ABSTRACT

The instant invention relates to a baby formula defoaming device, and a method of defoaming baby formula. According to the instant invention, the baby formula defoaming device includes a tared cap having an aperture therein, a stopper, and a seal. The stopper includes a shaft having a channel therethrough and a sealable valve. The sealable valve includes cooperating elastic parts, which define a slit therebetween. The sealable valve is adapted to close the channel, and the stopper is adapted to receive a pump device mounted thereon. The seal joins the stopper to the cap via the aperture. According to the instant invention, the method of defoaming baby formula includes the following steps: (1) providing water and baby formula in a bottle; (2) capping the bottle with a baby formula defoaming device; (3) connecting a pump device to the defoaming device; (4) removing the air from the bottle via the pump device; (5) disconnecting the pump device from the defoaming device; (6) shaking the bottle; (7) thereby generating a homogenous admixture of water and baby formula, and foams; (8) releasing air back into said bottle via defoaming device; (9) thereby removing said foams from said homogenous admixture; and (10) replacing the defoaming device with a cap adapted to feed a baby.
BABY FORMULA DEFOAMING DEVICE

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application is a non-provisional application claiming priority from provisional application Ser. No. 60/536,876, filed on Jan. 16, 2004, entitled “BABY FORMULA DEFOAMING DEVICE,” the teachings of which are incorporated by reference herein as if reproduced in full below.

FIELD OF INVENTION

[0002] The instant invention relates to a baby formula defoaming device.

BACKGROUND OF THE INVENTION

[0003] Bottle-feeding is an alternative method of feeding a baby. Babies may receive all of their nutritional needs via bottle-feeding. In general, feeding bottles have a nipple, which is inserted into a cap. The cap typically has a screw thread, which allows the cap and the nipple to be fastened onto the bottle. Generally, water and baby formula are combined with each other in the bottle, and then, the admixture of water and baby formula is shaken for a period of time to produce a homogeneous mixture. As a result of the shaking, foam is also formed as an undesired by-product, which accumulates on the surface of the baby formula. In general, foam is comprised of many air pockets surrounded by a thin film, which is formed when a fluid is mixed rapidly with air from the free surface. The foam, if consumed by the baby, may cause discomfort to the baby, i.e. gastrointestinal distress. Therefore, it is desirable to remove the foam from the baby formula prior to its consumption.

[0004] To remove the foam from the admixture of water and baby formula or to prevent their formation, different techniques, and devices have been employed in the past.

[0005] U.S. Pat. No. 950,710 discloses a nursing bottle having a moveable false bottom whose position is first adjusted so that the quantity of milk to be given to the child completely fills the initial capacity of the bottle, and, as the milk is consumed by the child, the false bottom moves toward the nipple end of the bottle to exclude air from the bottle.

[0006] U.S. Pat. No. 3,768,683 discloses an air valve at the bottom of a baby bottle, which manually admits air into the bottom of the bottle.

[0007] U.S. Pat. No. 4,613,050 discloses a baby feed and bottle combinations thereof with a screw fitting annular cap to which a teat, preferably molded of liquid silicone rubber, may be assembled before the cap is fitted to the bottle. The teat is molded with shape and dimensions such that, when the annular cap/tetra subassembly is fitted to the bottle and screwed down, a flap valve arrangement is produced by a depending lip on the teat which seals against the interior of the bottle neck. The flap valve arrangement is operative when the bottle is used to prevent collapse of the teat mouthpiece.

[0008] U.S. Pat. No. 4,880,125 discloses an anti-burp nursing bottle combination which includes an open ended shell adapted for containing a collapsible liquid therein and a nipple on the upper end of the open ended shell in open communication with the collapsible liquid container and held in place with a ring and plunger adapted to fit in mating relationship with the lower end of the open ended shell and adapted to be pushed against the lower portion of the collapsible liquid container in order to force air out through the opening in the nipple.

[0009] U.S. Pat. No. 4,869,381 discloses a support for an infant feeder, which comprises a hollow receptacle formed by an endless side wall extending in a longitudinal direction and having caps disposed at first and second ends thereof. A floating wall is disposed within the hollow receptacle and divides the interior of the hollow receptacle into a strained food receiving chamber and an air receiving chamber. A nipple is mounted on one of the caps at the first end of the receptacle. Food is supplied from the strained food receiving chamber to an infant through the nipple. A peg is molded or rigidly affixed to the cap at the second end of the hollow receptacle. A suction member forming the support for the feeder is removeably secured to a surface on which the feeder is mounted. The suction member includes a suction cup portion and an upstanding central portion including a longitudinal bore formed therein. The peg is inserted into and interlocked with the longitudinal central bore either by friction or by circumferentially extending rib received in a corresponding recess within the bore to securely mount the infant feeder on the surface.

