No. 719,587. PATENTED FEB. 3, 1903.

S. HASBROUCK.

ATOMIZER.

NO MODEL. APPLICATION FILED JUNE 7, 1902.

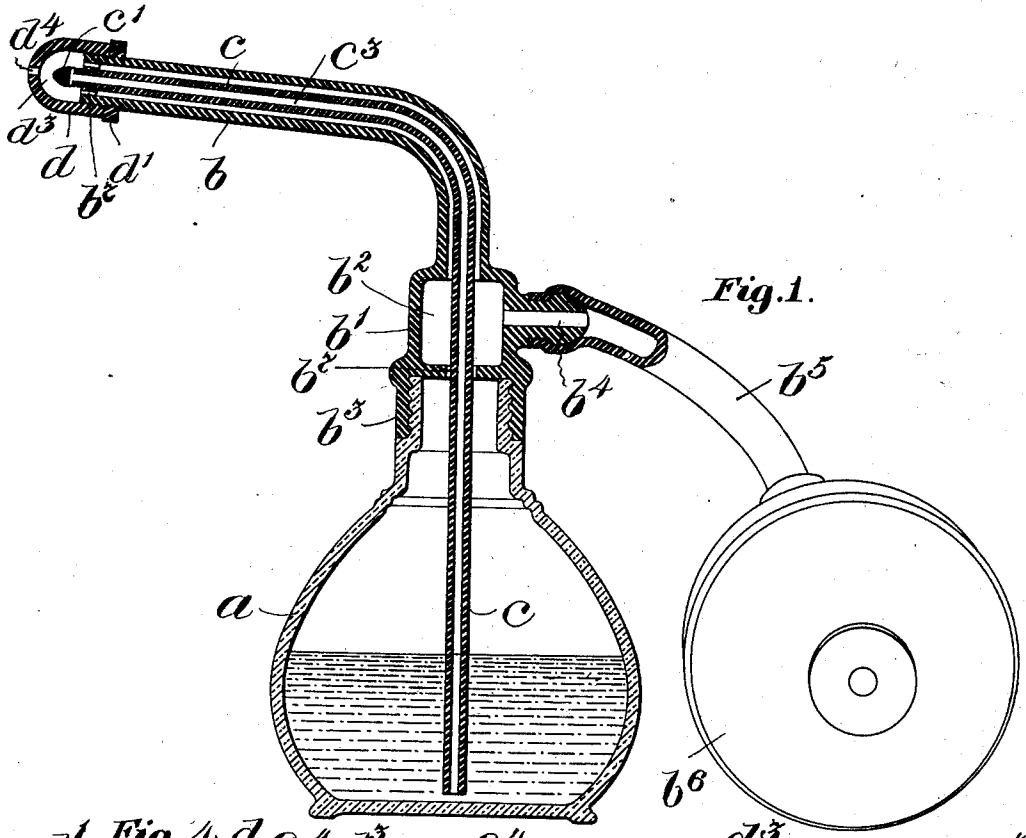


Fig. 1.

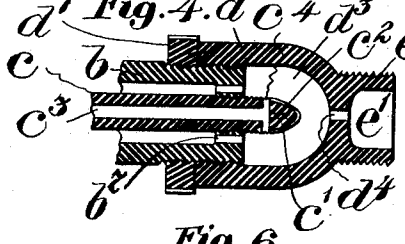


Fig. 4.

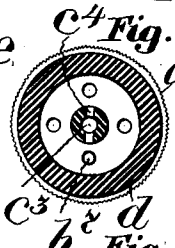


Fig. 3.

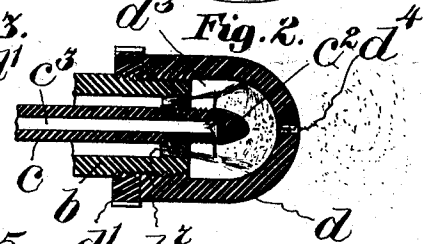


Fig. 2.

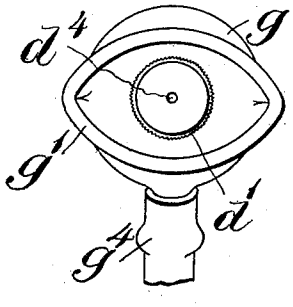


Fig. 6.

