March 21, 1933. F. BROWN 1,902,433

NIPPLE

Filed July 2, 1931 2 Sheets-Sheet 1

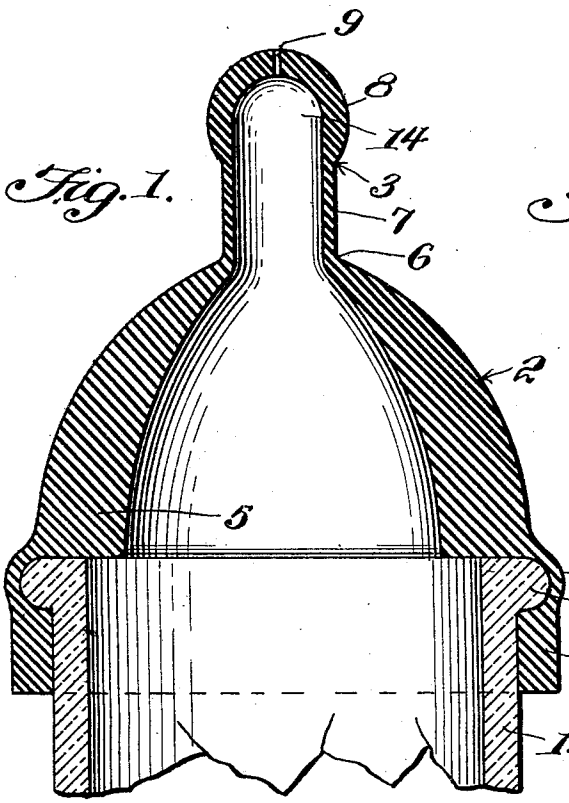


Fig. 1.

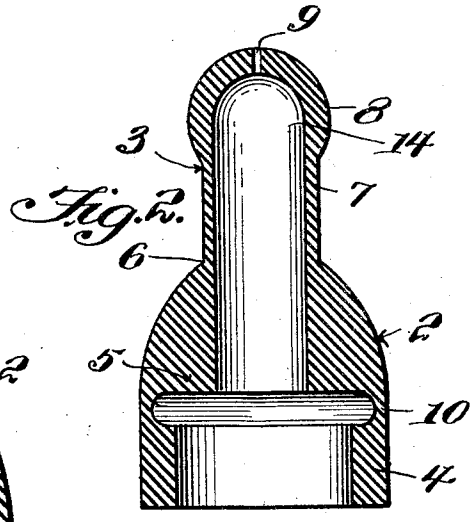


Fig. 2.

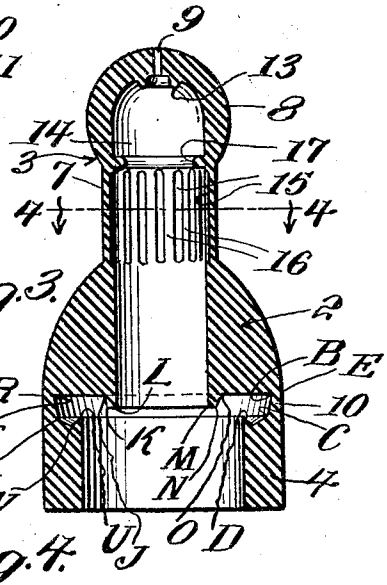


Fig. 3.

Fig. 4.

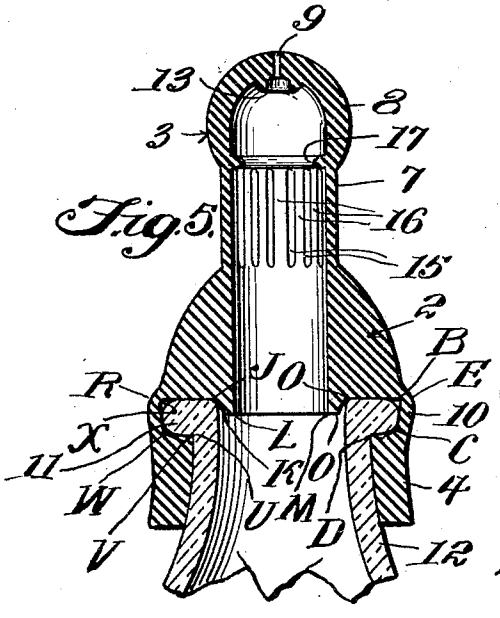
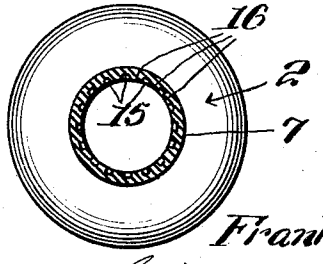


Fig. 5.



