

May 15, 1956

H. A. NEWTON
NURSING BOTTLE

2,745,568

Filed April 3, 1951

3 Sheets-Sheet 2

FIG. 7.

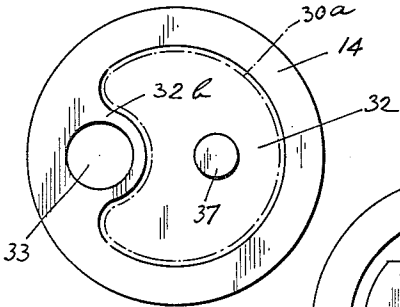


FIG. 8.

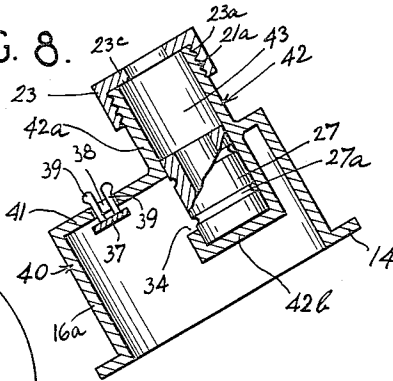


FIG. 10.

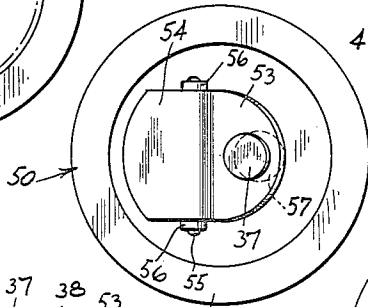


FIG. 11.

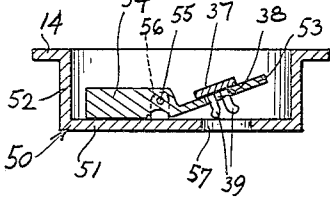


FIG. 9.

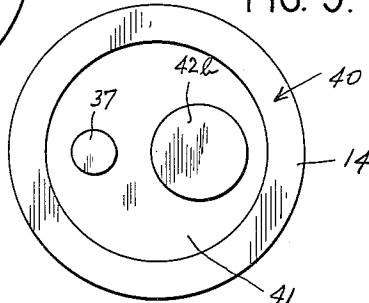


FIG. 12.

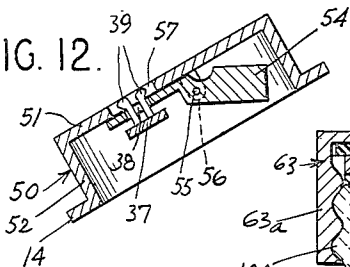


FIG. 14.

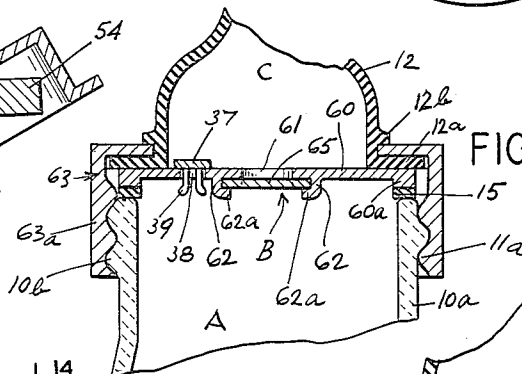


FIG. 13.

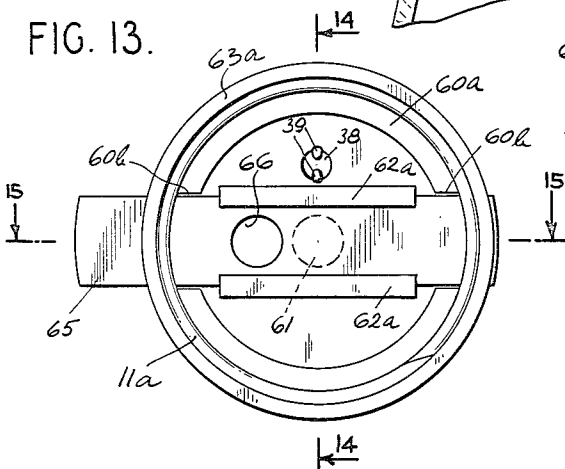
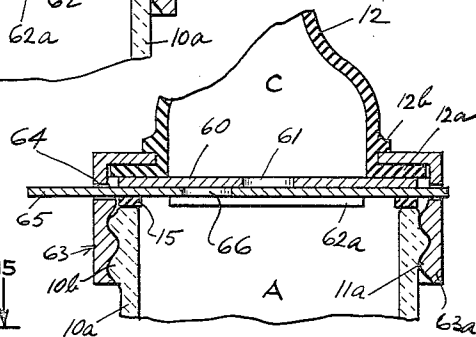


FIG. 15.



INVENTOR.
HARRY A. NEWTON
BY *Mock & Blum*

ATTORNEYS

1

2

2,745,568

NURSING BOTTLE

Harry A. Newton, New York, N. Y.

Application April 3, 1951, Serial No. 219,020

20 Claims. (Cl. 215—11)

This invention relates to an improved attachment for an infant's nursing bottle, and in particular relates to an attachment providing valve means to aid the infant in consuming the contents of said bottle. Further means are provided to permit the draining of liquid from said attachment when the bottle is no longer in use by said infant.

This application is a continuation-in-part of my earlier application, Serial No. 82,955, for Valve Means for Nursing Bottle, filed March 23, 1949.