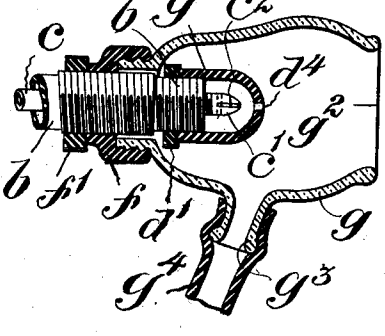


Fig. 5.

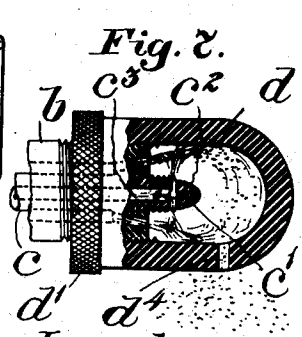


Fig. 7.

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UNITED STATES PATENT OFFICE.

SAYER HASBROUCK, OF PROVIDENCE, RHODE ISLAND.

ATOMIZER.

SPECIFICATION forming part of Letters Patent No. 719,587, dated February 3, 1903.

Application filed June 7, 1902. Serial No. 110,609. (No model.)

To all whom it may concern:

Be it known that I, SAYER HASBROUCK, of Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Atomizers, of which the following is a specification.

This invention has relation to "atomizers" or "nebulizers," so called, the object of the invention being to provide an apparatus of the character named which will produce a spray, vapor, or nebula such as may be desired for medicinal or other purposes.

In the illustrated embodiment of my invention I employ air-pressure for forcing the liquid through an inner tube and delivering it laterally in a jet which intersects the jets of air. These jets are discharged into a chamber formed at the end of the nozzle and having a curved inner wall against which the broken spray of liquid may strike and be deflected in various directions, so as to become completely broken up before it is discharged through an aperture in the wall of the chamber. This aperture is located out of alinement with both the air-jets and the jets of liquid. In addition to this feature of my invention there are others which render the device adaptable for use in various ways and for various purposes for treating certain organs of the body—such as the eye, ear, or nose—with better effect than has hitherto been possible.

Of the accompanying drawings, Figure 1 represents in section an atomizer or nebulizer embodying the invention. Fig. 2 represents an enlarged section through the end of a nozzle. Fig. 3 represents a section taken through the lateral discharge-ports in the inner tube. Fig. 4 illustrates a form of the device in which other appliances may be attached to the tip. Fig. 5 illustrates the atomizer with an eye-cup attachment. Fig. 6 is a front elevation of the same. Fig. 7 illustrates another form of tip which I may employ.

On the accompanying drawings the liquid-receptacle is indicated at a and may be of any form that is found convenient or desirable for holding the liquid. b indicates the outer tube, which may be straight or bent, as shown, and which is enlarged, as at b', to form an air-chamber b^2. At the base of the enlargement there is the internally-threaded portion b^3, adapted for attachment to the neck of the receptacle a. Projecting laterally from the enlargement b' there is a nipple b^4, over which may extend the end of a conduit b^5, leading from an air-compressor, such as the valve-bulb b^6. The air-chamber b^2 communicates with the interior of the receptacle a by an aperture b^7. Projecting through this aperture is the inner tube c, which extends well down into the receptacle, so as to have its lower open end below the level of the liquid therein. The upper end of the inner tube is passed through the end of the tube b, so as to completely close the said end, as shown in Fig. 2. The upper end of the inner tube c is likewise closed, being conical in form, as indicated at c', with longitudinal serrations or notches c^2.

The bore c^3 of the inner tube communicates at its upper end with two or more lateral discharge-ports c^4, so that when liquid is forced by air-pressure upward through the inner tube c it is discharged in jets laterally from the said tube.

In the closed end of the outer tube b there are apertures or ports b^7, located in the same plane with the outer ports c^4, so that air discharged through said ports b^7 would intersect the jet or stream of liquid issuing from the ports c^4, as clearly illustrated in Fig. 2.

The end of the outer tube b is externally threaded to receive a tip d and a check or lock nut d'. The tip d has a spherical end with an interior semispherical wall d^2, forming around the projecting end c' of the inner tube a chamber d^3. In the said tube is a discharge-aperture d^4, which is located in alinement with the central longitudinal line of the inner tube c.

The operation of the atomizer will be readily understood from the foregoing description; but this statement may be added: Air being forced into the air-chamber b^2 passes downwardly through the aperture b^7 into the receptacle a and forces the liquid up through the inner tube, so as to discharge it in lateral jets through the ports c^4. Air passing through the outer tube is delivered in jets or streams through the ports b^7 and meeting with the jets of liquid breaks them up and blows them

violently against the concave walls of the tip. As the broken spray is deflected at various times from the walls of the tip it is broken into a finer and finer spray and is discharged through the aperture d^4 as a vapor.

