This invention relates to plastic containers and consists more particularly in new and useful improvements in a light weight container adapted to hold liquids, powders and semi-solids, the present invention representing certain modifications in the container and composite package disclosed in my copending applications Serial Nos. 618,913, now Patent No. 2,950,029, dated Aug. 23, 1960, and 618,927, now Patent No. 2,954,901, dated Oct. 4, 1960, respectively, both filed October 29, 1956.

An object of the invention is to provide a container which is light in weight and comparatively inexpensive to manufacture, being of a design to require a minimum of space for storage.

Another object of the invention is to provide a container which is collapsible when empty, in such a manner as to provide a desired draft for nesting of a plurality of containers for shipping purposes.

A further object of the invention is to provide a container having a shape which provides the greatest volume for the minimum space area of any shape, and having symmetry about a line which is used for collapsing which is important for optimum space saving features.

Still another object of the invention is to provide a container which can be used for any product requiring protection from contamination, spillage, corrosive action or moisture and incorporating a built-in, funnel-shaped, projectible and retractable pouring spout, adapted for use with various types of closures.

A still further object of the invention is to provide a container of this type having a pouring spout which may be completely retracted within the confines of the container to form a concealing funnel neck and is projectible from the container wall conversely to form a pouring spout.

An additional object of the invention is to provide a plastic container which is "formed" to shape and having ample radii at all corners to stiffen them against flexing, the container being usable by itself adapted to be used as an insert in an outer carton of paper or other materials, thus serving as a composite package.

A still further object of the invention is to provide a plastic container of the character above referred to including closure means adapted to coact with the reversible fillings and pouring spout to cause the retraction and projection of the latter.

With the above and other objects in view which will appear as the description proceeds, the invention consists in the novel features herein set forth, illustrated in the accompanying drawings and more particularly pointed out in the appended claims.

Referring to the drawings in which numerals of like character designate similar parts throughout the several views:

FIG. 1 is a view in side elevation showing one embodiment of the present invention, with the filling and pouring spout in retracted position;
FIG. 2 is a top plan view of the same;
FIG. 3 is an enlarged fragmentary detail partially in section, showing one form of spout closure, combined with a pouring spout extension;
FIG. 4 is a similar view of a modified closure in the form of a plug; FIG. 5 shows a further modified closure adapted for use with a dispensing tube or hose;
FIG. 6 is a transverse sectional view taken on line 6--6 of FIG. 3;
FIG. 7 is a vertical sectional view taken on line 7--7 of FIG. 4;
FIG. 8 is a similar view taken on line 8--8 of FIG. 5;
FIG. 9 is a plan view of a pull-out tab which may be employed in connection with any of the closures above referred to;
FIG. 10 is a side elevational view of the pull-out tab shown in FIG. 9;
FIG. 11 is a modified form of filling and pouring spout;
FIG. 12 is a side elevational view of the container of the present invention with the pouring spout projected and the spout extension in pouring position;
FIG. 13 is a similar view with the pouring spout projected for direct pouring;
FIG. 14 is a perspective view showing the container enclosed in an outer carton and forming therewith a composite shipping package;
FIG. 15 is an enlarged fragmentary detail partially in section, showing the preferred form of spout closure and pouring spout extensions, in retracted position;
FIG. 16 is a similar view showing the pouring spout extension projected in pouring position;
FIG. 17 is a fragmentary view showing the preferred form of closure for use with a dispensing tube or hose, and
FIG. 18 is a fragmentary sectional view of the preferred form of closure plug.

In the embodiment of the invention shown in FIG. 1, the container generally designated 20 is formed of two symmetrical halves 22 and 24 which are sealed together by heat sealing along a seal line 26. It will be noted that the container is substantially in the shape of a cube which has been found to be the shape which provides the greatest volume for the minimum surface area of any rectangular shape. However, an exact cube is not absolutely essential, although the symmetry about the line which is used for collapsing, as will be pointed out hereinafter, is important for optimum space saving.

