

Dec. 11, 1945.

E. L. YOUNKINS
NONCOLLAPSIBLE NIPPLE

2,390,861

Filed June 7, 1943

Fig. 1

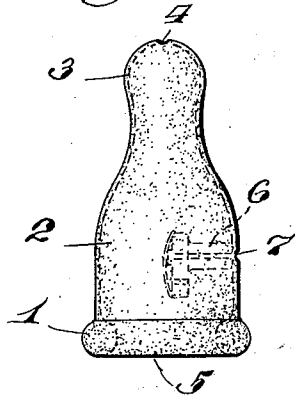


Fig. 2

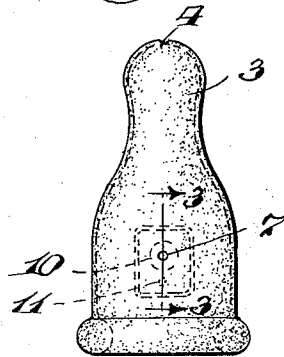


Fig. 3

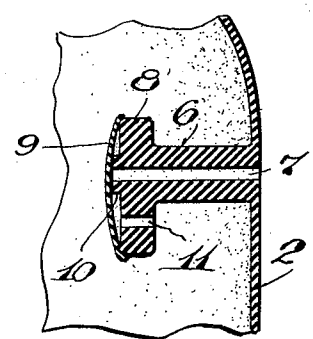


Fig. 4

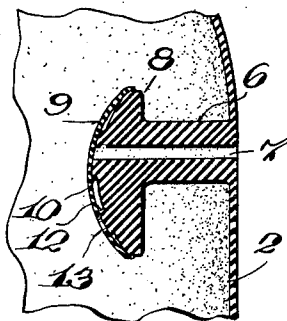


Fig. 5

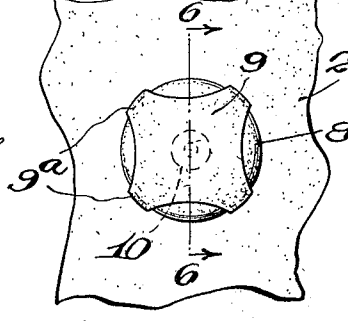


Fig. 6

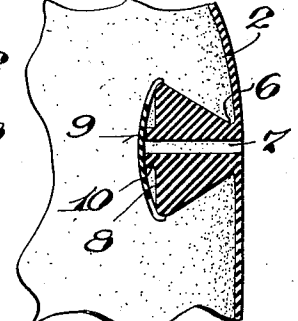


Fig. 7

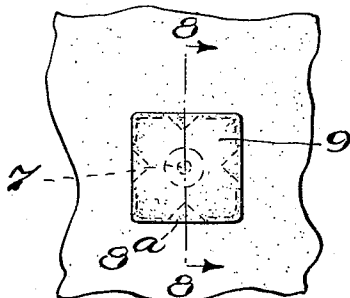


Fig. 8

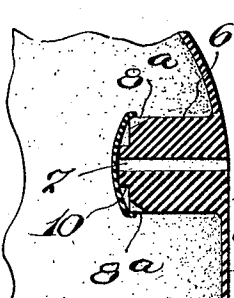


Fig. 9

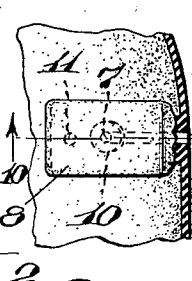


Fig. 10



Inventor
Earl L. Younkins

By

Stone, Boyden & Frank
Attorneys

UNITED STATES PATENT OFFICE

2,390,861

NONCOLLAPSIBLE NIPPLE

Earl L. Younkins, South Nyack, N. Y.

Application June 7, 1943, Serial No. 489,972

3 Claims. (Cl. 128—252)

This invention relates to nursing bottle nipples and is directed particularly to an improved nipple having means to prevent collapse of the nipple when partial vacuum is set up by suction.

A common fault of the conventional nipple is its tendency to collapse when in use and if the partial vacuum is not relieved. By the term "conventional" is meant that type having one or more openings in the teat portion for the discharge of liquid, the nipple otherwise being imperforate except for the opening in the base ring by which it is secured to a bottle. Various arrangements have heretofore been devised to provide for relief of that vacuum fault usually by providing some form of vent or opening in the side wall of the nipple whereby air may enter while preventing accidental discharge of liquid through such extra vent or opening.

The present invention is directed to this same general purpose and has, as one feature, an improved vacuum relief device which has a valve structure so designed and located that it is not affected by manipulation of the nipple wall.

