United States Patent

Bein

[15] **3,684,174**

[45] **Aug. 15, 1972**

[54] **ROTATING ATOMIZER FOR ELECTROSTATIC PAINTING APPARATUS**

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[21] Appl. No.: **48,843**

Related U.S. Application Data

[63] Continuation of Ser. No. 722,782, April 19, 1968, abandoned.

[52] **U.S. Cl.** **239/15**

[51] **Int. Cl.** **B05b 5/00,** F23d 11/28

[58] **Field of Search** 239/3, 15

[56] **References Cited**

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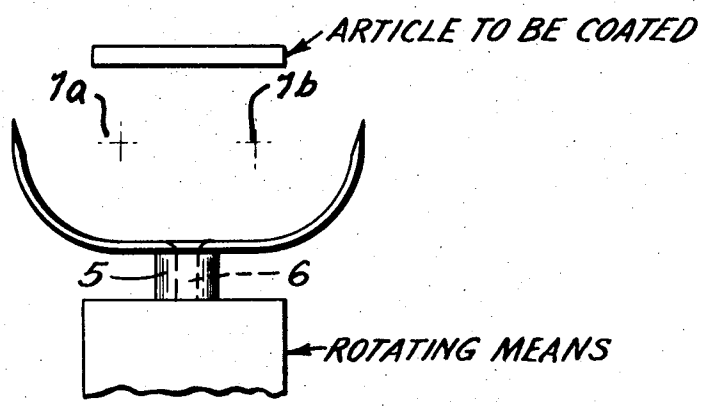
Attorney—Warren D. Flackbert

[57] **ABSTRACT**

A rotating atomizer for electrostatic painting apparatus, characterized by an open ended shell or dish having a spray edge defining a round, oval, or rounded rhombus shaped surface, when flattened, curved concavely towards the object to be coated.

