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Mojonnier

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[54] **PLASTIC SEAMLESS GABLE TOP CONTAINER**

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[52] **U.S. Cl.**..... **229/17 G,** 220/97 C, 220/DIG. 14, 229/2.5

[51] **Int. Cl.**..... **B65d 5/72**

[58] **Field of Search** ..... 150/.5; 220/31 S, 220/97 C, 97 D; 229/1.5 R, 2.5, 17 G, 37 R

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[57] **ABSTRACT**

A seamless container in which a cup-shaped article is drawn from a sheet of plastic material and has a lower cup-shaped body portion with upwardly diverging side walls, and an upper gable portion with side and end walls integral with and diverging upwardly from the upper ends of the body side walls and foldable to form a gable top for the body portion. The cup-shaped article has a step formed at the junction of the gable side and end walls with the body side walls to rigidify the upper end of the body portion and to facilitate in folding of the gable portion. Channels are formed in the gable top along gable fold lines to facilitate folding of the gable top.

8 Claims, 9 Drawing Figures

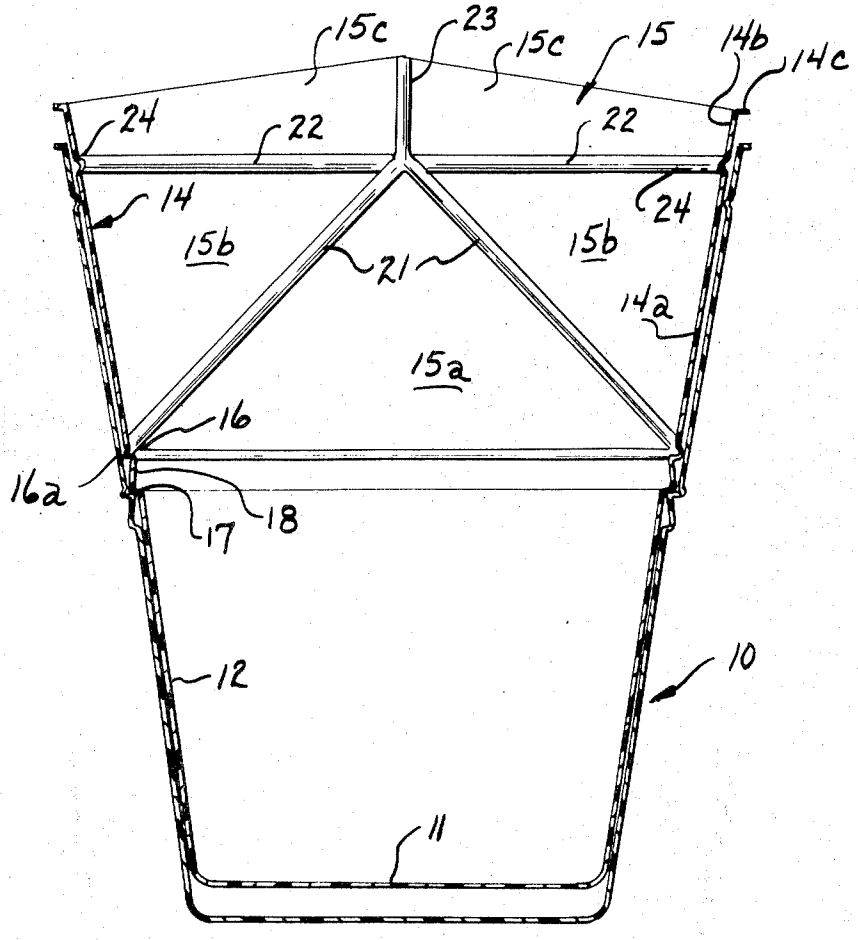


Fig. 1.

