PRESSURE EQUALIZATION MEANS FOR BABY BOTTLE

United States Patent Office 3,355,047 Patented Nov. 28, 1967

ABSTRACT OF THE DISCLOSURE

Pressure equalization means for use with a baby bottle by which air is automatically admitted interiorly of the bottle to equalize interior bottle pressure with the atmosphere by means of discrete openings in the embodiments of a tube mounted by a truncated nipple, a straw-like member mounted by a truncated nipple, a balloon-like member mounted by a truncated nipple and a tube with an out-turned flange, severally disposed in the bottle by intersection between the bottle's reduced, externally threaded lower portion and an internally threaded lower retaining cap.

This invention relates to the art of pressure equalization means for a baby bottle.

A conventional baby bottle or nursing bottle consists of a substantially cylindrical container having one end open, and referred to as the bottle, a nipple and an internally-threaded, retaining cap. The nipple has an out-turned flange portion whose bottom is seated upon the flat open end of the bottle. The externally-threaded, open end of the bottle is suitably engaged by the threaded portion of the retaining cap to maintain the nipple in its seated position with respect to the bottle. The tip area of the nipple with its perforations or holes formed therein is disposed in the baby's mouth, and sucking action on the part of the baby causes the formula or milk in the bottle to be drawn through the perforations or holes in the nipple tip into the baby's mouth. This sucking action on the part of the baby causes the creation of a partial vacuum or negative pressure interiorly of the bottle. This partial vacuum or negative pressure is less than atmospheric pressure with the result that the baby is physically unable to withdraw any more formula or milk from the bottle by his sucking action. However, the baby continues his sucking action on the nipple tip. The mid region of the nipple collapses and occludes to prevent any more formula or milk to be withdrawn from the bottle. Sustenance is close at hand, but the baby is not able to obtain this sustenance from his bottle. The baby continues to suck because a baby does not have physiologic and cognitive development to know that by releasing the nipple he will allow air to enter through the perforations or holes in the nipple tip and thereby allow air admission to relieve the partial vacuum created and to equalize the interior bottle pressure with the atmosphere. A baby under approximately twelve months does not possess sufficient physiologic and cognitive development to perform this intentional act of such air admission for such pressure equalization. Moreover, during the time of this occlusion of the mid region of the nipple, the baby in the course of his continued sucking on the collapsed and occluded nipple will draw some air into his stomach. This factor of the babydrawing air into his stomach has been medically attributed to be a contributing cause of colic. Contributing cause of colic or not, the air in the baby's stomach must be removed by burping the baby; otherwise, the baby may vomit the contents of his stomach to get rid of this air in his stomach. Upon such occlusion of the mid region of the nipple, his mother will take the bottle away from her baby to unscrew the retaining cap to allow the negative pressure in the bottle to equalize with atmospheric. Nevertheless, his mother sometimes must go one step further and remove the nipple in order that she can manipulate the nipple sufficiently to thereby constrain the collapsed and occluded nipple to resume its original configuration.

Another problem in the art often occurs in the sterilization of the bottle with its prepared formula or milk. With the prepared formula or milk in the bottle, the nipple is disposed in inverted position on the bottle and the retaining cap is loosely screwed on. The bottle is then placed in a sterilizer. The sterilizer conventionally is a container with a cover. The container has a wire container which will hold several bottles. Water is put into the container and boiled for twenty to twenty-five minutes. Thereafter the bottles are removed from the sterilizer, the retaining caps are screwed down, and the bottles are placed in the refrigerator. When his mother fetches her baby's bottle for his feeding, she must first unscrew the retaining cap, dispose the nipple in its upright position and then screw down the retaining cap. However, while the bottle is in the refrigerator cooling, often a partial vacuum or negative pressure of sufficient magnitude has been created interiorly of the bottle that when the mother unscrews the retaining cap to dispose the nipple in its upright position preparatory to feeding her baby the nipple will be "sucked in" the bottle with attendant difficulty in the removal of the nipple, with mess from such removal and with possible bacterial contamination of the nipple, bottle and the formula or milk contained in the bottle.

Accordingly, the problem of the art to which this invention pertains is the need for pressure equalization means whereby the partial vacuum or negative pressure created in the interior of the bottle in the initial sterilization of the bottle and through the sucking action of the baby in his feeding can be relieved and equalized with atmospheric pressure.

