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3,219,240

SHIPPING AND DISPENSING CONTAINER FOR LIQUIDS

Original Filed Sept. 22, 1960

3 Sheets-Sheet 1

FIG. 1

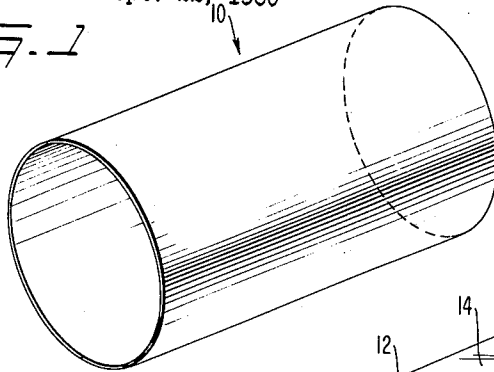
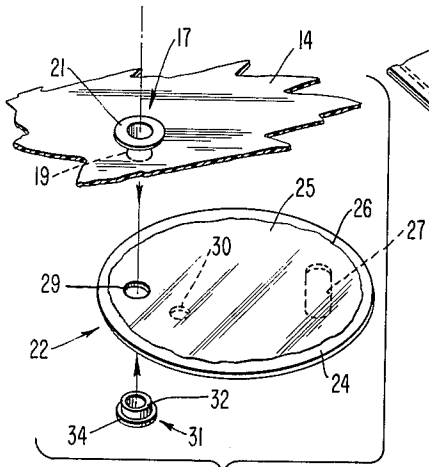


FIG. 3

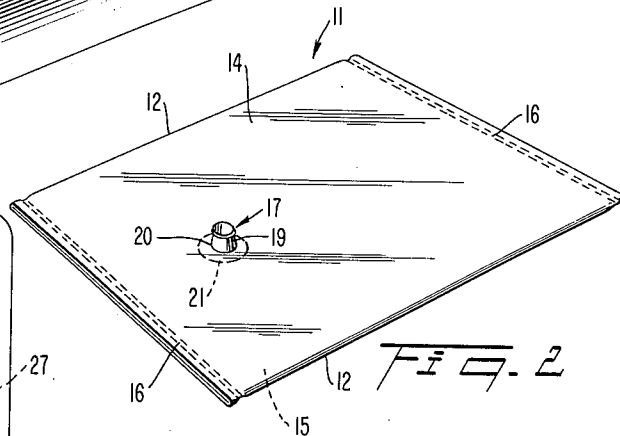


FIG. 2

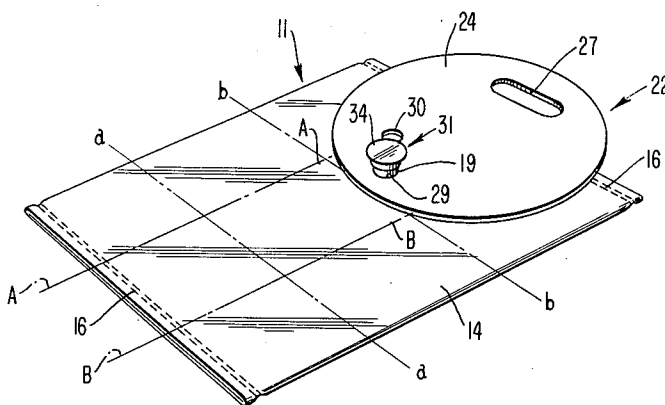


FIG. 4

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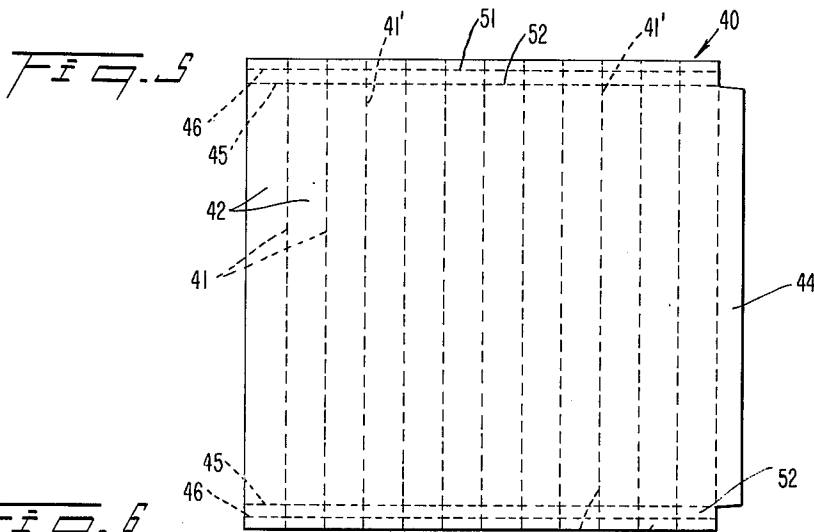
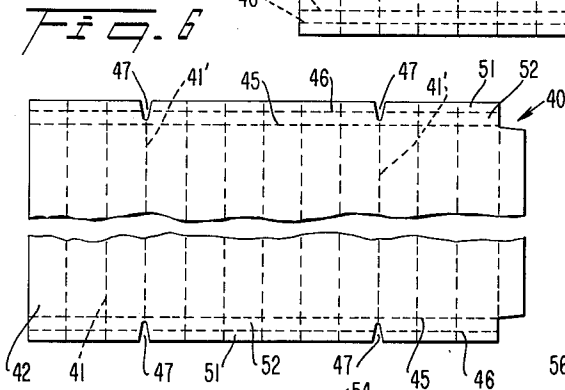
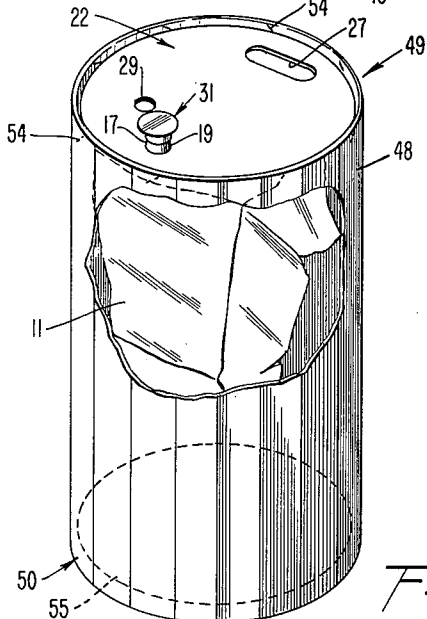
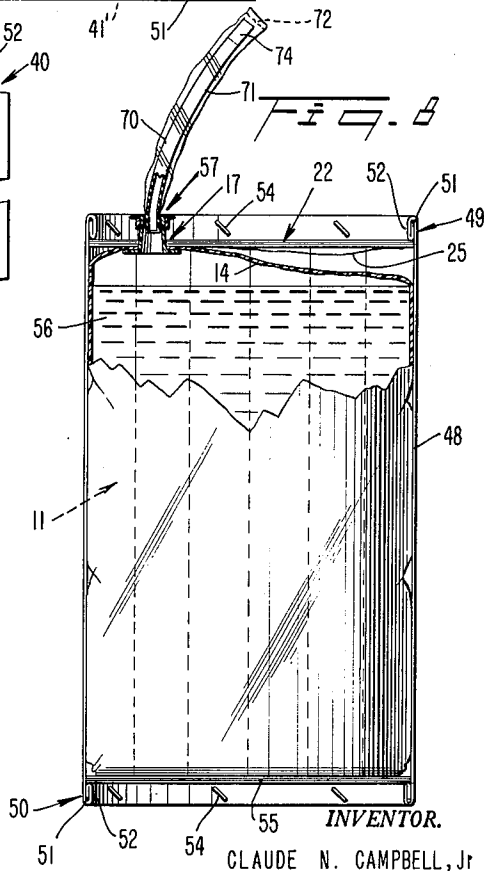
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3 Sheets-Sheet 2



