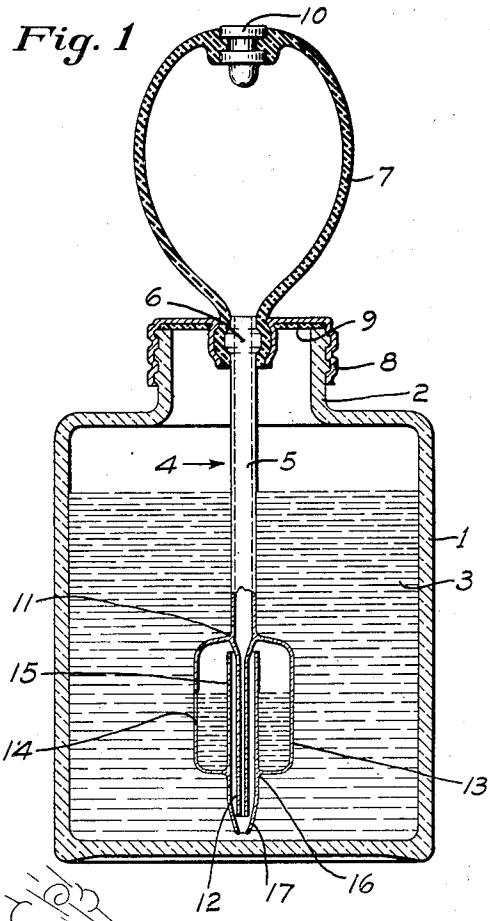
April 23, 1935. R. F. MASSA 1,998,901

ATOMIZER

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Fig. 1



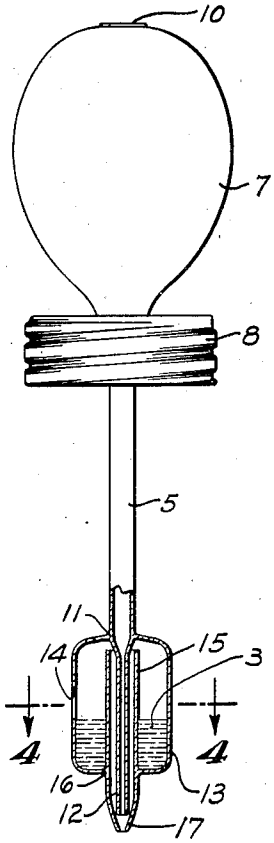


Fig. 2.

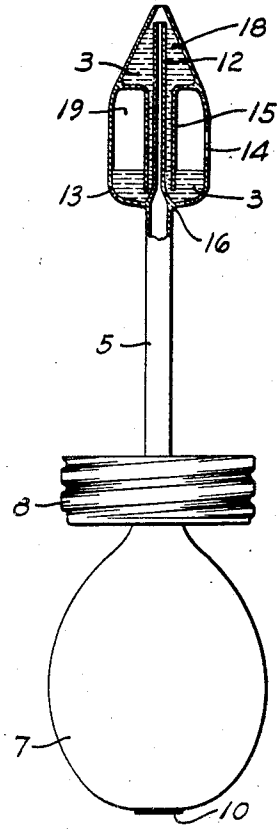


Fig. 5.

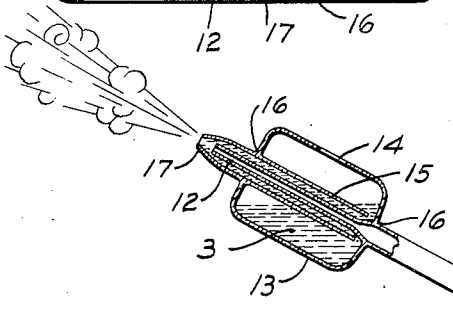


Fig. 3.