This improvement also provides for a valve element which is mounted on the inner wall of the nipple and projects inwardly away from the wall. Thus the valve per se is spaced a substantial distance from the nipple wall and its contour is not subjected to or influenced by the varying shape of the nipple, although the valve is sensitively subject to the variations in pressure when the nipple is in use.

Specific details of the invention pertain to the construction of the valve and its highly sensitive membrane-like valve part.

The above and additional features and details of the improved nipple and valve of this present invention are described and claimed in the following specification and claims, and illustrated in the accompanying drawing, in which:

Figure 1 represents a side elevation of the exterior of the nipple showing in dotted lines a side view of one of the valve devices of the present invention, located within the nipple;

Figure 2 is a view of the nipple shown in Figure 1, looking toward the opening in the side wall and showing in dotted lines the shape of the valve device in end elevation shown in Figure 1;

Figure 3 is an enlarged fragmentary sectional view taken on the line 3—3 of Figure 2, showing the ducts leading through the side wall of the nipple to the valve and from the valve to the interior of the nipple;

Figure 4 is a view similar to that shown in Figure 3 but of a modified form of valve construction;

Figure 5 is a fragmentary elevational view of a modified form of valve from the interior of the nipple;

Figure 6 is a sectional view taken on the line 6—6 of Figure 5;

Figure 7 is a view similar to that shown in Figure 5, but of a further modified form of valve structure;

Figure 8 is a sectional view taken on line 8—8 of Figure 7;

Figure 9 is a view of still a further modification of a valve; and

Figure 10 is a vertical sectional view taken on the line 10—10 of Figure 9, looking in the direction of the arrows.

Referring in detail to the several views of the drawing, 1 indicates the base ring of the nipple which is adapted to grip the neck of a nursing bottle or other container in conjunction with which the nipple is to be used. 2 is the side wall of the nipple and 3 is the teat portion. The usual outlet opening is indicated at 4 at the end of the teat portion. 5 is the opening in the base ring for the reception of the bottle or other container. As thus far described, the nipple is of a conventional structure.

The valve element which embodies the improvement features of this combination nipple and valve will now be described. It is important to the present invention that the valve for the relief of the vacuum be spaced away from the wall of the nipple. This is accomplished by means of a shank portion 6 which is shown as a tubular piece of rubber having walls 6 of substantial thickness as compared to the thickness of the nipple wall. The shank element with the wall 6 may be described as having one end secured to and supported by the side wall 2 of the nipple. The shank is otherwise unsupported and the opposite end projects into the space within the nipple. Extending lengthwise through the side wall of the nipple and lengthwise of the nipple is a duct 7 which provides for ported communication from the valve, yet to be described, to the exterior of the nipple. The inner end of the shank 6 is indicated at 8. In the forms illustrated in Figures 3, 4, 5 and 6, the portion 8 is broader than the thickness of the shank. In the device shown in Figures 1—8, inclusive, the duct 7 extends straight through the shank and the innermost end 8. Extending over and covering the extreme inner end of the duct 7 is a thin membrane-like valve covering 9, which is secured to the shank end portion 8 in several arrangements in the various modifications, as will be described. The extreme

inner end of the member 8 next adjacent the membrane 9 is preferably extended outwardly from the surrounding surface of the member 8, to provide a valve seat 10 which is substantially a continuation of the wall of the duct 7. The seat 10 is shown as continuous therearound. By having this valve seat projecting slightly beyond the contiguous area of the part 8, the membrane 9 is enabled to establish a well defined contact over the entire limited area of the seat portion 10. The membrane 9 is secured at its outer edge portions to the inner end 8 and preferably at spots in spaced relation to the valve seat 10, so as to provide for a substantial length of membrane whereby the same may move under the slightest change in the pressure within the nipple. In the form illustrated in Figures 1, 2, 3 and 4, the membrane 9 is secured at its periphery to the inner shank end 8.

The foregoing relation of the mounting of the membrane at the innermost end of the shank portion 6 thus spaced well away from the wall of the nipple is characteristic of all of the several forms of the device illustrated in the several views of the drawing.

In Figures 1, 2 and 3, an additional duct 11 is provided extending through the end portion 8 from a point between the end portion 8 and the membrane 9 to provide ported communication to the interior of the nipple. In this way, when a partial vacuum is set up within the nipple, air may enter through the duct 7 between the membrane 9 and the valve seat 10 and may escape through the duct 11 into the nipple. Similarly, the membrane serves to prevent the escape of liquid to the exterior by normally exercising constant contact on the valve seat 10 unless under the influence of suction within the nipple.

