

Dec. 30, 1958

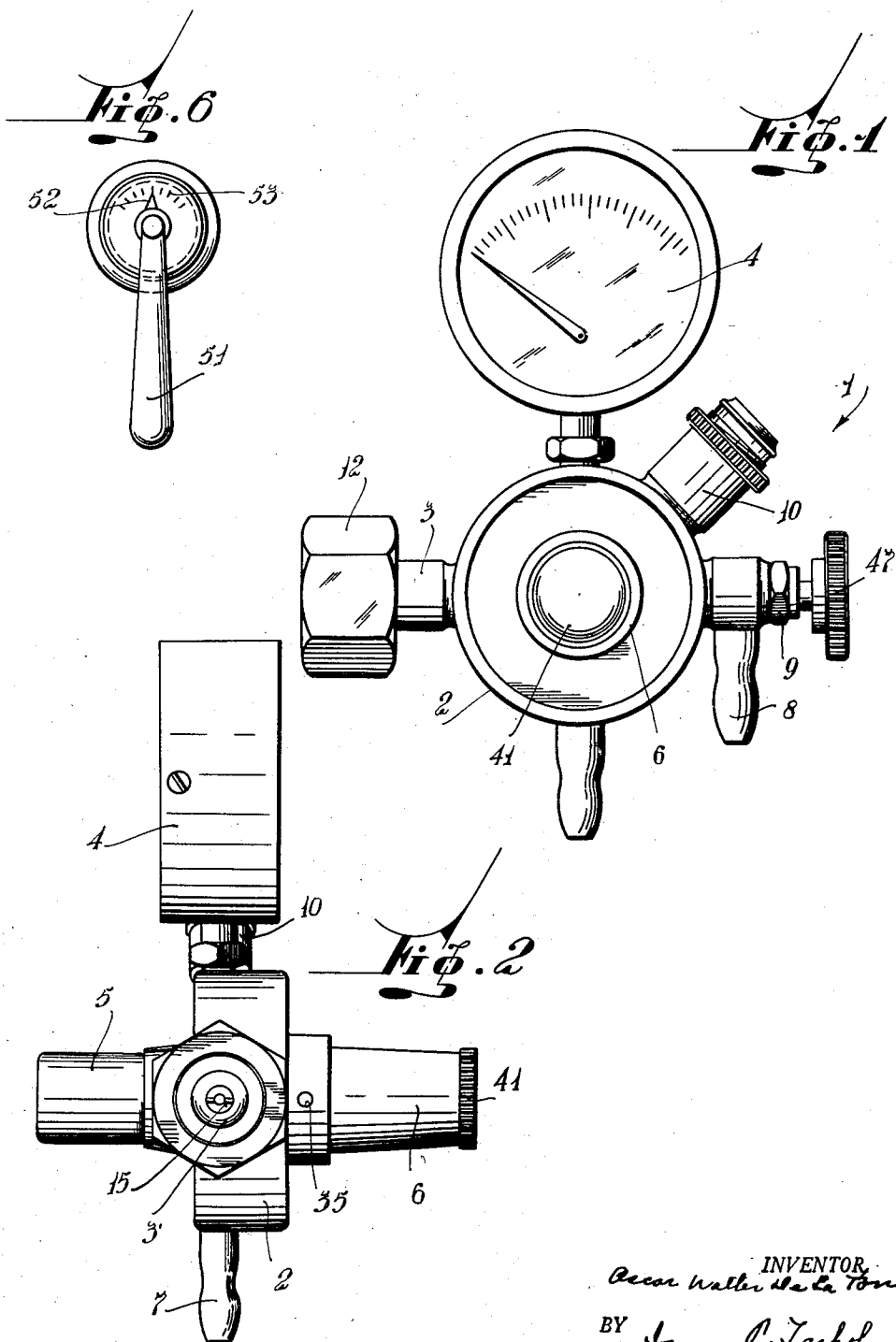
O. W. DE LA TORRE

2,866,455

APPARATUS FOR ADMINISTRATION OF ANAESTHETICS

Filed March 23, 1953

7 Sheets-Sheet 1



INVENTOR
Oscar Walter de la Torre
BY *Sam P. Tashof*
Attorney

Dec. 30, 1958

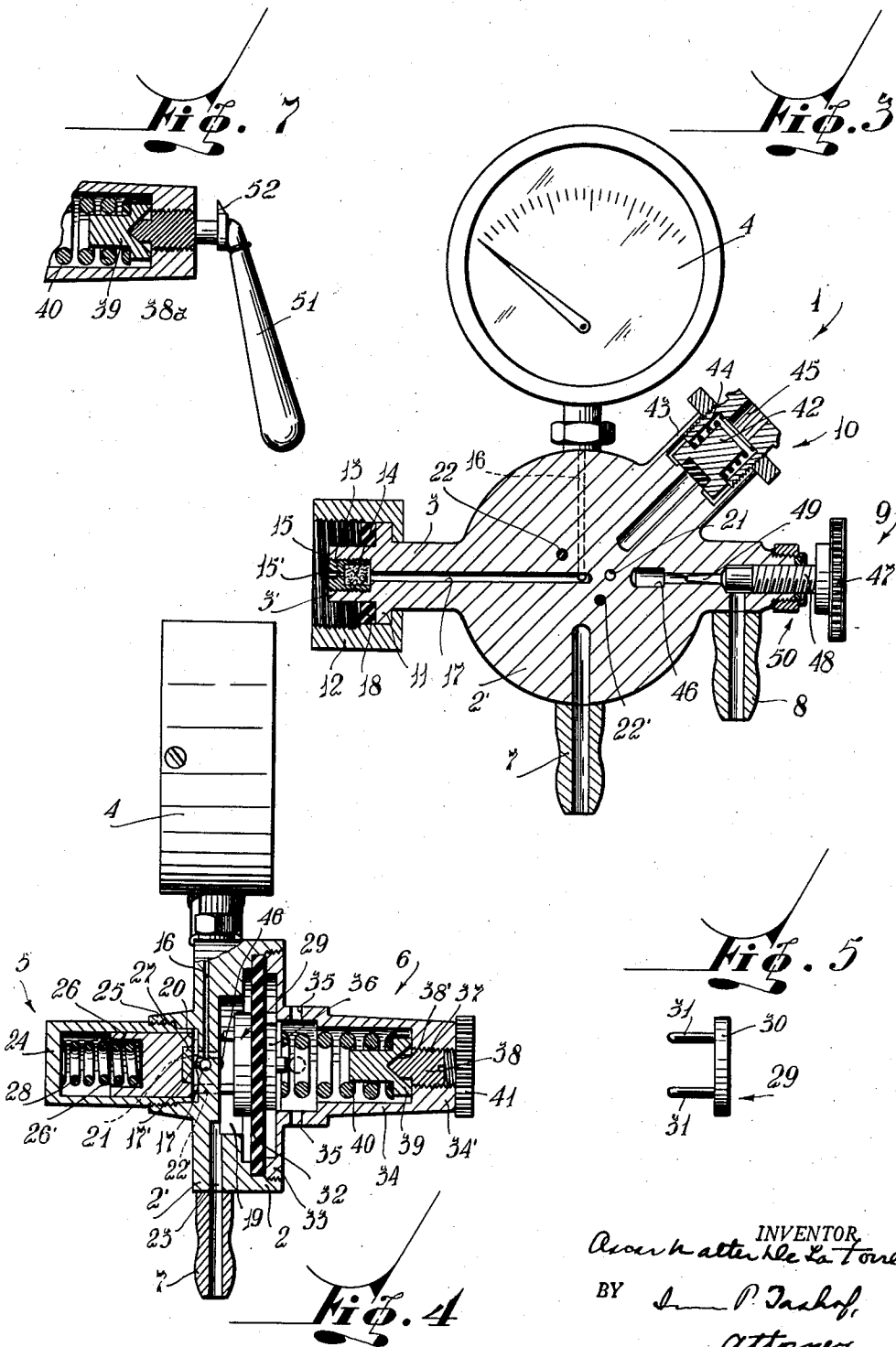
O. W. DE LA TORRE

2,866,455

APPARATUS FOR ADMINISTRATION OF ANAESTHETICS

Filed March 23, 1953

7 Sheets-Sheet 2



INVENTOR
Oscar W. De La Torre
BY *Sam P. Tashof*
Attorney

Dec. 30, 1958

O. W. DE LA TORRE

2,866,455

APPARATUS FOR ADMINISTRATION OF ANAESTHETICS

Filed March 23, 1953

7 Sheets-Sheet 3

