April 20, 1965 F. H. MILLER 3,179,323

SHIPPING CONTAINER FOR LIQUIDS

Filed April 15, 1963 4 Sheets-Sheet 1

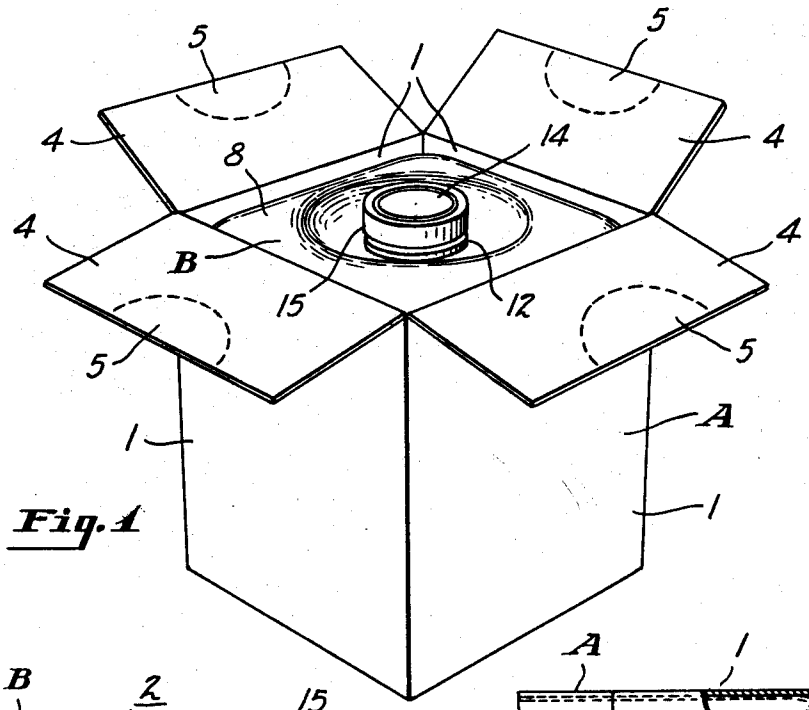


Fig. 1

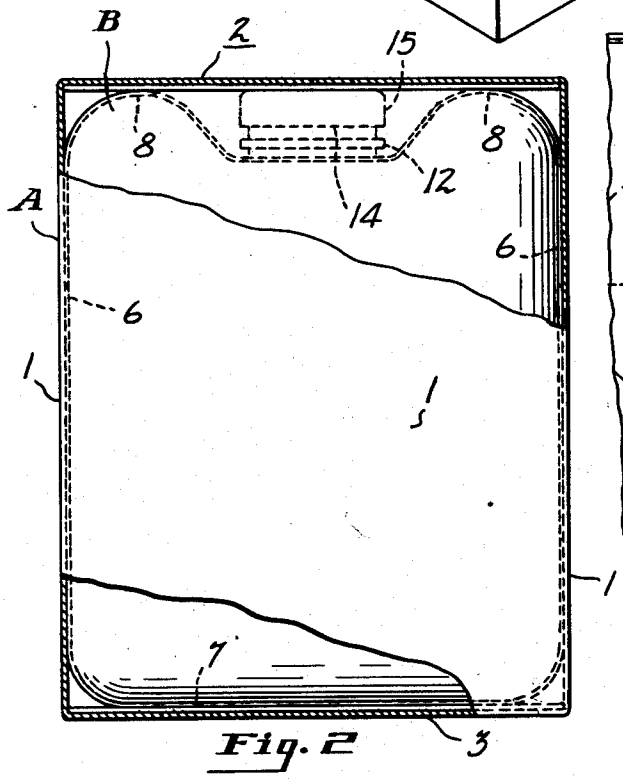


Fig. 2

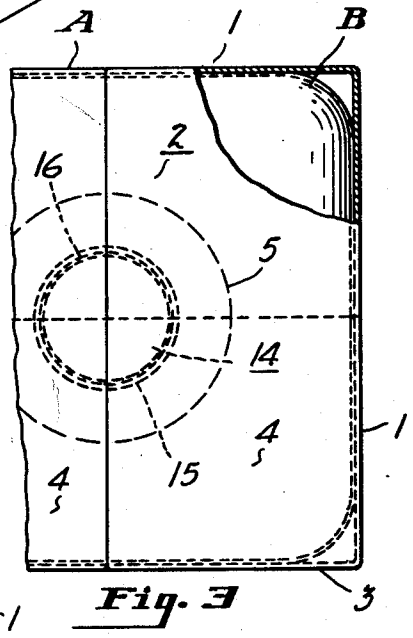


Fig. 3

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April 20, 1965 F. H. MILLER 3,179,323

