Sept. 10, 1968 N. A. KELLY 3,400,846

CONTAINER CONSTRUCTION

Filed Aug. 31, 1966 2 Sheets-Sheet 1

Fig. 1

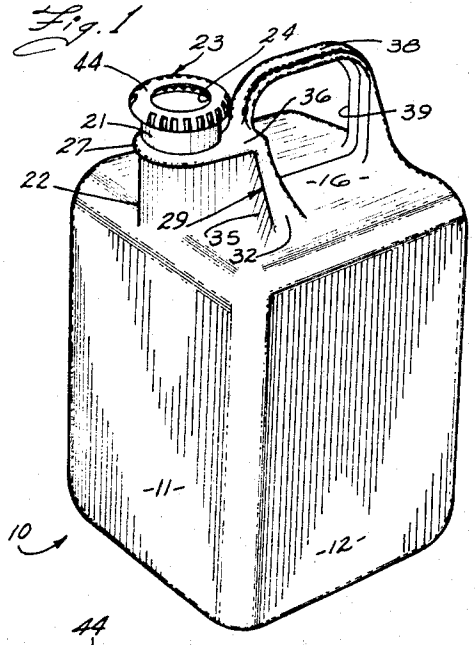
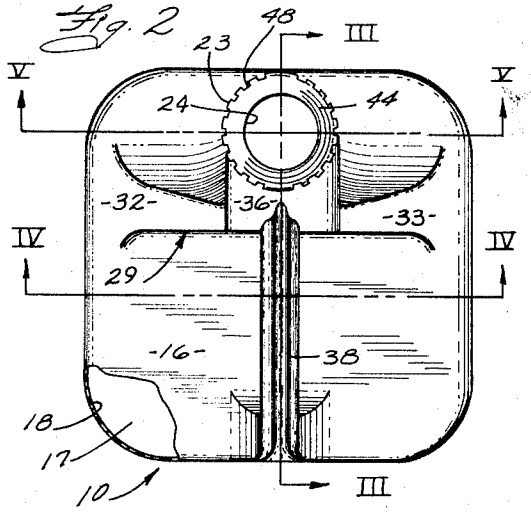