The attachment comprises a diaphragm which is adapted to be set in the neck of a nursing bottle. This diaphragm separates the main portion of the bottle from the interior nipple compartment of the usual nipple which is mounted on the top of the bottle. This diaphragm has mounted therein non-return check valve means and return valve means, which serve as the sole communicating means between the nipple compartment and the main portion of the bottle.

When the bottle is placed in feeding position, wherein it is inverted or downwardly inclined, the return valve means are closed, and the check valve means are normally open. Liquid in the main portion of the bottle can flow through the open check valve means into the nipple compartment until it is full. When the feeding infant's mouth presses the side wall of the nipple inwardly, the volume of the nipple compartment is decreased, thereby forcing excess liquid out of the nipple compartment. However, the check valve means are closed by the action of the liquid tending to flow from the nipple compartment through said check valve means into said main portion of the bottle. As a result, the excess liquid in the nipple compartment is forced out of the nipple opening into the infant's mouth. When the pressure on the side of the nipple is released, the check valve means again open to permit more liquid to enter the nipple compartment from the main portion of the bottle.

When the bottle is placed in non-feeding position, wherein it is upright or upwardly inclined, the check valve means closes. However, the return valve means opens and permits any liquid remaining in the nipple compartment to return to the main portion of the bottle.

My invention reduces the amount of sucking which must be performed by an infant in consuming the contents of a nursing bottle. In addition, the fact that the liquid drains from the nipple compartment when the bottle is in non-feeding position lessens the possibility of chemical reaction between the liquid and the nipple, and induces uniform cooling of all the liquid in the bottle.

I have developed a number of embodiments of my invention, all of which may be economically and easily manufactured, readily installed in nursing bottles, readily disassembled and readily cleaned.

Other objects and advantages of this invention will become apparent from the following description when taken in conjunction with the annexed drawings, in which preferred embodiments are disclosed.

In the drawings, a first embodiment is shown in Figs. 1-4, in which:

Fig. 1 is a longitudinal section, partly in elevation, through the device, showing it mounted in a nursing bottle which is in non-feeding position, the main portion of the bottle being broken away;

Fig. 2 is a view similar to Fig. 1, showing the device in feeding position;

Fig. 3 is a top plan view of the device partly broken away and in cross-section; and

Fig. 4 is a section on line 4-4 of Fig. 1.

A second embodiment is shown in Figs. 5-7, in which:

Fig. 5 is a view corresponding to Fig. 1;

Fig. 6 is a view corresponding to Fig. 2; and

Fig. 7 is a top plan view of the device.

A third embodiment is shown in Figs. 8 and 9, in which:

Fig. 8 is a longitudinal section, partly in elevation, through the device, showing it detached and in feeding position; and

Fig. 9 is a top plan view of the device.

A fourth embodiment is shown in Figs. 10-12, in which:

Fig. 10 is a top plan view of the device, showing it detached and in non-feeding position;

Fig. 11 is a longitudinal section through the device, showing it detached and in non-feeding position; and

Fig. 12 is a view similar to Fig. 11, showing the device in feeding position.

A fifth embodiment is shown in Figs. 13-15, in which:

Fig. 13 is a bottom view of the device, showing it detached;

Fig. 14 is a section on line 14-14 of Fig. 13, showing the device mounted on a nursing bottle which is in non-feeding position and whose main portion is broken away; and

Fig. 15 is a section on line 15-15 of Fig. 13 and is similar to Fig. 14.

A modification of the third embodiment is shown in Fig. 16, which is a longitudinal section through the device, the main portion of the bottle being broken away.

First embodiment

Referring to the drawings in detail, and in particular to Figs. 1-4 which show my first embodiment, it will be seen that my device is adapted to be mounted in a nursing bottle 10. For convenience, this bottle 10 is shown broken away shortly below its neck portion 10a. This neck portion 10a is externally threaded at 10b.

After the device is mounted on the lip of neck 10a and within the interior of said neck 10a, bottle 10 may be closed by means of cap 11 and nipple 12. This cap 11 has a side wall which is internally threaded at 11a so as to provide the usual screw fit with the threaded portion 10b of neck 10a. The top of cap 11 is apertured to receive the side wall of nipple 12. The bottom edge of said nipple 12 is provided with a transverse peripheral flange 12a which abuts the inner surface of the top of cap 11. The side wall of nipple 12 is provided with a transverse flange 12b which abuts the outer surface of the top of cap 11. Said side wall of nipple 12 abuts the edge of the aperture in the top of cap 11, and said nipple 12 is frictionally mounted upon cap 11.

The top of nipple 12 is provided with an aperture 12c, through which liquid may flow from nipple 12 into the mouth of an infant using the bottle.

As above described, bottle 10, cap 11 and nipple 12 are conventional, although I prefer to use a nipple of somewhat larger size than ordinary. Optionally, I can use a nipple of conventional size. My device may be used with most conventional baby feeding bottles as above described or of similar construction.

As above described, the interiors of nipple 12 and bottle 10 would normally be in communication. My

device includes a diaphragm member 13 which is adapted to be mounted in neck portion 10a of bottle 10 and which serves to block the passage of liquid between nipple 12 and the portion of bottle 10 below said diaphragm member 13, which I will term the bottle main portion A. I will term the space bounded by nipple 12 and diaphragm member 13 as the nipple compartment C. As is shown in Fig. 1, this diaphragm member 13 is cup-shaped and comprises a base 16 which has an upstanding cylindrical peripheral wall 16a which is adapted to fit within neck 10a. The top of wall 16a is provided with a transverse outwardly extending peripheral flange 14 which is adapted to rest upon the top of neck 10a. I prefer to space said flange 14 from the top of neck 10a by means of an annular gasket or washer 15 made of rubber or the like. When cap 11 is screwed onto neck 10a, nipple flange 12a abuts the top of flange 14, and diaphragm member 13 is thereby firmly mounted within the nursing bottle assembly.