SHIPPING CONTAINER FOR LIQUIDS

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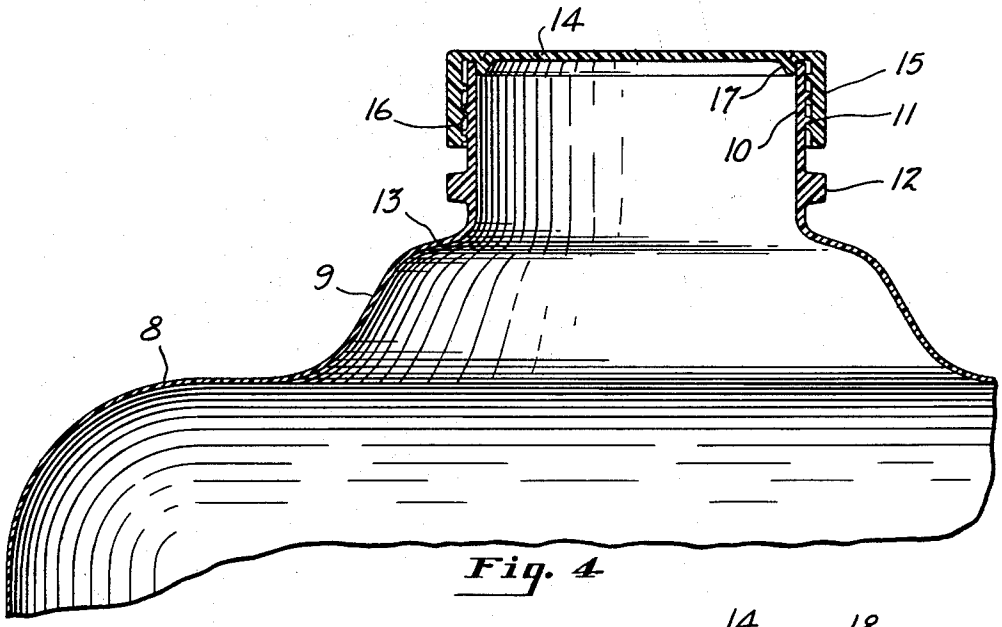


Fig. 4

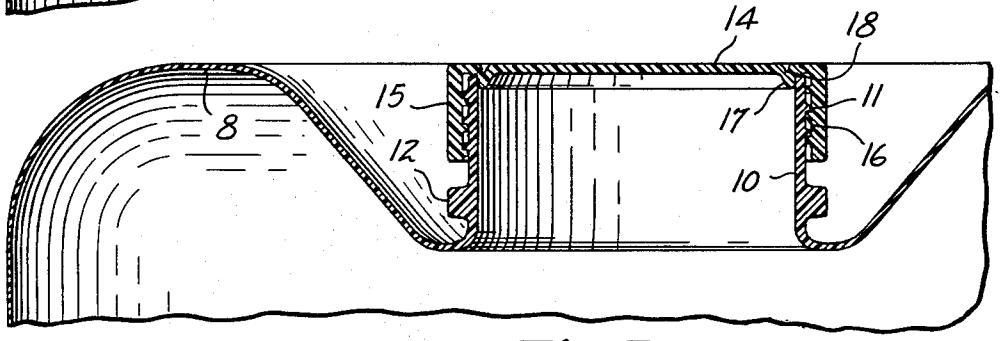


Fig. 5

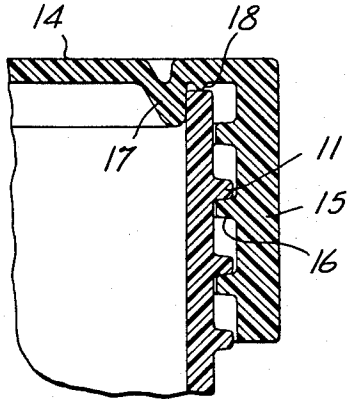


Fig. 6

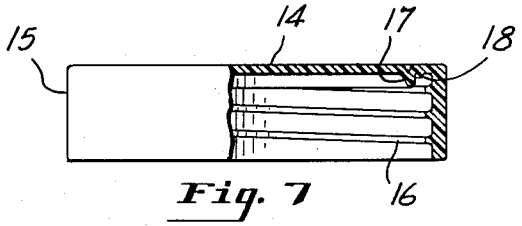


Fig. 7

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SHIPPING CONTAINER FOR LIQUIDS

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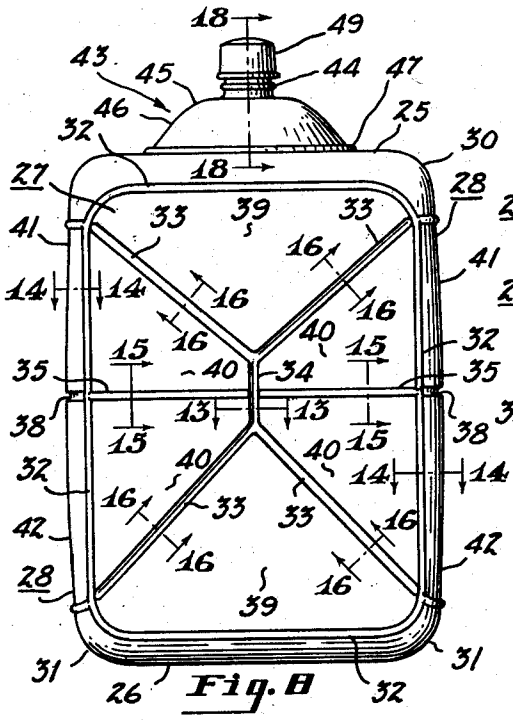


