Jan. 2, 1951 F. POREBER 2,536,214

POCKET TYPE ATOMIZER

Filed March 5, 1949

Fig. 1

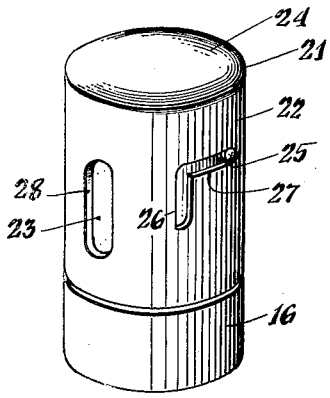


Fig. 2

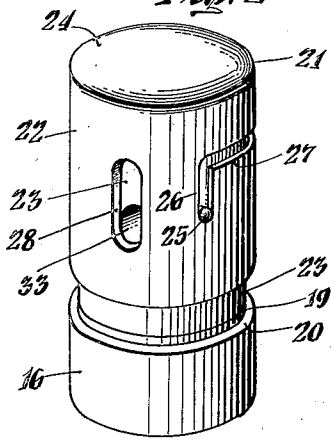


Fig. 3

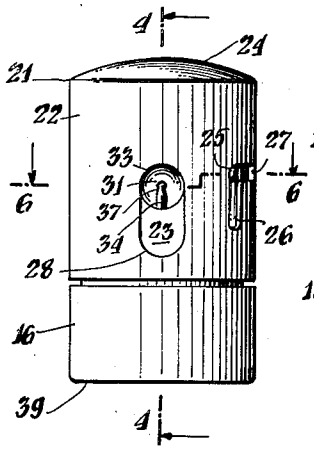


Fig. 4

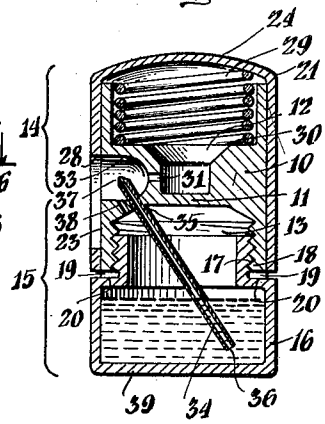


Fig. 5

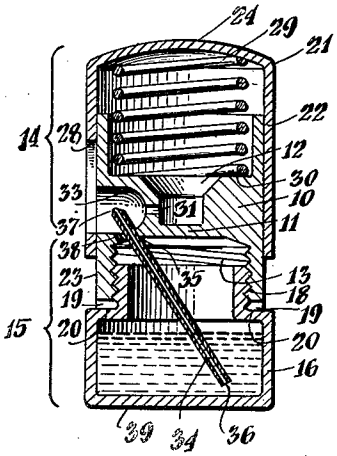
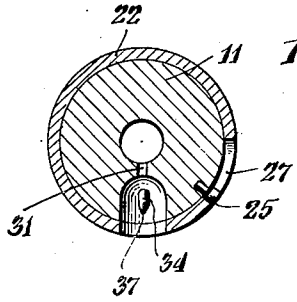


Fig. 6



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POCKET TYPE ATOMIZER

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4 Claims. (Cl. 299—88)

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This invention relates to liquid dispensers and particularly to atomizers of the type which are to be carried in a purse or pocket.

The apparatus of this invention is particularly adaptable to the dispensing of perfumes, toilet water and similar sundries, but it will be appreciated that the apparatus may be employed with equal efficacy for the dispensing of liquid medications and other liquids in finely divided liquid particles.

An important object of this invention is to provide a compact atomizer which dispenses liquid efficiently in minute particles and may be carried in a purse or pocket and which is substantially free of leakage.

Another object of the invention is to provide an atomizer which may be constructed of a relatively small number of parts and few assembly operations so as to reduce the cost of manufacture. The greater number of parts or the construction of the parts of presently available atomizing dispensers create susceptibility to mechanical failure, principally because of wearing or misplacement of parts during use.

Another important object of this invention is the provision of an article of simple and inexpensive construction, which is also particularly sturdy. In this regard the simplicity of construction and the small number of parts of the atomizer of this invention contribute markedly to its durability.

