

- [54] **FLUID DISPENSING DEVICE**
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- [52] U.S. Cl. **239/74, 239/338, 239/347,**
128/194
[51] Int. Cl. **B05b 7/24**
[58] Field of Search 239/74, 338, 347, 354;
222/28, 29, 48; 128/194

- [56] **References Cited**
UNITED STATES PATENTS
2,819,716 1/1958 Miller 239/338 X
2,847,248 8/1958 Schmitt et al. 239/338
3,191,869 6/1965 Gilmour 239/354 X
3,353,536 11/1967 Bird et al. 239/338 X
3,572,660 3/1971 Mahon 239/338 X

- FOREIGN PATENTS OR APPLICATIONS**
569,753 6/1945 Great Britain 239/338

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Sullivan and Kurucz

[57] **ABSTRACT**

A fluid dispensing device for providing a controlled ratio of a mixture of fluids introduced to the device. The device includes a container having an inlet section and an outlet section. The container is designed for contents used in treating a fluid mixture introduced through the inlet section. The inlet section is adapted to be connected to a source of a first fluid and has at least one opening therein of a predetermined size and configuration. A sleeve is movably mounted on the inlet section and has at least one opening therein of a predetermined size and configuration and is positioned so that movement of the sleeve with respect to the inlet section will determine the relative alignment of the openings. In this manner, the portion of the openings in the inlet section exposed to a source of the second fluid will be varied and the ratio of second fluid with respect to first fluid in the mixture introduced to the container is controlled. The outlet section provides for discharging the treated fluid mixture.