It will be apparent that the shape of diaphragm member 13 may be varied, although I prefer that a fairly large and planar transverse member 16 be interposed between nipple 12 and the main portion of bottle 10. For example, diaphragm member 13 may be disc-shaped and rest upon the lip of neck 10a, as shown in Fig. 16.

In all embodiments, I mount non-return check valve means and check valve means in diaphragm member 13, which serve as the communicating means between nipple chamber C and bottle main portion A.

In the first embodiment, shown in Figs. 1-4, these valve means take the following form:

I provide a through-and-through opening in diaphragm base 16, this opening being preferably off-center and circular. A cylindrical flange 20 is integral with base 16 and depends below said base 16 and extends around the periphery of said opening therein. The axis of said flange 20 is preferably parallel to the axis of bottle 10.

A preferably cylindrical valve body 21 is adapted to be mounted in the bore of flange 20 and is axially slidable therein. This valve body 21 serves as the non-return check valve means. I provide said valve body 21 with upper and lower stop means to limit its travel within flange 20. The upper stop means is preferably a transverse and circumferential flange 22 which is integral with the outside of valve body 21 at a position intermediate its ends. This flange is adapted to abut the upper face of base 16 when bottle 10 is in its upright position of Fig. 1 or in an uprightly inclined position, either of which positions is what I term a non-feeding position of bottle 10.

The lower stop means is preferably a closure cap 23 which is internally threaded at 23a and which is adapted to be screwed onto the lower end of valve body 21, which is externally threaded at 21a. The upper rim 23b of this cap 23 is adapted to abut the lower end of flange 20 when bottle 10 is in its downwardly inclined position of Fig. 2, or in an inverted position, either of which positions is what I term a feeding position of bottle 10.

The distance between rim 23b and flange 22 is greater than the distance between the upper face of base 16 and the free end of flange 20, so as to permit longitudinal movement of valve body 21. The extent of this longitudinal movement depends on the extent to which cap 23 is screwed onto valve body 21.

I provide flange 20 with one or more through-and-through longitudinally extending keying grooves 24, one such groove 24 being shown in the drawings. I provide valve body 21 with corresponding longitudinally extending keying flanges 24a, one such flange 24a being shown in the drawings. Said flange 24a fits into groove 24 and is slidable therein, whereby to fix the angular position of valve body 21 with respect to flange 20.

I provide a plurality of longitudinally extending, circumferentially spaced, through-and-through grooves 25 in the inner wall of flange 20. I also provide a plurality

of radially extending through-and-through grooves 26 in the face of the lower edge of flange 20, each said groove 26 communicating with a respective groove 25 to provide a path for the flow of liquid between bottle 10 and nipple 12 when cap rim 23b abuts flange 20.

Valve body 21 has a preferably cylindrical internal bore which preferably has a closed upper end 21c and is open at its lower end. Said valve body 21 has an opening 21d in its side wall above flange 22.

A hollow cylindrical piston 27 is adapted to be slidably mounted in the bore of valve body 21 and serves as the return valve means. This piston 27 preferably has longitudinally spaced circumferential grooves 27a in the outer surface thereof.

When piston 27 abuts valve body upper closure wall 21c, said piston 27 blocks opening 21d. In order to retain piston 27 in the bore of valve body 21, I provide the base of cap 23 with stop means, such as an intumed annular transverse flange 23c, which partially blocks the bottom of the bore of said valve body 21.

The assembly and operation of the device is as follows:

Piston 27 is inserted in the open end of the bore of valve body 21. Valve body 21 is inserted through the opening in flange 20 with flange 22 positioned above base 16. Cap 23 is screwed onto valve body 21. Bottle 10 is filled with a liquid. The device is placed in neck 10a with flange 12a resting upon gasket 15, which in turn rests upon the rim of neck 10a. Cap 11, which has been previously assembled with nipple 12, is screwed onto neck 12a.

When bottle 10 is placed in feeding position, such as its position of Fig. 2, piston 21 moves by gravity into abutment with wall 21c and blocks opening 21d. The return valve means is therefore closed. Valve body 21 moves by gravity into a position in which cap rim 23b abuts the rim of flange 20. Liquid can flow by gravity from the bottle main portion A through the respective channels 26, 25 between the walls of valve body 21 and flange 20 and between flange 22 and diaphragm base 16 into nipple chamber C. The non-return check valve means is thereby open.

In this initial operation of the device, the flow of milk from main bottle portion A to nipple compartment C is facilitated by squeezing the sides of nipple 12 together several times whereby to create successive partial vacuums in nipple chamber C. The device works best when nipple compartment C is full or nearly full.

When nipple compartment C is full, liquid can be drawn from opening 12c by compressing the side wall of nipple 12. This decreases the volume of nipple compartment C and places the liquid therein under pressure. The liquid under pressure pushes valve body 21 to a position in which flange 22 abuts base 16, thereby closing the check valve means. Some liquid may return through the check valve means to the main bottle portion A during the interval during which flange 22 moves to its closure position. The remainder of the excess liquid in nipple chamber C flows outwardly through opening 12c.

When the side wall of nipple 12 is released, it returns to its normal shape, and opening 12c closes or nearly closes. Valve body 21 returns to its position of Fig. 2, and liquid again flows into nipple compartment C. This flow of liquid through the relatively small channels 26, 25 is aided by the weight of the liquid in main bottle portion A and also by any partial vacuum that may have been created in nipple compartment C by the return of nipple 12 to its normal shape.

