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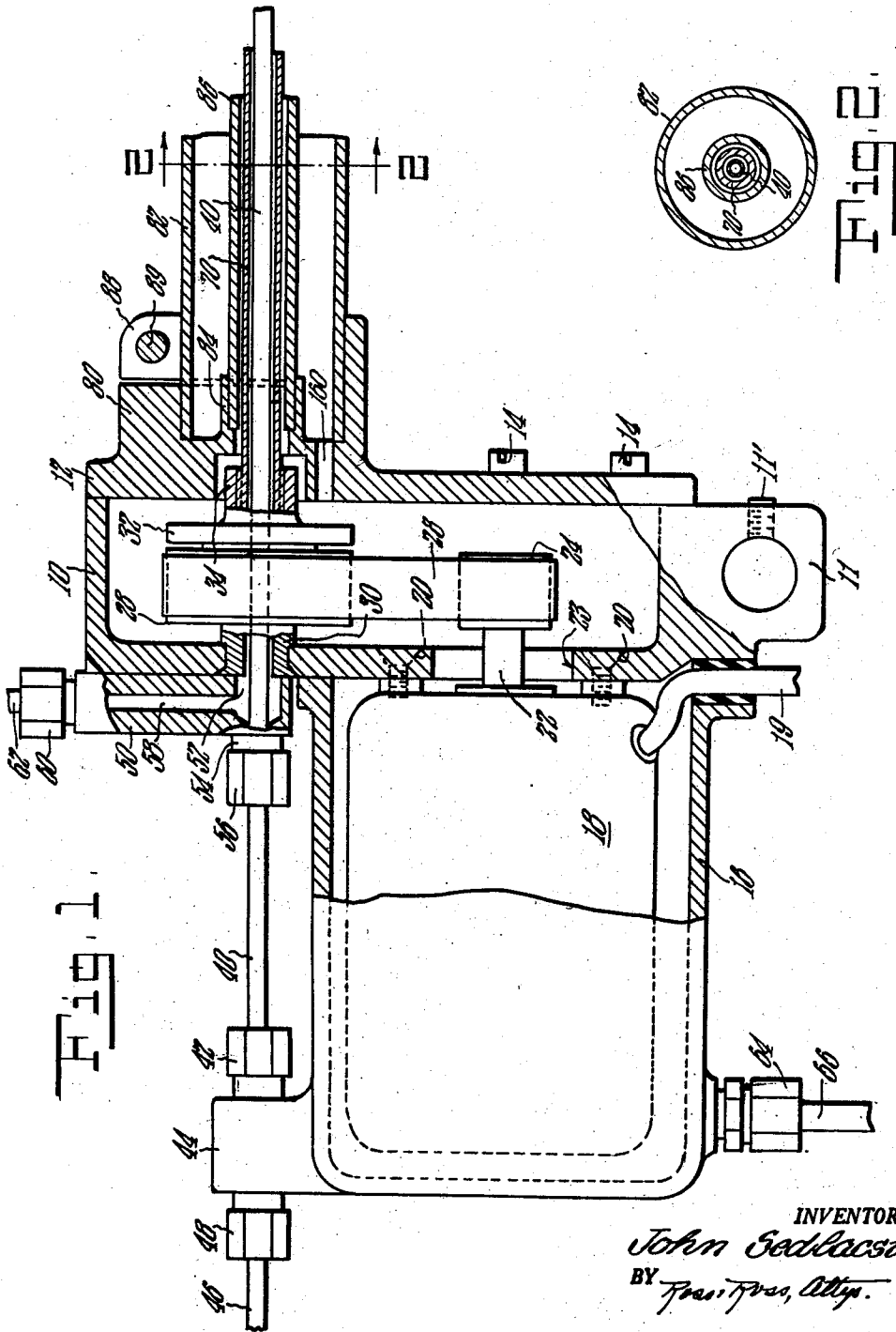
J. J. SEDLACSIK

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ELECTROSTATIC COATING APPARATUS UTILIZING BOTH
DIRECT CURRENT AND ALTERNATING CURRENT TO
SUPPLY CURRENT TO SUCCESSIVE DISCS

