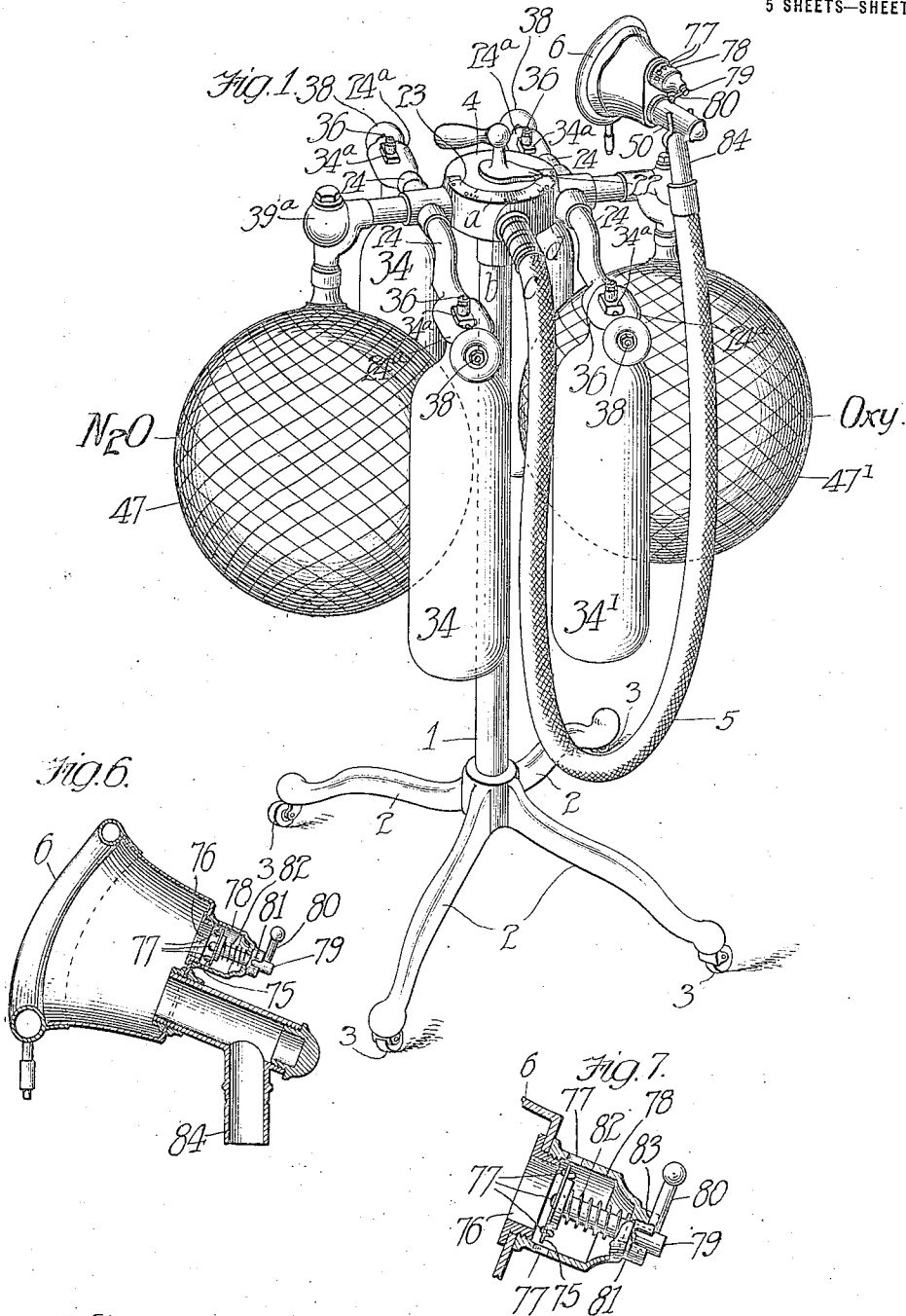


A. C. CLARK.
ANESTHETIC APPARATUS.
APPLICATION FILED MAR. 26, 1912.

1,302,133.

Patented Apr. 29, 1919.