[0010] U.S. Pat. No. 5,033,631 discloses a apparatus for expelling air from a flexible liner baby nursing bottle, which includes an axially elongated connecting rod which is guided and carried by a support bushing having the general size and shape of the lower open end portion of the shell body of the nursing bottle. The support bushing is located intermediate a disk shaped ram portion at one end of the connecting rod and a supporting handle at the opposite end of the connecting rod. The support bushing is inserted into the open end of the shell body and the ram portion is moved axially to decrease the volume of the flexible liner and expel air from within the cavity formed by the nipple and the flexible liner through the orifice of the nipple.

[0011] U.S. Pat. No. 5,600,359 discloses a device for eliminating air from a nursing bottle having an inner bag. The device includes a base member and a first member extending from the base member and adapted to engage with the inner bag of the nursing bottle. The device further includes a second member extending from the base member and adapted to support the nursing bottle during feeding. The base member is formed with a lip portion which surrounds the first and second members.

[0012] U.S. Pat. No. 6,138,848 discloses a baby bottle for storing milk in a substantially air-free environment and dispensing the milk without dispensing air along with the milk. The baby bottle includes a generally cylindrical housing with an open bottom and an open top. The housing is adapted for receiving a fluid therein. A cap portion is coupled to the top of the housing for closing the top of the housing. The cap portion has a nipple which has an aperture therethrough adapted for permitting passage of liquid there through. An insert member is slideably disposed in the housing and adapted for sealing a liquid in the housing. The insert member has a plurality of spaced apart grooves extending around an outer perimeter thereof. The insert
member has a plurality of sealing bands resting in the grooves of the insert member. The sealing bands engaging an inner surface of the housing for forming a seal therebetween.

[0013] Furthermore, U.S. Pat. No. 4,763,803 discloses a stopper having a slit valve for a bottle. The stopper is adapted to be used with a pump for evacuating air from the bottle to preserve wine.

[0014] However, none of these techniques or devices has successfully solved the problems associated with the removal of the foam. Therefore, there is a need for an improved baby formula defoaming device, which also facilitates the production of a more sterilized baby formula. Furthermore, there is a need for an improved method of defoaming baby formula, wherein said method facilitates the production of a more sterilized baby formula.

SUMMARY OF THE INVENTION

[0015] The instant invention relates to a baby formula defoaming device, and a method of defoaming baby formula. According to the instant invention, the baby formula defoaming device includes a threaded cap having an aperture therein, a stopper, and a seal. The stopper includes a shaft having a channel therethrough and a scalable valve. The scalable valve includes cooperating elastic parts, which define a slit therebetween. The scalable valve is adapted to close the channel, and the stopper is adapted to receive a pump device mounted thereon. The seal joins the stopper to the cap via the aperture. According to the instant invention, the method of defoaming baby formula includes the following steps: (1) providing water and baby formula in a bottle; (2) capping the bottle with a baby formula defoaming device; (3) connecting a pump device to the defoaming device; (4) removing the air from the bottle via the pump device; (5) disconnecting the pump device from the defoaming device; (6) shaking the bottle; (7) thereby generating a homogenized admixture of water and baby formula, and foams; (8) releasing air back into said bottle via defoaming device; (9) thereby removing said foams from said homogenized admixture; and (10) replacing the defoaming device with a cap adapted to feed a baby.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] For the purpose of illustrating the invention, there is shown in the drawings a form that is presently preferred; it being understood, however, that this invention is not limited to the precise arrangements and instrumentalities shown.

[0017] FIG. 1 is a top perspective view of the baby formula defoaming device of the instant invention;

[0018] FIG. 2 is a bottom perspective view of the baby formula defoaming device of the instant invention;

[0019] FIG. 3 is an exploded view of FIG. 1;

[0020] FIGS. 4A-B are schematic illustrations of the scalable valve in open and closed positions, respectively;

[0021] FIGS. 5A-B are schematic illustrations of the baby formula defoaming device of the instant invention secured to a baby bottle and a pump device; and

[0022] FIG. 6 is an exploded view of FIG. 5A along the line 5a-5a.

DETAILED DESCRIPTION OF THE INVENTION

[0023] Referring to the drawings wherein like numerals indicate like elements, there is shown, in FIGS. 1-3, a baby formula defoaming device 10 according to the instant invention. The defoaming device of the instant invention includes a cap 12, a stopper 14, and a seal 16.