Filed Feb. 6, 1957

2 Sheets-Sheet 1



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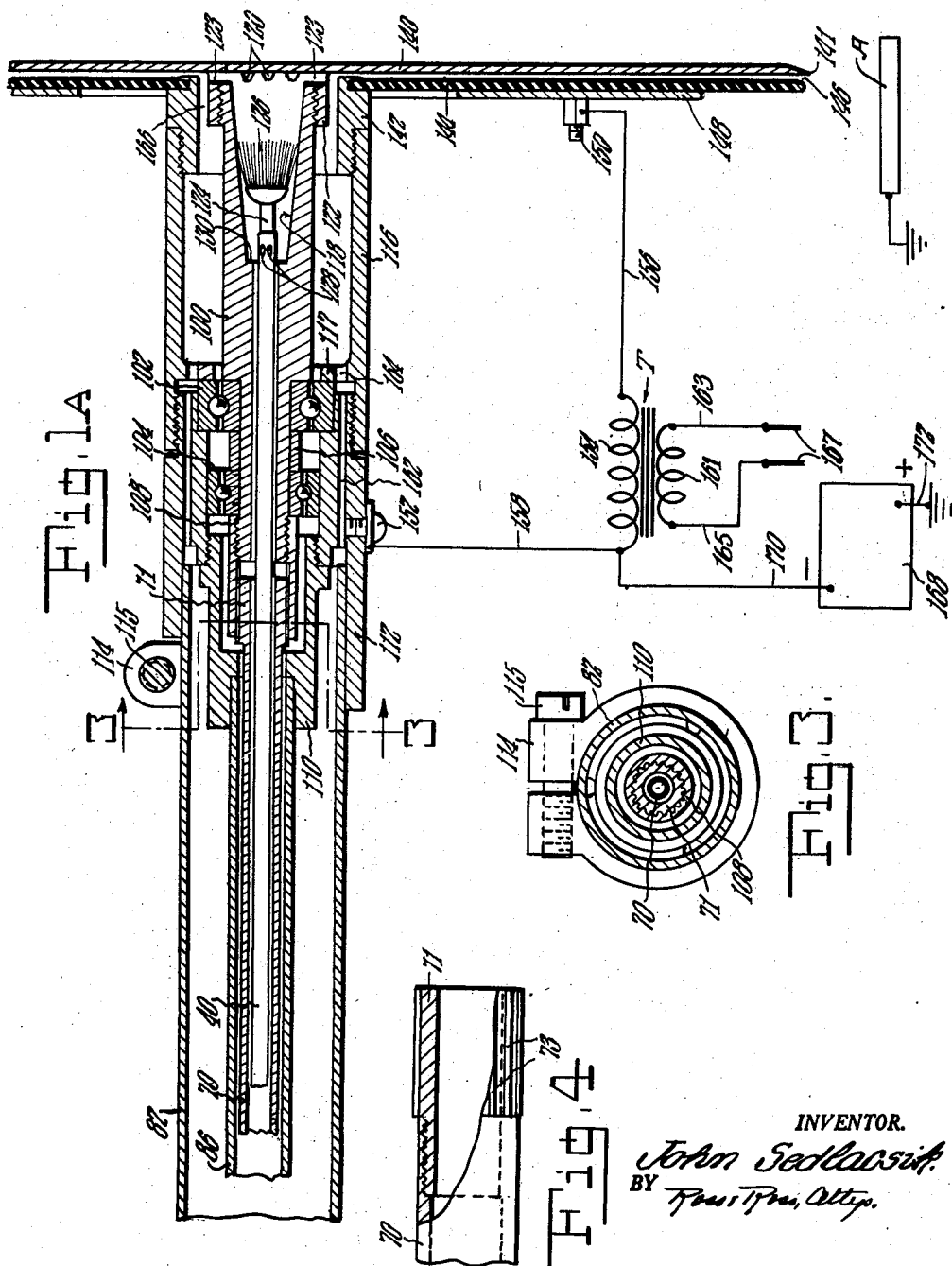
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ELECTROSTATIC COATING APPARATUS UTILIZING BOTH DIRECT CURRENT AND ALTERNATING CURRENT TO SUPPLY CURRENT TO SUCCESSIVE DISCS

John J. Sedlacsik, Garfield, N. J.

Application February 6, 1957; Serial No. 638,568

10 Claims. (Cl. 118—621)

This invention relates to new and useful improvements in the electrostatic deposition of a fluent material such as a coating liquid upon an article to be coated.

More particularly, it relates to an improved method of and structure for dispersing a coating liquid into a fine spray at a relatively low kinetic energy discharge in a highly ionized state and charged to a high potential of a polarity opposed to that of the article to be coated; by such means, an electrostatic field between the discharge electrode, or sprayer head, and the article to be coated is formed.

In electrostatic spraying, it is essential that the coating liquid be a dielectric substance (i. e., non-conductive to electricity) so as to be capable of assuming an electrostatic charge to the extent of being attracted to a body or electrode having an opposite polarity. However, for a uniform and smooth deposition of the coating fluid, said fluid must be so treated that each molecule is subjected to an equal charge of high intensity.

