July 7, 1970 E. J. MEIERHOEFER 3,519,157

SEALED FEEDING BOTTLE ASSEMBLY

Filed May 15, 1964 2 Sheets-Sheet 1

Fig. 2

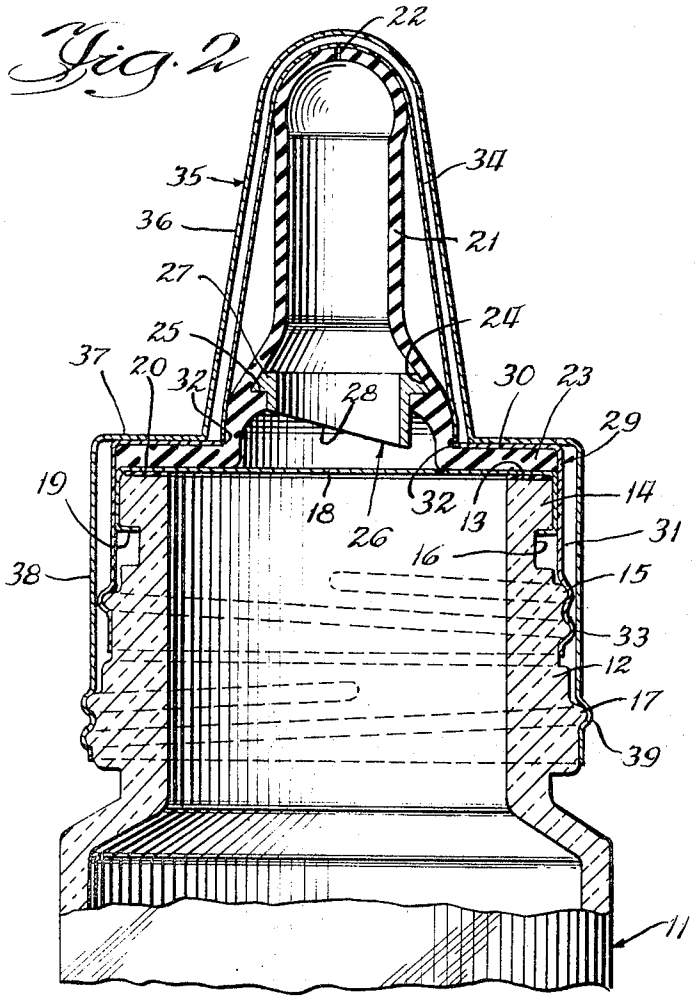

Fig. 1

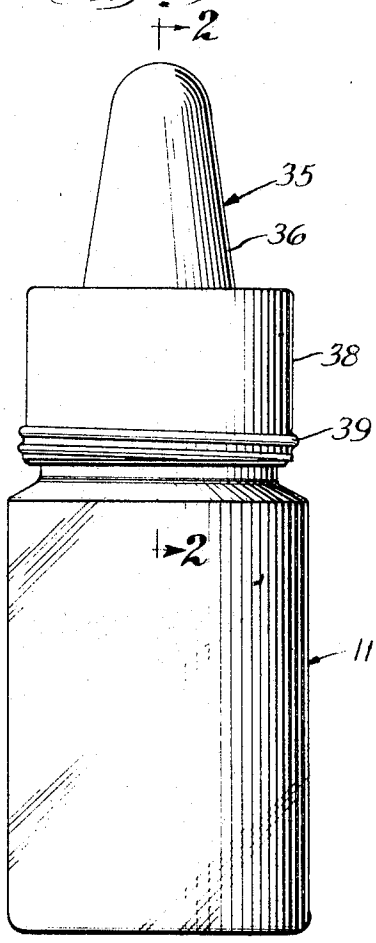

Fig. 5

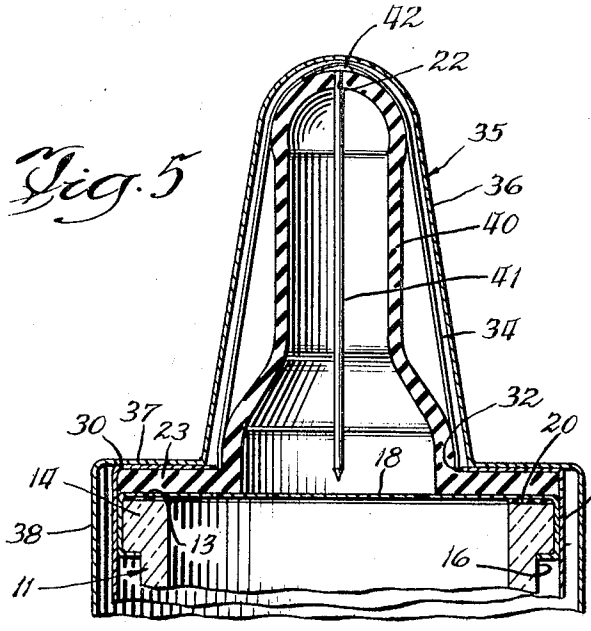

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Fig. 3

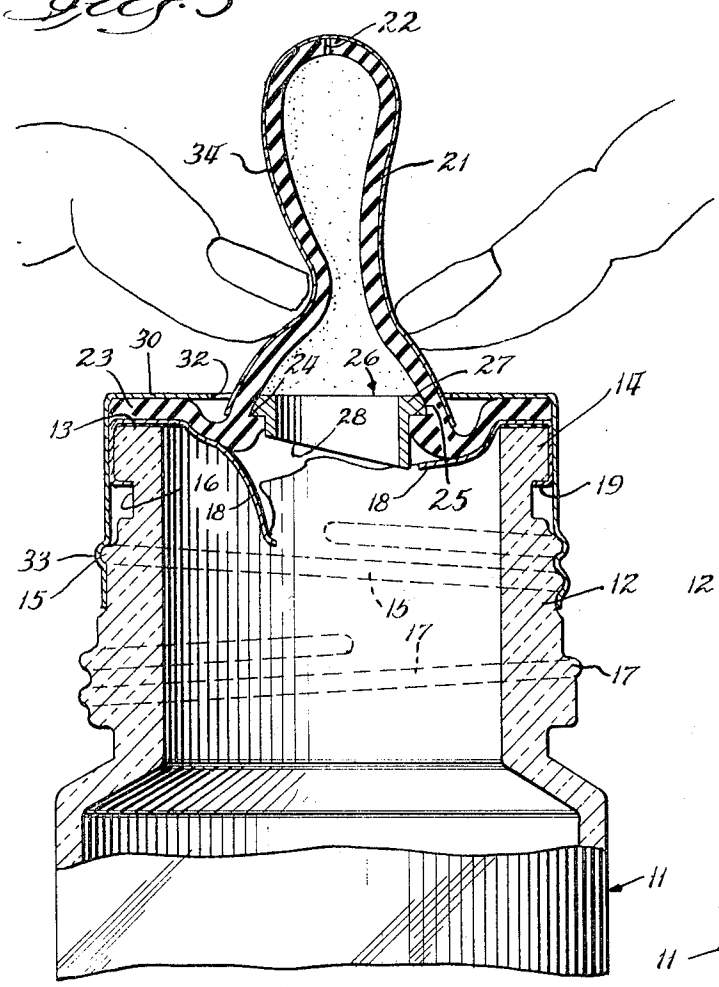


Fig. 4

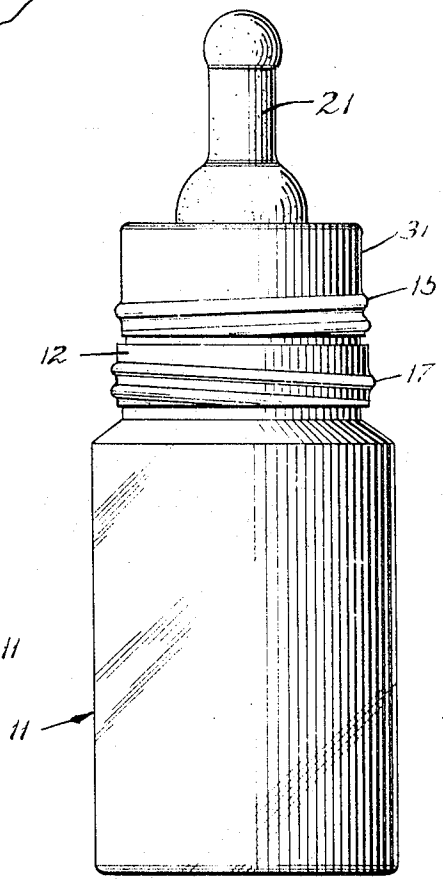
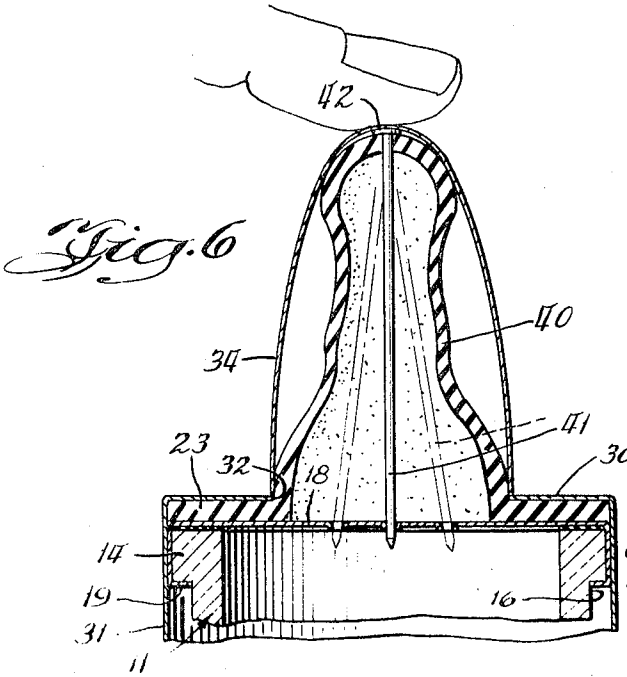


Fig. 6



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3,519,157

SEALED FEEDING BOTTLE ASSEMBLY

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U.S. Cl. 215—11 15 Claims

ABSTRACT OF THE DISCLOSURE

A disposable 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 with a nipple arrangement on its open end and means to break a seal interiorly of the nipple without destroying the sterile condition of the nipple arrangement.

This invention relates to a disposable 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 is particularly concerned with means for providing an efficient and economical method of packaging, transporting and storing individual sterilized 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 nipply arrangement for liquid or concentrated liquid food intake.