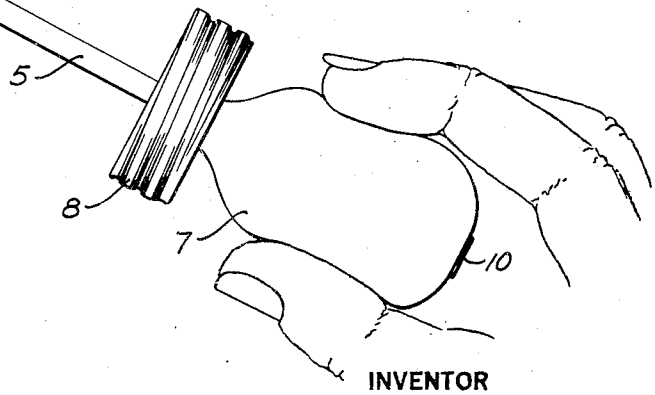
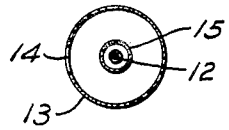


Fig. 4



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Fig. 6.

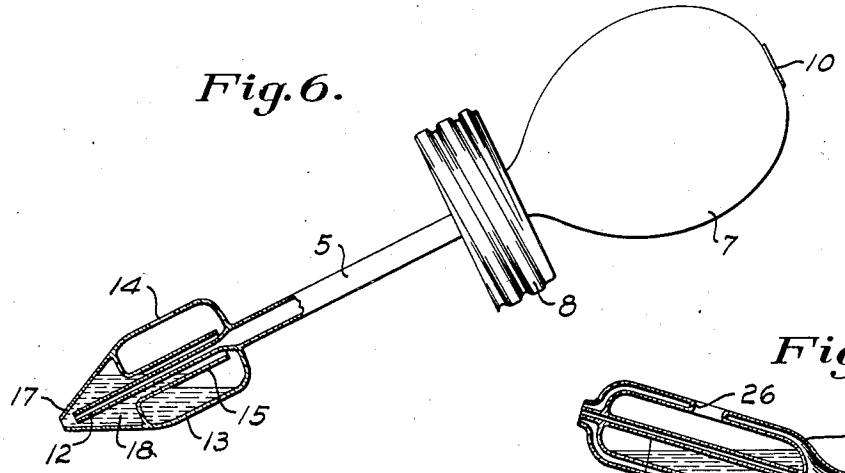
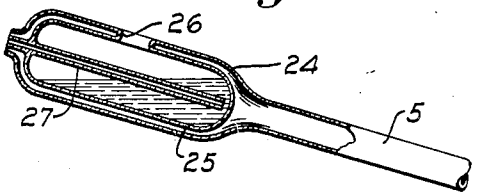


Fig. 10.



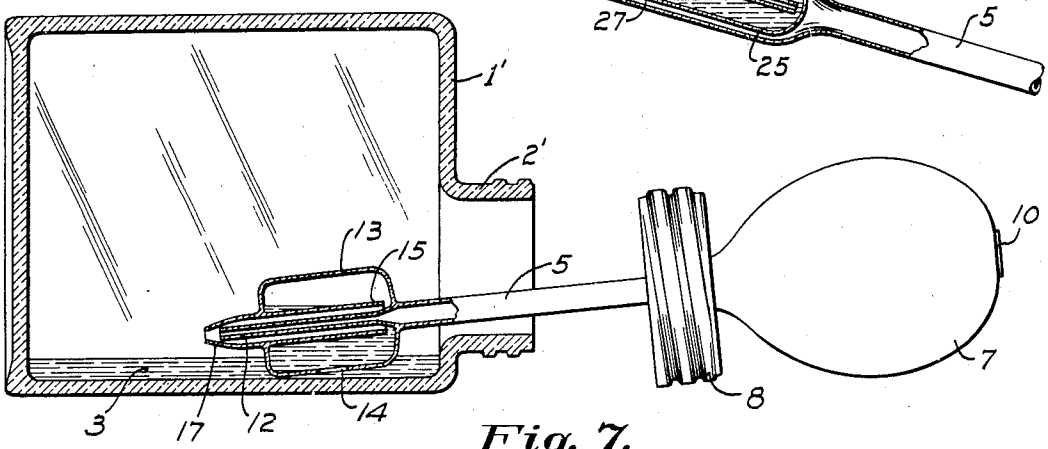


Fig. 7.

