

V. W. BLANCHARD.
INHALER.

No. 547,322.

Patented Oct. 1, 1895.

Fig 1.

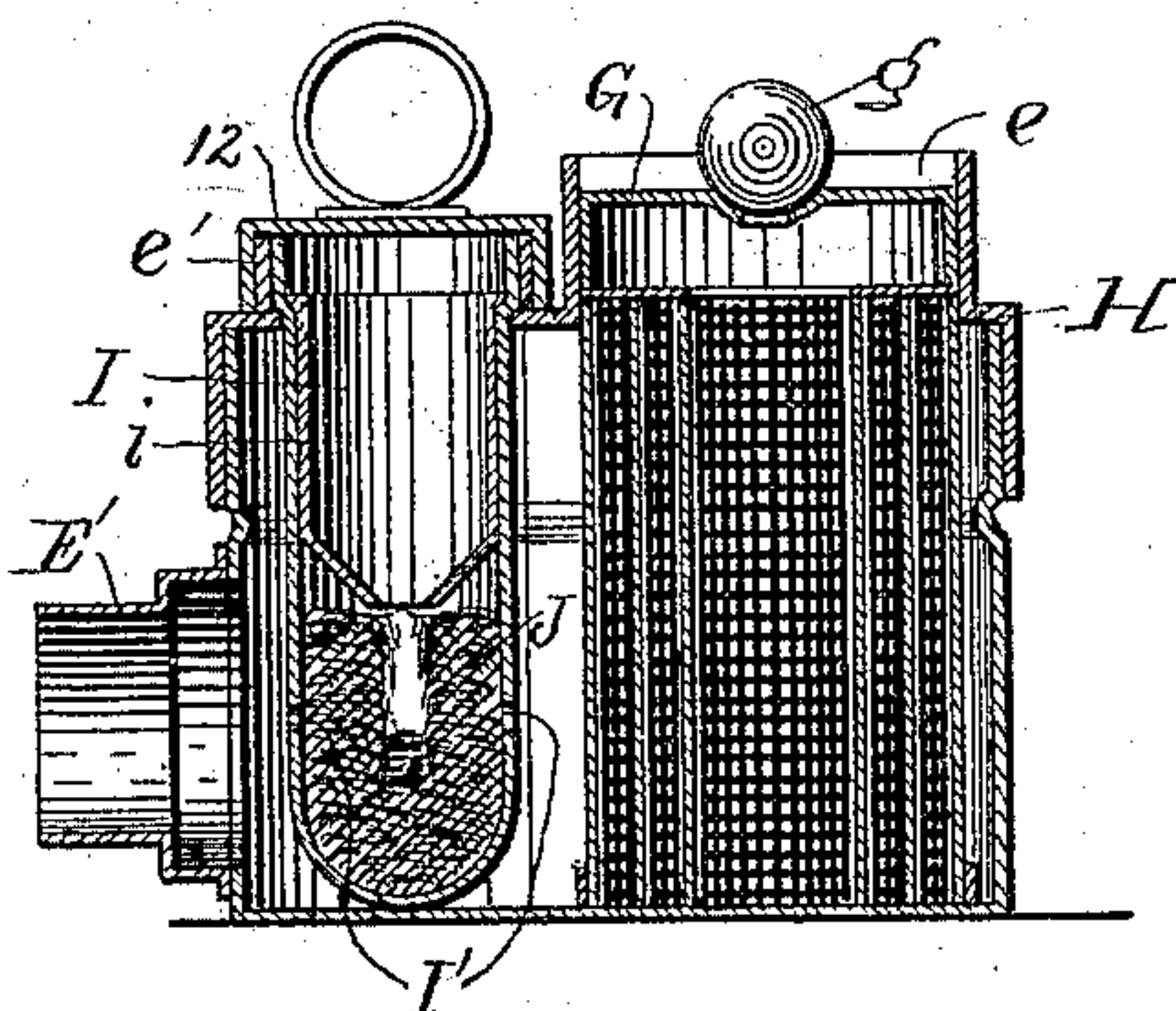
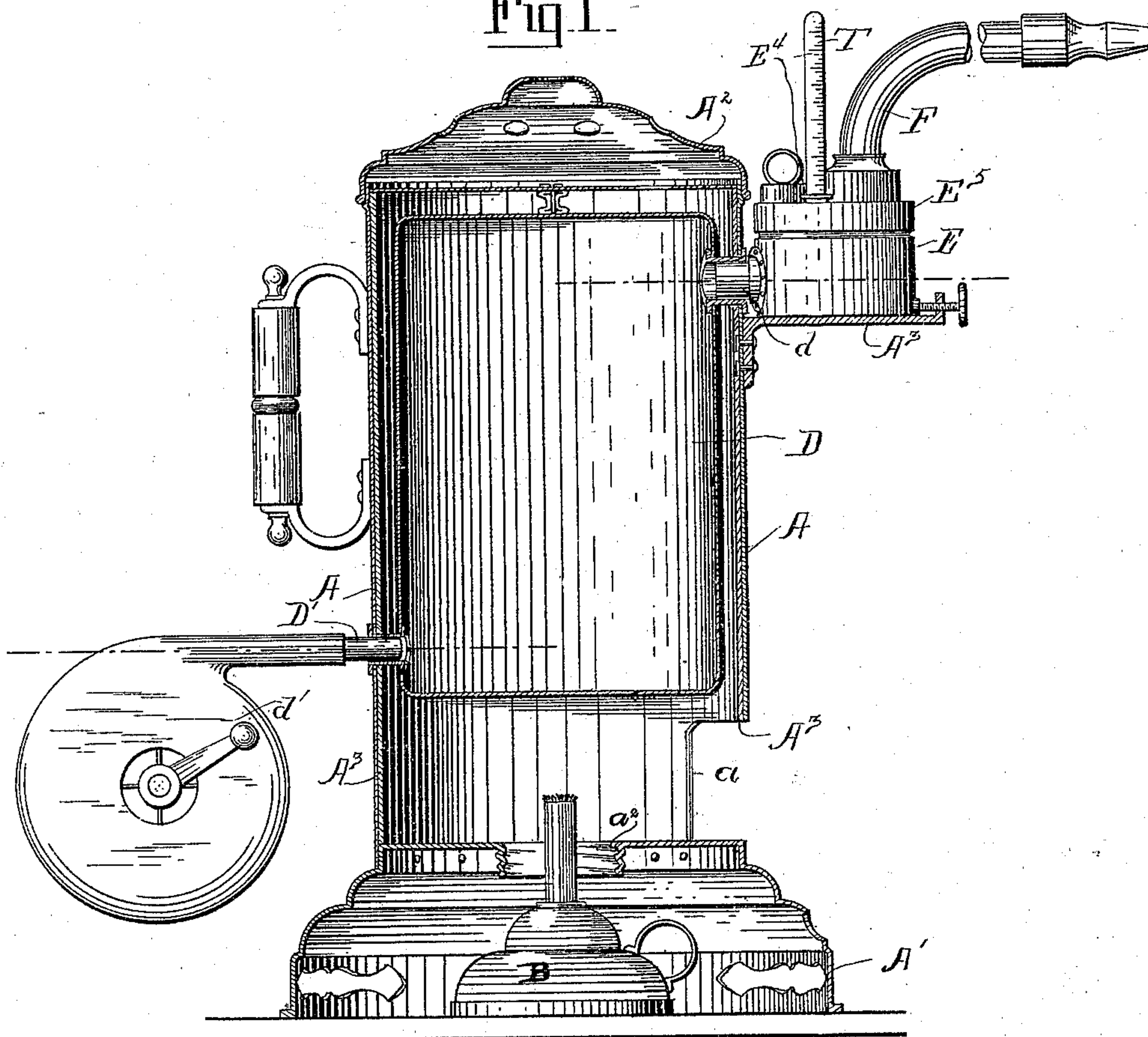


