Oct. 31, 1950 A. SCHOEPE 2,528,087

APPARATUS FOR SPRAY COATING

Filed Jan. 2, 1948 2 Sheets-Sheet 1

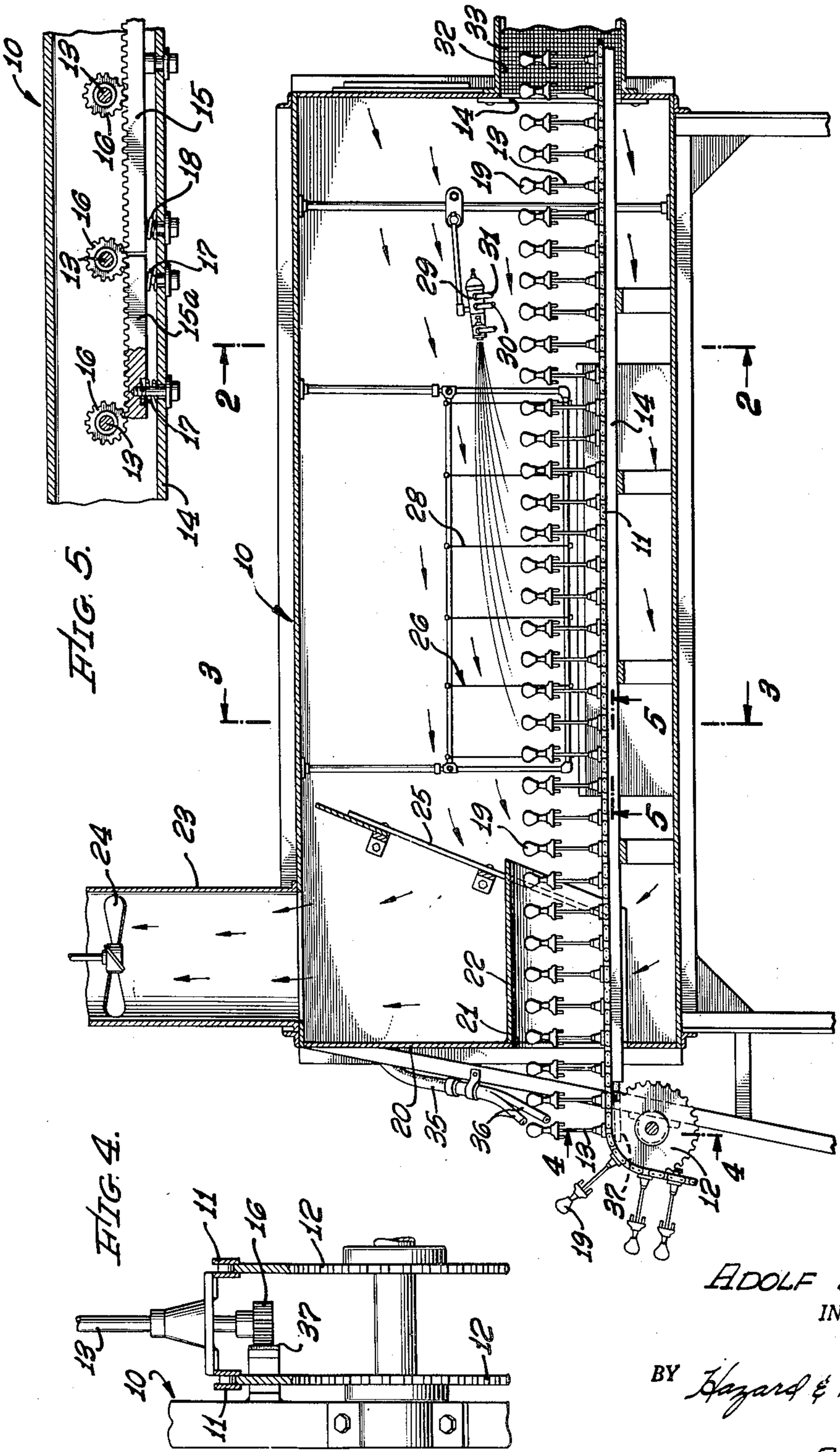


FIG. 5.

FIG. 1.

FIG. 4.

