(No Model.)

W. A. JOHNSTON & A. W. BROWNE.

INHALER.

No. 291,196. Patented Jan. 1, 1884.

Fig. 1.

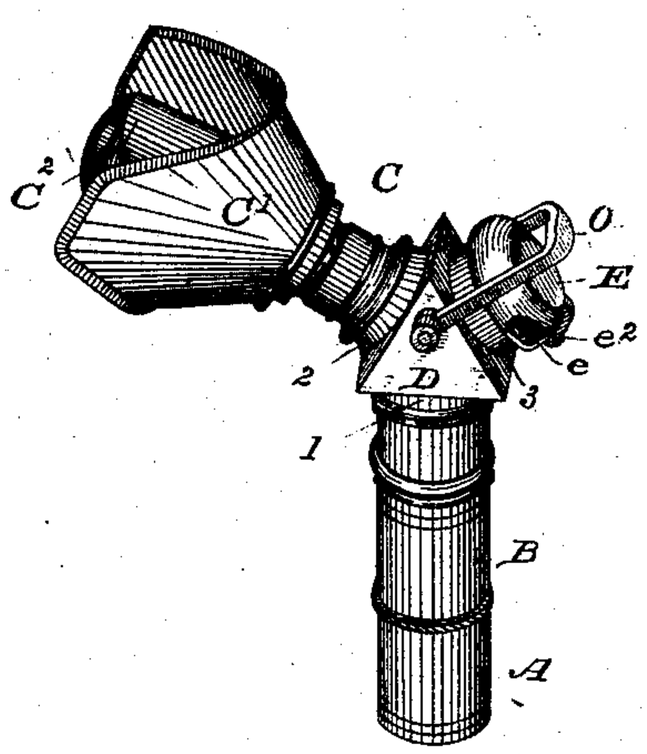


Fig. 2.

