United States Patent [19]

Bucaro

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[54] **VARIABLE SPRAY RATE AEROSOL**

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[73] Assignee: **Sequist Valve Company,** Cary, Ill.

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[52] **U.S. Cl.** **222/402.17**

[51] **Int. Cl.** **B65d 83/14**

[58] **Field of Search** 222/402.17; 239/394, 397, 239/337; 137/625.3, 553; 251/206.7, 353

[56] **References Cited**

UNITED STATES PATENTS

3,206,082	9/1965	Green	222/402.17
3,471,092	10/1969	Hickey	239/337 X

Primary Examiner—Stanley H. Tollberg
Assistant Examiner—John P. Shannon
Attorney, Agent, or Firm—Stein and Orman

[57] **ABSTRACT**

A variable spray aerosol system for use with an aerosol container comprising a button actuator including at least one terminal orifice recess formed in the side wall thereof, a valve stem recess formed in the base thereof and at least one feed supply channel extending therebetween and a valve stem including at least two feed supply passages disposed to selectively communicate with the interior of the aerosol container and the feed supply channel to provide a variable spray aerosol system.

9 Claims, 9 Drawing Figures

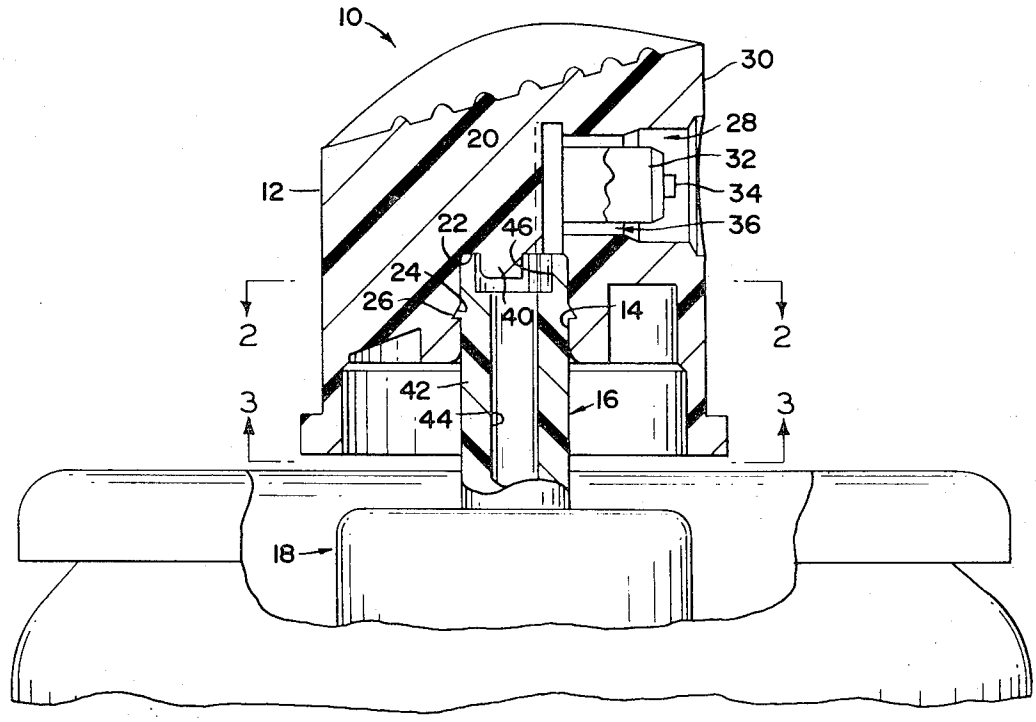
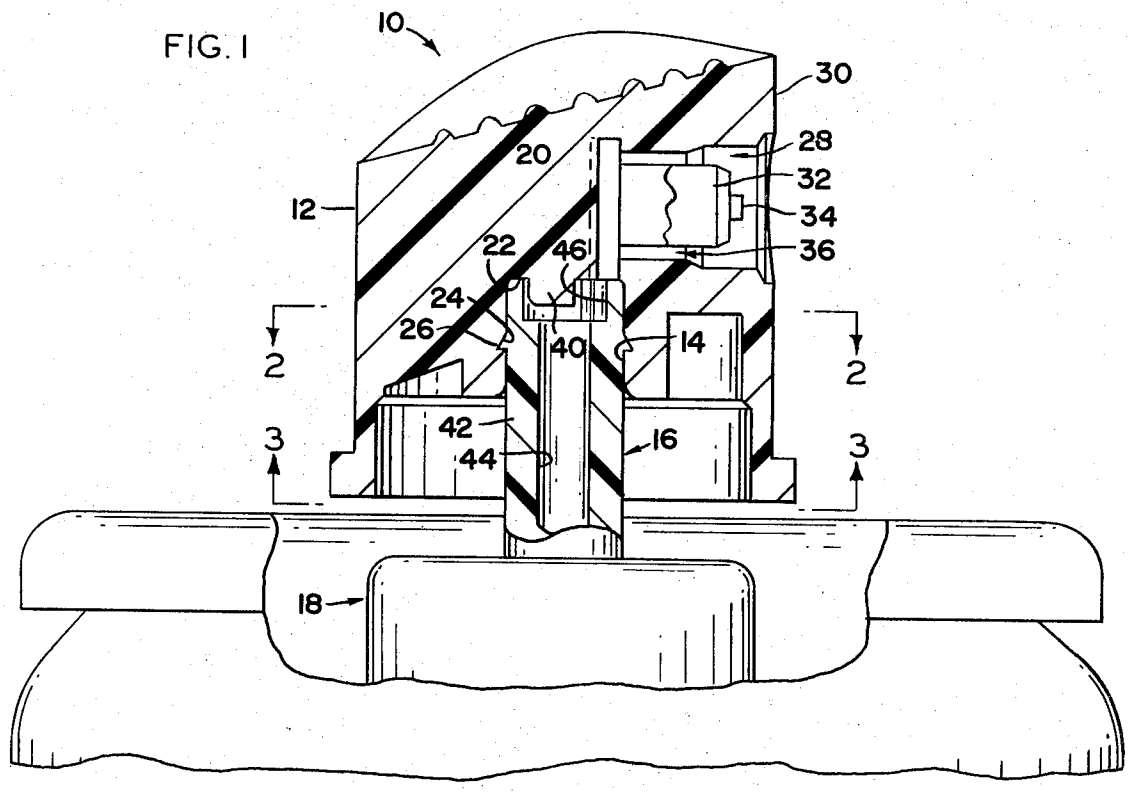


