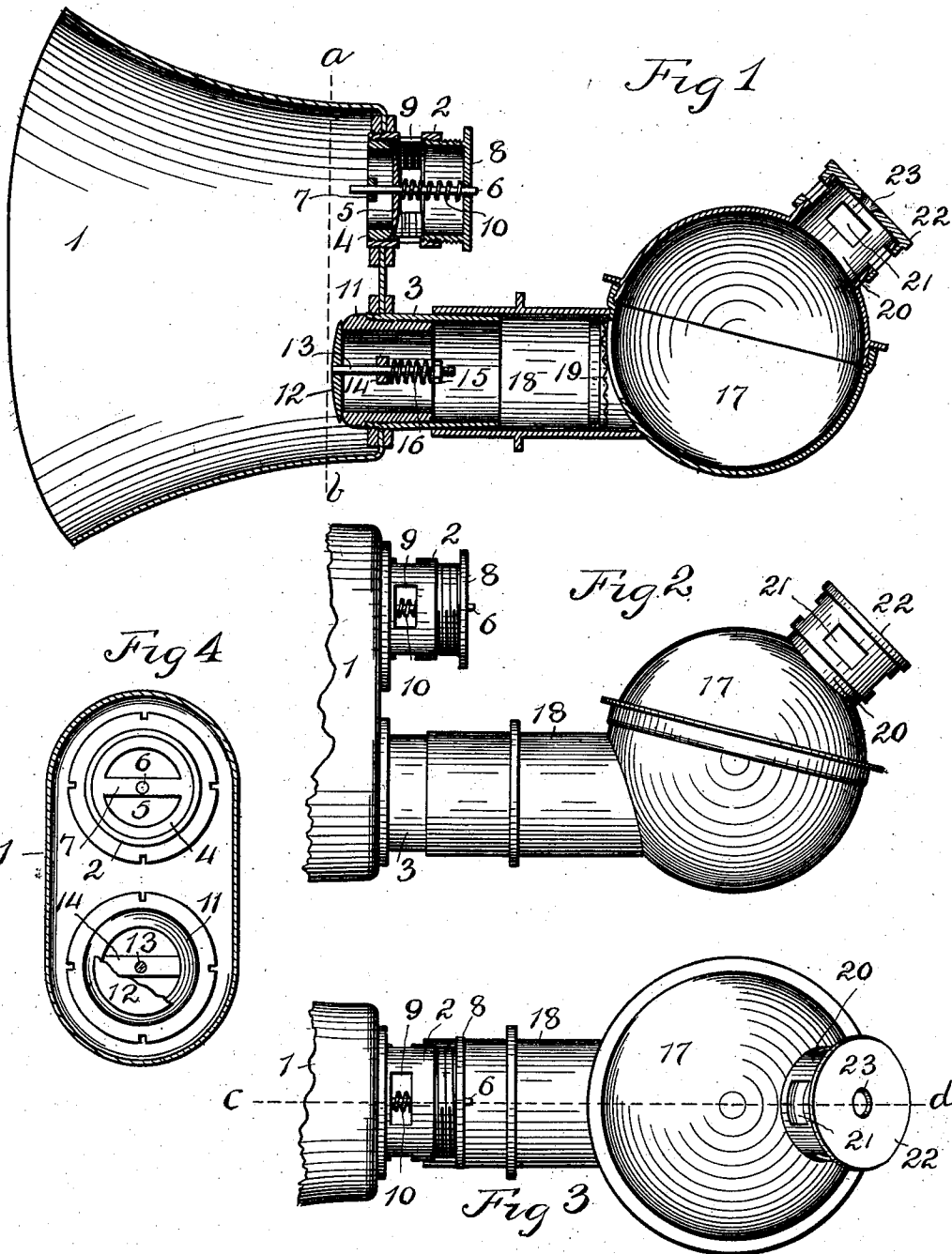


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E. MARSHALL.
ANESTHETIC INHALER.
APPLICATION FILED APR. 21, 1903.

NO MODEL.



Witnesses:

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ANESTHETIC-INHALER.

