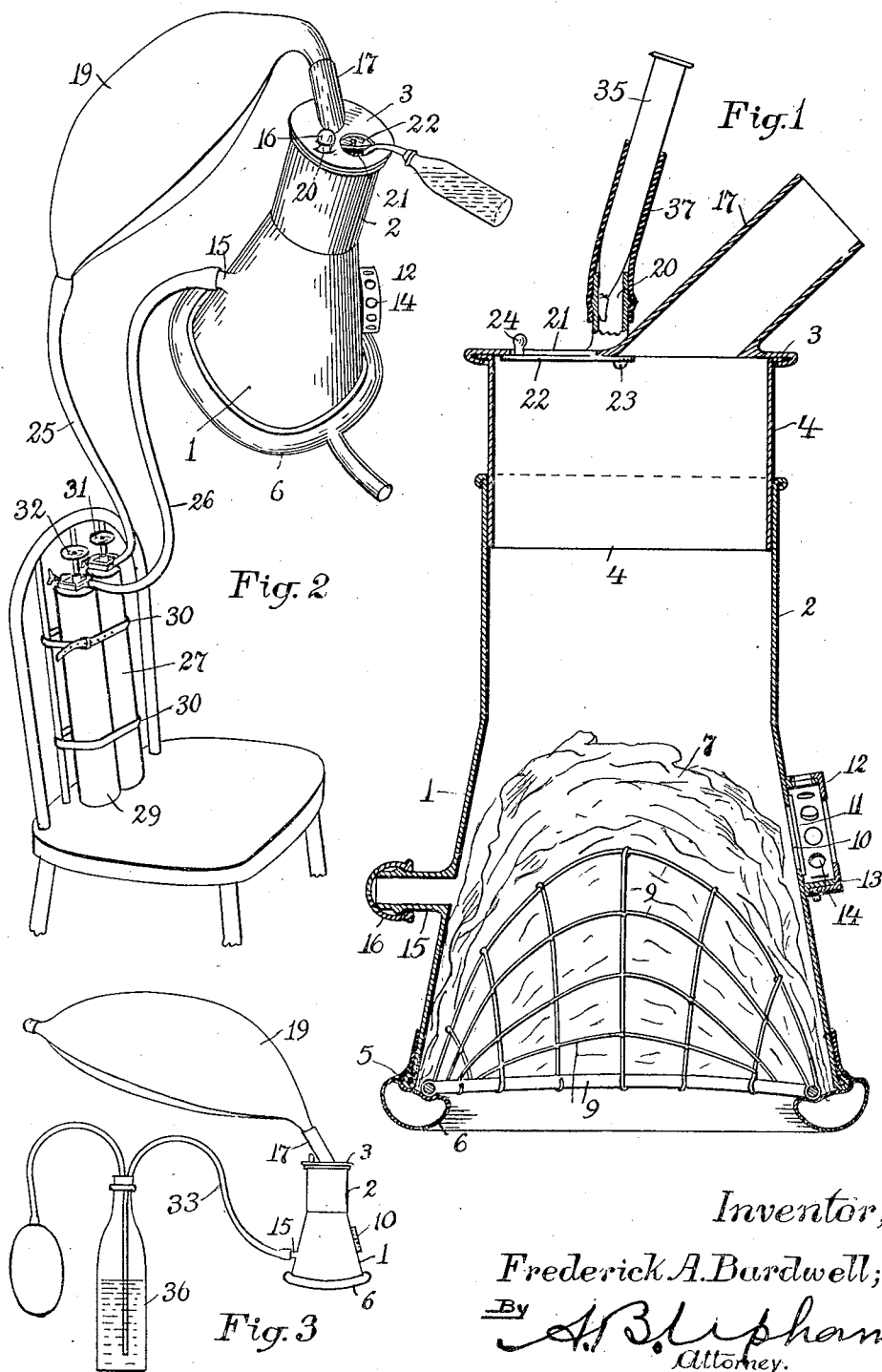


F. A. BARDWELL.
 INHALER FOR ADMINISTRATION OF ANESTHETICS.
 APPLICATION FILED APR. 17, 1918.

1,359,312.

Patented Nov. 16, 1920.



Inventor,
 Frederick A. Bardwell;
 By *A. B. Blupharm*
 Attorney.

UNITED STATES PATENT OFFICE.

FREDERICK A. BARDWELL, OF BOSTON, MASSACHUSETTS.

INHALER FOR ADMINISTRATION OF ANESTHETICS.

1,359,312.

Specification of Letters Patent. Patented Nov. 16, 1920.

Application filed April 17, 1918. Serial No. 229,026.

