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Kheradvar et al.

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(54) **NURSING BOTTLE APPARATUS FOR IMPROVEMENT OF SUCKLING**

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A61J 9/04	(2006.01)
A61J 9/00	(2006.01)

(52) **U.S. Cl.**

CPC ***A61J 9/04*** (2013.01); *A61J 9/003* (2013.01)
USPC **215/11.5**; 215/11.1; 215/11.6; 215/11.2; 215/11.3; 215/11.4

(58) **Field of Classification Search**

USPC 215/11, 11.1–11.6; 604/74; 222/207
See application file for complete search history.

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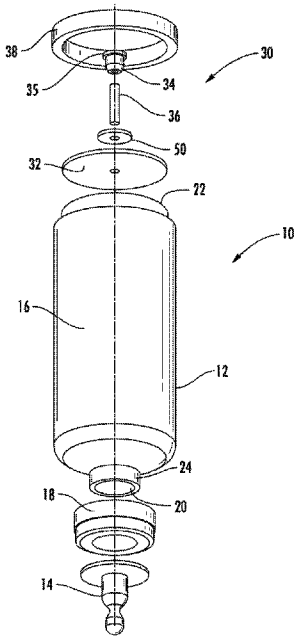
(57) **ABSTRACT**

In accordance with certain embodiments of the present disclosure, a nursing bottle is provided. The bottle includes a body having a hollow interior and defining an upper opening. The bottle further includes a nipple joined to the body and disposed over the upper opening. The bottle also includes a means for generating negative pressure within a portion of the interior of the body.

