is of greater diameter than the immediately adjacent portion 30 of side wall 25 lying beneath skirt 29. The upper end of stacking skirt 29 terminates at an internal stacking shelf 31.

The stacking skirt 29 includes a plurality of lugs 32 spaced circumferentially about its periphery and offset radially outwardly from skirt 29. Each lug 32 has a substantially vertical inner surface 33 and outer surface 34. As shown in FIGS. 1—7, outer vertical surface 34 is essentially concentric with the axis of container 21. Lugs 32 each have an outer bottom surface 35 which all are in a common plane and form an external interrupted stacking shelf 36 which serves to define the lower end of the stacking skirt. This external stacking shelf is widest where the lugs are offset outwardly the most and have the greatest external radius. The external shelf 36 is reduced in width between portions of the stacking lugs 32 having the greatest external radius. The sides 37 of lugs 32 are essentially vertical and parallel. The upper portion of lugs 32 merge into the internal stacking shelf 31, the internal shelf being reduced in width in those areas of merger with lugs 32 due to the outwardly radial configuration of the lugs. As shown in FIGS. 4 and 5 the configuration of the inner circumferential outline of internal stacking shelf 31 is generally complementary to the configuration of the outer circumferential outline of the external stacking shelf 35.

In one preferred embodiment of the invention, stacking shelf-members 38 connect the lower portions of several pairs of adjacent lugs such as 32A—32B shown in FIG. 1. The outer bottom surface 39 of shelf-member 38 lies in the same plane as outer bottom surfaces 35 of lugs 32A—32B. The outer surfaces 40 of stacking shelf-member 38 is in the same concentric plane as outer surface 34 of lugs 32A—32B.

As shown in FIGS. 2 and 7, when a plurality of containers shaped as described above are stacked in nested relation to one another the internal stacking shelf 31 of lower container 41 supports the outer bottom surface 35 of lugs 32 and the bottom surface 39 of stacking shelf-member 38 of the upper container 42. The two containers are thus maintained in properly aligned position with the lip 28 of container 42 disposed at a spaced position from the lip 28 of container 41 for purposes of automatic handling. As can be seen in FIG. 7, the provision of stacking shelf-member 38, having inner surface 43, alters the configuration of the circumferential outline of external stacking shelf 35 denoting a change in width in that section thereof. The possibil-

ity of the upper container 42 becoming telescopically wedged into lower container 41 is essentially eliminated (absent such force as to grossly deform the container), even if the adjacent containers become axially aligned, with the lugs 32 of each container vertically in line. A plurality of stacking shelf-members 37, preferably at least four, as shown in FIG. 1, is required to be fully effective.

FIG. 8 shows an alternate embodiment of the invention wherein the stacking shelf-member 44 has a surface 45 lying in the same plane as internal stacking shelf 31, altering the inner circumferential outline thereof and changing the width of shelf 31 in that section. Stacking shelf-member 44 prevents jamming between the container shown and another container above having its external stacking shelf resting on the internal stacking shelf 31 even if the lugs 32 of the stacked containers became vertically aligned.

The stacking shelf-member 38 of FIGS. 1-7 completely eliminates the reduction in width of selected portions of external stacking shelf 36. Likewise, stacking shelf-member 44 of FIG. 8 completely eliminates the reduction in width of selected portions of internal shelf 31. However, it is obvious that a shelf-member 38 or member 44 which only partially eliminated the reduction in width could still be effective.

FIGS. 1-8 illustrate a stacking skirt 29 having stacking lugs 32 which are essentially rectangular when viewed from the side. If desired, their sides may be slightly radially tapered. However, the stacking skirt may have a variety of shapes. As shown in FIG. 9, the stacking skirt 129 may be in the form of a sinusoidal ribbon, with projections 132 forming the stacking lugs, pairs of which are connected by stacking shelf-members 138 having bottom surfaces 139 in the same plane as lug surfaces 135. Similarly, as shown in FIG. 10, the stacking skirt 229 may be prismatic (saw-toothed) with the outer projections 232 forming the stacking lugs and having bottom lug surfaces 235. Adjacent lugs are connected by stacking shelf-members 238 having bottom surfaces 239.

The number of lugs included in the stacking skirt may be varied, depending in part on the circumference of the container. Using rectangular lugs as shown in FIGS. 1-8, normally 6-20 will suffice. More lugs are usually desirable on a stacking skirt of sinusoidal or prismatic configuration.

