J. G. E. HINKLE.

ANESTHETIC MACHINE.

APPLICATION FILED NOV. 12, 1914.

1,312,117.

Patented Aug. 5, 1919.

2 SHEETS—SHEET 1.

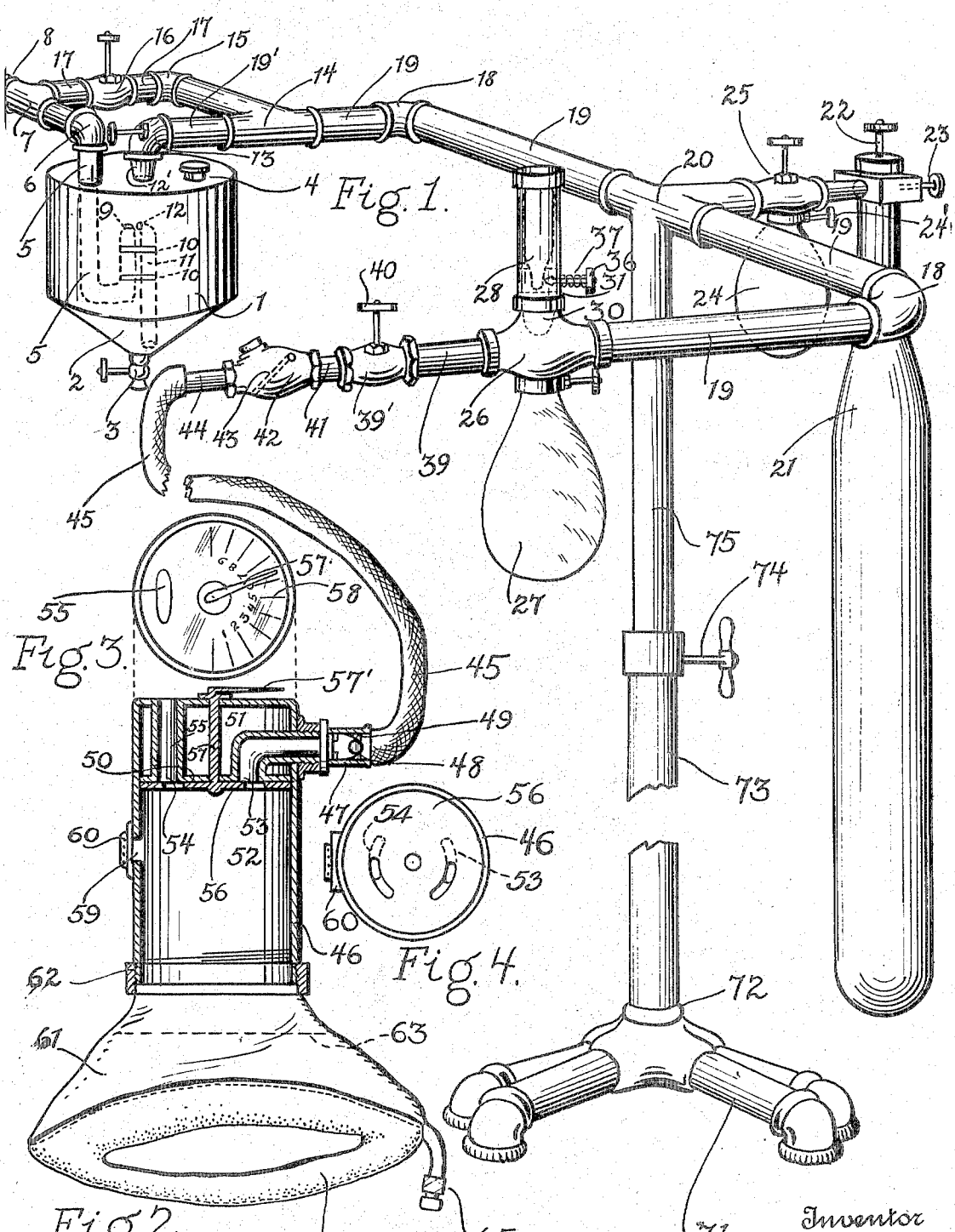

Fig. 1.