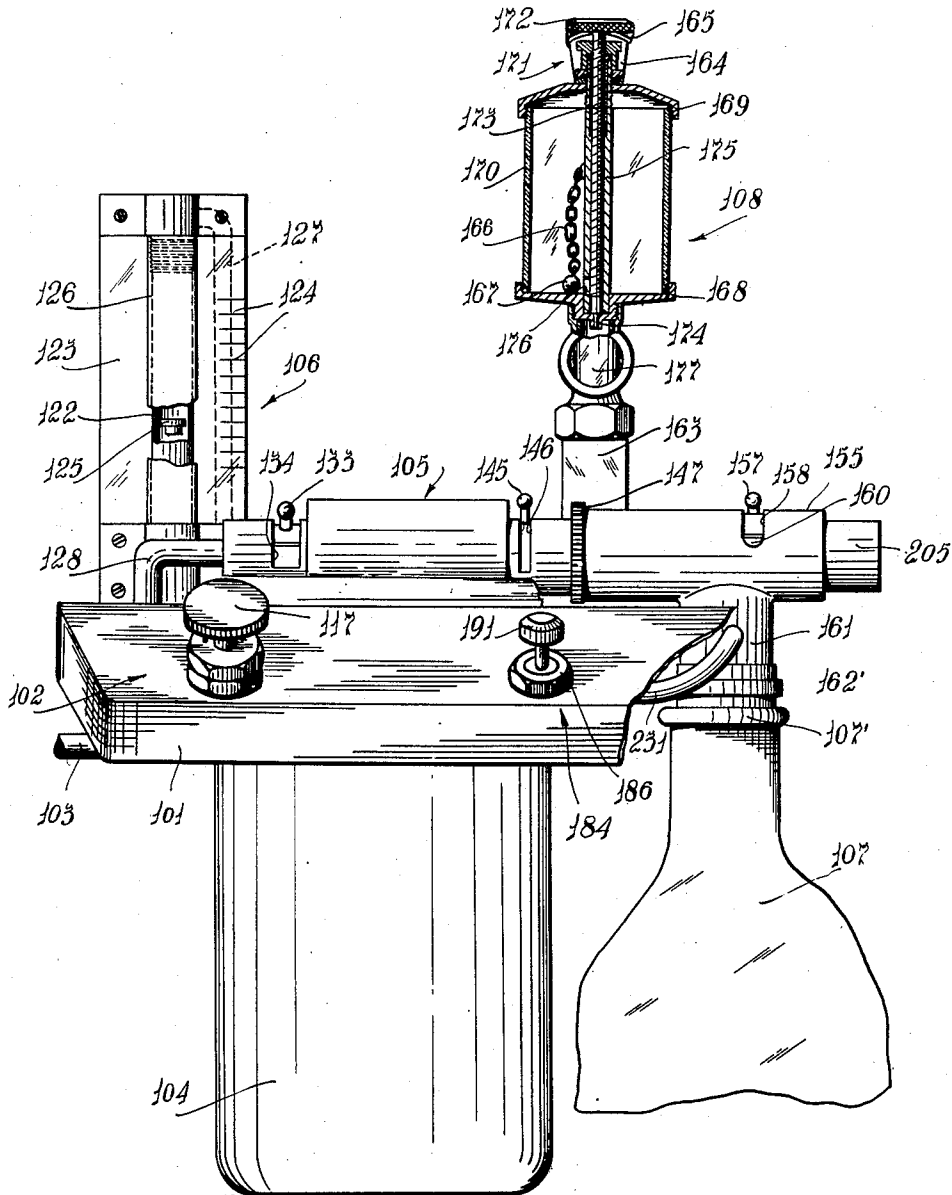


Fig. 8

INVENTOR,
Oscar Walter De La Torre
BY *Samuel R. Yach*
Attorney

Dec. 30, 1958

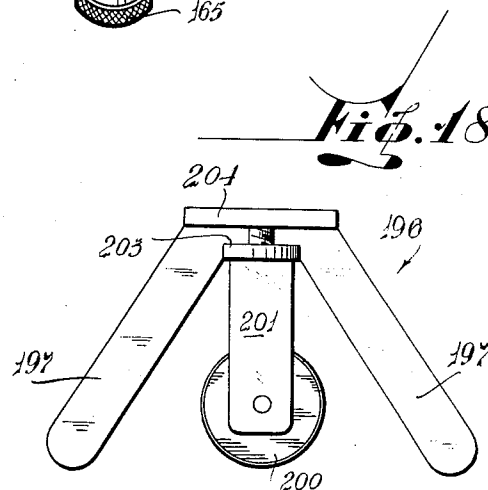
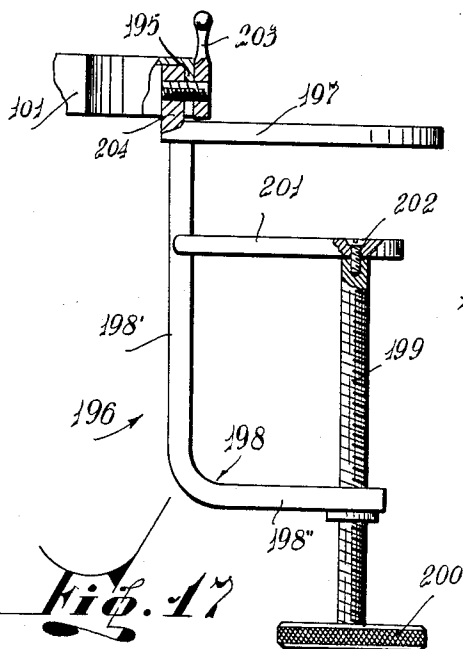
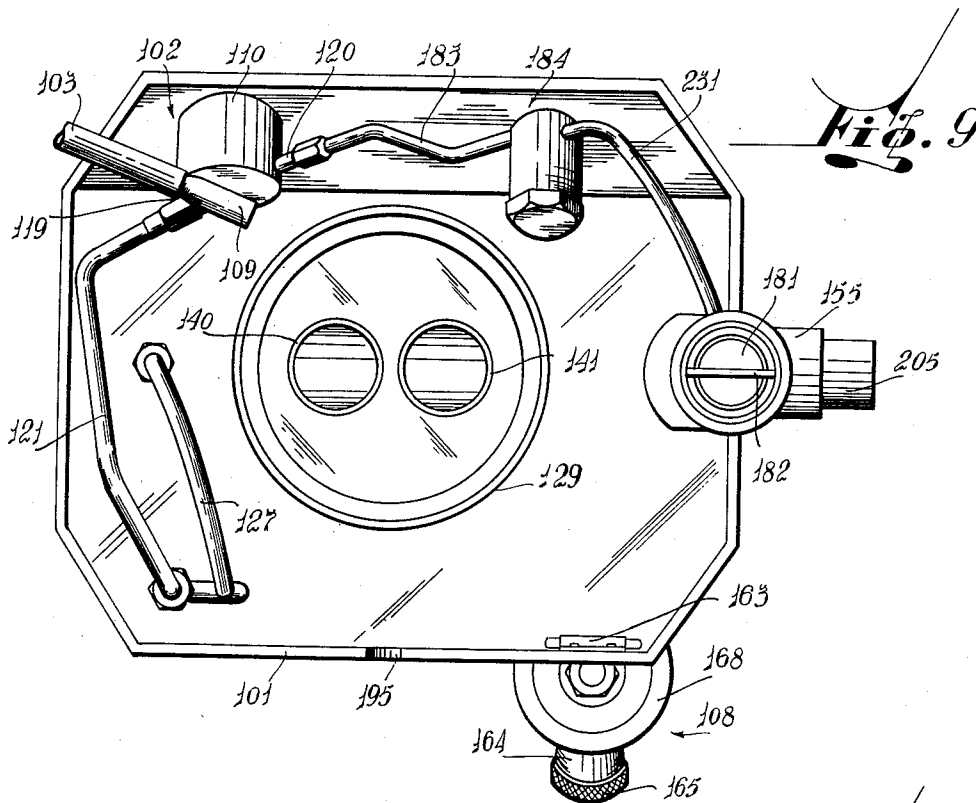
O. W. DE LA TORRE

2,866,455

APPARATUS FOR ADMINISTRATION OF ANAESTHETICS

Filed March 23, 1953

7 Sheets-Sheet 4



INVENTOR,
Oscar Walter de la Torre
BY *Sam O. Tashf,*
Attorney

Dec. 30, 1958

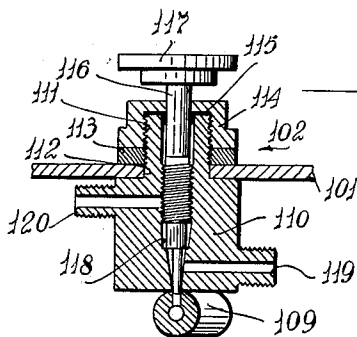
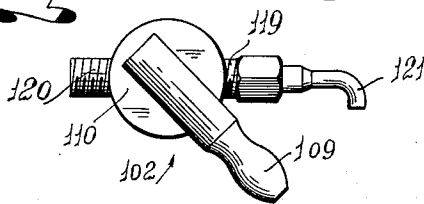
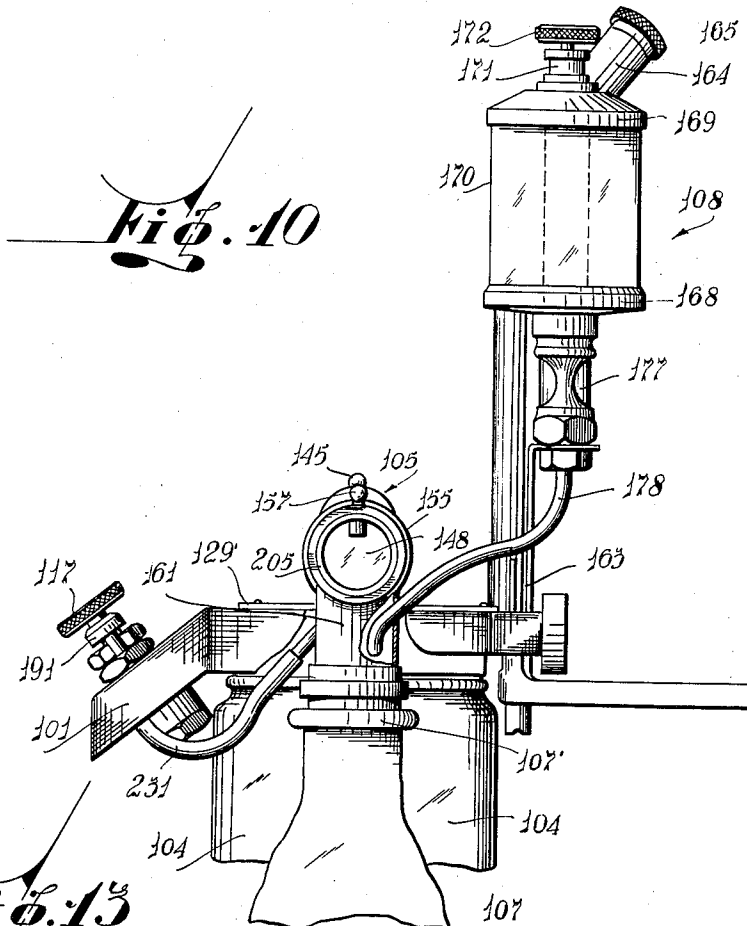
O. W. DE LA TORRE