5 SHEETS—SHEET 1.



Witnesses
Martin H. Olsen.
Robert D. Obberman

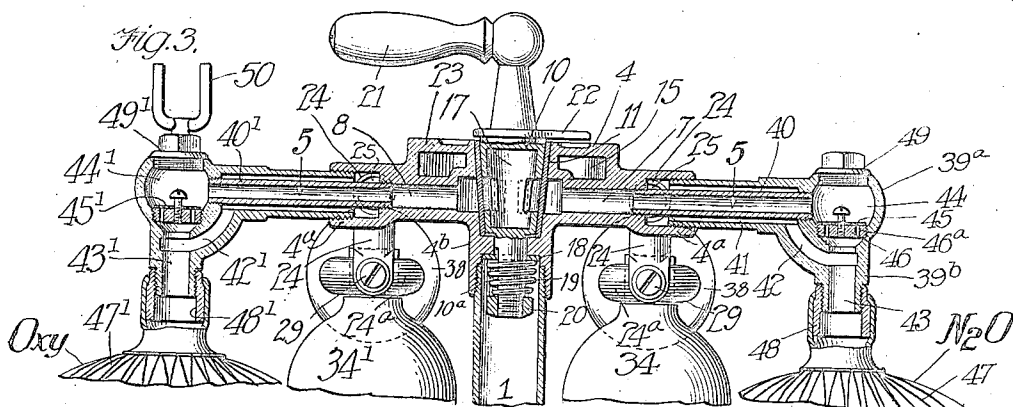
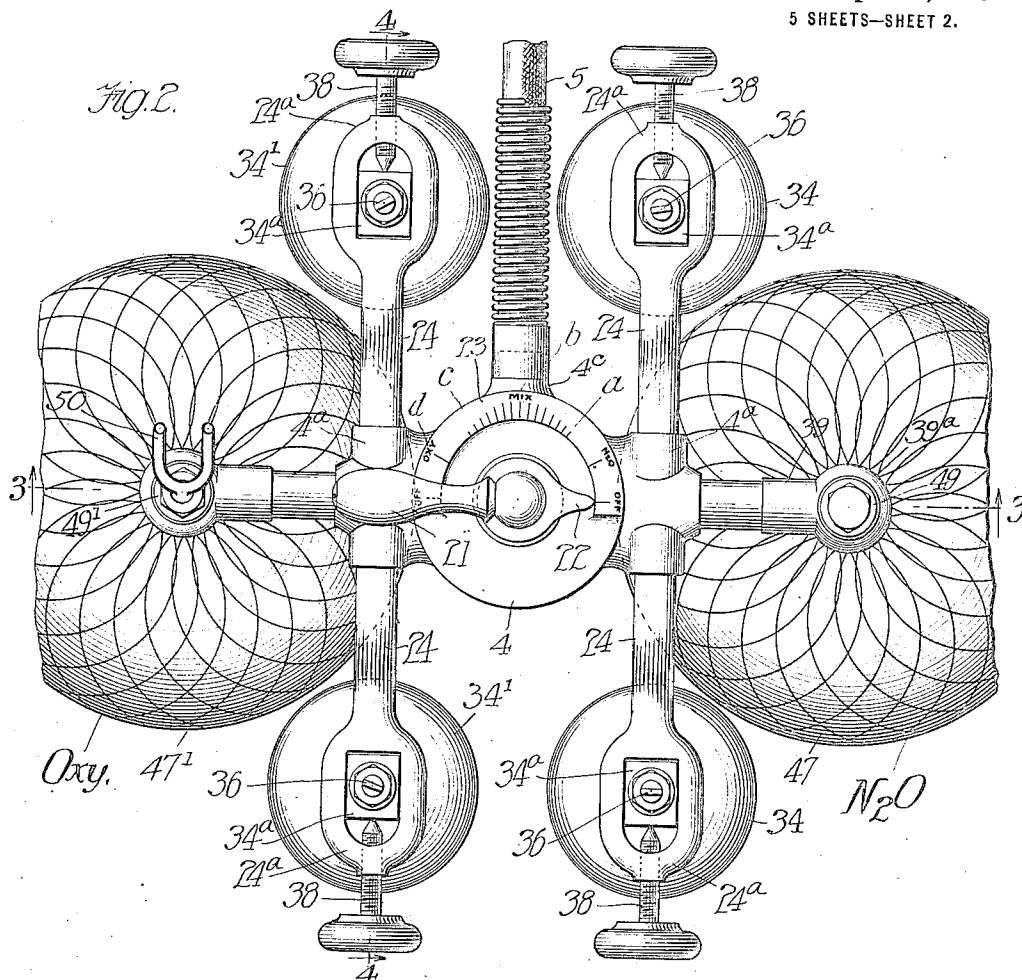
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5 SHEETS—SHEET 2.



Witnesses
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5 SHEETS—SHEET 3.

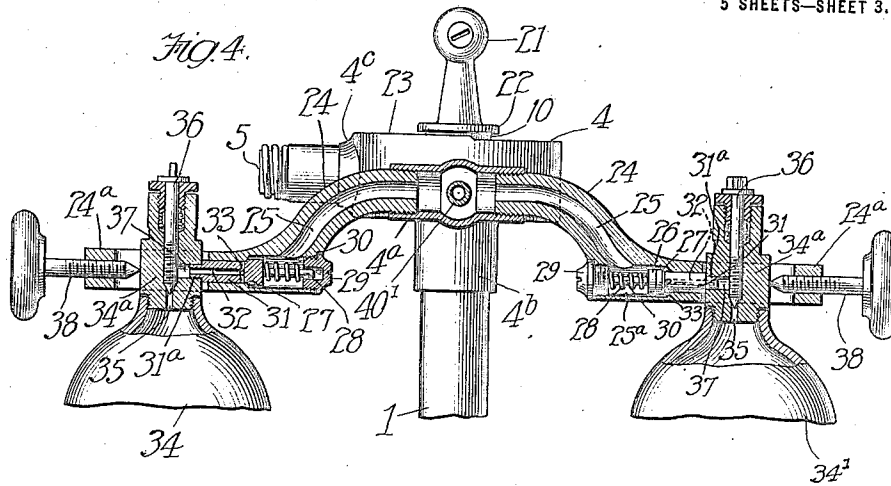
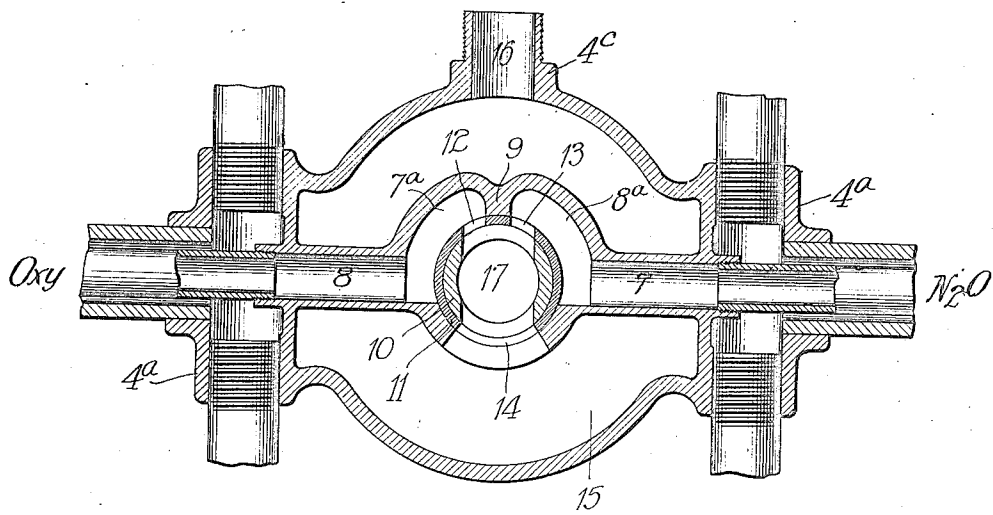


Fig. 5.