5 Claims, 14 Drawing Figures

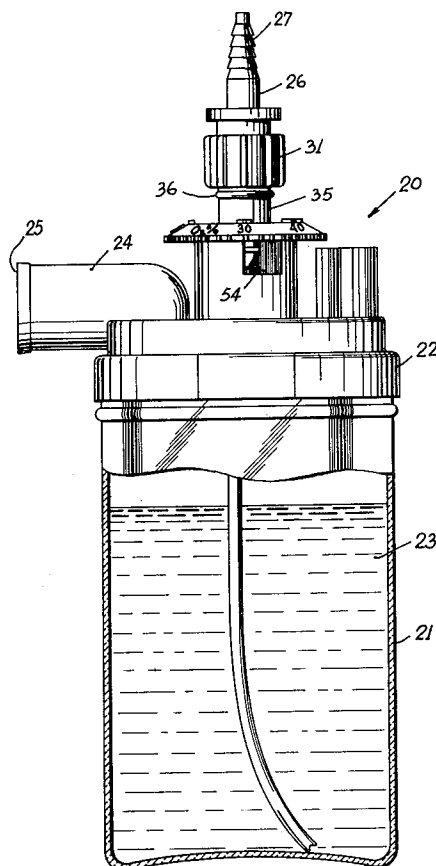


Fig. 1

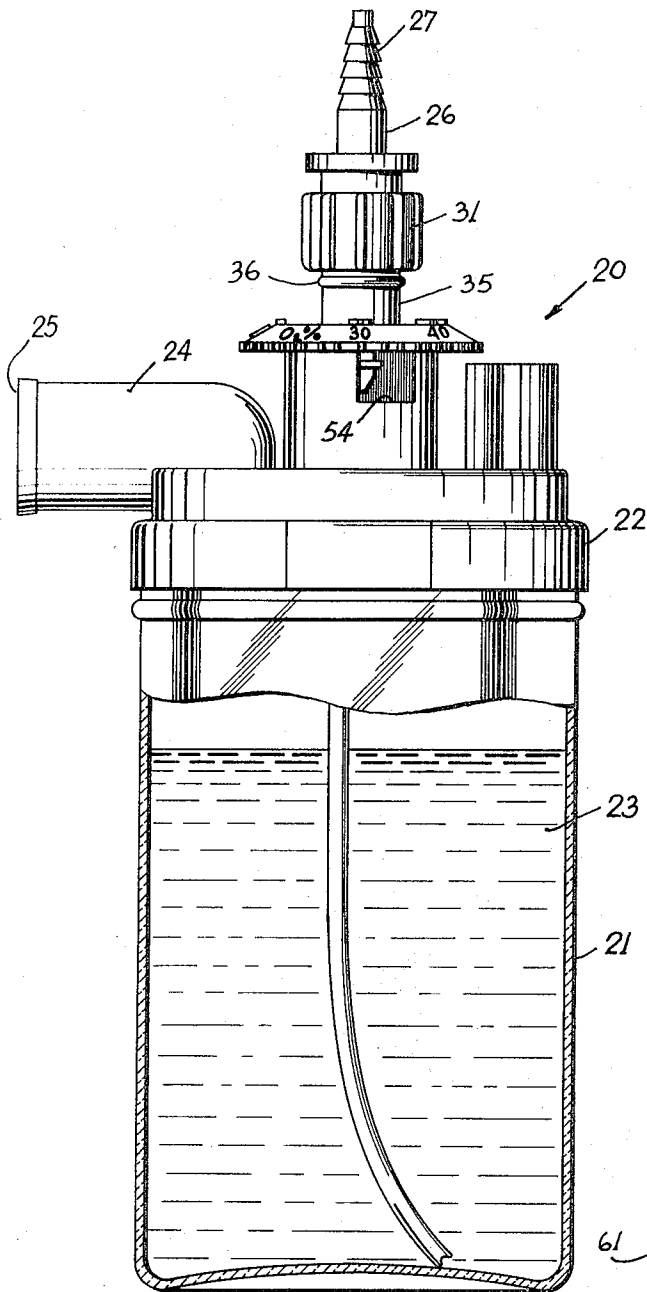


Fig. 3

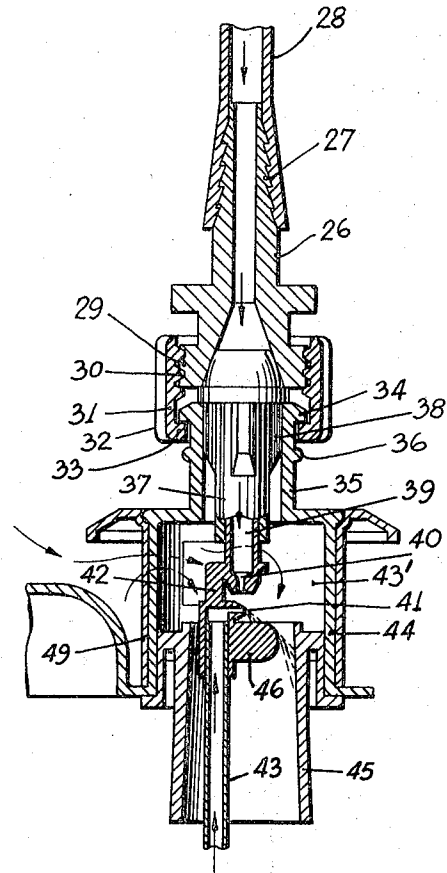
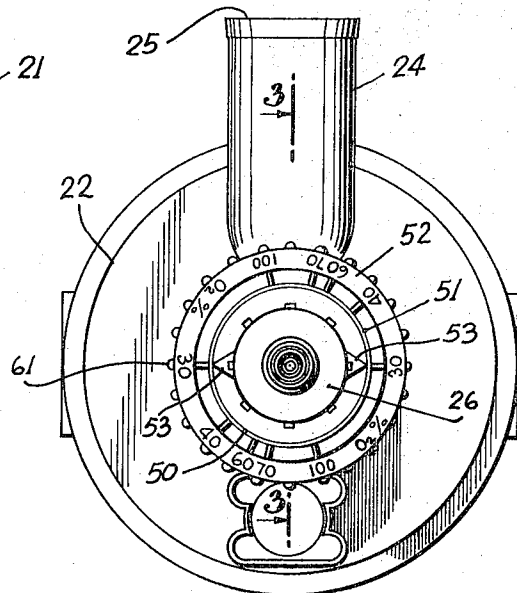