The desideratum is that the coating fluid is so atomized that, when leaving the discharge electrode, and because of the mutual repulsion of the molecules, the liquid bursts into a barely visible mist. In this manner, the liquid loses inertia of its own and is free to be attracted to the oppositely charged article to be coated.

Under ideal conditions, as the coating deposits on the surface of the article, the first molecular layers of the coating material are neutralized. Subsequent layers are neutralized to a lesser and lesser degree toward a point where the attractive force of the covered surface is reduced sufficiently to allow the ionized liquid mist to pass around to the rear of the article being coated.

However, it is difficult to maintain ideal operating conditions. If it was possible to discharge a burst of ionized liquid in sufficient quantity to cover the whole surface of an article in a fraction of a second, without any external force other than electrostatic attraction, then the whole surface could be uniformly covered, irrespective of its shape. In actual practice, however, the source of the ionized liquid supply is at a remote point from the article to be coated, and the rate of the supply is limited so that it takes time to cover a given area with a coating. This time delay permits leakage to neutralize the electrostatic charge on the deposited surface and attracts more of the coating material to the area nearest to the discharge electrode.

To reduce this effect, it is a general practice to use an external force, either by an air spray gun or by centrifugal force to expel or project the coating material toward the article to be coated at an optimum rate sufficient to ionize but not at an excess rate sufficient to cause sputtering.

One object hereof is to approach the ideal by treating the coating material preparatory to its being ionized and discharged in such a manner that it is preconditioned for a thorough molecular electrostatic charge at a relatively high rate of expulsion without resorting to any mechanical force to direct the ionized liquid toward the article or target.

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Another object hereof is to reduce the time required to cover the given surface of an article, thereby reducing the static leakage effect and thus obtaining a more uniform coating.

In the accompanying drawing, I have illustrated a complete example of a physical embodiment of the invention in which the parts are combined and arranged in accordance with one mode which I have devised for the practical application of the principles of the invention. It will be understood however that changes and alterations are contemplated and may be made in these exemplifying drawings and mechanical structures, within the scope of the claims, without departing from the principles of the invention.

In the drawings:

Figs. 1 and 1A are longitudinal sectional views of the device of the invention, Fig. 1A being a continuation of Fig. 1;

Fig. 2 is a sectional view on the line 2—2 of Fig. 1;

Fig. 3 is a sectional view on the line 3—3 of Fig. 1A.

Fig. 4 is an enlarged elevational view, partly in section, showing certain features of the invention.

In the following description and claims, various details will be identified by specific names for convenience.

These names however are intended to be as generic in their application as the art will permit.

Referring now to the drawing more in detail, in which similar characters of reference indicate corresponding parts in the several figures and referring more particularly

to the preferred form of my invention selected for illustrative purposes, I have shown a power transmission housing or casing 10 with which is associated a cover plate 12. The plate 12 may be fixed to the housing 10 as by bolts 14 or the like.

A lug 11, integral with the housing 10, may be suitably formed as to receive therein a set screw 11' or the like so as to permit the holding of the housing 10 and its attached components relative to a supporting stand in any of the conventional manners.

A motor housing 16 is associated with the housing 10 by any conventional means and encloses a motor 18 which may be fixed to the housing 10 as by bolts 20 or the like. An electrical connection 19 leads to the motor 18 through a suitable opening in the housing 16 from a source of electrical power (not shown).

Motor shaft 22 driven by the motor 18 extends through an enlarged opening 23 in the wall of the housing 10 so that there is sufficient clearance therearound for purposes presently to be observed.

Pulley 24 is fixed to the outer free end of motor shaft 22 and imparts rotation through a belt 26 to a pulley 28 which is journaled on a hollow stud or hub 30 fixed to one wall of the housing 10, as shown.

A flange 32 may be provided to secure the pulley 28 and the bearing associated therewith (not shown) to the stud 30.

The hub of flange 32 is provided with a hub extension 34 having a bore extending axially therethrough which is aligned coaxially with a bore extending axially through the hub 30, as shown.

A fluent coating material conduit 40 extends through the aligned bores in hubs 30 and 34 with a clearance sufficient to allow air to pass therearound, as will hereinafter be made apparent.

The rearward end of the conduit 40 extends outwardly beyond the housing 10 and terminates in an appropriate fitting 42 engageable with a boss 44 extending upwardly from the housing 16 and to which conduit is connected, through the boss 44 to a similar conduit 46 leading from a source of coating material supply (not shown), a fitting 48 connecting the conduit 46 to the boss 44.

A fitting 50 may be fixed to the housing 10 by any suit-

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able means and is provided with a transversely extending bore 52 into and through which conduit 40 extends. The bore 52 is of sufficient diameter as to provide an annular space around the conduit 40 disposed there-within.