Witnesses
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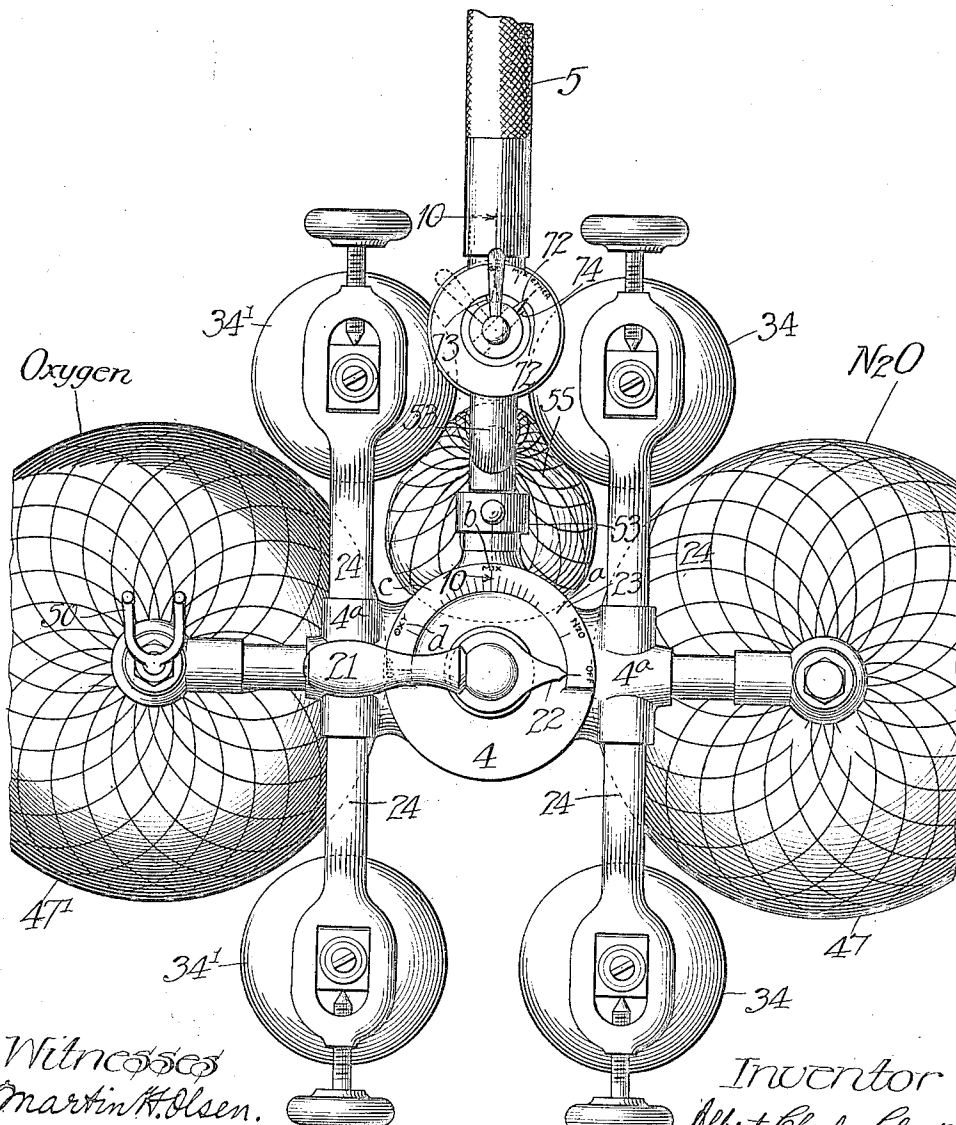
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5 SHEETS—SHEET 4.

Fig. 8.



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5 SHEETS—SHEET 5.

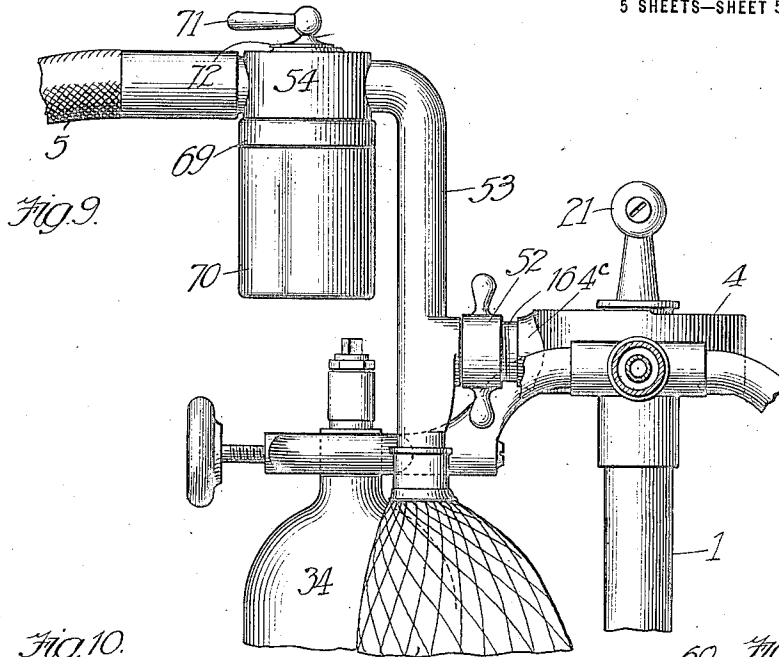


Fig. 9.

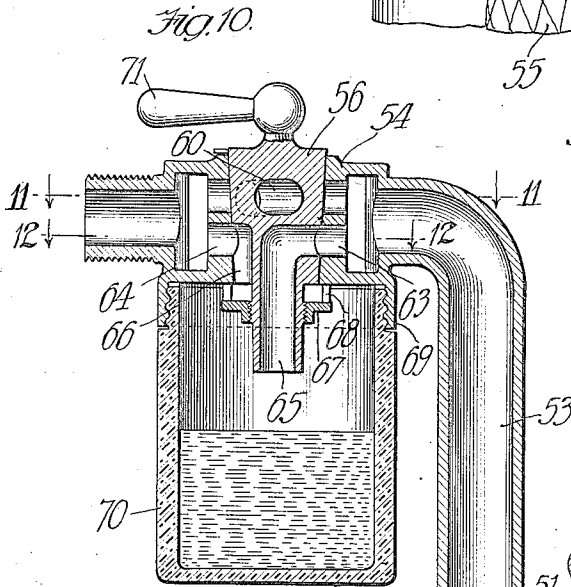


Fig. 10.

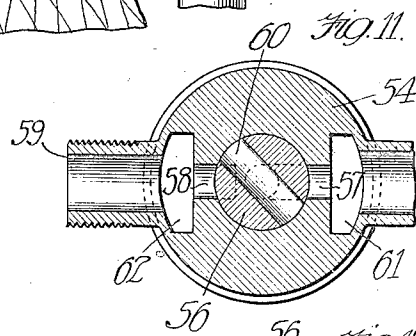


Fig. 11.