Fig. 2



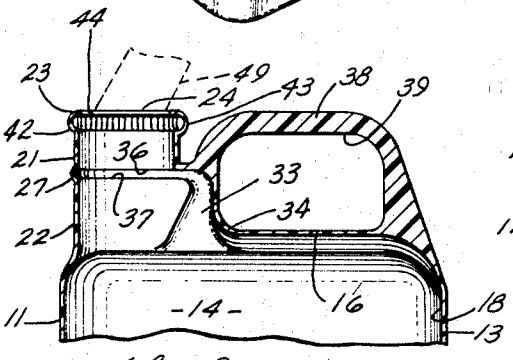


Fig. 3

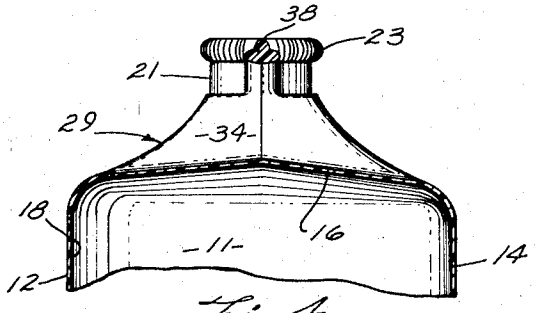


Fig. 4

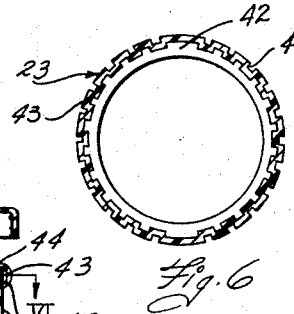


Fig. 6

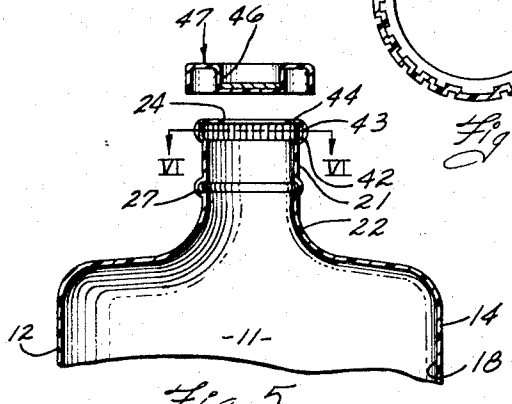


Fig. 5

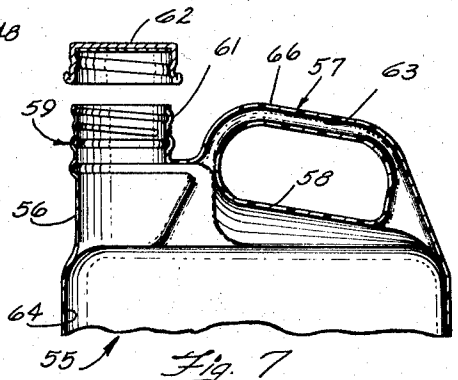


Fig. 7

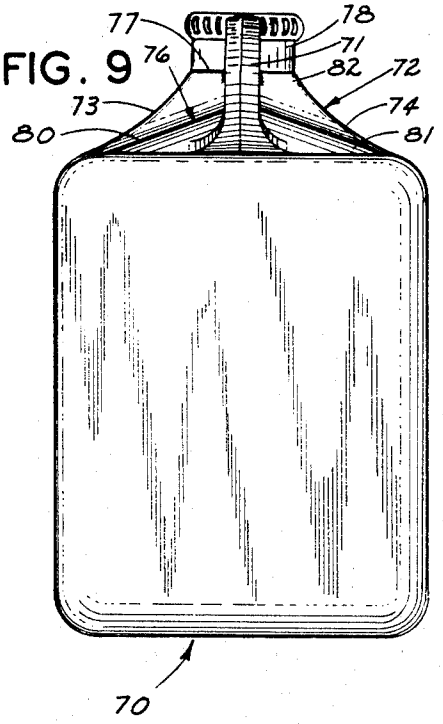
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CONTAINER CONSTRUCTION

