May 26, 1964 P. N. QUINN 3,134,494

INFANT FEEDING DEVICE

Original Filed July 1, 1957 2 Sheets-Sheet 1

Fig. 1

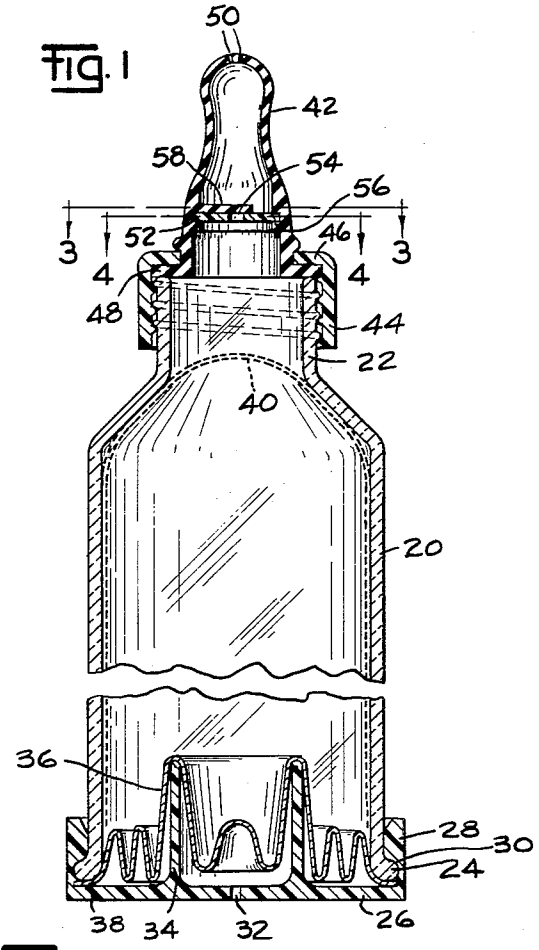


Fig. 2

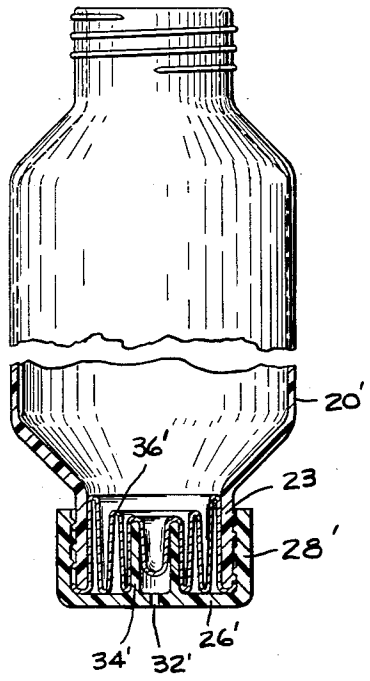


Fig. 3



Fig. 4

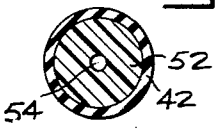


Fig. 15

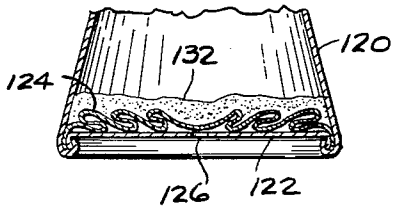
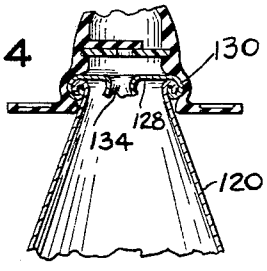


