United States Patent

Schaar

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[54] NIPPLE CONTAINERS WITH STERILE OPENING DEVICES

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[73] Assignee: **The Kendall Company**, Boston, Mass.

[22] Filed: **Aug. 12, 1964**

[21] Appl. No.: **389,085**

[52] U.S. Cl. .....**99/171 ND**, 215/11 B, 215/11 C, 215/46 A

[51] Int. Cl. **B65b 25/02**, A61j 9/04, A61j 11/04

[58] Field of Search.....99/171; 215/11

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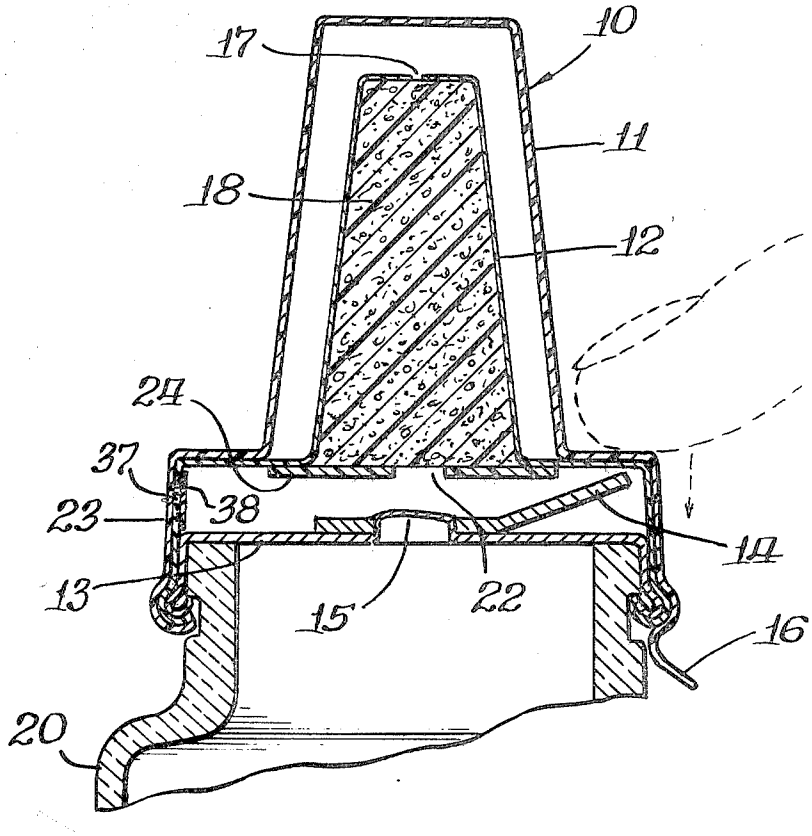
[57] **ABSTRACT**

Nursing unit for use in the feeding of liquid foods to infants wherein the unit has at least two separate and sterile compartments sealed from each other, one of which contains a liquid food, and an opening means located in either of the two compartments which can be actuated to create an opening between the two compartments without violating the sterility of either compartment. The nursing unit comprises in combination a sealed container enclosing liquid food in a sterile condition forming a first compartment and a nipple attached to the top of the sealed container to form with the top a second sterile compartment. The opening device acts upon a section of the top surface of the container to create an opening therein to provide a passageway for the liquid food from the container to the second compartment and the interior of the nipple. Nipple structures having venting means incorporated therein are provided for permitting venting of the unit during feeding, when necessary. Inexpensive nipples composed of a thin film shaped in the form of a teat and filled with a porous foam for use in the nursing unit are disclosed. An overcap for the nipple on the container is also provided to maintain the outer surface of the nipple sterile.

7 Claims, 16 Drawing Figures



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SHEET 1 OF 3

Fig. 1.

