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(12) # EUROPEAN PATENT APPLICATION

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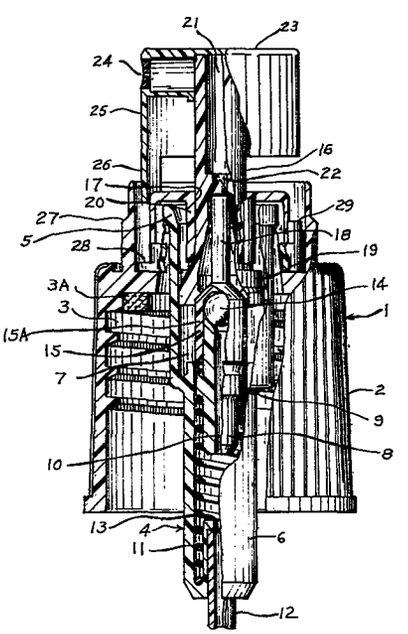
(54) **Variable-dispensing non-aerosol pump.**

(57) A variable delivery pump spray valve means comprising a valve (1) having, a dip tube (12) and an actuator button (23) and a means (29) cooperating with the actuator button, to vary the length of the stroke when said actuator button, is depressed to vary the amount of liquid delivered.



EP 0 070 385 A1

TITLE
see front page

VARIABLE RATE PUMP SPRAY DEVICE

The present invention relates to a non-aerosol pump for the variable delivery of low viscosity liquids. More particularly, it relates to the modification of the valving means in a conventional, non-throttling, constant pressure non-aerosol pump to permit the variable delivery of spray or, more accurately, to permit delivery of smaller or greater amounts or product. Conventional non-throttling pumps are shown in U.S. Patents 3,399,836; 4,050,613 and 4,173,297.

In the conventional non-aerosol pumps, when the actuator button seated atop the valve means is depressed, the liquid contents of the container are pumped and dispensed from the valve at a given rate and in a given spray pattern. The provision of variable spray patterns in a pump spray, that is, from fairly restricted to more disperse patterns, is known and is commonly found in commercially available trigger pump applicators. However, in such devices the amount delivered per stroke of the pump remains substantially constant. Insofar as we are aware, there has been no disclosure or use of a non-aerosol pump which provides a means for varying the delivery rate of a liquid product.

Since non-aerosol pumps are widely used to deliver a variety of liquid products, such as hair sprays, deodorants, various household products and cleaning agents, and the like, it is considered desirable to provide a means whereby the user can control the amount of product dispensed at any given time for any given purpose. This is particularly true with hair sprays where the user may only want to lightly spray the hair or apply spray to only a portion of the hair. Moreover, it provides means for the more ecconomical use of the product.

In accordance with the present invention means are provided for the modification of the valving means in a conventional non-aerosol pump, whereby the actuator button is provided with an extension of "tooth" which, when the button is depressed, engages against a cam insert in the valve shroud having variable elevations. The "tooth" is thereby limited in its downward travel by the height of the elevation on the insert against which it engages. The length of travel of the "tooth" governs the amount of product dispensed through the valve. This means, therefore, which is variable, enables a greater or lesser amount of product to be dispensed.

In principle, different amounts of spray will be delivered when the actuator button is depressed different distances from the original position. The amount of spray to be dispensed is determined by rotating the circular insert to, for example, the high, medium or low position. When the "tooth" engages that portion of the insert having the lowest elevation, then the highest amount of spray will be delivered. The lowest amount of spray will be delivered when the "tooth" contacts the highest elevation on the insert. By providing the insert with a series of elevations, a series of spray volumes can be obtained.

Figure 1 shows the upper housing of the pump, including the shroud, in partial cross-section;

Figure 2 is a top view of the shroud, including the annular space through which the actuator button travels;

Figure 3 shows an elongated view of the cam insert, including several height gradations, which fits into the annular space in the shroud;

Figure 4 shows the actuator button, including the "tooth" thereon;

Figure 5 shows a circular formed cam insert in perspective;

Figure 6 shows an alternative cam construction in partial cross-section;

Figure 7 shows a front view in elevation of the valve of Figure 6;

Figure 9 shows a top view of the cam of Figure 8;

Figure 10 shows a plan view of the elevational surfaces of the cam of Figure 8.

