March 21, 1961 H. J. REINDL ET AL 2,975,756

ELECTROSTATIC PAINT SPRAY

Filed Feb. 26, 1958

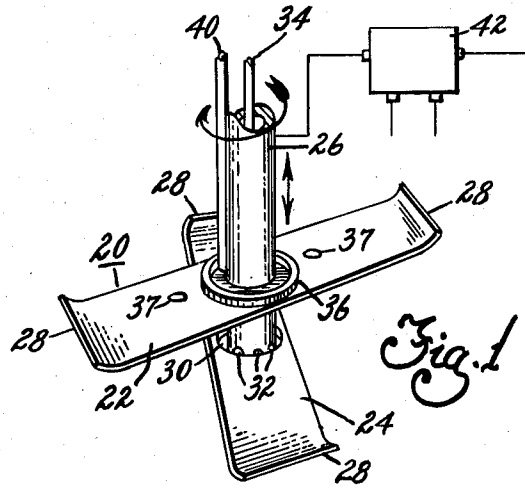


Fig. 1

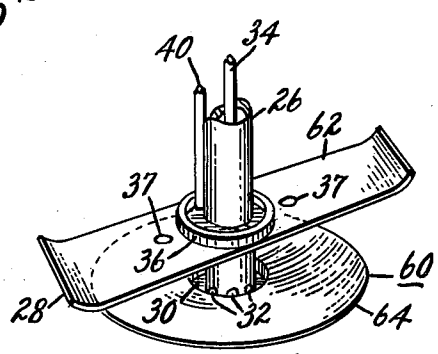


Fig. 2

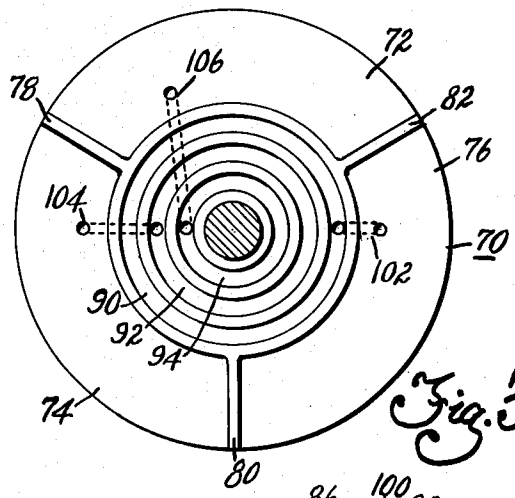


Fig. 3

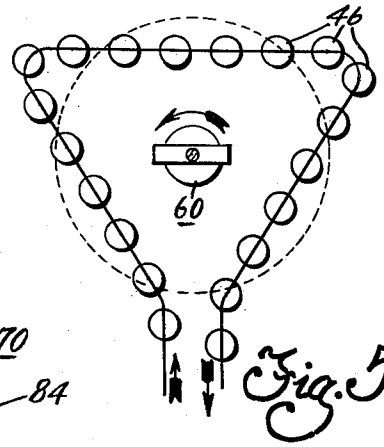


Fig. 5

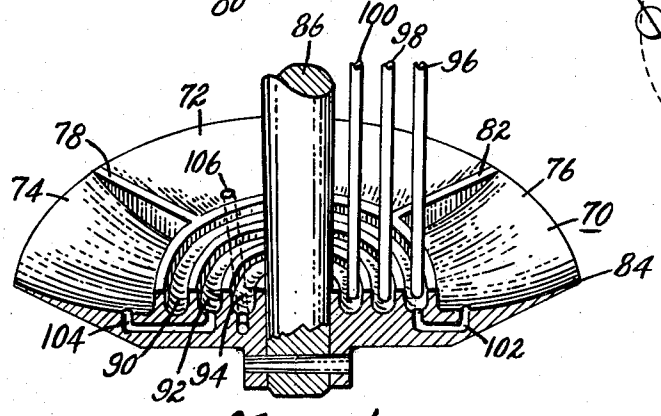


Fig. 4

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ELECTROSTATIC PAINT SPRAY

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3 Claims. (Cl. 118—627)

This invention relates to electrostatic painting and is particularly concerned with apparatus capable of depositing several different types of paint simultaneously.

It is an object of the invention to provide an apparatus for electrostatically painting an article wherein the article may be provided with a multi-color, marbleized or mottled appearance through the simultaneous deposition of more than one color or type of paint.

In carrying out the above object, it is a further object of the invention to provide an electrostatic paint spray apparatus which can be used to deposit a plurality of different types of paint simultaneously wherein each type of paint is distributed from a separate portion of a centrifugal distributor.

Another object of the invention is to provide a blade type distributor having two blades which may be separately supplied with paint and rotated simultaneously to throw the paint centrifugally outwardly while simultaneously electrostatically and centrifugally atomizing the paint therefrom.

