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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 5 :
B65D 83/20, B29C 45/00, 45/26

A1

(11) International Publication Number: **WO 94/12406**

(43) International Publication Date: 9 June 1994 (09.06.94)

(21) International Application Number: PCT/EP93/01293

(22) International Filing Date: 24 May 1993 (24.05.93)

(30) Priority Data:
DM/024 495 23 November 1992 (23.11.92) WO
(34) Countries for which the regional or international application was filed: BE et al.

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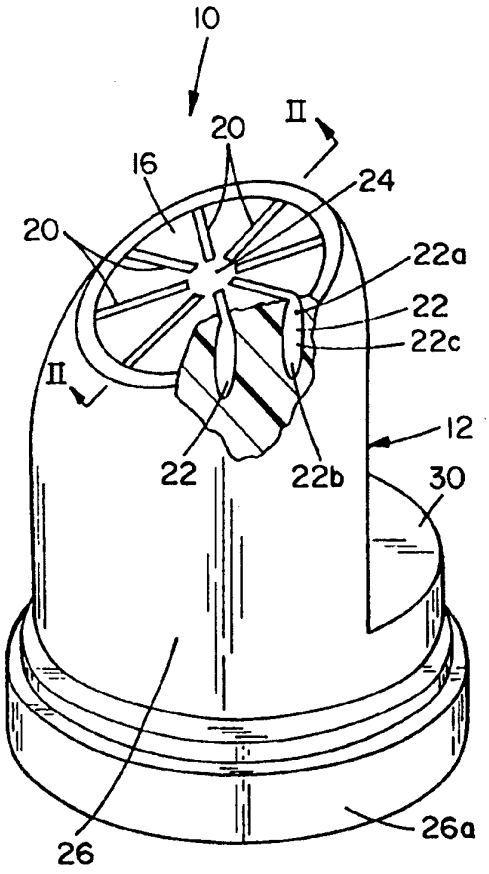
(81) Designated States: AT, AU, BB, BG, BR, CA, CH, CZ, CZ (Utility model), DE, DE (Utility model), DK, ES, FI, GB, HU, JP, KP, KR, LK, LU, MG, MN, MW, NL, NO, NZ, PL, PT, RO, RU, SD, SE, SK, SK (Utility model), UA, US, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).

Published
With international search report.

(54) Title: ACTUATOR FOR AN AEROSOL CONTAINER

(57) Abstract

An actuator (10) for an aerosol container, comprising a body forming an inlet, a top surface (16) defining a multitude of discharge slits (10), and a multitude of body passageways (22) to conduct fluid from the inlet to the discharge slits. Each of the body passageways has a pouch shape, including narrower upper (22a) and lower portions (22b) and a wider mid portion (22c). When the actuator is used to dispense foam from an aerosol container, the shape of the body passageways has several advantages. First, that shape helps the foam to expand as it passes outward through the dispenser; and second, after the container has been used to dispense a quantity of foam, the shape of the body passageways helps to draw back into the actuator any excess foam remaining on the outside of the actuator. Preferably, the actuator is formed in a plastic injection molding process, and the body passageways of the actuator are formed into the desired shape as the plastic cools during the molding process.



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ACTUATOR FOR AN AEROSOL CONTAINER

BACKGROUND OF THE INVENTION

This invention generally relates to actuators or spouts for pressurized packages commonly referred to as aerosol containers, and more specifically, to such actuators that are particularly well suited to dispense foam from aerosol containers.

Aerosol packages typically comprise a pressurized container that holds a fluid or solution, and a valve unit to dispense the fluid or solution from the container. The valve unit is situated in the neck of container and is opened by finger pressure against an actuator that is disposed at one terminal end of a valve stem. The valve unit has a moveable valve body and an associated hollow valve stem that, upon the application of the above-mentioned finger pressure, unseats from a gasket to permit flow of product into the valve stem and then through and from the actuator.