Fig. 2



SHEET 2 OF 3

Fig. 4

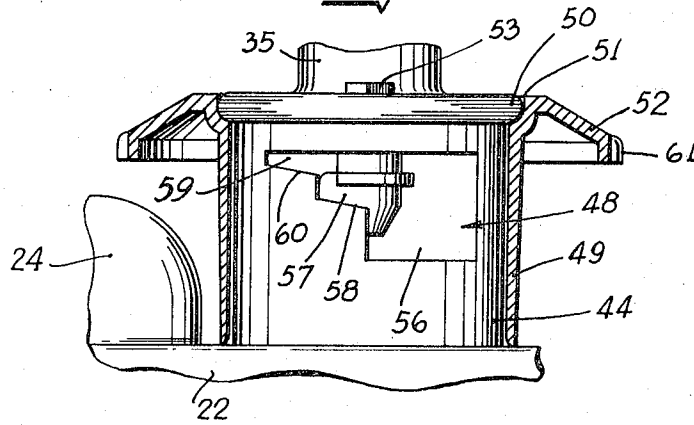


Fig. 5

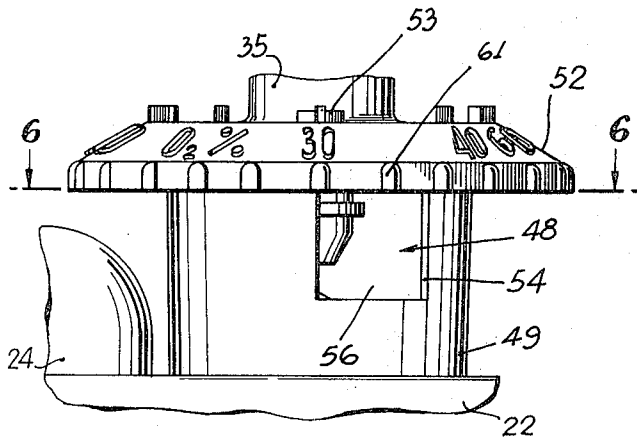


Fig. 6

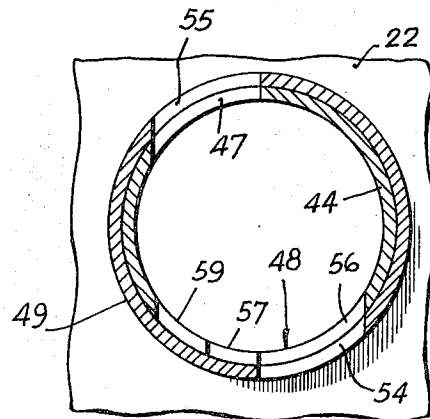


Fig. 7

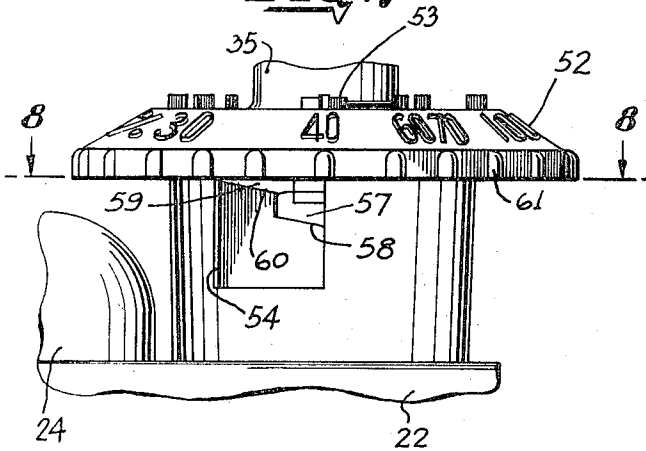


Fig. 8

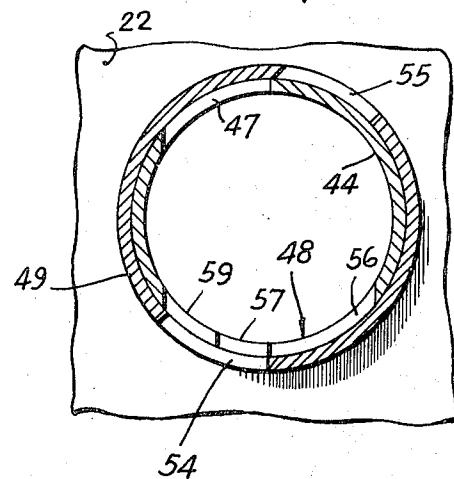


Fig. 9

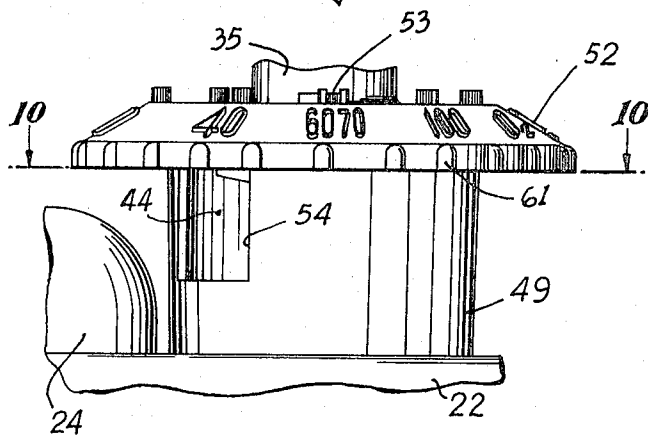


Fig. 10

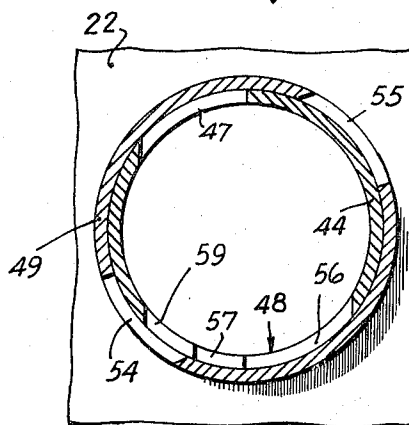


Fig. 11

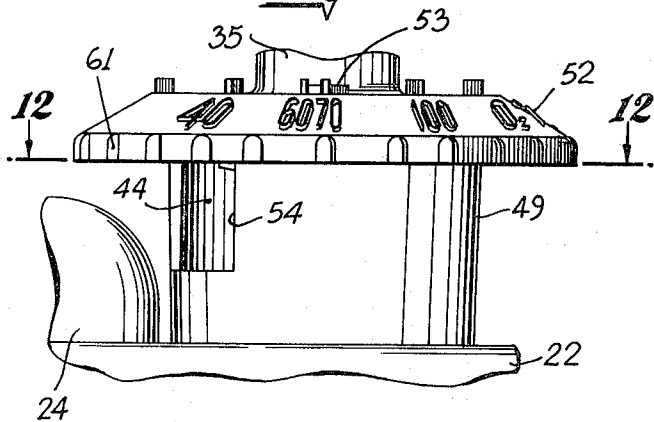


Fig. 12

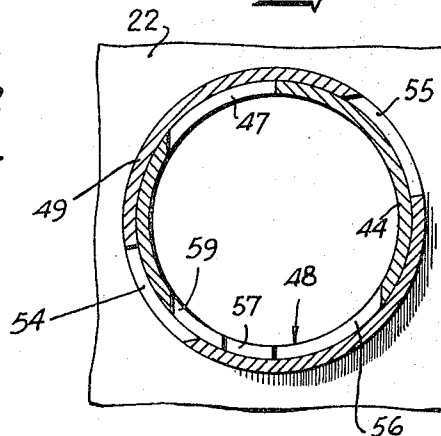


Fig. 13

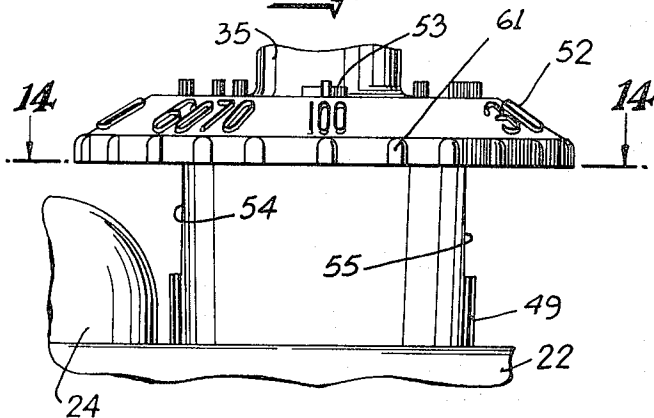
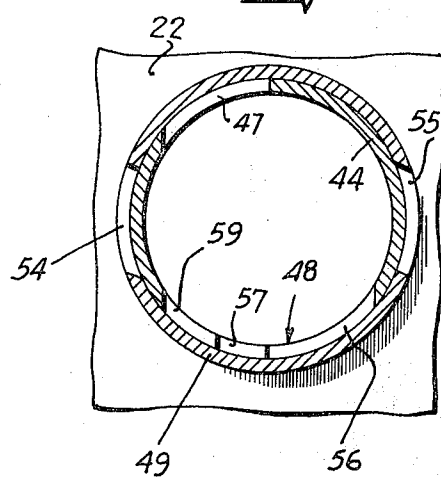


Fig. 14



FLUID DISPENSING DEVICE

BACKGROUND OF THE INVENTION

In controlling fluid flow, particularly in the medical field, it is often necessary to closely control the mixture of fluids in a system. This is extremely important when dealing with inhalable fluid mixtures such as in breathing apparatus. In connection with inhalable fluid devices, the basic fluid mixture is often comprised of oxygen and atmospheric air. Depending upon the condition of the patient and the circumstances under which the mixture is being employed the ratio of outside air to pure oxygen is often of concern. Additionally, devices such as nebulizers are frequently utilized to handle the mixture of oxygen and air and to treat the mixture before passing it on to a patient. In the case of a nebulizer, this is done by treating the mixture of oxygen and air with a fine spray of moisture.

There are a number of prior art devices which teach the treating of the oxygen and air mixtures in order to properly feed the desired fluid to the breathing system of the patient. However, it is often desirable to control the percentage of outside air entrained with the oxygen being fed into the system. Known devices are adapted to generally control whether or not air is mixed with the oxygen and to broadly determine the approximate ratio of outside air to oxygen. No known device is capable of adjusting the percentage of outside air to oxygen at a multiplicity of different percentage ratios along the majority of the scale from 30 to 100 percent.

