Jan. 10, 1956 H. P. RANSBURG 2,730,460

ELECTROSTATIC METHOD AND APPARATUS

Original Filed Dec. 30, 1943 3 Sheets-Sheet 1

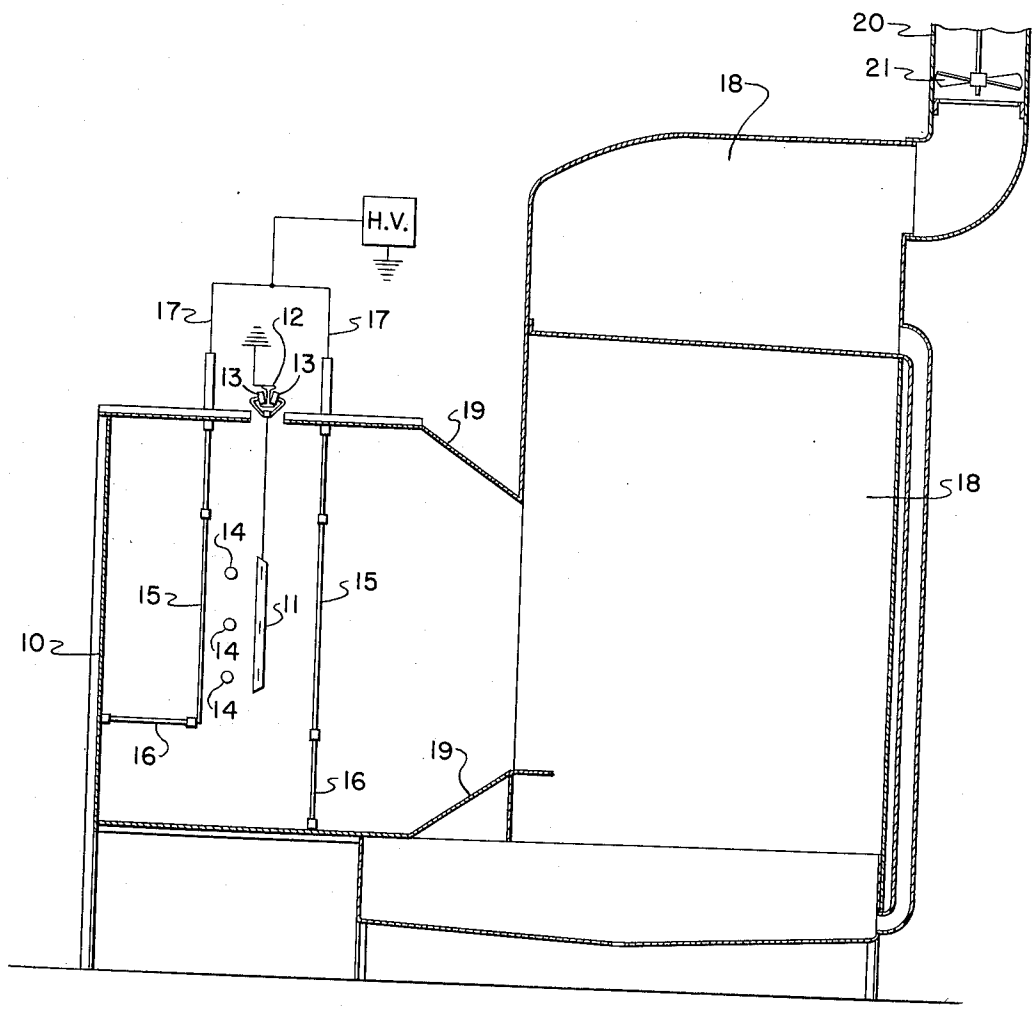

FIG. 1

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ELECTROSTATIC METHOD AND APPARATUS

