

[54] LIQUID PERFUME ATOMIZERS

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[57] ABSTRACT

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A liquid atomizer comprises a first cylinder containing a hollow, first piston, an atomizing nozzle communicating with the hollow piston and a second cylinder formed in a recess of the first piston and communicating with the interior thereof. A second piston is slidable in the second cylinder and valve means connected to the second piston serve to block communication between the hollow piston and the nozzle. A spring is provided to bias the valve means to close off the communication with the nozzle. The second cylinder is formed in an extension of the first piston of larger cross-section than the main part of the piston. The two cylinders preferably have the same section.

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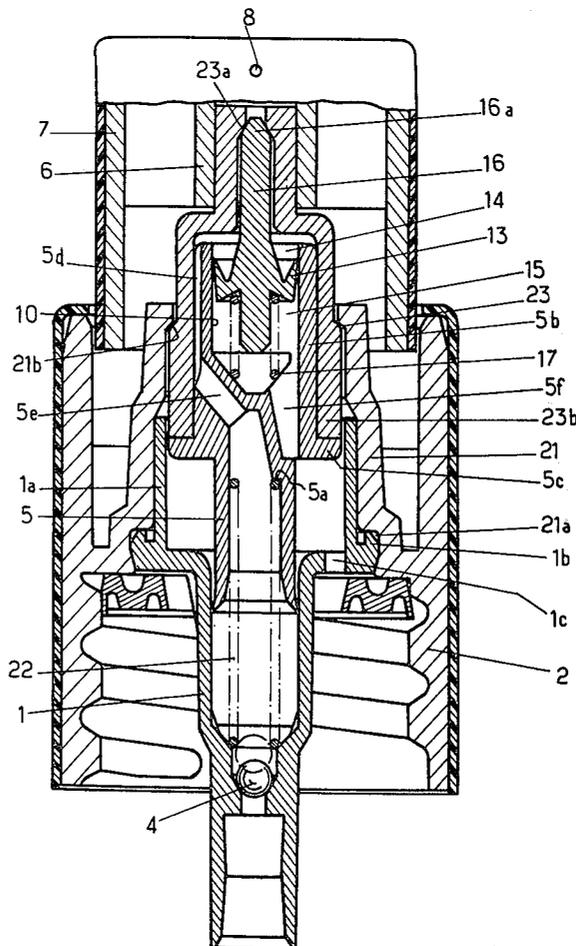
[58] Field of Search ..... 239/320, 321, 349, 340,  
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 222/321, 378, 380, 384, 385; 417/549

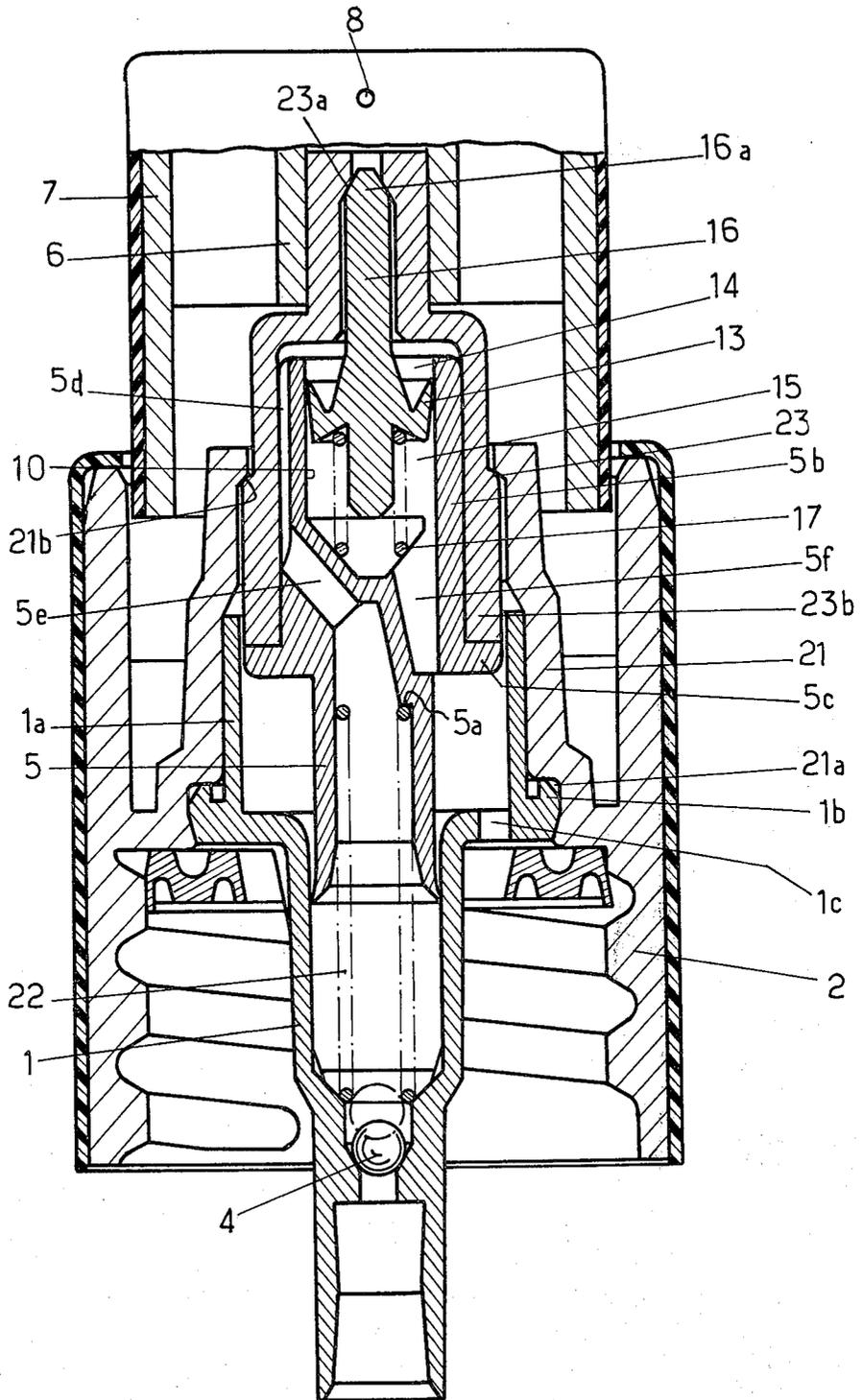
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7 Claims, 1 Drawing Figure