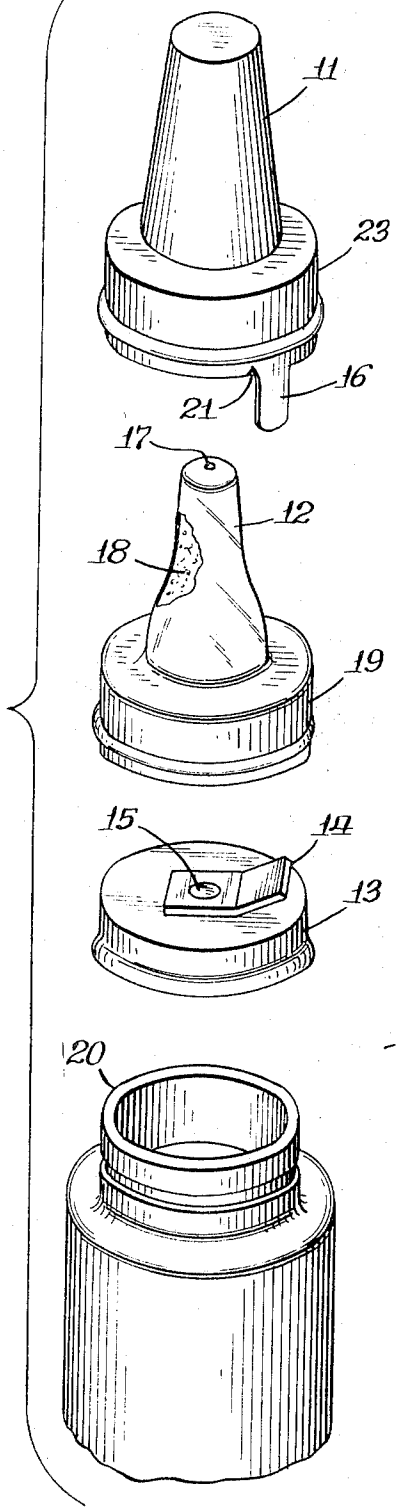


Fig. 2b.

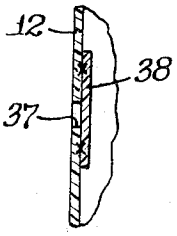
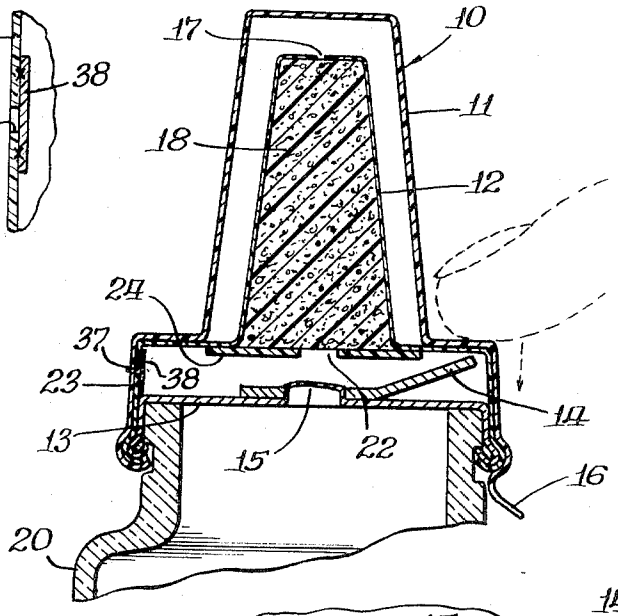


Fig. 2.



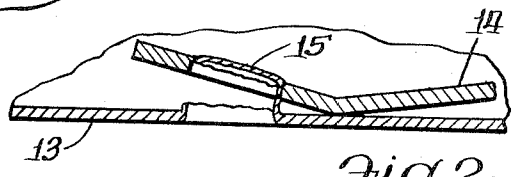


Fig. 2a.

Fig. 3.

