(No Model.)

C. DENISON.

INHALER.

No. 576,041. Patented Jan. 26, 1897.

Fig. 1.

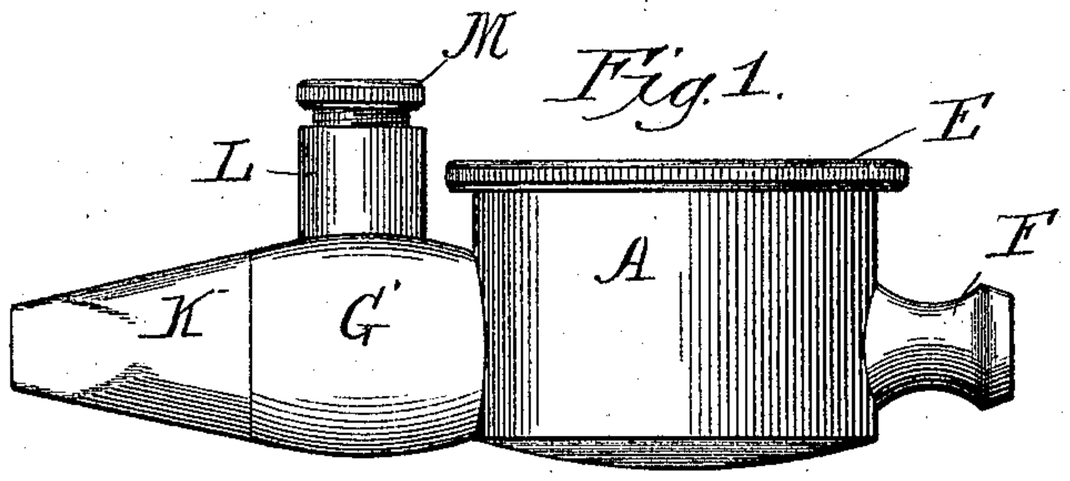


Fig. 2.

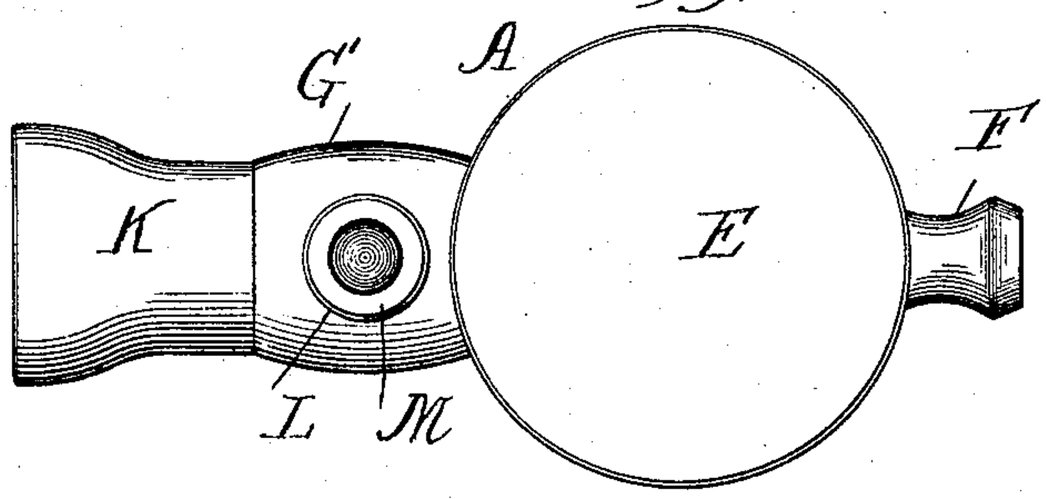


Fig. 3.