This shortcoming is particularly prevalent in the system utilized in handling inhalable fluid mixtures. For example, known nebulizer devices have means to provide openings so that a 100 percent oxygen condition can be reduced by providing openings to the outside air in the feeding system. The greatest disadvantage of the known systems is in controlling the percentage of outside air to oxygen by being able to increase and reduce the amount of outside air at will and also to be able to readily indicate and determine specific percentages of oxygen to outside air being fed to the fluid system at any given point in time and in regard to any given position of adjustable elements.

An additional shortcoming of the prior art when devices such as nebulizers are considered is that common nebulizers in use today for oxygen administration lack the ability to entrain a sufficient quantity of air to vary the oxygen percentage being administered. It is highly desirable to have the capability to mix air with the oxygen and to be able to control the ration from 100 percent oxygen to as low a percentage of oxygen as physical conditions make possible. Naturally, the oxygen content can never be zero since atmospheric air contains approximately 21 percent of oxygen content.

SUMMARY OF THE INVENTION

With the above considerations in mind, it is among the primary objectives of the present invention to provide a fluid dispensing device which is designed to closely control a wide range of fluid mixture ratios introduced into a fluid system. Control means are provided on the device to closely control the percentage of one fluid with respect to the other fluid and to indicate the ratios at a plurality of different points between 30 and 100 percent of one fluid with respect to the other. A low cost, economical to manufacture device

is provided with control means and indicator means thereon to adjust and control the percentage of one fluid of a fluid mixture with respect to the other at any time during the operation of the system quickly and efficiently with a simple manual adjustment on the device.

