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UNDERWATER SWIMMING APPARATUS

Filed May 11, 1956

Fig. 1.

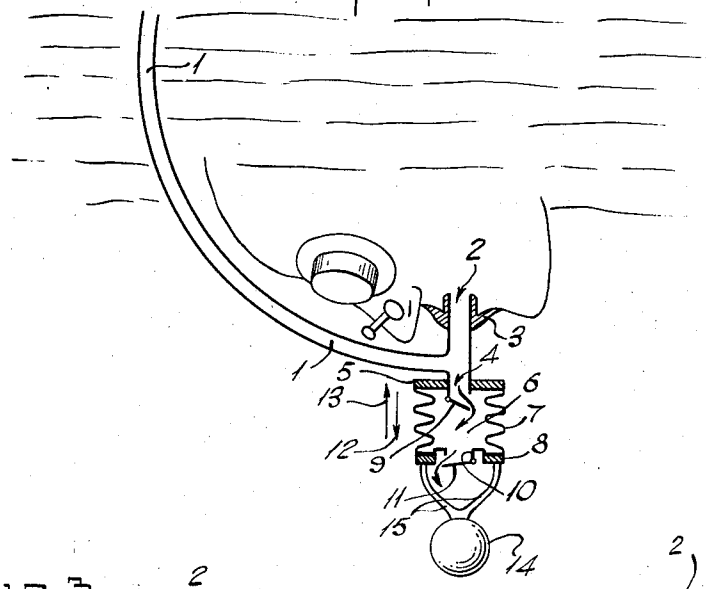


Fig. 3.

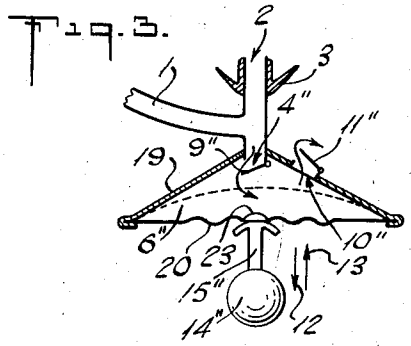


Fig. 2.

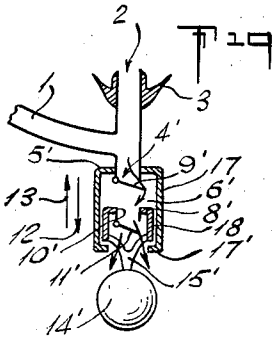
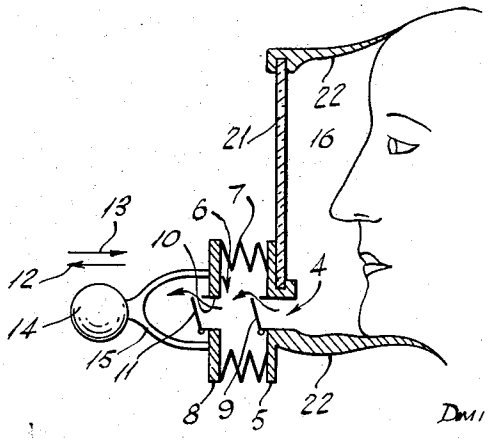


Fig. 4.



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UNDERWATER SWIMMING APPARATUS

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9 Claims. (Cl. 128—142)

The present invention relates to improvements in underwater swimming apparatus and in particular to means for evacuating water or other undesirable liquids or gases which may have accumulated within the tube apparatus or mask used by an underwater swimmer.

Breathing tubes of the snorkel and similar types and other underwater swimming apparatus which include face masks fed by a separate source of oxygen are subject to the difficulty that water sometimes seeps into such tubes and masks and will cause discomfort and sometimes danger to the life of the user unless it is properly evacuated.

An object of the present invention is to provide a readily operable manual means for simply and efficiently removing water and any other undesirable liquids or gases which have collected within a submarine breathing apparatus.

Another object thereof is the provision of such ejection means which may be readily operated from the outside of the breathing apparatus and may even be operated by a companion of the wearer.

In the preferred form the ejection means consists of a chamber formed by a cylindrical bellows which is closed at either end by walls having orifices over which flap valves are positioned, the same being one way or check valves, the inlet valve being directly in communication with the mask or breathing tube and opening when the volume of the chamber is expanded but closing upon contraction thereof, while the outlet valve is closed when the chamber is expanded but opens upon the decreasing of chamber volume thus venting the contents of the chamber to the outside.