2,866,455

APPARATUS FOR ADMINISTRATION OF ANAESTHETICS

Filed March 23, 1953

7 Sheets-Sheet 5



INVENTOR
Anson Walter DeLa Torre
BY Sam P. Tashof,
attorney.

Dec. 30, 1958

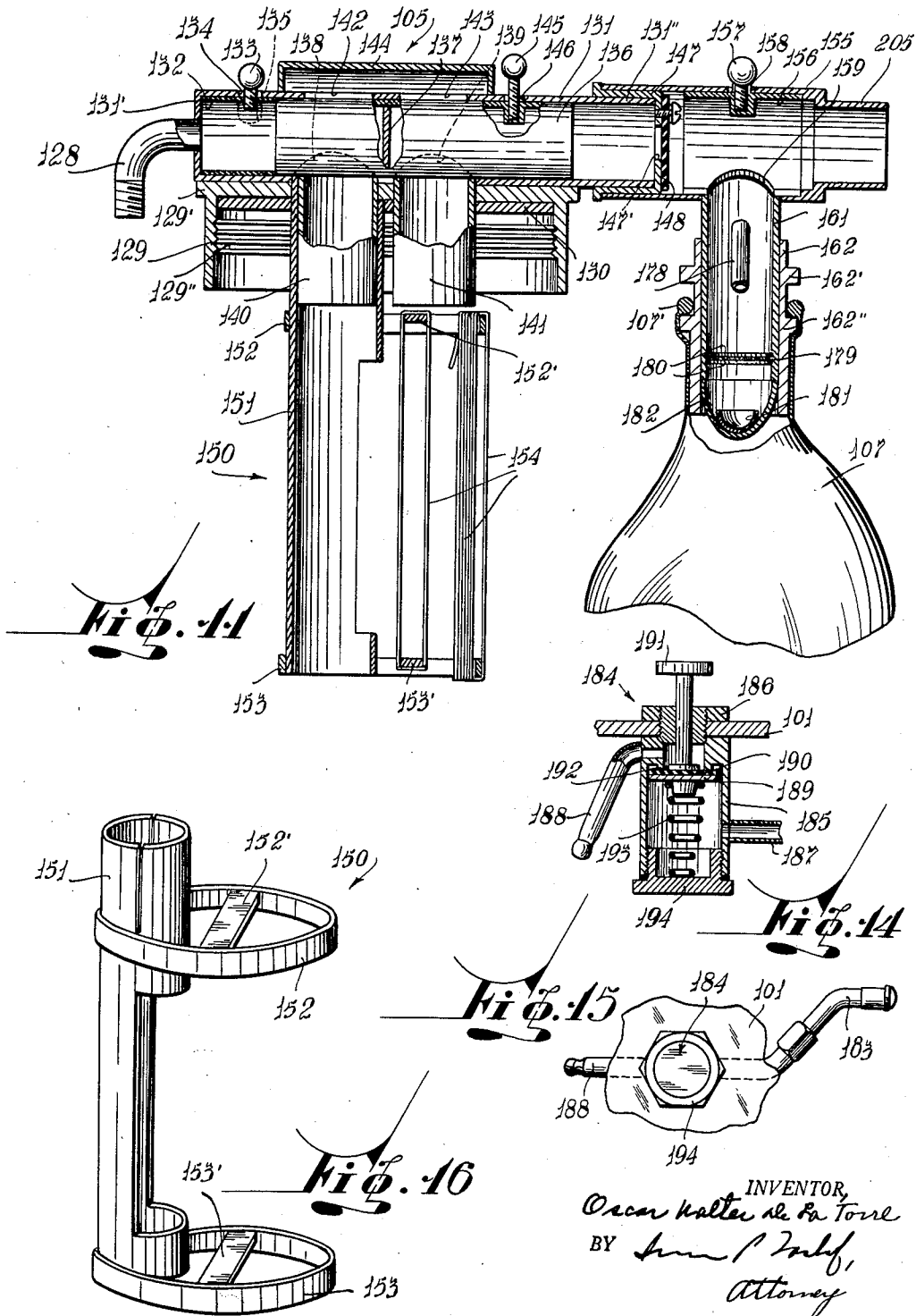
O. W. DE LA TORRE

2,866,455

APPARATUS FOR ADMINISTRATION OF ANAESTHETICS

Filed March 23, 1953

7 Sheets-Sheet 6



INVENTOR,
Oscar Walter de la Torre
BY *Sam P. [Signature]*
Attorney

Dec. 30, 1958

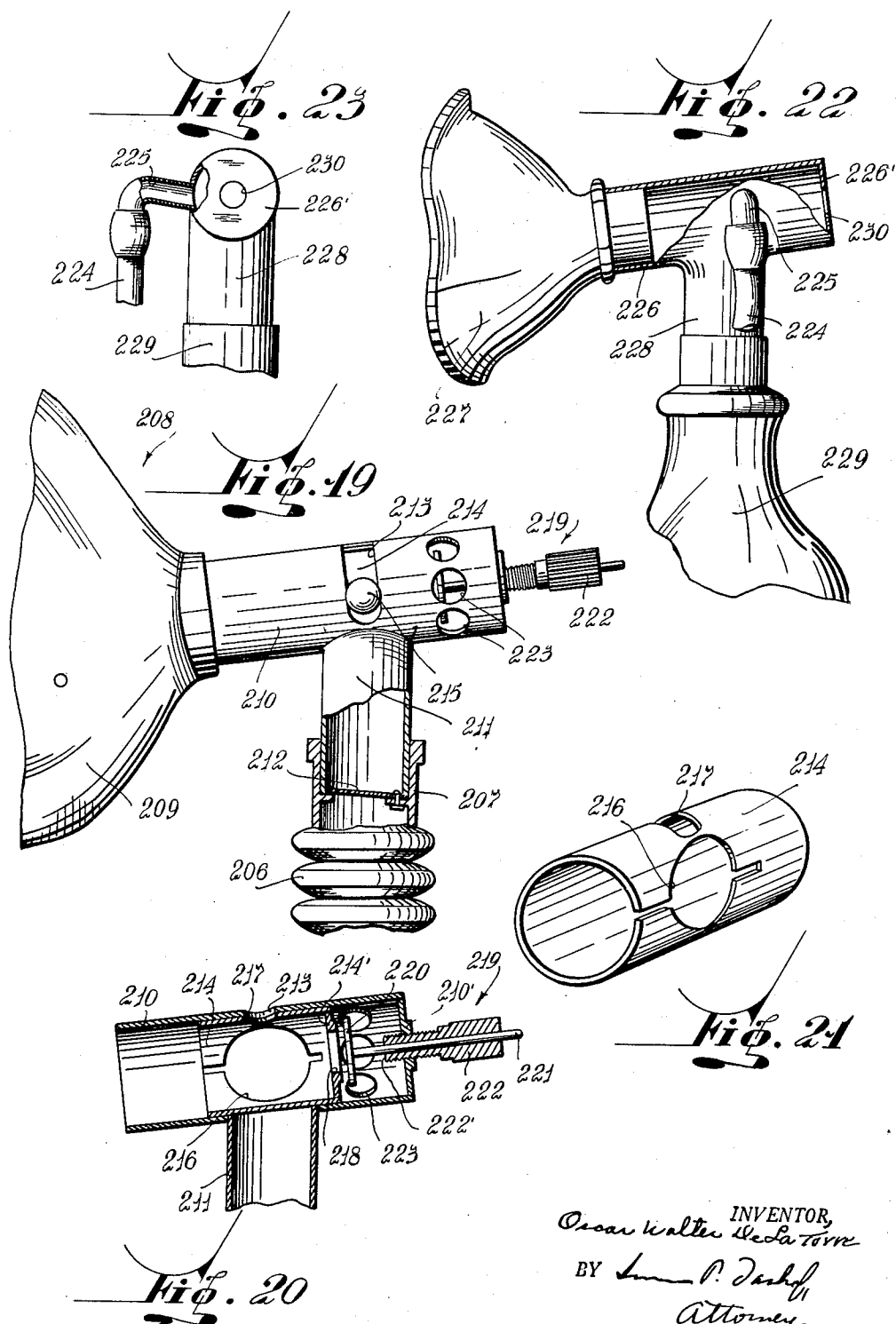
O. W. DE LA TORRE

2,866,455

APPARATUS FOR ADMINISTRATION OF ANAESTHETICS

Filed March 23, 1953

7 Sheets-Sheet 7



INVENTOR,
Oscar Walter De la Torre
BY *Sam P. Dushoff*
Attorney

2,866,455

APPARATUS FOR ADMINISTRATION OF ANAESTHETICS

Oscar W. de la Torre, Buenos Aires, Argentina

Application March 23, 1953, Serial No. 343,927

13 Claims. (Cl. 128—188)

This invention relates to an apparatus for the administration of anaesthetics and more particularly the present invention relates to an apparatus for administering anaesthetics during childbirth.