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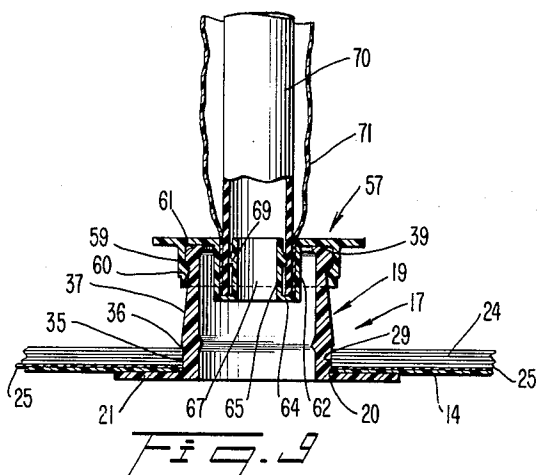
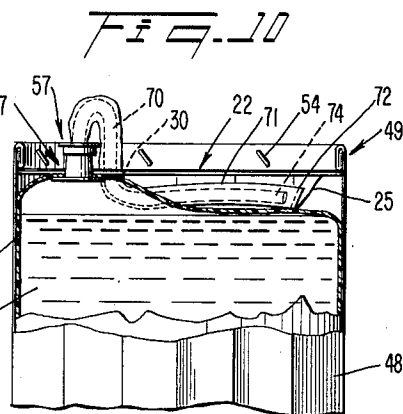
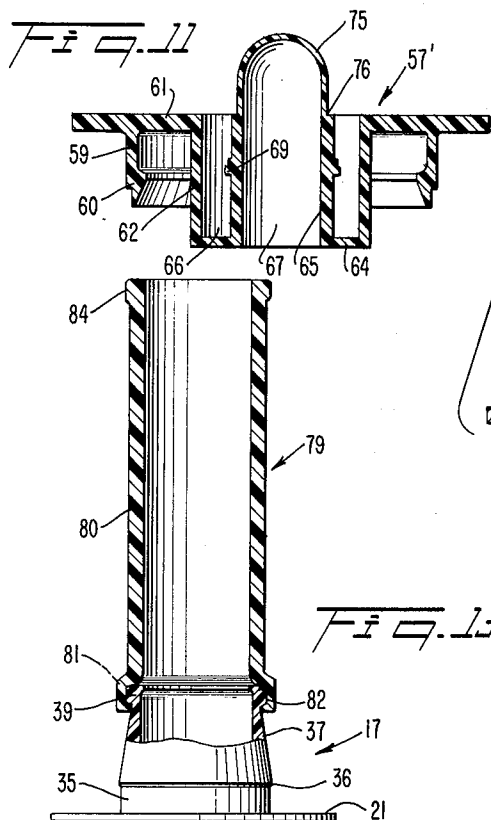
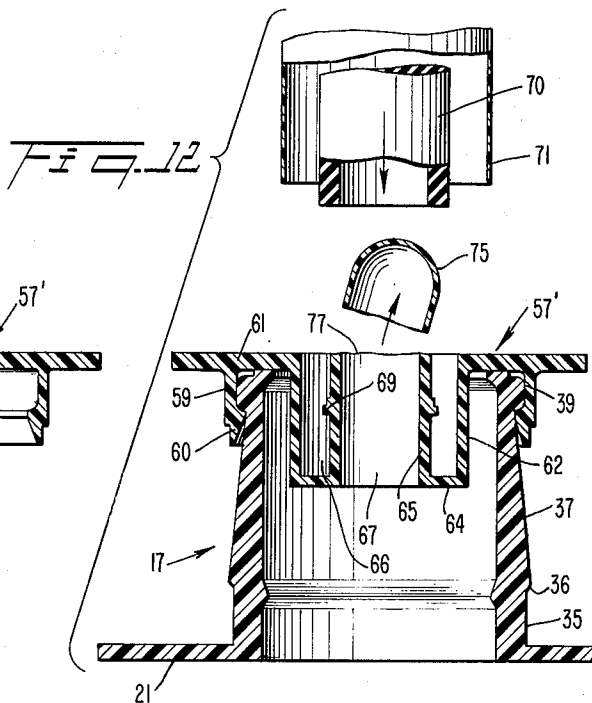
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SHIPPING AND DISPENSING CONTAINER FOR LIQUIDS

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3 Sheets-Sheet 3



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SHIPPING AND DISPENSING CONTAINER FOR LIQUIDS

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Continuation of application Ser. No. 57,696, Sept. 22,
1960. This application Dec. 14, 1962, Ser. No. 245,367
28 Claims. (Cl. 222—183)

This application is a continuation of my copending application Serial No. 57,696, filed September 22, 1960, and now abandoned, and a continuation-in-part of my copending application Serial No. 57,697, filed September 22, 1960, and now abandoned.