At one side of member 50, bore 52 is of reduced diameter, as shown, and has a sealing gland 54 associated therewith and held relative thereto by a coupling 56 which insures against any rearward escape of air through the bore 52, as will become apparent.

Communicating with the bore 52 is a bore 58 which leads outwardly to a fitting 60 connected to a primary air supply conduit 62 which is led from a source of primary air supply (not shown).

In the housing 16, a fitting 64 connects a conduit 66 leading from a source of secondary air supply (not shown) to the interior of the housing whereby the secondary air led thereinto may surround the motor 18 so as to aid in the cooling thereof and additionally in the pressurizing thereof so as to make same explosion proof.

A hollow transmission shaft 70 is concentrically disposed around the conduit 40 and is spaced therefrom so as to provide an annular air space therebetween. Its rearward extremity is suitably secured to the hub 34 in any convenient manner as by keying, splining, brazing, welding or the like.

The shaft 70 is made of insulating material and the spline thereof, being of metal is screwed into the hubs 34 in the direction of rotation by the motor.

The housing cover 12 is provided with a suitable annular hub extension 80 which is adapted to receive the rearward extremity of a hollow tube 82 and is further provided with an annular hub extension 84, concentrically disposed within the hub extension 80 and adapted to receive the rearward extremity of a drive shaft sheath 86 which is concentrically disposed around the transmission shaft 70.

The conventional clamp means 88 and clamp screw 89 may be provided on the hub extension 80 so as to insure the tight fit of members 80 and 82.

Members 40, 70, 82 and 86 are made of a suitable insulating material so as to separate the high potential elements, shortly to be described, from ground and to prevent objectionable arc-over.

The spray head of the device of the invention will now be described.

A rotating spindle or member 100 is journaled by ball bearings 102 and 104 which are separated by a spacer 106 and are held relative to the spindle 100 by means of a fitting 108 which may be fixed to the rearward extremity of the spindle 100 as by threaded engagement therewith and which extends upwardly. The rear end of member 108 is connected to the forward end 71 of the member 70 by means of interfitting splines.

Said member 71 may be a separate member secured to the member 70 as shown in Fig. 4 and provided with a plurality of splines 73.

Any other equivalent positive driving connection may be employed.

The outer races of the bearings 102 and 104 may be fixed to the interior wall of an annular sleeve member 112 shortly to be described.

An annular quill 110 having a transverse opening therethrough is disposed rearwardly of the spindle 100.

The forward extremity of the drive shaft sheath 86 may be suitably seated within an opening in the quill 110.

The outer periphery of the quill 110 is threadedly engaged with an inner wall of an annular sleeve member 112, as shown, which member 112 is suitably formed so as to receive the forward extremity of the tube 82.

The conventional clamp means 114 including clamp screw 115 may be associated with member 112 to insure clamping of members 112 and 82.

A secondary sleeve member 116 is provided which is

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threadedly engageable with, and is disposed forwardly of, the sleeve member 112.

The inwardly extending flange 117 of member 116 clamps the outer race of the bearing 102 into the seat in the forward end of the sleeve 112.

The forward end of spindle 100 is provided with an outwardly tapered bore 118 which communicates with the longitudinal bore or opening extending through the member 100.

The extreme forward end face of the spindle 100 is provided with a plurality of annularly disposed notches 120 leading from the bore 118 outwardly through the outer peripheral surface of the spindle.

An annular ring 122 is threadedly engaged with the outer peripheral surface of spindle 100 and is provided with a plurality of radially disposed openings 123 which may be aligned with the notches 120 so as to permit egress of the coating material and motive agent from within the bore 118 of the spindle 100, all as will hereinafter appear.

The annular disc 140, subsequently to be described, is fixed to the annular ring 122 and rotates therewith.

The forward end portion of the conduit 40 extends through the longitudinal bore of the spindle 100 and into the bore 118 thereof.

A brush-like member 124 is fixed to the forwardmost end of the member 40 and is of such configuration and dimension as to provide a ring comprising a plurality of bristle members 126 which embrace the wall of the annular bore 118.

Adjacent the forward extremity of the conduit 40, one or more openings 128 through the wall of the conduit are provided through which the fluent coating material passes from the conduit outwardly into the bore 118. It will be appreciated that said material is projected toward the wall of the bore, the openings 128 being radially disposed.

If desired, the inner or small end of the bore 118 may be provided with an annular shoulder 130 concentric with and around the opening of the longitudinal opening in the spindle 100 at its point of communication with the bore 118 thereof. It will be appreciated that such design of shoulder 130 provides a sharp annular edge for purposes subsequently to be referred to.