SPECIFICATION forming part of Letters Patent No. 747,742, dated December 22, 1903.

Application filed April 21, 1903. Serial No. 153,608. (No model.)

To all whom it may concern:

Be it known that I, EDWIN MARSHALL, a citizen of the United States of America, residing in Warrensburg, in the county of Johnson and State of Missouri, have invented a new and useful Improvement in Anesthetic-Inhalers, of which the following is a specification, reference being had therein to the accompanying drawings, forming a part thereof.

My invention relates to improvements in inhalers.

It relates particularly to the class of inhalers used for administering gas or anesthetics to patients.

The object of my invention is to provide an inhaler with means by which the inspirations and expirations of the patients may be adjusted during the administration of the anesthetic. With the use of my invention the air mixed with the anesthetic may be retained in the lungs a greater length of time than is ordinary, and economy in the use of the anesthetic may be thus effected, the quantity administered performing more service than where the respiration is unaffected.

My invention provides, further, means by which the proportions of air and the fluid mixed therewith may be varied.

Other novel features are hereinafter fully described and claimed.

In the accompanying drawings, illustrative of my invention, Figure 1 is a longitudinal vertical sectional view, both valves being shown seated. Fig. 2 is a side elevation view of the same, a portion of the mask being broken away. Fig. 3 is a top view of what is shown in Fig. 2. Fig. 4 is a cross-section taken on the dotted line *a b* of Fig. 1, a portion of the inspiratory-valve being broken away.

Similar characters of reference indicate similar parts.

1 indicates an ordinary mask, the flaring open end of which is adapted to fit over the mouth and nose of the patient. In the closed end of the mask are provided two openings, in which are secured, respectively, two hori-

zontal tubes 2 and 3. The inspiratory-tube 2 has secured in it an annular valve-seat 4, on which rests a disk valve 5 having a horizontal stem 6, the inner end of which is mounted movably in a transverse hole provided in a transverse bridge 7 in the seat 4. The outer end of the stem 6 is longitudinally movable in a hole provided in the end of a cap 8, the outside of which is screw-threaded and fitted in the screw-threaded outer end of the tube 2. The tube 2 is provided with a series of holes 9, adapted to be more or less closed by the cap 8 when the cap is moved lengthwise by turning. Encircling the stem 6 is a coil-spring 10, one end of which rests upon the outer side of the valve 5 and the other end of which rests against the inner end of the cap 8. By rotating the cap 8 the tension of the spring 10 may be varied and the valve 5 thus be held with more or less pressure upon the seat 4. In the tube 3 is mounted an annular valve-seat 11, which extends in the mask 1 and has mounted thereon a disk valve 12, which is provided with a horizontal stem 13, which is longitudinally movable in a transverse horizontal hole provided in a transverse horizontal bridge 14, which extends across the hole through the valve-seat 11. The outer end of the stem 13 is screw-threaded and has mounted thereon a nut 15. A coil-spring 16 encircles the stem 13 and bears at one end against the bridge 14 and at the other end against the nut 15. By adjusting the nut 15 upon the stem 13 the pressure of the spring 16 may be varied and the pressure of the valve 12 on the seat 11 also varied correspondingly.

17 indicates the mixing-chamber adapted to receive therein cotton or other absorbent material adapted to receive thereon the anesthetic material. One side of the chamber 17 is provided with a tubular extension 18, adapted to slip over the tube 3 and provided with a transverse screen 19 for retaining the cotton in the chamber. On the side of the chamber 17 opposite the tubular extension 18 is provided a tubular extension

20, having a series of peripheral holes 21 and having rotatably fitted over it a cap 22, also provided with a series of holes in its side wall adapted to register with the holes in the tubular extension 20. By rotating the cap 22 the holes 21 may be more or less closed, thus regulating the amount of air admitted into the chamber 17 and into the mask 1 past the valve 12. In the end of the cap 22 is provided a hole 23, through which the anesthetic material may be supplied.

