# United States Patent

**La Barge**

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## [54] NIPPLE ASSEMBLY AND PACKAGE


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[52] **U.S. Cl.** .....**215/11 C,** 128/252, 215/11 R, 215/11 B

[51] **Int. Cl.** .....**A61j 11/02,** A61j 9/00, B65d 51/16

[58] **Field of Search**.....215/11 R, 11 A, 11 B, 11 C, 215/11 D, 40; 128/252



[56] **References Cited**

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| | | | |
|---|---|---|---|
| 3,335,890 | 8/1967 | Grundmann et al. | 215/11 R |
| 3,516,564 | 6/1970 | Portlenz | 215/11 C |
| 3,190,482 | 6/1965 | Staub et al. | 215/40 |



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*Assistant Examiner*—Stephen Marcus
*Attorney*—David W. Brownlee



[57] **ABSTRACT**

An elastic dispensing nipple is provided which has an inwardly open annular recess in its base and a sealing disc disposed in the nipple base with the peripheral edge portion of the disc seated in the recess, the recess having a plurality of radially extending ribs on the undersurface of its top wall and on the upper surface of its bottom wall, and the disc having a plurality of radial ribs and a circumferential rib in its peripheral edge portion. An assembly of such nipple and disc is adapted to be sealed on a container entrance mouth with a shroud thereover to seal the contents in a container, and to dispense the contents of the container through the nipple after the shroud has been removed.


**4 Claims, 6 Drawing Figures**

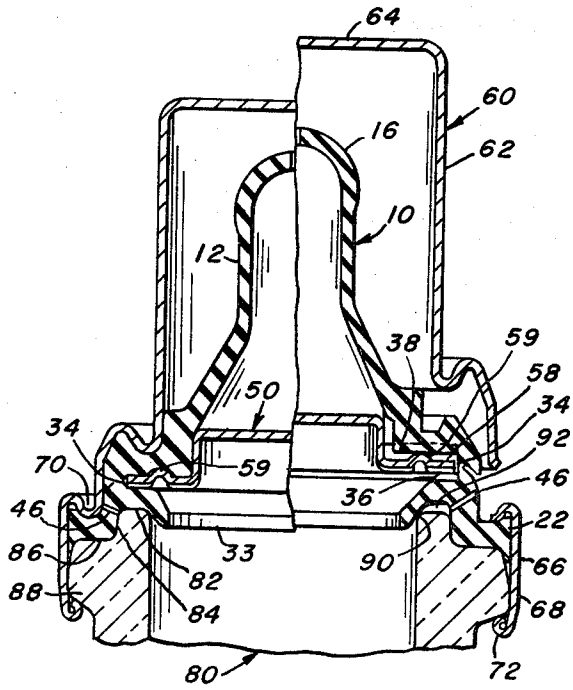


FIG. 1.

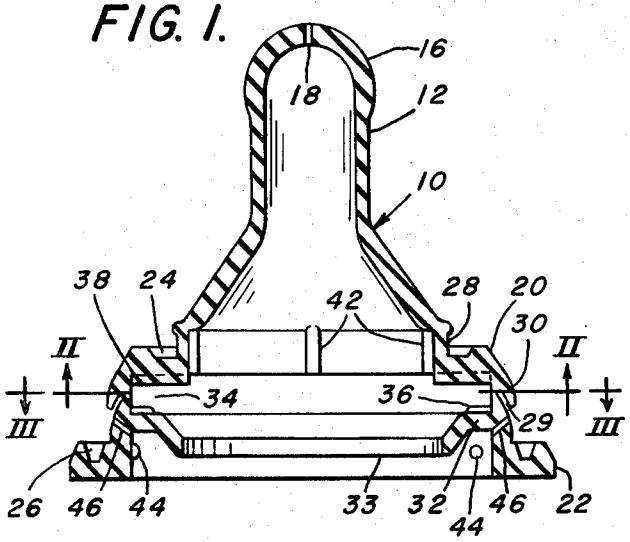



FIG. 2.