Many aerosol containers are used to dispense a foam that is used for personal or household purposes, such as mousse. It is known that the texture or quality of foams emerging from pressurized foam containers can be improved by making the foam pass through narrow passageways in the actuators of the containers. Heretofore, typically, in order to provide an actuator with a multitude of such narrow passageways, it has been necessary to make the actuator from two or more pieces that are made separately and then joined or fitted together. Despite the associated economic advantages, no commercially practical process has been developed for

forming a one-piece, integrally molded actuator having a multitude of narrow passageways.

Another disadvantage of prior art foam actuators is that often, after the actuator is used to dispense a quantity of foam, a small amount of that foam remains on the surface of the actuator. Over a period of time, that foam collapses and dries, leaving a sticky residue on the actuator that is both messy and unsightly.

SUMMARY OF THE INVENTION

An object of this invention is to improve actuators for aerosol containers.

Another object of the present invention is to provide an actuator that is able to draw foam back inward, into the actuator, after the actuator has been used to dispense a quantity of foam from an aerosol container.

A further object of this invention is to provide a one-piece, integrally molded actuator for dispensing foam from an aerosol container and having a multitude of narrow passageways that act to improve the texture and quality of the foam dispensed from the container.

Another object of this invention is to form a foam actuator in a plastic injection molding process, and to utilize the natural shrinkage that occurs during the molding process to form pouch-shaped passageways in the actuator that both improve the texture and quality of the foam discharged from the actuator, and also help to draw back into the actuator foam residue from the actuator surface.

These and other objectives are attained with an actuator for an aerosol container, comprising a body forming an inlet, a top surface defining a multitude of discharge slits, and a multitude of body passageways to conduct fluid from the inlet to the discharge slits. Each of the body passageways has a pouch shape, including narrower upper and lower portions and a wider mid portion. When the actuator is used to dispense foam from an aerosol container, the shape of the body passageways has several advantages. First, that shape helps the foam to expand as it passes outward through the actuator; and second, after the container has been used to dispense a quantity of foam, the shape of the body passageways helps to draw back into the actuator any excess foam remaining on the outside of the actuator. Preferably, the actuator is formed in a plastic injection molding process, and the body passageways of the actuator are formed into the desired shape as the plastic cools during the molding process.

Further benefits and advantages of the invention will become apparent from a consideration of the following detailed description given with reference to the accompanying drawings, which specify and show preferred embodiments of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a perspective view of an actuator, with portions broken away, embodying the present invention.

Figure 2 is a cross-sectional view of the actuator taken along plane II-II of Figure 1.

Figure 3 is a front view of the actuator.

Figure 4 is a back view of the actuator.

Figure 5 is a top view of the actuator.

Figure 6 is a simplified view illustrating a mold for making the actuator shown in Figures 1-5.

Figure 7 shows a portion of the actuator formed in the mold of Figure 6.

Figure 8 shows the actuator portion of Figure 7 after the actuator has cooled.

Figure 9 shows the actuator assembled in a valve for an aerosol container.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Figures 1-5 illustrate actuator or spray spout, generally designated at 10, for an aerosol container. Actuator comprises body 12 that forms inlet 14, top surface 16 that defines a multitude of elongated discharge slits 20, and a multitude of body passageways 22. Preferably, actuator body 12 also forms central stem 24, outside shell 26 including a lower mounting section 26a, and a finger or actuator surface 30. As discussed below, preferably actuator body 12 is a one-piece body formed in an injection molding process.

Inlet 14 is provided to connect actuator 10 to the valve stem of an aerosol valve, in fluid communication therewith. Each of the body passageways 22 extends between inlet 14 and a respective one of the discharge slits 20 to conduct foam from the body inlet to that discharge slit, through which the fluid is then discharged from the actuator. Shell 26, particularly mounting section 26a, is provided to mount actuator 10

on an aerosol container. Surface 30 provides an area for a user to apply finger pressure to actuator 10 to open the valve stem to which the actuator is connected and thereby dispense fluid through the actuator.