Fig. 14



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INFANT FEEDING DEVICE

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Fig. 5

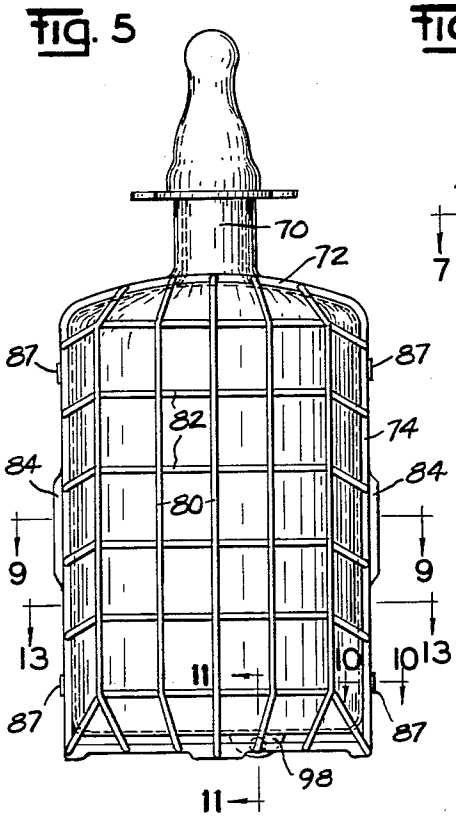


Fig. 6

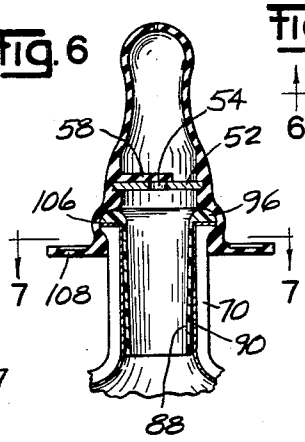


Fig. 7

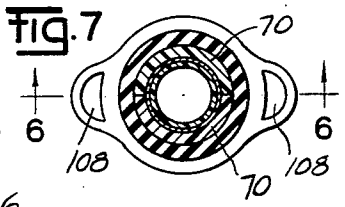


Fig. 8

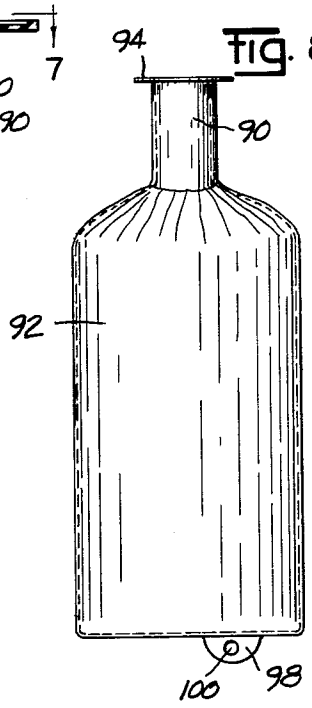


Fig. 10

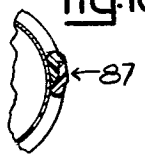


Fig. 9

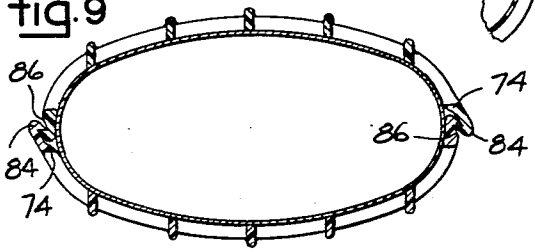


Fig. 11

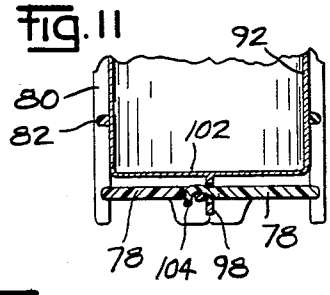


Fig. 13

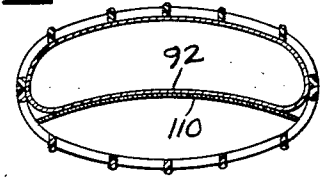




Fig. 12

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3,134,494

INFANT FEEDING DEVICE

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Continuation of application Ser. No. 669,201, July 1, 1957. This application Aug. 20, 1962, Ser. No. 219,362
6 Claims. (Cl. 215—11)

This invention relates to an infant feeding device.

The primary object of this invention is to provide a device of this character which excludes air from the liquid food chamber thereof at all times during use.

A further object is to provide a device of this character having a novel nipple provided with a positive acting check valve.

A further object is to provide a device of this character having a nipple with a check valve and a liquid food container of variable capacity responding to atmospheric pressure to automatically reduce the capacity thereof as food is withdrawn therefrom, so as to facilitate removal of food therefrom without entry of air therein.

A further object is to provide a device of this character having a comparatively rigid carrier for mounting a flexible collapsible pressure-responsive member and a valved nipple.

A further object is to provide a device of this character wherein a part thereof is disposable after use and the remainder is reuseable.

This application is a continuation of application Serial No. 669,201, filed July 1, 1957, now abandoned.

Other objects will be apparent from the following specification.