The device is particularly useful in an environment employing inhalable fluids such as in regard to a nebulizer which treats a mixture of air and oxygen gases introduced in a breathing system with moisture. The device is designed to mix air with oxygen from a condition of 100 percent pure oxygen to as low a percentage of oxygen as possible which would approach that which is contained in atmospheric air. In addition, the controls and indication means on the device are such that the percentage of oxygen to air can be determined at any desired ratio from the device and can be varied at will.

In summary, a fluid dispensing device is provided to contain means for providing a controlled ratio of a mixture of fluids introduced into the device. The device includes a container having an inlet section and an outlet section. Means are within the container for treating a fluid mixture introduced to the inlet section. The inlet means are on the inlet section adapted to be connected to a source of a first fluid. The inlet section has at least one opening therein of a predetermined size and configuration. A sleeve is movably mounted on the inlet section and has at least one opening therein of a predetermined size and configuration. The opening is positioned so that movement of the sleeve with respect to the inlet section will determine the relative alignment of the openings. In this manner, the portion of the openings in the inlet section exposed to a source of a second fluid will be varied and the ratio of second fluid with respect to the first fluid in the mixture introduced to the container is controlled. Finally, outlet means are at the outlet section for discharging the treated fluid mixture.

For descriptive purposes in the present disclosure, the invention will be described in the inhalable fluid environment, particularly in use as a nebulizer. The nebulizer is usually operated from a 50 psig Nom. oxygen supply. Air may be used if desired. The nebulizer produces a finely divided aerosol predominantly containing moisture particles between 1.0 and 1.8 microns in diameter. In operation of the device shown, gas flowing through the vertical gas jet past the horizontal liquid feed jet, creates a low pressure area in front of the liquid feed jet as a result of the Bernoulli effect. The liquid jet is positioned so that the high velocity gas shears through the immersing liquid stream. The liquid jet is positioned so that the high velocity gas shears through the immersing liquid stream, breaking it into small aerosol particles. A central baffle comprised of a solid cylinder with a hemispherical end, and vertical tubular baffle called a throat, are so sized and positioned that they produced the quality of aerosol particle size described above.

The nebulizer permits preselection of the oxygen concentration of the effluent gas when operating from an oxygen supply. The selected concentration is maintained between nominally plus or minus 5 percent of set concentration while the oxygen supply flow may be allowed to vary through the predominantly used flow range of 4 to 12 liters per minute. To accomplish this,

a particular aspiration geometry is provided in the depicted device.

With the above objectives, among others, in mind, reference is had to the attached drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings;

FIG. 1 is a partially sectional side elevation view of a fluid dispensing device of the invention;

FIG. 2 is a top plan view thereof;

FIG. 3 is an enlarged fragmentary sectional view of the inlet section thereof taken along the plane of line 3—3 of FIG. 2 with arrows showing the path of flow of fluid entering the device;

FIG. 4 is an enlarged fragmentary elevation view of the inlet section of the device with its sleeve section in cross section and showing one of the openings in the throat section thereof;

FIG. 5 is a fragmentary perspective view of the inlet section portion of the device of the invention showing the elements in position for a ratio of outside air to oxygen which provides a fluid mixture of 30 percent oxygen;

FIG. 6 is a fragmentary top sectional view of the sleeve and throat section portions taken along the plane of line 6—6 of FIG. 5;

FIG. 7 is a fragmentary perspective view of the inlet section of the device showing the elements positioned for a ratio of outside air to oxygen which provides a fluid mixture of 40 percent oxygen;

FIG. 8 is a fragmentary top sectional view of the sleeve and throat sections thereof taken along the plane of line 8—8 of FIG. 7;

FIG. 9 is a fragmentary perspective view of the inlet section of the device showing a ratio of outside air to oxygen which provides a fluid mixture of 60 percent oxygen;

FIG. 10 is a fragmentary top sectional view of the sleeve and throat section taken along the plane of line 10—10 of FIG. 9;

FIG. 11 is a fragmentary perspective view of the inlet section of the device shown in position to provide a ratio of outside air to oxygen in the fluid mixture which provides a 70 percent oxygen mixture;

FIG. 12 is a fragmentary sectional top view of the sleeve and throat section taken along the plane of line 12—12 of FIG. 11;

FIG. 13 is a fragmentary perspective view of the inlet section of the invention showing the elements in position to provide a fluid mixture of outside air to oxygen which provides a fluid mixture of 100 percent oxygen; and

FIG. 14 is a fragmentary top sectional view of the sleeve and throat section taken along the plane of line 14—14 of FIG. 13.

DESCRIPTION OF THE PREFERRED EMBODIMENT

For descriptive purposes, a fluid dispensing device of the present invention is depicted in the form of a nebulizer 20 adapted for use in an inhalable fluid system. As shown in FIG. 1, the device or nebulizer 20 includes a jar base 21 and a top portion 22. The entire nebulizer 20 can be constructed of any convenient, low cost material such as plastic which lends itself to disposability. The undersurface of the cap 22 contains threads which are interengageable with a threaded top portion on the

jar 21 to form the coupled container or nebulizer 20. The jar portion forms a receptacle for a fluid, preferably a liquid such as water which is adapted to be utilized in treating a gaseous mixture in a manner described below to provide a treated fluid for a patient to breathe.

