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N. J. FÉLICI ET AL
SPRAY-COATING APPARATUS

3,279,429

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3 Sheets-Sheet 1

FIG. 1

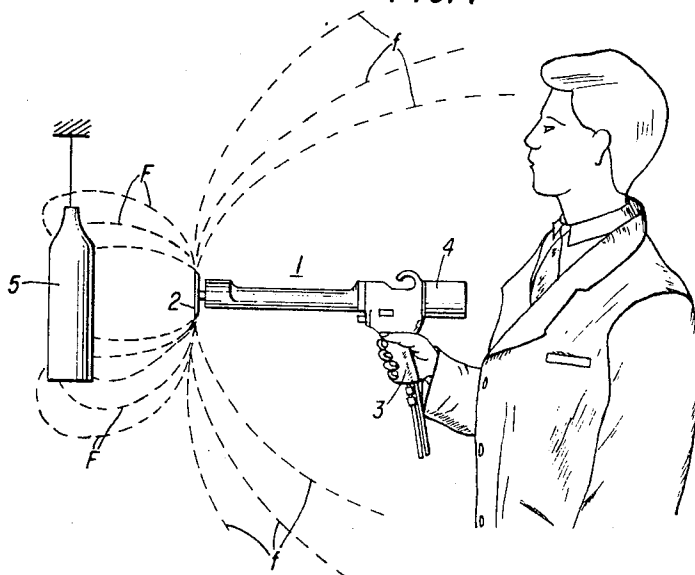
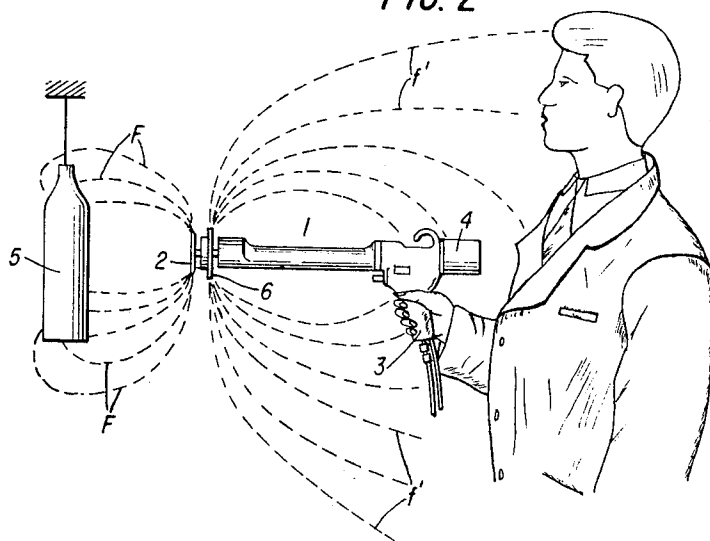


FIG. 2



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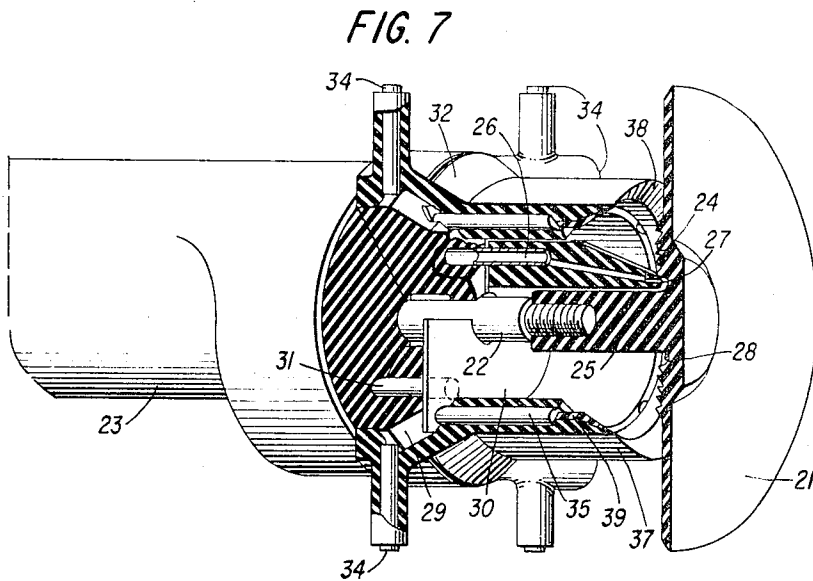
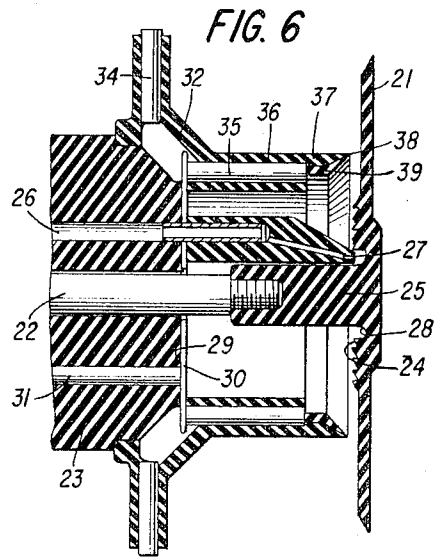
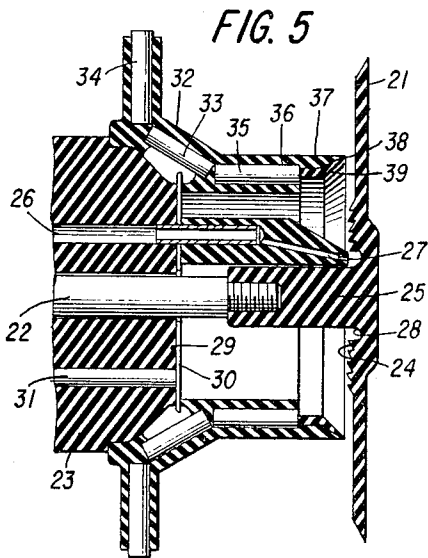
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SPRAY-COATING APPARATUS