Preferably there are a greater number of ports b^7 than there are ports c^4, so that sufficient air is supplied to the chamber d^3 to force the vaporized liquid outward under considerable pressure through the aperture d^4 in the tip.

By varying the position of the tip d with relation to the inner and the outer tubes, as by screwing it farther on or off from the end of the outer tube, I am able to vary the fineness of the spray or vapor that is delivered from the tip. The check-nut d' is of great value, in that I am able to accurately secure the tip in place and hold it against accidental dislocation. There is always danger of the tip working loose and accidentally dropping from the nozzle, and this is liable to happen when the atomizer is in use in spraying the throat, to the great danger of the patient. The employment of the check-nut is of additional value, in that it effects an air-tight closure between the tip and the outer tube by tightly securing the nut against the tip. An air-tight joint is provided, whereby the escape of air is effectively prevented and the spraying operation rendered more effective.

The ports b^7 may discharge the streams of air either in lines parallel with the bore of the inner tube c or else at a slight inclination thereto, as illustrated in Fig. 2. In either event I find that the construction as described is highly efficient for the purposes mentioned.

It is evident that the tip d may be provided with a threaded extension e for the reception of special appliances for the ear or nose, in which event the port d^4 opens into a chamber e'.

If desired, the atomizer may be equipped with a special eye-cup, such as shown in Figs. 5 and 6. In this case the outer tube b is provided with a threaded enlargement for the reception of the holder f for the cup g, there being a check-nut f' for securely locking the holder and cup in place. The said eye-cup is provided with a mouth g', which will fit closely around the eye. The chamber g^2 in the cup is large enough to receive the tip d, so that the vapor may be discharged against the eyeball when the eye is open. The cup is provided with a nipple g^3, on which is slipped a tube g^4, leading to a drip-receptacle, so as to provide for the discharge of the liquid as it runs from the eye and also for the discharge of air, so as not to cause the pressure of air against the eyeball.

Various other appliances may be employed in connection with my atomizer.

The invention is adapted for toilet or medicinal uses.

The invention may be embodied in disinfecting apparatus, vaporizers for oil or gas engines, paint-spraying appliances, &c.

In Fig. 7 the aperture d^4 in the tip is not located in line with the inner tube, but extends laterally through the tip, whereby I am enabled to direct the spray laterally into any organ of the body.

Having thus explained the nature of the invention and described a way of constructing and using the same, although without attempting to set forth all of the forms in which it may be made or all of the modes of its use, I declare that what I claim is—

1. An atomizer comprising an outer air-tube, having a discharge-port at its outer end, an inner tube passing through said outer tube and having a lateral port arranged in line with said discharge-port to deliver a jet of material intersecting the jet of air issuing from the port of the outer tube, and a curved wall surrounding the ends of said outer and inner tubes for deflecting and breaking up said material into fine particles, said wall having a discharge-aperture out of alinement with the said port.

2. An atomizer comprising an outer air-tube closed at its end and having a longitudinal port in said closed end, an inner tube passing through said outer tube and having a portion projecting through the closed end thereof, said projecting portion being provided with a lateral port, the line of which intersects the median line or lines of the port in the said outer tube, and a tip on said outer tube having a curved inner wall for deflecting and breaking up material delivered from the inner tube, said tip having a discharge-aperture out of alinement with said port.

3. An atomizer having a tube, an adjustable tip screwed on the tube and inclosing the end of the inner tube, and a check-nut screwed on said outer tube for locking said tip against movement from any point to which it may have been adjusted, and effecting an air-tight closure between the tip and the tube.

4. In combination, a receptacle, an air-chamber communicating with said receptacle, means for forcing compressed air into said chamber, an outer tube leading from said chamber and having longitudinal ports at its end, an inner tube passing through said outer tube and said air-chamber into said receptacle, said inner tube having a closed end projecting through the end of the outer tube with lateral ports whose median lines intersect the median lines of the ports in the outer tube, and a concavo-convex tip on the end of the outer tube having an aperture out of alinement with the said ports.

In testimony whereof I have affixed my signature in presence of two witnesses.

SAYER HASBROUCK.

Witnesses:
CHARLES R. DAY,
CHAS. L. GREEN.