In solving this problem of the art, certain conditions have been considered necessary and have been observed. One condition is that the pressure equalization device must be foolproof and must work.

Another condition is that the pressure equalization device must not affect the construction, operation, use and function of the conventional nipple. In this condition it should be mentioned that in the past attempts have been made unsuccessfully to incorporate with the nipple a pressure equalization function. Such unsuccessful attempts have resulted in nipples lacking their necessary softness and flexibility, in nipples that are very difficult to clean and sterilize, and in nipples whose incorporated pressure equalization function quickly malfunctions.

A further condition is that the pressure equalization device must lend itself to utter simplicity in thorough cleaning and sterilization. In the past, pressure equalization devices have not altogether observed this condition; and those pressure equalization devices rendered difficult the cleaning of the accumulation, deposit and build-up of formula, and with resulting malfunctions and bacterial contaminations.

Another condition is that the pressure equalization device must be of simple but durable construction, and must be inexpensive to manufacture. Of course, simplicity and durability of construction contribute to the factor of inexpensiveness in manufacture.

Along with simplicity and durability of construction is the condition that the assembly of the pressure equalization device for its intended use and function must be easily understood by, and should be self-evident quickly to, the average mother. If the assembly, function and use of a pressure equalization device is easily understood by the average mother, she will be most susceptible to employing the device in feeding her baby.

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Accordingly, the object of this invention is to provide a pressure equalization device which will solve the problem of the art and observe the conditions set forth with reference to such solution.

This object and other objects of the invention should be fully and distinctly described as will be perceived and appreciated by reference to the detailed specification taken in conjunction with the drawings, wherein like reference numerals refer to similar parts throughout the several views, in which:

FIG. 1 is a view partly in section, of one embodiment of the invention, and which further depicts the sub-assembly of the male-female adapter with a tube; FIG. 2 is a sectional view of the embodiment in FIG. 1, but which sectional view excludes the bottle, nipple, and upper-retaining cap of FIG. 1; FIG. 3 is a view of the sub-assembly of the male-female adapter with a straw-like tube; FIG. 4 is a fragmentary view of FIG. 3 in the direction of arrow "A"; FIG. 5 is a view of the sub-assembly of the male-female adapter with a balloon-like member; FIG. 6 is a view, partly in section, of another embodiment of the invention showing a flanged tube; FIG. 7 is a sectional view of the flanged tube shown in FIG. 6; FIG. 8 is a fragmentary view of FIG. 6 in the direction of the arrow "B." Shown in FIG. 1 of the drawings is a baby bottle 1, substantially of open-cylindrical configuration, having reduced upper and lower portions 3 and 5 which are externally threaded. A nipple 7 is of conventional construction and configuration in that same has an outflanged flange (not shown), a toroidal-like bead 9 formed on its surface, a mid region 11, and a tip 13 which has suitable perforations or holes therethrough. The nipple 7, in its emplaced disposition, extends through the center hole of conventional upper-retaining cap 15. Cap 15 is internally threaded. And sufficient mutual engagement of the internally threaded cap 15 with the externally threaded upper portion 3 provides securement of nipple 7 in its emplaced disposition as shown.

Similarly disposed in secured relationship is the conventional lower-retaining cap 17 which has its internally threaded portion sufficiently engaged with the externally threaded portion of lower portion 5. As viewed in FIGS. 1 and 2, disposed in ascending order between the annular inner portion 19 of cap 17 and the bottom of lower portion 5 are lower end cap 21, truncated nipple 23 and washer-like, sealing gasket 25. Truncated nipple 23 is disposed in inverted position with respect to lower portion 5.

Lower end cap 21 is shown to be of solid, disk-like configuration. However, it is within the concept of this invention to have formed through this described type of end cap an air-ingress hole covered and sealed by a hand-removable, adhesive-like tab. In this type of modification described end cap 21 can be of suitable plastic material or of waxed cardboard. And it is further within the concept of this invention for the end cap 21 to be of material and structure that same will be a finger-puncturable, waterproof, sealing membrane.

Truncated nipple 23 is similar to nipple 7 with its tip 13. The outflanged flange 27 of nipple 23 is disposed in abutting relationship between the annular inner portion 19 of cap 17 and gasket 25. The toroidal-like bead 29 of nipple 23 abuts gasket 25 and retains same in the disposition as shown.