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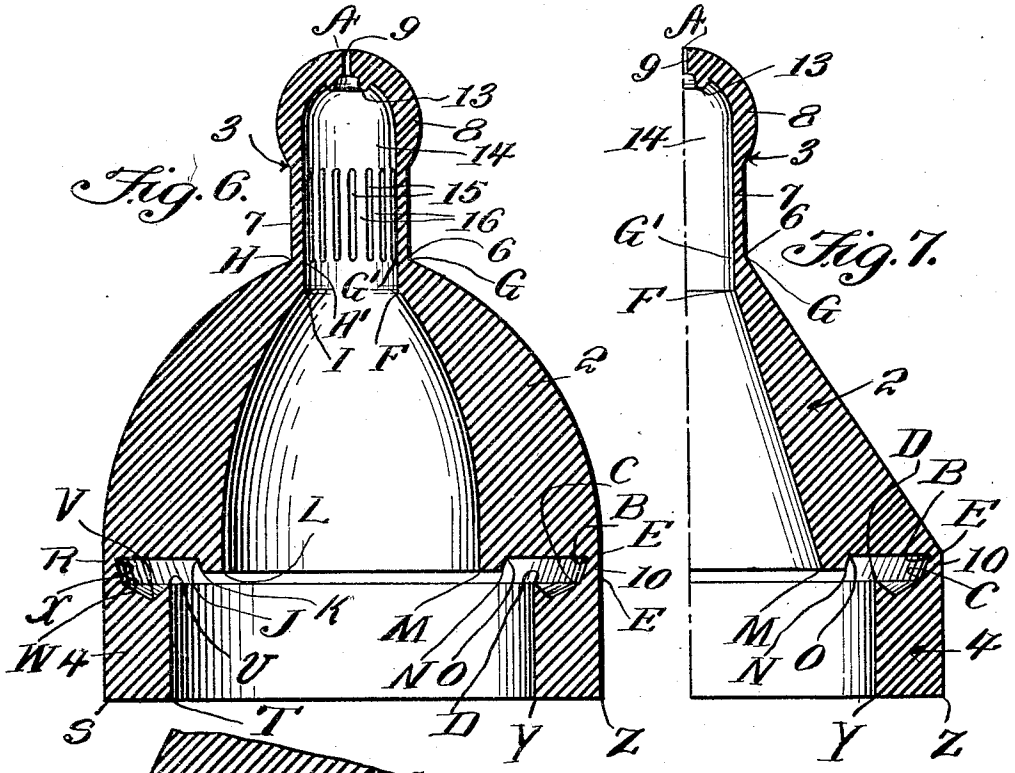


Fig. 6.

Fig. 7.

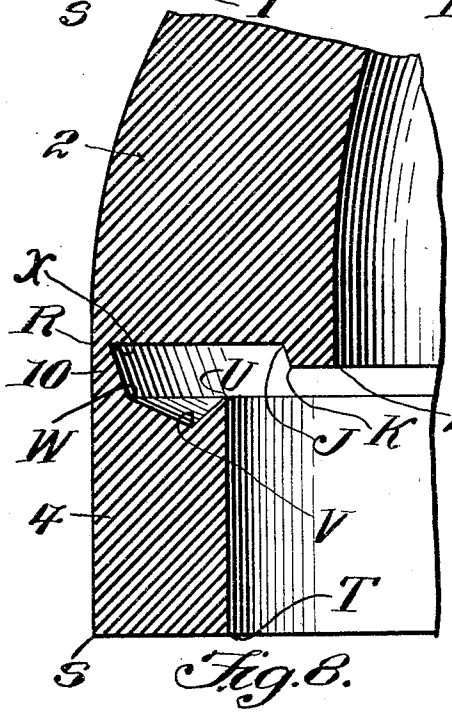


Fig. 8.