Other objects and a fuller understanding of the present invention may be had by referring to the accompanying drawings which illustrate preferred embodiments thereof, it being understood that the foregoing statement of the objects of the invention and the foregoing description therein contained, are intended to generally explain the same without limiting it in any manner.

Fig. 1 is a view in elevation of a preferred embodiment of the device, the chamber being shown in section and the device being related to a breathing apparatus and the user.

Fig. 2 is a similar view of another embodiment thereof, the user and portions of the breathing tube being omitted.

Fig. 3 is a view similar to Fig. 2 of still another embodiment of the present invention.

Fig. 4 is a view similar to Fig. 1 in which the invention is shown in association with a breathing mask.

Referring now to the drawings and more particularly to Fig. 1, the preferred form of the present invention there illustrated is shown in conjunction with a breathing tube 1, the free end of which extends above the level of the water and the other end of which terminates in a T portion, one arm of which ends in a mouth opening 2, about which there is fitted a mouth piece 3 which the user may grasp within his teeth, the other arm of said T terminating at a pump inlet opening 4 in end wall 5 of chamber 6, the side walls of said chamber consisting of bellows 7, the other end of which is closed by an end wall 8. An inlet valve 9, opening into chamber 6, is positioned within chamber 6 so as to close the inlet opening 4 in end wall 5. Said valve may be normally biased to a closed position by means of a spring, not shown. An outlet opening 10 in end wall 8 is similarly closed by an outlet flap valve 11 opening outwardly from chamber 6, which may be normally biased to a closed position against the valve seat by a spring not shown. Both flap valves 9 and 11 are check valves, valve 9 opening only when the bellows are expanded (volume of chamber 6 increased) i.e. the bellows pulled in a direction shown by arrow 12, and valve 11 opening only when the bellows are contracted (volume of chamber 6 decreased) i.e. the bellows pushed in a direction indicated by arrow 13. The pulling and pushing of said bellows may be accomplished by means of a ball handle 14 affixed to end wall 8 by means of a U-shaped strap 15.

In Fig. 4 the bellows type pump of Fig. 1 is shown adapted for use with a face mask which provides a breathing space 16 fed by conventional tank or other means not shown and defined by a transparent face piece or lens 21 and side pieces 22 which contact the wearer's head. The sole and minor difference in the bellows pumps shown is that the flap valves 9 and 11 as here illustrated are pivotally mounted on corresponding sides of end walls 5 and 8. In operation the pumps shown in Figs. 1 and 4 are identical. The inlet to said pumps from the breathing apparatus in both cases should be positioned either at the lowest point in the said apparatus, i.e. where water would normally collect by gravity, or at a point therein where the user can easily concentrate such water by tipping the mask. If water has leaked into the breathing apparatus through seepage around mouth piece 3 or end pieces 22, it collects in the neighborhood of inlet opening 4. If then the wearer displaces ball handle 14 in the direction shown by arrow 12 the volume of chamber 6 will be expanded, thus dropping the pressure therein, and the higher pressure within the breathing apparatus will cause flap valve 9 to open and at the same time the suction effect will cause the said collected water to be drawn into chamber 6. If then the wearer presses in the direction of arrow 13 the volume of chamber 6 will then be decreased and the increased pressure thus developed therein will cause flap valve 11 to open and exhaust the contents of said chamber through outlet opening 10.

Another embodiment of the present invetnion is shown in Fig. 2 which shows a slide type pump affixed to the breathing apparatus illustrated in Fig. 1. In said second embodiment cylindrical pump barrel 17 is closed at one end by end walls 5' and has at the other end an inturned flange 17', end wall 5' having pump inlet opening 4' therein closed by flap valve 9' which opens into barrel 17. A cylindrical slide member 18, having an end wall 8' in which there is an outlet opening 10' closed by an outwardly opening outlet flap valve 11', is positioned within said barrel 17 so that its end wall 8' faces end wall 5' of said barrel. Strap 15' affixed to the other end of said slide 18 extends through the open end of barrel 17 to a ball handle 14'. Flap valves 9' and 11' operate as check valves exactly as do valves 9 and 11 of the first embodiment, and hence the valve operates in the same fashion when the volume of chamber 6', defined by end walls 5' and 8' and that portion of barrel 17 between them, is varied in volume.