Fig 2.

Witnesses

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(No Model.)

V. W. BLANCHARD.
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2 Sheets—Sheet 2.

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Fig. 3.

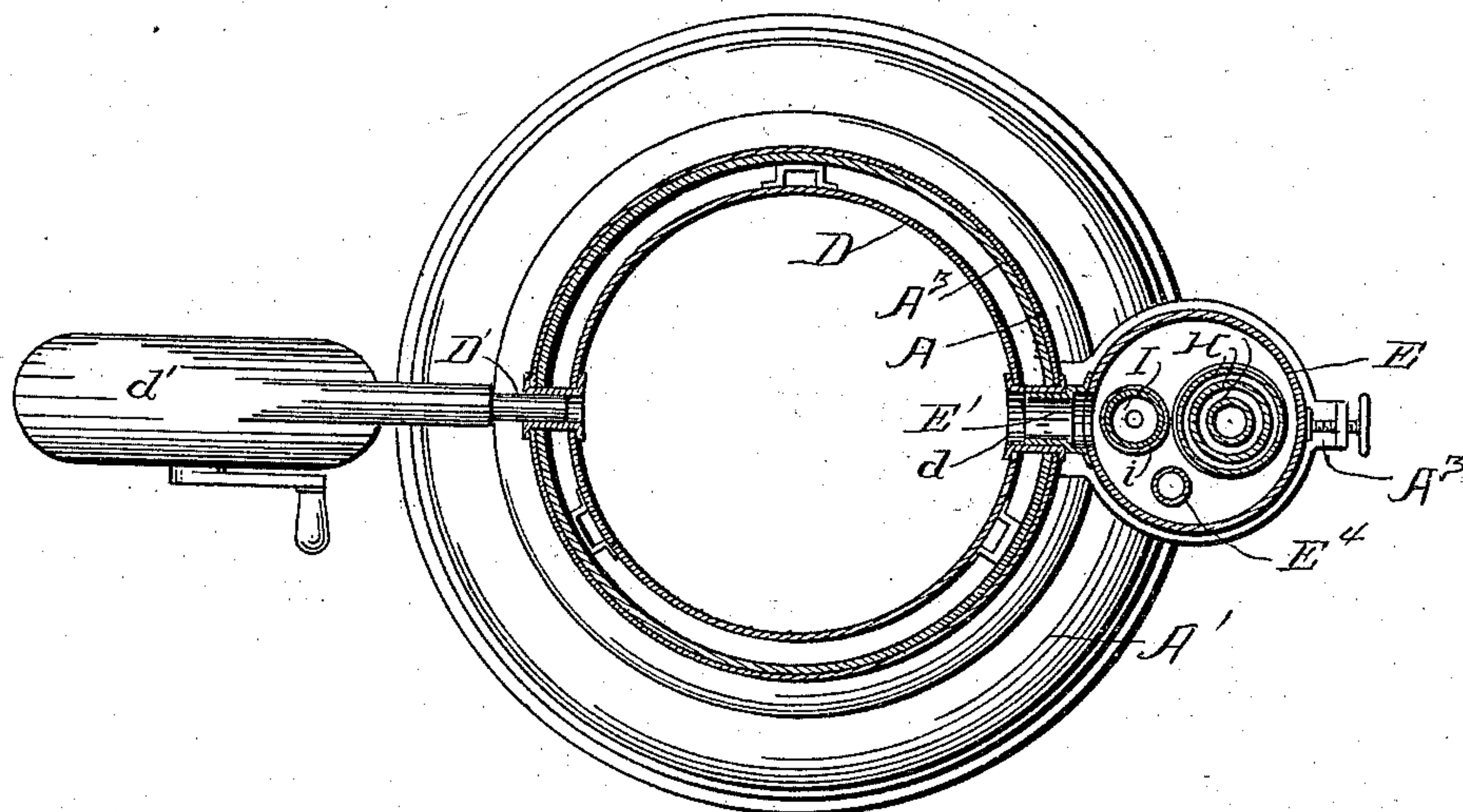


Fig. 4.