10 Claims, 5 Drawing Sheets



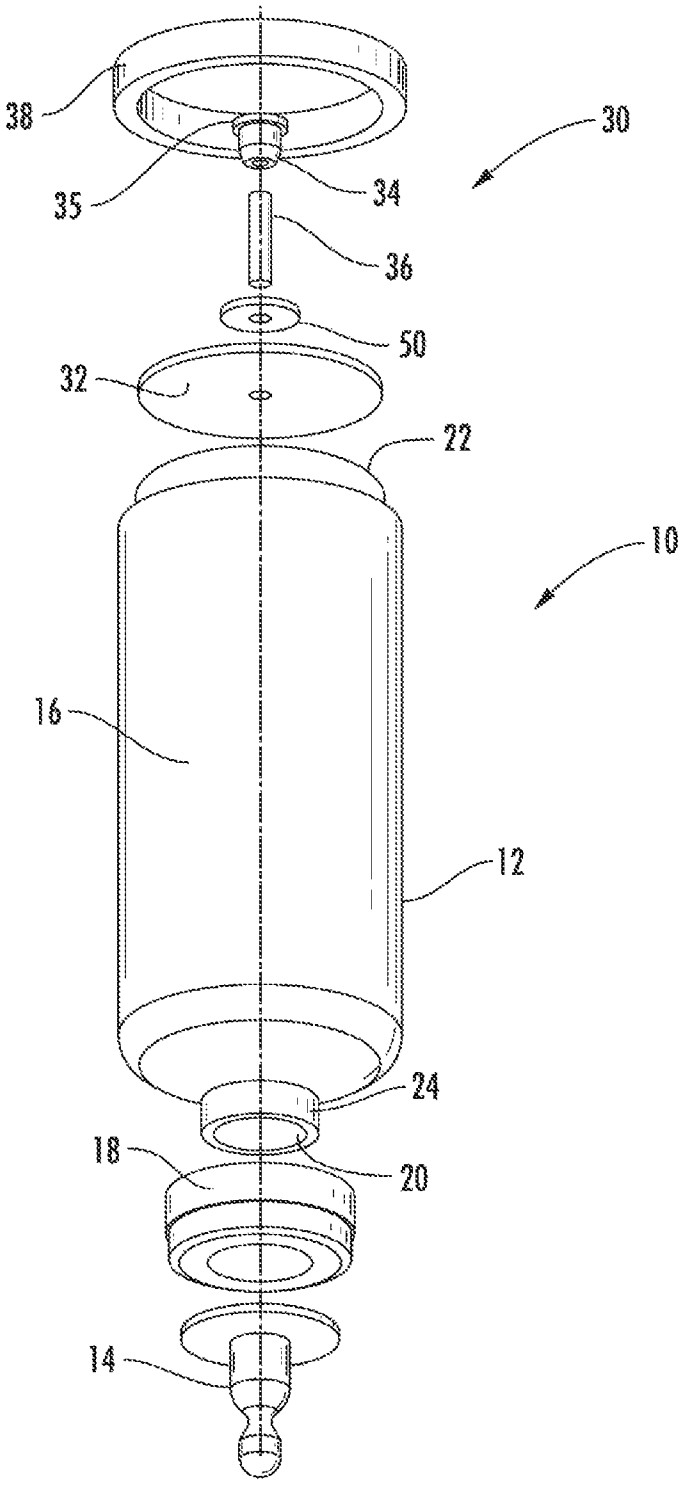


FIG. 1

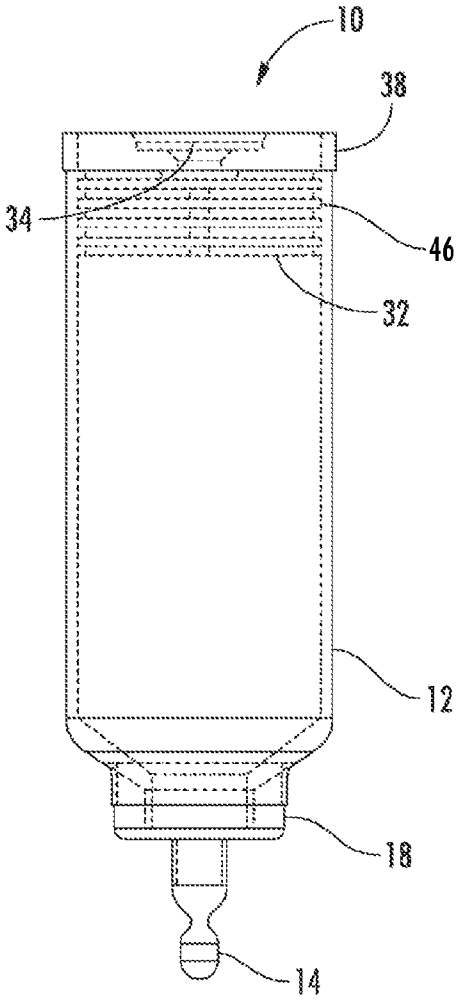


FIG. 2A

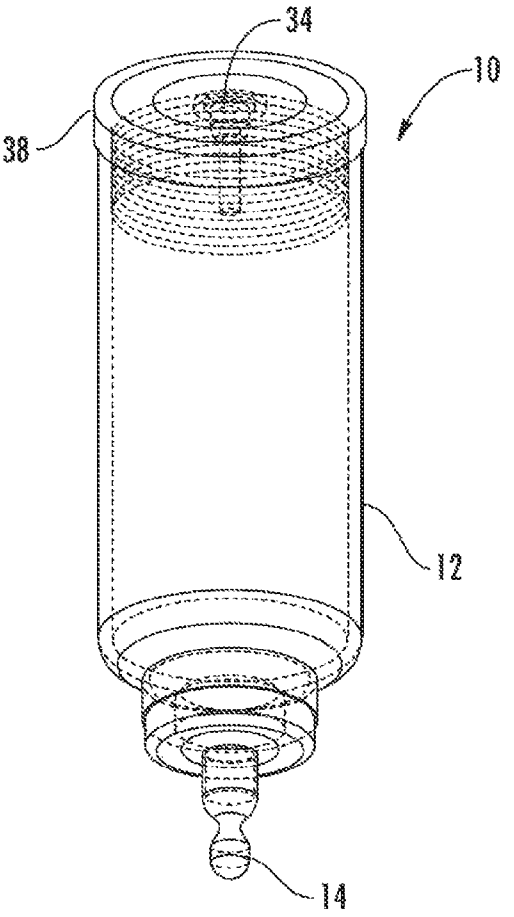