In accordance with the invention, a primary 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 a feeding bottle, a frangible inner primary seal, a feeding nipple secured to the bottle and provided with a cutting or rupturing element to break said primary seal, a flexible inner shroud, and a rigid outer shroud detachably secured to the bottle finish. The frangible primary seal extends across the mouth of the bottle and is permanently secured to the lip at the upper edge of the bottle. The feeding nipple has an annular flange extending laterally outwardly from the base of the nipple and overlying the outer edge portions of the inner seal. The flange of the feeding nipple is clamped against the upper edge of the bottle by a ferrule that is securely fixed to the bottle in any suitable manner such as by threads projecting outwardly from the finish of the bottle. The flexible shroud fits over the feeding nipple to protect it against contamination after removal of the rigid outer shroud and while piercing the frangible primary seal. The flexible shroud is held loosely in place by the rigid outer shroud which is securely affixed to the finish of the bottle in any suitable manner such as by threads projecting outwardly from the finish of the bottle. Said threads, however, should extend in a direction opposite to those that may be employed to secure the aforementioned ferrule and nipple to the finish of the bottle.

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 two preferred illustrative embodiments of the invention, in which:

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

FIG. 2 is an enlarged fragmentary vertical sectional view, taken along the line 2—2 of FIG. 1;

FIG. 3 is an enlarged fragmentary vertical sectional view of the assembly with the feeding nipple pressed downwardly through the inner seal;

FIG. 4 is an elevational view of the bottle assembly after both shrouds have been removed;

FIG. 5 is a fragmentary vertical sectional view of the bottle assembly with a different cutting element held by the feeding nipple; and

FIG. 6 is a view similar to FIG. 5, with the primary seal broken by the cutting element.