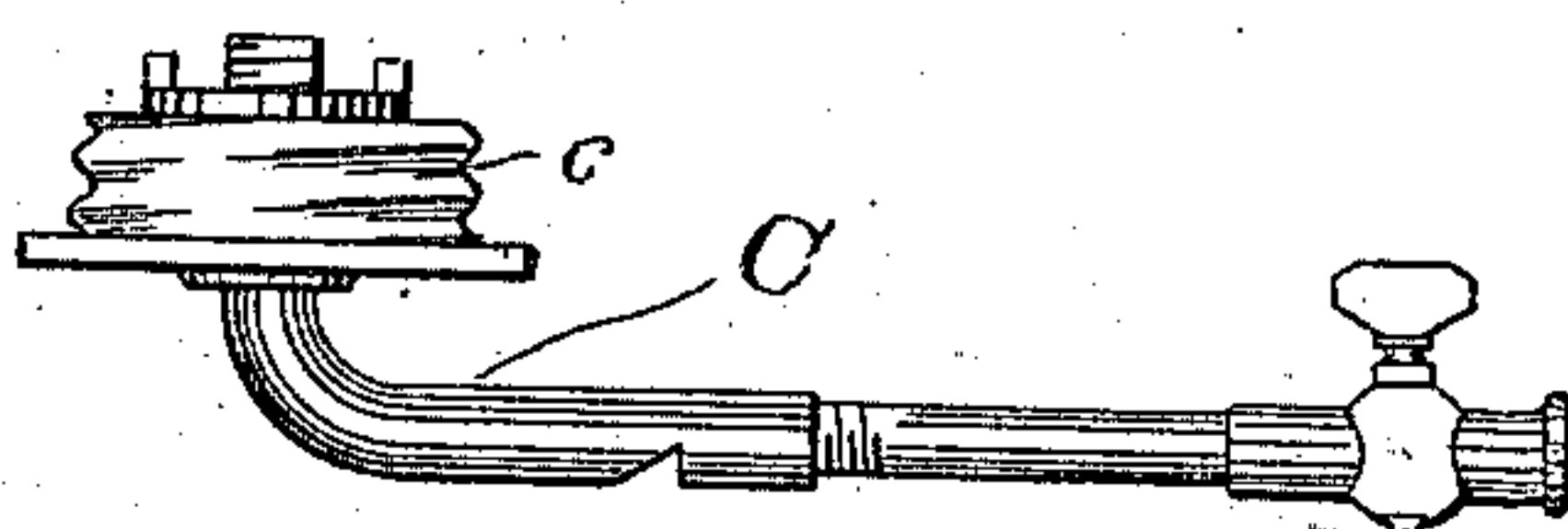


Fig. 5.



Fig. 6.

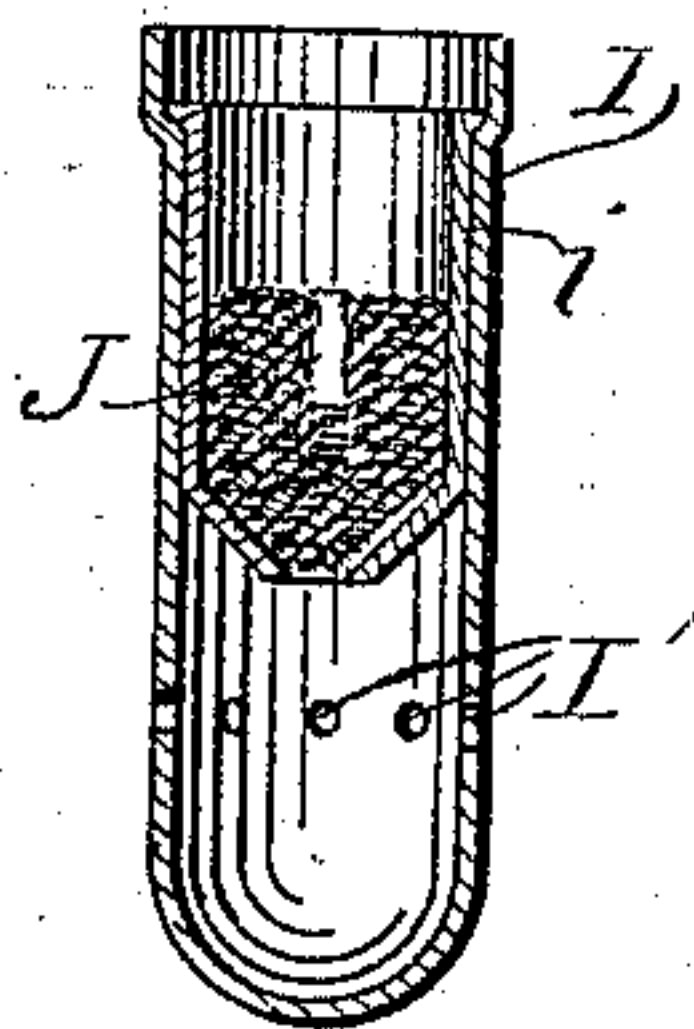
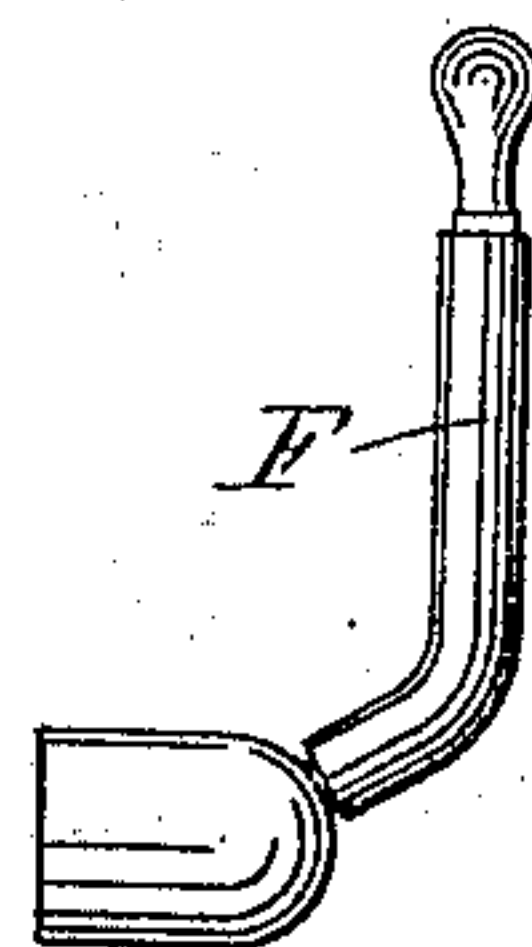


