

Description

[0001] The modern aerosol spraying systems were made around the 1930s, when Engineer Rotheim patented an expulsion method of a liquid product contained in a pressurized vessel by using a liquefied propellant.

[0002] This invention revolutionized the way of using all types of fluid product and indeed such technology was hugely successful, continuously evolving to the current days. Aerosol products have been increasingly more used, to reach the current popularity.

[0003] The operating method is very simple:

In a metal container, made of aluminum or steel, there is a liquid phase and a liquefied propellant.

[0004] The container is hermetically closed by means of a dispensing valve.

[0005] The valve is provided with a plastic dip tube, which is long as the container itself, so as to reach the bottom of the container.

[0006] While dosing, a part of the liquefied propellant passes from the liquid state to the gaseous state, pressurizing the entire content. The mixture formed by liquid phase and propellant is called aerosol mixture.

[0007] Pressing the button or dispensing cap operates the dispensing valve. A fraction of the aerosol mixture is expelled through the valve itself. In the can, a new part of the liquefied gas passes to the gaseous state, and so on until the content is finished.

[0008] The pressure inside the container remains almost unchanged during the entire time of use.

[0009] With the advancement of technological progress, it became apparent that dispensing all the entire product was optimal, but that it was equally important to be able to adjust the valve/dispenser pair as desired in order to vary the spray type.

[0010] Indeed, it is fundamental to be able to optimize the spray as a function of the product which must be expelled. This optimization implies the following steps.

- Dispensing the right amount of aerosol mixture.
- While sprayed, the dispensed product must be cone-shaped with vertex positioned at the outlet of the dispensing cap. Determining the diameter of the spray cone at a given dispensing distance is fundamental. If the cone is too broad, the dispensed product will be dispersed outside the area of concern; on the other hand, if the cone is too narrow, the dispensed product will be too concentrated in one point and therefore not uniform.
- Avoiding the aerosol mixture from being excessively imbalanced towards the liquid phase, and therefore too wet, or conversely towards the gaseous phase, and therefore too dry.

[0011] All this must be carefully evaluated during the step of designing to guarantee the best possible experi-

ence of use to the consumer.

[0012] The spray features are changed substantially by working on the valve type and on the dispensing stem type.

5 **[0013]** In order to be released from a can, the finished product, be it hairspray or furniture polish, must follow an obligatory route.

[0014] A number of channels allows the passage of the aerosol mixture making it exit outwards.

10 **[0015]** The amount of expelled product and the size of the dispensed particles can be varied by varying the diameter of the channels and their number.

[0016] The appearance of an aerosol product is adjusted by modifying the type of dispensing stem present on the button or on the dispensing cap.

15 **[0017]** The dispensing stem is an accessory which is usually molded separately and then mounted by pressing onto the dispensing cap or onto the dispensing button.

[0018] The shape, the spray cone and the size of the dispensed product particles is radially modified as the shape of the stem orifice and of the channels upstream of the outlet orifice vary.

20 **[0019]** Stemless dispensing caps are present on the market, but it is apparent that in this case it is not possible to customize the spray type as desired, settling for a "turn-key" solution, fixed for all types of product to be dispensed.

25 **[0020]** The possibility of changing the stem thus makes it possible to provide a multitude of different solutions to the same problem, but implies a greater initial purchasing cost for the button or for the dispensing cap. The assembly operation between insert (stem) and cap, or the dispensing button, is made in two different moments.

30 **[0021]** This solution has been adopted for decades by all the manufacturers present on the market.

35 **[0022]** The stemless dispenser inserted in the second step is instead less complicated to make, and therefore less expensive, because the orifice which allows the release of the product is made in a single operation during the molding of the dispensing cap.

40 **[0023]** Therefore, it would be ideal to combine the versatility of a dispensing cap having a stem system with the cost-effectiveness of a dispensing cap free from nozzle stem.

