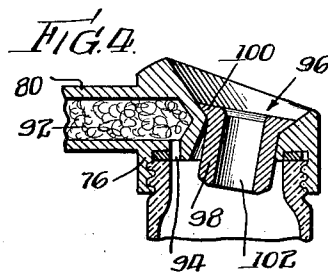
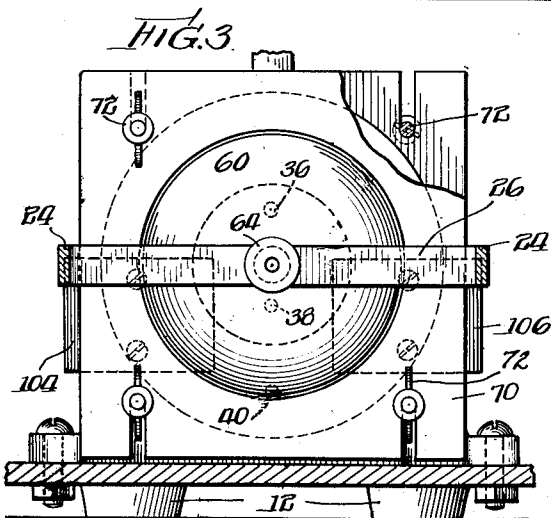
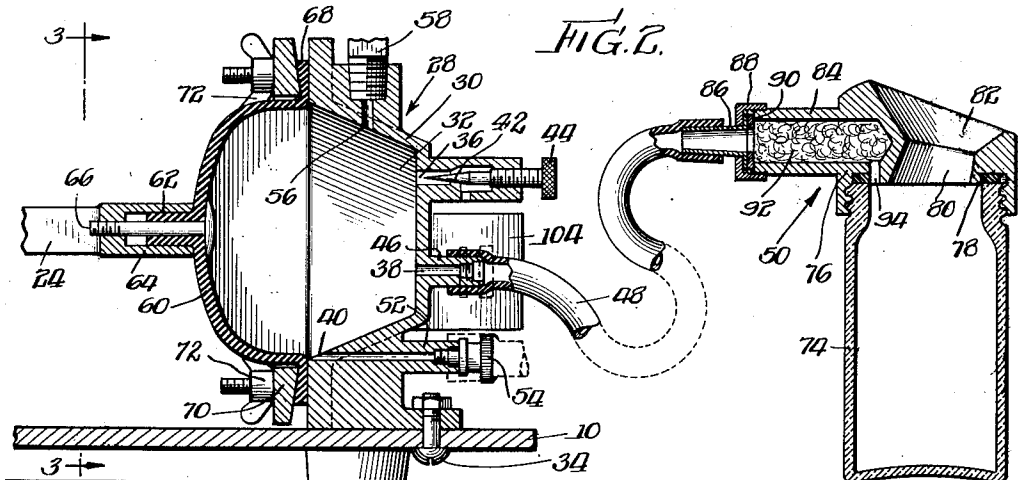
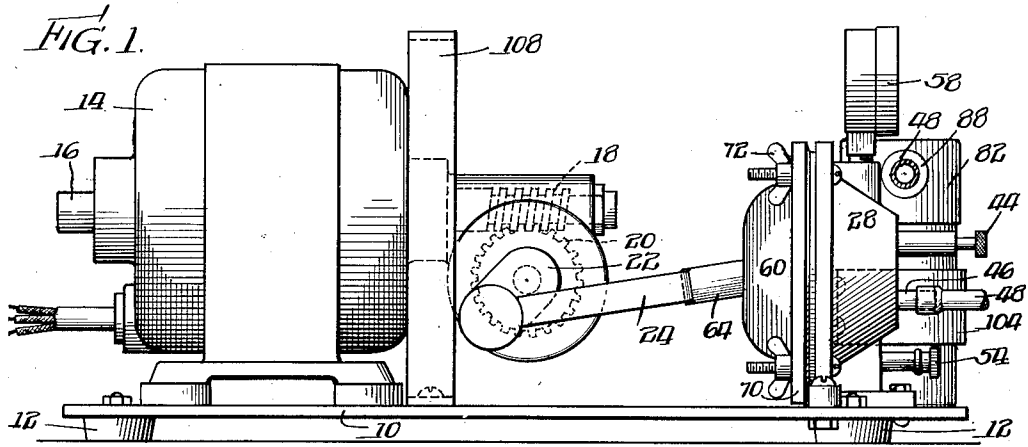