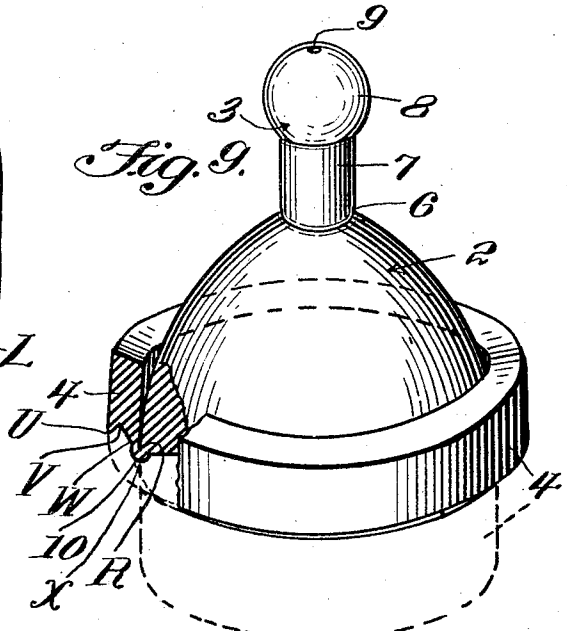


Fig. 9.

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NIPPLE

Application filed July 2, 1931. Serial No. 548,428.

The present invention is an improved nipple for nursing bottles, and has for an object the provision of a nipple embodying features of construction such that greatly improved resistance to disconnection when in use by the baby is provided, while affording ready disconnection by simple manipulation when desired.

Another object is to provide a nipple embodying a readily manipulated portion for greatly facilitating application of the nipple to the bottle, as well as its removal therefrom.

Another object is to provide a nipple affording improved resistance to collapse.

Another object is the provision of a reinforced nipple which maintains the orifice open, and which is so disposed as to not interfere with the softness of the nipple as contacted by the baby's mouth.

A further object is the provision of means whereby flow cannot be stopped by collapsing the walls of the nipple tip or mouthpiece.

Another object is to provide a nipple with a flared inner body wall of improved construction relative to the outer wall such as to prevent collapse of the wall, and such as to prevent collapse of the tip or mouthpiece into the body portion, due to vacuum or other cause.

A still further object is the provision of guide or positioning means on the nipple for facilitating application to the bottle.

Other objects will appear hereinafter.

The invention consists in the features, combination and arrangement of parts hereinafter described and particularly pointed out in the claims.

The drawings illustrate the invention and in these drawings,

Figure 1 is an enlarged cross-section of a nipple embodying certain features of the invention and of a size for application to a large size bottle neck.

Fig. 2 is an enlarged cross-sectional view of a nipple embodying certain features of the invention, and of a size and design for application to a smaller size bottle neck.

Fig. 3 is an enlarged view of a nipple generally similar to that of Fig. 2 and embodying further features of the invention with modifications.

Fig. 4 is a horizontal section substantially on line 4—4 of Fig. 3.

Fig. 5 shows the small nipple of Fig. 3 applied to the bottle.

Fig. 6 is an enlarged view of a nipple for application to a large bottle and embodying features of the invention in addition to those displayed in the large nipple of Fig. 1.

Fig. 7 is a view of a further modification of the construction shown in Fig. 6.

Fig. 8 is an enlarged fragmentary view showing in detail the construction of the lower parts of the nipple.

Fig. 9 is a view of the nipple with the base flange turned up preparatory to application to the bottle.

In the drawings, and referring to Fig. 1, the numeral 2 represents the body or breast portion of the nipple, 3 the tip or mouthpiece of the nipple, and 4 the flange of the nipple. The body portion 2 is relatively thick at the base as at 5 and gradually tapers upwardly to the point of juncture 6 with the nipple mouthpiece or tip 3.

