

June 23, 1970

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3,516,564

NIPPLE ASSEMBLY AND PACKAGE

Filed Jan. 30, 1969

2 Sheets-Sheet 1

FIG. 2.

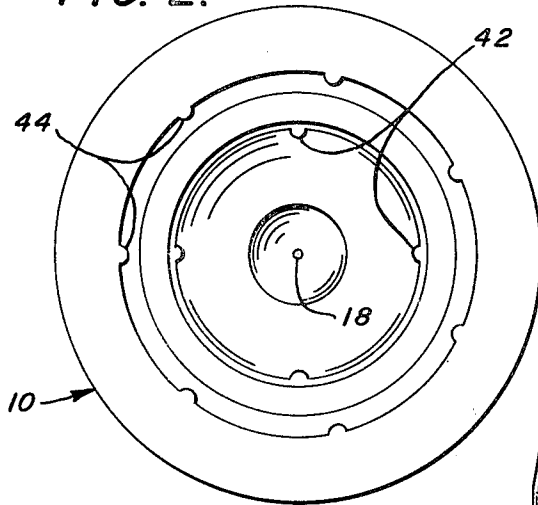


FIG. 1.

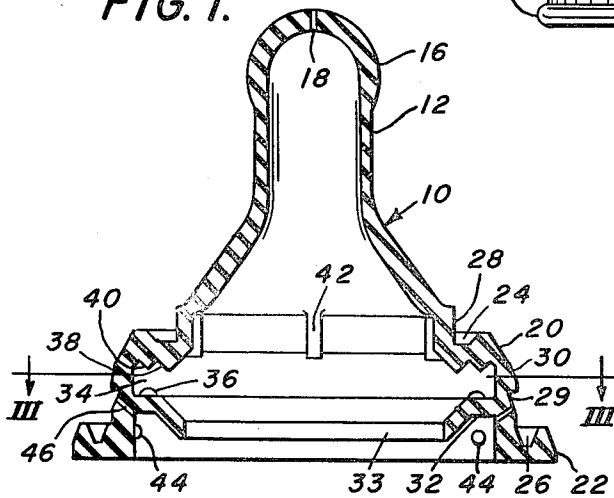


FIG. 3.

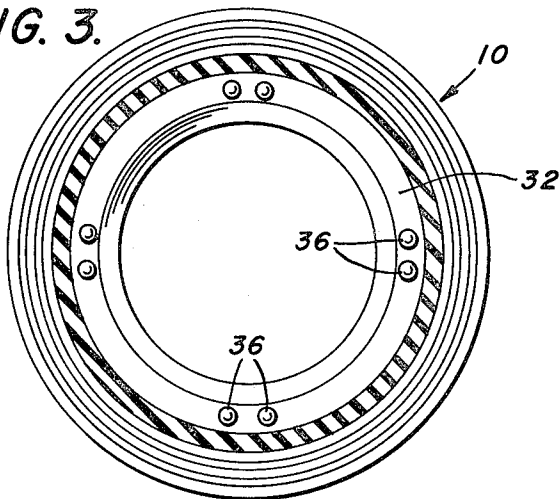


FIG. 6.

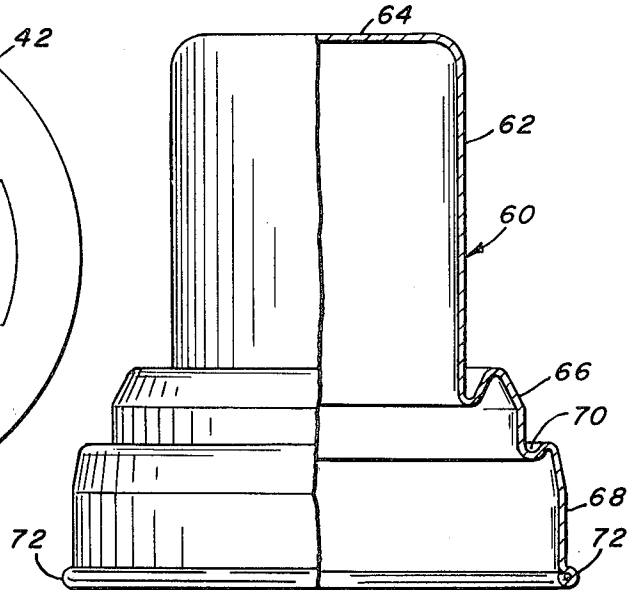


FIG. 4.