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FIG. 9



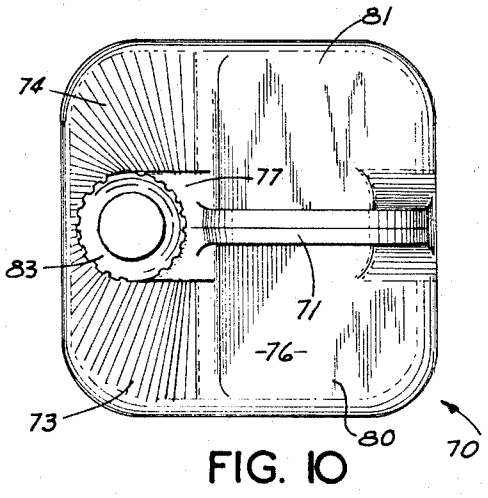


FIG. 10

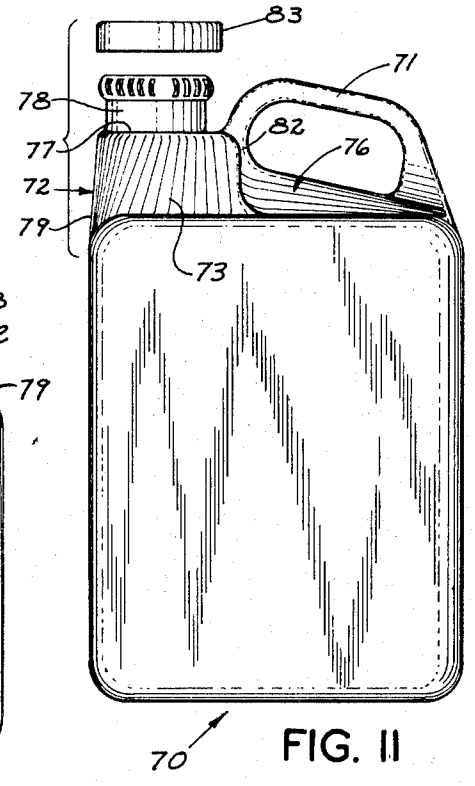


FIG. 11

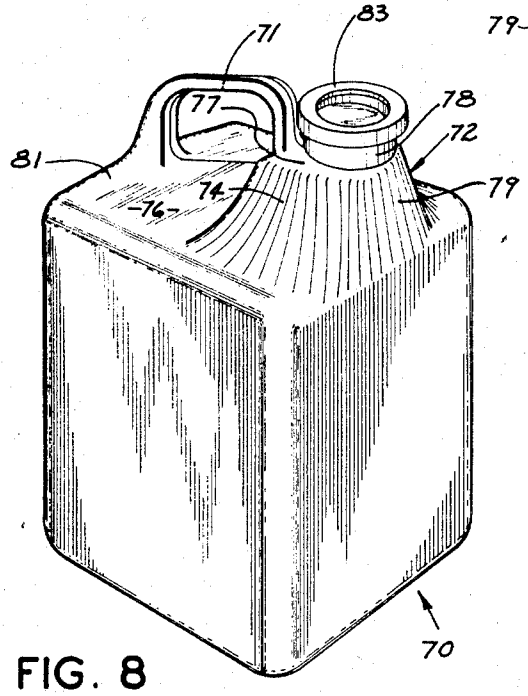


FIG. 8

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CONTAINER CONSTRUCTION

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Filed Aug. 31, 1966, Ser. No. 582,788
6 Claims. (Cl. 215—1)

ABSTRACT OF THE DISCLOSURE

The plastic jug is blow-molded and its relatively thin side walls, top wall and bottom wall define a liquid-holding chamber which is preferably rectangular in cross section. The jug includes an integral neck extending upwardly from the top wall and having a platform at its upper end from which a pouring spout extends. The neck is offset toward one side wall and a handle extends from the upper end of the neck to the opposite side wall of the jug, the center line of the pouring spout and the neck preferably being located within a central plane which bisects the chamber vertically. The neck includes downwardly and outwardly sloping wall means which rigidify the upper part of the jug.

This application is a continuation-in-part of patent application Ser. No. 390,799, filed Aug. 20, 1964 and entitled "Container Structure," which application has been abandoned.

This invention relates in general to a container construction and, more particularly, to a unitary, thin-walled plastic container having a combined neck, handle and pouring spout arrangement on the upper end thereof which imparts specific advantages to the container.

It has long been recognized that existing containers for certain liquids, such as beverages, have not been completely satisfactory. For example, glass bottles and coated paper cartons have been used for many years to distribute milk and similar dairy products to the consumer. However, glass bottles are susceptible to breakage and coated paper cartons tend to leak. Attempts have been made to provide plastic containers which would avoid these principal objections to glass and coated paper containers. However, plastic containers having the rigidity advantageous in a glass bottle have been too expensive, and thin-walled plastic containers, which are economically feasible, have lacked the desirable, if not necessary, strength and rigidity for adaptation to existing filling, capping and similar machines.

Specific reference is frequently made herein to the use of the container or bottle of the invention in the field of dairy products because the invention was conceived as the result of particular problems encountered in this field. However, it will be recognized that other uses of the invention will be readily found.

It is also well known that a substantial amount of troublesome foam is created when certain types of beverages, such as milk, are poured into containers by a filling machine. In some instances, the foam seriously impedes the filling operation and may even cause a short measure. In some instances, part of the foam is recovered by costly equipment. In other cases, some amount of the liquid is lost by the foaming. In large filling operations, a small loss in each bottle amounts to a large loss in the long run. Moreover, it is difficult to determine accurately how much loss will occur in each container due to the overflow of foam. That is, differences in the characteristics of different batches of the same liquid may have different foaming characteristics which may also be affected by atmospheric conditions. Thus, the bottles are often overfilled in order to insure a certain minimum amount of

liquid in each container. This also increases the cost of the filling operation.