The nipple mouthpiece or tip portion 3 comprises the relatively thin and relatively flexible cylindrical barrel portion 7 provided with a thickened ball-shaped top 8 having the usual outlet opening 9.

The thick base 5 of the body portion 2, which rests on the top of the bottle as shown in Fig. 1 is connected at its outer edge with the base flange 4, by means of a relatively thin connecting portion 10 as shown. In Fig. 1 the connecting portion 10 and flange 4 are shown as stretched to conform to the bead 11 of the mouth of bottle 12. It will be understood that normally and when not applied to the bottle the connecting portion 10 and base flange 4 are externally flush with the base diameter of body 2, as shown in the small embodiment of Fig. 2.

The thin connecting portion 10 joins the thick base 5 of the body 2 at its outer periphery, and is preferably made relatively thinner than the wall of the base flange 4, as clearly shown in the drawings.

The thin connecting portion 10, with its

large internal diameter to receive the bead 11 at the top of the bottle 12, provides means whereby the thicker flange portion 4 may be readily turned outwardly and upwardly against the outside of the body portion, to provide improved facility in applying the nipple to the bottle and in removing it therefrom. In applying my improved nipple to the bottle, the flange portion 4 is readily turned up about the thin portion 10 by a light outward and upward force applied thereto, and the flange then assumes the position against the body 2 as shown in Fig. 9. The nipple in this position, with the folded up flange 4, is then set on top of the bottle and the flange is readily turned down about the thin portion 10 into gripping position on the bottle, as shown in Fig. 1.

By reason of the construction of my improved nipple great resistance is afforded against removal of the nipple from the bottle unintentionally and when in use by longitudinal pull exerted by the baby or otherwise. The thinned connecting portion 10, however, provides for ready removability when used as a hinge about which the flange 4 is turned outwardly and upwardly against the body 2 of the nipple.

It will be noted that in all embodiments of the present invention, the chamber formed by the ball-shaped top 8 and the barrel 7, and with which the smaller opening 9 communicates, is of uniform diameter throughout. In the small nipple embodiments, this diameter is continued throughout to the bottom of the body portion 2, as clearly shown. In all embodiments the internal diameter of the ball-shaped top 8 is the same as the internal diameter of the cylindrical barrel portion 7.

In all embodiments the barrel 7 of the tip 3 is relatively flexible, resilient, yielding, and stretchable, while the top 8 and body 2 are relatively stiffer.

In all embodiments the wall of the body portion 2 is tapered gradually upwardly from the bottom thereof, whether the lines defining the wall be curved or straight.

In all embodiments the inner portions of the thick wall of the body 2, absorb to a large degree the stress incident to longitudinal pull exerted on the tip and body, so that the pulling stress reaching the outer peripheral edge of the bottom of the body 2 where it joins the thin connecting portion or hinge 10, is reduced to a minimum. The inner portions of the thick wall of the body 2 are more nearly in line with any longitudinal pull on the nipple than the outer portions and the inner portions absorb the stress. In the small nipple embodiments the line of force to the inner part of the bottom of the thick wall is perfectly straight and perpendicular in order that the longitudinal pull will be held near to the central portion of the nipple and as far away from the outside diameter as possible. In the large nipple embodiments this line is not made absolutely vertical and perpendicular to the base, in order to reduce weight, but the wall thickness is maintained as well as the relative size of the parts, so that the force is absorbed by the thick wall before it reaches the thin peripheral connecting hinge 10. In the large nipple, the outside diameter is about double that of the small nipple and to make the inside wall perpendicular would result in a very heavy body portion. Therefore in the large nipple, the inner wall is made a curve or incline diverging from a point just below the barrel portion of the tip.

In the construction of the nipple tip or mouthpiece portion 3 of my invention, the ball-shaped top or tip 8 is provided with a true hole 9 in the end thereof. That is, a rubber slug is removed leaving a hole that cannot close up, as is possible if the rubber is simply pierced or slitted. This true hole 9 being always open, allows the milk to freely flow out and the air to freely enter.

