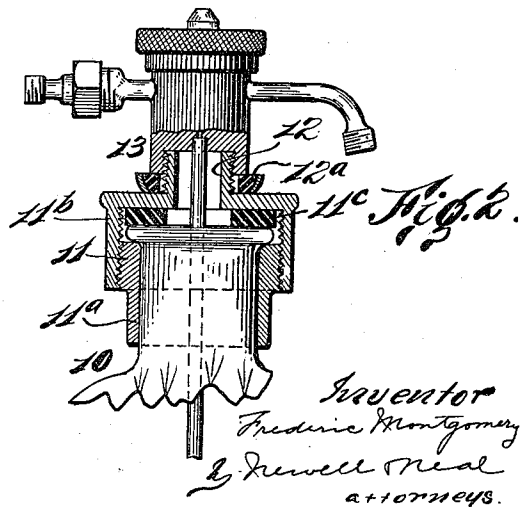
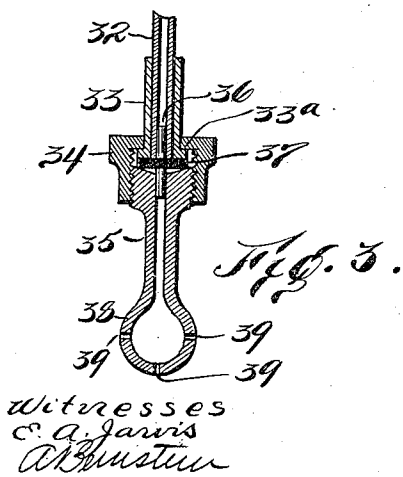
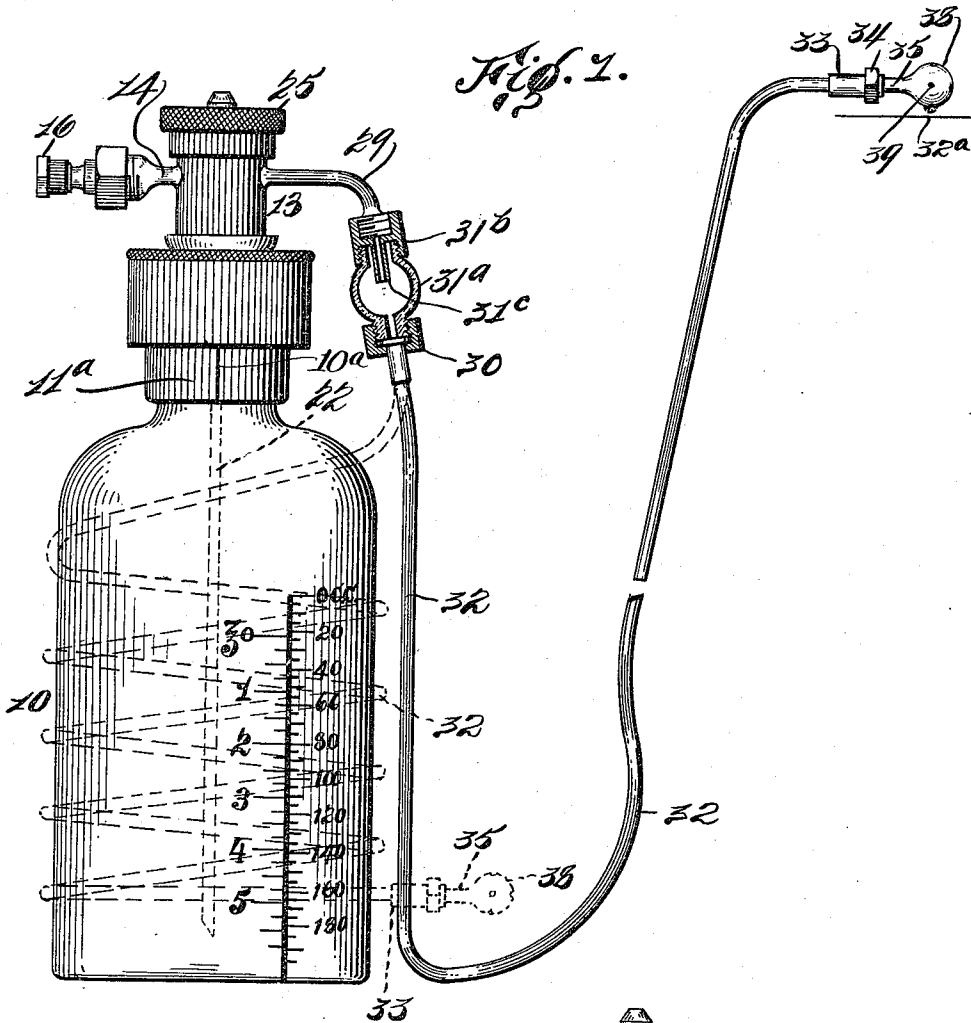