In the drawings:

FIG. 1 is an axial sectional view illustrating one embodiment of the invention;

FIG. 2 is a side view of a modified form of container used in the device, with parts thereof shown in section;

FIG. 3 is a transverse sectional view taken on line 3—3 of FIG. 1;

FIG. 4 is a transverse sectional view taken on line 4—4 of FIG. 1;

FIG. 5 is a side view of another embodiment of the invention;

FIG. 6 is an axial sectional view of a portion of the device shown in FIG. 5 illustrating the mounting of a nipple thereon;

FIG. 7 is a transverse sectional view taken on line 7—7 of FIG. 6;

FIG. 8 is a side view of a flexible container used in the construction illustrated in FIG. 5;

FIG. 9 is a transverse sectional view taken on line 9—9 of FIG. 5;

FIG. 10 is a fragmentary detail sectional view taken on line 10—10 of FIG. 5;

FIG. 11 is a fragmentary vertical sectional view taken on line 11—11 of FIG. 5;

FIG. 12 is a perspective view of a member insertable in the device shown in FIG. 5 to restrict the capacity of the container shown in FIG. 8;

FIG. 13 is a transverse sectional view similar to FIG. 9 and illustrating the use of the insert shown in FIG. 12;

FIG. 14 is an axial fragmentary sectional view of one end of a modified embodiment of the invention; and

FIG. 15 is a fragmentary axial sectional view of the opposite end of the container of the embodiment of the invention illustrated in FIG. 14.

Referring to the drawings, and particularly to FIGS. 1, 3 and 4 which illustrate one embodiment of the invention, the numeral 20 designates a container which may be formed of glass or plastic and which preferably is transparent, although it will be understood that the container may be formed of other material, such as metal. The

container has a neck 22 at one end thereof, preferably of restricted size and preferably screw-threaded in the manner well understood in the art. The opposite end of the container is open and preferably terminates in an outwardly projecting peripheral bead 24. A bottom or end member 26, preferably formed of rubber or synthetic resin having at least a measure of resilience, is adapted to span the open end of the container 20. The closure 26 preferably has a skirt portion 28 provided with an interior groove 30 to receive the bead 24 for the purpose of detachably anchoring the bottom 26 to the container 20. Thus the skirt 28 has a constrictive engagement with the lower end of the bottle 20 which provides for a snap lock of the skirt around the bead 24. The closure 26 is provided with an aperture 32 therein, preferably formed centrally thereof, as illustrated and within the outline of an interior projection 34 forming a part of the end cap 26 and here shown as of tubular or cup-shaped form.

A flexible cup-shaped member 36, preferably formed of rubber, polyethylene or other thin film material which flexes readily, is mounted in the container 20. The marginal portion 26 of the open end of the cup-shaped envelope or film member 36 is preferably removably clamped continuously thereof between the bead 24 of the container and the end wall 26. The flexible member 36 will be of a size adapted to line the member 20 terminating within the neck 22 thereof spaced from the open end of the neck, as illustrated in dotted lines at 40 in FIG. 1.

A nipple 42 formed of rubber or any other suitable material and of conventional, substantially cup-shaped configuration, is detachably mounted at its open end upon the member 20. In the form shown in FIG. 1 wherein the neck of the member 20 is screw-threaded to receive a screw-threaded clamping member 44 having an in-turned end flange 46, the nipple will be provided with an outwardly projecting flat flange 48 of circular outline adapted to seat against and be supported at the end of the neck 22 and to be pressed continuously circumferentially and sealingly thereagainst by the flange 46 of the retainer 44 when the latter has been secured to the neck by screw-threading thereon.

The nipple is provided with a check valve structure intermediate the ends thereof, that is, spaced above the mounting end thereof as defined by the flange 48 in the FIG. 1 construction, and spaced below the discharge openings 50 in the outer terminal end thereof. The check valve construction includes a disc 52 preferably formed of plastic which is substantially rigid and shape-retaining. The disc 52 has a central aperture 54 therein. The disc 52 is preferably seated with a sealed fit in a shallow circumferential groove formed in the interior of the nipple and defined in part by a circumferential rib or shoulder 56. A resilient tab or tongue 58 is formed integrally with the nipple 42 to extend transversely thereof and overlie the aperture 54 in the disc 52 in its normal position. The tab 58 is elongated and of such length that it completely covers the opening 54 and overlies the disc 52 continuously around the aperture 54 therein. The tab 58 is normally flat and is spaced from the circumferential rib 56 a distance equal to the thickness of the disc 52 so that the tab normally maintains continuous sealing face engagement with the disc 52 to constitute a check valve permitting flow of liquid in the nipple in reverse direction. The tab 58 will be sufficiently flexible so that it will be withdrawn from sealing engagement with the disc around the opening 54 in response to suction exerted by an infant who has the nipple in his mouth. The side edges of tab 58 are substantially straight and its free edge is rounded and substantially concentric with aperture 54. The side and free end edges of the tab are spaced from and clear of

