

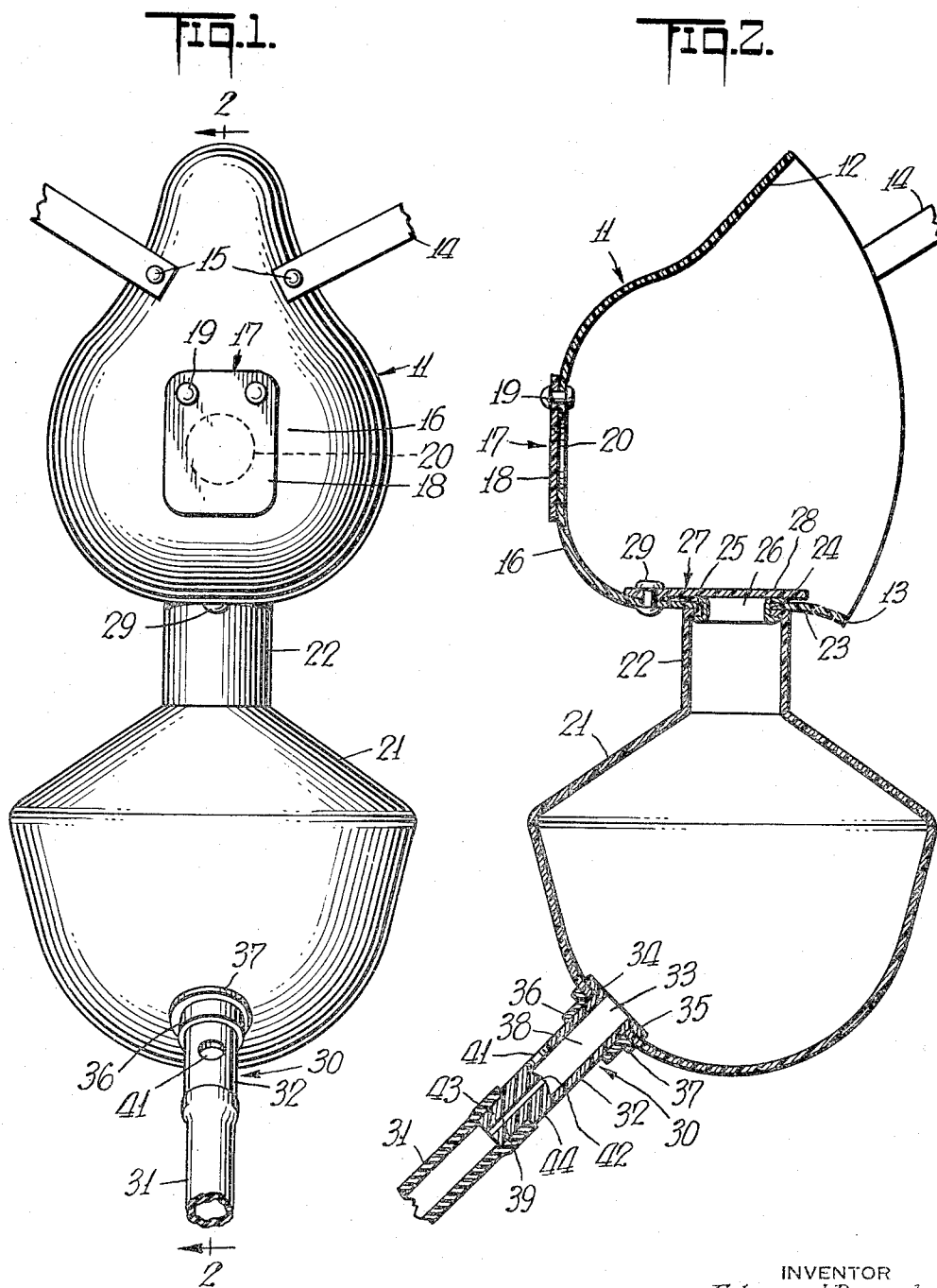
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OXYGEN MASK

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OXYGEN MASK

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This invention relates to oxygen masks, more particularly of the type to supply a mixture of air and oxygen to the user.

It is among the objects of the invention to provide an oxygen mask that is light in weight, compact with but few parts that may readily be fabricated at low cost, and which may feed a predetermined mixture of air and oxygen to the user without need for expensive metering valves and which may be used with any standard oxygen tank having only a conventional oxygen regulator thereon to give the desired mixture.