This invention relates to a bulk container adapted to serve as a shipping package and as a dispensing unit for the material contained therein. The container of the invention is particularly adapted for use with freely fluent materials such as liquid and free flowing slurries, and its construction is such as to make it advantageous when made as a disposable container.

Containers presently in use in the shipping and dispensing of liquids, slurries, and the like are usually made of metal. Such containers are generally heavy and expensive to make. Because of such expense, it is quite common in the milk and ice cream industries, for example, to use refillable containers which are shipped back empty to the supplier. Such practice adds to the expense involved, because of the necessary return of the containers to the supplier and the reconditioning and sterilizing of them before reuse. Further, reusable metal containers now available for this purpose usually are of such construction as to require time-consuming sterilization of the surfaces thereof with which the material comes into contact. The sterilization operation is further aggravated by the fact that the elapsed time between use and return of the container to the dairy may be sufficient to cause spoilage and solidification of the residue which introduces difficulties in cleaning and creates a sanitation problem.

The container of the present invention, in preferred embodiments thereof, is disposable, that is, it need not be returned to the supplier and can readily be destroyed. In such preferred embodiments, the container has an outer strength-providing protective case formed of paperboard, and an inner fluid-tight flexible plastic liner which is retained and supported by the walls of the container when the liner is filled or at least partially filled with freely fluent material. The case is of such form and shape that it may be conveniently shipped in flat form and may readily be erected at the location where the container is to be filled. The liner is also preferably shipped in preformed condition, ready for insertion within the main body of the case. The opening or openings into the liner, through which the liner is filled and from which the material is dispensed, are provided by a fitting sealed to the liner. The opening or openings through such fitting are preferably pre-sterilized and sealed from the atmosphere so that no separate sterilizing step or steps need be performed on such parts at the filling station. The container of the invention lends itself readily to being assembled, filled, and emptied in a variety of different manners in each of which, as required, the filling and dispensing openings and fittings may be readily maintained in sterile condition.

The invention has among its objects the provision of a novel bulk container which is characterized by the ease with which it is erected, filled, shipped, and the ease with which the contents of the container are dispensed therefrom.

Another object of the invention is the provision of a

novel bulk container of economical construction which may readily be destroyed after one use.

A further object of the invention lies in the provision of a novel, outer protective and strength-providing case for the bulk container of the invention.

Still another object of the invention lies in the provision of an improved wide-mouthed fitting for incorporation in the flexible liner of the container, such fitting providing a filling and dispensing orifice therethrough. Another object lies in the provision of further fittings for cooperation with the wide-mouthed fitting, such further fitting serving to seal the outer end of the wide-mouthed fitting and/or to provide for the dispensing of the contents of the container therethrough.

Another object of the invention lies in the provision of a container of the type described for fluid and fluid-like materials, such container incorporating a novel combination of outer, protective and strength-providing case and inner fluid-containing liner therewithin.

Yet another object of the invention lies in the provision of an improved flexible liner of such construction as to expand readily without the formation of undue localized stresses or unwanted creases and folds therein.

A still further object of the invention lies in the provision of an improved bulk container for liquid or liquid-like materials which requires no provision for the displacement of air within the container as the container is being filled, or for the ingress of air thereinto as the container is being emptied.

Another object of the invention lies in the provision of a novel method of assembling and filling a bulk container of the type described.

The above and further objects and novel features of the invention will more fully appear from the following description when the same is read in connection with the accompanying drawings. It is to be expressly understood, however, that the drawings are for the purpose of illustration only, and are not intended as a definition of the limits of the invention.

In the drawings, wherein like reference characters refer to like parts throughout the several views,

FIG. 1 is a view in perspective of a blank from which a flexible inner liner of the container in accordance with the invention is to be made;

FIG. 2 is a view in perspective of a sealed liner made from the blank of FIG. 1;

FIG. 3 is a fragmentary exploded view in perspective illustrating the manner of assembly of a filling and dispensing fitting on the liner blank and the fitting to a member which is to serve as the outer end closure member of the outer, protective case of the container;

FIG. 4 is a view in perspective showing a completely assembled liner, an end closure member for a case, and a filling and dispensing fitting for a container, the fitting being provided with a protective cap;

FIG. 5 is a view in plan of a first embodiment of paperboard blank for forming the body of a protective case for a container made in accordance with the invention;

FIG. 6 is a view in plan of a second embodiment of paperboard blank for forming the body of a protective case for a container made in accordance with the invention, a central portion of the blank being omitted for economy of space in illustration;

FIG. 7 is a view in perspective of the fully assembled inner and outer container parts of a first embodiment of container in accordance with the invention, the parts of the container being shown prior to the filling of the container with fluid material, a portion of the sidewall of the outer container part or case being broken away to show the configuration of the unfilled liner therewithin;

FIG. 8 is a view partially in side elevation and partially in vertical axial section through a container such as shown in FIG. 7 after it has been substantially filled with liquid, the container being shown provided with a sheathed dispensing tube which was applied to the container after the latter had been filled;

FIG. 9 is a fragmentary enlarged view in generally vertically axial section through the wide-mouthed fitting of the container shown in FIG. 8, a portion of the dispensing tube being shown in elevation;

FIG. 10 is a fragmentary view partially in vertical section and partially in elevation of the filled container shown in FIG. 8, the sheathed dispensing tube being shown in an inner protected position which is preferred during the shipping of the container;

FIG. 11 is an enlarged view in axial section through an alternative outer fitting which may be employed as a sealing closure for the wide-mouthed fitting of the container;

FIG. 12 is a schematic exploded view in axial section showing the further fitting of FIG. 11 applied to the wide-mouthed fitting of the container, and further illustrating the removal of a sealing means on the further fitting for the inner passage therethrough, and the application of the dispensing tube and the sheath therefor to the further fitting; and

FIG. 13 is a view in axial section through the combination of the wide-mouthed fitting and a tubular extension sealed thereto for aiding either the filling of the container or the dispensing of material therefrom.