45 **[0024]** It is our intention to claim a dispensing system which makes it possible to vary the features of the spray in predetermined manner by changing a detail of the dispensing cap mold.

50 **[0025]** A dispensing cap is formed by a fixed part, the cap body, and a movable part, constrained to the body as a lever, which works as actuator. The valve dispenses by pressing the actuator.

55 **[0026]** These two parts are present in the cap mold. The plastic is injected in the cavity and takes the shape of the mold.

[0027] The idea is to suggest multiple different dispensing types, incorporating in the mold the actuating part of the cap, the number of channels, the pattern there-

of and the diameter of the orifice necessary to obtain a given type of spray.

[0028] In this manner, a solution having performance which is very similar to that of the one with dispensing cap with stem is suggested to the customer at a considerably lower production cost. The cap with stem which is now suggested is indeed made in a single molding operation and does not require complex assembling.

[0029] If the customers do not appreciate the solution suggested at the beginning, they can choose the most appropriate one from a series of alternatives.

[0030] During the step of manufacturing, it will suffice to change the part of the mold dedicated to the dispensing part, i.e. the one having the features of nozzle-fan chosen by the customer, in order to obtain the chosen cap with the dispensing type which best combines with the product under development.

[0031] Besides the interchangeable nozzle-dispensing fan, the core of the model is also the button of the dispensing cap, which is the movable upper part of the dispensing control.

[0032] The peculiarities of the spray and the size of the dispenser are changed simply by changing a detail of the dispensing button.

[0033] For example, by making the dispensing nozzle with a simple through orifice, either circular or of other shape, a dispenser would be obtained capable of dispensing aerosol in powder form (e.g. deodorants with antiperspirant).

[0034] By changing the diameter of the orifice or its shape, and adding a small multiple channel swirling fan, a dispenser suited for dispensing deodorants, hairspray, starch, furniture polish and other would be obtained.

[0035] It is thus apparent that this simple device could provide innumerable advantages from the construction and economic points of view maintaining the performance of the finished product unchanged.

[0036] During a few years of tests, it was not possible to obtain the desired dispensing without finding leaks between the two parts assembled in the pilot mold.

[0037] The solution was to apply a second injection of polypropylene in the mold, which generates a plastic button adherent to the body of the dispenser which eliminates the release of the product from the body of the dispenser during dispensing.

Brief description of the drawings

[0038] We will now describe an embodiment of the present invention by way of example only with reference to the accompanying drawings, in which:

- Fig. 1 is a partial section of the main body of the dispenser, with a part of the upper nozzle - fan cap which can be inserted in the body itself;
- Fig. 2 is a cross section detail of the part which receives the nozzle-fan body with internal parts;
- Fig. 3 shows the position of the nozzle-fan body com-

pletely inserted in the dispenser body in the second step of compressing;

- Fig. 4 shows the button of different color already applied in the second step of molding;
- Fig. 5 is a view from the top which shows some important details for inserting the upper cap containing the nozzle-dispensing fan.

[0039] The dispensing system substantially includes three parts.

[0040] With reference to Fig. 1, the main body consists of a lower ring 2 followed on top by a smaller concentric ring 1. The upper part 3 is substantially spherical and joined to the lower part 1-2 by a circular rib sector or pin S1 with width of about 45° and by a seal rib S2 of limited width which in the step of first using of the dispenser is broken by pressing on the upper part to be able to dispense the product. The spherical upper part 3 has on one dispensing side a wall 4 with an orifice 5 of diameter 2-3 mm, which is placed in upper position on the wall 4 and to which a circular groove 4A is attached in the lower part, which has the function of distributing the product towards the fan 7A (shown in Figure 2). Between the outer part of the tongue 4 with circular channel 4A and the nozzle-fan tongue 6 there is a little clearance, also caused by the grooves of the fan which are generally radial, which create a product distribution chamber. Thus, the product, which exits from the orifice 5 by effect of the pressure of the can, follows a distribution path in the chamber along the circular channel 4A, the center of which coincides with the axis of the orifice-fan 7-7A. The fan 7A receives the product and dispenses it from the orifice 7, which may have different sizes, to modify the jet also on the outer face. The outer part of the tongue 6 may also have incision of different shapes to modify the jet or be a spherical shaped cavity or other type of recesses either provided with fluid diversion incisions or not. The dispensing fan 7A will be applied after the operation of assembling the upper cap 3. The fan 7A causes the circular distribution of the product which then exits from the front orifice 7.

