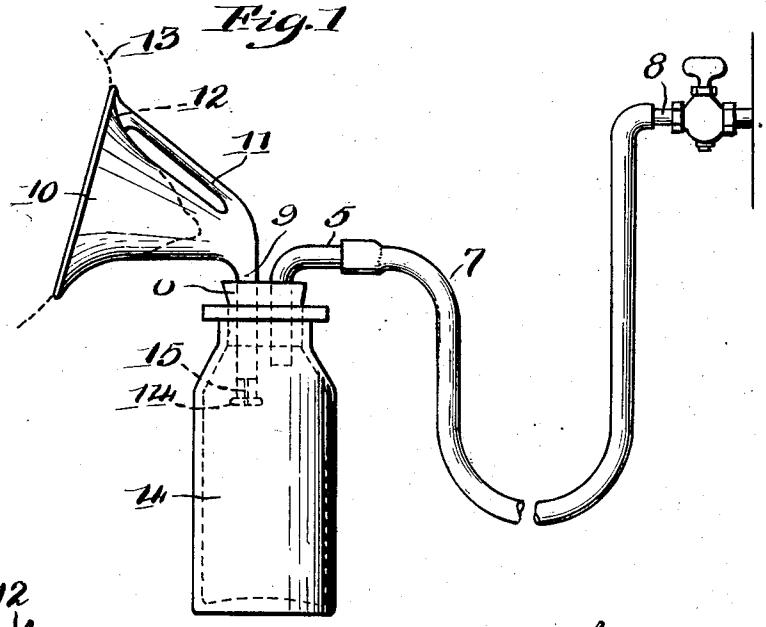
May 22, 1928. 1,670,610

W. COLBY

BREAST PUMP

Filed Nov. 3, 1926

Fig. 1



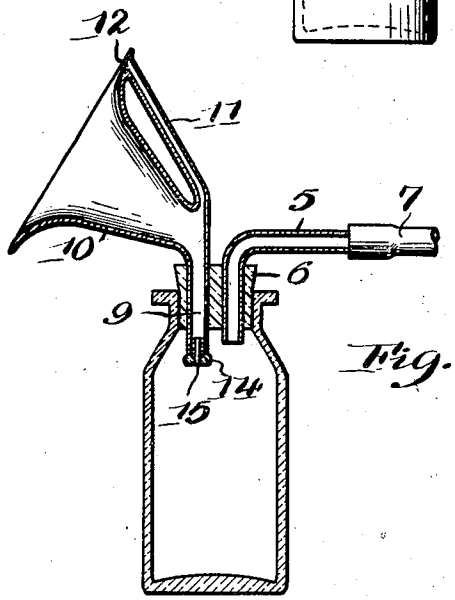


Fig. 2

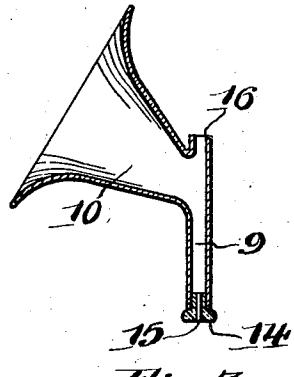


Fig. 3

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UNITED STATES PATENT OFFICE.

WOODARD COLBY, OF ST. PAUL, MINNESOTA.

BREAST PUMP.

Application filed November 3, 1926. Serial No. 145,963.

This invention relates to breast pumps and particularly to the portions of such pumps by which the suction applied to the nipple or breast may be controlled.

It is my object to provide a pump of this kind adapted to withdraw milk from the breast with unusual rapidity and at the same time effect the withdrawal with a minimum of discomfort to the user.

Other objects are to provide a pump which is inexpensive to manufacture, easy to cleanse and highly efficient in operation.

Heretofore, breast pumps have been provided with means for creating a continuous suction and for periodically interrupting the suction, but as far as I am aware all of such devices are so constructed that upon the relief or cessation of the suction, a substantial volume of air is admitted to the apparatus and this relatively large volume of air must be withdrawn before the suction can again be established in the bell mouth or milk receiving element. Obviously, the rate of withdrawal of the milk is dependent upon frequency of the suction impulses. Thus, the old type of apparatus is slow in operation unless the means for withdrawing the air is adapted to operate very rapidly. Rapid withdrawal of the air is apt to create excessive suction to the discomfort or injury of the patient and further requires relatively expensive suction apparatus.