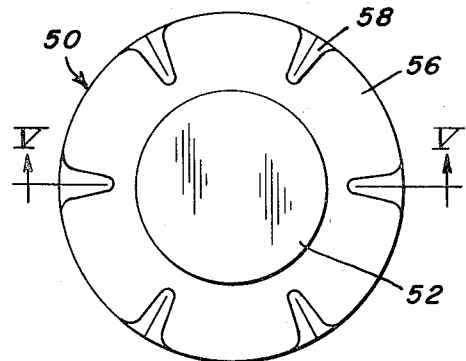
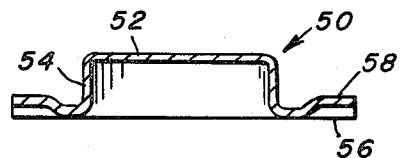


FIG. 5.



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2 Sheets-Sheet 2

FIG. 7.

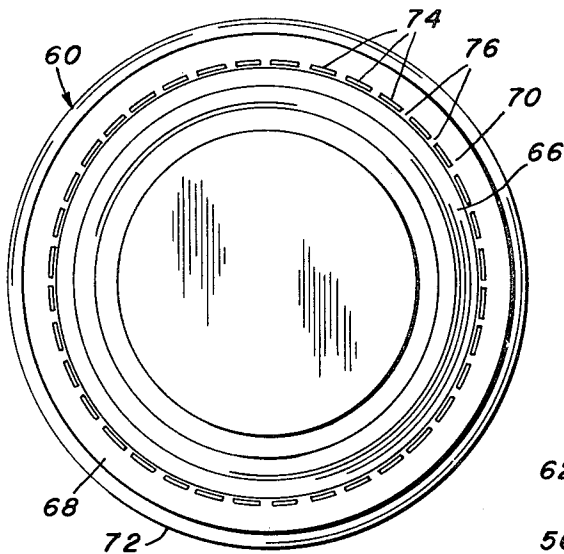


FIG. 9.

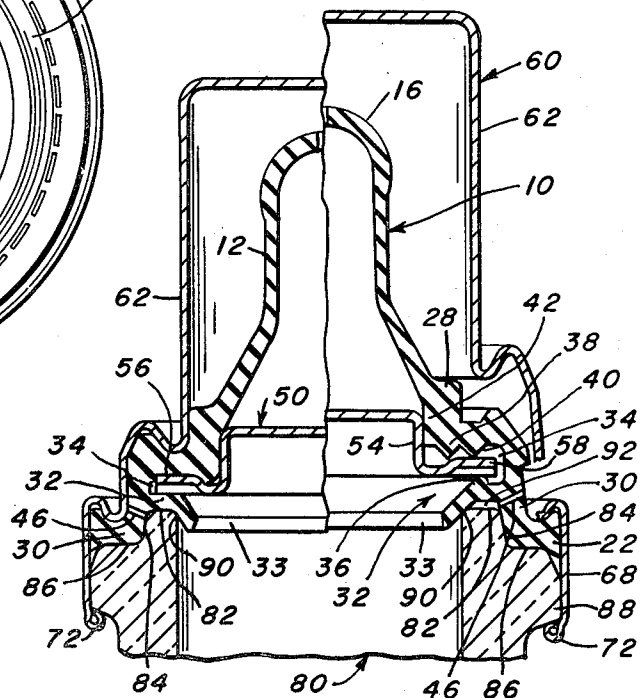
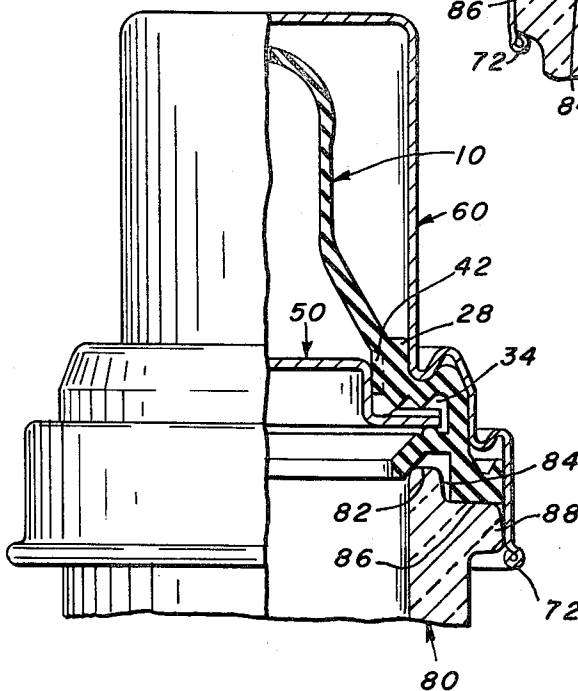