the inner surface of the nipple body. The internal cross-sectional dimension of the nipple may be greater at its open end than at the part thereof adjacent to the groove, as shown in FIG. 6, so as to facilitate insertion and removal of disc **52** for cleaning purposes when the nipple is removed from the container.

The manner of filling the bottle illustrated in FIG. 1 may vary according to the amount of liquid to be contained therein. In cases where the bottle is to be filled to its full capacity, the parts of the bottle, except the nipple, are assembled after sterilization and cleansing thereof, and the milk or other liquid food is introduced through the neck **22** to fill the same, whereupon the nipple is applied to the neck. The filling of the container excludes air therefrom and the only air which is entrapped in the nursing bottle incident to this procedure is that which occupies the small volume in the nipple below the check valve thereof. This small volume of entrapped air may be exhausted by squeezing the nipple outwardly of the valve several times.

In cases where the quantity of liquid to be introduced in the nursing bottle is less than the full capacity thereof, the nipple is assembled on the end thereof and the end plate **26** and the flexible member or liner **36** are removed until after the liquid food of the desired quantity has been introduced into the container **20** while inverted, thereupon the liner **36** is permitted to enter the container **20** to bear against the upper surface of the liquid therein and to displace air from the container **20** before the skirt **28** is snapped in place to anchor the end member **26** and the flexible liner **36** to the container **20**. By this means no air can be entrapped within the container **20**, and atmospheric pressure acting upon the flexible liner **36**, as permitted by the entry of air through the opening **32**, holds the liner in partially extended position in contact with the body of liquid while the valve **58** excludes the entry of air into the partially filled container **20** through the opening **54**.

In the nursing or feeding operation, the infant sucks upon the nipple in the usual manner, and this suction action unseats the valve **58** to admit liquid flowing into the outermost chamber of the nipple from which it can flow through the discharge opening **50**. As liquid is displaced from the container **20** in this manner, the air pressure acting against the flexible liner **36** will further extend that liner to maintain it in contact with the liquid content of the container. This eliminates the need to displace the liquid withdrawn through the valve with air. In other words, the extension of the flexible liner **36** in response to atmospheric pressure reduces the cubic volume of the liquid food receiving chamber within the container **20** proportionally to the rate of withdrawal of liquid past the check valve.

In normal use, the sucking of the infant upon the nipple will fill the end chamber of the nipple outside of the check valve, and hence the exertion of squeezing pressure upon the nipple by the infant will force the liquid through the opening **50** for entry into the infant's mouth. Such squeezing action alone, however, will not affect the valve which will remain sealed or closed at that time. The sucking action by the infant, or the return of the nipple to normal shape after squeezing thereof, will open the valve to replace the liquid food taken into the mouth. This arrangement results in the substantially constant filled condition of the outer end of the nipple being maintained during the feeding, and thus precludes the sucking of air by the infant during the feeding action. Also, it will be observed that the exertion of atmospheric pressure upon the flexible liner **36**, which occurs during the feeding action and suction by the infant, assists in forcing the food through the check valve and into the outer feeding section of the nipple. Thus the device responds readily to slight pressure or sucking by the infant and enables young and weak infants to readily get the liquid food they require. Another advantage of the action is that the training of the infant to bottle feeding is simplified.

One of the principal advantages of the elimination of air in the food chamber is that the taste of food disappears after the device has been emptied, hence the infant tends naturally to discard the device once it has been emptied. This reduces the attention needed to be paid by parents and nurses to remove the bottle after the feeding has ended. Furthermore, after the bottle has been emptied and the food taste disappears, the infant will not continue to munch food-flavored air bubbles and to pass them into the stomach in the manner which heretofore has commonly caused bloating.