FIG. 1



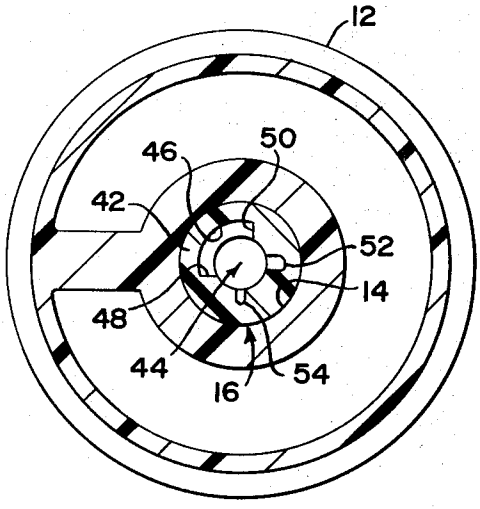


FIG. 2

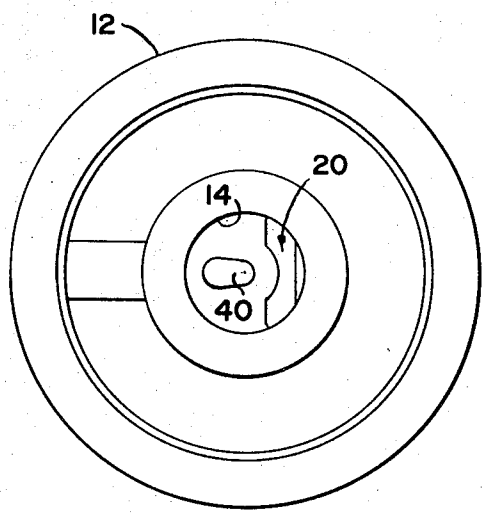


FIG. 3

FIG. 4

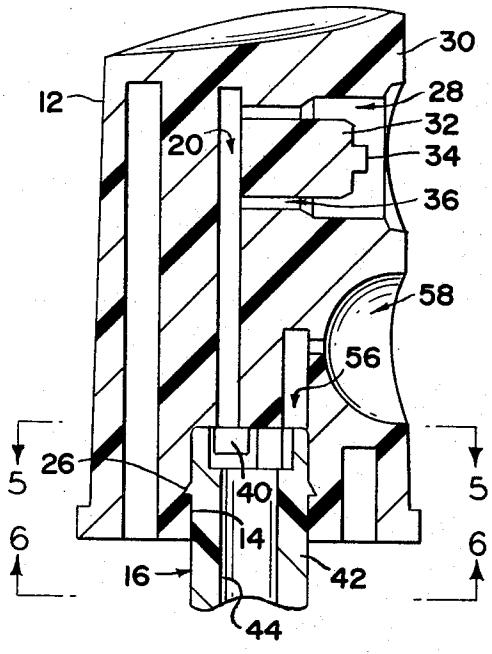


FIG. 5

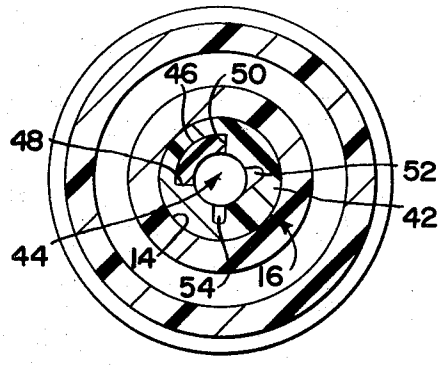
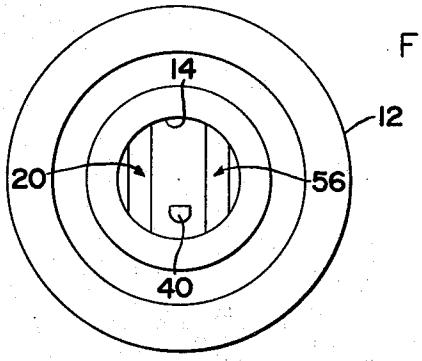


FIG. 6



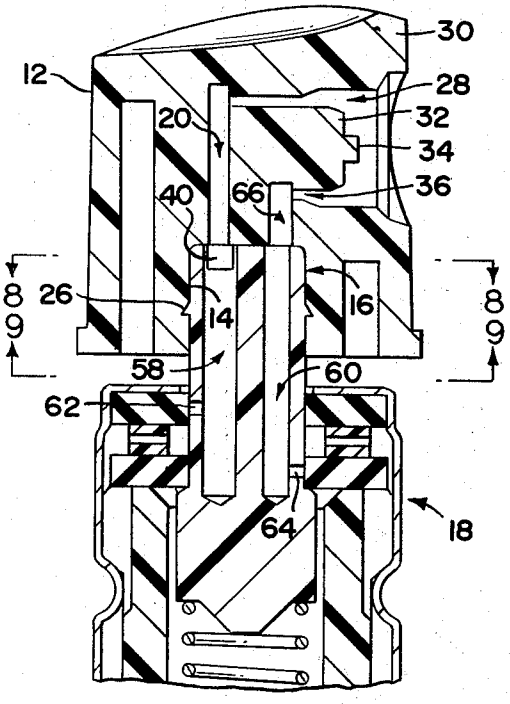


FIG. 7

FIG. 8

