No. 692,485. Patented Feb. 4, 1902.

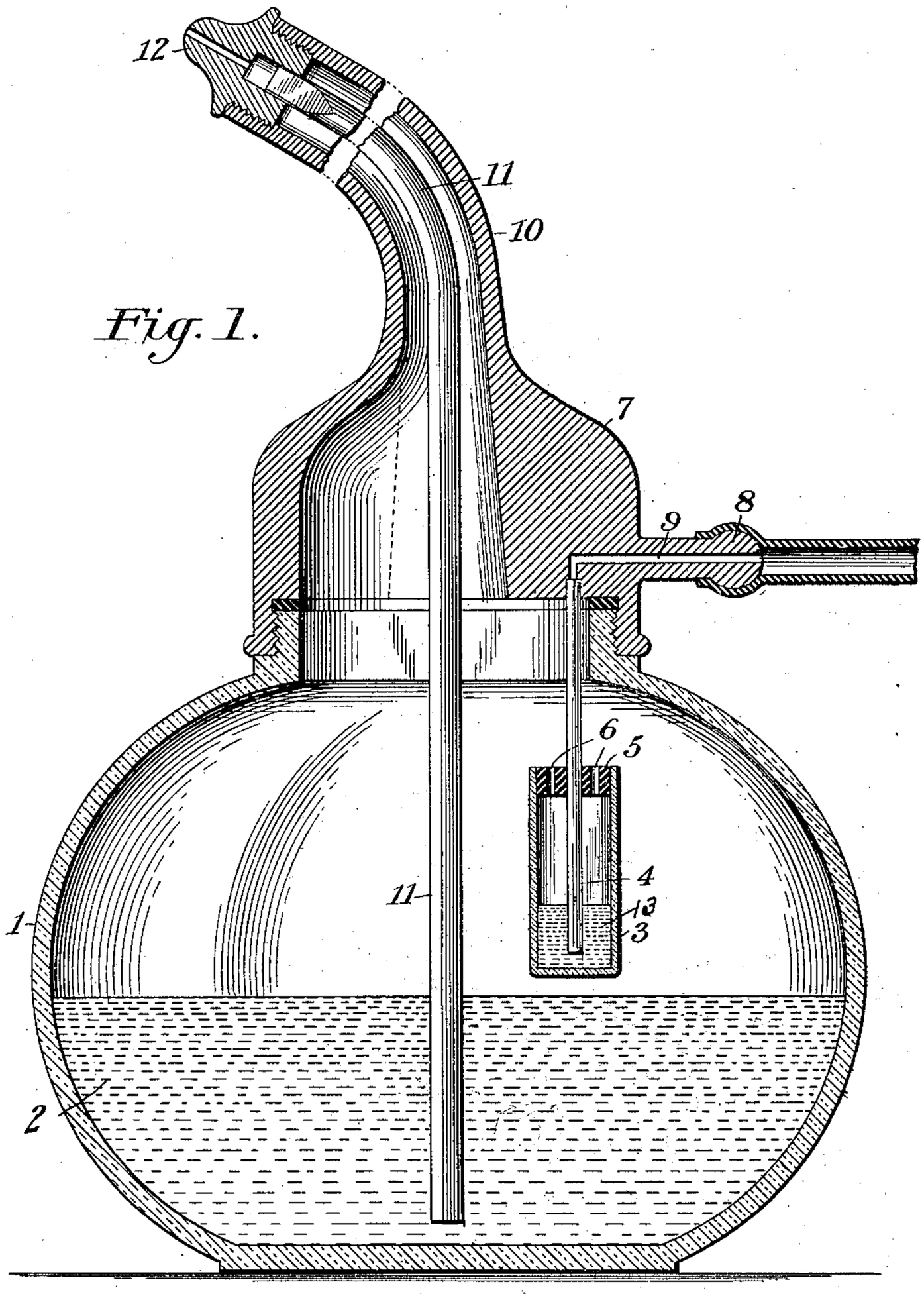
C. J. SELTZER.

ATOMIZER AND NEBULIZER.

(Application filed Mar. 19, 1900.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.



Witnesses:
R. A. Balderson
Chas. H. Baker.

Inventor:
Cyrus J. Seltzer,
by
E. W. Ogden.
his attorney.

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Fig. 2.