Fig. 3.

Fig. 4.

Fig. 2.

Witnesses

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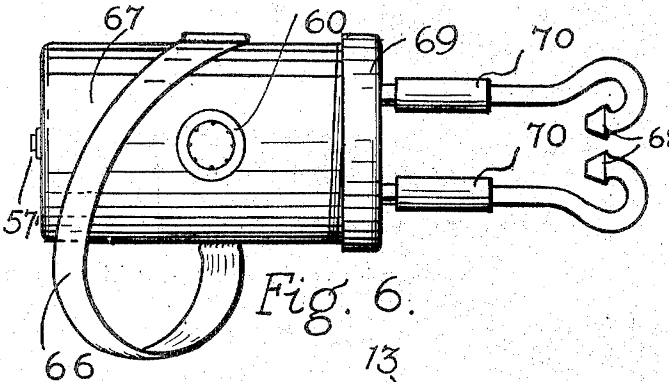

Fig. 6.

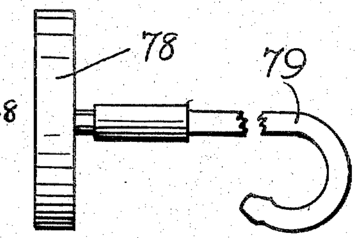

Fig. 8.

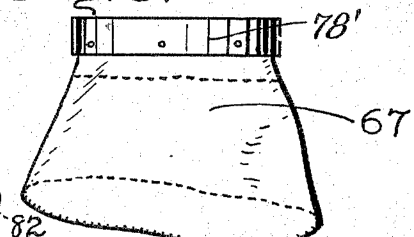

Fig. 10.

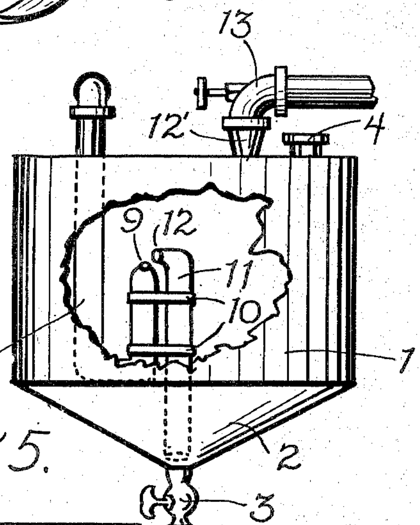

Fig. 5.

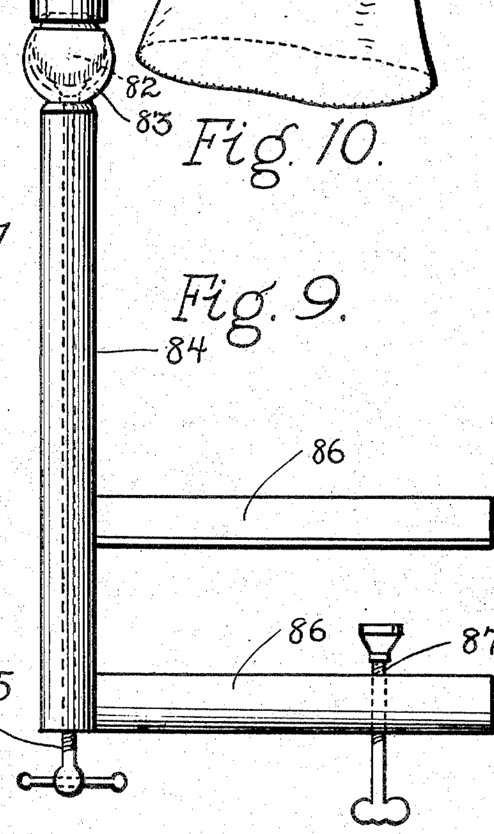

Fig. 9.