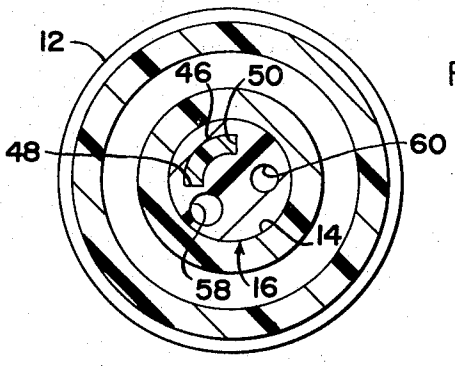
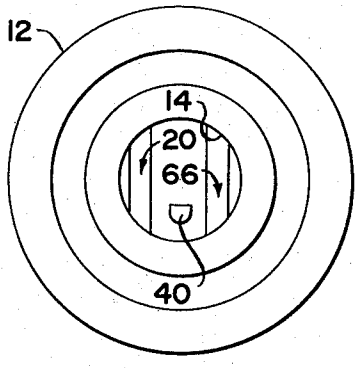


FIG. 9



VARIABLE SPRAY RATE AEROSOL

BACKGROUND OF THE INVENTION

1. Field of the Invention

A variable spray aerosol system comprising a button actuator and valve stem cooperatively configured to selectively dispense product with variable spray characteristics.

