

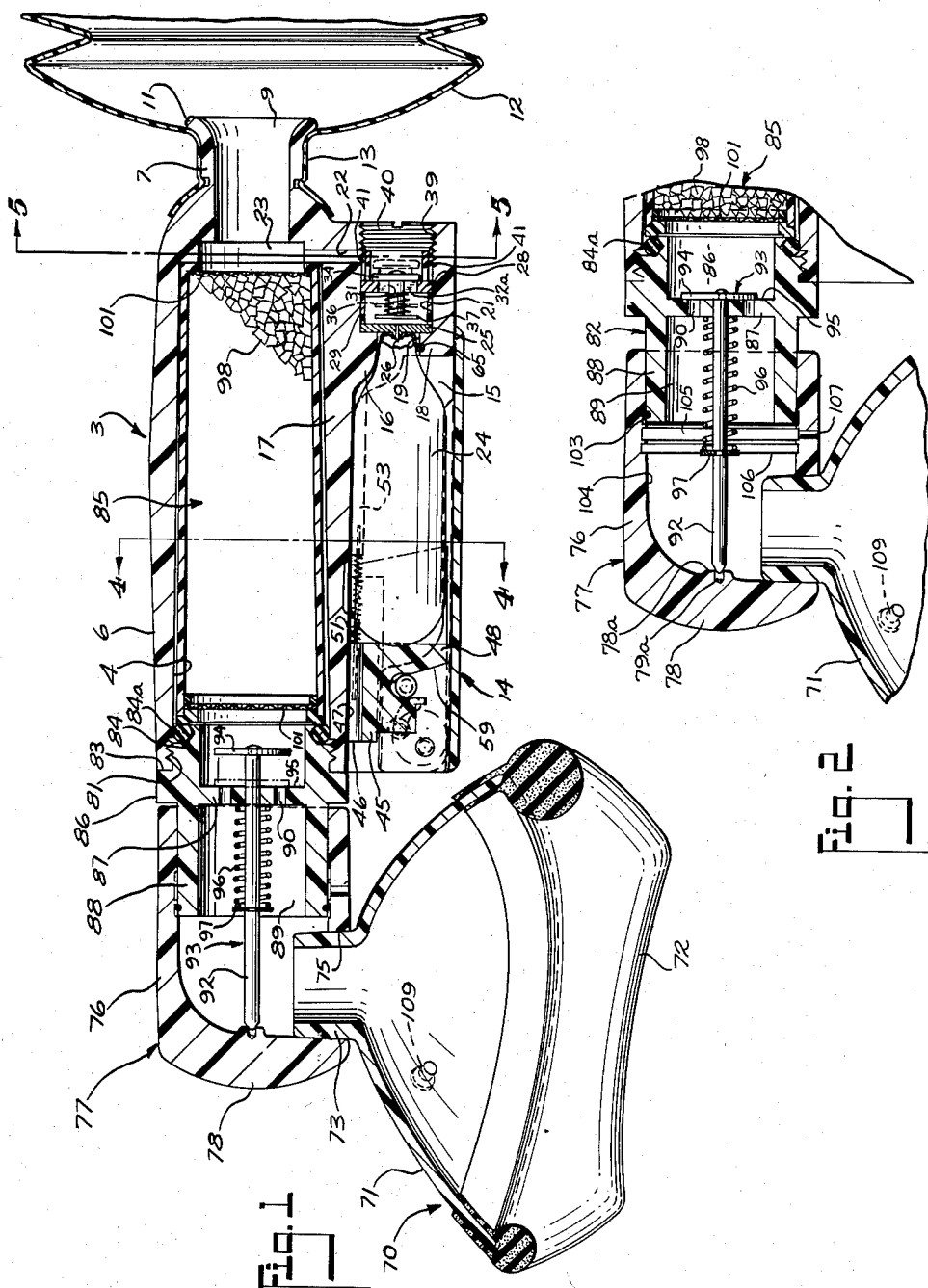
Feb. 7, 1961

J. C. DOAK
RESPIRATOR DEVICES FOR ADMINISTERING
OXYGEN OR OTHER GASEOUS AGENTS

2,970,594

Filed April 25, 1958

2 Sheets-Sheet 1



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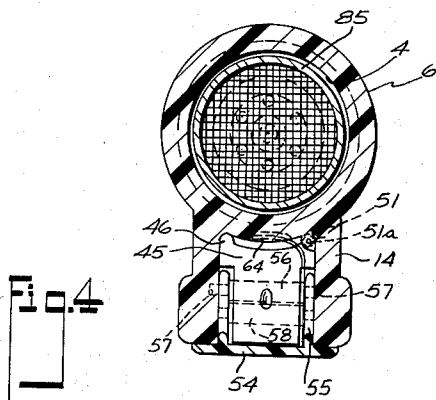
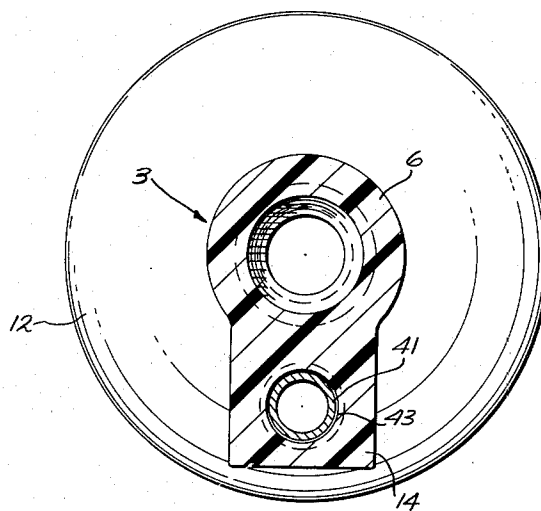
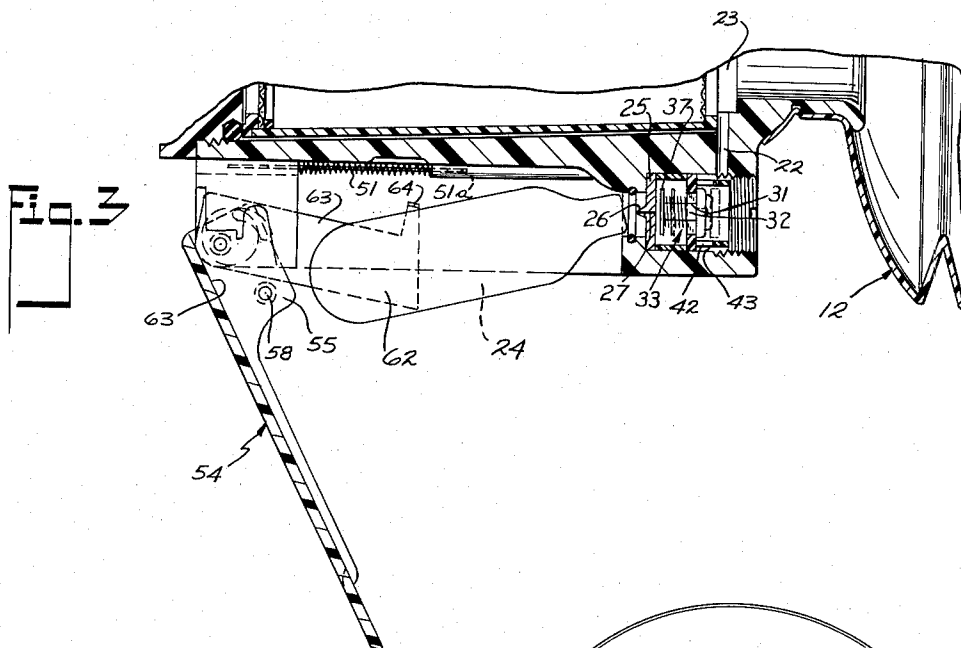


Fig. 5

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RESPIRATOR DEVICES FOR ADMINISTERING OXYGEN OR OTHER GASEOUS AGENTS

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5 Claims. (Cl. 128—203)

This invention relates to a respirator device for the administering of oxygen or like gaseous agents.

A primary object of the present invention is the provision of a novel and improved portable respirator device for the administering of oxygen or like gaseous agents, which device is a self-contained unit and wherein the gaseous agent for the same is preferably carried within a small sealed capsule or cartridge under a pressurized atmosphere.

Another object of the present invention is the provision of a novel and improved respirator device for the administering of oxygen or like gaseous agents and wherein said device is constructed of a minimum of parts, the operation and function of which may be readily undertaken by an average person whereby the services of an anestheologist or like specialized individual is not required.

Still another object of the present invention is the provision of a new and improved respirator device for the administering of oxygen or like gaseous agents, which device is a self-contained unit utilizing gaseous agents carried within small sealed capsules or cartridges under a pressurized atmosphere and further characterized by being a regenerative type of respirator device whereby the toxic gases, such as carbon dioxide, may be readily removed from said agent upon being exhaled by the user back into said device whereby the same may be used over and over again until exhausted.

Another object of the present invention is the provision of a new and improved respirator device for the administering of oxygen or like gaseous agents as referred to above and wherein the operation of said device is controlled by means carried within the same and selectively actuable by the user thereof.