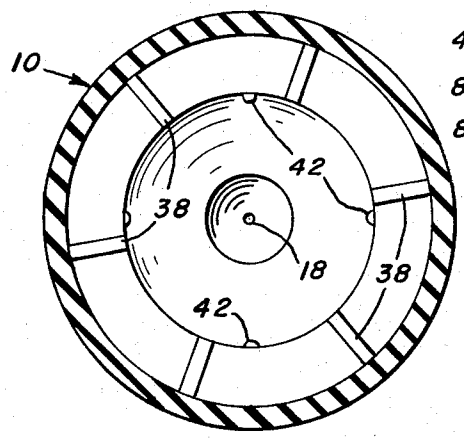



FIG. 3.

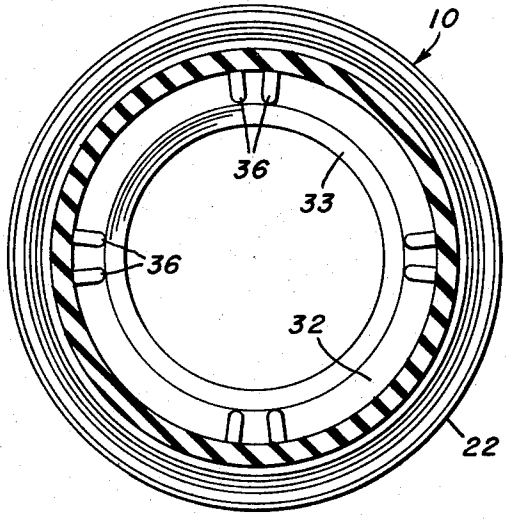



FIG. 6.

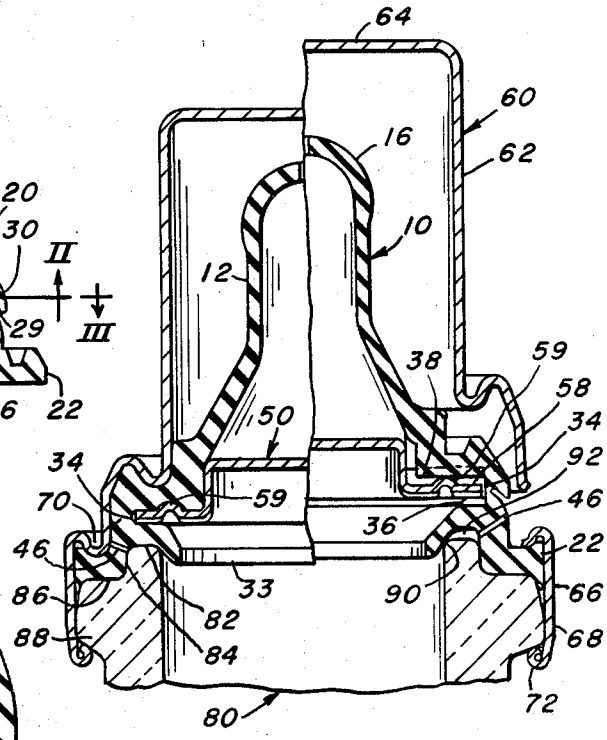



FIG. 4.

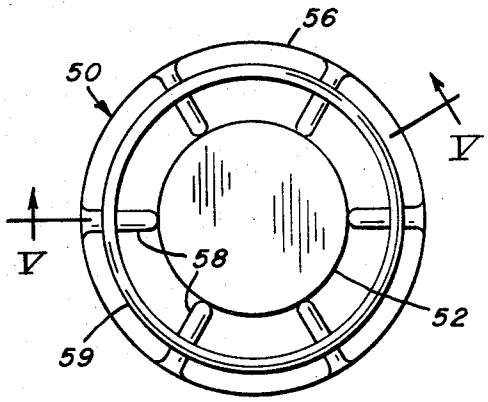
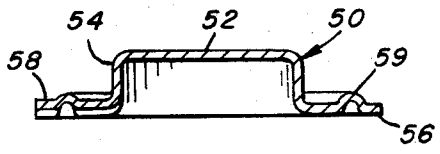



FIG. 5.