Fig. 8

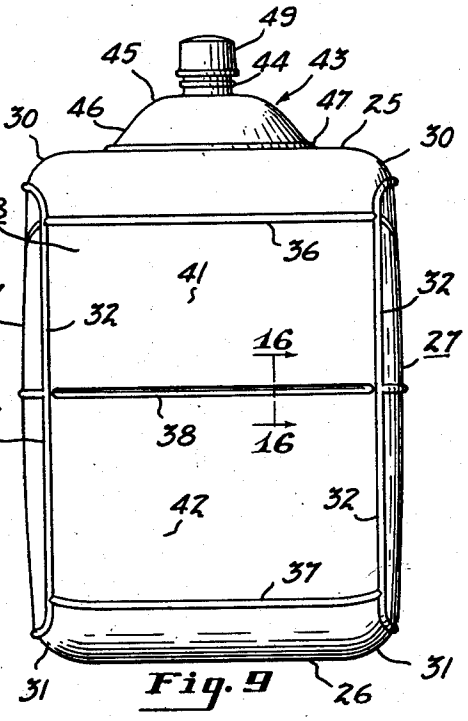


Fig. 9

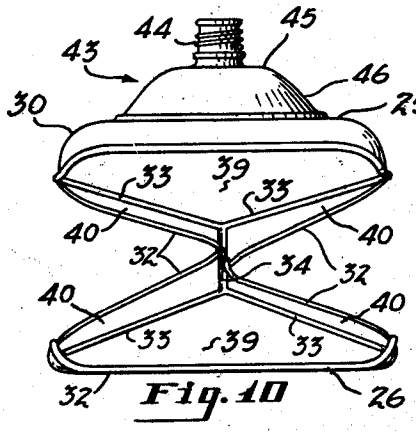


Fig. 10

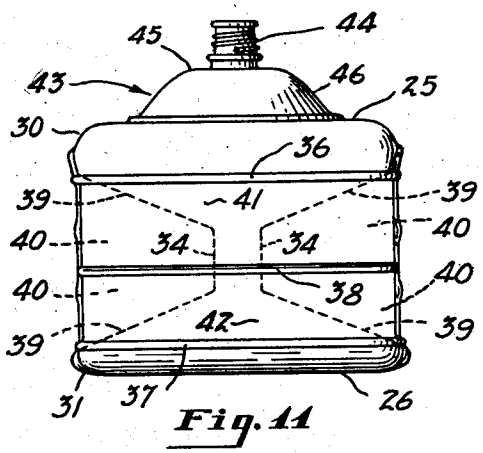


Fig. 11

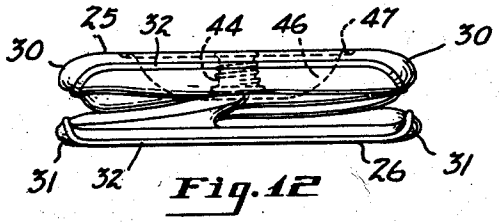


Fig. 12

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SHIPPING CONTAINER FOR LIQUIDS

Filed April 15, 1963 4 Sheets-Sheet 4

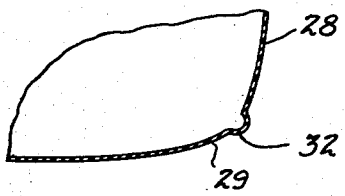


Fig. 14

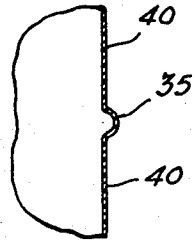


Fig. 15

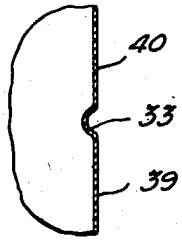


Fig. 16

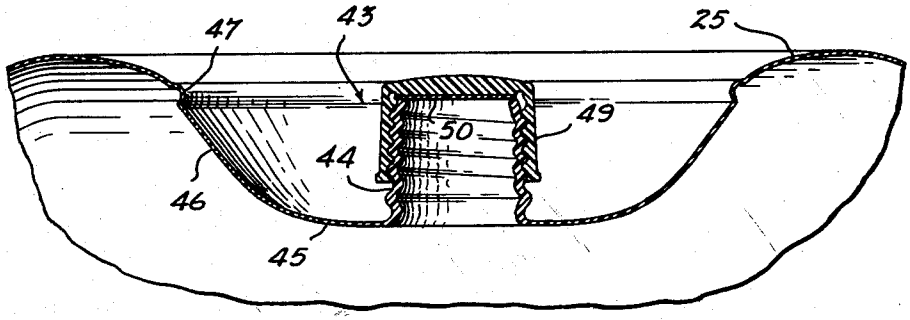


Fig. 17

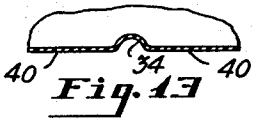


Fig. 13

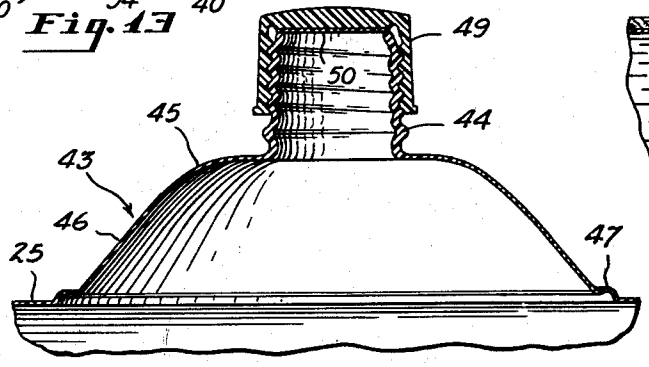


Fig. 18

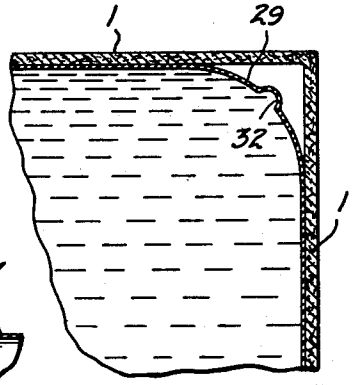


Fig. 19

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United States Patent Office 3,179,323 Patented Apr. 20, 1965

3,179,323

SHIPPING CONTAINER FOR LIQUIDS

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Filed Apr. 15, 1963, Ser. No. 282,826
9 Claims. (Cl. 229—14)

This application is a continuation-in-part of my copending application Serial No. 15,717, filed March 17, 1960, now abandoned.