The container is preferably formed of a flexible thermoplastic material such as, for example only, polyethylene which as is known has an unusual combination of properties including freedom from taste, odor, toxicity; flexibility at extremely low temperatures; low moisture-vapor transmission; and resistance to chemicals, solvents and greases. Manifestly, thermoplastic materials such as vinyls, acetates and styrenes, as well as others can be utilized. Additionally, if desired, a rigid plastic can be used which will still maintain the advantage of light weight.

As is known, polyethylene and many other semi-rigid thermoplastics are susceptible of stress fatigue when flexed or vibrated. Ample radii are used at all corners such as indicated at 28 to stiffen the corners against flexing. Due to the semi-rigid nature of the material contemplated and the method of forming, the container may be said to be "formed" to shape as is a bottle in contrast to a bag which is normally constructed of a very thin material, and which wrinkles or is folded into the shape of an outer carton when used, thereby leaving many points where stress fatigue due to flexing can occur. In relatively close proximity to one edge of container half 22, I provide a flexible, built-in filling and pouring spout or mouth 30, shown in dotted lines in retracted position in FIG. 1 and more in detail in FIG. 3. This spout 30 is formed integral with the plastic container half 22 and in this particular form of the invention, it comprises a substantially frusto-conical web terminating in a neck.
portion 32 which is cylindrical in form and adapted to reverse itself when projected to pouring position as shown in FIGS. 12 and 13, as will later appear. The lines of closures, plugs, and spout extensions may be employed in connection with this invention. For example, the device shown in FIG. 3 comprises a tubular member 34 of a diameter slightly greater than that of the neck 32, and adapted to fit snugly within the neck, terminating at its lower end in a radial flange 36 adapted to embrace the free edge of the neck 32. The opposite end of the tubular member 34 is preferably threaded to accommodate the complementary threads on a closure cap 38 which, when in place on the tubular member 34 and the web 30 is retracted in the container, lies within the confines of the container 29. In order to prevent rotation of the tubular member 34 with respect to the neck 32, when the closure cap 38 is being screwed on or off, the outer periphery of the tubular member may be provided with a series of annularly spaced vertical ribs 40 adapted to grip the inner surface of the flexible neck 32 when the tubular member is inserted therein.

In order to facilitate the projection of the retracted web and neck, a pull-out tab such as that illustrated in FIGS. 9 and 10 and generally indicated by the numeral 42, may be employed. This consists of a ring 44 of plastic or other suitable material and of a diameter to be slipped over the threaded end of the tubular member 34 and retained in place thereon by the closure cap 38 when the latter is screwed in place. A semi-circular rim 46 is integrally attached to the ring 44 at both ends but separated from the ring by an arcuate slot 48, whereby the rim 46 may be grasped between the fingers and thumb to exert a forward pulling force on the tubular member and, in turn, on the neck 33 and web 30.

In the use of this container, the filling operation is accomplished with the tubular member 34 and closure 38 removed from the neck 32 and the neck and web 30 retracted in a funnel-like position in the container half 22. Thus, the web and neck serve as a funnel when pouring liquid or powder into the container. After being filled, the tubular member 34 is forced into the neck 32 until its flange 36 has passed entirely through the neck and embraces the free edge thereof, after which the closure cap 38 is screwed onto the tubular member 34 with the pull-out tab 42 in place. The container then presents the appearance shown in FIGS. 1, 2 and with the closure 38 lying entirely within the confines of the container.

When it is desired to dispense the content of the container, the gripping rim 46 of the pull-out tab is grasped between the fingers and thumb and pulled outwardly. The outward force on the tubular member 34 causes the flange 36 to engage the free edge of the neck 32 which folds or rolls inwardly, reversing itself as the web 30 is being projected from the container wall to the position shown in FIG. 12 of the drawings. Here it will be seen that although the web 30 is fully projected, the rolled neck, doubled on itself, is still in engagement with the tubular member 34 which is in a position slightly extended from the end of the neck. The removal of the closure cap 38 then enables the dispensing or pouring of the content of the container 20 through the tubular member 34 which acts as an extension of the neck.