The annular disc 140 is disposed forwardly of spindle 100 and, as aforesaid, is held relative thereto by means of ring 122. That is, the ring 122 is fixed to the disc 140 and is threadedly engaged with the spindle 100.

The outer periphery of disc 140 is provided with a sharp edge 141 to produce a corona discharge when a high potential is applied, all to the end that effective ionization of the discharged coating material is obtained as will be more clearly disclosed hereinafter.

The forward end of sleeve 116 is threaded to receive adapter 142 to which a stationary annular dielectric disc 144 may be fixed and which is thereby held in spaced relation from the rotating disc 140 so as to provide a space 146 therebetween.

A secondary annular metallic ring 148 may be fixed to the rearward face of disc 144 as by cementing or the like and may be provided with a terminal 150 for electrical connection as will appear.

Disc 148 is smaller in diameter than the disc 144 and is provided with an enlarged central opening therethrough of such diameter as to insure against arc-over therefrom to the sleeve 116 and/or the adapter 142, with both of which members it is concentric, when high potential is applied between the disc 148 and the spray head with its associated elements including the rotating disc 140.

In this way, it is to be appreciated that the combination of the components including the stationary metal disc 148, the stationary dielectric disc 144 and the rotating metal disc 140 form an effective electrostatic capacitor, the disc 144 being made of a material having a high dielectric constant in order to reduce the hysteresis losses to the minimum. As an example, I prefer to use a

sheet of melamine impregnated glass fiber cloth which combines high physical strength with a high dielectric quality of nearly that of mica.

Secondary air passageways in the structure will now be described. Such passageways include 160 in the cover 12, 162 in the sleeve 112, 164 in the sleeve 116, and 166 between the adapter 142 and the ring 122.

The apparatus of the invention having been described, its operation will now be defined.

Rotation is imparted to disc 140 by the motor 18 through shaft 22, pulleys 24 and 28 and belt 26 running therebetween, transmission shaft 70 secured to hub 34 of the flange 32, spindle 100 secured to the shaft 70, and ring 142 fixed to the spindle 100 and to the disc 140.

The fluent coating material is forced at a predetermined and controlled rate through conduit 40 from the source of supply thereof and the conduit 46 leading therefrom to the said conduit 40. The coating material passes outwardly from the conduit 40 into the bore 118 of the rotating spindle 110 and thence outwardly past the bristles 126 to and through the aligned openings 120 and 123 of the members 100 and 122 respectively to the space 146 between the rotating disc 140 and the stationary dielectric disc 144 and thence outwardly to the outer annular edge thereof.

The primary air is forced at a predetermined and controlled rate from the source of supply thereof through the conduit 62 to the passageways 58 and 52 of the member 50 and thence forwardly through the opening in the hubs 30 and 34 and around the conduit 40 disposed therewithin. Thereafter it moves forwardly within the rotating transmission shaft 70 and around the conduit 40 disposed therewithin to the longitudinal opening in the spindle 100 and around the conduit 40 disposed therewithin and thence into the bore 118 of the spindle 100 where it mixes with the fluent coating material and passes therefrom through the openings 123.

The secondary air is forced at a predetermined and controlled rate from the source of supply thereof through the conduit 66 to the housing 16 where it surrounds the motor 18 as aforementioned and thence passes outwardly through opening 23 into the housing 10 passing forwardly therefrom through passageways 160 in the cover 12 into the interior of the tube 82 from which it passes through passageways 162 in the sleeve 112 and passageways 164 in the sleeve 116 to the interior of said sleeve 116. It then passes outwardly through the passage 166 into the space 146 where it merges with the fluent coating material and primary motive agent and is discharged outwardly from the space 146 toward the article A to be coated.

Inasmuch as fluent coating material is forced through conduit 40 into the bore 118 and the primary motive agent is forced through the shaft 70, into the bore 118, all as aforesaid, a spray of the coating material against the bristles 126 of the brush-like member 124 is obtained.

It may be mentioned here that the sharp annular edge of the shoulder 130 creates a turbulence of the primary motive agent as it leaves said edge, which turbulence effectively aids in the breakup of the coating material as it enters the bore 118 from the conduit 40 through the radially disposed openings 128 therein, the coating material being led in a sputtering manner into the nip between the brush-like member 124 and the wall of the bore 118.

The brush-like member 124 being stationary (it being fixed to the end of the conduit 40) and the spindle 100 having a rotary movement, the rotation of the spindle effectively wipes the coating material into a uniform layer upon the wall of the bore 118. Partly by the action of the brush-like member 124 and partly by the centrifugal action of the rotating spindle, the coating material is then forced forwardly to the front of the spindle and through

the notches 120 and the aligned openings 123 into the space 146.

