United States Patent [19]

Boris

[11] **3,774,849**

[45] **Nov. 27, 1973**

[54] **ATOMISERS FOR PERFUME AND OTHER LIQUIDS**

[75] Inventor: **Michel Boris,** Paris, France

[73] Assignee: **Societe Technique de Pulverisation,** Paris, France

[22] Filed: **Aug. 10, 1972**

[21] Appl. No.: **279,664**

[30] **Foreign Application Priority Data**

Aug. 19, 1971 France 7130271

[52] **U.S. Cl.** **239/338,** 239/357, 222/385, 222/321

[51] **Int. Cl.** **A61m 11/06**

[58] **Field of Search** 239/355–363, 333, 338; 222/383–385, 321

[56] **References Cited**

UNITED STATES PATENTS

3,239,151	3/1966	Jokelson	239/361 X
3,608,788	9/1971	Tanaka	222/384
3,627,206	12/1971	Boris	222/385
3,463,093	8/1969	Pfeiffer et al.	222/321 X

Primary Examiner—Allen N. Knowles
Assistant Examiner—Gene A. Church
Attorney—William D. Lucas

[57] **ABSTRACT**

An atomiser for dispensing perfume or other liquid comprises a pump in the form of a piston slidable in a cylinder, liquid being discharged only when a predetermined pressure exists within the cylinder. Ridges on the inner surface of the cylinder cause deformation of the piston at the end of its compressive stroke; such deformation causes air-escape passages to be formed between the piston and cylinder to facilitate priming of the pump.

