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(54) SPRAYING APPARATUS FOR MARKING A SURFACE

(71) I, THOMAS JOHN SMRT, a citizen of the United States of America, of 4N 671 Route 59, 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 a spraying apparatus for marking a surface, and more particularly to such spraying apparatus which can be wheeled over the surface, such as pavement, athletic field, and the like, on which a mark is to be made.

It is often desirable to apply an indicating line or stripe to a surface. For example, stripes may be applied to pavement to indicate parking spaces, directional signals, etc., and stripes may be applied to athletic fields to indicate out-of-bounds, goals, etc. While suitable marking devices are relatively common, it is desirable that these marking devices be relatively economical, easy to operate, and accurate.

The invention provides a spraying apparatus for marking a surface, comprising a frame, wheels rotatably mounted on the frame for permitting the apparatus to be rolled over a surface to be sprayed, holding means on the frame for supporting at least one valve equipped spray can in position to dispense the contents of the can or cans onto the surface to be sprayed, a handle secured to the frame for moving the apparatus along the surface, and actuating means movably mounted on the frame and adapted to engage the valve of the can or each can for releasing the contents of the can, the actuating means including a plate slidably secured to the frame and rectilinearly movable in its own plane between valve non-actuating and actuating positions, a crank lever rotatably mounted on the frame for rotation in a plane generally perpendicular to the plate, the crank lever having a camming portion engageable with the plate whereby rotation of the crank lever imparts sliding movement to the plate, and means for rotating the crank lever, and spring means secured to the frame and to the

valve-actuating plate for biasing that plate to the non-actuating position. A pair of cans may be used and may be held in a generally inverted position; and the valves of both cans can be operated simultaneously by a slide plate secured to the frame. The slide plate may be arranged be actuated by the operator as the apparatus is pushed, by a trigger which is positioned at the upper end of the handle. Side plates may be used to hold the cans; and the side plates may be made adjustable to regulate the inclination of the cans to vary the spray pattern of the cans as desired. The apparatus may also provide for a masking device to be mounted on the apparatus below the cans to provide a sharply defined spray. The colour of the marking material can be changed merely by changing the cans; and the apparatus remains substantially unmarked by the marking material so that cleaning of the apparatus of the material being sprayed is not required.

The invention will now be explained, by way of example only, by reference to a preferred embodiment as illustrated in the accompanying drawing, in which:—

Fig. 1 is a perspective view of the apparatus with a portion of the handle broken away;

Fig. 2 is a fragmentary perspective view of the apparatus from a different angle;

Fig. 3 is a top view of the apparatus with the spray cans removed taken along a line generally perpendicular to the handle;

Fig. 4 is a fragmentary perspective view of the bottom of the apparatus;

Fig. 5 is an enlarged fragmentary view of a portion of Fig. 4;

Fig. 6 is a sectional view taken along the line 6—6 of Fig. 5;

Fig. 7 is a fragmentary perspective view of the upper end of the handle;

Fig. 8 is a fragmentary perspective view of the upper end of the handle from a different angle;

Fig. 9 is a sectional view taken along the line 9—9 of Fig. 3;

Fig. 10 is a view similar to Fig. 4 showing the support from the mask;

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Fig. 11 is a view similar to Fig. 10 showing the mask in position; and

Fig. 12 is a sectional view taken along the line 12—12 of Fig. 11.

Referring to Figs. 1 and 2, the numeral 15 designates generally a spraying apparatus which includes a box-like frame 16 and a generally upwardly extending handle 17. The frame is supported for movement over the surface which is to be marked by a pair of front wheels 18 and 19 and a pair of rear wheels 20 and 21. The apparatus is adapted to hold a pair of aerosol spray cans 22 and 23, which can be filled with paint or other marking material, in generally vertical but inverted positions. The aerosol cans 22 and 23 do not include a dip tube, so the aerosol propellant expels the contents of the can when the can is held in a generally inverted position. Further, the valves for the cans are of the type which are activated when moved generally laterally, i.e., transversely of the longitudinal axis of the can.