ADOLF SCHOEPE,
INVENTOR.

BY Hazard & Miller

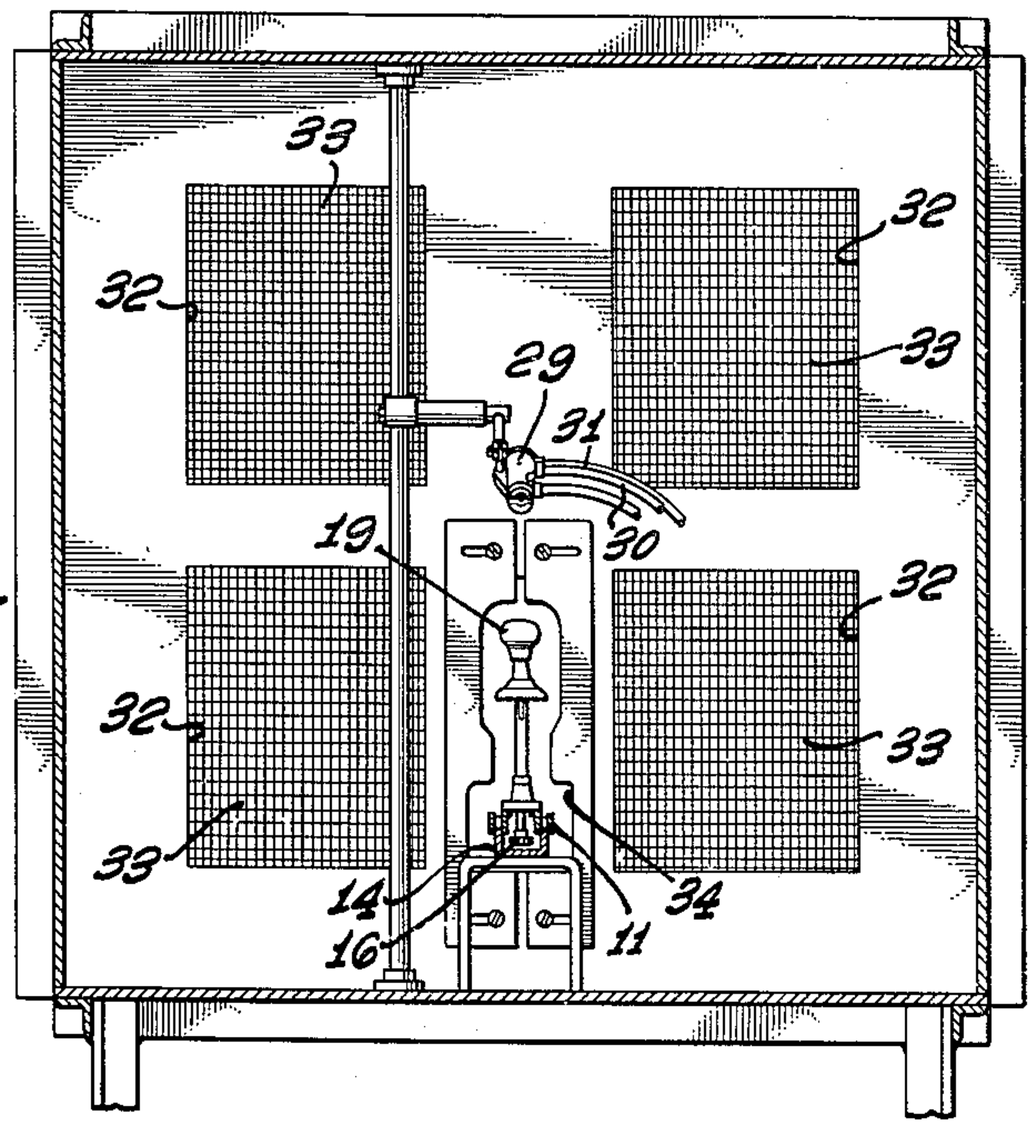
ATTORNEYS.

Oct. 31, 1950 A. SCHOEPE 2,528,087

APPARATUS FOR SPRAY COATING

Filed Jan. 2, 1948 2 Sheets-Sheet 2

FIG. 2.