With particular reference to Figures 1 and 8, each passageway 22 of actuator body 12 has a pouch shape, including narrower upper and lower portions 22a and 22b and a wider intermediate or middle portion 22c. More specifically, the upper and lower portions 22a and 22b of each passageway 22 have a width generally equal to the width of the discharge slits 20. The sidewalls 32a and 32b of each passageway 22 extend downwardly and outwardly from the top of the passageway, forming the enlarged central portion 22c of the passageway; and from this central portion, the sidewalls of each passageway extend downwardly and inwardly, narrowing the width of the passageway.

The unique shape of passageways 22 of actuator 10 has several advantages. First, when the actuator is used to dispense foam from an aerosol container, the enlarged portions of the body passageways help that foam to expand, improving the texture and quality of the foam. Second, after the actuator has been used to dispense a quantity of foam, the foam remaining in passageways 22 partially collapses, producing an appreciable vacuum that draws foam back into the passageways from top surface 16 of the actuator. This helps to keep that top surface clean and free of excess foam, eliminating the sticky residue that can be produced by any foam remaining on that surface.

Preferably, as previously mentioned, actuator 10 is formed in an injection molding process, and Figure 6 is a simplified illustration of a mold 40 for forming the actuator. Mold 40 includes first, second, and third parts 42, 44, and 46 that, when brought together as shown in Figure 6, form a recess or cavity 50 substantially having the shape of actuator 10. A multitude of blades 52 or similar means are connected to mold part 46 to form discharge slits 20 and body passageways 22, and these blades may be retractable into mold part 46.

To form actuator 10, mold parts 42, 44, and 46 are brought together to form cavity 50, and then a hot molten plastic is injected into the mold cavity to fill that cavity. After the cavity is filled with the plastic, the mold is cooled to harden the plastic. As the plastic cools, the upper portions of the actuator body 12 shrink from an initial shape, shown at 56 in Figure 7, to a final shape, shown at 60 in Figure 8, thus forming enlarged portions 22c of passageways 22. Once the plastic has sufficiently hardened, mold 40 is opened and the actuator is removed.

The above-mentioned shrinkage of the plastic material is normally undesirable, and usually efforts are made to prevent or minimize this shrinkage. The present invention employs this normally undesirable effect to actually improve the design and operation of the actuator.

Figure 9 shows actuator 10 assembled in an aerosol valve 70, which also includes mounting cup 72, valve body 74, valve stem 76, valve housing 80, spring

82, and gasket 84. The mounting cup 72 is shown partially cut away, and valve housing 80 is crimped to the mounting cup. Gasket 84 is disposed between the top of valve housing 80 and mounting cup and 72 extends around a central, top opening in the mounting cup. Valve stem 76 extends through this top opening and through gasket 84, and the valve stem forms a fluid passageway 76a that extends upward to the valve outlet 76b. The lower sidewall of valve stem 76 forms a through opening 76c that, as shown in Figure 9, is closed by gasket 84. Valve body 74 is connected to the lower end of valve stem 76, and the valve body is biased upwardly, into engagement with gasket 84, by spring 82, which is disposed between the bottom of the valve body and a surface of valve housing 80. Valve body 74 forms one or more openings that form fluid passageways between the exterior and interior of the valve body.

Aerosol valve 70 is of the type that is designed to be used in an inverted position. In particular, the valve is intended to be mounted on the top of an aerosol container that is inverted to dispense fluid downwardly from the container and through valve 70. For this reason, the bottom of valve housing 80 forms one or more openings 86 to conduct fluid into the valve housing from the associated aerosol container. As will be understood by those of ordinary skill in the art, valve housing 80 may be easily modified for use in an upright position; and specifically, this may be done by providing the valve housing with a conventional inlet, and connecting a conventional dip tube to that inlet to conduct fluid

upward into the valve housing from an associated aerosol container.