While coated paper cartons, for example, provide a large additional capacity at the upper ends thereof to minimize losses due to foaming, they also lack sufficient rigidity to make them adaptable for certain types of highly desirable filling machines. Reference is made to the type of filling machine in which the filling operation is responsive to engagement of the filling spout with a rigid part of the container adjacent its upper end. Accordingly, the plastic coated paperboard containers produce other types of filling problems which also result in overfilling to avoid short measure.

Glass bottles, which have been traditionally used for milk, provide the rigidity desired for certain types of convenient filling machines. However, due to the thickness of the material which must be provided in order to minimize losses due to breakage, and due to the relatively high cost of making such bottles, by comparison with other similar containers, it has been found inadvisable to provide large-sized necks on glass bottles, in order to provide the additional space at the top thereof to minimize losses due to foaming. Furthermore, glass, especially of the thickness required in milk bottles, is relatively heavy when compared to other container materials so that any additional weight in the bottle must be avoided for obvious reasons of inconvenience in use, additional cost of shipping, difficulty of handling and the like. Thus, the problem of the losses due to the foaming and other incidental problems have not been capable of solution economically at least by use of or redesign of glass milk bottles.

In addition to the foregoing, it has always been difficult to pour liquid from a full container, particularly of the half-gallon and gallon capacity, due to the low pressure condition often created in the bottle, particularly if it has a small spout. That is, the liquid tends to pulsate and splash as it is discharged from the bottle. Attempts have been made to solve this problem, as by use of a secondary air passageway from the interior of the container to atmosphere. However, such structure has usually increased the cost and complicated the use of the container.

While paperboard cartons are clearly disposable, glass bottles of the type used for milk, for example, are generally returned. Moreover, even glass bottles which are alleged by their producers to be disposable create further problems when such disposal is effected. That is, they quickly fill up garbage containers and, if broken, to minimize space requirements, cause hazardous conditions due to the sharp pieces of broken glass. Plastic bottles can be crushed, burned or otherwise easily disposed of, and they can also be easily cleaned and reused, particularly in the domestic household, which gives them a very distinct advantage over paperboard cartons.

It is well known that dairy plants using glass bottles must have a considerable amount of storage space for the stock of bottles plus a complete cleaning operation. Moreover, particularly in larger cities, the dairies must arrange for a clearance center which arranges for the return of their bottles and adds to the expense of the operation.

Numerous plastic bottles have been made by blow-molding processes for the purpose of carrying milk and the like. However, the pouring spout has generally been located in the center of the bottle top to simplify molding without sacrificing rigidity. However, the central location of the pouring spout virtually prevents the provision of a convenient and comfortable handle on the top of the gallon and half-gallon bottles. Any other location of the handle may increase the space requirements thereof and/or complicate the blow-molding operation.

Previous milk containers have usually presented difficulties in connection with the resealing of the container after a part of its contents has been used. Airtight resealing of paperboard cartons after partial use of their contents is virtually impossible. Resealing of the tops of most glass milk bottles is possible but difficult and inconvenient. As a rule, removal of the original milk cap furnished with a glass bottle damages its seal so that it is not tight upon reapplication to the bottle.

However, by using a blow-molded plastic bottle, it is possible to provide a lip construction on the bottle which permits the mounting thereon of a cap which can be repeatedly used without damaging in any way the sealing characteristics thereof, even though such use is somewhat abusive.

No mention has been made in the foregoing discussion about metal as a material for milk containers simply because, for a variety of well-established reasons, metal has not been found to be a suitable material for containers of fresh milk or the like.

