

[54] **BREAST PUMP**
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128/300, 301

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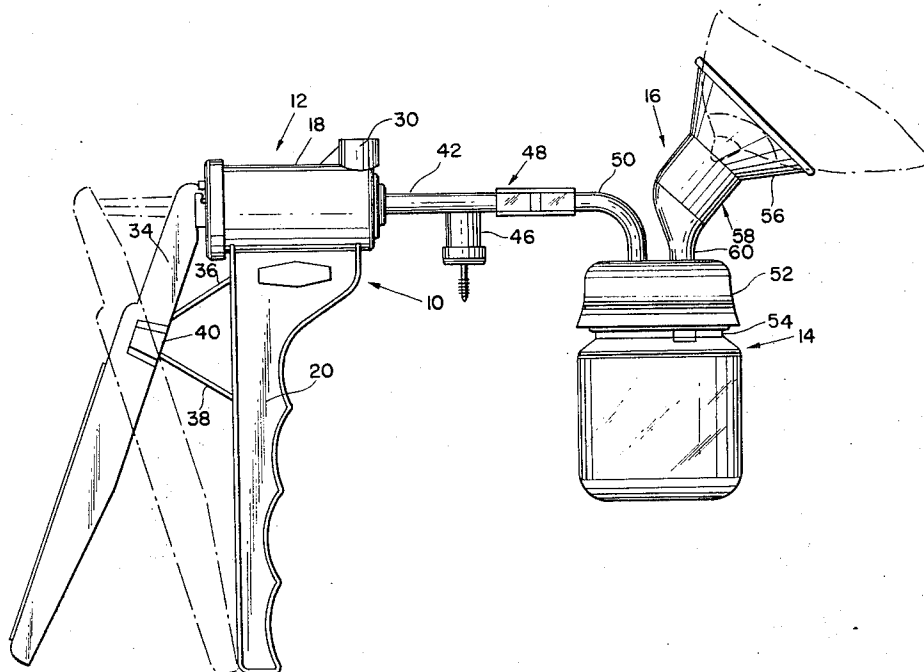
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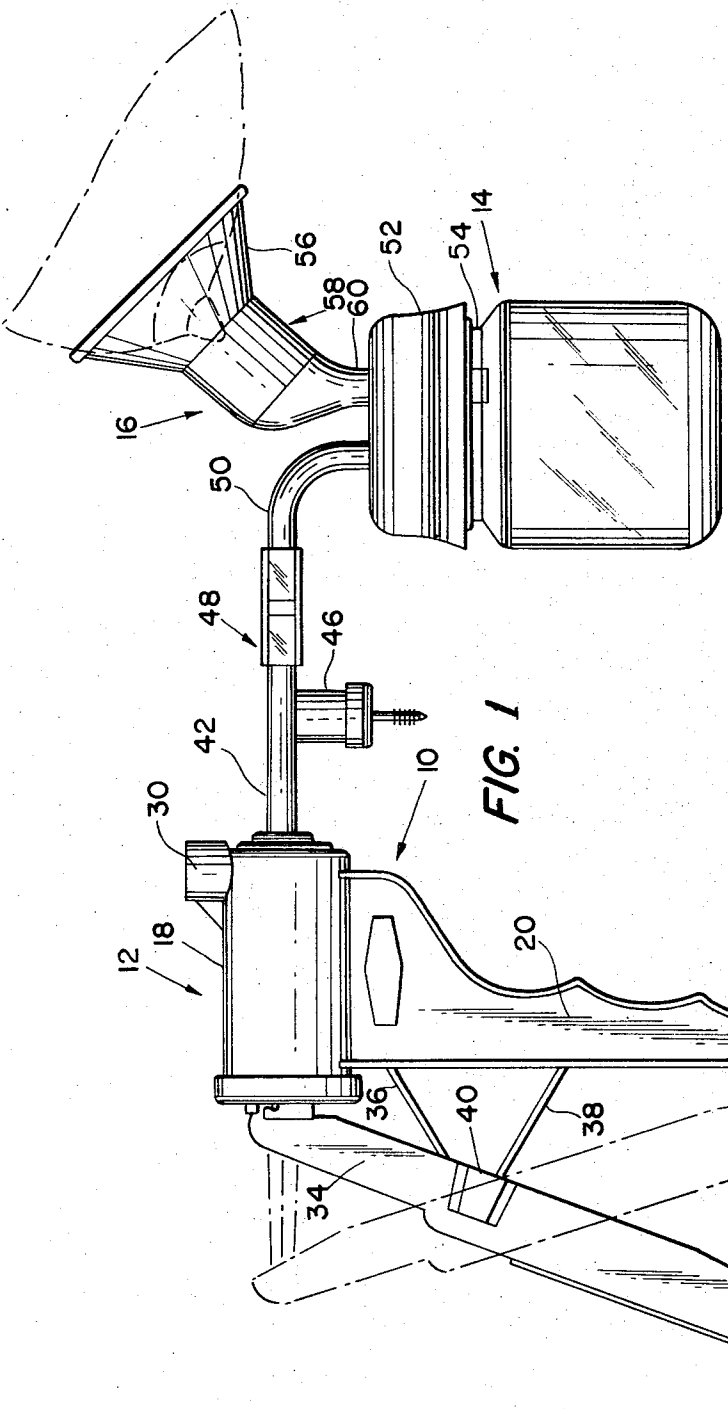
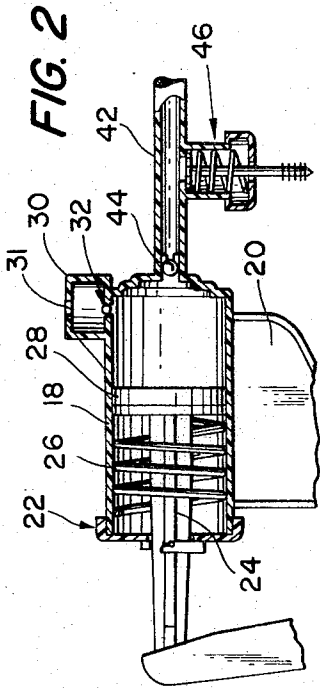
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[57] **ABSTRACT**

