

PATENT SPECIFICATION

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DRAWINGS ATTACHED

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(54) SPRAYING APPARATUS

Erratum
 (71) I, THOMAS JOHN SMART, a Citizen of the United States of America, of Route 1, Box 46A, Bartlett, Illinois, United States of America, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to spraying apparatus of the kind employing an aerosol dispensing can.

Aerosol spray cans are commonly used for a variety of purposes such as painting, marking, and the like. When a spray can is to be used to mark a surface, as when painting a stripe on pavement, it is often desirable to use a spray nozzle having a slotted orifice which will provide a relatively wide spray. However, unless the slotted orifice is aligned substantially transversely to the direction in which the can is being moved during the marking operation, the aerosol can will not be used with maximum effectiveness.

Aerosol cans are available which have valves which include a stem extending generally axially from the can, and the valve may be opened by moving the stem laterally. However, the stems of these valves are frequently not accurately aligned with the axis of the can, and the stem will therefore direct the contents of the can at an angle relative to the can axis.

The invention provides spraying apparatus comprising an aerosol dispensing can containing material to be sprayed mounted on a frame and having a valve for releasing the material to be sprayed, the valve including an elongated laterally movable stem extending from a valve mounting cup, the mounting cup having a substantially flat surface extending substantially perpendicularly to the stem, an actuator button rotatably mounted on the valve stem, the button being provided with a central bore receiving the valve stem and terminating in an elongated slot for spraying the material within the can, the button having a flat aligning surface extending parallel to

the longitudinal dimension of the slot and a valve-attaching portion terminating in a valve-engaging end having a planar beveled surface extending angularly with respect to said flat surface of the valve mounting cup and generally parallel to the longitudinal axis of the slot, and an actuating bar mounted on the frame for movement laterally with respect to the aerosol can, the aligning surface of the button being engageable by the actuating bar when the actuating bar is moved laterally with respect to the can whereby the button and the valve stem can be moved laterally, the planar beveled surface of the button being engageable with the flat surface of the valve mounting cup as the actuating bar moves the button and the valve stem laterally whereby the button can be rotated on the valve stem into a position in which the aligning surface thereof is aligned with the actuating bar and the axis of the central bore lies in a plane extending through the axis of the can and perpendicular to the aligning surface of the actuating button.

The invention will be explained in conjunction with an illustrative embodiment shown in the accompanying drawing, in which:—

Figure 1 is a fragmentary view of an inverted aerosol dispensing can, partially broken away, equipped with a valve actuating button;

Figure 2 is a side view of the aerosol can and button of Figure 1, the aerosol can being partially broken away;

Figure 3 is an enlarged fragmentary view of a portion of Figure 2;

Figure 4 is a bottom view of a marking apparatus holding a pair of actuator-button-equipped aerosol dispensing cans;

Figure 5 is a view similar to Figure 4 showing the actuating mechanism of the marking apparatus moved to align the can valves just prior to opening the valves;

Figure 6 is a plan view of the button taken along the line 6—6 of Figure 7;

Figure 7 is a side elevational view of the button, and

Figure 8 is a sectional view taken along the line 8—8 of Figure 3.

Referring now to Figs. 1—3, the numeral 10 designates generally an actuator button for an aerosol dispensing can 11. The aerosol can is conventional and includes a cylindrical container or body 12, a generally dome-like top 13 which provides a central opening 14, and a valve 15 which is recessed within the dome-like top and mounted on the top wall 16 of the container.

The can valve 15 is of the type which includes an axially extending stem 17 (Fig. 8) which is provided with a central bore through which the contents of the can may be expelled and which extends outwardly from a valve mounting cup 18. The valve can be opened to release the contents of the can through the stem by pivoting the stem laterally, i.e., away from the axis of the can, the stem being pivotable about a point within the valve mounting cup as is well known in the art. The aerosol can does not include a dip tube so that the aerosol propellant expels the contents of the can when the can is held in a generally inverted position as shown in Fig. 1. The valve mounting cup includes a generally cylindrical side wall 19 and a generally flat top or end wall 20 which extends generally perpendicularly to the axis of the can.

