

(No Model.)

2 Sheets—Sheet 1.

E. T. STARR.  
INHALER.

No. 417,795.

Patented Dec. 24, 1889.

Fig. 1.

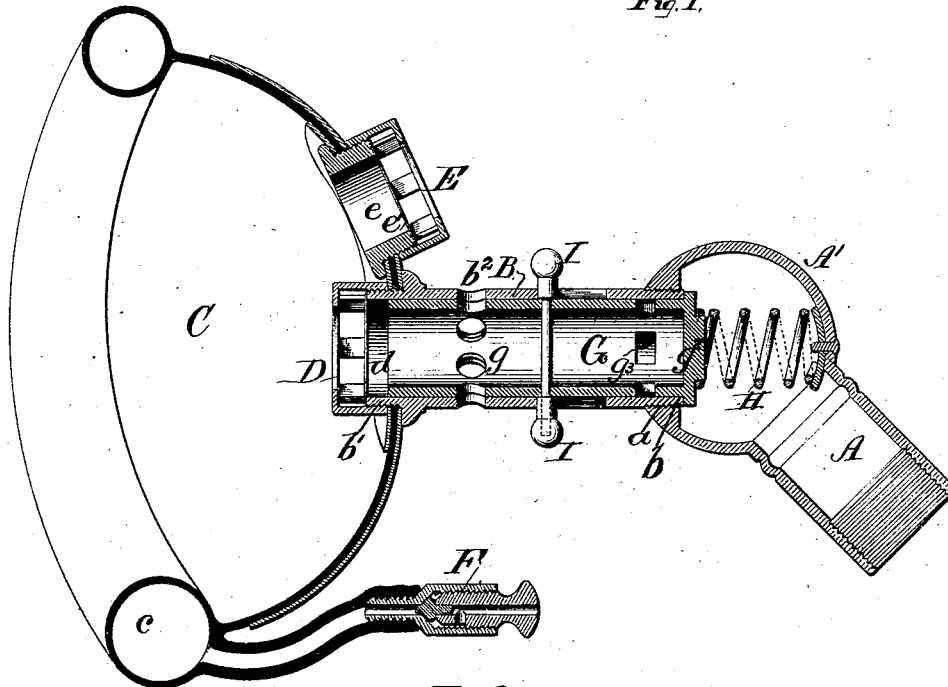


Fig. 2.

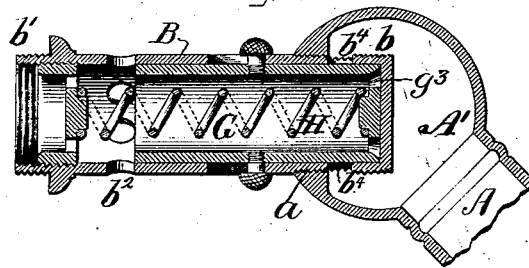


Fig. 3.

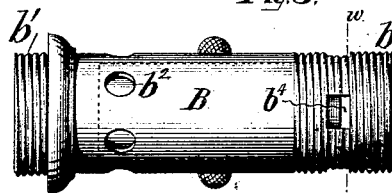
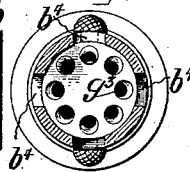


Fig. 4.