Accordingly, a primary object of this invention has been the provision of a thin-walled, unitary, disposable and plastic container which is sufficiently rigid and sturdy in construction to be filled, capped and otherwise handled on existing filling machines, and which is light in weight and convenient to handle when it is formed in relatively large sizes.

A further object of this invention has been the provision of a container construction, as aforesaid, which requires a minimum of room for storage and shipment, which will fit into existing crates for such shipment, which can be packed conveniently and safely when either empty or filled, which can be adapted for either a snap-top or screw-top type of cap or lid, and which can be manufactured by blow-molding processes.

A further object of this invention has been the provision of a container, as aforesaid, having a combined neck, spout and handle construction which imparts rigidity to the combination thereof and to the associated portions of the container defining the upper end of the main liquid-holding chamber.

A further object of this invention has been the provision of a container construction, as aforesaid, having a neck and pouring spout arrangement which minimizes the adverse effects resulting from foaming and which minimizes the splashing and pulsating which usually occur when liquid is poured from a container having a relatively small pouring spout.

Other objects and purposes of this invention will become apparent to persons familiar with this type of equipment upon reading the following specification and examining the accompanying drawings in which:

FIGURE 1 is a perspective view of a plastic bottle or jug embodying the invention.

FIGURE 2 is a top view of said bottle.

FIGURE 3 is a sectional view taken along the line III—III in FIGURE 2.

FIGURE 4 is a sectional view taken along the line IV—IV in FIGURE 2.

FIGURE 5 is a sectional view taken along the line V—V in FIGURE 2.

FIGURE 6 is a sectional view taken along the line VI—VI in FIGURE 5.

FIGURE 7 is a sectional view similar to that shown in FIGURE 5 and showing an alternate type of cap and neck construction.

FIGURE 8 is a perspective view of a modified plastic bottle embodying the invention.

FIGURE 9 is a rear elevational view of the modified bottle shown in FIGURE 8.

FIGURE 10 is a top view of said modified bottle.

FIGURE 11 is a side elevational view of said modified bottle with the cap separated from the remainder of the bottle.

For convenience in description, the terms "upper," "lower," "front," "rear" and words of similar import will apply to said bottle as appearing in FIGURE 1, the front side being closest to the pouring spout. The terms "inner," "outer" and derivatives thereof will have reference to the geometric center of said bottle and parts thereof.

General construction

The objects and purposes of the invention, including those set forth above, have been met by providing in a thin-walled, disposable and plastic bottle or jug, which may be fabricated by a blow-molding process, an improved handle, neck and pouring spout arrangement at the upper end thereof. The liquid-holding, lower portion of the bottle may be substantially rectangular in shape to minimize space requirements when shipping a plurality of the bottles.

The spout, handle and neck of the bottle are especially arranged so that they create the necessary rigidity found in a glass bottle while providing the excess capacity, pouring facility, low cost and minimum weight of a plastic coated paperboard carton. Thus, said plastic bottle is capable of minimizing the problems of pouring and foaming, and it can be filled and capped on machines designed for glass bottles. The pouring spout is off-center to facilitate pouring and the neck thereof extends rearwardly to minimize the vacuum problem during a pouring operation.

Detailed description

The container **10** (FIGURES 1 and 2), which has been selected to illustrate one preferred embodiment of the invention, may be fabricated from a plastic material by a blow-molding operation following existing procedures for performing such an operation. Preferably, the material is polyethylene, which is heated to a semifluid condition and then caused to pass through an extrusion die which forms a sleevelike parison of the plastic material in a moldable state. The parison is, in this particular instance, moved by gravity downwardly between a pair of mold halves which are supported for reciprocation toward and away from each other for the purpose of forming the external limits of the bottle during the blowing operation. A suitable gas, such as air, is injected into the softened parison to cause it to conform to the shape of the mold.