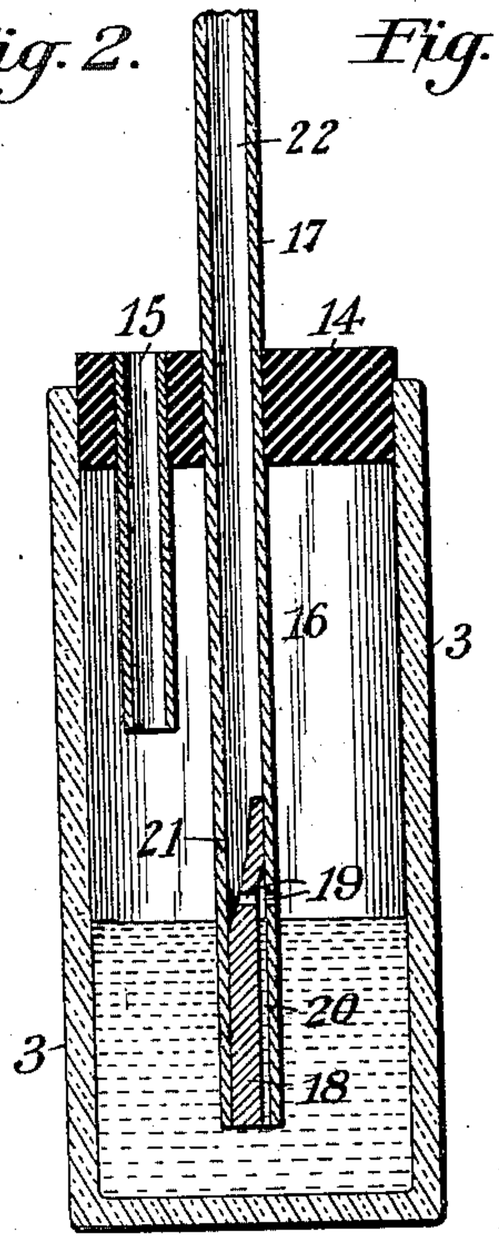


Fig. 3.