This invention relates to shipping containers for liquids and more particularly to a container consisting of a paperboard box having therein a fluid tight liner in the form of a plastic bottle that is shaped to conform to the interior of the box. In the container of the present invention the plastic bottle which fits in the container has thin flexible walls that engage the container walls and is provided with a flexible neck portion terminating in an outlet, the neck portion being collapsible into the top of the bottle to position the outlet end of the neck at the level of the marginal portion of the top wall where it will be positioned closely adjacent the top wall of the box.

The box may be a corrugated paperboard box of conventional construction and the liner bottle may be made of various thermoplastic materials such as polyvinyl chloride, rubber hydrochloride (Pliofilm), polypropylene or polyethylene which have a high tensile strength and a high yield strength which is much lower than the rupture strength. Polyethylene is preferred because it is inexpensive and is resistant to numerous acids and solvents. The boxes may be formed from flat paperboard blanks at the place of shipment of the liquid and the liner bottle may be inserted in the boxes and filled with liquid prior to sealing the flaps that form the cover or top wall of the box.

In order to provide for convenient dispensing of liquid from the containers, the flaps forming the cover of the paperboard box are provided with removable portions that, when detached, provide an opening in the top wall of the box at a point directly above the collapsed neck portion of the bottle, the opening being of a size to permit the outlet and neck portion of the bottle to be pulled through it to its extended position for convenient pouring of liquid from the container.

The liner bottle may be formed by conventional blow molding methods in which a blank softened by heat is expanded in a mold having sections which fit together to form a mold cavity of the size and shape of the bottle to be formed and having clamping portions at one end of the cavity which form the threaded bottle outlet.

The mold in which the blank is formed may be designed to provide the wall thickness required in various portions of the blank to produce bottom, side and top walls of the desired thickness. The open threaded end of the blank is held against expansion and provides as bottle outlet of the same thickness as in the molded blank while the neck portions below the outlet and the bottle walls are expanded and stretched until they are quite thin and flexible. The top wall and neck portion are preferably somewhat thicker and less flexible than the bottom and side wall portions of the bottle. The blown bottle has flat walls and rounded corners and is of a height corresponding to the height of the box when its neck portion is collapsed into the top wall so that the bottle can be readily slipped in the box and, when filled to the proper height with liquid, the neck can be collapsed so that the bottle conforms substantially to the interior of the box in which it is placed. The walls of the one piece plastic bottle may be provided with a system of fold line creases which enable it to be quickly and easily collapsed for shipment without forming sharp bends in the thin plastic walls.

The rounded corners of the bottle are formed to radii such that when the bottle is filled with liquid the corners thereof are spaced inwardly a substantial distance from the corners of the rectangular container, and since the horizontal perimeter of the bottle is substantially less than that of the container, a substantial portion of the hydrostatic pressure of the liquid is taken up by tension in the side walls of the bottle, thereby lessening the outward thrust on the flat side walls of the container. Also the free spaces at the corners permit expansion of the bottle when subjected to impact stresses which are cushioned by the elastic recovery of the walls subjected to tension.

The invention has for its object to provide a safe and convenient container for liquids that can be readily assembled at the place where the liquids are to be packaged and that is so inexpensive that it can be discarded after the container is emptied.

Further objects are to provide a one piece bottle with side walls that are formed to collapse into the space between the top and bottom walls and to be packed snugly in containers for shipment and storage without forming any sharp fold lines in the thin plastic walls and to provide a collapsible neck structure which can be quickly and easily extended to its pouring position or collapsed to a position in which it is positioned entirely below the level of surrounding portions of the top wall of the bottle.

Reference should be had to the accompanying drawings forming a part of this specification in which:

FIGURE 1 is a perspective view showing a paperboard box with its top open and having a liner bottle therein which has its neck portion collapsed to permit the flaps to be folded in and fastened together to form the top closure or wall of the box;

FIGURE 2 is a side elevation of the closed container with portions broken away and shown in vertical section;

FIGURE 3 is a fragmentary top plan view of the container with a corner portion of the top wall of the box broken away to show a portion of the bottle;

FIGURE 4 is a fragmentary vertical section on an enlarged scale showing the top portion of the bottle with its neck extended;

FIGURE 5 is a fragmentary vertical section showing the top portion of the bottle with its neck portion collapsed into the top wall;

FIGURE 6 is a fragmentary section on an enlarged scale showing the sealing means provided on the closure cap;

FIGURE 7 shows the cap partially in side elevation and partially in vertical section;

FIGURE 8 is a side elevation of a collapsible plastic one-piece bottle embodying the invention;

FIGURE 9 is a side elevation looking toward one of the side walls that is disposed at right angles to the wall shown in FIGURE 8;

FIGURE 10 is a side elevation showing the bottle partially collapsed;

FIGURE 11 is a side elevation looking toward one of the sides of the bottle partially collapsed shown in FIGURE 10;

FIGURE 12 is a side elevation showing the bottle fully collapsed;

FIGURE 13 is a fragmentary horizontal section taken on the line 13—13 of FIGURE 8 through one of the central reentrant fold line creases;

FIGURE 14 is a fragmentary horizontal section taken on the line indicated at 14—14 in FIGURE 8 through one of the marginal outwardly projecting fold line creases;

FIGURE 15 is a fragmentary vertical section taken on

the line indicated at 15—15 in FIGURE 8 through one of the central horizontal fold line creases;

FIGURE 16 is a fragmentary section taken on any one of the lines indicated at 16—16 in FIGURES 8 and 9 and showing the reentrant crease that provides transverse and diagonal fold lines in the side walls of the bottle;

FIGURE 17 is a fragmentary vertical section showing the collapsible bottle neck in retracted position;

FIGURE 18 is a fragmentary vertical section showing the collapsible bottle neck in extended position; and

FIGURE 19 is a fragmentary horizontal section through one corner of the container and a rounded corner of the filled bottle within the container.