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** and an annular lip **14** at the upper edge of said finish. An upper helical thread **15** projecting outwardly from the finish is spaced from the lower edge of the lip by an annular recess **16**. A lower helical thread **17** extending in the direction opposite the direction of thread **15** also projects outwardly from the finish. The finish of the bottle increases in diameter outwardly in the downward direction so that the diameter of the cylinder around which the upper helical thread extends is larger than the diameter of the lip at the upper edge of the finish, and is smaller than the diameter of the cylinder around which the lower helical thread extends.

A sealing disk **18**, made of metal, plastic or other suitable material that can be cut or ruptured, is seated on flat surface **13** and has its peripheral edge portion extending around lip **14**, as indicated at **19**. Suitable gasket material **20** positioned between the outer edge portion of disk **18** and upper surface **13** provides assurance of a primary hermetic seal between upper surface **13** and disk **18** upon application of pressure against the upper surface of nipple flange **23** by ferrule **30**. Gasket material **20** may be sprayed on the surface of the underside of the outer edge portion of disk **18**, or may be applied as a preformed gasket. The primary seal prevents the contents of the bottle from flowing into the cavity of a feeding nipple **21** regardless of the relative position of the bottle and the nipple.

The feeding nipple may be made of rubber, plastic or any other suitable elastomer type of material and has a discharge opening **22** extending through its top wall so that the contents of the bottle may be fed directly into the mouth of the recipient. The nipple has an integral flange **23** extending laterally from the lower end of the nipple cavity. The flange is seated on top of sealing disk **18** with its outer edge portions overlying flat surface **13**. The portion of nipple **21** adjacent flange **23** is thicker than the upper portion of the nipple and the thickened portion is provided with an annular groove **24** shaped to provide an internal shoulder **25**.

A tubular cutting member **26** of metal, rigid plastic or other suitable material rigid enough to pierce or puncture the primary seal has a circumference approximately coincident with the cross sectional circumference of the feeding nipple so that it will not impair the free flow of fluid from the bottle into the cavity of the feeding nipple. Cutting member **26** is provided at its upper edge with a lateral flange **27** shaped to conform to the cross sectional shape of groove **24** so that the cutting member is held firmly in place by the nipple. The lower edge of cutting member **26** preferably slopes vertically relative to the plane of the top surface of inner seal **18**, as indicated at **28**. The angular disposition of the lower edge of cutting member **26** facilitates the piercing or rupture of the primary seal when the contents of the bottle is to be fed to the recipient. If desired, a flat cutting member may be substituted for the tubular member shown.

Flange **23**, which forms the base of nipple **21**, is held firmly against flat surface **13** by a ferrule **29**, which may

be made of aluminum, plastic or other suitable material. The ferrule comprises a flat annular flange **30** and a depending cylindrical skirt **31**. The centrally disposed opening **32** in flange **30** has a larger diameter than the portion of the nipple contiguous to the top surface of flange **23**. The ferrule is positioned by dropping it over the top of the nipple so that flange **30** is seated on the top surface of flange **23**. The lower edge portion of skirt **31** is threaded, as indicated at **33**, to engage upper helical thread **15**. Thread **15** is preferably left-handed for reasons hereinafter disclosed.

A flexible inner shroud **34** fits over the top of the feeding nipple to protect it against contamination after removal of an outer shroud **35** and while activating cutting member **26**. The lower end of shroud **34** terminates adjacent the circumference of opening **32**. A rigid outer shroud **35** fits over the inner shroud and the ferrule. The rigid shroud is made of metal, such as aluminum, for example, or of any other suitable material having sufficient rigidity to provide the desired protection for the nipple and the bottle neck assembly during processing, packing, transport and storage. The outer shroud, which may be of single or multiple piece construction, comprises a dome **36**, a flat intermediate section **37** adapted to overlie flange **30**, and a depending cylindrical skirt **38** having a diameter larger than the outer diameter of thread **33**. The lower edge portion of skirt **38** is threaded, as indicated at **39**, to engage lower helical thread **17**. When the rigid outer shroud is securely affixed on the top of the bottle it is spaced from the outer surface of the inner shroud, as shown in FIG. 2.