In the present invention, I provide means whereby only a small amount of air is necessarily admitted to interrupt the suction, and the pulsations are created directly in the bell mouth tube without materially interrupting the vacuum in the milk receptacle or suction tube.

The invention will be best understood by reference to the accompanying drawing in which Figure 1 is a side elevation of my improved breast pump in its preferred form; Fig. 2 is a central vertical section through the pump and Fig. 3 is a central, vertical section through an alternate form of mouth and throat piece.

The pump has a receptacle or bottle 4 into which the milk is drawn by a partial vacuum maintained therein. A conduit for withdrawing air from the receptacle 4 consists of a rigid pipe 5, extending through a perforated stopper 6 in the top of the receptacle 4 and connected by a flexible tube 7 with a suitable suction element. As illustrated in Fig. 1, this suction element is indicated by the numeral 8 and consists of a valved pipe projecting from the wall. Such suction elements may be provided in hospitals or other buildings in the several rooms where the pumps are needed, a common pump of any suitable design being provided for all of the wall openings. Any means for producing a suction may, of course, be substituted for the element 8. Such means might consist of the water operated device of the kind shown in my copending application for patent, Serial No. 49,107, filed August 8, 1925, for breast pumps or in a portable motor driven pump.

The stopper 6 is also perforated to receive the throat tube 9 of a mouth piece 10, adapted to cap the nipple and adjacent portion of the breast in the usual manner. Communicating with the small end of the mouth piece 10, in the preferred construction, is a small tube 11 having its open end 12, adjacent to the outer or flaring periphery of said mouth piece. As indicated in dotted lines in Fig. 1, the breast 13, which is inserted in the bell mouth 10, normally covers the open end 12 of the tube 11, but may be readily depressed or indented to uncover the end of said tube when it is desired to interrupt the vacuum in the throat connected to the mouth piece. At the normally lower end of the throat 9, I restrict said throat by means of a removable stopper 14 having a small opening 15 through it for the withdrawal of the milk from the throat. This stopper 14 is preferably constructed from rubber and may be readily removed to permit cleansing of the throat 9. It will be noted that the throat 9 is straight to the junction of the tube 11 and said tube also extends in a straight line from its outer end 12, forming an angle with the throat 9. This arrangement facilitates the insertion of a swab or brush for cleaning the device.

In the alternate form of my device shown in Fig. 3, I omit the tube 11 and extend the neck 9 upward above the small end of the mouth piece 10. An opening 16 in the upper end of the projection is provided to interrupt the suction and may be covered with the finger of the operator to produce the desired pulsations.

The operation of my device will now be readily understood. When the tube 7 is connected to a suitable suction pump and the bell mouth 10 is applied to the breast, a par-

tial vacuum will be created in the receptacle 4 and in the throat tube 9 communicating with the bell shaped mouth near the nipple. With the preferred form of my device, the suction thus produced may be readily interrupted by indenting the breast 13 adjacent to the opening 12 in the tube 11 without withdrawing the nipple. At each opening of said tube, a small amount of air is admitted to the throat and small end of the mouth piece to interrupt the suction. This interruption of the suction can be effected with any desired frequency, and I have found by actual test of the device that a practically continuous stream of milk may be produced.

By reason of my arrangement of the restricted throat 9, milk is caused to stand in said throat above the stopper 14 and to form a seal which prevents the passage of the air from said throat into the receptacle 4. Thus, the vacuum in the receptacle 4 is substantially unaffected by the pulsations produced in the throat and mouth, and either a large or small receptacle 4 may be used with the present invention. Nor is the vacuum in the tube 7 affected by pulsations of air in the bell shaped mouth 10. Therefore, an unusually long tube leading to the suction element may be used with this invention, if desired.