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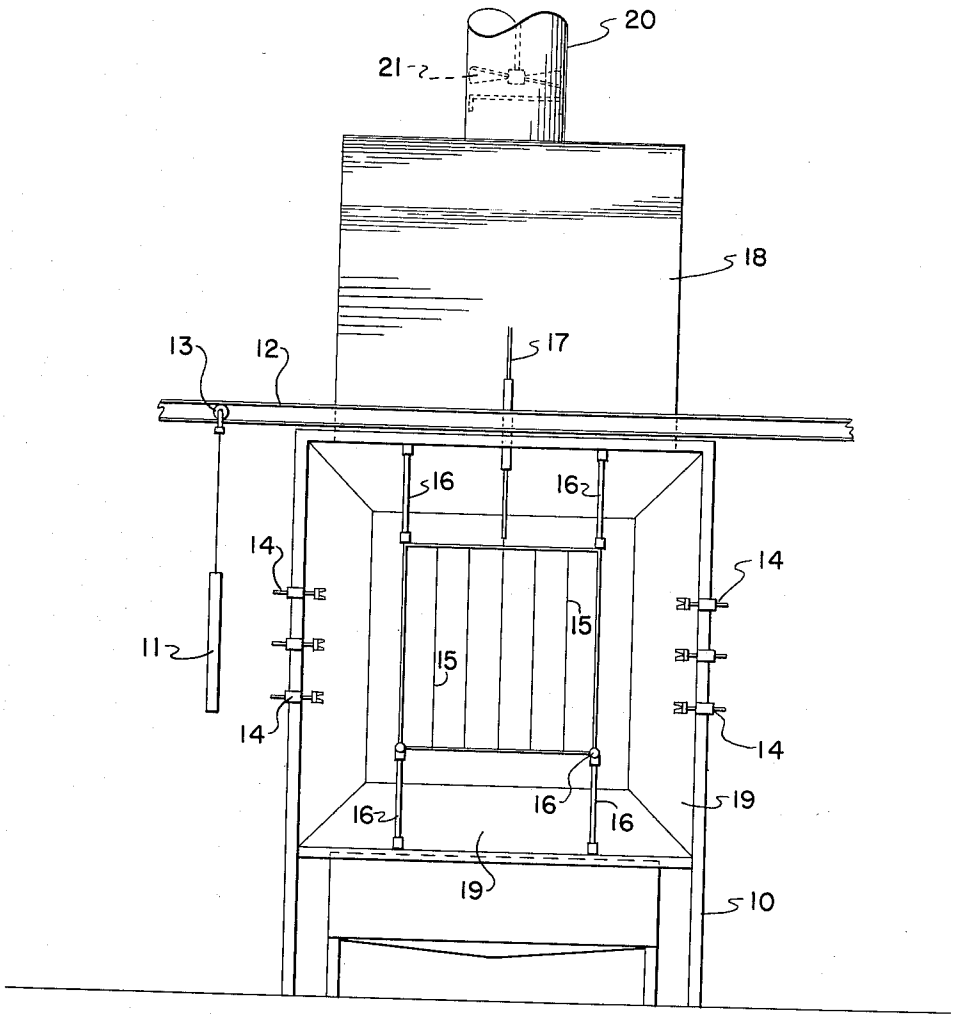

