July 23, 1968 E. J. MEIERHOEFER 3,393,817

SEALED FEEDING BOTTLE ASSEMBLY

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Fig. 1

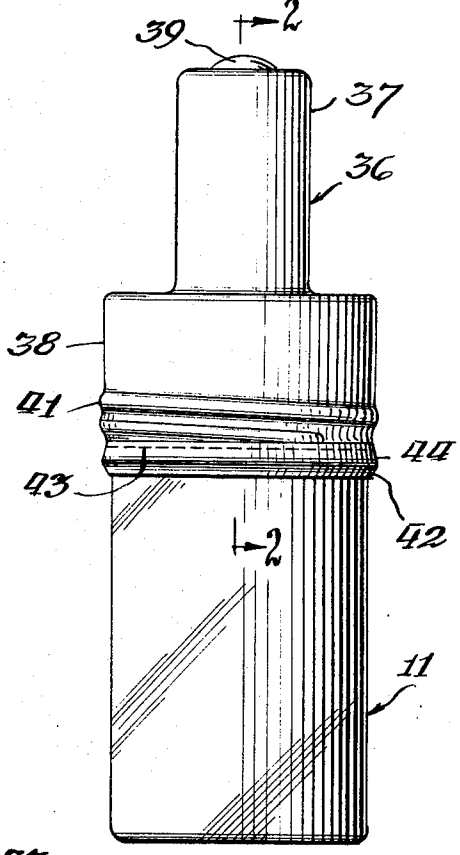

Fig. 7

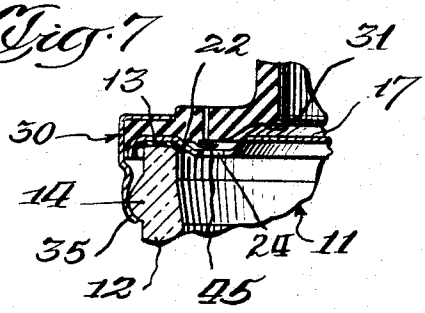

Fig. 2

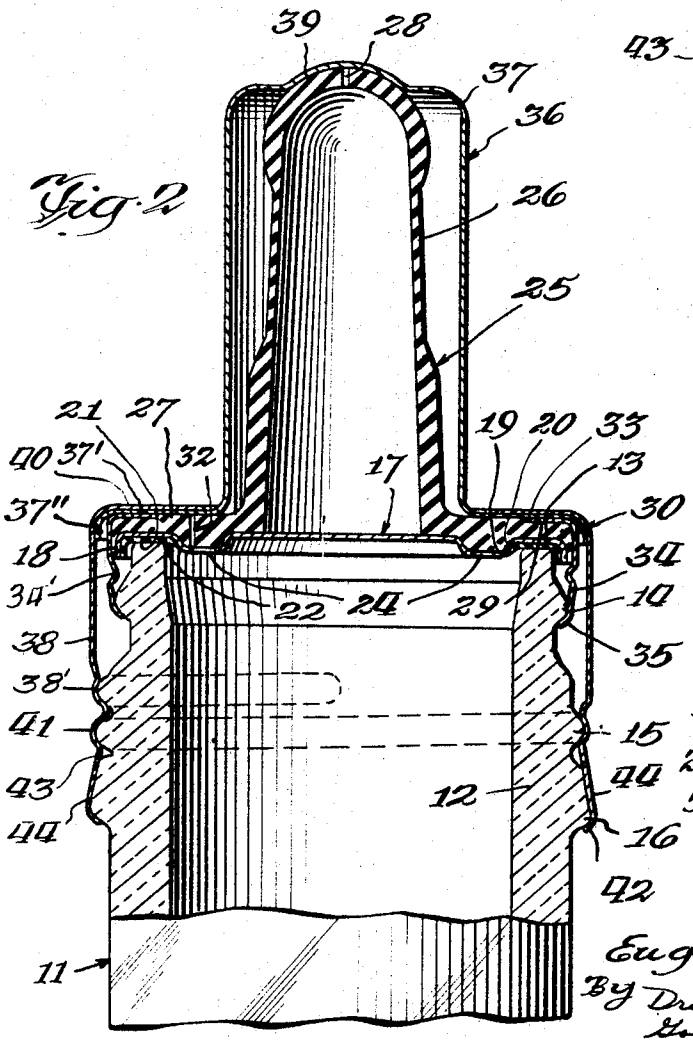

Fig. 8

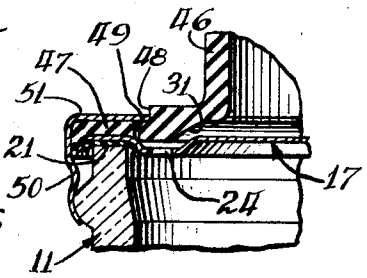

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Fig. 5

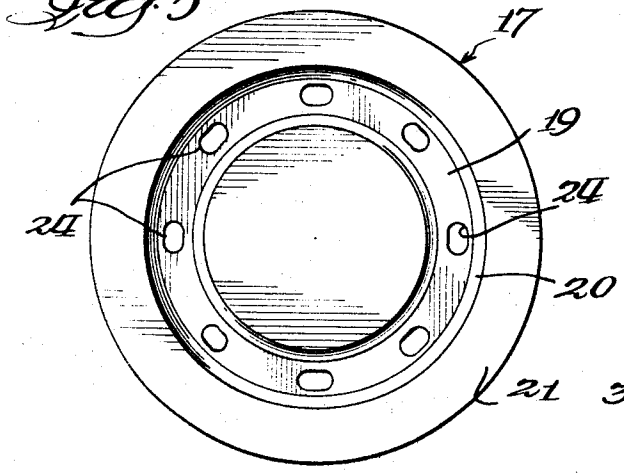


Fig. 3

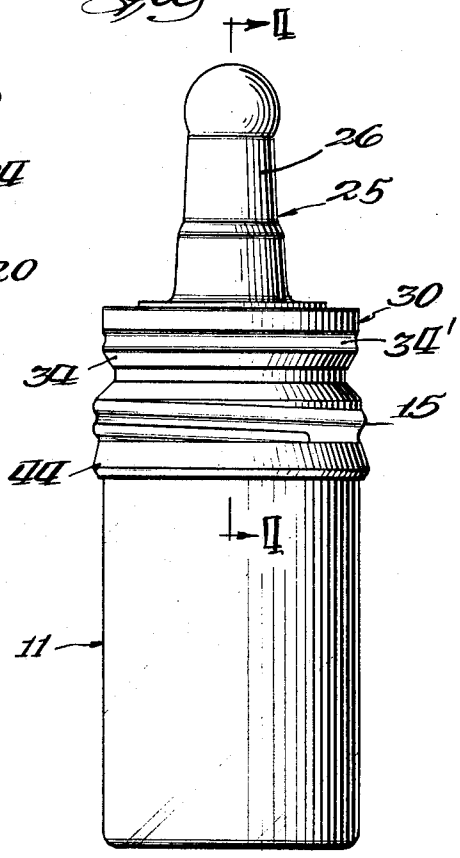
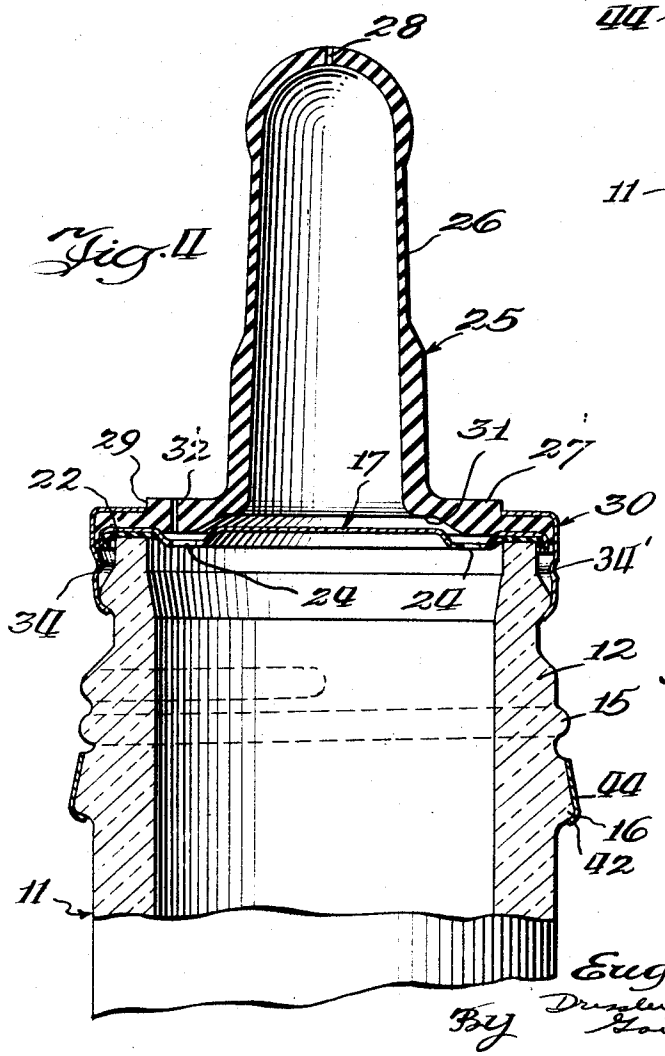