FIG. 2B

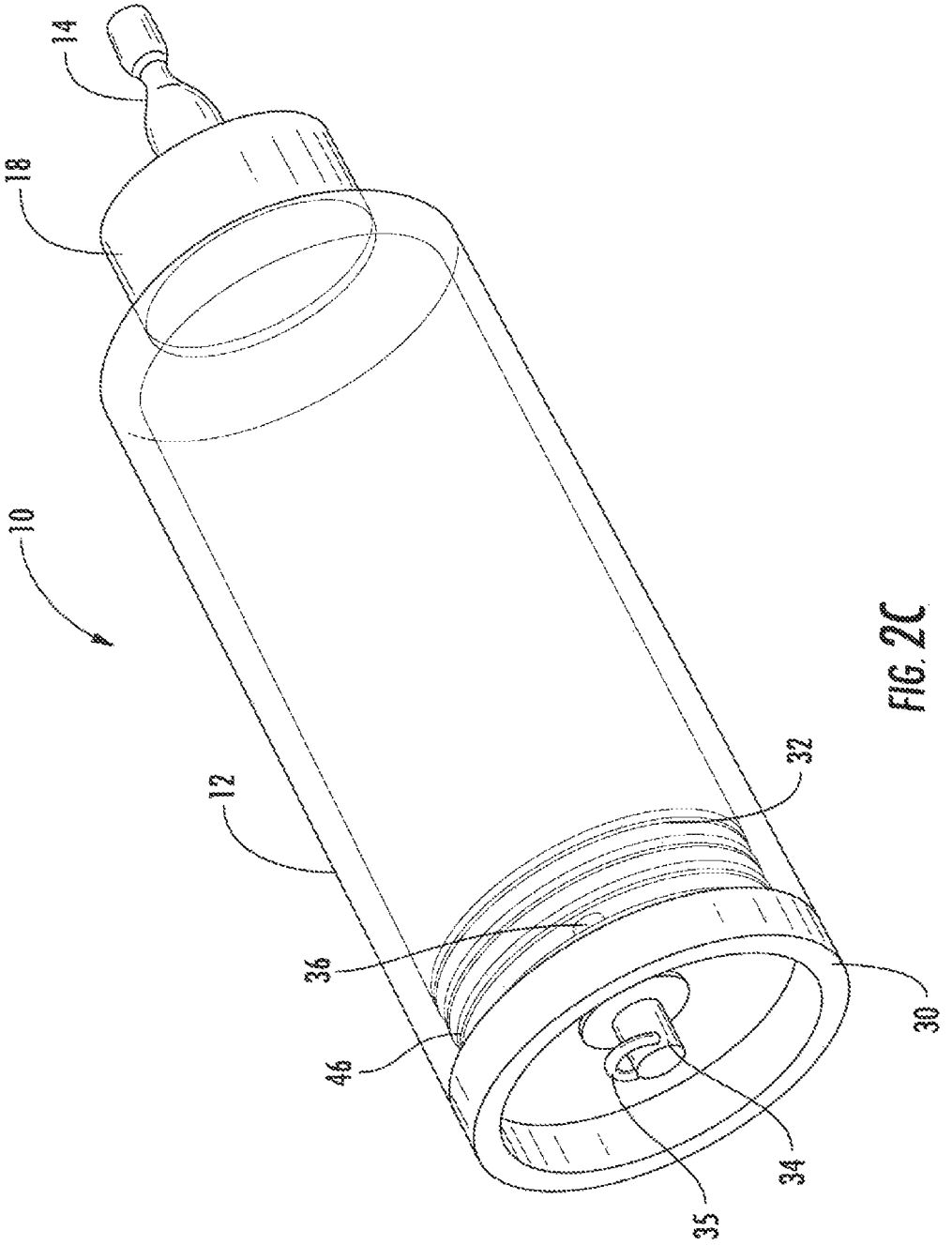


FIG. 2C

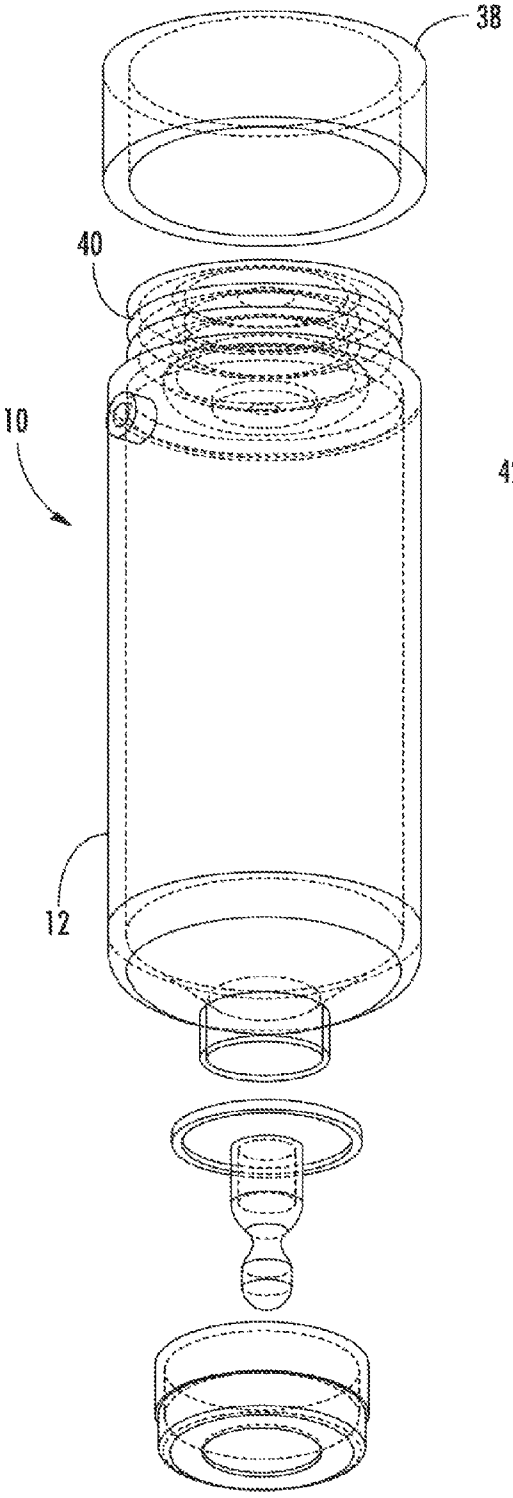


FIG. 3A

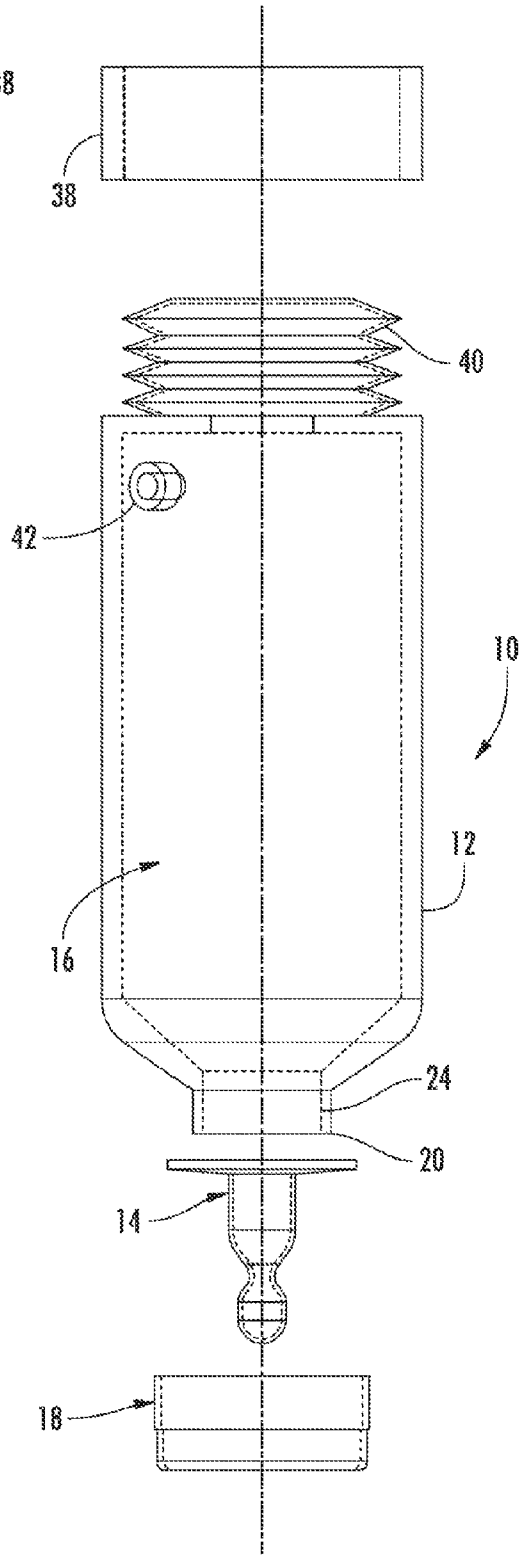


