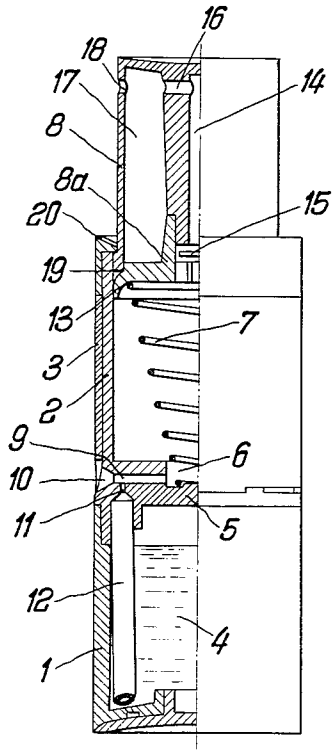
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POCKET-ATOMIZER

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POCKET-ATOMIZER

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Known in the prior art are liquid-atomizers, having a rapid stream of air to suck up liquid through a borehole or tube which extends at right angles with respect to the direction of the stream. Also known are such atomizers having an angle between the direction of the stream and the borehole or tube which is less than 90°. Through selection of the diameter of the borehole and the relation between the cross-section of the air-path and the cross-section of the bore-hole, the resultant mist can be controlled with respect to the size of its droplets. In previous designs, the human lung, a piston pump or a rubber ball having been employed as the source of the air-stream. Such atomizers are particularly used for perfume and hairtonics. The operation of such atomizers by means of propulsion gases has also become known.

It is also known that pocket atomizers are troublesome due to the fact that, in contrast to other atomizers, they have to close tightly and must be protected against leaking because they are used in all positions. In these cases, it is not possible to provide an airhole, as employed in the prior art, for the purpose of preventing a vacuum in the storage container during the extraction of fluids.

In order to eliminate these difficulties, an atomizer has become known using a vertically gliding pump-piston, which is brought into non-operating position by a spring, said pump-piston forcing an air-stream through a wick which is saturated with the medium to be atomized. The wick, however, has to be presaturated with the material to be atomized by holding the atomizer upside-down and operating it repeatedly. The wick can only absorb a small quantity of this material, and becomes clogged in its capillaries in a comparatively short time, so that a satisfactory operation of the atomizer is not secured in the long run, not counting the inconvenience of always turning the container upside down before use in order to saturate the wick.

The present invention avoids these disadvantages by providing an atomizer designed with a vertical pump-piston, which is brought into non-operating position by a spring, with a lateral discharge-point in the non-moving part, so designed that the piston makes contact with the outside air through an orifice which is preferably lateral, said orifice being closed during the operation of the piston through a flutter-valve protectively arranged inside the piston, by providing communication between the gliding-space of the piston and the spray opening, and by providing as known in the prior art, an ascending tube ending in the orifice, said tube extending down to the bottom of the storage-container.

Due to the flutter-valve it is no longer necessary, as it is for some of the pocket-atomizers known in the prior art, to close the piston-bore during the pressure stroke, nor to open it again during the suction-stroke.

On these known designs, an imperfect closing during the pressure stroke, resulted in a correspondingly lower effect of the pumping-action, and an incorrectly timed opening of the hole during the return-stroke of the piston

caused a sucking of fluid into the pumping-space, thereby impairing the effectiveness of the atomizer.

The present invention eliminates these disadvantages completely, and also permits operation with one hand.

Thus, the lateral arrangement of the piston-bore proved itself particularly effective.

The flutter-valve is protected through its position in a central-bore hole which, through a cross-bore, is connected with an outer chamber, which, in turn, is in communication with the outside air, through a cross-bore. An ingress of dirt, which might render the sensitive membrane of the valve ineffective, is thereby securely prevented. The discharge point of the ascending tube, which reaches down to the bottom, is dimensioned so small that no fluid can leak out without an effective suction of a passing air-stream. Since the subject of the invention, thereby, does not make a pressure-compensation of the fluid-chamber through a compensation-bore necessary, the atomizer cannot leak statically in any position.

Hereafter, the invention is described in detail by means of an example of operation, and the drawing which is a vertical view of the atomizer of the invention partly in cross section.

The atomizer is composed of the stationary part, which, in this case, consists of the fluid-container **1**, the mid-section **2** and the lock-ring **3**. In the fluid-container **1** is the fluid-chamber **4**, which is tightly sealed through the bottom **5** of the mid-section **2**. The connection between fluid-container and mid-section may be a screw-, adhesive-, or an equally effective connection. The bottom **5** of the mid-section **2** has a large, centrally located bore **6** which does not extend therethrough, and in which, preferably, a spring **7** braced; said spring **7**, in turn, is braced at its upper end against a sleeve **8***a*. A thin horizontal bore **9**, ending in a jet-opening **10** extends from the central bore **6**. Into the horizontal bore **9** a jet **11** opens, which is at the end of the ascending tube **12**. The piston **8** glides snugly through the mid-section **2** and for example the end of the sleeve **8***a* may be formed as a lip-gasket **13**. Provided in the piston **8** is a bore **14** which is preferably central and in which a flutter-valve **15** is arranged so that the piston and the sleeve form the chamber for the flutter-valve. Thereby the flutter-valve is put into motion through operating the piston. The bore **14** communicates with an ante-chamber **17** of the piston **8** through a compensating aperture **16**. The ante-chamber **17**, in turn, communicates with the outside air, through a suction aperture **18**.