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 APPARATUS FOR ADMINISTERING LIQUID ANESTHETICS.
 APPLICATION FILED APR. 3, 1915.

1,175,006.

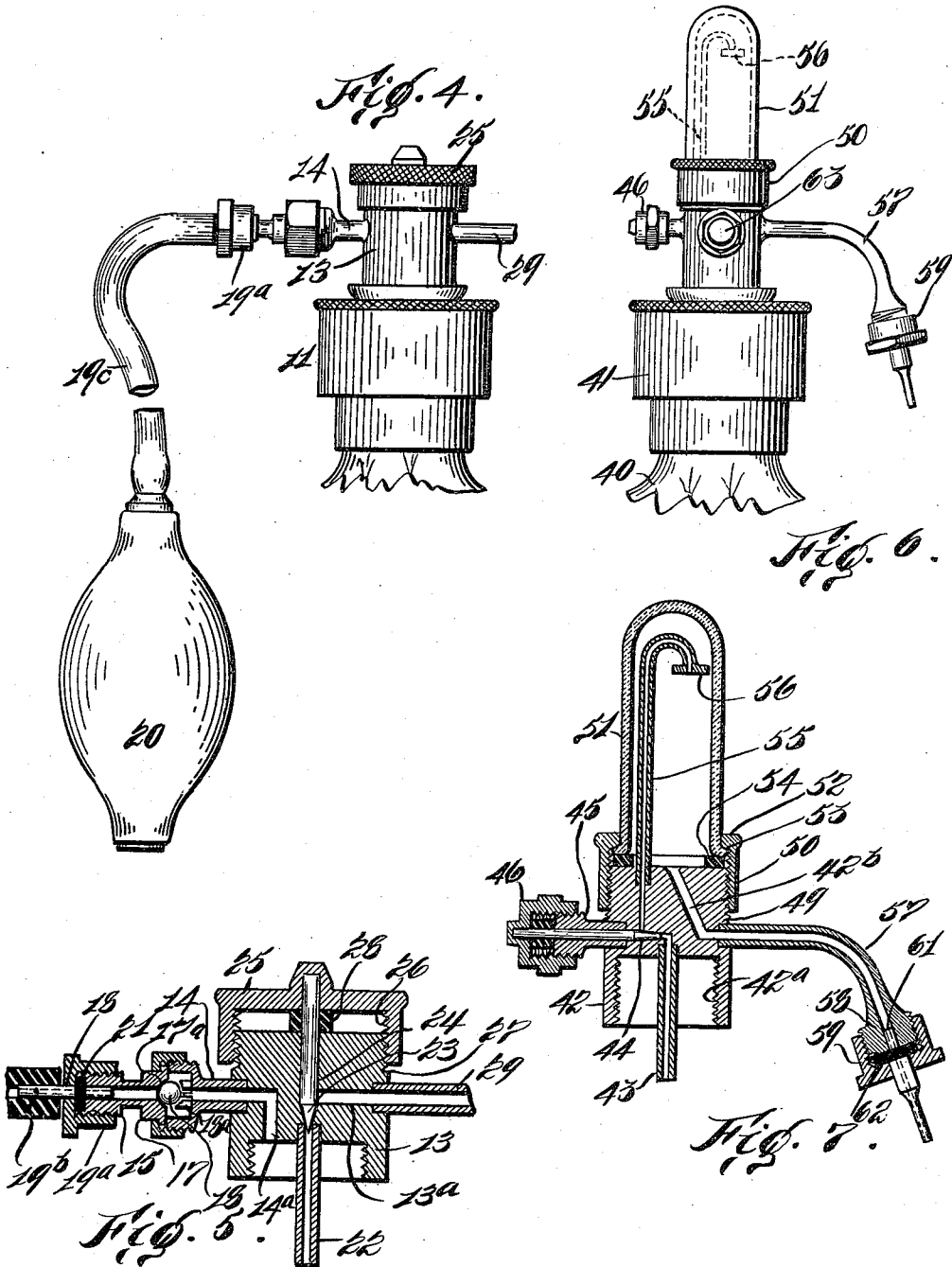
Patented Mar. 14, 1916.
 2 SHEETS—SHEET 1.