Fig. II



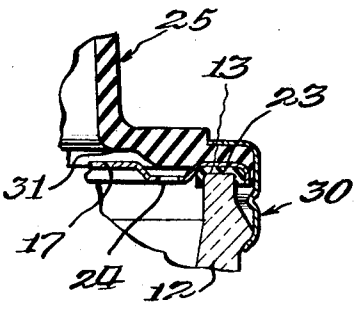


Fig. 6

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SEALED FEEDING BOTTLE ASSEMBLY

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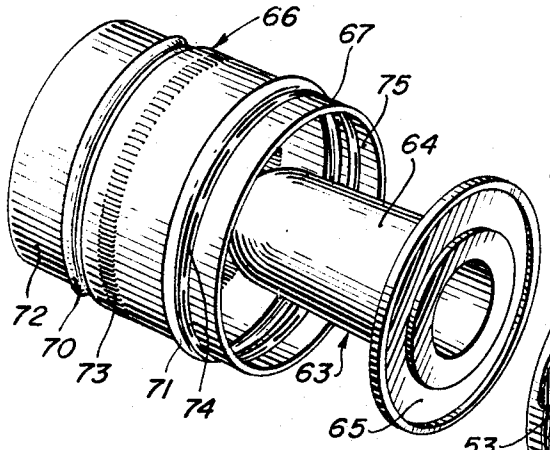
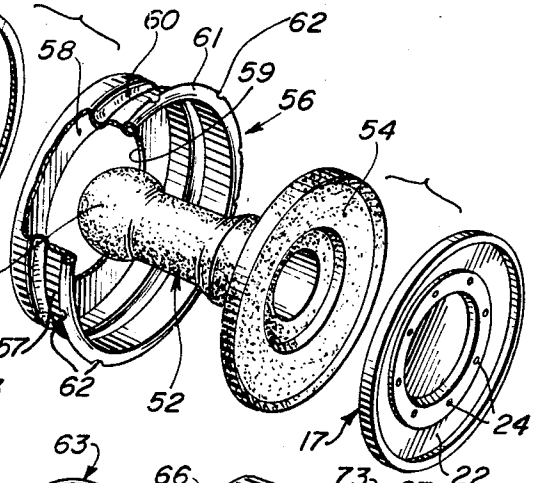


Fig. 11



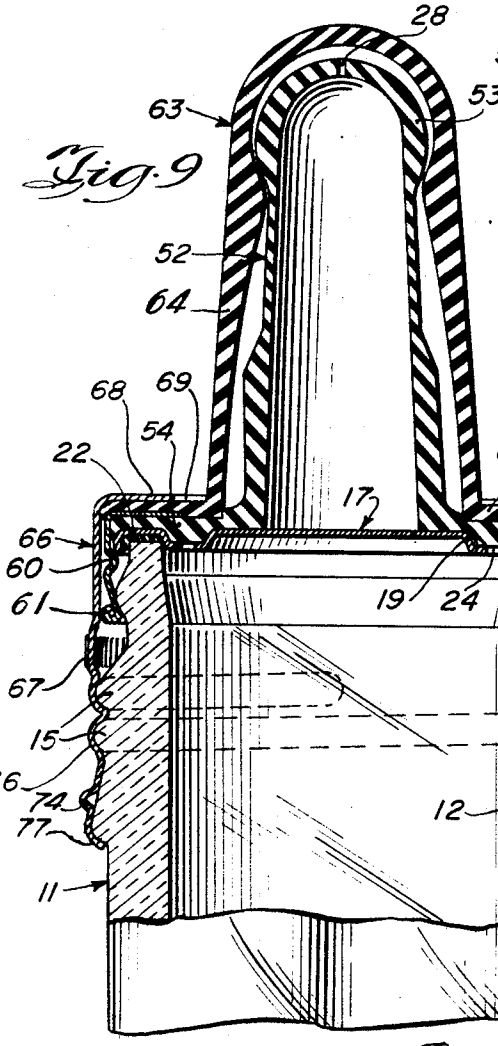


Fig. 9

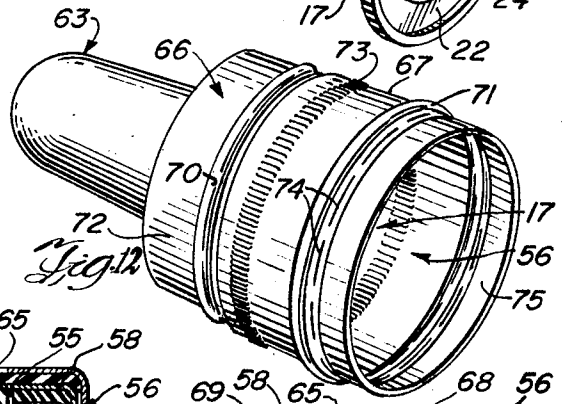


Fig. 12

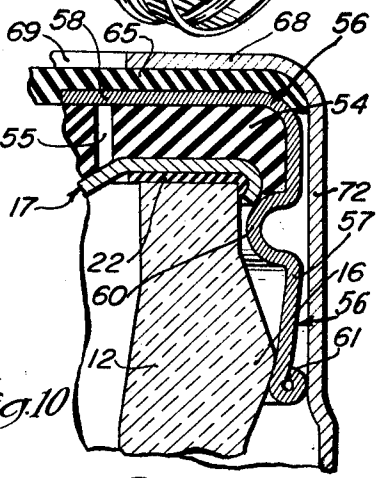


Fig. 10

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SEALED FEEDING BOTTLE ASSEMBLY