Fig. 7.



Witnesses

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UNITED STATES PATENT OFFICE.

VIRGIL W. BLANCHARD, OF NEW YORK, N. Y., ASSIGNOR TO G. B. UNDERWOOD & CO., OF SAME PLACE.

INHALER.

SPECIFICATION forming part of Letters Patent No. 547,322, dated October 1, 1895.

Application filed June 25, 1894. Serial No. 515,625. (No model.)

To all whom it may concern:

Be it known that I, VIRGIL W. BLANCHARD, of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Inhalers; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form part of this specification.

The object of this invention is to provide an improved inhaler or respirator adapted for the treatment of laryngeal, pulmonary, and nasal diseases, in which highly-heated air intimately mixed with proper volatile medicaments and, if desired, with a small volume of water-vapor may be introduced into the throat, lungs, and nasal passages of a patient suffering from disease of these parts, either by direct inspiration or by slight inspiratory efforts, assisted by an air-forcing device, as may be desired.

The invention consists in a novel device for preventing too rapid volatilization of the medicines whose vaporized atoms are to be intermingled with the heated air-current for inspiratory purposes and also in a novel device for intimately mixing and mingling the volatilized medicaments set free for remedial purposes with a heated current of air, and in the novel construction and combination of parts hereinafter described, and set forth in the claims.

In the accompanying drawings, forming part of this specification, Figure 1 is a vertical central section through the air-heating apparatus of the inhaler and a side view of the connected mixing-chamber and delivery-tube, with a conventional illustration of an air-blower. Fig. 2 is an enlarged vertical section of the mixing-chamber on line 2 2, Fig. 3. Fig. 3 is a transverse sectional view on line 3 3, Fig. 1. Fig. 4 is a detail view of a gas-burner. Fig. 5 is a detached view of volatilizer. Figs. 6 and 7 are details.

Referring to the drawings by letters, A designates the exterior casing of the heating portion of the apparatus, lined internally with asbestos or like non-heat-conducting material A³ and supported on a suitable hollow base A'. Its bottom is perforated, as at a², so that

a spirit-lamp B or like heating device may be placed in the base and used for heating the air-drum hereinafter described. An opening A' is made in the side of casing just above the base, through which the lamp may be lighted or extinguished. Where gas is convenient, a gas burner C, Fig. 4, may be substituted for the lamp by screwing the jet-head c into the opening a², the connection with gas-pipe being made by a flexible tube in any convenient manner. Within the casing is a closed air-heating drum D, suspended from the false top A², so that an air chamber or space surrounds the drum on all sides and there shall be no direct loss of heat from the drum by conduction, radiation, or convection. Air is admitted into the lower end of said drum by a small pipe D', opening through the wall of the casing, as shown, and air is drawn from the upper end of the drum through a pipe d, opening through the wall of the casing and communicating with the interior of a vaporizing and medicating cup or chamber E, hereinafter described. The air may, if desired, be forcibly driven into the drum by means of a blower d' or by any other suitable means for the purpose of facilitating inhalation of air by a weak patient or where the apparatus is used as a deodorizer or fumigator.