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UNITED STATES PATENT OFFICE.

FREDERIC MONTGOMERY, OF NEW YORK, N. Y.

APPARATUS FOR ADMINISTERING LIQUID ANESTHETICS.

1,175,006.

Specification of Letters Patent.

Patented Mar. 14, 1916.

Application filed April 3, 1915. Serial No. 18,865.

To all whom it may concern:

Be it known that I, FREDERIC MONTGOMERY, a citizen of the United States, residing at New York city, New York, have invented certain new and useful Improvements in Apparatus for Administering Liquid Anesthetics, of which the following is a clear, full, and exact description.

This invention relates to apparatus for administering liquid anesthetics for the purpose of general anesthesia by inhalation, in which the flow of anesthetic upon the face mask is accurately controlled, mechanically.

One of the objects of the invention is to provide means for administering anesthetics scientifically, with substantial accuracy, by means of a constant and even flow of anesthetic, by mechanically accurate regulation which insures the best and safest form of administration.

Another object is to provide a convenient and simple means for mechanically administering an anesthetic through the medium of a flexible self-supporting metallic conducting tube without the aid of an anesthetist.

A still further object is to provide means for accurately administering anesthetics from a bottle or other container, which is so economical and so simple in operation that it may be used in place of the present generally employed means of administering anesthetics by an anesthetist from a container, from which the flow cannot be readily controlled, and which, through carelessness of administration, often works to the disadvantage of the patient and occasionally causes fatalities.

These being among the objects of the present invention the same consists of certain features of construction and combinations of parts to be hereinafter described and then claimed with reference to the accompanying drawings illustrating desirable embodiments of the invention and in which—

Figure 1 is a side elevation of one form of the device, showing the flexible tube in full lines in one position and in another position in dotted lines which illustrates that the flexible tube can be wound around the container; Fig. 2 is a side elevation partly in section, of the parts which are attached to a bottle; Fig. 3 is an enlarged central section of the nozzle end of the flexible

tube; Fig. 4 is a side elevation showing an air pressure bulb attached to the device; Fig. 5 is a central vertical section showing portions of the device such as the valve, etc.; Fig. 6 is a side elevation of the upper part of the bottle illustrating another form of the device attached thereto; and Fig. 7 is an enlarged vertical central section of the valved parts which are attached to the bottle.

Referring to Figs. 1 to 5 inclusive, a bottle or container 10 is provided for containing the liquid anesthetic, and attached to the neck of the bottle are parts 11 provided with a screw-threaded portion 12 and surrounding it a packing member 12^a. Said parts 11 comprise a sleeve 11^a split at 10^a into two sections applied to the bottle lip, and which sections are screw-threaded to receive a nut 11^b between which and said lip a rubber washer 11^c is confined. The screw neck 12 is on said nut. Said neck may receive a screw cap which is screwed onto the screw portion 12, when the bottle serves as an ordinary receptacle, so as to prevent escape of the contents of the bottle. The specific device of the present invention is applied to the bottle and attached parts described by first unscrewing the screw-cap, if such specific device is not already fixed on, and then screwing the said device onto the screw portion 12.