Another object of the invention is to provide a single plate-like distributor having a plurality of zones thereon, each of which is supplied from a separate source of paint supply so that only one type of paint is thrown from any one zone whereby a multi-colored effect is obtained when various colors are used in the several zones.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein preferred embodiments of the present invention are clearly shown.

In the drawings:

Figure 1 is a diagrammatic view showing one type of centrifugal paint distributor in proximity to an article to be painted wherein the view is in perspective.

Figure 2 shows in perspective another type of paint distributor which may be used in connection with Figure 1.

Figure 3 shows a plan view of still another type of distributor utilizing a single plate divided into compartments.

Figure 4 is a perspective view in section of the distributor shown in Figure 3.

Figure 5 is a diagrammatic view of the distributor in connection with a conveyor used to convey a plurality of articles progressively through the field of painting.

In application S.N. 687,107, a centrifugal type of paint distributor is shown and described wherein a bladelike distributing device is used which is rotated at relatively high speeds in the order of 2000 r.p.m. and wherein paint is supplied to the surface thereof. The distributor is connected to one pole of a power source while the other pole thereof is connected to an article spaced from the distributor. Paint supplied to the distributor is centrifugally distributed thereover and thrown therefrom mechanically while simultaneously being electrostatically charged as it leaves the edge of the distributor whereby a

fine mist of electrostatically charged particles is produced which particles are electrostatically attracted and mechanically directed toward the article whereby deposition of the particles on the article produces a coating thereover.

In many instances, where articles are to be painted, it is desirable to form a multi-colored effect on the article. This may be accomplished by sequential painting through two painting systems wherein the article is first painted with a solid ground coat and is then lightly painted with a second coat of another color or texture of paint. This produces a mottled or multi-colored effect. However, this particular type of multi-color process is not flexible and is difficult to control while being substantially inoperative to produce marbleized effects since the paint from the first coat is generally substantially dry before the second coat is deposited thereover.

The present invention specifically provides an apparatus for multi-color painting wherein a reduction in paint loss is obtained and wherein the several colors to be deposited are deposited simultaneously whereby the paint does not necessarily produce sharp contrasts at the juncture of the several colors but rather blends one color into the other at the juncture thereof. This is accomplished by depositing both colors simultaneously and before the paint is completely dry.

By utilizing this principle, in connection with electrostatic paint spray, it is further possible to reduce paint losses and thereby reduce the cost of the operation. Furthermore, it is possible to deposit the paint without excessive solvent whereby improved mottling effects are obtained. Similarly, the apparatus may be used to deposit more than two colors by specific structural modifications and, in some cases, it may be desirable to deposit different types of paint for obtaining desired effects. For example, if a textured surface is desired, it is possible to deposit paint having one solvent content together with paint having a reduced solvent content whereby the second mentioned material is substantially dry when it is deposited. This causes a texturing effect since the dried particles of paint produce small bumps which adhere to the surface through a continuity of film with the other paint which is still in a fluid condition. Similarly, pigment paints may be deposited simultaneously with metallic paints for obtaining pleasing color effects and two or more paints, including immiscible solvents, may be used for varied effects.

Referring specifically to the drawings, a paint distributor is shown at 20 in Figure 1 and comprises two blades 22 and 24 shown at right angles to one another with respect to a driving shaft 26. The blades 22 and 24 may be turned upwardly adjacent the ends thereof as at 28 or may be flat as desired. The blade 24 is fixed to the lower end of the shaft 26 and includes an annular depression 30 concentrically arranged around the shaft 26. The shaft is hollow and is perforated at 32 so that paint fed thereto by a supply tube 34 flows out of the perforations 32 which are below the top of the depression and into the depression 30 thence is centrifugally distributed onto the surface of the blade 24. The blade 22 may be depressed at the center portion in a like manner or may be flat with an annular dam or ring 36 adjacent the center thereof. This dam or ring 36 forms a shallow cup which receives paint from a second supply tube 40. This cup may be connected by tubes or ducts (not shown) with supply orifices 37 on the surface of the blade. The blade 22 is also fixed to the shaft 26 so that when the shaft 26 is driven by a motor, not shown, the blades 22 and 24 rotate simultaneously. The blades 22 and 24 are connected to one side of a power source 42 while the

other side thereof is connected to a hanger 44 for an article 46 to be painted, in this case, a plate.

When the distributor 20 is rotated at speeds in the order of 1000 to 3000 r.p.m., and paint is supplied to supply tubes 34 and 40 and thence to the surface of the blades 22 and 24 of the distributor 20, the paint is centrifugally distributed over the blades in a nonuniform manner as described in the aforementioned application and is thrown off the severel edges of the blades in different concentrations so that a more or less undulating painting effect is obtained from either plate. Since the plates carry an electrostatic charge, particles of paint, as they are thrown from the edges of the plates which are preferably sharp edges, pick up the charge from the plates and are simultaneously electrostatically atomized into a fine mist while, at the same time, the particles of mist are thrown from the plate by centrifugal action. Since the article 46 bears an opposite charge, these charged and atomized particles are attracted to the article 46 and deposit onto the surface thereof.