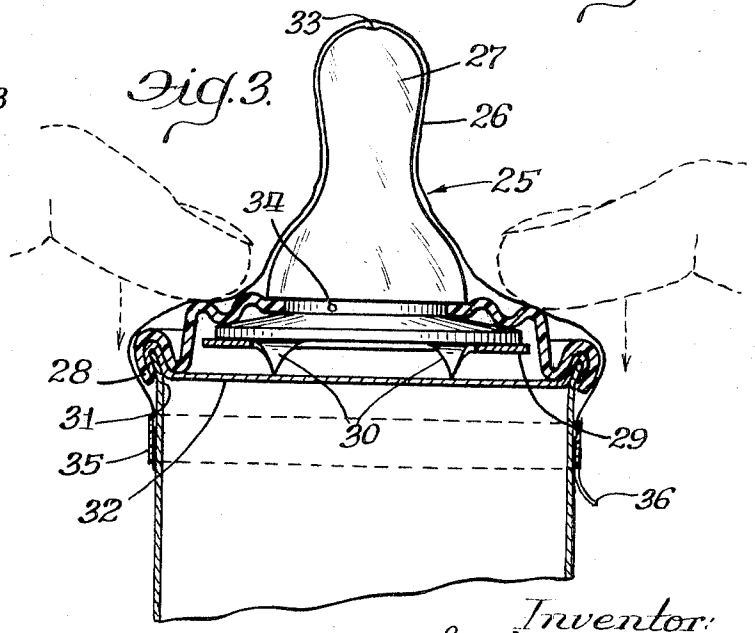


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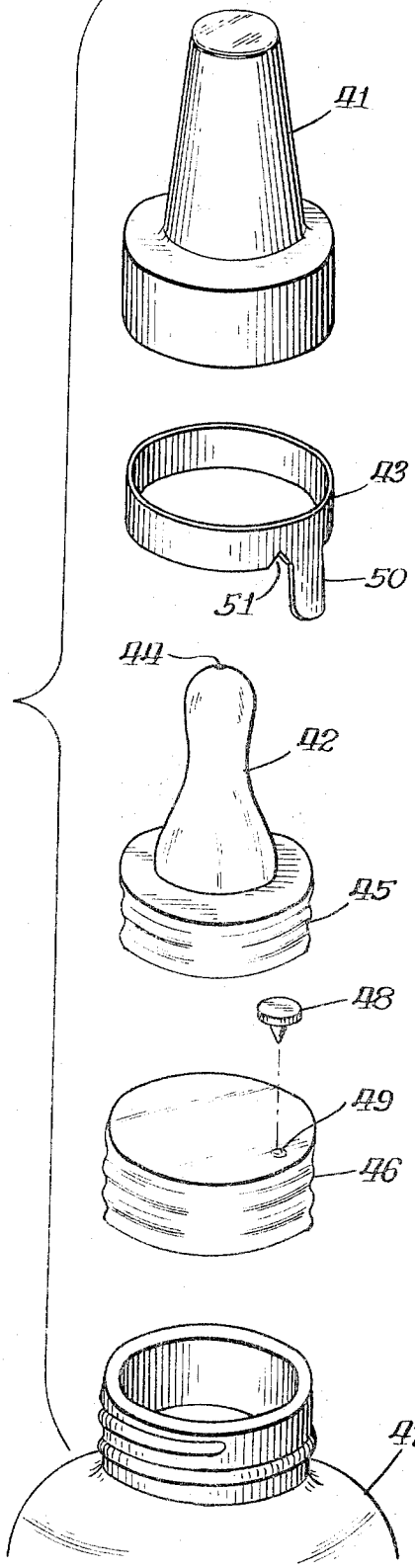
Fig. 4



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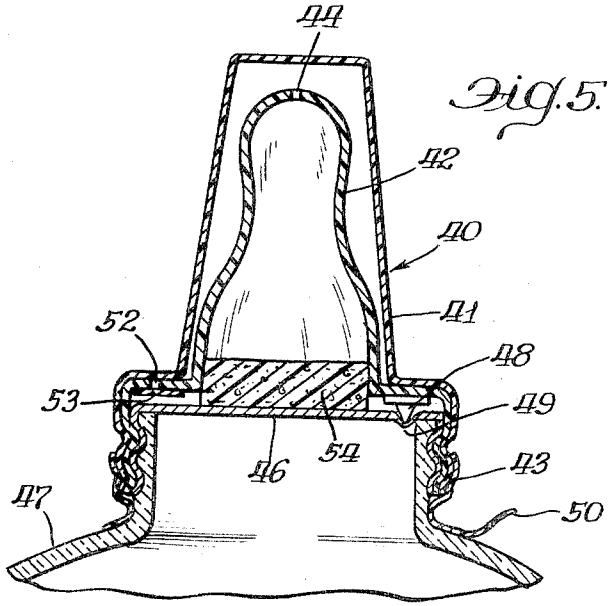

Fig. 6.

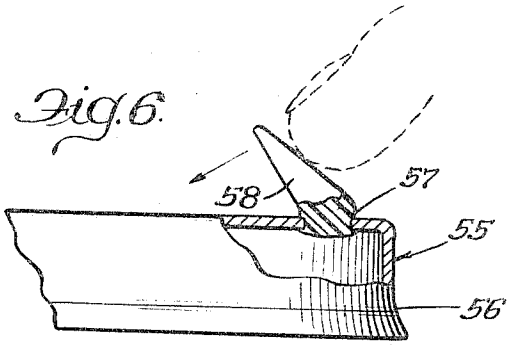

Fig. 7.

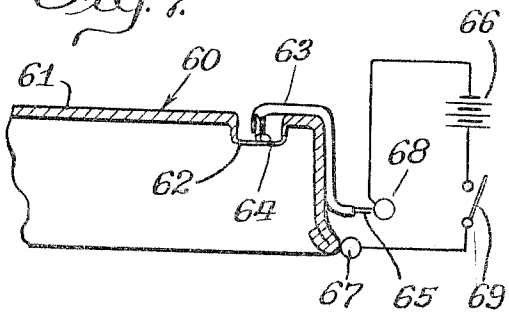

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Fig. 8.

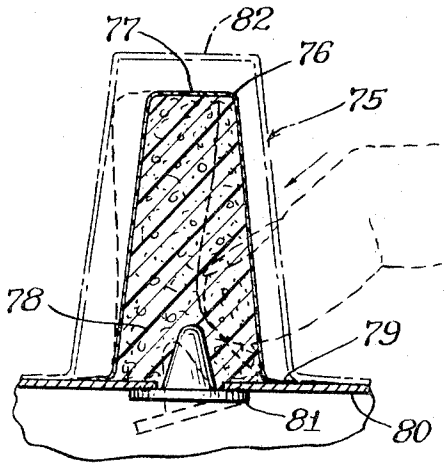


Fig. 9.