A breast pump utilizing a breast receiving element in the shape of a truncated cone in which the base of the cone is enlarged in order to avoid constriction of the nipple disposed therein and which further employs a suction pump capable of exerting various levels of vacuum force as required by the user.

5 Claims, 2 Drawing Figures





BREAST PUMP

BACKGROUND OF THE INVENTION

The present invention relates to breast pumps and, more specifically, to a breast pump arrangement employing an especially advantageous suction pump which is capable of exerting various levels of vacuum force on the breast of the user and which is further provided with a specially shaped breast receiving element which significantly enhances the comfort of one utilizing the device as well as the efficiency of the device.

Various types of breast pumps have been developed, but, generally these may be classified into two main groups: those in which the suction device is in the form of a resilient bulb of the squeeze-type, or relatively complex devices which employ, for example, electrically operated vacuum pumps. While the bulb-type of breast pump has the advantages of simplicity of design and operation, such bulbs are inherently defective vacuum sources inasmuch as the suction force exerted by the expansion of the bulb after compression of same is directly related to the resiliency of the bulb material and, consequently, it is difficult for the user to maintain the suction at a comfortable level. In order to create a suction force with such bulbs, it is necessary to rapidly collapse the bulb and immediately release same and oftentimes the sudden suction force which results is extremely painful to the user. In view of the fact, that the breasts of a lactating female are extremely tender due to the accumulation of milk, the pain often associated with the use of bulb-type breast pumps represents a serious drawback. On the other hand, while some of the power-driven pumps are capable of being regulated to produce various levels of vacuum force, they are generally too expensive and complex for home use.

