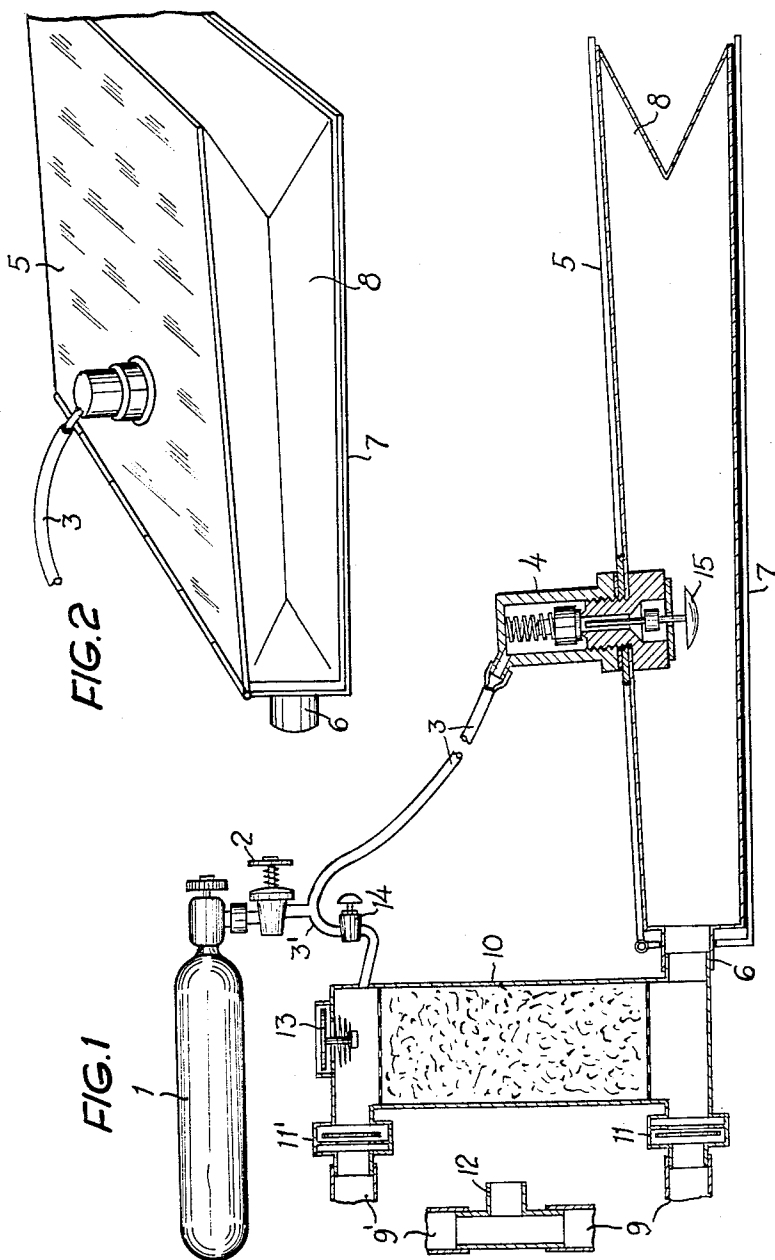


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BREATHING APPARATUS FOR SUBMARINE USE WITH
A STORING SAC AND WITH CONTROLLING
MEANS FOR THE GAS SUPPLY
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BREATHING APPARATUS FOR SUBMARINE USE WITH A STORING SAC AND WITH CONTROL- LING MEANS FOR THE GAS SUPPLY

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2 Claims. (Cl. 128—191)

The present invention refers to oxygen gas breathing apparatus of the carbonic acid absorption type, in which the storing sac is formed as a bellows with at least two rigid sides that are pivotally interconnected and adapted by their mutual movement to cause the opening and closing of a valve for the oxygen gas supply.