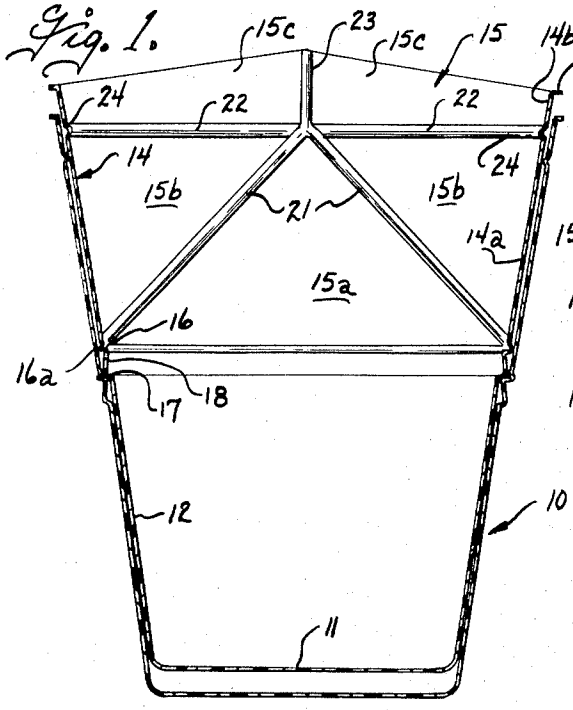
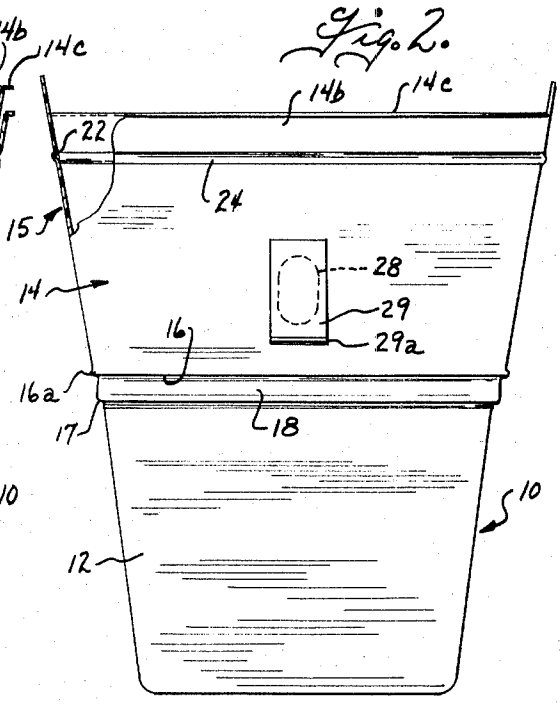


Fig. 2.



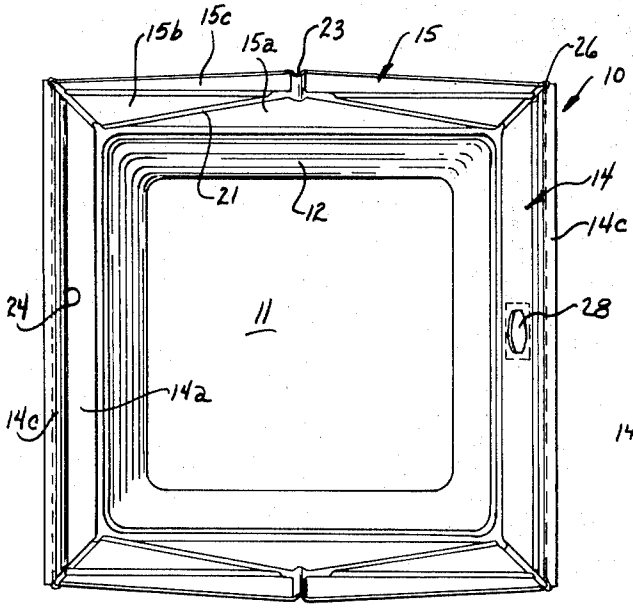


Fig. 3.

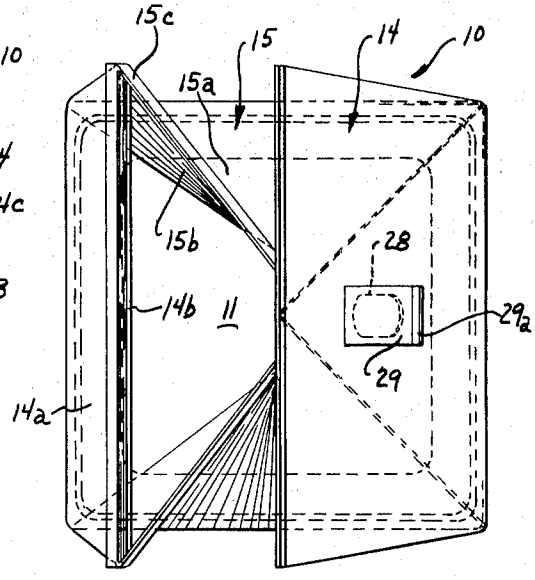


Fig. 4.