Referring to the Figures, a conventional accumulator (or non-throttling) valve 1 is shown in Figure 1, with housing or shroud 2 having inner threads 3 and gasket 3A for attaching to a liquid container (not shown). The valve body consists of an accumulator 4 which fits into the upper part of shroud 2 by means of cooperating detents 5 in shroud 2 and accumulator 4. The accumulator 4 has a lower section 6 and an upper section 7, section 7 having a larger cross-sectional area than section 6. Section 6 of accumulator 4 contains a seal valve 8 having seal 9, axial passage 10, which is biased upwardly by spring 11. Eductor 12 is connected to opening 13 at the lower end of section 6 of accumulator 4. Seal valve passage 10 is closed by spherical valve 14 held in place by an inverted cup 14A of poppet 15 which in turn is held by piston 16 which passes through opening 17 in the upper surface of shroud 2 and encloses the upper stem 18 of poppet 15. Piston 16 is retained by a flange 19 abbutting against the lower end of inner skirt 20 in shroud 2. Piston 16 contains axial passages 21 having an opening 22 sealed by poppet stem 18. An actuator spray head 23 is fitted to the top of piston 16 having spray orifice 24.

In the present invention, spray head 23 has an outer depending skirt 25, which has been modified to have a tooth 26. Shroud 2 has a collar 27 at the top which forms an annular groove 28. In the present invention a cam 29 fits in groove 28. In the operation of the pump valve, actuator spray head 23 is pressed down, thus pressing down piston 16, in turn pushing down poppet 15 and seal valve 8. Assuming that upper section 7 of accumulator 4 is primed (i.e. filled with liquid), the pressure of the liquid, being of greater cross-section than the area of lower section 6 will force seal valve 8 down faster, thus creating

an opening between piston 16 and poppet 15. The liquid in accumulator section 7 is then forced up through opening 22 of piston 16 through passage 21 and out spray orifice 24. Spray head 23 may normally be pressed down until it touches the base of annular groove 28, and liquid will continue to be expelled thus expelling the maximum amount of liquid as a spray.

As shown in Figures 4 and 5, a cam, in the form of an annular ring and having three elevations, H, M, and L on the upper surface thereof, fits into annular groove 28, and spray head 23 has a tooth 26 which will engage the elevated surfaces of cam 29.

As shown in Figure 1, cam 29 is positioned with the tooth over elevation H to allow the tooth to reach the base of groove 28 and expel the maximum amount of liquid. By rotating spray head 23, tooth 26 will be positioned above a higher elevated surface of the cam, e.g. L. When the spray head 23 is depressed, its downward stroke will be shorter, and thus the flow of liquid will be stopped sooner. Thus the amount of liquid expelled will be less. Although cam 29 has been shown with three steps, it will be understood that it may have any number of steps. Moreover, as shown in Figure 3, cam 29 may be a flat, flexible member the length of which is equal to the circumference of annular groove 28. The flexible strip cam is then curved and fitted into groove 28.

In the embodiment of the invention illustrated in Figures 1 to 5, cam 29 is stationary and spray head 23 rotates relative to cam 29. This may be done by fitting spray head 23 tightly to piston 16, by friction, adhesive means or by splines (not shown), so that when spray head 23 is rotated, piston 16 also rotates. On the other hand, piston 16 could be fixed against rotation (for example by axial splines not shown), and only spray cap 23 would rotate on piston 16. In either case, tooth 26 of spray head 23 may be positioned where desired over cam 29.

Figures 6 to 10 represent an alternative embodiment of the invention wherein the piston and spray head are fixed against rotation and the cam is rotatable. As shown in Figure 6, shroud 2 is modified to omit collar 27 (as seen in Figure 1) and to provide an annular ridge 30 on shoulder 31. Cam 29 is in the form of a molded cylinder 32 with an outer collar 33 and an annular groove 34 between collar 33 and cylinder 32 of cam 29. The inner surface 35 of cam 29 contains an annular groove 36 which fits over annular ridge 30 of shroud 2 in a snap fit. In this manner, cam 29 may be rotated around shroud 2.

Piston 16 is fitted with a pair of axial splines 37 which slide in axial grooves 38 so that piston 16 does not rotate about its axis. In like manner, spray head 23 is fixed against rotation by means of splines 39 on the upper end of piston 16 and by grooves 40 in spray head 23.