A third embodiment of the present invention is shown in Fig. 3 where, in addition to the same type of breathing apparatus, a membrane pump, adapted for the present use, is there illustrated. The pump consists of a conical body 19 at the apex of which there is positioned an inlet

opening 4'' closed by flap valve 9'' which opens inwardly into conical body 19. The base of said body is closed by a flexible membrane 20. An outlet opening 10'' in conical body 19 is closed by an outwardly opening flap valve 11''. Ball handle 14'' may be affixed by a strap 15'' to the center of membrane 20 by means of rivet 23. In this instance the volume of chamber 6'' defined by conical body 19 and membrane 20 is varied by alternately stretching and depressing membrane 20, causing valves 9'' and 11'' to act in the same manner as the corresponding valves in the previous embodiments.

It is to be understood, of course, that all connections between parts of the pumps shown are water and air tight.

It is obvious from the construction of the embodiment shown that this device may be used to evacuate air and other gases from the breathing apparatus.

It should also be noted that the present device may be used where the breathing apparatus communicates only with the nasal passages instead of the user's mouth.

Although the subject invention has been described with a certain degree of particularity, it is understood that the present disclosure has been made only by way of example and that numerous additional changes in the details of construction, combination and arrangement may be resorted to without transcending the scope of the invention as hereinafter claimed.

What is claimed is:

1. Underwater breathing apparatus comprising in combination with a diving mask supply means adapted to be connected between a source of air and the breathing passages of a user, means defining a chamber of variable volume said means defining said chamber including a fixed rearward end wall abutting said mask and a forward movable end wall, said chamber having an inlet opening formed in said fixed wall thereof lying directly between said mask and chamber and an outlet opening to the outside of said apparatus said movable end wall being movable toward and away from said inlet opening, a handle connected to said wall to move therewith whereby as said handle is moved in the direction away from said inlet opening said wall is moved therewith and the volume of the said chamber is expanded, first and second check valves mounted to said chamber to seat over said inlet and outlet openings respectively, said first valve opening upon expansion of the volume of said chamber and closing upon the contraction thereof and said second valve opening upon the contraction of volume of said chamber and closing upon the expansion thereof.

2. Underwater breathing apparatus as described in claim 1, said means defining a chamber comprising a bellows connected at either end to said end walls to form a closed chamber.

3. Underwater breathing apparatus as described in claim 2, said outlet opening extending through said movable end wall.

4. Underwater breathing apparatus as described in claim 3, spring means mounted in association with each of said check valves normally biasing said valves toward a closed position, whereby upon outward actuation of said handle by the user said chamber expands in a suction stroke causing the entry of material into said chamber through said inlet valve, and upon inward actuation said chamber contracts in a force stroke expelling the contents thereof through said outlet valve.

5. Underwater breathing apparatus as described in claim 1, said fixed end wall comprising a hollow conical body and said movable end wall comprising a flexible membrane secured about the open base thereof in sealing relationship thereto.

6. Underwater breathing apparatus as described in claim 5, said inlet opening being at the apex of said conical body and said outlet opening being in a wall thereof.

7. Underwater breathing apparatus as described in claim 1, said means defining a chamber comprising in addition to said end walls a cylindrical barrel connected at either end to said walls, said movable end wall comprising a slide reciprocally mounted in said barrel in sealing relation to said barrel, adapted to travel toward and away from said fixed end wall.

8. Underwater breathing apparatus as described in claim 7, said slide having said outlet opening therein.

9. Underwater breathing apparatus as described in claim 8, spring means mounted in association with each of said check valves normally biasing said valves toward a closed position, whereby upon outward actuation of said handle by the user said chamber expands in a suction stroke causing the entry of material into said chamber through said inlet valve, and upon inward actuation said chamber contracts in a force stroke expelling the contents thereof through said outlet valve.

References Cited in the file of this patent

UNITED STATES PATENTS

859,786	Steenerson	July 9, 1907
908,690	Neubert	Jan. 5, 1909
2,362,775	Sebouh	Nov. 14, 1944