2. Description of the Prior Art

With the increased sophistication of the aerosol dispensing industry and the introduction of new products, a wide variety of aerosol dispensing devices have been developed. Most recently a number of devices have been developed which feature variable spray rates or spray patterns from a single aerosol dispenser.

Commonly, such devices are used with hair lacquer, cosmetics, paint or the like. Spray rates and spray patterns may change during application such as during the process of adjusting coiffure where the user of sprayed hair lacquer may wish to dispense very small quantities for interim settings and when the hair is completely arranged, the user will wish to cover the entire coiffure with a heavy spray. Similar situations in applying paint, enamel, varnish or the like often arise.

As shown in U.S. Pat. No. 3,206,082, a number of aerosol devices comprise vertically aligned button actuator and valve stem combinations wherein at least one includes a plurality of apertures formed therein to register with at least one aperture formed on the counterpart element to provide a variable spray rate or pattern. These generally require twisting of the button actuator relative to the valve stem to achieve registry in different positions which is undesirable because there is no means provided to indicate the particular spray rate selected.

U.S. Pat. Nos. 3,045,877 and 3,231,153 show another such device which includes depressing the button actuator and valve stem to varying depths to change the effective size of the feed orifice in direct proportion to the vertical displacement of the button actuator and valve stem. In each of these two types of structures the operator is given no positive indication or control over the spray characteristics.

Another type of device comprises variable flow restrictors which maintain a substantially constant rate of flow or delivery of fluid over the wide range of pressures as shown in U.S. Pat. No. 2,878,836. Although various flow restrictors have been devised, these have been only partially satisfactory. Unfortunately, many such flow restrictors do not insure a satisfactory rate of flow at the lower pressures.

Thus, a need for a reliable variable spray aerosol system for use with an aerosol container exists.

SUMMARY OF THE INVENTION

This invention relates to a variable spray aerosol system for use with an aerosol container. More specifically, the variable spray aerosol system of the present invention includes a button actuator having at least one feed supply channel in communication with at least one terminal orifice recess formed in the side wall thereof and a valve stem operatively coupled to the button actuator by a valve stem recess formed in the base of the button actuator. The valve stem includes at least two feed supply passages and an inlet feed passage disposed to selectively communicate with the interior of the aerosol container and the feed supply channel.

In an alternate embodiment, the valve stem includes at least two feed supply passages disposed to selectively communicate with the interior of the aerosol container as in the first embodiment. In addition, the button actuator includes a first and second terminal orifice recess and a first and second feed supply channel. The first and second feed supply channels are disposed to communicate with the first and second terminal orifice recesses respectively. The first and second feed supply passages being disposed relative to the first and second feed supply channels respectively such that the first and second terminal orifice recesses may selectively communicate with the interior of the aerosol container through first feed supply passage and first feed supply channel and second feed supply passage and second feed supply channel respectively.

In still another alternate embodiment, the button actuator includes a first and second feed supply channel disposed to communicate with a terminal orifice recess formed in the side wall thereof. The valve stem includes at least two feed supply passages disposed to selectively communicate with the interior of the aerosol container as in each of the two previously described embodiments. The first feed supply passage communicates with the first feed supply channel and the second feed supply passage communicates with the second feed supply channel when the button actuator is in the first position and the second feed supply passage is isolated from the second feed supply channel and the first feed supply passage is communicated with the first feed supply channel when the button actuator is in the second position.