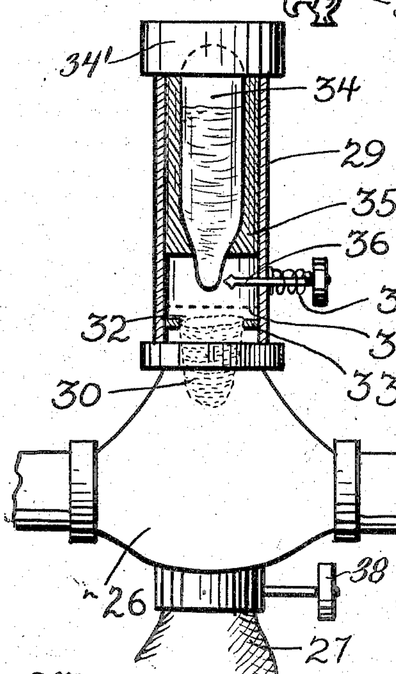

Fig. 7.

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UNITED STATES PATENT OFFICE.

JONATHAN G. E. HINKLE, OF BETHANY, MISSOURI.

ANESTHETIC-MACHINE.

1,312,117. Specification of Letters Patent. Patented Aug. 5, 1919.

Application filed November 12, 1914. Serial No. 871,736.

To all whom it may concern:

Be it known that I, JONATHAN G. E. HINKLE, a citizen of the United States, residing at Bethany, in the county of Harrison and State of Missouri, have invented new and useful Improvements in Anesthetic-Machines, of which the following is a specification.

My invention relates to an anesthetic machine and has as its principal object the provision of an apparatus by which one may prepare an anesthetic gas of known strength and may maintain the same under perfect control, thereby making an anesthetic safer and getting better results than now obtained.

A second object of my invention is to provide an apparatus whereby the operator may combine the vapors of chloroform, ether and somnoform or give them separately.

A third object of my invention is to provide an apparatus which will furnish the patient with a gas containing the normal amount of oxygen thereby supporting life in a normal way.

A fourth object of my invention is to provide an apparatus whereby a patient may be put into the analgesic state and kept there as long as desired.

A final object of my invention resides in the particular arrangement and combination of parts hereinafter described.

In the accompanying drawing:—

Figure 1 is a perspective view of the major portion of the apparatus comprising my invention.

Fig. 2 is an inhaler adapted to be connected with the apparatus shown in Fig. 1 for use in carrying out my invention.

Fig. 3 is a top plan view of the inhaler shown in Fig. 2, the mouth piece being removed.

Fig. 4 is a bottom plan view of the inhaler shown in Fig. 2, the mouth piece being removed.

Fig. 5 is a detail of the portion of the apparatus shown in Fig. 1.

Fig. 6 is a modified form of the inhaler for use in carrying out my invention.

Fig. 7 is a detail view, partly in section, of a portion of the apparatus shown in Fig. 1.

Fig. 8 is a detail, partly in section, of a modified form of inhaler for nose and throat work.

Fig. 9 is a modified form of support for use in connection with the apparatus shown in Fig. 1.

Fig. 10 is an elevational view of the preferred form of face piece for my inhaler.

Throughout the separate views the same part is designated by the same reference character.

Referring more particularly to the drawing, 1 is a tank for containing the liquid chloroform or ether, or a mixture of the two. The bottom of the tank has a conical shape as indicated at 2, and is fitted with a drain cock 3 at the lowermost point of the bottom. The top of the tank 1 is provided with an inlet for liquid normally closed by a screw threaded plug such as 4. 5 is a pipe projecting upwardly from the top of the tank 1 and extending through the top of the tank into its interior for a purpose which will be described later.