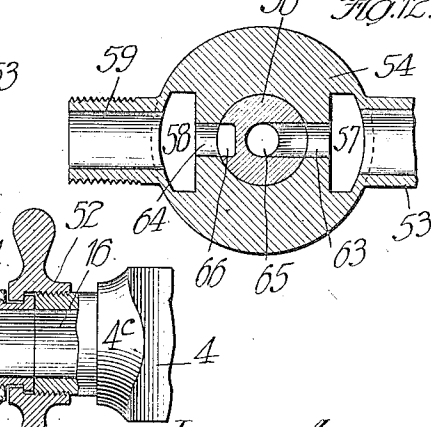


Fig. 12.

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UNITED STATES PATENT OFFICE.

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ANESTHETIC APPARATUS.

1,302,133.

Specification of Letters Patent. Patented Apr. 29, 1919.

Application filed March 26, 1912. Serial No. 686,252.

To all whom it may concern:

Be it known that I, ALBERT CHARLES CLARK, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Anesthetic Apparatus, of which the following is a specification.

My invention relates to apparatus for administering a gas or a mixture of gases for producing anesthesia or partial anesthesia, known as analgesia, and the object thereof is to produce an apparatus of this character which shall be simple in construction and efficient and reliable of operation and also capable of convenient, quick and accurate manipulation or operation by the operator. The apparatus is so constructed as to be capable of administering two gases, such as oxygen and nitrous oxid (M_2O), either separately to any desired degree or together in any desired proportions. While in the present instance I use this apparatus for administering the gases just named and while for convenience in description I will hereinafter refer to these two gases, it will be understood that any other gas or gases may be administered by this apparatus.

One of the principal objects of my invention is to dispense with the usual plurality of valves for supplying the gases to the inhaling device either separately or mixed and to provide a single valve control, so that by the manipulation of a single handle any gas in any desired amount or gases mixed in any desired proportions, as readily determined, may be administered.

Another principal object of my invention is to dispense with hand-operated valves for opening and closing communication between the gas cylinders and the apparatus and to provide in lieu thereof valve mechanisms which are operated automatically and as an incident to the act of attachment of the cylinders in place upon the gas apparatus.

In addition to and as an attachment to the above apparatus, I provide means for supplying and mixing with the gas administered by said apparatus such anesthetics as ether, chloroform, etc., including simple and accurately governed valve mechanism for controlling the supply and mixture of the gases with one of said last mentioned anesthetics, and I also provide means, as a part of such attachment, for re-breathing by the patient of the gas or gases administered.

By these means I am enabled to materially increase the range of use and utility of the complete apparatus and also to economize in the cost of the anesthetics or gases required.

Other objects of invention and features of advantage and utility in my apparatus will be apparent from the description hereinafter given.

In the drawings Figure 1 is a perspective of my complete apparatus capable of administering two gases either separately or as a mixture and having a pair of cylinders for each kind of gas; Fig. 2 a plan view of the apparatus as illustrated in Fig. 1 excepting that the supply hose is removed from the position shown in Fig. 1 and the operating valve is turned to a different position; Fig. 3 a sectional elevation on the line 3—3 of Fig. 2; Fig. 4 a sectional elevation on the line 4—4 of Fig. 2; Fig. 5 a sectional plan on the line 5—5 of Fig. 3 excepting that the valve is shown in the position illustrated in Fig. 1; Fig. 6 a section of the inhaler; Fig. 7 a detail section thereof; Fig. 8 a plan view of the same apparatus with a re-breathing and an ether-administering attachment, with the valve device thereof in horizontal section; Fig. 9 a side elevation of a portion of the apparatus of Fig. 8; Fig. 10 a section on the line 10—10 of Fig. 8, and Figs. 11 and 12 horizontal sections on the lines 11—11 and 12—12 respectively of Fig. 10.

For the sake of a clear and definite description of my invention I will describe the present embodiment thereof as illustrated in the drawings in which it is shown as capable of administering either separately or together two different gases such as oxygen and nitrous oxid although it will be understood that the same may be employed in connection with only one gas such as nitrous oxid for producing an anesthesia and also that mechanical changes may be made in the apparatus without departing from the spirit and scope of my invention and claims.

Referring to the apparatus illustrated in the drawings, the same comprises a central post or vertical support 1 connected at its lower ends to a framework consisting of a series of four legs 2, preferably having casters 3 whereby the same may be easily rolled or moved along the floor. This post may be of any suitable height but in practice its height is such that the valve mechanism which surmounts it shall be within easy and

convenient reach of the operator. Upon the top of this post is mounted a casing 4 which may be of any suitable shape and dimensions but which is here shown as substantially circular in plan with the exception of two diametrically and horizontal extensions 4^a. This casing is provided with a depending tubular extension 4^b which is screw threaded upon the upper end of the post 1 and thereby removably connected therewith. This casing is provided with suitable ports and passages and mixing chambers and such ports and passages are governed by a valve of the hollow plug type as hereinafter described in detail. From this casing extends a nipple 4^c to which is secured the gas administering hose 5 terminating in the inhaler device 6 which is of any suitable construction. This casing is connected in the manner hereinafter described with the supply of oxygen and nitrous oxid and the purpose of the valve mechanism in the casing is to administer in any desired and regulated quantities either gas alone or to mix such gases in any desired proportions.

Referring to the interior construction of the casing and the valve mechanism therein, such casing is provided with two radial passages 7 and 8 arranged on the same diameter, the former being adapted to communicate with the supply of nitrous oxid and the other with the supply of oxygen. At its inner end toward the central portion of the casing the passage 6 is extended laterally concentrically of such central portion to form the extended passage 7^a. The other passage 8 is provided with a similar concentric passage 8^a the inner ends of these two extended passages 7^a and 8^a approach each other but do not connect (except through the medium of the valve as hereinafter explained) but are separated by the wall 9. The casing is provided with a central bore having proper ports therein and adapted to contain a hollow plug valve 10. While these ports and the seat itself for the valve may be formed integral with the casing and also integral with the walls of the passages described, yet I prefer to provide a bushing 11 which is inserted in said bore and forms the seat for the valve. By using this separate bushing I am enabled to make the ports therein more accurately than if all parts of the casing were made or cast together. This bushing is provided on one side with the two separate ports 12 and 13 communicating with the passages 7^a and 8^a respectively and on the opposite side with the large single port 14 which communicates with the large annular chamber 15, which latter chamber communicates with the gas hose 5 through the passage 16 in the nipple 4^c.