Fig. 8.

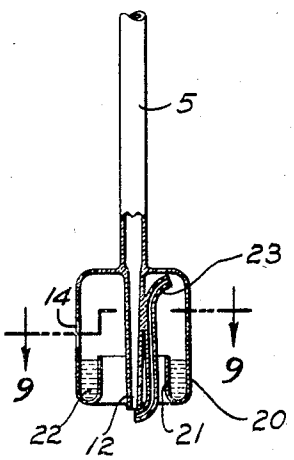


Fig. 11.

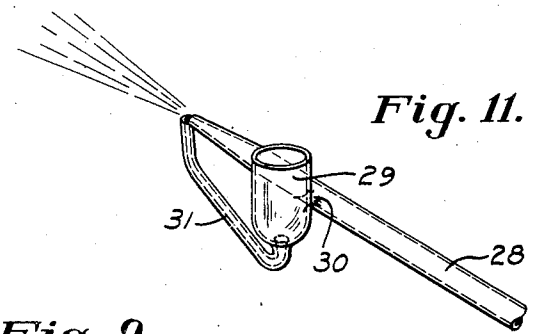
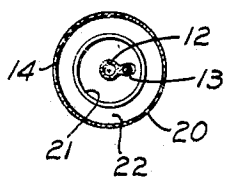


Fig. 9.



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1,998,901

ATOMIZER

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Application September 13, 1932, Serial No. 632,885

7 Claims. (Cl. 299—88)

This invention relates to atomizers for the spraying of liquids in finely divided condition.

Devices for this purpose as commonly constructed consist in general of a container or receptacle for holding the liquid to be sprayed and to which is attached, at least when the liquid is to be sprayed, the atomizer itself which receives its supply from the receptacle. This means that the container must be held near the object to be treated or sprayed even though a small amount of liquid is to be used. In some cases this holding of the container in the proper position is attended with more or less inconvenience to the user of the atomizer. Further disadvantages reside in the inconvenience in packing such devices for traveling and the danger of leakage of the liquid under these conditions.

In an attempt to overcome the disadvantages of devices of this type it has been proposed to use devices in which the atomizing elements when they are to be used are adapted to be withdrawn as a unit from the container and carry with them a sufficient supply of liquid for the purpose needed or for subsequent replenishing by reinserting them in the container in case the initial supply is insufficient. As far as I am aware devices of this latter class have not gone into practical use due to the many disadvantages which the proposed structures possess.

The present invention relates to the latter class of atomizers and has for its general object to avoid the disadvantages of previous devices of this type by the provision of an atomizer which may be compactly and cheaply constructed of parts that may be integrally formed of the same material. The material is preferably glass which is not acted upon or corroded by the liquids used in the atomizer and which also avoids invisible or concealed parts or sharp bends that may become unclean or even obstructed. It will be understood, however, that the bulb must be formed of some material, such as rubber, to permit proper manipulation and that even with the use of glass, certain parts, such as the nozzle of the device for instance, may be formed of metal or other nonvitreous material.

The atomizer may be readily sterilized and there are no mechanical parts which may get out of order, except the bulb, which, however, may be readily replaced when required.

In general the atomizer consists of a tube to which a bulb is attached for the ejection of air and which has associated with it a cup for the reception of the liquid to be sprayed, the cup being provided with an opening in order that it may be filled with liquid. A second tube which may be concentrically or eccentrically arranged with respect to the first tube provides a passage through which the liquid may be withdrawn from the cup for atomizing by the action of the air ejected from the first tube. The cup is so designed and related to the tubes that it may be filled directly by the inflow of liquid or by the suction effect of the air ejected through the first tube when the opening of the cup is submerged in the liquid to be sprayed.