In summary, the check valve is closed and liquid forced out of opening 12c by compression of the side wall of nipple 12. The release of nipple 12 allows the check valve to open and additional liquid to flow into nipple compartment C. The amount of sucking normally performed by an infant in draining the contents of a nursing bottle is greatly reduced. Nipple 12 may be made larger

and of softer and thinner material than is normally the case.

Valve body 21 is not air-tight with respect to piston 27 and diaphragm member 13, whereby air can flow from nipple compartment C into main bottle portion A to replace the liquid drained therefrom.

When bottle 10 is placed in non-feeding position, flange 22 abuts base 16, closing the check valve means. Piston 21 drops to abut flange 23c. Most of the liquid remaining in nipple compartment C flows through opening 21d and the bores of valve body 21 and piston 27 into main body portion A. This reduces the danger of chemical reaction between the liquid and nipple 12 and also minimizes the extent to which a large amount of liquid in nipple compartment C might cool at a different rate from the liquid in main body portion A if I did not provide return valve means.

The manner in which the device may be disassembled is obvious. The purpose of grooves 27a in piston 27 is to provide gripping means for a tool which may be inserted through opening 21d to eject said piston 27 if it should stick in the bore of valve body 21.

It will be noted that the amount of liquid which escapes through channels 25, 26 during the closing of the check valve means depends upon the size of the grooves 25 and 26 and on other variables. One such variable is the distance between flange 22 and base 16, which in turn depends upon the extent to which cap 23 is screwed on valve body 21. The amount of such liquid escaping through the check valve means determines the amount of liquid which flows through opening 12c. I therefore provide a simple means for controlling the flow of liquid through said opening 12c, consisting in the extent to which I screw cap 23 on valve body 21. In Fig. 2 I show a conventional vernier scale, whereby I can screw cap 23 on valve body 21 to a predetermined extent by aligning arrow 29a on the side wall of cap 23 with the desired one of the scale markings 29b which extend circumferentially around flange 20.

It will be noted that all of the drawings of the various embodiments are drawn substantially to scale of my preferred dimensions, except for exaggeration of the thickness of various parts for the sake of convenience. I prefer that the internal diameter of piston 27 be approximately $\frac{1}{4}$ inch, and that the outer diameter of valve body 21 be approximately $\frac{3}{16}$ inch. The size of opening 21d should be comparable to the internal diameter of piston 27.

The reason for the large diameter return valve path is that the pressure in nipple compartment C is insufficient to permit the liquid therein readily to return to main bottle portion A through a narrow opening when bottle 10 is returned to non-feeding position.

Opening 21d faces the larger free space between valve bottle 21 and wall 16a, as a result of the interfitting of key 24a in slot 24. This also facilitates the return flow of liquid from nipple compartment C. Ample space is also preferably provided between valve body 21 and the wall of nipple 12.

The parts of my attachment can readily be made of metal or molded plastic or other suitable materials.

Second embodiment

This is shown in Figs. 5-7 and chiefly differs from the embodiment of Figs. 1-4 in the construction of the check valve means and in the manner of mounting the return valve means.

The device according to this embodiment is adapted to be used with bottle 10, gasket 15, and cap 11, but a modified nipple 30 is employed.

The device comprises a diaphragm member 31 which has a base 32 which is similar to base 16, a wall 32a which is similar to wall 16a, and a supporting flange 14.

The return valve means has a body portion which is

preferably integral with diaphragm member 31 and with wall 32a thereof. One portion of said wall 32a is thickened inwardly at 32b in the manner shown in Fig. 7 and extends below base 32 at 32c in the manner shown in Figs. 5 and 6. I provide a longitudinally extending cylindrical bore 33 in wall portion 32b which is open at the top of said wall portion 32b and which is partially blocked at the bottom wall portion 32c, preferably by means of an inturned, transverse, annular, peripheral flange 33a.

I provide an opening 34 in wall portion 32b, which communicates between bore 33 and the upper open portion above base 32. The bottom of opening 34 is preferably level with base 32.

Piston 35 is adapted to be mounted in bore 33 and is similar in construction and operation to piston 27, save that the grooves 27a may optionally be omitted.

Nipple 30 has a wall which is quite similar to the wall of nipple 12 and which has an opening 12c and flanges 12b and 12a. However, a portion of the wall of nipple 30 is thickened at 36, said thickened portion having a bottom surface which has a shape approximately the same as that of the top of wall portion 32b and which is adapted to seal the upper end of bore 33. The bottom surfaces of flange 12a and wall portion 36 are in a substantially common plane.

The base of nipple 30 has a depending flange 30a which extends around the opening therein and which is adapted to be interfitted within the main opening in the top of diaphragm member 31.

The check valve means comprises a valve disc 37 which is positioned above an opening 38 in the main portion of base 32. Opening 38 is preferably circular and of smaller diameter than valve 37. Said valve 37 has a stem which optionally and preferably consists of a pair of integral legs 39 which respectively depend from valve 37 through opening 38 and below base 32. These legs 39 do not block opening 38 but sufficiently limit motion of translation of valve 37 with respect to the axis of said opening 38 so as to prevent unblocking thereof by valve 37 when it abuts base 32.

Legs 39 are outwardly thickened at their lower ends 39a, these thickened portions 39a normally serving as stops to prevent movement of valve 37 away from base 32, beyond the desired extent of such movement. However, when it is desired to assemble or disassemble valve 37 from diaphragm member 32, legs 39 may be pressed from their normal position toward each other to permit portions 39a to pass through opening 38. Upon release of this pressure, the resiliency of legs 39 returns them to their normal position.

