Aug. 14, 1951 W. C. BURRUCKER 2,564,392

SPRAYING DEVICE

Filed Dec. 4, 1946

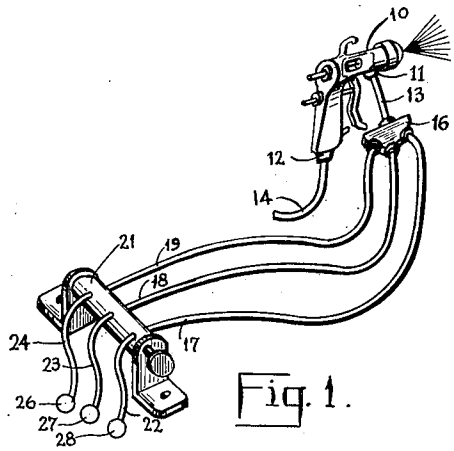


Fig. 1.

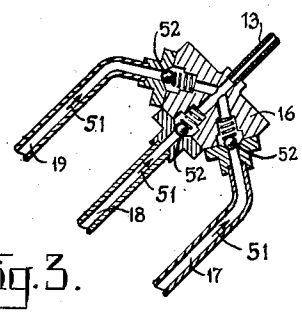


Fig. 3.

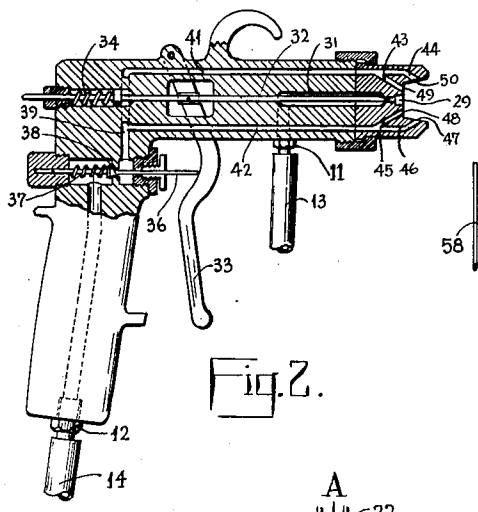


Fig. 2.

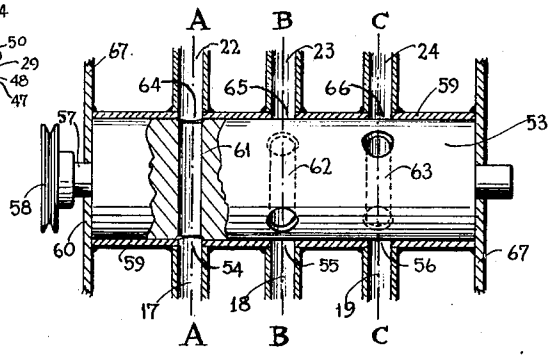


Fig. 4.

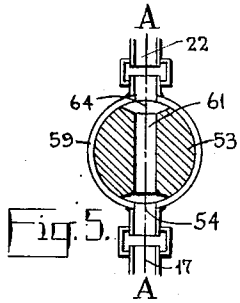


Fig. 5.

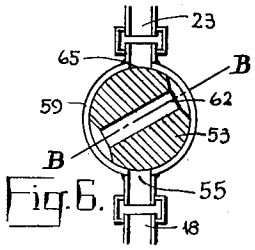


Fig. 6.

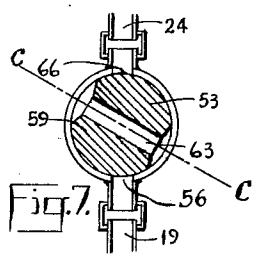


Fig. 7.

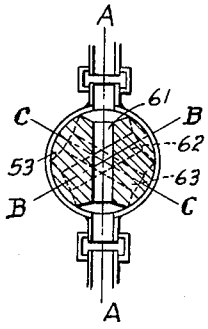


Fig. 8.

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SPRAYING DEVICE

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2 Claims. (Cl. 299—140)

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This invention relates to a spraying device adapted for applying coating compositions to surfaces. It particularly relates to a spraying device for applying multitoned finish coatings to surfaces.