6 Claims, 8 Drawing Figures



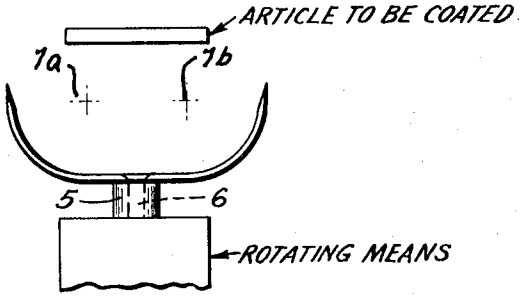


FIG. 1

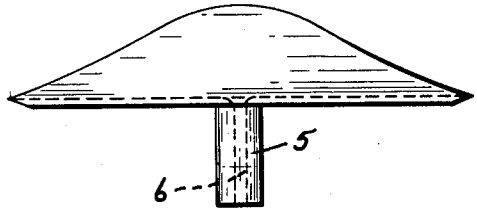


FIG. 2

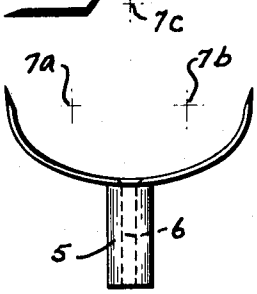


FIG. 3

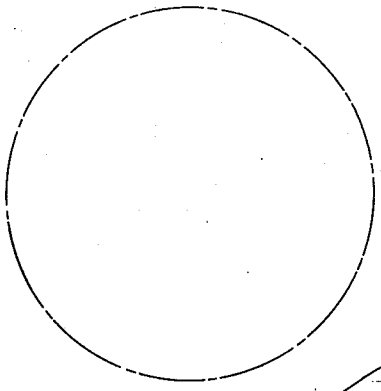


FIG. 8

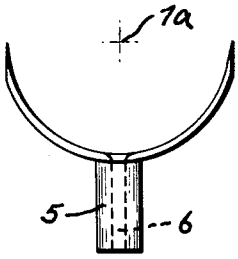


FIG. 4

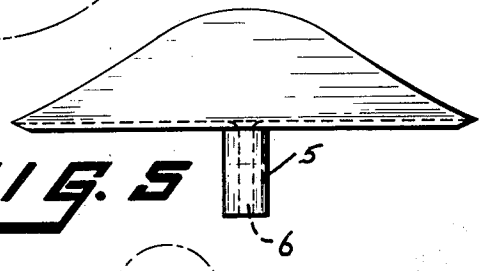


FIG. 5

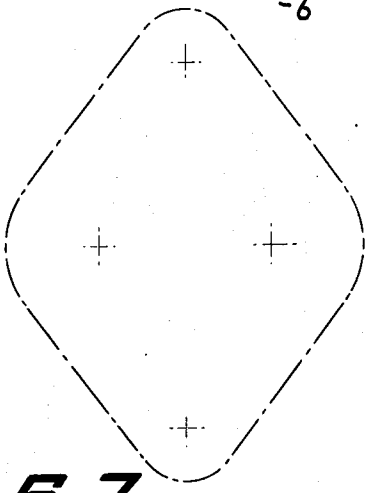


FIG. 7

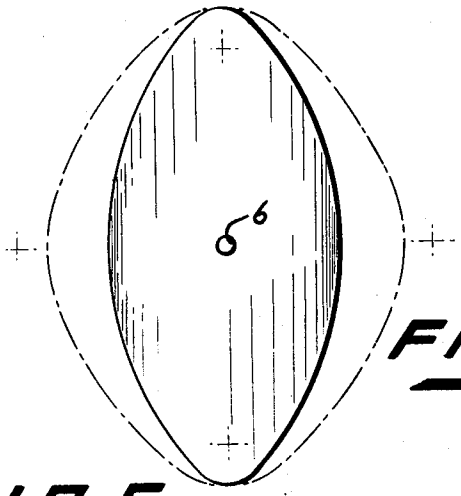


FIG. 6

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ROTATING ATOMIZER FOR ELECTROSTATIC PAINTING APPARATUS

The present application is a streamlined continuation of the now abandoned U.S. patent application Ser. No. 722,782, filed Apr. 19, 1968.

The invention relates to a rotating dish-like shaped atomizer for electrostatic painting apparatus, typically powered by an air or an electric explosion-proof motor. The atomizer is so mounted that its spraying edge moves in a regular and constantly changing distance about a rotation axis directed towards the object being painted or otherwise coated.

Rotating atomizers have been proposed defined as a hollow body having an elliptical cross section, such as an elliptical cone or an elliptical paraboloid. Such type of atomizer achieves a uniformity of coating which has not been attained heretofore with the use of a rotatable atomizer having a hollow body with a circular shape in cross-section, as a bell or cup, and, additionally, the working area, for an equal distance from the object to be coated or painted and an equal diameter of rotation, is greater than that of the aforesaid rotatable atomizer of circular configuration.

The aforesaid atomizer is relatively costly to manufacture, and one disadvantage thereof is that subsequent corrections of the shape of the cross-section of the hollow body for the purpose of adjustment to attain the optimal relationship between the quantities of paint sprayed in a unit of time from the edge points furthest from the rotation axis and from those nearest to the rotation axis, are only possible to a small degree. Changes in configuration are useful, for example, with a change from one type of paint to another. While, of course, the atomizer could be exchanged with another one better suited for a particular application, it is desirable to avoid such substitution.

In any event, the limitations of the aforesaid atomizer are obviated by the invention limitations provides a dish or shell-like surface oriented towards the object to be painted and having a perimeter spray edge which is a round, oval, or rounded rhombus shaped surface curved concavely across a diameter, preferably the greater diameter in the instance of an oval or rounded rhombus shaped surface.

The dish or shell of the atomizer is tray shaped, being open at opposite ends. The manufacture of the invention is comparatively simple, and changes of form or shape which may be needed from time to time, for different applications, are also simply accomplished.

An additional characteristic of the invention is that if the curve of the shell surface, expecially in the region of the smallest distance from the spray edge to the axis of rotation, is increased towards such spray edge, then the movement of paint towards the spray edge in this region will be increasingly slowed. Such measure serves, with a relatively low shell-profile (through the small diameter), to adjust the desired relation, itself dependent upon the appropriate proportioning of the involved diameters, between the quantities of paint sprayed out in a unit of time from the edge points furthest from the rotation axis and from those closest to the rotation axis.

In an alternative embodiment of the invention, the shell surface across the small diameter is curved slightly to assume a convex configuration.

It is of essential importance that from each spray edge point-pair lying on the same diameter line through the atomizer, a quantity of paint is sprayed out in a unit of time which is proportioned to the size of the object surface passed over by the spray edge point-pair in question, providing an even and uniform coating of the surface, in a more effective manner than arrangements in use heretofore. Since the spray edge points near the axis of rotation are always closer to the object to be painted than those far from the rotation axis, disturbance of the electrical field is precluded.

In an arrangement where two or more shells of different sizes are used, one inside of the other and on the same axis, the spray edge of the smaller shell would, in accordance with the invention, be in an inner direction from the larger spray edge facing the object to be painted. The preceding is to avoid any disturbance of the electrical field. For such reason, and also for the purpose of fine adjustment of the work area of the combined shells, it is advantageous to provide for adjusting the distance between the spray edges along the common axis.