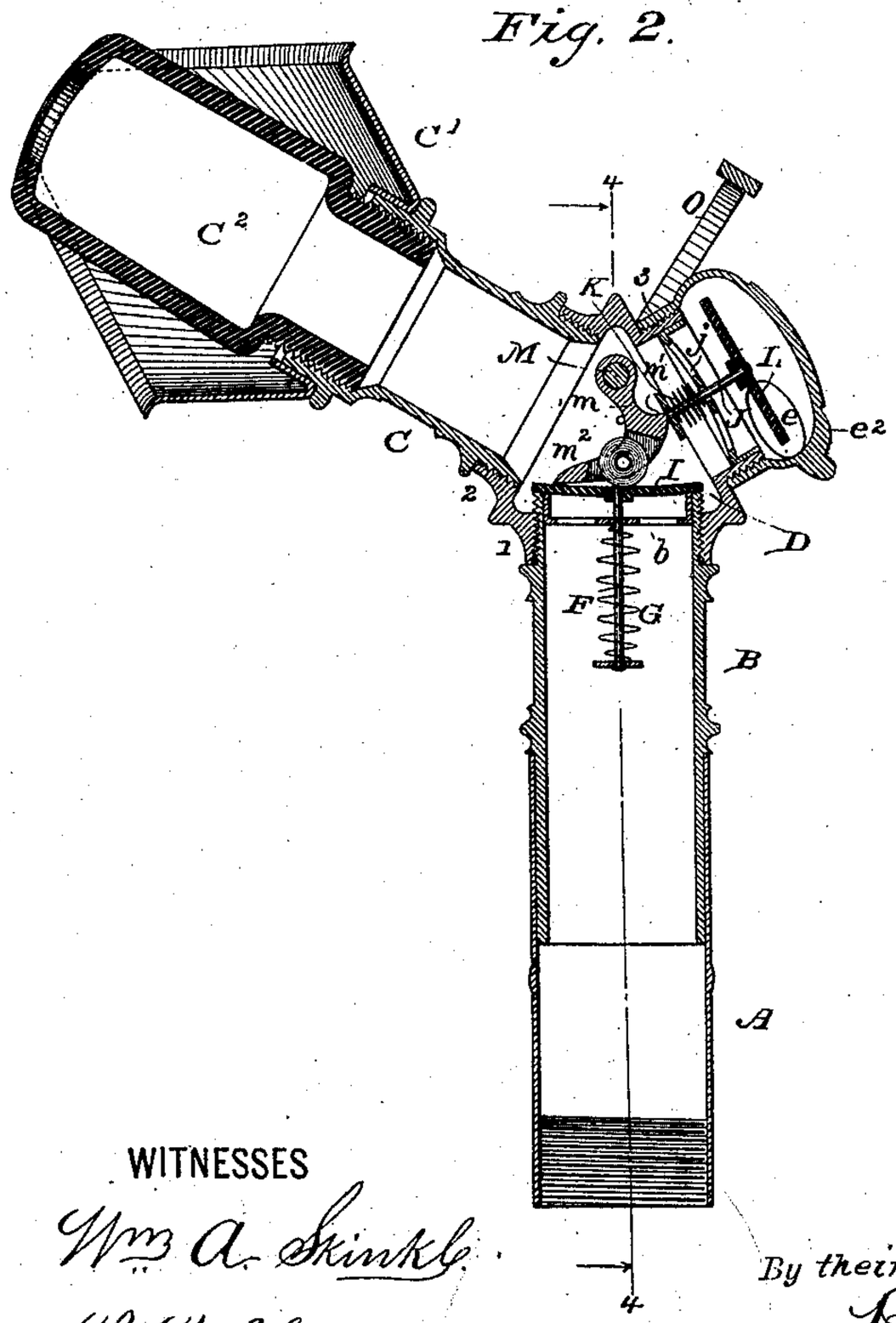


Fig. 3.

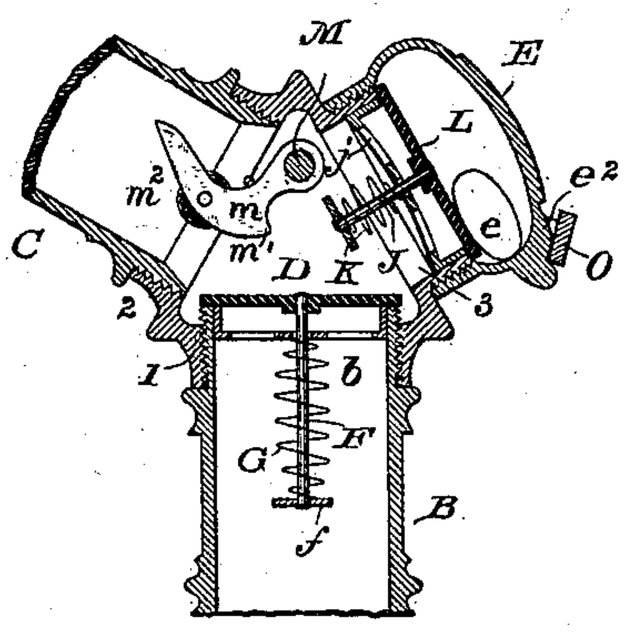
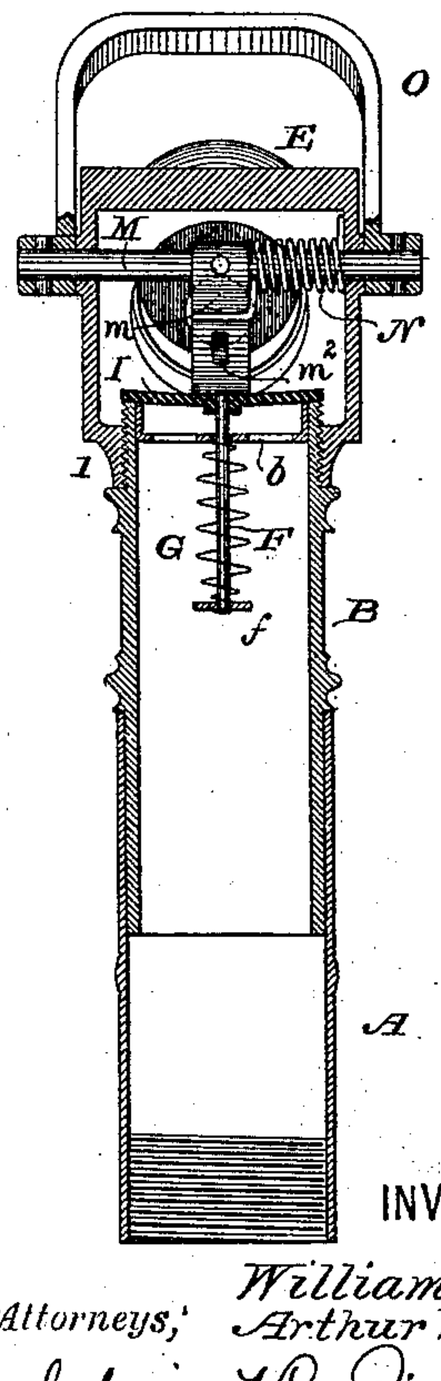


Fig. 4.