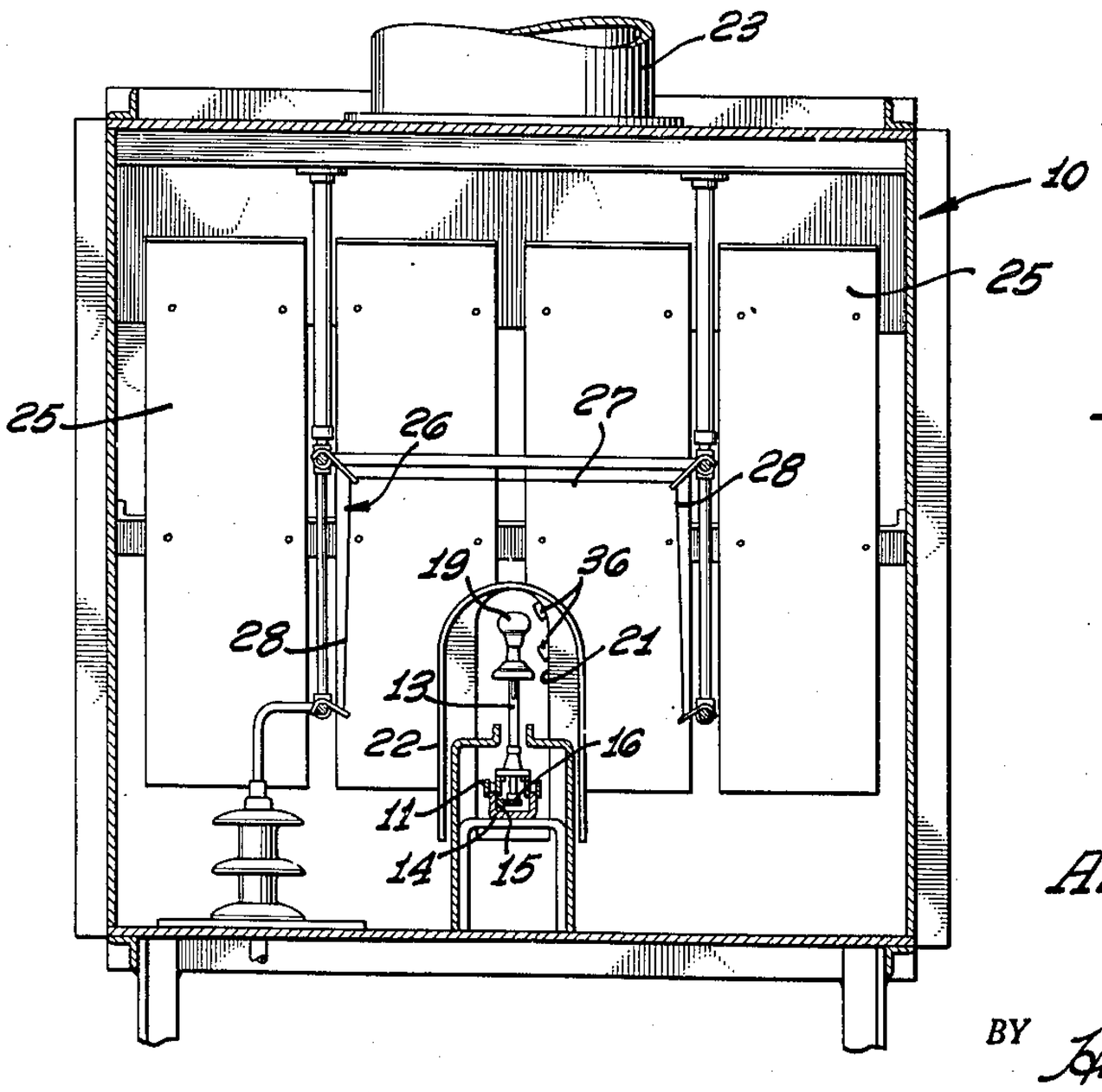


FIG. 3.

ADOLF SCHOEPE,
INVENTOR.

BY Hazard & Miller

ATTORNEYS.