Cam 29 has a curved upper surface 41 with notches at different elevations around its circumference at 0, 120 and 240° as shown in Figures 9 and 10. As shown in Figure 7, cam 29 has indicia corresponding with the notches, which indicia are positioned under spray head orifice 24 in accordance with the amount of liquid to be sprayed. When spray head 23 is depressed, skirt 25 fits into groove 34, and the lower surface 42 of spray orifice 24 contacts the notch that has been indexed therewith, thus limiting the downward travel of piston 16 and consequently the amount of liquid sprayed. The least amount of liquid will be delivered at index position 0, the greatest amount at index position 240 and an intermediate amount at index position 120. For practical purposes, cam 29 may be marked on its outer surface with indicia to select the amount of liquid to be delivered, e.g. H (high amount of liquid, index position 240), M (medium amount of liquid, index position 120) and L (low amount of liquid, index position 0).

It will be obvious that cam 29 may have any number of cam stop positions desired, and this would not be limited to three as described above.

Moreover, the cam means could take other forms, and could be vertical rotating cam attached either to the shroud or the spray head, the main requirement being that a variable cam means is provided which limits the stroke of the valve piston to finite positions.

The following example of the invention is provided solely to illustrate the invention.

In one particular embodiment, a fixed annular cam was provided on the upper surface of the shroud and the spray head was rotatable. The spray pump had the following particulars.

A conventional pump spray, having a shroud 10/16" in diameter with an annular space 1/16" wide was fitted with an insert 1 3/4" in length and a highest elevation of 4/16", a medium elevation of 2.5/16" and a low elevation of 1/16". The actuator button was provided with a "tooth" 4/16" long by 7/16" wide. The pump was fitted on a container having an aqueous alcoholic hair spray composition. The low setting provided 0.136 gram per stroke, the medium 0.068 gram per stroke, and the high gave 0.100 gram per stroke.

WE CLAIM:

1. A non-throttling variable spray pump comprising in combination a spray head, a shroud and a piston adapted to be depressed a set distance to deliver a spray, variable means to limit the distance said piston is depressed to distances less than said set distance to deliver amounts of liquid from said set amount to less than said set amount.

2. The spray pump of claim 1 wherein said variable means is a variable cam.

3. The spray pump of claim 2 wherein said variable cam is positioned on said shroud and said spray head has means to engage said cam.

4. The spray pump of claim 3 wherein said variable cam has an annular cam surface around the upper surface of said shroud.

