United States Patent [19]

Morane

[11] **3,918,615**

[45] **Nov. 11, 1975**

[54] **DISPENSING CAP FOR AEROSOLS AND MOLD FOR MAKING SAME**

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[22] Filed: **May 17, 1974**

[21] Appl. No.: **471,046**

[30] **Foreign Application Priority Data**

May 30, 1973 France 73.19810

[52] **U.S. Cl.** **222/402.13**

[51] **Int. Cl.**[2] **B65D 83/14**

[58] **Field of Search** 222/402.13, 182

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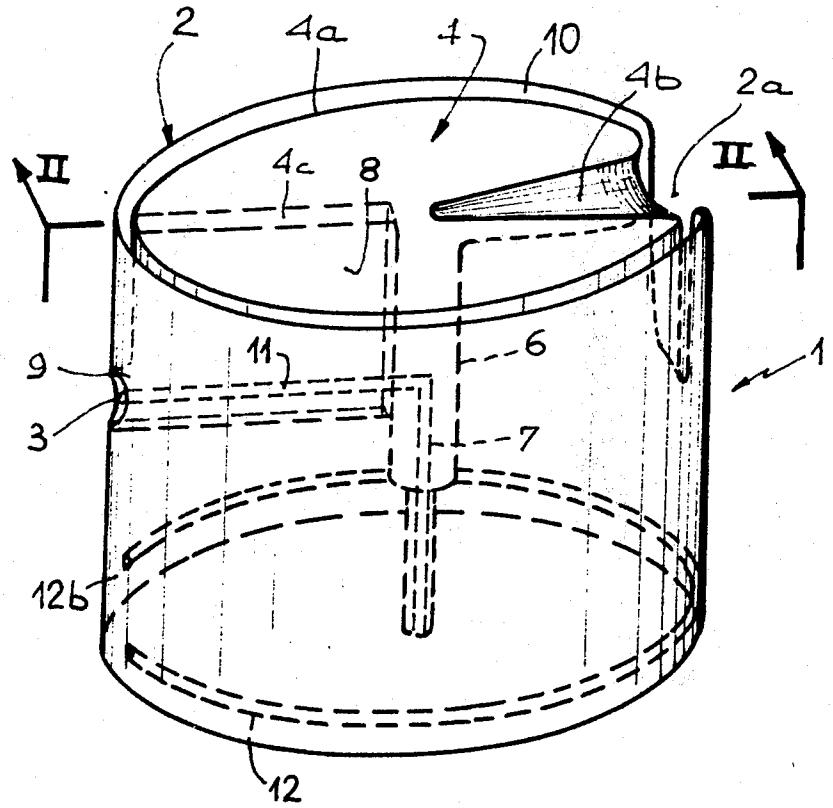
[57] **ABSTRACT**

A dispensing cap for an aerosol can comprises a cylindrical sleeve, the bottom of which snaps onto the can and which carries a transverse cover connected to said sleeve only by a hinge carried by a vane beneath the cover.