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14 Claims. (Cl. 118—627)

Our invention relates to an apparatus provided for coating purposes, chiefly by means of paint and forming part of a stationary plant, or else forming a portable apparatus and incorporating at least one atomizing head and improved by the application of an electric field between the head and the parts to be coated.

It has been found that in such apparatus certain particles projected by the atomizing head are sometimes thrown back towards the operator who is generally subjected to the same potential as the parts to be coated.

Our invention has for its object means for preventing such returns of particles and, to this end, we produce an ionized area extending between the operator and the atomizing head standing in front of him, said ionized area being directed radially at the level of the atomizing apparatus and bending rearwardly as it is considered nearer the operator so as to form a screen of ions, the polarity of which is the same as that of the particles projected by the atomizing head.

Our invention forms thus a rearwardly extending ionizing area which acts after the manner of an electrostatic bar preventing the particles of material projected by the atomizing head from returning rearwardly for any reason whatever. It should be remarked, however, that the atomizing area produces no substantial modification in the electrostatic field arising between the atomizing head and the article to be coated, so that the atomizing and impact phenomena are by no means modified.

In a preferred embodiment, said ionizing area is produced by a series of ionizing means distributed peripherally around the body of the apparatus and located to the rear of the atomizing head, so as to face the actual body of the apparatus. Said ionizing means are raised to a potential of the same sign as that of the atomizing head, either directly or through the agency of effluvia or of resistances ensuring a slight drop in voltage, whereby ions are provided the projection of which opposes the rearward movements of the particles.

It should be remarked that it has already been proposed to equip an electrostatic projecting apparatus with an auxiliary electrode located at the level of the atomizing head, so as to enclose preferably said atomizing head. Said auxiliary electrode, which is brought to a potential which is intermediate between the potential of the atomizing head and that of the articles or parts to be treated, provides merely a closing up of the bundle of lines of force of the main field towards the articles to be coated. The object of such an intermediate electrode consists therefore in producing a second field directed towards the article to be coated, which second field encloses the main field and concentrates it. In contradistinction, the ionizing means according to our invention cannot be compared with such an auxiliary electrode, which does not produce any ion, and, on the other hand, by reason of the arrangement of the present ionizing means to the rear of the atomizing head, it has practically no influence on the lines of force of the main field except those lines of force which are directed towards the operator to the rear.

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Our invention covers also a number of auxiliary arrangements to be incorporated with such projecting or atomizing apparatus, with a view to providing an easier execution and a better operation.

According to one of said arrangements, there is provided, between the rotary disc and the ionizing means forming a screen between the operator and the atomizing head, a ring of insulating material coaxial with the shaft driving the rotary disc, said ring ending in registry with and at a short distance from the rear surface of said disc. Through this arrangement, the metal sections of the body of the apparatus, and chiefly the threaded end of the driving shaft, which are subjected to a high D.C. voltage, are enclosed by the insulating ring which allows cutting out any fortuitous discharge between said conductive sections and other objects with reference to which the apparatus has been shifted within a too short distance.

It is of advantage for the terminal section of the insulating ring, registering with and located at a small distance from the rotary disc, to be bevelled so as to show a somewhat sharp edge, while the inner terminal surface of the ring is adapted to carry a socket of semi-conductive material, the end of which is also provided with a bevelled edge adjacent the edge of the disc, said socket being also subjected to a high D.C. voltage, preferably through the agency of one or more electrically resistant elements distributed coaxially with reference to the rotary shaft.

