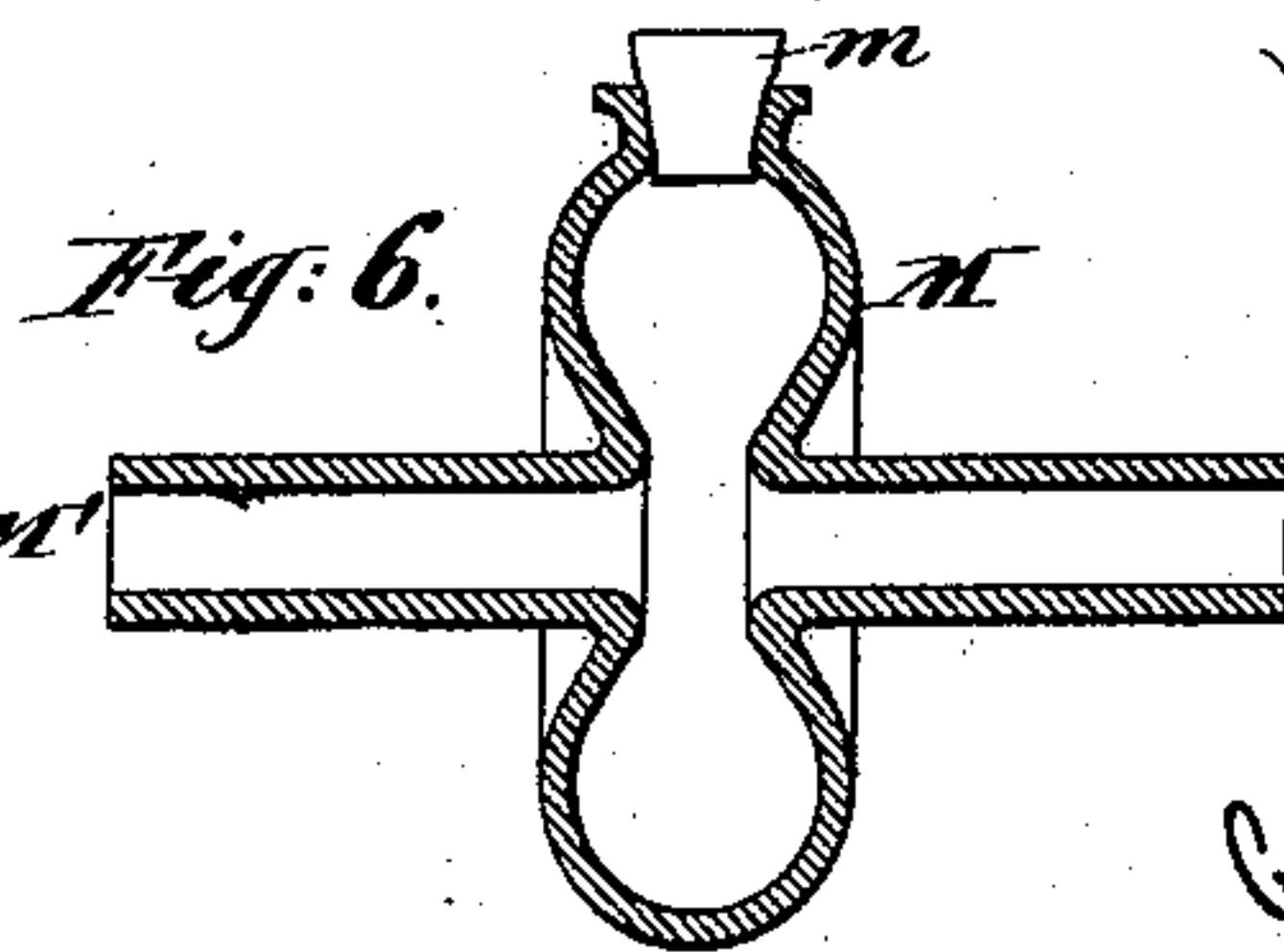