[0041] The upper cap part with nozzle-fan is formed by a platform 8 with a recess 9, shown in greater detail in Fig. 2, with two wings A1 and A2 with various cross sections directed downwards, which will be inserted in two cavities 8A shown in Figure 5. Two rod-like connections C1 and C2 are present between stem cap and the spherical part 3. Furthermore, a flat tongue 6 provided with orifice 7 is provided in the part of the cap visible from the front. A static fan 7A with various blade shapes is carved in the inner part of the tongue 6 in order to obtain a desired spraying jet type.

[0042] Also the outer part of the tongue 6 may have different shapes.

[0043] According to the number of blades of the fan and their shape and the interval between one blade and the other it is possible to vary the size of droplets of the jet and the shape and flow rate of the jet itself. The upper

recess 9 of approximately rectangular shape rounded on the front part makes it possible to fix the upper molded button 17 (Fig. 4) which will be successively applied with the second plastic molding.

[0044] As apparent in Fig. 2 (section view of Fig. 1, side F), the spherical part 3 in the lower part has a tubular protrusion 11, which is the can valve attachment, joined to the spherical part 3 with two ribs 12, 13. The rib 13 connects to part of channel wall 4 which accommodates the tongue 6 with the nozzle-dispensing fan 7 shaped as a fan 7A in the lower wall. The orifice 7 may have different sections of various shape. The cavity 15 which can be seen in this figure will be successively used to accommodate the second molding of the upper button 17, which molding will also cover the step recess 9. In the upper part of the sphere there is a flat part 10 which will also accommodate part of the upper button 17 (Fig. 4) made of different color.

[0045] Fig. 3 shows the final position of the cap 8 when it was compressed in its housing 14 and in the holes 8A' which can be seen in Fig. 5 and part of the nozzle-fan tongue 6 fitted in its housing 14.

[0046] Figure 4 shows the button 17 already applied with the second molding of plastic material of different material and/or color which adheres to the housing 15 but peripherally surrounds the fan-nozzle system 7 and 7A. Furthermore, in the molding of this part of different or the same color, an outer plastic winding is formed which joins the housing 15 on the front. Such element hermetically closes the spray chamber between the wall element 6 and the aforesaid wall 4. So, after the application of the hot molding of the upper button 17, a unitary body of the dispensing body 3 and of the button 17 is obtained, which during the use of the dispensing can oscillate about the front pin S1 when the minimum rear seal S2 is broken.

[0047] Fig. 5 shows the cavities 8A' which accommodate the wings 8A during the molding of the upper button 17. This arrangement system makes it possible to avoid the manufacturing and the assembly of a nozzle-fan insert 17 which was previously manufactured separately and then mounted in its front housing of the dispenser, fact which represents a high economic advantage for saving time and materials.

[0048] Obviously, the nozzle-fan 7-7A may have various inner blade shapes with various distance intervals between them and various blade shapes or also with a calibrated orifice of circular or other shape, according to the desired spraying purposes.

[0049] The presented model is not bound to the exact spherical shape, but may have other shapes on top, e. g. pyramid or egg-shaped, or other shape providing the lower circular shape is maintained for the connection with the can of the material to be dispensed.

[0050] The embodiment according to the present model illustrated here is envisaged to be an example only and a person skilled in the art may make numerous changes and modifications to it without departing from

the scope of the present model, as defined by the claims attached to this document.