5 Claims, 3 Drawing Figures



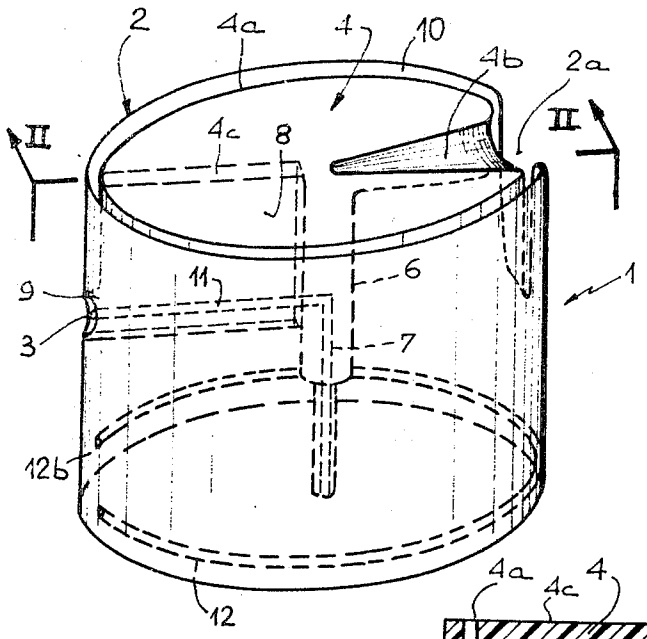


FIG.1

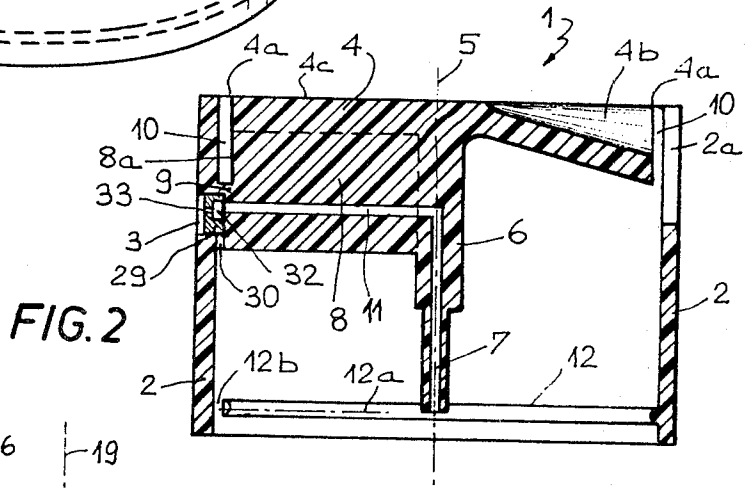


FIG.2

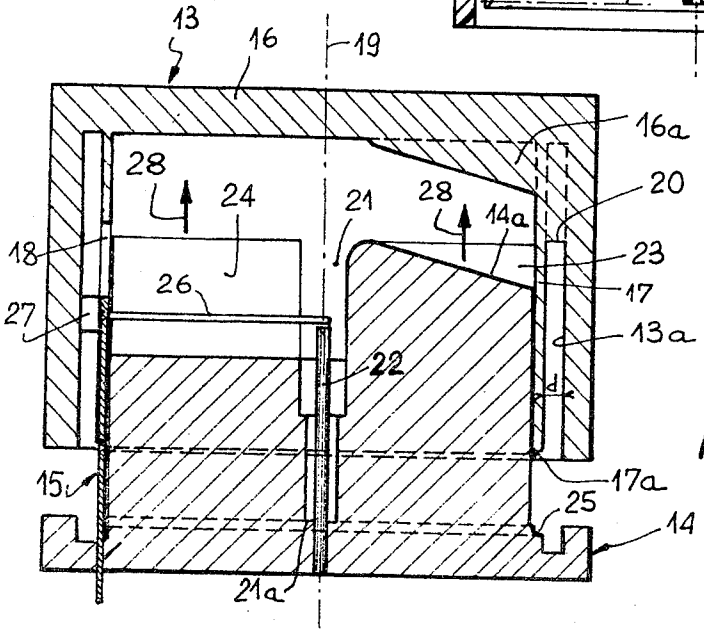


FIG.3

DISPENSING CAP FOR AEROSOLS AND MOLD FOR MAKING SAME

SUMMARY OF THE INVENTION

This invention relates to a dispensing cap adapted to be mounted on the upper part of a cylindrical pressurized container of the aerosol bomb type.

There are known dispensing caps of a particularly simple construction which are often molded in a single piece by successive manufacturing processes. The caps, made of a resilient plastic material, have the form of a cylindrical shell carrying at its upper end a cover which is substantially particular to the axis of the cylindrical shell and the edges of which are almost totally separated therefrom because they are connected thereto exclusively by a narrow zone constituting a hinge and overlying the dispensing zone. For this purpose the cover surmounts an internal axial hub cooperating with the dispensing valve of the pressurized container and provided with an axial duct leading to a radial duct which passes through the wall of the cylindrical shell and lies in the cover of the cap. The part of the cover directly opposite to the one carrying the hinge to the shell constitutes a tongue used to open and close the dispensing valve of the container, since it is almost completely separated from the shell of the cap. Finally, the lower part of the cap is equipped with means such as pins or a peripheral ring resulting from molding which permit the cap to be snapped onto the peripheral edge of the dished end of the pressurized container which supports the dispensing valve.