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# NIPPLE ASSEMBLY AND PACKAGE

## BACKGROUND OF THE INVENTION

It is known to provide a package for storing and dispensing individual portions or servings of liquid such as formula for infact consumption in which the container has a dispensing nipple thereon and a removable protective shroud thereover as is described in U.S. Pat. Nos. 3,335,890 and 3,516,564. These packages have worked well for the intended purpose, but some difficulty has been experienced in molding the nipples for the packages. Compression molded nipples have sometimes been defective, and defective nipples result in defective packages. Accordingly, it is desired to provide a dispensing nipple for such a package which can be molded in large quantities with few or no defects in the nipples.

## SUMMARY OF THE INVENTION

The invention provides a molded elastic dispensing nipple which has an inwardly open annular recess in its base with a plurality of radially extending ribs on the undersurface of the top wall and on the upper surface of the bottom wall of the recess, and which may have a sealing disc seated in the annular nipple recess, which disc has a plurality of radial ribs and a circumferential rib in its peripheral edge portion. When the nipple and disc are sealed on a container entrance mouth with a shroud thereover, the disc is sealed in the annular recess in the nipple so that the contents of the container cannot escape around the disc, and so that upon removal of the shroud the seal will be released for dispensing the contents of the container through the nipple.

Accordingly, an object of the invention is to provide an improved dispensing nipple and sealing disc for affixation to a container entrance mouth to form a hermetically sealed tamperproof package.

Another object of the invention is to provide a dispensing nipple which has an inwardly open annular recess in its base with a plurality of radial ribs on the undersurface of the top wall of the recess which are aligned with the direction of material flow during molding of the nipple to ensure that the nipple can be molded in large quantities with no defects in the molded nipples.

## BRIEF DESCRIPTION OF THE DRAWINGS

The above and other objects and advantages of the invention will be more fully understood and appreciated with reference to the following specification and drawings wherein:

FIG. 1 is a cross-sectional view of a nipple of the invention;

FIG. 2 is a cross-sectional view of the nipple taken along line II—II of FIG. 1;

FIG. 3 is a cross-sectional view of the nipple taken along line III—III of FIG. 1;

FIG. 4 is a top plan view of a disc element for assembly with a nipple;

FIG. 5 is a cross-sectional view of the disc element taken along line V—V of FIG. 4;

FIG. 6 is a cross-sectional view compositely illustrating, to the left of center, a closure assembly comprising a nipple, disc and shroud affixed to a container and, to the right of the center, a package in authorized opened condition thereof.

## DESCRIPTION OF A PREFERRED EMBODIMENT

An exemplary embodiment of a unitized closure assembly of the invention includes a contents dispensing member, such as a flexibly resilient or elastic infant feeding nipple, adapted to be permanently affixed against upwardly directed, axially and radially stepped sealing surfaces of a rigid container and an imperforate disc adapted to sealably separate the interior of the container from an interior cavity in the nipple and a fragibly removable cup-shaped outer protective shroud provided with a closure affixing locking ring engagable with the dispensing member and the exterior surface of the container



to form therewith a hermetically sealed tamperproof closure-container package.

Referring to the appended illustration, FIGS. 1 through 3 illustrate a flexibly resilient infant-feeding nipple 10 made of elastic material and including a substantially vertical upstanding teat portion 12 and a radially outwardly directed axially stepped hollow base. Teat portion 12 terminates in a generally spherically shaped mammilla 16 having a discharge orifice 18 therein. The base of nipple 10 is configurated to provide upper and lower outwardly stepped annular flanges 20 and 22 respectively with annular recesses 24 and 26 in the upper faces of the flanges. The outer surfaces of these flanges are tapered slightly to facilitate assembly of the nipple with a protective shroud adapted to be assembled over the nipple. The base also includes upper and lower substantially vertically disposed cylindrical wall or web sections 28 and 30 respectively with lower web section 30 having an annular groove 29 therein. The nipple base further has a relatively thin interior inwardly directed annular flange 32 terminating in a downwardly and inwardly directed flap portion 33 which is adapted for disposition against an upper surface of an underlying container. Small radially extending ribs or grooves, now shown, may be provided in the undersurface of flap portion 33 to improve venting of a package capped with such a nipple. Flange 32 in combination with the interior undersurface of step flange 20 forms therewith an inwardly open annular recess 34 for receiving the radial edge or rim of a substantially circular disc such as that illustrated in FIGS. 4 and 5.