It will be apparent from the construction that sterility of the device is easily maintained by reason of the separability of the parts for cleaning and sterilization thereof. Also, it will be apparent that reassembly is such as to avoid contamination thereof or of the food contents incident to filling of the container. The parts of the device which are handled by the parent or nurse and the infant during the feeding are all rigid and the flexible liner **36** is fully protected against possibility of perforation by reason of its confined position.

The construction of the device illustrated in FIG. 2 is substantially the same as that illustrated in FIG. 1 and possesses the same advantages. The differences in construction reside principally in the fact that the lower end portion **23** of the container **20'** in that construction constitutes a reduced externally screw-threaded neck and that the skirt portion **28'** of the bottom closure **26'** is screw-threaded upon that reduced neck **23**. The flexible liner **36'** is of cup-shape and is anchored at its open end by the closure **26'** continuously around the end of the neck **23** in the same manner described. The closure **26'** preferably will have the inwardly projecting members **34'** to hold the liner **36'** spaced from the air inlet opening **32'** similarly to the arrangement illustrated in FIG. 1. It will be understood that a nipple having a check valve will be mounted upon the opposite or upper end of the container **20'** in the same manner illustrated in FIG. 1, and that the FIG. 2 device may be filled from either end thereof in the same manner described above with reference to the FIG. 1 construction.

Another embodiment of the invention is illustrated in FIGS. 5 to 11, inclusive. In this construction a multiple part carrier, somewhat in the nature of a container or cage, is preferably provided. As illustrated, the carrier is formed in two parts and each part includes a neck portion **70** of semi-circular or split tubular characteristic. A marginal carrier frame includes top part **72** and side parts **74**, a bottom **78** and a cage structure including longitudinal ribs or bars **80** and transverse ribs or bars **82**. The carrier parts are preferably formed integrally from rubber, synthetic resin or any other suitable material, although they may be formed of glass or like material. The two halves of the cage are preferably interlocked, as illustrated in FIGS. 9 and 10. One of the marginal members **74** of each half has a hook **84** formed thereon, preferably intermediate its length, as illustrated in FIG. 5, and adapted to engage in a groove **86** formed in the other section. Also the parts may include the overlapping lips **87** shown in FIG. 10 spaced from hooks **84** and arranged in opposite overlapping relation thereto. These interlocking and overlapping parts **84**, **86** and **87** serve to orient the parts in association with means to be described which pivotally connect the carrier parts at the lower end and with a tubular insert **88** inserted in the neck portion **70** which prevents movement of the marginal frame **72**, **74** in the plane thereof when the hooks **84** engage in the recesses **86** to prevent separation of the parts in directions transverse of the parting plane between the sections.

Tubular insert **88** fits within a tubular neck portion **90** of a flexible sheath or liquid container **92** of a size and shape to fill the cage when extended. The container **92** is preferably formed of rubber or polyethylene film or any

other flexible film material which is fluid-tight in character. If desired the container 92 may be prefilled with dehydrated, concentrated or condensed food, and may be formed of disposable material. An enlarged flange 54 surrounds the open end of the neck 90 of the container and is adapted to seat against the end of the neck portion 70 of the cage. The tube 88 has an outwardly projecting flange 96 at its end adapted to bear against the container flange 54 and to hold the same against the end of the tube neck 70 of the cage, as seen in FIG. 6. The parts forming the neck 70 are preferably enlarged at their ends and are configured in a manner to provide, in cooperation with the rounded configuration of the flange 96, a substantially rounded bead assembly.

The container 92 preferably has a tab 98 at its end opposite the neck 90 thereof, and this tab is provided with an aperture 100 preferably located in the center plane thereof and adapted to be positioned between the confronting edges of the bottom section 78 of the cage. One of the bottom sections 78 is preferably recessed or cut away at 102 adjacent the tab 98 to receive and accommodate a hook 104 on the other bottom section which passes through the aperture 100 of the tab 98 of the container 92.

A nipple is mounted upon the neck portion 70 of the carrier after assembling container 92 and tubular insert 88. The nipple is of the same construction described above with the exception that it is of the constrictive type rather than the type which is anchored by means of the screw-threaded retainer. In other words, the body of the nipple is provided with an internal circumferential groove 106 spaced from its mouth and adapted for a constrictive fit upon the bead defined by flange 96 and associated parts, as best seen in FIG. 6. The nipple may include tongues 108 projecting from the sides thereof at the open end thereof to facilitate stretching thereof for insertion upon and removal from its mounting on the carrier. The nipple will include the check valve, including the tab 58, the disc 52, apertured at 54 and spanned by the tab 58, and generally of the construction heretofore illustrated and described.