At the upper end of the pipe 5 is an elbow 6 which is connected to a T 7 one leg of which is connected to a suitable source of compressed air, such as a foot bellows, or an electric fan or pressure tank, whichever is best suited to the operator's condition. The pipe 5 extends downwardly through the top of the tank and parallel with the vertical sides thereof for some distance, whereupon it is given two right angle bends as clearly indicated in dotted lines in Fig. 1, the upper end of the pipe being provided with a small opening indicated at 9.

Suitably attached to the pipe 5 within the tank 1, as indicated at 10—10, is a liquid tube 11 which is arranged vertically, and the lower end of which dips into the liquid in the tank. The upper end of the tube 11 is turned horizontally as indicated at 12 so that air delivered through the pipe 5 will flow across the end of the tube 11 drawing up liquid therethrough and effectually nebulizing such liquid to form a saturated vapor of chloroform or ether in the tank 1.

It will be seen that the tank 1 is relatively large so as to provide a large volume or space above the level of the liquid whereby the anesthetic vapor which may pass out from the tank, although saturated, will never contain particles of liquid anesthetic, although the outlet of the tank is entirely unobstructed and free from any gauze or other material which might impede the free flow of the vapor to the patient. In this way, the normal breathing of the patient is not interfered with, but a solution of

anesthetic vapor in air is, nevertheless, furnished continuously through the connection leading to the patient which is always saturated without danger of its being supersaturated.

Leading out of the top of the tank 1 is a nipple 12′ for taking off anesthetic gas to the place of use. The nipple 12′ is connected at its upper end to an angle valve 13, the other end of which is connected by means of a nipple 19′ to one leg of a T 14. Connecting the T 7 to the T 14 is a by-pass comprising an elbow 15, nipples 17—17 and a valve 16. It will be obvious that by closing the valve 13 and opening the valve 16, air from the pipe 8 may be passed around the tank 1. The conditions under which this may be desirable will be explained more fully below.

Leading from the side of the T 14 opposite the valve 13, extends a piping connection comprising a number of nipples 19—19 which are suitably connected by means of elbows 18—18 and T 20 so as to form with the T 14 and nipple 19′, a horizontal U two sides of which are parallel to the direction of the nipple 17. Connected to the T 20 is a short pipe connection which leads to an oxygen flask 21. The flask 21 is shown as provided with the usual needle valve 22 and a set screw 23. Adjacent the flask 21 is a rubber bag 24 which connects with the same pipe as the flask 21 and which serves to reduce the pressure of the gas admitted to the T 20. Intermediate the rubber bag 24, and the T 20 I place also a valve 25 by which the flow of oxygen may be regulated. By the arrangement just mentioned I am able to preserve the normal amount of oxygen in the gas flowing through the inhaler. At the mouth of the gas bag 24 I also provide a valve 24′ by which the bag can be cut off from the remainder of the system when so desired.

Connected to that one of the nipples 19 farthest removed from the valve 16 is a cross 26 to one branch of which is connected a gas bag 27 and to the other branch of which is connected a somnoform capsule container and breaker 28, which are shown in detail in Fig. 7.

The capsule breaker comprises an outer tube 29 which contains a lint chamber 30 formed by a wire netting. The lint chamber 30 has a collar 32 which is designed to rest on the collar 33, which collar is fixed to the inside of the tube 29. A capsule such as 34, containing somnoform or the like, is supported within the tube 29 by an inwardly projecting portion 35.

I provide a close fitting cap 34′ which fits over the upper end of the tube 29 and which may be pressed down over the upper end of the tube 29 so as to force a capsule such as 34 against the end portion of 35 so as to break the capsule. I also provide a breaker rod 36 which extends through the side of the tube 29 and which may be used for this purpose, being normally held out by spring 37. Above the collar 33, the tube 29 is provided with a wire gauze 31 soldered to its interior for the purpose of catching any particles of glass from the capsule. After the capsule is broken, the liquid contained therein is held by the lint in the chamber 30 so that it does not run down into the cross 26 but will give off vapor to the air passing through the cross as necessary. It will be seen that I also provide a valve 38 so that the bag 27 may be cut off from the pipes entirely.