[0024] Cap 14 may be made of any material; for example, Cap 14 may be made of a polymer or a metal. Cap 14 may further include an aperture 18, and it may further be tinned, i.e. grooves 40. Cap 14 may be adapted to be tightly secured to a baby bottle 36, as described in further details below.

[0025] Stopper 16 includes a shaft 20, and a scalable valve 24. The shaft 20 includes a channel 22 therethrough, and it may have any shape; for example, shaft 20 may have a cylindrical shape. Shaft 20 may be adapted to be tightly secured to a baby bottle 36 via cap 14 and seal 16. The scalable valve 24 may be any valve; for example, scalable valve 24 has an opening in the form of a slit 26 in an elevated element 38, i.e. cooperating elastic parts, mounted in the path of the channel 22, and transverse to the axis of the channel 22. The stopper 16 may further include an edge 28 enclosing the scalable valve 24 in order to facilitate its function, i.e. opening and closure, and to facilitate the connection of a pump device 30 to the stopper 16. The slit 26 remains closed due to the force generated by the pressure difference on either side of the valve 24 in combination with surface forces, which press different parts of valve 24 onto each other. The elevated element 38, i.e. cooperating elastic parts, may have any shape; for example, it may have a shape selected from the group consisting of a rectangular, diamond, oval, and the like. The elevated element 38 may further include a first set of integral ribs 31, which extends crosswise over the channel 22 and connects to the opposite zones of the raised edge 28. First set of integral ribs 31 provide support to the elevated element 38, and promote opening of the slit 26 when the edge 28 is pressed in to form an oval opening 34, as shown in FIG. 4A. The sides of the elevated element 38, transverse to the plane of the slit 26, may also be connected to the edge 28 via a second set of integral ribs 32. Second set of integral ribs 32 promote secure closure of slit 26, as shown in FIG. 4B.

[0026] All parts of the stopper 14 may be made of any material; for example, they may be made of an elastic synthetic material or rubber, which may be synthetic rubber or natural rubber. The elastic synthetic material may be a thermoplastic material. Exemplary materials include, but are not limited to, polyethylene, polyurethane, polyamides, or thermoplastic rubber.

[0027] Seal 16 may have any shape; for example, it may have a shape adapted to tightly secure stopper 14 to cap 12, e.g. an annular shape. Seal 16 may be a separate component or an integral component of stopper 12, i.e. a flange at the terminal end of the shaft 20. Seal 16 may be made of any material; for example, it may be made of an elastic synthetic material or rubber, which may be synthetic rubber or natural rubber. The elastic synthetic material may be a thermoplastic material. Exemplary materials include, but are not limited to, polyethylene, polyurethane, polyamides, or thermoplastic rubber.

[0028] Referring to FIGS. 5A-B, the baby formula defoaming device of the instant invention may further include a pump device 30, and a baby bottle 36.
The pump device 30 may be any pump; for example, pump device 30 may be a pump having a cylinder 44, a piston (not shown), a piston rod 46, and a handle 48. The pump device 30 may be any material; for example, it may be made of a rigid plastic such as polyamide, e.g. polyethylene or Acrylonitrile Butadiene Styrene (ABS), or a metal. Pump device 30 may be adapted to securely connect to defoaming device 10, and it may be adapted to easily disconnect from defoaming device 10.

Baby bottle 36 may any have any shape; for example it may have a cylindrical shape. Baby bottle 36 may be adapted to securely receive treaded cap 12; for example, baby bottle 36 may be treaded, i.e. complimentary grooves 42, to securely engage grooves 40 of the treaded cap 12.

In operation, referring to FIGS. 5A-B, water and baby formula is deposited into the baby bottle 36; the baby bottle is then capped with the baby formula defoaming device 10; pump device 30 is connected to the defoaming device 10; air is removed from the bottle via the pump device 30; pump device 30 is then, disconnected from the defoaming device 10. Subsequently, the water and baby formula is admixed via shaking; thereby, generating a homogenous admixture of water and baby formula, and foams. As illustrated in FIG. 4A, slit 26 is, then, opened via applied pressure on the opposite sides of edge 28, and air is released back into the bottle; thereby, removing about 10% to about 90% of the foams from the homogenous admixture of water and baby formula. Finally, the defoaming device 10 is replaced with a cap adapted to feed a baby, i.e. a nipple.