To the above end the present device comprises a head 13 laterally of which there extends a short branch tube 14 which is adapted to conduct a pressure medium such as air through the passage 14^a down into the bottle. Tube 14 is provided with a valve casing 17 which is provided with an outward seat 17^a for a ball valve 18, while at the opposite side of said valve, said casing is formed with a seat comprising a series of small projections or prongs 18^a, separated to permit passage of pressure air. The tube 14 is provided at its outer end with a screw-threaded portion 15 onto which may be screwed a screw-cap 16 shown in Fig. 1. This can is usually secured in place when the device is in use. In order to supply pressure air to the bottle, means as follows are preferably employed. In place of the screw-cap 16 a screw-cap 19^a is screwed onto the screw-threaded portion 15, and said cap 19^a carries a small piece of tubing 19^b which extends axially through it. The inner end

of said tubing extends into the adjacent end of the passage 14^a when the cap 19^a is screwed in position. The outer end of the piece of tubing 19 provides means for attaching one end of a piece of rubber tubing 19^c thereto, the outer end of the latter being provided with a rubber bulb or other form of pump 20, which is of well known construction so that by repeated pressure thereon compressed air may be supplied to the bottle in order to impose its tension upon the liquid in said bottle. Other means may of course be provided for supplying the pressure medium. When air is being supplied, the ball valve 18 is seated upon the small projections and the air passes between them and into the bottle. It is clear that when a sufficient air pressure is imposed upon the liquid in the container the ball valve is held by back pressure, upon seat 17^a to close the opening thereat. The cap or coupling 19^a is then unscrewed and the closed cap 16 shown in Fig. 1 substituted. Both of the caps 16 and 17 are preferably provided with packing as 21 shown in Fig. 5, which is compressed between the cap and the screw portion 15 so as to pack the joint.

In the customary operation of the device a suitable valve is closed to prevent the expulsion of liquid anesthetic while a sufficient air pressure is being produced in the bottle. The said device and concomitant parts are constructed as follows: The head 13 is axially bored and into the lower end of said bore the end of a depending tube 22 is screwed. This tube is of a length to extend deep down into the liquid. Just above said tube 22 a lateral passage 13^a is provided, while at the juncture between the two a valve-controlled orifice 23 is located. This orifice is presented upwardly so that it may be controlled by a downwardly extending needle valve 24 which is adapted to be rotated and adjusted in the upper end of the axial bore of head 13. Said needle valve is carried by a milled cap 25 at the top of the head 13, and having an internal screw-thread 26, so that said cap may be screwed upon the screw-threaded upper end 27 of the head 13. By giving the cap several turns the needle valve 24 is adjusted upwardly so as to open the orifice 23 to the desired extent. In order to prevent the escape of ether or other liquid anesthetic around the stem of the valve 24, said stem passes through a piece of rubber packing 28 which is adapted to be compressed between the underside of the cap 25 and the top of the head 13. When the valve is properly used and adjusted the said packing will seal the joint at all times.

A desirable feature of the present invention consists in suitable means for discharging the liquid anesthetic from the described means for withdrawing the liquid from the