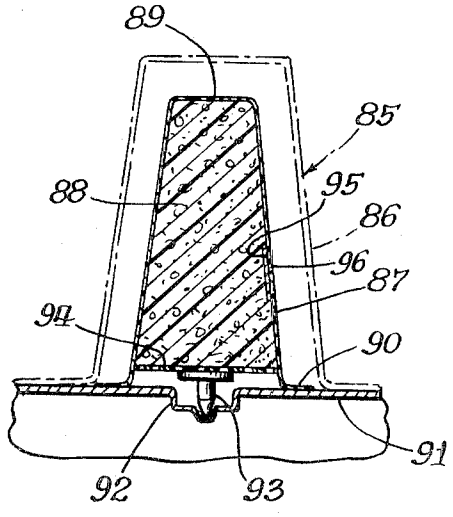


Fig. 10.

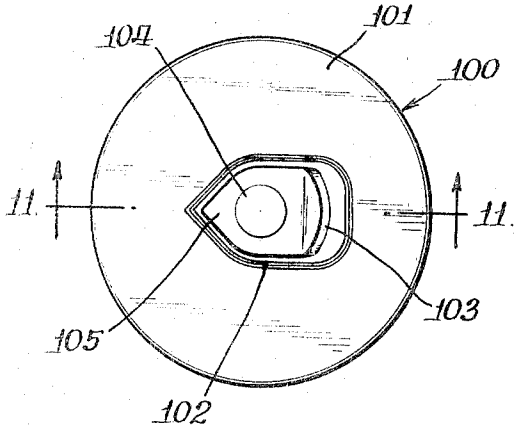


Fig. 11.

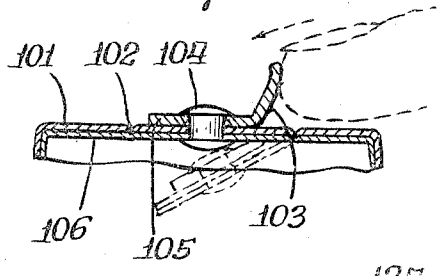


Fig. 14.

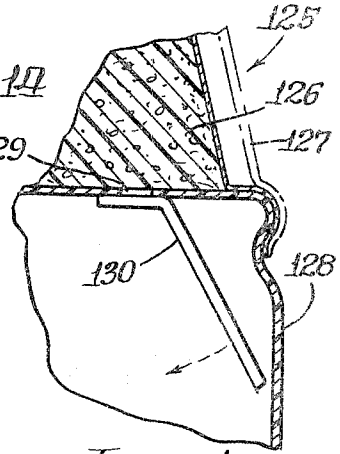


Fig. 13.

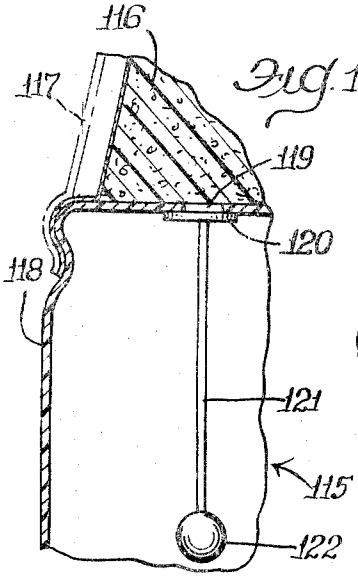
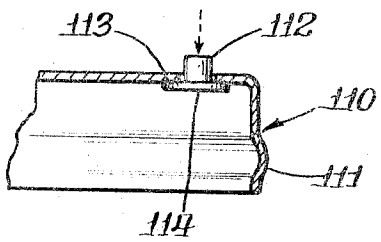


Fig. 12.



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NIPPLE CONTAINERS WITH STERILE OPENING DEVICES

This invention is concerned with liquid baby food packages particularly with such packages to which a feeding nipple is attached, the food and nipple being maintained in sterile condition until actual use at ambient temperatures.

Recently there have been revolutionary changes in baby feeding techniques. No longer is it necessary for mothers to wash and sterilize containers and nipples, to sterilize the milk or other liquid food, to refrigerate the filled nipple packages and finally to warm the food in the container at feeding time. A great deal of inconvenience may now be avoided with presterilized combinations which are essentially sealed food-filled containers with sterile tops and containing sterile food, a sterile nipple and simple means usually involving a plastic collar for fastening the nipple to the container top after the latter has been perforated. This combination need not be refrigerated because the container is sealed until just prior to feeding hence the original sterility of contents is not compromised. Likewise, warming is not necessary. After the feeding, the entire combination is discarded.