It may be advisable to offset the bores **18** and **16**, with respect to each other, in preference to arranging them in a line. On the underside, above the lip-gasket **13**, the piston **8** has a shoulder **19**, which, with the spring untensioned, braces itself against a corresponding shoulder **20** of a lock-ring or the mid section **2**.

In accordance with the invention, the device operates as follows:

If the piston **8** is pressed down, the flutter-valve **15** is forced against its seat and closes the bore **14**. Therefore, the compressed air will only be able to escape through the bores **6** and **9** and jet-opening **10**, and thereby will carry along the fluid sucked up through the ascending tube **12** and jet **11**. Through adjustment of jet **11** and bore **9**, the size of the droplets in the mist, thus created, can be controlled. The quantity of fluid drawn through one pump-stroke is so small, that the reduction of pressure occurring thereby in the fluid-chamber **4** is practically unimportant and of no effect. When the piston returns upwardly the pressure is compensated without difficulty in the fluid container through the ascending tube **12**, the jet **11**, the boring **9** and the spray-opening **10**, which is in communication with the outside air.

If the pocket-atomizer is operated in upright position, fluid is sucked up through the ascending tube. If the atomizer is operated in any other position whatsoever, for instance standing upside down, experience has shown that enough fluid reserve is contained in the ascending tube **12** for several sprays.

We claim:

1. A pocket atomizer comprising a casing including a liquid reservoir and a pump chamber, a piston movable within said chamber between a first position of maximum volume and a second position of minimum volume of said chamber, resilient means to normally urge said piston towards said first position an air passage terminating in a spray opening and connecting said chamber with the outside atmosphere, a discharge nozzle connected to said reservoir and terminating in said passage substantially transversely thereto, whereby to withdraw liquid from said reservoir by the airstream passing through said passage upon displacement of said piston within said chamber, said piston being composed of a pair of concentric inner and outer hollow cylindrical members each provided with a venting opening in the cylindrical wall thereof, to provide a pair of separate communicating inner cylindrical and outer annular spaces with said inner space forming a passageway connected to said pump chamber, and a check valve mounted within said passageway, to block communication of said chamber with the outside atmosphere, excepting through said passage, upon displacement of said piston towards said second position and to connect said chamber with the outside atmosphere upon displacement of said piston towards said first position, respectively.

2. A pocket atomizer comprising an oblong casing having a separating wall, to provide a liquid reservoir and a pump chamber, a piston within said chamber being normally resiliently urged towards a first position of maximum volume of said chamber and movable to a second position of minimum volume of said chamber, a lateral air passage within said wall terminating in a spray opening and connecting said chamber with the outside atmosphere, a discharge nozzle connected with said reservoir through a feeding tube and terminating in said passage substantially transversely thereto, whereby to withdraw liquid from said reservoir by the airstream passing through said passage upon displacement of said piston within said chamber, said piston being composed of a pair of concentric inner and outer hollow cylindrical members each provided with a venting opening in

the cylindrical wall thereof, to provide a pair of separate communicating inner cylindrical and outer annular spaces with said inner space forming a passageway connected to said pump chamber, and a check valve mounted within said passageway to block communication of said chamber with the outside atmosphere, excepting through said passage, upon displacement of said piston towards said second position and to connect said chamber with the outside atmosphere upon displacement of said piston towards said first position, respectively.

3. A pocket atomizer comprising a casing including a liquid reservoir and a pump chamber, a piston within said chamber normally resiliently urged towards a first position of maximum volume enclosed by said chamber and movable to a second position of minimum volume enclosed by said chamber, an air passage terminating in a spray opening and connecting said chamber with the surrounding atmosphere, a discharge nozzle connected to said reservoir and terminating in said passage substantially transversely thereto, whereby to withdraw liquid from said reservoir by the airstream through said passage during displacement of said piston within said chamber, said piston being composed of an inner hollow member forming a passageway connected to said pump chamber and an outer hollow member enclosing said inner member, to provide an intermediate space between said members, said inner member having an opening connecting said passageway with said intermediate space and said outer member having an opening connecting said intermediate space with the surrounding atmosphere, and a check valve mounted in said passageway to block communication of said chamber with the surrounding atmosphere during displacement of said piston towards said second position and to connect said chamber with the surrounding atmosphere during displacement of said piston towards said first position, respectively.

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