Therefore, there exists a need for an inexpensive breast pump which is simple to operate and which may be regulated by the user to deliver various degrees of suction as required.

SUMMARY OF THE INVENTION

It is therefore a primary object to provide a relatively inexpensive and efficient breast pump which utilizes an especially advantageous type of suction pump in combination with a fluid receptacle and a specially designed breast receiving element, which suction pump may be regulated by the user to exert different levels of vacuum force thereby avoiding the problems associated with certain prior art devices and preventing the discomfort associated with the use of heretofore known breast pumps.

Another object of this invention is to provide a breast receiving element which comfortably contacts the breast and nipple without exerting excessive pressure thereon and which facilitates the withdrawal of milk therefrom.

Other objects, features and advantages of this invention will become more apparent to those skilled in the art from the following detailed description and by reference to the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWING

Referring now to the drawing:

FIG. 1 is a side elevational view of a preferred embodiment of a breast pump arrangement in accordance with the present invention; and

FIG. 2 is a partial sectional view of a detail of the suction pump arrangement depicted in FIG. 1.

DETAILED DESCRIPTION OF THE INVENTION

Referring to FIG. 1 of the drawing, there is shown a breast pump arrangement according to a preferred embodiment of the present invention, designated generally by reference numeral 10, which is comprised of a suction pump 12 constructed of any suitable material, such as lightweight metal or strong plastic, in combination with a fluid receptacle 14 into which there is inserted a breast receiving element 16. The suction pump is comprised of a main body cylinder 18 from which there extends a flat grip portion 20 having four indentations in the edge thereof corresponding to the fingers of the operator's hand. As can best be seen by reference to FIG. 2, cylinder 18 is a piston-type pump cylinder having a cap 22 on one end thereof and having a piston disposed therein which piston is comprised of a shaft 24 surrounded by spring 26 and a piston-head 28 attached to the inner end of said shaft and in contiguous relationship with the inner walls of the cylinder. Near the other end of cylinder 18, there is provided a vent chamber 30 with an opening 31 and containing, for example, a ball-type check valve 32 which permits air to escape from the interior of cylinder 18 through opening 31.

Shaft 24 extends through an aperture in the center of cap 22 and is pivotally connected to one end of a pump arm 34 by means of a conventional pin assembly. Pump arm 34 is connected to grip portion 20 by means of supports 36 and 38 which terminate in journal-box 40 within pump arm 34 and which form a fulcrum for the pump arm. At the opposite end of cylinder 18 there is inserted a hollow inlet tube 42 containing a ball-type check valve 44 and further provided with a spring biased vacuum release valve 46 which communicates with the interior of inlet tube 42.

Suction pump 12 is connected to fluid receptacle 14 by means of a disengageable hollow tube or coupling 48 which is removably attached to an air withdrawal tube 50 inserted through an opening in cap 52 which frictionally engages neck portion 54 of receptacle 14. Tube 48 is optionally made of flexible material and may be of practically any length desired. Breast receiving element 16 is comprised of an upper truncated cone-shaped portion 56, a generally cylindrical portion 58 and a lower tubular stem portion 60 which is inserted through an opening in cap 52 and which is enlarged at its upper end where the stem joins with the intermediate portion.

In operation, the truncated cone-shaped portion of the breast receiving element is pressed firmly against the breast and the suction pump is actuated by applying pressure to pump arm 34 near the distal end thereof which causes the piston to move in the direction of cap 22. This movement opens valve 44 in inlet tube 42 and closes valve 32 thereby permitting air to be withdrawn from fluid receptacle 14 through air withdrawal tube 50 into cylinder 18. As the air is withdrawn from receptacle 14 by the suction pump, a partial vacuum is created in the receptacle which causes a suction force to be exerted on the breast whereby milk is withdrawn therefrom. As the pressure on the pump arm is released, the piston returns to its static position as a consequence of spring 26 and valve 44 is closed while valve 32 is opened to allow air within cylinder 18 to escape.