As above indicated, the container of the present invention is conveniently employed with liquids and semi-liquids which flow readily. Typical of such liquids is milk, and typical of such semi-liquids is ice cream premix, or slurry. It is to be understood, however, that the container of the invention may be used to advantage in the shipping of a wide variety of materials, including various acids, alkalies, and oils. It will be understood that the material of which the flexible liner forming the inner container part is made will be such as to be inert or substantially inert to the material to be contained therewithin. It will also be understood that, with respect to foodstuffs, the material of which the liner is made will be such as not appreciably to interact with or contaminate the foodstuffs. The container shown with the filling and dispensing means illustrated in FIGS. 7-13, inclusive, may be advantageously employed in the shipping of milk or in the shipping of a semi-liquid such as an ice cream slurry.

The container of the invention is shown in its assembled unfilled condition in FIG. 7 and in its filled condition in FIGS. 8 and 10. As there shown, the container includes an outer container part or case generally designated 48, which provides the necessary strength and rigidity of the container as a whole, and an inner, fluid-tight container part in the form of a flexible liner generally designated 11. In the described embodiments, the container is filled with a material such as a liquid 56 (FIGS. 8 and 10) through a wide-mouthed fitting 17 and is emptied through a further fitting which may be sealingly connected to the wide-mouthed fitting at the dispensing station.

The construction and manner of assembly of the liner 11 are shown more particularly in FIGS. 1-4, inclusive. In the illustrative embodiment, the liner is of single-walled construction, being made from an extruded tubular blank 10 shown in FIG. 1. Blank 10 may be made, for example, of a high density, high strength plastic material such as that sold under the trade name "Marlex" of the Phillips Petroleum Company. Such material, which is a blend of high density polyethylene with isobutyl rubber, has been used successfully for five-gallon containers in thicknesses of both 2 and 2.5 mils.

After having been cut to the requisite length, the blank 10 is folded longitudinally at edges 12 to form parallel upper and lower panels 14 and 15, respectively. A hole 20 is provided in one of the panels, here shown as panel

14 laterally centrally thereof and near one end of the liner. The wide-mouthed fitting 17, which has a stem 19 and a flange 21, is inserted in the lining as shown in FIG. 3 so that the flange 21 lies inwardly of the lining. The flange 21 is heat sealed to panel 14, following which the liner is sealed at its opposite ends as by heat sealing panels 14 and 15 together along lines 16. The liner is now ready for assembly with an end 22 for the outer case.

The end 22, which is in the form of a cylindrical disc, has a body 24 which is made of a strong stiff material such as paperboard or chipboard and may have a conventional vapor barrier formed on one or both surfaces to maintain dimensional stability. Body 24 has a substantially imperforate thin flexible protective plastic film member 25 heat bonded to its inner broad surface along the inner bonding line 26. Body 24 has an elongated hand hole 27 therethrough and a smaller round hole 30 therein, holes 27 and 30 being located beneath an imperforate portion of film member 25. Beyond hole 30 there is a further hole 29 which extends through both the body 24 and the protective film member 25.

The stem 19 of fitting 17 is provided with means whereby the stem mechanically locks in hole 29 when fitting 17 is thrust toward end member 22 as indicated by the vertical arrow in FIG. 3. The insertion of the stem 19 in hole 29 of body 24 may itself form the aligned opening in the protective web 25. The fitting 17 and the line 11, which have been prepared under sterile conditions, are protected from contamination by a protective cap 31 having a skirt 32 and an upper cover portion 34. Cap 31 is applied to stem 19 after the liner has been assembled with the end 22. The manner of interlocking of stem 19 with body 24 of the top will be subsequently described in detail in connection with FIG. 9. The interactions between the skirt and top member 32 and 34 of cap 31 and stem member 19 are the same as those of the corresponding parts of the further fitting 57, shown in FIG. 9, and the stem 19.

In FIG. 4 there is shown the final assembly of the liner 11, the wide-mouthed fitting 17, and the end 22 of the outer case. Before it is shipped the liner 11 is folded in such manner that it will fall freely downwardly within the outer case, remaining suspended by the fitting 17. One manner in which the liner may be folded to accomplish such result is shown. The longitudinal edges of the liner are folded inwardly upon the body thereof to form folds generally along lines A-A and B-B. Following this, the liner is first folded longitudinally about a transverse line a-a, and is then folded again about a second line b-b. Thus the liner will have been folded in thirds in both the longitudinal and transverse directions.

In the illustrative embodiment, the outer container part or case 48 (FIGS. 7, 8, and 10) is made of heavy paperboard, the main body of the case being formed of a single folded sheet of such material. In applications such as those for milk and ice cream slurry containers, the case is made of a paperboard laminated with either one or two moistureproof and vaporproof barriers to produce contraction and expansion stability and prevent the container from softening under high moisture conditions. The glue used for the side joint on the body of the case is a waterproof adhesive. In some instances the outer surface of the case may be waxed. Some or all of these waterproofing features may be omitted if the container is to be used for shipping liquids which do not require refrigeration or other exposure to excessive moisture.

In a preferred illustrative embodiment for use with a refrigerated product, so that sweating of the case normally occurs almost wholly on the outside thereof, it is necessary to waterproof only the outer surface of the case. For such use the blanks 40 (FIG. 5) and 40' (FIG. 6) may be made of 33/42 laminated paperboard having a layer of 33-pound paperboard on the outside and a layer

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of 42-pound paperboard on the inside, there being a layer of asphalt forming a moisture-vapor barrier between the two paperboard layers.