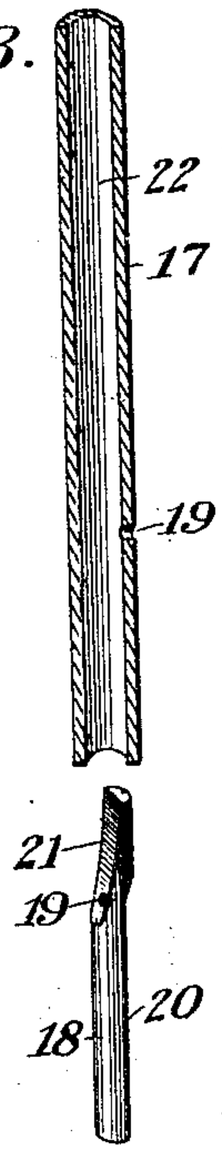


Fig. 5

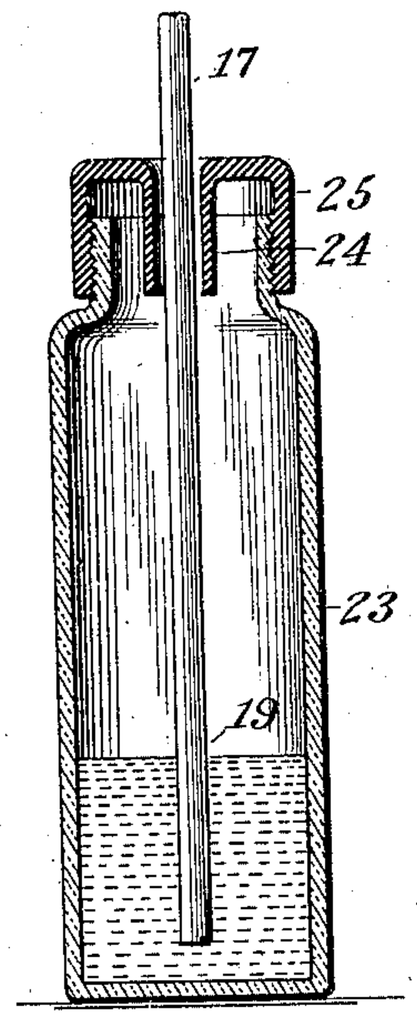
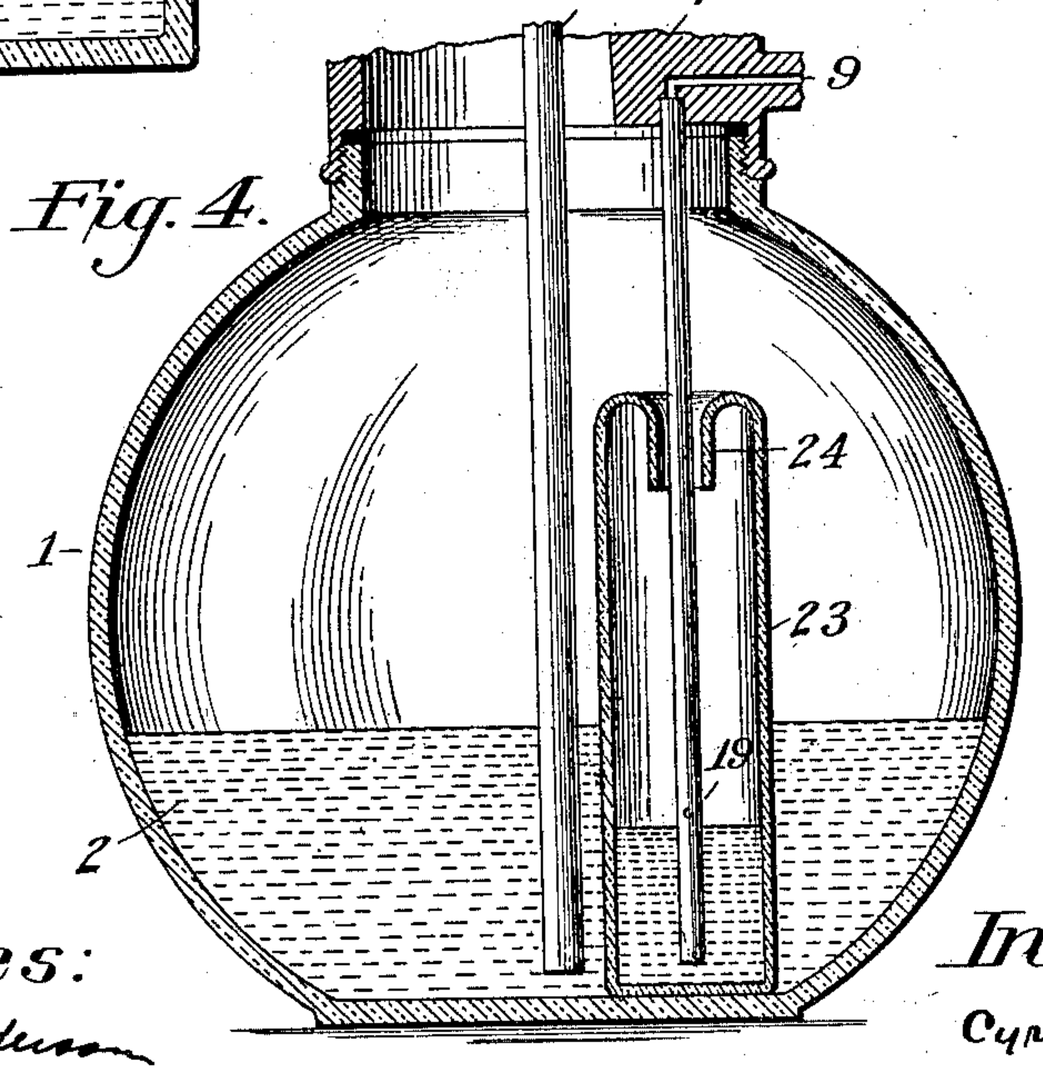


Fig. 4.



Witnesses:
R. A. Baldwin
Chas. H. Baker.

Inventor:
Cyrus J. Seltzer
by
E. W. Ayres.
his attorney.

UNITED STATES PATENT OFFICE.

CYRUS J. SELTZER, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO GEORGE WOODWARD, OF PHILADELPHIA, PENNSYLVANIA.

ATOMIZER AND NEBULIZER.

SPECIFICATION forming part of Letters Patent No. 692,485, dated February 4, 1902.

Application filed March 19, 1900. Serial No. 9,282. (No model.)

To all whom it may concern:

Be it known that I, CYRUS J. SELTZER, of Philadelphia, State of Pennsylvania, have invented a new and useful Improvement in Atomizers and Nebulizers, of which the following is a specification.

My invention relates to an improvement in atomizers and nebulizers, in which the spray may be alternately produced outside of the vessel containing the liquid when it is desired to use the device as an atomizer or produced within the vessel and directed against the adjacent interior wall thereof when it is desired to employ the device as a nebulizer.