The top 22 contains an outlet section including a nozzle 24 which is open to the interior of the container 20 to receive the threaded fluid mixture and is hollow with an opening 25 at its outer end for connection to a hose which in turn is directed in a convenient manner to a patient. At the apex of top 22 is a removable adapter 26 which has an upper ribbed end portion 27 which interengages with a hose 28 from an oxygen source in an interlocking manner as shown in FIG. 3. The lower end portion of adapter 26 has a threaded outer surface 29 which engages with the threaded inner surface 30 of hollow cap 31. Hollow cap 31 has a ribbed outer surface 32 to facilitate its rotation and has an annular flange 33 extending from its undersurface for interengagement with a corresponding annular flange 34 on the top of neck 35 of the cap 22. Spaced below flange 24 at a distance greater than the thickness of flange 33 is an annular ring 36 so that flange 34 and ring 36 retain cap 31 on neck 35. By providing the additional spacing between flange 34 and ring 36 cap 31 is given limited vertical freedom of movement. Additionally, the inner diameter of flange 33 is greater than the outer diameter of neck 35 at the point where it is proximal to neck 35 thereby permitting cap 31 to rotate freely about neck 35 and permitting cap 31 to be threadably interengaged with adapter 26. In this manner, container 20 can be connected to a source of oxygen which is received through hose 28.

An inlet nozzle 37 is mounted in neck 35 in a convenient manner such as by interengagement between the ribs 38 on the exterior surface of nozzle 37 and the ribs 38 on the exterior surface of nozzle 37 and the interior surface of neck 35. Additionally, engagement between the undersurface of adapter 26 and an annular ring on nozzle 38 can be utilized to assist in holding the nozzle in fixed position. The nozzle has a through passageway 39 which receives oxygen from tube 28 as shown by arrows in FIG. 3 until it is forced out of narrow aperture 40 at the lower end of the nozzle. By the Bernouli effect the rapidly moving oxygen passing from small aperture 40 at the lower end of nozzle 37 causes a lowering of the pressure at lateral aperture 41 of downwardly extending extension 42 of nozzle 37. The lower end of extension 42 is open providing a passageway to narrow lateral aperture 41 and is of a large enough diameter to receive siphon tube 43. The siphon tube 43 is in frictional interengagement with the inner walls of the lower portion of extension 42. As shown by the arrows in FIG. 3, the pressure reduction created by the high speed flow of oxygen from aperture 40 past aperture 41 draws fluid 23 from container 21 up through siphon tube 43 and out through aperture 41.

A predetermined amount of outside air is also introduced into the working chamber 43' where apertures 40 and 41 are located. A hollow cylindrical portion of top 22 which is generally referred to as a throat section 44 contains chamber 43' and the structure adjacent to apertures 40 and 41. Throat section 44 is integral with neck 35 and with the remainder of top 22 of device 20. A collar 45 is frictionally mounted inside of the lower end of throat section 44 and extends downwardly into

container 21. The upper end of collar 45 opens into chamber 43' and the lower end of collar 45 is open to the interior of container 21. Siphon tube 43 extends upwardly through collar 45 into engagement with extension 42.

Laterally extending from extension 42 and in alignment with the flow path of oxygen from aperture 40 is baffle 46. Oxygen from aperture 40 in combination with a predetermined amount of outside air along with liquid drawn from aperture 41 by the Bernoulli effect are directed against baffle 46. This action breaks up the liquid into a fine spray mist which is carried in the form of a fluid mixture with the oxygen and outside air down through collar 45 and out through outlet nozzle 24 to a breathing hose connected to opening 25 of outlet nozzle 24.

To facilitate introduction of outside air for combination with the oxygen entering chamber 43' through aperture 40, there are a pair of opposed openings 47 and 48 in the side walls of throat section 44. The portion of these openings exposed to the atmosphere is adjusted by means of a rotatable sleeve 49 mounted on the exterior surface of throat section 44. Sleeve 49 is fixed in position by the interengagement of annular rib 50 extending from the outer surface of throat section 44 and recess 51 on the upper peripheral edge of sleeve 49. In this manner, rotation of sleeve 49 about throat 44 is permitted but axial movement is restricted. A circumferential flange 52 extends from the upper portion of sleeve 49 and contains indicia on the upper surface thereof which may be brought into alignment with a pair of fixed diametrically opposed indicator pointers 53. The particular alignment of indicia with pointers 53 will designate to the operator the percentage of oxygen in ratio to outside air components other than oxygen in the mixing being treated within chamber 43'.