To all whom it may concern:

Be it known that I, FREDERICK A. BARDWELL, M. D., a citizen of the United States, and a resident of Boston, in the county of Suffolk and Commonwealth of Massachusetts, have invented certain new and useful Improvements in Inhalers for Administration of Anesthetics, of which the following is a full, clear, and exact specification.

The particular physical condition of the patient, the length of time needed for the operation, and the character of the depth of anesthesia required, each dictates the anesthetic to be used, and renders it desirable for the anesthetist to be able to use any one of the recognized anesthetics, and frequently to change in a moment from one to another.

For the administration of the different anesthetics, many forms of inhalers have been made, each being confined in use to one or two anesthetics, but none of them permitting instant change from one anesthetic to any of the others without removing the inhaler from the face.

One of the objects of the invention is to provide an inhaler by means of which any one of the known anesthetics, or combination of them, may be administered either by the so-called "open method" or "closed method" as may be desired. A further object is to provide an inhaler adapted for practically instantaneous change from one anesthetic to another without necessitating removal of the inhaler from the patient's face. A further object is to provide a portable inhaler of simple and inexpensive construction which shall combine in one device all of the valuable and essential features of the more complicated, expensive and cumbersome apparatus now on the market.

In the drawings forming part of this specification, Figure 1 is a central longitudinal section of an inhaler embodying my improvements. Fig. 2 is a perspective view of the same, showing it arranged for the administration of nitrous oxid and oxygen, and permitting the addition of ether. Fig. 3 is a side view of the inhaler showing the use of an atomizer bottle in connection therewith.

The main body of the inhaler comprises a somewhat conical shell 1 provided with a cylindrical portion 2 at its smaller end, which receives the flange 4 of a cover 3. Said flange and portion 2 being both cylin-

drical and snugly fitting, the cover 3 can be easily turned to any angle or slidably withdrawn, Fig. 1 showing it partially removed.

The open end 5 of the inhaler body is provided with a well known soft rubber pneumatic face piece or cushion 6 inclosing its edge, which also serves to hold a wire frame 9 whose function is to retain a quantity of gauze 7 above but out of contact with the face of the patient.

At one side of the cone 1 is located an exhaling valve 10 closed against the admission of air by a mica float or disk 11, but ordinarily permitting the ready escape of the patient's breath. When it is desired to have the anesthetic rebreathed, the perforated rotatable cap 12 is turned to put its holes 14 out of register with corresponding holes through the fixed flange 13. These holes being thereby closed, the mica disk closes the main opening of the exhaling valve to exhalation as well as to inhalation, but when these holes are open, the breath escapes freely through them notwithstanding the closure by the mica of the main opening.

At the other side of the cone 1 from the exhaling valve is a nipple 15, designed to be used when desired for the attachment of the tube through which certain anesthetics may be introduced to the inhaler, but which may be closed by a small rubber cap 16.

In the cover 3 are three openings; one comprising a comparatively large metal tube 17 rising at an angle therewith and designed for the attachment therewith of the gas or rebreathing bag 19; and another being a small nipple 20 intended for the attachment of the rubber tube from the atomizer bottle, 36, gas tank 29, ethyl chlorid tube or somnoform ampul. The third opening 21 is provided with a pivoted cover 22 opened or closed by means of the knob 24. When open, this permits pouring in ether or other liquid anesthetic, or the passage of air to and from the patient.

The easy turning of the cover 3 within the inhaler, and its oblique tube 17 with which the gas bag 19 is connected, permits the latter to be located at either side of the patient; while the slidable fit of the cover enables it to be instantly removed or replaced whenever necessary.

My apparatus may be operated as follows: When small metal gas tanks are used,

they may be firmly strapped or otherwise fastened to the back of a chair, as illustrated in the drawings, or to any other suitable support, in order that the valves 31, 32 may be freely manipulated. The gas and re-breathing bag 19 is connected with the tube 17, and the flexible tube 25 leading therefrom is connected with the tank 27 of nitrous oxid. The tube 26 is connected at one end with the nipple 15, and at its other end with a tank 29 of oxygen, the nipple 20 being closed by a suitable cap 16, and the opening 21 closed by its cover 22.

When thus administering nitrous oxid, the exhaling valve 10 is not closed until after a few respirations, when rebreathing may be favored for the greater economy of the nitrous oxid or other anesthetic, and also to induce deeper respiration, since the latter will be stimulated by the retained carbon dioxide gas.

During the administration of gas or gas-oxygen, it may be desirable to add ether in order that the muscles of the patient may be more relaxed, or to change onto ether, in which case ether may be poured through the opening 21 onto the gauze 7. The patient, now breathing nitrous oxid, oxygen and ether vapor, may receive more ether and be entirely brought under its influence, the nitrous oxid being shut off but the oxygen continued as needed. Or the cover 3 with the tube 26 may be removed and the ether treatment continued by the open method, *i. e.*, by pouring it in through the open end 2, as is done with the well-known Blake cone.