The frame includes side walls 24 and 25, front wall 26, rear wall 27, and an upwardly and rearwardly inclined top wall 28. Referring to Figs. 4 and 6, a bottom wall 29 extends forwardly from the rear wall 27 for only a portion of the length of the frame 16 to provide an opening in the frame above the surface to be marked through which the aerosol cans can spray. Front and rear axles 30 and 31 extend through the side walls and rotatably support the wheels.

The aerosol cans are supported between front and rear panels 32 and 33 and a pair of adjustable side panels 34 and 35 (Fig. 9). The cans are supported by a base plate 36 which extends downwardly and rearwardly from the front panel 32 to the bottom wall 29 at about a 45° angle (Fig. 6). The base plate is provided with a pair of openings 37 and 38 for receiving the conventional generally dome-like tops 39 and 40 of the cans 22 and 23, respectively. The openings 37 and 38 preferably have a diameter slightly less than the maximum diameter of the dome portions so that these portions of the cans can be held rather securely in the openings. A generally U-shaped clip 41 (Fig. 4) is secured to the base plate between the openings, and the clip 41 is formed of spring metal to hold the cans securely against the side plates 34 and 35.

The valves 42 and 43 of the aerosol cans 22 and 23, respectively, are actuated simultaneously by a slide plate 45 which is slidably mounted below the base plate 36. The slide plate includes an elongated sliding or attaching portion 46 and a transversely extending valve-actuating portion 47. The slide portion 46 is slidably secured to the base plate between the openings 37 and 38 by bolts 48 and 49 which extend through a longitudinally extending slot 50 in the slide

portion. The enlarged head portions of the bolts hold the slide portion 46 adjacent the base plate, and the shank portions of the bolt cooperate with the slot 50 to guide the sliding movement of the slide plate along a line equidistant from the centers of the openings 37 and 38. If desired, a bearing or wear plate of Teflon (Registered Trade Mark), nylon or other suitable material can be interposed between the slide portion and the base plate to facilitate the sliding movement of the slide plate, and the wear plate can be slotted to accommodate the bolts.

The forward end of the slide portion is offset downwardly as at 51 to position the actuating bar 47 adjacent the valves 42 and 43. The actuating bar is biased to a forward position out of engagement with the valves by spring 51 which is secured to a spring support plate 52 secured to the front panel 32.

As can be seen best in Fig. 6, a bell crank 54 is rotatably mounted on bracket 55 by bolt 56, and the lower end of the bell crank extends downwardly through a slot 57 in the base plate and through the rearward portion of the slot 50 in the slide bar. The particular bell crank illustrated is generally triangular, and the lower apex 58 acts as one crank arm while the rearward apex 59 acts as the other crank arm. An actuating cable 60 is secured to the bell crank for rotating the bell crank about the pivot 56 so that a portion of the edge of the bell crank passing between apices 58 and 59 acts as a cam to engage the plate 45 and move it against the spring 51 on anti-clockwise rotation of the bell crank.

The bracket 55 is formed from a pair of bracket halves 55a and 55b which straddle the handle 17 and which are secured as by welding to the panel 33. The bracket halves are reinforced by a bolt 61 (Fig. 2) extending therethrough rearwardly of the handle.

The cable 60 is operated by a trigger 62 which is pivotally secured to the upper end of the handle by a bolt 63 (Fig. 7). The cable is held adjacent the handle by a pair of spaced-apart clips 64 and 65 (Fig. 1), and the upper end of the cable is secured to the trigger by bolt 66. The cable extends slidably through the clips 64 and 65, and the clips can be moved axially along the handle to vary the effective length of the cable by increasing or decreasing the slack or the distance which the cable must travel between the trigger and the bell crank.

The apparatus can be pushed with one hand by grasping the upper end of the handle, and the slide bar can be moved to actuate the can valves as the apparatus is being pushed by squeezing the trigger 62 toward the handle with the hand that is pushing the handle. As the handle is squeezed, the cable 60 is pulled to rotate the

bell crank 54 counterclockwise as viewed in Fig. 6 to slide the actuating bar 47 into simultaneous engagement with the two can valves.