The amount of outside air being mixed with the oxygen received through tube 28 is adjusted by alignment between openings 47 and 48 in the throat section with openings 54 and 55 in the side walls of sleeve 49. Each of the openings 54 and 55 in sleeve 49 are substantially rectangular in configuration and are of similar size. The openings 54 and 55 are approximately diametrically opposed as are the openings 47 and 48 in throat section 44. Therefore, as will be discussed in detail below by rotating sleeve 49 with respect to fixed throat section 44, the relative percentage of openings 47 and 48 which are exposed to outside air through openings 54 and 55 can be varied. Opening 47 in throat section 44 is substantially rectangular in configuration and is approximately the same size as openings 54 and 55 in sleeve 49. However, as shown particularly in FIG. 4, opening 48 in throat section 54 includes three different size interconnecting opening portions. The principal opening portion 56 is substantially the same size and configuration as openings 47, 54 and 55. Adjacent to opening portion 56 is an interconnected opening portion 57 which is approximately one-quarter the size of opening portion 56 and has a bottom wall 58 which tapers downwardly so that the end of opening portion 57 remote from opening portion 56 is smaller than the size of opening portion 57 adjacent to opening portion 56. Additionally, opening portion 59 is adjacent to opening portion 57 and communicates therewith and has a bottom wall 60 which tapers downwardly toward opening portion 57 so that opening portion 59 gets larger as it approaches opening portion 57. Therefore, by rotating

sleeve 49 with respect to throat section 44 in a counter-clockwise direction with the parts as shown in FIG. 4 so that opening 54 comes in contact with opening 48, a greater and greater portion of opening 48 will be exposed as the rotation continues until opening 54 is aligned with opening 48. In this position, as shown in FIG. 6, openings 47 and 55 will also be aligned. Therefore, as shown in FIGS. 5 and 6 with openings 47 and 55 in alignment and large opening portion 56 in alignment with opening 54, the condition of maximum openings to the exterior of chamber 43' is achieved and the maximum amount of outside air to pure oxygen ratio is attained.

As shown in the embodiment depicted, in FIGS. 5 and 6, the percentage of oxygen in the fluid mixture of outside air and pure oxygen with maximum openings is 30 percent. FIGS. 7 and 8 depicts the position of the sleeve 49 with respect to the throat 44 which provides an oxygen percentage of 40 percent in the mixture. This position is achieved by rotating the sleeve 49 clockwise until the numerical indicia 40 is aligned with fixed pointers 53 on the top of the throat section. It should be noted that to facilitate rotation of sleeve 49 projections 61 are present on the exterior surface of flange 52 so that it may be more easily gripped and rotated. As shown, the 40 percent oxygen content is achieved by reducing the size of the exposed openings to the exterior of device 20. By rotating sleeve 49 clockwise, opening portion 56 is initially closed and smaller opening portions 57 and 59 of opening 48 are exposed. Thus, less opening space is available for outside air to reach chamber 43'.

Continued rotation of sleeve 49 in the clockwise direction will bring the device into the position shown in FIGS. 9 and 10 where as indicated 60 percent oxygen is present in the mixture within chamber 43. In this position, the 60 percent indicia is aligned with pointers 53 and opening 54 has been moved into alignment with opening portion 59 only of throat section 44. Since opening 59 is smaller than the previously discussed exposed openings, less outside air is permitted into chamber 43 and a greater percentage of oxygen is present. It should be kept in mind that in the position discussed above in regard to FIGS. 7 and 8 openings 47 and 55 are almost completely not aligned so that virtually no outside air is permitted access through opening 47. In the position shown in FIGS. 9 and 10 openings 47 and 55 are in complete non-alignment and no outside air can enter chamber 43' through opening 47. This is true in regard to both of the two further positions discussed below.

In the position depicted in FIGS. 11 and 12, sleeve 49 has been rotated until the indicator pointers 53 are aligned with indicia indicating 70 percent oxygen in the fluid mixture introduced to chamber 43'. To reach this position, the sleeve has been rotated clockwise until substantially all of opening 48 has been occluded with the exception of approximately one half of opening portion 59. This small opening is the only access port for outside air to be mixed with the pure oxygen entering chamber 43' through tube 28.

Finally, in the position depicted in FIGS. 13 and 14, sleeve 49 has been rotated until the indicator pointers 53 are aligned with indicia indicating that 100 percent oxygen is being introduced into chamber 43'. In this position, no portion of openings 47 and 48 are aligned with openings 54 and 55 in sleeve 49 and, therefore,

there is no access port for outside air to enter chamber 43'.

It should be kept in mind that although five specific oxygen percentage points are utilized in the depicted embodiment to provide specific controls of oxygen percentage in the fluid mixture introduced to the container, it can readily be seen that by varying the dimensions of openings and by shifting the alignment position of the openings of the sleeve with respect to the throat section, other definite percentages can be obtained. Additionally, it should be noted that clockwise rotation from the 30 to 100 percent position will gradually decrease the amount of access opening available in a continuous fashion so that intermediate points can be estimated as desired.

In summary, with the type of nebulizer depicted and described above, nozzle 37 and extension 42 thereof containing the gas 40 and liquid 41 feed jets is positioned at the upper end of the vertical cylindrical section of the throat 44. A larger cylindrical chamber 43' is fastened around the section of the nozzle containing the gas and liquid feed jets. Resulting configuration provides for efficient gathering and entraining of the air contained in the larger upper cylinder 43', into the high velocity gas stream escaping from gas jet 40. The lower cylindrical throat section or collar 45 efficiently contains and directs the air, oxygen, liquid, particle, aerosol mixture downward into container 21. As part of its function, the throat completes a pressure envelope around the high velocity gas, water, vapor stream and prevents the higher than atmospheric pressure aerosol from escaping back up into the lower than atmospheric pressure upper chamber. The above mentioned function is an internal part of oxygen dilution control. As oxygen supply flow is varied, the lower than atmospheric pressure in the upper chamber must be automatically and proportionately varied to provide for the proper amount of atmospheric air entrainment in order to maintain the desired preset oxygen dilution.