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Fig. 6.

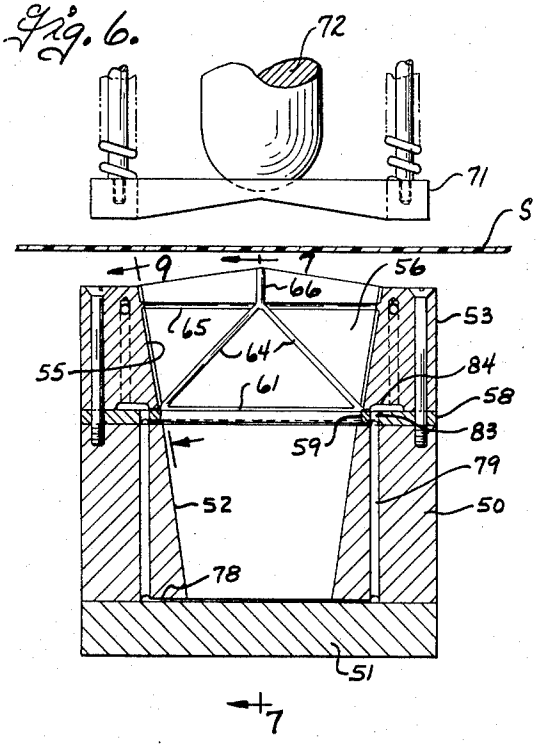


Fig. 7.

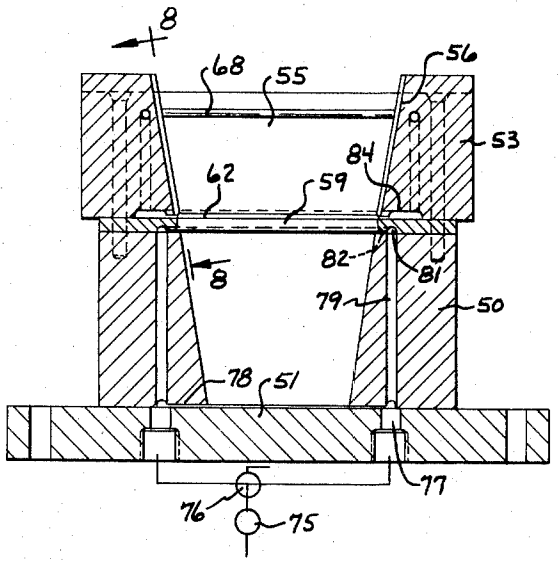


Fig. 8.

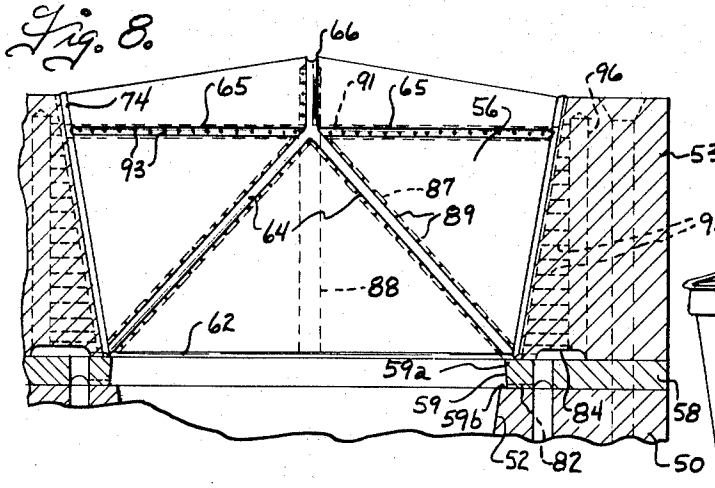


Fig. 5.

