

Aug. 4, 1964

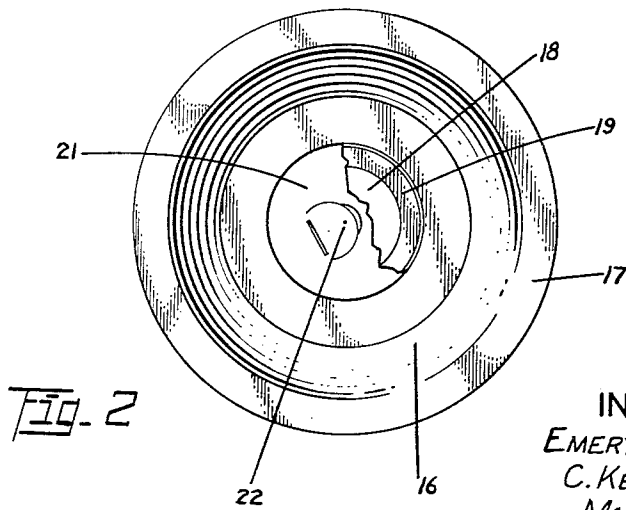
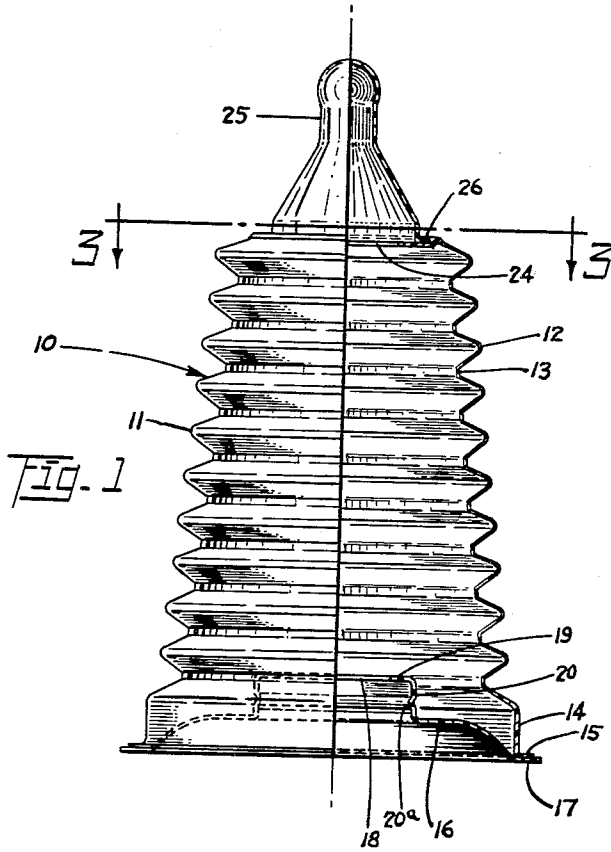
E. C. SWANSON ETAL