Applicant's invention resides primarily in the combined neck, handle and spout structure of the container **10** formed by the aforesaid blow-molding process. Said container **10** (FIGURES 1 and 3) has four side walls **11**, **12**, **13** and **14**, the side walls **11** and **13** being hereinafter referred to as the front and rear walls, respectively. The container **10** (FIGURE 2) also has a top wall **16** and bottom wall **17**, which cooperate with the four side walls to define a substantially rectangular chamber **18** of a predetermined size in which the beverage, such as milk, is held. The edges and corners between the various walls are preferably rounded for ease of manufacture and use, and all six of said walls of said container are integral and relatively thin.

The container **10** has an integral pouring spout **21** which is connected to a neck **22** and has a mouth portion or rim **23** defining a discharge opening **24**. All portions of the container **10** described thus far preferably have wall thicknesses of approximately $\frac{1}{32}$ of an inch or less with minor possible exceptions occurring in corners or along the parting line of the mold, for example. A container constructed in this fashion from polyethylene can be sufficiently rigid to be self supporting, even when filled with a relatively heavy liquid, can have a sufficient burst strength for the type of use to which it will be subjected and can be capable of withstanding relatively rough treatment which could shatter a glass container or render useless a conventional paperboard container for the same purpose.

The neck **22** is irregularly shaped and converges upwardly toward the flange portion **27**. The neck **22** includes a relatively thin and wide rear portion **29** which is substantially parallel with, and spaced rearwardly from, the front wall **11**. Said rear portion **29**, which is comprised of sloping side walls **32** and **33**, a rear wall **34** and a two-part front wall **35**, which merges into the remainder of the neck **22**, defines a space which communicates with the upper end of the chamber **18** (FIGURE 3). The rear portion **29** materially increases the rigidity of the neck **22**, hence the spout **21**, as well as the adjacent parts of the top wall **16** and side walls **12** and **14**.

The flanged portion **27** may be an enlargement of the neck **22** and it includes the upper and lower flanges **36** and **37**, respectively, which blend smoothly and respectively into the spout **21** and neck **22**, and into the rear and front walls **34** and **35**, respectively, of the rear portion **29**. The flanged portion **27** rigidifies the spout **21** and provides a supporting surface or platform to which the front end of the solid handle **38** is anchored. The rear wall is located so that it supports the handle **38** and minimizes pulsating during the pouring operation.

The rearward end of said handle **38** is secured to and is integral with the top wall **16** adjacent the center of the upper edge of the rear wall **13**. In a preferred embodiment, the front end of the handle **38** is closer to a plane defined by the front wall **11** than to a plane defined by the rear wall **13** in a gallon container. This arrangement provides ample room within the finger opening **39** defined by the handle **38**, the top wall **16** and the rear wall **34** of the spout lower portion **26**.

The spout **21** is preferably cylindrical and coaxial with the upper end of the neck **22**. The rim **23** has an outwardly projecting lower flange integral with the spout **21**, an upwardly projecting annular wall **43** and an annular top flange **44**, the inside edge of which defines the discharge opening **24**. The diameter of said opening **24** is preferably slightly less than the diameter of the substantially cylindrical portion **46** of the cap **47** (FIGURE 5) which is inserted into the discharge opening **24** when the cap **47** is mounted upon the rim **23** in an otherwise substantially conventional manner. The indentations **48** are formed in the annular side wall **43** both to rigidify the rim **23** and to oppose rotation of the cap **47** with respect to the rim **23** around the central axis thereof.

The upper edge of the handle **38** is preferably closely adjacent the plane defined by the rim top flange **44** to facilitate stacking of the containers **10** when they are either filled or empty. The rigidity produced in the spout **21** by its particular, above-described structure, permits the filling of this type of bottle and, thereafter, capping of the spout **21** by a conventional cap **47** on substantially any type of filling machine presently in use.

Clearly, the spout and neck construction of the invention permits capping of the spout without collapsing the bottle or neck **22** thereof. Also, the downwardly diverging neck **22** provides additional foam capacity when the container is filled by the average filling machine on the market which tends to produce a substantial amount of foam during the filling of a gallon container, in particular. Also, the enlarged, downwardly diverging rear portion **29** of the neck **26** tends to minimize the portion of the chamber **18** within which a vacuum can develop when the contents thereof are being poured therefrom.