To assemble the device, piston 35 is inserted in bore 33, and diaphragm member 31 is mounted in bottle 10. Cap 11 is then placed on top of bottle 10 with flange 30a interfitting with the main opening in said diaphragm 31. This locates wall portion 36 in its sealing position wherein it seals the top of bore 33. When cap 11 is screwed onto neck 10a, diaphragm member 31 turns with said cap 11 until the screwing action is completed.

It will be apparent that piston 35 blocks opening 34 when bottle 10 is in feeding position, this being the closed position of the return valve means, and that the return valve means is open when bottle 10 is in non-feeding position. It will also be apparent that check valve 37 blocks opening 38 in base 32 when bottle 10 is in non-feeding position, and that said check valve means is normally open when said bottle 10 is in feeding position and is adapted to be closed by the pressure of liquid upon said valve 37. Therefore, the mode of operation of the second embodiment is substantially the same as the mode of operation of the first embodiment.

It will be noted that in this embodiment check valve 37 need only rarely be separated from diaphragm member 31 for cleaning purposes, so that for most purposes the device may be assembled from two parts.

Third embodiment

A third embodiment, shown in Figs. 8 and 9, is a preferred embodiment, because it is economical to construct; easy to assemble, disassemble and clean; and practical in operation.

The device is not shown mounted in a nursing bottle, but it will be apparent that the device may be mounted in a nursing bottle comprising bottle 10, gasket 15, cap 11 and nipple 12, exactly as in the case of the first embodiment.

The device is shown only in feeding position, but it will be apparent that the position of the valves in non-feeding position of the device will be the same as in the case of the second embodiment.

The device includes a diaphragm member 40 which is quite similar to diaphragm member 13, except for a modified base 41 which is similar to base 32. This base 41 has a check valve 37 with stem legs 39 which extend through opening 38, exactly as in the case of the second embodiment.

In addition, return valve casing 42 is integral with base 41. Said valve casing 42 has a longitudinally extending and preferable cylindrical wall 42a which extends above and below base 41. Said casing 42 has a through-and-through longitudinally extending and preferably cylindrical bore 43 which is open at the bottom of casing 42 and closed at the top thereof by top casing wall 42b. Wall 42b has an opening 34 therein above base 41. Piston 27 is adapted to be slidably positioned in bore 43, and the bottom portion of wall 42a is externally threaded at 21a so as removably to receive cap 23.

The assembly of the device is apparent, and it will also be apparent that it operates in the same manner as the device of the second embodiment. This device has the advantage of requiring only one more part than the device of the second embodiment, and utilizes a nipple 12 which is simpler than nipple 30.

Because of the importance of this embodiment, certain possible modifications which are readily apparent and which may also apply to other embodiments, will be discussed specifically in connection with this embodiment.

Valve casing 42 is shown as positioned near wall 16a, and it may be desirable to fill the small spaces between casing 42 and wall 16a with solid matter, in order to facilitate cleaning. For example, casing 42 can be made integral with wall 16a by forming said wall 16a with a thickened portion similar to wall portion 32b, and by forming bore 43 within said thickened portion.

Cap 23 may be replaced by any suitable removable means for preventing piston 27 from falling through the bottom of bore 43, while still allowing the passage of liquid through the bottom of bore 43. Optionally, the release of piston 27 may be omitted or may be made possible by making top wall 42b removable.

Piston 27 and bore 43 may be made of any suitable interfitting shapes. Piston 27 may be replaced by any suitable gravity-responsive valve which blocks opening 34 when bottle 10 is in feeding position and unblocks opening 34 when bottle 10 is in non-feeding position.

Valve 37 may be replaced by other suitable check valve means, which operates in the same manner. If valve 37 is used, any suitable stem means may be used, which optionally need not be withdrawable from opening 38.

Diaphragm member 40 may optionally be disc-shaped or of other suitable shape, so long as it substantially blocks communication between nipple chamber C and main bottle portion A, except for the communication provided by the two valve means.

Fourth embodiment

This is shown in Figs. 10-12 and is shown disassembled from bottle 10.

The device comprises diaphragm member 50 which in-

cludes base 51, and upstanding cylindrical and integral wall 52 and the usual integral supporting flange 14.

The return valve means comprises a flap 53 which is optionally approximately semi-circular and planar in shape and which is connected along its diameter edge to a preferably integral weight member 54. This weight member 54 is preferably co-extensive with said flap 53 along the diameter edge thereof.

I provide a bearing axle 55 which extends through said weight member 54, said axle 55 being fixed in weight member 54 and being approximately parallel to the diameter edge of flap 53. The ends of said axle 55 protrude beyond the respective sides of weight 54 and are respectively turnably mounted in respective bearing members 56 which are mounted on the upper face of base 51. Axle 55 is spaced from and parallel to base 51.

I provide the above-described check valve opening 38 in flap 53, and I mount check valve 37 above flap 53 with stem legs 39 extending through said opening 38.

When bottle 10 is in non-feeding position, the base of weight 54 substantially rests upon diaphragm base 51. Flap 53 is upwardly inclined from its attached edge to the opposite edge thereof, with respect to base 51. The return valve opening 37, which is located in base 51 below flap 53, is thereby open. Check valve 37 is closed.

