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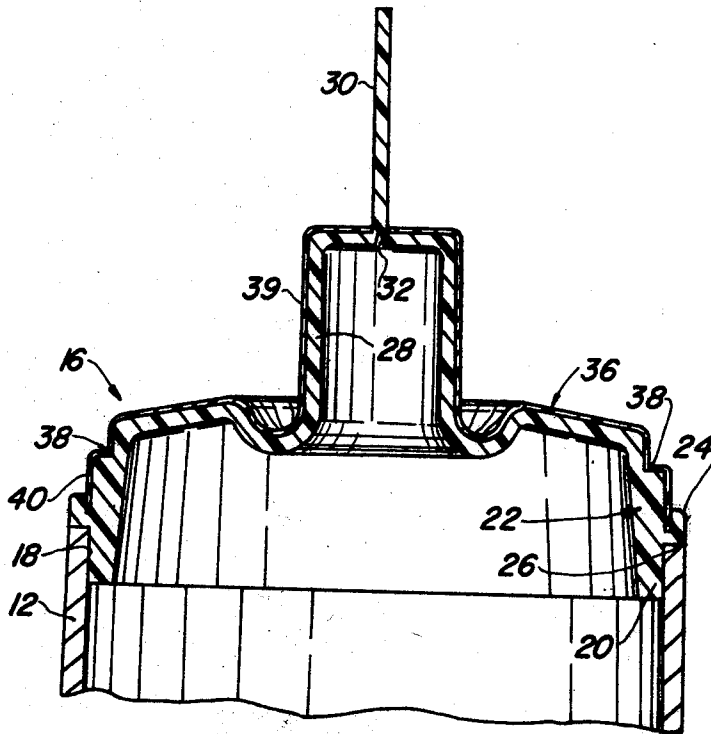
[54] **INFANT FEEDING UNIT**  
**6 Claims, 5 Drawing Figs.**

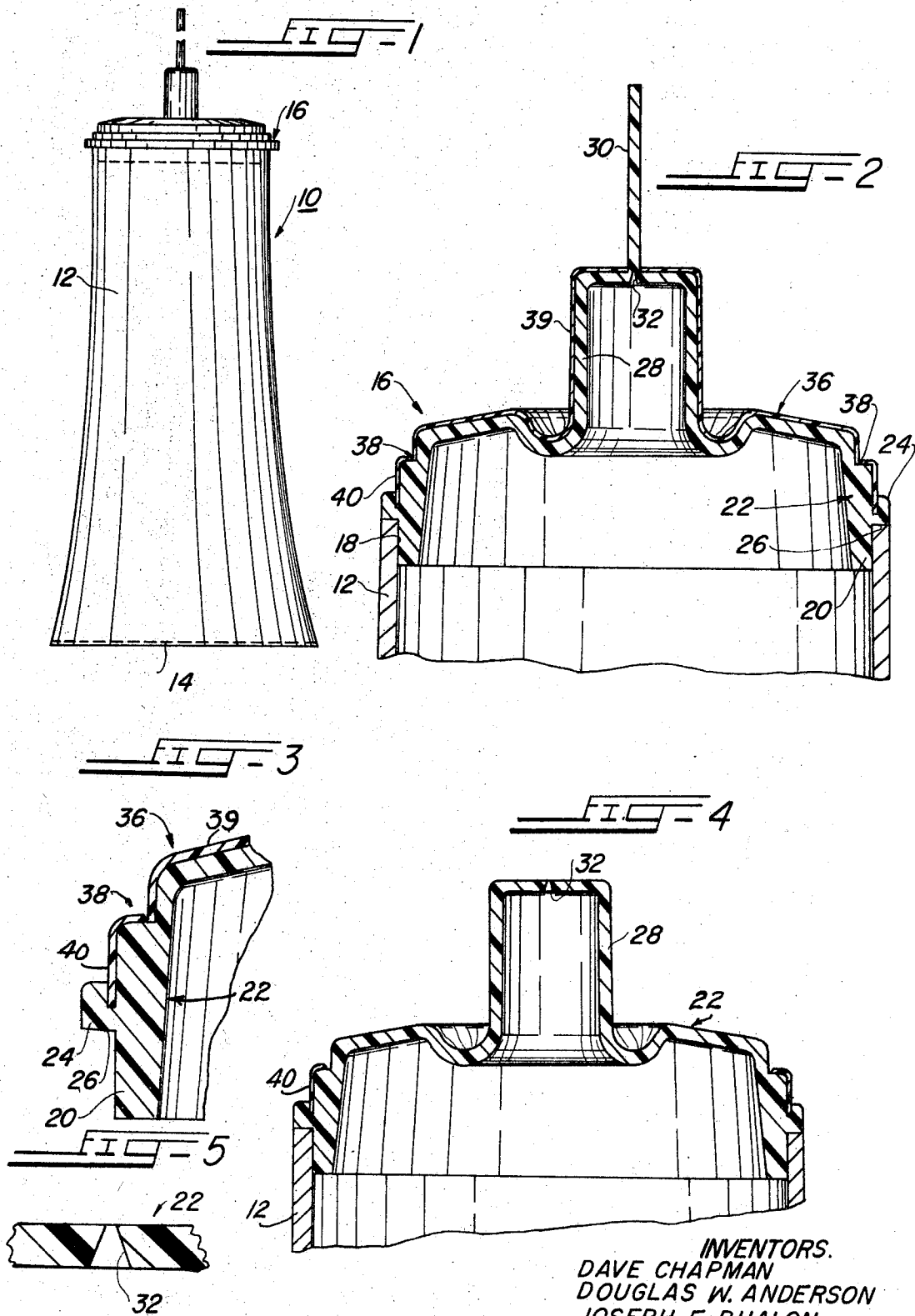
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**11.3; 222/105, 179.5, 183**