Blank 40 is shown as divided peripherally (horizontally in FIG. 5) into a number of similar vertically extending panels 42 by parallel vertical score lines 41 on the outside of the blank. The exact number of panels will depend in part on the diameter of the container and the gauge of paperboard used. It has been found as a practical matter that a panel width of from two to four inches is best if the panels are to remain undistorted and the finished container is to resemble a cylinder. The more nearly the periphery of the set-up blank approaches a cylinder the better from the standpoint of equalization of hydrostatic pressure on the sides of the container. Ideally it should be a cylinder but practically a many sided polyhedron is preferred. The blank is provided at its right hand end with a shorter narrow vertically extending glue strip or flap 44 which overlaps and is adhered to the free edge of the left hand panel 42 when the blank is folded to form a case 48. The blank is provided with two parallel horizontal score lines 45 and 46 forming strips 51 and 52 located close to each other and adjacent the upper and lower edges of the blank. The inner score lines 45 are disposed substantially in alignment with the upper and lower ends of the glue strip 44.

The upper and lower rims or chines 49 and 50 of case 48 are formed by bending or folding the outer horizontal strips 51 inwardly (away from the rear in FIG. 5) to overlie their respective strips 52 and then bending the doubled edge once more about the score line 45. Such rim or chine-forming operation is performed while the blank is in flat condition. The folds of the rims 49 and 50 may be held tightly together and secured to the side walls of case 48 as shown by the use of an adhesive between them, metal staples such as those shown at 54 which pierce and secure the layers of the rims to each other and the rims to the side walls, or both an adhesive and staples. If the rims are too wide thus projecting too far up into the interior of the formed container, they tend to roll inwardly away from the inner surface of the side wall panels 42 when the end 22 is forced into place. However, the rims should be wide enough to protect the projecting portions of the tube 70. It has been found that a width of from $\frac{3}{4}$ to $\frac{7}{8}$ of an inch will meet both requirements. However, this may be varied depending upon the gauge of the paperboard and the diameter of the container. After the rims or chines have been thus formed on the inner peripheral edges of the blank, the blank is folded as described so that the glue flap 44 overlies the left hand edge of the blank. In such folding operation the blank is folded about the spaced score lines 41'. The case is maintained in such folded condition during its storage and shipment, and until it is opened to be erected and assembled in the manner shown in FIG. 7.

The blank 40' shown in FIG. 6 is the same as blank 40 with the exception of the spaced notches 47 employed at the top and bottom edges of blank 40'. Such notches preferably are positioned, as shown, at the location of the score lines 41'. Notches 47, which are of narrow V-shape, extend inwardly from the edges to points between the score lines 45 and 46. Notches 47 relieve the upper and lower rims or chines of some of their tendency to bulge inwardly. For that reason the blank 40' may in some instances be preferred to blank 40.

At the location of use, which is assumed in this instance to be the filling room of a dairy or ice cream concentrate plant, the operator first erects the body of the case 48 by opening it and bringing it to generally cylindrical shape. A round end 55 in the form of a disc made of the same material as end 22 is then thrust into the bottom of case 48 so that it assumes the position shown in FIGS. 7 and 8. The insertion of end 55 may be from

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either end of the container but in either event the bottom is thrust into its final position by a downwardly directed force. In a preferred embodiment of the case the body 48 has a theoretical inner diameter above rim 50 of $10\frac{1}{4}$ ", and the disc 55 has the same diameter. Consequently, the disc 55 is firmly engaged by the body of the case, but is not prevented from being deliberately removed in an upward direction as is sometimes desirable in the emptying of the container in a manner to be described.

The operator then places the assembly of liner 11 and end 22 shown in FIG. 4, and folded as described, at the top of the body of case 48 so that the liner falls freely into the space within the case unfolding along transverse fold lines *a-a* and *b-b* and covering the bottom of the case. The envelope remains folded along longitudinal fold lines A-A and B-B. End member 22 is axially aligned with the end of the body of the case, and inserted somewhat edgewise into the end of the body of the case, following which it is pulled upwardly as by the hand hole 27, so as to lie tightly beneath the inboard rim 49 of the body of the case. To facilitate assembly of end 22 in the body of the case the end may be made with a diameter slightly less than the inner diameter of the container body adjacent the rim at that end. An end having a diameter of $10\frac{1}{8}$ " has been found satisfactory with a case having a theoretical inner diameter of $10\frac{1}{4}$ ".

The erected and assembled container, in the condition shown in FIG. 7, is now in condition to be filled. The filling, which may take place either with gravity or pumped, pressure flow, preferably is carried out with the container in horizontal position and with the fitting 17 at its lowermost position so that the liquid may unfold the liner during filling thus preventing the trapping of fluid. The protective cap 31 is removed from fitting 17 and the delivery pipe of the filling apparatus is connected to the fitting gas by the use of a conventional connector having a short inner tube telescoped within neck 19 of fitting 17 and a plurality of retractable outer gripping members engageable with the fitting neck beyond the outer bead 39 on the neck.

Liquid is then introduced under pressure into the interior of the line 11, the filling proceeding until the desired amount of material has been pumped into the container. Such operation may be conveniently performed by mounting the container to be filled on the scale pan of an automatic weighing and dispensing device, the device functioning to cut off the flow of the liquid being dispensed when a predetermined weight has been added to that initially present on the scale pan. The filling under pressure may proceed at a rapid rate because of the large effective flow area of the neck 19 of fitting 17, and because the liner 11 having been initially folded flat and sealed by the protective cap 31 in that condition, contains substantially no air to be displaced by the intruding liquid. Air displaced by the expanding liner readily escapes from the space between the liner and the protective case through the numerous small openings between the body of the case and its top 22 and bottom 55. During the filling operation, the initially draped liner 11 adjusts itself as required to conform to the then horizontal and vertical surfaces of the case, so that the case may back-up and reinforce the lining without imposing any undue stresses thereon. The cylindrical shape helps to achieve this.