It may be noted that the tubular member 34, while shown in the drawings as substantially of the same length as the neck 32, may be formed considerably longer than the neck so as to serve as an extendable pouring spout. In other words, the tubular member being longitudinally slidable in the neck, can be extended or retracted to provide a pouring spout of the desired length.

In some instances, it may be desirable to dispense with the neck portion 32, the spout just described in the web 39 and neck 32 per se, as the pouring spout. FIG. 13 of the drawings shows the spout projected in this manner and there it will be seen that the neck 32 has been fully projected and reversed to form the mouth of the pouring spout.

When the container is to be used in the fashion just described, a closure plug 59 such as shown in FIGS. 4 and 7, replaces the tubular member 34 and closure cap 38. This plug comprises a cylindrical body closed at its lower end by a radially flanged bottom 52 which engages below the neck 32 in a manner similar to the flange described in FIG. 3. In order to facilitate the removal of the plug 50, its upper end is peripherally recessed as at 54 to accommodate the thumb and fingers of the user.

An outward pull on the plug 50 projects the web 30 outwardly from the wall of the container half and engagement of the flanged bottom 52 with the neck 32 causes the latter to reverse itself so that it projects as a pouring spout as shown in FIG. 13. When it is desired to reclose the container, the neck 39 is reversed and with the web 30, is retracted into the body of the container, after which the plug 50 is inserted into the neck in the position shown in FIG. 4.

In this connection, it will be noted that the outer face of the flanged bottom 32 is of convex curvature to not only facilitate its insertion in the open end of the neck 32, but during that operation, to act in a self-sealing capacity to prevent the escape of air around the plug, as it is being inserted. In other words, without this convex seating surface of the bottom 52, a downward pressure on the flexible container during the insertion of the plug would permit the escape of air from the container through the neck and thus allow the upper portion of the container to collapse under this pressure. By preventing the escape of air during this operation, through the self-sealing action of the bottom 52, the collapse of the container is avoided.

Preferably, the upper end of the plug 50 is enlarged to provide a shoulder 56, spaced the required distance from the flanged bottom 52 to firmly engage the extremities of the neck 32 at both of these points, to thus maintain the plug 50 in its proper closing position.

Another form of dispensing closure is shown in FIGS. 5 and 8, comprising a cylindrical neck engaging portion 58 provided with a concavo-convex bottom 60, radially flanged as at 62 to engage beneath the neck 32 as previously explained, and flaring outwardly at its upper end as at 64 to provide a funnel-like portion which partially overides the web 30 of the filling and pouring spout.

The central portion of the concavo-convex bottom 66 is formed with an integral, upwardly extending nipple 66 closed at its upper end 68 which lies within the confines of the flared upper end 64 of the closure. The closed upper end 68 of the nipple 66 is adapted to be cut off on the dotted line 70, providing an integral hose-fitting to facilitate tube dispensing.

In the use of this form of closure, the web 30 and neck 32 are projected in the manner previously described in connection with the embodiment shown in FIG. 1. The closed end 68 of the nipple 66 is severed on the line 70 and a hose (not shown) is applied to the nipple. Thus, when the container is tilted to pouring position, its contents may be easily dispensed through the hose.

In all three of the embodiments shown in FIGS. 3-8 inclusive, it is to be noted that the neck 32 of the pouring spout is eccentrically positioned with respect to the web 30, so as to locate the pouring area as close to the front edge of the container as possible, for improved pouring characteristics. As shown in FIG. 2, this location is preferably at the middle of an edge rather than at a corner, for the reason just stated. In other words, by tilting the container to the proper degree, all of the contents thereof are directed into the projected web 30 and described in the neck 32, into the container and the positioning of the pouring spout.

A simpler form of the invention is shown in FIG. 11 which may be used in some instances where the use of
the enlarged web area is not considered essential. In this embodiment, the container wall 22 is simply provided with a projectible and retractible neck 72 which functions much in the same manner as those just described. The retracted position of 72 is shown in full lines in FIG. 11 and its projected position in dotted lines. Either of the closures previously described may be employed in connection with this form of the invention.