WITNESSES

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UNITED STATES PATENT OFFICE.

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INHALER.

SPECIFICATION forming part of Letters Patent No. 291,196, dated January 1, 1884.

Application filed April 2, 1883. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM A. JOHNSTON, of Clifton, in the county of Richmond and State of New York, and ARTHUR W. BROWNE, of Pleasant Plains, in the said county and State, have jointly invented certain new and useful Improvements in Inhalers, of which the following is a specification.

Our invention relates to an inhaler for use, with suitable apparatus, for inhaling nitrous-oxide gas, ether, and other like anæsthetics, which are administered to a patient for the purpose of producing anæsthesia, and consequent insensibility to the pain produced by a surgical or dental operation.

Our invention relates particularly to the inhaling part of the apparatus. Its objects are to improve the inhaler so as to permit of more perfect operation and control over the anæsthetic, to produce better effects therefrom, to avoid waste or leakage of the anæsthetic, and to so connect the inhaler with the reservoir from which the gas or other anæsthetic is drawn that the inhaler-tube will lie parallel with the patient's breast and be out of the way of the operator.

The subject-matter claimed herein is particularly pointed out at the close of the specification.

In the accompanying drawings, which illustrate our improvements as embodied in the best way now known to us, Figure 1 is a perspective view of the inhaler. Fig. 2 is a longitudinal central section therethrough, showing the valves of the inhaler in one position. Fig. 3 is a similar section of part of the inhaler, showing the valves in a different state of operation; and Fig. 4 is a section through the inhaler at right angles with Fig. 2 on the line 4 4 of said figure.

Some of our improvements may be used without the others, and in inhaling apparatus differing somewhat from that particularly shown in the drawings.

A tube, A, is connected, as usual, by means of screw-threads, with the free end of the usual flexible inhaling-tube leading from the gas-reservoir, and in connection with a tube, B, forms a friction or slip joint, as clearly shown in Figs. 1, 2, and 4, whereby the tube-sections A and B may be readily separated when desired. We will call these tubes, or any equivalent thereof, "a draft-tube." The tube B is connected with a mouth-piece-carrying tube, C, so that said tube C shall be connected with the tube B, and be supported thereon at an angle of about forty-five degrees, (more or less,) by means, preferably, of a five-sided prismatic chamber casing or coupling, D, the said chamber-casing being provided upon its sides, which constitute virtually a triangle in cross-section, with three several openings, the walls of two of which openings, 1 and 2, are screw-threaded to receive the screw-threaded ends of the tubes B and C, as clearly shown in Figs. 2 and 3, while the walls of the opening 3 are provided with a screw-connection, by which a cap, E, is secured upon said prismatic casing. The outer end of the mouth-tube C is provided with the usual hood, C′, to surround the mouth, and with the usual hard-rubber mouth-piece, C^2, preferably connected with the outer end of said tube C by screw-threads, so as to be removable. The cap E is provided with an opening, *e*, as clearly shown in the several figures, to permit free access of air to the chamber-casing D in one condition of operation of the apparatus.

Fitted within the upper end of the tube B is a bridge-piece, *b*, through a central opening of which a guide-stem, F, passes, said stem being provided at its lower end with a shoulder, *f*, between which and said bridge-piece *b* a light spiral spring, G, is compressed, so that the tendency of said light spring is to thrust the guide-stem F inward into the tube B, the extent of movement being determined by means of a plate or disk, I, preferably of hard rubber, fastened to the upper end of said guide-stem, and fitted to constitute a valve by means of its under surface being carried against the upper annular end of the tube B, so as to close said tube when the valve is resting against its end. The bridge-piece *b*, before mentioned, is perforated or open, so as to permit the free passage of the gas or an-

æsthetic to be inhaled, as will be presently more fully explained.

Fitted in the exhaling-opening in the chamber casing or coupling D is also inserted a bridge-piece, *j*, through which a guide-stem, J, passes, and is acted upon by a light spring, K, the tendency of which is to thrust said guide-stem into the chamber, the extent of inward movement being determined by a disk or plate, L, preferably of hard rubber, mounted upon the outer end of said guide-stem, and fitted to constitute a valve to close said exhaling-opening by coming against the annular shoulder formed at the outer termination of said opening.