As shown in Fig. 3, the hole 9 is reinforced at its inner end by a rib reinforcement 13 extending downwardly from the tip 8 around the opening 9, and insuring an ever open exit for milk and entrance for air. As this reinforcement is disposed within the ball tip, it cannot interfere with the child in any way, and it prevents the hole from being squeezed shut in use.

The opening 9 opens into the chamber 14 of uniform diameter provided by the ball tip 8 and the barrel 7. The outer diameter of the ball tip 8, and hence its wall thickness, is greater than that of the barrel 7, and the ball tip will not collapse. Any collapse in the mouthpiece will be a lateral collapse of the cylindrical barrel 7 due to the flattening out of its circle to an ellipsoid or oval, by the baby in use. The ball tip of the mouthpiece is substantially spherical and is of such small internal diameter and of such wall thickness that it will not collapse and its internal volume will be maintained so that milk will always be present therein during nursing.

The relatively thin flexible and stretchable wall of the barrel portion 7 is reinforced above by the heavier collapse resisting ball tip 8, and below by the heavier body portion 2. These heavier parts above and below tend to hold their diameters against collapse due to vacuum created by the baby or otherwise and thus assist the thinner walled barrel portion to maintain its normal tubular shape against lateral collapse.

The child's lips naturally fall on this thin barrel portion, the heavier walled ball tip 8 holding its true shape and volume within the child's mouth. The pressure of the lips

flattening out the barrel portion 7, pumps the milk into the ball tip naturally and without effort and then out through the ever open hole.

The barrel portion 7 provides a true column effect against longitudinal collapse, its cross section being uniform throughout its length. This prevents any portion of the ball tip or barrel portion collapsing within itself due to vacuum created.

As shown in Fig. 3, the inner side of the barrel wall is preferably provided with a series of parallel grooves or channels 15 extending longitudinally throughout the length thereof. The grooves or channels are more narrow than the spacer or portions 16 of the barrel wall between them, so that if the walls are brought together or collapsed, there will be no meshing and the channels or grooves will remain open for the unimpeded passage of milk.

As an additional feature of the improved nipple, an annular reinforcing rib may be provided as shown at 17 in Fig. 5, to maintain the cross-sectional shape and to resist lateral collapse at the juncture of the barrel portion 7 with the ball tip 8. This feature is equally applicable to the small and large nipples as the nipples are all the same in size above the body portion.

The body 2 of the nipple is so constructed that it will not collapse within itself, i. e., it cannot turn even partially inside out through the force of the vacuum created within the bottle by the sucking baby. Neither can the body 2 be collapsed by pressure from without. If outside pressure is brought to bear on the body 2, upon removing that pressure, the nipple will again assume its natural molded shape, because enough thickness of rubber is provided in the body portion to give a power or force greater than any vacuum the child could create by removing milk and air.

The body portion in order to possess true non-collapsing characteristics according to the present invention must be designed according to fixed rules:—

1. The outside surface of the body portion 2 must be either a single non-tortuous curve, or a straight line, in cross-section.

2. If a straight line, then the inner surface of the body must also be a straight line diverging from the outer surface as it approaches the bottom of the body portion.

3. If a curve, then the inner surface must define a curve or straight line such that the two surfaces diverge as the bottom of the body 2 is approached, always producing thereby a heavier wall portion as the bottom of the body 2 is approached.

Whether the inner and outer surfaces define curves or straight lines, the thickness of the wall of the body portion must increase downwardly from top to bottom.

This is exemplified in the small nipple of Figs. 2, 3 and 5 by the perpendicular and straight inner wall surface of the body portion 2 and the curved outer wall surface, gradually tapering upwardly.

This is shown in the large nipple of Figs. 1, 6 and 7, in Fig. 6 showing the novel features of the present invention applied to the large nipple, and showing the outer body wall surface defined by a curve HR and the inner wall surface defined by a curve IL, the wall thickness between these curves gradually increasing from top to bottom.

Fig. 7 shows the outer body wall surface defined by a straight line GE and the inner wall surface defined by a straight line FM, the wall thickness between these straight lines, gradually increasing from top to bottom of the body portion 2.