3 Claims, 4 Drawing Figures

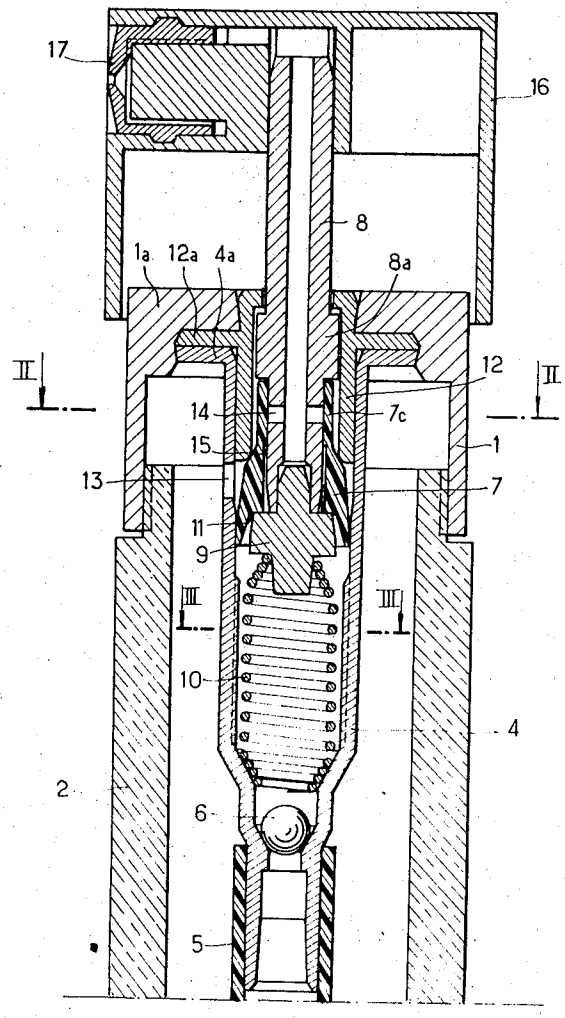


FIG. 1

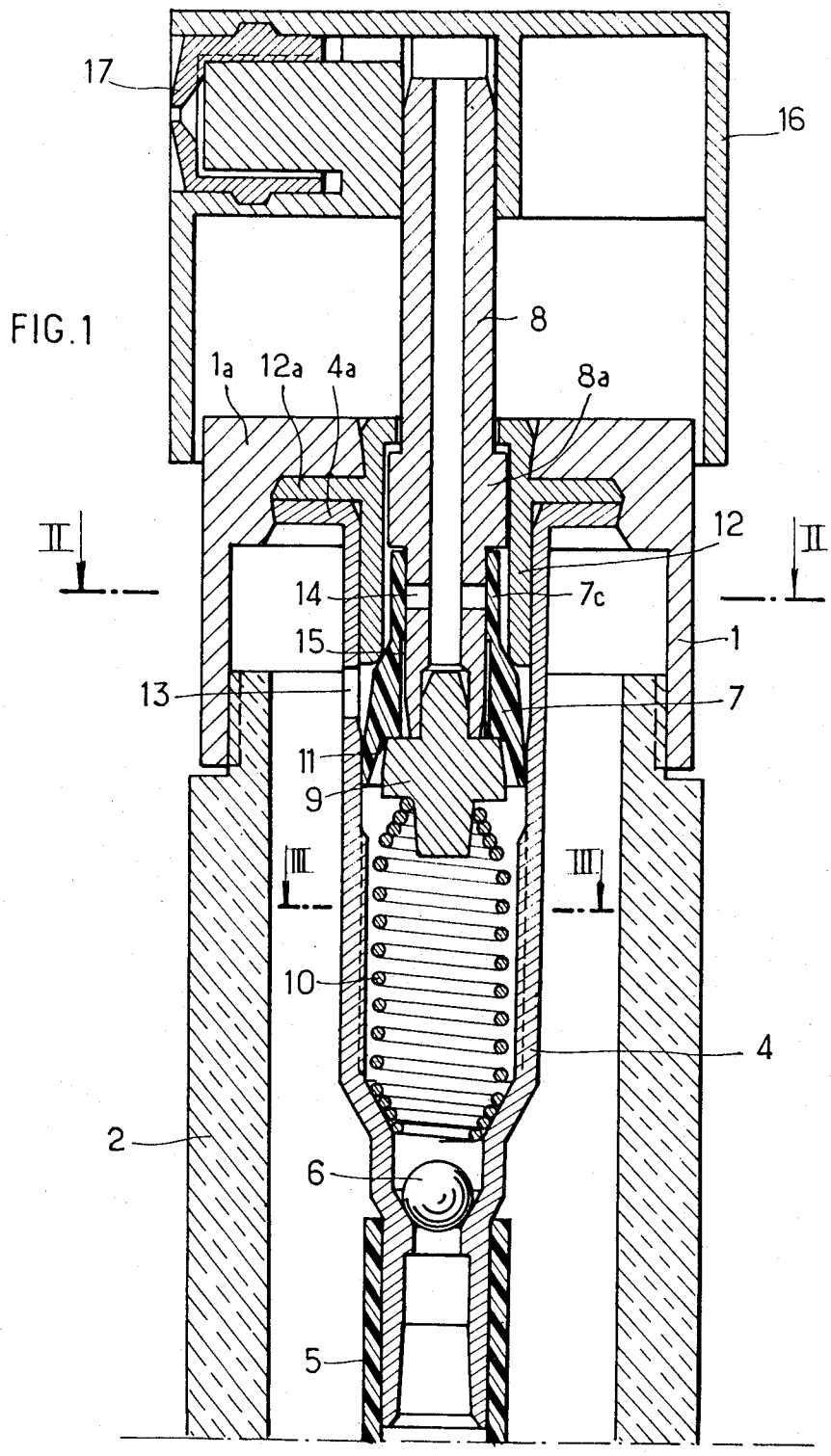


FIG. 2

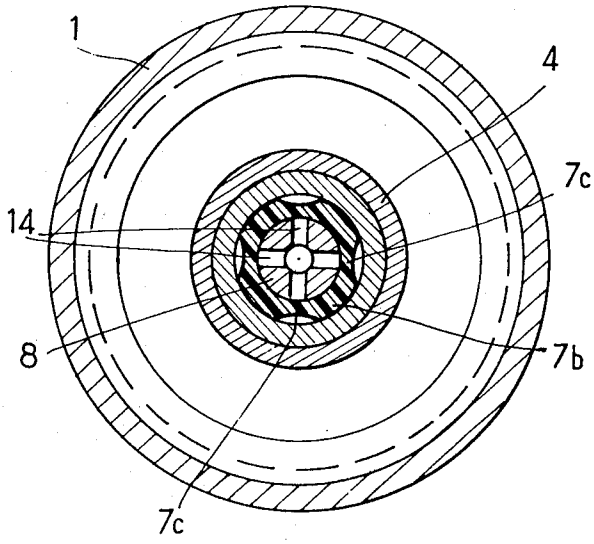


FIG. 3

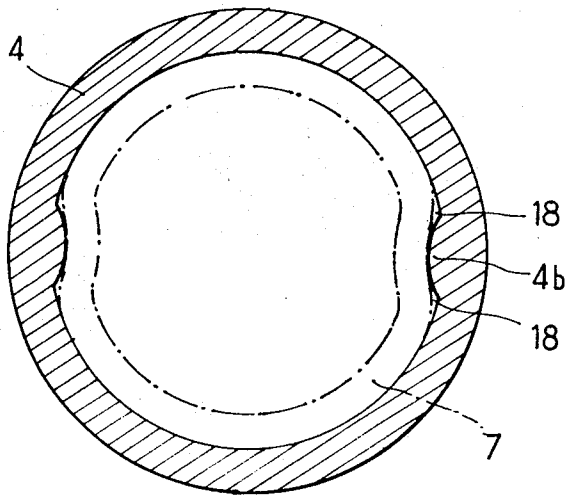
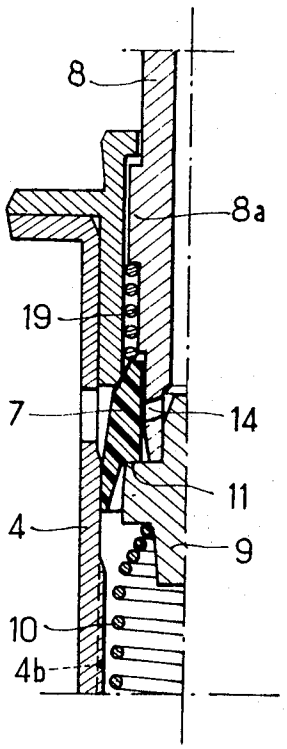


FIG. 4



ATOMISERS FOR PERFUME AND OTHER LIQUIDS

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention relates to atomisers for discharging a spray of liquid, for example perfume.

2. Description of the Prior Art

One previously proposed atomiser comprises a pump chamber which is connected to a liquid container through a non-return valve and in which are fitted, with freedom to slide, a hollow piston connected to an atomiser nozzle, a shut-off member for isolating the nozzle from the pump chamber, spring-action components which seek to maintain the said member in its closed position, and means whereby the pressure within the chamber can be used to move the shut-off member to its open position.

The pump chamber is normally isolated from the atomiser nozzle. When the piston is forced into that chamber, the pressure of the liquid within rises, since the non-return valve prevents that liquid from returning to the container. Once that pressure is sufficient to overcome the action of the spring-action components, communication is established between the pump chamber and the nozzle. The liquid contained in the pump chamber is thus not vapourised until its pressure has reached a particular level, so as to prevent the liquid from forming into non-vapourised drops, as would occur if the pump chamber were placed in communication with the nozzle directly the piston movement began. The same applies to the final stage of the piston movement, the shut-off member being caused by the spring-action components to return to its closed position, thereby preventing communication between the pump chamber and the nozzle, while the pressure within the chamber is still at a certain level.

This previously proposed atomiser is, however, difficult to prime since, at the outset, the pump chamber contains nothing but air. The rise in pressure associated with movement of the piston is insufficient to overcome the action of the spring-action components and move the shut-off member to its open position, so that the compressed air is unable to escape. All that happens when the piston is restored to its starting position is that this air expands, no liquid being drawn into the pump chamber.

According to the present invention, there is provided in an atomiser, means defining a pump chamber, a non-return valve, means connecting the pump chamber to a liquid container through the non-return valve, a hollow piston having an active part slidable in the pump chamber, atomiser nozzle means connected with the piston, closure means normally isolating the nozzle means from the pump chamber, said closure means being releasable by pressure within the chamber to permit communication between the chamber and the nozzle means, and ridges defined on the inner surface of the chamber, the axial length of the ridges being at least equal to the length of the active part of the piston.

The result of this arrangement is that the piston undergoes transverse deformation as it reaches the end of its stroke, resulting in the formation of passages through which the air can escape between the pump chamber wall and the piston.

