



METHOD AND SYSTEM FOR DISPENSING OF LIQUIDS ON DEMAND

Field of the Invention

[0001] The present invention generally relates to liquid dispensers. In particular, the invention relates to a method and system for dispensing of liquids on demand.

Background of the Invention

[0002] Mammals are easily distinguished by their characteristics of birthing their young whole and the secreting of milk to nurse their young. Human beings are also mammals and the nursing of an infant also involves the suckling of the infant at the mother's breast.

[0003] While it is traditional practice for mothers to carry their babies while babies suckle, the act of carrying while suckling babies is apparently quite a chore. Mothers constantly complain of backaches and inexperience mothers find the act difficult. Milk bottles used for feeding infants are not exempt from similar problems.

[0004] While feeding infants, the mother is completely occupied and unable to handle any other simple chores like answering phones or picking up something unless she puts the infant down and interrupts the feeding process. However, there are at the present no effective hands free equipment for dispensing milk to infants that are reliable. The concerns are that the dispensing equipment must not leak and only allows milk to flow when the infant desires to be fed and starts sucking on the nipple of the milk bottle. There is also the concern that such dispensing equipment may be too complex for an infant to operate and still require substantial assistance from an adult.



[0005] It can thus be seen that there exists a need for a simple and effective system and method for dispensing of liquids on demand.

Summary of the Invention

[0006] The present invention seeks to provide a method and system for dispensing liquids on demand.

[0007] Accordingly, in one aspect, the present invention provides, a system for dispensing a liquid on demand comprising: a bottle for storing of the liquid; a bottle warmer for holding the bottle; a cap having a nozzle for closing the bottle; the nozzle coupled to a feeding tube for providing liquid flow out of the nozzle; a dispenser module having an inlet port coupled to the feeding tube for receiving the liquid; the dispenser module further comprising a dispensing chamber in communication with both a plunger chamber and the inlet port; a flow regulator having a regulator extension, the regulator extension having external screw threads matching internal screw threads in the dispensing chamber, whereupon rotation of the flow regulator results in varying volume of the dispensing chamber; a stopper ball biased by a spring against the regulator extension for closing off communication between both the inlet port and the plunger chamber with the dispensing chamber, whereupon displacement of the stopper ball re-establishes communication between both the inlet port and the plunger chamber with the dispensing chamber; an outlet port for allowing flow of liquid from the inlet port through the flow regulator and out of the outlet port; wherein application of suction force on the outlet port causes displacement of the stopper ball against the spring resulting in flow of liquid from the bottle through the nozzle, through the feeding tube, through the inlet port, through the dispenser chamber and dispensed through the outlet port of the flow regulator.

[0008] In another aspect, the present invention provides, a method for dispensing a liquid on demand comprising the steps: providing a dispenser module having an inlet port coupled to a liquid source; the dispenser module further comprising a dispensing chamber in communication with both a plunger chamber and the inlet port; a flow regulator having a regulator extension, the regulator extension having external screw threads matching internal screw threads in the dispensing chamber, whereupon rotation of the flow regulator results in varying volume of the dispensing chamber; a stopper ball biased by a spring against the regulator extension for closing off communication between both the inlet port and the plunger chamber with the dispensing chamber, whereupon displacement of the stopper ball re-establishes communication between both the inlet port and the plunger chamber with the dispensing chamber; an outlet port for allowing flow of liquid from the inlet port through the flow regulator and out of the outlet port; priming the dispenser module; ensuring the dispenser chamber is completely filled with the liquid; adjusting the flow regulator until leakage from the outlet port is just prevented; providing suction force at the outlet port; wherein application of suction force on the outlet port causes displacement of the stopper ball against the spring resulting in flow of liquid from the liquid source through the inlet port, through the dispenser chamber and dispensed through the outlet port of the flow regulator.

Brief Description of the Drawings

[0009] A preferred embodiment of the present invention will now be more fully described, with reference to the drawings of which:

[0010] FIG.1 illustrates the apparatus in accordance with the present invention;

[0011] FIG.2 illustrates a mounting device for the apparatus of FIG.1;

[0012] FIG.3 illustrates a cross-sectional view of the dispenser module of FIG.1;

[0013] FIG.4 illustrates a prospective view of the cross sectional view of the flow regulator of FIG.3; and

[0014] FIG.4 illustrates a flow chart illustrating a method in accordance with the present invention of FIG.3.

Detailed description of the Drawings

[0015] A method and system for dispensing liquids on demand is disclosed. In the following description, details are provided to describe the preferred embodiment. It shall be apparent to one skilled in the art, however that the invention may be practiced without such details. Some of the details may not be described at length so as not to obscure the invention.

[0016] Referring to FIG.1, a liquid dispenser in accordance with the present invention is shown. The liquid dispenser is designed for the dispensing of milk for feeding of infant mammals and particularly for human infants.

