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APPARATUS FOR USE IN CONNECTION WITH BOTTLES
CONTAINING A GASEOUS FLUID UNDER PRESSURE
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Fig. 1.

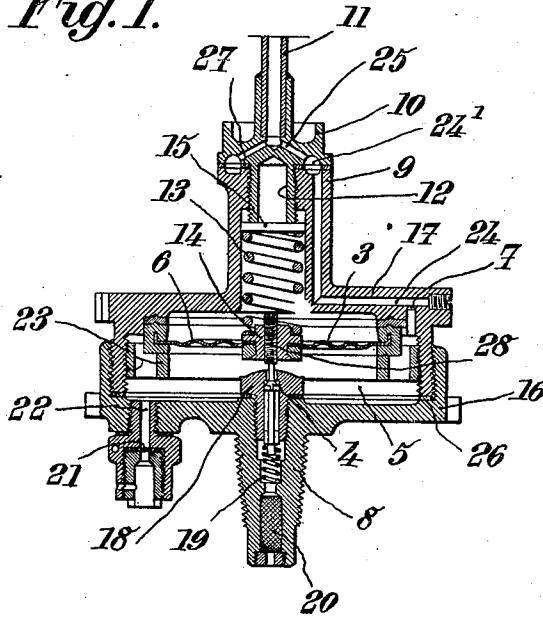
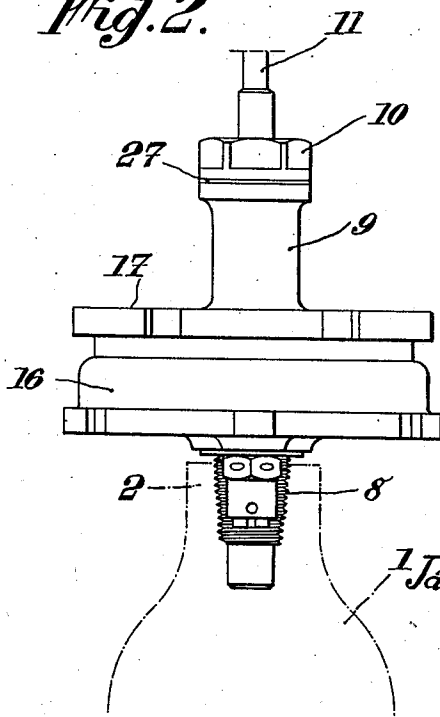


Fig. 2.



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APPARATUS FOR USE IN CONNECTION WITH
BOTTLES CONTAINING A GASEOUS FLUID
UNDER PRESSUREJacques Gustave Méjean, Chatou, France, as-
signor to Société Bronzavia, Courbevoie
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10 Claims. (Cl. 284—18)

The present invention relates to apparatus for use in connection with bottles containing a gaseous fluid under pressure. It is more especially, although not exclusively, concerned with oxygen inhalers such as those with which aircraft pilots are to be equipped for flying at very high altitudes.

The object of the present invention is to provide an apparatus of the kind above referred to which is better adapted to meet the requirements of practice than inhalers made up to this time, especially from the point of view of the space occupied by the apparatus and the weight thereof.

The essential feature of the present invention consists in delivering the compressed gas from the bottles or tanks of apparatus of this kind, by fitting said bottles or tanks with a pressure regulating device arranged in such manner that the gas is capable of flowing automatically through said device when the end of the conduit or tube through which the expanded gas is led to the place where it is to be used, is secured to said pressure regulating device, for instance by screwing said conduit or tube in place on said device.

Another feature of the present invention concerns especially inhaling apparatus such as those to be used by pilots or passengers of aircrafts and consists in providing on the one hand a bottle of a light alloy, for instance hooped aluminum, containing a certain reserve of oxygen, and adapted to be constantly carried by said pilot or passengers, and, on the other hand, a pressure regulating device fixed to said bottle or tank, and to which the feed conduit of a respiratory mask can be fitted, said pressure regulating device being preferably arranged as above explained, whereby said conduit is always under pressure, once it has been fitted onto the pressure regulating device, and the pilot needs only to open a valve, easy to reach, for producing the delivery of the gas.

Still another feature of the present invention consists in providing said bottle or tank with two orifices, preferably located at opposite ends of said bottle or tank, these orifices serving respectively for discharging the gas and for refilling the bottle or tank.

Other features of the present invention will result from the following detailed description of a specific embodiment thereof.

A preferred embodiment of the present invention will be hereinafter described, with reference to the accompanying drawings, given merely by way of example, and in which:

Fig. 1 is an axial sectional view of the portion

of an oxygen inhaler according to the present invention including the bottle or tank, the pressure regulating device, and the feed tube or conduit leading to the mask;

Fig. 2 is an elevational view corresponding to Fig. 1.

In the following description, the invention will be more especially described as applied to an oxygen inhaling apparatus intended to permit a pilot or a passenger of an airplane to fly at a high altitude for a predetermined period of time.