In the preferred form of closure and spout extension illustrated in FIGS. 13 and 14, the tubular member 34 is elongated and its outer periphery is provided centrally with a radially projecting, annular rib 83 which defines on the periphery of the tube, upper and lower neck receiving areas 84 and 85 respectively. The neck receiving area 84 is bounded at its upper end by an enlarged rim 86, while the neck receiving area 85 is bounded at its lower end by an enlarged rim 87, the lower edge of which is either rounded or beveled to facilitate its insertion in the neck 32 of the spout.

In this form of the invention, the periphery of the tubular member is not provided with the longitudinal radial gripping ribs such as shown in the FIG. 3 embodiment, but is provided with a diameter of a size just tightly within the neck 32 when forced therein. Thus, when the tubular member 34 is inserted in the neck 32, the lower rim 87, the lower neck engaging area 85 and the central rib 83 are forced entirely through the neck until the latter tightly embraces the upper neck receiving area 84 with its lower extremity in abutment with the central rib 83, as shown in FIG. 15. In this position, the web 30 is retracted and the upper rim 86 tightly engages web 30 at the opening of the neck and limits the downward movement of the tubular member 34.

When it is desired to project the pouring spout, the tubular member 34 is pulled outwardly and in the course of this outward movement, the central rib 83, acting against the lower exteriority of the neck 32, causes the latter to completely reverse itself in a rolling movement, leaving the upper neck receiving area 84 and tightly embracing the lower neck receiving area 85 as shown in FIG. 16. In this position, the lower rim 87 engages the interior of the web 30 immediately adjacent the neck 32, preventing the tubular member 34 from being withdrawn beyond its predetermined extent. As will be seen in FIG. 16, the projecting area 84 of the tubular member provides a pouring extension for the spout.

A system of upper and lower neck engaging areas 84 and 85 is preferred for use in connection with the tube-type dispensing closure as shown in FIG. 17. This closure is similar in all respects to that shown in FIG. 8 with the exception of the elongated tubular member provided with the central rib 83. The projection of the preferred form of FIG. 17 is similar to that described in connection with FIGS. 15, 16 and 17.

The preferred modification of closureplug shown in FIG. 18 is basically similar to that illustrated in FIG. 7, the only exception being that the closed end 52a is substantially semi-spherical in shape which has been found to be more readily insertable in the neck 32 and more effective in its self-sealing action to avoid collapse of the container while being inserted.

As in the case of my said copingend applications, containers formed in accordance with the present invention may be easily collapsed and nested for shipping purposes. Due to the use of semi-rigid plastic material, the body of the container can be flexed so that either of the body halves 22 or 24 is collapsed into the opposite half and a plurality of containers thus nested.

Where it is desired to use the present container as an insert in an outer carton such as 74, shown in FIG. 14, the container can be shaped to fit or conform with the contour of the outer carton without folds or creases and semi-rigid are used at all corners to stiffen them against flexing. The carton 74 is preferably provided with a pair of inner flaps 76, foldably connected to the carton walls opposite site edges and a complementary pair of outer flaps 78, arranged at right angles to the inner flaps and foldable therewith. The adjacent free edges of the inner flaps 76 are provided with registering, semi-circular cut-out portions 80 of a size to accommodate the web 30 and neck 32 of the pouring spout when the latter is projected, and in order to gain access to this pouring spout, the overlying outer flap 78 is provided with a perforated area 82 which registers with the cut-out portions 80 when the outer flap is folded into closed position.

Thus, the outer flaps may be adhered to the inner flaps by glue when the carton is closed to provide a more secure opening for heavier industrial products. As distinguished from the outer carton shown in my copending application Serial No. 618,927, in the present instance it is not necessary to extend the perforated area over the edge of the carton. As seen in FIG. 14, this area lies entirely in the top flap portion of the outer carton, thus avoiding a weakening of the corner area.

From the foregoing, it will be apparent that a container made in accordance with the present invention possesses numerous advantages over prior structures. The funnel shape of the filling and pouring spout provides easy filling, enabling the container to be filled from normal horizontal position similar to other conventional containers, employing existing filling equipment. When using the plug-type closure of FIGS. 4 and 18, the built-in funnel turns inside out, providing an efficient spout extension for complete and easy emptying of the contents.