FIG. 3B

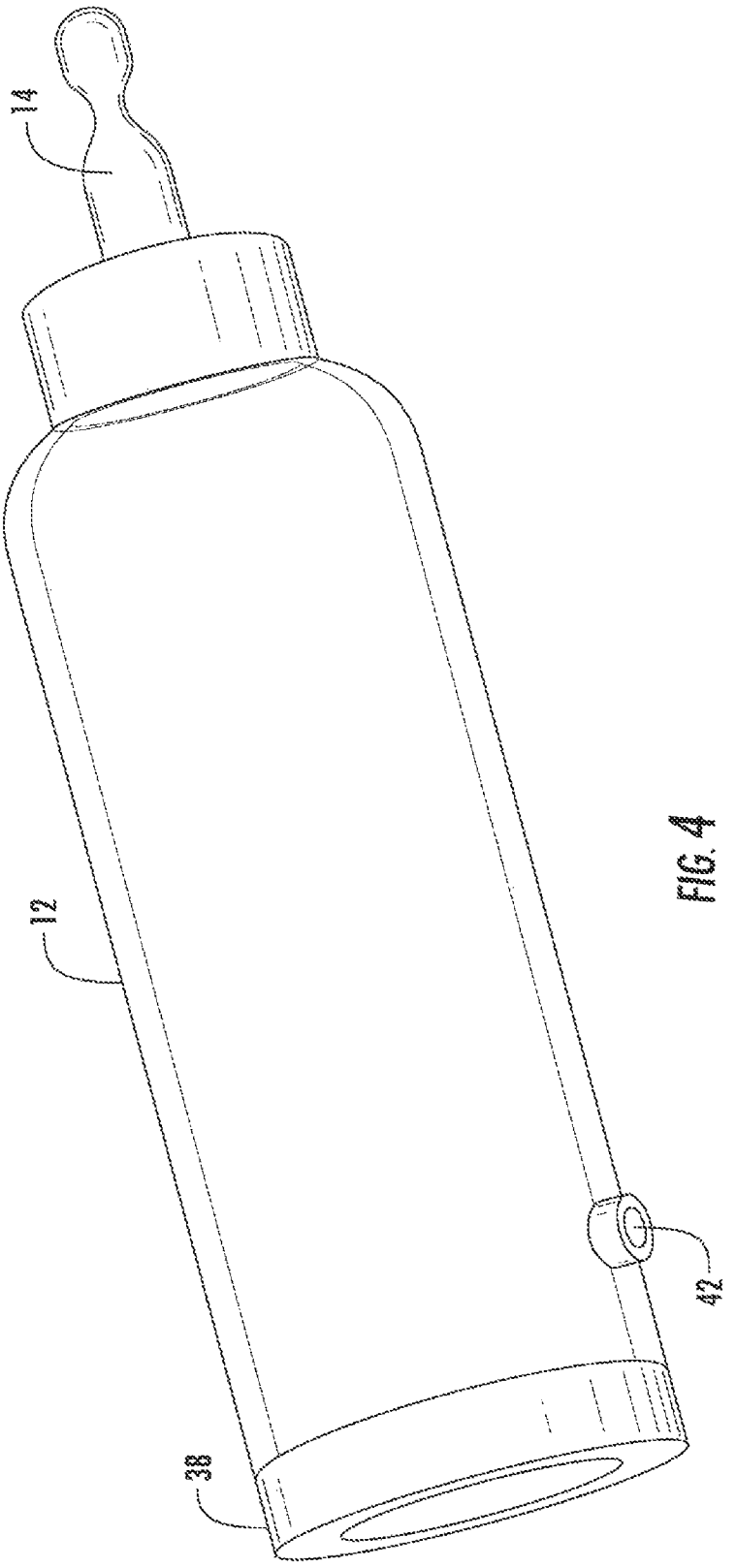


FIG. 4

NURSING BOTTLE APPARATUS FOR IMPROVEMENT OF SUCKLING

CROSS-REFERENCE TO RELATED APPLICATION

The present application is based on and claims priority to U.S. Provisional Application 61/188,580 having a filing date of Aug. 11, 2008, which is incorporated by reference herein.