Multitoned decorative coatings have been produced by applying two or more different colors of coating composition, such as paints, lacquers, and varnishes, to the surface to be decorated. The operation by which such multitoned surfaces have in general been produced consists of spraying the various colors of coating composition from two or more spray guns, i. e. each color of composition from a different spray gun, the spraying operation with the various spray guns being conducted simultaneously or alternately. Such processes have certain disadvantages. For instance, if each color of paint, or other coating composition, is sprayed from a different spray gun, this necessitates a greater investment in spray equipment and labor than would be required if the multitoned decorative surface could be produced by a one-step spraying process with a single spray gun for all the colors of coating composition to be applied.

It is one of the main objects of the present invention to provide a spraying device for sprayable coating compositions which may be operated by one person and yet produce a multitoned decorative effect upon the surface to be coated. Another object is to provide a spray device for applying sprayable coating compositions which permits a plurality of colors of spray composition to be sprayed alternately and continuously from the same spray gun.

The principles which are used in the construction of the spraying device of the present invention are adaptable to all types of conventional spray guns for applying sprayable coating compositions. In general conventional types of spray guns have as common features, (1) a spray orifice in the head of the gun for issuance of spray composition from the gun, (2) a spray chamber adjacent to the spray orifice and (3) a spray supply feed line communicating with the spray chamber and with a source of coating composition. These three simple elements may appear in various forms depending upon the construction of the other parts of the spray gun which gives rise to the several types of spray guns that are available, such as bleeder and non-bleeder guns, external and internal mix guns, and pressure, gravity, or suction feed guns. In all of these types of spray guns the cross-sectional area of the spray chamber is generally much greater than that of

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the spray orifice in the head of the gun. Such construction is not particularly objectionable for spraying a single coating composition, but such construction is not satisfactory where it is desired to produce a multitoned effect upon the surface to be coated by alternately feeding a plurality of colors of coating composition into the spray gun. Due to the relatively large space within the spray chamber as compared to the cross-sectional areas of the spray orifice and spray feed line, the turbulent action of the coating compositions entering the spray chamber from the feed line results in mixing of the various colors of spray composition within the spray chamber. Thus a multitoned finish coating will not be produced when the mixed colors of coating composition are forced from the spray gun onto the surface to be coated.

I have discovered that the above mentioned difficulties encountered with the conventional type of spray gun can be overcome by constructing the spray gun in such a manner that the spray chamber and feed line have a cross-sectional area equal to or larger than that of the spray orifice, but not more than about 6.25 times that of the spray orifice. Use of a spray gun constructed in this way does not allow turbulence of the various colors of coating composition as they flow alternately from the feed line into the spray chamber, hence a very pronounced multitoned effect may be produced on the surface to be coated.

The various novel features of the present invention will be more readily understood by referring to the accompanying drawings which illustrate the manner in which the invention may be adapted to an external mix type of spray gun. In the accompanying drawings,

Figure 1 is a perspective view of a spraying device showing the manner in which a spray gun embodying the novel features of the invention is supplied by three different coating compositions.

Figure 2 is a sectional elevation of a spray gun embodying the novel features of the invention,

Figure 3 is a sectional view of a valve arrangement for reducing three tributary feed lines to a single line, and also reducing the cross sectional area,

Figure 4 is a plan view, partly in section, of a valve arrangement for alternately feeding three different colors of spray composition into a main feed line, and

Figures 5, 6, and 7 are sectional views through the lines AA, BB and CC of Figure 4, respectively.

Fig. 8 is a composite of Figs. 5, 6 and 7.

In the illustrated embodiment of the invention the completely assembled device as shown in Figure 1 comprises a spray gun 10 having suitable connections at 11 and 12 with spray composition main feed line 13 and air pressure line 14, respectively. Main feed line 13 communicates with a valve arrangement 16 that is so constructed as to allow coating composition from any of tributary feed lines 17 to 19 to flow under pressure into main feed line 13 but prevents the back flow of coating composition from the main feed line into the tributary lines.