According to the invention these objects are accomplished by the arrangement and combination of elements hereinafter described and particularly recited in the claims.

In the accompanying drawings in which is shown one of various possible embodiments of the several features of the invention,

Fig. 1 is a front elevational view of the oxygen mask, and

Fig. 2 is a longitudinal sectional view thereof taken along line 2—2 of Fig. 1.

Referring now to the drawings, the oxygen mask which illustratively is of the non-rebreather type, desirably comprises a substantially rigid face piece 11 preferably formed from any suitable plastic. The face piece 11 is designed to cover the nose and mouth of the user in conventional manner so that the upper portion 12 thereof rests on the bridge of the nose and the lower rear edge 13 thereof rests against the chin. The face piece 11 is desirably retained in position by means of a head band 14 designed to pass around the head of the user, said head band desirably being affixed at its ends to the side edges of the face piece as by rivets 15.

Desirably located in the front wall 16 of the face piece 11 is an expiratory flutter valve 17, which may comprise a substantially rectangular piece of flexible sheet material 18 preferably of plastic, affixed at its upper edge as by rivets 19 to the outer surface of said front wall 16 and positioned over an opening 20 therein normally to seal the latter.

The oxygen mask also includes a reservoir 21, preferably a deformable bag which may be of relatively thin plastic material, suspended by its neck 22 from the bottom wall 23 of the face piece 11 and in communication with the interior of the latter through an opening 24 in said wall 23. Although the neck of reservoir 21 may be affixed to the bottom wall 23 in any suitable manner, in the embodiment herein shown, the upper end of neck 22 is inwardly bent as at 25 and

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clamped about the periphery of opening 24 by means of a grommet 26.

Associated with opening 24 is an inspiratory flutter valve 27 which also may comprise a substantially rectangular piece of flexible plastic sheet material 28 desirably affixed by rivets 29 at one edge to the inner surface of wall 23 and normally resting on the periphery of grommet 26 to seal opening 24.

In order that a mixture of oxygen and air may be supplied to the reservoir 21, a metering member 30 is desirably interposed in the oxygen supply line 31 between the conventional oxygen supply regulator of an oxygen tank (not shown) and the reservoir 21. The metering member 30 is so designed that upon flow of oxygen therethrough, a quantity of air will also be sucked into the reservoir 21.

In the illustrative embodiment herein shown, the metering member 30 desirably comprises a rigid inlet tube 32, preferably of plastic, which is affixed at its inner end 33 in an inlet port 34 in the lower portion of reservoir 21 and extends outwardly from the latter. Although the inlet tube 32 may be affixed to the reservoir in any suitable manner, as illustratively shown it desirably has an external annular flange 35 at such inner end 33 positioned in the reservoir and seated on the periphery of inlet port 34, said flange being desirably retained against said periphery as by cementing. In addition, a collar 36 may be provided, encompassing inlet tube 32 and having an external annular flange 37 at one end which clamps the periphery of inlet port 34 against flange 35. Flange 37 also may be cemented against the periphery of port 34 to ensure that an air tight seal is provided.

The inlet tube 32 desirably has a longitudinal bore 38 therethrough, of reduced diameter as at 39 at its outer end to define a restricted orifice. As shown in Fig. 2, an air inlet port 41 of relatively large diameter with respect to that of restricted orifice 39 is provided in the larger diameter portion of bore 38 adjacent the outlet end 42 of said orifice 39 at right angles thereto.

In order that the oxygen supply line 31, which desirably is of any suitable resilient material such as rubber, may readily be affixed to the outer end of inlet tube 32, the latter preferably is of reduced diameter as at 43 defining a shoulder 44 against which the end of the supply line 31 may abut. In this position, the air inlet port 41 will be open so that air may be sucked therein in the manner hereinafter described.

With the oxygen mask positioned on the face

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of the user, as oxygen under pressure is forced through supply line 31 and restricted orifice 39, it will emerge from the outlet 42 of the latter with relatively great velocity. As a result a Venturi action will be affected which will suck air through inlet port 41 into the enlarged portion of bore 38 and the mixture of air and oxygen will be forced through inlet port 34 into reservoir 21 to inflate the latter.