Said semi-conductive ring is designed so as to cut out any risk of fortuitous discharges for the case where the atomizing head is brought into the immediate proximity of an object at a very different potential.

According to a first embodiment, the electrically resistant elements are in contact with a radial conductive or semi-conductive plate which is fed by a line feeding high voltage, whereby the ionizing ring is practically at the same potential as the high voltage supplied.

In a modified embodiment, the electrically resistant elements are in contact with a plurality of semi-conductive rods arranged along the periphery of and at a short distance from the edge of a radial conductive or semi-conductive plate fed by the lead feeding the high voltage, the other ends of said rods being connected with the auxiliary ionizing projections, in which case, the ionizing protecting ring is brought to a potential which is slightly less than that of the high voltage supplied.

The features and advantages of our invention will appear clearly from the following description, reference being made, by way of example, to the accompanying drawings, wherein:

FIG. 1 is a side view of a conventional spraying gun operated by a workman.

FIG. 2 is a similar view in the case of our improved spraying gun.

FIG. 3 is a perspective view, with certain parts shown broken away and in section, of the end of the carrier of an electrostatic head provided with ionizing means designed in conformity with our invention, said means rotating in unison with the atomizing or spray-coating means.

FIG. 4 is a view similar to FIG. 3, wherein the ionizing means are stationary in accordance with a modification and are rigidly carried by the head support.

FIG. 5 is a fragmentary axial sectional view of a spray-coating head according to our invention.

FIG. 6 is a fragmentary axial sectional view of a different embodiment of a spray-coating head according to our invention.

FIG. 7 is a perspective view, with certain parts shown broken away and in section, of the atomizing head according to FIG. 6.

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Turning to FIG. 1, an operator holds in his hand a spray-coating gun 1 of a conventional type carrying an atomizing head constituted by a rotary disc 2 revolving at a high speed of a magnitude of 3,000 r.p.m. so that the atomization may be obtained through the combined action of centrifugal force and of an electrostatic field. Into the butt 3 of the gun are engaged in a conventional manner a pipe feeding liquid paint, a low voltage lead for the feeding of a power unit 4 driving the disc 2 through the agency of an insulating shaft housed inside the body of the gun and a lead for high D.C. voltage adapted to set the atomizing or spray-coating head at a high potential of a magnitude of say 90 kv. with reference to the article 5 to be coated, which article is grounded.

With such a gun, there is obtained a very intense electric field between the rotary disc 2 and the article 5 to be coated, said field cooperating, as already disclosed, in the atomization of the paint, while it ensures practically through its sole action the impact of the atomized particles onto said article 5, by following the lines of force F. But, in addition to the lines of force F, the field includes also further lines of force *f* the intensity of which cannot be neglected and which return from the atomizing head rearwardly towards the operator.

In FIG. 2, where corresponding parts have been given the same reference numbers, the portable gun 1 is equipped in the vicinity of the atomizing head 2 with ionizing means 6 forming an ionized area *f'* extending towards the operator. The ions are loaded with the same sign as the particles of paint moving along the lines of force F, so that all the particles liable to return towards the operator are held back by said ionizing area.

Turning to FIG. 3, and the end 7 of the head support is shown with the metal end 8 of the shaft controlled by the motor 4 (FIG. 2), while the intermediate insulating shaft is not illustrated. To said end 8 there is fitted through any suitable means an atomizing disc 2 of an electrically conductive material, or else, of a material the electric resistivity of which is of a magnitude of 10^6 to 10^7 ohm-cm., or again of an insulating material. Excellent results have been obtained with an insulating disc 2 producing a more concentrated impact on the article to be painted and which furthers the protection against sparks, provided by the ionizing means as disclosed hereinafter.

The disc 2 may be of the type disclosed in the co-pending Specification Ser. No. 204,562, filed on June 22, 1962 by Marcel Auguste Roger Point and relating to "Improvements in Liquid-Atomizing Heads for the Coating of Articles," now Patent No. 3,148,832.

A paint-feeding pipe carried by the support 7 terminates with a metal injector 9 extending in parallelism with the axis of the head and in the vicinity of the latter.

The atomizing disc 2 is mechanically rigid with an insulating fitting 10 which serves as a support for the ionizing means 6 illustrated in FIG. 2.

Said fitting 10 includes at its rear end a ring 11 surrounding coaxially at a small distance a conductive or semi-conductive plate 12 rigid with the support 7 carrying the head and in contact with the end of the lead 13 connected with one of the terminals of the supply of high voltage D.C.

It is apparent that in the example illustrated, the ionizing means 6 include a number of pins or points 14 the number of which is eight in the embodiment illustrated, said pins extending radially in an outward direction, so as to project beyond the corresponding radial extensions of the insulating fitting 10, carrying said pins.