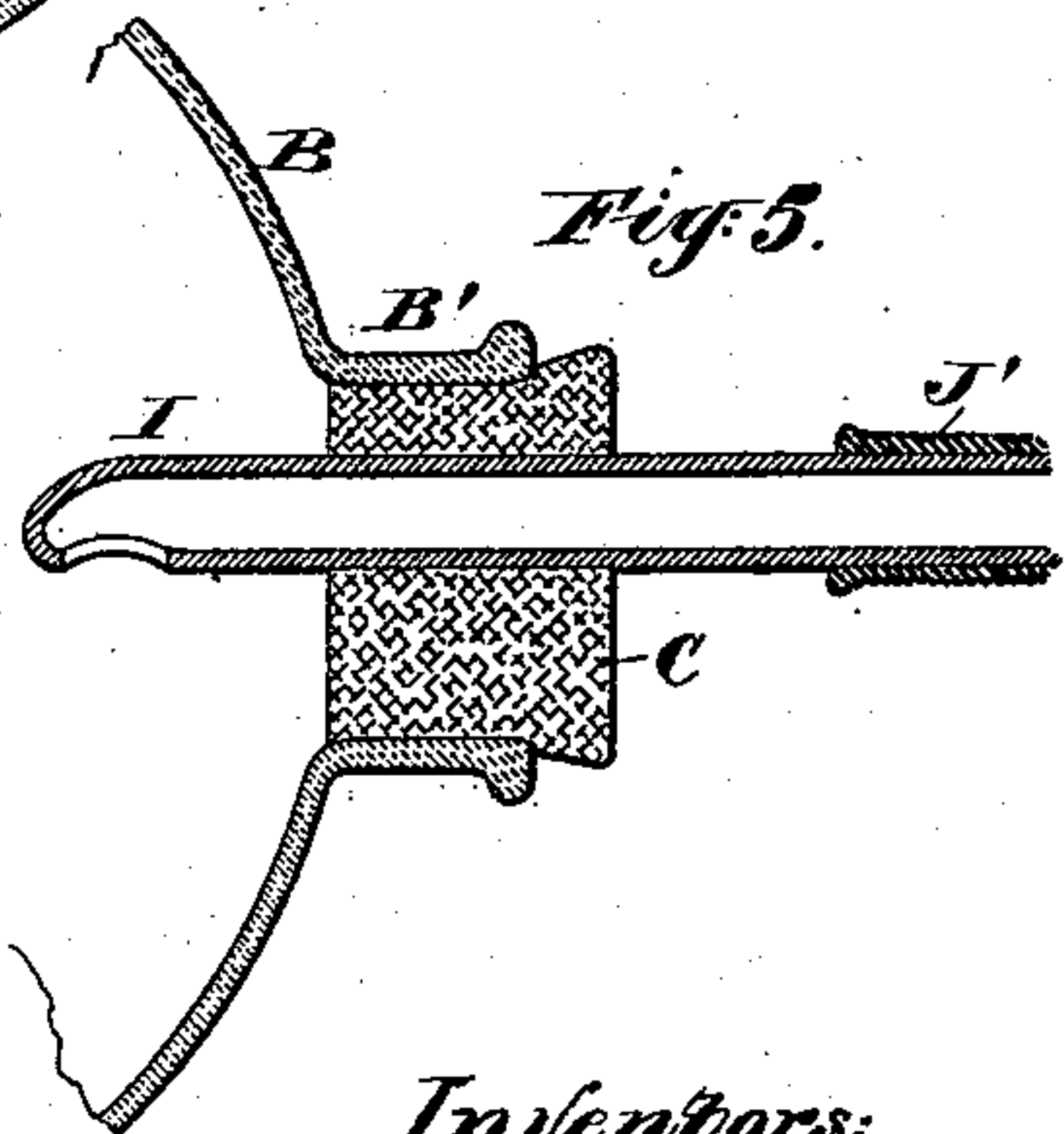