The atomizer of this invention has an air compression chamber and a liquid containing chamber which are partly defined and separated by a central member, preferably unitary, which also defines an atomizing space or chamber. The air compression chamber is defined by said central member and a cylindrical cup-like member slidably mounted thereon. The liquid containing chamber is principally defined by a cylindrical member which is fixed to and sealed by said central member. A suitable discharge port for the direction of compressed air from the compression chamber to the atomizing operation is defined by and contained within said central member. The liquid discharge to the atomizing operation or chamber is likewise through a wall of said central member, and it is a particular feature of this invention that the liquid discharge element is so disposed with relation to the liquid containing chamber that substantial leakage of liquid from said chamber may be prevented to an extent as to preclude the necessity of the use of a closure for said discharge element.

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For a more complete description of apparatus of preferred construction embodying the invention, reference is made to the drawings, in which:

Figs. 1 and 2 are perspective views of an atomizing device embodying the invention, the views illustrating, respectively, the closed and the open or operative positions;

Fig. 3 is an elevational view of the same device;

Fig. 4 is a sectional view taken along the line 4—4 in Fig. 3;

Fig. 5 is a sectional view similar to that of Fig. 4 with the cap in the raised or outward position; and

Fig. 6 is a cross-sectional view taken along the line 6—6 in Fig. 3.

Referring to Figs. 4 and 5, a central cylindrical member 10 is formed to provide two opposed open ended compartments separated by a wall or partition 11. The upper compartment 12 forms the floor and walls of an air compression chamber generally designated as 14 and the lower compartment 13 forms the roof and upper walls of a liquid containing chamber generally designated as 15. Formed in the outer surface 23 of the member 10 is a recess 33, sized to serve as a mixing or atomizing area, recess or compartment. As shown in Figs. 4 and 5, the atomizing recess 33 is positioned substantially at the division of the upper and lower compartments 12 and 13 of the central member 10. While this location is not critical from the operative standpoint of atomizing, it is highly desirable for other purposes such as easy establishment of the desired angle of the discharge member 34, simple inexpensive construction and facility of assembly.

The lower compartment 13 is closed by a cup-like member 16, provided with screw threads 17 which correspond to threads 18 formed on the central member 10 on a surface defining a portion of the lower compartment 13. The cup 16 may be detachably but fixedly secured to the lower compartment 13 by turning into place, gasket 19 being positioned on the shoulder 20 of the cup 16 to provide a liquid-tight joint. Cup 16 and compartment 13 thus define a liquid containing chamber designated generally as 15.

An upper or air compression chamber, generally designated as 14, is defined by compartment 12 and cap 21. This cap has a top portion 24 to which depends a skirt portion 22 sized to surround and slidably engage the outer cylindrical surface 23. Thus the cap 21 is adapted for reciprocal movement along the outer surface 23 of the central member 10. A projection or pin 25 protrudes from the cylindrical surface 23 of the

member 10 and is received in the vertical slot 26 cut in the skirt 22 of the cap 21, as shown in Figs. 1, 2 and 3. The slot 26 acts as a guideway for the cap 21 during its inward and outward movements and defines the limits of those movements. Horizontal slot 27 in the skirt 22 communicates with the vertical slot 26 at an extremity of the latter and provides a bayonet type locking means to hold the cap 21 in the inward position shown in Fig. 1. An elongated port 28 cut in the skirt 22 serves to expose the atomizing compartment, or recess 33 when the cap 21 is in operative position for movement along the vertical guideway 26 (see Fig. 2). A spring 29 seated within the portion 12 of the central member 10 on the shoulder 30 is thus contained within the air chamber defined by the central member and the cap 21 to resist movement of cap 21 downwardly over the member 10.