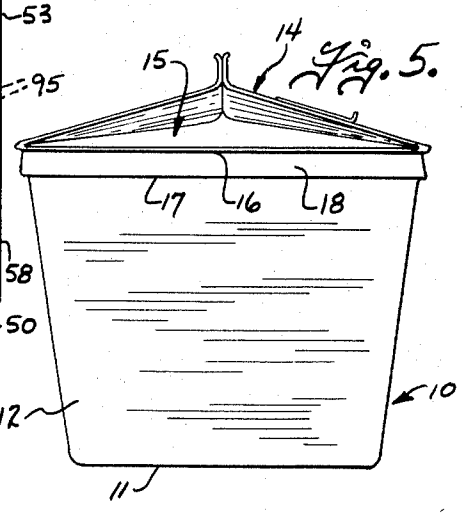
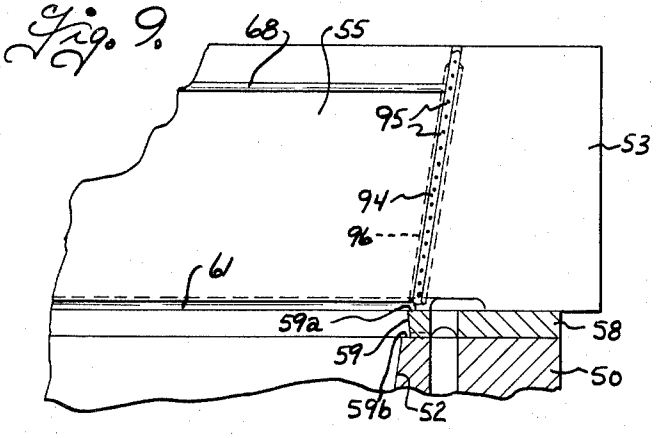


Fig. 9.



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PLASTIC SEAMLESS GABLE TOP CONTAINER

BACKGROUND

Gable top containers have been made for many years from flat blanks of coated fiberboard stock, which flat blanks are erected by folding the sides into a longitudinal tube; seaming the tube; and thereafter closing the lower end of the tube by either infolding flaps at the lower end or seaming a separate bottom closure to the lower end of the tube. In order to overcome the problem of "wicking" and eventual leaking of the fiberboard containers, which sometimes occurred when the coating was ruptured at a corner or fold line, it has been more recently proposed to make the gable top containers from flat plastic blanks which are erected in a manner somewhat similar to that utilized with the previous coated fiberboard blanks.

The price of plastic per pound is quite high as compared to coated fiberboard stock and it is necessary to utilize very thin wall sections in plastic containers in order to be competitive in price with the fiberboard containers. The practical requirement of utilizing very thin wall sections in the plastic containers, however, aggravates the problem of providing adequate rigidity in the container to enable handling of the container, particularly when the container is filled with liquid.

An important object of this invention is to provide an improved plastic gable top container and method of forming the same which enables use of thin wall sections in the container while yet providing adequate rigidity for handling of the container before and after filling of the same.

Plastic material in thin sections is quite flexible and tends to buckle when lateral pressure is applied and it is another object of this invention to provide an improved container and method of forming the same by which grooves and ribs are formed along at least the gable fold lines where sharp folding occurs, which grooves and ribs in the gable walls separate the same into panels and facilitate folding of the panels relative to each other during infolding of the gable top.

The prior gable top containers which were formed from blanks required relatively complex machinery to erect, close and seal the bottom preparatory to filling of the same. The speed at which the container blanks could be erected by such carton erecting machinery is limited and, when the container filling operation is associated with the container erecting mechanism, the speed at which filling can be achieved is limited by the speed at which the containers can be erected. This is particularly serious in the smaller size containers such as the half-pint containers.

Another object of this invention is to provide a plastic gable top container which is preformed so as to eliminate the necessity of providing carton erecting machinery at the place of filling, and which is nestable prior to filling and closing so that the preformed containers can be economically and sanitarily stored and transported to the place of filling and sealing.

A more particular object of this invention is to provide a gable top plastic container which is drawn from a sheet of plastic material to provide a seamless cup-shaped body portion and an integral gable top.

Nestable thin walled containers, when stacked, tend to wedge together and it is yet another object of this invention to provide an improved container and method of forming the same which controls nesting of one container within the other.

More particularly, it is an object of this invention to provide a nestable gable top container with a step at the juncture between the gable walls and the body side walls which both rigidifies the container adjacent the other end of the body portion; facilitates folding of the gable walls relative to the lower body side walls and further controls nesting of the container where the latter are stacked.

