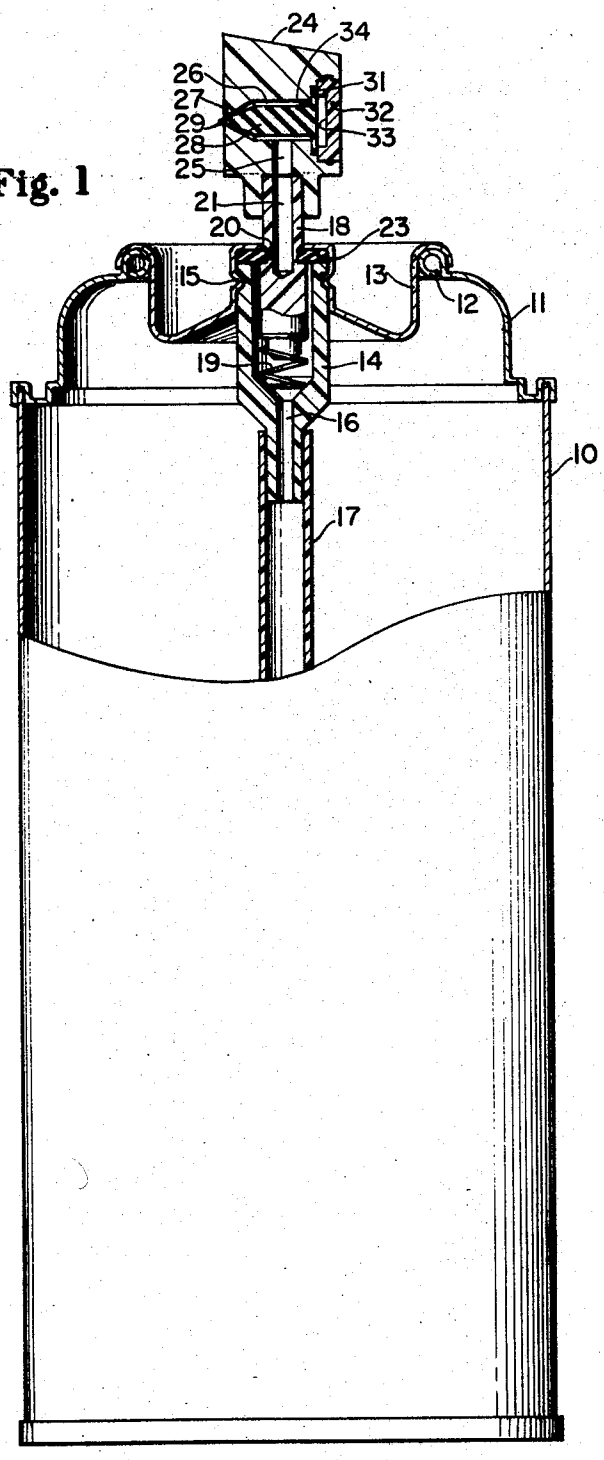
March 3, 1970 G. O. CHARRIER 3,498,506

DISPENSING VALVE MECHANISM

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Fig. 1



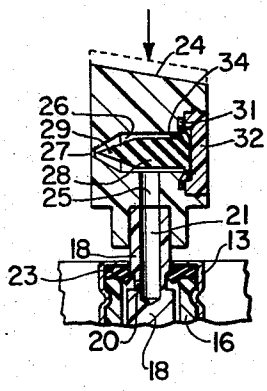


Fig. 2

INVENTORS
George O. Charrier
Finn Clement

BY Fredrick H. Braun
ATTORNEY

March 3, 1970 G. O. CHARRIER 3,498,506

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Fig. 4

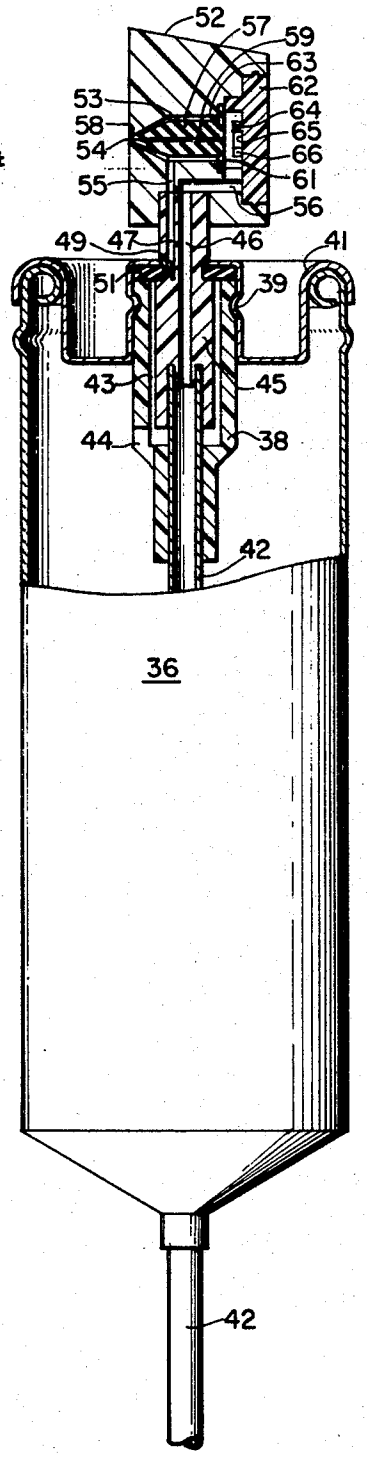


Fig. 5

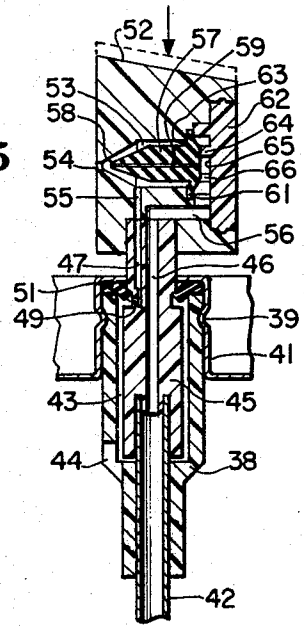
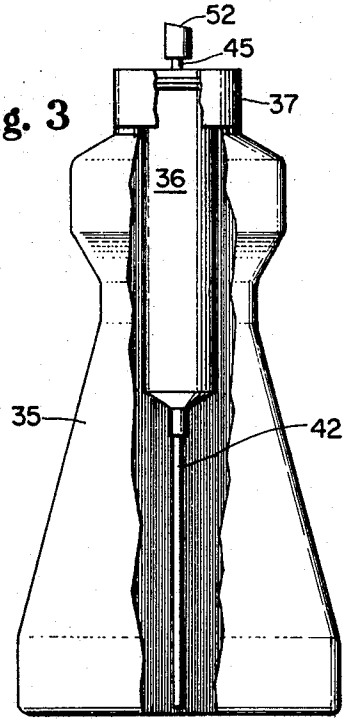


Fig. 3



INVENTORS
George O. Charrier
Finn Clement

BY Fredrick H. Braun

ATTORNEY

United States Patent Office

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DISPENSING VALVE MECHANISM

George O. Charrier and Finn Clement, Cincinnati, Ohio, assignors to The Procter & Gamble Company, Cincinnati, Ohio, a corporation of Ohio

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Int. Cl. B67d 47/20
U.S. Cl. 222—402.12 10 Claims

ABSTRACT OF THE DISCLOSURE

An actuating button for a pressurized spray container is fitted with an internal resilient plunger which is normally seated on a discharge orifice in the button to provide a seal. Depression of the button allows a propellant to act on and move the plunger thereby exposing the discharge orifice and permitting the product to be sprayed from the container. When the button is released, product spray ceases as the plunger is reseated on the discharge orifice. The structure provides an actuating button in which residual product in the internal valve mechanism can neither be contaminated nor otherwise affected by atmospheric conditions.

BACKGROUND OF THE INVENTION

The necessity for this invention was brought about by a need for a dispensing valve in a propellant actuated spray container which can be readily shut off at the discharge orifice when not in use. The lack of such a device in the prior art made it difficult if not impossible to protect the product from contamination and drying between sprayings. Thus the primary object of the present invention is the provision of a valve mechanism that can be reliably sealed at the spray orifice whenever the valve is not in use.