In the alternative, referring to FIGS. 5A-B, one may continue defoaming by repeating the following steps as necessary immediately prior to replacing the defoaming device 10 with a cap adapted to feed a baby; pump device 30 is re-connected to the defoaming device 10, and air is removed from the bottle via pump device 30; the pump device 30 is then, disconnected from the defoaming device 10. As illustrated in FIG. 4A, slit 26 is, then, opened via applied pressure on the opposite sides of edge 28, and air is released back into the bottle; thereby, removing about 10% to about 90% of the foams from the homogenous admixture of water and baby formula.

In another alternative operation, baby formula and water is added in a bottle 36, and the bottle is sealed via a baby formula device 10. Vacuum is pulled on the bottle, and then, the baby formula and water is admixed. Subsequently, the vacuum is released, thereby, defoaming the admixture of baby formula and water.

The present invention may be embodied in other forms without departing from the spirit and the essential attributes thereof, and, accordingly, reference should be made to the appended claims, rather than to the foregoing specification, as indicated the scope of the invention.

I claim:

1. A baby formula defoaming device comprising:
   a treader cap having an aperture therein;
   a stopper comprising a shaft having a channel there-through and a scalable valve, said valve having cooperating elastic parts defining a slit therebetween, said valve adapted to close said channel, said stopper adapted to receive a pump device mounted thereon; and
   a seal, joining said stopper to said cap via said aperture.

2. The baby formula defoaming device according to claim 1, wherein said valve being formed by a slit in an elevated element mounted in and closing said channel when said slit is closed.

3. The baby formula defoaming device according to claim 2, wherein said elevated element is supported by a first set of integral ribs, said first set of ribs being parallel to said slit in said valve whereby pressure on said set of ribs opens said slit.

4. The baby formula defoaming device according to claim 1, wherein said defoaming device further comprising a bottle having external grooves adapted for receiving said treader cap.

5. The baby formula defoaming device according to claim 1, wherein said seal being a flange at a terminal end of said stopper.

6. The baby formula defoaming device according to claim 1, wherein said stopper being made from an elastic synthetic material or rubber.

7. The baby formula defoaming device according to claim 1, wherein said pump device comprises a cylinder, a piston in said cylinder, a piston rod extending outside said cylinder and a handle at the outer end of said piston rod.

8. A method of defoaming baby formula comprising the steps of:
   providing water and baby formula into a bottle;
   capping said bottle with the baby formula defoaming device according to claim 1;
   connecting a pump device to said defoaming device;
   removing the air from the bottle via said pump device connected to said defoaming device;
   disconnecting said pump device from said defoaming device;
   shaking said bottle;
   thereby generating a homogenous admixture of said water and said baby formula, and foams;
   releasing air back into said bottle via said defoaming device;
   thereby removing said foams from said homogenous admixture of said water and said baby formula; and
   replacing said defoaming device with a cap adapted to feed a baby.

9. The method of defoaming baby formula according to claim 8, wherein said valve being formed by a slit in an elevated element mounted in and closing said channel when said slit is closed.

10. The method of defoaming baby formula according to claim 9, wherein said elevated element is supported by a first set of integral ribs, said first set of ribs being parallel to said slit in said valve whereby pressure on said set of ribs opens said slit.

11. The method of defoaming baby formula according to claim 10, wherein said releasing of air back into said bottle being accomplished via applying pressure on said first set of ribs to open said slit.

12. The method of defoaming baby formula according to claim 8, wherein said pump device comprises a cylinder, a
piston in said cylinder, a piston rod extending outside said cylinder and a handle at the outer end of said piston rod.

13. The method of defoaming baby formula according to claim 8, wherein said method of defoaming baby formula removes at least 10% or more of said generated foams.

14. The method of defoaming baby formula according to claim 8, wherein said method of defoaming baby formula removes between 50-85% of said generated foams.

15. The method of defoaming baby formula according to claim 8, wherein said method further comprises the following steps repeated as necessary:

- re-connecting said pump device back to said defoaming device;
- removing the air from the bottle via said pump device connected to said defoaming device;
- disconnecting said pump device from said defoaming device;
- releasing air back into said bottle via said defoaming device;

thereby removing said foams from said homogenous admixture of said water and said baby formula.

16. The method of defoaming baby formula according to claim 15, wherein said method of defoaming baby formula removes at least 50% or more of said generated foams.

17. The method of defoaming baby formula according to claim 15, wherein said method of defoaming baby formula removes 85% of said generated foams.

18. A method of defoaming baby formula comprising the steps of:

- adding dry formula and water into a bottle;
- sealing the bottle with a baby formula defoaming device;
- pulling a vacuum on said bottle;
- admixing the formula and the water;
- releasing said vacuum, and thereby defoaming said admixed baby formula and water.

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