In this first embodiment, the button body is rotatable relative to the valve stem between a first and second position. When in the first position, feed supply channel is aligned with the first feed supply passage such that as the button is depressed, pressurized product passes upwardly through the inlet feed passage and the first feed supply passage to the feed supply channel where it is forced forwardly through the terminal orifice recess. Upon rotation on the button body to the second position, the feed supply channel communicates directly with the second feed supply passage such that as the button is depressed, the pressurized product passes upwardly through the inlet feed passage and second feed supply passage to the feed supply channel where it is forced forwardly through the terminal orifice discharge. Since the first and second feed supply passages have different cross-sectional areas, a variable spray rate is provided.

With reference to the first alternate embodiment, the button body is rotatable relative to the valve stem between the first and second position. When in the first position, the button body is depressed forcing product upwardly through inlet feed passage through the first feed supply passage to the feed supply channel where it is forced forwardly through the first terminal orifice recess. When in the second position, the button body is depressed forcing product upwardly through the inlet passage through the second feed supply passage into the second feed supply channel where it is forced forwardly through the second terminal orifice recess. Thus, by rotation of the button body relative to the valve stem, a variable spray rate and spray pattern is provided.

With reference to the second alternate embodiment, the button body is similarly rotatable between the first

and second position relative to the valve stem. When in the first position, the feed supply channel is aligned with the first feed supply passage and the second supply feed channel is aligned with the second feed supply passage. Upon actuation, vapor passes through a first feed port, the first feed supply passage and the first feed supply channel to the terminal orifice recess. Simultaneously, product passes through a second feed port and the second feed supply passage through the second feed supply channel and then to the terminal orifice recess where it is combined with the vapor to exit from terminal orifice to the second position. When in this position, the second feed supply passage is aligned with the second feed supply channel while the first feed supply passage is isolated from the first feed supply channel. Upon actuation, product is fed through the second feed port, second feed supply passage and second feed supply channel and exist through terminal orifice recess. Thus, by this combination of structural elements, an alternate spaced spray or residual spray is provided.

The invention accordingly comprises the features of construction, combination of elements and arrangement of parts which will be exemplified in the construction hereinafter set forth, and the scope of the invention will be indicated in the claims.

BRIEF DESCRIPTION OF THE DRAWINGS

For a fuller understanding of the nature and objects of the invention reference should be had to the following detailed description taken in connection with the accompanying drawings in which:

FIG. **1** is a cross-sectional side view of the variable spray aerosol system.

FIG. **2** is a cross-sectional top view of the variable spray aerosol system taken along lines **2—2** of FIG. **1.**

FIG. **3** is a bottom view of the button actuator.

FIG. **4** is a cross-sectional side view of an alternate embodiment of a variable spray aerosol system.

FIG. **5** is a cross-sectional top view of an alternate embodiment of a variable spray aerosol system taken along line **5—5** of FIG. **4.**

FIG. **6** is a bottom view of the alternate embodiment of the button actuator of FIGS. **4** and **5.**

FIG. **7** is a cross-sectional side view of still another alternate embodiment of the variable spray aerosol system.

FIG. **8** is a cross-sectional top view of the alternate embodiment of the variable spray aerosol system taken along line **8—8** of FIG. **7.**

FIG. **9** is a botton view of the alternate embodiment of the button actuator of FIGS. **7** and **8.**

Similar reference characters refer to similar parts throughout the several views of the drawings.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

As shown in FIG. **1,** the variable spray aerosol system generally indicated at **10,** comprises a button actuator including button body **12** having centrally disposed valve stem recess **14** formed in the lower portion thereof to receive the upper portion of valve stem **16** of aerosol valve **18** (shown only in outer form). Immediately above valve stem recess **14** is feed supply channel **20.** Annular support surface **22** is formed by the inner end of valve stem recess **14** to engage the upper end of valve stem **16** to cooperatively form a seal therebetween. Anchoring groove **24** may be formed about the periphery of valve stem recess **14** to cooperatively engage anchoring ring **26** formed about the periphery of valve stem **16** to affix button body **12** securely thereto.

Terminal orifice recess **28,** formed in side wall **30** of button body **12,** extends inwardly to feed supply channel **20.** Affixed to button body **12** adjacent feed supply channel **20** in the rear portion of recess **28** is cylindrical terminal orifice feed post **32** including volume saver plug **34** formed on the face thereof. Feed post **32** and the inner portion of recess **28** cooperatively form discharge feed passage **36** which extends forwardly. Although not shown, the variable spray aerosol system **10** is used in combination with a terminal orifice insert of varying structural configuration. Key means **40** extends downwardly from annular support surface **22.** As described more fully hereinafter, key means **40** in combination with a key way formed in valve stem **16** forms a limit means.