After a measured quantity of the liquid food is poured into the bottle, the primary seal is placed across the mouth of the bottle with gasket **20** in place, the feeding nipple is positioned with its flange over the peripheral edge portion of the primary seal, and the ferrule is screwed on thread **15** to hold these components in place. The flexible inner shroud is slipped over the nipple and the rigid outer shroud is then secured in place by screwing it on thread **17**.

When the contents of a bottle are to be fed to a recipient, the rigid outer shroud is removed by unscrewing it from thread **17**. Thread **17** is preferably right-handed, so that the ferrule, which is screwed on a left-handed thread, will not be loosened when the rigid shroud is unscrewed from its thread. The lower portion of the feeding nipple is grasped between the fingers of a user and depressed to force the lower edge of the cutting element through the primary seal to rupture the seal, as shown in FIG. 3. When the user pushes the cutting element into engagement with the primary seal to rupture it, the user's hand touches only the flexible inner shroud, and does not come into contact with either the nipple or the cutting element. The flexible inner shroud thus protects the nipple and the contents of the bottle against contamination during the seal rupturing operation. The flexible inner shroud is then pulled off the nipple and discarded, leaving the nipple exposed. With proper handling, the nipple is not touched by the user's hands or any other source of possible contamination. The feeding nipple is then placed in the recipient's mouth in an inverted position and the contents of the bottle flow downwardly toward the discharge opening **22** for the feeding operation.

The structure of FIGS. 5 and 6 is identical to that of FIGS. 1 to 4 except for a slight modification of the nipple and a different cutting element. The same reference numerals are used to designate the structure that is identical.

The nipple **40** is essentially similar to nipple **21**, except that nipple **40** does not have the annular groove **24** and the related thickened portion adjacent the lower portion of the nipple.

A straight pin **41** is dropped into discharge opening **22** and is held in place by a head **42** which has a larger diameter than the discharge opening. The pin may be made of metal, plastic or any other suitable material.

Inner shroud **34** prevents the pin from falling out of the nipple if the bottle is inverted before outer shroud **35** is removed. The length of pin **41** is slightly less than the distance between primary seal **18** and the top of nipple **40**, and the rigid shroud prevents premature rupture of the primary seal by the pin.

When the contents of a bottle of the type shown in FIGS. 5 and 6 is to be fed to a recipient, the outer shroud is removed, and the pin is depressed, by pressure applied to the flexible inner shroud, to puncture the primary seal. When the pressure against the top of the inner shroud is removed, the nipple moves back to its normal position and lifts the pin out of the opening in the seal. The pin may then be pushed out of vertical alignment with said opening and pressed down again to make another opening. In this way any desired number of openings may be provided in the seal without contaminating either the nipple or the seal.

After enough openings are provided in the primary seal, the piercing pin is removed from opening **22** with the flexible shroud by grasping the pin head through the flexible shroud and then pulling the shroud off the nipple. The nipple may then be placed in the recipient's mouth in its inverted position, and the contents of the bottle flow downwardly toward the discharge opening for the feeding operation the same as with the embodiment of FIGS. 1 to 4.

Although I have described two embodiments of the invention 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, I do not desire to be restricted to the exact construction described.

I claim:

1. A bottle assembly for holding sterilized fluid contents in sterile condition, said assembly comprising a bottle having an open mouth and a feeding nipple having an open end secured to said bottle, means providing a primary seal between said bottle and the open end of said nipple, said nipple having a discharge opening opposite its open end, means secured to said nipple for rupturing said primary seal, and a flexible shroud enclosing said nipple, said shroud and said nipple being movable by force applied to said nipple through said shroud in a direction axial with respect to said nipple to cause said means to rupture said seal, whereby said fluid contents may flow from said bottle to the discharge opening of said nipple in sterile condition.