**ABSTRACT:** An infant feeding unit comprises a flexible tube having a nipple and overlying removable cap hermetically sealed thereto. The inner surface of the cap conforms to the outer surface of the nipple which is injection molded directly into the cap thereby assuring that the nipple remains in an aseptic condition until the cap is removed.





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## INFANT FEEDING UNIT

The present invention relates to a new and improved sanitary closure and method of making it, and it relates more particularly to a novel disposable nursing system and nipple.

An important advance in the care and feeding of infants occurred with the advent of the artificial nipple and bottle for feeding a sterilized liquid such as milk to the child. Through the years the formulations as well as the nipples and associated containers have been improved to facilitate the handling and feeding of liquid food to infants. For example, rigid containers have been replaced by flexible containers to minimize the amount of air which the child sucks in with the liquid, and standard formulas which do not require refrigeration are now on the market.

In spite of these many advances, however, there is still the problem of maintaining the nipple aseptic until it is placed in the infant's mouth. To this end, it would be desirable to provide an hermetically sealed, prefilled feeding unit which incorporates a nipple and which requires no separate handling of the nipple prior to actual use. Such a disposable system would eliminate the need for the mother or nurse to sterilize the nipple and/or connect it to the container holding the formula. Consequently, an added advantage of such a system would be its convenience of use.

Preferably, although perhaps not necessarily, the package should be protected by a sealing member which is tamper-proof in the sense that a visual inspection thereof will indicate whether the aseptic or hermetic seal has been broken.

Up to the present time, no satisfactory method has been devised to replace the piercing operation which has been used for many years to provide the small feed opening in an infant feeding nipple. The piercing operation is, however, relatively expensive to perform and, being carried out at the manufacturing facility, prevents the use of the nipple as the sealing member for the associated container. Therefore, it would be desirable to provide a new and improved nipple which is so constructed as to eliminate this piercing operation, and, moreover, enable the use of the nipple as a closure for prepackaged formula.

The present invention is described herein in connection with a novel infant feeding, prefilled nursing unit but there are many aspects of the invention which have other applications in the packaging field and in the plastic molding industry in general. For example, the two-part separable closure and the process of injection molding the nipple into a removable cover member may be used for making other types of closures and articles where the dispensing member is something other than a nipple and may be formed of a more rigid material.

Referring now to the drawings,

FIG. 1 is an elevational view of an infant formula package and nursing device embodying the present invention;

FIG. 2 is an enlarged cross-sectional view of the upper portion of the unit of FIG. 1 particularly showing the nipple and sanitary cap therefor;

FIG. 3 is a greatly enlarged fragmentary cross-sectional view of a portion of the closure including the nipple and sanitary cap;

FIG. 4 is a cross-sectional view similar to that of FIG. 2 but with the sanitary cap and tear-off tab removed; and

FIG. 5 is a greatly enlarged view of the portion of the nipple having the feed opening therein.