- 5 The trigger can be releasably locked in the actuating position illustrated in Fig. 8 by means of a pin 67 which extends through the handle 17 and which is biased outwardly by a coil spring 68. The trigger 62 is provided with an opening 69 below the pin 67, and when the trigger is squeezed to actuate the valves, the pin 67 can be depressed by the thumb to push the lower end of the pin through the opening 69 to maintain the trigger in the actuating position. The pin is retained in the locking position against the bias of the spring 68 by the force exerted by the trigger which is being pulled by the cable 60. When it is desired to release the trigger, the trigger can be squeezed slightly to remove the force on the pin 67, and the spring 68 will move the pin upwardly out of the opening 69. Thereafter, the trigger can be released, and the spring 51 will return the actuating bar 47 to the non-actuating position illustrated in Fig. 6.

- 15 Referring now to Fig. 9, the longitudinal axes of the spray cans are seen to be angled toward each other so that the sprays from the cans will converge toward each other. The angle of inclination of the axes of the spray cans will determine the amount of overlap of the sprays; and the overall width of the marking material deposited by the cans in combination can be varied by varying this angle of inclination.

- 20 The side plates 34 and 35 which support the cans can be adjusted to vary this angle of inclination. Each of the side plates 34 and 35 includes a bottom attaching flange 70 and 71, respectively, which are suitably secured to the base plate 36, as by welding or bolts. The side plates have sufficient flexibility to permit flexing of the upwardly extending portions of the sideplates about the attaching flanges, and adjusting screws 72 and 73 extend through the side walls 24 and 25, respectively, into engagement with the side plates. In order to provide good threaded engagement with the side walls, a pair of internally threaded bushings 74 and 75 may be secured to the side walls.

- 25 Referring to Fig. 9, if a relatively narrow stripe of marking material is desired, the adjusting screws 72 and 73 can be moved outwardly to permit the spring clip 41 to increase the included angle between the axes of the spray cans, thereby increasing the amount of overlap of the two sprays. The spring clip preferably engages the cans in the upper half thereof so that the upper ends are spread apart as the adjusting screws are moved outwardly. If a wider stripe is desired, the screws can be moved inwardly to decrease the angle between the side plates

and between the can axes and thereby decrease the amount of overlapping of the sprays.

For some applications a sharply defined stripe is desired, for example, in marking property lines, parking areas, and the like. In this event, masking plate 80 illustrated in Fig. 11 may be used. The masking plate is provided with a central opening 81 through which the sprays from the cans can pass, and the mask is made of suitable absorbent material to prevent dripping of the marking material which does not pass through the opening. The mask can be supported in position below the spray cans by a pair of generally Z-shaped supports 82 and 83 which can be removably secured to the side walls 24 and 25 of the frame. The side walls are seen to have inwardly extending bottom flanges 24a and 25a, and the upper, outwardly extending flange portions 82a and 83a of the mask supports are secured thereto by screws 84. The lower flange portions 82b and 83b extend inwardly to support the mask. When a new mask is needed, the mask can merely be lifted from the support flanges 82b and 83b.

The handle 17 is secured to the central portion of the frame to provide good balance as the apparatus is wheeled along the surface which is being marked, and the spray cans are positioned forwardly of the handle. This provides a substantial area 85 (Fig. 6) rearwardly of the handle which is enclosed by the side walls 24 and 25 and the rear wall 27 which can be used as a storage area for full and empty aerosol cans.

Although the specific apparatus described and illustrated is intended for use with two aerosol cans, it will be understood that the apparatus shown can be used with one can, or the apparatus could be modified slightly to accommodate only a single can. If only one can is used, the valve for the can can be selected to provide the desired width of spray. Also, the apparatus could be modified to accommodate more than two cans in a line to provide a wider stripe.

The apparatus could be used to spray both a herbicide and a paint to kill the grass that is being painted by using a base plate with two openings in front of the openings 37 and 38 and having a second actuating bar attached to the slide plate for actuating the two forward cans. The forward actuating bar could be attached to the bar 47 by a rod or bar extending between the valves of the front cans. The two forward cans could then spray herbicide, and the two rearward cans could spray marking material. Alternatively, the two forward cans could spray cement sealer or asphalt sealer for sealing cement or asphalt before marking.

Further, although the particular appar-

atus illustrated included a cable for actuating the valve, other means such as solenoids and the like could be used.

