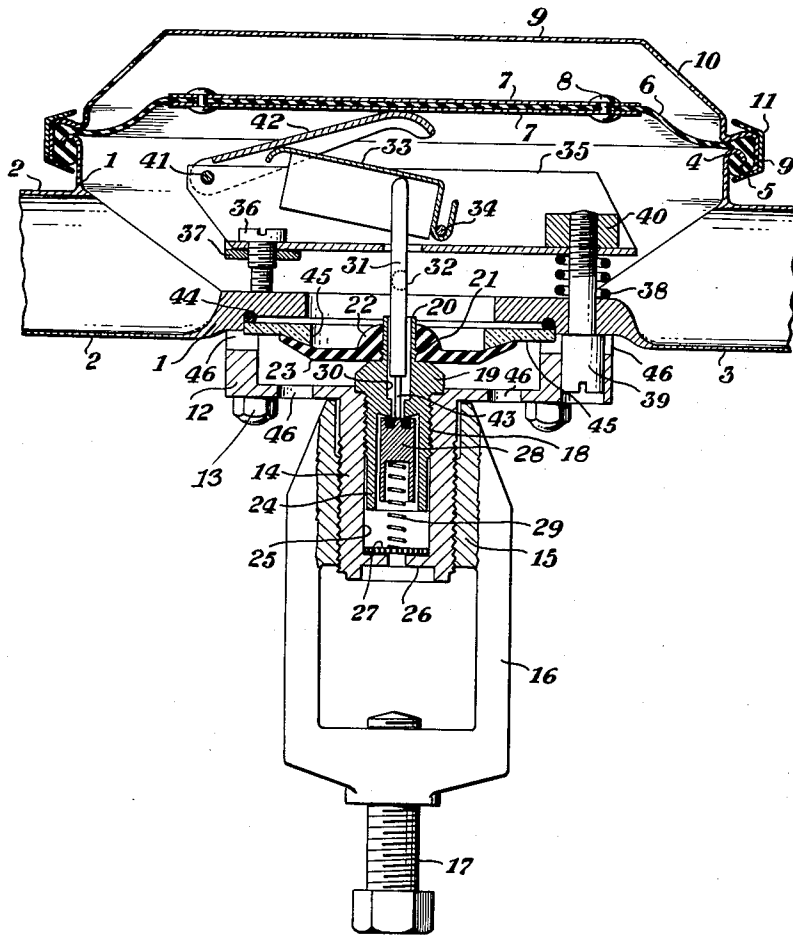


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AIR DELIVERY UNITS PARTICULARLY FOR UNDERWATER
COMPRESSED AIR RESPIRATORS
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AIR DELIVERY UNITS PARTICULARLY FOR UNDERWATER COMPRESSED AIR RESPIRATORS

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The present invention relates to an air delivery unit, particularly suitable for underwater compressed air respirators.

The purpose of this invention is that of embodying a device of the concerned type, allowing the inhalation and exhalation to be effected under absolute safety and regularity conditions.

According to this invention a unit is provided comprising: a metal casing having a frusto-conical shape, sealingly closed by an elastic membrane; an apertured metal cap located over said elastic membrane; a pair of pipes from the lower chamber of the casing leading to a breath mouthpiece, one inlet valve for the air interposed between to compressed air source and said tubes, said valve being carried by a nozzle rigid with said casing and being provided with a shutter element operated by said membrane; an exhaust valve, consisting of a second funnel shaped elastic membrane, concentric with said nozzle and having its peripheral edge which under closure conditions shuts off the passage from the lower chamber of the casing to outside.

Also according to this invention in order to allow for an easy inspection and a ready replacement of the most delicate elements of the air delivery unit, the latter is embodied according to this invention in two parts, split along a plane at right angles to the axis of the device, said parts being connected and fastened by immediately accessible fastening devices.

This invention will be now described with reference to the attached drawing showing by way of example and with no intended limitation a cross-sectional view of one preferred embodiment of the unit.