In the nipples described in Pat. No. 3,516,564, the lower interior flange of the nipple is provided with a plurality of small upwardly extending buttons, and the undersurface of the upper flange is provided with one or more annular beads for sealing against the peripheral edge portion or rim of a disc positioned in the nipple recess. Although these buttons and beads have functioned well when properly molded, difficulty has been experienced in compression molding such formations on the surfaces of the recess. Because of the shape and orientation of the buttons and beads they have sometimes not been formed or, if formed, were formed with missing portions in them. With improperly formed nipples of this kind, the packages sealed with such nipples may not function properly.

It is a feature of this invention that the undersurface of flange 20 and the upper surface of flange 32 be provided with a plurality of radially extending ribs 38 and 36 respectively which can be molded with nipples 10 without producing defective nipples. When the package is opened ribs 36 hold the disc away from the upper surface of flange 32 and ribs 38 hold the disc away from the undersurface of flange 20 thereby providing communication between the container and the teat cavity of nipple 10. Ribs 36 and 38 extend inward from the outer wall of the nipple, and are aligned with the direction of material flow during molding of nipple 10 so that almost absolute assurance can be had that the ribs and the flat sealing surfaces between the ribs will be properly formed during molding. With the buttons and annular beads which have heretofore been formed on such nipples, the material which was injected into the mold had to change directions of flow in order to form the buttons and beads. This required direction change makes molding more difficult and has sometimes resulted in improperly or missing buttons and beads. Since the sealing between the nipple and disc occurred at the extremity of the annular bead, minor defects in the annular bead resulted in defective sealing performance. With the present invention, however, improper molding seldom or never happens. The present invention can also tolerate large defects in the form of voids in the radial ribs without detrimental affect on the performance of the package. Accordingly, nipples 10 of the invention will, when sealed on containers, produce packages which are almost completely free of defects.

As does the nipple disclosed in U.S. Pat. No. 3,516,564 nipple 10 further includes a plurality of substantially vertical inwardly extending ribs 42, or other inwardly projecting protrusions on the interior inwardly disposed surface of web section

28 for providing a centering means for a disc such as the one illustrated in FIGS. 4 and 5. In the form illustrated, nipple 10 has four such vertical ribs 42 equally spaced around the circumference of the interior surface of web 28. Additionally, a plurality of small projections 44 are provided on the interior inwardly disposed surface of lower flange 22 of the nipple base. These projections 44 are designed to center nipple 10 on a container entrance mouth prior to securement of the nipple to the container. Seven such projections 44 equally spaced around the nipple are illustrated in the preferred embodiment. The base of nipple 10 further has at least one small vent hole 46 through the nipple wall below interior annular nipple flange 32 for providing communication between the interior of the nipple below such flange 32 and the exterior of the nipple. Two such holes, 180° apart and having diameters of approximately 0.006 inch are employed in the preferred embodiment of the nipple.