Although reference will be mainly made, when describing this invention, to an apparatus for the administration of anaesthetics in childbirth which apparatus permits reduction practically to insensibility the pains of labor and at the same time to practice a reanimation or revival on the child just born, it is to be understood, that, as will be apparent to those skilled in the art, that it is possible to apply this apparatus for administration of anaesthetics in general, that is to say for operations of any kind.

The apparatus has been so designed as to enable the use of modern anaesthetics and more particularly the use of trichloro ethylene ($\text{CHCl}:\text{CCl}_2$) which is known to be a most excellent anaesthetic but has the disadvantages of having a high density (4.53; air=1) so that in order to obtain sufficient evaporation, upon passing a current of air or oxygen along its surface it requires the design of special means. Furthermore it has to be kept in mind, that the application of trichloro ethylene has a determined limit, so that under certain circumstances a reinforcing volatile anaesthetic agent such as ether, chloroform or ethyl chloride is usually required and the apparatus of the present invention, provides means which permit said reinforcing anaesthetic to be added.

The apparatus is further provided with a control system for controlling the flow of oxygen so that the concentration of the anaesthetic vapors can be changed in accordance with the requirements, without having to modify the apparatus per se.

When the apparatus is used for administration of anaesthetics in childbirth, a reanimating system is added for the child just born, which is based on the principle of oxygenation, to which end suitable means are supplied which enable at the same time the anaesthetic and analgesic treatment of the delivering mother.

The devices which have been conceived up to now and in which it is possible to use a heavy anaesthetic, do not provide the necessary means for adequately evaporating said anaesthetic.

A further drawback of the known devices resides in that the latter accumulate carbon anhydride, so that during the anaesthetic treatment the mask must be intermittently withdrawn to eliminate said carbon anhydride; the result thereof is that the percentage of the anaesthetic supplied varies continuously and often produces undesirable excitement of the patient.

In substantially all the known devices for producing anaesthesia, as well as in any other device wherein a constant flow of gas is required, and particularly in those cases wherein the required pressure is relatively low with regard to the source of pressure, it is common practice to use a secondary supply source, which may consist of a small tank or bottle in which the gas is stored at approximately the required pressure, which secondary source is successively recharged by the main source.

This is necessary in order to insure that the commonly used textile sheathed rubber tube does not explode or slip off the nipples, which happens when the rubber tubes are directly coupled to the main source of high pressure with the obvious consequences. On the other hand, the continuous refilling or recharging of the secondary source, is a definite drawback, especially in apparatus for administering anaesthetics, which often have to operate continuously for rather long periods.

In order to eliminate said secondary supply source, a constant flow pressure means has been conceived which enables the latter to be connected for example to an oxygen tube of the high pressure type and deliver under all circumstances the required low pressure to the apparatus to be fed.

A number of further drawbacks could be more specifically described such as the failure of known apparatus to provide means for cutting out the anaesthetics and supplying pure oxygen, but it is considered that the foregoing gives a sufficient picture of the art.

Bearing in mind the above there has been provided apparatus for administration of anaesthetics. This comprises an intake connection for oxygen and the like, a flow control valve means connected to said intake connection, a first container for housing and evaporating a first anaesthetic, and a flow directing device having an admission end and an exit. The admission end of said flow directing device is connected to said flow control valve means, and said first container is connected to said flow directing device. There is further provided a control means in said flow directing device for directly connecting said admission end to said exit and closing off said first container, a one way valve connected to said exit permitting flow from said admission end through said exit, as well as a collapsible container connected to said one way valve. Also there is provided a second container for housing a second anaesthetic and having a flow control, said second container being connected to said collapsible container, said collapsible container being also directly and controllably connected to said flow control valve means and an administering mask connected to said collapsible container.

It is an object of the invention to provide an apparatus for the administration of anaesthetics of relatively small size and low weight so as to make it a portable apparatus.

A further object is to provide an apparatus which permits a supply of mixture of several anaesthetics and oxygen or oxygen alone and which has additional valves which enable to connect the apparatus directly to the air at several points in case the oxygen supply source is empty, or for other purposes as will be later specified.

Another object is to supply an apparatus which is provided with a constant flow pressure means to be located between the oxygen supply source and the intake connection so that the apparatus may be directly connected to a high pressure supply source in spite of which the administration of the anaesthetics or oxygen is constant and without substantially any variations as far as pressure is concerned.

A still further object of the invention is to provide an apparatus which due to the arrangement of suitable valves eliminates the carbon anhydride which cannot reach the anaesthetics evaporating system.

Another object is to provide an apparatus which when used in childbirth is provided with additional means for reanimating the newly born child.

A further object is to provide an apparatus by means of which the anaesthetic gases can be eliminated from the system at will without the necessity of withdrawing the mask from the patient.

Another object is to provide an apparatus of simple structure and which may be easily cleaned.

These and further objects and advantages will become more apparent during the course of the following description, in which by way of example a specific embodiment as well as a modified embodiment have been shown.

In the drawings:

Figure 1 is a front elevation of the constant flow pressure means provided with a branch for reanimation in case said constant flow pressure means is used in childbirth or in other cases wherein a second branch for oxygen supply, such as oxygen tents, is required.

Figure 2 is a side elevation of the constant flow pressure means, shown in Figure 1.

Figure 3 is a partial longitudinal sectional view of the constant flow pressure means shown in Figure 1.

Figure 4 is a partial longitudinal sectional means of the constant flow pressure means shown in Figure 2.

Figure 5 is a detail in side elevation of an element integral of the constant flow pressure means.

Figure 5 is a detail in front view of a modification which may be used in the constant flow pressure means shown in Figure 1.

Figure 7 is a partial sectional side elevation of the detail shown in Figure 6.

Figure 8 is a perspective front view, with a part broken away, of the main part of the apparatus for administration of anaesthetics, in accordance with the present invention.

Figure 9 is a bottom plan view of the main support with accessories of the apparatus for administration of anaesthetics, in accordance with the present invention.

Figure 10 is a side elevation of the part of the apparatus shown in Figure 8.

Figure 11 is a detail in longitudinal section of the flow directing device to which the collapsible container and the evaporating aid of the first container is connected.

Figure 12 is a longitudinal section of the flow control valve means.

Figure 13 is a plan view of the flow control valve means shown in Figure 12.

Figure 14 is a longitudinal section of the control valve for connecting the flow control valve means to the collapsible container.

Figure 15 is a plan view of the control valve mounted on the main support and part of its connecting tubes.

Figure 16 is a perspective view of the evaporating aid of the first container.

Figure 17 is a side elevation, partially in section, of the holder of the main support.

Figure 18 is a top plan view of the holder shown in Figure 17.

Figure 19 is a side elevation, partially in section, of the main mask.

Figure 20 is a longitudinal section of the control valve of the main mask.

Figure 21 is a perspective view of an element shown in Figure 20.

Figure 22 is a side elevation, partially in section, of the baby's mask with part of its collapsible container.

Figure 23 is an end view of part of the mask shown in Figure 22.

As may be best seen in Figures 1 and 2, the constant flow pressure means 1 consists of a main casing 2 integral with an admission arm 3 having coupling means for connecting it to the supply source and further comprising a manometer 4 for measuring the pressure of the supply source, usually an oxygen bottle, a constant flow pressure valve 5, and a control valve, or control means 6 for varying the position of the constant flow pressure valve, a main nipple 7 for forwarding the gas under constant pressure, a secondary nipple 8 mounted on a needle by-pass valve 9 and a safety valve 10. The admission arm 3 (see Figure 3) comprises, adjacent to its front end portion 3', said coupling means which consists

of a shoulder 11 and an internally threaded nut 12 abutting against the shoulder 11. The free end portion 3' is provided with an internally threaded boring 13 in which a filter element 14 is housed and protected from outside by a perforated closure member 15 which is screwed into boring 13 and pressing the filter element 14 against a supply boring 17 which connects the outside through the perforation 15' of the closure member 15, filter 14, with the main casing 2. A vertical boring 16 (Figure 4) in the main housing 2 connects boring 17 with the manometer 4, whereby said manometer indicates the pressure of the supply source. The valve 6 serves as a control valve since it controls the pressure on a diaphragm or rubber plate 32.

The internally threaded nut 12 is directly mounted on the discharge opening (not shown) of the oxygen tube or the like and in order to insure a hermetical sealing, a washer 18 is housed in said nut 12 abutting against the shoulder 11.

