TWO-LEVEL HAND PUMP NASAL ASPIRATOR

CROSS-REFERENCE TO RELATED APPLICATION

[1] This application claims the priority of Taiwanese patent application No. 113210963, filed on October 9, 2024, which is incorporated herewith by reference.

BACKGROUND OF THE INVENTION

1. Field of the Invention

[2] The present invention relates to a hand pump nasal aspirator structure, particularly a two-level hand pump nasal aspirator with controllable suction force achieved through a limit structure.

2. The Prior Arts

[3] Due to the underdeveloped growth of infants and toddlers, the structural support in their nasal cavities is insufficient, which leads to narrow nasal passages. When they have a cold or experience allergies and the mucus produced may easily block their nasal passages, leading to nasal congestion. However, since the infants and toddlers are generally unable to blow their noses to relieve nasal congestion caused by nasal mucus, they need caregivers to assist in cleaning. By using a nasal aspirator, a negative pressure can be generated to suck excess mucus from the nasal cavity.

[4] Conventional nasal aspirators can generally be divided into two main structures: a negative pressure generating device and a suction end contacting the nasal cavity. The negative pressure generating device is further classified into electric and hand pump types based on the power source. For electric nasal aspirators, negative pressure is generated by a motor-driven suction, but a significant noise will be generated during motor operation, which may easily startle the infants and toddlers, leading to

rejection of the caregiver's assistance in cleaning. For hand pump nasal aspirators, the operator can activate the negative pressure generating device by mouth suction, foot-pedaling or hand-pulling, and then clean the nasal cavity with the suction end.

[5] Most negative pressure generating devices of the conventional hand pump nasal aspirators use fixed suction strokes, which means that each use involves a complete reciprocating movement to generate negative pressure for the operation of the suction end. However, the fixed suction stroke also means that it is difficult for the operator to reduce the suction force. Therefore, when the care receiver experiences discomfort, the suction force can only be adjusted by the operator through controlling the force in a hand pump manner.

[6] Moreover, the nasal aspirator body has a semi-enclosed space therein, and when the negative pressure generating device acts, air will be drawn from the suction end, which is in a dynamic equilibrated state. To maintain a fixed suction force, the operator needs to control the force. When the nasal aspirator is used by an operator with less strength or less dexterity in operation, the suction force in each use will be unstable, which results in varying effectiveness of the nasal aspirator depending on the operator.

[7] In view of the drawback of conventional nasal aspirators in which the fixed stroke makes it difficult to adjust the suction strength, the inventor has actively and continuously developed an invention to address the aforementioned issues.

SUMMARY OF THE INVENTION

[8] A main object of the present invention is to control each stroke of the pump body by a limit structure constituted by a detent, so as to change the suction power in each use, so that an operator only needs to pull the pump body all the way down each time.

[9] Another object of the present invention is to provide air vent holes of the pump body around a pull rod to increase ventilation, allowing the pull rod of the pump body to quickly rebound.

[10] The two-level hand pump nasal aspirator of the present invention comprises a pump body and a nasal aspirator body. The pump body includes a cylinder, a piston, an air vent hole cover, a pull rod, a spring, and a detent, wherein the cylinder has a piston space formed therein for the piston to act, one end of the piston space is an air vent, another end of the piston space is an air suction port. An air vent hole cover is disposed at the air vent, and the air vent hole cover is provided with air vent holes and a handle, with the handle having a reciprocating space formed therein. The piston is disposed in the piston space, and provided with a silicone ring for sealing and fitting an inner wall of the cylinder, and the piston is provided with a check valve, which may push air in the piston space toward the air vent hole, and suck air from the air suction port.

[11] One end of the pull rod is connected to an end surface of the piston adjacent to the air vent and extends through the air vent hole cover, and another end of the pull rod is provided with a pull handle, the pull handle is provided with a limit slot on an end surface thereof perpendicular to an axis direction of the pull rod; the operator can pull the pull rod by the pull handle to drive the piston to act. The spring is disposed in the piston space adjacent to the air vent, with both ends of the spring abutting against the piston and the air vent hole cover, such that when the operator releases the pull rod, the piston naturally rebounds toward the air suction port. The detent is placed in the limit slot for reducing the stroke of the pull handle in the reciprocating space, thereby controlling the suction force of the pump body.