In this construction the container 92 is filled to the desired extent through the neck opening 90, and the flexibility of the container, coupled with the exposure thereof to atmospheric pressure, excludes air when it is completely filled. Application of the nipple permits only a small quantity of air to be confined within the device below the level of the check valve disc 52 and above the level to which the container is filled. This small amount of air is not detrimental to the device but may be exhausted by slight compression of bag 92 to raise the liquid level inu the device to the level of the disc 52. As the infant sucks upon the nipple to draw liquid food therefrom, the outer feeding chamber of the nipple becomes filled, and atmospheric pressure acting upon the flexible envelope 92 reduces the volume of the envelope while the check valve prevents the entry of air into the envelope to replace the liquid food withdrawn. It will be apparent, therefore, that the operation of the device and the achievement of the results sought therein is similar to the operation of the embodiment of the invention illustrated in FIG. 1.

One of the advantages of the construction illustrated in FIG. 5 is that means may be provided therein to accommodate partial filling only of the flexible envelope 92, so that air can be excluded therefrom even though the same is only partially filled. This result can be accomplished by use of a shield or partition member of the character illustrated in FIG. 12. The member 110 may be of any size or shape desired and is mounted within a cage alongside the flexible envelope 92 in the manner illustrated in FIG. 13. Member 110 may have an apertured tab 111 for anchorage by a hook 104. The size of the member 110 serves to regulate the cubic capacity of the envelope 92 when confined within the cage, as illustrated in FIG. 13, and thereby limits the extent to which the envelope can be filled. To the extent that it can be filled, all air is excluded therefrom when it is filled to a selected level, and the exclusion of air is as effective when filled to only partial capacity in this manner as air exclusion is effective when the envelope 92 is completely filled. It will be apparent that a plurality of members 110 of different sizes and configurations may be provided for each cage and that the difference in the shape and size of these members may regulate the liquid capacity of the envelope 92 in each case. Thus by supplying a set of members 110 with the device illustrated in FIG. 5, it is possible to use the device effectively for air-excluding purposes during the full period when an infant is on a liquid diet, and, by the simple operation of successively replacing the inserts 110 with progressively smaller units, the feeding capacity of the device can be increased as such increases in capacity are required. Also, it is possible to mount two members in the cage in opposing relation to provide a desired capacity of the container. The container 92 may be of prefilled disposable character if desired.

It is possible to provide the advantages of my device in a unit of generally disposable character. One example of such a device is illustrated in FIGS. 14 and 15. In this instance a container of disposable character, such as a waxed paper container 120, is provided with a bottom 122 suitably anchored therein and anchoring between the same and the container wall 120 the open marginal end portion of a flexible liquid-proof film member 124 of a character similar to that used in FIG. 1. An air intake opening 126 will be provided in the bottom 122. The opposite end of the container 120 is preferably sealed by a cap 128 having a marginally crimped bead forming rim 130 providing sealed connection between the same and the closure 128. However, cap 128 may be removably mounted on the container 120. The closure 128 will preferably be formed of wax paper or other disposable and readily perforated material. The bead 130 will provide means for anchorage of a nipple of the character and construction illustrated in FIG. 6 and provided with the check valve parts 52, 58, as previously described.

The arrangement of this construction makes possible the packaging of liquid food in a container and its dispensing for ready use. Preferably the liquid food would be in dehydrated or concentrated or condensed form, to be prepared in condition for use by filling the container 120 with warm water introduced through an opening 134 in the cap 138 formed by a user when use thereof is required. After the introduction of the warm water, the nipple 42 can be applied and the device is ready for use as soon as the dehydrated food 132 becomes thoroughly mixed in the water. It will be understood, of course, that after the single use of the container it can be thrown away and the nipple will be applied to a different container when the next infant feeding period occurs.

While the preferred embodiments of the invention have been illustrated and described, it will be understood that changes in the construction may be made within the scope of the appended claims without departing from the spirit of the invention.