Convenient as these modern packages and techniques are for feeding babies, there is one difficulty connected with opening the sealed container which is undesirable and in accordance with the teachings of this invention, unnecessary. Since the container must be opened as late as possible before feeding the baby to preserve the liquid contents in sterile condition, it is present practice to remove the covering preserving the container top in sterile condition and then to puncture the sterile top with a sterile instrument after which the nipple is secured to the top and its cover removed. Alternatively, the whole top is removed and replaced with a sterile nipple top. It is obvious at once that by the puncture technique the top of the container and the bottom of the nipple are momentarily exposed to the air and hence to bacteria. Furthermore, when puncture means are utilized, the puncturing means must be sterilized and unless a sterile instrument is furnished, utilization of some sterilizing technique on the part of the mother is required. Obviously, also when the entire container top is removed and replaced with a sterile nipple, the entire contents and the bottom of the nipple are momentarily exposed to bacteria. While this is probably not serious in view of the fact that the food is consumed before any bacteria has an opportunity to multiply to any substantial concentration, it does represent bacterial exposure which in accordance with the teachings of this invention is unnecessary. Furthermore, the person preparing the baby's food is put to unnecessary inconvenience at the least. This is particularly frustrating where facilities are inadequate as when traveling.

It is an object of this invention to provide sealed containers containing sterile baby food and an attached sterile nipple and means for opening the container without exposing either the sterile contents or the sterile nipple to bacterial contact.

It is a further object of the invention to provide a container for sterile liquid baby food with an attached sterile nipple which may be stored indefinitely and then opened for immediate feeding of any time without risk of bacterial contamination of the nipple and the liquid contents.

It is a further object of this invention to provide a container for sterile liquid baby food with a thermoplastic nipple heat-sealed to the sterile container top and providing a strainer for the liquid food, the container being capable of being opened without exposing the nipple or contents to bacterial contact.

Other objects of the invention will be evident from an inspection of the specification of the drawings. In the latter:

FIG. 1 represents an exploded perspective view of a typical nursing unit of the invention.

FIG. 2 illustrates in cross section and unit of FIG. 1 in assembled relationship and ready to be opened.

FIG. 2*a* illustrates the opening means of FIG. 2 after the opening operation.

FIG. 2*b* illustrates in greater detail the event valve of FIG. 2.

FIG. 3 illustrates partially in cross section another typical nursing unit of the invention.

FIG. 4 represents an exploded perspective view of another typical nursing unit of the invention.

FIG. 5 illustrates in cross section the unit of FIG. 4 in assembled relationship and ready to be opened.

FIG. 6 illustrates in partial cross section a container top with a typical opening of the invention attached.

FIG. 7 illustrates in cross section a container top of the invention equipped with an electrical opening device.

FIG. 8 illustrates the nipple portion of another typical nursing unit of the invention in partial cross section.

FIG. 9 illustrates the nipple portion of still another typical nursing unit of the invention in partial cross section.

FIG. 10 is a top view of a typical container top with an opening device of the invention.

FIG. 11 is a partial side view in partial cross section of the top and opening device of FIG. 10.

FIG. 12 illustrates in partial cross section a partial side view of a container top with a typical opening device of the invention.

FIG. 13 illustrates in partial cross section a partial side view of a nursing unit of the invention with a typical opening device.

FIG. 14 illustrates in partial cross section a partial side view of a nursing unit of the invention with a typical opening device.

The objects of the invention are achieved by providing nursing unit sealed containers of sterile liquid baby food having means for preserving the attached nipple in sterile condition, the unit including means for opening the sealed container by moving a sterile device within the sterile area so as to create an opening in the container such that sterile liquid will flow only in sterile areas through the opening into the nipple.

An important feature of this invention is the provision of a nursing unit comprising three sterile areas, one being the area between the nipple cap and the nipple including the outside of the latter, a second sterile area being the inside of the sealed liquid container and the third being the inside of the nipple and the area communicating with it at its base including at least a portion of the adjoining wall (usually the top) of the container. The sterile opening means is disposed within either the second or third sterile area and functions when operated to create and opening in the container wall in the area separating the second and third sterile areas. The opening means preferably is operated without violating the sterility of any of the sterile areas but obviously one might remove the nipple cap just prior to operating the opening means without serious bacterial contamination of the outside or inside of the nipple. For purposes of this invention, therefore, it is essential only that the opening means be operative without itself violating the sterility of areas two and three. Any practical means for opening which is operative in the space of the second or third sterile areas without violating their sterility is suitable. Openings may be made by piercing, tearing, cutting, punching, separating, abrading, peeling, sliding, twisting, melting and the like. Typical means are illustrated but for purposes of this invention any means operative in the sterile area is considered equivalent to those illustrated and described. The opening created permits the liquid food to pass from the container through the opening into the nipple by a completely sterile path. The sterility of the nipple and the contents may be preserved until the last instant when the nipple cap is removed after the opening is created and the nipple is immediately placed in the baby's mouth.