In operating my invention the mask is fitted to the face of the patient in the ordinary manner. During the inspiration the air is admitted through the tube 3, past the valve 12, the valve opening for the purpose and being closed as soon as the expiration begins by the spring 16. During expiration the respired air passes out of the tube 2, lifting the valve 5 from its seat 4 against the pressure of the spring 10. Before the chamber 17 is fitted to the tube 3 the respiration is noted. If too forcible, the valves are made to press more firmly upon their seats by adjusting the cap 8 and the nut 15. When the valves have been adjusted to properly control the respiration, the chamber 17 is slipped on the tube 3, an absorbent material (not shown) having previously been placed in the chamber in front of the screen 19. The anesthetic material is then inserted through the opening 23 in the cap 22, and the cap 22 is rotated on the extension 20 until the proper amount of air enters the chamber 17 through the opening 23 and the side openings 21. After the patient has become influenced by the anesthetic, if it is desired to further control the inspirations and expirations by increasing or diminishing the passage of fluid through the tubes 2 and 3, the caps 8 and 22 are rotated, so as to uncover or cover more or less the holes 9 and 21, respectively. It will be understood by those skilled in the art that the anesthetic material inserted in the chamber 17 being of a volatile nature will volatilize and be thoroughly mixed with the air entering the holes 21 before passing into the mask 1.

My invention may be modified in many ways without departing from its spirit.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In an inhaler, the combination with the mask provided with two openings, of two valves controlling respectively the said two openings, one of the valves opening with the inspirations and closing with the expirations and the other valve opening with the expirations and closing with the inspirations, and adjustable means for controlling the size of the two openings.

2. In an inhaler, the combination with the mask provided with two openings, of two valves controlling respectively the two openings, two springs, one for each valve, for nor-

mally holding the valves closed, one of the valves opening with the inspirations and closing with the expirations, and the other valve opening with the expirations and closing with the inspirations, means for regulating the tension of each of said springs, and means for regulating the size of the two openings.

3. In an inhaler, the combination with the mask provided with two openings, of a valve controlling one of said openings, the valve opening with the expirations and closing with the inspirations, a spring for holding the said valve closed, means for simultaneously varying the tension of the said spring and the size of the opening controlled by the said valve, a valve controlling the other of said openings, the latter valve opening with the inspirations and closing with the expirations, a spring for holding the latter valve closed, means for regulating the tension of the latter spring simultaneously with regulation of the size of the opening controlled by the last-named valve.

4. In an inhaler, the combination with the mask provided with an opening having a valve-seat, of a valve seated in said valve-seat, a spring normally holding said valve in its seat, the valve opening with the expirations and closing with the inspirations, and an adjustable device for regulating the amount of fluid passing through the said opening and serving also to regulate the pressure of the said spring on said valve.

5. In an inhaler, the combination with the mask provided with two openings, of a mixing-chamber connected with one of said openings and provided with an inlet-opening, means for controlling the size of said inlet-opening, a valve for preventing expirations through the mixing-chamber, and adjustable means for regulating the expirations through the other of said openings in the mask and preventing inspirations therethrough.

6. In an inhaler, the combination with the mask provided with two openings therethrough, of two tubes fitted one in each of said openings, each tube being provided with a valve-seat, two valves mounted respectively one on one seat and the other on the other seat, one valve opening only with the inspirations and the other valve opening only with the expirations, two springs normally holding the two valves seated, means for regulating the tension of said springs, adjustable means for controlling the passage of fluid through the expiration-tube, a mixing-chamber connected with the other tube and having an inlet for air and a fluid to be mixed therewith, and means for adjustably controlling the proportions of air and other fluid introduced into the mixing-chamber.

7. In an inhaler, the combination with the mask provided with two conductors for fluid, of adjustable means for controlling the expirations passing through one of said conductors, means for preventing inspirations

through the expiratory conductor, means for preventing expirations through the inspiratory conductor, a mixing-chamber connected with the inspiratory conductor and provided
5 with an inlet for two fluids, and means by which the proportions of said fluids entering the mixing-chamber may be regulated.

In testimony whereof I have signed my name to this specification in presence of two subscribing witnesses.

EDWIN MARSHALL.

Witnesses:

WARREN D. HOUSE,
HENRY F. ROSE.