With reference to the drawing, the air delivery device according to this invention, consists of a metal casing 1 provided in diametrically opposite positions, with two rigid sleeves 2 and 3, to which are sealingly fastened two flexible pipes leading to a breath mouthpiece, not shown in figure.

To the projecting edge 4 of the casing is fastened the folded margin 5 of an elastic membrane which sealingly closes the entire casing, said membrane being provided on each face with a metal disc 7 fastened by the rivets 8. A metal cap 9 is mounted over the membrane 6; said cap is provided with the holes 10 and the whole unit is made fast along its peripheral edge by a collar 11. A cylindrical body 12 is mounted at the base of the casing by means of the bolts 13.

The body 12 is provided with a screwthreaded cylindrical sleeve 14 which is threadedly engaged with the sleeve 15 bodily connected to the stirrup 16 provided with the bolt 17, which serves to connect the unit to a compressed air source, of a known type and therefore not shown in the drawings.

The sleeve 14 is internally hollow and is provided with an inner threading 18 with which a nozzle 19 is engaged, said nozzle being provided at its upper end 20 with a peripheral ridge 21 on which is seated the central portion 22 of a funnel shaped membrane 23. At its lower end the nozzle terminates with a pipe fitting 24 which is received into the bore 25 of the sleeve 14, which at its end is provided with an apertured bottom member 26 whereon rests a filter 27.

A plunger 28 is mounted within the pipe 24, and said plunger is upwards pressed by the spring 29, the

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upper end of the plunger closing the passage 30 of the nozzle 19. The passage 30 is passed through by a needle 31 having a round cross-sectional shape with a flat 32 and bearing at its top against a lever 33 pivoted on the pin 34 carried by a bridge element 35 the cross-section of which is U shaped. At its lower end the needle 31 is provided with an extension 43 which bears against the plunger 28. The bridge element 35 is fastened at one of its ends by the screw 36 which passes through the cross-element 37, while at its other end said bridge rests on a spring 38 wound about the screw 39 the threadings of which engage a block 40 inserted into the recess of the bridge element.

Near to the screw 36, the bridge element 35 carries a pivot pin 41 on which is pivoted the lever 42 the free end of which, under the thrust exerted by the lever 33, acts against the lower disc 7 carried by the membrane 6.

Between the piece 12 and the casing 1 are tightened a seal O-ring 44 located in a groove provided in the body 12, and an apertured disc 45 the lower face of which has a conical shape, corresponding to the shape of the edge of the membrane 23.

As shown in the drawing, the apertured disc 45 rests exactly against the membrane 23 which in its position as shown, shuts off the passage from the inner recess of the casing to the holes 46 provided in the body 12.

The operation of the unit is as follows:

The compressed air, which is supplied by a bottle, not shown in the drawing, passes through the filter 27 and fills the bore 25 and the clearance surrounding the plunger 28. When an inhalation is effected, a vacuum is created in the ducts 2 and 3 and therefore the membrane 6 is lowered, downwards pushing the levers 42 and 33. The lever 33 rotates causing the needle 31 to be downwards pushed, and said needle overcoming the action of the spring 29 causes the plunger 28 to glide downwards; said plunger opens thus the passage 30 and the air moving along the needle 31 enters into the casing.

The air stream is deflected by the lever 33 and enters preferentially into the duct 2 wherefrom the air is inhaled. At the end of the inhaling step, the membrane 6 comes again to its original position and the spring 29 pushes the plunger 28 to shut off the passage 30. The exhalation occurs contemporaneously through the ducts 2 and 3 and the air acting on the upper face deflects the membrane 23 and is then outwards discharged through the holes 46. When the exhaust of the air has been terminated the membrane 23 comes back due to its elasticity to adhere to the apertured disc 45 preventing thus the water from entering into the casing of the air delivery unit.

The screw 39 which is located at an easily accessible position, serves to adjust the position of the pivot pin 34 and therefore gives the opportunity of adjusting the "feeling" of the unit in conformity with the pressure of the water on the upper face of the main membrane 6.

The present invention has been illustrated and described in one preferred embodiment, but it is understood that constructive variations might be practically adopted without issuing from the scope of the present industrial privilege.