This type of cap has a first disadvantage inherent in its construction. This disadvantage is due to the fact that the dispensing zone is necessarily situated at the top of the cylindrical shell of the cap since it is located immediately beneath the cover constituting the upper part of the member defining the radial dispensing duct. Since the hub has its shape and length determined by the dispensing valve of the container, it is impossible to alter the height of the cap, since its cover is itself necessarily positioned immediately above the upper end of this hub. The relative dimensions of the operating tongue and the diameter of the cylindrical shell are also determined by the diameter of the cup by means of which the cap is mounted on the container, so that it is difficult to provide a cap equipped with a tongue which is easy to operate, flexible, and effective at all times, since frequently the cap is of small diameter, low in height, and provided with a tongue having a small surface, the pivotal axis of which is positioned practically in the plane of the tongue. The user must thus necessarily, at the moment the dispensing valve is opened, exert a substantial pressure on a very small tongue.

It is obvious that this operation is difficult and that the ideal would be to provide a dispensing cap which the operating tongue, on the one hand, is larger, and on the other hand, is more advantageously located in a plane at a level clearly above the plane in which the tongue is pivotally attached to the cylindrical shell, which plane is substantially the same as that of the zone in which the product stored inside the container is dispensed.

Moreover, the type of cap above described is made by injecting into a two-part mold comprising an upper half forming the external surfaces of the cap and a lower half forming the internal surfaces of the cap. It has been seen that the cap comprises at its lower end

pins or a peripheral annular rib for attaching it to the end of the container. Then, after molding of the cap, it is necessary to withdraw the lower half of the mold by pulling it out, or by deforming the cap in order to release the components which will subsequently serve to attach it to the end of the container. This removal constitutes a delicate supplementary operation in the course of which the cap may be cracked, thus increasing the percentage of caps which must be discarded after final manufacturing inspection.

It is the purpose of the present invention to overcome these disadvantages and for this purpose it is particularly directed to a dispensing cap which is so constructed that the location of the dispensing zone is independent of the height of the cap, that is to say, of the position of the actuating means which constitutes the cover. Moreover, the construction of the cap according to the invention permits its manufacture in a three-part mold, so that the separation of the mold parts presents no particular difficulty, while the dispensing cap is always made in a single piece which does not require any subsequent connection between the parts by cementing or welding after manufacture.

It is accordingly the object of the present invention to provide as a new article of manufacture a dispensing cap adapted to be located at the top of a cylindrical pressurized container of the aerosol bomb type comprising a dispensing valve at its upper end, said cap having at its bottom means for attaching it to the top of said container and being characterized by the fact that the cap is made in a single piece from a resilient plastic material in the form of a body comprising a cylindrical shell, the lateral wall of which is provided with at least one dispensing orifice, a cover substantially perpendicular to the axis of the cylindrical shell the edges of which are totally separated therefrom, a central hub provided with an axial duct and cooperating with a dispensing valve and a radial vane connecting the cover to the hub and extending as far as the cylindrical shell at the level of the dispensing orifice of the latter to form a narrow pivotal zone connecting the cover hub vane assembly to the shell. The vane also comprises a radial duct communicating with the axial duct in the hub, and opens in alignment with the dispensing orifice in the lateral wall of the shell. The means for attaching the cap to the container are located on the inner face of the lateral wall of the shell and made in the form of an annular rib lying entirely in a plane substantially perpendicular to the axis of the cylindrical shell. In a preferred embodiment of the invention the annular rib is interrupted at at least one point along its length. The annular rib has a transverse substantially semi-circular section. The cover has, for opening and closing the dispensing valve, a groove extending toward the lower part of the cap the width of which is substantially equal to that of the finger of the user, said groove being located in the zone of the cover directly opposite to that overlying the radial vane extending from the cover to the cylindrical shell. The lateral wall of the cylindrical shell has at its upper part facing the groove a notch extending downwardly for substantially the depth of the groove.