Oxygen dilution refers to diluting the pure oxygen supply flow with nominally 21 percent oxygen atmospheric air. The nebulizer permits the user to select effluent gas oxygen concentrations between 30 through 100 percent. For convenience, concentration selection points of 30, 40, 60, 70 and 100 are marked on the dilution adjustment sleeve. The sleeve may be be affectively positioned at any other setting within the 30 to 100 percent range and consistent performance will be maintained.

Rotating the sleeve uncovers a pair of specially shaped apertures in the upper chamber wall. These apertures are shaped to provide a practical sleeve position difference between concentration settings. For example, a long thin slot is uncovered for the 70 and 60 percent settings. Aperture height is nominally doubled between 60 and 40 percent. It is greatly increased and a second aperture added between 40 and 30 percent oxygen concentration settings. The system described above is directed to the only device of this type with established calibrated presetable concentration control points which also permits selection of concentration between the established settings while maintaining a reasonable degree of accuracy over the declared range of oxygen supply flow rates. This result is obtained through employment of the combined mechanical elements which provide the functions described above.

Thus, the above objectives of the invention, among others, are effectively attained.

I claim:

1. A fluid dispensing device for providing a controlled ratio of a mixture of fluids introduced to the device comprising:
 - a container having an inlet section and an outlet section;
 - means within said container for treating a fluid mixture introduced through the inlet section;
 - inlet means on said inlet section adapted to be connected to a source of a first fluid;
 - said inlet section having at least one opening therein of a predetermined size and configuration;
 - a sleeve movably mounted on said inlet section and having at least one opening therein of a predetermined size and configuration and positioned so that movement of said sleeve with respect to said inlet section will determine the relative alignment of said openings whereby exposure of the at least one opening in the inlet section to a source of a second fluid will be varied and the ratio of second fluid with respect to first fluid in the mixture introduced to the container is controlled;
 - outlet means at said outlet section for discharging the treated fluid mixture;
 - indicator means positioned on the container and responsive to the position of the openings in said sleeve and said inlet section to indicate the relative percentages of the first and second fluids in the mixture;
 - the inlet section includes a cylindrical throat section and the openings in the inlet section being lateral openings in the cylindrically shaped throat section;
 - the sleeve being substantially cylindrical in shape and in surrounding engagement with the cylindrical throat section and having its openings laterally positioned thereon;
 - said cylindrical sleeve being rotatable about said cylindrical throat section to bring the lateral openings in the throat section and the sleeve into and out of alignment with one another;
 - at least two lateral openings in the cylindrical throat section and being spaced about the circumference of the throat section and at least one being irregular in configuration to facilitate introduction of a multiplicity of different accurate percentages of fluid mixtures;
 - the irregularly shaped lateral opening being of substantially gradually increasing diameter as it extends around the circumferential surface of the throat section thereby providing for gradual and closely controlled adjustment of the ratio between the fluids in the mixture; and
 - the indicia on the annular flange arranged to coincide with the various alignments between the openings in the cylindrical throat section and the sleeve so as to provide readings of percent of the first fluid in the mixture of 30 percent and at least four other accurate and discrete percentages of first fluid.
2. The invention in accordance with claim 1 wherein the cylindrical throat section has a downwardly depending hollow collar extending therefrom and in fluid communication and in cooperation therewith for facilitating mixture of the fluids received through said inlet section.

3. The invention in accordance with claim 1 wherein the lateral openings in the cylindrical sleeve are of substantially the same size and are rectangular in configuration, one of the openings in the cylindrical throat section is rectangular in configuration and substantially the same size as the openings in the sleeve, the other of said openings in the throat section having a rectangular portion substantially the same size as the openings in the sleeve and having communication with a pair of adjacent smaller portions of the opening, the first adjacent smaller portion being substantially rectangular in configuration and approximately one-quarter the size of the openings in the sleeve and tapering from a smaller to a larger size as it approaches the other opening in the throat section, the second adjacent opening portion being smaller than the first adjacent opening portion and tapering from a smaller to a larger size as it approaches the first adjacent opening portion.

4. The invention in accordance with claim 1 wherein

the first fluid is oxygen and the second fluid is air and the indicia on the annular flange gives readings of percent oxygen in the mixture of 30, 40, 60, 70 and 100 percent.

5. The invention in accordance with claim 1 wherein the inlet means is adaptable for connection to a source of an inhalable gas to be introduced under pressure into said container, an aspirator positioned in said inlet section including a first nozzle in fluid flow communication with said inlet means for directing the gas downwardly, a second nozzle positioned crosswise and adjacent said first nozzle for the education of a spray of fluid therefrom, a siphon tube in fluid flow communication with said second nozzle and extending downwardly into the container containing fluid, and a baffle member adjacently below said nozzle onto which the spray of the fluid is directed to nebulize the same.

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