Another object of the present invention is the provision of a novel and improved respirator device for the administering of oxygen or like gaseous agents, the latter being normally contained within a small sealed capsule or cartridge under a pressurized atmosphere and wherein valve means located in said device are selectively actuable in response to placing said capsule or cartridge within the same to condition said device for its intended respirating function.

Additional objects and advantages of the respirator device of the present invention will be realized by one skilled in the art to which it pertains and upon reference to the following disclosure of a preferred embodiment thereof and as illustrated in the accompanying drawings, wherein:

Fig. 1 is a longitudinal sectional view of a respirator device embodying the present invention;

Fig. 2 is a fragmentary sectional view of the respirator device of Fig. 1, particularly the left hand portions thereof mounting the facial mask;

Fig. 3 is a fragmentary longitudinal sectional view of the respirator device of Fig. 1 and shows the oxygen capsule or cartridge ejector mechanism as the same is in its ejecting operation;

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Fig. 4 is a transverse sectional view taken substantially on line 4—4 of Fig. 1; and

Fig. 5 is a transverse sectional view taken substantially on line 5—5 of Fig. 1.

Referring now to the drawings, wherein like parts are designated by the same reference character, the instant form of respirator device of the present invention herein shown includes an elongated housing 3 formed preferably of a plastic material, being substantially key-hole shaped in section as is shown in Fig. 4, and having a chamber 4 formed therein and extending longitudinally centrally through the enlarged semi-cylindrical housing part 6. One end of the housing 3, in longitudinal prolongation of the semi-cylindrical part 6, which end may be hereinafter referred to as the lower end of the housing as the same is normally utilized, is provided with a necked-down portion 7. A passageway 9 is formed centrally through said necked-down portion and opens on its upper end to the aforesaid housing chamber 4. The lower end of said necked-down portion is likewise provided with a radially outwardly flared end 11.

An expansible container 12, the form shown herein being constructed of a plasticized material, such as a vinyl sprayed over a suitable template and preferably taking the form of an accordion type of structure, has its throat portion 13 extended over the aforesaid necked-down portion 7 of the housing 3, in such manner as to provide a gaseous seal therebetween. In this manner, the expansible container 12 communicates with the lower end of the aforesaid passageway 9 in the housing necked-down portion 7, and hence with the housing chamber 4.

The rectangular shaped part 14 of the housing 3 is likewise centrally provided with a breech or chamber 15 opening on its upper transverse end and outermost longitudinal face to the exterior of said housing part, as is seen in Fig. 1. The lower end of said breech or chamber is defined by a substantially semi-cylindrical shoulder 16 integrally formed with the partition 17, the latter defining and interconnecting with the aforesaid housing parts 6 and 14, respectively. As seen particularly in Fig. 1, the aforesaid semi-cylindrical shoulder 16 inclines inwardly toward the longitudinal center of the chamber 15 and integrally connects with a transverse wall 18, the latter having an aperture 19 provided therein and communicating on its opposite end with a cylindrical cavity 21 formed centrally in the lower part of the rectangular shaped housing part 14 and opening to the bottom face of the latter. A passageway 22, extending transversely across the lower or right hand portion of the housing part 14 as viewed in Fig. 1, communicates on its one end with the aforesaid cavity 21 and on its opposite end with an enlarged counterbore 23, the latter in turn, being interposed between and communicating with the housing chamber 4 and passageway 9 in the necked-down portion 7 of the housing 3. In this manner, the aforesaid cavity 21 in the housing 14 communicates with the housing chamber 4 and also with the expansible container 12, the purpose for which will be presently explained.

As previously mentioned, the oxygen supply or like gaseous agent for the present form of respirator device is normally contained within a sealed capsule or cartridge. This cartridge, as indicated by the reference character 24 in Fig. 1 is adapted to be placed within the breech or chamber 15 in such manner as to enable said agent to flow into and through the aforesaid cavity 21 and passageway 22 and thence through the communicating counter-bore 23 and passageway 9 into the expansible container 12. For this purpose, means are mounted within the aforesaid cavity 21 and are operative when the capsule or cartridge 24 is placed within the breech or chamber 15 in the manner shown in Fig. 1 to pierce the