As best seen in FIGS. **1** through **3,** valve stem **16** comprises elongated body **42** having centrally disposed inlet feed passage **44** extending therethrough. The upper end of valve stem **16** includes keyway **46** forming stops **48** and **50.** Also formed in the upper end of valve stem **16** are first and second feed supply passages **52** and **54.** Feed passages **52** and **54** are disposed to alternately communicate with feed supply channel **20** while stops **48** and **50** are disposed to alternately engage key **40** to limit the rotational movement of button body **12** relative to valve stem **16.**

FIGS. **4** through **6** show an alternate embodiment of the present invention where similar parts are similarly numbered. In addition to the basic elements disclosed in FIGS. **1** through **3,** the alternate embodiment of FIGS. **4** through **6** includes second feed supply channel **56** disposed in spaced parallel relationship relative to feed supply channel **20.** A second terminal orifice recess **58** is formed in side wall **30** below terminal orifice recess **28** and extends rearwardly to second feed supply channel **56.** Feed supply passages **52** and **54** are disposed to alternately align or register with first and second feed supply channels **20** and **56** respectively while stops **48** and **50** are disposed to alternately engage key **40** to limit the rotational movement of button body **12** relative to valve stem **16.**

FIGS. **7** through **9** show a second alternate embodiment of the present invention where similar parts are similarly numbered. In this alternate embodiment, first and second feed supply passages **59** and **60** respectively communicate with the interior of the container through first and second feed ports **62** and **64** respectively. Second feed supply channel **66** extends from recess **14** to discharge feed passage **36** in spaced parallel relationship relative to first feed supply channel **20.** Feed supply passages **59** and **60** are disposed to register or align with feed supply channels **20** and **66** as more fully described hereinafter to alternately provide a space spray or residual spray.

With reference to the embodiment of FIGS. **1-3** when in use button body **12** is rotated relative to valve stem **16** such that key **40** engages either stop **48** or **50.** When key **40** engages stop **48** (first position) feed supply channel **20** is aligned with first feed supply passage **52** such that as button **10** is depressed, pressurized product passes upwardly through inlet feed passage **44** and first feed supply passage **52** to feed supply channel **20** where it is forced forwardly through discharge feed

passage **36** and exits from the discharge feed passage **36.** Upon rotation on button body **12** such that key **40** engages stop **50** (second position) feed supply channel **20** communicates directly with second feed supply passage **54** such that as button **10** is depressed, the pressurized product passes upwardly through feed passage **44** and second feed supply passage **54** to feed supply channel **20** where it is forced forwardly through discharge feed passage **36** and exits from terminal discharge chamber **38.** Since first and second feed supply passages **52** and **54** respectively have different cross-sectional areas, a variable spray rate is provided.

With reference to the alternate embodiment of FIGS. **4–6,** button body **12** is rotatable relative to valve stem **16** such that key **40** moves between stops **48** and **50.** With key **40** engaging stop **50,** button body **12** is depressed forcing product upwardly through inlet feed passage **44** through first feed supply passage **52** to feed supply channel **20** where it is forced forwardly through discharge feed passage **36** and exits from discharge feed passage **36.** Alternately, with key **40** engaging stop **48,** button body **12** is depressed forcing product upwardly through feed passage **44** through second feed supply passage **54** into second feed supply channel **56** where it is forced forwardly through and exits from second terminal orifice recess **58.** Thus, by rotation of button body **12** relative to valve stem **16** a variable spray rate and spray pattern is provided.