The button 10 is generally T-shaped and includes a generally cylindrical attaching portion 22 and an elongated aligning or end portion 23. The aligning portion includes a pair of spaced-apart parallel flat side surfaces 24 and 25, a bottom surface 26, a top surface 27 and a pair of rounded ends 28 and 29. The cylindrical valve-attaching portion 22 extends from the bottom surface 26 of the aligning portion intermediate the rounded ends thereof, and a central bore 30 extends axially through the valve-attaching portion and the aligning portion. The central bore 30 includes a major portion 31 having a diameter sized to receive the stem 17 of the can valve relatively snugly. The major portion 31 of the bore merges with a radially reduced portion 32 approximately midway through the aligning portion 23 of the actuator, and the bore 32 merges with an elongated slot-like spray orifice 33 adjacent the top surface of the button. Referring to Fig. 6, the slot 33 is defined by a pair of straight side walls 34 and 35 which extend parallel to the flat side surfaces 24 and 25 and a pair of arcuate end walls 36 and 37 which have the same radius as the wall of the reduced portion 32 of the bore. The slotted orifice therefore has a long dimension equal to the diameter of the reduced portion 32 of the bore and a much narrower short dimension or width. An annular embossment 38 surrounds the orifice and projects axially outwardly from the top surface of the button.

The valve-attaching portion 22 terminates in a valve-engaging end 40 which includes a pair of beveled surfaces 41 and 42 which converge along an edge or narrow surface 43

which extends parallel to the longitudinal axis of the slot 33. The planes of the beveled surfaces also extend generally parallel to the longitudinal axis of the slot, i.e., the longitudinal axis would never intersect either plane no matter how far the axis was extended.

The button is positioned on the valve by inserting the valve stem into the major portion 31 of the central bore and pushing the button axially along the stem. The button is advantageously positioned on the stem so that the bottom of the valve-engaging end is spaced slightly from the top of the valve mounting cup—a spacing of the order of about 1/32 to 1/16 inch. This spacing ensures that the valve will be opened fully as the button and stem are moved laterally by the actuating bar. If desired, this spacing can be achieved relatively easily by providing the enlarged portion 31 of the bore with a length less than the length which the valve stem extends above the valve mounting cup in an amount corresponding to the desired spacing. The button can then be pushed onto the stem until the stem engages the reduced bore portion 32. The bore 31 is provided with a tapered mouth portion 44 to facilitate insertion of the button on the stem.

The actuator-button-equipped aerosol can is adapted for use in the marking apparatus described in United States Patent No. 3,700,144, to which reference may be had for details. A portion of the apparatus 50 is shown in Figs. 4 and 5, the apparatus including a base plate 51 which is provided with a pair of openings 52 for receiving the dome-like tops 13 of a pair of button-equipped aerosol cans. The openings 52 have a diameter slightly less than the maximum diameter of the dome portions so that these portions of the can can be held rather securely in the openings.

The valves are operated by a generally T-shaped actuating bar 53 which is slidably mounted to the lower surface of the base plate 51. The actuating bar includes an elongated sliding or attached portion 54 and a transversely extending valve-actuating portion 55 having a pair of generally flat actuating edges 56 and 57. The slide portion 54 is slidably secured to the base plate between the openings 52 therethrough by bolts 58 and 59 which extend through a longitudinal extending slot 60 in the slide portion. The enlarged head portions of the bolts hold the slide portion adjacent the base plate, and the shank portions of the bolt cooperate with the slot 60 to guide the sliding movement of the slide portion along a line equidistant from the centres of the openings 52. The actuating bar is also guided by a pair of pins 61 and 62 (Fig. 5) which extend downwardly from the base plate and which cooperate with elongated slots 63 and 64 in the slide portion.

The forward portion of the actuating bar is

offset away from the base plate 51 to position the actuating portion 55 adjacent the valves of the aerosol can. The actuating bar is biased to a non-actuating position shown in Fig. 4, in which the actuating bar does not engage the aerosol can valves, by a spring 65 which is secured to the frame of the marking apparatus.