Where the cap **47** is also fabricated from a reasonably can be repeatedly inserted into and removed from the lightweight and durable material, such as polyethylene, it can be repeatedly inserted into and removed from the mouth portion **23** of the spout **21** without damaging the seal therebetween.

The container **10** can be filled on existing filling machines and can be shipped or stored in zones previously occupied by other types of containers.

The source of air under pressure utilized to perform the blow-molding operation may be directed into the upper end of the spout **21** by a mold cavity indicated by broken lines at **49** in FIGURE 3.

Modified structure

FIGURE 7 illustrates a modified container **55** having an alternate neck **56** and alternate handle **57** which are arranged on the top wall **58** in a manner similar to that described and disclosed above with respect to the corresponding parts of the container **10**. More specifically, the alternate neck **56** may be and preferably is substantially identical with the neck **22**. However, the spout **59** is provided with an integral screw thread **61** in place of a mouth portion **23**. A screw cap **62** is provided for engagement with the screw thread **61** to close the container **55**.

The alternate handle **57** is hollow and defines a passageway **63** which communicates at its rearward end with the liquid chamber **64** of the container **55** and at its frontward end with the interior of the neck **56** adjacent the lower end of the spout **59**. Accordingly, when the contents of the container **55** are poured from the spout **59**, air can move into the upper neck **56** above the pouring liquid and thence through the passageway **63** into the chamber **64** to break any vacuum which may develop therein during the pouring operation, particularly when the container **55** is substantially completely filled with liquid.

As shown in FIGURE 7, the grip **66** on the handle **57** and the rearward portion of the top wall **58** may slope downwardly and rearwardly to facilitate the pouring operation and minimize the possibility of forming a vacuum within the chamber **64**. However, the front end of the grip member **66** is preferably and approximately on the same level as the upper end of the spout **56** to facilitate the support of other similar containers thereon during storage or shipment. It will follow that the top wall **16** and handle **38** of the container **10** can be similarly sloped for similar purposes, if desired.

The modified jug **70**, illustrated in FIGURES 8 to 11, has a canted handle **71** substantially identical with that disclosed in FIGURE 7. However, the neck **72** of the jug **70** has upwardly converging side walls **73** and **74** which extend from near the opposite, side edges of the top wall **76** to a platform **77**, from which the spout **78** projects upwardly. The front wall **79** of the neck **72** curves rearwardly into the side walls **73** and **74**, and all three of these walls may be curved gently into the platform **77** to facilitate the fabrication and use of the jug. The upwardly converging side wall structure coupled with the platform **77** tends to rigidify the neck **72** in a manner similar to that achieved by the platform **30** and walls **34** and **35** on the flanged rear portion **29** of the neck **22** in the jug **10**.

The neck **72** also has a rear wall **82**, and the front end of the handle **71** extends integrally and upwardly out of said rear wall **82** and platform **77** at the junction thereof. The rear end of the handle **71** is integral with the rear edge of the top wall **76**. In this embodiment, as well as in the container **55**, the top wall **76** may be comprised of two substantially flat parts **80** and **81** which slope downwardly and sidewardly away from a central meeting line preferably beneath the handle **71**.

The spout **78** and its cap **83** may be and preferably are identical with the spout **21** and the cap **47** on the container **10**.

Although particular preferred embodiments of the invention have been described in detail above for illustrative purposes, it will be understood that variations or modifications of such disclosure, which come within the scope of the appended claims, are fully contemplated.

It will be seen from the foregoing that the containers **10** are compact and capable of stacking, one upon the other. Also, the spout is located so that the container can be emptied without turning same completely upside down. The chamber **25** (FIGURE 3) defined within the neck **22** will accommodate foam and upward surging of liquid if the container is dropped. The chamber **25** also provides a funnel into the spout **21**, and the rearward extension

of said neck minimizes the likelihood of pulsating flow due to the creation of a vacuum during pouring.