necked portion of the same and thereafter permit the gaseous agent contained therein to flow through the above described connected fluid passageways and thence into the expansible container 12. To accomplish this, a flat circular plate 25 is placed against the underside face of the transverse wall 18 and is provided centrally with a piercing element 26, the latter depending substantially perpendicularly outwardly of said plate and into the aforesaid aperture 19 in said wall. The piercing element 26 is likewise integrally formed with a channel 27 which extends longitudinally through the latter and also the plate 25, communicating on its uppermost end with the breech or chamber 15 and on its opposite end to the cavity 21. A valve plate 28 is also placed within the cavity 21, being mounted therein in spaced relation to the plate 25 by means of a cylindrical spacer element 29. The valve plate is centrally provided with an opening 31 through which extends the stem 32 of a valve element 33. In like manner, said valve plate is formed with a plurality of circumferentially spaced ports 32a disposed in equal spaced relation to the opening 31. Said valve element also includes a disc-shaped valve head 34 normally positioned to extend over the ports 32a and into engagement with the lower or right hand face of the valve plate 28 as viewed in Fig. 1, to seal said ports from the lower portion of the cavity 21 and communicating passageway 22. The valve element 33 is biased into this position by means of a coil spring 36 placed over the stem 32 and having its one end engaging with a fixed plate 37 rigidly attached to the extremity of said stem and its opposite end engaging with the left hand or upper face of the valve plate 28. The lower or extreme right hand end of the aforesaid cavity 21 is internally threaded as is indicated at 39 and receives a similarly externally threaded plug 40 in such manner as to seal said end of the cavity. A cylindrical bridge member 41 is also preferably interposed between the adjoining faces of the valve plate 28 and the plug 40 in such manner as to locate the former substantially in the medial portion of the valve cavity 21. As is seen particularly in Figs. 1 and 3, the bridge member 41 is formed with a plurality of openings 42 spaced circumferentially around the same on the end thereof adjacent the valve plate 28, being operative in a manner later to be described, to accommodate the flow of the gaseous agent therethrough. As seen in Figs. 3 and 5, the diameter of the bridge member 41 is slightly smaller than the diameter of the valve cavity 21, said components when located in the manner just described, defining an annular passageway 43 which communicates at its lower end with the aforementioned passageway 22. In this manner, said bridge member is operative to space the valve plate 28 in its preferred location while at the same time permitting the gaseous agent to flow freely therethrough and thence into the passageway 22 and communicating expansible container 12.

As previously mentioned, the metal capsule or cartridge 24 containing the gaseous agent under a pressurized atmosphere is placed within the breech or chamber 15 in an inverted position similar to that as is shown in Fig. 1, but in a position when the piercing element 26 may only slightly engage the closed end of the same, as shown in Fig. 3. With said capsule thus located, it is then adapted to be moved longitudinally downwardly, or to the right such that the piercing element 26 is effective to puncture said closed end and thus permit the entrapped gaseous agent to escape therefrom. To accomplish this, means are provided to force the capsule 24 longitudinally through the breech 15 into piercing engagement with the aforesaid element 26. For this purpose, said means includes a block member 45 movably disposed in the breech or chamber 15, Figs. 1 and 4, and which is provided with a pair of spaced feet 46 adapted to rest upon the adjoining face 47 of the partition 17 defining the base of said breech or chamber. As shown particularly in Fig. 4,

the aforesaid feet 46 of the block member are shaped to conform to the curved configuration of the partition face 47 in such manner as to centrally locate said block member in the breech 15.

The block member 45, as shown particularly in Fig. 1, is integrally formed with a striker plate 48 which has a flat face extending substantially transversely to the partition face 47, and thus located so as to engage with the rearward end of the sealed capsule 24. A suitable coil spring 51 disposed in the breech 15 adjacent the base thereof and extending longitudinally therethrough, is mounted on a pin 51a, the latter of which has its one end embedded within one of the aforesaid feet 46 of the block member 45 and its opposite end similarly disposed within the adjoining end of a longitudinal ridge 53 depending outwardly from the partition 17. With this construction, the block member 45 is normally urged toward the aforementioned open transverse end of the breech. A closure member as indicated at 54 in Figs. 1 and 4, is integrally provided on its one end with a pair of hinge plates 55, the latter extending longitudinally therealong, being slightly spaced inwardly of the opposed longitudinal edges of the same and in parallel spaced relation to each other. Said closure member is hingebly attached to the housing part 14 and for this purpose, a pintle 56 has its reduced end portions extending through each of the aforementioned hinge plates 55 and into oppositely disposed dead-end holes 57 provided in the housing part 14 opening into breech 15. In this manner, the closure member is pivotally movable about said pintle from an open position as is shown in Fig. 3 to a closed position as is shown in Fig. 1. It is contemplated that with the movement of said closure member to said latter position, the aforesaid block member 45 is actuated longitudinally of the breech 15, to effect the puncturing of the capsule or cartridge as above described, and for this purpose a rod or bar 58 anchored to and extending between the hinge plates of the closure member remote from the pintle 56, is adapted to be moved into engagement with the inclined wall of a groove 59 extending substantially transversely across said block member closely adjacent its flat wall 48. As seen particularly in Fig. 3, said groove wall inclines from its outwardmost edge inwardly longitudinally of the block member and toward the above described pivotal connection for the closure member 54. With this construction, it is seen that when the closure member is swingably moved toward its Fig. 1 or closed position, such that the bar 58 engages with the aforesaid inclined groove wall, the block member 45 is driven longitudinally of the breech 15 against the resistance of the coil spring 51 toward the transverse wall 18. It is realized, therefore, that with a cartridge 24 positioned within the breech in the manner above described, this movement of said block member will be sufficient to move said capsule such as to puncture the end of the same by the aforesaid piercing element 26. As a result, the gaseous agent flows out of the capsule and into and through the piercing element channel 27 under considerable force effective to actuate the valve element 33 and carry its head 34 downwardly away from the valve plate 28. Said gaseous agent thence flows through the open ports 32a in said plate and into the lower part of the valve cavity 21, and thereafter into the channel 22 and container 12, from thence it may be utilized as needed. As soon as the supply of gaseous agent is substantially completely expelled from the capsule 24, the pressure thereof actuating the valve element 33 ceases and consequently the coil spring 36 is effective to cause said valve element to move to its normally closed position, and hence seal off the passageway 22 from the upper portion of the cavity 21. In this manner, the gaseous agent, once it flows into the expansible container 12 is prevented from flowing back through the aforesaid valve cavity 21 in the reverse direction toward the breech 15. A suitable O-ring 65 of conventional construction may also