Other objects and advantages of the present invention will be apparent from the following description when taken in conjunction with the accompanying drawings wherein:

FIG. 1 is a sectional view of a plurality of containers constructed in accordance with the principals of the present invention, such containers being stacked and nested in telescoped relation;

FIG. 2 is an elevational view of the container shown in FIG. 1 at right angles to the plane of FIG. 1;

FIG. 3 is a top plan view of the container of FIG. 1 with the gable top in an open condition;

FIG. 4 is a top plan view of the container of FIG. 1 showing one side of the gable top folded to a closed position and the other side of the gable top partially folded;

FIG. 5 is a side elevational view of the container showing the gable top in a folded condition;

FIG. 6 is a sectional view through a mold apparatus for forming the container of FIG. 1;

FIG. 7 is a sectional view taken on the plane 7—7 of FIG. 6;

FIG. 8 is a fragmentary sectional view taken on the plane 8 of FIG. 7 and illustrating the mold on a larger scale; and

FIG. 9 is a fragmentary sectional view taken on the plane 9—9 of FIG. 6 and illustrating the mold section on a larger scale.

The container as hereinafter described in detail is made of any suitable plastic sheeting which can be drawn, either cold or in a heat softened condition, into a relatively deepdrawn article. The container described in this application is made from high impact polystyrene, but it is to be understood that other suitable plastic sheet material particularly thermoplastic sheet material such as polyethylene, polypropylene, polyvinyl chloride, etc., could be used.

Referring now in greater particularity to FIGS. 1–5 of the drawings, there is shown a drawn plastic cup designated generally by the numeral 10. The container includes a lower body portion of cup-like configuration having a bottom wall 11 and body side walls 12 formed integrally with and extending upwardly and outwardly from the bottom wall 11. The bottom wall 11 is preferably of generally rectangular configuration and the body side walls 12 are preferably generally planar and diverge outwardly relative to the axis at a shallow angle, for example about 8°, sufficient to enable nesting of the body portion of one container into the body portion of a subjacent container. In order to minimize thinning and weakening of the container adjacent the corners during drawing into the cup-shaped body, the body side walls are preferably joined to each other and to the bottom wall by smoothly rounded corners best shown in FIGS. 1 and 3. The body portion has a generally rectangular configuration at its upper end and an upper gable portion is formed integrally with the body portion. The

gable portion includes gable side and end walls 14 and 15 formed integrally with the upper ends of the body side walls and integrally joined to each other at the corners of the container.

The container is advantageously formed with a step at the upper end of the body portion to rigidify the body portion adjacent its upper end and facilitate infolding of the gable side and end walls relative to the body side walls. In the preferred embodiment illustrated, the step at the upper end of the body portion is further constructed and arranged to form a stacking ring for controlling nesting of the containers. As best shown in FIG. 1, the body side walls 12 are formed with a narrow outwardly extending flange 16 at their upper ends and the gable side and end walls 14 and 15 are integrally joined to the outer edges of the flange 16. The gable side and end walls are thus joined to the body side walls along a well defined line of discontinuity so as to minimize the tendency of the body side walls to buckle, when the gable side walls are folded inwardly. In order to facilitate infolding of the gable side and end walls, the latter are preferably joined to the outer ends of the flange by a narrow inwardly opening channel 16*a*, best shown in FIG. 1. The outwardly extending flange 16 defines an upwardly facing shoulder at the innerside of the containers and the body side walls 12 are preferably formed with a lower shoulder portion 17 extending outwardly below the flange 16 and defining a downwardly facing shoulder adapted to rest upon the inner shoulder defined by the flange 16 on a subjacent container. As shown in FIG. 1, the spacing of the outer edge of the shoulder 17 from the axis of a container is sufficiently greater than the spacing of the inner edge of the flange 16 from the container axis to enable the lower outwardly extending shoulder on one container to rest upon and be supported by the inwardly facing shoulder defined by the upper flange 16. A connecting wall portion 18 extends between the outer edge of the shoulder 17 and the inner edge of the flange 16 and has an axially extent such as to axially space the containers, when nested, a distance sufficient to prevent tight wedging of the body portion of one container in the body portion of a subjacent container.

In order to facilitate infolding of the gable side and end walls, the gable portion is preferably formed with embossed channels at least along those gable fold lines where sharp folding occurs. As best shown in FIG. 1, upwardly converging embossed channels 21 are formed in the gable end walls and separate the gable end walls into a generally triangular central closure panel 15*a* and a pair of generally triangular foldback panels 15*b*, one at each side of the central closure panel. The upwardly converging embossed channels 21 are advantageously arranged to open in a direction outwardly of the container, so as to facilitate inward flexing of the fold lines during infolding of the gable end walls.