3,143,429

COLLAPSIBLE DISPOSABLE CONTAINER AND NURSING UNIT

Filed Oct. 9, 1961

3 Sheets-Sheet 1



INVENTORS  
EMERY C. SWANSON  
C. KEITH SHERCK  
MARVIN E. COOK

By

*George W. Porter*  
Attorney

Aug. 4, 1964

E. C. SWANSON ETAL

3,143,429

COLLAPSIBLE DISPOSABLE CONTAINER AND NURSING UNIT

Filed Oct. 9, 1961

3 Sheets-Sheet 2

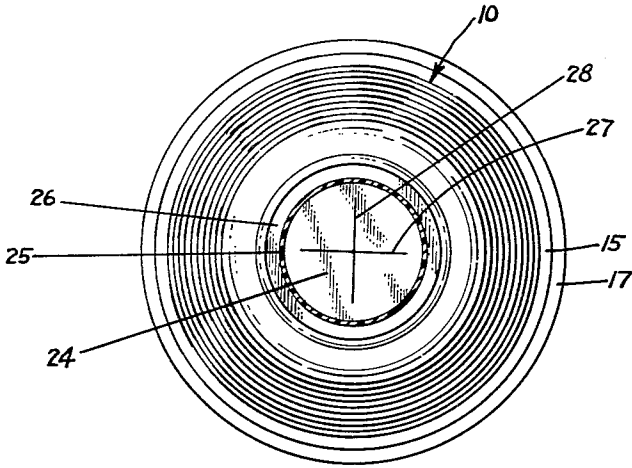


Fig-3

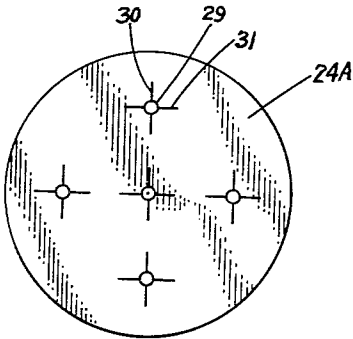


Fig-4

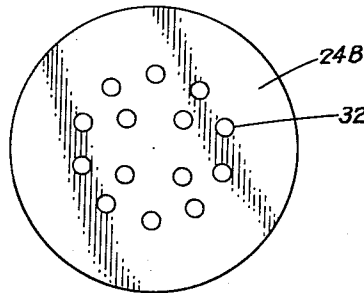


Fig-5

INVENTORS

EMERY C. SWANSON

C. KEITH SHERCK

MARVIN E. COOK

By

*George W. Porter*  
Attorney

Aug. 4, 1964

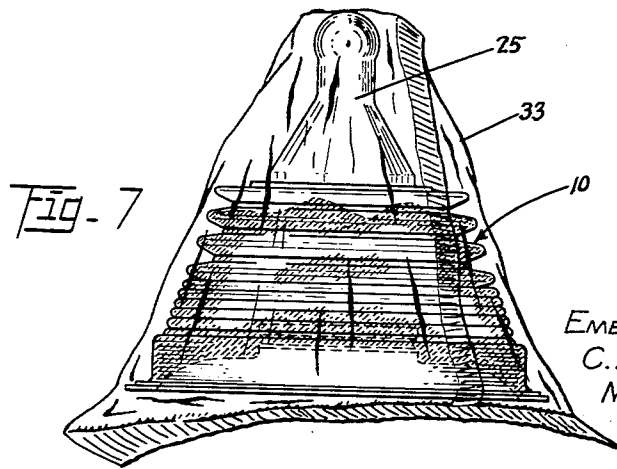
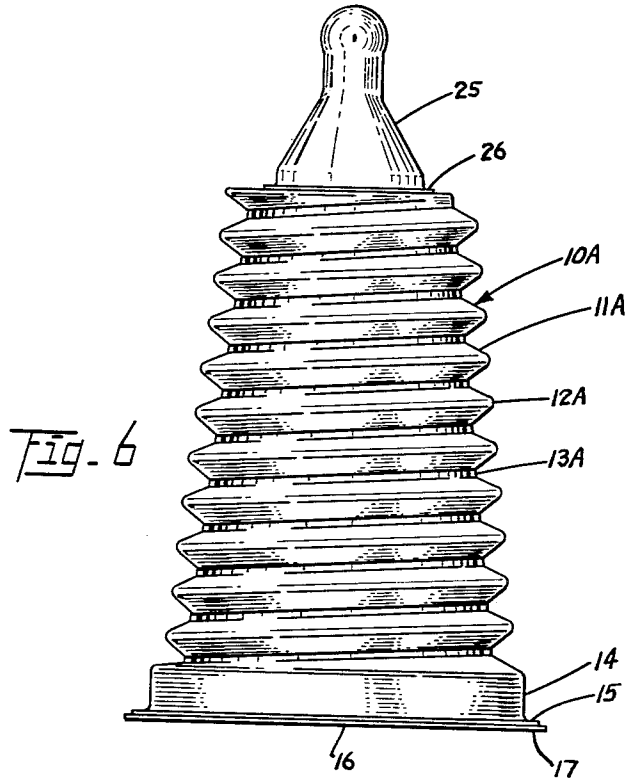
E. C. SWANSON ETAL