[12] The nasal aspirator body has a liquid accommodating space formed therein, and is communicated with the air suction port through a connecting tube, one end of the nasal aspirator body is a nasal aspirator opening. The nasal aspirator body has a suction head to cover the nasal aspirator opening, one end of the suction head forms a suction end with a tapering outer diameter for contacting a nasal cavity; and another end of the suction head is provided with a suction head check valve, which is located in the liquid accommodating space, and may prevent the liquid sucked from the suction end from flowing back into the suction end.

[13] In a preferred embodiment of the present invention, the operator may pull the pull rod to drive the piston, to generate a negative pressure in the piston space near the air suction port, thereby sucking up the liquid by the nasal aspirator body.

[14] Specifically, when the detent is placed in the limit slot, it reduces the travel stroke of the pull handle in the reciprocating space, such that when the operator grips the handle and pulls the pull handle, the travel amount of the piston is reduced and the amount of the negative pressure decreases, thereby reducing the suction force of the nasal aspirator body.

[15] In a preferred embodiment of the present invention, the air vent hole is provided in plural, and disposed around the pull rod.

[16] Preferably, the pull rod is disposed along the center axis of the pump body.

[17] Preferably, the air vent holes are radially disposed around the pull rod.

[18] Preferably, the handle is provided with a storage slot, which is disposed at one end of the handle that extends beyond the reciprocating space, such that when the detent is not needed, the detent may be placed in the storage slot to prevent loss.

[19] In a preferred embodiment of the present invention, the nasal aspirator body is provided with a raised rib on an inner wall at another end thereof distant from

the nasal aspirator opening, to increase liquid adhesion of the liquid entering the liquid accommodating space, thereby promoting the liquid to adhere to the inner wall of the nasal aspirator body.

[20] Preferably, the raised rib is provided in plural, to increase the adhesion area of the liquid.

[21] In a preferred embodiment of the present invention, the nasal aspirator body and the suction head are connected by a quick detachment structure, thereby allowing for easy and quick attachment and detachment of the nasal aspirator body, making cleaning more convenient.

[22] Preferably, the quick detachment structure is a snap, for preventing the suction head from detaching.

BRIEF DESCRIPTION OF THE DRAWINGS

[23] FIG. 1 is an exploded view according to an embodiment of the present invention;

[24] FIG. 2 is a cross-sectional view according to the embodiment of the present invention;

[25] FIG. 3 is a structural view of an air vent hole cover and a pull rod according to the embodiment of the present invention;

[26] FIG. 4 is a cross-sectional view according to a first application of the embodiment of the present invention; and

[27] FIG. 5 is a structural view of a nasal aspirator body according to the embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[28] For the convenience of understanding the present invention, description of the present invention will now be given below in detail according to embodiments and drawings. The drawings illustrate a part of embodiments of the present invention, rather than all embodiments. The present invention may be implemented in various forms, but is not limited to the embodiments described herein. On the contrary, the object of providing those embodiments is to offer a clearer and more comprehensive understanding of the present disclosure. Based on the embodiments of the present invention, all other embodiments obtained without inventive effort by those skilled in the art are within the scope to be protected of the present application.

[29] Unless otherwise defined, all technical and scientific terms used herein have the same meaning as understood by those skilled in the art. The terms used in the present specification are only intended to describe the specific embodiments, but not intended to limit the present application.

