July 20, 1965 N. W. SEAQUIST 3,195,569

PLURAL SPRAY VALVE

Filed Sept. 3, 1963

Fig. 1

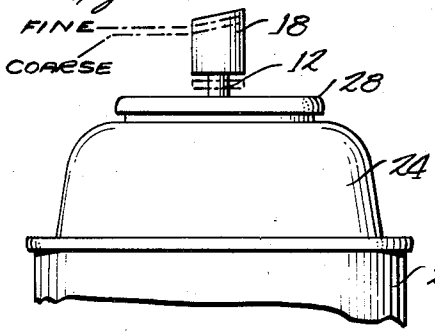



Fig. 2

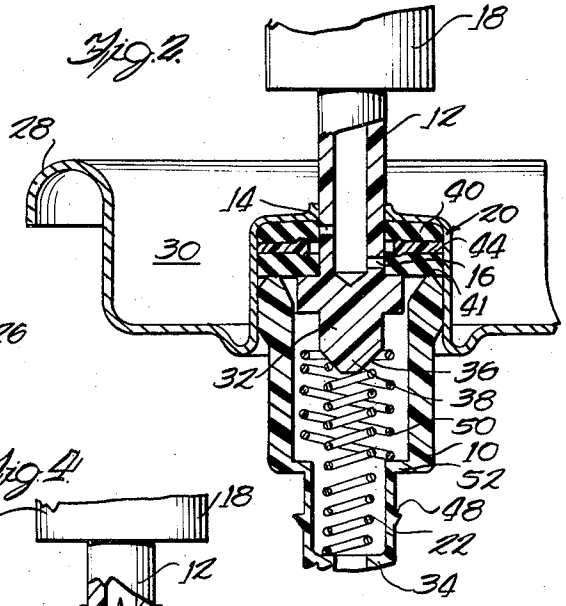



Fig. 3

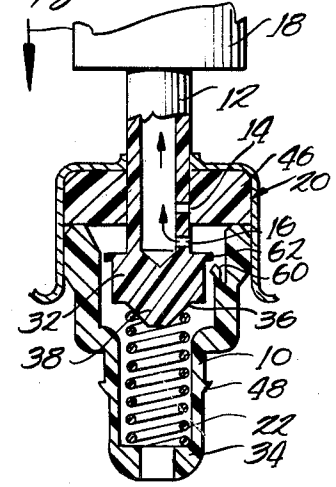



Fig. 4

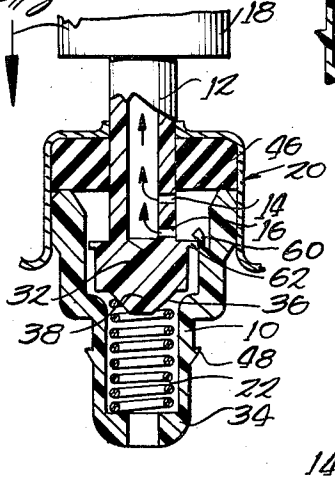



Fig. 5

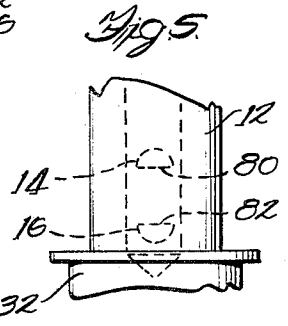
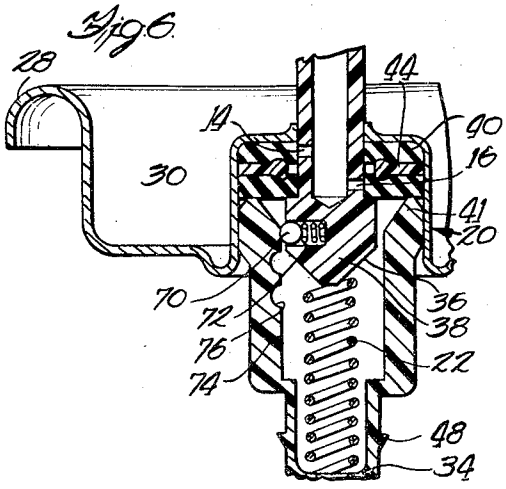



Fig. 6




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3,195,569

# PLURAL SPRAY VALVE

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7 Claims. (Cl. 137—553)

This invention relates to an aerosol valve, and more particularly to an aerosol valve which is capable of spraying a plurality of spray patterns by simply varying the actuating force upon the valve.

