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(54) **METHOD FOR YIELDING MAXIMUM
EXPRESSION IN BREASTPUMPING**

Related U.S. Application Data

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(75) Inventor: **Donna T. Geddes**, Dianella (AU)

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Correspondence Address:
**MCDONNELL BOEHNEN HULBERT &
BERGHOFF LLP
300 S. WACKER DRIVE
32ND FLOOR
CHICAGO, IL 60606 (US)**

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(57) **ABSTRACT**

(73) Assignee: **Medela Holding AG**, Baar (CH)

A method of yielding maximum expression in a breastpump provides a pumping cycle that maintains a minimum level of vacuum within a breast shield chamber (baseline vacuum) throughout at least some, if not all, of a pumping session, while operating the breastpump in a milk expression mode with a sequence having a frequency in the range of about 80 to about 100 cycles per minute.

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(22) Filed: **Sep. 21, 2007**

METHOD FOR YIELDING MAXIMUM EXPRESSION IN BREASTPUMPING

APPLICATION HISTORY

[0001] Applicant claims the benefit of prior pending U.S. Provisional Application Ser. No. 60/846,689 filed on Sep. 22, 2006, entitled "Infant Sucking and the Effect of Respiration and Swallowing: Shapes, Patterns and Vacuum in Depth Including Frequency, Vacuum and Breast Expression."

FIELD OF THE INVENTION

[0002] This invention relates to breastpumps for drawing breastmilk, and particularly to a breastpump with a pressure control system to regulate the pressure as actually applied to the breast within a breast shield chamber during a pumping cycle, and also to vary that pressure in a cycle that maintains a minimum vacuum with an optimum frequency yielding maximum expression.

BACKGROUND OF THE INVENTION

[0003] Breastpumps for use by nursing mothers are well known. They allow the nursing woman to express the breastmilk as necessary or convenient, and further provide collection of the breastmilk for later use. For some mothers, breastpumps may be a necessity, such as when the child has suckling problems, or if the mother has problems nursing.

[0004] There are three general broad classifications of breastpumps: hand pumps that generate suction manually, battery operated pumps with small motors that generate suction from power supplied by batteries, and electric pumps in which suction is created by various types of electric motors that run off "house" current. Some pumps can cross over these broad classifications.

[0005] Various types of hand pumps exist. An example of such manually-driven pumps is in U.S. Pat. No. 6,497,677.

[0006] A battery-driven portable breastpump is described in U.S. Pat. No. 4,964,851, for example. This breastpump is small, lightweight and achieves good vacuum (i.e., negative pressure) regulation in preferred limits. The LACTINA breastpump sold by Medela, Inc. is also another type of breastpump, which may be driven by battery as well as house current. It is generally disclosed in U.S. Pat. No. 5,007,899.

[0007] All of these breastpumps are designed to cycle pressure, typically a negative pressure or vacuum, that is applied to the breast and nipple within the breast shield.

[0008] The prior art does not regulate vacuum at the breast shield to reach a maximum negative pressure, and then a desired minimum negative pressure still less than ambient, without the need to return to atmospheric pressure for successful milk expression. Yet a return to ambient pressure within the breast shield chamber may not be required, and benefits may be achieved by maintaining a minimum level of vacuum on the breast throughout at least a portion of the pumping session. Such would include, for example, reducing the amount of energy required to thereafter reach maximum vacuum. The "elastic rebound" of the nipple upon release of vacuum would also be minimized. This provides comfort to the nursing mother. A breakthrough in providing

a baseline vacuum for breastpumping is described in U.S. patent application Ser. No. 11/786,364, filed on Apr. 11, 2007.

SUMMARY OF THE INVENTION

[0009] It is a principal objective of the present invention to provide a method of yielding maximum milk expression in a breastpump, either manual or motorized, that maintains a minimum level of vacuum within a breast shield chamber throughout at least some, if not all, of a pumping session, while operating the breastpump at frequencies in a range of about 80 to about 100 cycles per minute.

DETAILED DESCRIPTION OF AN EMBODIMENT OF THE INVENTION

[0010] A breastpump providing a pumping cycle that maintains a minimum level of vacuum (otherwise referred to as a baseline vacuum) within a breast shield chamber throughout at least some, if not all, of a pumping session is disclosed in pending U.S. patent application Ser. No. 11/786,364 filed on Apr. 11, 2007, which is incorporated herein by reference. A minimum baseline vacuum used herein would be in the range of about -20 mmHg to about -60 mmHg.

[0011] With such a pump having a baseline vacuum, it has been found that maximum expression of milk is achieved while operating at frequencies in the range of about 80 to about 100 cycles per minute, and particularly in the range of 81 to 99 cycles per minute. The peak or maximum negative pressure used during the milk expression session was conventional, i.e., in the upper range of about -150 mmHg to about -250 mmHg. A peak pressure of about -200 mmHg was most preferred. The resulting excellent expression of milk was not expected, and it is believed that the identification of this frequency range was hitherto unknown to yield such improved milk expression results.

[0012] A further beneficial effect is considered to be accomplished through the use of some kind of oscillation or vibration of the nipple, again in conjunction with the nipple restraint. This could be a mechanical element run off of the electrical source (used to power the vacuum source), which essentially rapidly "thumps" or drums the exterior of the collar or nipple tunnel. Such a mechanical element could be a motor with an eccentric, such as done in cell phones. It could also be an air vibration (acoustical) superimposed on the air within the breastpump assembly. Such an acoustical means could be generated by small oscillations of the vacuum mechanism.

[0013] Thus, while the invention has been described herein with relation to a certain embodiment and application, those with skill in this art will recognize changes, modifications, alterations and the like which still come within the spirit of the inventive concept, and such are intended to be included within the scope of the invention as expressed in the following claims.

What is claimed is:

- 1. An improved method for operating a breastpump for the expression of mother's milk, wherein the improvement comprises operating a breastpump assembly during at least

some of a pumping session and with a baseline vacuum, while using an expression sequence having a conventional maximum negative pressure at a frequency in the range of about 80 to about 100 cycles per minute, to thereby achieve maximum expression.

2. The improved method for operating a breastpump of claim 1 wherein said range is 81 to 99 cycles per minute.

3. The improved method for operating a breastpump of claim 1 wherein the minimum vacuum level is within a

range of about -20 mmHg to about -60 mmHg, and said conventional maximum negative pressure is in the range of about -150 mmHg to about -250 mmHg.

4. The improved method for operating a breastpump of claim 3 wherein said maximum negative pressure is about -200 mmHg.

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