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Fig. 13

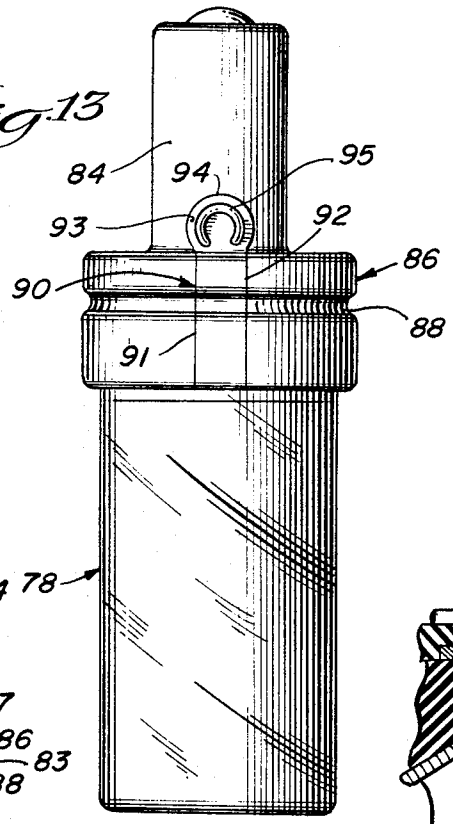


Fig. 14

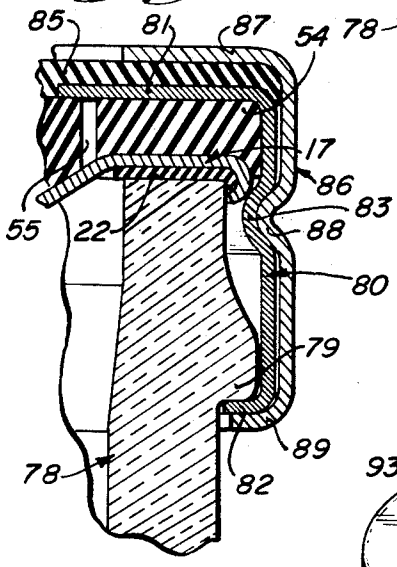
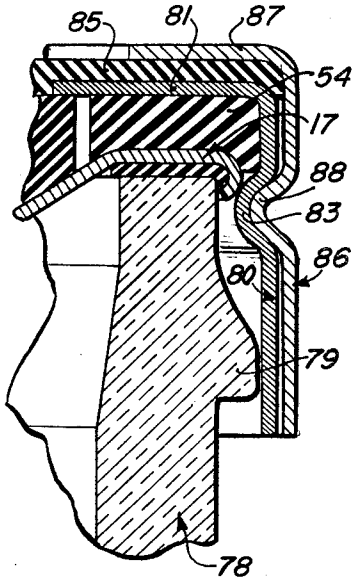


Fig. 15



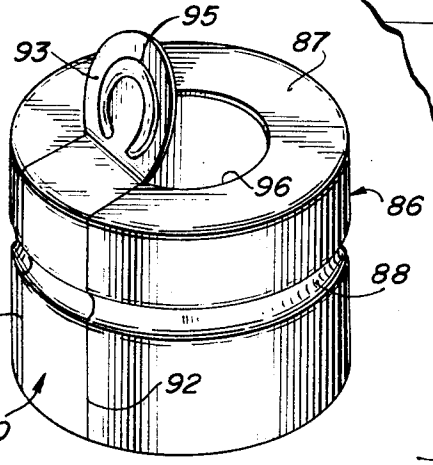


Fig. 16

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United States Patent Office

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SEALED FEEDING BOTTLE ASSEMBLY

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Continuation-in-part of application Ser. No. 365,403, May 6, 1964. This application Apr. 12, 1965, Ser. No. 448,581

23 Claims. (Cl. 215—11)

ABSTRACT OF THE DISCLOSURE

This application is directed to a tamperproof sealed feeding bottle assembly comprising a bottle, a sealing disk extending over the open top of the bottle, a nipple having a flange seated on top of the disk, an inner ferrule clamping the flange and the disk against the top of the bottle, a shroud fitting over the nipple and having a flange overlying the top of the inner ferrule, and an outer ferrule clamping the shroud to the bottle. The nipple, sealing disk, shroud and both ferrules may be preassembled into a single unit to facilitate assembly with the bottle. The outer ferrule has a weakened line to facilitate removal of shroud. Removal of shroud permits the nipple flange to move out of sealing engagement with apertures through the sealing disk, so that liquid contents may flow from the bottle to the nipple when the bottle is inverted. A vent through the nipple flange permits air from the atmosphere to flow into the bottle, as the contents are dispensed, to prevent formation of a vacuum in the bottle.

This application is a continuation-in-part of my prior copending application Ser. No. 365,403, filed May 6, 1964.

This invention relates to a disposable tamperproof sealed feeding bottle assembly adapted to hold an individual sterilized serving of water, a liquid milk product, or other liquid food, etc., in sterile condition, and to a method of securing a nipple assembly to a feeding bottle, and is particularly concerned with means for providing an efficient and economical method of packaging, transporting and storing individual servings of water, liquid food or other liquid compositions intended primarily for human use.

Although the feeding bottle assembly of the present invention is most often used in connection with feeding infants, it is also useful in feeding liquid or concentrated liquid nutrients to invalids, geriatric patients, animals and others requiring a nipple arrangement for liquid or concentrated liquid food intake.

In accordance with the invention, a seal is applied to the feeding bottle assembly in such a manner that the nipple and the liquid food are completely protected against contamination until the seal is broken. The assembly includes an outer frangible seal that may be easily broken when desired, but cannot be opened accidentally. After the seal has been broken, it cannot be reapplied to the bottle without detection.

The feeding bottle assembly comprises a bottle, a sealing disk, a feeding nipple, an inner and an outer clamping ferrule, and a shroud. The nipple, sealing disk, shroud, and both ferrules may be preassembled into a single unit to facilitate the final assembly in which the nipple assembly may be secured to a filled feeding bottle. The sealing disk and the base of the nipple fit on top of the finish of the bottle and are clamped thereon by an inner ferrule which has a skirt and an annular flange extending inwardly from one end of the skirt. The annular flange overlies the outer edge portions of the base of the nipple, and the lower end of the skirt is crimped under a bead on the finish of

the bottle to secure the sealing disk and the base of the nipple to the bottle.

The shroud has a dome adapted to fit over the outer surface of the teat portion of the nipple, and a flange adapted to fit over the flange of the inner ferrule and the portion of the base of the nipple adjacent the teat portion. The shroud is clamped in place by the outer ferrule, which has an annular flange overlying the outer edge portions of the flange of the shroud, and a skirt crimped under a bead on the finish of the bottle. The outer ferrule has a weakened portion which may extend in a circumferential or in an axial direction. The outer ferrule must be ruptured to permit removal of the shroud which protects the nipple against contamination prior to use, or until the seal of the outer ferrule is broken.

The shroud may be made of any suitable material, such as, for example, rubber, plastic, or metal, but rubber having a hardness within the range of 40 to 100 durometers is preferred. Rubber of such hardness is hard enough to provide the desired protection for the nipple, and is soft enough to provide an effective seal at the inner edge of the annular flange of the inner ferrule to prevent any possibility of leakage in this region during filling, storage or transit.

When the outer ferrule is crimped in place to hold the shroud in place, it exerts enough pressure against the base of the nipple in the region adjacent the base of the teat portion to force it downwardly against the sealing disk to effect a seal which prevents access to the nipple by the liquid contents of the bottle until the seal is broken. The skirt of the outer ferrule may have a portion in threaded engagement with a helical thread on the finish, and a circumferentially weakened portion of the skirt located between the threaded portion and the lower edge which is crimped into engagement with a bead on the finish. Rotation of the outer ferrule on the thread of the finish ruptures the outer ferrule along the weakened portion of its skirt and breaks the seal easily when the bottle is to be used for feeding the recipient.

The interengaging helical threads of the finish and outer ferrule may be omitted, and the outer ferrule may be held in sealing position solely by the crimped engagement of its lower edge with a bead on the finish. In this embodiment it is preferred to have the weakened portion of the outer ferrule in the form of a tear strip extending in an axial direction. Whether the weakened portion extends in a circumferential or in an axial direction, the outer ferrule is removed by rupturing the weakened portion.