In the aerosol field, it is frequently desirable to vary the spray pattern; for example, in hair spray application, a fine spray is desirable for the smaller forehead tresses, while a coarse spray is desirable for the larger neck tresses. In garden sprays, a heavy spray is desirable for dense foliage to insure complete coverage, whereas individual branches of the same plant need only a light spray. In insecticidal sprays, a coarse spray is preferred where insect density is expected to be high, such as around screen doors. Light sprays are best for atmospheric application to flying insects, such as in a bedroom or tent before retiring.

It is not convenient or commercially practical to market different aerosol cans with different spray patterns. The inventory problem is overwhelming.

An object of this invention is to provide a novel aerosol valve which is capable of spraying a plurality of spray patterns.

Another object of this invention is to provide an aerosol valve of the above character which is operable over its entire pattern range by mere variation in valve actuating force.

Still another object is to provide an aerosol valve of the above character having an indicating mechainism for detecting a next upward or a next downward step in the spray pattern.

A further object is to provide an aerosol valve of the above character which has a unique instant change-over in spray pattern whereby undesirable and ineffectual scatter patterns during switchover are avoided.

A still further object is to provide an aerosol valve of the above character which is relatively simple in structure whereby construction and assembly costs are minimized.

Another object is to provide an aerosol valve of the above character which can be affixed to an aerosol can with existing canning machinery.

Still another object is to provide an aerosol valve of the above character which is dependable over a long shelf life.

Other objects of the invention will in part be obvious and will in part appear hereinafter.

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

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 drawing, in which:

FIG. 1 is a side elevational view of the upper part of an aerosol can showing the valve of this invention affixed to the crown top.

FIG. 2 is a cross-sectional view of one embodiment of the valve of this invention.

FIG. 3 is a cross-sectional view of another embodiment showing it with the lower exit port open whereby a fine spray pattern is effected.

FIG. 4 illustrates the next sequential operational step of FIG. 3 when a coarse spray pattern is being effected.



FIG. 5 is a detailed side view of the valve stem of FIG. 3 to illustrate a particular configuration for the exit ports whereby instantaneous change-over from fine to coarse spray or vice versa is effected.

FIG. 6 is a cross sectional view of still another embodiment of the valve of this invention.

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

As illustrated in the drawing, FIGS. 2 to 4 and 6 specifically, the novel aerosol valve of this invention comprises, in its broader aspects, a valve body 10, a tubular valve stem 12, having a plurality of vertically disposed dispensing ports 14 and 16 (only two shown) on its side wall, preferably radially dispersed around the stem to facilitate molding, a dispensing head 18, sealing means 20, and valve stem biasing means 22. More particularly, the valve of this invention comprises a tubular valve body 10, which contains the valve stem biasing means 22 and the closed bottom portion 32 of the tubular valve stem 12. As shown, the biasing means preferably comprises a spring which, in its usual condition, is compressed between a lower inwardly directed annular rim 34 of the valve body 10 and the bottom surface 36 of the valve stem 12. Boss 38 guides the spring against lateral movement during operation of the valve. In the normal closed position of the valve, the two or more dispensing ports 14 and 16 which are located in vertical fashion on the side wall of the valve stem 12, and preferably in radially opposite fashion (see FIGS. 2 and 6) are covered by sealing means 20. As the valve stem is depressed via dispensing head 18, the individual dispensing ports move downwardly and become free of the sealing means so that they communicate with the contents of aerosol can 26 (see FIG. 1). Pressure within the can causes expulsion of the contained material (active material plus propellant) through the tubular valve body 10, through the dispensing ports as they are uncovered, through the hollow tubular valve stem 12 and out through the dispensing head 18. Dependent upon the amount of material expelled, a fine to a coarse spray pattern is effected. Thus, by simple variation of the actuating force on the dispensing head, differing spray patterns can be had. And such unique variation in spray pattern does not require any change in the basic dimension of the valve so that, as shown in FIG. 1, it may in customary fashion be mounted upon the opened crown top 24 of standard stock aerosol cans 26 by the usual gripping means 28 on the valve housing member 30. As seen in FIGS. 2 and 6, such gripping means generally comprise a crimped lip which grips the beaded edge of the crown top 24. Other means such as threading, soldering, and the like can also be utilized, if desired.