The main casing 2 comprises a front chamber 19 (Figure 4) and a smaller back chamber 20, separated by the main partition wall 2' of said casing 2. The front chamber 19 and back chamber 20 are interconnected by three cross borings 21, 22 and 22' in said main partition wall 2'. The back chamber 20 is also connected to the supply boring 17 by means of prolongation 17'. Thus, front and back chambers 19 and 20, respectively, are connected to the supply boring 17.

The main nipple 7 is connected to the front chamber 19 by means of conduit 23 and thereby the main nipple 7 is also connected to the supply source (not shown). It is however an object of the constant flow pressure means 1, to supply the gas under a predetermined constant pressure to the main nipple 7 and to this end the constant flow pressure valve 5 and control valve 6 are necessary which operate in combination.

The constant flow pressure valve consists of a cylindrical housing 24 which is screwed into a ring-like projection 25, integral with the main casing 2. A constant flow valve member 26 is slideably housed in said cylindrical housing 24 and comprises a valve head 27 that is capable of blocking the opening of prolongation 17' and a valve spring 28, one end of which abuts against the base of the cylindrical housing 24, while the other end is housed in a recess 26' of said constant flow valve member 26.

The control valve 6 includes a control member 29, consisting of a disk 30 (see Figure 5) and two separated distance pins 31, which are slideably housed in said cross borings 22 and 22'. A rubber plate 32 of circular shape seals the front chamber 19 from the outside and which rubber plate 32 is in contact with said control member 29 and is maintained in its sealing position by means of cover 33 screwed into the main casing 2. Said cover comprises a cylindrical hollow projection 34 having a plurality of radial perforations 35, which are arranged adjacent to said cover 33. A disk-like member 36 of smaller diameter than the disk 30 of the control member 29 is located in front of said disk 30 and enters in contact therewith through said rubber plate 32. Conveniently the diameter of said disk-like member 36 is smaller than the diameter of the hollow of said cylindrical projection 34 so that it may enter thereinto. The free end portion 34' of said cylindrical hollow projection 34 is provided with a threaded perforation 37 in which an adjusting screw 38 is housed having an actuating end portion 38' commanding a false support 39 of a helical pressure spring 40, the other end of which operates on said disk-like member 36. A cover screw 41 closes the access to said adjusting screw 38.

It will thus be understood that by varying the position of the adjusting screw 38, such as by displacing it towards the main casing 2, the pressure exerted by helical pressure spring 40 onto the control member 29 through the disk-like member 36 and rubber plate 32 will be increased, whereby the distance pins 31 will displace the

constant flow valve member 26 in opposition to the pressure exerted by valve spring 28 towards the base portion of the cylindrical housing 24, whereby the back chamber 20 will be increased in size and thus the gas may enter thereto at a larger pressure. In other words, the gas supplied by the supply source through the supply boring 17 will leave the main nipple 7 at a higher pressure due to the fact that the distance between the prolongation 17' and the valve head 27 has been increased and thus the gas entering into the back chamber 20 will pass through the cross boring 21 at a higher pressure to the front chamber 19 wherefrom it passes through the conduit 23 into the main nipple 7. In case the rubber plate 32 is injured, as for example, if the pressure in the supply source increases due to any unforeseeable event, the helical pressure spring 40 will be compressed and the excess of gas will be able to leave the main chamber through the radial perforations 35.

For safety purposes the constant flow pressure means and more particularly the front chamber 19 is connected through boring 42 to the safety valve 10 (Figure 3) which consists of a valve head 42 located in a projecting arm 43 and provided with the commonly known spring 44 and exit opening 45, as is well known in the art.

So far the valve has been described as a constant flow pressure means. It may however be necessary to provide a second connection by means of which an additional supply of gas may be provided and to which end the front chamber 19 is connected to a boring 46 in which the needle by-pass valve 9 is housed consisting of a handle 47 having a threaded stem 48 ending into a needle 49 for controlling the amount of gas capable of leaving through the secondary nipple 8. The usual type of stuffing box 50 provides the gas tight joint for the stem 48.

As a modified embodiment, the same constant flow pressure means as hereinbefore described, may be provided with a control adjusting screw, such as shown in Figures 6 and 7, wherein the false support 39 is controlled by an adjusting screw 38a that is integral with a handle 51 and the handle has an indicator 52 in operative relationship with a scale 53. Upon turning said handle 51 the pressure on the helical pressure spring 40 may be varied.

The apparatus for the administration of anaesthetics comprises a main support 101 (see Figure 8) which is provided with a flow control valve means 102 that is connected to an intake connection 103. A first container 104 for housing and evaporating a first anaesthetic 104, such as trichloro ethylene is supported by said main support 101. A flow directing device 105 is connected to said flow control valve means 102 through an oxygen flow measuring means 106 and said flow directing device 105 is also connected to said first container 104 and is also provided with a by-pass, as will be later explained, and this is for the purpose of directly connecting said flow measure means to a collapsible container 107 which on its turn is also connected to a second container 108 for housing a second anaesthetic.

The intake connection 103, as may be better seen in Figure 9, consists of a textile sheathed rubber tube, the other end of which is connected to the main nipple 7 of the constant flow pressure means 1. The intake connection 103 is mounted on a nipple 109 (Figure 13) that is integral with the casing 110 of the flow control valve means 102. Said casing 110 (Figure 12) comprises a cylindrical threaded projection 111 which passes through a bore 112 of the main support 101 and a nut 113 and counternut 114 mounted on said cylindrical projection 111 fix the flow control valve means 102 to said main support 101. A suitable gasket 115 is located between said counternut 114 and said cylindrical projection 111 for a partially threaded needle valve stem 116 operated by means of a handle 117. Said needle valve stem 116 is screwed into the main bore 118 of the casing 110 and controls the admission opening which connects the flow control valve means 102 to the nipple 109. A first branch 119 and a

second branch 120 are connected to said main bore 118. By opening the needle valve stem 116, an equal quantity of gas, and in the particular case, oxygen, is capable of flowing both through the first branch 119 as well as through the second branch 120. As may be better seen in Figure 9, the first branch 119 is connected to a tube 121 relating said first branch 119 with the flow measure means 106 consisting of a vertical transparent tube 122 (see Figure 8) mounted in a support 123 fixed to the main support 101 and on which support 123 a scale 124 is marked. A float 125 is slideably housed in said transparent tube 122. A convenient glass protection 126 may surround said transparent tube 122. The upper end of said transparent tube 122 is connected to a return pipe 127 part of which is located underneath the main support 101, as may be seen in Figure 9, and is connected to the supply pipe 128 (see Figure 8) of the flow directing device 105.

Since the largest diameter of the float 125 is slightly smaller than the internal diameter of the transparent tube 122, upon opening the flow control valve means 102 by handle 117, the float 125 will rise in said transparent tube 122 up to a certain level and the horizontal plane passing tangentially by the upper end of said float will indicate at the scale 124 the volume of oxygen which passes through the flow control valve means 102 at a determined unit of time; the more the valve means 102 is opened, the higher the float 125 will rise in said transparent tube 122.

The flow directing device 105 comprises a basic support 129 having an upper rim 129' (see Figures 10 and 11) which engages the upper surface of the main support 101 and passes partially through an opening arranged therein so that the lower part of said basic support projects out of the main support as may be seen in Figure 9. Said basic support is provided with an internally threaded section 129'' and a washer 130. The first container 104 (see Figure 8) is screwed into said basic support 129 and more particularly supported by said threaded section 129'' and the washer 130 provides a gas-tight seal. The top of the basic support 129 is integral with a tubular member 131 having an admission end portion 131' to which the supply pipe 128 is connected. Inside said admission end portion 131' a cylindrical air connecting member 132 is rotatably housed, which air connecting member is provided with an actuating knob 133 emerging through a slot 134 (Figure 8) arranged in the admission end portion 131'. The cylindrical air connecting member 132 is also provided with a slot 135 of similar size as said slot 134 so that upon rotating said cylindrical air connecting member 132, upon registry of the slots 134 and 135, the inside of the tubular member 131 will be connected with the outside. In the position shown in Figures 8 and 11, this air connection is closed and it is only opened in case the supply pipe 128 is not able to supply the required oxygen.

Adjacent to the cylindrical air connecting member a flow directing cylinder 136 (Fig. 11) is rotatably housed in said tubular member 131, which flow directing cylinder is divided into two parts by a disk-shaped partition 137. Each section of said flow directing cylinder 136 is provided with a circular bore 138 and 139, respectively, which may coincide either, as shown in Figure 11, with corresponding downwardly projecting tubes 140 and 141, respectively, or with corresponding openings 142 and 143 respectively, that are arranged in the upper portion of the tubular member 131. Said openings 142 and 143 are interconnected by a by-pass 144. Similarly as the cylindrical air connecting member 132, the flow directing cylinder 136 is provided with an actuating knob 145 emerging through a slot 146 (Figure 8) arranged in said tubular member 131. The exit end portion 131'' is covered by a cup 147 having an exit 147' controlled by a one-way flapper valve 148 formed of a circular rubber disk screwed onto said cup 147 by means of a screw 149.