The secondary air is also forced into the space 146 between the dielectric disc 144 and the rotating disc 140.

A terminal 152 is secured to member 112 and may be in the form of a screw, as shown. A transformer T has a secondary 154 connected by leads 156 and 158 to the terminals 150 and 152, respectively. The primary 161 of the transformer T is connected by leads 163 and 165 to an A. C. line represented by 167.

A D. C. power supply is represented by 168. Its negative side is connected by 170 to the secondary 154 of the transformer T, and its positive side is connected by 172 to ground. Each of the articles A to be coated will be connected to ground.

Alternating current voltage in the order of 10,000 to 25,000 volts is applied between the stationary disc 148 and the rotating disc 140 and a negative D. C. potential in the order 75,000 to 200,000 volts is applied between the disc 140 and the article to be coated. The positive terminal of the D. C. supply is grounded and the article to be coated is also grounded so as to form a highly charged electrostatic field between the rotating disc 140 and the article A to be coated.

As the paint works itself out onto the rear surface of the disc 140, it is propelled, partly by centrifugal force and partly by the secondary air flow toward the periphery of the disc. During this movement, it passes thru the alternating electrostatic field between discs 140 and 148, forming an additional dielectric layer with dielectric disc 144.

As is well known, the atomic structure of a dielectric substance is such that its electrons are tightly bound. Depending upon the electric potential applied, the electronic orbit of the atoms are distorted due to the stress, tending to disrupt the structure by a mutual repulsion of the electrons. If the charge is carried far enough, disintegration takes place and the insulating quality of the dielectric material breaks down. A similar action takes place with a fluid dielectric. Here, however, the molecules have mobility and the highly charged electronic orbit of the molecules tend to repulse each other in the direction following the path of least resistance so that a molecular motion takes place. Accordingly, when the fluid coating material reaches the zone of alternating electrostatic field between the discs 140 and 148, its atoms are subjected to alternating positive and negative charges. Due to the dielectric hysteresis, a rapid mutual repulsion and attraction takes place with attendant molecular friction and consequent heating, so that the viscosity of the coating fluid is considerably reduced and formed into a suspended fog within the zone of the alternating electrostatic field. By the combined action of the rotating disc 140 and the secondary air flow through the space 146, the fog is driven out into the zone of negatively charged direct current electrostatic field. When it reaches the edge of the disc 140 into the zone of the corona discharge of maximum energy transfer, the finely divided and highly charged particles are repulsed from the energy source and from each other expanding into a barely visible mist and attracted to the oppositely charged object to be coated.

The method of preconditioning the coating fluid by subjecting it to alternating electrostatic stresses makes it possible to effectively atomize the fluid at a relatively high rate of flow and to cover a larger area in a shorter time, resulting in a more uniform coating due to reduction of the leakage time factor.

It may be emphasized here that the rotation of the disc 140 is not intended to propel the coating fluid toward the target. Its prime function, with the aid of the secondary air flow is to carry the fluid to the edge of the disc. For this reason, maximum effectiveness is obtained if both the rate of rotation of the disc 140 and the air pressure are adjustable.

Depending upon the object to be covered, the atom-

izer head may be placed axial or tangentially toward the objects moved by a conveyor.

While I have illustrated and described the invention as embodied in certain specific arrangements, I do not intend to be limited to the details shown since various modifications and structural changes may be made without departing in any way from the spirit of the invention. Without further analysis, the foregoing is intended to so fully reveal the gist of my invention that others can, by applying current knowledge, readily adapt it for various applications without omitting features which, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention, and therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the claims below.

I claim:

1. An electrostatic atomizing apparatus of the class described, comprising discharge electrode means, a rotating metallic disc adapted to be spaced from an article to be coated and which article is of an opposite polarity to that of said means for constituting a collector electrode, a stationary dielectric disc spaced rearwardly of said rotating disc, a stationary metallic disc adjacent and rearward of said dielectric disc and dimensioned to prevent arc-over when high potential is applied between said rotating and stationary metallic discs to form a capacitor, a hollow spindle fixed to said rotating metallic disc and having a conical bore, passages from the bore of said spindle to the rearward face of said rotating metallic disc for the passage of a fluent coating material into the space between said rotating metallic disc and said dielectric disc, a stationary fluent coating material conduit projecting into the bore of said spindle and having radially disposed openings in the wall of said conduit near the small end of the bore of said spindle, a hollow transmission shaft concentric with and disposed around said conduit including means for permitting the passage of air therethrough and around said conduit, a motor, means to impart rotation to said rotating metallic disc, means for forcing a supply of secondary air into the space between said rotating metallic disc and said dielectric disc, a high potential D. C. supply connected across said rotating metallic disc for forming an intense uninterrupted electrostatic field between said rotating metallic disc and the article, a high potential A. C. supply connected across said rotating and stationary metallic discs for forming an electrostatic field of alternating polarity for effecting molecular agitation of the fluent coating material passing through the space between said rotating metallic disc and said dielectric disc for maximizing the charging and atomizing of fluent coating material emerging at the edge of said rotating metallic disc, whereby the thus highly charged and atomized fluent coating material is more rapidly repulsed from its source and readily attracted to said article.