As shown in the accompanying drawings, the container of the present invention consists of a paperboard box A and a fluid-tight bottle B of thin thermoplastic sheet material that fits within the box and provides a liquid container of slightly less volumetric capacity than that of the box. The box A may be a conventional, corrugated paperboard box of the type that is made up at the place of use from a flat paperboard blank. As herein shown, the box is of square cross section having four vertical walls 1 that are of equal width and that can be folded about parallel fold lines to rectangular form, the edges of the blank being secured together along one corner of the box. The box has top and bottom walls 2 and 3 of double thickness that are formed by flaps integral with the walls 1. As shown in FIGURE 1, the vertical walls 1 have integral flaps 4 at the top that are of a length to extend half way across the top of the box and which can be fastened together to form the top closure wall. Each flap 4 has a semi-circular tear-out portion 5 at its free edge midway between its ends which are separable from the body of the flap by means of arcuate lines of perforations or other suitable weakening connection.

The liner bottle B has substantially flat side and bottom walls 6 and 7 that conform to the side and bottom walls 1 and 3 of the paperboard box and at the top thereof the bottle has a top wall with a substantially flat marginal portion 8, an upwardly tapering flexible and resilient neck portion 9 and a rigid cylindrical outlet portion 10. Except for rounded corners, the bottle B conforms to the interior of the box A, being substantially square in horizontal cross section and of a size to fit within the box A. The marginal portion 8 of the top wall is at a height above the bottom wall 7 that corresponds to the height of the box A.

The cylindrical outlet portion 10 of the bottle has an external screw thread 11 and an external circumferential stiffening rib 12 inwardly of its threaded portion. The portion of the neck immediately surrounding the outlet portion 10 is less steeply inclined than the lower portion of the neck to provide a circumferential shoulder 13 of small inclination which facilitates the collapse of the neck portion into the top wall of the bottle. The outlet portion is of the same thickness as the wall of the blank from which the bottle is blown and may be about $^{7}/_{1000}$" in thickness. The bottom and side walls of the bottle are of a thickness at least $^{10}/_{1000}$" and the top wall is preferably somewhat thicker than the side and bottom walls. The outlet 10 is closed by means of a cap 14 of molded plastic material similar to the material of the bottle but preferably somewhat stiffer. The bottle and cap may, for instance, both be made of polyethylene, the material of the cap being formed of a more linear polymer which is somewhat stiffer than the polymer from which the bottle is formed.

The cap 14 has a cylindrical rim portion 15 provided with an internal thread 16 that is formed to engage with the thread 11 of the bottle outlet. The cap 14 has an annular stopper flange 17 which is concentric with the rim 15 and projects downwardly. The annular flange 17 has a slightly tapering exterior face which is of a diameter to tightly fit within the cylindrical outlet 10,

the outer end of which is received between the rib 17 and the rim 15. Between the rib 17 and the rim 15 the cap is provided with a second short, sharp pointed V-shaped rib 18 that engages with the end face of the outlet 10 when the cap is screwed tightly onto the bottle outlet 10. The short rib 18 is pressed into the end face of the outlet while the stopper rib 17 is pressed tightly against the inner face of the outlet 10 so that an effective seal for preventing the escape of liquid is provided.

The bottle has rounded corners 20 in its peripheral wall and rounded corners 21 and 22 at the junction of the top and bottom walls with the side walls 6 as shown in FIGURES 2 and 3. When the bottle is filled with liquid hydrostatic pressure acting on the corners 20 and 22 which are free to expand toward the corners of the container puts the peripheral and bottom walls of the bottle under tension so that a substantial portion of the expanding thrust that would otherwise be exerted on the flat side walls of the container is taken in tension by the walls of the bottle. The yield strength under tension of the bottle walls is much higher than that normally imposed by the liquids with which the bottle is filled. However, to be considered safe for certain liquids, containers must be capable of withstanding severe shock tests without developing leaks. For example, the container filled with liquid may be dropped upon a floor surface from a height of three or four feet. Upon impact with the floor, the hydrostatic pressure of the liquid will be momentarily increased to more than fifteen times the normal. Below the yield point the elastic recovery of the bottle walls is substantially complete and between the yield point and rupture point the elastic recovery is partial. The corner spaces provided by the rounded corners of the bottle permit not only the freedom to expand necessary to enable the elasticity of the bottle walls to be utilized for cushioning but will allow a permanent enlargement of the bottle if the walls should be subjected to tension stresses above the yield point of the thermoplastic material of which the walls are composed.

In packaging the liquid the bottle is placed within the paperboard box and the liquid is poured into the bottle while its neck is in the extended position shown in FIGURE 4. After liquid has been filled to the proper level in the bottle, the cap 14 is screwed onto the outlet 10, after which the neck is collapsed into the top wall of the bottle to the position shown in FIGURE 5 by pressing downwardly on the cap 14. The air trapped in the top portion of the bottle will prevent collapse of the marginal portions 8 of the bottle so that downward movement of the outlet portion 10 will depress the shoulder 13 reversing its curvature and gradually reversing the curvature of the steeper portion of the neck until the outlet is moved to and retained in the position shown in FIGURE 5, after which the flaps 4 are moved to closed position and secured together by gluing or other suitable means.