FIG. 8.



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1

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NIPPLE ASSEMBLY AND PACKAGE

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U.S. Cl. 215—11

9 Claims

ABSTRACT OF THE DISCLOSURE

An assembly of an elastic contents dispensing nipple and disk therein for affixation, with a removable protective shroud thereover, upon the entrance mouth of a rigid container to form a tamperproof hermetically sealed package, the dispensing nipple having interior, vertically disposed ribs for disposition against a substantially cylindrical side wall of a raised central portion of the disk to center the same without stiffening the nipple against compressive sealing with the container mouth.

BACKGROUND OF THE INVENTION

It is known to provide packages for storing and dispensing individual portions or servings of liquids such as formulae for infant consumption in which the container has a dispensing nipple thereon and a removable protective shroud thereover such as those described in U.S. Letters Patent No. 3,335,890 granted on Aug. 15, 1967 and in U.S. Letters Patent No. 2,982,432 granted on May 2, 1961.

It is desirable to provide such a dispensing package which has a protective shroud thereon which can be removed with a minimum of force, and which upon removal of the shroud will dispense the contents of the package with a low pressure differential between the interior of the container and the ambient exterior air.

SUMMARY OF THE INVENTION

This invention provides an assembly comprised of an elastic dispensing nipple and a disk therein which, when secured with a removable protective shroud thereover upon a container entrance mouth, will sealably separate the interior of the container from an interior cavity in the nipple, the nipple and disk having improved means for centering the disk in the nipple without unduly stiffening the nipple. The assembly of this invention may be sealably secured with a shroud thereover upon a container entrance mouth with relatively low top sealing pressures whereby permanent deformation of the nipple and adhesion of the nipple and disk are avoided.

Accordingly, an object of the invention is to provide an improved assembly of a dispensing nipple and disk therein for a dispensing package.

Another object of the invention is to provide a package which has incorporated therein improved structure for centering a disk in a dispensing nipple without unduly stiffening the nipple.

These and other objects and advantages of the invention will be fully understood and appreciated with reference to the following specification and drawings appended thereto.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 represents a sectional elevational view of a nipple in accordance with the invention.

FIG. 2 represents a bottom plan view of the nipple element of FIG. 1.

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

2

FIG. 4 represents a top plan view of a disk element for assembly within the nipple.

FIG. 5 represents a cross-sectional view of the disk element taken along line V—V of FIG. 4.

FIG. 6 represents an elevational view, in partial sectional of a closure shroud for enclosing the nipple.

FIG. 7 represents a top plan view of the shroud of FIG. 6.

FIG. 8 represents an elevational view in partial sectional of a closure assembly of a nipple, disk and shroud adapted for subsequent affixation to a container to form a tamperproof, non-refillable package.