Referring to the plug valve 10 the same is provided with a transverse passage or way

17 of ample dimensions and also extended upwardly as seen in Fig. 3 and adapted to not only serve as a connection between the nitrous oxid and oxygen ports 12 and 13 but also as a mixing chamber, the two gases after passing through said ports 12 and 13 being brought into close contact, into rubbing contact so to speak, and intermixed within the interior of this valve. The body or plug portion of this valve is tapered and the bushing or valve seat is correspondingly tapered. The lower end of the valve is extended downwardly through the extension 4^b of the casing and into the upper end of the post 1. In order to hold the valve in place and on its seat with a yielding pressure and also against removal, a washer 18 is inserted in the lower recessed end of such extension 4^b and a spring 19 introduced between such washer and a nut 20 screwing on to the lower end of the valve plug. The washer is held to the valve plug and rotates therewith by flattening one side of the lower end of such plug as at 10^a, Fig. 3. The valve extends upwardly above the top plane of the casing and is provided with a handle 21 and also with a pointer or indicator 22 which in connection with the suitably marked dial or dial plate 23 on the top of the casing indicates the different positions of the valve so that the operator may at a glance be enabled to turn the valve to any desired position. In the present instance there are two "off" positions at diametrically opposite sides of the casing, indicating that the valve is in a position to close all of the ports and passages which it governs. In practice the starting position is at the "off" position illustrated at the left-hand side of Fig. 1. The next position indicated on the dial is marked "N₂O". The other positions indicated on the dial are "N₂O" indicating the position for administering the nitrous oxid, the indication "OXY" indicating the position for administering oxygen and the indication "MIX" for indicating a mixture of the two gases. The different positions of the valve will be hereinafter described when the mode of operation is explained more in detail.

Referring to the means for supplying the nitrous oxid and the gas bag device in connection therewith, one of the extensions 4^a constitutes the means of attachment and support for two similar passages 25 which while communicating at their inner or adjacent ends do not communicate directly with the supply passage 7 but only indirectly, that is, through the medium of the gas bag hereinafter described. At the outer end of each arm 24 and at the outer end of its passage 25 is a valve mechanism of automatic character and in the present instance comprising a valve 26 tending to be seated upon its seat 27 with a yielding pressure.

This valve and its seat are located in a chamber 25^a forming substantially a continuation or enlargement of said passage. This valve has an inwardly extending stem 28 which is received and guided by a central bore in a screw plug 29 which screws into and closes the inner end of the valve chamber 25^a. A coiled spring 30 encircles this valve stem, abutting at one end against the screw plug and at the other end against the valve 26 thereby holding the latter on its seat with a yielding pressure. The other or outer end of the valve is provided with a tubular extension or rod 31 fitted to slide within a bore at the extreme outer end of the arm 24. This rod has a longitudinal passage 32 communicating at its inner end with a port or ports 33 immediately in front of the valve proper. It is evident that when the valve is forced back off its seat a communication is established through the passage 32 and into the valve chamber 25^a and thence into the passage 25.

The outer end of each arm 24 is formed as a closed yoke 24^a, the opening being arranged to receive the head 34^a of a gas cylinder 34. This cylinder head is provided with an outlet passage 35 which is governed by the usual needle valve 36 and such head is also provided with a passage 37 opening laterally of said head and arranged at right angles with the passage 35. When the valve 36 is opened the supply of gas in the cylinder flows from the passage 35 to the passage 37. This latter passage is adapted to receive the outer end 31^a of the valve rod or stem 31 which end is reduced and of such size as to fit accurately in the passage 37. When the valve 26 is seated the stem or rod 31 extends outwardly within the yoke opening and likewise the reduced end 31^a. When a cylinder is to be attached the head thereof is inserted in this yoke opening with said reduced end 31^a fitting in the passage 37, after which the set screw 38 is screwed inwardly against the outer side of the cylinder head with the result that the entire cylinder is forced inwardly and with the further result that the valve is moved in the same direction and concentrically off its seat against the tension of its spring, it being understood that the cylinder head bears against the shoulder formed between the reduced end 31^a and the valve rod or stem 31. In Fig. 4 the cylinders are shown in place with the right-hand cylinder in position to open and hold open the valve 26 and with the left-hand cylinder in place but in a position to open the valves. The right-hand cylinder is therefore being utilized for the gas supply while the other cylinder is held in reserve. Referring next to the gas bag device and the means of communication between the supply such as the cylinders and the valve casing, the right-hand extension 4^a (Fig.

2) also serves as a means of attachment and support for a tubular arm 39 which has a globular outer end 39^a and a tubular depending portion 39^b, Fig. 3. Within the horizontal portion of this tubular arm is concentrically arranged a smaller tube 40 secured at its outer end to said globular portion 39^a and at its inner end to the outer end of the passage 7, Figs. 3 and 5. As a result there is provided an annular passage 41 between the inner ends of the passages 25 and a passage 42 in said arm 39 which latter passage communicates with a vertical passage 43 in the depending extension 39^b. The globular portion 39^a contains a chamber 44 adapted to communicate with the passage 43 and also with the tube 40, the communication with the passage 43 being controlled by a check valve 45 which is here shown as a disk of suitable material preferably mica and adapted to normally close a series of holes 46^a in a valve seat 46 which is in the form of a disk screwing into the lower portion of the globular chamber 44. A gas bag 47 is secured to the depending portion 39^b in suitable manner as by means of the coupling 48 screwing thereupon. Said globular portion 39 has a top opening for the insertion of the check valve and for inspection purposes and such opening is closed by a screw plug 49, the corresponding one 49' of which is provided with a hook 50 for holding the outer end of the gas hose 5 and the inhaler when not in use. It will be understood that this gas bag and described communications therewith and therefrom accommodate both of the cylinders 34.

When either one of the cylinders 34 is in position to supply gas to the passage 25, the gas flows through such passage through the annular space 41, passage 42 and thence into the gas bag which becomes distended by the gas. During an operation the gas is supplied constantly to the bag but to a limited degree and the gas may be entirely shut off by closing the needle valve 36 of the cylinder by means of the usual key (not shown). When the gas of the cylinder is exhausted, the communication between it and the apparatus is closed in automatic manner by merely backing off the set screw and removing the cylinder, whereupon the valve 26 will be automatically closed. This latter valve is thus always dependent for its open condition upon the presence of its cylinder.