After the filling operation has been completed, the filled container is turned into its normal, vertical position as shown in FIG. 8, during which time the envelope 11 will readjust its position slightly, if such is required, with respect to the case 10. The filling nozzle is then disconnected from the neck 19 of fitting 17, and, in accordance with a first embodiment of the invention, an assembly of a further fitting 57 and a dispensing tube 70 and protective sheath 71 (FIGS. 8 and 9) is sealingly snapped onto the outer end of neck 19. The outer end of tube 70 is provided with a sealing plug 74, and the outer end

of the tubular sheath 71 is transversely sealed at 72. The outer end of the tube and sheath combination 70, 71 is then thrust inwardly through the hole 30 in the body 24 of the container top 22 so that the bend in the tube does not lie much above the upper rim 49 of the case. The outer end of the tube, when thus positioned inwardly into the case, lies generally horizontal in the space between the body 24 of the case top and the protective layer 25 sealed thereto, as shown in FIG. 10.

The filled containers are preferably shipped in vertical position, as shown in FIGS. 8 and 10. Such containers have sufficient strength to allow them to be stacked at least several high during such shipment and to undergo the normal shocks of transportation and handling without any danger of damage thereto. When the container of the above described first embodiment has reached its destination and it is desired to empty the contents therefrom, the sheathed tube 70 is first withdrawn from the upper part of the container, the sheath is removed from the outer end of the tube 70, a sterilized dispensing shut-off is then attached to the outer end of tube 70, and the tube 70 is cut off between the shut-off plug 74. Following this, the container may be disposed in either horizontal or inverted vertical position, the contents emptying therefrom by gravity. Because the envelope 11 contains substantially no air, dispensing of liquid from the container is rapid and substantially non-turbulent, since virtually no air need enter the liner to replace the dispensed fluid. The liner is compressed as liquid is dispensed therefrom, by the pressure of the atmosphere which readily finds its way within the interior of the body of case 48 through the various joints between it and the top and bottom members of the case. Thus usually there need be no manipulation of liner 11 to insure that it becomes fully emptied. As a routine matter, however, toward the end of the emptying operation an operator can readily thrust the bottom 55 of the container inwardly and inspect the liner. Should some fluid prove to have been trapped by a fold in the liner, the operator can readily free the fluid by shaking or locally squeezing the liner. Because no air enters the liner during the dispensing operation the spoilage time and contamination factor to which the contents would otherwise be exposed during an intermittent dispensing operation are greatly improved.

The construction of the wide-mouthed fitting 17, its manner of interaction with the body 24 of top 22 of the case, the further fitting 57 and its connection to tube 70 and protective sheath 71 are shown in detail in FIG. 9. As there shown, the neck 19 of fitting 17 has a circular cylindrical surface 35 immediately adjacent flange 21, surface 35 terminating at an outer enlarged annular zone 36. Outwardly beyond zone 36 the neck 19 is provided with an outwardly converging frusto-conical surface 37. Beyond the smaller end of surface 37 neck 19 is provided with an annular outwardly extending bead portion 39.

The diameter of portion 35 is such that it snugly engages the inner wall of hole 29 in body 24 of the top. The axial length of zone 35 is such that the face 14 of liner 11 and the body 24 of the top are snugly received between the flange 21 and the annular enlarged zone 36. Preferably the configuration of the portion of enlargement 36 which merges with the outer end of surface 35 is such that fitting 17 is constantly resiliently held against axial movement. Fitting 17 is formed of resilient plastic material which is inert to the material incased within the liner. Polyethylene is an example of such a material for foods. Upon being inserted in the hole in the top of the case, the outer end of the fitting passes freely through the hole. Upon engagement of the rear portion of surface 37 with the sidewall of the hole, neck 19 is momentarily deformed until enlarged zone 36 has passed through the hole in the top to assume the position shown in FIG. 9.

The further fitting or closure member 57, which is made of relatively stiff resilient plastic material, has an annular top 61 which spans and sealingly engages the outer end

of neck 19 of fitting 17. Depending from top 61 and coaxial thereof is an outer sleeve 59 which has an inwardly directed annular bead 60 adjacent its lower end. The length of skirt 59 and the relative diameters of beads 39 and 60 are such that the fitting 57 must be snapped into the position shown in FIG. 9 to form a firm sealing engagement with fitting 17. Fitting 57 has a second, inner skirt 62 integral therewith, skirt 62 being positioned coaxial of skirt 59 and of such diameter as to be spaced somewhat from the inner surface of neck 19. At the bottom of inner skirt 62 there is an integral inwardly extending annular flange 64, the radially inner edge of portion 64 being integrally connected with an inner upstanding sleeve 65 coaxial of skirt 62. Skirt 62 and sleeve 65 thus present a vertically extending annular space 66 therebetween. Space 66 is of such radial thickness as snugly to engage the lower end of the combined tube 70 and protective sheath 71 as shown. In order to insure the maintenance of a seal between the fitting 57 and the tube and sheath combination, the outer wall face of sleeve 65 is provided with a tapered or stepped projection 69 intermediate its length, projection 69 increasing in radial height in a direction downwardly or inwardly of sleeve 65. With such construction, the lower end of the combined tube and sheath combination 70, 71 may be thrust into the space 66 so as to make an effective seal between it and members 62 and 65.

In FIGS. 11 and 12 there are illustrated an alternative further fitting or closure member there designated 57', and the manner in which such further fitting 57' may be employed in accordance with another manner of use of the container of the invention. The further fitting 57' has the same construction as fitting 57 with the exception of the removable dome 75; the same reference characters are employed in connection with fitting 57' as those showing similar parts in fitting 57. The dome 75 is a thin-walled element initially formed integral with the body of fitting 57'. Dome 75 is attached to the upper end of sleeve 65 at an annular shoulder 76.