Generally, shelf-members 38 will connect only two adjacent lugs 32. However, if desired, the shelf-members may connect three adjacent lugs, as shown in FIG. 10, in which member 238 connects three prismatic lugs 232.

The container preferably is fabricated from a plastic such as moldable polystyrene, polyethylene, or polypropylene, and shaped by conventional techniques such as compression, injection molding, or thermoforming. It is particularly adaptable to thermoforming operations. Normally the side wall is of the order of about 0.020 inch thick and has a side wall taper of any desired degree, e.g., about 3° to about 15°, more or less. The overall shape of the container may be pointed or conical, or in the shape of a polyhedron such as a trilon or pyramid. More usually the containers are in the form of a frustum of a hollow cone or polyhedron, preferably a frusto-conical shape.

An asymmetrical stacking skirt design optionally may be used in respect of the location around the periphery

of the container of the lugs 32 or of the stacking shelf-members 38 by varying the widths of lugs 32. However, a stacking skirt design utilizing stacking shelf-members effectively prevents telescopic wedging of adjacent containers, and, in contrast to prior art designs, an asymmetrical stacking skirt design does not significantly further reduce the probability of wedging.

In describing the invention, horizontal distances passing through the vertical axis of the container have been referred to as diameters. In a tapered polyhedron embodiment, such distance would be referred to as widths.

In accordance with the foregoing description, a nestable container has been provided by the present invention. A greater freedom from telescopic wedging or jamming of such containers is provided, as well as greater bearing surfaces of adjacently nested containers, as a result of the use of the shelf-members connecting pairs or groups of adjacent lugs.

While only a few embodiments of the invention have been shown and described, it is to be understood that changes and additions may be made to the described embodiments without departing from the scope and spirit of the invention.

Having thus described the invention, I claim:

1. A nestable seamless plastic container comprising:

- a bottom;
- a sidewall portion extending upwardly from said bottom and terminating at an open end portion;
- a substantially vertical stacking skirt formed in said sidewall portion, said stacking skirt being defined at its upper portion by an internal stacking shelf lying in a plane and extending inwardly toward the axis of said container;
- a plurality of stacking lugs disposed radially outwardly from said stacking skirt, each of said lugs having a bottom portion lying in a common plane and forming an interrupted external stacking shelf extending outwardly from said container axis and from said sidewall portion and defining the lower portion of said stacking skirt; said external stacking shelf being reduced in width between portions of said stacking lugs having the greatest external radius and having an outer circumferential outline, said lugs including top portions merging with said internal stacking shelf, said internal stacking shelf being reduced in width in those areas of merger with said lugs due to the outwardly radial offset configuration of said lugs and having an inner circumferential outline said lugs each having substantially vertical opposing sides whereby each reduced in width portions of said internal stacking shelf is axially aligned with the portions of the lugs having the greatest external radius on said external stacking shelf;
- the configuration of said inner circumferential outline of said internal stacking shelf except in selected sections being complementary to the configuration of said outer circumferential outline of said external stacking shelf; and
- a plurality of stacking shelf-members on said skirt, each of said stacking shelf-members having a surface lying substantially in the plane of one of said internal or external stacking shelves and altering the circumferential outline of at least one of said stacking shelves by at least partially eliminating the

reduction in width in said selected sections of at least one of said internal or external stacking shelves, said stacking shelf-members providing additional constantly available stacking surface when a plurality of containers are in nested relation with one another and said external stacking shelf of one container is in stacking engagement with said internal stacking shelf of a container below in a stack of such nested containers.

2. The container as described in claim 1 comprising at least three of said stacking shelf-members.

3. The container as described in claim 1 wherein said stacking shelf-members connect the bottom portions of at least two adjacent lugs.

4. The container as described in claim 3 wherein said stacking shelf-member completely eliminates the reduction in width of said external stacking shelf between

said two connected adjacent lugs.

5. The container as described in claim 1 wherein each of said stacking shelf-members completely eliminates the reduction in width of said internal stacking shelf where the shelf would be otherwise reduced in width due to the radial offset configuration of one of said stacking lugs.

6. The container of claim 1 wherein the outer circumferential face portion of each of said stacking lugs is essentially rectangular.

7. The container of claim 1 wherein the outer circumferential face of said stacking skirt including said stacking lugs is essentially sinusoidal.

8. The container of claim 1 wherein the outer circumferential face of said stacking lugs are prismatic.

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