The chamber E is hollow and closed by a removable cap E⁴, which has a flanged opening e and a smaller flanged opening e'. The chamber has a short lateral pipe E', which fits into the pipe d and receives air there-through from the interior of the drum D. The chamber is detachably mounted on a bracket A³, attached to the side of the casing, as shown; but it may be permanently secured thereto. The opening e is the air-outlet from the chamber and communicates with a detachable inhaling-pipe F, to which detachable inhaling-tubes or mouthpieces, &c., can be attached when the instrument is in use. The opening e may be partially closed by a diaphragm G, which has a central perforation closed normally by a light globular valve g, as shown. Below this opening e is a series of concentric screens H, of fine reticulated or woven metal, through which the air has to pass before it can escape into the pipe F, the screens insuring the thorough commingling

of the heated air and vaporized medicines escaping from the chamber.

E⁴ is a thermometer-tube attached to the cap and in which a thermometer-glass T can be placed while the apparatus is in use to ascertain and regulate the temperature of the inhaled gases.

I designates a vaporizer consisting of a tubular shell suspended in the chamber through opening e', its upper end being open and shouldered to fit said opening and its lower end closed; but several small perforations I' are made in its walls above its bottom, as shown. Within this shell is closely-fitting tube i, shorter than the shell and conical at bottom. Its upper end is open and shouldered, so that it will be suspended in shell I, and in its lower end is a small opening, as shown. When the vaporizer is suspended in the chamber, it is closed by a removable cap I². If desired, shell I could be permanently secured in the chamber; but it is preferably made removable for the sake of ease in cleansing it.

J is a wad of asbestos or other non-heat-conducting fibrous material placed in the lower end of vaporizer I, as shown in Fig. 1, when it is desired to vaporize the medicines very slowly.

If it is desirable to moisten the heated air, a few drops of water are put in tube i, which serves as a guide to deliver the water into the central cavity in wad J. The thermometer T is then adjusted in its proper position, as shown, and the gas or alcohol lamp under the air-heating drum D lighted. A current of heated air will then be established, flowing into through and from the drum into and through the chamber E, the mixing-screens H, and finally through the inhaling-tube F and mouthpiece, as is obvious.

When the thermometer indicates the desired temperature in the chamber E, a proper quantity of the volatile medicine is put into the inner tube i and delivered therefrom into the wad in shell I, the water in the wad having been evenly diffused by capillary attraction through the entire substance thereof. The shell I is then closed. The volatile medicament is thus exposed to a slight uniform degree of heat from the passage of the heated air-current through the chamber and it is volatilized very slowly, and the atoms during their passage outward through the moistened wad to the perforations in the shell are intimately mixed and mingled with vapor molecules, such as are given off from water before the boiling or steam-making point is reached.

The deposition of a volatile medicament in the center of a wad of moist non-heat-conducting material where it is absolutely protected from sudden volatilization by the heated air is a vitally-important feature in my invention, as by this process the volatile atoms of the medicament are first given off to the exterior heated-air current through the perforations

in the inclosing shell very slowly, and, being slightly moistened with an admixture of water molecules, produces at the commencement of the treatment of a patient a gentle bland soothing effect rather than an abrupt violent constricting one, such as results from the ordinary method of direct exposure of the flat sponge or mat of fibrous material saturated with a volatile medicament to a heated current of air that is immediately inhaled into the lungs of the patient.