Sliding movement is imparted to the actuating bar by a bell crank 67 which extends downwardly through a slot 68 in the base plate and through the rearward portion of the slot 60 in the actuating bar.

Although the buttons 10 are frictionally engaged with the stem 17, they can be rotated about the stems without difficulty. When the aerosol cans are inserted into the marking apparatus, it is usually difficult to align the slotted orifice of the buttons transversely to the direction in which the marking apparatus is to be advanced, indicated by the arrow A, particularly since these cans are inverted and are enclosed within the casing of the marking apparatus. However, when the valves of the cans are to be opened by sliding the actuating bar rearwardly and downwardly (as viewed in Fig. 4), the flat leading edges 56 and 57 of the actuating bar will engage the flat aligning side surfaces of the buttons. If the slotted orifices and therefore the side surfaces do not extend generally perpendicularly to the direction in which the apparatus is being advanced, the actuating bar will rotate the buttons about the stems 17 of the aerosol cans until the leading edges of the actuating bar become flush with the side surfaces of the buttons as shown in Fig. 5. Thereafter, rearward sliding movement of the actuating bar will move the stems of the can valves laterally to open the valves so that the contents of the cans are sprayed through the slotted orifices onto the surface to be marked.

At times the valve stem extends slightly askew from the axis of the can in a direction to the right or left of the direction in which the marking apparatus is advanced. For example, as viewed in Fig. 8, the stems of some cans may extend angularly to the right or left of the position illustrated. As cans are emptied and replaced with new cans, such misalignment can cause the spray pattern laid down by the new cans to be an inch or more to the right or left of the previous pattern.

The bevelled surfaces of the button serve to correct such misalignment and bring the stem substantially into position in a plane extending through the axis of the can and perpendicular to the aligning surfaces 24 and 25 of the button. Referring to Figs. 2 and 3, as the button and the stem are moved to the right or left by the actuating bar, one of the beveled surfaces 42 or 43 will come into engagement with the top surface 20 of the valve mounting cup 18. As the button is moved to fully open the valve, indicated in phantom at 10a and

10b, the beveled surface will become substantially fully engaged with the surface 20 and will extend substantially parallel thereto. If the stem is misaligned with the can axis and extends angularly inwardly or outwardly from the plane of Fig. 3, the beveled surface will initially make edge contact with the surface 20. As the button is further moved by the actuating bar, the stem will become properly aligned with the can axis as the beveled surface is forced into full engagement with the surface 20.

In one specific embodiment of the invention, the beveled surfaces 41 and 42 formed an included angle of about 140° so that each surface extended at an angle of about 20° from the surface 20. The flat surface 43 had a width of about 0.002 inch, the major portion 31 of the bore had a diameter of 0.109 inch and a length of 0.375 inch, and the reduced portion 32 of the bore had a diameter of 0.047 inch. The slotted orifice 33 had a major dimension of 0.047 inch and a width of 0.016 inch.

While in the foregoing specification a detailed description of a specific embodiment of the invention has been set forth for the purpose of illustration, it is to be understood that many of the details herein given may be varied considerably by those skilled in the art within the scope of the invention as defined in the appended claims.

WHAT I CLAIM IS:—

1. Spraying apparatus comprising an aerosol dispensing can containing material to be sprayed mounted on a frame and having a valve for releasing the material to be sprayed, the valve including an elongated laterally movable stem extending from a valve mounting cup, the mounting cup having a substantially flat surface extending substantially perpendicularly to the stem, an actuator button rotatably mounted on the valve stem, the button being provided with a central bore receiving the valve stem and terminating in an elongated slot for spraying the material within the can, the button having flat aligning surface extending parallel to the longitudinal dimension of the slot and a valve-attaching portion terminating in a valve-engaging end having a planar beveled surface extending angularly with respect to said flat surface of the valve mounting cup and generally parallel to the longitudinal axis of the slot, and an actuating bar mounted on the frame for movement laterally with respect to the aerosol can, the aligning surface of the button being engageable by the actuating bar when the actuating bar is moved laterally with respect to the can whereby the button and the valve stem can be moved laterally, the planar beveled surface of the button being engageable with the flat surface of the valve mounting cup as the actuating bar moves the button



offset away from the base plate 51 to position the actuating portion 55 adjacent the valves of the aerosol can. The actuating bar is biased to a non-actuating position shown in Fig. 4, in which the actuating bar does not engage the aerosol can valves, by a spring 65 which is secured to the frame of the marking apparatus.