Inside the first container in which the trichloro ethylene

is to be housed, an evaporating aid 150 is housed (Figure 16) which evaporating aid consists of a partially open tubular member 151 mounted on said downwardly projecting tube 140 and integral with two parallel spaced apart rings 152 and 153 each having a transverse bar 152' and 153', respectively. Between said parallel spaced rings 152 and 153 and said transverse bars 152' and 153' a plurality of absorbing threads 154 (Figure 11) are wound which thereby enlarge the evaporating surface of the first anaesthetic housed in said first container 104. The evaporating aid 150 and more particularly the tubular member 151 is merely fit onto the downwardly projecting tube 140 so that upon unscrewing the container 104 from the threaded section 129" and without emptying said container, it is possible to withdraw said evaporating aid 150 and to clean or replace the thread 154. Also the first container 104 may thus be separately stored, containing the anaesthetic.

In the position shown in Figure 11, the oxygen which is supplied through the supply pipe 128 enters the tubular member 131 passing through the cylindrical air connecting member 132 which is closed and enters the flow directing cylinder 136 where it changes its path due to partition 137 passing through the circular bore 138, the downwardly projecting tube 140 into the first container 104, wherein said oxygen is impregnated with trichloro ethylene vapors and rising in said container 104 through said downwardly projecting tube 141, circular bore 139 again into the flow directing cylinder but in the other section with regard to the disk-shaped partition 137 and then flowing towards the exit 147', opening the one way valve 148.

If it is desired to cut out the trichloro ethylene vapors, it is only necessary to rotate the flow directing cylinder 136 by rotating actuating knob 145, so that the circular bores 138 and 139 coincide with the openings 142 and 143, whereupon the access to the downwardly projecting tubes 140 and 141 is closed and the oxygen provided by supply pipe 128 passes through the by-pass 144 from one section of the flow directing cylinder 136 to the other section, with regard to the disk-shaped partition 137, flowing towards the exit 147'.

On the cup 147 a bulb control member 155 is mounted, and this comprises a cylindrical discharge member 156 having an actuating knob 157 emerging through a slot 158 (Figure 8) arranged in said bulb control member 155. Said cylindrical discharge member 156 is provided with a first opening 159 and a second opening 160 which latter is only visible in Figure 8. In normal operative position said second opening 160 faces a closed portion of said bulb control member 155. Under determined circumstances, as will be later explained, said second opening 160 may at least partially face said slot 158 while the first opening 159 is still in communication with the downwardly projecting branch 161 so that a connection is established between the bulb or collapsible container 107 and the exterior.

The downwardly projecting branch 161 is provided with a bulb supporting member 162 having an upper ring 162' and a lower ring 162" between which the collar 107' is mounted, which thereby supports said bulb 107. This is usually a thin rubber bulb for accumulating the trichloro ethylene vapors coming from the exit 147' and may be discharged towards the mask 208, by compressing with the hand, said bulb 107, as well be later explained.

Under certain circumstances it may be advisable to mix the trichloro ethylene vapors with a second anaesthetic, such as for instance ether, in order to reinforce the anaesthetic properties. To this end the second container 108 is mounted on a suitable support 163 (see Figures 8 and 10) and comprising a charge opening 164 closed by a closure member 165, preferably provided with a chain 166 having a ball 167 or the like at its free end which is larger than the internal diameter of said charge opening 164 so that the closure member 165 cannot be

lost. The second container 108 consists of a base member 168 and a top member 169, between which a glass cylinder 170 is located so that the volume of the second anaesthetic may easily be controlled. Said top member 169 supports the charge member 164 and further comprises the stuffing box 171 for a dosimetric valve consisting of a handle 172 integral with a threaded stem 173 having a needle 174. The stem is screwed into a partially internally threaded bushing 175 having at its portion adjacent to said base member 168 an opening 176, through which the ether enters and passes downwardly by said needle 174. A glass sight 177 enables the flow of ether to be controlled which is usually a dropwise flow by controlling the handle 172. The lower end portion of the sight 177 is connected to a tube 178 (see Figure 10) which enters into the upper portion of the downwardly projecting branch 161 (Figure 11).

The free end of tube 178 faces a wire net filter 179 clamped between upper and lower circular wires 180 mounted into corresponding grooves arranged in said downwardly projecting branch 161. This filter 179 also assures that a good evaporation of the reinforcing anaesthetic takes place and in order to avoid that the latter may drop in liquid form into the rubber bulb 107, a cup shaped trap 181 is provided and supported by a U-shaped wire support 182 (Figure 9) which is fixed to the lower edge of the downwardly directed branch 161.

It is thus understood that the rubber bulb 107 constitutes a storing container for the anaesthetic or anaesthetics and the continuously produced vapors of anaesthetics which are gradually stored are supplied with every inspiration by the patient, while during the expiration sufficient time passes to accumulate a new charge.

Under certain circumstances it is however desirable to supply instead of a charge of anaesthetics, a charge of pure oxygen to which end it is necessary in first instance to quickly establish by actuating knob 157 a connection between the interior of the bulb 107 and the exterior. Thus, by compressing the bulb 107 the content thereof is discharged through the second opening 160 (see Figure 8) and thereafter the bulb 107 is released, the air connection 160 is again closed by knob 157 and the bulb 107 may be charged with oxygen, as will be now explained.

To this end a direct connection between the flow control valve means 102 and the bulb 107 is provided, consisting of a tube 183 (see Figure 9) connected to the second branch 120 of the casing 110 at one end and to a push button valve 184 (Figure 8) at the other end. This push button valve 184 (see Figures 14 and 15) consists of a casing 185 screwed onto the main support 101 by means of a nut 186. The casing is provided with an intake pipe 187 connected to said tube 183 and a discharge pipe 188. A valve head 189 having a sealing member 190 capable of entering in sealing contact with a seat 192 integral with said casing 185 is operated by a push button 191 and a helical compression spring 193 located between said valve head 189 and a cup-screw 194 normally maintains said valve head 189 in closed position so that no connection is established between the intake pipe 187 located at one side of said seat 192 and said discharge pipe 188. The discharge pipe 188 is connected by means of tube 231 (see Figures 8, 9 and 10) to a downwardly directed branch 161.

Thus, as previously explained, once the rubber bulb 107 is discharged, the push button 191 is pressed downwardly, whereby an immediate flow of oxygen enters said rubber bulb 107.

The main support 101 is provided in the middle portion of its back side with a recess 195 (see Figure 9) into which the upper part of a holder 196 (see Figures 17 and 18) may be fitted, which holder is of the clamping type for holding or supporting the apparatus of the present invention. To this end, said holder 196 comprises a fork-like member 197 integral with a vertical branch 198' of

an L-shaped bar 198, the horizontal branch 198' of which supports at its free end a screw 199 operable by means of handle 200 and comprising a jaw 201 slideably engaging at one end said vertical branch 198' and being screwed to the free end of said screw 199 by means of a screw 202. A clamp member 203 screwed into a prolongation 204 of said vertical branch 198' permits the clamping of the back portion of the main support 101 by sliding the portion having the recess 195 between said prolongation 204 and said clamping member 203 and tightening the latter thereafter. The holder 196 is for instance mounted on the edge portion of a table (not shown) by locating said edge portion between the fork-like member 197 and the jaw 201. Upon pressing the jaw 201 against the lower face of the table edge portion by actuating the handle 200, the holder is fixed to the table and thereby the assembly is supported.

The bulb control member 155 comprises a coupling end 205 (see Figures 8, 9, 10 and 11) to which a coupling end (not shown) of a corrugated rubber tube 206 (see Figure 19) may be connected, and this has a second metal coupling end 207 similar to the first coupling end which is not shown, for coupling said corrugated rubber tube 206 to a mask 208.

The mask is preferably formed of a rubber mouth and nose piece 209 of the known type and which has only been partially shown and which is mounted on a cylindrical member 210 (Figure 20) having a downwardly directed branch 211 which is provided at its free end with an inspiration flapper valve 212. Said valve will open when the patient is inspiring, so as to normally withdraw the content of vapors housed in the collapsible container or bulb 107. During the expiration, said valve closes and thus the carbon anhydride cannot enter into the bulb 107 nor can it enter into the first container 104 which is also provided for safety purposes with the flapper valve 148 (see Figure 11) as already previously explained.

The cylindrical member 210 comprises a slot 213 and a flow directing cylinder 214 (Figure 21) provided with an actuating knob 215 emerging out through said slot 213. Said flow directing cylinder 214 is rotatably mounted in said cylindrical member 210 and comprises a circular lateral opening 216, an oblong lateral opening 217 and a back opening 218 (see Figure 20). When the circular lateral opening 216 coincides with the opening of the downwardly directed branch 211, the oblong lateral opening 217 faces the internal wall of the cylindrical member 210, so that the connection is established between the bulb 107 and the mask 209. On the other hand if by actuating knob 215 the oblong lateral opening 217 coincides with the slot 213, the circular lateral opening 216 faces the internal wall of the cylindrical member 210 as shown in Figure 20, whereby the connection to the downwardly connected branch 211 from the mask 209 is interrupted and the mask is connected to the exterior. The back opening 218 is controlled by an adjustable throttle valve 219 consisting of a valve head 220 having a stem 221 slideably mounted in a displaceable bushing 222 screwed into the base portion 210' of the cylindrical member 210. A plurality of peripheral holes 223 are arranged in the cylindrical member 210 adjacent to the back opening 218 and behind said flow directing cylinder 214. The throttle valve 219 is the expiration valve which normally allows the expiration which leaves the cylindrical member 210 through said plurality of peripheral holes 223.