3,143,429

COLLAPSIBLE DISPOSABLE CONTAINER AND NURSING UNIT

Filed Oct. 9, 1961

3 Sheets-Sheet 3



INVENTORS  
EMERY C. SWANSON  
C. KEITH SHERCK  
MARVIN E. COOK

By *George W. Porter*  
Attorney

1

2

3,143,429

## COLLAPSIBLE DISPOSABLE CONTAINER AND NURSING UNIT

Emery C. Swanson and Charles Keith Sherck, Golden Valley, and Marvin E. Cook, New Brighton, Minn., assignors to The Pillsbury Company, Minneapolis, Minn., a corporation of Delaware

Filed Oct. 9, 1961, Ser. No. 143,624

12 Claims. (Cl. 99—171)

This invention relates to a collapsible disposable container or package. More particularly, the invention relates to a collapsible single-use disposable plastic container useful as a nursing or feeding bottle for infants, a dispenser for catsup or mustard or the like, a feeding unit for use in space travel under conditions of weightlessness, a dispenser for adhesives, and other related uses.

It is the principal object of this invention to provide a collapsible and disposable container or package formed of thin resilient synthetic resinous plastic material, capable of being collapsed to relatively small size for shipment and storage, capable of being expanded in use, and of inexpensive construction so that it may be discarded after a single use.

It is another object of this invention to provide a container of the class described having an integral dispensing member for the expulsion of the contents of the container.

It is a further and more particular object of this invention to provide a container of the class described having an integral nipple member and being adapted for the feeding of infants.

It is a still further object of this invention to provide a package for dried foodstuffs and other dried commodities capable of reconstitution upon addition of water in the form of a collapsible disposable container of the class described.

Other objects of the invention will become apparent as the description proceeds.

To the accomplishment of the foregoing and related ends, this invention then comprises the features hereinafter fully described and particularly pointed out in the claims, the following description setting forth in detail certain illustrative embodiments of the invention, these being indicative, however, of but a few of the various ways in which the principles of the invention may be employed.

The invention is illustrated by the accompanying drawings in which the same numerals refer to corresponding parts and in which:

FIGURE 1 is an elevation, partly in section, of one form of collapsible container according to the present invention;

FIGURE 2 is a bottom plan view of the container of FIGURE 1;

FIGURE 3 is a plan view of one form of disc member utilized as a barrier wall in the container, being a partial section on the line 3—3 of FIGURE 1 and in the direction of the arrows;

FIGURE 4 is a plan view on a somewhat enlarged scale of a modified form of disc barrier wall;

FIGURE 5 is a similar plan view of a further modified form of barrier wall;

FIGURE 6 is an elevation of a modified form of collapsible container wherein the corrugations of the body are in spiral or helical form; and

FIGURE 7 is an elevation of the collapsible container in collapsed condition and contained within an outer wrapper.

Referring now to the drawings and particularly to FIGURES 1 and 2, there is shown a collapsible disposable container or package according to the present invention in the form of a baby bottle indicated generally at 10.

The bottle includes a body portion 11 formed of thin walled resilient synthetic resinous plastic material in the form of a plurality of concentric circular corrugations or annular accordion pleats extending along the length of the body and composed of alternate ridges 12 and valleys or troughs 13. For greater stability when filled with liquid, the body 11 is desirably slightly tapered, as shown, in the form of a truncated cone, although it may be in the form of a corrugated cylinder.

The bottom end of the bottle body 11 is provided with an integral generally cylindrical base portion 14 having an outwardly extending and generally planar flange 15. A bottle base 16 having an outwardly extending generally planar flange 17 is heat sealed to the flange 15 at the base of the bottle body 11 to partially enclose the open bottom end of the bottle body. The base 16 of the bottle is provided with a central opening 18. The opening 18 is desirably formed in a recessed or offset portion of the base to provide a recessed flange 19 surrounding the opening which is adapted, in cooperation with the surrounding off-setting walled portion 20, to seat and frictionally engage a suitable closure member, such as a standard cardboard disc milk bottle type cap closure or the like.