5 Claims

1. An aerosol spray product dispensing device connectable to a can enclosing said product, said device being **characterized in that** it comprises:

- a spraying cap (6, 8, A1, A2) including:

- a platform (8);
- a pair of wings (A1, A2) integrally and transversally connected to said platform (8) at a lower face thereof, at opposite edges of said platform (8);
- a tongue (6) integrally and transversally connected to said platform (8) at said lower face, arranged transversally to said wings (A1, A2);
- a first through hole (7) made in said tongue (6);
- a recess (9) made in said platform (8) at an upper face thereof, opposite to said lower face;

- a main body (1, 2, 3) including:

- a fixed portion (2) connectable to said can;
- a movable portion (3) hinged to said fixed portion (2) and pivotable with respect thereto, said movable portion (3) comprising:

- > a first cavity (15) at least partially delimited by a housing (14) of said tongue (6), said housing (14) including a wall (4) opposite to said tongue (6);
- > a second through hole (5) made in said wall (4) and opposite to said first hole (7);
- > a pipe (4A, 11) integrally connected, at a first end, to said wall (4) at said second hole (5) and connectable at a second end, opposite to said first end, to the valve for dispensing said aerosol product and included in said can;
- > a second and a third cavity (8A) laying on opposite parts with respect to said pipe (4A, 11) and at least partially acting as housings of said wings (A1, A2);

- a button (17) connected to said spraying cap (6, 8, A1, A2) at least at said recess (9) and to said movable portion (1, 2) at least at said first, second and third cavities (8A, 15) so as to hermetically seal said wall (4) to said tongue (6)

about said first and second holes (5, 7).

2. A device according to claim 1, **characterized in that** said wings (A1, A2) are respectively connectable by means of interlocking to said movable portion (3) at said second and third cavities (8A).

3. A device according to claim 1, **characterized in that** said spraying cap (6, 8, A1, A2) further comprises:

- two rods (C1, C2) respectively and integrally connected to said wings (A1, A2) at an end of said wings (A1, A2) opposite to said platform (8), said rods (C1, C2) being connectable by means of interlocking to said movable portion (3) at said second and third cavities (8A).

4. A device according to claim 1, **characterized in that** said spraying cap (6, 8, A1, A2) further comprises:

- a plurality of grooves made on said tongue (6) close to said first hole (7) so as to form, with the latter, a static nozzle-fan (7A).

5. A device according to claim 4, **characterized in that** said grooves are made at a face of said tongue (6) facing said wings (A1, A2).

6. A device according to claim 1, **characterized in that** said tongue (6) is integrally connected to said platform (8) at a first edge thereof, said recess (9) being made from a second edge of said platform (8) opposite to said first edge, said wings (A1, A2) being reciprocally parallel and integrally connected to said platform (8), respectively at a third and a fourth edge interposed between said first and second edges.

7. A device according to claim 6, **characterized in that** said recess (9) is substantially rectangular and rounded at its edge opposite to said second edge of said platform (8).

8. A device according to claim 1, **characterized in that** said fixed portion (1, 2) comprises at least one ring (1, 2) connectable to said can.

9. A device according to claim 8, **characterized in that** said movable portion (3) is substantially hemispherical or pyramidal or egg-shaped, a lower part of said movable portion (3) being substantially circular and concentric to said ring (1, 2).

10. A device according to claim 9, **characterized in that** said main body (1, 2, 3) further comprises:

- a circular rib sector (S1) interposed between said ring (1, 2) of said fixed portion (1, 2) and said lower part of said movable portion (3), said

circular rib sector (S1) acting as a pin between said fixed portion (1, 2) and said movable portion (3).

11. A device according to claim 10, **characterized in that** said main body (1, 2, 3) further comprises:

- a seal rib (S2) interposed between said ring (1, 2) of said fixed portion (1, 2) and said lower part of said movable portion (3), laying on the opposite side of said circular rib sector (S1) with respect to said movable portion (3), breakable when said movable portion (3) is first rotated with respect to said fixed portion (1, 2).