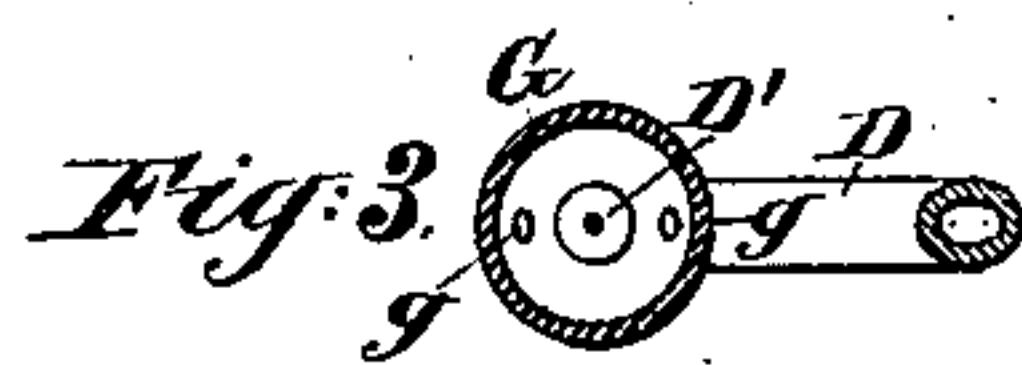
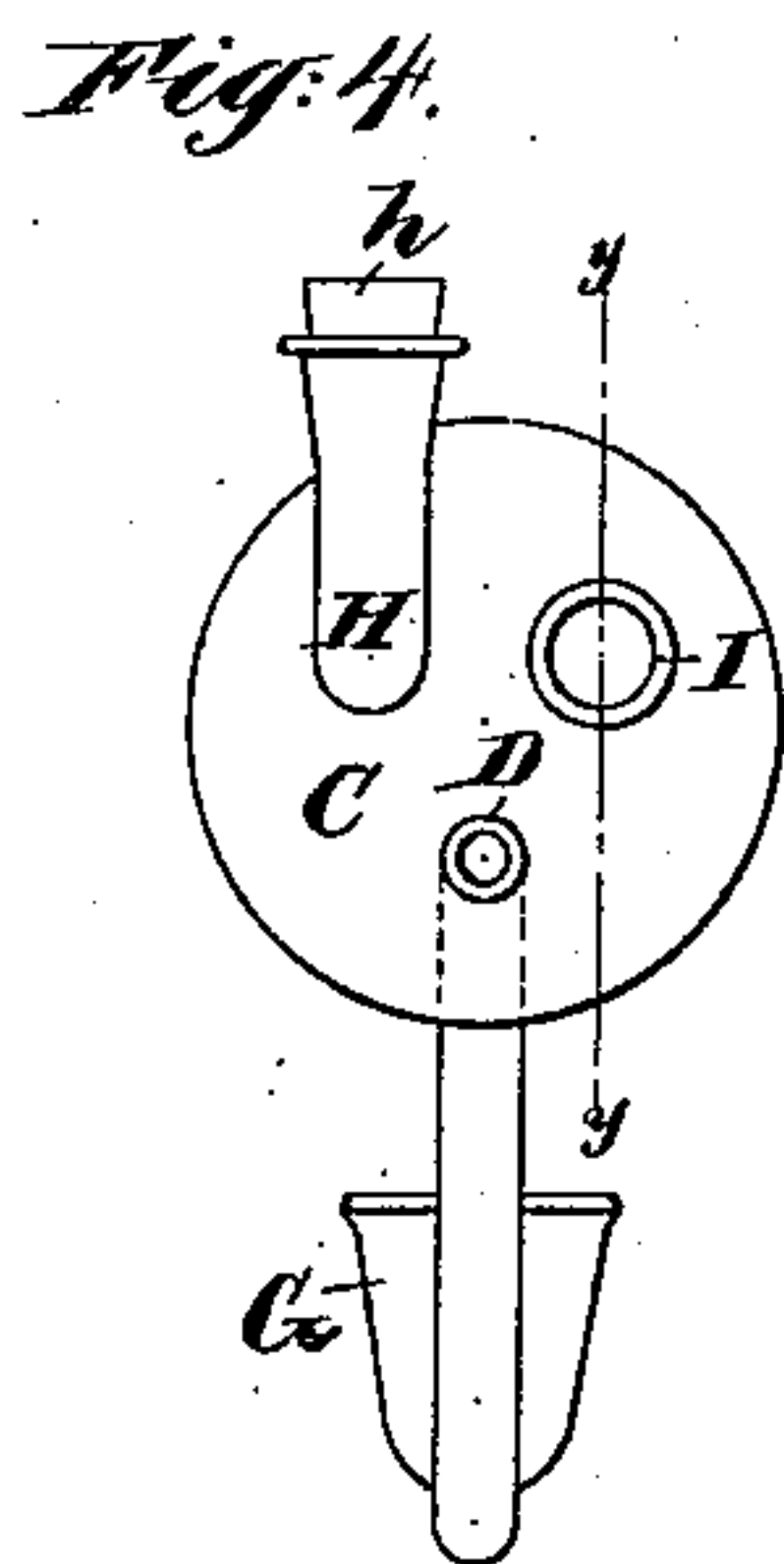