BACKGROUND

There is evidence that breastfeeding is protective against asthma in early childhood. Compared to the children who were not breastfed, those who were breastfed for at least 4 months had vital capacities that were larger than those who were not breastfed, after adjusting for birth weight, sex, and current height and weight (0.008). In addition to bioactive factors transferred to the infant in breast milk, another potential explanation for these associations is the mechanical stimulus due to prolonged suckling at the breast that results in improved mechanics of ventilation in breast fed children compared to bottle-fed infants.

Physical exercise training resulting from suckling at the breast, about six times daily on average (for more than four months), may result in increased elasticity and efficiency of the lung parenchyma. This may lead to increases in lung capacity and airflow in breastfed children compared to bottle-fed children. Such differentials in the pressure generated between breastfed and bottle fed infants have been noted by previous researchers, with findings of up to a three-fold higher negative pressure due to breastfeeding. Thus, at least some of the benefits of breastfeeding may he lost when mothers practice "indirect" breastfeeding (i.e. pumping and bottle feeding their infants) compared to direct suckling at the breast. When direct breastfeeding is not possible, the benefit conferred by direct suckling may be (partly) achieved by the use of modified feeding bottles that would mimic natural direct breastfeeding. However, conventional bottle designs seek to increase pressure and remove negative pressure from the bottle to make fluids flow more easily out of a bottle.

Thus, in order to promote normal lung growth and development, an artificial increase of flow "resistance" from infant feeding bottles may prove beneficial. Such bottles are of increasing significance to improve respiratory health, since approximately 75% of the mothers in the United States pump and bottle feed their children, in particular after one month of lactation.

As such, a need exists for devices that better replicate natural direct breastfeeding. Methods relating to such devices would also be desirable.

SUMMARY

In accordance with certain embodiments of the present disclosure, a nursing bottle is provided. The bottle includes a body having a hollow interior and defining an upper opening. The bottle further includes a nipple joined to the body and disposed over the upper opening. The bottle also includes a means for generating negative pressure within a portion of the interior of the body.

In another embodiment of the present disclosure, a nursing bottle is provided. The bottle includes a body having a hollow interior and defining an upper opening. The bottle further includes a nipple joined to the body and disposed over the upper opening. The bottle also includes a piston mechanism at least partially disposed within the interior of the bottle, the piston mechanism configured to generate negative pressure within a portion of the interior of the body.

In still another embodiment of the present disclosure, a nursing bottle is provided. The bottle includes a body having a hollow interior and defining an upper opening. The bottle further includes a nipple joined to the body and disposed over the upper opening. The bottle also includes a diaphragm at least partially disposed within the interior of the bottle, the piston diaphragm configured to generate negative pressure within a portion of the interior of the body.

Other features and aspects of the present disclosure are discussed in greater detail below.

BRIEF DESCRIPTION OF THE DRAWINGS

A full and enabling disclosure, including the best mode thereof, directed to one of ordinary skill in the art, is set forth more particularly in the remainder of the specification, which makes reference to the appended figures in which:

FIG. **1** illustrates an exploded view of a device in accordance with certain embodiments of the present disclosure;

FIGS. **2**A-**2**C illustrates different views of a device in accordance with certain embodiments of the present disclosure;

FIGS. **3**A-**3**B illustrate an exploded view of a device in accordance with certain embodiments of the present disclosure; and

FIG. **4** illustrates a perspective view of a device in accordance with certain embodiments of the present disclosure.

Repeat use of reference characters in the present specification and drawings is intended to represent the same or analogous features or elements of the present disclosure.

DETAILED DESCRIPTION

Reference now will be made in detail to various embodiments of the disclosure, one or more examples of which are set forth below. Each example is provided by way of explanation of the disclosure, not limitation of the disclosure. In fact, it will be apparent to those skilled in the art that various modifications and variations can be made in the present disclosure without departing from the scope or spirit of the disclosure. For instance, features illustrated or described as part of one embodiment, can be used on another embodiment to yield a still further embodiment. Thus, it is intended that the present disclosure covers such modifications and variations as come within the scope of the appended claims and their equivalents.