The structure by means of which the above mentioned and other advantages of the invention are attained will be fully described in the following specification, taken in conjunction with the accompanying drawings showing illustrative embodiments of the invention, in which:

FIGURE 1 is an elevational view of a sealed feeding bottle assembly embodying the invention;

FIG. 2 is a fragmentary vertical sectional view, taken along the line 2–2 of FIG. 1;

FIG. 3 is an elevational view of the assembly after the outer ferrule has been ruptured and the outer ferrule and the shroud have been removed;

FIG. 4 is a fragmentary vertical sectional view, taken along the line 4—4 of FIG. 3;

FIG. 5 is a top plan view of the sealing disk;

FIG. 6 is a fragmentary sectional view, showing a modified form of sealing gasket;

FIG. 7 is a fragmentary sectional view, showing a flutter valve for sealing the air vent;

FIG. 8 is a fragmentary sectional view, showing another embodiment of the sealing structure in which the position of the air vent has been changed;

FIG. 9 is a fragmentary vertical sectional view of another embodiment, with the assembly in sealed position;

FIG. 10 is a view showing a portion of the structure of FIG. 9 on an enlarged scale;

FIG. 11 is an exploded view showing the parts of the closure member in position for assembly;

FIG. 12 is a detail perspective view of the assembled closure member;

FIG. 13 is an elevational view of another embodiment of the sealed feeding bottle assembly;

FIG. 14 is a cross sectional view of the structure shown in FIG. 13;

FIG. 15 is a view similar to FIG. 14, showing the same structure before the lower edges of the ferrules are crimped under the bead on the finish; and

FIG. 16 is a detail perspective view of the outer ferrule of the embodiment of FIGS. 13–15.

In the drawings, a bottle **11**, which may be made of glass, plastic or any other suitable material, is provided with a finish **12** having a flat top surface **13**. An upper bead **14**, a helical thread **15**, and a lower bead **16** project outwardly from the outer surface of said finish. The beads are preferably annular, as shown in the drawings, but may comprise circumferentially spaced projections, if desired. The helical thread, which is positioned intermediate the upper and lower annular beads, extends slightly more than one complete turn around the finish to afford sufficient rise for its intended purpose, hereinafter described. The finish of the bottle increases in diameter in the downward direction, i.e., the diameter of the cylinder around which the helical thread extends is larger than the diameter of the circle defined by the upper annular bead and is smaller than the diameter of the circle defined by the lower annular bead.

A sealing disk **17**, made of metal, plastic or other suitable material, is seated on the flat top surface of finish **12**. The sealing disk is provided at its outer edge with a depending annular flange **18** which overhangs the upper edge of finish **12**. An annular feed groove **19** is spaced inwardly from flange **18** a distance slightly greater than the thickness of finish **12** adjacent its upper edge. The groove and flange cooperate to add rigidity to the sealing disk. One sidewall **20** of groove **19** cooperates with flange **18** to form an inverted annular channel **21** into which the upper edge of finish **12** fits. A layer **22** of sealing material is applied to the underside of inverted channel **21** in any suitable manner as, for example, by spraying, to seal the joint between the inverted channel and flat top surface **13** of the finish. The sealing material may be flowed into the channel, or may be applied as a preformed annular gasket, as shown at **23** in FIG. 6. Gasket **23** is preferably shaped to conform to the shape of the upper edge of finish **12**.

Feed groove **19** has a plurality of circumferentially spaced apertures **24** extending through its bottom to form part of a passageway for the liquid contents of the bottle to move from the bottle to the feeding nipple **25** when the bottle is tilted into feeding position after the seal is broken. When the feeding bottle assembly is originally packed and sealed, the sealing disk prevents access to the nipple by the liquid contents of the bottle regardless of the relative position of the bottle and the nipple.

Nipple **25**, which may be made of rubber, plastic, or any suitable elastomer type of material, comprises a teat portion **26** and a flexible base **27** in the form of an annular flange extending outwardly from the lower end of the teat portion. The teat portion has a discharge opening or openings **28** extending through its upper end. Base **27** seats on the top surface of the sealing disk and overlies annular feed groove **19** and inverted channel **21**. The outer peripheral edge portion of base **27** is recessed from its top surface, as indicated at **29**, to provide a seat for an inner clamping ferrule **30**. The lower surface of base **27** of the nipple is recessed adjacent the teat portion, as indicated at **31**, for a purpose hereinafter disclosed. Nipple **25** is also provided with one or more air vents **32** which preferably extend through the base.

Inner ferrule **30**, which may be made of aluminum, plastic or other suitable materials, comprises a flat annular flange **33** and a depending skirt **34**. The opening in flange **33** has a larger diameter than the teat portion of the nipple. In the embodiments of FIGS. 1 to 8, the inner ferrule is positioned by dropping it over the teat portion of the nipple so that flange **33** is seated in recess **29** on the top surface of the base of the nipple. Skirt **34** is provided with a peripheral recess **34'** which may be formed by indenting a plurality of circumferentially spaced embossments, or may be continuous, as shown. The lower end of skirt **34** is crimped under bead **14**, as indicated at **35**, to permanently secure sealing disk **17** and base **27** to flat surface **13** of the finish of bottle **11**. The clamping pressure of inner ferrule **30** causes the sealing material **22**, or the gasket **23**, to form a permanent airtight seal between sealing disk **17** and flat surface **13** at the upper edge of finish **12**.

As shown in FIG. 4, recess **31** on the underside of the base of the nipple forms part of a passageway above the top surface of sealing disk **17** so that after the seal of the assembly is broken, the liquid contents of the bottle can flow through apertures **24** and then between the sealing disk and the underside of the base of the nipple into the teat portion of the nipple. In the sealed condition of the feeding bottle assembly, a shoud **36** presses base **27** firmly against disk **17** to block passage of liquid through annular groove **19** and apertures **24**, as shown in FIG. 2. The shroud is made of metal, plastic, rubber, or any suitable material, and comprises a dome **37** adapted to fit over nipple **25**, and a lateral flange **37'** adapted to seat on the upper surface of base **27**. Dome **37** preferably fits in close contact with the outer surface of nipple **25** contiguous to discharge opening **28**, as indicated at **39**. Flange **37'** terminates in a short depending skirt **37''**. An outer ferrule **38**, preferably of aluminum, is provided at its upper end with an annular flange **40** which overlies flange **37'**. The outer ferrule clamps flange **37'** against the upper surface of base **27** to close the upper end of air vent **32** and to seal off the space under dome **37**, protecting all surfaces of the nipple, so that no air or foreign fluid may enter the sealed assembly. Outer ferrule **38** may be secured to the bottle in any suitable manner as, for example, by a frangible skirt **38'** provided with an intermediate portion threaded, as indicated at **41**, to engage thread **15** on the finish. The lower edge of skirt **38'** is crimped under bead **16**, as indicated at **42**. The skirt has a structurally weakened portion extending around its circumference, as indicated at **43**, between the threaded portion **41** and the crimped edge **42**. The frangible skirt may be weakened in any suitable manner as, for example, by a row of closely spaced perforations, by a continuous score line that extends almost but not quite through the thickness of the skirt, or by a suitable tear strip.

When the outer ferrule is rotated in one direction, the angular incline of helical thread **15** directs it upwardly. The portion **44** of skirt **38'** below the weakened line **43** is held against upward movement by its engagement with bead **16**. Accordingly, application of rotational force to outer ferrule **38** results in rupturing of the skirt **38'** of the outer ferrule along the weakened line **43**, thus breaking the seal at the outer end of the air vent and the seal between dome flange **37'** and base **27** of the nipple. When the dome **37** is lifted to remove it, dome flange **37'** engages flange **40**, carrying the upper portion of skirt **38'** from the assembly. The bottle assembly is then in the condition shown in FIG. 4, in which the contents of the bottle may be fed to the recipient.