FIG. 9 represents a sectional elevational view compositely illustrating, to the left of the center of the figure, the closure assembly of FIG. 8 following affixation to a container and, to the right of the center, the package in authorized open 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, an imperforate disk adapted to sealably separate the interior of the container from an interior cavity in the nipple and a frangibly removable, cup-shaped, outer protective shroud provided with a closure affixing locking ring engageable 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 illustrations, FIGS. 1 and 2 represent a flexibly resilient infant-feeding nipple made of elastic material and including a substantially vertical upstanding, hollow 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 small discharge orifice 18 therein. The base of nipple 10 is configured to provide upper and lower outwardly stepped annular flanges 20 and 22 respectively with annular recesses 24 and 26 in the upper surfaces thereof. 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. Flange 32 in combination with the interior under surface of stepped flange 20 forms therewith an inwardly open recess 34 for receiving the radial edge or rim of a substantially circular disk such as that illustrated in FIGS. 4 and 5.

Referring to FIG. 3, the substantially horizontal upper surface of interior flange 32 is provided with a plurality of small upwardly extending projections 36 for aiding in relieving any tendency of a disk to adhere to such upper surface thereof. In the form illustrated there are eight such projections 36 arranged in four pairs equally spaced around the circumference of flange 32, although such an arrangement and number of projections is not critical or essential to the operation of the package. Returning to FIG. 1, the interior under surface of flange 20 is provided with inner and outer, downwardly disposed, triangular shaped, annular beads 38 and 40 respectively for sealing against the upper surface of a disk positioned in nipple recess 34. A plurality of substantially vertical

3

inwardly extending ribs 42, or other inwardly projecting protrusions, are also provided on the interior, inwardly disposed surface of web section 28 for providing a centering means for a disk such as the one illustrated in FIGS. 4 and 5. In the form illustrated, the nipple 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 permanent securement of the nipple to the container as hereinafter described. 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 degrees 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 disk 50, preferably made of aluminum or aluminum alloy, is illustrated for assembly with the nipple as seen in FIGS. 8 and 9. Disk 50 is substantially round and has a raised central portion with a horizontal upper wall 52 and a substantially cylindrical side wall 54, and a peripheral rim 56 with a plurality of flutes 58 therein for providing communication between the upper cavity in the teat portion of the nipple and the container during feeding. In the form illustrated, there are six equally spaced flutes 58 radially extending over approximately the outer three-quarters of the width of the rim 56 of the disk. Disk 50 is configured and dimensioned such that when assembled with nipple 10 and the nipple is positioned in a shroud, the outer rim diameter of disk 50 is slightly smaller than the transverse outer diameter of recess 34 in the nipple base, and the outer diameter of the raised central portion substantially corresponds to the transverse dimension between the innermost surface of opposed ribs 42 on the interior surface of nipple web 28 to insure sealing of disk 50 in a sealing package as is hereinafter described.

FIG. 6 illustrates a protective shroud or closure member 60 for assembly with the nipple and securement to a container as illustrated in FIGS. 8 and 9. Shroud 60 has been illustrated in the form of a drawn, substantially inelastic, metallic shell, preferably made of aluminum or an aluminum alloy, and has an upwardly extending tubular body portion 62 terminating in a top panel 64, and at its lower end in a depending 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.

Reference to FIG. 7 reveals a frangible or rupturable circumferential zone located in the curved valley 70 formed between the upper ring portion 66 and the lower band portion 68. The frangible zone is preferably provided in the form of a plurality of arcuate slots or slits 74 interrupted in their circumferential trace and continuity by connecting bridges 76. A scored groove could also be provided for the same purpose.

FIG. 8 illustrates an assembly of a nipple 10, disk 50 and shroud 60 positioned on a container 80 but prior to securement thereto. It is observed that the container is illustrated as 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, preferably diverging downwardly contiguous therefrom into slightly flared

4

connection to a second radially outwardly and upwardly facing, annular, sealing surface or finish 86 providing a laterally projecting shoulder or locking bead 88 therebelow.