The closure cap is desirably provided with a finger tab 22 to facilitate removal and reinsertion of the cap without contamination of the contents of the bottle. The wall 20 is provided with an annular projection 20a spaced slightly away from flange 19. The diameter of the recess or depression defined by flange 19 and wall 20 inwardly from projection 20a is of slightly lesser diameter than the entry to the recess or depression outwardly from the projection. The closure cap is adapted to fit with a slide fit in the peripheral edge of the recess outwardly from projection 20a to provide a powder-tight seal against loss of dried material packaged within the bottle body. The cap may be readily removed without damage to permit introduction of liquid to the bottle. After introduction of liquid and replacement of the closure cap, the cap is forced past the projection to the bottom of the recess against flange 19 where it is adapted to seat tightly in this slightly smaller area to insure a liquid tight seal for the container and to avoid accidental displacement of the cap and spillage of the contents.

The base 16 of the bottle is desirably dished, as shown in FIGURE 1, so that when the bottle is inverted the base functions as a shallow funnel for the introduction of both solid and liquid material to the container through opening 18. In some instances for extra protection it may be desired to apply an outer protective cover such as a patch of sheet material provided with pressure sensitive adhesive over the entire opening recess and closure.

The opposite or top end of the bottle body 11 comprises a barrier wall or disc 24, which desirably is of integral one piece construction with the rest of the body of the bottle, as shown. A nipple 25 of the usual configuration, having an outwardly extending generally planar flange 26 at its base, is heat sealed, or otherwise securely and non-separably attached, to the top of the bottle adjacent the barrier wall 24. The nipple 25 may be provided with one or more openings for dispensing of liquid from the bottle, or not, as desired. In some instances, it may be desirable to provide this opening at the time the container is put into use. When the container is to be used for other purposes, such as a catsup or mustard dispenser the liquid dispensing member may be in the form of a tubular nozzle or spout through which the product may be forced by compressing the bottle body.

The barrier wall 24 functions to keep dried nutrient material packaged within the collapsible container from becoming packed into the narrow end of the nipple where it might become compacted and be difficult to dissolve or suspend in liquid upon reconstitution and interfere

with the use of the container as a feeding bottle. It is necessary, however, that there be communication through the barrier wall after the dried material is reconstituted. A preferred form of opening is shown in plan view in FIGURE 3 wherein two perpendicular slits 27 and 28 are provided. The barrier wall in this instance functions as a flap valve to eliminate backflow.

The barrier wall may be eliminated in instances where the material to be dispensed is not placed in the bottle until time of use. When this is done the dispensing member may be formed integrally with the body. When the liquid material to be dispensed is of heavy consistency the barrier may be eliminated or modified to permit passage of the heavy liquid.

In FIGURE 4 there is shown a modified form of barrier wall 24A provided with a plurality of small openings 29 intersected by a pair of perpendicular slits 30 and 31. In FIGURE 5, there is shown a further modified form of barrier wall 24B in which the openings are simply perforations 32. The limited communication through the barrier wall also permits it to function as a strainer for any unreconstituted solid material.

As shown in FIGURE 6, a modified form of container, indicated generally at 10A, may be provided in which the corrugations of the bottle body 11A are formed as a spiral or helical convolution or thread. The ridge 12A and valley 13A of the corrugation extend in a single spiral pattern from the top to the bottom of the body of the bottle. In all other respects, the spirally corrugated bottle is the same as that already described.

In FIGURE 7 there is shown the collapsible container or package according to the present invention partially collapsed for shipment or storage. The package contains an amount of a dried product such as powdered milk or dried infant's formula, dehydrated catsup, dried mustard, powdered casein adhesive, or the like, sufficient to be reconstituted to requisite strength or concentration when the bottle is expanded and filled with liquid, such as water. When used to package foodstuffs the collapsed package may be maintained sterile by such means as a heat sealed transparent overwrap 33, as shown, by overwrapping and cartoning, by blister packaging, or the like.

The nipple or other dispensing member, the corrugated bottle side walls; and the base are formed by molding, and desirably from compatible heat sealable thermoplastic synthetic resinous materials. The nipple is desirable made by drape forming by which a heated sheet of thermoplastic material is draped over a male mold and pulled into contact with the mold by vacuum. To prevent webbing of the plastic the male mold is desirably recessed in a block or a ring assist or a combination of the two may be used. The heated plastic sheet is stretched slightly as it is drawn into the recess and stretched further as the vacuum pulls it into the cavity around the male mold and up and against the mold surface.