The canted handles **57** and **71** permit the centering of the load beneath the handle when the container is full despite the offset position of the handle. However, the neck **56** (FIGURE 7) serves to elevate the spout so that the mouth portion **23** is well above the liquid level in the container when it hangs from the handle **56**, which is supported in a horizontal position.

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

1. A thin-walled, blow-molded plastic container, comprising:

flexible side walls and a bottom wall defining a liquid-holding chamber having a substantially rectangular cross section in a plane parallel with said bottom wall;

a substantially flat top wall covering a substantial portion of said liquid-holding chamber;

a neck on said container extending upwardly from said top wall adjacent one side wall and defining a neck chamber communicating with said liquid-holding chamber;

a pouring spout projecting upwardly from said neck and defining a passageway communicating with the upper end of said neck chamber, said spout having cap-engaging means thereon;

upwardly converging wall means extending between the top wall and the neck near said spout for strengthening said neck; and

an upwardly projecting, substantially U-shaped handle means integral at one end thereof with said top wall remote from said one side wall approximately midway between the edges thereof and integral at its other end with said neck adjacent said spout.

2. A structure according to claim **1** wherein said handle means extends from near said one side wall to a point past the center line of said container.

3. A blow-molded plastic container comprising:

a bottom wall;

a continuous peripheral wall upstanding from said bottom wall and defining a liquid-holding chamber having a longitudinal center plane normal to said bottom wall and extending between opposed points on said peripheral wall;

a substantially flat top wall defining the upper end of said chamber;

a neck projecting above said top wall with the front of said neck adjacent to said peripheral wall and the center thereof substantially in said center plane, said neck defining a neck chamber communicating at its bottom with said liquid-holding chamber and having an upper flange, side walls and a rear wall, said upper flange defining the top of said neck and being substantially parallel to said bottom wall with longitudinal edges spaced inwardly from the adjacent edge of said top wall, said upper flange extending inwardly of said container along said center plane a distance less than one half the width of said container at said center plane, said side walls diverging downwardly transversely of the container from the longitudinal edges of said upper flange to adjacent the junction of said top wall and said peripheral wall, and said rear wall being disposed substantially in a plane normal to said center plane and extending upwardly from said top wall to the rear edges of said upper flange and said side walls and extending laterally substantially to the junction of said top wall and said peripheral wall;

a spout communicating with said neck chamber through said upper flange with the front of said spout substantially at the front of said upper flange and the rear of said spout spaced from the rear of said upper flange; and

a handle having a substantially straight gripping portion disposed in spaced and substantially parallel relation to said top wall with the longitudinal center thereof substantially in said longitudinal center plane, said handle being connected at one end of said gripping portion to said top wall adjacent to the junction of said top wall and peripheral wall and at the other end of said gripping portion to said neck adjacent to the junction of said upper flange and said rear wall of said neck, the upper edge of said handle lying substantially within a plane parallel to said top wall.

4. A blow-molded plastic container in accordance with claim **3**, in which said peripheral wall comprises four side walls including a front wall, a rear wall, and an opposed pair of intermediate walls, said walls being arranged to provide a substantially rectangular cross section in a plane parallel to said bottom wall, said longitudinal center plane extending between said front and rear walls and parallel to and midway between said side walls, the front of said neck being adjacent to said front wall, and said one end of said handle being connected to said top wall adjacent to said rear wall, said spout having cap-engaging means near the upper end thereof.

5. A blow-molded plastic container in accordance with claim **4**, in which the cross section of said liquid-holding chamber is substantially square.

6. A blow-molded plastic container according to claim **3**, wherein the upper flange is part of a flanged portion at the upper end of the neck having a lower flange which projects beyond the front and side walls of said neck, said lower flange defining a substantially downwardly facing surface which, along with said handle, can be engaged by mechanical lifting means.

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