The extension 4^a on the other side of the apparatus is provided with similar arms and the construction throughout as to ports and passages, cylinders, gas bag and valve mechanisms are the same for the oxygen supply as for the nitrous oxid, so that in the drawings all the parts have the same reference characters but primed, and to distinguish the two sets of cylinders I have indicated the nitrous oxid cylinders with the symbol

N₂O and the oxygen cylinders with the abbreviation OXY.

In practice the starting position of the valve is a position where the handle and indicator are at the right-hand off position of Fig. 2 so that the initial movement of the valve will cause an administering of the nitrous oxid alone. When the valve is turned to the position indicated by N₂O in Fig. 2 the port 13 is partially opened and the limited supply of nitrous oxid passes through the valve, through the large ports 14, into the chamber 15, out through the port 16 and through the gas hose 5 to the inhaler 6. Continued movement of the valve increases the amount of nitrous oxid administered until the indicator reaches the point *a* at which time the other port 12 just begins to be opened, the other port 13 remaining wide open. At this time there is therefore a slight mixture of the two gases but in considerable disproportions. Continued movement of the valve to the point *b* opens fully the two ports 12 and 13 with the result that the nitrous oxid and oxygen in equal qualities are admitted and are preliminarily mixed in the interior of the valve, again in the mixing chamber 15 and finally on their passage through the gas tube 5 with the result that the two gases are thoroughly and intimately mixed. By preference, the ports 14 and 16 are located opposite each other, so as to compel the gases to traverse the mixing chamber from one side to the other and thereby cause a thorough mixing of the two gases. Continued movement of the valve to the position *c*, while still maintaining a mixture of the gases, changes the proportions in favor of the oxygen, at this point there being only a very small quantity of the nitrous oxid admitted. Continued movement of the valve to the position *d* cuts off the supply of nitrous oxid altogether and admits oxygen alone and further movement to the other off position completely closes all the ports governed by the valve. In this manner and by these means the supply of either gas alone in any proportion or mixed in any proportion may be admitted in a very convenient and accurate manner by the operator. By this simple operation of the valve by means of the handle in one direction or the other the proper mixture best suited to the patient is obtained and after the operation or in case of an excess of nitrous oxid a supply of oxygen alone may be instantly administered to revive the patient. The check valves employed in connection with the bags are used to prevent the gas backing up and going from one bag to the other.

The apparatus above described is used for the purpose of administering any two gases either separately or mixed, but if desired, and as shown in Figs. 8 to 11, I may employ

in addition to such apparatus and as an attachment thereto, means for supplying an anesthetic such as ether, chloroform, etc., to the gas or mixed gases from said apparatus, provision being made by means of conveniently and accurately governed valve mechanism for controlling the proportions of the gases and ether or chloroform. In the same attachment I provide a re-breathing means whereby the patient may re-breathe the gas or gases administered until a proper limit is reached whereupon fresh gas or gases may be supplied for further re-breathing purposes.

Referring to the attachment, which is illustrated in Figs. 8 to 11, the same consists primarily of a connection with the gas outlet 16 of the regular apparatus, a re-breathing bag, a chloroform or ether jar, valve mechanism for governing the gas supply from the regular apparatus and its communication with said jar, and a gas administering hose terminating in the usual inhaler.

In the present instance, and as shown, a coupling sleeve 51 is clamped at its inner end by means of the coupling ring 52 to the outlet 16 of the regular apparatus and at its outer end screws into an L-shaped casting which includes a pipe portion 53 and a valve casing 54. To the lower end of this pipe portion is secured a re-breathing bag 55 of the same general character as the other two bags but unprovided with any check valve, whereby gas supplied from the regular apparatus may be readily admitted and permitted to be re-breathed by the patient in the manner hereinafter explained. The gas thus supplied from the regular apparatus does not enter directly into the conduit of the pipe 53 but indirectly through the downwardly extending passage 53^a leading from the coupling sleeve 51 and at its lower end communicating with said pipe. By reason of this passage 53^a the gas has a tendency to flow downwardly into the bag 55 rather than upwardly through the pipe 53.

The valve casing 54 is provided with a central bore in which oscillates a plug valve 56, having a limited movement and adapted to govern ports and passages in the casing. As shown in Figs. 10 and 11 the casing has on opposite sides of its bore the two ports 57 and 58, the former communicating with the pipe 53 and the other with the pipe connection 59 to which the gas-administering hose is attached. The valve 56 is itself provided toward its upper portion with a transverse passage 60 which is adapted to control ports 57 and 58 and to connect the same in one position either to a full extent or to any limited extent as determined by the operator. The valve casing is provided at opposite sides with the vertical passages 61 and 62 communicating respectively with the pipe 53 and the connection 59. These passages also

communicate with the two ports 63 and 64 located at opposite sides of the bore and governed by the valve. As shown in Fig. 10 the valve is provided with an L-shaped passage 65 communicating with the port 63 at its upper end and extending downwardly through the entire length of the valve. The valve is also provided with a passage 66 which communicates at its upper end with the port 64 and extends downwardly, emerging on the lower surface of the valve casing. As shown the valve is held in place by means of the nut 67 screwing on to the tubular depending portion of the valve and having upwardly extending fingers 68 bearing against the lower side of the casing. The lower portion of the casing is provided with a screw-threaded depending portion 69 to which is screwed the usual bottle 70 containing ether or chloroform.

The above described construction and arrangement is such that when the valve 56 is turned to the position indicated in Figs. 10, 11 and 12 the gas from the regular apparatus instead of being supplied directly to the patient, is caused to flow through the ether bottle, thereby taking up some of the ether vapor which becomes mixed with the gas and assists in the anesthetizing action. In this position of the valve the gas will flow through the pipe connection 53, through passage 61, port 63, passage 65 in the valve and into the ether jar or bottle. Leaving the jar the gas thus mixed with the ether flows upwardly through passage 66, port 64, passage 62 and pipe connection 59 to the usual gas hose. It will be noted from Fig. 11 that in this position of the valve the direct communication between the ports 57 and 58 is cut off with the result that the gas is compelled to flow through the ether jar as above explained.