In each of these large nipples, the inner wall surface must begin at upper points I, F, which are below the top of the body 2 where it joins the barrel at H, G, sufficiently so that the distances HI, FG, are greater than the distances HH', G'G. This prevents the collapsing of the barrel 7 into the body of the nipple, and effects a reinforcement at the juncture between the barrel and body.

The large and small modifications of the body portion 2 of the nipple are provided in order to provide nipples for fitting wide mouth bottles as well as narrow mouth bottles. Substantially the only difference in the body portion of these different size nipples is in the inner wall IL, FM. The small nipple for fitting narrow neck bottles may have an outside diameter across the base about one-half that of the larger nipple across the base at RE.

In the case of the little nipple, it is essential to remove the pull exerted at the tip as far as possible from the points RX and BE of its diameter and if IL and FM is a continuation of the wall of the barrel of the tip the more the pull will be spent along IL and FM. In the case of the large nipple it is just as essential to remove the pull from RX and BE but in the large nipple these points are double the distance from point L and M, and since the tip AHG always remains the same, the pull will remain the same and point L and M need not lie on the continuation of the perpendicular wall of the barrel. However, this new inner body wall of the large nipple must be a curve or straight line and must start at points I, F, so that the distances HI and FG are greater than the distances HH', G'G in order that the tip of the nipple is reinforced against collapse into the body portion.

This reinforced body portion is of advantage in many ways.

It places a soft pad or guard of rubber between the baby's mouth and the bottle top.

It absorbs and distributes the pull on the

tip so that very little pull reaches the base flange 4.

Its upper wall thickness which is heavier than the barrel wall of the tip helps this barrel to maintain its true molded diameter.

Its bottom wall thickness, which is about eight times heavier than the connecting wall portion RX of base flange 4, Fig. 5, also sets up a great inward force upon this weaker wall. When the nipple is on the bottle (as in Fig. 5) the pull of the heavy body portion is toward the center of the nipple. The top of the bottle is forcing the thin connecting wall RX outwardly opposite forces tending to hold the nipple tighter. Now, any upward pull upon the tip and necessarily upon the reinforced body causes the diameters of these two portions to tend to become smaller and smaller at the same time making RX tighter and tighter around the bead of the bottle top.

This reinforced body portion also provides a support for the flange base 4 as it is turned up and down and receives and supports the turned up base for application to the bottle.

This reinforced body portion also is sufficiently thick to make it possible to provide the downwardly extended rim KL, MN, Fig. 6. This rim or rib KL prevents the nipple with base flange 4 upturned, from sliding off of the top of the bottle in the act of turning down the base flange. This guiding or positioning rib is also a means of knowing that the nipple with flange upturned is in the right position on bottle top before turning down the flange 4. This extended guide or positioning portion is preferably of a diameter to be loosely received within the mouth of the bottle as shown in Fig. 5.

Regardless of the force without or the vacuum within, this nipple body is always in its true molded shape and in being so allows milk to flow undisturbed from the bottle to the body's mouth and air to enter to fill up the vacant space within the bottle. Thus an uninterrupted easy feeding is accomplished and a true anti-colic nipple produced.

The base flange 4 of this nipple or any nipple, i. e., the part that clutches the neck of the bottle, is the only thing that holds the nipple to the bottle. In other nipples any pull by the baby at the tip will be transmitted directly and without diminished force upon the base or holding flange.

In the nipple shown in the drawings, and referring particularly to Fig. 8, any pull at the tip is transmitted fully at L diminishing as it reaches X and R. Since very little of the pull reaches RX and that which reaches it is not perpendicular to line RX the base flange 4 and connecting portion 10 will be disturbed very slightly. However, stress upon connection 10 and base flange 4 will begin only in the remote event that the pull on the tip actually becomes so great as to exhaust the stretching power of the tip, lift the reinforced body off the top of the bottle where it is seated and actually transfer the pull from the tip to the point RX. The fully stretched tip and reinforced body without power to absorb any more pull become one, allowing all pull to center at RX. To take care of this latter condition angle JXW is made less than 90° or acute. If pull does reach RX the angle at X being acute and the diameter of the holding flange becoming less or smaller or tighter as point W is approached, this increasingly smaller diameter and consequently an increased wall thickness sets up a counter or opposite pull downward tending to offset some of the upward pull at RX. An increased grip on the bottle bead is provided downwardly along the surface XW. This nipple is shown applied to the bottle in Fig. 5.