This apparatus includes essentially an oxygen or compressed air bottle or tank, made of a metal which is both light and strong, in such manner that, while containing a reserve sufficient for permitting breathing at a high level for a sufficient time (say for instance one hour), its weight is relatively light, and it can therefore be carried by the person using the apparatus, through suitable means, on the chest or on the back, or again on the side.

On this bottle or tank, I fit a pressure regulating device arranged in such manner that when said device is fixed, for instance by screwing, to the feed conduit conveying the gas to be breathed to the respiratory mask, this automatically produces the flow of the gas through the pressure regulating device which is normally closed.

Such an arrangement therefore permits of providing the pilot or passenger with a reserve of oxygen which he carries continuously upon himself and which he may use whenever it is necessary to do so.

The apparatus may, for instance, be made in the following manner:

Concerning first the bottle or tank proper designated by reference character 1, I may make it of an aluminum alloy, such for instance as duralumin, the strength of which is preferably improved by means of a steel wire hooping in a manner known per se.

According to another feature of the invention, instead of providing said bottle, in the usual manner, with a single orifice or nozzle through which it is also refilled, I provide said bottle or tank with two nozzles, preferably located at opposite ends thereof, respectively, whereby, one of these nozzles, marked by reference character 2, is adapted to receive the pressure regulating device, while the other one (not visible in the drawings) is adapted to receive a tube or pipe through which it can be refilled.

Concerning now the pressure regulating device, it includes at least one expansion stage, said pressure regulating device being for instance of

the type including a diaphragm 3 coacting with a valve 4 and subjected to the action of a spring 13. This diaphragm separates from each other two chambers 5 and 6 which are connected respectively to the bottle or tank and to the outlet orifice upon which the feed conduit of the mask is to be fitted, communication between these parts being ensured through a valve opening or throttled orifice 7 which may be adjustable.

The casing at the inside of which the above mentioned parts are secured is provided, on the one hand, with an extension 8 adapted to be screwed to the bottle or tank, engaging for instance into nozzle 2, and, on the other hand, with an outlet nozzle 9 to which may be secured, preferably also by screwing, a connecting or coupling element 10 carried by the corresponding end of tube 11 leading to the mask, said connecting or coupling element being, for instance, provided for this purpose with a tubular part 12 capable of being screwed inside nozzle 9.

For controlling the gas inflow into the pressure regulating device by screwing coupling element 10 in place thereon, I cause said element to act either upon a special valve device controlling the feed of gas to the pressure relief device, or, according to the embodiment shown by the drawings, directly upon the pressure regulating device. For instance, as long as the coupling element is not screwed in position, the diaphragm 4 is kept in a position where it remains closed, but as soon as the coupling element is screwed into position it automatically moves the diaphragm in the opening direction with respect to the valve.

For instance, as shown by the drawings, I interpose spring 13 between the diaphragm or a piece 14 rigid therewith, and a thrust collar 15 against which the extended tubular portion 12 of coupling element 10 is applied when said coupling is screwed into place.

In order to obtain a correct working, I devise the parts in such manner that, when the coupling element is not in position, collar 15 assumes a disengaged position in which the diaphragm does not bear upon the valve. The screwing of the coupling produces, through the displacement of said collar, the compression of the spring and the opening of the valve.

Preferably, the casing containing the various parts above referred to is arranged in such manner that it can easily be taken apart. For instance, this casing consists of two pieces 16 and 17, arranged to be screwed into each other, with the interposition of a packing element 26.

In piece 16, which carries element 8, there is screwed the element 18 in which valve 4 is movable against the action of a spring 19.

Before this valve, I may provide a filtering and braking device, consisting for instance of a mass of brass wire, as shown at 20.

Furthermore, in combination with chamber 5, piece 16 may be provided with a safety device preventing excess pressures from being produced in said chamber. This safety device consists for instance of a plurality of silver sheets 21 disposed across a conduit 22 leading to the atmosphere, so that an excess of pressure in chamber 5 causes said sheets to be perforated.

In piece 17, there is for instance secured the diaphragm 3, by means of a tightening collar 23 and of course this piece 17 is provided with a channel 24 conveying the gas through valve opening 7 to coupling element 10 and tube 11.

Coupling element 10 itself is provided with a circular groove 24¹ and radial conduits 25 com-

municating with tube 11. Finally, a packing member 27 is provided between coupling member 10 and nozzle 9.

Advantageously, the apparatus will be completed by means for adjusting the pressure after expansion of the gas through the pressure regulating device. Such means may be of different kinds. I may act, for instance, either upon the tension of spring 13, or on valve opening 7, or as shown by the drawings, on the respective positions of diaphragm 3 and valve 4, for instance by means of adjusting screw 28, which is screwed in piece 14 and can easily be reached through the bore of nozzle 9. These means may be designated so that they can be controlled from the outside.

Finally, concerning the feed conduit 11, through which the gas is led to the mask, it is preferably provided with a valve which can easily be reached, and which may be located for instance within the part of said conduit that passes along the chest of the person making use of the apparatus.