The closure assembly is formed by positioning disk 50 within recess 34 in the hollow base of nipple 10. This assembly has been readily accomplished by circumferential elastic stretching and widening of the lower entrance of the nipple base. When nipple 10 with disk 50 therein is inserted into shroud 60, the hollow nipple base has its diameter slightly reduced by interference with the base of shroud 60 to provide restraining frictional engagement between the interior surfaces of the base of shroud 60 and the adjacent exterior surfaces of nipple 10 thereby from a unitized nested assembly. An integral, outwardly extending, annular, bulbous bead, now shown, may also be provided on the outer surface of web 28 to provide additional restraining frictional engagement between nipple 10 and shroud 60, or a spot of adhesive can be employed to insure retention of nipple 10 within shroud 60 during handling and processing of the assembly. Upon assembly of nipple 10, disk 50 and shroud 60, the unitized closure assembly is positioned over the container entrance mouth as illustrated in FIG. 8.

Affixation of a unitized closure assembly to a rigid container can be effected by various methods and tools, including those illustrated and described in U.S. Pat. No. 3,335,890 wherein live steam, gas, vapor or the like may be employed to treat and sterilize the external and internal surfaces of the nipple, disk and shroud substantially simultaneously with the affixation of the assembly thereof to a container. That patent further described tools and steps of affixation that may be utilized in the affixation of the closure assembly of the present invention.

Alternative to the method described in U.S. Pat. No. 3,335,890, a closure assembly of the invention can be affixed to a container by means of a pressure block having a cavity therein substantially conforming to the upper surfaces of shroud 60 for applying top pressure thereagainst, and a segmented collet closing head for permanently deforming and constricting closure bead 72 beneath the shoulder provided by container locking bead 88. The axially applied pressure of the pressure block elastically deforms and compresses the base of nipple 10 as illustrated to the left of center in FIG. 9 and as hereinafter described in respect to the hermetically sealed unitized package, and the permanent securement of closure bead 72 under container locking bead 88 effects affixation of the assembly to container 80.

FIG. 9 compositely illustrates, to the left of center, the unitized closure assembly of FIG. 8 following affixation to container 80, and also to the right of center the 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 portion, as well as circumferentially and axially restrained by the 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 surfaces of the elastically compressed and deformed nipple base in continuous abutment against the upwardly directed stepped container surfaces 82 and 86. Additional side sealing may also be accomplished and developed between the elastically compressed and confined web section 30 of the nipple base in abutment against an underlying cylindrical area of the container side finish 84.

In respect to the imperforate disk 50, deformation of the nipple base in the closure affixing operation results in elastic deformation and contacting abutment between the upper and lower walls of recess 34 continuously with the faces of the peripheral rim 56 of disk 50 to develop a hermetically sealed transverse partition between the interior of the container 80 and the interior of the nipple

10. In this regard, the sealing generated by elastic deformation of the triangular shaped beads 38, and 40 against the upper radially fluted rim 56 of disk 50 has been found to develop continuous circumferential hermetic sealing abutment against the fluted surface of disk 50 regardless of the effectiveness or establishment of hermetic sealing between the under surface of the disk within nipple recess 34. Beads 38 and 40 are not distinguishable on the left side of FIG. 9 because of such continuous circumferential abutment against the fluted disk rim 56. In order to provide such continuous circumferential sealing between beads 38 and 40 on the under surface of nipple recess 34 and the fluted surface of disk 50 it is necessary that disk 50 be substantially centered within recess 40. It is a feature of this invention that such centering is provided by inwardly projecting protrusions such as vertical ribs 42 on the interior surface of web 28 in at least substantially centering contact, if not complete abutting contact, with side wall 54 of disk 50 as is hereinafter described.

The elastic deformation of the nipple base by affixation of shroud 60 to container 80 also seals the under surface of annular flange 32 and its flap portion 33, under compression, against underlying upper surface 82 and curved surface 90 of container 80. The axially applied pressure of shroud 60 against the surface of nipple 10 thereby 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, although shown uncompressed on the left hand side of FIG. 9.

Authorized opening of the tamperproof package is effected by application of a breaking torque across the rupturable zone of shroud 60 by restraining container 80 and applying force laterally against one side of tubular body portion 62 of shroud 60 to fracture bridges 76 (FIG. 7) in the circumferential frangible zone between the lower permanently secured locking band 68 and the remainder of the shroud to separate the latter from the package as illustrated to the right of center in FIG. 9. Authorized removal of the upper portion of shroud 60 exposes nipple 10 in permanent attachment to the container by the unremoved locking band portion 68 of the shroud, with closure bead 72 thereof secured under container locking bead 88. The lower nipple flange 22 remains thereby sealed against the upwardly directed lower container finish 86.