As soon as the outer ferrule is ruptured along line **43**, the pressure against the top surface of the base of the nipple above recess **31** is relieved, and the nipple springs back toward its normal position in which the nipple base

is spaced from feed groove 19. When the bottle is tilted to the proper angle, the liquid contents flow through the apertures 24 into groove 19 and through the space created by recess 31 into the teat portion of the nipple. The liquid contents may be fed from the teat portion through discharge opening 28 in any suitable manner. Sometimes a recipient may suck the nipple irregularly and cause the liquid to pulse out through the air vent. The air vent may be protected against pulsing of liquid therethrough by providing a valve adjacent the bottom of the vent as, for example, a flutter valve 45, as shown in FIG. 7.

The flutter valve is pushed against the bottom of the air vent by any pressure inside the bottle in excess of atmospheric pressure. Even if the recipient blows air through the discharge opening, the pressure cannot force liquid from the bottle through the air vent. When the recipient sucks liquid out of the bottle through the discharge opening and reduces the pressure within the bottle to less than atmospheric pressure, air from the atmosphere will force its way past valve 45 into the bottle.

Another means for protecting the air vent against pulsing is shown in the embodiment of FIG. 8. In this embodiment, a nipple 46 has a flexible base in the form of a lateral flange 47 which is provided on its upper surface with an annular recess 48 of greater radial width than recess 29 of the other embodiments. An air vent 49 extending through base 47 is located radially outwardly of apertures 24. The portion of the base through which the air vent extends is comparatively thin and is freely flexible. An inner clamping ferrule 50 has an annular flange 51 seated in recess 48 and overlying the upper end of the air vent so that liquid flowing from the bottle into the teat portion of the nipple cannot pulse through the air vent. Flange 51 seals the upper end of the air vent when the assembly is sealed, as in FIG. 2, and also when the seal is broken, as in FIG. 4. The upper end of air vent 49 is positioned in close proximity to the inner edge of flange 51.

A recipient being fed through nipple 46 distorts the nipple by sucking on it to pull the liquid through discharge opening or openings 28. Even if the recipient is an infant, the distortion is sufficient to flex flange 47 and separate the upper end of the air vent from flange 51 at intermittent intervals. Every separation of the upper end of the air vent from flange 51, regardless of the shortness of time the separation lasts, permits ingress of air from the atmosphere through the vent and into the bottle. The air flowing into the bottle replaces the liquid sucked out of the bottle and prevents formation of a vacuum within the bottle, just as in the case of the air vents in the other embodiments.

The method of assembling and sealing the feeding container is simplified by the structure shown in the embodiment of FIGS. 9 to 12. In this embodiment, the closure is preassembled as a unit and is applied to the feeding bottle in a single operation, as hereinafter described. A nipple 52, preferably of rubber, comprises a teat portion 53 and a flange 54 forming a flexible base portion for the nipple. Flange 54 is thicker adjacent the bottom of teat portion 53 to provide extra strength. The underside of nipple 52 adjacent the bottom of teat portion 53 is recessed, as shown at 31, FIG. 8, to form part of the passageway, for flowing liquid from bottle 11 to discharge opening 28 after the seal between flange 47 and the sealing disk is broken. An air vent 55 extends through a thin portion of flange 54 and is located radially outwardly of apertures 24 in the sealing disk.

Inner ferrule 56, preferably of aluminum, comprises a skirt 57 and an annular flange 58 provided with a central opening 59 large enough to allow teat portion 53 of the nipple to project therethrough. The inner edge of flange 58 overlies the upper end of air vent 55 as described above in connection with the embodiment of FIG. 8. The inner edge of flange 58 is located adjacent vent 55 so that a slight distortion of nipple 52 is enough to allow air from the atmosphere to flow through vent 55 into the bottle to prevent creation of a vacuum within the bottle when the recipient sucks some of the liquid contents through the nipple discharge opening. Skirt 57 is provided with a circumferential locking groove 60 adjacent flange 58 and an outwardly extending rolled bead 61 at its lower end. Locking groove 60 has a diameter slightly less than the diameter of flange 54 which is locked in place between flange 58 and locking groove 60. Bead 61 is provided with a series of indentations 62 spaced evenly around the bead to facilitate deformation of the bead during the assembly of the closure.

A shroud 63 comprises a dome 64 large enough to fit snugly over teat portion 53 of the nipple and a flange 65 extending laterally from the base of the dome. In the sealed assembly, flange 65 overlies flange 58, and the portion of the upper surface of flange 54 not covered by flange 58. The shroud 63 is preferably made of rubber, suitably of rubber having a durometer reading within the range of 40 to 100, with rubber having a durometer reading between 70 and 90 preferred. Rubber within the range of hardness specified is soft enough to provide an effective seal against the upper surface of flange 58 to prevent any possibility of leakage around the inner edge of flange 58. The close adjacency of air vent 55 to feed groove 19 makes this region most susceptible to leakage, particularly since the inner edge of flange 58 must be located close to air vent 55 in order to permit the air vent to function properly.

Rubber within the permissive range of hardness specified above is flexible enough so that it can be squeezed against the teat portion of the nipple to pull the base of the nipple away from the sealing disk if it should become adhered thereto during storage or at any time prior to use of the assembly for feeding a recipient. The rubber specified above has sufficient rigidity to provide the desired protection for teat portion 53 of the nipple prior to removal of the shroud from the assembly.

Shroud 63 is held in place in the sealed container by an outer ferrule 66, preferably of aluminum. Outer ferrule 66 comprises a skirt 67 and an inwardly extending annular flange 68 having an opening 69 large enough to permit dome 63 to project therethrough. Skirt 67 has two axially spaced circumferential beads 70 and 71 intermediate its length. The portion 72 of skirt 67 above bead 70 is smaller in diameter than the portion of skirt 67 below bead 70. The skirt is knurled between beads 70 and 71, as indicated at 73, to facilitate rotational movement of the outer ferrule when it is desired to break the tamperproof seal. Skirt 67 is made frangible by a structurally weakened portion 74 adjacent the lower edge of bead 71. Portion 74 may be weakened by a score line extending almost but not quite through the thickness of the skirt, by a row of closely spaced perforations, or by a suitable tear strip. If a score line is used, it may be continuous, or may have short interruptions. The lower end portion 75 of skirt 67 is long enough to permit it to be crimped under bead 16 to provide a tamperproof seal for the closure assembly. This seal is broken by rotational movement of the outer ferrule in one direction which causes rupture of skirt 67 of the outer ferrule along the weakened portion 74.

The closure for the bottle, comprising sealing disk 17, nipple 52, inner ferrule 56, shroud 63 and outer ferrule 66, is preassembled as a unitary structure, and is applied to bottle 11 as a unit. In assembling the closure, flange 54 of the nipple is pressed past locking groove 60 of the inner ferrule, with teat portion 53 projecting through aperture 59. The teat of nipple 52 is then pushed into the dome cavity of shroud 63. Proper placement of the teat in the dome cavity may be insured by inserting a probe into the nipple cavity and pushing the teat into place. Sealing disk 17 is then placed inside the skirt of inner ferrule 56 and pressed inwardly until it and nipple flange 54 are locked between locking groove 60 and flange 58.

Outer ferrule 66 is then assembled with shroud 63, inner ferrule 56, nipple 52 and sealing disk 17 by placing

it over the shroud with dome **63** projecting through opening **69**, and pressing the parts together until bead **61** of the inner ferrule is seated in bead **70** of the outer ferrule. When bead **61** is seated in bead **70**, the bottom of the nipple flange is pressed into feed groove **19** with sufficient force to seal apertures **24** in the sealing disk. The closure assembly is then an integral unit that may be handled as a unit and may be applied to feeding bottle **11** in one operation.