Referring now to the drawings, and particularly to FIG. 1 thereof, there is shown a package and nursing unit 10 which includes a collapsible tubular bag 12 suitably formed of an impervious flexible plastic and hermetically sealed along the bottom edge 14 thereof. Hermetically sealed over the top of the bag 12 is a closure nipple device 16. The bag 12 may be formed of any suitable impervious material such as a multiple-ply plastic film and has a circular opening 18 at the upper marginal edge thereof into which a depending flange 20 on a nipple 22 extends. An annular bead 24 is provided on the nipple 22 at a location above the flange 20 and provides an annular shoulder 26 against which the upper edge of the bag 12 abuts.

The portion of the bag 12 which engages the nipple 22 is hermetically sealed thereto by suitable means such, for example, as by a heat seal.

The nipple 22 is molded of a soft, elastomeric material such, for example as ethylvinylacetate, and includes a generally cylindrical upstanding portion 28 which is adapted to be placed in the infant's mouth. A finger tab 30 which is integral with the remainder of the nipple 20 extends upwardly from the central portion of the nipple and a conical recess 32 extends upwardly from the inner wall of the nipple a substantial distance into the tab 30. When the unit 10 is to be used to feed the infant, the tab 30 is snapped off thereby to break the nipple material adjacent to the upper edges of the recess 32 thereby to open the feed orifice in the nipple.

Overlying the nipple 22 is a thin, imperforate protective cap 36 which may be formed of any suitable material such, for example, as aluminum or plastic and which conforms to and overlies the outer surface of the nipple 22. The cap 36 is provided with an annular line of weakness 38 which separates an upper removable portion 39 from an annular lower portion 40 to facilitate removal of the upper portion 39 of the cap 36 from the nipple at the time the unit is to be used. It will be noted that the cap 36 does not extend over the tab 30 but surrounds it at its base and the recess 32 extends a short distance above the cap 36 into the tab 30. If desired, the line of weakness may be provided by a tear-off strip extending along the line 38.

As is explained in greater detail hereinafter, the outer surface of the nipple 22 which underlies the inner surface of the cap 36 is maintained in an aseptic condition by the cap 36 until the cap is removed just prior to use of the package for feeding. In this way the outer surface of the nipple remains in an aseptic condition and no further sterilization or handling of this aseptically clean surface is required.

Preferably, the cap 36 is preformed in a preceding operation and the nipple 22 is injection molded directly into it. Since the nipple material is at a relatively high temperature during the injection molding process, it is itself aseptic, and in addition, it sterilizes the inner surface of the cap 36. The cap 36, being impervious, maintains the outer surface of the nipple in a sterile condition after it sets. The close fit between the cap 36 and the nipple 22 which is molded directly into it thus maintains the outer surface of the nipple in an aseptic condition until the cap 36 is removed. The cap 36 may be a metal stamping, it may be a thermoformed plastic sheet or it may be formed in some other manner. During the injection molding of the nipple 22, the cap 36 serves as one mold surface for the nipple and operates in conjunction with a mold core which defines the inner surface of the nipple 22 and the orifice 32. A proper selection of the materials from which the cap 36 and the nipple 22 are formed enables the cap to be separated from the nipple at the time it is to be used. If desired, a release agent, such as a silicon liquid may be sprayed onto the inner surface of the cap 36 prior to the molding of the nipple 22 therein.

In the illustrated embodiment of the invention, the lower cap portion 40 and the adjoining surface of the nipple 22 have a series of annular steps or ridges just below the area of weakness 38 to cause these lower portions thereof to hold together after the upper portion of the cap is removed. The enlarged rim also reinforces the closure during the heat sealing operation. It will be appreciated, however, that this series of steps, while desirable, is not essential since the entire cap 36 may be removed if desired. The advantage obtained by bonding the lower edge of the cap to the nipple is that the unit is tamper-proof. Other configurations to provide such a bond may be used. For example, the bead portion 24 of the nipple may be molded around the marginal edge of the cap, which may be formed with a serrated or other irregular surface.