The multi-color effect may be obtained by supplying different colors of paint to the two plates through the supply tubes 34 and 40 which tubes are connected by pumps, not shown, to sources of supply, not shown. In general, the article 46 is but one of many articles that are conveyed around the electrostatic paint distributor preferably in a noncircular path as shown in Figure 5. In this instance, the particular type of conveyor may vary widely and the conveyor shown in Figure 5 is but one of several types of conveyors which may be used. In this respect conveyors are shown in detail in copending application, S. N. 698,490, wherein noncircular conveyors are depicted. Circular conveyors may also be used and the conveyor forms no part of this invention.

In Figure 2, a different type of distributor 60 is shown wherein the upper member 62 thereof is a blade similar to the blade 22 shown in Figure 1 while the lower member is a disc 64. In this instance, the blade 62 will distribute paint nonuniformly while the disc 64 distributes paint uniformly and thus different effects may be obtained by varying the shape of the several members of the distributor 60. In other words, it is possible to use two discs one above the other or, as shown in Figure 1, two blades as determined by the type of painting desired. Also, the speeds thereof may be different through the use of gearing or two separate drive shafts to vary the centrifugal effect, if desired.

Figures 3 and 4 show still another type of distributor 70. In this type of distributor, a single slightly cupped plate is used which is divided into segments 72, 74 and 76 by radial ribs 78, 80 and 82. The plate 70 has a sharp edge 84 therearound and is carried by a shaft 86 suitably connected thereto. The shaft 86 is driven by a motor and the entire distributor plate 70 may be substituted for the distributor 20 or 60 in a similar set-up. In the present instance, however, three colors are being distributed by the distributor 70. These are distributed onto the various segments of the plate by utilizing a plurality of concentric central cups 90, 92 and 94. Each of these cups are formed by annular raised portions on the surface of the plate wherein the outer raised portion merges with the ribs 78, 80 and 82. In this instance, three supply tubes 96, 98 and 100, connected by suitable pumps to paint supplies, each exhaust into one of the annular cups 90, 92 and 94, respectively. Each paint supply tube may carry a separate color whereby three separate colors are supplied to the three annular cups. The cup 90 is connected by means of a duct 102 with segment 76 while the cup 92 is connected by duct 104 with segment 74 leaving the cup 94 to be connected by duct 106 with the segment 72. Thus, when the distributor 70 is rotating at a suitable speed (1000 to 3000 r.p.m.) and paint is being supplied to the several cups, the paint is centrifugally drawn through the several ducts onto the segmental surfaces of the plate whence it is thrown centrifugally outwardly and is electrostatically atomized and distributed.

When the distributor 70 is placed in the same position as the distributor 20, as shown in Figure 1, it will deposit simultaneously three different colors or types of paint onto an article 46. It is apparent that by increasing the number of annular cups, the number of segments may be increased and likewise, the cups may be decreased in number to provide only two segments as desired. In all instances, the distributors must be connected to one pole of an electrostatic source while the article to be painted is connected to the other pole thereof and, in this connection, the polarity of the distributor is a matter of choice in accordance with the specific set-up being used. Similarly, in all of the instances shown, the supply tubes are stationary relative to the distributors although by using rotating connections, it is possible to make tubes rotate with the distributor as desired, these factors being matters of choice and not of patentable significance in connection with the present invention. In all instances, the distributors are preferably metallic although nonmetallic distributors may be used satisfactorily.

While the embodiments of the present invention as herein disclosed constitute preferred forms, it is to be understood that other forms might be adopted.

What is claimed is as follows:

1. An electrostatic painting apparatus for painting of an article spaced therefrom with at least two different paints, comprising in combination; a distributor plate including a plurality of segmental portions each being adapted for connection to a separate source of supply of paint, a plurality of paint supplies for supplying different paints to the several portions simultaneously, means for rotating the distributor plate, and a source of electrostatic power for supplying opposite charges to the distributor plate and the article.

2. An electrostatic painting apparatus for painting of an article spaced therefrom with at least two different paints, comprising in combination; a generally dish-shaped distributor plate including a plurality of radial dams dividing the plate into segments, a plurality of concentric grooves adjacent the center of the plate, each one of said grooves being connected to a different segment of the plate wherein the number of segments and the number of grooves are equal, a plurality of paint supply means for supplying different paints to the several grooves simultaneously, means for rotating the distributor plate and a source of electrostatic power for supplying opposite charges to the distributor plate and to the article.

3. A multicolor paint spraying apparatus wherein a plurality of different paints may be supplied to a single distributor, comprising in combination; a single circular distributor plate divided into a plurality of segmented portions, a separate source of supply of paint for each of said portions for supplying paint to said portions simultaneously, and means for rotating the distributor plate.

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