What is claimed is:

1. An infant feeding device comprising a container having a rigid neck portion, a flexible liquid bag within said container responsive to atmospheric pressure to reduce the cubic capacity theerof as liquid is withdrawn therefrom, the open end of said bag being folded over the end of said rigid neck portion, a resilient nipple having a supporting portion on one end thereof and a restricted discharge aperture in the other end thereof, said supporting portion being supported on and sealed to the end of said neck portion with the folded end of the bag tightly compressed therebetween, said nipple having an inwardly presenting annular groove intermediate the ends thereof, a valve disc removably seated in said groove and having an aperture therein, and a resilient, flap-like tongue projecting inwardly from an inner surface of said nipple and normally bearing on the surface of said valve disc facing

said discharge aperture to provide a flap spanning and closing the aperture in said disc, said valve disc and tongue constituting a normally closed check valve accommodating passage of liquid therethrough from said bag and preventing the flow of air and liquid therepast into said bag.

2. An infant feeding device comprising a container having a rigid neck portion, a flexible liquid bag within said container responsive to atmospheric pressure to reduce the cubic capacity thereof as liquid is withdrawn therefrom, the open end of said bag being folded over the end of said rigid neck portion, a resilient nipple having a supporting portion on one end thereof and a restricted discharge aperture in the other end thereof, said supporting portion being supported on and sealed to the end of said neck portion with the folded end of the bag tightly compressed therebetween, said nipple having an inwardly presenting annular groove intermediate the ends thereof, a valve disc removably seated in said groove and having an aperture therein, and a resilient flap-like tongue projecting inwardly from an inner surface of said nipple and normally bearing on the surface of said valve disc facing said discharge aperture to provide a flap spanning and closing the aperture in said disc, said valve disc and tongue constituting a normally closed check valve accommodating passage of liquid therethrough from said bag and preventing the flow of air and liquid therepast into said bag, and a partition removably mounted within said container in position to reduce the volume of the container occupied by said flexible bag whereby the cubic capacity of said bag is controlled by said partition.

3. A resilient nipple having a supporting portion on one end thereof adapted to be mounted on a liquid container having a rigid neck portion and a flexible portion responsive to atmospheric pressure to reduce the cubic capacity thereof as liquid is withdrawn therefrom, the other end of said nipple having a restricted discharge aperture therein, said nipple having an inwardly presenting annular groove intermediate the ends thereof, a valve disc removably seated in said groove and having an aperture therein, and a resilient flap-like tongue integral with and projecting inwardly from the inner surface of said nipple and normally bearing on the surface of said valve disc facing said discharge aperture to provide a flap spanning and closing the aperture in said disc, said valve disc and tongue constituting a normally closed check valve accommodating passage of liquid therethrough from the container and preventing the flow of air and liquid therepast into the container.

4. An infant feeding device comprising a container

having a resilient nipple thereon for dispensing liquid from the container, said container containing a flexible portion responsive to atmospheric pressure to reduce the cubic capacity of the container as liquid is drawn therefrom, said nipple having a supporting portion on one end thereof mounted on the container and a restricted discharge aperture in the other end thereof, a valve disc removably seated in said nipple intermediate the ends thereof and having an aperture therein, and a resilient flap-like tongue affixed to and projecting inwardly from the inner surface of said nipple and normally bearing on the surface of said valve disc facing said discharge aperture to provide a flap spanning and closing the aperture in said disc, said disc and tongue constituting a normally closed check valve accommodating passage of liquid therethrough from the container and preventing the flow of air and liquid back into the container.

5. An infant feeding device comprising a container having a resilient nipple thereon for dispensing a liquid from the container, said container including a flexible portion responsive to atmospheric pressure to reduce the cubic capacity of the container as liquid is withdrawn therefrom, and a normally closed pressure responsive valve between said nipple and container to define a separate chamber within said nipple which is normally completely sealed off from the space within said container by the normally closed pressure responsive valve; said normally closed pressure responsive valve opening in response to a reduction in pressure in said separate chamber coupled with atmospheric pressure acting on said flexible portion to allow liquid to pass therethrough into said separate chamber, said normally closed check valve at all times preventing the flow of air and liquid from said separate chamber back into the container.

6. The invention as defined in claim 5 wherein said normally closed pressure responsive valve comprises a disc positioned within said nipple and having a central aperture therein through which the liquid from the container must pass, and a flap-like tongue projecting inwardly from the inner surface of said nipple and normally bearing on the surface of said valve disc facing outwardly from said container to provide a flap spanning and normally closing the aperture in said valve disc.

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