The particular nature of the invention as well as other objects and advantages, will appear most clearly from a description of certain preferred embodiments thereof as shown on the accompanying drawings in which,

Fig. 1 is a view, chiefly in section, of one form of atomizer in a bottle with which it may be used;

Fig. 2 is a similar view showing the atomizer removed from the bottle;

Fig. 3 is a similar view showing the atomizer in operative position;

Fig. 4 is a transverse sectional view along the line 4—4 of Fig. 2;

Fig. 5 is a view, partly in section, of a second form of atomizer in one operative position;

Fig. 6 is a similar view showing the same atomizer in another operative position;

Fig. 7 is a view, partly in section, of a third form of atomizer adapted for use in a special form of bottle;

Fig. 8 is a view, partly in section, of a fourth form of atomizer;

Fig. 9 is a transverse sectional view along the line 9—9 of Fig. 8;

Fig. 10 is a view, partly in section, of a fifth form of atomizer, and

Fig. 11 is a view of a sixth form of atomizer.

Referring to Fig. 1, there is shown a bottle 1 provided with a neck 2 and adapted to contain a liquid 3 which is to be used in the atomizer which is indicated as a whole by 4. The atomizer consists of a tube 5, preferably of glass, at the upper end of which is an enlargement 6 which is surrounded by the orifice end of a bulb 7, the end being held in place by a correspondingly shaped part of a cap 8, adapted to be screwed on the neck of the bottle. The flat portion of the cap has a gasket 9 of any suitable material for making a liquid tight joint between the cap and the bottle. The other end of the bulb is provided with a suitable check valve 10, adapted to permit air to flow into the bulb under certain

conditions but checks the out-flow of air upon reverse conditions.

At the point 11, the tube 5 is tapered to a tube 12 of lesser diameter and at this point it is joined to a cylindrical cup 13, preferably of the same material and provided with an orifice 14 through which it may be filled. The other end of the cup 13 is joined to a tubular member 15 at the point 16. This member is of the same material as the tube 5 which it concentrically surrounds but beyond which it extends in the form of a nozzle 17.

In using the atomizer described above and assuming that it is in place in the bottle 1 the liquid will flow into the cup 13 until its upper level reaches the upper edge of the orifice 14 as shown in Fig. 1. The air which will be trapped above the liquid under these conditions will prevent the liquid from completely filling the cup.

Instead of allowing the cup to be filled by the natural flow of liquid into it, it may be filled by suction, but in this case it is necessary to tilt the bottle and hold the atomizer in such a relation to the surface of the liquid therein that the orifice 14 is submerged but the nozzle 17 is above the surface of the liquid. Compression of the bulb 7 will force air out of the tube 12 and create a suction in the cup 13 which will immediately cause the liquid to flow into the cup through the orifice 14.

When it is desired to use the atomizer it is unscrewed from the neck of the bottle and removed therefrom as indicated in Fig. 2. When the cup 13 is brought above the level of liquid in the bottle some liquid will flow out of the cup until it reaches the level shown in Fig. 2. If, however, the opening 14 is small the liquid will neither enter nor flow out by gravity. In this case the cup can be filled only by the suction effect caused by operation of the bulb as described above. The atomizer may be held over the bottle until any excess liquid in the cup has drained back into the bottle, or it may be wiped off, or if the atomizer is inverted before the excess liquid has drained off it will run down the stem and collect in the cap 8. It is obvious that the atomizer cannot be used in this position (Fig. 2) for compressing the bulb merely ejects air from the tubes 5 and 12 without any effect upon the liquid in the receptacle. In order that the atomizer may operate it is necessary to turn it until the inner end of the tubular member 15 is submerged as indicated in Fig. 3 in which position the air ejected from tubes 5 and 12 draws liquid from the cup through the tubular member 15 and atomizes the same as it is discharged from the nozzle 17. Liquid may be ejected from the atomizer as long as the end of member 15 remains submerged. The limits between which the atomizer will operate will depend upon the capacity of the cup 13, the proportioning of the parts, etc., but it is necessary that it be given some inclination above the horizontal in order to operate. It will be understood that during operation the atomizer must be held with the orifice 14 at the top in order to prevent leakage of liquid from the cup unless the orifice is so small that liquid will not flow from it.