Referring once more to the drawings:

In FIGS. 1 and 2, a typical nursing unit 10 of the invention includes a nipple cap 11, a nipple 12, a container 20 with preferably a permanently fastened cover 13 and an opening device 14 fastened to the cover 13. In practice, finger pressure through the interposed nipple cap wall and the nipple causes the opening device handle to exert an upward force on the thinned cup 15. The cup 15 is an integral part of the cover 13 and acts like a hollow rivet to hold the opening device in place but when the device handle is pressed down, the thinned portion tears creating an opening. FIG. 2*a* illustrates the general

type of opening created. The nipple in the embodiment has an orifice 17 and a base 24 which holds a resilient material such as polyurethane foam 18 in place. The base has a hole 22 for ingression of the liquid food. The nipple depending skirt 19 which is sealed to the skirt of the container cap 13. This may be done by shrink-sealing, heat-sealing, gluing, or other means which creates a nonleak bacteria-impervious jointure. The nipple skirt in this embodiment is equipped with a vent so that air may enter to replace the liquid food removed through the nipple action of the baby. This vent, shown more clearly in FIG. 2*b*, consists of a hole 37 in the nipple skirt and a film 38 covering the hole and sealed on its sides but not at its ends to the nipple skirt. As a partial vacuum is formed by the liquid removed, the film of the vent is drawn away from the hole to let in air and relieve the partial vacuum. The provision of a vent in any of the nursing units of this invention while preferred is optional, however, and is not critical to the invention.

The nipple of FIG. 2 may be covered by any type nipple cap which preserves the sterility of the nipple. Preferably the nipple cap is formed of a thin flexible material which may be distorted in operating the opening means without violating the sterility of the enclosed space. But the benefits of the invention are still present even though the cap may be so inflexible that it must be removed just prior to opening the container. For purposes of the invention, therefore, it is necessary only that the opening means to be operable with the nipple in place without violating the sterility of sterile areas two and three except for the nipple orifice. In the embodiment shown in FIGS. 1 and 2, the nipple cap is heat shrunk over the container cover and the nipple skirt in the skirt area 23. The cap is removed by pulling the tab 16 which causes the cap to tear away helped by the notch 21.

In FIG. 3, the nursing unit 25 is a somewhat different embodiment of the invention in that a typical rubber nipple 27 might be used. This nipple which is equipped with a feeding orifice 33 and a vent 34 snaps into a flexible collar 28 made of material such as polypropylene. The collar in turn snaps over the upstanding rolled edge 31 of a container preferably of tinplate with an aluminum top 32 to form a leakproof seal between the collar and the container. A hard plastic or preferably metal washer 29 with piercing teeth 30 is disposed under the nipple base in position to make openings in the top 32 when pressed downwardly. A nipple covering or cap 26 forms a bacterial impervious cover. The cap preferably is of thin film but may be of paper or other thin material. The cap is retained in bacteria impervious relationship with the container by a plastic shrink band 35 which was a tear tab 36 by which it may be torn free. As in the nursing unit of FIG. 2, the nursing unit of FIG. 3 includes a sealed container of sterile liquid food and an area covered by the nipple cap which is sterile. This embodiment may include a sponge strainer as is shown in FIG. 5 or it might include a plastic perforate film strainer. The container of this embodiment may be opened by pressing down with the thumbs or fingers at each side as is illustrated. The piercing teeth 30 readily penetrate aluminum and thin tinplate. Obviously, the container might be made of waxed paperboard or of plastic.

In the embodiment illustrated in FIGS. 4 and 5, the nursing unit 40 includes a nipple 42, a nipple cap 41, a shrink band 43, a sealed container 47 with a screw top 46 and an opening device 48 resting in a depressed and thinned area of the top 46. The nipple may be a conventional rubber nipple with a feeding orifice 44 as is illustrated with or without the foam filter 54 and fitted with a skirt 45 to snap over the screw top 46. Alternatively, it may be a thin film nipple as in FIGS. 1 and 2 with a foam filling and the skirt may be heat-shrunk over the screw top. A vent-valve comprising a film 52 covering a hole 53 in the nipple base may be adhered with latex or if plastic film is involved in the nipple base may be heat-sealed or otherwise glued or fastened along the sides but not along the ends similar to FIG. 2*b*. The nipple cap 41 fits snugly over the screw top 46 and is held in bacteria impervious relationship to the screw cap skirt by the shrink band 43 which has a tearing notch 51 and a tab 50. The area under the nipple cap is sterile including the opening device 48, the nipple and foam, and the top of the screw top 46. The sealed liquid container contains sterile liquid food. The container is opened by pushing down on the opening device 48 which is an enlarged tack of metal or hard plastic. The screw cap is preferably of aluminum.