FIG. 2

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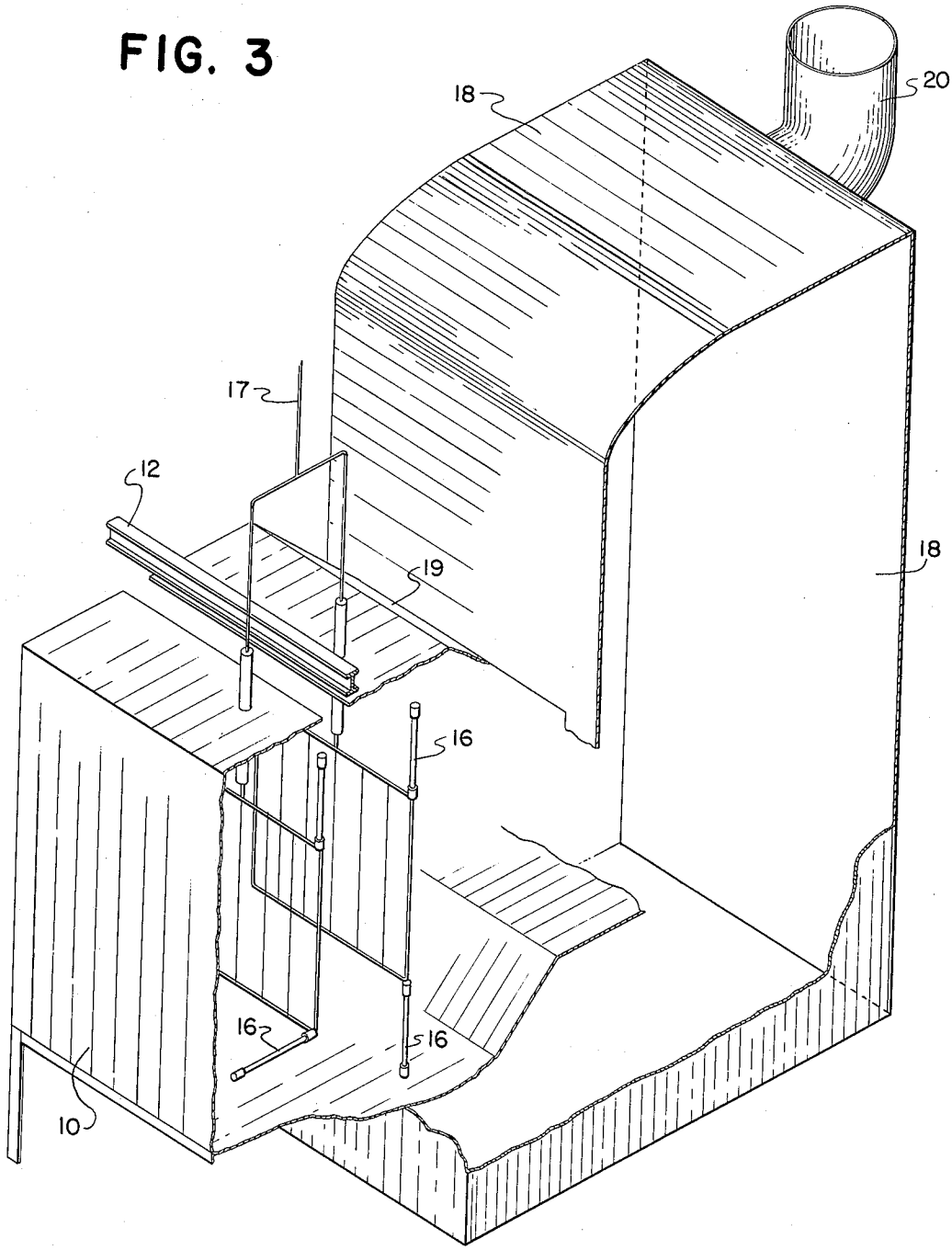
FIG. 3



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2,730,460

ELECTROSTATIC METHOD AND APPARATUS

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Continuation of application Serial No. 516,256, December 30, 1943. This application September 28, 1949, Serial No. 118,245

7 Claims. (Cl. 117—93)

This invention relates to spray coating of articles in an electrostatic field such as is disclosed and referred to in Letters Patent No. 2,247,963, issued July 1, 1941, on an application filed by Harold P. Ransburg and Harry J. Green, entitled "Apparatus for Spray Coating Articles."

The present application is a continuation of application Serial No. 516,256, filed by Emery P. Miller and Harold P. Ransburg on December 30, 1943, for "Overspray Recovery for Spray Booth," now Patent No. 2,486,877, dated November 1, 1949.

One object of the present invention is to provide a novel method and apparatus by which the billowing effect of the atomizing agent on the coating particles is materially reduced, the movement of atomized coating particles prior to deposition may be more effectively and consistently controlled, and the production of uniform coatings on certain types of articles facilitated.

Another object of the present invention is to provide a novel method and apparatus by which electrostatic coating may be accomplished with better uniformity and greater efficiency.

The full nature of the invention will be understood from the accompanying drawings and the following description and claims:

In the accompanying drawings, Fig. 1 is a central transverse vertical section through the apparatus; Fig. 2 is a front elevation of the spray booth with the front wall removed; and Fig. 3 is a diagrammatic illustration of the apparatus in perspective.