Turning to FIGS. 4 and 5, an imperforate disc 50, preferably made of aluminum or an aluminum alloy, is illustrated for assembly with a nipple 10 as seen in FIG. 6. Disc 50 is substantially round and has a raised central portion with a horizontal upper wall 52 and a substantially cylindrical side wall 54, and an annular rim portion 56 with a plurality of upwardly embossed flutes or radial ribs 58 and an upwardly embossed annular rib 59 which presses into ribs 38 and into the flat undersurface of flange 20 thereby providing a seal which separates the upper cavity in the teat portion of a nipple and a container in the sealed condition. In the form illustrated, there are six equally spaced flutes 58 radially extending over the width of the rim portion 56 of the disc. Ribs 58 prevent a seal between underside of disc 50 and the upper surface of flange 32 which seal would be unbroken during opening of a package thereby preventing communication between the container and the teat of a nipple because atmospheric pressure acting on top of the disc combined with vacuum in the container would act to continue to hold the disc in a down and sealed position. Circumferential rib 59 is higher than flutes 58 and has a relatively sharp radius at its apex to insure penetration of ribs 38 to their full depth thereby insuring a seal between annular rib 59 and the underside of flange 20. Disc 50 is configurated and dimensioned such that when assembled with nipple 10 and the assembly is positioned in shroud, the outer rim diameter of disc 50 is slightly smaller than the transverse outer diameter of recess 34 in the nipple base to permit flow of product therebetween, and the outer diameter of the raised central portion substantially corresponds to the transverse dimension between the innermost surfaces of opposed ribs 42 on the interior surface of nipple web 28 to ensure proper positioning of disc 50 in a package.

FIG. 6 illustrates a package comprising a nipple 10, a disc 50 in the nipple and a shroud or closure member 60 over the nipple and securing it to a container 80. Shroud 60 is illustrated in the form of a drawn substantially inelastic metallic shell preferably made of aluminum or an aluminum alloy. It comprises an upwardly extending tubular body portion 62 terminating in a top panel 64, and a laterally outwardly and axially stepped base including an upper annular ring portion 66 and a lower annular ring or locking band portion 68, with a curved valley 70 therebetween. Locking band portion 68 preferably terminates in an annular curled bead 72 defining an open circular entrance mouth to the shroud 60, and a frangible or rupturable circumferential zone not shown is located in the curve valley 70 between the locking band and the upper ring portion 66 of the shroud. Preferably, the frangible zone is provided in the form of a plurality of arcuate slots or slits with intermediate connecting bridges as described and illustrated in U.S. Pat. Nos. 3,335,890 and 3,516,564. This zone provides a means for separating a top portion of the shroud to open a package as will be described.

A container suitable for affixation of a nipple 10 and disc 50 of the invention is illustrated in the form of a molded or blown substantially rigid glass or plastic bottle 80 having an entrance opening or mouth defined by an upwardly directed substantially horizontal flat annular top sealing surface or finish 82 in combination with a lateral or side finish 84 which preferably diverges downwardly into slightly flared connection to a second radially, outwardly and upwardly facing, annular sealing surface or finish 86 providing a laterally projecting shoulder or lacking bead 88 therebelow.

A closure assembly may be formed by positioning a disc 50 in recess 34 in the hollow base of a nipple 10 and positioning the assembly in a shroud 60. This assembly of a nipple and disc has been readily accomplished by circumferential elastic stretching and widening of the lower entrance of the nipple base for positioning the disc in the base. Upon assembly of nipple 10, disc 50 and shroud 60, the unitized closure assembly is positioned over the container entrance mouth and affixed thereto by constriction of bead 72 under the projecting shoulder 88 of the container.

FIG. 6 compositedly illustrates, to the left of center, a unitized closure assembly following affixation to container 80, and to the right of the center, a package after authorized opening thereof. From this illustration, it is observed that nipple 10 has been compressibly and elastically deformed from the original dimensional configuration of its base as well as circumferentially and axially restrained by substantially inelastic enclosing base configuration of shroud 60 in the hermetically sealed tamperproof condition of the closure assembly on its container. The hermetically sealed condition of container 80 and nipple 10 is developed between the surfaces of the elastically compressed and deformed nipple base in continuous abutment against the upwardly directed stepped container surfaces 82 and 86. Deformation of the nipple base in the closure affixing operation further results in elastic deformation and contacting abutment between the upper wall of recess 34 continuously with the annular rib 59 of disc 50 to develop a hermetically sealed transverse partition between the interior of the container and the interior of nipple 10. In this regard, the ribs 38 (FIG. 1) on the surface of recess 34 and ribs 58 on the disc 50 do not interfere with the continuous circumferential hermetic sealing abutment between the upper surface of the recess and the circumferential rib 59 on the disc. Beads 36 and 38 are not distinguishable on the left side of FIG. 6 because they have been elastically deformed against the rim of disc 50. Accordingly, as shown to the left of center in FIG. 6, the axially applied pressure of shroud 60 against nipple 10 completely seals the interior of container 80 from the cavity in the teat portion 12 of nipple 10 and also compresses venting aperture 46 to a sealed condition respecting the interior of the container.