It is a further object of the present invention to provide a new article of manufacture which consists of a mold for making the said dispensing cap characterized by the fact that it comprises an upper hollow cylindrical part, the bottom of which has a shape complementary to that of the external surface of the cover of the cap to

be manufactured, and the outer part of which is provided with an annular web parallel to the lateral inner wall of the shell and separated therefrom by a distance equal to the thickness of the lateral wall of the cylindrical shell. The thickness of this web is equal to that of the space separating the cylindrical shell from the edges of the cover and its height is equal to that separating the upper edge of the shell from the median plane of the annular rib positioned on the internal lower face of said cylindrical shell. A lower solid cylindrical part, the top of which has a shape complementary to that of the hub, the vane, and the internal face of the cover of the cap to be obtained, and the lateral face of which is in contact with the internal lateral face of the web of the upper part comprises in its lower part a recess extending to the median plane of the lower annular rib positioned on the internal face of said cylindrical shell. Finally, a core is formed of a sheet placed on the lateral wall of the lower part in alignment with the radial connecting vane to be formed, said core carrying at its upper end means for forming the dispensing orifice in the cylindrical shell and the dispensing duct in said vane.

In a preferred embodiment of the invention, the annular web of the upper part has, in alignment with the radial connecting vane, a recess extending from the lower free end of said web parallel to the axis of said shell. The width of the strip forming the hub is equal to that of the recess formed in the annular web. The means for forming the orifice and the dispensing duct in the cap comprise a radial pin substantially perpendicular to the common axis of the cylindrical parts of the mold prolonged by a tip, said tip and said pin being situated on opposite sides of the strip forming the hub. The thickness of the strip forming the hub is equal to the thickness of the annular web attached to the bottom of the upper part of the mold. In order that the object of the invention may be better understood, a preferred embodiment thereof will now be described, purely by way of illustration and example, with reference to the accompanying drawing, in which:

FIG. **1** is a perspective view of the dispensing cap according to the invention;

FIG. **2** is a transverse axial sectional view taken along the line II—II of the cap of FIG. **1**; and

FIG. **3** is a transverse axial sectional view of the three-part mold used to manufacture the cap according to the invention.

Referring now to these drawings it will be seen that reference numeral **1** indicates the dispensing cap according to the invention as a whole. This cap is adapted to be mounted on the upper part of a cylindrical pressurized container of the aerosol bomb type (not shown), which container carries a dispensing valve at its upper end. The cap **1** is manufactured in successive steps, preferably by injection and in a single piece, from resilient plastic material such as polyethylene, or any other appropriate polymer.

The cap **1** has a body comprising a cylindrical bottomless shell **2**, the lateral wall of which is provided with at least one dispensing orifice **3**. The cap has a cover **4** of preferably uniform thickness substantially perpendicular to the axis **5** of the cylindrical shell **2**, the two edges **4***a* of which cover are completely separate from the shell **2**. The cap also comprises a central hub **6** provided with an axial duct **7**, the axis of which lies preferably along the axis of the cylindrical shell **2**. This central hub and its duct **7** cooperate with a dispensing valve (not shown) supported by the central part of the top of the pressurized container onto which the cap will be mounted.

A radial vane **8** connected to the horizontal cover **4** (the cap **1** being so mounted that its axis of symmetry **5** is vertical), and to the vertical hub **6**, extends outwardly to the cylindrical shell **2** at the level of the dispensing orifice **3** to form a narrow hinge **9** about which the assembly comprising the cover **4** and hub **6** together with the radial vane **8** is adapted to swing as a unit on the shell **2**. This swinging movement is made possible by the fact that the cover **4** is completely separated from the cylindrical shell **2** with a continuous annular space **10**, preferably of uniform width, separating the edges **4a** of said cover from the shell and separating the front part **8a** of the radial vane **8** from the same shell except in the zone **9** where this vane is hinged to the shell. A duct **11**, preferably at right angles to the axial duct **7** of the hub, is connected thereto and opens opposite the dispensing orifice **3** in the lateral wall of the shell.