With the alternate form of device shown in Fig. 3, the application of any convenient cover, such as a finger of the operator to the opening 16, makes it possible to produce the desired vacuum in the mouth 10 and throat 9, and this vacuum may be interrupted by the removal of the cover at any desired frequency. As only a small amount of air is admitted for each interruption of the suction, it will be evident that a relatively slow acting and inexpensive suction pump may be supplied with my improved device to produce satisfactory results. It will be obvious that means other than the stopper 14 may be provided for restricting the throat tube 9. The lower end or other portion of said throat tube may be reduced by drawing the side walls inward. As the throat tube is preferably constructed from glass, such alternate form of restriction may be provided without difficulty or added expense. However, I prefer removable restricting means which facilitate cleansing the throat.

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

1. In a breast pump the combination with a receptacle for milk and means for producing at least a partial vacuum in said receptacle, of a throat communicating with said receptacle, an enlarged mouth for application to a breast, communicating with said throat, means adapted to permit interrupting the vacuum in said mouth and means for restricting the passage of air between said mouth and receptacle whereby intermittent suction may be applied to the breast without interrupting the vacuum in said receptacle.

2. In a breast pump the combination with a receptacle for milk and means for producing a partial vacuum in said receptacle, of a throat communicating with said receptacle, a bell shaped mouth for application to the breast, communicating with said throat, means for restricting the flow through said throat, and means adapted to permit interruption of the vacuum directly in said mouth whereby intermittent suction may be applied in said mouth without materially affecting the vacuum in said receptacle.

3. In a breast pump the combination with a receptacle for milk and means for producing a partial vacuum in said receptacle, of a throat communicating with said receptacle, an enlarged mouth for application to the breast, communicating with said throat, a perforated stopper restricting the lower end of said throat and means for interrupting the vacuum directly in said mouth whereby intermittent suction may be applied to the breast without materially affecting the vacuum in said receptacle.

4. In a breast pump the combination with a receptacle for milk and means for creating a partial vacuum in said receptacle, of a bell shaped mouth and throat therefor communicating with said receptacle and a vacuum relief tube communicating at its inner end with the smaller end of said mouth and at its outer end near the larger end of said mouth, said tube being adapted to be closed at its outer end by a breast inserted in said bell shaped mouth.

5. In a breast pump the combination with a receptacle for milk and means for creating a partial vacuum in said receptacle, of a closure for the top of said receptacle having a perforation, a tubular member extending through said perforation and communicating with said receptacle, an enlarged mouth on said member adapted to cap a breast, a vacuum relief tube communicating at its inner end with the inner end of said mouth and at its outer end near the open end of said mouth, said tube being adapted to be closed at its outer end by the breast inserted in said mouth and a perforated stopper located in the lower end of said tubular member to restrict the flow of milk into said receptacle.

6. In a breast pump the combination with a receptacle for milk and means for producing at least a partial vacuum in said receptacle, of a tubular member extending downward into said receptacle and communicating therewith, an enlarged mouth for application to a breast, communicating with the upper end of said member, said mouth having an opening near the upper

end of said member, adapted to permit interrupting the vacuum in said mouth and means for restricting the passage of air between said mouth and receptacle, whereby intermittent suction may be applied to the breast without entirely eliminating the vacuum in said receptacle.

7. In a breast pump the combination with a receptacle for milk, of a tubular member extended downward into said receptacle and communicating therewith at its lower end, an enlarged mouth for application to a breast on the upper end of said member, means for creating a partial vacuum in said mouth, means connected with said mouth having an opening to permit interruption of the vacuum in said mouth and means for restricting the passage between said mouth and receptacle, whereby when suction is created in said mouth, milk is drawn from the breast and allowed to accumulate above said restricting means, said milk being subsequently expelled from said member upon interruption of the suction.

8. In a breast pump the combination with a receptacle for milk, of a tubular member extended downward into said receptacle and communicating therewith at its lower end, an enlarged mouth arranged to receive milk from a breast formed integral with the upper end of said member, means for creating a partial vacuum in said mouth and tubular member, means connected with said mouth and having an opening to permit interrupting the vacuum in said mouth and means carried upon the lower end of said member for restricting the passage between said member and receptacle, whereby when suction is created in said mouth, milk is drawn from the breast and allowed to accumulate above said restricting means, said milk being subsequently expelled from said member upon interruption of the vacuum in said mouth and member.

In testimony whereof, I have hereunto signed my name to this specification.

WOODARD COLBY.