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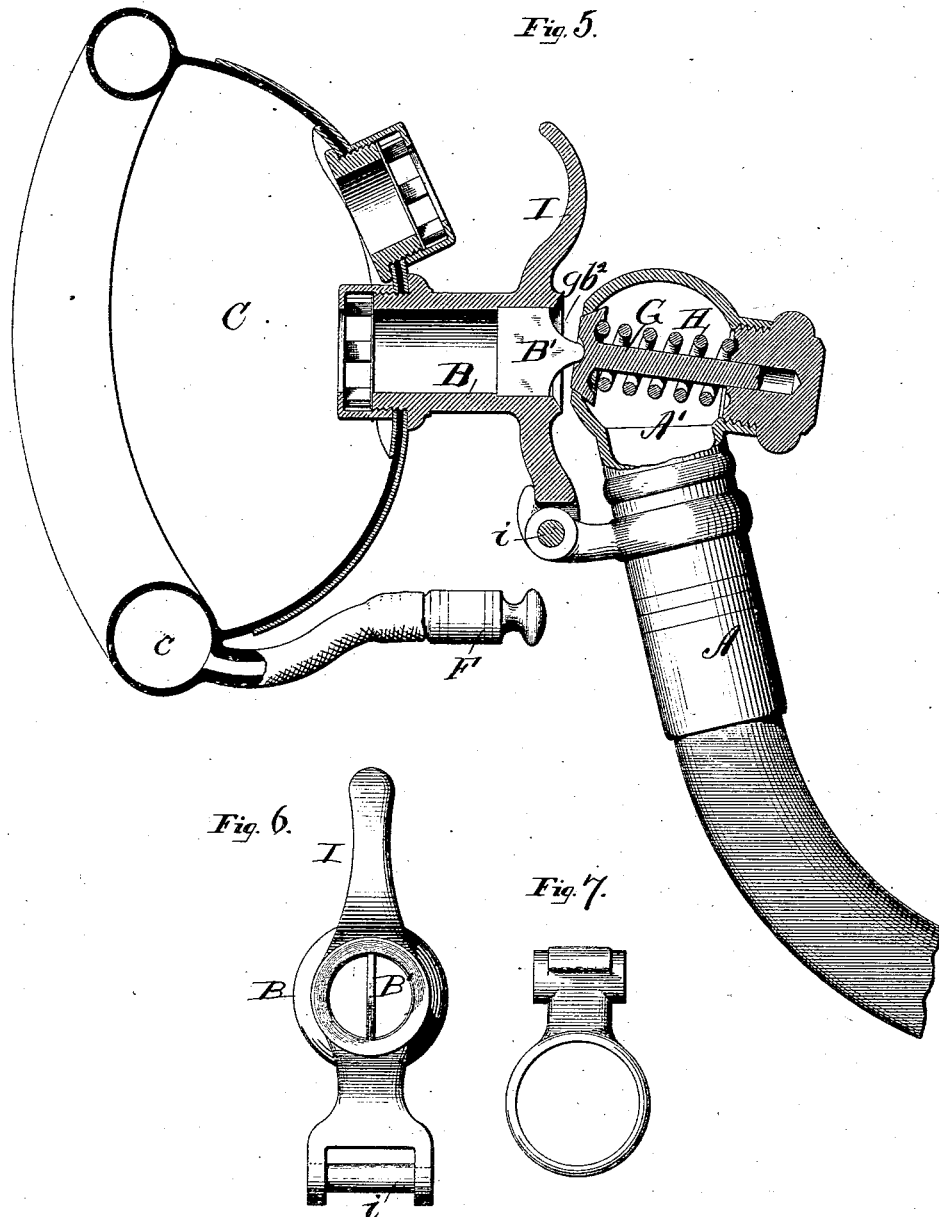
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# UNITED STATES PATENT OFFICE.

ELI T. STARR, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO THE S. S. WHITE DENTAL MANUFACTURING COMPANY, OF SAME PLACE.

## INHALER.

SPECIFICATION forming part of Letters Patent No. 417,795, dated December 24, 1889.

Application filed February 13, 1888. Serial No. 263,820. (No model.)

*To all whom it may concern:*

Be it known that I, ELI T. STARR, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Inhalers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to automatic inhalers for the administration more particularly of nitrous-oxide gas or other anæsthetics in producing anæsthesia, and has for its object to provide an improved inhaler.

My invention, to be hereinafter specifically designated by the claim, consists of a certain novel combination of devices sufficiently described in detail below in the preferred form thereof to enable my invention to be practiced.

In the accompanying drawings, Figure 1 is a longitudinal section through my improved inhaler. Fig. 2 is a similar section through a modification thereof with the hood or face-piece omitted. Fig. 3 is a view of the periphery of the main or valve section thereof; and Fig. 4 is a cross-section therethrough on the line *ww* of Fig. 3, showing more particularly the gas inlet or port openings in the end of the sliding valve-section.

In Figs. 5, 6, and 7 is also shown a modification of my improved inhaler, to be alluded to more particularly farther on.

Having reference to my improved inhaler shown in Figs. 1 to 4, A is the casing-section for connection with the gas-bag or anæsthetic-containing vessel by the usual flexible rubber tubing, (not necessary to be shown,) and terminating in an enlargement or spheroidal end A', fitted with a threaded opening *a* to receive the rear male-threaded end *b* of the main or valve section B of the casing, the front end of which is also male-threaded, as at *b'*, to form the connection of the hood or face-piece C and the inhaling-valve D, which may be of the usual construction. Said hood or face-piece is provided with the usual exhalation-valve E, and I have also shown said hood as having an inflation-rim *c*, of well-

known construction, and which with its inflating-pipe and stop-cock F may be desirable in some instances.

The particular form of the face-piece of course constitutes no part of my improvements.