- 5 While in the foregoing specification, a detailed description of a specific embodiment of my invention was 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 without departing from the scope of my invention.

WHAT I CLAIM IS:—

- 15 1. A spraying apparatus for marking a surface, comprising a frame, wheels rotatably mounted on the frame for permitting the apparatus to be rolled over a surface and to be sprayed, holding means on the frame for supporting at least one valve equipped spray can in position to dispense the contents of the can or cans onto the surface to be sprayed, a handle secured to the frame for moving the apparatus along the surface and actuating means movably mounted on the frame and adapted to engage the valve of the can or each can for releasing the contents of the can, the actuating means including a plate slidably secured to the frame and rectilinearly movable in its own plane between valve non-actuating and actuating positions, a crank lever rotatably mounted on the frame for rotation in a plane generally perpendicular to the plate, the crank lever having a camming portion engageable with the plate whereby rotation of the crank lever imparts rectilinear sliding movement to the plate, means for rotating the crank lever, and spring means secured to the frame and to the valve-actuating plate for biasing the plate to the non-actuating position.

- 20 2. Apparatus according to Claim 1, wherein said means for rotating the crank lever comprises a cable secured to the crank lever and extending along the handle whereby movement of the cable may rotate the crank lever and slide the valve-actuating plate into engagement with the can valve, trigger means provided on the handle, the cable being secured to the trigger means whereby the cable can be moved by the trigger means to rotate the crank lever; and wherein locking means are provided engageable with the trigger means for releasably holding the trigger in position to actuate the valve of the or each can.

3. Apparatus according to either of the preceding claims, wherein said holding means are adapted to hold two of the aerosol cans in a side-by-side position.

4. Apparatus according to any of the preceding claims, wherein the frame includes a base plate provided with one or two openings therein for receiving one end of the aerosol can or cans respectively.

5. Apparatus according to Claim 4,

wherein the valve-actuating means include an actuating bar secured to the valve actuating plate and extending adjacent the or each opening and spaced therebelow and being movable in a plane extending generally parallel to the base plate and spaced therefrom.

6. Apparatus according to Claim 4 or 5, wherein the holding means comprise the base plate and a pair of spaced-apart side plates extending generally upwardly from the base plate to receive an aerosol spray can or cans therebetween, and wherein the valve-actuating plate is slidably secured to the base plate for sliding movement in a direction generally parallel to the base plate, the valve-actuating plate being positioned below the opening in the base plate and including an actuating portion spaced from the base plate and engageable with the valve of the can or each can.

7. Apparatus according to Claim 4, 5, or 6, wherein the valve actuating plate includes an elongated slide portion slidably secured to the base plate, the actuating portion of the valve-actuating plate extending generally transversely of the slide portion.

8. Apparatus according to Claim 7, wherein said slide portion is provided with a longitudinally extending slot, a bolt extending through the slot and secured to the base plate for holding the valve-actuating plate adjacent the base plate and for guiding the sliding movement of the valve-actuating plate on operation by said means for slidably moving the valve-actuating plate.

9. Apparatus according to Claim 7 or 8, wherein the base plate is provided with a pair of openings for receiving the respective valve ends of two aerosol cans, and said actuating portion of the valve-actuating plate is spaced downwardly from the base plate; the slide portion being slidable along a line extending generally perpendicularly to a line extending between the centers of the openings in the base plate.

10. Apparatus according to any of the preceding claims, wherein the holding means comprises a base plate and a pair of spaced apart side plates extending generally upwardly from the base plate to receive a pair of aerosol spray cans therebetween, the base plate having a pair of openings one for each can, to receive the valve end thereof, and means for varying the included angle between the side plates whereby the sprays from the can can be made convergent to a greater or lesser extent.

11. Apparatus according to Claim 10, wherein spring means are provided secured to the base plate between the openings for biasing the upper ends of the cans away from each other and towards the side plates.

12. Apparatus according to any of the preceding claims, wherein means are provided on the underside of the frame for

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atus illustrated included a cable for actuating the valve, other means such as solenoids and the like could be used.