Patented Oct. 31, 1950 2,528,087

UNITED STATES PATENT OFFICE

2,528,087

APPARATUS FOR SPRAY COATING

Adolf Schoepe, Los Angeles, Calif., assignor to Kwikset Locks, Inc., Anaheim, Calif., a corporation of California

Application January 2, 1948, Serial No. 263

1 Claim. (Cl. 91—45)

1

This invention relates to a method and apparatus for applying coatings and has been highly useful in applying enamel coatings to doorknobs and similar articles.

Heretofore processes and mechanisms for applying coatings electrostatically have been devised wherein the coating material is sprayed in an atomized condition in an electrostatic field. The articles to be coated are passed through the field and are electrically charged so as to be receiving electrodes, the discharge electrodes for the field being located remotely therefrom. The atomized coating material is thus attracted to the articles to be coated and is deposited thereon.

The present invention relates to improvements in a method and apparatus of this character and has for one of its objects the provision of a method and apparatus wherein the articles are caused to progress through the field in the opposite direction to that in which the coating material is sprayed. In this manner those particles of the coating material which are first deposited on the articles to be coated are particles which have passed through the air the greatest distance and which have been subjected to the greatest drying. These particles, on being electrostatically deposited, collect on the articles initially somewhat like a light frost and form a highly satisfactory base or foundation for the subsequent particles that are later deposited as the articles approach the source of the spray. Consequently, even though the later particles that are deposited may be quite wet due to their not having been thrown any great distance, the tendency for the coating to run on the articles is satisfactorily eliminated.

Another object of the invention is to provide a method and apparatus for coating articles having the above mentioned characteristics wherein an air draft is created in the direction of the spray and in opposition to the direction of movement of the articles which will tend to more evenly distribute the spray through the electrostatic field.

Another object of the invention is to provide a method and apparatus for coating articles wherein the articles are conducted through a cabinet in which there is an electrostatic field and within which the coating material is sprayed for deposit on the articles wherein air is drawn through the cabinet through a filter. This filter not only filters out dust from the air but tends to distribute the air stream throughout the cabinet and thus cause an even distribution of the spray so that when the articles of the coating

2

material are discharged in the electrostatic field they will be so distributed that an even deposit on the articles will be secured.

Another object of the invention is to provide an apparatus for coating having the above mentioned characteristics wherein the articles immediately before entering the cabinet are blown with clean air so that any dust on the articles will be removed on entering the cabinet and will consequently not interfere with the deposit of the coating.

Still a further object of the invention is to provide an apparatus for coating wherein deflectors are arranged within the cabinet to cause the air flowing through the cabinet to be properly directed and thus enables an even distribution of the sprayed coating particles on the articles to be coated.

With the foregoing and other objects in view, which will be made manifest in the following detailed description and specifically pointed out in the appended claim, reference is had to the accompanying drawings for an illustrative embodiment of the invention wherein:

Fig. 1 is a longitudinal vertical section through the apparatus embodying the present invention;

Fig. 2 is a sectional view taken substantially upon the line 2—2 upon Fig. 1 in the direction indicated;

Fig. 3 is a vertical section taken substantially upon the line 3—3 upon Fig. 1 in the direction indicated;

Fig. 4 is a partial view in vertical section taken substantially upon the line 4—4 upon Fig. 1; and

Fig. 5 is a partial view in horizontal section taken substantially upon the line 5—5 upon Fig. 1.

Referring to the accompanying drawings wherein similar reference characters designate similar parts throughout, the apparatus embodying the present invention consists of an elongated cabinet generally indicated at 10 the walls of which may or may not be formed of insulating material. A chain 11 which may be trained over sprockets 12 has a series of upstanding supports mounted for rotation thereon. This chain as it passes through the cabinet has its links supported on an inverted channel constituting a track and near one side of this channel there is disposed a rack 15. The lower ends of the supports 13 carry pinions 16 that may engage with the rack as they pass through the cabinet so that as the chain moves from left to right, as viewed in Fig. 1, the supports 13 on having their pinions 16 engage the rack will be slowly but continuously

rotated to rotate the articles to be coated that are mounted thereon. As a means for facilitating proper mesh of the pinions 16 with the rack 15 the forward or advance end of the rack has a section 15*a*, see Fig. 5, that is yieldably mounted on the side of the channel 14 such as by compression springs 17 so that as the pinions approach the rack they will first engage this yieldable portion 15*a*. As the teeth on the pinions would mesh with the teeth on the section 15*a*, this section may be forced laterally. However, as movement continues the pinions will ultimately adjust themselves so as to properly mesh with the teeth on the section 15*a* and on approaching the major portion of the rack 15 they will be turning in mesh therewith. The forward end of the major portion of the rack 15 may also be yieldably supported as indicated by the compression spring 18.