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P. A. FRIMAND
BREAST PUMP DEVICE
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BREAST PUMP DEVICE

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2 Claims. (Cl. 230—170)

My invention relates generally to breast pump devices, and more particularly to improvements in portable types of pumping devices for general use in the home or hospital. Conventional types of breast pump devices with which I am familiar, and particularly those of the power operated type are complicated in design, bulky in construction, and are inconveniently heavy.

It is one of the primary objects of my present invention to overcome the above mentioned and other disadvantages by providing a breast pump device which is extremely simple in construction, is made up of relatively few parts, and is very efficiently operable.

Another object of my present invention is to provide in a device of the nature set forth above, a pumping unit proper which is of extremely simple construction and may be very conveniently assembled or disassembled for purposes of repair, replacement, sterilization, and the like.

More specifically, my invention contemplates a breast pump device, in which the pumping unit is so arranged that by merely removing one section thereof, the entire pump housing or chamber is exposed, and furthermore, I propose to provide a pumping unit which may be sterilized by a simple transposition of elements from one nipple to another.

Still more specifically, my invention contemplates the provision of a device as set forth above, in which a resilient diaphragm detachably connectible with a companion chamber pump section is employed, and I propose to so arrange said diaphragm as to render the same readily detachable for replacement, repair, cleansing, etc.

The foregoing and numerous other objects and advantages will be more apparent from the following detailed description when considered in connection with the accompanying drawing, wherein—

Figure 1 is a side elevational view of a breast pumping device which is representative of one embodiment of my invention;

Figure 2 is an enlarged vertical sectional view taken centrally of the pumping unit of Figure 1 in combination with a transverse central sectional view of the breast attachment detached from the pumping unit proper;

Figure 3 is a transverse sectional view taken substantially along the line 3—3 of Figure 2; and

Figure 4 is a fragmentary sectional view of the upper portion of the breast attachment equipped with one of my improved nipple receiving inserts.

Referring now to the drawing more in detail wherein like numerals have been employed to

designate similar parts throughout the various figures, it will be seen that my invention contemplates the provision of a breast pumping device which includes a suitable base 10 preferably supported by resilient or rubber feet 12. Secured to the base 10 at one end thereof is a suitable power mechanism or electric motor 14, the drive shaft 16 of which terminates in a worm structure 18, Figure 1. This worm meshes with a companion worm wheel 20. A pair of crank arms 22 positioned on opposite sides of and driven from the worm wheel 20 are pivotally connected at their free extremities to arms 24 which, in plan, present a U-shaped construction, said arms being connected by a cross arm or section 26, Figure 3. The arms 24 and the cross element 26 formed integral therewith provide the connecting link between the power mechanism or motor 14 and a pump unit, which I have designated generally by the numeral 28. This pump unit 28 includes a section 30 formed with a pump chamber 32, said section or block being secured to the base 10 by screws 34, Figure 2. One side of the pump block or section 30 is formed with three orifices or apertures 36, 38, and 40, which communicate at their inner extremities with the pump chamber 32. A needle valve 42 associated with the orifice 36 serves to control the degree of vacuum to which the chamber 32 is subjected, and this needle valve may be manually adjusted by rotating the knurled head 44. The orifice or passage 38 is positioned within a nipple 46 formed integral with the block 30 and is designed to receive one end of a flexible coupling or tube 48, the opposite end of said tube connecting with a breast attachment designated generally by the numeral 50, later to be described. The orifice or passage 40 also terminates at its outer end within a nipple 52 which is threaded to receive a cap 54. Another orifice or aperture 56 positioned in the upper portion of the block 30 communicates with a suitable vacuum gauge 58.