When bottle 10 is in feeding position, the action of gravity on weight 54 causes axle 55 to turn with respect to bearing members 57 so that flap 53 substantially rests against base 51 and blocks opening 36. Check valve 37 is then longitudinally movable with respect to bottle 10, in the usual manner. Weight 54 is inclined away from base 51 from its attached side to its opposite free side.

Weight member 54 may be internally weighted if desired.

It will be apparent that the assembly and operation of the device of this embodiment is quite similar to the assembly and operation of the devices of the prior embodiments.

Optionally, return valve flap 53 may be operated by any other suitable weight-controlled means.

Fifth embodiment

This is shown in Figs. 13-15 and differs from the other embodiments in that the return valve means is manually operable.

I provide a diaphragm member 60 which is substantially circular and disc-shaped and which has a depending integral, annular, peripheral flange 60a with a lower face which is adapted to rest upon the usual gasket 15.

Diaphragm 60 has a central and preferably circular return valve opening 61. This opening 61 is located between parallel guide flanges 62 which depend from and are integral with diaphragm 60. These flanges 62 are preferably equally spaced from the center of opening 61 and extend substantially along chord lines of said diaphragm 60. The lower portions of flanges 62 are in-turned to form opposed support flanges 62a which are spaced from and parallel to diaphragm 60. The distance between flanges 62a and diaphragm 60 is approximately equal to the height of the inner wall of flange 60a. The flanges 62 and 62a, together with diaphragm 60, serve as a channel which I designate as B. I define the longitudinal axis of this channel B to be that axis which is equidistant between the flanges 62. Flange 60a is cut-away to form diametrically opposed cut-outs 60b where the longitudinal axis of channel B intersects said flange 60a. These cut-outs 60b are of the same width as channel B.

I provide the usual check valve 37, whose stem legs 39 extend through the usual opening 38 in diaphragm 60, said opening 38 being positioned in the smaller sector between the chord line of one of the flanges 62 and the outer edge of diaphragm 60.

Diaphragm 60 is preferably assembled with bottle cap 63 prior to screwing said cap 63 on bottle 10. The upper part of cap 63 is quite similar to cap 11 and is assembled with a nipple such as 12. However, the cylindrical side wall 63a of said cap 63 has a pair of slots 64 therein, above the internally threaded portion 11a of said wall 63a. These slots 64 are diametrically opposed, of a width approximately equal to the distance between flanges 62, and of a thickness approximately equal to the distance between flanges 62a and diaphragm 60.

Diaphragm 60 and cap 63 are assembled by means of bar 65, which is adapted to be extended through the respective slots 64 and cut-outs 60b and through channel B as is clearly shown in the drawings. Bar 65 is preferably longer than the diameter of cap 63 and of width and thickness conforming to the size of slot 64 and channel B. Slots 64 are oriented as shown in the drawings so that channel B can be properly aligned with slots 64. Bar 65 is freely slidable in the direction of its axis through said channel B and said slots 64.

When cap 63 is screwed on bottle neck 10a, diaphragm 60 is held frictionally between gasket 15 and nipple flange 12a. Bar 65 is frictionally gripped between gasket 15 and diaphragm 60, but remains axially slidable. Bar 65 blocks opening 61, save that said bar 65 has a return valve opening 66 which registers with said opening 61 in one axial position of said bar 65.

When bottle 10 is to be used for feeding, bar 65 is moved to a position in which it blocks opening 61, and bottle 10 is placed in feeding position. Check valve 37 operates in the usual manner.

When bottle 10 is returned to non-feeding position, the return valve means may be manually opened by moving bar 65 axially so that openings 61 and 66 are in registration.

Modification of third embodiment

As mentioned in the description of the third embodiment, shown in Figs. 8 and 9, diaphragm 40 may be in the shape of a circular disc. This modification makes it difficult to use a gasket such as 15, since I prefer not to glue a gasket to any of the parts. I therefore show means for overcoming this difficulty in Fig. 16.

Fig. 16 shows a slightly modified bottle 70 whose neck 70a is externally threaded at 70b. The external diameter of neck 70a is decreased at its top portion 70c to provide an annular horizontal shoulder 70d.

Bottle cap 71 comprises a cylindrical side wall 71a whose lower portion is internally threaded at 71b so as to be adapted to be screwed onto neck 70a. Cap 71 has an annular top wall 71c which is integral with wall 71a. This top wall 71c is provided with an integral upstanding cylindrical flange 71d which extends around the periphery of the opening in said wall 71c.

I provide a nipple 72 which has the usual opening 72a in the top thereof and a side wall which fits within flange 71d and is preferably frictionally held therein. The bottom edge of nipple 72 is provided with an integral, outwardly extending, annular peripheral flange 72b which abuts the under-surface of wall 71c. The outer edge of this flange 72b is provided with an integral, depending, cylindrical peripheral flange 72c which abuts wall 71a.

The disc-shaped diaphragm member is shown at 73 and is provided with the same return valve means and check valve means as disclosed in the previous description of the third embodiment. The lower portion 73a of said member 73 is of decreased diameter and fits within neck 70a, the upper portion of this member 73 thereby having an under-surface 73b which is annular in shape and which is adapted to rest upon the top of bottle portion 70c.

To assemble the device, I set diaphragm 73 on the top of neck 70c. I then set cap 71 on bottle 70, with nipple flange 72c abutting the outer edge of diaphragm 73 and

the inner side surface of bottle portion 70c. When I screw cap 71 onto bottle 70, cap flange 71c frictionally presses nipple flange 72b and diaphragm 73 against the top edge of bottle portion 70c, thereby sealing nipple chamber C. The bottom edge of nipple flange 72c is pressed against shoulder 70d, said flange 72c being positioned between bottle portion 71c and cap wall 71a. The height of flange 72c is such that it is compressed, whereby its wall bulges and the inner surface of its wall seals the space between diaphragm 73 and the top of bottle portion 70c. This seals main bottle portion A.