Angle JXW is also made acute in order that wall thickness RX is less than at any other part of the base. Point RX acts as hinge for turning the base collar up and upon the reinforced body portion in order that this nipple may have the feature of being easier to put on than any other nipple that must be stretched over the bottle neck. To put the nipple as shown in the drawings on easily, the base flange is turned up on the body as shown in Fig. 9. The whole is then set upon the bottle top and the flange pressed down again around neck of bottle.

Also since RX is the smallest wall thickness throughout the base flange any pull on RX will spend itself at RX and would not be spread to the heavier portions of the base. These heavier portions, due to their own molded diameters which are smaller than at RX, are exerting a counter pull against any pull that would tend to disturb or enlarge their diameters.

Because these small diameters (all points on line UT) do exert a natural pull of their own inwardly as they have been stretched larger than their true molded diameter, angle XWV has been made obtuse (the perpendicular from V to line XJ being greater than the perpendicular from W to line XJ) and in this form a downward-inward pull is transmitted or centered upon RX thus offsetting upward pull at RX.

Angle VUT is made acute in order to form a point or locking hook arrangement U under the flange on the bottle.

The purpose of having XWV, Fig. 3, an angle rather than an arc is that the angular shape in contact with the usual rounded head of the bottle will afford greater resistance to slippage (as in the case of liquid reaching that point) than if it conformed to the shape of the bead on bottle. Interrupted contact points are thereby provided, the angular interruptions at X, W, V providing pockets

which tend to drain the liquid from the contact points between them.

Fig. 5, showing this construction in position on the bottle, is diagrammatic in character and is intended to illustrate in a general way the stretched condition of the parts of the nipple when applied to the bottle, and it is not desired to limit the invention to the exact configuration of the assembled bottle and nipple, no attempt at absolute accuracy of configuration having been made in the conception of Fig. 5.

It is not desired to limit the invention to the exact construction shown, as actual manufacture may require certain mechanical changes, but it is intended to define the invention in the appended claims.

It will be understood that where in the above description or in the drawings a feature disclosed in connection with one form of the invention is susceptible of use with other illustrated forms, said feature is to be regarded as though particularly disclosed in connection with the said other forms. The material of which the nipple is made is rubber.

I claim:

1. A rubber nipple comprising a thick, upwardly tapering, relatively stiff breast portion non-collapsible under pressure to which it will ordinarily be subjected in use while applied to a bottle, a flexible elastic mouth piece extending from the top of the breast portion, a flexible elastic attaching flange at the base of the breast portion, and a flexible elastic connecting portion between the flange and the base of the breast portion, the attaching flange being sufficiently thin to be rolled up against the breast portion preparatory to applying the nipple to the bottle, the breast portion being non-collapsible under the pressure exerted thereon while the attaching flange is being rolled up and while it is being rolled down into engagement with the bottle.

2. A rubber nipple comprising a thick, upwardly tapering, relatively stiff breast portion non-collapsible under pressure to which it will ordinarily be subjected in use while applied to a bottle, a flexible elastic mouth piece extending from the top of the breast portion, a flexible elastic attaching flange at the base of the breast portion, a flexible elastic connecting portion between the flange and the base of the breast portion, the attaching flange being sufficiently thin to be rolled up against the breast portion preparatory to applying the nipple to the bottle, the breast portion being non-collapsible under the pressure exerted thereon while the attaching flange is being rolled up and while it is being rolled down into engagement with the bottle, the base of the breast portion extending inwardly beyond the connecting portion, and a shallow positioning rib carried by the base inwardly of the connecting portion and adapted to fit loosely in the mouth of the bottle to hold the nipple against lateral displacement while the attaching flange is being rolled down into engagement with the bottle.

In testimony whereof, I affix my signature.

FRANKLIN BROWN.