The gable forming portion of the container is constructed to form a rib at the ridge or top of the gable for closing and sealing the container. In order to facilitate forming of the rib on the gable during closing, embossed channels 22 are preferably formed in the gable end walls 15. The channels 22 are spaced from the upper edge of the end walls and define end rib panels 15*c* along the upper edge of the fold-back panels 15*b*. A medial embossed channel 23 is provided between the end rib panels 15*c* and extends upwardly from the apex of the converging channels 21. The medial channel 23 opens in a direction outwardly of the container to facilitate infolding of the rib panels and channel 22 opens inwardly of the container to facilitate flexing of the rib panels relative to the fold-back panels.

Portions of the gable side walls 14 form the outer faces of the rib on the closed container and the gable side walls are advantageously formed with an embossed channel 24 spaced from the upper edge of the gable side walls and defining side rib panels 14*b* along the upper edge of the main gable side panels 14*a*. The channels 24 open outwardly of the container to facilitate flexing of the side rib panels outwardly relative to the gable side panels 14*a*. A rigidifying flange 14*c* is advantageously provided at the upper edge of the rib panels and extends outwardly from the container, when the latter is opened. Improved flexing of the gable side and end walls relative to each other is achieved by inwardly opening channels 26 formed at the juncture of the side and end walls, as best shown in FIG. 3.

The pitch of the gable top formed on the container can obviously be varied by changing the size and relative shapes of the gable side and end walls and, as will be understood, the pitch of the gable top can be varied from a relatively flat pitch to a relatively steep pitch without departing from the scope of the invention.

While the gable top can be wholly or partially opened for dispensing of the contents, it is also contemplated that the container can be provided with an opening conveniently in one of the gable side panels for receiving a straw or the like. As shown in FIGS. 2–4, an opening 28 is formed in one of the gable side panels 14*a*, as by punching, and the opening is conveniently closed by an adhesive cover strip 29. In order to minimize any possible contamination of the product by the adhesive coating on the cover strip, the blank punched out of the opening 28 can be pressed back into the opening and held in place by the cover strip 29. The cover strip is preferably provided with an unsealed portion 29*a* to facilitate lifting of the cover strip.

The gable forming portion of the container, by reason of the embossed channels 21–24 has an effective thickness greater than the thickness of the gable side and end walls and greater than the thickness of the body side walls 12. In order to facilitate compact nesting of the containers when opened, the gable side and end walls are preferably arranged to diverge outwardly relative to the container axis at an angle somewhat greater than the angle of divergence of the body side walls. More particularly, in order to provide compact nesting, the spacing of the stacking shoulders 16 and 17 is selected in accordance with the taper on the body side walls 12 so as to allow relatively close nesting of the body side walls without wedging or jamming of the body side walls together. The gable side and end walls, having a relatively greater effective thickness than the body side walls, are then arranged to diverge at a slightly greater angle so as to inhibit wedging of the gable tops under these conditions. For example, with the container shown, and the body side walls having a taper of about 8°, the gable side and end walls are angulated outwardly at a relatively greater angle, for example 10°. In order to provide clearance for the lower stacking shoulder 17 on one container, when nested in a subjacent container, the gable side and end walls 14 and 15 are offset outwardly from a plane through the body side walls 12 a distance such that the lower ends of the gable side and end walls are respectively spaced

from the axis of the container a distance greater than the spacing of the outer edge of the lower shoulder 17 on the respective side walls. In this manner, clearance is provided at the gable side and end walls for receiving the lower stacking shoulders 17.

As previously described, the container 10 is drawn from a sheet of plastic material to form a seamless cup-shaped body with an integral gable top and in such a manner that the containers can be nested for compact storage and shipment. Further, the containers during drawing of the same are formed with a peripheral stacking and reinforcing ring and are also formed with channels along the gable fold lines to facilitate folding of the gable top.