As the user breathes inwardly the resultant suction created in face piece 11 will cause the valve 17 to close and the valve 27 to open so that the mixture of air and oxygen in the reservoir 21 may be drawn into the lungs. As a result of the withdrawal of such mixture of air and oxygen from reservoir 21, the latter will deflate. As the user exhales, the pressure created in face piece 11 will close valve 27 to prevent such exhaled air from entering reservoir 21 and valve 17 will open due to the pressure thereagainst, for exhaust of the exhaled air. With the closure of valve 27 the reservoir 21 will again expand due to the mixture of oxygen and air flowing therein.

In the event that the oxygen mask is being used for therapy, and it is desired to supply substantially pure oxygen at the beginning of the treatment and a mixture of air and oxygen thereafter, it is a relatively simple matter for an attendant or the user himself to move the end of the supply line 31 past shoulder 44 on inlet tube 32 so that it covers air inlet port 41. As a result, as oxygen flows through line 31 and inlet tube 32 no air will be sucked in from the outside.

It is to be noted that in order to fill the lungs of the user a minimum volumetric quantity of either air or oxygen or a mixture thereof is required to be delivered to the reservoir 21.

When the air inlet port 41 is open as above described, the volumetric quantity of oxygen required from the oxygen tank would be less than that required if the port 41 was closed, for the Venturi action created in inlet tube 32 will also suck a quantity of air into the tube to be mixed with the oxygen. Thus, for example, if the volumetric quantity desired is 10 liters per unit time, and it is desired to give a mixture of one-half oxygen and one-half air, the oxygen regulator is set to deliver 5 liters per unit time and the diameter of the restricted orifice 39 and air inlet port 41 are made of such size that 5 liters of air will be sucked into the tube.

If it is desired to deliver only oxygen to the user, with air inlet port 41 sealed, the oxygen regulator is set to deliver 10 liters of oxygen per unit time to give the desired volume.

As the oxygen mask above described is equipped with self-contained means for affording a mixture of oxygen and air to the user, there is no need for the bulky and relatively expensive meter generally used in conjunction with the oxygen regulator to provide a mixture of oxygen and air. Thus the mask may be used to give such mixture with any conventional oxygen tank equipped with only a standard regulator.

As the oxygen mask and its self-contained metering device are formed from relatively inexpensive materials the mask may be discarded after having been used by a patient, thereby to eliminate the need for sterilization of the otherwise expensive masks generally used.

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As many changes could be made in the above construction, and many apparently widely different embodiments of this invention could be made without departing from the scope of the claims, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. An oxygen mask comprising a face piece, a deformable reservoir connected to said face piece and in communication therewith, said reservoir having an inlet port, a substantially tubular inlet member having an annular lateral flange at one end positioned in the inlet port of said reservoir and resting on the inner periphery thereof, a collar encompassing a portion of said tubular member outside said reservoir to clamp the periphery of said inlet port against said flange, said inlet member having a longitudinal bore therethrough in communication at its affixed end with said reservoir and of reduced diameter at the outer end thereof, said bore having an air inlet opening leading thereinto at right angles thereto adjacent the inner end of the reduced diameter portion thereof.

2. An oxygen mask comprising a face piece, having an opening in the front wall thereof, a strip of flexible material affixed to the outer surface of said front wall so as to cover said opening, a deformable reservoir having a neck affixed to the undersurface of said face piece and suspended therefrom, said reservoir being in communication with said face piece, said reservoir having an inlet port near the lower end thereof, a substantially tubular inlet member, means clamping one end of said inlet member to said reservoir about the periphery of said inlet port, said inlet member extending outwardly from said reservoir, said inlet member having a longitudinal bore therethrough in communication at its inner end with said inlet port in said reservoir and of reduced diameter at its outer end defining a restricted orifice having an outlet in said bore, said bore having an air inlet port leading thereinto adjacent the outlet end of said restricted orifice at substantially right angles to the latter, whereby upon flow of gas through said restricted orifice, a Venturi action will be created to suck air through said air inlet port into said bore.

3. The combination set forth in claim 2 in which the neck of said reservoir is in communication with said face piece through an opening in the bottom wall thereof, a strip of flexible material being affixed to the inner surface of said face piece and extending over said opening to seal the latter.

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