The several parts of the valve are maintained in assembled fashion, as shown, by crimping or force fitting the inner cup portion of the valve housing member 30 upon the upper portion of valve body 10.

Anchor rim 48 is for the purpose of anchoring a dip tube to the valve to insure complete emptying the aerosol can.

The embodiment shown in FIG. 2 consists of a spray pattern change indication means comprising a second spring 50 which rides on mid-shoulder 52 of the valve body 10. The upper end of spring 50 engages the bottom surface 36 of the valve stem 12, which may be slightly larger to accommodate the added spring 50, just before the second dispensing port 14 becomes free of the sealing means 20. Additional finger pressure is therefore required of the operator to further actuate the valve and thus provide a touch indication of the change from a fine to a coarser spray. Additional spring means could be similarly

positioned and utilized if further spray pattern means are incorporated into the valve.

The embodiment shown in FIGS. 3 and 4 utilizes a spray indicator finger **60**, angled toward the center line of the tubular valve housing to engage one or more spray indicator nibs **62** (only one shown) mounted upon the wall of the valve stem **12**. The nibs are located so that they are engaged just before the next dispensing port is opened. When the indicator finger **60** is forced past the nibs **62**, an audible click noise is produced as the finger **60** and the nibs **62** snap back to their normal positions. This design for a spray indicator permits both a touch and an audio means for detecting the change in spray pattern.

The embodiment shown in FIG. 6 utilizes a spring biased ball **70** within a cavity **72** in the wall of the closed bottom portion **32** of the valve stem **12**, bearing against the inner surface **74** of the valve body **10**. Surface **74** contains a series of longitudinally spaced recesses **76** for the purpose of receiving the outwardly biased ball **70** to indicate, as discussed above, the change from one spray pattern to the next.

The sealing means shown in the embodiments of FIGS. 2 and 6 comprises two gaskets, **40** and **41**, with a spacer **44** between them for the purpose of providing support. The gaskets bear against the wall of the vertically reciprocating valve stem to seal the contents of the aerosol can until one or more of the dispensing ports **14**, **16**, and others not shown are moved free of the gaskets. Generally, the gaskets comprise a soft neoprene or Buna S rubber, or other resilient plastic chemically inert material.

In situations where the gasket means are sufficiently stiff, the assembly shown in FIGS. 2 and 6 need not be used. One gasket, **46**, as shown in FIGS. 3 and 4, will be satisfactory to properly seal the valve.

Reference is now made to FIG. 5, wherein the dispensing port **16** on the valve stem is illustrated in side elevational view. It will be noted that it and its mate port **14** have a half circular configuration. The flat **80** and **82** of each orifice face each other. Thus, as the valve stem travels downwardly during actuation of the valve, there is an instantaneous substantially complete exposure of port **14** to the pressurized contents, and upon release, there is an instantaneous cutoff or sealing of port **14**. Scatter patterns during changeover are therefore minimized.

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 of the generic and specific features of the invention 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 I claim as new and desire to secure by Letters Patent is:

**1.** A valve capable of dispensing a plurality of spray patterns comprising a valve body, means on said valve for affixing said valve to an aerosol container, a hollow valve stem with a closed end reciprocally operable within said body, said stem having a plurality of dispensing ports disposed in its wall along its length which are opened sequentially as said valve stem is reciprocally operated, valve stem biasing means acting upon said closed end to bias said stem outwardly of said valve body, and valve sealing means disposed so as to seal said dispensing ports when the closed end of said stem is biased outwardly of said valve body.