Tributary feed lines 17 to 19 communicate with a valve arrangement 21 which operates to supply coating composition alternately to the three tributary feed lines in such a manner that a continuous flow of spray composition is maintained in main feed line 13. Feed lines 22 to 24 feed coating composition of different colors into valve arrangement 21 and the various colors continue on the spray gun side of the valve through the tributary lines 17 to 19. Spray containers 26 to 28 are conventional pressure tanks for supplying coating composition to a spraying device or may be one large container with a separate compartment for each color. These containers or compartments contain different colors of coating composition, which colors of course govern the type of multitoned finish produced. For example, when containers or compartments 26 to 28 contain red, white, and blue coating compositions respectively, then these colors feed alternately into the tributary feed lines 17 to 19 and then follow through the main feed line in the same order and eventually from the nozzle of the spray gun to give a multitoned decorative finish consisting of red, white and blue areas.

It is obvious from the above simple description of the invention that it is readily adaptable to the production of multitoned decorative finishes having a plurality of different colors. The number of different colors which may be employed is governed by the number of tributary feed lines used and of course by the construction of valve 21 for alternately supplying spray compositions of different colors to the tributary lines and thence to the main feed lines.

In the detailed view of an external mix type of spray gun shown in Figure 2 embodying the novel features of my invention, 13 represents the main feed line for coating composition and has an inside diameter of about twice the diameter of the spray orifice 29 in the head of the spray gun. Likewise, 31 represents a spray chamber having a diameter about twice that of the spray orifice. Both the main feed line diameter and the spray chamber diameter must be from about equal to not more than about 2.5 times the diameter of the spray orifice. This of course, corresponds to a maximum cross sectional area of about 6.25 times the cross sectional area of the spray orifice. Needle 32 is controlled by trigger 33 and spring 34 to open and close the spray orifice 29. Air under pressure enters the spray gun handle at 12 through air line 14. The movement of stem 36 is controlled by spring 37 and trigger 33 to form an air valve at 38. Air, after passing valve 38, travels through main air line 39, then through branch air lines 41 and 42, which further branch out into air lines 43 to 46. Air lines 43 to 46 terminate in air vents 47 to 50 in the head of the spray gun.

In this illustrated embodiment the principles of the present invention are adapted to a non-bleeder external mix type of spray gun but it is obvious that the same principles could be adapted to other types of conventional spray guns, such as, for instance, the non-bleeder internal mix gun or the bleeder type external mix gun.

In the valve arrangement shown in Figure 3, 13 represents the main feed line to a spray gun, and 17 to 19 represent tributary feed lines. In the preferred embodiment of the invention this valve arrangement is located as near the spray chamber as is possible. This of course is obvious since it decreases the amount of mixing of the colors in the main feed line 13.

During the operation of the spraying device coating composition of different colors flows under pressure alternately from tributary feed lines 17 to 19 in the direction of arrows 51 into the main feed line 13. Ball valves 52 prevent the backflow of coating composition into the tributary feed lines when coating composition is not flowing from a tributary line to the main feed line. At any one time coating composition is flowing from only one of the tributary feed lines.

Tributary feed lines 17 to 19 communicate with a second valve 21 of Figure 1. Details of the construction of this valve are shown in Figures 4 to 7 inclusive. The valve consists of a cylinder 53 having three passages 61 to 63 at different angles through its center approximately perpendicular to the longitudinal axis of the cylinder. The holes 61 to 63 are so spaced along the cylinder that they are in alignment with three sets of connections 54 and 64, 55 and 65, and 56 and 66 in jacket 59 which encloses the cylinder. The holes in the cylinder are of any convenient diameter, but preferably not more than about one-fourth the diameter of the cylinder. The holes are at about 60° angles to each other around the cylinder and are countersunk at their exits in such manner that as the cylinder is rotated through a complete revolution the holes in the cylinder alternately communicate with the connections in the jacket which are aligned with them to give an alternating feed of coating composition through connections 64 to 66 on one side of the cylinder through the cylinder and out the other set of connection 54 to 56 on the opposite side of the cylinder and then into tributary feed lines 17 to 19. Due to the countersinks in the cylinder at the opening of each hole, the holes 61 to 63 engage and disengage themselves with their corresponding jacket connections in such manner as to give a continuous feed of coating composition consisting of three alternating colors. For example, when red spray composition is fed through line 22, white through line 23 and blue through line 24 these same spray compositions issue alternately through connections 54 to 56 into tributary feed lines 17 to 19. When this type of feed is reduced to a single main feed line as illustrated in Figure 3 there is produced a continuous flow of an alternating series of red, white and blue coating composition in the main feed line.