When it is desired to dispense liquid from the container, the tearout portions 5 of the top wall may be removed, providing a circular opening directly above the cap 14 that is of a diameter sufficiently greater than the cap to enable the outlet 10 to be pulled upwardly through the opening and extend the tapered neck 9 beyond the top wall of the box for convenient pouring of liquid from the container.

In FIGURES 8 to 18 of the drawing a modification of the invention in which rounded creases in the form of short radius undulations or corrugations in the bottle walls provide fold lines which facilitate collapsing of the walls. The side walls are creased to provide fold lines which permit them to be collapsed between the top and bottom walls and the creases are so formed that the collapsed bottles may be packed snugly in suitable containers for shipment and storage without the formation of any sharp bends in the bottle walls that would weaken the walls of bottles stored for a considerable time in collapsed condition.

The bottle shown in FIGURES 8 to 17 is similar to the bottle previously shown and described both as to general configuration and as to the thermoplastic material of which it is composed. Like the bottle previously described, it is blow molded in a mold to which the bottle walls conform but in which the mold cavity walls have ribs and grooves which form the fold line creases or corrugations.

As shown in FIGURES 8 to 11, the bottle has top and bottom walls 25 and 26, two pairs of opposed side walls 27 and 28, rounded corners 29 connecting the side walls and rounded corners 30 and 31 connecting the side walls with the top and bottom walls.

Each pair of opposed side walls are provided with identical fold lines. The walls 27 each have a marginal outwardly projecting fold line crease 32 extending continuously along its side, top and bottom edges and forming a rounded rib on the exterior face of the wall, a diagonally inclined crease 33 extending inwardly from near each corner of the marginal crease 32. The diagonally inclined creases 33 converge toward the center of the wall and meet at their inner ends at opposite ends of a short vertically disposed crease 34, the creases 33 and 34 being reentrant and forming rounded grooves in the exterior face of the wall.

Horizontal creases 35 which form rounded ribs in the external face of the wall extend horizontally midway between the top and bottom edges of the wall from the marginal crease 32 to the central crease 34.

The opposed walls 28 each have fold line creases 36 and 37 that extend horizontally at the top and bottom edges from the marginal crease 32 of one side wall to the marginal crease 32 of the other side wall. The creases 36 and 37 project outwardly and form rounded external ribs. A central horizontal reentrant crease 38 forming a rounded groove extends across the center of each wall 28 from the marginal groove of one side wall 27 to the other.

The diagonally inclined fold line creases 33 with the top and bottom portions of the marginal crease 32 form the two triangular panels 39. Four panels 40 of substantially triangular form are formed between the creases 33 and the central creases 35. When the walls 27 are pressed inwardly, the triangular panels 39 fold toward the top and bottom walls hinging on the fold lines formed by the top and bottom portions of the marginal crease 32 and the panels 40 fold outwardly toward the inner faces of the inwardly folded panels 39 hinging on the creases 33, the panels 40 hinging with respect to each other on the creases 35.

The walls 28 are divided into upper and lower rectangular panels 41 and 42 which fold inwardly hinging on the top and bottom creases 36 and 37 and the center crease 38. The outwardly projecting or rib creases provide hinges for panels that swing inwardly during their collapsing movements and the reentrant or groove creases provide hinges for panels that swing outwardly while collapsing. The creases 33, 34 and 38, which are in form of outwardly facing grooves, form the hinge connections between panels that converge radially inwardly during folding and the creases 32, 35, 36 and 37 which are in the form of inwardly facing grooves form the hinge connections between panels that converge outwardly during folding so that the bend of each fold line corresponds substantially to the transverse curvature of the groove. Each rounded crease forms a relatively stiff, narrow, rounded fold line which prevents sharp bends that might weaken the walls if the collapsed container were stored for a long period of time, causing the plastic material to take a permanent set.

In collapsing the bottle the panels 39 swing inwardly about the rib creases 32 while the panels 40 swing outwardly about the groove creases 33, the panels 40 swinging inwardly with respect to each other about the rib creases 35. At the same time the panels 41 and 42 of the walls 28 swing inwardly about the rib creases 36 and 37 and outwardly with respect to each other about the groove creases 38. The fold lines permit the bottle to be collapsed to the position shown in FIG. 10, after which the bottle may be fully collapsed by pressure on the top wall.

As herein illustrated the bottle is formed to fit in a container that is square in horizontal cross section and that is of a height somewhat greater than its breadth. The height of each triangular panel 39 measured from its apex to the marginal fold line 32 is approximately one-half the width of the side walls 28 and the height of the panels 42 are approximately one-half the height of the walls 28 and the width of the panels 40 measured from the fold line 32 to the fold line 34 is also approximately equal to one-half the width of the wall 28. Since the height of the walls 27 and 28 is greater than their width the short fold lines 34 are provided between the panels 40. Since the panels 41 and 42 are of a height greater than one-half the width of the walls 27 the folds formed by these panels overlap in the fully collapsed container as shown in FIG. 11. The side walls of the bottle readily collapse inward to the position shown in FIG. 10 after which pressure on the top wall will complete the collapse by bending the short crease 34 to the extent necessary to accommodate the overlap between the panels 41 and 42 of the walls 28 and permit movement of the panels 39 and 40 of the walls 27 to substantially horizontal position. It is apparent that if the body of the bottle were made substantially cubical the creases 33 would meet centrally of the wall 27 and the crease 34 would be unnecessary.