When the further fitting 57' is used, such further fitting is preferably substituted for the protective cap 31 in the assembly shown in FIG. 4. The body of the case is erected at the filling station, as before, but with the fitting 57' thereon, and is there installed in the case. The operator will then remove fitting 57', fill the container as before, and then replace the fitting 57' after having removed the dome 75 as by cutting it along a line 77 generally defined by shoulder 76. The combined dispensing tube 70 and protective sheath 71 may then be assembled within and tightly gripped or sealed to fitting 57' in the same manner as above described in connection with fitting 57. Alternatively, the filled container may be shipped with closure member 57', and the dispensing tube 70 assembled and sealed with closure member 57 just prior to the dispensing operation.

In a further, unillustrated manner of employing the container of the invention, the liner and case top assembly shown in FIG. 4 may be changed by omitting cap 31 and by substituting therefor the combination of a fitting 57 and a tube and sheath combination 70, 71 shown in FIGS. 8 and 9. In such procedure the case is erected and assembled as before, the filling of the container is accomplished by removing the cap 31 and attaching the fitting and tube to sleeve 19 and the dispensing of the contents takes place through the tube 70. The outer end of the tube and sheath combination may then be thrust inwardly through hole 30 of the top in the same manner as shown in FIG. 10.

In FIG. 13 there is shown an extension tube 79 which may be advantageously employed in dispensing operations. Member 79, which is made of resilient plastic material such as polyethylene, has a generally circular cylindrical tube-like body 80. Body 80 has an enlarged lower end 81 having an inner annular seat 82 therein which is adapted to be snapped over and sealingly to engage the

bead 39 on the outer end of neck 19 of fitting 17. The outer end of body 80 has an annular bead 84 which is similar to bead 39 on fitting 17.

Although only a limited number of embodiments of the invention have been illustrated in the accompanying drawings and described in the foregoing specifications, it is to be especially understood that various changes, such as in the relative dimensions of the parts, materials used, and the like, as well as the suggested manner of use of the container parts thereof of the invention, may be made therein without departing from the spirit and scope of the invention as will now be apparent to those skilled in the art. Thus, for example, in the shipping of liquids such as acids and the like it may be desired further to protect and cushion the liner 11. For such purpose there may be employed an annular corrugated paperboard sleeve which is inserted within the body 48 of the case coaxial thereof and lying in contact with the inner surface thereof. The corrugated paperboard sleeve, having an axial length substantially equal to that between the inner surfaces of top 22 and bottom 55 of the case, is held in place by such top and bottom members.

What is claimed is:

1. A container adapted for use with liquids which comprises an outer, expansion-resistant protective case, and a fluid-tight flexible liner for the case, the liner being free for movement with respect to the case over the predominant part of its extent, the liner when empty being generally air-free and when substantially filled with liquid having pressure-transmitting engagement with the inner surface of the case throughout its extent upwardly to the level of the top of the liquid in the liner, and integral means providing both for the ingress and egress of liquid into and from the interior of the liner and for attaching the liner to the case at one zone of the liner, the container case having an inwardly movable member forming a wall of the case, the movable member being located spaced from the zone of the means providing for the ingress and egress of liquid into and from the interior of the liner.

2. A container as claimed in claim 1, wherein the inwardly movable member forms the bottom wall of the case, and the liner is attached to the top of the case and is filled and emptied through such zone of attachment to the top of the case.

3. A container adapted for use with liquids which comprises an outer, expansion-resistant protective case, and a fluid-tight flexible liner for the case, the liner being free for movement with respect to the case over the predominant part of its extent, the liner when empty being generally air-free and when substantially filled with liquid having pressure-transmitting engagement with the inner surface of the case throughout its extent upwardly to the level of the top of the liquid in the liner, and a fitting sealed to the liner, said fitting having a hollow stem projecting outwardly through a hole in the wall of the case, said stem providing for the ingress and egress of liquid into and from the interior of the liner and for attaching the liner to the case, the stem of the fitting being made of resilient plastic material and having a snap fit with the hole in the wall of the case.

4. A container adapted for use with liquids which comprises an outer, expansion-resistant protective case, and a fluid-tight flexible liner for the case, the liner being free for movement with respect to the case over the predominant part of its extent, the liner when empty being generally air-free and when substantially filled with liquid having pressure-transmitting engagement with the inner surface of the case throughout its extent upwardly to the level of the top of the liquid in the liner, a resilient plastic fitting sealed to the liner and having a hollow filling and dispensing stem attaching the liner to the case at the top of the container so that the liner hangs down from such zone of attachment free of other attachment to the case, the hollow stem of the fitting projecting outwardly through a hole in the top of the case, the stem having a frusto-

conical outer end portion and an annular enlargement inwardly thereof, the relaxed diameter of the enlargement somewhat exceeding the diameter of the hole in the top of the case, whereby the inner end of the stem of the fitting may be thrust outwardly through the hole in the top of the case and may be retained therein with a snap fit.

5. In a container for liquid, the combination of a fluid-impervious flexible bag which is generally air-free when empty, a resilient fitting having a hollow stem connected to the bag to provide for the filling and emptying of the bag therethrough, a flange on the inner end of the stem, the flange being sealed to the wall of the bag, a plate-like fitting-supporting member having a hole therein through which the stem of the fitting protrudes, and means on the stem of the fitting providing for the retention of the fitting on the member with a snap fit.

6. The container as claimed in claim 5, wherein the stem of the fitting has a first, generally cylindrical portion contiguous to the flange, said first portion having a diameter such that it snugly engages the inner wall of the plate-like member, and an annular shoulder on the stem at the outer end of the said first portion, the shoulder snugly engaging the surface of the plate-like member surrounding the hole through which the stem of the fitting extends.

7. The container as claimed in claim 6, wherein an annular portion of a wall of the bag is sealed to the inner surface of the flange on the fitting and is interposed and gripped between the flange and the plate-like member.

8. The container as claimed in claim 6, wherein the portion of the stem of the fitting outwardly of the shoulder is frusto-conical with the larger end thereof at the shoulder.

9. The container as claimed in claim 8, comprising an annular outer bead on the forward outer end of the stem for the sealing connection of a further fitting to the stem.