[0017] The liquid dispenser comprises a bottle 20 with a cap 22 having a nozzle 23. The nozzle 23 is coupled to a feeding tube 30 which is further coupled to a dispenser module 100. The cap 22 of the bottle 20 further has an open tube 24 with an opening at both ends. The open tube 24 allows air to enter into the bottle 20, when liquid flows out of the nozzle 23. This prevents trapped air in the bottle 20 from preventing the outflow of liquid out of the bottle 24.

[0018] The bottle 20 is held by a bottle warmer 50 which also acts as a bottle holder. The bottle warmer 50 is electrically operated and provides some means of transferring heat to the bottle 20 to keep the contents of the bottle 20 at a predetermined temperature.

[0019] The feeding tube 30 is coupled to the nozzle 23 of the cap 22 and allows the flow of liquid from the bottle 20 through the nozzle 23 into the feeding tube 30. The liquid is then fed into the dispensing module 100 for dispensing on demand.

[0020] As a safety precaution, the feeding tube 30 is enclosed by a bolster 40 which acts as an anti-fouling device preventing any danger of the feeding tube 30 from strangling the infant.

[0021] Referring to FIG.2, the bottle 20 may also be mounted in a mounting device 50. The mounting device 50 comprises of a backplate 52 and a receiving unit 60. The receiving unit 60 is shaped and contoured to receive the cap 22 of the bottle 20 while allowing the nozzle 23 to extend beyond the receiving unit 60. The backplate 50 comprises at least one handle 53 for ease of carrying the mounting unit 50. The backplate 52 further comprises several securing holes 54 for securing or mounting the mounting device 50 to a stable stand or wall. The securing holes 54 will typically work with suction cups 62, hooks 63 or clips 64. The mounting device 50 may also further be mounted inside a vehicle for the feeding of the infant on the move. This advantageously allows the infant to be fed while the bottle 20 is mounted in a stable condition.

[0022] Referring to FIG.3 and FIG.4, the dispensing module 100 comprises a main body 120 having a inlet port 122 for coupling to the feeding tube 30, a flow regulator 144 and a plunger switch 128.

[0023] The inlet port 122 of the main body 120 is in communication with a dispensing chamber 124. The dispensing chamber 124 is further in communication with a plunger chamber 126. The flow regulator 144 comprises a flow control knob 145 and a regulator extension 146 which has external screw threads matching

internal screw threads of the dispensing chamber 124. This allows the flow control knob 145 of the flow regulator 144 to be rotated to vary the volume of the dispensing chamber 124 when the regulator extension 146 is screwed into the dispensing chamber 124.

[0024] A stopper ball 140 is biased by a spring 130 against the regulator extension 146 to closes off communication between both the inlet port 122 and the plunger chamber 126 with the dispensing chamber 124. When the plunger switch 128 is depressed into the plunger chamber 126, a plunger extension 127 of the plunger switch 128 comes into contact with the stopper ball 140 and displaces it against the bias of the spring 130. This displacement of the stopper ball 140 then re-establishes the communication between both the inlet port 122 and the plunger chamber 126 with the dispensing chamber 124. Varying the volume of the dispensing chamber 124 thus results in varying the strength of the bias of the spring 130 on the stopper ball 140.

[0025] Effectively, the stopper ball 140 cuts off the flow of liquid from the feeding tube 30 into the inlet port 122 into the dispensing chamber. When the stopper ball 140 is displaced, liquid is thus allowed to flow from the inlet port 122 into the dispensing chamber 124.

[0026] Consequently, the liquid in the dispensing chamber 124 will also flow through the regulator extension 146 of the flow regulator 144 and be dispensed out of an outlet port 132 of the flow regulator 144. A rubber nipple 160 may be mounted at the outlet port 132 of the flow regulator 144 to facilitate ease of dispensing of the liquid.

[0027] In operation, the dispenser module 100 dispenses liquid not by activation of the plunger switch 128, but by way of application of suction at the outlet port 132 of the flow regulator 144. Suction force applied at the outlet port 132 will be transmitted through liquid in the flow regulator 144 and regulator extension 146 to

the stopper ball 140. When the suction force is strong enough to overcome the bias of the spring 130, the stopper ball 140 will be displaced and be “sucked” towards the regulator extension. This displacement of the stopper ball 140 then re-establishes the communication between the inlet port 122 with the dispensing chamber 124 and allows liquid to flow from the inlet port 122 into the dispensing chamber 124 and then out of the outlet port 132.

[0028] However, if the suction force is too strong, the stopper ball 140 may be sucked onto the opening of the regulator extension 146 and effectively cut off flow into the regulator extension 146. To prevent this from occurring, arranged at the opening of the regulator extension 146 are a plurality of fins 147 which allows the stopper ball 140 to rest on if the suction force is too strong. The fins 147 serve to offset the stopper ball 140 from the opening of the regulator extension 146. When the stopper ball 140 is resting on the fins, there is still space between the stopper ball 140 and the opening of the regulator extension 146 to allow the flow of liquid.