An air discharge orifice or port 31 is formed in a wall of the recess 33 and provides connection between that recess and the air compression chamber 14. This orifice or port is so located as to deliver from the air compression chamber 14 a stream of air in a selected path, according to well known principles, to effect efficient atomization. In the form here shown that path is substantially horizontal to the vertical axis of the assembly. Another port or passage 35 is provided in the wall of recess 33 to define a seat for a discharge member or tube 34 of such length that one extremity 36 extends into the liquid held in liquid chamber 15, and the other extremity 37 is positioned in the atomizing recess 33 in atomizing relation to the air port or passage 31, i. e. so that the extremity 37 is in the path of air issuing from said air passage. It will be noted that the liquid eduction tube 34 is arranged at an angle to the vertical axis of the assembly; the significance of this angular relationship will be later discussed. A small hole 38 through the well of the recess 33 serves as an air vent for the liquid chamber 15 and for other purposes hereinafter described.

In operation the liquid chamber 15 is filled with perfume or other dispensable liquid. The cap 21, which normally is retained in the inward position shown in Figs. 1, 3 and 4 by the interaction of the projection 25 and the horizontal groove 27, is rotated to register the projection 25 in the vertical slot 26. Under pressure of the spring 29, the cap moves to the outward position, as illustrated in Figs. 2 and 5. The atomizing recess 33 which is enclosed by the skirt 22 when the cap is locked in the closed position, is exposed when the cap 21 is rotated to this operative position, the opening 28 in the skirt 22 thereby being brought into register with the recess 33. The port 28 is of substantially the same width as the recess 33, but is elongated so that the recess is exposed throughout the stroke defined by the inward and outward movements of the cap 21. To operate, the atomizer may be held in the upright position shown in the drawings with the thumb and forefinger pressing against the bottom 39 and top 24, respectively. Upon the application of pressure the cap 21 moves downwardly along the outer wall of the central member 10, against the pressure of the spring 29, forcing air contained in the compression chamber 14 through the passage in a rapidly moving substantially horizontal stream or plume. The air stream moves across the liquid discharge orifice 37 and draws liquid from the tube 34, the liquid becoming admixed in minute particles with the stream or plume of air to form a fine vapor.

It will be noted that the presently contemplated embodiment of the invention is constructed of a minimum number of elements or parts and these are of simple and durable construction. In total the preferred construction shown has but seven parts, the central member 10, the liquid eduction tube 34, the pin 25, the spring 29, the cap 21, the cup 16 and the gasket 19. These parts may be conveniently reproduced in metal, plastic or other suitable material. Assembly operations are simple and may be accomplished expeditiously. The tube 34 having been assembled with central member 10, the gasket 19 is assembled in the cup 16 and the cup is screwed into the central members. Spring 29 is then placed on shoulder 30, the cap 21 is positioned around the spring and the central member, and pressure is applied to allow insertion of pin 25. It will be at once apparent that in such a simple sturdy construction there is little which can be harmed by careless or rough usage. Also, the device may be quickly taken apart for cleaning or the like by persons without mechanical skill or knowledge.

Thus the device of this invention may be readily produced at low cost and yet will give satisfactory service in the hands of the user.

A difficulty which is encountered in the use of atomizers of the type herein described is that the user carries the article in purse or pocket and is not concerned with maintaining the article in a position which will prevent leakage. Consequently it has heretofore been considered necessary to provide the eduction tube or other liquid discharge means with a closure to prevent leakage or seepage of the liquid therefrom. Such closures complicate manufacture, require registry of parts within close tolerances and are, otherwise, undesirable.

In the preferred construction of the device of this invention, closure elements are eliminated by arranging the liquid discharge means and the air vent spacially with regard to the position of the liquid containing compartment and the liquid intake means. The stated relationship may be expressed in various ways. A preferred example is shown in the drawings where the tube 34 is so positioned that its intake extremity 36 lies on a different side of the liquid containing chamber than does the delivery extremity 37, and the air vent 38. Thus, it will be noted that if the liquid is maintained below a certain level in the liquid containing chamber 15, the result will be that there is no position into which the device may be turned which will induce liquid to move through the tube 34. An additional result will be that there is no position in which the chamber 15 is not vented to compensate for changes in air pressure. To obtain the desired results the proper maximum liquid level for best operation can, of course, be indicated to the user by suitable marking on the inner surface of the cup 16.