2. An electrostatic atomizing apparatus of the class described, comprising discharge electrode means, a first metallic disc having a sharp peripheral edge adapted to be spaced from an article to be coated and which article is of an opposite polarity to that of said means for constituting a collector electrode a dielectric disc spaced rearward of said first metallic disc, a second metallic disc disposed rearwardly of said dielectric disc and insulated by the latter from said first metallic disc to form a capacitor when high potential is applied to said first and second metallic discs, means to supply coating fluid into the space between said first metallic disc and said dielectric disc, means to propel coating fluid toward said edge of said first metallic disc for atomization therefrom, a high potential direct current supply connected across said first metallic disc and the article to be coated to form an intense uninterrupted electrostatic field between said first metallic disc and said article, and a high po-

tential alternating current supply connected across said first and second metallic discs for molecular agitation of the coating fluid passing between said first metallic disc and said dielectric disc for maximizing charging and atomization of the coating fluid emerging at the edge of said first metallic disc, whereby the thus highly charged and atomized coating fluid is repulsed from its source and readily attracted to the article to be coated in an accelerated manner.

3. An electrostatic atomizing apparatus of the class described, comprising discharge electrode means, a rotating metallic disc adapted to be spaced from an article to be coated and which article is of an opposite polarity to that of said means for constituting a collector electrode, a stationary dielectric disc spaced rearwardly of said rotating disc, a stationary ring-like metallic disc adjacent and rearward of said dielectric disc, said stationary metallic disc being dimensioned to prevent arc-over when high potential is applied between said rotating and stationary metallic discs to form a capacitor at one end and provided with a hollow spindle fixed to said rotating metallic disc and having a conical bore, passages from the bore of said spindle to the rearward face of said rotating metallic disc for the passage of a fluent coating material into the space between said rotating metallic disc and said dielectric disc, a stationary fluent coating material conduit projecting into the bore of said spindle and having radially disposed openings that extends through the wall of said conduit adjacent the small end of the bore of said spindle, a hollow transmission shaft disposed about said conduit and including means for permitting the passage of air therethrough and around said conduit, means for imparting rotation to said rotating metallic disc, means for forcing a supply of secondary air into the space between said rotating metallic disc and said dielectric disc, a high potential D. C. supply connected to said rotating metallic disc and adapted to be connected to the article for forming an electrostatic field between said rotating metallic disc and the article, a high potential A. C. supply connected across said rotating and stationary metallic discs for forming therebetween an electrostatic field of alternating polarity for effecting molecular agitation of the fluent coating material passing through the space between said rotating metallic disc and said dielectric disc.

4. In an atomizing spray device having means for electrically charging particles of coating material discharged thereby for improving the deposition of the material upon the electro-conductive surface being coated, the improvement comprising, a rotating metallic disc, a stationary dielectric disc spaced rearwardly of said rotating disc, a stationary metallic disc adjacent and rearward of said stationary dielectric disc and dimensioned to prevent arc-over when high potential is applied between said rotating and stationary metallic discs to form a capacitor, a hollow spindle fixed to said rotating metallic disc and having a conical bore therethrough, passages from the bore of said spindle to the rearward face of said rotating metallic disc for the passage of a fluent coating material into the space between said rotating metallic disc and said dielectric disc, a stationary fluent coating material conduit projecting into the bore of said spindle and having radially disposed openings in the wall of said conduit near the small end of the bore of said spindle, a hollow transmission shaft concentric with and disposed around said conduit including means for permitting the passage of air therethrough and around said conduit, a motor, means for imparting rotation to said rotating metallic disc, means for forcing a supply of secondary air into the space between said rotating metallic disc and said dielectric disc, a high potential D. C. supply connected across said rotating metallic disc and the electro-conductive surface forming an electrostatic field therebetween, a high potential A. C. supply connected across said rotating and stationary metallic discs forming an electrostatic field of alternating polarity

for molecular agitation of the fluent coating material passing through the space between said rotating metallic disc and said dielectric disc for charging and atomizing the fluent coating material emerging at the edge of said rotating metallic disc.