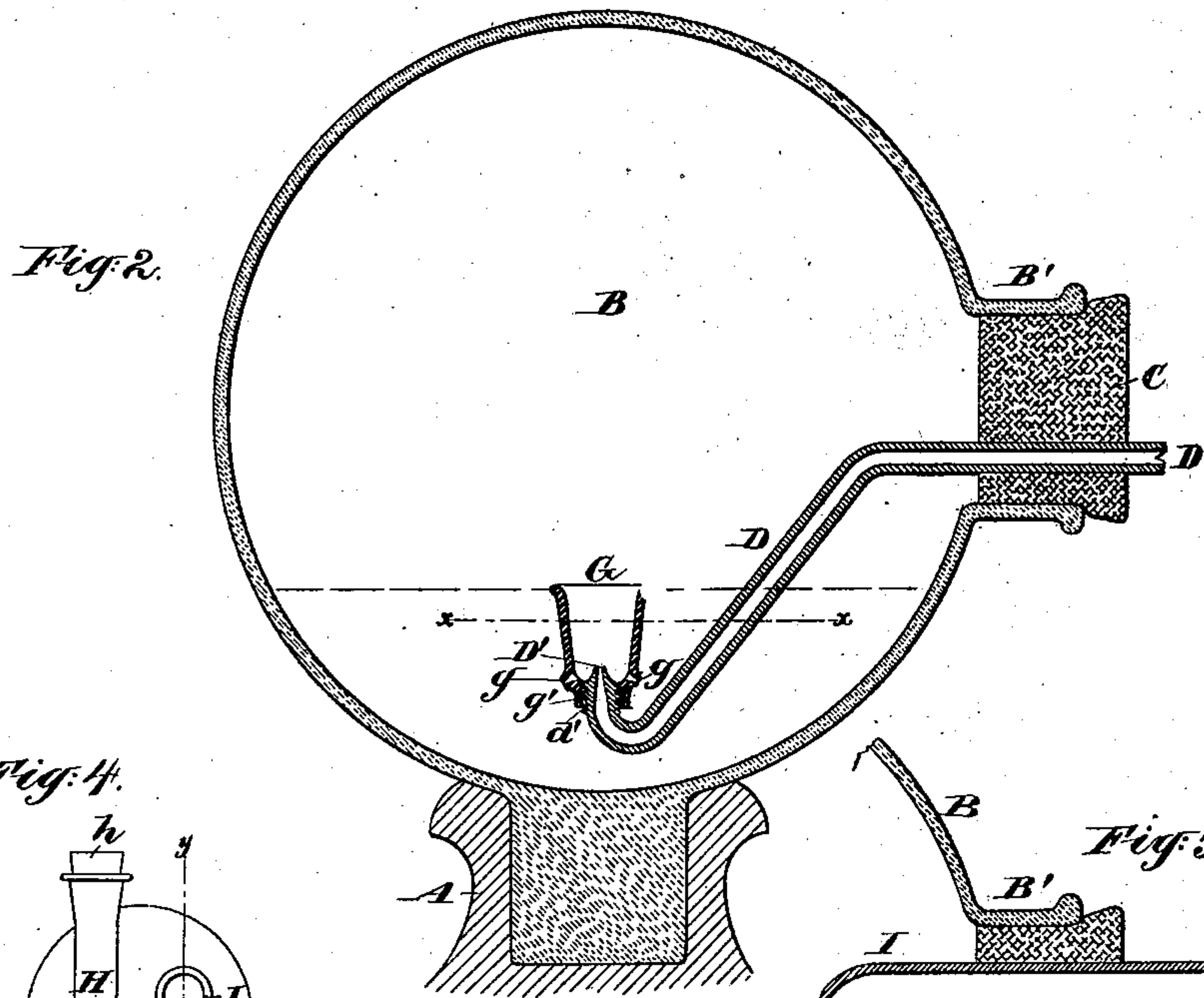