The distinguishing feature of the invention resides, above all, in that the valve is arranged on one of the rigid sides preferably within the gas space of the storing sac. Compared to apparatus with a storing sac provided with flexible walls only, the invention brings the advantage that in an apparatus according to the invention every change in volume of the gas in the storing sac brings about a movement of one of the rigid sides as a whole relative to the other. Hence no local concavities and convexities will occur in the walls of the sac due to the differences in the hydrostatic pressure on the various points of the sac walls. In connection therewith an exact opening and closing function of the valve is attained on account of the rigid sides, besides which the valve is kept in a protected position on the rigid wall. A material advantage also resides in that the control of the oxygen gas supply is so finely adapted that the normal working volume of the sac may be regulated to 0.5–1 liter. Consequently, it need not normally have an unpractically large volume but may hold a maximum of about 7 liters, which will prevent gas losses from the system should the gas expand, for instance by reason of a reduced water pressure. Should a rapid rise from a great depth or some other reason cause a gas expansion that cannot be held by the storing sac, a spring-loaded valve provides for the escape of superfluous gas from the system.

If it is desired, for example, to fill the system with oxygen gas for the purpose of increasing the buoyancy, this may be effected with the aid of a manually operable push button valve separated from the automatic lung valve.

The accompanying drawing illustrates a form of embodiment of the invention by way of diagrammatic representation in which:

Fig. 1 is a partly sectioned longitudinal elevational view of the apparatus; and

Fig. 2 is a perspective view of the storing sac.

Referring to the drawings, the gas under pressure passes from the oxygen gas receptacle 1 through the reducing valve 2 to the circulatory breathing system either via branch 3' containing the push button valve 14 or via the automatic lung valve 4. The storing sac consists of a

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stationary sheet metal side 7, a border wall 6 rigidly projecting upwardly from said side 7, a second sheet metal side 5 pivotally connected to said border wall, and a flexible end wall 8 connecting the free ends of the sheet metal sides 5, 7 to form a closed gap receptacle.

By pivotal movement of the rigid side 5 relative to the stationary side 7 of the storing sac, operating member 15 of valve 4 is brought into and out of contact with the rigid side 7 of the storing sac to cause valve 4 to periodically open to supply a desired quantity of oxygen into the sac from receptacle 1 through conduit 3.

Upon inhalation of the user of the apparatus during actual submarine application, oxygen gas passes through the opening in border wall 6, through gas rectifier valve 11 and through conduit 9 to the conduit 12 in communication with the user's mouth. Upon exhalation by the diver, the carbon dioxide gas produced by the user passes through conduit 9', rectifier valve 11' and through the gas purifying container 10 (containing a suitable absorption agent such as natron lime, for example) and into the sac through the opening in the border wall 6. Spring loaded safety valve 13 in the upper portion of container 10 provides means for the escape of gas from the system if the pressure should exceed a desired amount. Should it be desired to fill the system with oxygen gas for the purpose of increasing buoyancy, push button valve 14 is inserted to introduce oxygen from the receptacle 1 directly.

What we claim is:

1. An underwater breathing apparatus comprising a storage sac consisting of a first rigid stationary side, a second rigid side pivotally connected at one end to said first rigid side, and flexible end and side walls connected to said first and second rigid sides to form therewith a closed bellows; a sac inlet valve mounted in said second rigid side, said valve having an operating member extending across said sac to cooperate with the other of said rigid walls so that said valve is operable by relative pivotal movement of said rigid side walls; an outlet conduit extending from said sac; a gas purifying receptacle containing carbon dioxide absorbent and having an outlet connected to said sac outlet conduit and an inlet; a conduit connecting the inlet and the outlet of said receptacle, said conduit having a branch arranged for communication with the mouth of a user of the apparatus; a source of oxygen gas under pressure; and conduit means connecting said oxygen gas source to said sac inlet valve.
2. Apparatus as defined in claim 1 and further including an auxiliary conduit connecting said oxygen source to the inlet of said gas purifying receptacle, said auxiliary conduit having a manually operable shut-off valve connected therein.

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