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be disposed in the aperture 19 and positioned to engage with the neck portion of the capsule 24 in a sealing relation as the same is moved into piercing engagement with the aforesaid element 26 and thus aid in sealing off the valve cavity 21 from the breech 15.

Means are also provided to automatically cause the ejection of a spent capsule or cartridge 24 from the breech 15 when the supply of gaseous agent contained therein has been exhausted. For this purpose, the form of respirator device herein shown includes an ejector member or arm 62 which has its one end pivotally secured to the pintle 56 in such manner that the extremity of said arm adjacent to said pintle is adapted to be engaged by the under-surface 63 of said closure member in the manner as is shown in Fig. 3 as said closure member moves from its Fig. 1 or closed position to its open position as shown in said Fig. 3. The ejector member 62 also includes a curved finger 64 which extends around the capsule or cartridge 24 in the manner shown in Fig. 1 when the latter is placed in the housing breech 15. With this association of elements, it will now be realized that as the closure member 54 is being moved toward its Fig. 3 position, said movement is effective to actuate the ejector arm 62 clockwise as viewed in Fig. 3, whereby the ejector finger 64 partially ejects the cartridge 24 from the breech or chamber 15. Referring again momentarily to the block member 45, it was heretofore seen that when the same was moved toward the transverse wall 18 the resistance of the coil spring 51 increased. Hence, upon moving the closure member 54 to its open position in ejecting the exhausted capsule, the pressure of said coil spring and the angulation of the inclined wall of the groove 59 are such that when the bar 58 reaches a certain point on said wall and the closure member is free to be swung about its pivotal connection, said closure member is thereafter snapped or swung rapidly to its fully extended or open position and thus impart sufficient force to the cartridge 24 by means of the engaging ejector finger 64 such that the same may be completely rapidly ejected from the breech or chamber 15.

As previously mentioned, the instant respiratory device includes means for directionally dispensing the gaseous agent to the person of an individual user. In the form herein disclosed, said means comprises a facial mask as indicated generally in Fig. 1 by the reference character 70 and which includes a bell-shaped adapter member 71 preferably constructed of a suitable plastic material and mounting a face engaging part 72, the latter being formed of a soft pliable material such as a vinyl-silicone material covered with a vinyl coating, and also configured to readily conform to the facial characteristics of a particular individual so that as the gaseous agent passes through the same, said face engaging part prevents said agent from escaping therebetween. As seen particularly in Fig. 1, the bell-shaped adapter member 71 of the facial mask is provided with a hollow throat portion of relatively small diameter as indicated at 73 which extends into and is rigidly secured within an aperture 75 provided in the upper portion of the annular wall 76 of a cup-shaped bulkhead member 77 and preferably juxtaposed to the closed end 78 of the same. Said bulkhead member and facial mask are adapted to be connected to the housing 3 of the respirator device in longitudinal prolongation thereof and on the end thereof opposite to the expansible container 12, being movable longitudinally to said housing between a position as indicated at Fig. 2, hereinafter referred to as the "off" position, and a position as shown in Fig. 1, hereinafter referred to as the fully "on" position. For this purpose, the upper end of the housing 3 or the left hand portion as is shown in Fig. 1, is internally threaded as at 81 and threadably receives a valve sleeve 82, the latter being integrally provided with an annular shoulder portion as is indicated at 83, which seats upon the adjoining end of the housing 3 sufficiently to effect a suitable seal therebetween. The