When it is desired to use nitrous oxid alone, without oxygen, as a preliminary to ether, the gas bag 19 is attached to the inhaler by the tube 17 and cover 3 as before, but the tube from the atomizer bottle 36 is connected with the nipple 15 by a tube 33, and as soon as the patient exhibits signs of coming under the influence of the gas, air and ether vapor are forced to the patient from the atomizer bottle 36. This affords a smooth and gradual transition, to be followed later by ether by the open method.

In the use of "somnoform" for brief operations, a short length of flexible tubing 37 is drawn over the point of the glass ampul 35, and the other end of the tube 37 is drawn down on the outside of the nipple 20, thus making an air-tight but flexible connection with the inhaler. The rebreathing bag 19 is connected with the inhaler but all other openings closed, and the inhaler applied to the patient's face. The point of the glass ampul within the nipple 20 is now broken off by pushing the ampul over to one side, permitting the point and liquid somnoform to descend to the gauze 7.

In using ethyl chlorid from the tube commonly employed for local anesthesia, the cover 3 is removed and the ethyl chlorid

sprayed directly upon the gauze 7, followed by ether as desired.

It will be observed that the cover flange 4, telescopes within the cylindrical portion 2, leaving the exterior portion of the cone uncovered, so that it may be firmly grasped by the anesthetist, and danger of slipping in his hand is avoided. The cover is at all times free for movement longitudinally of the cone to permit quick removal when desired. It is also free at all times for rotative movement, whereby it may be readily rotated to permit the gas and rebreathing bag to be shifted, so that the cone may be easily placed in position over the face of the patient, no matter on which side he may be resting. It is to be understood, however, that there is sufficient friction between the cover and the body of the cone to normally retain the former in any adjusted position. There is a distinct advantage in arranging the tube 17 at an inclination, because, when the patient is on one side, the angle between the bag and the tube is not sufficiently abrupt to cause a bend in the flexible bag connection, sharp enough to shut off communication between the bag and the cone, as sometimes happens, where the tube of the cone is parallel with the axis of the cone.

An important advantage is obtained by the combination of the tube 17, nipple 20 and opening 21. For instance, in using gas-oxygen, the gas supply and rebreathing bag may be connected with tube 17 and the oxygen with nipple 20, which is of much smaller diameter than tube 17. During the administration of the gas and oxygen, another anesthetic may be introduced through opening 21. If no gas-oxygen tanks are available, or if it is preferred to employ the ethyl-chlorid-ether sequence, a rebreathing bag may be connected with the tube 17 and ethyl-chlorid or somnoform introduced through the nipple 20, and ether later introduced through opening 21. Thus in a single device means are provided by which the gas-oxygen system may be used alone or in connection with at least one other different anesthetic, or two other anesthetics may be substituted for gas-oxygen. When it is desired to sterilize the parts of the cone the cover 4 is removed from the cone body, the rubber face piece 6 is slipped off and the wire frame 9 may be removed. These parts may then be sterilized in any suitable manner.

It is evident that this inhaler lends itself to other methods of use and combinations of anesthetics that will readily suggest themselves to a skilled anesthetist.

What I claim is:

1. An inhaler cone closable at its smaller end and having an opening through one side, a float valve closing said opening against inhalation, a flange surrounding said

opening and valve, a cage having a flange snugly fitting the first-named flange but rotatable thereon, and means limiting such rotation, the flanges having holes which come into alinement at one limit of rotation, and out of alinement at the opposite limit.

2. An inhaler of the character described comprising a cone open at both ends, a cover normally closing one end, said cover being at all times free for movement longitudinally of the cone and also free for complete rotation, said cover being also provided with an opening through which air or an anesthetic may be introduced at will, a closure normally sealing said opening, and an inclined tube extended from said closed end to which a gas and rebreathing bag may be connected and placed in communication with the interior of the cone.

3. An inhaler of the character described comprising a cone normally closed at one end, said closed end being provided with an opening through which air or an anesthetic may be introduced at will, a closure normally sealing said opening, means independent of said opening whereby a gas and rebreathing bag may be connected with said closed end and placed in communication with the interior of the cone, and means whereby oxygen, gas or an anesthetic may be introduced into the cone at will at a point distant from the closed end.

4. An inhaler of the character described comprising a cone normally closed at one end, said closed end being provided with an opening through which air or an anesthetic may be introduced at will, a closure normally sealing said opening, a tube extending from said closed end at a point distant from said opening whereby a gas and rebreathing bag may be connected with said closed end and placed in communication with the interior of the cone, a nipple projecting from said closed end through which oxygen or a special anesthetic may be introduced, said nipple being of smaller diameter than said tube, and means normally closing said nipple.