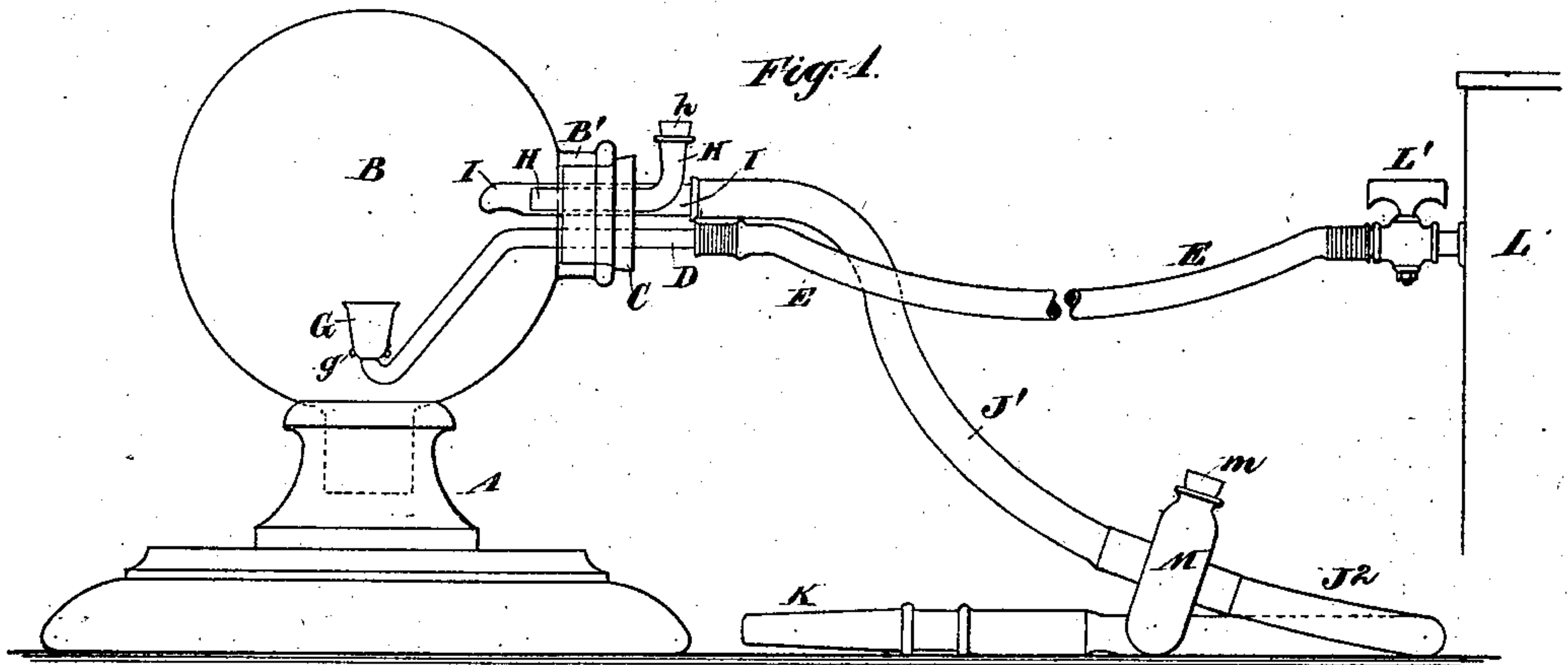