2. A bottle assembly for holding sterilized fluid contents in sterile condition, said assembly comprising a bottle having an open mouth and a feeding nipple having an open end secured to said bottle, means providing a primary seal between said bottle and the open end of said nipple, said nipple having a discharge opening opposite its open end, means secured to said nipple for rupturing said primary seal, a flexible inner shroud enclosing said nipple and movable therewith as said nipple is moved to cause said means to rupture said seal, whereby said fluid contents may flow from said bottle to the discharge opening of said nipple in sterile condition, and a rigid outer shroud detachably secured to said bottle, said outer shroud in its secured position preventing access to said flexible shroud and thereby preventing accidental rupture of said primary seal.

3. A bottle assembly for holding sterilized fluid contents in sterile condition, said assembly comprising a bottle having an open mouth, a feeding nipple having an open end secured to said bottle, means providing a primary seal between said bottle and the open end of said nipple, said nipple having a discharge opening opposite its open end, a flexible shroud extending over said nipple to protect it against contamination, a cutting element held by said nipple in spaced relationship to said primary seal, said cutting element being movable into engagement with

said primary seal only by temporary distortion of said nipple, said nipple being manipulatable to move said cutting element axially for rupturing said primary seal while said flexible inner shroud is retained in its protective position, whereby said fluid contents may flow from said bottle to the discharge opening of said nipple in sterile condition, and a rigid outer shroud detachably secured to said bottle, said outer shroud in its secured position preventing access to said flexible shroud and thereby preventing accidental rupture of said primary seal.

4. A bottle assembly for holding sterilized fluid contents in sterile condition, said assembly comprising a bottle having an open mouth and a feeding nipple having an open end secured to said bottle, means providing a primary seal between said bottle and the open end of said nipple, said nipple having a discharge opening opposite its open end, a flexible inner shroud extending over said nipple to protect it against contamination, a tubular cutting element axially aligned with said nipple, said cutting element being secured to said nipple with its cutting end in spaced relationship to said primary seal, said nipple being manipulatable to move said cutting element axially for rupturing said primary seal while said flexible inner shroud is retained in its protective position, whereby said fluid contents may flow from said bottle to the discharge opening of said nipple in sterile condition, and a rigid outer shroud detachably secured to said bottle, said outer shroud in its secured position preventing access to said flexible shroud and thereby preventing accidental rupture of said primary seal.

5. A bottle assembly for holding sterilized fluid contents in sterile condition, said assembly comprising a bottle having an open mouth and a feeding nipple having an open end secured to said bottle, means providing a primary seal between said bottle and the open end of said nipple, said nipple having a discharge opening in its upper end, a pin extending through said discharge opening, said pin having an enlarged head at one end holding it in place with its other end spaced from said primary seal, a flexible inner shroud extending over said nipple to protect said nipple, said pin, and said fluid contents against contamination, said nipple being manipulatable to move said pin axially to pierce said primary seal while said flexible inner shroud is retained in its protective position, and a rigid outer shroud detachably secured to said bottle, said outer shroud in its secured position preventing access to said flexible shroud in its protective position, whereby said fluid contents may flow from said bottle to the discharge opening of said nipple for feeding said fluid contents in sterile condition to a recipient after removal of said outer and inner shrouds and said pin.

6. A bottle assembly for holding sterilized fluid contents in sterile condition, said assembly comprising a bottle having an open mouth and a feeding nipple having an open end secured to said bottle, a frangible sealing disk completely covering said mouth to provide a primary seal between said bottle and the open end of said nipple, said nipple having a discharge opening opposite its open end, a cutting element held by said nipple in axial alignment with said mouth and in spaced relationship to said disk, a flexible inner shroud extending over said nipple to protect it and said cutting element against contamination, said nipple being manually manipulatable to move said cutting element into piercing engagement with said disk to rupture it in the area in alignment with said mouth while said flexible shroud is held in its protective position, whereby said fluid contents may flow from said bottle to the discharge opening of said nipple in sterile condition, and a rigid outer shroud detachably secured to said bottle, said outer shroud in its secured position preventing access to said flexible shroud and thereby preventing contamination of said nipple and accidental rupture of said disk prior to removal of said outer shroud.