Under certain circumstances it may be desired to avoid the expiration for a moment, whereupon the operator has simply to press the stem 221 at its free end so that the valve head 220 obturates the back opening 218. If the apparatus is used in birth delivery, in order to provoke larger contractions of the strong muscular wall of the abdomen, such a procedure may be required. If it is desired to allow only a very slow expiration, that is to say to allow that the valve head 200 opens only in a very

small extent, all that is necessary to do is to screw in the bushing 222 so that its front end 222' (see Figure 20) is located at a small distance from the back opening 218, whereby the valve head 220 cannot move backward the normal extent. Finally it is obviously possible to completely lock said valve 219 by pressing the valve head 220 continuously onto the base portion 214' of the flow directing cylinder 214, which is carried out by advancing the bushing 222 so as to lock by means of its front end 222' said valve head 220.

If the apparatus of the present invention is used in childbirth, it may be convenient to be able to initiate an artificial respiration on the child immediately after it has been born to which end the secondary nipple 8 (see Figure 1) is provided, to which one end (not shown) of a rubber tube 224, the other end of which is shown in Figure 22, is connected, which rubber tube is connected to a branch 224 (Figure 23) of a cylinder 226 provided at one end with a rubber mask 227 and having a connection 228 onto which a collapsible container or bulb 229 (only partially shown) for storing oxygen is fitted. The base portion 226' has a central perforation 230 connecting the interior of the mask 227 to the outside.

If artificial respiration is required, all that is necessary is to open the needle by-pass valve 9 (see Figure 1) whereby oxygen enters through the rubber 224 into the bulb 229 (see Figure 22) and by conveniently pressing and releasing said bulb 229 and opening and closing the central perforation 230 with a finger or thumb, the artificial respiration is carried out, as will be understood by anyone skilled in the art.

The way of operating and controlling the apparatus for administering anaesthetics has already been described during the above description and the way of administering the different gases, will depend on each particular case and on the type of operation or the like that it is being used in connection with, and it is not considered necessary to enter into these details for the purpose for which this apparatus has herein been described.

I claim:

1. An apparatus for administration of anaesthetics, comprising an intake connection for oxygen and the like, a constant flow pressure means connected to said intake connection, a flow control valve means connected to said intake connection, a first container for housing and evaporating a first anaesthetic, a flow directing device having an admission end and an exit, said admission end of said flow directing device being connected to said flow control valve means, said first container being connected to said flow directing device, control means in said flow directing device for directly connecting said admission end to said exit and closing off said first container, a one way valve connected to said exit permitting flow from said admission end through said exit, a collapsible container connected to said one way valve, a second container for housing a second anaesthetic, said second container, being connected to said collapsible container and an administering mask connected to said collapsible container.

2. An apparatus for administration of anaesthetics, comprising an intake connection for oxygen and the like, a constant flow pressure means connected to said intake connection, a flow control valve means connected to said intake connection, a first container for housing and evaporating a first anaesthetic, a flow directing device having an admission end and an exit, said admission end of said flow directing device being connected to said flow control valve means, said first container being connected to said flow directing device, control means in said flow directing device for directly connecting said admission end to said exit and closing off said first container, a one way valve connected to said exit permitting flow from said admission end through said exit, a collapsible container connected to said one way valve, a second container for housing a second anaesthetic and

having a flow control, said second container being connected to said collapsible container, and an administering mask connected to said collapsible container.

3. An apparatus for administration of anaesthetics, comprising an intake connection for oxygen and the like, a constant flow pressure means connected to said intake connection, a flow control valve means connected to said intake connection, a first container for housing and evaporating a first anaesthetic, a flow directing device having an admission end and an exit, said admission end of said flow directing device being connected to said flow control valve means, said first container being connected to said flow directing device, control means in said flow directing device for directly connecting said admission end to said exit and closing off said first container, a one way valve connected to said exit permitting flow from said admission end through said exit, a collapsible container connected to said one way valve, a second container for housing a second anaesthetic and having a flow control, said second container being connected to said collapsible container, said collapsible container being also directly and controllably connected to said flow control valve means, and an administering mask connected to said collapsible container.

4. An apparatus for administration of anaesthetics, comprising an intake connection for oxygen and the like, a constant flow pressure means connected to said intake connection, a flow control valve means connected to said intake connection, a first container for housing and evaporating a first anaesthetic, a flow directing device having an admission end and an exit, said admission end of said flow directing device being connected to said flow control valve means, said first container being connected to said flow directing device, control means in said flow directing device for directly connecting said admission end to said exit and closing off said first container, a one way valve connected to said exit permitting flow from said admission end through said exit, a collapsible container connected to said one way valve, said second container being connected to said collapsible container, said collapsible container being also directly and controllably connected to said flow control valve means, and an administering mask connected to said collapsible container.

5. An apparatus for administration of anaesthetics, comprising a constant-flow pressure means, an oxygen intake connection connected to said constant flow pressure means, a flow control valve means connected to said intake connection, a first container for housing and evaporating a first anaesthetic, a flow directing device having a by-pass, an admission end and an exit, said admission end of said flow directing device being connected to said flow control valve means, said first container being connected to said flow directing device, control means for controlling said first container and said by-pass in said flow directing device for directly connecting said admission end through said by-pass to said exit and closing off said first container, a one way valve connected to said exit permitting flow from said admission end through said exit, a collapsible container connected to said one way valve, a second container for housing a second anaesthetic and having a flow control, said second container being connected to said collapsible container, said collapsible container being also directly and controllably connected to said flow control valve means, and an administering mask having an inspiration valve and a controllable expiration valve connected to said collapsible container.

6. In an apparatus for administration of anaesthetics, a constant flow pressure means adapted to be connected to a high pressure gaseous supply source, said constant flow pressure means comprising a main casing, an admission arm integral with said main casing and having coupling means for connecting said admission arm to

said supply source and a supply boring in said admission arm, a constant flow pressure valve and a control means for controlling said constant flow pressure valve, a main nipple for forwarding gas under constant pressure, a needle by-pass valve, a secondary nipple controlled by said needle by-pass valve, said main casing comprising a front chamber, a back chamber and a main partition wall separating said front chamber from said back chamber, a prolongation connecting said supply boring to said back chamber, a vertical boring connecting said manometer to said supply boring, at least one cross boring in said main partition wall connecting said back chamber to said front chamber, a conduit connecting said front chamber to said main nipple, said needle by-pass valve being also connected to said front chamber.

7. For an apparatus for administration of anaesthetics, a mask for administering said anaesthetics comprising a mouth and nose piece, a cylindrical member connected to said mouth and nose piece, a branch connected to said cylindrical member having a base portion, an inspiration flapper valve in said branch, a flow directing cylinder rotatably housed in said cylindrical member and having means for controlling said flow directing cylinder, there being a circular lateral opening, an oblong opening and a back opening in said flow directing cylinder, there being a slot in said cylindrical member, said circular opening being capable of coinciding with said branch, said oblong opening being capable of coinciding with said slot when said circular opening is not coinciding with said branch, and an adjustable throttle valve for controlling said back opening.

8. For an apparatus for administration of anaesthetics, a mask for administering said anaesthetics comprising an elastic mouth and nose piece, a cylindrical member connected to said mouth and nose piece, a branch connected to said cylindrical member having a base portion, an inspiration flapper valve in said branch, a flow directing cylinder rotatably housed in said cylindrical member and having means for controlling said flow directing cylinder, there being a circular lateral opening, an oblong opening and a back opening in said flow directing cylinder, there being a slot in said cylindrical member, said circular opening being capable of coinciding with said branch, said oblong opening being capable of coinciding with said slot when said circular opening is not coinciding with said branch, an adjustable throttle valve for controlling said back opening, said adjustable throttle valve comprising a bushing displaceably mounted in said base portion of said cylindrical member, a stem in said bushing and emerging out therefrom, a valve head integral with said stem capable of obturating said back opening, and there being a plurality of peripheral holes in said cylindrical member adjacent to said back opening and in front of said bushing.

9. An apparatus for administration of anaesthetics, comprising a constant flow pressure means, an intake connection connected to said constant flow pressure means, a flow control valve means connected to said intake connection, a flow measure means connected to said flow control valve means, a first container for housing and evaporating a first anaesthetic, an evaporating aid in said first container, a flow directing device comprising a tubular member having an admission end portion and an exit end portion, there being a first slot in said admission end portion, a cylindrical air connecting member rotatably housed in said admission end portion and having a first actuating knob emerging through said first slot and accessible from outside, a flow directing cylinder rotatably housed in said tubular member adjacent said air connecting member, there being a second slot in said tubular member, a second actuating knob integral with said flow directing cylinder and emerging through said second slot and accessible from outside, there being a

first circular bore and a second circular bore in said flow directing cylinder, a disk-shaped partition in said flow directing cylinder and separating said first and second circular bores, a first downwardly projecting tube and a second downwardly projecting tube connected to said tubular member, said first and second circular bores being respectively capable of coinciding with said first and second downwardly projecting tubes, a first opening and a second opening in said tubular member, a by-pass connecting said first and second openings, said first and second circular bores being capable of establishing a connection with said first and second openings, said first and second downwardly projecting tubes entering said first container supported by said flow directing device, a cup mounted on said exit end portion having an exit, a one-way valve controlling said exit, a bulb control member mounted on said cup, a cylindrical discharge member rotatably mounted in said bulb control member, means for controlling the position of said cylindrical discharge member, a collapsible bulb connected to said bulb control member, said cylindrical discharge member being capable of connecting said bulb to said exit and to the atmosphere, a second container for housing a second anaesthetic and having a flow control, said second container being connected to said bulb control member, said bulb control member being also directly and controllably connected to said flow control valve means, and an administering mask connected to said collapsible container.