The present disclosure is generally directed to a nursing bottle. In accordance with the present disclosure, the nursing bottle described herein is designed to improve suckling by providing negative pressure within the bottle during suction. Negative pressure refers to a situation in which an enclosed area has lower pressure than the area around it. Such negative pressure can promote normal lung growth and development with an artificial increase of flow "resistance" within the bottles described herein.

Referring to FIGS. **1** and **2**A-**2**C, a bottle **10** in accordance with the present disclosure is illustrated. FIG. **1** illustrates an exploded view of such bottle **10** including a mechanism for creation of negative pressure therein. Bottle **10** can comprise a substantially rigid body **12** having a nipple **14** disposed at a first open end **20** of the body. Nipple **14** can be in fluid communication with a contained space **16** inside body **12**. For example, bottle **10** can comprise a molded bottle with a screw-top opening for attaching a nipple, as would be known

in the art. However, any other suitable bottle configuration is contemplated for use with the present disclosure.

Suitable materials for body **12** can include plastic, glass, stainless steel, aluminum, or the like, although any other suitable material may also be used. Similarly, any suitable nipple as would be known in the art can be utilized with bottle **10**. Nipple should define a single seal interface from which fluid can pass. However, nipple is designed to remain sealed when not in use so as to maintain negative pressure within contained space **16** of body **12**. In addition, nipple can be directly joined to body or can be joined using any suitable method as would be known in the art. For instance, as illustrated, nipple **14** can be joined to body **12** using bottle cap **18**. First end **20** of bottle **10** can define threads **24** that correspond to threads within a portion of bottle cap **18**. Bottle cap **18** can be screwed onto body **12** with nipple **14** disposed therebetween.

Disposed at the second end **22** of body **12** is a mechanism **30** for creation of negative pressure. However, it should be understood that the mechanism for creation of negative pressure can be located at any suitable location in or on bottle **10**. In the particular embodiments illustrated in FIGS. **1** and **2**A-**2**C, negative pressure can be created in the bottle **10** by a piston mechanism **30**. In the illustrated embodiments, second end **22** of body **12** defines an opening with piston mechanism **30** positioned therein.

Piston mechanism **30** includes piston **32** and handle **34**. Piston **32** can be any suitable piston that can be accommodated by body **12** of bottle **10**. Piston can be formed from any suitable material that permits a sealing engagement with body **12** of bottle **10**, such as a rigid polymer material or the like. In this manner, piston **32** can be pulled to create negative pressure within contained space **16**. Alternative, if too much negative pressure has been created, piston **32** can be pushed in to create positive pressure. Contained space can define grooves **46** that correspond to predefined negative pressure within the interior of the body **12**. Piston **32** can be maintained at a desired position within the bottle **10** based upon the desired negative pressure. Indicia can be present on the outside of the bottle or any other suitable location that corresponds to the negative pressure at each groove.

Handle **34** can be any suitable handle. For instance, as illustrated, handle **34** is a swivel handle. Swivel **35** is joined to handle **34** and can be pulled by a user permitting handle **34** to be more easily grasped. Piston **32** can be joined to handle **34** by any suitable method as would be known in the art. For instance, as illustrated, piston mechanism **30** includes swivel **35** joined to handle **34** which is joined to piston shaft **36** that is joined to bottle seal **50** which is joined to piston **32**. Bottle stand **38** maintains piston mechanism **30** in place on bottle **10**. Second end **22** of bottle **10** can define threads **24** that correspond to threads within a portion of bottle stand **38**. Bottle stand **38** can be screwed onto body **12** with piston mechanism **30** disposed therebetween. Bottle stand **38** can also permit handle **34** to be concealed within bottle stand **38**, if desired. The various components of piston mechanism can be formed from any suitable materials as would be known in the art. Such components can be integrally joined together or can be assembled and joined using adhesives, fasteners, or any other suitable method of joining as would be known in the art.

Referring to FIGS. **3**A-**3**B and **4**, alternate embodiments of the present disclosure are illustrated. Negative pressure can be created in the bottle **10** by one or more diaphragm **40**. In the illustrated embodiments, second end **22** of body **12** defines an opening with diaphragm **40** positioned therein. However, it should be understood that diaphragm can be positioned in or on any suitable location of bottle **10**.