[30] FIGS. 1 to 5 are schematic views of embodiments of the present invention. As shown in FIG. 1, which is an exploded view of an embodiment of the present invention, a two-level hand pump nasal aspirator of the present invention comprises a pump body 1 and a nasal aspirator body 2. The pump body 1 includes a cylinder 11, a piston 12, an air vent hole cover 113, a pull rod 13, a spring 14, and a detent 15. As shown in FIG. 2, which is a cross-sectional view of the embodiment of the present invention, the cylinder 11 has a piston space 110 formed therein for the piston 12 to act, one end of the cylinder 11 is an air vent 111, and another end of the cylinder 11 is an air suction port 112. The air vent hole cover 113 is disposed at the air vent 111, and the air vent hole cover 113 is provided with a plurality of air vent holes 1130 and a handle 1131, and the handle 1131 has a reciprocating space 1310 formed therein. The piston 12 is provided in the piston space 110, and the piston 12 is made of an elastic material

at a rim thereof for sealing and fitting an inner wall of the cylinder 11. The piston 12 is provided with a check valve 121, which may push air in the piston space 110 toward the air suction port 112, and allow air to be drawn from the air vent hole cover 113.

[31] One end of the pull rod 13 is connected to an end surface of the piston 12 adjacent to the air vent 111 and extends through the air vent hole cover 113, another end of the pull rod 13 is provided with a pull handle 131, and the pull handle 131 is provided with a limit slot 132 on an end surface thereof perpendicular to an axis direction of the pull rod 13; the operator may pull the pull rod 13 by gripping the pull handle 131 to drive the piston 12 to act. The spring 14 is disposed in the piston space 110 adjacent to the air vent 111, with both ends of the spring 14 abutting against the piston 12 and the air vent hole cover 113, respectively, such that when the operator releases the pull rod 13, the piston 12 naturally rebounds toward the air suction port 112. The detent 15 is placed in the limit slot 132 for reducing the stroke of the pull handle 131 in the reciprocating space 1310, thereby controlling the suction force of the pump body 1.

[32] As shown in FIG. 2, the nasal aspirator body 2 has a liquid accommodating space 20 formed therein, and is communicated with the air suction port 112 through a connecting tube 3, and another end of the nasal aspirator body 2 is a nasal aspirator opening. The nasal aspirator body 2 has a suction head 21 to cover the nasal aspirator opening. One end of the suction head 21 forms a suction end with a tapering outer diameter for contacting a nasal cavity; and another end of the suction head 21 is provided with a suction head check valve 212, which is located in the liquid accommodating space 20, and may prevent the liquid, which is sucked from the suction end 211 into the liquid accommodating space 20, from flowing back into the suction end 211.

[33] As shown in FIG. 2, the operator may pull the pull rod 13 to drive the piston 12, to generate a negative pressure in the piston space 110 near the air suction port 112, thereby sucking up liquid by the nasal aspirator body 2.

[34] As shown in FIG. 3, which is a top view of the air vent hole cover 113 and the pull rod 13 according to the embodiment of the present invention, the air vent holes 1130 are disposed around the pull rod 13.

[35] Preferably, the pull rod 13 is disposed along the center axis of the pump body 1.

[36] Preferably, the air vent holes 1130 are radially disposed around the pull rod 13.

[37] As shown in FIG. 4, which is a cross-sectional view according to a first application of the embodiment of the present invention, when the detent 15 is placed in the limit slot 132, it reduces the travel stroke of the pull handle 131 in the reciprocating space 1310, such that when the operator grips the handle 1131 and pulls the pull handle 131 single-handed, the travel amount of the piston 12 is reduced and the amount of the negative pressure decreases, thereby reducing the suction force of the nasal aspirator body 2.

[38] As shown in FIG. 2, when there is not need to reduce the suction force, the detent 15 may be placed in the storage slot 1132 to prevent loss.

[39] As shown in FIG. 5, which is a structural view of the nasal aspirator body 2 of the embodiment of the present invention, the nasal aspirator body 2 is provided with a raised rib 22 on an inner wall at an end thereof distant from the nasal aspirator opening, to increase liquid adhesion of the liquid entering the liquid accommodating space 20, thereby promoting the liquid to adhere to the inner wall of the nasal aspirator body 2.

[40] As shown in FIG. 5, the nasal aspirator body 2 and the suction head 21 are connected by a quick detachment structure, thereby allowing for easy and quick attachment and detachment of the nasal aspirator body, making cleaning more convenient.