In the assembly 55 of FIG. 6 only the container top 56 with the opening device 58 is illustrated. It is to be understood that the top 56 may be substituted for the container top 13 of FIGS. 1 and 2 in a complete nursing unit as is illustrated in those figures. In practice it is obvious that the finger does not press directly against the opening device 58 but rather through the interposed nipple at least and preferably through both the nipple and nipple cap. The opening device 58 consists of a plastic pop-plug fastened into a hole 57 in the top 56.

In FIG. 7 is illustrated a container top 60 which likewise may be substituted for the top 13 of FIGS. 1 and 2 in a complete nursing unit as is illustrated in those figures. As can be seen from the illustration, a cup-shaped depression or well 62 is formed in the top portion 61 of the container top. A short piece of insulated wire 63 is secured to the container top preferably by heat sealing and a bare end 64 projects into the well and contacts the thin bottom of the well. Another bare end 65 projects from under the bottom edge of the nipple cap. Likewise, a portion of the bottom edge of the container top is left exposed. When the end 65 and the bottom edge of the top are contacted by the electrical contacts 67 and 68 and the switch 69 is closed, the electrical source 66 causes the thin well bottom to the perforated by melting. In practice tinplate is the preferred material for the container top, but other metals or heavy metal foil may be substituted. Depending upon the thinness and resistance of the top, a voltage as low as 40 volts may cause perforation or one as much as 120 volts may be necessary. Obviously, where plastic is employed for the container top, a high-resistance wire in coil, loop, or other form may be used to melt an opening. For instance, a No. 32 steel wire approximately 5 inches in length when formed into a coil and placed in contact with a 30 mil polypropylene container top became hot enough when energized by about 2 volts AC to melt an opening in about 15 seconds. These methods may be advantageous in hospitals where a great number of nursing units must be prepared at about the same time.

In FIG. 8 it is to be understood that the complete nursing unit 75 includes a sealed container containing a sterile liquid food and that the wall 80 is a wall of that container. The unit includes a nipple 76 of the thin film type with a foam filling 78 and a nipple feeding orifice 77. The nipple of this embodiment is unusual in that it terminates in a flat flange 79 which is sealed, preferably heat-sealed to the container wall 80 and the opening device 81 projects up into the base of the nipple. The nipple cap 82 may be heat-sealed or otherwise glued to the wall of the container also or it may extend over the container top as in FIGS. 2 or 3 being heat-shrunk to the container top or fastened by a heat-shrunk band. Preferably a tear tab is furnished to permit easy removal of the nipple cap. As is illustrated by the dotted lines, the nipple and preferably the nipple cap may be distorted sufficiently to force the opening device away from the wall 80 creating an opening. It is preferred that the opening device be of hard plastic sealed, preferably heat-sealed, to the container wall to cover an aperture in the latter.

In FIG. 9 the complete nursing unit 85 includes a nipple 87 of thin film with a feeding orifice 89 and a foam filling 88. Again the nipple base 90 is sealed, preferably heat-sealed, to a wall 91 of the sealed container containing the sterile liquid baby food. Again as in the nursing unit of FIG. 8, the nipple cap 86 covers at least the nipple and maintains the area beneath it sterile. In the embodiment illustrated in this figure, however, the container wall is provided with a cup 92 having a thin depressed center portion which together with the perforated disk 94 holds the opening device 93, a large tack of metal or hard plastic, in place. This opening device is operated by pressing downward through the nipple cap and nipple on

the device so that its point pierces the container wall 91. A vent is provided in the nipple of this embodiment consisting of a hole 96 in the nipple wall and a covering film sealed at the sides but not at the ends to cover the hole as is shown more clearly in FIG. 2*b*. The vent is optional but should be located outside the area normally in the baby's mouth. Preferably, it should be just above the perforated disc 94.

In FIGS. 10 and 11, it is to be understood that the container top 100 and the opening device 105 are part of a complete nursing unit such as is illustrated in FIG. 2. The container top is seen to consist of two layers, a top layer 101 and a more easily torn or punched layer 106. The top layer may be of tinplate and the bottom plate of aluminum, for example. In the embodiment shown, the top layer is scored in a boat shape by the score 102. The opening device is riveted by rivet 104 to the container top. The device preferably has a pointed end. When the handle 103 of the device is pushed in the direction of the arrow, not by the finger in direct contact as illustrated but by the finger against the interposed nipple cap and nipple, the top layer tears along the score 102 and helps to tear or puncture the bottom layer 106 thus creating an opening in the sealed container in the sterile area.

In FIG. 12, likewise, the assembly 110 consisting of a container top 111 and an opening device 112 is to be understood as part of a complete nursing unit such as is illustrated in FIG. 2 with the container top of that illustration replaced by the assembly 110. In practice, the flat flange 114 of the opening device which may be of hard plastic or metal is sealed with the seal 113 to the container top. When the button of the opening device is pressed down, the seal is broken and an opening is created.