It is a feature of the invention that the seal between the interior of a container and a hollow nipple affixed thereto is effected by rib 59 sealing against the undersurface of the top wall of the nipple recess, and is not dependent upon annular beads in the nipple recess as has been the case with prior art packages. In a package of the prior art, annular beads on the nipple sealed against the rim of the disc to provide a seal between the interior of the container and the hollow nipple, and if these beads were not properly formed, the package could be defective. In a package of the invention, however, rib 59 on disc 50 provides this seal between the interior of the container and the hollow nipple by sealing against the undersurface of the top wall of the nipple across ribs 38 and the flat surfaces between such ribs. Ribs 38 on the nipple are not functional in providing this seal, but instead function in the opened package to provide passageways for the flow of formula around the disc as will be described. In their function of providing passageways for the flow of formula, it is not critical that ribs 38 be perfectly formed. It is the sealing rib 59 on disc 50 that must be accurately formed if defective packages are to be avoided. Rib 59, however, can be mechanically formed on the rim of disc 50 and can therefore be repeatedly formed without defect. Consequently, packages of the invention can be produced in large quantities with a minumum of functional defects therein.

Authorized opening of the tamperproof package is effected by application of a breaking torque across the rupturable zone in shroud **60** by restraining container **80** and applying force laterally against one side of tubular body portion **62** of the shroud to fracture the bridges in the circumferential frangible zone between the lower secured locking band **68** and the remainder of the shroud to separate the latter from the package. As illustrated to the right of center of FIG. **6**, authorized removal of the upper portion of shroud **60** exposes nipple **10** in permanent attachment to the container by the unremoved locking portion **68** of the shroud with closure bead **72** secured under container locking bead **88**, and lower nipple flange **22** sealed against the upwardly directed lower container finish **86**.

Removal of the upper portion of the shroud **60** permits the elastic nipple base to resiliently return to its original uncompressed and unconfined condition above the permanently secured and sealingly compressed lower nipple flange **22**. This releases compressive restraint of disc **50** within recess **34** and destroys or breaks the hermetic seal between annular rib **59** of the disc **50**, and the undersurface of the top wall of the nipple recess **34**. Inner communication between the interior of nipple **10** and container **80** is thereby established radially outwardly between ribs **36** which separate undersurface of disc **50** from lower surface of recess **34**, then through annular clearance between the periphery of the disc and the circumferential wall of recess **34**, and then radially inward across the top of the disc between ribs **38** which separate the upper surface of the disc from the upper surface of recess **34**. The radial ribs **36** and **38** on the upper and lower surfaces of recess **34** and ribs **58** on disc **50** aid in relieving any tendency of surface adhesion between the surfaces of disc **50** and the abutting surfaces of the nipple following authorized opening of the package, thereby ensuring that the previously described passageways for communication between the container and the inner space of the nipple will open properly. With the nipples previously known, missing or defective buttons or beads on the walls of the recess resulting from improper molding would sometimes produce continued surface adhesion between the disc and surfaces of the nipple in the opened package, and formula could not flow around the disc in the package as desired. However, with nipple **10** of the invention, the nipple is almost invaribly properly molded and those defects which do occur are unlikely to cause malfunctioning of the package.