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lower threaded portion 84 or the valve sleeve extends downwardly or to the right, as viewed in Fig. 1 into the housing chamber 4 and preferably terminates closely adjacent the upper end of a filter element 85, the latter element to be defined in greater detail hereinafter. An O-ring 84a may be carried by said threaded valve sleeve portion and located such as to engage with the wall of the housing chamber 4 to thus effect a gaseous fluid seal therebetween. Said lower threaded portion of the valve sleeve 82 is likewise centrally provided with a chamber 86 which extends upwardly centrally therethrough being defined at its uppermost end by a transversely extending wall 87 provided in the medial portion of said valve sleeve. The upper portion of said valve sleeve as is indicated at 88 is preferably substantially cylindrical in configuration, also being provided with a chamber 89 which extends centrally downwardly therethrough being terminated at its lowermost end by the opposite face of said wall 87. Said wall, in addition, is provided with a plurality of circumferentially spaced ports 90 which communicate with each of the aforesaid valve sleeve chambers 86 and 89 respectively. In like manner, the transverse wall 87 is centrally provided with an aperture 91, the same being centered within said spaced ports 90. Said aperture slidably receives the stem 92 of a valve member 93, the lower end of said stem rigidly mounting a flat circular valve element 94, the latter having a diameter substantially larger than the distance between oppositely disposed ports 90 on the transverse wall 87, being movable into engagement with the lower surface 95 of said wall, as is seen in Fig. 2, to effectively seal said ports from the aforementioned valve sleeve chamber 86. Said valve element is normally biased into the latter described position by means of a coil spring 96 placed over the valve stem 92 and having its one end engaging with the upper surface of the transverse wall 87 of said valve sleeve 82 and its opposite end engaging with a retainer washer 97 carried by said valve stem approximately at its medial portion.

The aforesaid bulkhead member 77 is placed end-wise over the upper cylindrical part 88 of the valve sleeve 82, being slidable longitudinally thereover to effect the actuation of the valve member 93 such that the facial mask adapter member 71 is connected in circuit with the housing chamber 4. To accomplish this, and assuming that the bulkhead member 77 is located in its Fig. 2 position wherein the valve member 93 is closed, it will then be realized that by moving said bulkhead member longitudinally downwardly along said cylindrical part of the sleeve member 82, toward and to the Fig. 1 position thereof, the free end of the valve stem 92 will engage with the closed end 78 of said bulkhead member and thus force the same and the attached valve element 94 out of sealing engagement with the aforesaid ports 90. The inner surface of the closed end 78 of said bulkhead member may be additionally integrally provided with an outwardly depending boss 78a formed centrally with a dead-end hole 79a into which the said free end of the valve stem 92 may seat whereby said association of elements assist in maintaining the valve element centered with respect to the valve sleeve 82. As a result of the valve movement, the valve sleeve chamber 89 and hence the interior of said bulkhead member and adapter member of the facial mask 70 are brought into communication by means of the ports 90 with the lower valve sleeve chamber 86 and housing chamber 4 in circuit with the latter. When this occurs, the oxygen or like gaseous agent previously injected into the expansible container 12, is thence allowed to flow upwardly through said housing chamber 4 and communicating passageways just described to the facial mask 70 wherein the same is dispatched to the mouth of the person utilizing the respirator device. When the person has received the desired amount of gaseous agent, he may then slidably move said bulk-head member upwardly or to the left as viewed in Fig. 1 to allow the

valve member 93 to again move into sealing relation with the aforesaid ports whereby the gaseous agent is disconnected from the facial mask 70. Hence, with this construction, it is now realized that the person utilizing the respiratory device of the present invention is capable of regulating the flow of the gaseous agent by a simple adjustment being made to the bulk head member 77 carrying the facial mask whereby the aforesaid valve means 93 are selectively actuatable in response thereto, being likewise movable in the same direction as said bulk head movement to connect and/or disconnect said supply of gaseous agent to the facial mask 70.