Another important advantage afforded by the invention is that with the use of two atomizers, one beside the other and/or one above the other, with parallel axes, there is no mutually interfering effects, in contrast to the mentioned circular type atomizers. In this connection, the distance from each other can even be lessened if the large, and, respectively, the small diameters of the two atomizers stand in pairs at a certain angle with respect to each other, preferably 90°. The preceding is quite important in actual use, as in the painting of automobile bodies, and especially the roofs thereof, which previously had been plaqued by mutual interferences between the two atomizers. The same advantages also apply to a bell shaped atomizer having an oval shaped cross section.

The invention will become more apparent from the following description, taken in conjunction with the accompanying drawing, wherein

FIG. 1 is a view in end elevation of the invention, partly in vertical section, showing one configuration of the shell surface;

FIG. 2 is a view in side elevation of the shell configuration of FIG. 1;

FIG. 3 is a view in end elevation, partly in vertical section, of another configuration of the shell surface;

FIG. 4 is another view in end elevation, partly in vertical section, showing still another configuration of the shell surface;

FIG. 5 is a view in side elevation of the shell configuration of FIG. 4;

FIG. 6 is a top plan view of an oval shell, where the broken lines show the shell when flattened into a single plane;

FIG. 7 is a top plan view, in phantom, of another shell configuration when flattened into a single plane, in this instance defining a rounded rhombus; and,

FIG. 8 is a top plan view, in phantom, of another shell configuration, after flattening into one plane, in this instance, round or circular.

For the purposes of promoting an understanding of the principles of the invention, reference will now be made to the embodiments illustrated in the drawing and specific language will be used to describe the same.

It will nevertheless be understood that no limitation of the scope of the invention is thereby intended, such alterations and further modifications in the illustrated device, and such further applications of the principles of the invention as illustrated therein being contemplated as would normally occur to one skilled in the art to which the invention relates.

Referring to the figures, FIGS. **1** and **2** show an open-ended shell configuration curved symmetrically, in mirror fashion, about its principal plane of symmetry (being the long diameter in the instance of an oval or rounded rhombus), namely, defined by, in part, circular portions having centers of radius **7***a* and **7***b*. As a matter of background, while the overall spraying apparatus is not disclosed for reasons of clarity, the paint or other coating material passes through a hollow axial opening **6** which extends through a mounting shaft **5**. Such is true in each alternative shell configuration, where, and also not shown, an air or electrical explosion- proof motor serves to rotate the shell.

The invention configuration of FIG. **3** is comparable to that of FIG. **1**; however, an open-ended shell form in the cross-sectional shape of a half ellipse is provided. The preceding is accomplished through radius points **7***a*, **7***b*, and **7***c*. The side elevation view of FIG. **2** also represents the side elevation of the invention embodiment of FIG. **3**.

FIG. **4** illustrates an open-ended shell curved in a circular shape in cross-section, where the radius point **7***a* achieves such end results. The corresponding side view of the invention embodiment of FIG. **4** is shown in FIG. **5**. In this instance, the distance along the axis between the points of the spray edge nearest the axis of rotation and the points furthest from the axis of rotation are greater than the invention embodiments of FIGS. **1** and **3**.

FIGS. **6** and **7** show top plan views of the shell of the invention, where, in FIG. **6**, the oval shell is flattened into a single plane. Another outline of shell flattened into a single plane, in FIG. **7**, has the shape of a rounded rhombus. Additionally, the shell may have the aforementioned circular shape (not shown), when flattened, with associated open ends, and any of the cross-sectional characteristics of FIGS. **1**, **3** and **4**.

From the preceding, it should be understood that the invention affords highly effective uniform spraying of large areas, and the invention embodiments disclosed herein should be considered illustrative, and not as limiting the scope of the following claims.

I claim:

1. In electrostatic coating apparatus, a rotating atomizer having a spray edge which moves in a regular and constantly changing distance about the axis of rotation comprising a shell having symmetrically curved laterally extending side walls defining a concave surface which faces towards an article to be coated.

2. The rotating atomizer of claim **1** where said shell is circular if flattened into a single plane.

3. The rotating atomizer of claim **1** where said shell is oval if flattened into a single plane.

4. The rotating atomizer of claim **1** where said shell is a rounded rhombus if flattened into a single plane.

5. The rotating atomizer of claim **1** where said shell defines a semi-circle in a lateral plane through said curve.

6. The rotating atomizer of claim **1** where said shell defines a half ellipse in a lateral plane through said curve.

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