Thus, if the device be placed on its side or upended or positioned at any angle to the vertical, either the liquid receiving end 36 or the discharge end 37, or both, of the tube 34 will be above the level of the liquid in the liquid containing compartment and the only leakage or seepage to be expected will be of any liquid which may have been in the tube 34. Also, either the air vent 38 or the liquid receiving end 36, or both, will be above the liquid level to assure adequate ventilating, to compensate for changes in air pressure due

to changes in temperature or barometric changes. Leakage or seepage through the air vent 38 is of course maintained at a minimum by limiting the size of this vent, the size shown in the drawing being exaggerated for purposes of illustration. Leakage and evaporation are also kept to a minimum by the close fitting skirt portion 22 which covers the atomizing recess 33 when the cap 21 is in the closed inward position shown in Fig. 1. The enclosing of the recess 33 effects an entrapment of the air in the recess so that the normal evaporation process resulting from air flowing over the discharge orifice 36 and the vent 38 is reduced to a minimum. In regard to the covering of the atomizing recess 33 with the skirt 22 when the atomizer is not in operation, it will be noted that the cap serves the additional purpose of a dust cover to protect the small orifices in the recess 33 from dust particles.

The tube 34 need not be straight as shown in the drawings although this is of course the most convenient shape with regard to the atomizing action and ease of assembly. However, whether the eduction tube be straight, curved or angled, it is the relative position of the intake and discharge ends thereof which are of importance to the preferred aspect of the invention. This relative position can be defined as one in which the intake orifice and the discharge orifice of the eduction tube lie on opposite sides of any plane which includes the vertical axis of the liquid containing chamber and does not include both the said intake and discharge orifices. The preferred relative position of the air vent is the one in which the vent is adjacent the liquid discharge orifice so that its relative position with regard to the intake orifice is similar to that of the discharge orifice.

In an atomizing device of the general type herein discussed there is some tendency for droplets of atomized liquid to collect in or about the atomizing area. In the preferred practice of this invention, this accumulation of moisture is minimized by placing the air vent for the liquid chamber and the air discharge port for the air compression chamber on opposite sides of the discharge orifice of the eduction tube 34 and by sloping the eduction tube in the direction of the path or stream of air moving out from the air discharge orifice 31 and spacing the liquid discharge orifice 37 apart from the air discharge orifice 31. Such a construction is shown in the drawings, the discharge passage 31 opening in the recess on one side of the discharge tube 34 while the air vent 38 opens into the recess on the opposite side of said tube. The reason why such construction minimizes the moisture accumulation in the atomizing area is not fully understood. However, the positioning of the eduction tube 34 at an angle in the direction of the path of air moving out of the air discharge passage 31 is believed to assist in drawing the liquid from the tube and to impede any liquid being drawn from the tube by a back draft into the passage 31. While the air vent may be located at other points either in or out of said atomizing area, an advantage is obtained when the air vent is located as described.

No attempt has been made to specify or describe the exterior ornamentation of the atomizer which may be decorated in any suitable manner. However, the compactness and simplicity of exterior contour add materially to the beauty as well as practicality of the device.

It will be appreciated that numerous variations in the form of the illustrated device are possible, the preferred construction only being illustrative.

What is claimed is as follows:

1. In an atomizer, a central portion defining two oppositely disposed open-ended compartments and an atomizing recess, two cup-like closure members, one closure member slidably engaging the outer surface of the central portion and closing one of said open compartments to form an air compression chamber, the other closure member detachably secured to the inner surface of the central portion, closing the other of said open-ended compartments to form a liquid receiving chamber, an air discharge port disposed in the atomizing recess, for the direction of compressed air from the air compression chamber, an air vent disposed in the atomizing recess connected to the liquid chamber, said vent being spaced apart from the air discharge port, a liquid discharge orifice disposed in the atomizing recess between the air vent and the air discharge port and in atomizing relation to the air discharge port, an intake orifice, connected to the liquid discharge orifice and disposed in the liquid receiving chamber, the intake orifice and the liquid discharge orifice being disposed in relation to the liquid receiving chamber so that they lie on opposite sides of any plane which passes through the vertical axis of the liquid receiving chamber which does not include both the said intake and discharge orifices.