In Figs. 5 and 6 there is shown a form of atomizer adapted to be used in any position. In these figures parts equivalent to those shown in Figs. 1, 2 and 3 are correspondingly numbered, such as tubes 5 and 12, bulb 7, cap 8 and tubular member 15. In this form, however, the annular passage between the tube 12 and the tubular member 15 of the form of the device shown in Fig. 1 is enlarged at the discharge end to form a chamber 18 in addition to the chamber 19 formed by the cup 13, these two chambers being in communication through the tubular member 15.

In using the atomizer, the cup 13 is partially filled in the same manner as previously described. It is then removed from the bottle and inverted as shown in Fig. 5. A few compressions of the bulb will cause more or less of the liquid in the chamber 19 to be drawn through the tubular member 15 into the chamber 18 from which it may be atomized whether the device is in the position shown in Fig. 5 or Fig. 6.

When it occupies the latter position, the liquid in chamber 18 will constitute a source of supply which may be atomized until exhausted regardless of the fact that the remaining liquid in chamber 19 does not cover the open end of the tubular member 15.

In Fig. 7 the form of atomizer disclosed in Figs. 1, 2 and 3 is shown in connection with a special form of bottle that permits more liquid to be used therefrom than is possible with the ordinary type of bottle shown in Fig. 1. In this case the neck 2' of the bottle 1' is displaced to one side of its usual central position. When the quantity of liquid gets so low that the bottle may be tipped on its side without the liquid flowing therefrom, as shown in Fig. 7, the atomizer may be filled by inserting it in the bottle with the orifice 14 submerged and the nozzle 17 above the surface of the liquid. The suction effect created in the cup 13 by compression of the bulb 7 will cause the liquid to flow into the cup, after which the atomizer may be used as hereinbefore described.

Another form of atomizer is shown in Fig. 8, in which the tubes 5 and 12 and the bulb (not shown) are substantially of the form shown in the other figures, but the cup 20 is provided with an inwardly directed annular flange 21, thereby forming an annular supply chamber 22 into which liquid flows when the atomizer is put into a bottle. Instead of the concentric tubular member of the other figures, there is a tube 23 attached to the tube 12 and terminating at one end near the outer end of tube 12, the other end being curved, so that when the device is tilted into a position like that of Fig. 3, this end will be submerged and liquid may be discharged therefrom in an atomized condition. It is, of course, advisable to place the tube 23 on the opposite side of tube 12 to that at which the orifice 14 is disposed.

In the forms of atomizer above described the air passes through a central tube and the liquid to be atomized through an outer tube either concentrically arranged as in Figs. 1 to 6 inclusive, or eccentrically arranged as in Fig. 8. In Fig. 10 there is shown a form in which the reverse arrangement is employed. In this case the tube 5 terminates in a bulb-like portion 24 within which is located a cylindrical member 25 forming a liquid chamber, an orifice 26 being provided for filling the latter. A tube 27 is attached near one end to the member 25 and terminates in the liquid when the device is tipped into the position shown for operation as will be obvious.

A final embodiment of the invention is shown in Fig. 11, in which a tube 28 to which a bulb is attached carries a cup 29 fastened by a bracket 30. From the bottom of the cup a liquid supply tube 31 terminates adjacent to the end of tube 28. The cup may be filled by inserting the device in a bottle and suitably manipulating it or it

may be filled while being held in the position shown.