In use, valve 70 is mounted on an aerosol container and fluid from that container passes into valve housing 80. Normally, valve 70 is in the position shown in Figure 9, in which gasket 84 closes opening 76c of valve stem 76 and prevents fluid from passing from housing 80 and into the valve stem. To discharge fluid from the aerosol container, actuator 10 is pressed downward (as viewed in Figure 9), moving valve stem 76 and valve body 74 downward. This moves side opening 76c of valve stem 76 away from gasket 84, allowing the fluid to pass into the valve stem and then through actuator 10, which discharges the fluid.

While it is apparent that the invention herein disclosed is well calculated to fulfill the objects previously stated, it will be appreciated that numerous modifications and embodiments may be devised by those skilled in the art, and it is intended that the appended claims cover all such modifications and embodiments as fall within the true spirit and scope of the present invention.

CLAIMS

1. An actuator for an aerosol container, comprising:

a body forming

i) an inlet to connect the actuator to a discharge outlet of the container, in fluid communication therewith, to receive fluid therefrom,

ii) a top surface defining a multitude of elongated discharge slits to discharge fluid from the actuator, and

iii) a multitude of body passageways, each of the body passageways extending between the inlet and a respective one of the discharge slits to conduct the fluid from the inlet to said one of the discharge slits,

each of the body passageways having a narrow upper portion, a narrow lower portion, and a wider mid portion, to allow the fluid to expand as the fluid is conducted outward through the body passageways, and to draw back into the body passageways excess fluid from the top surface of the actuator.

2. An actuator according to Claim 1, wherein side walls of each body passageways gradually taper downwardly outwardly from the upper portion of the passageway to the mid portion thereof, and taper downwardly inwardly from the mid portion of the passageway to the lower portion thereof.

3. An actuator according to Claim 2, wherein:

the top surface of the body has a central stem; and

the multitude of elongated discharge slits radially extend outward from said central stem.

4. An actuator according to Claim 3, wherein each of the body passageways extends directly downward from the respective one of the discharge slits.

5. An actuator according to Claim 4, wherein the discharge slits are uniformly spaced apart around the stem of the body.

6. An actuator according to Claim 2, wherein the body is made of an integrally molded plastic material.

7. An actuator according to Claim 6, wherein the mid portions of the body passageways are enlarged as said plastic material cools and shrinks.

8. An injection molding process for forming an actuator for an aerosol container, comprising:

injecting a plastic material into a mold to form a body having

i) an inlet to connect the actuator to a discharge outlet of the container, in fluid communication therewith, to receive fluid therefrom,

ii) a top surface defining a multitude of elongated discharge slits to discharge fluid from the actuator, and

iii) a multitude of body passageways, each of the body passageways extending between the inlet and a respective one of the discharge slits to conduct the fluid from the inlet to said one of the discharge slits;

cooling the plastic material, wherein portions of the plastic material shrink and enlarge intermediate portions of the body passageways between the inlet and the discharge slits; and

removing the plastic material from the mold.

9. A process according to Claim 8, wherein the cooling step includes the steps of forming each body passageways with a narrow upper portion, a narrow lower portion and a wider mid portion.

10. A process according to Claim 9, wherein the mold has a series of internal blades, and the injecting step includes the steps of:

injecting the plastic material around the series of blades; and

removing the blades from the plastic material to form initial shapes for the elongated discharge slits and the body passageways.