In the drawings there is shown for purpose of illustration, a spray booth **10** in which articles **11** are electrostatically coated, such as with a paint, lacquer or the like discharged from the usual spray gun or guns. The spray booth may be of the ordinary type for hand spraying in normal atmosphere, or, as shown herein for purposes of illustration, it may be of the type for electrostatic coating, as more particularly and fully set forth and described in the above-mentioned Patent No. 2,247,963.

Extending along the top of the spray booth **10** there is an I-beam track **12** from which the articles **11** are suspended and caused to travel through the booth on the supporting rollers **13**. Adjacent and to one side of the line of travel of the articles therethrough and mounted in the wall of the booth at either or both ends of the booth, there are a series of adjustable fixed spray guns **14** through which an atomized coating material is sprayed into the booth for electrostatic deposition on the surface of the articles to be coated.

An electrostatic field into which the coating is sprayed is provided by high voltage discharge electrodes **15** mounted in the booth by the insulating supports **16** so as to be spaced on one or both sides of the line of travel of the articles **11**. By this arrangement, articles **11** constitute the opposite electrode, preferably being grounded through the track **12**, said track being connected through the ground with one side of the source of high voltage, where-

as the electrodes **15** are connected with the opposite side of said source through insulated lead wires **17**. The coating which is sprayed in a fine mist into the electrostatic field becomes charged and is electrostatically deposited on the articles.

In order to better distribute the coating material in the electrostatic field about the articles, a forced draft is created in the booth which leaves the booth through the passage indicated at **19** and out through chimney or duct **20**.

The forced draft is created by apparatus which may include motor driven exhaust fan **21** in the duct **20** at the discharge portion of the housing **18**. This housing communicates with the spray booth through the passage **19**, the axis of which is generally transverse to the path of article movement in the booth **10**.

In order to reclaim the overspray it may be passed through suitable apparatus which may be set up in the housing **18**. One embodiment of such reclaiming apparatus is described and claimed in the application of Harold P. Ransburg and Emery P. Miller previously mentioned and therefore will not be described here.

From the foregoing it will be evident that with the electrostatic method and apparatus here disclosed it is possible to modify the distribution of the finely divided coating particles in the electrostatic field and increase the quantity of atomized coating material present in the field regions between adjacent articles moved through the booth by the conveyor.

I claim as my invention:

1. A method of electrostatically depositing liquid coating material on the surface of a plurality of articles, comprising moving the articles in spaced relation to each other over a predetermined path in a coating zone, maintaining an electrostatic field over the surfaces of the articles in the coating zone, the lines of force of said field being generally perpendicular to said path, discharging a stream of atomized coating material particles into the field on one side of said article-path for electrostatic deposition on the articles, and withdrawing air from said coating zone on the opposite side of said article-path from where the coating material is introduced in a direction generally transverse to said article-path to create in the coating zone a movement of air from the region of the field into which the coating material is introduced and toward and across the article path and thereby to aid in moving the coating particles toward and between the articles in the coating zone for electrostatic deposition thereon.

2. A method of electrostatically depositing liquid coating material on the surface of an article, comprising moving the article through a coating zone longitudinally thereof over a predetermined path extending from an inlet opening to an outlet opening, maintaining an electrostatic field over the surface of the article in the coating zone, the lines of force of said field being generally perpendicular to said path, discharging a stream of atomized coating material particles suspended in air into the field from a point near one of said openings and on one side of said article-path, said stream being directed in a generally parallel direction to said article-path, and withdrawing air from said coating zone intermediate said inlet and outlet openings on the opposite side of said article-path from where said stream is discharged and in a direction generally transverse to said article-path to create in the coating zone a movement of air from the region of the field into which the coating particles are introduced and toward and across the article-path and thereby to aid in modifying the direction of movement of said coating particles generally to follow the lines of force of said field whereby the coating particles are moved toward and around the article for electrostatic deposition thereon.