Connecting with the cross 26 is a nipple 39 to which nipple is connected a hand operated valve or turning plug 39′ which may be opened or closed by the handle 40 to govern the flow of gas to the nipple 41 which connects to a check valve 42 containing a pivoted flap valve 43 to prevent back flow of the gas. Valve 42 connects to a nipple 44 which is connected to the inhaler by means of a silk covered hose 45.

My improved inhaler comprises a casing such as 46 to the upper portion of which is attached a nipple 47 for attachment to the hose. Within the nipple 47 is a ball 48 which is arranged to coöperate with a seat such as 49 to prevent the passage of fluid from the inhaler into the nipple 47, but which will readily allow the passage of the fluid from the nipple into the casing 46. The casing 46 is divided by a disk 50 into a chamber 51 and a mixing chamber 52, the nipple 47 being extended through the chamber 51 to an opening 53 in the disk 50. The disk 50 is provided with another aperture 54, an air tube 55 which passes up through the chamber 51 being directly connected to the aperture 54, while the aperture 53 serves to allow gas to pass from the nipple into the chamber 52. In order to regulate the percentage of air and gas flowing into the mixing chamber 52, I provide a valve disk 56 which is similar in shape to the disk 50 and which is mounted evenly below 50 being carried at the end of a stem 57, at the outer end of which is a pointer or handle 57′. It will be understood that the valve disk 56 is provided with two apertures arranged to cooperate with the apertures 53 and 54 in such a manner that when one of the apertures in 50 is opened, the other is closed a proportionate amount. Thus when aperture 53 is fully open the aperture 54 is fully closed.

Moreover, the stem 57 is provided with an indicating needle 57′ which coöperates with graduations 58 on the top of the casing 46 which indicates the amount of opening of aperture 53 and the degree of closure of aperture 54, by which the percentage of gas passing into the vapor may be determined.

Opening out of the chamber 52 is a short tube 59, the sides of which are perforated as shown at 60 and within which is a light disk valve, (not shown), which, when the patient exhales, will lift so as to permit his breath to pass out through the apertures 60 but which, when he inhales, will drop down so as to close communication between the apertures and the inner portion of the tube 59 so as to prevent the entrance of air into the mixing chamber.

61 is a face piece of sufficient size to go over both the mouth and nose of the patient and to which is attached a ring 62 which connects to the mixing chamber 52 by means of a threaded joint, as shown. It will be understood that the ring 62 may connect with the body of the inhaler by means of a slip joint, if so desired. The face piece 61 carries within it a wire screen such as 63 and around the edge, which goes against the face of the patient is provided with a rubber ring 64 which may be inflated so as to make the best possible contact with the face of the patient, the inflation being controlled through the air valve 65.

In place of the face piece 61, however, I may use a soft rubber nose piece.

In Fig. 6 I have shown another modification of an inhaler, which I have designated as a whole by the reference number 67. In most of its features the inhaler 67 is identical with the form previously described, and in such features it is identically numbered. The inhaler 67, however, is intended to be used in connection with the nose only of the patient and for this purpose, the body of the inhaler is provided with a head band 66, arranged to hold the inhaler proper in correct position on the forehead. 68—68 are nasal tubes made of hard rubber or other suitable material and connected to a metal cap 69 by means of soft rubber tubes 70—70, the cap 69 affording means for holding the tubes 68 and 70 to the body of the inhaler by slipping over and fitting tightly on the end thereof.

In Fig. 8 I have shown a cap 78 which may be used with the inhaler 67 in place of the cap 69. The cap 78 is provided with a single hook 79 thereon which is to be used in nose and throat work.