[41] In a preferred embodiment of the present invention, the detent 15 is provided in plural, allowing for adjustment between multiple levels of suction force for the pump body 1.

[42] Preferably, the storage slot 1132 is provided in plural, and the storage slots 1132 have a number corresponding to that of the detents 15, for storing detents 15 of different lengths.

[43] Preferably, the piston 12 is provided with a silicone ring at a rim thereof for increasing the fitting extent with the cylinder 11.

[44] Preferably, the suction head 21 is made of silicone.

[45] Preferably, the detent 15 is provided with a silicone pad at an end thereof distant from the pull handle 131 for relieving the impact between the detent 15 and the handle 1131 during use.

[46] Preferably, the pull rod 13 and the piston 12 are threaded-connected.

[47] The embodiments described above merely represent preferred implementations of the present invention with more specific and detailed descriptions; however, it should not be understood as a limitation on the claimed scope of the present application. It should be noted that for those skilled in the art, several modifications and improvements can be made without departing from the concept of the present invention, and all of which fall within the scope to be protected of the present application.

WHAT IS CLAIMED IS:

1. A two-level hand pump nasal aspirator, comprising:

a pump body, including:

a cylinder having a piston space formed therein, wherein one end of the piston space is an air vent, and an opposite end of the piston space is an air suction port;

an air vent hole cover disposed at the air vent, the air vent hole cover is provided with a plurality of air vent holes and a handle, with the handle having a reciprocating space formed therein;

a piston disposed in the piston space for pushing air toward the air suction port, with the piston provided with a check valve;

a pull rod, wherein one end thereof is connected to an end surface of the piston adjacent to the air vent and extends through the air vent hole cover, and another end thereof is provided with a pull handle, the pull handle is provided with a limit slot on an end surface thereof perpendicular to an axis direction of the pull rod;

a spring disposed in the piston space adjacent to the air vent, with both ends of the spring abutting against the piston and the air vent hole cover, respectively, so as to make the piston abut against the air suction port in its free state; and

a detent placed in the limit slot for reducing a travel stroke of the pull handle in the reciprocating space; and

a nasal aspirator body having a liquid accommodating space formed therein, wherein the nasal aspirator body is communicated with the air suction port through a connecting tube, one end of the nasal aspirator body is a nasal

aspirator opening, and the nasal aspirator body is provided with a suction head to cover the nasal aspirator opening;

wherein an operator pulls the pull rod to drive the piston, to generate a negative pressure in the piston near the air suction port, thereby sucking up liquid by the nasal aspirator body.

2. The two-level hand pump nasal aspirator of claim 1, wherein the handle is provided with a storage slot, which is disposed at one end of the handle that extends beyond the reciprocating space, and the storage slot serves to store the detent.

3. The two-level hand pump nasal aspirator of claim 2, wherein

one end of the suction head forms a suction end for contacting a nasal cavity, and another end of the suction head is provided with a suction head check valve, which is located in the liquid accommodating space;

wherein the nasal aspirator body is provided with a raised rib on an inner wall at another end thereof distant from the nasal aspirator opening, promoting the liquid to adhere to the inner wall of the nasal aspirator body.

4. The two-level hand pump nasal aspirator of claim 3, wherein the raised rib is provided in plural.

5. The two-level hand pump nasal aspirator of claim 4, wherein the nasal aspirator body and the suction head are connected by a snap for quick attachment and detachment of the suction head.

6. The two-level hand pump nasal aspirator of any one of claims 3 to 5, wherein the detent is provided in plural, and lengths of the detents are different from each other, allowing for adjustment between multiple levels of suction force for the pump body.

7. The two-level hand pump nasal aspirator of claim 6, wherein the storage slot is provided in plural, and the storage slots have a number corresponding to that of the detents.

8. The two-level hand pump nasal aspirator of any one of claims 3 to 5, wherein the piston is provided with a silicone ring at a rim thereof for sealing and fitting an inner wall of the cylinder.

9. The two-level hand pump nasal aspirator of any one of claims 3 to 5, wherein the suction head is made of silicone.