The rounded fold line creases 32 are located in the corner portions of the bottle that are out of contact with the container walls as shown in FIG. 18 and these creases increase the stretch of the bottle walls under tension and have spring action which serves to more effectively cushion pressure surges which may be caused by impact shocks. The stretchability of the peripheral wall of the bottle is also increased somewhat by the creases in the walls 27 which also act as cushioning springs.

The bottle has a collapsible neck portion 43 which terminates in a rigid tubular externally threaded outlet 44 that is integral with a slightly inclined flexible annular shoulder 45 that surrounds the outlet 44 and extends from the base of the outlet 44 to a more steeply inclined portion 46 of the neck that is integral with the surrounding portion of the top wall 25 of the bottle. The neck portion 43 is collapsible from the position shown in FIGS. 8, 9, and 10, where it projects upwardly from the body of the bottle to provide a pouring spout to the retracted position shown in FIGS. 11 and 17 where it is entirely below the level of the surrounding portion of the top wall 25. By reason of its shape the neck portion offers substantial resistance both to the downward pressure necessary to collapse it to its lowermost position and to the upward pull necessary to move it to its extended position. To lessen the distortion of the neck portion during its movements from extended to retracted position and from retracted to extended position, an annular crease 47 is provided at the juncture of the base of the tapered portions 46 with the surrounding portion of the top wall 45. The crease 47 permits some radial expansion of the base portions of the tapered neck, thereby lessening the distortion of the flexible portions 45 and 46 of the neck during their movements from extended to retracted position and vice versa. The outlet 44 may be closed by means of a threaded cap 49 that is provided with a suitable sealing means such as a gasket 50 so that when the container is filled to the proper height with liquid the air above the level of the liquid may be trapped between the liquid and top wall 25 to hold the top wall against collapse while the flexible neck is pushed downwardly to its retracted position.

It is to be understood that in accordance with the provisions of the patent statutes, variations and modifications of the specific devices herein shown and described may be made without departing from the spirit of the invention.

What I claim is:

1. A shipping container comprising a one-piece seamless bottle composed of a flexible resilient thermoplastic material and a paperboard box in which said bottle fits, said bottle having thin flexible bottom and upright walls, a top wall provided with a tapering upwardly projecting neck and a substantially flat portion that is thin and flexible and that surrounds the lower end of said neck, said neck having a flexible portion that is integral with and that tapers upwardly from said flat portion and that terminates at its upper end in a relatively rigid tubular outlet, said flexible portion of said neck having an upper portion less steeply inclined than its lower portion and forming a shoulder surrounding said outlet that facilitates inward bending adjacent said outlet, a fluid tight closing and sealing means for said outlet which serves to trap air in said bottle to provide resistance to collapse of said marginal portions of the top wall so that downward pressure exerted on said outlet causes said flexible tapered portion to bend inwardly around the base of said outlet and to collapse to a reverse reentrant position with respect to said flat surrounding portion of the top wall where it forms the annular wall of a downwardly tapering recess and supports said outlet in a lowered position below the level of said surrounding portion of the top wall, an annular crease being provided at the juncture of the lower end of the neck with the surrounding portion of the top wall which permits limited radial expansion of the base portion of said neck and reduces the distortion of the neck during movement of the neck from its extended to its collapsed position or from its collapsed position to its extended position, said box having a top closure wall that is secured in position over the top of a filled bottle that has its neck collapsed into its top wall, said closure wall having a separable portion that can be removed to provide an opening that registers with the collapsed bottle neck and through which said neck may be extended.

2. A one-piece seamless bottle composed of a resilient and flexible thermoplastic material and having thin flexible top, bottom and upright walls, said top wall having an upwardly projecting neck and a substantially flat portion surrounding the base of said neck, said neck terminating at its upper end in a relatively thick tubular outlet portion and having a flexible shoulder portion of small inclination surrounding the inner end of said outlet portion and a more steeply inclined, flexible, upwardly tapering portion extending downwardly from said shoulder portion to said flat portion of the top wall, said flexible shoulder and tapering portion being collapsible into the bottle to a reversed reentrant position with respect to said surrounding flat portion of the top wall to provide a recess in said top wall in which said outlet portion is retained below the level of said surrounding portion of the top wall, an annular crease being provided at the juncture of the lower end of the neck with the surrounding portion of the top wall which permits limited radial expansion of the base portion of said neck and reduces the distortion of said neck during its collapse or extension.

3. A shipping container comprising a collapsible liner bottle consisting of a flexible resilient thermoplastic material and a rectangular box in which said bottle fits, said box consisting essentially of one sheet of paperboard, said bottle having thin flexible seamless upright walls and a top wall provided with a tapering upwardly projecting neck and a substantially flat portion that is thin and flexible and that surrounds the lower end of said neck, said neck being free from attachment to the top wall of the box and having a flexible portion that is integral with and that tapers upwardly from said flat portion and that terminates at its upper end in a relatively rigid externally threaded tubular outlet said flexible portion of said neck having an upper portion less steeply inclined than its lower portion and forming a shoulder surrounding said outlet that facilitates inward bending adjacent said outlet, a removable internally threaded cap for said outlet provided with sealing means which serves to trap air in said bottle to provide resistance to collapse of said marginal portions of the top wall so that downward pressure exerted on said outlet causes said flexible tapered portion to bend inwardly around the base of said outlet to a reverse reentrant position with respect to said flat surrounding portion of the top wall where it forms the annular wall of a downwardly tapering recess and supports said outlet in a lowered position below the level of said surrounding portion of the top wall, said box having a top closure wall that is secured in position over the top of the filled bottle that has its neck depressed into its top wall, said closure wall having a separable portion that can be removed to provide an opening that registers with the depressed bottle neck and through which said neck may be extended.