Another object of invention is the provision of an improvement in valve mechanisms which can be incorporated into a pressurized spray mechanism for containers which use propellants under pressure to spray materials or products held separately at atmospheric pressure or in containers where the product and propellant are admixed and stored in the container under pressure.

Still another object of the invention is the provision of a valve mechanism of the character described above which is simple and inexpensive and can be easily incorporated into existing spray dispensing valves now used commerically in the aerosol industry.

SUMMARY OF THE INVENTION

The nature and substance of the invention can be briefly summarized as the provision of a valve within the actuating button of a pressurized dispensing container. The valve is composed of a resilient plunger mounted within a chamber in the actuating button there being a sealing tip at the forward end of the plunger which normally engages a discharge orifice in the actuating button. The plunger is movable in response to propellant pressure in the chamber resulting from the depression of the actuating button. This causes the plunger to be axially displaced such that its sealing tip is withdrawn from the discharge orifice to permit spray discharge of product from the orifice. On release of the actuating button, the plunger is resiliently restored to its normal position in which its forward end seals the discharge orifice in the button.

BRIEF DESCRIPTION OF THE DRAWINGS

While the specification concludes with claims particularly pointing out and distinctly claiming the subject matter regarded as forming the present invention, it is believed the invention will be better understood from the following description taken in connection with the accompanying drawings in which:

FIGURE 1 is an elevation, partially in cross section, showing the upper portion of a typical aerosol container including the valve mechanism and modified actuating button.

FIGURE 2 is a fragmentary elevation, in cross section, showing the several parts of the valve mechanism with the actuating button depressed.

FIGURE 3 is an elevation, partially in section, illustrating a spray container in which the propellant and product are stored separately.

FIGURE 4 is an enlarged fragmentary elevation, partially in cross section, showing the valve mechanism adapted to a container of the type illustrated in FIGURE 3.

FIGURE 5 is a fragmentary elevation, in cross section, illustrating the several parts of the valve mechanism of FIGURE 4 with the actuating button depressed.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to FIGURE 1, there is illustrated a container **10** which may be of conventional sheet metal construction such that it is sufficiently strong to store a liquid product and propellant under typical commercial pressures. The upper portion of the container **10** includes an annular shoulder portion **11** having a bead **12** there being a dispensing valve suspended from the specially formed container cap **13** which is secured to the bead **12**.

The dispensing valve includes a valve body **14** held in place by the annular crimp **15**. The lower portion of the valve **14** has a passage **16** communicating with a dip tube **17** suspended downwardly to the bottom of the container **10**. A reciprocable core **18** is normally held in its uppermost position by a return spring **19** there being a radial inlet passage **20** and an axial bore **21** therein. A resilient sealing gasket **23** is mounted above the body **14** such that it normally seals off the inlet passage **20** as the spring **19** maintains the core **17** in its uppermost position.

An actuating button **24** is provided with an internal dispensing valve structure as will now be described in greater detail. The actuating button **24** fits snugly over the upper projection of the core **18** there being a passageway **25** in communication with the hollow chamber **26** which converges forwardly to a discharge orifice **27** as best illustrated in FIGURE 2. A resilient and flexible plunger valve **28** which preferably is made of a pliable rubber or similar composition is mounted within the chamber **26**. The forward portion of the flexible plunger element **28** tapers to a sealing tip **29** which normally engages in the opening of the orifice **27** to form a seal.

Means are provided for moving the plunger rearwardly in response to fluid pressure in the chamber **26** such that the orifice **27** will be exposed to allow a spray discharge. The rear portion of the plunger **28** has a radially extending flange **31** the outer portion of which is securely held in the actuating button **24** by means of the retainer member **32** which is hollowed at **33** to permit a predetermined movement of the plunger **28** as illustrated in FIGURE 2. The inward portion **34** of the flange **31** is exposed in the chamber **26**.