The movable element of the pump 28 includes a flexible or resilient cup-shaped diaphragm 60, which is provided at its medial point with a boss 62. This boss extends within a socket 64 formed integral with the cross member 26 and is secured within said socket through the agency of a suitable clamping screw 66. The outer margin of the flexible member or diaphragm 60 is formed with a flange 68. A clamping plate 70 is designed to be clamped against the flanges 68 through the agency of wing nuts 72, as clearly shown in Figures 2 and 3. I prefer to have the flanges 68 of tapered cross section as indicated in Figure 2, 55

and I also prefer to have the plate 70 of a similar tapered or wedge-shaped cross section in order to effect a more positive sealing or clamping of the flange when the wing nuts are tightened.

5 In order to remove the diaphragm 60, it is only necessary to loosen the wing nuts and shift the plate 70 upwardly as a unit with the arms 24, thereby exposing the walls of the chamber 32, as well as the interior surface of the diaphragm.

10 In this manner the parts may be very conveniently replaced or cleaned whenever occasion demands.

The breast attachment 50 includes a suitable bottle or receptacle 74, which is threaded at the neck thereof to receive a breast shield 76. Clamped between the neck of the bottle 74 and the shield 76 is a suitable sealing gasket 78. The shield 76 is preferably of non-breakable material, such as aluminum or other suitable material, and is formed with an aperture 80 which establishes communication between the bottle 74 and a flared opening 82. The wall surrounding the opening 82 is suitably shaped and arranged to provide an effective breast shield, and the opening 80 is designed to receive the breast nipple. Extending laterally of the shield 76 is a nipple 84, the outer end of which is connected with the flexible hose or tube 48 through the agency of a tapered sleeve 86, a cap 88, and a gasket 90.

20 Suitable filtering or absorbent material 92, such as cotton, is provided within the chamber of the nipple 84 and prevents foreign matter from passing into the bottle 74 from the pump 28. The chamber which contains the absorbent material 92 communicates with the bottle through an orifice 94. In operation, power is supplied from the motor 14, which causes the connecting arms 24 to experience reciprocation. During the forward movement, namely, to the right, Figure 2,

40 the arms 24 cause the diaphragm 60 to force air from the chamber 32, and upon the return stroke causes air to be withdrawn from the bottle 74 through the orifice 94, the nipple 84, the tube 48, and the nipple 46 into the chamber 32. These successive evacuations of the receptacle or bottle 74 produce the desired pulsating suction upon the nipple positioned within the aperture 80. The degree of vacuum created within the receptacle 74 during the movement of the diaphragm 60 to the left may be controlled by merely adjusting the needle valve 42. The gauge 58 indicates the degree of vacuum, and obviously the needle valve 42 may be set for the desired amount. This adjustment feature is of the utmost importance

55 in order to prevent the breast and nipple from being subjected to undue expansion during the interval of evacuation. It will be apparent that during the forward stroke of the diaphragm 60, namely, to the right, Figure 2, the absorbent material 92 will prevent the passage of any foreign matter into the receptacle 74. Obviously the absorbent material 92 must be sufficiently porous so as not to impair the suction action of the diaphragm when it moves to the left.

65 Attention is directed to the structure shown in Figure 4. In this figure I have shown a detachable or insertable nipple receiving element 96. This element 96 includes a sleeve-like or tubular section 98 formed at one extremity with a flange 100. The central aperture 102 of the element 96 is designed to receive the nipple of the breast, and the adjacent outer surface of the element 96 cooperates with the adjacent flared or conical surface of the member 76 in providing an effective shield for the breast proper. The ad-

vantage of the insert or detachable element 96 is that it enables the breast attachment 50 to accommodate nipples of various sizes and shapes by merely selecting and employing the insert which is best suitable. It will be apparent that the conical surface of the shield 76 and the companion conical surface of the flange 100 of the element 96 cooperate to form an effective seal for the receptacle 76 when in use. From the foregoing, it will be apparent that the shield structure 76 not only serves as a shield proper, but also functions as a bottle cap, and further provides a filter for preventing the passage of foreign matter into the receptacle 94. From this standpoint, my improved breast attachment presents a very practical device, and it should be apparent that its construction is so simple that it can be made by practicing the most common machine shop methods. Furthermore, it presents many sanitary features. Its very simplicity materially contributes to the ease with which the associated parts may be disconnected and cleansed.