While I have disclosed preferred embodiments of my invention and have indicated various changes, additions and omissions which may be made therein, it will be apparent that various other changes, additions and omissions may be made without departing from the scope and spirit of my invention.

The drawings being substantially to scale, as above mentioned, reference is made to the drawings to complete this disclosure, and they are to be considered as part of this disclosure.

In the claims, I have transferred the allowed claims of my aforesaid application, Serial No. 82,955, to this application with minor changes in wording in certain instances. In the claims, "feeding position of the bottle" means a position of the bottle in which it is inverted or downwardly inclined. In the claims, "non-feeding position of the bottle" means a position of the bottle in which it is upright or uprightly inclined.

I claim:

1. In combination with a nursing bottle having a nipple with a nipple opening, an attachment comprising a diaphragm member which is adapted to be mounted in said bottle to separate said bottle into a relatively large bottle chamber below said diaphragm member and a relatively small nipple chamber above said diaphragm member, first means mounted on said diaphragm member for permitting liquid flow from said nipple chamber to said bottle chamber only when said bottle is held upwardly inclined, second means mounted on said diaphragm member and normally active only when said bottle is held downwardly inclined for permitting liquid flow between said bottle chamber and said nipple chamber so as to permit the liquid to fill said nipple chamber, and control means for said second means responsive to and operative during excess of pressure within said nipple chamber resulting from squeezing of said nipple when said bottle is held downwardly inclined and said nipple chamber is filled with liquid so as to render said second means inactive, whereby excess of liquid is forced out of said nipple opening.

2. A combination in accordance with claim 1, in which said first means comprises a valve chamber extending through said diaphragm and having an opening therein below said diaphragm, said valve chamber having an upper portion extending above said diaphragm and having an aperture in the side wall thereof, a closure member secured to said valve chamber and adapted to slide to seal said wall aperture when said diaphragm is held downwardly inclined, said closure member being further adapted to slide to expose said side wall aperture when said diaphragm is held upwardly inclined.

3. A combination in accordance with claim 1, in which said diaphragm has an opening, and said first means comprises a blocking member which is mounted on said diaphragm, said blocking member being manually movable between a position in which it substantially blocks said diaphragm opening and a position in which it unblocks said diaphragm opening.

4. A combination in accordance with claim 2 in which said valve chamber has a cylindrical bore, and said closure member is cylindrical in shape and positioned inside said valve chamber.

5. A combination in accordance with claim 1 said diaphragm member having an opening therein, said second

means comprising a sealing member which is positioned above said diaphragm opening, said sealing member having a stem which extends slidably through said diaphragm opening, the lower part of said stem being provided with stop means which normally prevent the withdrawal of said stem from said diaphragm opening, said sealing member sealing said diaphragm opening when it abuts said diaphragm member.

6. A combination in accordance with claim 1 said diaphragm having an aperture therein, said second means comprising an upstanding valve chamber slidably disposed in said aperture, a circumferential flange secured to said valve chamber above said diaphragm and serving to seal said aperture when it abuts said diaphragm, and stop means secured to said valve chamber below said diaphragm, said flange and said stop means retaining said valve chamber within said aperture, said valve chamber being shaped to permit liquid to flow through said aperture when said stop means abuts said diaphragm, said first means comprising said valve chamber, said valve chamber having an apertured bottom wall and an opening in its side wall above said diaphragm and means closing the top of said valve chamber and a hollow piston which is disposed within said valve chamber and slidable between the top and bottom walls thereof, said piston exposing said side wall opening when it abuts the bottom of said valve chamber and blocking said side wall opening when it abuts the top of said valve chamber.

7. A combination in accordance with claim 6, in which said stop means comprises an internally threaded screw cap which has an opening in the bottom thereof, said valve chamber being externally threaded whereby said cap is adapted to be screwed on the bottom of said valve chamber, the extent to which said cap may be screwed on said valve chamber being adjustable.

8. A combination in accordance with claim 1, said diaphragm having an aperture therein, said second means comprising an upstanding valve chamber slidably disposed in said aperture, a circumferential flange secured to said valve chamber above said diaphragm and serving to seal said aperture when it abuts said diaphragm, and stop means which are mounted on said attachment in a position to stop upward movement of said valve chamber before it is withdrawn from said aperture, said valve chamber being shaped to permit liquid to flow through said aperture when said flange is spaced from said diaphragm, said first means comprising said valve chamber, said valve chamber having an opening in the bottom thereof and a transverse stop member partly blocking said opening, said valve chamber having a closed upper wall and an opening in the side wall thereof above said diaphragm, and a hollow piston which is located within said valve chamber and slidable between the top wall and stop member thereof, said piston exposing said side wall opening when it abuts said stop member and blocking said side wall opening when it abuts the top of said valve chamber.

9. A combination in accordance with claim 1, in which said first means comprises a valve chamber extending through said diaphragm and having an opening therein communicating with said bottle chamber and having an inturned portion which at least partly blocks the bottom of said valve chamber, said valve chamber extending above said diaphragm and being closed at the top and having an opening in the side wall thereof, a hollow piston mounted in said valve chamber and slidable therein, said piston blocking said side wall opening when it abuts the top of said valve chamber and unblocking said opening when it abuts said inturned portion.