**2.** A valve capable of dispensing a plurality of spray patterns comprising a valve body, means on said valve for affixing said valve to an aerosol container, a hollow valve stem with a closed end reciprocally operable within said body, said stem having a plurality of dispensing ports disposed in its wall along its length, valve stem biasing means acting upon said closed end to bias said stem outwardly of said valve body, valve sealing means disposed so as to seal said dispensing ports when the closed end of said stem is biased outwardly of said valve body, valve stem actuating means affixed to said stem for reciprocally operating said valve stem to sequentially open the dispensing ports of said valve to effect a plurality of spray patterns and a spray pattern change indication means operated when said valve stem is reciprocally operated within said body to provide an indication of a change in said spray pattern.

**3.** A valve capable of dispensing a plurality of spray patterns comprising a valve body, means on said valve for affixing said valve to an aerosol container, a hollow valve stem with a closed end reciprocally operable within said body, said stem having a plurality of dispensing ports disposed in its wall along its length which are opened sequentially as said valve stem is reciprocally operated, valve stem biasing means acting upon said closed end to bias said stem outwardly of said valve body, valve sealing means disposed so as to seal said dispensing ports when the closed end of said stem is biased outwardly of said valve body, and a spray pattern change indication means comprising a resilient finger acting upon a nib, said finger and nib being affixed to said body and said stem whereby movement between the body and stem results in a touch and audio indication of a changeover in spray pattern.

**4.** A valve capable of dispensing a plurality of spray patterns comprising a valve body, means on said valve for affixing said valve to an aerosol container, a hollow valve stem with a closed end reciprocally operable within said body, said stem having a plurality of dispensing ports disposed in its wall along its length which are opened sequentially as said valve stem is reciprocally operated, valve stem biasing means acting upon said closed end to bias said stem outwardly of said valve body, valve sealing means disposed so as to seal said dispensing ports when the closed end of said stem is biased outwardly of said valve body, and a spray pattern change indication means comprising a ball detent mechanism affixed to said body and said stem whereby movement between the body and stem results in a touch and visual indication of a changeover in spray pattern.

**5.** A valve for dispensing a spray pattern comprising a valve body, means on said valve for affixing said valve to an aerosol container, a hollow valve stem with a closed end reciprocally operable within said body, said stem having a dispensing port disposed in its wall, said port having a flat therein for effecting substantially complete exposure of the port during actuation of the valve whereby scatter patterns are minimized, valve stem biasing means acting upon said closed end to bias said stem outwardly of said valve body and valve sealing means disposed so as to seal said dispensing port when the closed end of said stem is biased outwardly of said valve body.

**6.** A valve for dispensing a plurality of spray patterns with minimal scatter patterns during changeover from one pattern to the next, comprising a valve body, means on said valve for affixing said valve to an aerosol container, a hollow valve stem with a closed end reciprocally operable within said body, said stem having dispensing ports disposed in its wall along its length which are opened sequentially as said valve stem is reciprocally operated, said ports having flats therein which face the flat of the next adjacent port for effecting substantially complete exposure of each port during actuation of the valve whereby scatter patterns are minimized, valve stem biasing means acting upon said closed end to bias said stem outwardly of said valve body and valve sealing means disposed so as to seal said dispensing ports when the closed end of said stem is biased outwardly of said valve body.

**7.** A valve capable of dispensing a plurality of spray patterns with minimal scatter patterns during changeover from one pattern to the next comprising a tubular valve

body, means on said valve for affixing said valve to an aersol container, a hollow valve stem with a closed end reciprocally operable within said valve body, said stem having a plurality of dispensing ports disposed in its wall along its length, said ports having flats therein which face the flats of the next adjacent port for effecting substantially complete exposure of each port during actuation of the valve whereby scatter patterns are minimized, valve stem biasing means within said valve body, and acting upon said closed end to bias said stem outwardly of said valve body, valve sealing means disposed so as to seal said dispensing ports when the closed end of said stem is biased outwardly of said valve body, valve stem actuating means affixed to said stem whereby the dispensing ports of said valve may be opened sequentially by pressure against said actuating means to effect a plurality of spray patterns, and a spray pattern change indication means comprising additional valve stem biasing means which act upon said closed



end in sequential order as the valve stem is reciprocated within said valve body to bias said stem outwardly of said valve body to thereby indicate, by change in actuation resistance, a changeover in spray pattern.

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