By forming the atomizer of glass, a further advantage is obtained in that by softening the glass, at the point 11 in Fig. 1 for instance, the cup 13 may be slightly displaced with respect to the tube 12 to alter the distance that the orifice of nozzle 17 projects beyond the tube 12 in order to secure the best atomizing effect.

Assurance of freedom from breakage due to temperature changes is secured by the elimination of rigid joints between longitudinally placed parts as would be the case, for instance, if there were a connection between the inner end of tubular member 15 and the point 11. In that case a difference of temperature between the parts 13 and 15 such as would be caused by sudden plunging into boiling water for sterilizing would cause a strain.

While certain preferred embodiments of the invention are disclosed herein, it will be understood that it may be embodied in other forms and that various changes in structural details may be made without departing from the principle of the invention as defined in the appended claims.

I claim:—

1. In an atomizer, the combination of a pair of tubes, an air bulb attached only to one end of one of the tubes extending beyond the end of the tube, and a cup, said tubes and cup being concentrically arranged with respect to each other, said cup being attached to one of the tubes the other tube being supported from and extending through the cup in communication therewith, and the ends of the tubes remote from said air bulb being arranged in asperating relation whereby air forced from the bulb through said one tube will cause a discharge of fluid from the cup through said other tube.

2. An atomizer adapted to be placed in a container for liquid for supplying liquid to the atomizer, said atomizer including a tube, a cup-shaped member adapted to attach the atomizer to the container, an air-bulb attached to the tube, a single cup associated with and arranged concentrically with respect to the tube and provided with an orifice through which liquid may flow into the cup when the atomizer is in place on the container, and means whereby liquid may be withdrawn from the cup and atomized by manipulation of the air bulb when the atomizer is removed as a unit from the container, said cup-shaped member being open towards said cup so that it serves to catch the liquid that drains from the surface of the atomizer when the atomizer is removed from the container and positioned for use.

3. An atomizer including a tube adapted to receive at one end an air bulb for ejecting air therethrough; a closed cup provided with a filling orifice; and a tubular member having one end in asperating relation with said tube and the other end extending into said cup and in communication therewith; said tube, cup, and tubular member being concentrically arranged, said cup being integrally attached to said tube and said tubular member being integrally attached to said cup.

4. In an atomizer the combination of a tube, an air bulb concentrically attached to one end of the tube and extending beyond the tube, a substantially cylindrical cup attached at one end to the other end of the tube and provided with an orifice in its side through which it may be filled by submerging it in a liquid and a tubular member attached to the cup, said tubular member having one end in asperating relation with the other end of said tube and its other end in communication with said cup whereby liquid may be withdrawn from the cup for atomizing by the air ejected from the tube by manipulation of the bulb.

5. In an atomizer, the combination of a tube, an air bulb attached to the tube, a cup attached to the tube and formed with a pair of chambers through one of which the tube extends and in the other of which the tube terminates, and a tube forming a passage between the chambers and terminating near the inner end of the chamber through which the first named tube extends, an opening in each of said chambers, the opening in said other chamber being aligned with the end of the first named tube whereby in one position of the atomizer air ejected from the tube by manipulation of the bulb will cause liquid in one of the chambers to be atomized and in another position of the atomizer will cause liquid in both chambers to be atomized.

6. In an atomizer, the combination of an air supply conduit, a liquid supply conduit surrounding the first named conduit, a liquid storage chamber surrounding both conduits, and an air bulb on which the conduits and chamber are mounted, said air bulb being in communication with said air supply conduit and said liquid supply conduit being in communication with said liquid storage chamber.

7. In an atomizer, the combination of an air supply conduit, a liquid supply conduit surrounding the first named conduit, a liquid storage chamber surrounding both conduits, and an air bulb on which the conduits and chamber are mounted, said air bulb being in communication with said air supply conduit and said liquid supply conduit being in communication with said liquid storage chamber, said chamber being provided with a filling orifice through which when immersed in a liquid supply the liquid chamber can be filled by compressing the bulb.

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