Mounted within the main section B of the casing, for example, is the valve arrangement, shown as consisting of a sliding tube G, normally thrust forward by a spring H. This tube G is perforated, preferably, with a series of holes, as at *g*, and the main casing-section B is likewise perforated correspondingly, as at *b'*, and when in its normal position said perforations are coincident or in line and afford free passage for the external air to the lungs as the patient breathes or inhales when the inhaler is first applied to the face, the inhalation drawing the air through said openings, the valve-disk *d* of the valve D opening inwardly in a well-known way.

In exhaling, the pressure of the expired breath closes the valve D and the expired breath passes out at the exhalation-opening *e* of the valve E, the disk *e'* of that valve falling away or opening for the purpose and under the pressure. When inhaling external air through the air-inlet openings *g b''*, the suction of course closes the valve-disk *e'* of the valve E.

The purpose and function of the air-inlet opening or openings are to accustom the patient, if timid, to the inhaler and enable the natural air to be inhaled. When the anæsthetic is to be administered, the tube G or valve-operating device is moved endwise by the fingers, which grasp the inhaler, and is drawn backward by means of the handle or knobs I I, one or more, so as to carry the inlet-openings *g b''* out of coincidence and close said openings, and against, of course, the pressure of the closing-spring H. This act also protrudes the rear end *g'* of the tube G into the cavity of the sphere or hollow casing portion A' and exposes the gas-inlet openings *g'''* in the rear end of said tube, whereby the air-inlet opening or openings is or are closed and the gas-inlet openings opened, an inhalation then drawing the gas or anæsthetic

into the lungs to produce anaesthesia. As soon as the desired effect is produced in the patient the retracting pressure on the handle or knobs I is relieved, and the spring H immediately thrusts forward said tube G, carrying the gas-inlet openings within the rear end of the casing-section B and closing the escape of the anaesthetic or gas and again bringing the air-inlet openings *g b''* into alignment to enable the natural air to be breathed therethrough or to close the outlet of the gas if the inhaler is to be removed from the face.

I have thus provided an inhaler (for the first time) with a gas-inlet, a normally-open air-inlet, a valve arrangement, and a handle which is moved by the hand of the operator to open the normally-closed gas-inlet, and the valve automatically operated by a spring to close the gas-inlet and open the air-inlet as soon as the pressure of the hand upon the handle is relieved, and this irrespective of and without any pressure of the apparatus upon the face of the patient to attain this result, which was old. Such a handle I style a "self-contained" handle. This pressure upon the face to operate such openings or equivalent valve arrangements is objectionable, and hence I have devised my improvements to attain the results of such face-pressure inhalers and avoid their disadvantages, while retaining the automatic closing of the gas-inlet opening when the instrument is to be thrown out of operation or the administration is to cease by simply releasing the pressure upon the handle.

It is obvious that my improvements admit of many modifications. For instance, in Figs. 2, 3, and 4 I have shown a modification of my invention. In that example the spring H is within a valve-tube G, which has gas-inlet openings or ports *g'''*, which are closed in the normal position of the apparatus by being thrust by the spring H against the wall of the closed end of the main casing-section B, which position opens the air-inlet openings *b''*. Forward pressure upon the handle or knobs I

carries said tube G forward, closing the air-inlet openings *b''* and opening the ports or gas-inlet openings *g'''* to communicate with the gas-supply through the opening or openings *b'''* in the periphery of the rear end of said section B, which is fitted to extend into the spherical or equivalent chamber A'.

In the modification which I have made, and as shown in Figs. 2, 3, and 4, the forward pressure on the handle or knobs I opens the gas-inlet and closes the air-inlet.

In Fig. 1 the retraction or backward pressure, by means of the handle or knobs I, opens the gas-inlet and closes the air-inlet, and in both cases as soon as the pressure is relieved the outflow of gas is immediately and automatically stopped by the closing of its valve opening or openings.

Figs. 5, 6, and 7 show another construction, changed only in details, doing the same thing. The valve G is acted upon by a spring H in a similar manner to normally close the gas-inlet opening, and an air-inlet is then provided by means of the opening *g b''* or separation of the sections A B. The section B is hinged, as at *i*, to the section A, and by means of a handle I the section B may be retracted, and through a thin or perforated plate B' open the gas-inlet valve G, and at the same time close the air-inlet passage by closing the sections A B together, the joint being suitably formed for the purpose. I do not claim the details of this modification shown in Figs. 5, 6, and 7.

I claim as my invention—

An inhaler having an air-inlet opening, a gas-inlet opening, a valve to control said openings, a self-contained handle to operate said valve, and a spring to normally close said gas-inlet and open said air-inlet, substantially as described.

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

ELI T. STARR.

Witnesses:

JAS. J. WILLIAMS,  
ROBT. E. GORDON.