Disposed in the mid region 31 of nipple 23 is the male-female adapter 33. Adapter 33 is retained in such disposition in the mid region 31 by the interfering engagement of the shoulder 35 of adapter 33 by reason of the fact that the external diameter of shoulder 35 is slightly greater than the internal diameter of mid region 31.

Adapter 33 has a neck portion 37. Externally, neck portion 37 is utilized for penetrating, retentive engage-
57 will project above the liquid line of the formula or milk in the bottle 1. At any liquid level in the bottle 1, the top 57 of member 53 will float at that liquid level and will project itself above such liquid level. The pressure of the liquid in the bottle 1 collapses and occludes the walls of member 53 to prevent any formula or milk from leaking through member 53. Of course, the top 57 of member 53 floats in unobstructed condition above the liquid line. And as is the case with respect to FIGS. 1-4, as the baby sucks upon nipple 7 and as the partial vacuum or negative pressure less than atmospheric pressure commences to be created interiorly of bottle 1, air at atmospheric pressure which is greater than the pressure interior of bottle 1 is drawn internally through member 53 and is admitted interiorly of bottle 1 to equalize the interior negative pressure with the atmospheric pressure. Since the atmospheric pressure is greater than the interior bottle pressure, the atmospheric pressure will open up the occluded walls of member 53 on its passage to the top 57 of member 53 and subsequent admission interiorly of bottle 1.

In the embodiment shown in FIG. 6 of the drawings, bottle 79 is similar in configuration to bottle 1, and mounts a nipple and cap 15 for like purpose, use and function. The reduced lower portion 81 is similarly threaded externally by engagement therewith the internally threaded portion of lower retaining cap 83. Cap 83 has a centrally disposed hole 85 and an annular inner portion 87. As viewed in FIG. 6, disposed in ascending order between the annular inner portion 87 of cap 83 and the bottom of lower portion 81 are lower end cap 89 and the outturned flange 91 of tube 93. Tube 93 is of sufficient length such that its top 95 will project above the liquid line of the formula or milk in the bottle 79. The internal diameter of tube 93 is restricted to that range of internal diameter small enough to minimize and retard the flow therethrough of formula and milk, but large enough in diameter to allow the passage of air in sufficient quantity to allow practically automatic equalization of the air pressure in the bottle with the atmosphere. Lower end cap 89 is a finger-puncturable waterproof, sealing membrane; however, in the absence of lower end cap 89, a lower end cap similar to lower end cap 21 can be utilized, or a lower end cap can be utilized in accordance with the modifications that were described with reference to lower end cap 21. With an opening punctured through end cap 89, the embodiment shown and described with reference to FIGS. 6, 7 and 8 functions in the manner similar to the embodiments previously described to allow practically automatic equalization of the air pressure interiorly of bottle 79 with the atmosphere.

Of paramount importance in this breakthrough in this art is the fact that tube 39, tube 47, member 53, tube 69 and tube 93 are each one-time use, disposable items. A great amount of ingenuity, time and effort has been expended in the effort in achieving the ameliorative result in comparison to the prior art by the structural design of each of the disposable items 39, 47, 53, 69 and 93 so that these enumerated items have cooperative and correlative, arrangement and association with their respective structure such that each one of the embodiments with their modifications is fool-proof and works in effectuating pressure equalization, and that the enumerated items can be mass-produced at minimal expense. Hence, this factor of the enumerated items being produced and manufactured minimally expensive means opens the doors to other ameliorative results in comparison to the prior art.

With respect to the use by the mother of one of the enumerated items, for example, such as enumerated item 47—tube 47 can be produced and sold in quantity for pennies. The factor of production expense allows tube 47 to be used only once and then thrown away. The only element of the embodiment of FIG. 3 that can malfunction in pressure equalization is tube 47 which is used only once and replaced by another tube 47 on the succeeding occasion the baby is given the bottle 1. Even assuming a defect in manufacture causes tube 47 to malfunction, the fact of the minimal expense for tube 47 allows another tube 47 to be substituted.

With respect to the embodiments herein shown and described, the conventional nipple 7 is utilized; and the embodiments of the pressure equalization device do not affect the construction, operation, use and function of the conventional nipple 7 utilized with the embodiments.

Resuming the explanation with respect to the exemplary tube 47 of FIG. 3, it should be apparent and manifest that the only parts that need cleaning and sterilization are bottle 1, nipples 7 and 23, caps 15 and 17, end cap 21, gasket 25 and adapter 33. These parts can be easily and quickly cleaned and then sterilized.