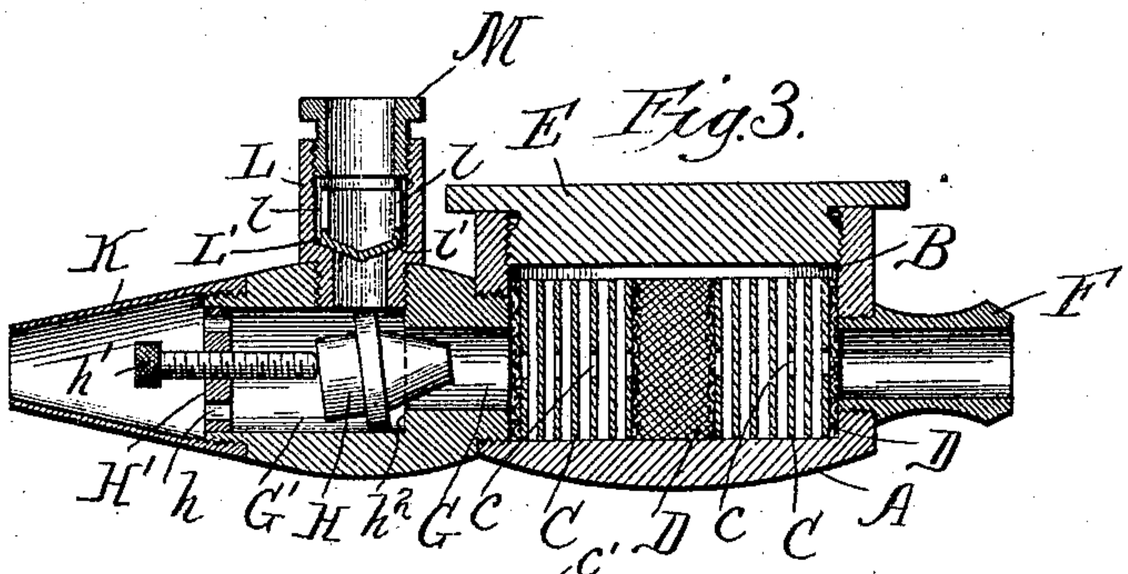


Fig. 4.

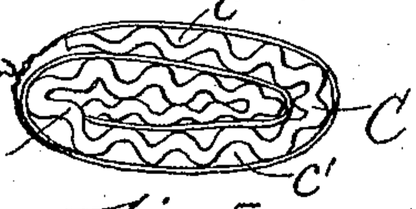
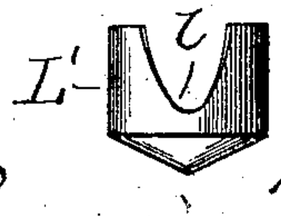


Fig. 5.



Witnesses:
Alice S. Hall
Wm. N. Rheem.

Inventor:
Charles Denison,
By Joseph G. Parkinson
Attorney

UNITED STATES PATENT OFFICE.

CHARLES DENISON, OF DENVER, COLORADO.

INHALER.

SPECIFICATION forming part of Letters Patent No. 576,041, dated January 26, 1897.

Application filed March 20, 1894. Serial No. 504,362. (No model.)

To all whom it may concern:

Be it known that I, CHARLES DENISON, a citizen of the United States, residing at Denver, in the county of Arapahoe, State of Colorado, have invented certain new and useful Improvements in Air-Pressure Inhalers and Exhalers, of which the following is a specification.

In treating chronic diseases of the lungs by respiratory apparatus it is desirable, and in fact essential, that the air-pressure within the lungs shall be adjustably controlled, for neither individuals nor diseases are ever exactly alike, and adjustability to the needs of each is a necessity of successful treatment, the object to be aimed at being a proper exertion in the inspiration and such a graduation of a forced expiration that the air inspired is driven into the diseased cells or portions, expanding them and carrying with it such medicaments as it may be charged with.

My invention relates to apparatus adapted to this end; and it consists in combining with an inhaler and exhaler an adjustable inlet-valve whereby the flow of the air under inspiration may be regulated; in combining with an inhaler and exhaler an adjustable outlet-valve whereby the discharge of air from the lungs may be obstructed and the tension of expiration thereby increased or decreased; in combining with an inhaler and exhaler an adjustable inlet-valve and an independent adjustable outlet-valve; in combining in an inhaler and exhaler an adjustable inlet-valve and an adjustable outlet-valve, an inlet-duct, and a chamber for the reception of medicaments located between the inlet-duct and the valves, and in the various other combinations and details of construction hereinafter described and claimed.

In the drawings, Figure 1 is a side elevation of an inhaler and exhaler constructed according to my invention. Fig. 2 is a top plan view thereof. Fig. 3 is a vertical longitudinal section therethrough. Fig. 4 represents an alternative form of packing, and Fig. 5 is an enlarged detail of the outlet-valve.

A represents the casing of my device. This has a medicament-chamber B, within which may be placed a packing of any suitable absorbent material, as wool or a strip of blotting-paper C, having perforations *c* or corrugations *c'*, as in Fig. 4, to facilitate the passage of air or gas and loosely wound in a coil, the folds of which may be separated by a diaphragm, such as a strip or strips D, of gutta-percha or wire-gauze or other suitable material, the whole being a little less in diameter than the caliber of the box or chamber. This packing serves to hold and gradually disseminate the various combinations of germicidal and healing oils or other vaporized or vaporizable substances which are intended to be used.