10. The container as claimed in claim 5, comprising a removable stem-closing member sealingly connected to the outer end of the stem of the fitting.

11. The container as claimed in claim 10, wherein the stem-closing member comprises a cap-like member spanning and removably secured to the outer end of the stem.

12. In a container, the combination of a fluid impermeous flexible bag which is generally air-free when empty, a resilient fitting having a hollow stem connected to the bag to provide for the filling and emptying of the bag therethrough, a flange on the inner end of the stem, the flange being sealed to the wall of the bag, a plate-like fitting supporting member having a hole therein through which the stem of the fitting protrudes, means on the stem of the fitting providing for the retention of the fitting on the member with a snap fit, and a cap-like member spanning and removably secured to the outer end of the stem, said cap-like member comprising a double wall tubular structure lying generally axially of said stem and having a dispensing passage formed by the inner wall of said structure, the space between the two walls of the structure being closed toward the bag and open toward the outer end of the stem, such space being adapted sealingly to receive the inner end of a dispensing tube.

13. The container as claimed in claim 12, wherein a wall of the double-walled tubular structure is provided on the side adjacent said space with an annular radially projecting bead for forming a seal with the wall of the tube.

14. The container as claimed in claim 12, wherein the outer end of the inner wall of the double-walled structure is provided with a removable sealing member spanning across said inner wall.

15. The container as claimed in claim 14, wherein the removable sealing member is in the form of a dome projecting outwardly beyond the outer end of the main body of the cap-like member.

16. The container as claimed in claim 15, wherein the dome wall is markedly thinner than the wall of the main, inner portion of the inner wall of the double-walled structure, the dome meeting such main, inner portion along an outer annular shoulder generally aligned with the outer surface of the cap-like member.

17. A closure member comprising a member having inner, center and outer tubular walls in spaced relation to each other, means on said outer tubular wall for retaining said member in fluid tight engagement with an opening, and means for retaining said tubular walls in said spaced relation, said inner tubular wall defining a dispensing passage and said inner and center space between said walls being adapted sealingly to receive the inner end of a dispensing tube.

18. The closure member as claimed in claim 17, wherein means are provided in said space between said inner and center tubular walls for retaining an object in said space.

19. The closure member as claimed in claim 17, wherein one of said inner and center tubular walls is provided, on the side adjacent said space, with an annular radially projecting bead for forming a seal with the wall of said tube.

20. The closure as claimed in claim 17, wherein the outer end of said inner wall is provided with a removable sealing member spanning said dispensing passage defined by said inner wall.

21. The closure as claimed in claim 20, wherein said removable sealing member is in the form of a dome projecting outwardly beyond the outer end of the main body of the cap-like member.

22. The closure as claimed in claim 21, wherein the dome wall is markedly thinner section than the wall of the main, inner portion of the inner wall of the double-walled structure, the dome meeting such main, inner portion along an outer annular shoulder generally aligned with the outer surface of the cap-like member.

23. The closure as claimed in claim 17, wherein the means for retaining the tubular walls in spaced relation comprises a member which seals said space between said tubular walls and prevents ingress and egress of fluid through said space.

24. The closure member as claimed in claim 17, wherein said tubular walls are concentrically mounted.

25. The method of assembling and filling a container adapted to receive liquid for shipment, said container having an upright outer, expansion-resistant air pervious protective case, a removable top member adapted to be mounted on the body of the case, and a fluid-tight thin flexible liner for the case, the liner being attached to the case only at the top member of the case and being free for movement with respect to the case over its entire extent, except for its zone of attachment thereto, and means at said zone of attachment providing at least one opening for the ingress and egress of material into and from the interior of the liner, said method comprising forming the liner as a flattened sheet-like envelope, attaching the envelope to the top member of the case and to the means providing for the ingress and egress of material into and from the liner, sealing the liner and the last named means from the atmosphere with the liner in flattened generally air-free condition, folding the liner so that it lies in large panels of substantially less width and length than such respective dimensions of the extended, unfolded liner, introducing the liner in folded condition into the top of the case body and then releasing the liner while attaching the top member to the body of the case, whereby the unfilled liner hangs freely downwardly in unfolded condition from the top member, and introducing fluid under pressure into the liner

through said means providing for the ingress of material thereto while displacing air within the case outwardly of the liner outwardly through the case.

26. The method as claimed in claim 25, comprising laying the container on one side after its assembly and immediately prior to its being filled, introducing material under pressure into the liner with the container in such position whereby the liner expands into contact with the case as the filling operation proceeds, and after the filling operation has been completed, turning the container into upright position and sealing the filling opening in the liner.

27. A container adapted for use with liquids which comprises an outer, expansion-resistant protective case, and a fluid-tight flexible liner for the case, said liner being free for movement with respect to said case over the predominant part of its extent, said liner when empty being generally air-free and when substantially filled with liquid having pressure-transmitting engagement with the inner surface of said case throughout its extent upwardly to the level of the top of the liquid in the liner, and a flexible conduit having a portion located outwardly of said case, and having its inner end communicating with the interior of the liner, a closure member at the outer end of said conduit, and a thin flexible sealed impervious protective tubular sheath loosely embracing the conduit and the closure member and sealed thereto, said conduit providing both for the ingress and egress of liquid into and from the interior of the liner and attaching the liner to the case.

28. A container adapted for use with liquids which comprises an outer, expansion-resistant protective case, and a fluid-tight flexible liner for the case, said liner being free for movement with respect to said case over the predominant part of its extent, said liner when empty being generally air-free and when substantially filled with liquid having pressure transmitting engagement with the inner surface of said case throughout its extent upwardly to the top of the liquid in the liner, and a flexible conduit having a portion of substantial length located outwardly of the case, and having its inner end communicating with the interior of the liner, the outer end of the conduit having a closure member thereon, and means for securing the outer end of the conduit during periods of its disuse comprising a passage through the walls of the case laying adjacent the inner end of the conduit to allow the threading of the conduit therethrough into the interior of the case, and means within the case forming a pocket isolated from the liner for receiving such outer end of the conduit lying within the case.

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