It is also intended that the valve member 93, when moved to its actuated or open position as indicated in Fig. 1, be retained in said position, preferably automatically, and thereby permit said device to be freely operable without further manual control. For this purpose, and as is seen in Figs. 1 and 2, the cylindrical portion 88 of the valve sleeve member 82 is preferably formed with an annular groove which receives an O-ring 103 or the like, said O-ring being of such size as to completely fill said groove and protrude outwardly thereof into substantial pressure engagement with the inside surface 104 of the bulkhead member 77. Said bulkhead member, in addition, is provided with an internal annular groove 105 opening to said latter surface being located thereon in a pre-selected position, the purpose for which will be presently explained. The upper edge of said groove, or the lefthand wall thereof, as viewed in Fig. 2, defines the lower face of an annular shoulder 106, whose diametrical dimension is preferably substantially the same as that of the interior surface 104 of said bulkhead member. In addition, a plurality of circumferentially spaced holes 107 are provided in the annular wall 76 of said bulkhead member preferably spaced longitudinally along said wall from the aforementioned aperture 75 in the latter, and opening on the inner end thereof to the groove 105.

With this construction, and assuming that the bulkhead member 77 is in its fully extended position on the valve sleeve 82, the aforesaid O-ring 103 passes firmly against the inner surface 104 of said bulkhead member. Then, assuming that the latter is moved longitudinally downwardly over the cylindrical portion 88 of said valve stem toward its Fig. 1 position, the O-ring 103 enters the annular groove 105 and said bulkhead member is freely slidably movable over said valve sleeve. While said bulkhead member is thus moved, the valve stem 92 is pressed downwardly to carry its valve element 94 away from the ported wall 87 whereby the gaseous agent is connected to the facial mask in the manner as above described. As said bulkhead member is moved to its fully actuated position, as is shown in Fig. 1, the annular shoulder 106 on the same passes over the aforesaid O-ring 103, the latter being of such dimension as to press firmly against said shoulder sufficiently to resiliently retain said bulkhead member in said latter position. With the bulkhead member thus located it is intended that the force exerted by said O-ring member on the shoulder surface is greater than the force exerted by the coil spring 96, the latter being in a somewhat compressed condition, due to the movement of the valve sleeve 92 and therefore said bulkhead member remains in its actuated or Fig. 1 position. With said member in its actuated position, the aforementioned holes 107 provided in the annular wall 76 thereof are also carried downwardly past the O-ring 103 and hence are sealed from the valve sleeve chamber 89. In this manner, the gaseous agent is prevented from flowing outwardly through said holes to atmosphere and is therefore restricted to flow through the facial mask 70.

When it is desired to return the bulkhead member and facial mask to its non-actuated position as is illustrated in Fig. 2, said bulkhead member is merely pulled slightly upwardly or to the left as viewed in Fig. 1 a distance sufficient to remove the O-ring 103 from engagement with the annular shoulder 106 whereby said O-ring again en-

ters into the groove 105. Thereafter, the coil spring 96 being in a somewhat compressed condition as above described, is sufficient to rapidly snap said bulkhead member to its fully extended position as is shown in Fig. 2 while at the same time causing the valve member 93 and hence the valve element 94 to again move into sealing relation with the aforementioned ports 90.

With the bulkhead member 77 located in its Fig. 2 position, and with the facial mask 70 in its normally operative position with the person of a user, he may if desired, use the latter to inhale and/or exhale the atmospheric air through the aforementioned holes 107 in said bulkhead member and thus determine the operativeness of the above mask components prior to using the same.

As also mentioned previously, it is contemplated that the instant form of respirator device of the present invention is to be regenerative in operation, that is to say, the oxygen or like gaseous agent is returnable to said device once exhaled by the user such that it may be revitalized or separated from the toxic gaseous agents normally exhaled therefrom, such as carbon dioxide. For this purpose, the aforementioned filter element 85 takes the form of an elongated hollow canister preferably constructed of a plastic material and carrying a suitable quantity of a crystalline filtering material such as soda lime crystals as indicated by the reference character 98. The walls of the canister and housing chamber 4 are likewise preferably constructed so as to incline slightly radially inwardly toward the housing necked-down portion 7 as is indicated in Fig. 1, such that said components may be placed in assembled condition only when the drafts of the same correspond. A very fine metallic screen mesh, as indicated at 101, is disposed in each end of the canister to thus prevent the escapement of the filtering particles.

With the canister placed within the housing chamber 4 in the manner as indicated in Fig. 1, it will be realized, that when the respirator device is operated as previously described, the oxygen or like gaseous agent travels upwardly out of the expandable container 12, thence through the canister 85, bulkhead member 77 and attached facial mask 70, wherein it is thence inhaled by the patient. And in like manner, when said patient next exhales, at least a portion of said expelled gaseous agent, now mixed with various other agents to form carbon dioxide, for example, is forced back into the respirator device wherein it flows downwardly, to the right as viewed in Fig. 1, through the canister 85 in the opposite direction to that previously experienced, being revitalized thereby or separated from said other agent by the aforesaid filtering material 98 carried therein. The expelled gaseous agent, when separated from the aforementioned mixture, then flows back into the expandable container 12 and hence is conditioned for subsequent use.