bottle. Such discharge means preferably comprise a tubular bracket or arm 29 which is firmly secured to the head 13 so that the lateral passage 13^a will communicate with the passage in said bracket. A glass sight tube or bulb 31^a may be located at the end of said tubular bracket, it having a screw connection 31^b at its upper end so that it may be screwed onto the lower end of said bracket. A dropper 31^c extends from said connection 31^b into the sight tube. One end of a flexible conduit or tubing 32 is rigidly attached to a connection 30 at the lower end of the sight tube or bulb 31^a. The flexible tubing 32 is composed of any suitable material but it may be composed of a material which will render the said tubing substantially self-supporting, to which end the said tubing can be made of pure black tin, without seam or joint, and without the manifold joints of flexible tubing usually composed of metal. The length of such flexible tubing 32 may be approximately 2½ feet long and should be of sufficient length to conveniently extend from the anesthetic container which rests upon a table or other stand to the face mask which is indicated at 32^a in Fig. 1. Another feature of this flexible tubing resides in the fact that it is of small diameter and that which is preferable is an outside diameter of approximately ¼th of an inch and an inside bore diameter as small as possible, so as to provide a near-capillary passage through said flexible tubing. Furthermore the length of said flexible tubing is such that it may be wrapped or wound a number of times around the container or bottle as indicated in dotted lines in Fig. 1, in which position it will be supported by the bottle.

To the outer end of the flexible tubing 32 there is attached a sleeve 33 (see Fig. 3) over which is placed a gland nut 34, which rests upon an annular shoulder 33^a of said sleeve and is internally screw-threaded so that it may receive the screw-threaded end of a dropper or nozzle 35. The joint between the flexible tubing 32 and nozzle 35 is preferably packed similarly to the manner shown in Fig. 5, to which end a short length of a small tube 36 carries a piece of rubber packing 37, and when one end of the tube section 36 is inserted in the outer end of the flexible tubing 32 and the other end thereof into the passage of the nozzle, the packing will be located in the joint and prevent the escape of the liquid anesthetic thereat. Said nozzle is preferably provided with a discharge head 38 of hollow spherical construction and provided with a number of perforations 39 which are scattered around said discharge head. The object of the described hollow spherical discharge head is to enable drops to be formed when the said head is in using position shown in Fig. 1, 130

while at the same time any air passing through the tubing will escape from the upper part of said head.

The described device is used as follows:

5 The normal position of the flexible tubing 32 is that shown in dotted lines in Fig. 1, in which it is coiled a number of times around the bottle or container. If, now, a suitable air pressure has been imposed upon the liquid anesthetic as ether in the bottle, the device is ready for use. When the flexible tubing is coiled about the bottle the discharge end of the nozzle should project an inch or two away from the side of the bottle. 15 The bottle is now grasped with one hand and the thumb and fore-finger are placed upon the milled cap 25 so that the operator may now begin the dropping of the anesthetic upon the mask. The anesthetic is usually given in this way until the patient is fully under it and has become perfectly quiet. After the patient has become anesthetized the bottle is placed in some convenient position at the head of a table or on one of the stands for holding the bottle, or on the ground in emergency cases, and the flexible tubing is uncoiled so that the nozzle will rest over the face mask as shown in full lines in Fig. 1. When the flexible tubing is uncoiled and in the latter position it will be substantially self-supporting. From now on the administration of the anesthetic becomes automatic, due to the pressure of air within the bottle and upon the body of liquid anesthetic therein, so that the operator will be entirely free to otherwise assist or operate. An advantage of coiling the flexible tubing about the bottle resides in the fact that one hand only of the operator is required to hold and manipulate the apparatus, the other hand being free, which is essential when it is necessary to deal with refractory patients. The invention is not limited to self-supporting tubing. The sight glass enables the rate of flow to be observed prior to the discharge of the anesthetic.