With reference to the alternate embodiment of FIGS. **7–9,** button body **12** is rotatable between the first and second position relative to valve stem **16** where the key **40** alternately engages stops **48** and **50.** With key **40** engaging stop **50,** feed supply channel **20** is aligned with first feed supply passage **58** and second supply feed channel **66** is aligned with second feed supply passage **60.** Upon actuation, vapor passes through first feed port **62,** first feed supply passage **59** and first feed supply channel **20** through discharge feed passage **36.** Simultaneously, product passes through second feed port **64** and second feed supply passage **60** through second feed supply channel **66** and then to discharge feed passage **36** where it is combined with the vapor to exit from terminal discharge chamber **38** as a spaced spray. By varying the effect, cross-sectional areas of passages **59** and **60** relative to channel **20** and **66** respectively, the ratio of vapor to product may be varied. Alternately, button body **12** is rotated such that key **40** engages stop **48.** When in this position, second feed supply passage **60** is aligned with second feed supply channel **66** while first feed supply passage **59** is isolated from first feed supply channel **20.** Upon actuation, product is fed through second feed port **64** and second feed supply passage **60** and second feed supply channel **66** to discharge feed passage **36** from which it exits. Thus, by this combination of structural elements and alternate spaced spray or residual spray is provided.

It will thus be seen that the objects set forth above among those made apparent from the preceding description, are efficiently attained, and since certain changes may be made in the above construction without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the following claims are intended to cover all the generic and specific features herein described, and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

Now that the invention has been described,

What is claimed is:

1. A variable spray aerosol system for use with an aerosol dispenser, said variable spray aerosol system comprising: a button and valve stem combination, said button comprising a button body including at least one terminal orifice recess formed in the side wall thereof, a valve stem recess formed in the bottom thereof and feed supply channel means extending between said terminal orifice recess and said valve stem recess, said button body further including a key means formed thereon, said valve stem including keyway means disposed in operative engagement with said key means and further including feed passage means extending longitudinally along the interior of at least a portion of said valve stem, said valve stem further including at least a first and second feed supply passage, said feed passage means disposed in fluid communication between said dispenser interior and said one terminal orifice insert via said first and second supply passage and said feed supply channel means, said button body movable between at least a first and second position relative to said valve stem, said first and second feed supply passage disposed to alternately communicate with said feed supply channel means, said first feed supply passage communicating with said feed supply channel means when said button body is in said first position and said second feed supply passage communicating with said feed supply channel means when said button body is in said second position.

2. The variable spray aerosol system of claim **1** wherein a post is disposed in said terminal orifice recess, said terminal orifice recess and said post cooperatively forming a discharge feed passage therebetween.

3. The variable spray aerosol system of claim **1** wherein said key means comprises a key extending downwardly from said valve stem recess and said keyway comprises a recess formed in the upper portion of said valve stem.

4. A variable spray aerosol system as in claim **1** wherein said feed passage means comprises a plurality of individual feed passages, each disposed in fluid communicating relation with said one terminal orifice recess.

5. A variable spray aerosol system as in claim **4** wherein said feed supply channel means comprises a plurality of feed channels, each of said feed channels disposed in fluid communication with at least separate ones of said individual feed passages.

6. A variable spray aerosol system as in claim **1** wherein said feed passage means comprises a single feed passage; said feed supply channel means comprises a plurality of feed supply channels, each of said feed supply channels movably disposed relative to said single feed passage for fluid communication therewith.

7. A variable spray aerosol system as in claim **6** wherein said button body comprises at least a second terminal orifice, each of said first and second terminal orifices disposed in fluid communication with one of said feed supply channels.

8. A variable spray aerosol system as in claim **1** wherein said button body includes a second terminal orifice recess and said supply channel means includes at least a first and a second feed supply channel, said second feed supply channel disposed to selectively

communicate with said second feed supply passage and said first supply channel is disposed to selectively communicate with said first supply passage, said first terminal orifice recess communicating with the interior of the aerosol dispenser when said button body is in said first position through said first feed supply channel and said first feed supply passage, said second terminal orifice recess communicating with the interior of the aerosol dispenser when said button body is in said second position through said second feed supply channel and said second feed supply passage.

9. A variable spray aerosol as in claim **1** wherein said feed supply channel means comprises a first and second feed supply channel, said second feed supply channel communicating with said valve stem recess and said one terminal orifice recess, said valve stem includes a feed passage means including a first and a second feed passage, said first feed supply channel being disposed to communicate with the interior of the aerosol dispensers through said first feed supply passage and said second supply channel communicating with the interior of the aerosol dispenser through said second feed passage when said button body is in said first position and wherein said first feed supply channel is isolated from the interior of said aerosol dispenser and said second supply channel is communicating with the interior of the aerosol dispenser through said second feed supply passage when said button body is in said second position.

* * * * *