5. The spray valve of claim 4 wherein said variable cam is fixed and said spray head is rotatble about its axis.

6. The spray head of claim 4 wherein said variable cam is rotatable about its axis and said spray head is fixed.

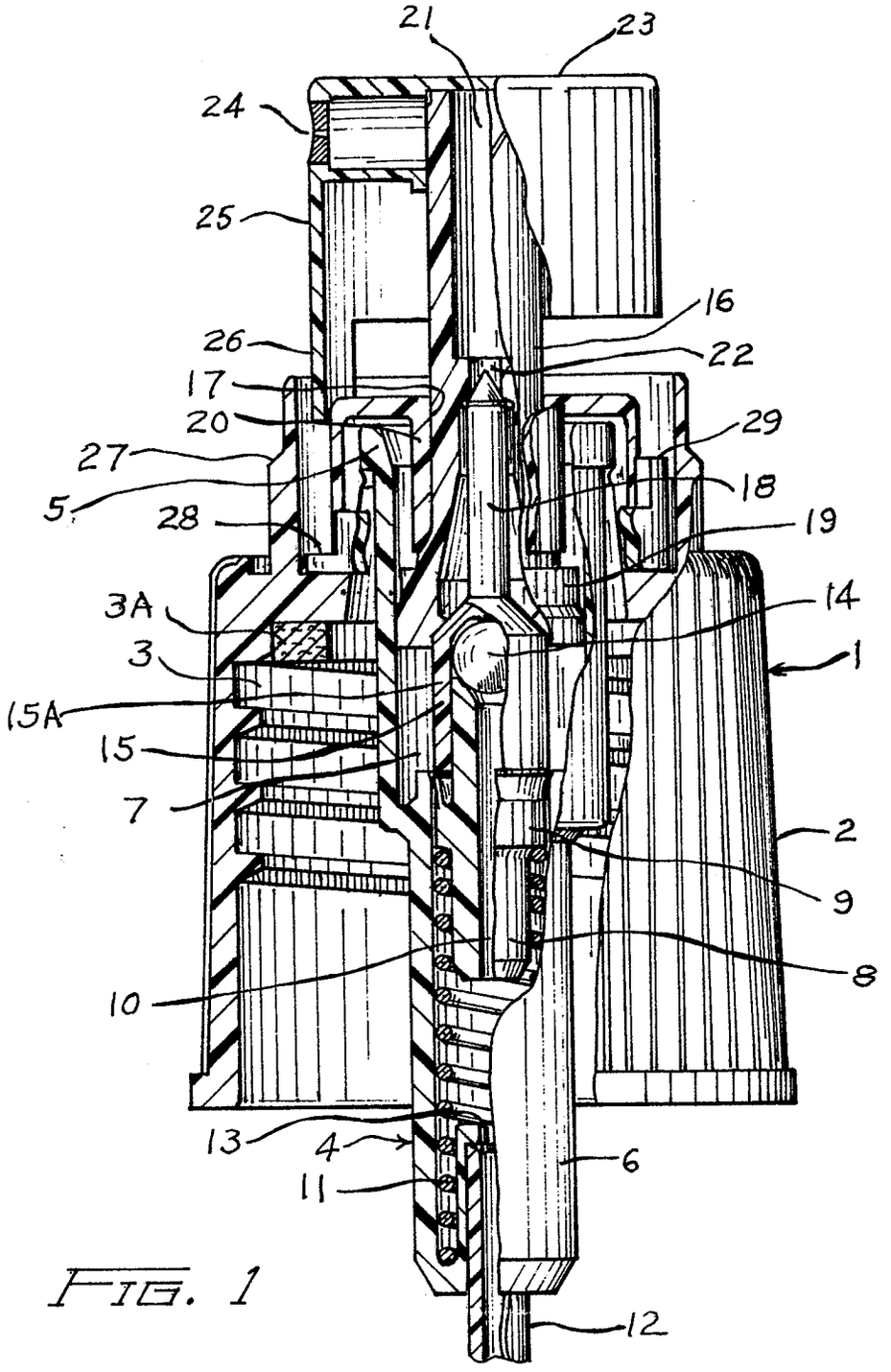

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FIG. 1

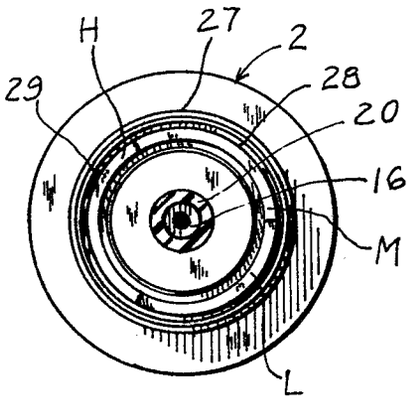

FIG. 2

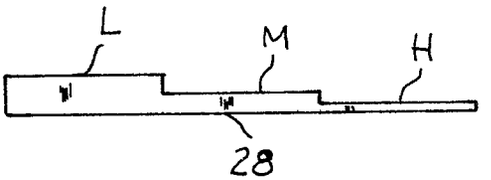

FIG. 3

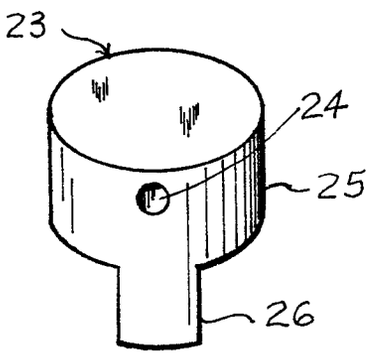

FIG. 4

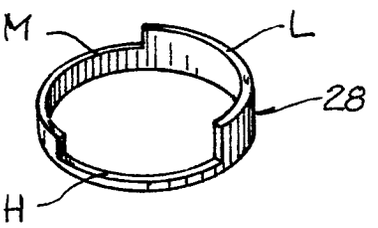

FIG. 5

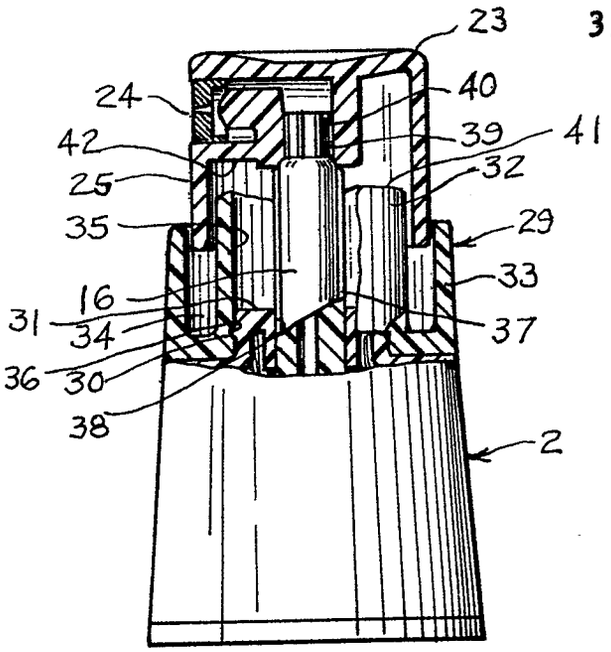

FIG. 6

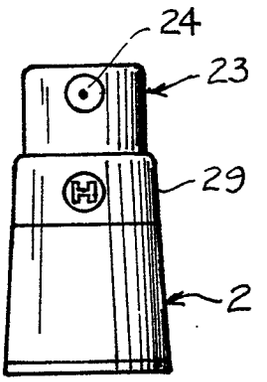

FIG. 7

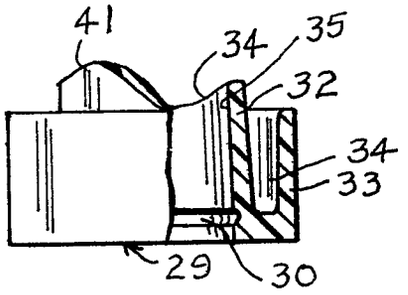

FIG. 8

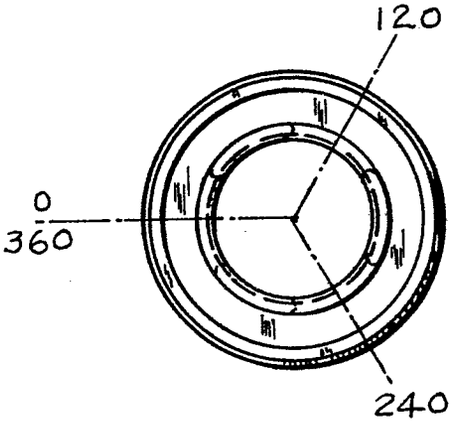

FIG. 9

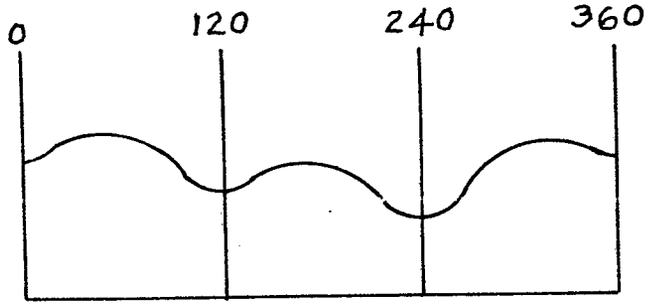

FIG. 10

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EUROPEAN SEARCH REPORT

Application number
EP 82104976.4

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 3)
A	US - A - 4 051 983 (W.F. ANDERSON) * Abstract; column 2, line 28 - column 4, line 65; fig. 1,2 * ----	1	B 05 B 9/043 F 04 B 9/14

TECHNICAL FIELDS SEARCHED (Int.Cl. 3)

B 05 B
F 04 B

CATEGORY OF CITED DOCUMENTS

X: particularly relevant if taken alone
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P: intermediate document
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E: earlier patent document, but published on, or after the filing date
D: document cited in the application
L: document cited for other reasons

&: member of the same patent family, corresponding document

X The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
VIENNA	14-09-1982	KAHOVEC

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