While in the foregoing specification, a detailed description of a specific embodiment of my invention was 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 without departing from the scope of my invention.

WHAT I CLAIM IS:—

1. A spraying apparatus for marking a surface, comprising a frame, wheels rotatably mounted on the frame for permitting the apparatus to be rolled over a surface to be sprayed, holding means on the frame for supporting at least one valve equipped spray can in position to dispense the contents of the can or cans onto the surface to be sprayed, a handle secured to the frame for moving the apparatus along the surface and actuating means movably mounted on the frame and adapted to engage the valve of the can or each can for releasing the contents of the can, the actuating means including a plate slidably secured to the frame and rectilinearly movable in its own plane between valve non-actuating and actuating positions, a crank lever rotatably mounted on the frame for rotation in a plane generally perpendicular to the plate, the crank lever having a camming portion engageable with the plate whereby rotation of the crank lever imparts rectilinear sliding movement to the plate, means for rotating the crank lever, and spring means secured to the frame and to the valve-actuating plate for biasing the plate to the non-actuating position.

2. Apparatus according to Claim 1, wherein said means for rotating the crank lever comprises a cable secured to the crank lever and extending along the handle whereby movement of the cable may rotate the crank lever and slide the valve-actuating plate into engagement with the can valve, trigger means provided on the handle, the cable being secured to the trigger means whereby the cable can be moved by the trigger means to rotate the crank lever; and wherein locking means are provided engageable with the trigger means for releasably holding the trigger in position to actuate the valve of the or each can.

3. Apparatus according to either of the preceding claims, wherein said holding means are adapted to hold two of the aerosol cans in a side-by-side position.

4. Apparatus according to any of the preceding claims, wherein the frame includes a base plate provided with one or two openings therein for receiving one end of the aerosol can or cans respectively.

5. Apparatus according to Claim 4,

wherein the valve-actuating means include an actuating bar secured to the valve actuating plate and extending adjacent the or each opening and spaced therebelow and being movable in a plane extending generally parallel to the base plate and spaced therefrom.

6. Apparatus according to Claim 4 or 5, wherein the holding means comprise the base plate and a pair of spaced-apart side plates extending generally upwardly from the base plate to receive an aerosol spray can or cans therebetween, and wherein the valve-actuating plate is slidably secured to the base plate for sliding movement in a direction generally parallel to the base plate, the valve-actuating plate being positioned below the opening in the base plate and including an actuating portion spaced from the base plate and engageable with the valve of the can or each can.

7. Apparatus according to Claim 4, 5, or 6, wherein the valve actuating plate includes an elongated slide portion slidably secured to the base plate, the actuating portion of the valve-actuating plate extending generally transversely of the slide portion.

8. Apparatus according to Claim 7, wherein said slide portion is provided with a longitudinally extending slot, a bolt extending through the slot and secured to the base plate for holding the valve-actuating plate adjacent the base plate and for guiding the sliding movement of the valve-actuating plate on operation by said means for slidably moving the valve-actuating plate.

9. Apparatus according to Claim 7 or 8, wherein the base plate is provided with a pair of openings for receiving the respective valve ends of two aerosol cans, and said actuating portion of the valve-actuating plate is spaced downwardly from the base plate; the slide portion being slidable along a line extending generally perpendicularly to a line extending between the centers of the openings in the base plate.

10. Apparatus according to any of the preceding claims, wherein the holding means comprises a base plate and a pair of spaced apart side plates extending generally upwardly from the base plate to receive a pair of aerosol spray cans therebetween, the base plate having a pair of openings one for each can, to receive the valve end thereof, and means for varying the included angle between the side plates whereby the sprays from the can can be made convergent to a greater or lesser extent.

11. Apparatus according to Claim 10, wherein spring means are provided secured to the base plate between the openings for biasing the upper ends of the cans away from each other and towards the side plates.

12. Apparatus according to any of the preceding claims, wherein means are provided on the underside of the frame for



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attaching thereto a masking plate having an opening therethrough for controlling the area of deposition on the surface of the aerosol spray.

5 13. Apparatus according to Claim 12, including said masking plate.

14. Spray apparatus for marking a surface substantially as hereinbefore described

with reference to the accompanying drawings.

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