[0029] The plunger switch 128 is retained in the plunger chamber 126 by a plunger stopper 129 and is intended to be used as a means for priming the dispenser module 100 and also during cleaning of the inside of the main body 120.

[0030] When operating the system 10 for feeding of infants, liquid such as milk is placed in the bottle 20 and maybe kept at a predetermined temperature by the bottle warmer 50. The dispenser module 100 then needs to be primed and adjusted before use. The flow control knob 145 of the flow regulator is adjusted to control the suction force required before flow of liquid is achieved. If the flow control knob is too tight, the suction force required may be so strong that an infant would have difficulty overcoming the bias of the spring 130 to be able to drink the liquid.

[0031] Referring to FIG.4, the method 300 for operating the dispenser module starts with the priming 310 of the dispenser module by activating the plunger

switch 128. Next, the step of ensuring 315 the dispensing chamber is completely filled with liquid is performed.

[0032] Following that, the plunger switch 128 is released and the flow control knob 145 is adjusted 330 until leakage from the dispenser module 100 is just prevented. The rationale here is that if the leakage is just prevented from the dispenser module 100, then a little suction force would be required to displace the stopper ball 140 and allow the liquid to flow.

[0033] It will be appreciated that various modifications and improvements can be made by a person skilled in the art without departing from the scope of the present invention.

Claims

1. A system for dispensing a liquid on demand comprising:
 - a bottle for storing of said liquid;
 - a bottle warmer for holding said bottle;
 - a cap having a nozzle for closing said bottle; said nozzle coupled to a feeding tube for providing liquid flow out of said nozzle;
 - a dispenser module having an inlet port coupled to said feeding tube for receiving said liquid;
 - said dispenser module further comprising a dispensing chamber in communication with both a plunger chamber and said inlet port;
 - a flow regulator having a regulator extension, said regulator extension having external screw threads matching internal screw threads in said dispensing chamber, whereupon rotation of said flow regulator results in varying volume of said dispensing chamber;
 - a stopper ball biased by a spring against said regulator extension for closing off communication between both said inlet port and said plunger chamber with said dispensing chamber, whereupon displacement of said stopper ball re-establishes communication between both said inlet port and said plunger chamber with said dispensing chamber;
 - an outlet port for allowing flow of liquid from said inlet port through said flow regulator and out of said outlet port;

wherein application of suction force on said outlet port causes displacement of said stopper ball against said spring resulting in flow of liquid from said bottle through said nozzle, through said feeding tube, through said inlet port, through said dispenser chamber and dispensed through said outlet port of said flow regulator.
2. The system in accordance with claim 1, further comprising a plunger switch retained in said plunger chamber by a plunger stopper.

3. The system in accordance with claim 2, wherein said plunger switch may be activated to displace said stopper ball.

4. The system in accordance with claim 1, wherein said flow regulator further comprises a flow control knob for easy adjustment of said flow regulator.

5. The system in accordance with claim 1, wherein said flow regulator further comprises a rubber nipple mounted over said outlet port for ease of dispensing of liquid.

6. A method for dispensing a liquid on demand comprising the steps:

a) providing a dispenser module having an inlet port coupled to a liquid source;
said dispenser module further comprising a dispensing chamber in communication with both a plunger chamber and said inlet port;

a flow regulator having a regulator extension, said regulator extension having external screw threads matching internal screw threads in said dispensing chamber, whereupon rotation of said flow regulator results in varying volume of said dispensing chamber;

a stopper ball biased by a spring against said regulator extension for closing off communication between both said inlet port and said plunger chamber with said dispensing chamber, whereupon displacement of said stopper ball re-establishes communication between both said inlet port and said plunger chamber with said dispensing chamber;

an outlet port for allowing flow of liquid from said inlet port through said flow regulator and out of said outlet port;

b) priming said dispenser module;
c) ensuring said dispenser chamber is completely filled with said liquid;
d) adjusting said flow regulator until leakage from said outlet port is just prevented;
e) providing suction force at said outlet port;

wherein application of suction force on said outlet port causes displacement of said stopper ball against said spring resulting in flow of liquid from said liquid source through

said inlet port, through said dispenser chamber and dispensed through said outlet port of said flow regulator.

7. The method in accordance with claim 6, wherein said step b) further comprises activating a plunger switch retained in said plunger chamber causing displacement of said stopper ball.

8. The method in accordance with claim 6 wherein said step d) further comprises rotating a flow control knob of said flow regulator thus varying the volume of the dispensing chamber and consequently the strength of the bias of the spring on the stopper ball.