In the above described position of the valve 56 the entire flow of gas was caused to pass through the ether jar but, if desired, any less amount may be caused to thus by-pass through the jar or all of the gas may be caused to flow directly through the valve and its casing. When the valve is turned so as to bring the passage 60 directly in line with the ports 57 and 58, the gas will pass freely through the valve casing and the valve and at the same time the by-pass connections through the ether jar will be cut off. However, instead of turning the valve 56 so as to connect the two ports 57 and 58 to their full extent, it may be turned to a slight extent thereby partially or to a limited degree connecting such two ports with the result that according to the degree of turning of the valve the gas flow may be divided in any proportions as determined by the operator between the by-pass connections and the direct connections through the valve. Consequently the amount of ether mixed

with the gas may be varied to a nicety and with great accuracy. Moreover, this control of the gas and its mixture with the volatile anesthetic is accomplished by a single valve.

The valve 56 which is operated by the handle 71 is provided with a combined pointer and stop 72 which coöperates with the two shoulders 73 and 74 on the valve casing for limiting the degree of turning of the valve. The top surface of the casing may be suitably marked to indicate the different positions of the valve, for instance one extreme position indicated by the word "Gas" would mean that the full direct flow of gas through ports 57 and 58 was then provided for and the other extreme position indicated by the word "Ether" would mean that the full flow of gas was taking place through the ether jar, and an intermediate position indicated by the word "Mix" meaning that the gas was being passed both directly and also indirectly through the ether jar. By preference the indicator 72 is at an angle and not directly underneath the handle 71 so that the indicator or pointer will be full exposed to the view of the operator.

The re-breathing bag 55 is not essential either to the regular apparatus or the additional anesthetic attachment just described, but the same is desirable as a matter of economy in the use of the anesthetic inasmuch as up to a certain point the anesthetic may be re-breathed. In the present instance I have shown this bag as located between the regular apparatus and the point of attachment of the jar, but it will be understood that if desired it may be located on the other side of the jar. For re-breathing purposes, the inhaler 6 is provided with an exhalation valve 75 which is in the form of a loose disk adapted to govern the port 76 from the mouth-piece portion of the inhaler and also the outlet 77 through the valve casing 78 to the atmosphere, it being understood that the gas hose is connected at its outer end to the connection or nipple of the inhaler. In the position of the valve shown in Fig. 6 the exhalation is free to pass through the outlet 77 but then the spring-pressed plunger 79 is turned to a position that will permit its side arm 80 to enter one of the deeper notches 81 of the casing, the valve is pressed to its seat by the pressure of the coiled spring 82 and the exhalation through the outlet 75 is thereupon prevented. In some instances it is desirable that the exhalation be restricted without being entirely cut off and for this purpose one or more partial depth notches 83 are provided for the arm 80, these notches being of less depth than the full depth notches 81 with the result that the plunger 79 cannot project inwardly far enough to seat the valve when the arm 80 is in one of the notches 83.

In practice, when the re-breathing of the gas is desired, the regular apparatus is operated to supply the bag 55 with a sufficient quantity of the gas but only under a slight pressure. The inhaler is now applied to the patient and the gas is inhaled from the bag and then exhaled back into the bag, the gas being thus re-breathed until a proper limit is reached, whereupon the inhaler is operated so that its valve may be permitted to operate. Thereupon the patient will shortly empty the bag 55 of the re-breathed gas after which, if found necessary, a new supply of gas is admitted to the bag from the regular apparatus. For re-breathing purposes I prefer to use the third or additional gas bag but it will be understood that the nitrous oxid bag of the regular apparatus might be employed for such purpose if its check valve were omitted whereupon the re-breathing action would take place through the valve mechanism and connections and said gas bag of the regular apparatus.

By the use of the above described attachment and also the re-breathing means, my complete apparatus may be used for such work or operations where the regular apparatus having the gas only, would not be sufficient, that is to say, the apparatus, by reason of said attachment may be utilized in such operations that require some administering of anesthetic, like chloroform or ether, with the result that the range of usefulness of the complete apparatus is materially increased. Moreover, the complete apparatus is capable of supplying a mixture, which, in the estimation of many operators, is far superior to the gas alone as supplied by the regular apparatus. Furthermore, by the use of the re-breathing means the full value of the anesthetic may be obtained and the cost of the administering of anesthetics is thereby considerably reduced.

In practice and as herein shown I prefer to arrange the ports and passages in the valve 56 and in its casing so that when the through gas passage is closed the passage through the ether jar remains open to some extent at least, with the result that the communication between the inhaler and the re-breathing bag is open. Consequently there is no danger of the patient becoming suffocated, which might be the result in case the valve 54 closed off all of the communication to the re-breathing bag.

I claim:

1. In an apparatus of the class described, the combination of a casing having two gas inlet ports and containing a mixing chamber and a valve chamber, the mixing chamber being around the valve chamber which communicates with said inlet ports and is provided with a port communicating with the mixing chamber, and a valve in the valve

chamber for governing said ports for administering a gas from either inlet port separately or from both inlet ports simultaneously in variable proportions.

2. In an apparatus of the class described, the combination of a casing having two gas inlet ports and containing a mixing chamber and a valve chamber, the latter being within the mixing chamber and communicating with said inlet ports and having an outlet port communicating with the mixing chamber, and a valve in the valve chamber for governing said ports for administering a gas from either inlet port separately or from both inlet ports simultaneously, said casing having an outlet port at a point opposite the outlet port of the valve chamber.

3. In an apparatus of the class described, the combination of a casing having two gas inlet ports and containing a valve chamber and a mixing chamber around the former, the valve chamber having a pair of juxtapositioned inlet ports communicating with said inlet ports of the casing and also having a single outlet port, and a valve governing said ports of the valve chamber and having a single passage acting to preliminarily mix the gases from said pair of ports.

4. In an apparatus of the class described, the combination of a casing provided with a substantially annular mixing chamber and a substantially central valve chamber and also with two gas supply passages which enter the casing from opposite sides and extend partway toward the valve chamber on the same diameter and then extend concentric of such valve chamber, entering the latter by inlet ports at the same side, the valve chamber also having an outlet port, and a valve in the valve chamber for governing the ports thereof, the mixing chamber having an outlet port.

5. In an apparatus of the class described, the combination of a casing provided with a substantially annular mixing chamber and a substantially central valve chamber and also with two gas supply passages which enter the casing from opposite sides and extend partway toward the valve chamber on the same diameter and then extend concentric of such valve chamber, entering the latter by inlet ports at the same side, the valve chamber also having an outlet port and a valve in the valve chamber for governing the ports thereof, said valve having a single passage acting as a preliminary mixing chamber.