The closure assembly is positioned above the finish of a bottle holding the liquid contents to be packaged therein. Steam is blown into the head space of the bottle to retard or minimize oxidation of the vitamins in the product and the product itself. The steam also effects a vacuum within the sealed package. After the application of steam to the head space of the bottle, the closure assembly is placed on the bottle, and the bottle and closure assembly are pressed together into final sealing engagement by any suitable means. The pressure applying member fits snugly around portion **72** of the outer ferrule and applies pressure against the upper edge of bead **70** to deform it inwardly until its circumference is substantially the same as that of portion **72**. The inward deformation of bead **70** also deforms skirt **57** of inner ferrule **56** by forcing bead **61** inwardly under bead **14** of finish **12**.

As the closure assembly is held against the bottle, suitable thread forming rollers are moved into engagement with skirt **67** to form a thread **76** in engagement with helical thread **15** on finish **12**. Another roller or set of rollers is moved into engagement with the lower edge of skirt **67** and crimps it under locking bead **16**, as indicated at **77**. The deformation of bead **70** must be prior to the formation of thread **76** and locking crimp **77**, because the deformation of bead **70** increases the length of skirt **67**. The order in which thread **76** and crimp **77** are formed is unimportant, and both can be formed simultaneously, if desired.

In the embodiment of the invention disclosed in FIGS. 13 to 16 the structure of the feeding bottle assembly differs from the srtucture of the other embodiments in only two particulars, namely, the finish of the feeding bottle, and the weakened portion of the outer ferrule that provides the means for removing the shroud from the assembly when the feeding botle is to be made ready for feeding a recipient.

The bottle **78** of this embodiment has a finish distinguished by a single bead **79** extending circumferentially of the bottle. As shown in FIG. 14, a sealing gasket **22**, which may be flowed in place or may be a separate member, is positioned between the underside of sealing disk **17** and the top of the finish. Flange **54** of the nipple is seated on top of the sealing disk, and an inner ferrule **80** clamps the nipple flange and sealing disk in sealing position. Inner ferrule **80** has a annular flange **81** extending inwardly far enough to cover air vent **55** and has its lower edge **82** crimped over bead **79** to hold the sealing disk and nipple flange against displacement. A locking groove **83** extends circumferentially of the inner ferrule adjacent the peripheral edge portion of sealing disk **17**. Locking groove **83** is preferably continuous, but may comprise a series of spaced indentations, if desired.

A shroud **84**, preferably of plastic, but which may be metal or rubber, has a flange **85** overlying flange **81** of the inner ferrule and the portion of nipple flange **54** that is not covered by flange **81**. An outer ferrule **86**, preferably of thin metal such as aluminum, for example, has an annular flange **87** overlying the outer edge portion of flange **85**, and a circumferential locking groove **88** fitting into locking groove **83** of the inner ferrule. The lower edge **89** of outer ferrule **86** is juxtaposed against the lower edge of the inner ferrule and is crimped over bead **79**.

Outer ferrule **86** is provided with a structurally weakened portion in the form of a tear strip **90** that extends in an axial direction and facilitates rupture of the thin metal of the outer ferrule. Tear strip **90** is formed integral with the outer ferrule by scoring or perforating the metal along parallel lines **91** and **92**. If lines **91** and **92** are scored, they extend almost but not quite through the thickness of the metal, and, if they are perforated, the perforations extend completely through the metal but adjacent perforations are spaced apart so that the outer ferrule holds the parts of the bottle assembly firmly in sealed position. A pull tab **93** is formed at one end of strip **90** by severing a portion of the top of the outer ferrule along a line **94** joining the upper ends of lines **91** and **92**. Tab **93** may be provided with a reinforcement **95**, if desired, and is bent upwardly to provide an opening **96** through which the dome of shroud **84** extends. Lines **91** and **92** extend axially from the lower edge of outer ferrule **86** and terminate at the base of tab **93**. When tab **93** is pulled downwardly, tear strip **90** is completely separated from the outer ferrule, and the outer ferrule and shroud may then be readily removed from the assembly and the contents of the bottle may be fed to a recipient.

In the embodiment of FIGS. 13 to 16, the parts are preferably preassembled as described above in connection with FIG. 11. After the bead space above the liquid contents of the bottle is properly conditioned, either by vacuumizing or gassing, the nipple assembly and filled bottle are pressed together axially, and the lower edges of the inner and outer ferrules are crimped under bead **79**.

Although a few preferred embodiments of the invention have been described in considerable detail, it will be understood that the description thereof is intended to be illustrative, rather than restrictive, as many details of construction may be modified or changed without departing from the spirit or scope of the invention. Accordingly, it is not desired to be restricted to the exact construction described.

What is claimed is:

1. A tamperproof feeding container comprising a bottle having a finish, a sealing disk having its outer edge portions sealed to said finish, a feeding nipple mounted above said disk, said nipple having a discharge opening, means forming a passageway serving, when open, to permit the flow of liquid contents from said bottle to the discharge opening of said nipple, said last mentioned means including an apertured feed groove in said disk, said feed groove being spaced inwardly of said finish, said nipple having a flexible base overlying said feed groove, means permanently sealing said flexible base to said bottle, and means clamping said flexible base against the apertured portion of said feed groove to seal said passageway and thereby prevent the liquid contents of said bottle from flowing into said nipple, said clamping means having a structurally weakened portion to facilitate rupture of said clamping means to open said passageway.

2. A tamperproof feeding container comprising a bottle having a finish, a sealing disk having its outer edge portions sealed to said finish, a feeding nipple mounted above said disk, said nipple having a discharge opening, means forming a passageway serving, when open, to permit the flow of liquid contents from said bottle to the discharge opening of said nipple, said last mentioned means including an apertured feed groove in said disk, said feed groove being spaced inwardly of said finish, said nipple having a flexible base overlying said feed groove and normally spaced therefrom, a shroud fitting over the outer surface of said nipple to protect it against contamination prior to use, said shroud having a lateral flange overlying said flexible base, and a ferrule clamped to said bottle, said ferrule holding said shroud against displacement and clamping said flexible base against said apertured feed groove to seal said passageway and thereby prevent the liquid contents of said bottle from flowing into said nipple, said ferrule having a structurally weak-

ened portion to facilitate rupture of said ferrule to release said shroud and thereby open said passageway.

3. A feeding container comprising a bottle having a finish, a sealing disk having its outer edge portions sealed to said finish, a feeding nipple mounted above said disk, said nipple having a discharge opening, means forming a passageway serving, when open, to permit the flow of liquid contents from said bottle to the discharge opening of said nipple, said last mentioned means including an apertured feed groove in said disk, said feed groove being spaced inwardly of said finish, said nipple having a flexible base overlying said apertured feed groove, an air vent extending through said flexible base for establishing air flow communication between the interior of said bottle and the atmosphere, a shroud fitting over the outer surface of said nipple to protect it against contamination prior to use, said shroud having a lateral flange overlying said flexible base, and ferrule means clamped to said bottle, said ferrule means holding said shroud against displacement, closing said air vent, and clamping said flexible base against said feed groove to seal said passageway and thereby prevent the liquid contents of said bottle from flowing into said nipple.