7. A bottle assembly for holding sterilized fluid contents in sterile condition, said assembly comprising a bottle having an open mouth and a feeding nipple having an open end secured to said bottle, a frangible sealing disk secured to the upper edge of said bottle and completely covering said mouth to provide a primary seal between said bottle and the open end of said nipple, said nipple having a discharge opening opposite its open end, a cutting element held by said nipple in axial alignment with said mouth and in spaced relationship to said disk, a flexible shroud extending over said nipple to protect it and said cutting element against contamination, said nipple being manually manipulatable, by pressure applied thereto through said flexible shroud without touching said nipple, to move said cutting element into piercing engagement with said disk to rupture it in the area in alignment with said mouth, whereby fluid contents of said bottle may flow from said bottle to the discharge opening of said nipple, and removable means enclosing said flexible shroud to prevent accidental rupture of said disk.

8. A bottle assembly for holding sterilized fluid contents in sterile condition, said assembly comprising a bottle having an open mouth and a feeding nipple having an open end secured to said bottle, a frangible sealing disk secured to the upper edge of said bottle and completely covering said mouth to provide a primary seal between said bottle and the open end of said nipple, said nipple having a discharge opening opposite its open end, a cutting element held by said nipple in axial alignment with said mouth and in spaced relationship to said disk, a flexible inner shroud extending over said nipple to protect it and said cutting element against contamination, said nipple being manually manipulatable to move said cutting element into piercing engagement with said disk to rupture it in the area in alignment with said mouth while said flexible shroud is held in its protective position, whereby said fluid contents may flow from said bottle to the discharge opening of said nipple, and a rigid outer shroud detachably secured to said bottle, said outer shroud in its secured position preventing access to said flexible shroud and thereby preventing contamination of said nipple and preventing accidental rupture of said disk prior to removal of said outer shroud.

9. A feeding container comprising a bottle having an open mouth and a feeding nipple having an open end secured to said bottle, a fragible sealing disk secured to the upper edge of said bottle and completely covering said mouth to provide a primary seal between said bottle and the open end of said nipple, said nipple having a discharge opening opposite its open end, a cutting element held by said nipple in axial alignment with said mouth and in spaced relationship to said disk, a flexible inner shroud extending over said nipple to protect it and said cutting element against contamination, said nipple being manually manipulatable, by pressure applied thereto through said flexible shroud without touching said nipple, to move said cutting element into piercing engagement with said disk to rupture it in the area in alignment with said mouth, whereby fluid contents of said bottle may flow from said bottle to the discharge opening of said nipple, and a rigid outer shroud detachably secured to said bottle, said outer shroud in its secured position preventing access to said flexible shroud and thereby preventing accidental rupture of said disk prior to removal of said outer shroud.

10. A feeding container comprising a bottle having an open mouth and a feeding nipple having an open end secured to said bottle, a frangible sealing disk secured to the upper edge of said bottle and completely covering said mouth to provide a primary seal between said bottle and the open end of said nipple, said nipple having a discharge opening opposite its open end, a tubular cutting element held by said nipple in axial alignment with said mouth and in spaced relationship to said disk, a flexible inner shroud extending over said nipple to protect it and said

cutting element against contamination, said nipple being manually manipulatable, by pressure applied thereto through said flexible shroud without touching said nipple, to move said tubular cutting element into cutting engagement with said disk to rupture it in the area in alignment with said mouth, whereby fluid contents of said bottle may flow from said bottle through said tubular cutting element to the discharge opening of said nipple, and a rigid outer shroud detachably secured to said bottle, said outer shroud in its secured position preventing access to said flexible shroud and thereby preventing accidental rupture of said disk prior to removal of said outer shroud.