Removal of the upper portion of shroud 60 also 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, and the nipple base thereby releases compressive restraint of disk 50 within recess 34 and destroys or breaks the hermetic seal between the triangular beads 38 and 40 and the upper surface of the fluted rim of disk 50. Intercommunication between the interior of nipple 10 and container 80 is thereby established radially outwardly through the flutes 58 of the otherwise imperforate disk 50. Projections 36 on the upper surface of the inwardly directed flange 32 of the nipple base have been found to aid in relieving any tendency of surface adhesion between the under surface of disk 50 and the abutting upper surface of flange 32 following authorized opening of the package.

In the open condition, flexible flap 33 on interior nipple flange 32 provides a flutter or flapper valve seal responding to a low differential pressure between the interior of container 10 and outside atmospheric pressure entering the venting apertures 46 into the circumferential space 92. 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 space 92 therebetween with flap 33 bearing against curved container surface 90 as is seen in the right half of FIG. 9. Flap portion 33 of flange 32 in the uncompressed or open condition is

designed to have a slight interference with curved container surface 90 and may arcuately conform thereto. Flap 33 is also relatively flexible and is responsive to an internal vacuum in container 80 produced by an intermittent sucking action exerted on the nipple mammilla 16 to provide a flutter seal with the curved 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. Ambient air is thereby permitted to enter container 80 through such flutter valve.

As mentioned above, it is a feature of this invention that in a unitized closure assembly disk 50 is substantially centered in the hollow base of nipple 10 by means of inwardly projecting protrusions such as vertical ribs 42 on the interior surface of web 28 in at least substantially centering contact, if not in complete abutting contact, against the substantially vertical side wall 54 of the disk. Such centering means assures sealing of nipple beads 38 and 40 on the under surface of nipple recess 34 against the fluted surface of disk 50 without unduly stiffening nipple 10. Centering means for disk elements in nipple assemblies have heretofore been provided in the form of ribs on the outer wall of the nipple recess which reacted against the periphery of the disk. For packages having such nipple assemblies thereon, extremely high top sealing pressures were required to effect sealing of the packages. With such high top sealing pressures, the nipple, and particularly the interior nipple flange thereof, could be permanently distorted. Moreover, undesirable adhesion could be produced between the interior surfaces of the nipple and the surfaces of the disk as well as upper container sealing surface by such high top sealing pressures. Permanent distortion of the nipple and adhesion of the surfaces of the elements may cause leaking of the contents of the package and may require a high pressure differential between the interior of the container and ambient conditions to effect dispensing of the contents of the container.

According to the present invention, vertical centering ribs 42 are provided which permit securement of a nipple assembly on a container with the application of a low top sealing pressure. It has been found that by providing the centering means in the nipple assembly above the hollow base of nipple 10 which is compressed during affixation, much lower top sealing pressures can be employed. Unlike prior nipple assemblies, the centering means of the present invention adds no stiffness to the base of the nipple. The location of ribs 42 on the inner surface of web 28 above the area of axial compression by shroud 60 avoids interference with such compression of the nipple during securement of the assembly on the container. Top sealing pressure on shroud 60 and the underlying nipple surfaces may therefore be relatively low, in the range of forty to fifty pounds, and still effect a good seal of disk 50 within nipple recess 34 and nipple flange 32 against upper container sealing surface 82.

A low top sealing pressure is also desirable in that it permits the employment of a shroud having relatively weak or easily rupturable bridges 76 (FIG. 7) therein. With such weak bridges, the upper portion of the shroud can be removed with the application of a minimum of force thereagainst, and very little difficulty is encountered in opening the package. With the heretofore known nipple assemblies which required relatively high top sealing pressures for application, easily rupturable bridges were not feasible in that the bridges were subject to rupture during application of the closure. In a package constructed in accordance with the present invention the upper portion of the shroud can be separated from the container by the application of approximately 15-25 inch pounds of torque across the rupturable zone of the shroud.