4. A feeding container comprising a bottle having a finish, a sealing disk, an inner metal ferrule clamping the outer edge portions of said sealing disk to said finish to provide a permanent seal therebetween, a feeding nipple mounted above said disk, said nipple having a discharge opening, means forming a passageway serving, when open, to permit the flow of liquid contents from said bottle to the discharge opening of said nipple, said last mentioned means including an apertured feed groove in said disk, said feed groove being spaced inwardly of said finish, said nipple having a flexible base overlying said apertured feed groove, an air vent extending through said flexible base to establish air flow communication between the interior of said bottle and the atmosphere, a shroud fitting over the outer surface of said nipple to protect it against contamination prior to use, said shroud having a compressible lateral flange overlying said flexible base and a portion of said inner metal ferrule, and outer ferrule means clamped to said bottle to hold said shroud against displacement, said outer ferrule means sealing said air vent, and clamping said flexible base against said feed groove to seal said passageway and thereby prevent the liquid contents of said bottle from flowing into said nipple.

5. A feeding container comprising a bottle having a finish, a sealing disk having its outer edge portions overlying said finish, a layer of sealing material interposed between the top of said finish and the underside of said sealing disk, means clamping the outer edge portions of said sealing disk to the top of said finish to form a permanent seal therebetween, a feeding nipple mounted above said disk, said nipple having a discharge opening, means forming a passageway serving, when open, to permit the flow of liquid contents from said bottle to the discharge opening of said nipple, said last mentioned means including an apertured feed groove in said disk, said feed groove being spaced inwardly of the seal between said disk and said finish, said nipple having a flexible base overlying said apertured feed groove, and frangible means for clamping said flexible base against the upper surface of said apertured feed groove to provide a seal in said passageway and thereby prevent the liquid contents of said bottle from flowing into said nipple while said last mentioned seal is intact.

6. A feeding container comprising a bottle having a finish, a sealing disk having its outer edge portions overlying said finish, means sealing the outer edge portions of said sealing disk to said finish, a feeding nipple mounted above said disk, said nipple having a discharge opening, means forming a passageway serving, when open, to permit the flow of liquid contents from said bottle to the discharge opening of said nipple, said last mentioned means including a feed groove in said disk and an aperture in said feed groove, said feed groove being spaced inwardly of the seal between said disk and said finish, said nipple having a flexible base overlying said aperture in said feed groove and normally spaced therefrom, an air vent extending through said flexible base to establish air flow communication between the interior of said bottle and the atmosphere, a flutter valve fixed to the inner surface of said nipple and extending over one end of said air vent, and releasable means for clamping a portion of said flexible base against the upper surface of said sealing disk throughout the area contiguous to said feed groove to seal said passageway and thereby prevent the liquid contents of said bottle from flowing into said nipple until said last mentioned seal is broken.

7. A feeding container comprising a bottle having a finish, a sealing disk having its outer edge portions overlying said finish, means sealing the outer edge portions of said sealing disk to said finish, a feeding nipple mounted above said disk, said nipple having a discharge opening, means forming a passageway serving, when open, to permit the flow of liquid contents from said bottle to the discharge opening of said nipple, said last mentioned means including a feed groove in said disk and an aperture in said feed groove, said feed groove being spaced inwardly of the seal between said disk and said finish, said nipple having a flexible base overlying said aperture in said feed groove and normally spaced therefrom, an air vent extending through said flexible base to establish air flow communication between the interior of said bottle and the atmosphere, valve means closing the inner end of said air vent when the air pressure within said bottle is at least equal to the atmosphere pressure outside the bottle, and releasable means for clamping a portion of said flexible base against the upper surface of said sealing disk throughout the area contiguous to said feed groove to seal said passageway and thereby prevent the liquid contents of said bottle from flowing into said nipple until said last mentioned seal is broken.

8. A feeding container comprising a bottle having a finish, a sealing disk having its outer edge portions sealed to said finish, a feeding nipple mounted above said disk, said nipple having a discharge opening, an apertured feed groove in said disk, said feed groove being spaced inwardly of said finish, said nipple having a flexible base overlying said apertured feed groove, a recess in the underside of said base contiguous to said feed groove, said recess cooperating with said feed groove to form a passageway serving, when open, to permit the flow of liquid contents from said bottle to the discharge opening of said nipple, and means for clamping said flexible base against the upper surface of said feed groove to provide a seal for said passageway and thereby prevent the liquid contents of said bottle from flowing into said nipple.

9. A feeding container comprising a bottle having a finish provided with an upper bead and a lower bead, a sealing disk having its outer edge portions overlying said finish, a feeding nipple mounted above said disk, said nipple having a discharge opening, means forming a passageway serving, when open, to permit the flow of liquid contents from said bottle to the discharge opening of said nipple, said last mentioned means including an apertured feed groove in said disk, said feed groove being spaced inwardly of the circumference of said finish, said nipple having a flexible base overlying said apertured feed groove and normally spaced therefrom, an inner ferrule having an inwardly extending flange overlying the outer edge portions of said flexible base and a skirt crimped over said upper bead to permanently seal the outer edge portions of said sealing disk to said finish, and an outer ferrule having an inwardly extending flange overlying the flange of said inner ferrule and the inner portion of said flexible base, and a skirt crimped over said lower bead to clamp said flexible base against the upper surface of said feed groove to provide a seal for said passageway and thereby

prevent the liquid contents of said bottle from flowing into said nipple until said last mentioned seal is broken.

10. A feeding container comprising a bottle having a finish, a sealing disk having its outer edge portions permanently sealed to said finish, a feeding nipple mounted above said disk, said nipple having a discharge opening, means forming a passageway serving, when open, to permit the flow of liquid contents from said bottle to the discharge opening of said nipple, said last mentioned means including an apertured feed groove in said disk, said feed groove being spaced inwardly of said finish, said nipple having a flexible base overlying said apertured feed groove and normally spaced therefrom, an air vent extending through said flexible base to establish air flow communication between the interior of said bottle and the atmosphere, said air vent being spaced inwardly of said finish and out of register with the apertured portion of said feed groove to prevent the liquid contents of said bottle from pulsing out through said air vent, and releasable means for sealing said air vent and for clamping said flexible base against the upper surface of said feed groove to provide a seal for said passageway and thereby prevent the liquid contents of said bottle from flowing into said nipple.

11. A feeding container comprising a bottle having a finish, a sealing disk having its outer edge portions overlying said finish, means forming a permanent seal between the outer edge portions of said sealing disk and said finish, a feeding nipple mounted above said disk, said nipple having a discharge opening, means forming a passageway serving, when open, to permit the flow of liquid contents from said bottle to the discharge opening of said nipple, said last mentioned means including an apertured feed groove in said disk, said feed groove being spaced inwardly of the seal between said disk and said finish, said nipple having a flexible base overlying said apertured feed groove and normally spaced therefrom, an air vent extending through said flexible base to establish air flow communication between the interior of said bottle and the atmosphere, said air vent being spaced inwardly of said seal and out of register with the apertured portion of said feed groove to prevent the liquid contents of said bottle from pulsing out through said air vent, a shroud fitting over the outer surface of said nipple to protect it against contamination prior to use, said shroud having a lateral flange overlying said flexible base, and ferrule means holding said shroud against displacement and clamping said flexible base against the upper surface of said sealing disk throughout the area contiguous to said feed groove to form a seal for said air vent and said passageway, and thereby prevent the liquid contents of said bottle from flowing into said nipple until said last mentioned seal is broken.