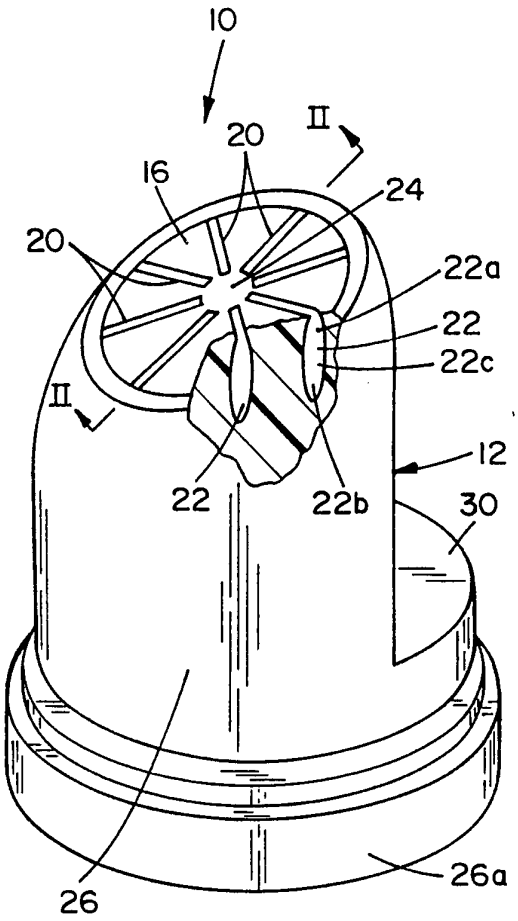

10
II
20
16
24
20
22a
22
22c
II
12
22
22b
30
26
26a

FIG.1

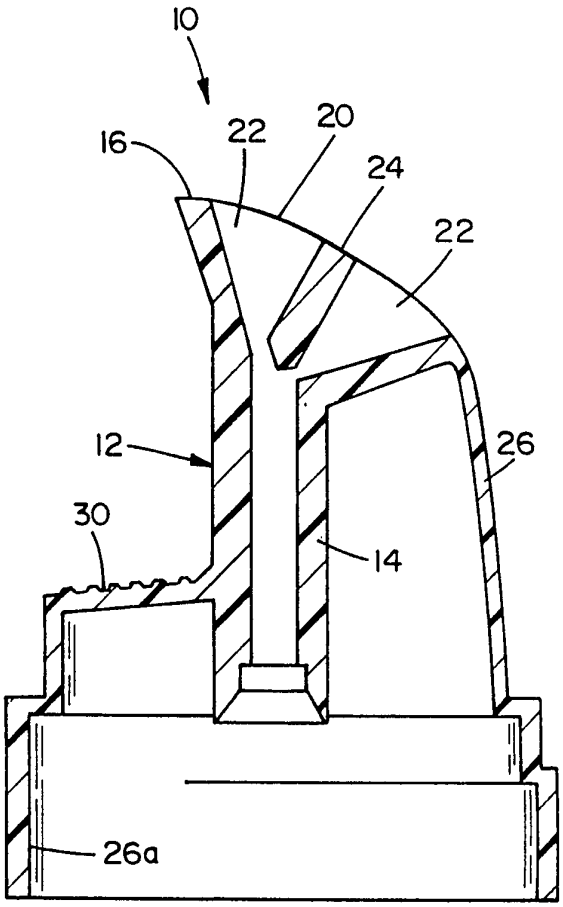

10
16
22
20
24
22
12
26
30
14
26a

FIG.2

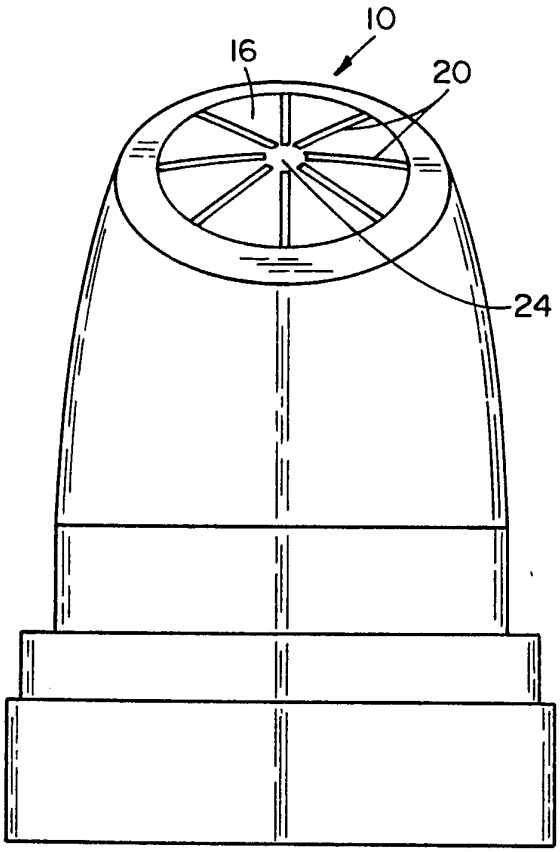


FIG.4

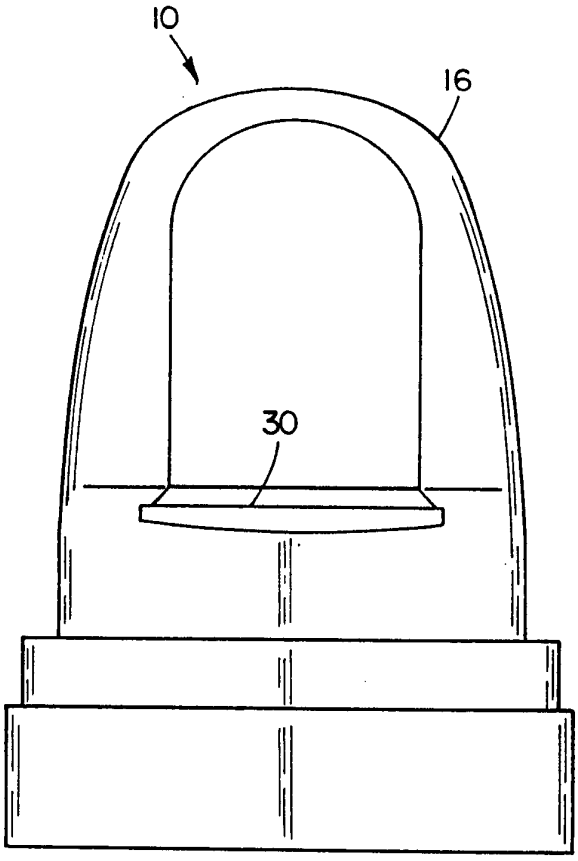


FIG.3

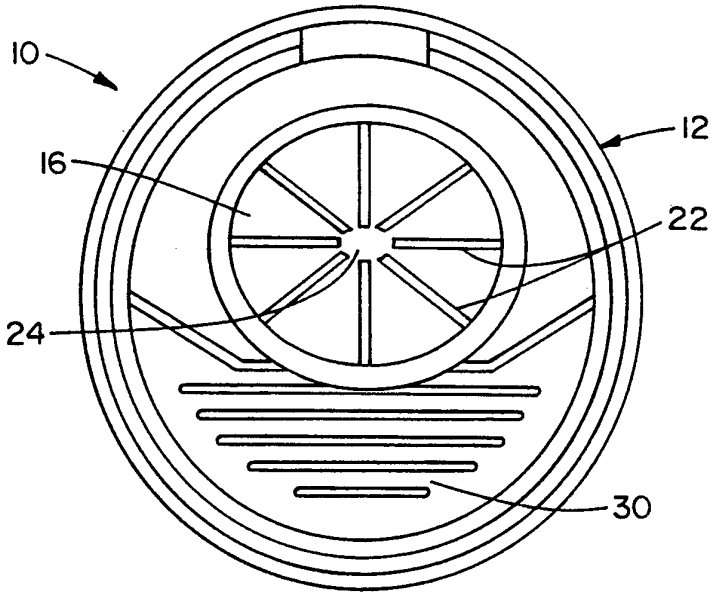


FIG.5

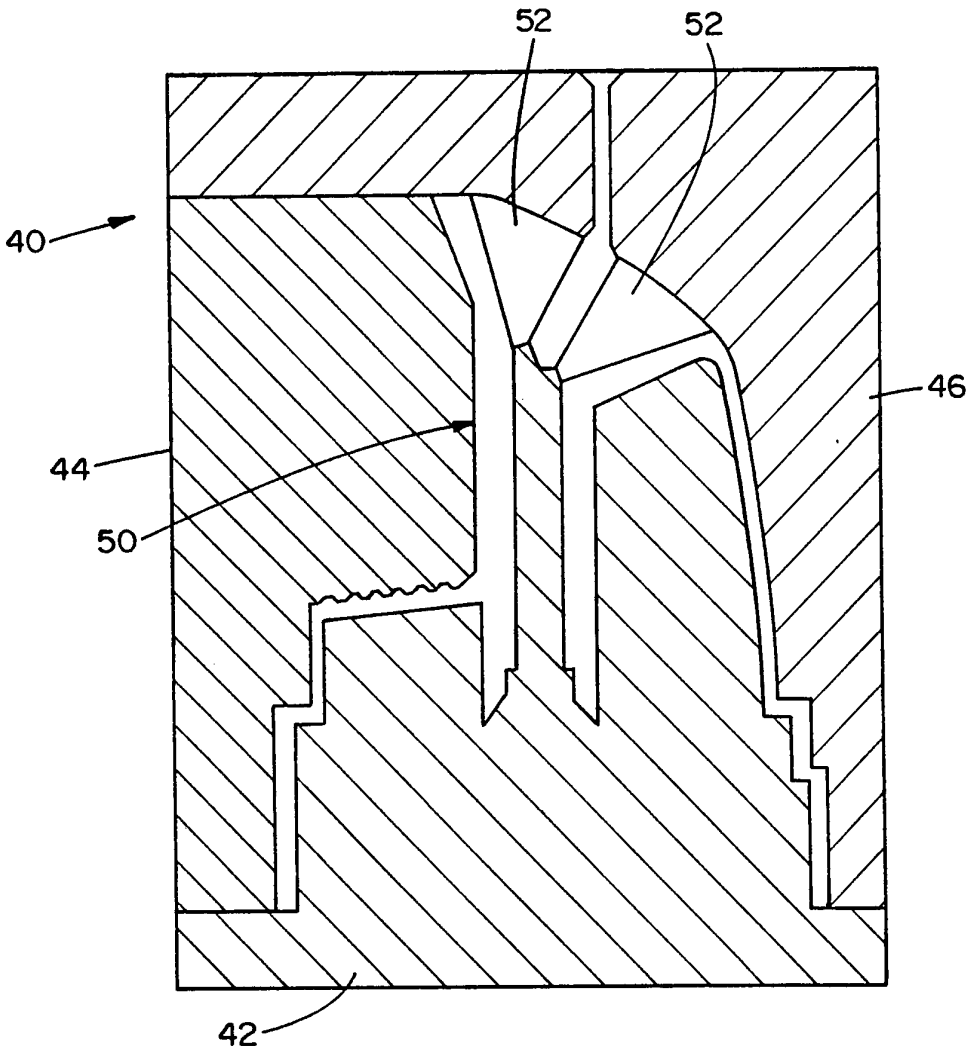


FIG.6

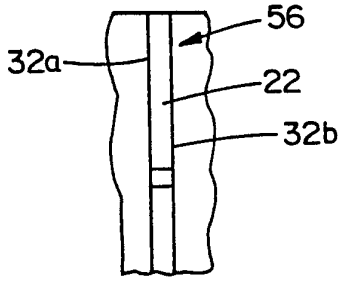


FIG.7

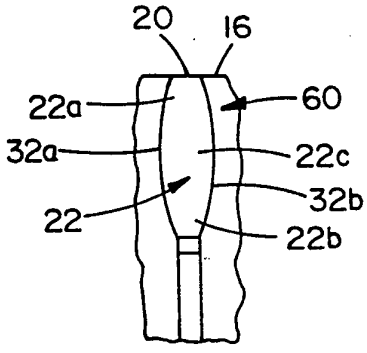


FIG.8