Diaphragm **40** can be formed from any suitable material as would be known in the art. For example, diaphragm can be formed from an elastic polymer material. Diaphragm **40** can be convex-shaped Diaphragm **40** forms a seal with the sides of body **12** so that liquid cannot leak from bottle **10**. As illustrated, diaphragm **40** is joined to one-way valve opening **42**. One-way valve opening **42** can be located in or on the body **12** of bottle **10** or in any other suitable location. Diaphragm can be joined to body **12** using any suitable method such as adhesive or the like. Bottle stand **38** can be screwed onto body **12** with diaphragm **40** disposed therebetween. Bottle stand **38** can also allow diaphragm **40** to be concealed within bottle stand **38**, if desired.

Diaphragm **40** can serve as a pump whereby when pressed, air exits the one-way valve **42** and results in diaphragm becoming compressed. In this manner, diaphragm **40** can be utilized to create negative pressure within contained space **16**. Alternative, if too much negative pressure has been created, air can be allowed to enter diaphragm **40** to create positive pressure. In certain embodiments, the bottle can include a pressure gauge (not illustrated) which can be used to achieve desired negative pressure.

In practice, the bottles described herein can be utilized to provide any number of fluids to a child including, but not limited to, milk, juice, or the like. In this regard, methods of utilizing the present bottles can include adding negative pressure to the bottle during feeding and/or creating negative pressure prior to feeding. In addition, as indicated above, if the negative pressure reaches past a desired level, positive pressure can be added to the bottle.

While certain mechanisms have been described for achieving negative pressure in a bottle, it should be understood that any suitable mechanism for creating negative pressure in a bottle can be utilized in accordance with the present disclosure.

These and other modifications and variations to the present disclosure can be practiced by those of ordinary skill in the art, without departing from the spirit and scope of the present disclosure, which is more particularly set forth in the appended claims. In addition, it should be understood that aspects of the various embodiments can be interchanged both in whole or in part. Furthermore, those of ordinary skill in the art will appreciate that the foregoing description is by way of example only, and is not intended to limit the disclosure.

What is claimed is:

1. A nursing bottle comprising:

a body having an exterior surface and a hollow interior having an interior surface defining a space configured to house a liquid, and defining the body further having an upper opening immediately adjacent to the space;

a nipple joined to the body and disposed over the upper opening; and

a diaphragm at least partially disposed within the interior of the bottle, the diaphragm configured to generate negative pressure within the interior space defined by the body, the diaphragm being joined to a one-way valve opening on the exterior surface of the body,

wherein the diaphragm is configured as a pump such that, when the diaphragm is pressed, air is expelled out of the body through the one-way value so as to generate negative pressure within the body,

wherein the diaphragm is configured to seal against an inner surface of the body.

2. The bottle of claim **1**, wherein the diaphragm comprises an elastic, convex-shaped diaphragm.

3. The bottle of claim 1, wherein the body comprises a bottle stand, wherein the diaphragm is at least partially disposed within the bottle stand.

4. The bottle of claim 1, wherein the diaphragm has a bellows-type pump configuration.

5. The bottle of claim 1, wherein the body is made of plastic.

6. The bottle of claim 1, wherein the body extends lengthwise between a first end and a second end, the upper opening being defined at the first end, the second end defining a lower opening, wherein the diaphragm extends at least partially though the lower opening.

7. The bottle of claim 6, wherein the exterior surface extends between the first and second ends, the one way valve extending through the exterior surface.

8. A nursing bottle comprising:

a body having an exterior surface and an interior defining a space configured to house a liquid, the body further having an upper opening immediately adjacent to the space;

a nipple joined to the body and disposed over the upper opening; and

a piston mechanism at least partially disposed within the interior of the bottle, the piston mechanism configured to generate negative pressure within the interior space defined by the body, wherein the piston mechanism comprises a diaphragm at least partially disposed within the interior of the bottle, the diaphragm being joined to a one-way valve opening on the exterior surface of the bottle and configured to expel air out of the one-way valve opening and generate negative pressure within the body,

wherein the piston mechanism further comprises a piston and a handle, the piston being joined to the handle such that the handle is configured to assist in moving the piston to generate negative pressure, wherein the interior of the body defines grooves that are configured to maintain the piston in a predetermined position within the interior of the body.

9. The bottle of claim 8, wherein the grooves correspond to a predefined negative pressure within the interior of the body.

10. The bottle of claim 8, wherein the body comprises a bottle stand, wherein the piston mechanism is at least partially disposed within the bottle stand.

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