The thusly preformed nipple with its integral flange is trimmed and placed in a cavity or receptacle in the base of the female mold cavity for vacuum forming of the bottle body. The bottle body is formed by positioning a preheated resinous plastic sheet over the female mold cavity and lowering the sheet into the cavity by means of a heated truncated cone plug or plunger assist. That part of the sheet which is in contact with the surface of the end of the truncated plunger retains the flat shape of that end of the plunger and because that portion of the sheet is not stretched it remains essentially the thickness of the original sheet.

The end of the plunger seats this circular disc-like member against the flange of the preformed nipple and fuses and bonds the nipple to the bottle body by heat sealing. Concurrently, the heated plastic sheet forming the side-walls of the body is being stretched by the plunger and pulled into the corrugations of the female mold by vacuum. The bottle body with attached nipple is then removed from the mold. If desired, the flat end of the mold

plunger may be provided with means for slitting or perforating the disc barrier wall simultaneously with the heat sealing operation. Alternatively, the communicating means in the barrier wall may be formed in a separate operation. If the barrier wall is eliminated the dispensing member, whether it be a nipple or in some other form, may be formed integrally with the bottle body. The dispensing member may also be formed separately and attached by heat sealing or adhesively secured to a previously formed body. The base is desirably vacuum formed using a shallow female mold cavity and is then heat-sealed to the bottom flange of the bottle body.

A concentrated or powdered material, such as a dried milk-base infant formula or any of the other exemplary materials, capable of reconstitution upon addition of a liquid, such as water, is filled into the container through the opening in the base. The bottle is compressed to about the minimum volume necessary to contain the dry material. The container is then closed and inserted in a protective overwrap or carton or similar package capable of maintaining the bottle in its compressed state for shipment and storage and maintaining the bottle free from contamination.

Where the dispensing member is a nipple it may be formed from any of those resilient materials commonly employed for the manufacture of nipples which are preferably at the same time heat sealable to the material of which the bottle body is formed. Dispensing spouts or tubes may be less resilient. Since a variety of synthetic resinous, preferably heat sealable, thermoplastic materials may be used for the bottle body, wide latitude is allowed in selecting the material for the nipple or other dispensing member. As an example, when the bottle body is formed from polyethylene, the dispensing member may also be polyethylene, but a preferred material for forming the nipple is a copolymer of polyethylene with ethyl acrylate, a rubber modified polyethylene, such as polyisobutylene modified polyethylene, or a vinyl copolymer.

The nipple wall may be between about 0.008 and 0.235 of an inch and is desirably between about 0.01 to 0.012 of an inch in thickness although, here too, wide latitude is permitted. The nipple should, however, have sufficient thickness and resilience that it will spring back to its original shape after being collapsed. In some instances the nipple interior may be filled with a spongy material to provide support for the nipple walls and minimize backflow.

The bottle body may likewise be formed from any readily formable resilient thermoplastic heat sealable sheet material. Desirably, the original sheet material is between about 0.02 to 0.06 of an inch. In the finished bottle, the barrier wall 24 is virtually unstretched and maintains the original thickness of the sheet. The base portion 14 of the bottle body and attached flange 15 are subjected to minimum stretching and, therefore, are just slightly less in thickness than the original thickness of the sheet from which the bottle body is formed. The corrugated side walls are somewhat thinner due to greater stretching. Exemplary thermoplastic sheet materials, in addition to polyethylene, includes vinyl polymers, both plasticized and unplasticized, and copolymers such as vinyl-vinylidene, vinylacetate-vinyl chloride, etc.; polystyrene; cellulosic sheets, such as cellulose acetate, ethyl cellulose and cellulose acetate butyrate; polycarbonates; and the like.

Although the disc barrier wall 24 is desirably formed integrally with the bottle body, in some instances (as where the dispensing member is formed integrally with the body in a one step molding process), the barrier wall may be separately formed and then inserted and secured adhesively or by heat sealing. The preferred form of communicating opening through the barrier wall between the bottle body and nipple is the form of flap valve shown in FIGURE 3. Where perforations are formed in the

barrier wall, they are typically about  $\frac{1}{16}$  inch in diameter and preferably are no larger than  $\frac{3}{32}$  of an inch.