Extending transversely across the upper and smaller end of the prismatic chamber-piece D is a rock-shaft, M, carrying a cam piece or projection, *m*, said cam-piece being provided with a projecting point, *m'*, and with a small anti-friction roller, m^2. The shaft M has coiled about it a spring, N, the tendency of which is to throw the shaft in the position to carry the cam-piece *m* in position to cause its projection *m'* to come against the inner end of the guide-stem of the valve L and raise said valve from its seat, and the anti-friction roller m^2 to bear against the upper surface of the valve I and close said valve down upon its seat upon the end of the tube B. By the operation of this spring the valve I will be closed, while the valve L will be opened or lifted from its seat, as shown in Fig. 2, so as to permit the free passage of air through the opening *c* in the cap E to the chamber D, and from thence to the lungs of the patient. In this position of the parts, as shown in Fig. 2, free access of the air to the lungs, as we have stated, is permitted, while no gas can be inhaled through the flexible inhaling-tube and parts A B, as the passage from the gas-reservoir to the lungs of the patient will be closed by the valve I. When the gas or other anæsthetic is to be administered, the shaft N is rocked, so as to carry the cam-piece *m* away from the valves and their connections, as shown in Fig. 3.

The operating connection preferably consists of a bow-shaped finger-piece, O, connected at its ends with the outer ends of said shaft M, and being so organized that when moved to the position to rock the shaft M and carry its cam-piece away from the valves it will be retained in such position by riding over a detent-shoulder, c^2, in this instance, which is formed externally upon the cap E, before described. When in this position, as clearly shown in Fig. 3, it will be obvious that the light coiled springs respectively act to close their valves or disks. The patient is now caused to breathe through the mouth-piece of the inhaler, and at each inspiration the valve I is lifted to permit of the flow of gas or other anæsthetic to the lungs to produce anæsthesia, while it is obvious at such inspiration the valve L will keep its closed position, so as to prevent the entrance of external air to the lungs through the inhaler. When exhaling, the expired breath is delivered directly against the top of the valve I, causing it to close, while the valve L is lifted from its seat, and permits the expired breath to pass out through the opening in the cap E. Upon renewed inspiration the valve I will again be lifted for a fresh draft of the gas, while the air will be excluded from entering by the closing of the valve L, and the inspirations and exhalations continue until anæsthesia is produced, upon which the operator simply releases the yoke from its detent or catch e^2, when the spring N will cause the cam-piece *m*, before described, to firmly close the valve I and positively open the valve L, whereupon external air only will be admitted to the lungs, and the gas will be shut off. By connecting the tubes B and C by a detachable elbow casing or coupling, D, various advantages accrue, prominent among which is the ease with which the parts are put together and taken apart when necessary for repairs, and the ease in fitting the valves and controlling them by means of a single piece of mechanism. By the construction described, also, the mouth-tube C and inhaler or draft-tube are so connected together that the usual flexible inhaling-tube is permitted to lie down upon or parallel with the patient's breast, and be out of the way of the operator during the administration of the anæsthetic. Another advantage of the organization is that the passage for the expired breath is direct, and its easy escape is afforded. This is essential to a perfect inhaler, as during the progress of producing anæsthesia, when the patient's breath becomes weaker and weaker, direct escape for the expired breath should be afforded.

Without elaborating further advantages of our improvements, which have been demonstrated by practical operation and experience with the inhaler, we would say that we claim herein as of our invention—

1. The combination of the draft-tube with the mouth-tube by means of a prismatic coupling or chamber-piece, substantially as described.

2. A prismatic chamber-piece for inhalers, having openings therein communicating with a mouth-tube, draft-tube, and an air-inlet, and provided with detachable connections for said tubes, substantially as described.

3. The combination, substantially as hereinbefore set forth, of the mouth and draft tubes with two valves and an operating mechanism for said valves, substantially as described, whereby said operating mechanism in one position permits said valves to act automatically and in another position closes one of said valves and opens the other.

4. The combination of the draft and mouth tubes, the chamber-piece or coupling, the operating-valves, the rock-shaft carrying a cam or its equivalent to control said valves, and a handle to operate said rock-shaft.

5. The combination of the draft and mouth tubes, the chamber-piece or coupling, the valves, the rock-shaft carrying a cam or its equivalent to control said valves, the spring acting upon said rock-shaft, the handle or finger-piece to operate said shaft, and a detent to retain said shaft against the force of its spring.

In testimony whereof we have hereunto subscribed our names this 30th day of March, A. D. 1883.

WILLIAM A. JOHNSTON.
A. W. BROWNE.

Witnesses:
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