2. A pocket type atomizer comprising a hollow cylindrical central member having a dividing partition disposed therein to define the floor of an air compression chamber and the roof of a liquid containing chamber, a cap with a skirt portion, said cap being mounted on one end of the cylindrical member and adapted to define the air compression chamber, said skirt portion in relatively tight but sliding engagement with the outer cylindrical surface adjacent said end and adapted to slide inwardly and outwardly of said end and rotate relative to said cylindrical member, spring means positioned in the compression chamber adapted to urge the cap outwardly of said end of the central member, means to guide the cap during its inward and outward movement and associated means to lock the cap in the inward position when the cap is rotated out of operative position, a cup releasably fixed at the other end of the central member and adapted to define the liquid container, an atomizing recess provided in the cylindrical surface of said central member, said recess being covered by the skirt of the cap when the cap is rotated to the locked position, an air discharge port adapted to deliver a stream of air from the compression chamber into the atomizing recess, a liquid discharge tube leading from the liquid chamber into the atomizing recess, said tube being sloped in the direction of the stream of air issuing from the air discharge port, a liquid discharge orifice disposed in the path of the stream and a liquid intake orifice positioned in the liquid containing chamber, an air vent connecting the liquid chamber and the atomizing recess positioned adjacent the liquid discharge tube, and an opening in the skirt of the cap adapted to expose the atomizing recess through the inward and outward movements when the cap is rotated to the operative position.

3. In an atomizer, a unitary central cylindrical portion shaped to define two oppositely disposed cup-like open-ended compartments, the outer cylindrical wall of said central portion being

shaped to define an atomizing recess opening outwardly thereof, means to close one of said compartments to form a liquid receiving chamber and means slidably mounted on the outer cylindrical wall of said central portion to close the other of said compartments to form an air compression chamber, a spring positioned in said air compression chamber to resist the said slidably mounted means in its air compression movement, means for limiting the movement outward from the central cylindrical portion by the slidably mounted means and for locking the slidably mounted means in an inward position relative to said central portion, an air discharge orifice positioned in said atomizing recess adapted to deliver a stream of air from the compression chamber, a liquid eduction tube having a discharge orifice in the atomizing recess and in the path described by the stream of air from the air discharge orifice and an intake orifice located in the liquid containing chamber at a point to be contained within liquid disposed in said chamber when the chamber is held in the vertical position, said tube being so shaped and disposed that its discharge orifice and intake orifice lie on opposite sides of any plane which includes the vertical axis of the liquid containing chamber except a plane which also includes both of said orifices, and an air vent adapted to connect the liquid containing chamber and the atomizing recess, said air vent being disposed adjacent the liquid discharge tube.

4. A pocket-type atomizer comprising, in combination, a hollow cylindrical member, a partition disposed therein dividing the cylindrical member into an upper compartment and a lower compartment, a cap with a skirt portion mounted on the upper end of the cylindrical member, the skirt portion engaging the outer surface of said member in sliding contact, the cap and the upper compartment defining an air compression chamber, a cup releasably secured in the lower end of the cylindrical member, the cup and the

lower compartment defining a liquid containing chamber, said liquid containing chamber adapted to be partly filled with liquid, a recess in the outer surface of the cylindrical member defining an atomizing compartment, an air discharge port disposed in the wall of the recess, said port being connected to the air compression chamber and adapted to discharge a stream of air in a selected path, a liquid eduction tube extending into the recess and having a discharge orifice disposed in the path of the stream of discharged air, the tube extending diagonally into the liquid containing chamber entering at one end of the chamber adjacent to the wall at one side thereof and extending through the vertical axis of the liquid chamber to a point adjacent the opposite side of said chamber and having an intake orifice at its lower end, and an air vent disposed in the wall of the atomizing recess and connecting said recess with said liquid containing chamber; said air discharge port, said discharge orifice, and said air vent all being disposed in the same vertical plane.

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