The base member 16 may be formed from metal or any thermo-formable, preferably heat sealable, plastic sheet material capable of bonding to the bottle body. Where the body and base are not compatible for fusion bonding they may be adhesively secured. Where the base is metal the parts may be secured by crimping or similar means. Desirably, the base is formed of the same material as the bottle body. Where polyethylene is used as the material for the base of a polyethylene bottle, it is desirably of greater density. The base is preferably somewhat thicker and more rigid than the bottle body in order to provide support when the bottle is filled with liquid. Because of the shallow dishing of the base it is subjected to relatively little stretching during forming. If desired, ribs may be formed in the base member for greater strength and rigidity.

An infant feeding body produced according to the present invention provides a convenient time-saving method of preparing liquid feeding units for infants. The mother is spared the necessity of providing glass or plastic bottles, rubber nipples, plastic bottle closures and nipple covers, measuring and stirring devices, etc., all of which must be washed and normally sterilized before each use. The formula preparation time, which commonly requires about one hour per day for three to six months after the birth of a child, is reduced to mere minutes.

Normally, feedings are prepared at one time in multiple units and must then be refrigerated until use. Packaged formulas utilizing the container of the present invention need not be prepared until immediately before use. No refrigeration is required. There is a minimum opportunity for bacteria growth since the feeding formulation is consumed by the child immediately after preparation.

The feeding formula container is presterilized and maintained in this condition by its outer wrapper until time of use. Since the mother need merely add water to the container, the baby may be fed while away from home, such as while traveling, with a minimum of fuss and bother. When the contents of the collapsible container have been consumed, the container is simply thrown away.

Comparable advantages and conveniences are present when the container is used in other applications. The containers are light weight, non-breakable and occupy a smaller volume of space than do conventional containers. The necessity for handling, shipping and storing of water is largely eliminated, thereby resulting in considerable savings.

It is apparent that many modifications and variations of this invention as hereinbefore set forth may be made without departing from the spirit and scope thereof. The specific embodiments described are given by way of example only and the invention is limited only by the terms of the appended claims.

What is claimed is:

1. A collapsible disposable container comprising a corrugated hollow tubular body having an attached base, a non-separable liquid dispensing member attached to the body at the end opposite from the base, a barrier wall separating the interior of said body from the interior of said liquid dispensing member, said barrier wall being provided with communicating means to permit the passage of liquid and to substantially prevent the passage of a dry powdered material from said body to said dispensing member opening means in said base for introducing material into said container body and closure means for sealing said opening, said container body, base and liquid dispensing member being composed of compatible thermoformable synthetic resinous material and inseparably heat sealed together.

2. A container according to claim 1 further characterized in that said opening means in said base is centrally

disposed and said base is provided with sloping walls from its outer edge to said opening, whereby upon inversion of the container the base functions as a funnel to facilitate introduction of material to the container.

3. A container according to claim 1 further characterized in that said liquid dispensing member is a nipple integrally attached to said container body.

4. A container according to claim 3 further characterized in that said barrier wall is integral with said container body and provided with intersecting slits to form flap valve communicating means through said barrier wall.

5. A single-use collapsible disposable synthetic resinous plastic feeding bottle for infants comprised of a corrugated hollow tubular bottle body having an attached base, said bottle body having a plurality of thin walled resilient concentric and generally circular corrugations of progressively varying diameters along the length of the body whereby said bottle body is tapered from broader adjacent the base to narrower at the opposite end, a non-separable resilient nipple integrally attached to the bottle body at the end opposite from the base, a barrier wall integral with said bottle body separating the interior of said body from the interior of said nipple, communicating means through said barrier wall to permit passage of liquid and substantially prevent passage of a dry powdered material from said body to said nipple, a centrally disposed opening in said base, said base having sloping walls from its outer edge to said opening whereby upon inversion of the bottle the base functions as a funnel to facilitate introduction of material into the bottle through the opening, and closure means for sealing said opening, said bottle body, base and nipple being composed of compatible thermoformable synthetic resinous material and inseparably heat sealed together.