(No Model.)

A. J. & G. H. PALMER.  
COMBINED ATOMIZER AND INHALER.

No. 386,025.

Patented July 10, 1888.



Witnesses:  
Charles R. Searle,  
H. A. Johnstone.

Inventors:  
A. J. Palmer.  
G. H. Palmer.  
By their attorney  
Thos. Dewar



# UNITED STATES PATENT OFFICE.

ADONIRAM J. PALMER AND GEORGE H. PALMER, OF BROOKLYN, NEW YORK.

## COMBINED ATOMIZER AND INHALER.

SPECIFICATION forming part of Letters Patent No. 386,025, dated July 10, 1888.

Application filed April 7, 1888. Serial No. 269,941. (No model.)

*To all whom it may concern:*

Be it known that we, ADONIRAM J. PALMER and GEORGE H. PALMER, both of Brooklyn, in the county of Kings and State of New York, physicians, have invented a certain new and useful Improvement in Atomizers and Inhalers, of which the following is a specification.

We will describe our apparatus as applied for atomizing liquid by compressed air received from a reservoir, as more fully set forth in a previous patent to us, dated July 5, 1887, No. 366,022. We have discovered that the effect is improved by surrounding the nozzle from which the compressed air is discharged upward with a small open-topped casing or chamber, which is perforated to admit the liquid slowly. The success of the atomizing operation is affected by variations in the level of the liquid. When the surface of the liquid is too high and the nozzle is too deeply immersed, the escape of air is retarded, and the efficiency of the atomizing is reduced. When, on the other hand, the level of the liquid sinks too low, so that the nozzle is completely uncovered, the atomizing stops. We have in our patent of 1887, referred to, provided for tilting the vessel, so as to allow the immersion of the nozzle to the right depth with varying quantities of liquid in the vessel. Our present invention avoids the necessity of such adjustment. The level of the liquid takes care of itself. So long as there is sufficient liquid in the vessel it will flow through the limited aperture into our open-topped chamber and become atomized by the smartly-ascending jet of air discharged from the nozzle. An excess in quantity of the liquid will induce only a slight increase in the rapidity with which the liquid will flow inward and be presented to the nozzle. The chamber will restrain the excess with such approximate uniformity that the atomizing will proceed successfully with a wide range in the height of the liquid.

Our apparatus will serve for atomizing the various liquids required in this condition for medicinal uses. It will also serve under proper

conditions to promote vaporization of liquids in distilling and in analogous operations in the arts. We provide for conveniently removing the chamber at will, to better adapt it for emulsifying and mixing.

We have devised a new construction and arrangement of the trap which reduces the cost and promotes convenience in use and cleaning.

The accompanying drawings form a part of this specification, and represent what we consider the best means of carrying out the invention.

Figure 1 is a general side elevation. The remaining figures show certain portions on a larger scale. Fig. 2 is a vertical section. Fig. 3 is a horizontal section on the line  $xx$  in Fig. 2. Fig. 4 is a view of the plug and its connections detached. Fig. 5 is a vertical section on the line  $yy$  in Fig. 4, and Fig. 6 is a vertical section of the trap.

Similar letters of reference indicate corresponding parts in all the figures where they occur.

A is a foundation of wood, B a globe or vessel of glass fixed thereon, and B' a nozzle, which receives a plug, C, of soft vulcanized rubber or other suitable material, perforated to receive the pipes.

D is an air-induction pipe, of glass, receiving the air through a flexible hose, E, and discharging it at a high pressure through a fine perforation in the upturned nozzle D'. The conditions are favorable for atomizing the liquid provided the liquid be prevented from flowing too deeply over the orifice. The exterior of the nozzle D' is formed with screw-threads  $d'$ .

G is an open-topped casing or chamber which performs important functions. Its lower end has a hole which is tapped or otherwise treated to produce screw-threads  $g'$ , matching on the screw-threads  $d'$ . This chamber G is of glass. In the process of forming it two or more thin projections are forced outward near the bottom, and by removing the material at the apex of one or more of these projections



orifices *g* are provided, which admit the water or other liquid nearly or quite as fast as the jet of air issuing from *D'* can atomize it. These orifices *g* can be conveniently enlarged at any time by delicately filing the apexes of the projections.

*H* is a pipe inserted through the plug *C*, and having a turned-up outer end secured by a cork, *h*. The liquid to be atomized is supplied from time to time through this pipe.

*I* is a pipe, of glass or other material, inserted through the plug *C*, and connecting by the flexible hose, made in two lengths, *J'* *J''*, with a tip, *K*, which, when the apparatus is used for medical purposes, is held in the mouth of the patient, who inhales through this pipe *I* and exhales through the nostrils; or, if preferred, the exhalation may be through this same mouth-piece *K*, provided with a branch valve attachment. (Not shown.)

*M* is an annular trap having on its upper edge a capacious nozzle, which, on removing the cork *m*, gives facilities for thoroughly washing the interior.

*M'* *M''* are nozzles at the center, by which the two lengths of rubber hose *J'* *J''* are conveniently attached.