Further according to the present invention, there is provided in an atomiser, means defining a pump chamber, a non-return valve, means connecting the pump chamber to a liquid container via the non-return valve, piston means mounted in the pump chamber, nozzle means arranged for communication with the pump chamber, valve means closable to prevent communication between the nozzle means and the pump chamber, said valve means being opened when a predetermined pressure exists in the chamber, and a projection arranged on the inner surface of the chamber to cause relative deformation between the piston means and the chamber at the end portion of the compressive stroke of the piston means such that an air escape passage is defined between the piston means and the chamber.

BRIEF DESCRIPTION OF THE DRAWINGS

Embodiments of the invention will now be described, by way of example only, with reference to the accompanying diagrammatic drawings, in which:

FIG. 1 is an axial section of an atomiser in accordance with the invention;

FIG. 2 is a section taken on line II—II in FIG. 1;

FIG. 3 is a section, to an enlarged scale, taken on line III—III in FIG. 1; and

FIG. 4 is a fragmentary axial section of another form of atomiser in accordance with the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The atomizer shown in FIG. 1 comprises a cylindrical member 1 arranged to be attached to a container 2, which holds the liquid to be dispensed, so as to form a stopper for the container. For this purpose, the member 1, made of plastics, for example, is threaded and can be screwed on to the neck of the container 2.

Within the member 1 is a cylindrical pump chamber 4 having at its upper end a flange 4*a* which is held tightly against an inner shoulder 1*a* on the member 1. The lower part of the pump chamber 4 is extended by a dip tube 5, a non-return valve 6 being interposed between the pump chamber 4 and the dip tube 5.

A sleeve 7, which constitutes a piston,is slidable in the pump chamber 4, and a tube 8 is slidable within the sleeve 7, the lower end portion of the tube 8 carrying a valve 9. Movement of the sleeve 7 in relation to the tube 8 is limited in one direction by the valve 9 and in the other by an annular shoulder 8*a* on the tube 8. A spring 10, interposed between the valve 9 and the lower end portion of the pump chamber 4, biases the valve 9 against a seat 11 at the end of the sleeve 7.

The outer diameter of the annular shoulder 8*a* is less than the inner diameter of a bush 12, fitted into the upper end portion of the pump chamber 4 and carrying a flange 12*a*, which is gripped between the shoulder 1*a* of the member 1 and the flange 4*a* of the pump chamber.

The sleeve 7 has a portion 7*a* with a frusto-conical outer surface, which, in the inoperative condition of the atomiser, bears against the lower rim of the bush 12. An aperture 13 is formed in the wall of the pump chamber 4 adjacent the sleeve 7.

The frusto-conical portion 7*a* of the sleeve 7 is extended by a cylindrical portion 7*b* which enables the sleeve 7 to slide with a considerable degree of friction on the tube 8. Parts 7*c* of the cylindrical portion 7*b* are of reduced thickness and cover openings 14 in the tube 8 as shown in FIG. 2. A gap 15 is provided between the tube 8 and the frusto-conical portion 7*a*.

The upper end portion of the tube **8** carries a press-knob **16** and is in communication with an atomiser nozzle **17**, secured in the side of the press-knob **16**.

In the drawing, the atomiser is shown in an inoperative condition. The spring **10** holds the valve **9** against its seat **11** and also maintains the frusto-conical portion **7***a* of the sleeve **7** in contact with the rim of the bush **12**, so that the aperture **13** is blocked. The pump chamber **4** and the interior of the container **2** are thus isolated from the atmosphere and no leakage is possible.

To operate the atomiser, the press-knob **16** is depressed whereupon the valve **9** leaves its seat **11**, but the liquid contained in the pump chamber **4** cannot pass from that chamber into the tube **8**, because the thinned wall portions **7***c* are pressed against the openings **14**.

When the shoulder **8***a* of the tube **8** engages the portion **7***b* of the sleeve **7**, the latter compresses the liquid in the chamber **4**. The liquid pressure acts on the thinned wall portions **7***c*, and when that pressure is sufficiently high, the thinned wall portions **7***c* move transversely away from the openings **14** thus enabling the liquid to pass through the openings **14** and the tube **8** into the nozzle **17** at a given pressure.

Atomisation proceeds as the sleeve **7** descends and drives the liquid into the tube **8**. At the end of the movement, the pressure in the chamber **4** falls and the thinned wall portions **7***a* cover the openings **14**, thus preventing the liquid from reaching the nozzle while the chamber is still pressurised.