With the use of the spout extension type closure shown in FIGS. 3 and 15, having the screw cap, the same integral funnel shape renders the container extremely versatile as to a selection of the type of closure and extension, in that it makes possible the use of an extensible spout of varying lengths.

It should also be noted that the present invention provides improved sealing characteristics achieved by the annular sealing contact surface between the spout neck and the plug or spout closure. The plug or spout being made slightly larger than the sealing area of the neck, assures a liquid tight seal through internal pressure at all times. The pressure of liquid against the outside of the neck 32, pressing against the tubular member 34, further assures this seal.

From the foregoing, it is believed that the invention may be readily understood by those skilled in the art, without further description, it being borne in mind that numerous changes may be made in the details disclosed, without departing from the spirit of the invention as set forth in the following claims.

I claim:

1. A plastic container for liquids, powders and semi-solids comprising a hollow container body having walls of self-sustaining rigidity, and a filling and pouring spout formed integrally with one wall and opening into the interior of said body, said spout being of semi-rigid flexible plastic material, retractable into and projectible from the interior of said body through said wall, and terminating at its outer extremity in an integral, extended, cylindrical, tubular...
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7. A container for liquids, powders and semi-solids comprising a hollow container body having walls of self-sustaining rigidity, and a substantially funnel-shaped filling and pouring spout formed integrally with one wall and opening into the interior of said body, said spout being of semi-rigid flexible plastic material, retractable into and projectable from the interior of said body through said one wall, and comprising a flaring web portion which terminates at its outer extremity in an integral tubular neck portion, the wall of said neck portion being initially directed downwardly in said container and rollably reversible upon itself, and a closure member having the same cross-sectional configuration as the neck portion with outer dimensions slightly greater than the inner dimensions of the neck portion, said closure member being forcibly insertable into said neck portion and having means removably engageable with the downwardly directed extremity of said neck portion for reversing the latter upon itself, whereby the withdrawal of said closure member is adapted to project said spout.

4. A container as claimed in claim 3, wherein said closure comprises a closed, cylindrical body insertable in said neck portion, and a radial flange at the lower end of said body, engageable under the adjacent edge of said neck portion.

5. A container as claimed in claim 3, wherein said closure comprises a tubular body insertable in said neck portion, a radial flange on said body, engageable under the edge of said neck portion, and a closure cap for said tubular body.

6. A container as claimed in claim 3, wherein said closure comprises a cylindrical body insertable in said neck portion, a radial flange on said body, engageable under the edge of said neck portion, and means adjacent the upper end of said body to facilitate the projection of said body with said spout.

7. A container as claimed in claim 3, wherein said closure comprises a tubular body insertable in said neck portion, a radial flange at the lower end of said body, engageable under the adjacent edge of said neck portion, a closure cap for the opposite end of said body, and gripping means on the periphery of said body, engageable within said neck portion to prevent rotation of said body.

8. A container as claimed in claim 3, wherein said closure comprises a cup-shaped body open at its upper end and insertable in said neck portion, the bottom of said body terminating centrally in an upstanding nipple for receiving a dispensing tube, means normally closing the end of said nipple, and a radial flange on said body, engageable under the edge of said neck portion.

9. A container as claimed in claim 3, wherein said closure comprises a cylindrical body insertable in said neck portion, and a radial enlargement at the lower end of said body, the lower surface of which is convex to form a self-sealing face during insertion in said neck portion.

10. In a container, a substantially funnel-shaped filling and pouring spout formed integrally with one wall thereof, said spout being of semi-rigid flexible material, retractable and projectable through said wall, and having a cylindrical, tubular neck portion which is rollably reversible upon itself, a cylindrical closure tube of slightly greater diameter than the inner diameter of the neck portion, insertable in said neck portion with a forced fit and of a length substantially greater than that of said neck portion, an annular peripheral rib intermediate the ends of said tube, defining thereon alternate neck engaging areas, said rib serving as an abutment for the free edge of said neck portion, upon the projection or retraction of said tube, to reverse said neck portion and simultaneously shift it from one neck receiving area to the other.

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