Referring specifically to the construction shown in Figure 4, it will be observed that the membrane 9 has an opening 13 which is positioned over a seat 12 provided on the inner shank end 8. As shown in this view, the seat 12 is raised slightly above the adjoining surface of the portion 8 so that the rim portion of the membrane at the opening 13 may rest on the raised portion 12 to establish a positive engagement. In the operation of the device shown in Figure 4, air enters through the duct 7, and passes over the valve seat 10 and is permitted to escape over the seat 12 through the opening 13 into the interior of the nipple.

In Figures 5 and 6, the shank portion is shaped somewhat after the manner of a truncated cone with the small end united with the wall 2 of the nipple, and supported by the wall. The innermost end 8 may be considered the base of the cone and the extreme inner end surface thereof is provided with a membrane 9 and valve seat 10 in a construction similar to that shown in Figures 3 and 4. The membrane 9 differs from that shown in Figures 3 and 4 in that it is secured at its four corner portions 9^a and extends freely therebeneath except where it rests on the valve seat portion 10. In between the corner portions 9^a, the edges of the membrane 9 are curved inwardly. The structure shown in Figures 5 and 6 has the duct 7. When air enters through the duct 7 and passes between the membrane 9 and valve seat 10, it escapes beneath the side portions of the membrane 9 and between those portions and the adjacent surface 8 into the interior of the nipple.

In the modification shown in Figures 7 and 8, the shank portion 6 is shown as being substan-

tially square in cross section, and in end view, as indicated in Figure 7. The diaphragm 9, used in the structure shown in Figures 7 and 8, is substantially square to conform to the contour of the innermost end of the shank 6. The marginal edge of the membrane 9 is secured to the edges of the shank 6 except at points 8^a on the opposite sides of the shank where the shank has been cut away or otherwise provided with notches to provide for the escape of air from between the membrane and the end surface of the shank 6. It will accordingly be understood that in the use of the structure shown in Figures 7 and 8, air entering through the duct 7 will pass over the valve seat 10 when suction is applied to the nipple and from the valve seat 10, the incoming air is permitted to escape through the notches 8^a into the interior of the nipple.

In the modification shown in Figures 9 and 10, the shank and its attached membrane is substantially wedge-shaped, as viewed from either end of the nipple, and the opposite sides are curved from the end nearest the nipple wall to the innermost end although they are substantially straight across, as viewed lengthwise of the nipple. The shank portion is relatively small immediately adjacent the nipple wall and at a short distance away it increases substantially in cross sectional area. In that respect, it is somewhat similar to the structure shown in Figures 5 and 6, but it differs from the structure of Figures 5 and 6 in that from its largest dimension it is progressively smaller toward the interior of the nipple, whereas, according to Figures 5 and 6, the innermost end of the shank is the largest end. According to the structure shown in Figures 9 and 10, the duct 7 extends at first straight inwardly from the nipple wall and midway along the length of the shank, it turns and opens through one of the side walls 14 of the nipple at substantially right angles to the face thereof. At that point, there is a valve seat 10, as in the structures shown in the other views. A membrane covers the valve seat 10, as heretofore described, and its face view, as shown in Figure 9, is substantially rectangular. It is secured around its edges to the solid material of the shank. The discharge of air after leaving the valve seat 10 is made possible by a duct 11 which passes transversely through the thickness of the shank from the wall 14 and from a point adjacent to the valve seat 10 to the opposite face 15 to a position between that opposite face and a similar membrane which has a discharge opening 13 in it, after the manner of the opening 13, as shown at Figure 4. The peripheral walls of that valve opening 13 are adapted to rest on a valve seat projection or elevation 12, as in Figure 4. Thus air entering the duct 7 finally escapes through the opening 13, when the device is in use.

The material of which the nipple and valve structure is formed is preferably a good grade of rubber throughout. Points of securement constitute substantially homogeneous unions. The whole article may be sterilized by boiling, as is customary in the use of conventional nipples.

It will be apparent that in each of the constructions shown in the several views of the drawing, the location of the valve seat 10 and its covering membrane is definitely spaced away from the wall of the nipple as contrasted to being located on the surface of the nipple wall or in juxtaposition thereto.