In FIG. 13, the nursing unit 115 includes a sealed container 118 containing sterile liquid baby food, a foam-filled nipple 116 and a nipple cap 117. A hole 119 in the container top is covered by a flat flange 120 which is connected by a rod 121 to a weight 122. The flange 120 is sealed to cover the hole 119. When the container 118 is struck sharply on its side, the inertia of the weight tears loose the seal holding the flange 120 in place thus creating an opening.

In FIG. 14, the nursing unit 125 includes a sealed container 128 with flexible walls containing sterile liquid baby food, a foam-filled nipple 126, and a nipple cap 127. A hole 129 in the container top is covered by a flat face of the opening device 130 which is sealed over the hole and which has an elongated arm extending near the container wall. When it is desired to open the container, a finger is pressed against the elongated arm pushing it inward and breaking the seals around the hole 129.

While metal is preferred as the material of the container wall in which the opening is created in the nursing unit of this invention, obviously a great many of the opening devices could be used with plastics or with wax-coated or plastic-coated paperboard. It is intended to include in this invention nursing units utilizing such materials.

In certain of the embodiments illustrated, a well or depression is shown. This well is a convenience but is not a necessity and may be eliminated, if desired.

I claim:

1. A nursing unit including:
   a. a sealed container defined by top, bottom and side walls, said container enclosing within said wall a primary sterile zone containing sterile liquid baby food;
   b. A nursing nipple having an upstanding teat and a base, said nipple being attached to said container with said base positioned toward and over the outside surface of the top wall of the container and the teat extending away from the container to provide a secondary sterile zone bounded by inside walls of said nipple and the outside surface of the top wall of the container over which the attached nipple is located;
   c. sterile opening means disposed within one of said sterile zones comprising an arm means having one part thereof fixed to the top wall of said container over which the attached nipple is located and an arm part extending beyond the fixed part disposed at an angle to the surface of said top wall of the container to provide a lever arm which is operable without violating the sterility of either of said zones by application of a load thereto to cause the top wall of the container to rupture at the place where the arm means is fixed thereto to create an opening therethrough and to displace said fixed part of the arm means and the top wall portion which is fixed thereto toward the teat in the direction of flow of the liquid baby food from the container to the nipple when in use; and
   d. a nipple cap covering at least the teat of said nipple and maintaining the covered portion of the nipple and the secondary sterile zone in sterile condition during storage.

2. A nursing unit in accordance with claim 1 wherein the arm part disposed at an angle to said surface is positioned in the secondary sterile zone.

3. A nursing unit in accordance with claim 2 wherein said one part of the arm means is fixed to a section of said top wall of the container which is structurally weaker than adjacent sections of the top wall and thus more easily rupturable than said adjacent sections.

4. A nursing unit in accordance with claim 1 wherein the arm part disposed at an angle to said surface is positioned in the primary sterile zone.

5. A nursing unit in accordance with claim 1 wherein said one part of the arm means is fixed to a section of said top wall of the container which is structurally weaker than adjacent sections of the top wall and thus more easily rupturable than said adjacent sections.

6. A nursing unit in accordance with claim 3 wherein the structurally weaker section is thinner than said adjacent sections.

7. A nursing unit including:
   a. a sealed container enclosing a primary sterile zone containing sterile liquid baby food;
   b. a nursing nipple having an upstanding teat and a base, said nipple being attached to said container with said base positioned toward an outside surface of the container and the teat extending away from the container to provide a secondary, sterile zone bounded by inside walls of said nipple and that portion of the surface of the container over which the attached nipple is located and defined by the attachment of the nipple thereto;
   c. sterile opening means dispose in one of said sterile zones and operable without violating the sterility of either said zones comprising an electrical circuit in contact with a section of the portion of the container in said zones, said circuit comprising electrical leads extending to the outside of the nursing unit for attachment to a source of electrical energy, said circuit when connected to said source heating said section to melt an opening therein; and
   d. a nipple cap covering at least the teat of said nipple and maintaining the covered portion of the nipple and the secondary sterile zone in sterile condition during storage.

* * * * *

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,635,724 Dated January 18, 1972

Inventor(s) Charles H. Schaar

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

Column 1, line 66, for "and" read -- of the --; column 1, line 69, for "the" read -- and --; column 2, line 43, for "an" read -- and --; column 3, line 1, for "the" read -- this --; column 3, line 4, after "nipple" insert -- has a --; column 3, line 27, strike out "to"; column 3, line 46, for "bacterial" read -- bacteria --; column 3, line 50, for "was" read -- has --; column 4, line 31, for "the" read -- be -- .

Signed and sealed this 6th day of March 1973.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents

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