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Although the buttons 10 are frictionally engaged with the stem 17, they can be rotated about the stems without difficulty. When the aerosol cans are inserted into the marking apparatus, it is usually difficult to align the slotted orifice of the buttons transversely to the direction in which the marking apparatus is to be advanced, indicated by the arrow A, particularly since these cans are inverted and are enclosed within the casing of the marking apparatus. However, when the valves of the cans are to be opened by sliding the actuating bar rearwardly and downwardly (as viewed in Fig. 4), the flat leading edges 56 and 57 of the actuating bar will engage the flat aligning side surfaces of the buttons. If the slotted orifices and therefore the side surfaces do not extend generally perpendicularly to the direction in which the apparatus is being advanced, the actuating bar will rotate the buttons about the stems 17 of the aerosol cans until the leading edges of the actuating bar become flush with the side surfaces of the buttons as shown in Fig. 5. Thereafter, rearward sliding movement of the actuating bar will move the stems of the can valves laterally to open the valves so that the contents of the cans are sprayed through the slotted orifices onto the surface to be marked.

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The bevelled surfaces of the button serve to correct such misalignment and bring the stem substantially into position in a plane extending through the axis of the can and perpendicular to the aligning surfaces 24 and 25 of the button. Referring to Figs. 2 and 3, as the button and the stem are moved to the right or left by the actuating bar, one of the beveled surfaces 42 or 43 will come into engagement with the top surface 20 of the valve mounting cup 18. As the button is moved to fully open the valve, indicated in phantom at 10a and

10b, the beveled surface will become substantially fully engaged with the surface 20 and will extend substantially parallel thereto. If the stem is misaligned with the can axis and extends angularly inwardly or outwardly from the plane of Fig. 3, the beveled surface will initially make edge contact with the surface 20. As the button is further moved by the actuating bar, the stem will become properly aligned with the can axis as the beveled surface is forced into full engagement with the surface 20.

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While in the foregoing specification a detailed description of a specific embodiment of the invention has been set forth for the purpose of illustration, it is to be understood that many of the details herein given may be varied considerably by those skilled in the art within the scope of the invention as defined in the appended claims.

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and the valve stem laterally whereby the button can be rotated on the valve stem into a position in which the aligning surface thereof is aligned with the actuating bar and the axis of the central bore lies in a plane extending through the axis of the can and perpendicular to the aligning surface of the actuating button.

5 2. Apparatus according to claim 1 in which the beveled surface extends at an angle of about 20° from said flat surface of the valve mounting cup.

10 3. Apparatus according to claim 1 in which the button is generally T-shaped and includes an elongated end portion having a pair of spaced-apart flat parallel side surfaces and a pair of ends, each of the flat parallel side surfaces extending parallel to the longitudinal dimension of the slot and providing a flat aligning surface, the valve attaching portion

15 20 being generally cylindrical and extending from

the end portion intermediate the ends thereof.

4. Apparatus according to claim 1 in which the valve engaging end of the button has a pair of such planar beveled surfaces, the planar beveled surfaces being located on opposite sides of the axis of the bore and converging towards the said flat surface.

5. Apparatus according to claim 4 in which the beveled surfaces define an included angle of about 140°.

6. Spraying apparatus substantially as hereinbefore described with reference to the accompanying drawings.

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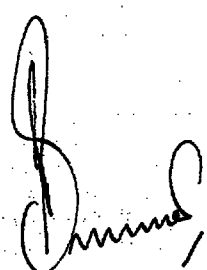
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14 JAN 1977



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