6. In an apparatus of the class described, the combination of a supporting post, a valve casing surmounting the post and having gas inlet ports and an outlet port, valve mechanism in said casing for governing the ports, and a single manually operative means extending above the casing for operating the valve mechanism.

7. In an apparatus of the class described, the combination of a supporting post, a valve casing centrally surmounting the post and detachably connected therewith, the
 5 valve casing having a gas inlet port and a gas outlet port, valve mechanism in said casing for governing said ports, a handle therefor, a dial on the casing for indicating the proportions of the gases admitted, and
 10 an indicator operated by the handle and co-operating with the dial.

8. In an apparatus of the class described, the combination of a supporting post, a valve casing surmounting the post and having a plurality of gas inlet ports and an
 15 outlet port, said casing having a transverse walled opening in axial alinement with the post and forming a valve chamber, and valve mechanism located in said chamber
 20 and arranged to govern said ports and a single handle for operating said valve mechanism.

9. In an apparatus of the class described, the combination of a supporting post, a
 25 valve casing surmounting the post and having a plurality of gas inlet ports and an outlet port, and also having a transverse walled opening forming at its upper end a valve chamber communicating with said
 30 ports, and a valve located in said chamber for governing its ports, said post entering the lower end of such opening.

10. In an apparatus of the class described, the combination of a supporting post, a
 35 valve casing surmounting the post and having a plurality of gas inlet ports and an outlet port, and also having a transverse walled opening forming at its upper end a valve chamber communicating with said ports, the
 40 post entering the lower end of such opening, a valve located in said chamber for governing the ports, and valve retaining means co-operating with the lower end of the valve and exposed when the casing and post are
 45 detached.

11. In an apparatus of the class described, the combination of a supporting post, a valve casing surmounting the post and having a plurality of gas inlet ports and an out-
 50 let port, and also having a transverse walled opening forming at its upper end a valve chamber communicating with said ports, the post entering the lower end of such opening, a valve located in said chamber for governing the ports, and valve retaining means co-operating with the lower end of the valve and exposed when the casing and post are detached, said means comprising a stem projecting from the valve and a coiled
 55 spring surrounding said stem and bearing at one end against it and at its other end against said casing.

12. In an apparatus of the class described, the combination of a supporting post, a
 60 valve casing centrally surmounting the post

and detachably connected therewith, the valve casing having a gas inlet port and a gas outlet port, and a plug valve located centrally of the casing and post and having its lower end entering the top of the post. 70

13. In an apparatus of the class described, the combination of a supporting post, a valve casing surmounting the post and having two gas inlet ports and a gas outlet port, a single valve in said casing for governing
 75 the ports, and two parallel arms connected to opposite sides of the casing and having passages communicating with the inlet ports, said arms having on their outer ends means for supporting gas cylinders, said valve hav- 80
 ing a manually operable member extending above the casing, and said arms being downwardly turned at their end portions to a position below the casing and said member to make the valve the highest part of the 85
 apparatus.

14. In an apparatus of the class described, the combination, with valve mechanism, of a supporting arm for a gas cylinder, said arm having a gas passage for the gas sup- 90
 ply, a second arm having a passage communicating with said supply, a tube arranged in said latter passage and communicating with the valve mechanism, a depending extension on said arm connecting with both of 95
 said passages, and a gas bag supported by said extension and communicating with said passages.

15. In an apparatus of the class described, the combination, with valve mechanism, of 100
 a supporting arm for a gas cylinder, said arm having a gas passage for the gas supply, a second arm having a passage communicating with said supply, a tube arranged in said latter passage and communicating 105
 with the valve mechanism, a depending extension on said arm communicating with both of said passages, a gas bag supported by said extension and communicating with said passages, and a check valve in the com- 110
 munication between the gas bag and the tube.

16. In an apparatus of the class described, the combination of a central post, a single valve mechanism including a casing mount- 115
 ed thereon, parallel arms mounted on opposite sides of said casing, means on the outer ends of said arms for holding gas supply cylinders, arms supported by said casing and extending radially thereof, said last named 120
 arms having uninterrupted passages communicating respectively with the gas supply and directly with the valve mechanism, and gas bag devices supported by said last mentioned arms and communicating with both 125
 of said passages.

17. In an apparatus of the class described, the combination of a central post, a single valve mechanism including a casing mount- 130
 ed thereon, parallel arms mounted on oppo-

site sides of said casing, means on the outer ends of said arms for holding gas supply cylinders, arms supported by said casing and extending radially thereof, said last named arms having uninterrupted passages communicating respectively with the gas supply and with the valve mechanism, said last named arms having hollow depending extensions, and gas bag devices supported by such extensions and arranged to communicate with said passages.

18. In an apparatus of the class described, the combination of a central post, a single valve mechanism including a casing mounted thereon, said casing having on opposite sides lateral extensions provided with passages extending in opposite directions but in alinement and with supply ports communicating with the valve mechanism, and also provided with lateral openings, pairs of hollow arms communicating with said passages in the extensions, and with sources of gas supply, hollow arms having separate passages connecting respectively with said ports and passages, and gas bags attached to said last named arms and adapted to communicate with their passages.

19. In combination with an apparatus for administering gas, valve mechanism comprising a casing having a gas inlet port 57

communicating with said apparatus, a gas outlet port 58 opposite ports and passages 63 and 64, a valve having a through-way or passage 60 for directly connecting ports 57 and 58, ports and passages 65 and 66, the former communicating with port 63 and the latter with port 64 and a receptacle adapted to contain a volatile anesthetic and communicating with the ports and passages 65 and 66 of the valve.

20. In combination with an apparatus for administering gas, valve mechanism comprising a casing having a gas inlet port 57 communicating with said apparatus, a gas outlet port 58 and ports and passages 63 and 64, a valve having a through-way or passage 60 for directly connecting ports 57 and 58 and ports and passages 65 and 66, the former communicating with port 63 and the latter with port 64, said casing having a depending cover portion 69 through which the valve extends, and a receptacle adapted to contain a volatile anesthetic and secured to said cover portion, said passages 65 and 66 of the valve communicating with the interior of the receptacle.

ALBERT CHARLES CLARK.

Witnesses:

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