It is an important feature of the present invention that the level of suction produced by the suction pump is easily regulated by the operator. By gently actuating the pump arm, the operator is able to effectuate a very slight suction force on the breast and by continually operating the device in such manner slowly accumulate sufficient suction force to cause the withdrawal of milk therefrom. It will be appreciated then, that as a consequence of the foregoing feature, the breast pump arrangement of the instant invention allows the user to regulate the suction force according to her personal needs and obviates the problem of sudden or excessive suction and the resulting serious discomfort associated with certain prior art devices.

Another significant feature of the present breast pump arrangement is the spring-biased vacuum release valve 46 which permits the user to release the partial vacuum created in the fluid receptacle which causes an immediate cessation of the suction force exerted upon the breast. Thus, the foregoing vacuum release valve provides a second means by which the user may regulate the suction force and prevent any pain which may result, for example, when the pump arm is inadvertently actuated too rapidly or with excessive force.

Another important feature of the instant invention is the special design of the breast receiving element wherein the breast-contacting surface is in the shape of a truncated cone having an enlarged cylindrical base portion. Inasmuch as the breast receiving element is enlarged at the point where the nipple will normally be situated during the operation of the device, the nipple and the lactiferous ducts contained therein are prevented from being constricted by the suction force exerted by the device which would, of course, preclude the flow of milk and defeat the intended purpose of the device.

In addition to the above features, it is intended that the fluid receptacle, cap, breast receiving element and air withdrawal tube be manufactured as a unit and constructed of suitable lightweight plastic or other material so that the unit may be sold separately and disposed of after each use thereby avoiding problems of contamination and the need for sterilization.

While the invention has been described and pointed out with reference to certain embodiments thereof, those skilled in the art will appreciate that various changes and modifications and substitutions can be made without departing from the spirit of the invention. For example, while ball-type check valves are depicted in the accompanying drawing and referred to above, it is apparent that any suitable valve may be

used for the inlet check valve and the valve in the vent chamber. Moreover, in lieu of a valve in vent chamber 30, the flow of air into the cylinder during the upstroke of the piston may be restricted and the venting of the cylinder on the downstroke thereof may be controlled by placing one's finger over the opening in the vent chamber during the appropriate cycle. It is intended, therefore, that the invention be limited only by the scope of the claims which follow.

What is claimed is:

1. A breast pump arrangement comprising:

- a. a milk receiving receptacle having a neck portion, a removable cap in fluid-sealing relationship with said neck portion, a breast receiving element having a tubular portion inserted through a first opening in said cap, an air withdrawal tube inserted through a second opening in said cap to permit the evacuation of said receptacle;
- b. a suction pump capable of being regulated to exert different levels of vacuum force comprising a vented cylinder having a spring-biased piston disposed therein, said piston having a shaft extending through an aperture at one end of said cylinder and pivotally connected to one end of a pump arm, fulcrum means to enable pivotal movement of said pump arm, a finger-grip portion extending from said cylinder, and a hollow inlet tube at the opposite end of said cylinder and provided with a one-way valve means; and
- c. a connecting tube joining said receptacle to said suction pump.

2. The breast pump as defined in claim 1 further comprising a vacuum release valve connected to said inlet tube.

3. The breast pump as defined in claim 1 wherein said connecting tube is flexible.

4. The breast pump as defined in claim 1 wherein the breast receiving element comprises a truncated cone-shaped upper portion which contacts the breast, a generally cylindrical intermediate portion contiguous with the narrow end of said cone, and a generally tubular lower stem portion contiguous with said intermediate portion and enlarged at the point of contact between said intermediate and lower portions.

5. The breast pump as defined in claim 1 wherein the connecting tube is selectively engageable with the suction pump, and wherein said cap, said air withdrawal tube and said breast receiving element form an integral unit which is disposable as a unit.

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