I claim:

1. An air delivery unit, particularly for underwater compressed air respirators, comprising a casing having an open top and having two pipes extending from said casing, a first elastic membrane mounted over and tightly closing the top of the casing, a cap mounted over said membrane and having holes therein, a body having a cavity therein and holes therein opening out of the cavity, said body being fastened to the lower part of said casing, a central projecting hub on said body having an axial bore and being internally and externally threaded, a sleeve

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threaded on the externally threaded portion of said projecting hub, said sleeve being adapted to be connected to a source of compressed air, said projecting hub having a filter over the open end of said bore, a nozzle threaded into the internally threaded portion of said projecting hub, valve means within said nozzle for controlling the passage of air through the nozzle, said casing having an aperture therein opening into said cavity, a second elastic membrane between said casing and the body concentric with said nozzle and arranged to selectively open and close the aperture in said casing, a bridge element adjustably mounted inside said casing, lever means pivoted on said bridge element and engaging said first membrane and abutting said valve means positioned within said nozzle, whereby movement of the said first membrane moves said lever means to move said valve means.

2. An air delivery unit particularly for underwater compressed air respirators, comprising a metal casing having a frusto-conical shape and having two rigid pipes on diametrically opposite sides thereof, a first elastic membrane mounted over and tightly closing the top of the casing, a metal cap mounted over the said membrane and having holes therein, a cylindrical body having a cavity therein and holes therein opening out of the cavity, said body being fastened to the lower part of the said casing, a central projecting hub on said body having an axial bore and being internally and externally threaded, a sleeve screwed on the externally threaded portion of said projecting hub and having a stirrup fastened thereto adapted to be connected with a compressed air source, said projecting hub having a disc shaped filter over the free end thereof, a nozzle screwed into the internally threaded portion of the said projecting hub, valve means located within the said nozzle for controlling the passage of air through the nozzle, said casing having an aperture therein opening into said cavity, a second funnel shaped elastic exhaust membrane interposed between the said casing and the said cylindrical body concentric with the said nozzle and arranged to selectively open and close the aperture in said casing, a U-shaped bridge element adjustably mounted inside the said casing, a first lever pivoted in the lower central zone of the said bridge element, and a second lever pivoted at the end of the upper part of the said bridge element, said first and second lever abutting each other, said second lever being engaged by said first membrane which closes the top of the casing

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and said first lever abutting the said valve means located within the said nozzle.

3. An air delivery unit as claimed in claim 2, in which the said first elastic membrane has a pair of metal discs on the two opposite faces of the central zone thereof, said discs being riveted to each other, and in which a metal collar is provided which engages a peripheral edge of the membrane, said peripheral edge being folded between the corresponding edges of said casing and said metal cap.

4. A delivery unit as claimed in claim 2, in which a screw fastens one end of said U-shaped bridge element to the said casing and an adjusting screw on the other end of said bridge, and a spring mounted on said adjusting screw, said spring being compressed between said casing and said bridge element.

5. A delivery unit as claimed in claim 2, in which said nozzle is provided with an axial bore having an upper length of a lesser diameter and a lower length of a greater diameter, and said nozzle having an annular projection on its outer surface which tightly abuts said cylindrical body, and the said annular projection abutting said second exhaust membrane, and in which the said valve means comprises a plunger slidably mounted in the lower length of greater diameter of the axial bore of the said nozzle, a spiral spring pressing said plunger against said length of lesser diameter of the axial bore and against the filter on the said projecting hub, and a cylindrical needle having a flat parallel to the axis of the needle, said needle having a lower end of a lesser diameter which abuts against the upper face of the said plunger and an upper end which abuts against the said first lever pivoted on the said U-shaped bridge element, said upper end passing through the said bridge element.

6. A delivery unit as claimed in claim 2, in which a bored disc is provided having the lower face with a conical shaped edge, said disc being secured between the said casing and the said cylindrical body, a circular packing ring between said disc and said casing, the said second exhaust membrane having its peripheral border abutting against the inner edge of the said bored disc.

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