Although a specific embodiment of the invention has been selected for illustration and description, it will be

appreciated by those skilled in the art that various modifications can be made therein within the scope of the invention and the scope of the claims appended hereto. Included in such modifications is the provision of various alternative shrouds or closures for the package such as a shroud having threads in the base thereof for engaging matching threads on the container entrance mouth. Modification of the disk within the nipple is also contemplated as being within the scope of the invention. For example, a disk could have at least one aperture in the periphery thereof which would be sealed by the overlying nipple surface by the elastic deformation of the nipple in the closed condition, and which aperture, in the open condition of a package, would provide communication between the container and the nipple mamilla.

What is claimed is:

1. In an assembly of an elastic dispensing nipple and a disc therein adapted for securement upon the entrance mouth of a rigid container to form a hermetically sealed package, said nipple having a discharge end with an orifice therein and a hollow, open-ended base for sealing securement against a lower sealing surface of the container entrance, an inwardly projecting annular flange in said hollow nipple base for overlying an upwardly disposed upper sealing surface of the container entrance, at least one venting aperture through the nipple base below said annular nipple flange and an inwardly open recess in the nipple base above the annular nipple flange, and said disk being disposed transversely across the nipple with the rim of the disk supported within said nipple recess, the improvement comprising:

said nipple having a plurality of inwardly directed protrusions on the interior surface thereof above the recess in the nipple base, and

said disk having a raised central portion with a substantially cylindrical side wall thereof in substantially centering contact with said nipple protrusions to center the disk in the nipple recess,

whereby the nipple base can be axially compressed on the container entrance to hermetically seal the disk in the nipple recess and compressibly seal the annular nipple flange against an upper surface of the container entrance by application of pressure against the exterior surface of the nipple overlying the rim of the disk and the annular nipple flange.

2. An assembly as set forth in claim 1 in which said nipple protrusions are disposed above said exterior nipple surface overlying the rim of the disk and the annular nipple flange.

3. An assembly as set forth in claim 1 in which said protrusions comprise a plurality of vertical ribs on the interior surface of the nipple above the nipple recess.

4. An assembly as set forth in claim 1 in which said disk is imperforate and has a radially fluted rim.

5. An assembly as set forth in claim 1 in which the nipple has a shroud thereover for compressing the nipple base on the container entrance mouth.

6. 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-ended base permanently, sealingly secured against said lower container sealing surface, an inwardly projecting annular flange in the nipple base overlying said upper container sealing surface, at least one venting aperture through the hollow nipple base below said annular nipple flange and an inwardly open recess in the nipple base above the annular nipple flange, a disk transversely across the nipple with the rim of the disk supported within said nipple recess, and a substantially inelastic shroud enclosing the nipple and secured to the container, said shroud engaging the exterior surface of the nipple overlying the upper sealing surface of the container in axial compression of the nipple to hermetically seal the disk within the nipple recess and compressibly seal the annular nipple flange against the upper container surface, the improvement comprising:

said nipple having a plurality of inwardly directed protrusions on the interior surface thereof above the recess in the nipple base, and

said disk having a raised central portion with a substantially cylindrical side wall thereof in substantially centering contact with said nipple protrusions,

whereby the disk is substantially centered in the nipple recess to provide a continuous seal between the interior of the container and nipple.

7. A package as set forth in claim 6 in which said nipple protrusions are disposed above said exterior nipple surface which is engaged by the shroud.

8. A package as set forth in claim 6 in which said protrusions comprise a plurality of vertical ribs on the interior surface of the hollow nipple base above the nipple recess.

9. A package as set forth in claim 6 in which said protective shroud has a depending locking band which permanently seals the hollow base of the nipple against the lower container sealing surface, and has a transverse rupturable zone above said locking band for removal of an upper portion of the shroud, said rupturable zone being rupturable by the application of approximately 15-25 inch pounds of torque thereacross.

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