In order to facilitate the opening and closing of the dispensing valve, the cover **4** has advantageously a groove **4***b* extending toward the bottom of the cap **1**, the width of which groove is substantially that of the finger of a user. It is obvious that this actuating step is facilitated when the recess **4***b* is positioned in the zone of the cover directly opposite the zone **4***c* overlying the radial vane **8** carrying the hinge attaching the cover **4** to the cylindrical shell **2**. Aligned with this recess **4***b* the cylindrical shell advantageously comprises at its upper end a notch **2***a* extending toward the bottom for substantially the entire distance through which the zone of the cover provided with recess **4***b* may be swung.

The cap **1** has at its lower end attaching means for connecting it to the upper part of the pressurized container. These means are positioned on the inner surface of the lateral wall of the shell **2** in the form of an annular rib **12** extending all around the shell in a plane substantially perpendicular to the axis **5** of the cylindrical shell **2**. By way of example, this annular rib has a transverse section which is substantially semi-circular with a radius of the order of 1 mm.

It will be noted that the cap **2** may be attached directly to the upper part of the pressurized container by snapping it into a peripheral groove operating with the rib **12** or onto the end member supporting the dispensing valve. Moreover the height of the cap is independent of the characteristics of the dispensing valve because the position of the cover **4** of the cap is not directly dependent upon the position of the dispensing orifice **3**. The height of the radial vane **8** exending between the two said members may be whatever desired and consequently is advantageously so determined that the operation of the recess **4***b* and the cover **4** is as sure and efficacious as possible.

The cap is made in a three-part mold comprising an upper part **13** and lower part **14** and a core **15** in sheet form.

The upper part **13** of the mold is a hollow cylinder the bottom **16** of which has a surface complementary to that of the external surface of the cover **4** of the cap to be made, that is to say, it carries a projection **16***a* which creates the groove **4***b* and is provided with an annular web **17** parallel to the lateral inner wall **13** of the shell and separated therefrom by distance *d* equal to the thickness of the lateral wall of the cylindrical shell **2**. The web **17** has itself a thickness equal to that of the

space **10** separating the cylindrical shell from the edges **4***a* of the cover **4** and its height is equal to that separating the upper edge of the shell from the median plane **12***a* of the lower annular rib **12** positioned on the inner surface of the cylindrical shell **2.** Moreover, the web **17** of the upper part of the mold has, in alignment with the radial connecting vane **8,** a notch **18** extending from the lower end of said web parallel to the axis **19** of said shell. The depth of the notch **18** is such as to permit the creation of the hinge **9** connecting the radial vane **8** to the cylindrical shell. Finally, at the level of the bottom **16** of the upper part of the mold a connection **20** connects the annular web **17** to the inner surface **13***a* of the lateral wall of the shell, the width and height of this connection **20** being such that they correspond to the width and depth of the notch **2***a* to be formed on the shell **2** opposite the swinging range of the groove **4***b* in the cover **4.**

The lower part of the mold **14** is a plain cylinder, the top **14***a* of which is shaped to correspond to that of the hub **6,** the vane **8,** and the inner surface of the cover **4,** in order to define the inner part of the cap. Consequently, the core **14** has a central hole **21** provided axially therein and a rod **22** extending from its bottom **21***a* to form the axial duct **7.** A recess **23** permits the formation of the groove **4***b*. A slot **24** extending from the hole **21** to the lateral face of the lower part of the mold permits the manufacture of the radial vane **8.** Moreover, the lateral face of this lower mold part is in contact with the internal lateral face of the web **17** of the upper mold part **13** and has at its lower part a recess **25** extending to the median plane **12***a* of the lower annular rib **12** on the internal face of the cylindrical shell **2.** When the annular rib **12** is of regular substantially semi-circular section it is clear that the recess **25** on the one hand and the free end **17***a* of the web **17** on the other hand have the section of a quarter circle.