5. An inhaler of the character described comprising a cone normally closed at one end, said closed end being provided with an opening through which air or an anesthetic may be introduced at will, a closure normally sealing said opening, means independent of said opening whereby a gas and rebreathing bag may be connected with said closed end and placed in communication with the interior of the cone, an exhaling valve controlling escape of the patient's breath from said cone, and means for closing said valve.

6. An inhaler of the character described comprising a cone normally closed at one end, said closed end being provided with

an opening through which air or an anesthetic may be introduced at will, a closure normally sealing said opening, means independent of said opening whereby a gas and rebreathing bag may be connected with said closed end and placed in communication with the interior of the cone, means whereby oxygen, gas or anesthetic may be introduced into the cone at will at a point distant from the closed end, a nipple projecting from said closed end through which a special anesthetic may be introduced, and means normally closing said nipple.

7. An inhaler of the character described comprising a cone normally closed at one end, said closed end being provided with an opening through which air or an anesthetic may be introduced at will, a closure normally sealing said opening, means independent of said opening whereby a gas and rebreathing bag may be connected with the said closed end and placed in communication with the interior of the cone, means whereby air or anesthetic may be introduced into the cone at will at a point distant from the closed end, an exhaling valve controlling escape of the patient's breath from said cone, and means for closing said valve.

8. An inhaler of the character described comprising a cone normally closed at one end, said closed end being provided with an opening through which air or an anesthetic may be introduced at will, a closure normally sealing said opening, means independent of said opening whereby a gas and rebreathing bag may be connected with said closed end and placed in communication with the interior of the cone, a nipple projecting from the cone at a point distant from the closed end thereof and positioned to permit introduction of oxygen, gas or anesthetic at will, and a removable closure for said nipple.

9. An inhaler of the character described comprising a cone open at both ends, a cover normally closing said end, said cover being at all times free for movement longitudinally of the cone, and also free for complete rotation, said cover having an opening through which air or an anesthetic may be introduced, as may be desired, a closure normally sealing said opening, and means independent of said opening whereby a gas and rebreathing bag may be connected with said cover and placed in communication with the interior of the cone.

10. An inhaler of the character described comprising a cone open at one end, a cover having a flange telescoping within one end of said cone, said flange being at all times free for movement longitudinally of the cone and also free for complete rotation, said cover having an opening through which air or an anesthetic may be introduced as desired, a closure normally sealing said open-

ing, and means independent of said opening whereby a gas and rebreathing bag may be secured to said cover and placed in communication with the interior of the cone.

- 5 11. An inhaler of the character described comprising a cone open at both ends, a cover normally closing said end, said cover being at all times free for movement longitudinally of the cone and also free for complete
10 rotation, said cover having an opening through which air or an anesthetic may be introduced, as may be desired, a closure normally sealing said opening, means independent of said opening whereby a gas and re-
15 breathing bag may be connected with said cover and placed in communication with the interior of the cone, a nipple projecting from said cover through which a special anesthetic may be introduced, and means
20 normally closing said nipple.

12. An inhaler of the character described comprising a cone normally closed at one end, said closed end being provided with an opening through which air or an anesthetic
25 may be introduced at will, a closure normally sealing said opening, a tube extending from said closed end at a point distant from said opening, whereby a gas and rebreathing bag may be connected with said closed
30 end and placed in communication with the interior of the cone, a nipple projecting from said closed end through which oxygen or a special anesthetic may be introduced, said nipple being of smaller diameter than
35 said tube, means normally closing said nipple, an exhaling valve controlling escape of the patient's breath from said cone, and means for closing said valve.

13. An inhaler of the character described

comprising a cone normally closed at one 40 end, said closed end being provided with means whereby air or an anesthetic may be introduced at will, a closure normally sealing said opening, means spaced from said opening whereby a gas and rebreathing bag 45 may be connected with said closed end and placed in communication with the interior of the cone, additional means spaced from said opening and the rebreathing bag connection whereby oxygen or a special anes- 50 thetic may be introduced into the cone, and removable means whereby a substantial mass of gauze may be loosely supported within said cone in a position spaced from the open end thereof. 55

14. An inhaler of the character described comprising a cone open at both ends, a cover normally closing one of said ends, said cover being at all times free for movement longitudinally of the cone and also free for 60 complete rotation, said cover having an opening through which air or an anesthetic may be introduced as may be desired, a closure normally sealing said opening, means independent of said opening where- 65 by a gas and rebreathing bag may be connected with said cover and placed in communication with the interior of the cone, and removable means contiguous to the other end of the cone by which a substan- 70 tial mass of gauze may be loosely supported within said cone in a position spaced from said end.

In testimony that I claim the foregoing invention, I have hereunto set my hand this 75 15th day of April, 1918.

FREDERICK A. BARDWELL