10. A combination in accordance with claim 9, said diaphragm member having a further opening therein, said second means comprising a sealing member which is positioned above said further opening, said sealing member having a stem which extends slidably through said further opening, the lower part of said stem being

provided with stop means which normally prevent the withdrawal of said stem from said further opening, said sealing member sealing said further opening when it abuts said diaphragm member.

11. A combination in accordance with claim 1, in which said first means comprises a flap which is turnably mounted on the upper face of said diaphragm so as to be turnable about an axis which is parallel to said diaphragm, and weight means connected to said flap, said weight means being adapted to turn said flap into a position of abutment with said diaphragm when said bottle is in said downwardly inclined position, said diaphragm having an opening which is then substantially blocked by said flap, said weight means being further adapted to move said flap to unblocking position when said bottle is in said upwardly inclined position.

12. A combination in accordance with claim 1, said diaphragm having an aperture therein and including a door portion which is mounted thereon so as to be pivotable between a closing position in which it blocks said aperture and an opening position in which it unblocks said aperture, said first means including said diaphragm door portion and a weight disposed above said diaphragm and adapted to move toward and away from said diaphragm under the influence of gravity, said weight being operatively connected to said door portion whereby to move same to its closing position when said weight moves toward said diaphragm, and to its opening position when said weight moves away from said diaphragm.

13. A combination in accordance with claim 12, said door portion having an opening therein, said second means comprising a blocking member which is positioned above said door opening, said sealing member having a stem which extends slidably through said opening, the lower part of said stem being provided with stop means which normally prevent the withdrawal of said stem from said door opening, said blocking member blocking said door opening when it abuts said diaphragm door portion.

14. A nursing bottle in accordance with claim 1, in which said diaphragm member has a planar body portion which is transverse to the longitudinal axis of said bottle, said body portion having an opening therein, said first means comprising a blocking bar mounted on said diaphragm member and extending transversely to said bottle axis, the sides of said bottle having openings through which the respective ends of said bar protrude, said blocking bar being manually slidable in the direction of its axis and normally substantially blocking said opening, said blocking bar having at least one opening which registers with said opening in an axial position of said blocking bar.

15. A nursing bottle in accordance with claim 1, in which said bottle chamber has a substantially cylindrical neck portion which has an external annular shoulder disposed below the top thereof and which is externally threaded below said shoulder, said diaphragm member extending within said bottle chamber and having an annular peripheral flange which rests upon the top of said neck portion, said nipple chamber comprising a nipple and a closure cap, said closure cap having an internally threaded substantially cylindrical side wall which is screwed onto said neck portion, said closure having a top wall which has a central opening, said nipple having a side wall which extends through said top wall opening, said nipple wall having an annular transverse peripheral flange at the base thereof, said transverse flange having a depending cylindrical peripheral flange, said transverse nipple flange being sealed against the top of said diaphragm member by said top wall, said depending nipple flange being sealed against the space between said diaphragm member and the top of said bottle by said cap top wall, said cap side wall and said neck portion shoulder.

16. A bottle in accordance with claim 15, in which said cap top wall has an upstanding cylindrical flange

which extends around the periphery of said top wall opening and which abuts said nipple side wall.

17. A bottle in accordance with claim 15, in which said first means comprises a valve chamber extending through said diaphragm and having an opening therein communicating with said bottle chamber and having a transverse stop member which at least partly blocks the bottom of said valve chamber, said valve chamber extending above said diaphragm and being closed at the top and having an opening in the side wall thereof, a hollow piston mounted in said valve chamber and slidable therein, said piston blocking said side wall opening when it abuts the top of said valve chamber and unblocking said opening when it abuts said stop member.

18. A bottle in accordance with claim 17, said diaphragm member having a further opening therein, said second means comprising a sealing member which is positioned above said further opening, said sealing member having a stem which extends slidably through said further opening, the lower part of said stem being provided with stop means which normally prevent the withdrawal of said stem from said further opening, said sealing member sealing said further opening when it abuts said further member.

19. A nursing bottle in accordance with claim 1, in which said first means comprises a valve chamber extending through said diaphragm and having an opening therein communicating with said bottle chamber and having an intumed portion which at least partly blocks the bottom of said valve chamber, said valve chamber extending above said diaphragm and being open at the top and having an opening in the side wall thereof, said nipple chamber including a closure cap whose side wall is inter-

nally threaded, said bottle chamber having an externally threaded neck whereby to receive said cap, said cap having a top wall opening through which the nipple side wall extends, means mounting said nipple on said cap, the base of the side wall of said nipple having an enlargement, means releasably locating said nipple angularly with respect to said diaphragm member whereby said enlargement blocks the top opening in said valve chamber.

20. A nursing bottle in accordance with claim 19, said diaphragm member having a further opening therein, said second means comprising a sealing member which is positioned above said further opening, said sealing member having a stem which extends slidably through said further opening, the lower part of said stem being provided with stop means which normally prevent the withdrawal of said stem from said further opening, said sealing member sealing said further opening when it abuts said diaphragm member.

References Cited in the file of this patent

UNITED STATES PATENTS

467,176	Jensen -----	Jan. 19, 1892
745,191	Johnson -----	Nov. 24, 1903
2,429,984	Berglund -----	Nov. 4, 1947
2,528,600	Lombard -----	Nov. 7, 1950
2,597,483	Head -----	May 20, 1952

FOREIGN PATENTS

11,290	Great Britain -----	of 1891
399,393	Germany -----	Aug. 2, 1924
507,836	Germany -----	Sept. 20, 1930
365,984	Great Britain -----	Jan. 28, 1932
460,274	Great Britain -----	Jan. 25, 1937