The articles to be coated are illustrated as consisting of doorknobs 19 although any other articles to be coated may be mounted on the supports 13 in a similar manner. These doorknobs are illustrated as being mounted on the supports 13 above their respective rosettes, suitable spacers being positioned therebetween. The end 20 of the cabinet has an opening 21 formed therein which is slightly larger than the supports 13 and the articles or doorknobs positioned thereon so as to provide adequate clearance thereabouts. A hood 22 extends inwardly from the end 20 of the cabinet for a short distance and a conduit 23 extends upwardly from the top of the cabinet over this hood and has a fan or blower 24 disposed therein which serves to draw air through the cabinet toward the end wall 20 and to exhaust fumes therefrom. Baffle boards 25 which are slightly spaced from each other are inclined downwardly toward the end wall 20 but are spaced slightly in advance of the lower end of the exhaust conduit 23. These baffle boards, although they permit the air and fumes to pass through the spaces therebetween, are employed for the purpose of maintaining the current of air drawn through the cabinet flowing in an approximately horizontal direction so that the air will not be drawn directly to the top of the cabinet or toward the entrance to the exhaust conduit 23. In this way the air which carries the coating material will not be drawn away from the knobs 19 or other articles that are to be coated.

An electrostatic field is created by a series of discharge electrodes 26. These electrodes consist of wires each of which has its central portion 27 extending transversely across the tops of the articles 19. The ends of these wires extend downwardly at the sides as indicated at 28. One side of a source of high electrical potential such as a direct current generator adapted to supply direct current with a voltage of the order of 100,000 volts, is connected to the electrodes 26 and the other side of the generator is electrically connected to the chain 11 so as to be in turn electrically connected to the articles 19 that are to be coated.

Near the other end of the cabinet there is mounted a spray gun 29 which is directed through the electrostatic field created by the electrodes 26 and the articles 19. This spray gun may be supplied with the coating material such as liquid enamel and compressed air such as through hoses 30 and 31. It delivers the coating material in the electrostatic field in a highly atomized or finely divided condition. The spray

gun normally is not directed against the articles 19 on the holders 13 but usually is so directed as to discharge the spray in a substantially horizontal direction longitudinally through the electrostatic field and over the tops of the articles to be coated.

In the forward wall of the cabinet there are openings 32 designed to receive filter units 33. Any suitable filter units may be employed for this purpose but I prefer to use filter units under the trade name of "Airmaze" which have the ability not only to filter dust from the air drawn through the cabinet but to deliver the filtered air into the cabinet in the form of a large multiplicity of closely parallel air streams or striation. The opening 34 in the forward wall provides for egress of the chain 11, the supports 13 and the articles 19. This opening preferably is shaped to fit around the articles and the holders therefor sufficiently closely so that no great amount of unfiltered air can enter the cabinet about the articles.

In advance of the wall 20 I prefer to locate a hose 35 having nozzles 36 which are directed toward the articles 19 as they enter the cabinet. This hose may be connected to a vacuum cleaner which is arranged to be used as a blower and which draws air through a water bath or water spray that removes the dust therefrom. The air as it passes through the vacuum cleaner has the water particles remaining therein separated therefrom on passing through the bag or strainer of the vacuum cleaner. Consequently, the air discharged through the nozzles 36 may be regarded as filtered air which blows off any dust particles that are on the knobs 19. Near the location where the nozzles 36 discharge the filtered air I provide a friction member 37, see Fig. 4, designed to be frictionally engaged by the pinions 16 so that the knobs 19 will be given approximately one complete revolution as they pass adjacent the nozzles so that dust on all sides thereof will be blown off before the knobs enter the cabinet. In a coating apparatus of this character it is highly important that the articles to be coated enter the cabinet substantially free of dust and that the air flowing through the cabinet flows at a slow steady rate through the electrostatic field to enable the particles of coating to become subjected to the effect of the field.