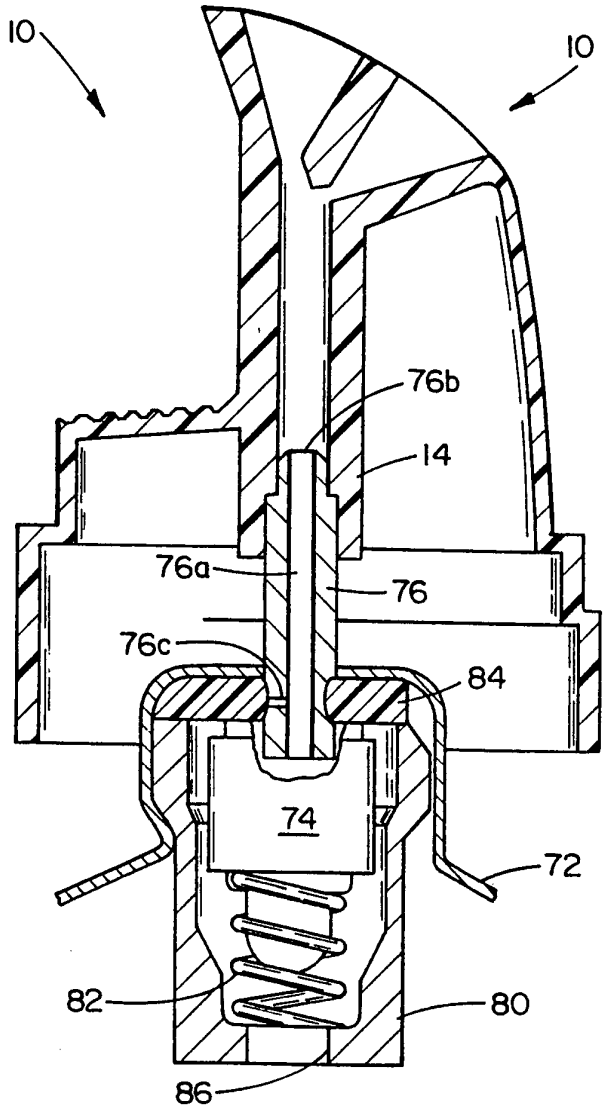


FIG. 9

INTERNATIONAL SEARCH REPORT

International Application No PCT/EP 93/01293

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all)[6]

According to International Patent Classification (IPC) or to both National Classification and IPC

Int.Cl. 5 B65D83/20; B29C45/00; B29C45/26

II. FIELDS SEARCHED

Minimum Documentation Searched[7]

Classification System	Classification Symbols
Int.Cl. 5	B65D ; B05B ; A47K ; A45D B29C

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched[8]

III. DOCUMENTS CONSIDERED TO BE RELEVANT[9]

Category °	Citation of Document, [11] with indication, where appropriate, of the relevant passages [12]	Relevant to Claim No.[13]
A	FR,A,2 588 490 (VALVE PRECISION) 17 April 1987 see the whole document	1,8
A	EP,A,0 452 208 (LUCAS) 16 October 1991 see the whole document	1
A	GB,A,1 326 714 (SIEBEL) 15 August 1973 see the whole document	8
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IV. CERTIFICATION

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11 OCTOBER 1993	12. 11. 93
International Searching Authority	**Signature of Authorized Officer**
EUROPEAN PATENT OFFICE	LEONG C.Y.

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON INTERNATIONAL PATENT APPLICATION NO.

EP 9301293
SA 75678

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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EP-A-0452208	16-10-91	FR-A- 2660635	11-10-91
GB-A-1326714	15-08-73	None	
US-A-3767125	23-10-73	None	