As shown in FIGS. 2 and 3, the line of weakness 38 which separates the removable portion of the cap 36 from the unremovable portion may be formed by a V-shaped groove formed in the outer surface of the cap 36. If desired, the cap

36 may be provided with a plurality of perforations located along the groove 38 such that the upper surface of the nipple would be exposed through these perforations and the removable and unremovable cap portions would be connected together by the tablike portions between the perforations. Because of the large area of contact between the removable portion of the cap 36 and the nipple 22, the portion of the nipple which would come in contact with the infant's mouth is, nevertheless, maintained in an aseptic sterilized condition in spite of these perforations. Another manner in which the area of weakness may be provided is with a removable tear-strip which is formed in the cap 36 and surrounds it at the line 38.

As described hereinabove, the closure which includes the cap 36 and the nipple 22 is formed in a sequence of operations and is thereafter sealed to the mouth of the bag 12 either before or after the bag has been filled. It will be appreciated by those skilled in the art that the inner surface of the nipple will require sterilization as by a gas method prior to the actual filling of the container 12. Accordingly, if the container 12 is filled prior to placement of the closure thereon, the inner surface of the closure will be sterilized before it is placed onto the bag. On the other hand, if the closure is fitted into and sealed to the bag 12 before the bag is filled, then the usual procedure is to simultaneously sterilize the inside of the bag 12 and the inside of the nipple 22 prior to filling the bag through the bottom end which is thereafter sealed along the line 14.

When the unit 10 is to be used to feed an infant, or others such as a geriatric, the tab 30 is grasped with the fingers and broken off against the adjoining surface of the cap 36 to expose the opening 32. Depending upon the material of which the nipple 22 is molded, it may be desired to provide the cap 36 with an annular enlargement surrounding the tab 30 thereby to facilitate this removal of the tab from the nipple. The cap 36 is then removed from the nipple. In the illustrated embodiment of the invention, the cap 36 may best be removed by first squeezing around the vicinity of the line of weakness 38 to break the cap at this location so that it can then be readily removed from the nipple 22. With the tab broken away and the upper portion of the cap 36 removed, the nipple is now ready for use as shown in FIG. 4. If desired, the cap 36 may be replaced over the nipple as a cover should the contents be only partially used.

It will be understood by those skilled in the art that the nipple orifice must be extremely small. The shape of the orifice as it actually appears in the nipple after the tab 30 is broken away is best shown in the enlargement of FIG. 5. Other orifice configurations may be used if desired.

While the present invention has been described in connection with particular embodiments thereof, it will be understood that those skilled in the art may make many changes and modifications without departing from the true spirit and scope of this invention, and accordingly, all such changes and modifications which fall within the true spirit and scope of this invention are intended to be covered in the appended claims.

We claim:

1. A tamperproof dispensing device and closure, comprising:
  - a container having an opening at one end;
  - a nozzle member having a depending skirt extending into said opening;
  - said container being sealingly bonded to the outer periphery of said skirt;
  - an annular enlargement on said nozzle disposed adjacent to the portion of said container defining said opening;
  - an imperforate sealing and protective cover member positioned over said nozzle member;
  - said cover member having an annular skirt portion embedded in said annular enlargement on said nozzle to fixedly secure said skirt portion to said nozzle member;
  - said cover member having an annular line of weakness disposed in proximity to said skirt portion; and
  - the entire inner surface of said cover being in intimate contact with said nozzle member.
2. A tamperproof dispensing device and closure according to claim 1, wherein said container is tubular and formed of a flexible plastic.
3. A tamperproof dispensing device and closure according to claim 1, wherein said nozzle member is formed of an elastomeric material in the shape of a nursing nipple.
4. A tamperproof dispensing device and closure according to claim 3, wherein:
  - said cover member is formed of a hard material; and
  - said nozzle is directly molded into said cover.
5. A tamperproof dispensing device and closure according to claim 3, wherein:
  - said nozzle member has a protrusion forming a tab on the outer surface thereof and a small recess on the inner surface extending into said tab;
  - whereby said tab may be broken away to provide a feeding orifice in said nozzle member.
6. A tamperproof dispensing device and closure according to claim 5, wherein said tab extends completely through said cover member.

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