The core **15** formed from sheet material is placed on the lateral wall of the lower mold part **14** in alignment with the radial connecting vane to be formed so that this core fills the notch **18** in this zone part way up to the level of the web **17** of the upper mold part. Consequently, the thickness of the core **15** is advantageously equal to the thickness of the web **17.** At its upper part, the core **15** carries means for creating the dispensing orifice **3** in the cylindrical shell and the dispensing duct **11** is passing radially through said vane **8.** These means comprise, for example, a radial pin **26** substantially perpendicular to the common axis **19** of the cylindrical parts **13** and **14** of the mold, which pin terminates in a projection **27,** said projection and said pin being positioned on opposite sides of the sheet forming the core.

In FIG. **3,** the three parts of the mold have been shown before it is opened. It is obvious that during the closing of said mold, as is schematically indicated by the arrows **28,** the space separating the recess **25** from the free end **17***a* of the web **17** is zero. The space separating the top of the lower mold **14** from the bottom of the upper mold **13** is equal to the thickness of the cover to be formed and the configuration of the core **15** relative to the web **17** and the notch **18** is such that it permits the formation of the hinge **9.**

The cap has a narrow duct **30** below the dispensing orifice formed by the projection **27.** This duct is then advantageously obstructed by a nozzle **29** provided with a chamber **32** and a spray duct **33** in alignment with the duct **11** which permits the distribution of the pressurized product from inside the aerosol bomb and dispensed once the valve is provided therewith. It will be noted that the sheet **15** must be very accurately adjusted as to height relative to the lower mold part and because of this fact said sheet preferably traverses the lower mold part **14** so as to be able to be adjusted thereafter from the outside of the mold. It is obvious that in the latter case the annular rib **12** must have a gap at the level of the zone occupied by the sheet and for this reason the annular rib **12** is interrupted over at least a part of its length, that is to say, it has an interrupted zone **12***b* in alignment with the hinge **9.**

It will, of course, be appreciated that the embodiment which has just been described may be modified as to detail without thereby departing from the basic principles of the invention as defined by the following claims.

What is claimed is:

1. Dispensing cap for mounting on the upper end of a cylindrical pressurized container of the aerosol dispenser type equipped with a dispensing valve on said upper end, said cap comprising means for attaching it to said pressurized container and being made of a single piece of resilient plastic material comprising a body in the form of a cylindrical shell, the lateral wall of which is pierced by at least one dispensing orifice containing a nozzle entirely contained within the outer circumference of said wall, a cover substantially perpendicular to the axis of the cylindrical shell the edges of which are totally separated from said shell, a central hub provided with an axial duct aligned with said dispensing valve and a radial vane connecting said cover to the hub and extending to the cylindrical shell near the level of said dispensing orifice, said vane comprising a duct connected to the axial duct in the hub and terminating opposite the dispensing orifice in the lateral wall of the shell, and a narrow hinge lying on only one side of said duct and connecting said vane to said shell, said means for attaching the cap to the container being located on the internal surface of the lateral wall of the shell and consisting of an annular rib lying in a plane substantially perpendicular to the axis of the cylindrical shell.

2. Cap as claimed in claim **1** in which the annular rib is discontinuous.

3. Cap as claimed in claim **1** in which the annular rib has a semi-circular transverse section.

4. Cap as claimed in claim **1** in which the cover is provided with a depression for use in opening and closing the dispensing valve, said depression having a width substantially equal to that of a human finger and being positioned in the zone of the cover directly opposite the one surmounting the radial vane.

5. Cap as claimed in claim **4** in which the lateral wall of the cylindrical shell has at its upper part opposite the finger receiving depression a notch extending toward the bottom as far as said depression will swing.

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