6. A feeding bottle according to claim 5 further characterized in that said barrier wall is provided with intersecting slits to form flap valve communicating means through said barrier wall.

7. A package of material capable of reconstitution upon addition of liquid, which package comprises a partially collapsed container including a collapsible corrugated hollow tubular body having an attached base and containing the material, a non-separable liquid dispensing member attached to the container body at the end opposite from the base, a barrier wall separating the interior of said body from the interior of said liquid dispensing member, communicating means through said barrier wall to permit the passage of liquid and substantially prevent passage of a dry powdered material from said body to the dispensing member, opening means in said base for introducing liquid into said container body to reconstitute said material contained therein, removable and replaceable closure means sealing said opening, said container body, base and liquid dispensing member being composed of compatible thermoformable synthetic resinous material and inseparably heat sealed together, and an outer protective covering enclosing said container and maintaining said container in partially collapsed condition.

8. A package according to claim 7 further characterized in that said liquid dispensing means is a nipple integrally attached to said container body and said container body is comprised of a plurality of thin walled resilient concentric and generally circular corrugations of progressively varying diameters along the length of the body, whereby said body is tapered from broader adjacent the base to narrower adjacent the nipple.

9. A package of dried milk-base feeding formula for infants capable of reconstitution upon addition of water, which package comprises a partially collapsed single-use disposable synthetic resinous plastic feeding bottle for infants, said bottle including a collapsible corrugated hollow tubular bottle body having an attached base and containing the dried milk-base formula material therein, said

7

bottle body having a plurality of thin walled resilient concentric and generally circular corrugations of progressively varying diameters along the length of the body whereby said bottle body is tapered from broader adjacent the base to narrower at the opposite end, a non-separable resilient nipple integrally attached to the bottle body at the opposite end from the base, a barrier wall integral with said bottle body separating the interior of said body from the interior of said nipple, said barrier wall preventing substantial passage of said dried formula material from said bottle body to said nipple, communicating means through said barrier wall to permit passage of liquid from said body to said nipple after introduction of water to said bottle, a centrally disposed and recessed opening in said base for introducing water into said bottle body to reconstitute said dried formula material contained therein, said base having sloping walls from its outer edge to said opening whereby upon inversion of the bottle the base functions as a funnel to facilitate introduction of liquid into the bottle through the opening, removable and replaceable closure means sealing said opening, said bottle body, base and nipple being composed of compatible thermoformable synthetic resinous material and inseparably heat sealed together, and an outer protective covering enclosing said feeding bottle and maintain said bottle in partially collapsed condition, said outer protective cover being a sheet of thermoformable synthetic resinous material heat sealed at its edges into a hermetically sealed enclosure around said feeding bottle.

10. A package according to claim 9 further characterized in that said barrier wall is provided with intersecting slits to form flap valve communicating means through said barrier wall.

8

11. A method of making a collapsible disposable container according to claim 1 which comprises performing a resilient liquid dispensing member of thermoformable synthetic resinous material, inserting the preformed dispensing member into the base of a female mold having the configuration of the container body, draping a heated sheet of compatible thermoformable synthetic resinous material over the mold cavity, forcing the heated sheet of resinous material into the mold into contact with the preformed dispensing member to heat seal the dispensing member to the sheet and substantially simultaneously forcing the heated sheet into contact with the mold surfaces to form the container body, and thereafter heat sealing a preformed base member of compatible synthetic resinous material to the molded container body.

12. The package of claim 9 further characterized in that said recessed opening in said base is provided with a ledge disposed circumferentially around said recess, said ledge defining inner and outer recessed portions, the inner portion thereof having a small diameter than the outer portion.

#### References Cited in the file of this patent

##### UNITED STATES PATENTS

2,628,911	Horan	Feb. 17, 1953
2,685,316	Krasno	Aug. 3, 1954
2,738,107	Graham	Mar. 13, 1956
2,899,110	Parker	Aug. 11, 1959

##### FOREIGN PATENTS

593,764	Canada	Mar. 8, 1960
---------	--------	--------------

##### OTHER REFERENCES

"Modern Packaging," November 1959, page 161.