Another practical feature of my disclosed apparatus resides in the arrangement of the nipples 46 and 52, as clearly shown in Figure 2. In this figure I have shown the flexible conduit or tube 48 connected with the nipple 46 and the cap 54 secured within the nipple 52. When it is desired to clean the chamber 32 and the associated area within the diaphragm 60, it is only necessary to remove the tube from the nipple 46, and then remove the cap 54 and screw it into the nipple 46. Then the removed extremity of the tube 48 may be placed upon the nipple 52, as indicated by the dotted lines in Figure 2, and the other extremity of the tube may be removed from the sleeve 86 and directed to any suitable drain. In this manner any condensate which may have collected at the lower portion of the diaphragm and block, will be forced out through the orifice 40 and thence through the tube 48. If it is further desired to flush the chamber 32 and associated area of the diaphragm with a sterilizing solution, it is only necessary to place the free extremity of the tube within the solution and allow said solution to be drawn into the pump chamber during the movement of the diaphragm to the left, Figure 2. This may be repeated until the parts have been thoroughly cleansed. These sanitary features have a very practical significance, and the ease with which the cleaning or sterilizing may be accomplished presents a decided advancement over the types of breast pump devices with which I am familiar.

It will be noted that the receptacle or bottle 74 may be conveniently secured within one of two spring clips 104 and 106 secured to one side of the block 30. By having the two clips, provision is made for the retention of a second bottle for emergency use. In order to render the pumping device more readily portable, I provide a handle 108 which constitutes an inverted U-shaped strip, the free extremities of which are secured to the base 10. This handle is positioned at approximately the center of gravity and enables the device to automatically assume a horizontal position when the user grips said handle.

From the foregoing, it will be apparent that my invention contemplates the provision of a breast pumping device which is very practical in construction and efficient in operation. The parts which constitute the device are relatively few in number and are compactly arranged. In other words, the device is of a self-contained,

portable nature. It will also be noted that the diaphragm construction precludes the necessity of employing lubricants within the pump chamber, thereby enabling said device to be maintained in a sanitary condition.

5 Obviously numerous changes and modifications may be made in the structural features herein disclosed without departing from the spirit and scope of my invention, and said invention should be limited only by the scope of the
10 appended claims.

The claims herein are directed to the pump construction; claims to the combination of the pump with the breast appliance and to the appliance per se are to be presented in another
15 application.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

20 1. A breast pump device including a base, a pump structure on said base including a section having a pump chamber, a flexible pumping diaphragm superimposing said chamber and adapted to vary pressure conditions within said chamber, coupling means associated with said pump
25

chamber and adapted to be connected with a breast appliance, conducting means communicating with said chamber and adapted to direct fluid such as condensate away from said chamber, and means for closing said conducting
5 means, said closing means being removable from said conducting means and attachable to said coupling.

2. A pump device comprising a base, a pump structure on said base including a rigid section defining a pump chamber, a flexible pumping diaphragm adapted to engage said section to enclose the chamber, means for reciprocating the diaphragm whereby to vary pressure conditions within the chamber, a conduit adapted to connect the pump chamber with an appliance to be pumped,
10 a second conduit communicating with the chamber adjacent the bottom thereof, closure means for normally closing said second conduit and means for attaching a tube to said second
15 conduit in communication therewith upon removal of said closure means whereby to facilitate the introduction of cleaning fluid into the chamber and the withdrawal of such fluid therefrom.

PETER A. FRIMAND. 25