By using my device as an atomizer the usual coarse spray is produced at or adjacent to the atomizer-tip in the ordinary manner, while when employing my device as a nebulizer the spray is produced within the liquid-containing receptacle and directed against the adjacent interior wall thereof, thus causing the liquid to be finely divided or disintegrated, and the finely disintegrated or nebulized liquid issues from the receptacle in the form of an exceedingly fine mist or cloud. Both of these results are old and have been accomplished by numerous well-known devices; but an apparatus capable of being interchangeably used as either an atomizer or a nebulizer is novel; and my invention has for its object the production of such an apparatus in a convenient form which shall be highly efficient and at the same time simple in construction, durable, readily accessible for cleaning, and inexpensive.

A further object of my invention is to produce a simple form of efficient nebulizer spray-tube which can be made at a much less cost than the existing forms of tubes.

Reference is to be had to the accompanying drawings, forming a part of this application, in which similar reference-numerals indicate corresponding parts in the several views.

Figure 1 is a central vertical sectional view illustrating the construction and general arrangement of my combined atomizer and nebulizer. Fig. 2 is a detail view, on a large scale, showing my nebulizer spray-tube in position within the vessel containing the liquid to be nebulized. Fig. 3 is a detail view on the same scale as Fig. 2, showing the construction of my nebulizer spray-tube. Fig. 4 is a detail view of the nebulizer vessel, showing a form of liquid seal for preventing the nebulizer liquid from escaping therefrom into the vessel containing the fluid to be atomized. Fig. 5 is a detail view of the nebulizer-bottle, illustrating another form of liquid seal for preventing the escape of the liquid therefrom.

1 is a receptacle constructed of any suitable shape and material for containing the fluid 2 to be atomized.

3 is any suitable vessel for containing the liquid to be nebulized.

4 is the nebulizer spray-tube, passing through the stopper or closure 5. Any common form of nebulizer spray-tube may be employed. The closure 5 may be formed integral with the receptacle 3 and the nebulizer-tube 4 or it may be secured thereto in any well-known manner, as by screw-threads, a close-fitting joint, cement, &c. If desired, the closure 5 can be entirely omitted and the receptacle 3 be supported on the bottom of receptacle 1, with the tube 4 extending in proper position therein.

The closure 5 is provided with one or more apertures 6 to establish free communication between the interiors of the receptacles 1 and 3.

7 is the cap-piece for vessel 1, which is provided with a nipple 8 to enable proper connection to be made with a bulb or other source of air under pressure. The nipple may be formed integral with the cap-piece or secured thereto in any suitable way, this being merely a question of mechanical expediency. The nebulizer spray-tube 4 is secured to the cap-piece with its air-passage in communication with the passage 9 through the nipple 8.

The cap-piece 7 carries the exterior or air tube 10 usual in atomizers, and this tube 10 may either be formed integral with the cap-piece or secured thereto in any well-known manner.

11 is the ordinary inner or liquid tube common to atomizers.

12 is the usual atomizer spray-tip. Any old form of detachable tip may be employed in this position.

To employ my apparatus for nebulizing the fluid 13 of receptacle 3, the detachable atom-

izer spray-tip 12 is removed, thus providing a free exit from the interior of vessel 1 through the outer tube 10. Air under pressure is then caused to pass through the passage 9, which through its communication with the air-passage in the nebulizer-tube 4 causes the liquid 13 to be sprayed against the interior surface of receptacle 3, and thus to be nebulized or disintegrated to an exceedingly fine degree. The nebulized fluid escapes from receptacle 3 through the aperture or apertures 6 into vessel 1, from which it issues through tube 10 in the form of a mist or cloud.

The successful operation of my apparatus as an atomizer depends on a discovery made by myself as the result of a large number of experiments. I have discovered and definitely ascertained that when the tip 12 is positioned on the end of the tube 10 in the usual and proper manner, thus greatly reducing the size of the exit-orifice from the tube 10, and air under pressure is then caused to pass through passage 9 and nebulizer spray-tube 4 in the usual way, as just described, the apparatus operates in the following manner: The air under pressure entering through passage 9 and nebulizer-tube 4 speedily causes a material increase of pressure in the air-spaces of the communicating receptacles 1 and 3, this being due to the greatly-reduced exit-orifice from tube 10. I have found that when this increase of pressure has been established in the air-space of receptacle 3 the liquid 13 is not nebulized by the action of the air passing through nebulizer-tube 4, the resultant mode of operation being that the increased pressure in the air-space of vessel 1 forces the liquid 2 up through the inner tube 11 to the atomizer spray-tip 12, where it is atomized in the usual manner by the air under pressure escaping through the greatly-reduced exit-orifice from the tube 10. Thus to change the action of my combined apparatus from that of an atomizer to that of a nebulizer it is necessary simply to remove the detachable atomizer spray-tip 12, and vice versa.