The most important and valuable antiseptic remedies for treating diseased pulmonary tissue are of such delicate volatile character that a comparatively-slight degree of heat will effect their complete and almost instant volatilization, and the direct exposure of such medicament to a highly-heated air-current is certain, in the majority of cases, to produce extreme and violent results by inducing constriction of the air passages and cells, nausea and vomiting, and in some instances hemorrhage from diseased surface. My invention is particularly adapted to effectually remedy this difficulty, as in my inhaler the effect produced on the patient is gently and gradually progressive, the volume of the volatile particles discharged from the inhaler I being gradually increased as the heat communicated to its interior becomes augmented. By this means the diseased pulmonary tissue becomes gradually accustomed without unpleasant sensations or violent symptoms to a more and more powerful dose till the maximum result is realized, which at the outset may be accurately and scientifically predetermined by the quantity of the medicament introduced into the volatilizer. Another important result in this connection is that the water in the wad is dissipated or carried out by the volatilized medicine in the form as vapor and not as steam, producing a mild bland moisture-laden air-current for pulmonary inspiration that will cause an agreeable pleasurable sensation to the patient inhaling it as it comes in contact with the diseased surfaces, and the slight degree of moisture serves as a lubricant which in conjunction with the presence of proper medication will relieve morbid circulation and establish to a greater or less degree a normal healthy condition.

The particles of suitable volatile medications derived from the wad with or without the presence of water, as the physician or patient may elect, will be carried by the heated-air current traversing the chamber and thoroughly commingled therewith by the screens H, and then all pass off through the delivery-pipe and mouthpiece into the air-passages and air-cells of the patient's lungs, as is evident, thereby being brought into actual contact with diseased surfaces thereof, thereby destroying or retarding the development of bacteria or spores infesting such surfaces.

The suspension of the volatilizer in the chamber in the heated-air current traversing it facilitates the admixture of the volatile

elements set free from the wad contained in it, with the air-currents passing through the chamber. These are so perfectly mixed and mingled by the screens that the current becomes devoid of irritating properties, thereby not only preventing annoyance and discomfort, but at the same time hastening and promoting the healing process.

The patient by glancing at the thermometer may determine at each inspiration the heat of the current traversing the chamber, and is thereby enabled to keep the medicated current at the proper temperature which the disease present in the pulmonary tissue may warrant.

The supporting-chamber, perforated shell, inner tube, wad, mixing device, ball-seat, delivery-tube, and mouthpiece are all removable for cleansing, and the entire channel traversed by the heated air and vapor currents is preferably constructed of non-oxidizable material.

The fibrous wad should be frequently renewed and may be formed of linen or asbestos fiber.

The temperature of the air and vapor current should be adapted to the condition of the patient under treatment.

By means of the blower, of any suitable construction, a forced-air current is provided for weak debilitated patients to lessen the labor of drawing deep inspirations through the mouthpiece, and particularly if the patient is confined to the bed, and a long connecting-pipe is necessary to transmit the heated air from the inhaling-tube to the mouthpiece. This element I consider a very valuable auxiliary under certain conditions in my invention.

It will be observed that the perforations in the shell are below the upper extremity of the fibrous wad, the latter closing them, thereby compelling the atoms of the medicament and the molecules of the water-vapor to traverse its substance before escaping into the chamber, so that sudden voluminous escape of the volatile elements set free by heat is effectually prevented.

In the case of weak delicate sensitive lungs when the minimum impression at the commencement of treatment is desirable, I prefer to place the wad in the inner tube $\frac{1}{2}$, so that the current of heated gases traversing the chamber can only reach the wall of the tube $\frac{1}{2}$ through the perforations in the outer shell. Being thus protected from the direct effects of the heat present in the chamber, with only a single perforation in the bottom of the inner tube to allow their escape into the perforated shell, the vaporization of the liquid volatile elements introduced from above into the fibrous wad or packing in the inner shell will be carried on very slowly and at the commencement almost imperceptibly, a result desirable in the treatment of certain forms and stages of pulmonary disease.

My invention is also applicable for the treat-

ment of all inflammatory and chronic forms of disease present in the throat and nasal passages, and for the latter forms of disease a nasal tube, Fig. 7, is provided in the place of the mouthpiece.

In certain cases of pulmonary disease when it is found that the lungs of the patient will tolerate and require for curative purposes large dense volumes of volatilized medicament the wad and inner tube may be removed and the medicines placed freely in the perforated shell and volatilized.