12. A device according to claim 1, **characterized in that** said pipe (4A, 11) comprises a first channel (4A) orthogonally connected to said wall 4 at said first hole (5), and a second channel (11) orthogonally connected to said first channel (4A) and protruding towards said fixed portion (1, 2) of said main body (1, 2, 3), said pipe (4A, 11) being connectable to said dispensing valve at said second channel (11).

13. A device according to claim 1, **characterized in that** it is made of polypropylene.

14. A method of manufacturing a device according to any one of the preceding claims, **characterized in that** it comprises the following steps:

a) making said sprayer cap (6, 8, A1, A2) and said main body (1, 2, 3) of plastic material by means of a first molding;
b) connecting said sprayer cap (6, 8, A1, A2) to said movable portion (3) so that said tongue (6) and said wings (A1, A2) are accommodated in their respective housings (14, 8A) in said movable portion (3);
c) making said button (17) of plastic material by means of a second hot molding on said sprayer cap (6, 8, A1, A2) and said main body (1, 2, 3) so as to hermetically seal said wall (4) to said tongue (6) about said first and second holes (5, 7).

15. A system for manufacturing a device according to one of the claims from 1 to 13, adapted to implement a method according to claim 14.

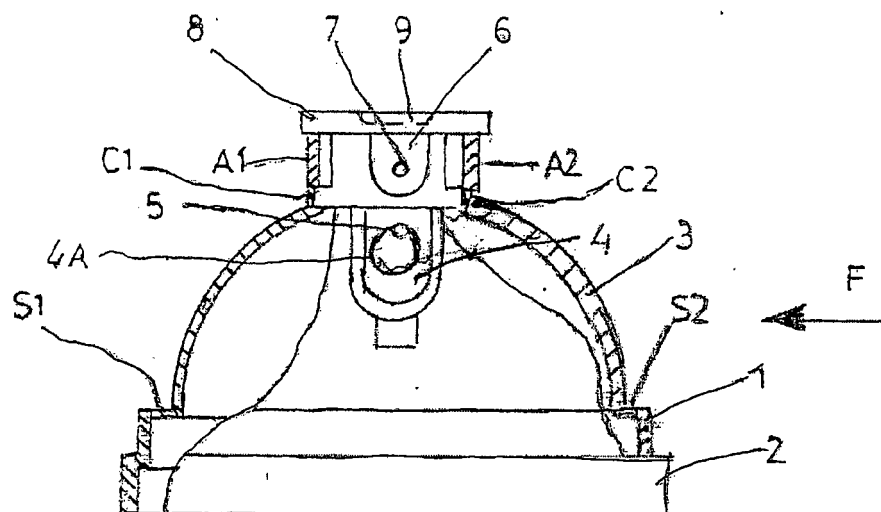


FIG. 1

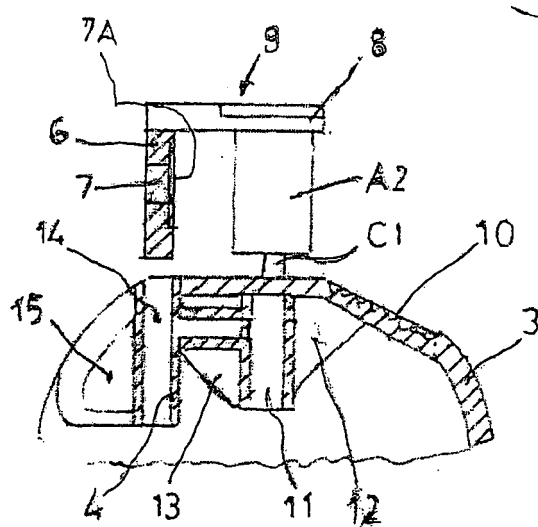


FIG. 2

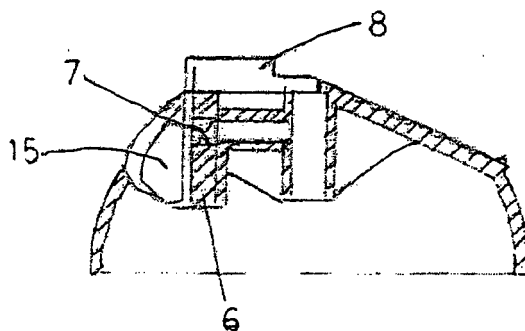


FIG. 3

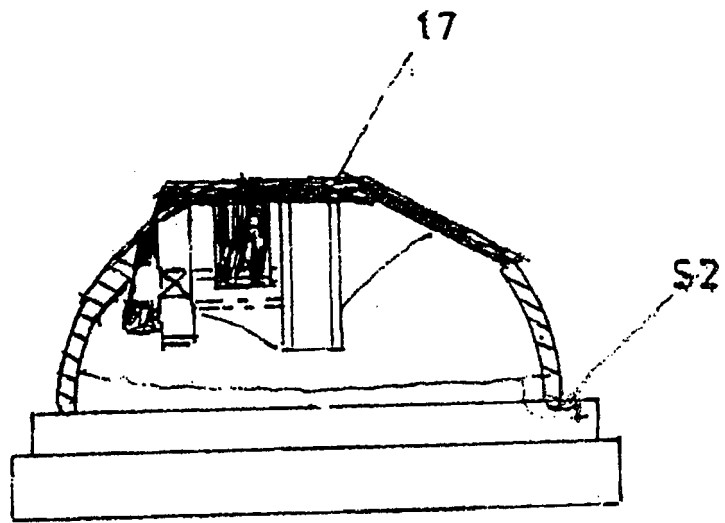


FIG. 4

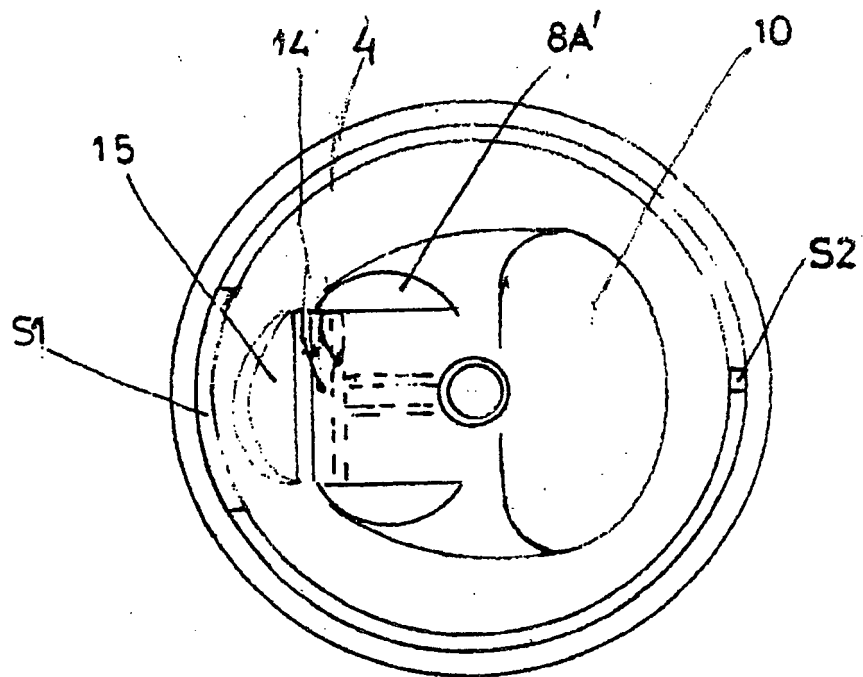


FIG. 5



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Place of search Munich		Date of completion of the search 4 August 2017	Examiner Twellmeyer, Andrea
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