## LIQUID PERFUME ATOMIZERS

## BACKGROUND OF THE INVENTION

## 1. Field of the Invention

This invention relates to liquid atomizers, particularly of perfume.

## 2. Description of the Prior Art

A liquid atomizer has been proposed which comprises a hollow, first, piston slidable in a first cylinder, an atomizing nozzle communicating with the hollow piston, a second cylinder of smaller cross-section than the first cylinder and communicating with the first cylinder, a second piston slidable in the second cylinder, valve means connected to the second piston and disposed to interrupt communication between the first cylinder and the nozzle, a first spring acting on the second piston and biasing the valve means to a position in which the said communication is interrupted, a dip tube communicating with a space defined by the two cylinders through a non-return valve, the second cylinder being disposed within the first piston and being movable with respect to the first cylinder, and a second spring acting to bias the two cylinders apart. When the first piston is displaced, the liquid within the first cylinder is passed into the second cylinder in which the pressure rises.

The second piston tends to move within its cylinder against the action of resilient means which act thereon. When this pressure reaches a sufficient value to balance this action, the second piston is displaced while acting on the valve which itself is so connected that the cylinders are placed in communication with the atomizing nozzle. In the prior proposal the first piston has a constant diameter so that the second cylinder necessarily has a section less than that of the first. But this difference in section gives rise to a disadvantage. The velocity of displacement of the second piston is substantially higher than that of the first piston. It follows that the valve is suddenly displaced from its seat, which gives rise to a sudden supply of liquid to the nozzle; the atomization is thus poor and the nozzle spatters or spits, such movement arising even when the first piston is displaced very slowly.

The problem to be solved by the present invention is to provide an atomizer which overcomes this disadvantage.

According to the present invention, the second cylinder is formed in an enlarged part of the first piston, which enables this cylinder to be given the desired section.

The two cylinders preferably have substantially the same section.

In one advantageous embodiment of the invention, the first cylinder is connected to the second by a bore formed within the thickness of the enlarged part of the first piston.

## BRIEF DESCRIPTION OF THE DRAWING

An embodiment of an atomizer in accordance with the present invention will now be described, by way of example, with reference to the accompanying drawing the sole FIGURE of which is a longitudinal sectional view of the atomizer.

## BRIEF DESCRIPTION OF THE PREFERRED EMBODIMENT

The atomizer preferably for perfumes includes a cylinder 1 which communicates and is preferably integral with a dip tube, the cylinder and tube communicating through the intermediary of a non-return valve 4. A hollow piston 5 is slidable within the cylinder. The cylinder 1 comprises a portion 1a of larger cross-section than the portion thereof which receives the piston 5 and is fitted in a sleeve 21 rigid with an internally-screwed plug 2. The portion 1a has an external collar 1b which is a force fit or snap fit in an internal, annular, recess 21a of the sleeve 21. A spring 22 extends between the inner end of the cylinder 1 adjacent the valve 4 and an internal shoulder 5a of the piston 5.

The piston 5 extends upwardly as a part 5b of larger diameter than the part slidable in the cylinder 1 and is provided at its end adjacent the part 5 with a collar 5c. The latter supports a sleeve 23 which surrounds the part 5b and of which an upper end portion, of reduced diameter, is secured in a tube 6 which communicates with a nozzle 8.