E is a cap, herein shown as a screw-cap, covering the chamber and giving access thereto, and F is an induction-tube opening into one side of the chamber and preferably adapted to the attachment of a rubber tube connected with an oxygen-tank or any desired vaporizer or gas-generator. This duct opens directly into the chamber and is not necessarily obstructed by any valve.

From the side of the medicament-chamber opposite the induction-tube a passage G leads to a valve-chest G', in which is mounted a suitable valve H, adapted to close the passage against exhalations into the chamber, but yielding to permit inhalations from the chamber or induction-tube. The outer end of the valve-chest is closed by a diaphragm H', advisably detachable, perforated, as at *h*, for the passage of air, and in this diaphragm is mounted a set-screw *h'*, by which, or by other suitable adjusting device, the limit to which the valve, hereinafter termed the "inhaling-valve," may retreat from its seat h^2 and the consequent ease or difficulty of inspiration may be controlled. Beyond the diaphragm is a mouth or nose piece K, shown as detachable, so as to give access to the set-screw for adjustment of the inhaling-valve and also for cleansing. The valve-chest and induction-tube may also be detachable from the medicament-chamber for the latter purpose and for convenience in packing and in replacing broken or defective parts.

An eduction or exhaling tube L leads out of the valve-chest, and in this plays a valve L', hereinafter termed the "exhaling-valve," (shown as a cup-valve,) with flaring slots *l* in its sides and a cone-shaped bottom fitting upon a concave seat *l'*, adjacent to the valve-chest. A centrally-open confining-screw M

takes into the outer end of the exhaling-tube and serves to determine the distance to which the valve can retreat from its seat under air-pressure in expiration. The outgoing air may be, however, carried off through a series of exit-ducts made in the side of the exhaling-tube, and the screw M, made solid or as a shell, to act itself as the valve by closing one or more of said ducts, according to its adjustment.

By means of the adjustable valves the tension of the air or respirable fluid is increased at will from an easy to a more difficult use of the instrument, according to the need and ability of the patient. For ordinary use the inhaling-valve will be from one-half to nine-tenths open, while the exhaling-valve should be only from six-tenths to one-tenth open; but other combinations will be necessitated by individual cases and diseased conditions.

In the use of this device an inspiration opens the inhaling-valve to the extent permitted by its adjusting-screw and closes the exhaling-valve, the path of the air or vapor inhaled being then from the induction-tube through the medicament-chamber, when one is used, thence through the valve-chest and mouthpiece to the lungs. The succeeding expiration expelling the impoverished and tainted current closes the inhaling-valve and opens the exhaling-valve, the path then being from the lungs, through the mouthpiece, into the valve-chest, and thence through the exhaling-tube into the open.

I do not limit myself to the specific construction herein described, as the outline of the medicament-chamber may be changed, or it may be merged in the induction-tube when the apparatus is not intended to be charged with remedial agents or when they are supplied from an independent tank or other reservoir. The valves also may be other than those herein exemplified, and their adjustment may be controlled by different means, and the relation of induction-tube, valve-chest, mouthpiece, and exhaling-tube may somewhat depart from that shown and explained; but

What I claim is—

1. In an inhaler and exhaler, the combination with a casing constituting a medicament-chamber, of an induction-tube secured to one end thereof, a valve-chest secured to the other end of the casing and provided with an exhaling-opening, a valve within the valve-chest, a mouthpiece secured to the outer end of the valve-chest, and a threaded valve-adjusting device between the valve-chest and the mouthpiece.

2. The combination with the valve-chest, and medicament-chamber, of an induction-tube secured to the latter, a detachable mouthpiece, an adjustable valve within the valve-chest, a threaded adjusting device between the valve-chest and the mouthpiece, and an exhaling-tube communicating with said valve-chest, and provided with an adjustable valve.

3. The combination with the medicament-chamber, and valve-chest, of a mouthpiece secured to the outer end of the valve-chest, an adjustable valve within the valve-chest, a threaded valve-adjusting device between the valve-chest and the mouthpiece, and an exhaling-tube provided with means for regulating the exhalations.

CHARLES DENISON.

Witnesses:

ELLA L. DENISON,

G. G. KENDALL.