5. An electrostatic atomizing apparatus of the class described, comprising discharge electrode means, a rotating metallic disc having a sharp marginal edge and adapted to be spaced from an article to be coated and which article is of an opposite polarity to that of said means for constituting a collector electrode, a stationary dielectric disc closely spaced rearwardly of said rotating metallic disc, a stationary metallic disc disposed rearwardly of said dielectric disc and dimensioned to form a capacitor and prevent arc-over when a high potential is applied between said rotating metallic disc and said stationary dielectric disc, a spindle having a passage therethrough terminating in a conical bore in its outer end adjacent said rotating disc and provided with passage means leading from the conical bore of said spindle to the rearward face of said rotating metallic disc for allowing the coating fluid to pass into the space between said rotating metallic disc and said stationary dielectric disc, a stationary coating fluid supply conduit projecting into the conical bore of said hollow spindle and equipped within said bore with a brush-like member having wiping engagement with the wall defining said bore, said conduit being provided with an opening effecting communication between said bore and the interior of said conduit for supplying said bore with coating fluid from said conduit, said conduit being circumspaced within said spindle to provide an air passage within the spindle to permit a supply of air to be blown through said spindle to effect spraying of the fluid emerging from said conduit against said brush, a motor, means to transmit and impart rotation to said rotating metallic disc from said motor, conduit means independent of said fluid conduit for blowing air through the space between said rotating metallic disc and said stationary dielectric disc, a high potential D. C. supply connected to said rotating metallic disc and adapted to be connected to the article to be coated to form an electrostatic field between said rotating metallic disc and the article, a high potential A. C. supply connected across said rotating metallic disc and said stationary metallic disc for forming an electrostatic field of alternating polarity for effecting molecular agitation of the coating liquid passing through the space between said rotating metallic disc and said stationary dielectric disc for maximizing charging and atomization of the coating fluid emerging at the edge of said rotating metallic disc, whereby, the highly charged and atomized coating fluid being repulsed from its source is readily attracted by the article to be coated in a shorter period of time.

6. In an atomizing spray device having means for electrically charging particles of coating material discharged thereby for improving the disposition of the material upon the electro-conductive surface of an article to be coated, the improvement comprising, a first metallic disc having a sharp peripheral edge at the extreme outer end, a dielectric disc disposed rearwardly of and spaced from said metallic disc, a second metallic disc disposed rearwardly of said dielectric disc and insulated there-

from to form a capacitor when high potential is applied to said first and second metallic discs, means for supplying coating material into the space between said first metallic disc and said dielectric disc, means for propelling coating material toward said edge of said first metallic disc, a high potential direct current supply connected across said first metallic disc and with the article to be coated adapted to coact with said first metallic disc to form an intense uninterrupted electrostatic field between said first metallic disc and the article to be coated, and a high potential alternating current supply connected across said first and second metallic discs for effecting molecular agitation of the coating material passing between said first metallic disc and said dielectric disc for maximizing the charging and atomizing of the coating material emerging from said space at said edge, whereby, the thus highly charged and atomized coating material is repulsed from its source and readily attracted to the article to be coated in an accelerated manner.

7. The structure as set forth and defined in claim 5, including a motor housing having a chamber housing said motor and communicating with said conduit and said conduit means for supplying said conduit and said conduit means with air introduced into said chamber whereby air introduced into said chamber serves to prevent explosion of said motor due to arcing thereof.

8. In apparatus for coating articles by atomization of fluid material including an atomizer including a circular centrifugal disc, means for propelling said fluid material to an atomizing zone of said atomizer, means for impressing unidirectional high potential voltage across said atomizer and said articles to be coated for electrostatic atomization and coating of said articles by said fluid material, and means to provide molecular agitation of said fluid material substantially immediately prior to atomization thereof, last said means comprising conductor means spatially positioned from said atomizer and terminating within the confines thereof a distance sufficient to avoid arc-over and forming a capacitor therewith to provide a passageway therebetween for said fluid material, and an alternating power source connected to said conductor means and said atomizer to provide said molecular agitation of said fluid material.

9. In apparatus for coating articles as set forth in claim 8, wherein said conductor means is circular and of a diameter smaller than the diameter of said atomizer.

10. Apparatus for electrostatically coating articles comprising a rotatably mounted disc type atomizer, means for rotating said atomizer to propel said coating material to an atomizing zone adjacent the edge of said atomizer, means for charging the particles of said coating material for atomization and electrostatic deposition thereof onto said articles, conductor means spatially positioned adjacent said atomizer and terminating within the confines thereof a distance sufficient to avoid arc-over providing a passageway for said coating material between said conductor means and said atomizer, means for supplying coating material to said passageway, and a source of alternating current connected across said atomizer and said conductor means to provide molecular agitation of said coating material prior to atomization.

No references cited.