More particularly, forming of the gable-top container is achieved as best shown in FIGS. 6–9, by drawing a sheet S of plastic material into a female forming mold 50. The sheet material S is preferably a thermoplastic which is supplied to the mold in a heat softened condition either directly from an extruder or after passage through a heating zone. The forming mold includes a lower mold portion having a bottom wall 51 and upwardly diverging body forming side walls 52 shaped complementary to the cup-shaped body portion of the container 10. The forming mold also includes an upper mold portion 53 having gable forming side and end walls 55 and 56 which extend upwardly and outwardly from the body forming side walls. The female mold is shaped to provide a step in the container between the upper end of the body portion and the gable portion to rigidify the container in this area and facilitate infolding of the gable side and end walls. In the embodiment shown, the step forming portion comprises a plate 58 interposed between the upper and lower mold portions 53 and 50 respectively, and having an opening 59 therein. The opening 59 and its upper end is smaller in cross section than the lower end of the gable forming side and end walls to provide an upper outwardly projecting shoulder 59*a* in the mold. The lower end of the opening 59 is larger in cross section than the upper end of the body forming side and end walls 52 to provide a lower inwardly directed shoulder 59*b* spaced below the upper shoulder 59*a*.

Fold lines are formed in the gable top during forming of the container. As shown, inwardly opening grooves 61 and 62 are formed in the gable forming side and end walls 55 and 56 at the point of juncture with the upper flange 59*a*, to form the inwardly opening channels 16*a* in the container between the foldable gable top and the body portion. Upwardly converging ribs 64 are provided on the gable forming end walls 56 and extend from the lower corners of the gable end walls to a point of convergence spaced below the top of the gable end walls. Ribs 64 are arranged to form inwardly flexible channels or fold lines 21 in the gable end walls. Grooves 65 are provided in the gable forming end walls spaced from the upper edge thereof to form the aforedescribed inwardly opening channels 22 in the gable end walls of the container. A medial rib 66 is provided on the gable forming end walls and extends upwardly from the converging ribs 64 to form the aforedescribed medial channel 23 in the gable end wall of the container. Ribs 68 are provided on the gable forming side walls 55 to form the aforedescribed outwardly opening channels 24 in the gable forming side walls of the container.

Various different well known thermoforming techniques can be utilized for drawing the sheet of thermoplastic material S into the mold. In the preferred embodiment illustrated, a vacuum forming technique is utilized and an assist plug provided to aid in drawing and controlling distribution of the sheet material during the drawing operation. As best shown in FIG. 6, a clamp ring 71 is provided for clamping the sheet of heat softened thermoplastic material to the upper end of the mold and an assist plug 72 is thereafter operated by a mechanism (not shown) to draw the sheet into the mold. Vacuum is thereafter applied to mold so that atmospheric pressure forces the sheet material off the assist plug and against the mold walls. As diagrammatically shown in FIG. 7, a vacuum pump 75 is connected as through a valve 76 to vacuum passages 77 in the bottom wall 51 of the mold. The vacuum passages 77 communicate through shallow radial passages, such as grooves 78 in the lower mold portion 50, with the lower end of the body forming mold cavity. Vacuum passages 77 also communicate through passages 79 with an annular channel 81 in the plate 58. Shallow grooves 82 communicate the channel 81 with the lower portion of the step forming opening 59 in the plate. The passages 79 also communicate through passages 83 in the plate with an annular distribution channel 84 in the upper mold portion. The channel forming grooves 61, 62 are communicated with the distribution channel 84 through small passages 86 formed at the underside of the upper mold portion. Converging passages 87 (FIG. 8) are formed in the gable forming end walls 56 and have their lower ends communicating with the channel 84 and their upper ends communicating through an upright passage 88 with the channel 84. Small bleed holes 89 are provided along opposite sides of the ribs 64 and communicate with the converging vacuum passage 87. Lateral vacuum passages 91 also communicate through upright passage 88 with the annular distribution channel 84 and small bleed openings 93 are provided in the base of the channel 65 and communicate with the lateral passage 91. Channels 94 are provided at the corners of the gable forming side and end walls and, as best shown in FIG. 9, bleed openings 95 are provided in the channels 94 and communicate through vacuum passages 96 with the distribution channel 84. With this arrangement, the vacuum will operate to firmly draw the plastic material against the body and gable forming side walls and firmly around the ribs and into the grooves in the gable forming walls. In this manner, the flex line forming channels in the top and side walls of the container are formed simultaneous with the drawing of the sheet material into the mold body.