11. A feeding container comprising a bottle having an open mouth and a feeding nipple having an open end secured to said bottle, a frangible sealing disk secured to the upper edge of said bottle and completely covering said mouth to provide a primary seal between said bottle and the open end of said nipple, said nipple having a discharge opening opposite its open end, a piercing element held by said nipple in axial alignment with said mouth and in spaced relationship to said disk, a flexible inner shroud extending over said nipple to protect it and said piercing element against contamination, said nipple being manually manipulatable, by repeated applications of pressure to said nipple through said flexible shroud without touching said nipple, to move said piercing element into piercing engagement with said disk in a plurality of spaced locations in alignment with said mouth, whereby fluid contents of said bottle may flow from said bottle through openings made in said disk by said piercing element to the discharge opening of said nipple, and a rigid outer shroud detachably secured to said bottle, said outer shroud in its secured position preventing access to said flexible shroud and thereby preventing accidental piercing of said disk by said piercing element prior to removal of said outer shroud.

12. A feeding container comprising a bottle having an open mouth and a feeding nipple having an open end secured to said bottle, a frangible sealing disk secured to the upper edge of said bottle and completely covering said mouth to provide a primary seal between said bottle and the open end of said nipple, said nipple having a discharge opening opposite its open end and an internal annular groove adjacent its lower end, a cutting element having an annular flange fitting in said groove, the interengagement of said flange and groove holding said cutting element in axial alignment with said mouth and in spaced relationship to said disk, a flexible inner shroud extending over said nipple to protect it and said cutting element against contamination, said nipple being manually manipulatable, by pressure applied thereto through said flexible shroud without touching said nipple, to move said cutting element into piercing engagement with said disk to rupture it in the area in alignment with said mouth, whereby fluid contents of said bottle may flow from said bottle to the discharge opening of said nipple, and a rigid outer shroud detachably secured to said bottle, said outer shroud in its secured position preventing access to said flexible shroud and thereby preventing accidental rupture of said disk prior to removal of said outer shroud.

13. A feeding container comprising a bottle having an open mouth, a sealing disk seated on the upper edge of said bottle and completely covering said mouth, a feeding nipple having a discharge opening at its upper end and a flange extending laterally outwardly at its lower end, said flange being seated on said sealing disk, a ferrule threaded on said bottle and securing said flange and said disk against the upper edge of said bottle, a cutting element held by said nipple in axial alignment with said mouth and in spaced relationship to said sealing disk, a flexible inner shroud extending over said nipple to protect it and said cutting element against contamination, said nipple being manually manipulatable, by pressure applied thereto through said flexible shroud without touching said nipple, to move said cutting element into piercing engagement with said sealing disk to rupture it in the area in alignment with said mouth, whereby fluid contents of said bottle may flow from said bottle to the discharge opening of said nipple, and a rigid outer shroud threaded on said bottle to prevent access to said inner shroud in protective position and thereby prevent accidental rupture of said sealing disk prior to removal of said outer shroud, the thread for said outer shroud and the thread for said ferrule being oppositely directed to permit removal of said outer shroud while said ferrule is firmly held in threaded engagement with said bottle.

14. A bottle assembly for holding sterilized fluid contents in sterile condition, said assembly comprising a bottle having an open mouth and a feeding nipple having an open end secured to said bottle, means providing a primary seal between said bottle and the open end of said nipple, said nipple having a discharge opening opposite its open end, a flexible shroud enclosing said nipple, and means for rupturing said primary seal without puncturing said nipple or said shroud, said shroud and said nipple being movable by force applied to said nipple through said shroud in a direction axial with respect to said nipple to cause said rupturing means to rupture said seal, whereby said fluid contents may flow from said bottle to the discharge opening of said nipple in sterile condition.

15. A bottle assembly for holding sterilized fluid contents in sterile condition, said assembly comprising a bottle having an open mouth and a feeding nipple having an open end secured to said bottle, means providing a primary seal between said bottle and the open end of said nipple, said nipple having a discharge opening opposite its open end, means cooperating with said nipple for rupturing said primary seal, and a flexible shroud enclosing said nipple, said shroud and said nipple being movable by force applied to said nipple through said shroud in a direction axial with respect to said nipple to cause said rupturing means to rupture said seal, whereby said fluid contents may flow from said bottle to the discharge opening of said nipple in sterile condition.

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JAMES B. MARBER, Primary Examiner

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