It will thus be seen that my apparatus is capable of being easily and quickly converted into either an atomizer or a nebulizer at will. It will also readily be seen that if it be desired to use my apparatus simply as a nebulizer the inner receptacle 3 could be entirely omitted and the fluid to be nebulized placed in the receptacle 1, the atomizer-tip 12 being also removed, as described. Again, if it be desired to employ the apparatus simply as an atomizer, the inner receptacle 3 and the nebulizer-tube 4 can be removed, the atomizer-tip 12 being properly placed in position on the end of tube 10.

Referring now to Figs. 2 and 3, 3 is a receptacle for containing the liquid 13 to be nebulized. 14 is a closure for receptacle 3 and is provided with a short tube 15, which permits the nebulized liquid to issue from receptacle 3, but acts to prevent the liquid 13 from escaping in case the receptacle 3 be accidentally tipped over. 16 is my improved form of nebulizer spray-tube. It consists, primarily, of an ordinary tube 17, of rubber, glass, paraffined paper, or other suitable material, and an inner plug 18. The plug 18 is formed with the two depressions or recesses 20 and 21, arranged as shown, or the plug may be formed as a rod and the depressions 20 and 21 afterward produced in it.

In constructing my nebulizer-tube I insert the plug 18, provided with the depressed portions 20 and 21, in the tube 17 and then drill or otherwise form the passage 19 through one wall of tube 17 and through plug 18 in such position as to communicate with the two depressions, as clearly shown, or the passage 19 may be formed separately in the tube 17 and plug 18 and the two parts afterward assembled. The operation of the nebulizer spray-tube is as follows: The air under pressure entering the air-passage 22 escapes with considerable velocity through the jet-passage 19. This jet of air flowing across the top of the liquid-passage 20 causes a decrease of pressure therein, whereby the liquid is drawn up in said liquid-passage and is sprayed by the air-jet in the well-known manner.

Referring to Figs. 4 and 5, which illustrate two forms of liquid seals, Fig. 4 shows a construction in which the receptacle 23 for the nebulizer fluid is provided with an integral reëntrant part 24, through which the nebulizer spray-tube extends, said part being made of sufficient size to provide an exit around the nebulizer spray-tube, acting to prevent the accidental escape of the liquid in receptacle 23 and for the nebulized fluid. Fig. 5 shows a similar construction, in which the receptacle for the liquid to be nebulized is provided with a detachable cap 25, having a reëntrant portion 24.

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

1. In a combined atomizer and nebulizer, an outer receptacle, a cap-piece having a thickened portion formed integral therewith and provided with a tube arranged in free communication with the interior of said receptacle, an inner tube situated within the aforesaid tube and extending into the receptacle, a detachable atomizer spray-tip adapted to be positioned in the usual manner upon the adjacent outer ends of the two tubes, a nipple carried by said cap-piece adjacent its thickened portion and integral therewith, a passage formed in the thickened portion of said cap-piece and its integral nipple, an inner receptacle situated within the outer receptacle, an apertured closure for said inner receptacle for the free passage of air or vapor between the interiors of the two receptacles, means carried by said closure to prevent the escape of liquid from the inner receptacle through said aperture, a nebulizer spray-tube pendent from said cap-piece and passing through the aperture in

said closure, the passage in the cap-piece being arranged in communication with the usual air-passage in the nebulizer-tube, substantially as described.

2. In a combined atomizer and nebulizer, an outer receptacle 1, a cap-piece 7 therefor, a nipple 8 integral with said cap-piece, a tube 10 carried by said cap-piece, a tube 11 within said tube 10 and extending into receptacle 1, an atomizer spray-tip 12 detachably carried at the outer ends of tubes 10 and 11, an inner receptacle 3, a liquid seal 24 for said inner receptacle, a nebulizer spray-tube 16 carried by said cap-piece and extending within said inner receptacle, and a passage 9 formed in one wall of said cap-piece and its integral nipple, said passage 9 communicating with the usual air-passage in said nebulizer-tube, substantially as described.

3. A nebulizer-tube comprising a tube of suitable material, a short rod or plug of a diameter throughout its length substantially equal to the bore of the tube, said rod or plug being positioned within the bore of said tube, a passage extending through the wall of said tube and through said plug, a recess in the upper portion of said plug and communicating with the bore of the tube and with said passage, and a second recess in said plug extending upwardly from the bottom thereof and intersecting said passage, substantially as described.

In testimony whereof I hereunto set my hand this 17th day of May, 1899, in the presence of two attesting witnesses.

CYRUS J. SELTZER.

Witnesses:
MALCOLM LLOYD, Jr.,
EDWARD S. LOWER.