In the use of our apparatus the liquid, which may be supposed to be water or oil, either pure or variously medicated, may be introduced through the pipe *H* without much nicety in regard to quantity. It is sufficient that it fill the base of the globe *B* above the orifice *g* and not above the top of the chamber *G*. Then, inserting the tip *K* in the mouth of the patient, the cock *L'* is opened cautiously and a sufficient blast is allowed to flow from the reservoir *L* of compressed air through the hose *E* and pipe *D*, issuing upward through the nozzle *D'*, and rapidly throwing out any excess of liquid which had previously been received in the chamber *G*. Now, the blast of air continuing, atomizing will commence, and the liquid, slowly entering through the limited apertures *g*, will be atomized and mingled with the air, filling the upper portion of the globe *B*. The patient, inhaling from the mid height in the globe *B*, finds the air well filled with the liquid in the familiar atomized condition. Any excess of liquid thrown upward from the chamber at the commencement of the operation, or at any later period, will strike the top of the interior of the globe and adhere, trickling down the sides to again mingle with the liquid in the bottom. Any excess of liquid which shall chance to be drawn out through the pipe *I* and the first length of hose, *J'*, will fall by gravity into the lower portion of the trap *M*. Any saliva from the mouth of the patient descending through the second length of hose, *J''*, will be similarly stopped.

After each use of the apparatus, the plug *m* is removed and the trap thoroughly washed by injecting through the orifice or by other obvious means.

An important function in the treatment of some liquids is performed by the chamber *G* in arresting the disturbing influence due to foaming and to irregular motions of the mass of liquid lying in the vessel *B*. The chamber *G* not only prevents the disturbance of the action by variations in the level of the liquid, but also prevents disturbance by agitation and foaming of the liquid. So soon as the operation has fairly commenced the strong blast of air rising from the nozzle *D'* finds a just sufficient depth of tranquil fluid within the chamber *G* to allow its most favorable action.

Although we have used the term "atomizer," it will be understood that in ordinary practice, blowing in liberal quantities of warm dry air ready to absorb the vapor, the liquid is in the course of the treatment evaporated, and its vapor mingles with the air and is conveyed to the lungs through the inhaling-tube in the form mainly of vapor. The terms "atomizer" and "vaporizer" may be used in this relation as equivalents.

Modifications may be made in the details without departing from the principle or sacrificing the advantages of the invention.

We can vary the form of the nozzle *D'* within wide limits so long as it is adapted to project the air upward in one or more small and strong streams. The foundation-piece *A* may be of glass, cast or otherwise formed integral with the globe *B*. The chamber *G*, with its screw-threaded apertures to match on the nozzle, and with its fine aperture or apertures *g*, may be made of other material than glass. We propose to use hard rubber in many cases.

The supply of liquid may be introduced through a branch of the inhaling-pipe *I*, having a proper plug, and thus the special filling-pipe *H* and its plug *h* may be dispensed with. We prefer the whole as shown.

We claim as our invention—

1. The open-topped chamber *G*, with one or more apertures for the slow admission of the liquid, in combination with the globe or vessel *B*, air-induction pipe *D*, with its contracted aperture *D'*, and inhaling-pipe *I*, arranged and adapted to serve substantially as herein specified.

2. In an atomizer and inhaler, the open-topped chamber *G*, with one or more apertures, *g*, the vessel *B*, plug *C*, pipe *D*, with its nozzle *D'*, connected by the hose *E* to the air-reservoir *L*, and inhaling-pipe *I*, with its connected hose *J'*, in combination with each other and with the provisions, as the screw-threads *d'* *g'*, for connecting and disconnecting the chamber *G* and the nozzle *D'* at will, to adapt the apparatus for different uses, substantially as herein specified.

3. In an atomizer and inhaler, the annular trap *M*, with its cleansing-plug *m*, arranged, as shown, between two lengths of hose, *J'* *J''*, in combination therewith and with the tip *K*,



pipe I, plug C, and globe or vessel B, and with  
the air-reservoir L, cock L', hose E, pipe D,  
and nozzle D', for atomizing a liquid within  
the vessel B, all adapted to serve substantially  
5 as herein specified.

In testimony whereof we have hereunto set  
our hands, at New York city, this 5th day of

April, 1888, in the presence of two subscrib-  
ing witnesses.

A. J. PALMER.

GEO. H. PALMER.

Witnesses:

H. A. JOHNSTONE,

M. F. BOYLE.