3. A method of electrostatically depositing liquid coating material on the surfaces of a plurality of articles, comprising moving the articles in spaced relationship to each other in a coating zone over a predetermined path extending longitudinally thereof, maintaining an electrostatic field over the surfaces of the articles in the coating zone, the lines of force of said field being generally perpendicular to said path, discharging a spray of atomized liquid coating material particles suspended in air into the field along one side of said article-path and generally parallel thereto for electrostatic deposition upon the articles, and withdrawing air from said coating zone in a direction generally transverse to the direction of article movement to create in the coating zone a movement of air from the region of the field into which the coating particles are introduced and toward and across the article-path and thereby to aid in modifying the direction of movement of the atomized particles generally to follow the lines of force of said field whereby the atomized particles are moved toward and between the articles in the coating zone for electrostatic deposition thereon.

4. A method of electrostatically depositing liquid coating material on the surfaces of a plurality of articles, comprising moving the articles in spaced relation to each other in a coating zone over a predetermined path extending from an inlet opening to an outlet opening, maintaining an electrostatic field over the surfaces of the articles in the coating zone, the lines of force of said field being generally perpendicular to said path, discharging separate streams of atomized coating material particles suspended in air into the field from points near said inlet and outlet openings and on one side of said article-path, said streams being directed in a generally parallel direction to said article-path and toward each other, and withdrawing air from said coating zone intermediate said inlet and outlet openings and in a direction generally transverse to said article-path to create in the coating zone a movement of air from the region of the field into which the atomized particles are introduced and across the article-path and thereby to aid in modifying the direction of movement of the atomized particles to generally follow the lines of force of said field whereby the atomized particles are moved toward and between the articles in the coating zone for electrostatic deposition thereon.

5. Electrostatic apparatus for coating a plurality of articles, comprising a booth having an air exhaust passage opening into one side thereof, means including a plurality of spaced article-supports for conveying the articles in spaced relationship to each other past the opening of said exhaust passage along a predetermined path in said booth, a discharge electrode spaced from the walls of said booth and the articles on said conveying means and located on the opposite side of said path from the opening of said exhaust passage, means including a high voltage source for establishing an electrostatic field between the articles in the booth and said discharge electrode, means for discharging a stream of atomized coating material particles into said field adjacent said discharge electrode for electrostatic deposition on the articles, said means being located on the opposite side of the article-path from said exhaust passage, and means for withdrawing air from said booth through said exhaust passage generally transverse to the path of article movement to create within the region of said field into which the atomized particles are discharged a movement of air from the region of the electrode toward and across the article-path and thereby to aid in moving the atomized particles toward and between the articles for electrostatic deposition thereon.

6. Electrostatic apparatus for coating a plurality of articles, comprising a booth having an air exhaust passage, means including a plurality of spaced article-supports for conveying the articles in spaced relationship to each other along a predetermined path in said booth, a plurality of discharge electrodes disposed on opposite sides of said conveying means in the booth and spaced therefrom, means including a high voltage source for establishing an electrostatic field between the articles in the booth and said discharge electrodes, said exhaust passage having an inlet opening disposed in the opposite side of one of said electrodes from the conveying means, means for discharging atomized coating material particles into said field adjacent the other of said discharge electrodes for electrostatic deposition on the articles, and means for withdrawing air from said booth through said exhaust passage generally transverse to the path of said conveying means to create in the booth a movement of air from the region of the electrode adjacent said coating material discharge means and toward and across the article-path and thereby to modify the movement of the atomized coating material whereby the atomized particles surround the articles by moving toward and between them and are electrostatically deposited on the articles.

7. Apparatus for coating a plurality of articles, comprising a spray booth having inlet, outlet and side openings, a conveyor having a plurality of spaced article-supports for moving the articles in spaced relationship over a predetermined path in said booth passing from said inlet opening to said outlet opening and past said side opening, a discharge electrode mounted in said boothe in insulated relationship thereto and being spaced from said article-path on the opposite side thereof from said side opening, means for maintaining a potential difference between said discharge electrode and the articles on said conveyor to create an electrostatic field therebetween, means for directing a spray of finely divided coating particles generally parallel to the path of conveyor movement and on the opposite side thereof from said side opening, and means for withdrawing air from said booth through said side opening generally transverse to the path of said conveying means to create a movement of air from the region of the field into which the coating particles are introduced and toward and across the article-path and thereby to aid in modifying the direction of movement of the coating particles whereby the coating particles are moved toward and between the articles for electrostatic deposition thereon.

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