4. A shipping container for battery acid and other liquid comprising a collapsible one-piece seamless liner bottle having thin flexible bottom, side and top walls consisting of a resilient thermoplastic material, which has a high yield strength under tension and a rupture strength materially greater than its yield strength, molded to provide an upright peripheral wall with generally flat side portions and rounded portions of large radius at the juncture of the side walls with one another and with said top and bottom walls, said rounded portions extending throughout the periphery of the bottle at the top and bottom of the side walls and at the margins of the top and bottom walls, and a rectangular box in which said bottle fits that has flat rectangular top, bottom and side walls with square corners at the juncture of the side walls with one another and having an internal horizontal perimeter materially greater than the horizontal perimeter of said bottle and providing spaces at the vertical corners where substantial portions of the bottle walls are out of contact with said container walls when the bottle is filled with liquid, said box consisting essentially of one piece of paperboard, the entire peripheral wall of said bottle having a thickness less than that of the upper portions of the bottle, the thin portions of said peripheral wall near the vertical corners of said box expanding circumferentially at said corners into said spaces to take up in tension a substantial portion of the hydrostatic pressure of the liquid that would otherwise exert an expanding thrust on the container side walls and to cushion surges of pressure caused by impact shocks.

5. A shipping container such as set forth in claim 4 in which a narrow vertical transversely rounded crease is provided in each portion of the peripheral wall of the bottle that is out of contact with the container at the vertical corners, said creases increasing the stretchability and elastic recovery of said peripheral wall to effectively cushion pressure surges.

6. A shipping container such as set forth in claim 5 in which narrow transversely rounded horizontal creases are provided in the portions of the bottle walls out of contact with the container walls at the top and bottom corners thereof.

7. A one-piece seamless collapsible bottle molded to a substantially rectangular form in horizontal cross section and having substantially flat, thin and flexible top, bottom and upright walls with rounded corners at the juncture of the upright walls with one another and with the top and bottom walls, the side walls of the bottle being divided into panels that are hingedly connected to one another and to the top and bottom walls by fold line creases in the form of short radius corrugations in the bottle walls to fold inwardly between the top and bottom

walls, the creases between panels that converge outwardly during folding being in the form of reentrant corrugations forming outwardly facing grooves and the creases between the panels that converge outwardly during folding being in the form of outwardly projecting corrugations providing rounded bends at the junctures of the collapsed panels, said bends being relatively stiff to prevent flattening of the collapsed bottle, said side walls being hingedly connected to one another by outwardly projecting corrugations, the corrugations forming the hinge connections between the side walls being positioned in the rounded upright corners and serving to cushion pressure surges in the filled bottle caused by impact shocks, the corrugations forming the hinge connections between the side walls and the top and bottom walls extending across the side walls adjacent the top and bottom walls, each side wall of one opposed pair being divided into two generally rectangular panels by a reentrant horizontal corrugation substantially midway between its top and bottom, each side wall of the other opposed pair being divided into six generally triangular panels by horizontal outwardly projecting corrugations midway between the top and bottom walls and four reentrant corrugations converging from the four corners of the wall generally toward the central part of the wall, the generally triangular panels that are hinged to the top and bottom walls having their apices spaced a substantial distance apart and a substantial distance from said last-named horizontal corrugations.

8. A seamless bottle as defined in claim 7 wherein a reentrant vertical corrugation extends between said apices of said triangular panels and wherein the hinge connections between said last-named panels and the top and bottom walls curve inwardly at their opposite ends to follow the rounded corners of the bottle.

9. A shipping container for battery acid and other liquid consisting of a collapsible one-piece paperboard box of substantially square cross section, a one-piece seamless collapsible impervious liner bottle of generally square cross section consisting of a flexible resilient thermoplastic material, and a central removable internally threaded cap for said bottle, said bottle having a thin bottom wall and thin flexible upright side walls, said bottle having a top wall provided at its center with a relatively thick rigid annular outlet that is externally threaded to receive said cap and provided with a generally flat marginal portion that is thin and flexible, said top wall having a wide tapering upwardly projecting annular neck extending between said rigid outlet and said thin marginal portion and gradually increasing in thickness in a radial direction toward the thick outlet, said neck being relatively stiff and having a thickness greater than the lower portions of the bottle but being sufficiently flexible to snap from a stable upwardly extending position to a stable reverse reentrant position when sufficient downward pressure is applied, said neck being free of attachment to the top wall of said box, the radially inner portion of said neck being less steeply inclined than the radially outer portion of the neck and forming a shoulder surrounding the outlet that facilitates snapping of the neck to said reentrant position, annular sealing means carried by said outlet and engaging said cap to trap air in the fluid-tight bottle to provide resistance to collapse of the marginal portions of the top wall so that a downward pressure exerted on said outlet sufficient to snap said neck from the upper to the reentrant position does not collapse the bottle and the air inside the bottle is placed under compression below said marginal portion of the top wall to reinforce the bottle and to cushion shock, said neck in the reentrant position supporting said outlet in a lowered position just below the level of the surrounding marginal portion of the top wall, said box having a top closure wall formed by the flaps of the box that is secured in position over the top of the bottle and engages said last-named marginal portion around the lowered outlet, said closure wall having a portion providing a circular opening that registers with the collapsed bottle neck and through which said neck may be extended without moving the entire top wall of the box.

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