The several parts of the dispensing valve assume the position illustrated in FIGURE 1 when at rest such that no product is being sprayed from the orifice **27**. In this condition, the sealing tip **29** closes off the discharge orifice **27** as shown in the drawing (FIGURE 1) so that any residual product in the chamber **26** or the passageway **25**, axial bore **21**, etc., will not be exposed to atmosphere. This substantially eliminates contamination, drying out and other undesirable changes in the product.

When it is desired to spray from the container **10**, the

actuating button 24 is depressed downwardly thereby deforming the gasket 23 in the manner illustrated in FIGURE 2. This exposes the inlet passage 20 and allows the product-propellant mixture to flow upwardly through the dip tube 17 and through the various passageways to the hollow chamber 26. The product-propellant mixture in the chamber 26 is at considerably above atmospheric pressure. This pressure effect acts on the exposed inner face 34 of the flange 31 to cause the flexible plunger valve 28 to be moved into the position illustrated in FIGURE 2. This then exposes the discharge orifice 27 and allows the product-propellant mixture to be sprayed out during the time that the actuator button 24 is depressed.

When spraying is to be discontinued, the actuating button 24 is merely released thereby restoring the gasket 23 to its unflexed configuration to close off the inlet passage 20 in the core member 17. The residual pressure in the chamber 26 is thus reduced until it allows the sealing tip 29 to return to its sealing position with the orifice 27 as illustrated in FIGURE 1. The several parts remain in this position until the valve mechanism is again used to spray or dispense product.

Another embodiment of the invention is illustrated in FIGURES 3, 4, and 5. This embodiment is representative of the invention as applied to an aerosol spray device in which the propellant is stored above atmospheric pressure in a separate capsule within a container wherein the product itself is at or very near atmospheric pressure. This allows the use of containers, e.g., thin-walled plastic bottles and the like, which need no special structural design features to hold a pressurized product or product-propellant mixture.

FIGURE 3 illustrates a container 35 of this general type wherein the container is designed to hold and maintain the product to be dispensed at or near atmospheric pressure. The pressurized propellant capsule 36 is suspended from the mouth of the container 35. The capsule 36 normally is filled with a compatible propellant which is under substantial pressure. The capsule 36 is held in the mouth of the container 35 by a suitable cap 37 which can be readily removed so that the capsule 36 can be replaced or it can be removed to allow additional product to be filled in the container 35.

The structural details of this embodiment are best illustrated in FIGURE 4. The valve body 38 is held in place by the crimp 39 in the cap 41 which is suitably attached to the capsule 36. The dip tube 42 extends upwardly through the lower portion of the body 38. The body 38 is internally recessed at 43 and is in communication with the contents of the pressurized capsule 36 by means of the radial opening 44. A reciprocable core 45 receives the dip tube 42 in its lower portion such that the latter communicates with an upwardly extending product passageway 46. The core is also provided with an upwardly extending propellant passageway 47 which communicates with the radial inlet passage 49. The resilient sealing gasket 51 is mounted above the body 38 such that it normally seals off the inlet passage 49.

An actuating button 52 is provided with an internal dispensing valve structure as will now be described in greater detail. The actuating button 52 is fitted snugly over the upper extending portion of the core 45. The interior portion of the actuating button 52 is provided with the hollow chamber 53 which tapers forwardly to a discharge orifice 54 (best illustrated in FIGURE 5) the latter preferably being of oval cross section. A passageway 55 is provided in the button 52 which provides a path of communication between the propellant passageway 47 and the hollow chamber 53. A product passageway 56 in the button 52 communicates with the product passageway 46 in the core 45. A flexible plunger valve 57 is provided which tapers forwardly to a sealing tip 58 the latter being normally engaged in the orifice 54 such that the oval cross section of the latter pinches shut the central passageway 59 through the plunger 57. The material for the plunger 57 can be any pliable rubber or like composition that has the requisite resiliency.

Means are provided for axially moving the plunger 57 within the chamber 53. These means preferably include a radially extending flange 61 the outer portion of which is secured by the retainer member 62 such that the inner face 63 of the flange 61 is exposed to pressure conditions in the hollow chamber 53. The retainer 62 has a forwardly extending annular projection 64 recessed at 65 and communicating by means of a radial opening 66 with the product passageway 56. The latter structure permits the plunger member 57 to be moved to the position illustrated in FIGURE 5 without inhibiting flow through the central passageway 59 and yet providing a positive stop to limit the travel of the plunger 57 during product discharge.