The first time the atomiser is used, the air contained in the pump chamber **4** is compressed as the sleeve **7** descends. The pressure of that air might well be insufficient to ensure the movement of the thinned wall portions **7***a* away from the tube **8** in which event no air would escape to the nozzle **17** and the atomiser could not be primed.

In order to overcome this difficulty, the lower part of the wall of the pump chamber **4** has interior raised projections or ridges **4***b* (FIG. **3**), which extend parallel to the axis of the chamber **4**. The ridges **4***b* are longer than that part of the sleeve **7** which bear against the wall of the chamber **4** and cause deformation of the sleeve **7** at the end of its downstroke and thereby create passages **18** which enable the air to escape from the chamber **4**. When the sleeve **7** rises again, it resumes its original shape and restores the seal, so that the air in the dip tube **5** is drawn into the chamber **4**. After the press-knob **16** has been depressed several times, all air will have been expelled from the chamber **4** with the result that the chamber **4** will be full of liquid; thus, further pressure of the press-knob will cause liquid to be discharged in spray form from the nozzle **17**.

There is a possibility that a small amount of liquid will escape through the passages **18** at the end of the compression stroke, but this does not matter, since any such liquid will return to the container through the aperture **13**.

The atomiser shown in FIG. **4** is similar to that described in French Pat. specification No. 70 24679. In this atomiser, the openings **14** are uncovered the whole time, so that the pump chamber **4** is placed in communication with the nozzle **17** as soon as the valve **9** is lifted off its seal **11**; a spring **19** is interposed between the sleeve **7** and the shoulder **8***a* on the tube **8**, so that the sleeve is initially carried along with the valve and this lifts off its seat only when the pressure in the chamber **4** is sufficient to overcome the force applied by the spring **19**. During priming, the valve **9** remains on its seat **11**, because the pressure of the air is insufficient to counter-balance the action of the spring **19**; but this priming is made possible by the raised ridges **4***b*.

The spring **19** could be replaced by a thin collar fixed to or forming part of the sleeve **7** and bearing against the shoulder **8***a*, in which case the collar, would be elastically deformed to enable the valve to lift off its seat.

In a further alternative form (not shown) of atomiser the pump chamber is in communication with a cylinder of smaller cross-sectional area acting in conjunction with a second piston connected to the valve, a spring or the like biasing the valve against a seat in the first piston, which latter follows the translational motion of the press-knob. In this atomiser, movement of the first piston causes movement of the second, but the volume available for the liquid is reduced by virtue of the cross-sectional area of the cylinder being larger than that of the pump chamber. The pressure of the liquid contained in that chamber rises, so that the second piston seeks to move in relation to the first in opposition to the spring or the like. When that pressure becomes high enough to counteract the spring action, the second piston moves, carrying with it the attached valve, so that the pump chamber is placed in communication with the atomiser nozzle. In this case likewise, the provision of raised ridges in the lower part of the pump chamber enables rapid priming to be achieved.

What is claimed is:

1. In an atomiser,
means defining a pump chamber,
a non-return valve,
means connecting the pump chamber to a liquid container through the non-return valve,
a hollow piston having an active part slidable in the pump chamber,
atomiser nozzle means connected with the piston,
closure means normally isolating the nozzle means from the pump chamber, said closure means being releasable by pressure within the chamber to permit communication between the chamber and the nozzle means, and
ridges defined on the inner surface of the chamber, the axial length of the ridges being at least equal to the length of the active part of the piston.

2. An atomiser as claimed in claim **1** wherein the ridges extend parallel to the axis of the chamber.

3. In an atomiser,
means defining a pump chamber,
a non-return valve,
means connecting the pump chamber to a liquid container via the non-return valve,
piston means mounted in the pump chamber,
nozzle means arranged for communication with the pump chamber,
valve means closable to prevent communication between the nozzle means and the pump chamber, said valve means being opened when a predetermined pressure exists in the chamber, and
a projection arranged on the inner surface of the chamber to cause relative deformation between the piston means and the chamber at the end portion of the compressive stroke of the piston means such that an air escape passage is defined between the piston means and the chamber.

* * * * *