I claim:

1. In a nipple having a large opening therein

for connection with a bottle and a flexible rubber teat portion with an outlet therein for discharge of liquid, a valved device entirely of rubber mounted on said nipple wall and including a tube portion of substantial thickness as compared to the nipple wall supported by the wall and projecting away from its supporting wall inwardly into the space within the nipple, one end of said tube portion being secured to the nipple wall and the opposite end projecting into the interior of the nipple, said tube portion having a duct for the passage of air extending lengthwise therethrough and continued through the wall of said nipple, the end of said duct farthest removed from the nipple wall having an end wall and a valved closure spaced from the nipple wall by a substantial portion of the length of said tube and including flexible membrane means disposed transversely as a thin sheet across the end wall of said duct as a movable closure therefor and adapted to normally removably engage the end wall of said duct to close the same against discharge of liquid into said duct while yet being yieldable inwardly to permit air to enter through the duct into the nipple, said tube portion and said membrane having a passageway therebetween providing for ported communication from the inner end of the duct beneath the membrane, thence between the membrane and the material of the tube portion, and thence to the interior space within the nipple, the length of said tube portion between said nipple wall and said valved closure being sufficiently great so that flexing of the nipple wall does not affect the functioning of the closure, said membrane means being secured to the tube portion at a plurality of points around and spaced from the end of the duct so that the membrane means is yieldably held against the end wall of the duct, said end wall being continuous therearound and of even contour where engaged by said membrane means whereby the contact between the membrane means and said end wall may be uniform at all points.

2. In a nipple having a large opening therein for connection with a bottle and a flexible rubber teat portion with an outlet therein for discharge of liquid, a valved device entirely of rubber mounted on said nipple wall and including a tube portion of substantial thickness as compared to the nipple wall supported by the wall and projecting away from its supporting wall inwardly into the space within the nipple, one end of said tube portion being secured to the nipple wall and the opposite end projecting into the interior of the nipple, said tube portion having a duct for the passage of air extending lengthwise therethrough and continued through the wall of said nipple, the end of said duct farthest removed from the nipple wall having an end wall and a valved closure spaced from the nipple wall by a substantial portion of the length of said tube and including flexible membrane means disposed transversely as a thin sheet across the end wall of said duct and adapted to normally removably engage the end wall of said duct as a movable closure therefor to close the same against discharge of liquid into said duct while yet being yieldable inwardly to permit air to enter through the duct into the nipple, the innermost end of the tube portion being wider than the intervening tube portion between said innermost end and the adjacent wall of the nipple, said wider portion having a second duct which extends through the thickness of said wider portion and provides

ported communication between the space within the nipple and a location between the tube portion and said membrane, the length of said tube portion between said nipple wall and said valved closure being sufficiently great so that flexing of the nipple wall does not affect the functioning of the closure, said membrane means being secured to the tube portion at a plurality of points around and spaced from the end of the duct so that the membrane means is yieldably held against the end wall of the duct, said tube portion and said membrane having a passageway therebetween providing for ported communication from the inner end of the duct beneath the membrane, thence between the membrane and the material of the tube portion, and thence to the interior space within the nipple, said end wall being continuous therearound and of even contour where engaged by said membrane means whereby the contact between the membrane means and said end wall may be uniform at all points.

3. In a nipple having a large opening therein for connection with a bottle and a flexible rubber teat portion with an outlet therein for discharge of liquid, a valved device entirely of rubber mounted on said nipple wall and including a tube portion of substantial thickness as compared to the nipple wall supported by the wall and projecting away from its supporting wall inwardly into the space within the nipple, one end of said tube portion being secured to the nipple wall and the opposite end projecting into the interior of the nipple, said tube portion having a duct for the passage of air extending lengthwise therethrough and continued through the wall of said nipple, the end wall of said duct farthest removed from the nipple wall having a valved closure spaced from the nipple wall by a substantial portion of the length of said tube and including flexible membrane means disposed transversely as a thin sheet across the end wall of said duct, said membrane means having an opening therethrough at a location spaced from the innermost end of said tube, and said tube portion having a seating surface against which said membrane means normally presses as a movable closure therefor to hold said opening normally closed but yieldable to permit said membrane means to flex away from said seating surface, said membrane means being adapted to normally removably engage said seating surface to close the same against discharge of liquid into said duct while yet being yieldable inwardly to permit air to enter through the duct into the nipple, the length of said tube portion between said nipple wall and said valved closure being sufficiently great so that flexing of the nipple wall does not affect the functioning of the closure, said membrane means being secured to the tube portion at a plurality of points around and spaced from the end of the duct so that the membrane means is yieldably held against said seating surface, said tube portion and said membrane having a passageway therebetween providing for ported communication from the inner end of the duct beneath the membrane, thence between the membrane and the material of the tube portion; and thence to the interior space within the nipple, said seating surface being continuous therearound and of even contour where engaged by said membrane means whereby the contact between the membrane means and said seating surface may be uniform at all points.