The operation of the embodiment of FIGURES 3–5 is somewhat similar to that of the embodiment of FIGURES 1–2. The normal position of the several parts of the valve mechanism are illustrated in FIGURE 4. In this position there is no flow. In addition, the discharge orifice 54 is sealed off and the central passageway 59 is pinched shut at the sealing tip 58 because of the oval configuration of the orifice 54. These seals prevent drying and contamination of any residual product in the various passageways of the valve mechanism.

When product dispensing is desired, the actuating button 52 is depressed so that the several parts assume the postion illustrated in FIGURE 5. This exposes the inlet passage 49 in the core member 45 to permit flow of propellant from the capsule 36 upwardly into the hollow chamber 53. The propellant is substantially above atmospheric pressure and acts on the exposed flange surface 63 to move the resilient plunger 57 to its discharge position illustrated in FIGURE 5. This results in propellant flow through the discharge orifice 54. It also causes an aspirating effect at the terminus of the central passageway 59 which then draws product upwardly from the dip tube 42 by means of the various connecting passageways. The product-propellant mixture is discharged from the orifice 54 as a spray.

When flow is to be discontinued, the actuating button 52 is merely released thereby sealing off the inlet passage 49 to prevent further flow of propellant to the chamber 53. This also discontinues the aspirating effect on the product in passageway 59. As the pressure in the chamber 53 returns to atmospheric, the plunger member 57 is restored to its original position as illustrated in FIGURE 4, thus sealing the orifice 54 and pinching off the sealing tip 58 to protect the residual product in the various passageways of the valve structure as well as within the container itself. When the parts are in this attitude, there is no contamination and product deterioration through drying effects when the container is stored for any length of time.

While particular embodiments of the invention have been illustrated and described it will be obvious to those skilled in the art that various changes and modifications can be made without departing from the spirit and scope of the invention and it is intended to cover in the appended claims all such changes and modifications that are within the scope of this invention.

What is claimed as new is:

1. A dispensing valve mechanism comprising an actuating button having a hollow chamber, a discharge orifice communicating with said chamber, a resilient plunger mounted within said chamber, said plunger having a sealing tip at its forward end which normally engages and seals said discharge orifice of said actuating button, means for admitting a pressurized fluid propellant to said chamber to raise the pressure in said chamber above atmospheric pressure, and means associated with said plunger to move said plunger in response to the propellant pressure in said chamber thereby withdrawing said seal-

ing tip from said orifice to allow product to be discharged therefrom.

2. A dispensing valve as claimed in claim 1 wherein said means for moving said plunger comprises a flange extending radially from said plunger in spaced relation to said sealing tip.

3. A dispensing valve as claimed in claim 2 including means for securing the outer portion of said radially extending flange so that a portion of the inner face of said flange is exposed in said chamber.

4. A dispensing valve as claimed in claim 3 wherein the plunger is tapered to the sealing tip.

5. A dispensing valve as claimed in claim 4 including means in said actuating button for limiting the travel of said plunger in response to the propellant pressure in said chamber.

6. A dispensing valve as claimed in claim 1 including a central passageway through said plunger, said central passageway communicating with a product container maintained substantially at atmospheric pressure.

7. A dispensing valve as claimed in claim 6 wherein the forward end of said plunger is tapered to the sealing tip.

8. A dispensing valve as claimed in claim 7 wherein said discharge orifice in said actuating button is substantially oval in cross section.

9. A dispensing valve as claimed in claim 8 wherein said means for moving said plunger comprises a flange extending radially from said plunger in spaced relation to said sealing tip and means for securing the outer portion of said radially extending flange so that a portion of the inner face of said flange is exposed in said chamber.

10. A dispensing valve as claimed in claim 9 including means in said actuating button for limiting the travel of said plunger in response to the propellant pressure in said chamber.

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SAMUEL F. COLEMAN, Primary Examiner

N. L. STACK, JR., Assistant Examiner

U.S. Cl. X.R.

222—504; 239—412