As will be seen, the container formed from a sheet of thermoplastic material can be readily nested without wedging of adjacent containers for compact storage and shipment to the point of filling. Since the containers are fully erected, the speed of filling of the containers is limited only by the speed of the filling mechanism and not by the speed of the erecting mechanism as is the case with gable top containers formed from blanks. After filling, the gable top can be closed by hand or by mechanism which operates to first tuck in the gable end walls which, in turn, causes the gable side walls to fold inwardly as shown in FIG. 4. Sealing of the container can then be achieved by apparatus which operates to seal the rib forming portions of the gable top together, as shown in FIG. 5. The channels formed at the gable

fold lines separate the gable end walls into the closure and foldback panels and not only facilitate relative folding of the panels but also inhibits buckling of these panels during folding.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A one-piece seamless nestable container of thin-walled plastic having a seamless cup-shaped lower body portion and an integral seamless upper gable portion foldable to form a gable-type closure for the body portion, said body portion having a single thickness seamless bottom wall and peripherally continuous seamless body side walls integrally joined along a peripherally continuous seamless bottom corner to said bottom wall and extending upwardly and outwardly from said bottom wall and defining a cup of generally rectangular configuration at its upper end, said gable portion having opposed gable side walls integrally joined along seamless fold lines to the upper end of the body portion at opposite sides thereof and opposed gable end walls integrally joined along seamless fold lines to the upper end of the body portion and extending between and integrally joined along seamless side corners with the opposed gable side walls, said gable side and end walls diverging upwardly and outwardly to enable nesting of the containers when the gable portion is open and said end walls having upwardly converging fold lines defining in each gable end wall a generally triangular central closure panel and a pair of triangular fold back panels, one at each side of the central closure panel, said gable end walls being adapted to be folded inwardly between the gable side walls during closing of the container with the fold back panels underlying the gable side walls and the central panels extending between the gable side walls to form a gable-type top having a ridge at the juncture of the gable side walls.

2. A container according to claim 1 wherein body side walls have lateral flange portions at their upper ends extending outwardly from the respective side walls and said gable side and end walls are integral with the outer portions of the flanges in the body side walls.

3. A container according to claim 1 wherein said gable end walls, when open, diverge upwardly and outwardly from the upper ends of the body side walls at an angle of divergence greater than the angle of divergence of the body side walls.

4. A container according to claim 1 wherein said body side walls have lateral flange portions at their upper ends extending outwardly from the respective side walls, said gable side and end walls being integral with the outer portions of the flanges on the body side walls and diverging upwardly and outwardly at an angle of divergence greater than the angle of divergence of the body side walls.

5. A container according to claim 1 wherein said lower body portion of the container has stacking and reinforcing means at its upper end including an upper outwardly extending shoulder at the upper ends of said body side walls; a lower outwardly extending shoulder spaced below the upper shoulder and a connecting wall portion extending between the outer margin of the lower shoulder to the inner margin of the upper shoulder, the outer cross-sectional dimension of the container body measured at the lower shoulder being greater than the inner cross-sectional dimension of the container body measured at the upper shoulder whereby the lower shoulder on one container is adapted to rest upon and be supported by the upper shoulder of a subjacent container when nested therein.

6. A one-piece seamless nestable container of thin-walled plastic having a seamless cup-shaped body portion and an integral seamless gable portion foldable to form a gable-type closure for the body portion, said body portion having a single thickness seamless bottom wall and body side and body end walls integrally joined along a peripherally continuous seamless bottom corner to said bottom wall and extending upwardly and outwardly from said bottom wall and defining a cup of generally rectangular configuration at its upper end, said body side and end walls having an integral outwardly directed flange portion at their upper ends, said gable portion including gable side walls integrally joined to the flange portions on the upper ends of the body side walls and gable end walls integrally joined to the flange portions on the upper ends of the body end walls, said gable side and end walls being integrally joined to each other along seamless side corners and diverging upwardly and outwardly to enable nesting of the containers when the gable portion is open, said gable end walls having upwardly converging fold lines defining in each gable end wall a triangular central closure panel and a pair of triangular fold back panels, one at each side of the central closure panel to facilitate infolding of the gable end walls between the gable side walls during closure of the container.

7. A container according to claim 6 wherein said body end walls are generally planar and said gable end walls, when open, are disposed outwardly of the plane defined by said body end walls.

8. A container according to claim 7 wherein said body side walls are generally planar and said gable side walls, when open, are disposed outwardly of the plane defined by said body side walls.

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