The form of the invention shown in Figs. 6 and 7 differs from that previously described, at least in one respect and that is that the dropping of the liquid is rendered visible through a differently located sight tube in advance of its discharge. Referring to said figures the bottle 40 has attached thereto well known parts such as 41 having a screw-thread by means of which a head 42 may be attached through its screw-thread 42^a. Said head carries a depending dip tube 43 through which the liquid anesthetic is withdrawn from the bottle, the outlet passage from said tube being regulated by means of a needle valve 44 which extends laterally of the head 42 and is rotatably mounted in a short tube 45. The latter is screw-threaded to receive a screw-threaded cap or gland nut 46, to which said valve is

attached and whereby said valve may be turned, for the purpose of closing the outlet from the tube 43, or for regulating the size of the outlet. Around the valve stem is a soft rubber packing 48 which is adapted to prevent a leak around the said stem. When the valve is closed said packing is compressed and it still closes the joint when the valve is opened, due to the expansion of the rubber. The upper end of the head 42 is screw-threaded at 49 and onto the screw-threaded portion there is secured an internal screw-threaded collar 50 whereby a dome-shaped sight tube 51 of transparent material is rigidly secured in upstanding position through the medium of an internal shoulder 52 on said collar which clamps an annular lip 53 on said transparent sight tube upon an elastic packing ring 54. Extending upwardly from the valve-controlled passage from the liquid-withdrawing tube 43 is an upwardly extending tube 55 which is located within the sight tube 51 and is bent downwardly to form a dropping nozzle 56. The outlet from said nozzle is located at the upper end of the sight tube so that the dropping of the liquid anesthetic may be observed before the same is discharged from the apparatus. This sight tube and its contained dropping nozzle, as well as the corresponding parts shown in Fig. 1, constitute a sort of measuring or metering device and enables the operator to regulate the rate at which the drops shall fall, before the liquid is discharged. The drops of liquid anesthetic pass through a duct 42^b in the head 42, which then pass into a tubular bracket or arm 57 on said head, said bracket being screw-threaded at its outer end to receive a screw-threaded cap or collar 59, to which may be attached a piece of flexible discharge tubing. Preferably the joint between the parts 58 and 59 is packed, to which end a short length of tube 61 is inserted into the outer end of the tubular arm or bracket 57 with one end extending beyond the cap 59, and a piece of packing 62 is placed around said short tube 61 so as to be located between the outer end of said bracket and the said cap 59. Preferably all joints are packed.

Obviously the invention is susceptible of further modification as parts may be omitted, added and substituted without departing from the spirit and scope of the invention as claimed.

What I claim as new is:—

1. In an apparatus for administering liquid anesthetics, the combination of a container for a liquid anesthetic, said container having an opening for pressure fluid, as compressed air, and said opening being located above the liquid level, means extending into said liquid for withdrawing a supply thereof under such pressure, a needle

valve for obtaining a fine control of the passage through said withdrawing means and for reducing the pressure and flow in the discharge conduit, and said discharge conduit, connected with said withdrawing means and terminated by a dropper, said conduit having a minute, near-capillary, passage of a capacity such that, when the first said passage is throttled by said valve while the liquid is flowing, the second said passage is free from any flow of air counter to the feed of said liquid, whereby substantially the same rate of flow as that directly past said valve is obtained from said dropper while said pressure lasts.

2. In an apparatus for administering liquid anesthetics, the combination of a container for a liquid anesthetic, said container having an opening for pressure fluid, such as compressed air, said opening being located above the liquid level, means extending into said liquid for withdrawing a supply of said liquid under such pressure, a flexible substantially self-supporting conduit of seamless metal tubing connected with said withdrawing means, having a minute capillary like passageway and provided with

a dropper at its outer end, and means for regulating the dropping of said liquid therefrom, the linear extent of said attached conduit being such that it may be wound about said container.

3. In an apparatus for administering liquid anesthetics, the combination of a container for a liquid anesthetic, said container having an opening for pressure fluid, such as compressed air, said opening being located above the liquid level, means extending into said liquid for withdrawing a supply of said liquid under such pressure, a flexible conduit connected with said withdrawing means and consisting of a continuous length of seamless block tin tubing having a substantially capillary like passageway, and provided with a dropper at its outer end, and means for regulating the dropping of liquid from said dropper.

Signed at New York, N. Y., this 20th day of March, 1915.

FREDERIC MONTGOMERY.

Witnesses:

BEATRICE MIRVIS,
ABRAM BERUSTEED.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."