It will be seen that I have illustrated my apparatus as supported from a base 71 which is connected at 72 to a hollow pipe or standard 73 which carries at its upper end a set screw 74 for the purpose of holding the tube 75, which is slidable within the member 73, in any desired position. At its upper end the tube 75 is fixed to the T 20, being shown as integral therewith.

Where circumstances make it preferable, I may substitute for the member 75 a rod or tube such as 81 shown in Fig. 9 which is provided with a ball 82 at its lower end arranged to be held in a socket such as 83 which is formed integral with a vise or clamp 84, a set screw 85 being provided for holding the ball 82 and rod 81 in adjusted position. The member 84 is shown as having two fingers such as 86—86 which may embrace the edge of a table or similar article, and a set screw 87 is provided for fastening the fingers 86 to the table.

Referring to Fig. 10 I have shown therein my preferred form of face piece comprising a cap 78′ which is designed to fit on a casing such as 46 or 67 and a resilient rubber screen 67′ which can be made in any size desired so as to fit over the nose or over both the nose and mouth of the patient. Such a rubber screen can be easily cleaned and disinfected.

It will be understood that the fitting used in my apparatus should be nickeled. Moreover, I prefer to use pipe nipples of lead.

Having thus described my invention, what I claim is:—

1. In an anesthetic machine in combination, means for forming a saturated solution of anesthetic vapor in air, means for bringing the oxygen contents of said solution to its normal percentage for breathing, means for supplying a regulated amount of air under pressure to said solution prior to the addition of said oxygen, and means for supplying the resulting mixture to a patient.

2. In an anesthetic machine in combination, means for preparing a solution of an anesthetic gas in air and means for adding to said solution the vapor of somnoform or the like, comprising a substantially horizontal pipe through which the anesthetic gas passes, a capsule breaker above said pipe, a bag below said pipe beneath said breaker, and a valve for said bag.

3. In an anesthetic machine in combination, means for forming a solution of anesthetic vapor in air, a pipe for supplying air to said means, connections for leading said solution to a patient, means for introducing into said connections an additional anesthetic vapor, and a valved by-pass between said pipe and said connections whereby air may be delivered into said connections without passing through said means.

4. In an anesthetic machine in combination, a tank for holding an anesthetic liquid, a nebulizing apparatus disposed in said tank for producing an anesthetic solution of vapor in air, connections for leading said solution to a patient, a check valve in said connections, a stop valve in said connections, and a pipe connection leading into said connections at a point between said check valve and said stop valve, an oxygen flask connected with said pipe connection, and a valve for controlling the delivery of oxygen from said flash.

5. In an anesthetic apparatus, an inhaler

comprising a casing, said casing having a disk forming the head of a mixing chamber, said disk having two apertures therein, a connection for introducing anesthetic gas through one of said apertures into said chamber, an air tube for supplying air to the other one of said apertures, and an apertured valve disk mounted adjacent said disk, said valve disk being so arranged that the flow of gas into the chamber through said connection is inversely proportional to the flow of air through said tube at any given time.

6. In an anesthetic apparatus, an inhaler comprising a casing, said casing having a disk forming the head of a mixing chamber, said disk having two apertures therein, a connection for introducing anesthetic gas through one of said apertures into said chamber, an air tube for supplying air to the other one of said apertures, and an apertured valve disk mounted adjacent said disk, said valve disk being so arranged that the flow of gas into the chamber through said connection is inversely proportioned to the flow of air through said tube at any given time, a rod connected to said valve disk extending through said head, and a pointer on the outer end of said rod to indicate the position of said valve disk.

7. In an anesthetic machine in combination, means for forming a solution of anesthetic vapor in air, a pipe for supplying pressure air to said means, connections for leading said solution to a patient, and a valve bypath between said pipe and the said connection so arranged that air may be delivered into said connection without passing through said means and while said vapor forming means is in action.

In testimony whereof I affix my signature in the presence of two witnesses.

JONATHAN G. E. HINKLE.

Witnesses:

HAZEL BALLARD,

GOLDIE M. SWITZER.