The operation and advantages of the improved method and apparatus are substantially as follows. As the articles 19 enter the cabinet they are first cleaned by the filtered air discharged through the nozzles 36. In the course of this cleaning operation the articles 19 are given approximately one complete rotation so that the discharged air will be effective on all sides thereof. After entering the cabinet the pinions 16 engage the yieldable rack section 15*a* and thereafter the major portion of the rack 15 and as they proceed through the cabinet the articles 19 will be slowly but continuously rotated in the course of their movement longitudinally through the cabinet. During this movement the coating material such as liquid enamel is continuously sprayed from the sprayer 29. The particles of enamel that are discharged from the sprayer through the air in the cabinet the greatest distance will have the greatest opportunity to dry before being deposited. Consequently, the particles that are first deposited on the articles 19 will be in the driest state and will be deposited thereon in the form of very light frost. Those particles therefore which are deposited on the

articles 19 first will form a semidried base or foundation for the later and wetter particles that have not traveled such a great distance from the sprayer. Consequently, as the artcles 19 approach the sprayer, even though the particles that are deposited on the articles close to the sprayer may be quite wet, the dry or semi-dried base or foundation deposited on the knobs by the initial partially dried particles of coating will effectively prevent running of the wetter portions of the coating. In this manner the coating can be applied to the articles very heavily and evenly without danger of running. The depositing of all of the coating particles on the knobs is induced by the knobs being rendered receiving electrodes in the electrostatic field and a condition analogous to electrophoresis exists between the electrodes 26 and the articles to be coated.

Even distribution of the coating particles is also somewhat advanced by the air draft that is continuously drawn through the cabinet from the filter elements 33. This air draft tends to longitudinally distribute the spray through the electrostatic field and to some extent retard the settling of the spray by gravity. The baffle boards 25 prevent the air draft from being drawn upwardly directly to the exhaust conduit 23 and thus carrying an excess of the spray coating out of the conduit, it being desirable to withdraw through the conduit only air and the fumes of the volatile enamel solvents.

After the knobs have passed out of the electrostatic field with the coatings applied thereto they are then carried to a suitable location where they may dry or, in the preferred arrangement, they are carried by the chain into and out of an oven which is adequately heated to bake the enamel thereon.

From the above described construction it will be appreciated that an improved apparatus for spray coating is provided wherein filtered air is constantly drawn into the cabinet and exhausted therefrom. This filtered air flows in a direction opposed to the direction of movement of the articles and in sympathy with the direction of the spray discharged from the sprayer 28. Consequently, by means of this arrangement, those particles of the coating which are first deposited on the knobs are not only evenly

distributed but are particles which are largely dried and which may form a suitable base for the wetter particles that are subsequently deposited nearer the sprayer 29. The articles before they enter the cabinet are effectively cleaned by the draft through the nozzles 36 and, as the air within the cabinet is filtered, dust particles will not be deposited on the knobs in the electrostatic field along with the coating.

Various changes may be made in the details of construction without departing from the spirit and scope of the invention as defined by the appended claim.

I claim:

An apparatus for coating articles comprising a cabinet, a conveyor for conveying the articles to be coated in a substantially straight path through the cabinet through one end wall thereof into the cabinet and out of the other end wall thereof, means for discharging the coating material in the cabinet adjacent the outlet end wall thereof in a direction toward the inlet, there being air filtering means in the outlet end wall of the cabinet, means forming an outlet air duct in the top of the cabinet adjacent the inlet end wall thereof, means in said duct for drawing air therethrough so as to create an air draft through the cabinet through the air filtering means in opposition to the direction of movement of the conveyor and toward the inlet end wall of the cabinet, baffles in the cabinet between the outlet air duct and the coating discharging means arranged to extend downwardly and toward the inlet, electrodes in the cabinet between the baffles and the discharging means, and means for supplying the articles to be coated and the electrodes with electric energy of high potential to induce the atomized coating material to be deposited thereon.

ADOLF SCHOEPE.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,442,986	Ransburg	June 8, 1948
2,446,953	Ransburg	Aug. 10, 1948