As seen in the right hand side of FIG. **6**, removal of the upper portion of shroud **60** relieves the compression of flange **32** against the underlying surface **82** of container **80** and leaves a circumferential space **92** therebetween, with flap **33** bearing against the curved container surface **90**. Flap portion **33** of the flange **32**, in the uncompressed or opened condition, is designed to have a slight interference with curved container surface **90** and may actually conform thereto, and is relatively flexible and is responsive to an internal vacuum in container **80** produced by an intermittent flexure action exerted on the nipple mammilla **16** to provide a flutter seal with the curve container surface **90** under a slight compressive pressure. In this regard, the flutter valve action of the resilient and flexible flap **33** reacts to make and break circumferential sealing contact with curved container surface **90** responsive to differential pressures between the interior of container **80** and ambient pressures outside the container. Small ribs or grooves not shown on the undersurface of the flap **33** help to assure that the circumferential contact between the flap and container surface can be broken with a relatively low pressure differential. Ambient air is thereby permitted to enter container **80** through such flutter valves.

It is therefore seen that an improved nipple is provided which has ribs on the surfaces of an annular recess in the nipple base which extend radially inward from the wall of the nipple to facilitate molding the nipple, and which nipple is adapted to be assembled with an imperforate disc for affixation to a container to form a package that can be fabricated on a production basis with few or no defects.

Although a specific embodiment of the invention has been illustrated and described, it will be appreciated by those skilled in the art that various modifications can be made therein without departing from the scope of the appended claims.

What is claimed is:

**1.** In an assembly of an elastic dispensing nipple and a disc therein adapted for securement on the entrance mouth of a rigid container to form a sealed package, the nipple having a discharge end with an orifice therein and a hollow open-end base for sealing securement against a sealing surface of the container entrance mouth and an inwardly open annular recess in the nipple base for overlying an upwardly facing sealing surface on the container, and said disc being disposed transversely across the nipple with an annular rim portion of the disc supported in the said nipple recess, the improvement comprising:

said nipple having a plurality of radial ribs on the undersurface of the top wall of the annular recess in the nipple base and extending inward from the outer wall of the nipple, and said disc having an annular rib and a plurality of radial ribs of lesser height in its annular rim portion,

whereby, the nipple base can be axially compressed on a container entrance mouth to seal the disc in the nipple recess and, upon release of the axial compression, the radial ribs on the nipple recess and disc will provide passageways for flow of the contents of the container between the disc and the nipple recess to be dispensed through the orifice in the discharge end of the nipple.

**2.** An assembly as set forth in claim **1** in which radial ribs are provided on the upper surface of the bottom wall of the nipple recess extending inward from the outer wall of the nipple.

**3.** In a tamperproof hermetically sealed package including a rigid container for enclosing liquid contents and having upper and lower upwardly facing sealing surfaces adjacent the entrance mouth thereto, an elastic dispensing nipple having a discharge end with an orifice therein and a hollow open-end base permanently sealingly secured against the lower sealing surface of the container, and an inwardly open annular recess in the nipple base overlying the upper sealing surface of the container, a disc transversely disposed across the nipple with an annular rim portion of the disc supported in the nipple recess, and a substantially inelastic shroud enclosing the base of the nipple and secured to the container, said shroud engaging the exterior surface of the container in axial compression of the nipple base to seal said disc in the nipple recess, the improvement comprising:

said nipple having a plurality of radial ribs on the undersurface of the top wall of the annular recess in the nipple base and extending inward from the outer wall of the nipple which configuration promotes elimination of molding defects in this critical area during molding of the nipple, and said disc having an annular rib and a plurality of radial ribs of lesser height in its annular rim portion,

whereby upon release of the axial compression of the nipple base, the radial ribs on the nipple recess and disc provide passageways for flow of the container's contents between the disc and the nipple recess to be dispensed through the orifice in the discharge end of the nipple.

**4.** A package as set forth in claim **3** in which radial ribs are provided on the upper surface of the bottom wall of the nipple recess extending inward from the outer wall of the nipple.

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