I am aware that steam has been applied to cup-shaped receptacles containing volatile medications for the volatilization and admixture with a current of steam for inspiratory purposes. This I disclaim as harmful and injurious to diseased pulmonary tissue from an excess of heat and moisture in the heated current entering the lungs of a patient, producing results not contemplated in my invention; also I disclaim the use of a large surface of medicated fibrous substance saturated with a volatile liquid directly exposed to a current of air in a highly-heated condition for inspiratory purposes.

When the water and medicament are exhausted in the wad or cylinder, a new supply of cold water should be introduced, followed by the introduction of the medicament, as set forth. By this means the wad is cooled and fitted for a repetition of the process of volatilization of contained fluids, as previously described.

Of course unmedicated, dry, or moistened air can be prepared for inhalation by the apparatus also.

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

1. In an apparatus for preparing medicated vapors for inhalation, the combination of means for heating air, a moistened wad of fibrous-non-heat-conducting material containing the medicines to be volatilized, and a perforated shell or holder inclosing said wad placed in the path of the air currents between the air heater and the inhaling tube, the air currents circulating around but not in said holder substantially as described.

2. In an apparatus for administering medicated vapors, the combination of means for heating air, and a tube for conducting air to the mouth or nostrils; and a closed chamber interposed between the tube and air heater; with a wad of non-heat conducting absorbent material in which the medicament is placed, a perforated shell or inclosure containing said wad, said shell being placed in said chamber, so that the air currents circulate around but not directly in said shell whereby the medicament is indirectly exposed to the heated air current and volatilization thereof gradually effected, substantially as and for the purpose specified.

3. In an inhaler the combination of an air heater, the inhaling tube, and a hot air cham-

ber interposed between the heater and said tube;—with a perforated shell for holding medicines suspended in said chamber, so that the medicines are vaporized by the heat instead of contact with air currents substantially as described.

4. In an inhaler the combination of an air heater, the inhaling tube, and a hot air chamber interposed between the heater and said tube;—with a perforated shell for holding medicines suspended in said chamber, and a wad of fibrous non-heat-conducting packing in said shell, whereby the medicines are vaporized by heat instead of contact with air substantially as described.

5. In an inhaler the combination of an air heater, the inhaling tube, and a hot air chamber interposed between the heater and said tube;—with a perforated shell for holding medicines suspended in said chamber, and a tube suspended in said shell, substantially as described.

6. In an inhaler the combination of an air heater, the inhaling tube, and a hot air chamber interposed between the heater and said tube;—with a perforated shell for holding medicines suspended in said chamber, and a wad of fibrous non-heat-conducting packing in said shell, and a tube in the shell above the wad, substantially as described.

7. In an inhaler the combination of an air heater, the inhaling tube, and a hot air chamber interposed between the heater and said tube;—with a perforated shell for holding medicines suspended in said chamber, whereby the medicines are vaporized by heat instead of contact with air and a gas mixer in said chamber, substantially as described.

8. In an inhaler the combination of the casing, the heating drum suspended therein, means for heating said drum, a chamber at-

tached to the casing communicating with the upper end of said drum; the inhaling tube connected to said chamber, and the vaporizer I consisting of shell I, tube *i*, and wad J, all substantially as described.

9. The perforated shell I in combination with the fibrous wad J and the tube *i*, substantially as and for the purposes specified.

10. The air heating drum D the inclosing non-conducting heat layer and casing, in combination with the chamber E, the removable perforated shell I and its cap substantially as and for the purposes set forth.

11. In an inhaler the combination of the casing, the heating drum suspended therein, means for heating said drum, a chamber attached to the casing communicating with the upper end of said drum; the inhaling tube connected to said chamber and the vaporizer I consisting of shell I, tube *i*, and wad J, substantially as described, and the screens H, in said chamber, all substantially as described.

12. In an inhaler the combination of the casing the heating drum suspended therein, means for heating said drum, a chamber attached to the casing communicating with the upper end of said drum; the inhaling tube connected to said chamber and the vaporizer I constructed substantially as described, and the screens H, in said chamber, and a device for forcing air into said drum and the thermometer in said chamber, substantially as described.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

VIRGIL W. BLANCHARD.

Witnesses:

JAMES R. MANSFIELD,
ARTHUR E. DOWELL.