Furthermore, it should be self-evident that these parts 1, 7, 23, 15, 17, 21, 25, 33 and 39 are of simple and durable construction, and that the assembly of same is easy to understand and to perform by the average mother.

With respect to the use by the mother of another of the enumerated items, for example, such as enumerated item 93—tube 93 can be produced and sold in quantity for pennies. This factor of production expense allows tube 93 to be used only once at each feeding of the baby and then thrown away. Lower end cap 89 as a finger-puncturable, waterproof, sealing membrane is likewise used only once at each feeding of the baby and is then thrown away. Since tube 93 and lower end cap 89 would be used for only one feeding of the baby and then thrown away, the only parts requiring cleaning and sterilization would be bottle 79, nipple 7, cap 15 and cap 83; and these parts can be easily and quickly cleaned and then sterilized.

The choice of material for bottles 1 and 79 is either glass or plastic. The nipples 7 and 23 are of soft rubber or suitable plastic. Member 53 is made of soft rubber. And the other elements shown and described herein are made of suitable plastic, including hard rubber, unless otherwise specified.

With respect to the problem of partial vacuum or negative pressure being created interiorly of the bottle upon sterilization after preparation of the formula or milk, it should be appreciated from the descriptions of the embodiments and modifications of the air pressure equalization devices and their respective utility explanations that the air pressure interiorly of any bottle will be equalized practically automatically with the atmosphere in a similar manner provided there is communication from the atmosphere through the pressure equalization device to the interior of the bottle.

Having thus described my invention, I claim:

1. Pressure equalization means for use with a baby bottle for the admission of air interiorly of the bottle to equalize the interior bottle pressure with the atmosphere; said pressure equalization means including an opening within that range small enough to minimize and retard the flow therethrough of formula or milk, but large enough to allow the passage of air in sufficient quantity to allow of practically automatic equalization of the air pressure in the bottle with the atmosphere, said pressure equalization means including a truncated nipple, a male-female adapter and a tube having said opening, said truncated nipple carrying said adapter, and said adapter carrying said tube.

2. Pressure equalization means for use with a baby bottle for the admission of air interiorly of the bottle to equalize the interior bottle pressure with the atmosphere; said pressure equalization means including an opening within that range small enough to minimize and retard the flow therethrough of formula or milk, but large enough to allow the passage of air in sufficient quantity to allow of practically automatic equalization of the air pressure in the bottle with the atmosphere, said pressure equalization means including a truncated nipple, a male-
female adapter and a straw-like tube having said opening, said truncated nipple carrying said adapter and said adapter carrying said straw-like tube.

3. Pressure equalization means for use with a baby bottle for the admission of air interiorly of the bottle to equalize the interior bottle pressure with the atmosphere; said pressure equalization means including an opening within that range small enough to minimize and retard the flow therethrough of formula or milk, but large enough to allow the passage of air in sufficient quantity to allow of practically automatic equalization of the air pressure in the bottle with the atmosphere, said pressure equalization means including a truncated nipple, a male-female adapter and a balloon-like member having said opening, said truncated nipple carrying said adapter and said adapter carrying said balloon-like member.

4. Pressure equalization means for use with a baby bottle for the admission of air interiorly of the bottle to equalize the interior bottle pressure with the atmosphere; said pressure equalization means including an opening within that range small enough to minimize and retard the flow therethrough of formula or milk, but large enough to allow the passage of air in sufficient quantity to allow of practically automatic equalization of the air pressure in the bottle with the atmosphere, said pressure equalization means including a tube and an internally threaded, lower-retaining cap, said tube having an out-turned flange and said opening, said bottle having an externally threaded, reduced lower portion, said reduced lower portion having a bottom, said outturned flange being disposed between said lower-retaining cap and said bottom of said reduced lower portion, and being retained in such disposition by mutual engagement of the threaded portions of said reduced lower portion and said lower-retaining cap, said bottle having a reduced upper portion, said reduced upper portion having a lowermost portion, said tube opening projecting above said lowermost portion.

References Cited

UNITED STATES PATENTS

362,554 5/1887 Suydam 215—11
1,037,309 9/1912 Poore 215—11
1,080,070 12/1913 Mambourg 215—11
1,441,406 1/1923 Dales 215—11
2,094,721 10/1937 Puetz 215—11
2,456,337 12/1948 Soper 215—11
3,134,495 5/1964 Carbonel 215—11

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