With this particular location for the filtering canister, it is realized that the gaseous agent is subjected to the filtering action of the same prior to its being applied to the person of the user. Also, that portion of the gaseous agent recirculated through the respirator device is subjected to said canister cleansing action at least twice during each cycle of its flow before the same is next utilized. In this manner, it is hence apparent that a maximum use of the limited supply of oxygen or like gaseous agent contained within the aforesaid capsule 24 is accomplished. Further, it is realized that with the location of said filtering canister intermediate the source of said agent and its dispensing mask, a maximum cleansing action is accomplished by said canister.

The respirator device is preferably adapted to be releasably attached to the head of the patient such that it may be automatically retained in its operative position without need of the patient holding the same for in some instances he may be semi or completely unconscious. For this purpose, suitable fastening means such as stud members 109 may be integrally formed on the outside

surface of the mask adapter member 71 preferably on opposite sides of the throat portion 73. A stretchable belt or strap (not shown) may be placed around the head of the patient and anchored at its ends to said stud members and in this manner retain the facial mask and attached components of the respirator device in their normal operative position.

Having thus described a preferred embodiment of respirator device of the present invention, it is realized that the same is susceptible to various modifications, arrangements and combination of elements without departing from the inventive concepts thereof as defined in the claims.

What is claimed is:

1. A respirator device for administering oxygen or like gaseous agent, comprising a housing mounting a facial mask on its one end, an expansible container mounted on the opposite end of said housing, a chamber formed in said housing and communicating with said mask and container, a breach provided in said housing and arranged to receive a sealed cartridge containing a compressed gaseous agent, closure means swingably attached to said housing and adapted to extend over said breach, a valve cavity formed in said housing communicating with said breach, a passageway in said housing communicating with said valve cavity and said chamber, valve means in said cavity and including a piercing element for said cartridge, means carried by said closure means being movable therewith to engage said cartridge and force the same into piercing engagement with said element being effective to cause the actuation of said valve means and provide a flow of gaseous agent to said valve cavity and connected expansible container, and means operable in response to the actuation of said facial mask to a first position to connect the latter in circuit with said container and effect a flow of gaseous agent therebetween.

2. A respirator device for administering oxygen or like gaseous agent as defined in claim 1 and wherein the means responsive to the actuation of the facial mask includes second valve means automatically conditioned in response to a movement of said facial mask to said first position to connect the latter in circuit with the expansible container.

3. A respirator device for administering oxygen or like gaseous agent as defined in claim 2 and wherein said second valve means are carried in the housing being normally conditioned to seal said mask from the latter and movable to an open position in response to the

actuation of said mask to said first position to connect said mask in circuit with the expansible container.

4. A respirator device for administering oxygen or like gaseous agent, comprising a housing, a facial mask operatively connected with said housing for dispensing a gaseous agent to the mouth and nasal passages of a person, expansible container means attached to said housing, a breach provided in said housing and arranged to receive a sealed cartridge containing a supply of gaseous agent, means in said housing for connecting said supply to said expansible container, means responsive to a conditioning of said facial mask relative to said housing to connect said expansible container to said mask, and means operatively connected to said housing being effective to rapidly expel said cartridge upon the supply of gaseous agent being exhausted from the same.

5. A respirator device for administering oxygen or like gaseous agent, comprising a housing mounting a facial mask on its one end, an expansible container mounted on the opposite end of said housing, a chamber formed in said housing and communicating with said mask and container, a breach provided in said housing and arranged to receive a sealed cartridge containing a compressed gaseous agent, closure means swingably attached to said housing and adapted to extend over said breach, a valve cavity formed in said housing communicating with said breach, a valve cavity formed in said housing communicating with said breach, a passageway in said housing communicating with said valve cavity and said chamber, valve means in said cavity and including a piercing element for said cartridge, said valve means normally sealing said cavity from said breach, means carried by said closure means being movable therewith to engage said cartridge and force the same into piercing engagement with said element being effective to cause the actuation of said valve means and provide a flow of gaseous agent to said valve cavity and connected expansible container, means operable in response to the actuation of said facial mask to a first position to connect the latter in circuit with said container and effect a flow of gaseous agent therebetween, and means responsive to a cessation of said flow to move said valve means to its normal sealing position.

References Cited in the file of this patent

FOREIGN PATENTS

790,263	Great Britain	Feb. 5, 1958
791,183	Great Britain	Feb. 26, 1958