10. An apparatus for administration of anaesthetics comprising a constant flow pressure means, an intake connection connected to said constant flow pressure means, a flow control valve means connected to said intake connection, a flow measure means connected to said flow control valve means, a first container for housing and evaporating a first anaesthetic, an evaporating aid in said first container, a flow directing device comprising a tubular member having an admission end portion and an exit end portion, there being a first slot in said admission end portion, a cylindrical air connecting member rotatably housed in said admission end portion and having a first actuating knob emerging through said first slot and accessible from outside, a flow directing cylinder rotatably housed in said tubular member adjacent said air connecting member, there being a second slot in said tubular member, a second actuating knob integral with said flow directing cylinder and emerging through said second slot and accessible from outside, there being a first circular bore and a second circular bore in said flow directing cylinder, a disk-shaped partition in said flow directing cylinder and separating said first and second circular bores, a first downwardly projecting tube and a second downwardly projecting tube connected to said tubular member, said first and second circular bores being respectively capable of coinciding with said first and second downwardly projecting tubes, there being a first opening and a second opening in said tubular member, a by-pass connecting said first and second openings, said first and second circular bores being capable of establishing a connection with said first and second openings, said first and second downwardly projecting tubes entering said first container supported by said flow directing device, a cup mounted on said exit end portion having an exit, a one-way valve controlling said exit, a bulb control member mounted on said cup, a cylindrical discharge member rotatably mounted in said bulb control member, means for controlling the position of said cylindrical discharge member, a second container for housing a second anaesthetic and having a flow control tube connected to said flow control and having a downwardly projecting branch integral with said bulb control member, a bulb supporting member mounted on said downwardly projecting branch, a collapsible bulb supported by said bulb supporting member, a filter for said second anaesthetic and mounted in said downwardly projecting branch, a cup shaped container located below said filter and supported by said downwardly projecting branch, 75

said tube entering said downwardly projecting branch above said filter, a push button valve connected to said flow control valve means and to said downwardly projecting member, and an administering mask connected to said bulb control member.

11. An apparatus for administration of anaesthetics comprising a constant flow pressure means adapted to be connected to a high pressure gaseous supply source, said constant flow pressure means comprising a main casing, an admission arm integral with said main casing and having coupling means for connecting said admission arm to said supply source and a supply boring in said admission arm, a manometer, a constant flow pressure valve and a control valve for controlling said constant flow pressure valve, a main nipple for forwarding gas under constant pressure, a needle by-pass valve, a secondary nipple controlled by said needle by-pass valve and a safety valve, said main casing comprising a front chamber, a back chamber and a main partition wall separating said front chamber from said back chamber, a prolongation connecting said supply boring to said back chamber, a vertical boring connecting said manometer to said supply boring, at least two cross borings in said main partition wall connecting said back chamber to said front chamber, a conduit connecting said front chamber to said main nipple, said needle by-pass valve and said safety valve being also connected to said front chamber, an intake connection connected to said constant flow pressure means, a flow control valve means connected to said intake connection, a flow measure means connected to said flow control valve means, a first container for housing and evaporating a first anaesthetic, an evaporating head in said first container, a flow directing device comprising a tubular member having an admission end portion and an exit end portion, there being a first slot in said admission end portion, a cylindrical air connecting member rotatably housed in said admission end portion and having a first actuating knob emerging through said first slot and accessible from outside, a flow directing cylinder rotatably housed in said tubular member adjacent said air connecting member, there being a second slot in said tubular member, a second actuating knob integral with said flow directing cylinder and emerging through said second slot and accessible from outside, there being a first circular bore and a second circular bore in said flow directing cylinder, a disk-shaped partition in said flow directing cylinder and separating said first and second circular bores, a first downwardly projecting tube and a second downwardly projecting tube connected to said tubular member, said first and second circular bores being respectively capable of coinciding with said first and second downwardly projecting tubes, a first opening and a second opening in said tubular member, a by-pass connecting said first and second openings, said first and second circular bores being capable of establishing a connection with said first and second openings, said first and second downwardly projecting tubes entering into said first container, a cup mounted on said exit end portion having an exit, a one-way valve controlling said exit, a bulb control member mounted on said cup, a cylindrical discharge member rotatably mounted in said bulb control member, means for controlling the position of said cylindrical discharge member, a second container for housing a second anaesthetic and having a flow control tube connected to said flow control and having a downwardly projecting branch integral with said bulb control member, a bulb supporting member mounted on said downwardly projecting branch, a collapsible bulb supported by said bulb supporting member, a filter for said second anaesthetic and mounted in said downwardly projecting branch, a cup shaped container located below said filter and supported by said downwardly projecting branch, said tube entering said downwardly projecting branch above said filter, a push button valve connected to said flow control valve means

and to said downwardly projecting member, and an administering mask connected to said bulb control member and comprising an elastic mouth and nose piece, a cylindrical member connected to said mouth and nose piece, a branch connected to said cylindrical member having a base portion, an inspiration flapper valve in said branch, a flow directing cylinder rotatably housed in said cylindrical member and having means for controlling said flow directing cylinder, there being a circular lateral opening, an oblong opening and a back opening in said flow directing cylinder, there being a slot in said cylindrical member, said circular opening being capable of coinciding with said branch, said oblong opening being capable of coinciding with said slot when said circular opening is not coinciding with said branch, an adjustable throttle valve for controlling said back opening, said adjustable throttle valve comprising a bushing displaceably mounted in said base portion of said cylindrical member, a stem in said bushing and emerging out therefrom, a valve head integral with said stem capable of obturating said back opening, there being a plurality of peripheral holes in said cylindrical member adjacent to said back opening and in front of said bushing, an oxygenation mask connected to said secondary nipple, and a holder for holding the apparatus.

12. An apparatus for administration of anaesthetics, comprising a high pressure gaseous supply source of oxygen and the like, a constant flow pressure means connected to said supply source, said constant flow pressure means comprising a main casing, an admission arm integral with said casing and having coupling means for connecting said admission arm to said supply source and a supply boring in said admission arm, a constant flow pressure valve and a control valve for controlling said constant flow pressure valve, a main nipple for forwarding gas under constant pressure, a needle by-pass valve, a secondary nipple controlled by said needle by-pass valve and a safety valve, said main casing comprising a front chamber, a back chamber and a main partition wall separating said front chamber from said back chamber, a prolongation connecting said supply boring to said back chamber, at least one cross boring in said main partition wall connecting said back chamber to said front chamber, a conduit connecting said front chamber to said main nipple, said needle by-pass valve and said safety valve being also connected to said front chamber, an intake connection connected to said main nipple, flow control valve means connected to said intake connection, a first container for housing and evaporating a first anaesthetic, a flow directing device having a by-pass, an admission end and an exit, said admission end of said flow directing device being connected to said flow control valve means, said first container being connected to said flow directing device, control means for controlling said first container and said by-pass in said flow directing device for directly connecting said admission end through said by-pass to said exit and closing off said first container, a one-

way valve connected to said exit permitting flow from said admission end to said exit, a collapsible container connected to said one way valve, a second container for housing a second anaesthetic and having a flow control, said second container being connected to said collapsible container, said collapsible container being also directly and controllably connected to said flow control valve means, an administering mask for administering the anaesthetic housed in said collapsible container, said mask comprising a mouth and nose piece, a cylindrical member connected to said mouth and nose piece, a branch connected to said cylindrical member having a base portion, an inspiration flapper valve in said branch, a flow directing cylinder rotatably housed in said cylindrical member and having means for controlling said flow directing cylinder, there being a circular lateral opening, an oblong opening and a back opening in said flow directing cylinder, there being a slot in said cylindrical member, said circular opening being capable of coinciding with said branch, said oblong opening being capable of coinciding with said slot when said circular opening is not coinciding with said branch and an adjustable throttle valve for controlling said back opening, a tube connected to said inspiration flapper valve and to said collapsible container, a second mask, a cylinder connected to said second mask, a perforation in said cylinder, a branch connected to said cylinder and to said second nipple, a connection connected to said cylinder, and a bulb connected to said connection.

13. For an apparatus for administration of anaesthetics, a mask for administering said anaesthetics, a body member connected to said mask, a branch connected to said body member and having a base portion, an inspiration valve in said branch, a flow directing cylinder rotatably housed in said body member and having means for controlling said flow directing cylinder, there being a circular opening, an oblong opening and a back opening in said flow directing cylinder, there being a slot in said body member, said circular opening being capable of coinciding with said branch, said oblong opening being capable of coinciding with said slot when said circular opening is not coinciding with said branch, and an adjustable valve for controlling said back opening.

References Cited in the file of this patent

UNITED STATES PATENTS

Re. 15,874	Heidbrink	July 22, 1924
514,628	Smithard	Feb. 13, 1894
1,433,104	Foregger	Oct. 24, 1922
1,500,614	Heidbrink	July 8, 1924
1,500,615	Heidbrink	July 8, 1924
1,763,305	Heidbrink	June 10, 1930

FOREIGN PATENTS

803,000	France	June 22, 1936
---------	--------	---------------