12. A feeding container comprising a bottle having a finish, a sealing disk having its outer edge portions overlying said finish, a feeding nipple mounted above said disk, said nipple having a discharge opening, means forming a passageway serving, when open, to permit the flow of liquid contents from said bottle to the discharge opening of said nipple, said last mentioned means including an apertured feed groove in said disk, said feed groove being spaced inwardly of said finish, said nipple having a flexible base overlying said feed groove and normally spaced therefrom, an air vent extending through said flexible base to establish air flow communication between the interior of said bottle and the atmosphere, said air vent being spaced inwardly of said finish and out of register with said apertures, and ferrule means clamping the outer edge portions of said sealing disk and said flexible base against the upper surface of said finish to form a permanent seal between said bottle and the outer edge portions of said sealing disk, said ferrule means including a flat annular flange overlying the upper end of said air vent, the inner edge of said flat annular flange being spaced in close proximity to the upper end of said air vent, whereby a slight deflection of said flexible base causes the upper end of said air vent to separate from said flat annular flange to allow ingress of air from the atmosphere through said air vent into said bottle.

13. A nipple assembly comprising an outer ferrule having an annular flange and a cylindrical skirt depending from said flange, an inner ferrule means fitting within said skirt and having an annular flange paralled to said first mentioned flange, a shroud having a flange fitting between said first and second flanges, a nipple having a flexible base fitting within said inner ferrule means, and a sealing disk interengaged with said inner ferrule means below said flexible base.

14. A nipple assembly comprising a nipple having a base with an air vent extending through said base, an inner ferrule for securing said nipple to a bottle, said inner ferrule having an annular flange overlying said air vent and terminating in close adjacency thereto, a shroud fitting over said nipple and having a rubber flange overlying the edge of said first mentioned flange adjacent said air vent, and an outer ferrule for holding said rubber flange in tight engagement with said first mentioned flange to provide a seal for preventing leakage in the region adjacent said air vent when said nipple is secured to a bottle.

15. A feeding container comprising a bottle, a sealing disk seated on said bottle, a nipple having a base seated on said disk and an air vent extending through said base, inner ferrule means clamping said nipple base and disk to said bottle, said inner ferrule means having an annular flange overlying said air vent with its inner edge terminating in close adjacency thereto, a shroud having a rubber flange overlying the inner edge of said first mentioned flange, and outer ferrule means clamping the flange of said shroud against said first mentioned flange to provide a seal in the region adjacent the inner edge of said first mentioned flange.

16. A nipple assembly comprising an outer ferrule having an annular flange and a cylindrical skirt depending from said flange, an inner ferrule having a flange fitting within said skirt parallel to said first mentioned flange, a shroud having a flange fitting within said skirt between said first and second flanges, said inner ferrule having a cylindrical skirt depending from its flange and a locking groove in said last mentioned skirt, a nipple having a flexible base fitting between said second mentioned flange and said locking groove, and a sealing disk pressed against said flexible base by said locking groove to hold the parts of said nipple assembly against accidental displacement.

17. A nipple assembly comprising an outer ferrule having a cylindrical skirt and an inwardly extending annular flange at the upper end of said skirt, a shroud having a dome projecting upwardly through said annular flange and a flange in engagement with the underside of said mentioned flange, an inner ferrule having a cylindrical skirt fitting within said outer ferrule and an annular flange parallel to said first and second flanges, a nipple having a flexible base fitting within said inner ferrule and a test portion in engagement with the interior of said dome, and a sealing disk fitting within the skirt of said inner ferrule and holding said flexible base in engagement with the flange of said inner ferrule.

18. A nipple assembly comprising an outer ferrule having a cylindrical skirt and a circumferential bead in said skirt, and inner ferrule having an annular flange and a cylindrical skirt fitting in said first mentioned skirt, said second mentioned skirt having a circumferential bead fitting in said first mentioned bead and a circumferential locking groove, a feeding nipple having a flexible base fitting between said locking groove and said annular flange, and a sealing disk fitting between said flexible base and said locking groove to hold said flexible base and said locking groove to hold said flexible base against accidental displacement.

19. A nipple assembly comprising an outer ferrule having a cylindrical skirt and a flange at one end of said skirt, the inner edges of said flange defining a centrally disposed opening, a circumferential bead in said skirt, an inner ferrule having a flange and a cylindrical skirt fitting in said first mentioned skirt, the inner edges of said last mentioned flange defining an opening aligned with said first mentioned opening, said second mentioned skirt having a circumferential bead fitting in said first mentioned bead, and a circumferential locking groove, a shroud having a flange between said first and second flanges and a dome projecting through said first mentioned opening, a feeding nipple having a teat portion fitting in said dome and a flange fitting between said locking groove and said second mentioned flange, and a sealing disk fitting between the flange of said nipple and said locking groove to hold said nipple against accidental displacement.

20. A nipple assembly comprising an outer ferrule having a flange, the inner edges of said flange defining a centrally disposed opening, a cylindrical skirt depending from said flange, a shroud having a flange fitting within said skirt against the underside of said first flange and a dome projecting upwardly through said opening, an inner ferrule fitting within said outer ferrule, said inner ferrule having a flange, the inner edges of said last mentioned flange defining a centrally disposed opening, a cylindrical skirt depending from said last mentioned flange, a nipple having a flexible base engaging the underside of the flange of said inner ferrule, and a teat portion projecting upwardly through both of said openings into engagement with said dome, and a sealing disk interengaged with the skirt of said inner ferrule to hold said nipple in interengagement with said inner ferrule.

21. A nipple assembly adapted to be secured to a feeding bottle as a unit, said nipple assembly comprising an outer ferrule having a cylindrical skirt adapted to be crimped into interlocking engagement with a feeding bottle and an annular flange extending inwardly at the upper end of said skirt, an inner ferrule having a cylindrical skirt and an annular flange extending inwardly at the upper end of said second skirt, said second skirt fitting within said first mentioned skirt and being adapted to be crimped into interlocked engagement with the feeding bottle, a shroud having a flange interposed between the flanges of said ferrules, a nipple having a flexible base below the flange of said inner ferrule, and a sealing disk secured within said second skirt to hold said flexible base against displacement.

22. A tamperproof feeding container comprising a bottle and a nipple assembly, said bottle having a finish and two axially spaced circumferential beads on said finish, said nipple assembly comprising a nipple, an inner ferrule having a skirt crimped under one of said beads, and a flange overlying the base of said nipple to secure it to said bottle, a shroud enclosing said nipple to protect it from contamination prior to use, said shroud having a flange overlying the flange of said inner ferrule, and an outer ferrule, said outer ferrule having a flange overlying the flange of said shroud, and a skirt crimped under said other bead to hold said shroud against accidental displacement, said outer ferrule having a weakened portion extending axially thereof to facilitate removal of said outer ferrule and said shroud.

23. A tamperproof feeding container comprising a bottle and a nipple assembly, said bottle having a finish and a circumferential bead on said finish, said nipple assembly comprising a nipple having a flexible base, an inner ferrule having a skirt crimped to said bead and a flange overlying the flexible base of said nipple to secure it to said bottle, a shroud enclosing said nipple to protect it from contamination prior to use, said shroud having a flange overlying the flange of said inner ferrule, and an outer ferrule, said outer ferrule having an annular flange overlying the flange of said shroud and a skirt crimped to said bead to hold said shroud against accidental displacement, said outer ferrule having an integral pull strip defined by a line of structural weakness extending from the inner edge of said annular flange through the lower edge of said outer ferrule, said pull strip having a tab at one end to facilitate complete severance of said outer ferrule along said structurally weakened line, whereby said outer ferrule and said shroud may be removed from said container.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,393,817 July 23, 1968

Eugene J. Meierhoefer

It is certified that error appears in the above identified patent and that said Letters Patent are hereby corrected as shown below:

Column 4, line 7, "thas" should read -- has --. Column 12, line 55, after "said" insert -- first --; line 75, after "displacement" insert -- until the nipple assembly is secured to a bottle --.

Signed and sealed this 13th day of January 1970.

SEAL)
Attest:

dward M. Fletcher, Jr.
ttesting Officer

WILLIAM E. SCHUYLER, JR.
Commissioner of Patents