A cylindrical hollow space 10 is formed within the enlarged part 5b of the piston 5 and this space 10 constitutes the second cylinder in which is slidably mounted a piston 13 dividing this cylinder 10 into two chambers 14 and 15. The piston 13 is rigid with a rod 16 which traverses with a predetermined clearance the reduced diameter end portion of the sleeve 23b and of which an end portion 16a constitutes a valve arranged to engage a seat 23a formed within the sleeve 23b. A spring 17, interposed between the base of the chamber 15 and the piston 13, biases the valve 16a into abutment with its seat 23a. The chamber 14 which is defined by the sleeve 23b, communicates with the hollow piston 5 through a groove 5d provided in the outer face of the enlarged part 5b and through an internal bore 5e of this enlarged part.

The chamber 15 communicates with the interior of the atomizer reservoir on which the plug 2 is mounted, through a passage 5f formed in the enlarged part 5b which communicates in turn with the interior of the enlarged part 1a of the cylinder 1, and with the exterior of the piston 5 through an aperture 1c provided in the base of this enlarged part 1b. The sleeve 23b comprises an external shoulder 23 arranged to abut an internal shoulder 21b of the sleeve 21.

In its rest position, the spring 22 biases the piston 5 to its upper position and, therefore, the shoulder 23 against the shoulder 21b. The spring 17 biases the valve 16a against its seat 23a.

Assuming the atomizer to be ready for use, the user presses on a push-button 7 which drives downwardly the piston 5 together with its sleeve 23b. The liquid contained in the cylinder 1 is thus supplied to the chamber 14 through the bore 5e and the groove 5d. Since the valve 16a is seated on its seat 23a, the liquid cannot flow to the nozzle 8. When the pressure in the chamber 14 balances the force exerted by the spring 17, the piston 12 is displaced downwardly so that the valve leaves its seat and the liquid under pressure can then flow to and out of the nozzle 8. This movement takes place at a speed which is substantially equal to that of the movement caused by the pressure on the button 7. At the end of the stroke of this button, the

pressure falls and the valve 16a is returned to its seat by the spring 17.

When the user releases the button 7, the spring 22 returns the piston 5 and the sleeve 23b into their initial positions so that the shoulder 23 of this sleeve abuts against the shoulder 21b of the sleeve 21. During this movement, the liquid is aspirated from the reservoir (not shown) into the cylinder 1 through the non-return valve 5.

During the movement of the piston 5, air can enter the reservoir to replace the liquid withdrawn by passage through the annular space lying between the sleeve 23b and the sleeve 21, and then through the hole 1c.

Furthermore, if the flexible sealing lips of the piston 13 are not fluid-tight, the liquid which enters the chamber 15 can return to the reservoir by passage through the space 5f and the hole 1c.

I claim:

- 1. In an atomizer for perfumes and other liquids, means defining a first cylinder forming a pump chamber, a non-return valve, a dip tube communicating with the first cylinder through the non-return valve, the dip tube being arranged to extend into the liquid to be atomized, a hollow, first, piston slidable in the first cylinder, an extension, of increased cross-section, to the first piston and defining a second cylinder, a second piston slidable in the second cylinder, an atomizing nozzle, a valve controlling communication between the first cylinder and the atomizing nozzle, said second piston being connected to the valve, and resilient means acting on the second piston and biasing the valve into a position in which communication from the first cylinder to the nozzle is interrupted.
- 2. An atomizer according to claim 1, wherein the two cylinders have the same cross-section.
- 3. An atomizer according to claim 1, wherein the first

cylinder communicates with the second cylinder through a bore formed in the extension of the first piston.

4. An atomizer according to claim 1, comprising a spring disposed between the base of the first cylinder and the first piston.

5. An atomizer according to claim 1, wherein the extension of the piston is formed with a passage which is in communication with the liquid to be atomized and leads into that one of the chambers formed in the second cylinder by the second piston which chamber is cut off from the first cylinder.

6. An atomizer according to claim 1 comprising a push-button for operating the atomizer, a first sleeve carried by and surrounding the said extension and having an external shoulder, and a second sleeve rigid with the push-button and having an internal shoulder, said first and second sleeves being engageable through their respective shoulders.

7. A liquid atomizer comprising a first cylinder, a hollow, first, piston slidable in the first cylinder, an atomizing nozzle communicating with the hollow piston, an extension of the first piston defining a recess which forms a second cylinder communicating with the first cylinder, said extension having a larger cross-section than the first piston, a second piston slidable in the second cylinder, valve means connected to the second piston and disposed to interrupt communication between the first cylinder and the nozzle, a spring acting on the second piston and biasing the valve means to a position in which the said communication is interrupted, a non-return valve, and a dip tube communicating with a space defined by the two cylinders through the non-return valve.

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