Whatever be the specific arrangement of the parts of the apparatus, said apparatus can be fitted on the pilot or passenger before he takes off, coupling element 10 being screwed upon the pressure regulating device. The feed conduit 11 is thus constantly fed with gas at a predetermined pressure, for instance 1 kg., and it suffices, for the pilot or passenger, when, during the flight, he wishes to breathe oxygen, to put on the mask and to open the valve carried by conduit 11, this last mentioned valve being arranged within reach of his hand.

Such an apparatus is therefore of light weight and easy to operate, contrary to existing apparatus which include relatively heavy bottles or tanks provided with pressure regulating devices of the usual type. With these apparatus, if the bottle or tank had to be carried by the pilot or passenger, the latter would be compelled, in order to permit oxygen to reach the conduit feeding the mask, to operate the valve of the pressure regulating device, which would be awkward, especially when the bottle or tank is carried on the back of the pilot or passenger.

On the contrary, the apparatus according to the present invention is always ready to deliver fluid, through the mere operation of the valve disposed in conduit 11.

This apparatus is therefore particularly well adapted for pilots of fighting planes, although it may be applied to many other cases.

The apparatus according to the invention is also applicable in connection with the use of parachutes, so as to permit a person to breathe when at very high altitudes. In this application, the valve controlling the flow through conduit 11 might be disposed close to the control device of the parachute or it might even be combined with said control device.

Finally, the system according to the present invention permits the quick filling of the bottle or tank without requiring the removal of the pressure regulating device, since the filling operation is effected through the opposite end of the bottle or tank.

In a general manner, while I have, in the above description, disclosed what I deem to be practical and efficient embodiments of the present invention, it should be well understood that I do not wish to be limited thereto as there might be changes made in the arrangement, disposition and form of the parts without departing from the principle of the present invention as compre-

hended within the scope of the appended claims.

What I claim is:

1. An apparatus for use in connection with a container of gaseous fluid under pressure, which comprises, in combination, a pressure regulating device adapted to be secured to said container and comprising valve means, a conduit adapted to be detachably connected to the outlet of said pressure regulating device, and resilient means operated by securing said conduit to said outlet, for resiliently pressing upon and opening said valve means.

2. An apparatus for use in connection with a container of a gaseous fluid under pressure, which comprises, in combination, a pressure regulating device adapted to be secured to said container and including an outlet for the expanded gas having flown therethrough, a conduit adapted to be screwed to said outlet, valve means normally adapted to stop the flow of gaseous fluid from said container to said pressure regulating device, and resilient means operated by screwing said conduit in place on said outlet member for resiliently pressing upon and opening said valve means and maintaining said means in the open position at least at normal pressure of said gaseous fluid.

3. An apparatus for use in connection with a container of gaseous fluid under pressure comprising a casing, a valve within said casing, a diaphragm within said casing for regulating the gas pressure therein, a spring acting upon said diaphragm and against said gas pressure, and means for increasing the pressure of said spring for opening said valve and for regulating the flow of gas passing through said valve.

4. An apparatus according to claim 3, further comprising a conduit for conveying the gas which has passed through said valve to a place where it is used, said means for increasing the spring pressure comprising an element for coupling said conduit to said casing whereby said valve is converted from a cut-off valve to a pressure-regulating valve by actuation of said coupling element.

5. An apparatus for use in connection with a container of gaseous fluid under pressure comprising a casing, a valve within said casing, a diaphragm within said casing for regulating the gas pressure therein, a spring acting upon said diaphragm and against said gas pressure, a con-

duit for conveying the gas which has passed through said valve to a place where it is used, means for increasing the pressure of said spring for opening said valve and for regulating the flow of gas passing through said valve, said means comprising an element for coupling said conduit to said casing, said element having an extension, a member bearing upon one end of said spring, said extension displacing said bearing member when said coupling element is secured to said casing.

6. An apparatus for use in connection with a container of gaseous fluid under pressure comprising a casing consisting of two parts, one being screwed into the other, a valve secured within one part of said casing, an element for connecting said casing to said container and secured to said first part of said casing, a diaphragm secured to the other part of said casing for regulating the gas pressure within said casing, a spring acting upon said diaphragm and against said gas pressure, a conduit for conveying the gas which has passed through said valve to a place where it is used, means for increasing the pressure of said spring for opening said valve and for regulating the flow of gas passing through said valve, said means comprising an element for coupling said conduit to said second part of the casing.

7. An apparatus according to claim 3 further including safety means, said means comprising a conduit secured to said casing and connecting the inside thereof with the atmosphere, and a diaphragm closing said conduit, the thickness of said diaphragm being such that it is ruptured when the gas pressure within said casing exceeds a predetermined limit.

8. An apparatus according to claim 3 in which the position of said diaphragm within said casing is controlled in accordance with the relative position of said valve.

9. An apparatus according to claim 3 further comprising means for adjusting the position of the diaphragm relative to said valve.

10. An apparatus according to claim 3 further comprising means for adjusting the position of the diaphragm relative to said valve, said last means comprising an adjusting screw connecting said diaphragm with said valves.

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