Cylinder 53 and jacket 59 are mounted on suitable supports 67. The jacket is rigidly attached to the supports while the cylinder is rotatably mounted and may be rotated by means of pulley 58 attached to shaft 57. Shaft 57 extends through packing at 60 and is attached to the cylinder or may be a continuation of the cylinder. In effect, the packing 60 and jacket 59 serve as a bearing in which the cylinder is free to rotate, but both the jacket and the packing fit closely enough to prevent leakage of spray composition. Any suitable source of power may be

used to turn the cylinder, preferably a small electric or air motor which is geared down to rotate the cylinder at from about 5 to 50 revolutions per minute is used. Although various speeds of rotation of the cylinder may be used I prefer to use the speeds of about 5 to 50 revolutions per minute.

It is important to note that in a spraying device embodying the novel features of my invention that the tributary feed lines feeding into the main feed line may be of any cross sectional area desired. However, both the spray chamber and the main feed line communicating with it must have cross sectional areas of not more than about five times that of the spray orifice of the spray gun.

As many modifications and variations may be made in the details of the invention I do not intend to limit the scope of the invention except as defined in the appended claims.

I claim:

1. A spray device for sprayable coating compositions capable of producing multitoned effects comprising in combination: a spray head having an orifice, a coating composition supply chamber adjacent to said orifice, said chamber having a cross-sectional area from one to about 6.25 times the area of the orifice, a main feed line connected to the chamber said feed line having a cross-sectional area from one to about 6.25 times the area of said orifice, a plurality of tributary feed lines communicating with the main feed line through a common connection, each of said tributary feed lines containing a valve adjacent the common connection which permits fluid to flow only in the direction of the main feed line and each of said tributary feed lines communicating with a multiple valve comprising a rotatable cylinder enclosed in a jacket, the cylinder having a plurality of countersunk bores therethrough equal in number to the number of tributary feed lines, each of said bores being in alignment with a corresponding set of outlet and inlet holes in the jacket, and wherein the sum of the arcs subtended on the circumference of said cylinder by the diameters of the countersinks of said countersunk bores is equal to the circumference of said cylinder so as, to provide a single color passage through the cylinder and jacket at all positions of the cylinder as the cylinder is rotated, each of the outlet holes in said jacket communicating with one tributary feed line and each of said inlet holes communicating with an individual source of coating composition under pressure, means for rotating said cylinder, a dispersing fluid supply for supplying fluid for atomizing and scattering the coating composition at the spray head and means for cutting off the flow of coating composition and dispersing fluid.

2. A spray device for sprayable coating compositions capable of producing multitoned effects comprising in combination: a spray head having an orifice, a coating composition supply chamber adjacent to said orifice, said chamber having a cross-sectional area from one to about 6.25 times the area of the orifice, a main feed line connected to the chamber said feed line having a cross-sectional area from one to about 6.25 times the area of said orifice, a plurality of tributary feed lines communicating with the main feed lines through a common connection, each of said tributary feed lines containing a valve adjacent the common connection which permits fluid to flow only in the direction of the main feed line and each of said tributary feed lines communicating with a multiple valve comprising a rotatable cylinder enclosed in a jacket, the cylinder having a plurality of countersunk bores therethrough equal in number to the number of tributary feed lines, said bores being in alignment with a plurality of sets of outlet and inlet holes in the jacket, and wherein the sum of the arcs subtended on the circumference of said cylinder by the diameter of the countersinks of said countersunk bores is equal to the circumference of said cylinder so as to provide a single color passage through the cylinder and jacket at all positions of the cylinder as it is rotated, each of the outlet holes in said jacket communicating with one tributary feed line and each of said inlet holes communicating with an individual coating composition pressure supply tank, means for rotating said cylinder, a dispersing fluid supply for supplying fluid for atomizing and scattering the coating composition at the spray head and means for cutting off the flow of coating composition and dispersing fluid.

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