An example of the distribution of such ionizing pins 14 is illustrated in FIG. 4, but, obviously, their number and relative arrangement are not necessarily those illustrated, and it is sufficient for them to be arranged in a manner such that they may provide a screen of ions in accordance with our invention, said screen starting

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from the vicinity of the atomizing disc 2 and extending between the latter and the operator.

Said pins may be made of metal or else show a high electric resistivity or they may be insulating and carry a highly resistant coat.

Said pins are raised to a potential of the same sign as the atomizing disc 2 and the value of which is slightly less than that of the potential of said disc with reference to the article 5. Said result is obtained by means of effluvia 17 as produced between the plate 12 connected with the high voltage lead 13 and semi-conductive rods 15 housed obliquely inside the insulating fitting 10 and one of the ends of each of which is in contacting relationship with the corresponding pin 14, their other ends 16 projecting beyond said fitting 10.

Experience shows, generally speaking, that the possible return of paint droplets onto the actual ionizing means 6 is all the more reduced when the projecting surfaces of the pins 14, whether they are conductive or semi-conductive, forming said means 6, are smaller. For this reason and as clearly illustrated in FIGS. 3 and 4, only the outer ends of the ionizing means in the general case or of the ionizing tips 14 in the embodiment illustrated project outside the insulating fitting 10.

The semi-conductive rods 15 have furthermore for their object to prevent the jumping of sparks between the metal injector 9 through which the paint is projected and any grounded article which lies too near the electrostatic head.

It has been found that the location of the ionizing means leading to the best results in accordance with the general remarks disclosed at the beginning of the present specification corresponds to a distance which is advantageously about 35 mm. between the edge of the atomizing disc 2 and that of the ionizing means 6 for the voltages which are generally resorted to.

It is also of advantage for the outer size of the ionizing means 6 to be substantially equal to or slightly larger than that of the atomizing member 2.

For a voltage of 90 kv. between the atomizing means and the article to be coated, a difference in potential ranging between 10 and 15 kv. between said atomizing means and the ionizing means appears to be suitable, the effluvia 17 allowing said reduction in potential.

As mentioned hereinabove, the invention is also applicable as a modification with stationary ionizing means 6 rigid with the end of the head support 7 in which therefore only the atomizing disc 2 rotates.

In FIG. 4, where the same reference numbers designate corresponding elements as precedingly, it is apparent that the shaft 8 provides solely for the rotation of the atomizing disc 2 fed with paint through the injector 9 as in the preceding case.

In contradistinction, the ionizing means 6 are secured in any suitable manner to the end of the support 7 for the head. The fitting 10 of FIG. 3 is modified as illustrated in FIG. 4, which latter figure shows cross-sectionally the modified shape 10' of said fitting to be used for the present modification.

The above disclosure relating to the pins 14 and rods 15 and also the effluvia producing the voltage applied to said pins, is valid for the present case.

In the embodiment illustrated in FIG. 5, the atomizing head includes a disc 21 rigid with the end of a rotary shaft 22 revolving in an insulating part 23 which is only partly illustrated, said shaft being driven at a high speed by a motor which is not illustrated in FIG. 5. Preferably, the disc 21 is made of an insulating material provided with annular striations 24 or corrugations, and it includes an axial tapped extension 25 into which is screwed the threaded end of the shaft 22.

The liquid is fed to the disc through an insulating channel 26 extending through the insulating part 23 and opening into a nozzle 27. The nozzle 27 is in registry with an annular groove 28 extending around the extension 25.

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A conductive or semi-conductive plate 30 is connected with a lead 31 under a high D.C. voltage. The plate is secured over the terminal surface 29 of the insulating body 23.

Along the periphery of the conductive plate 30 and at a short distance from the edge of the latter are provided, inside an insulating ring 32, a plurality of semi-conductive rods 33 which slope slightly with reference to the axis of the atomizing head; the rear end of each rod 33 is in contacting relationship with one or more auxiliary ionizing pins 34 embedded radially inside the mass of the insulating ring 32. The front ends of the rods 33 are respectively in contact with a plurality of electrically resistant members 35. These members form a coaxial arrangement relative to the shaft 22 and are secured to the inner cylindrical surface 36 of an annular extension 37 which is integrally formed with the ring 32 and surrounds coaxially the shaft 22, the terminal edge 38 of said extension being bevelled and facing the disc 21 at a short distance from the latter.

A conductive or semi-conductive ring 39 is fitted between the ends of the resistant members 35 and the bevelled edge 38.

During operation, the disc 21 revolves at a high speed of, say 3,000 r.p.m., which is sufficient for ensuring even without any electrostatic field an atomization under the action of the centrifugal force of the liquid projected through the nozzle 27, and the high voltage current passes in the shape of effluvia leading to a slight drop in voltage in the interval between the plate 30 and the rods 33, from which the current flows into the ionizing pins 34, so as to produce the ionizing screen in the manner disclosed.

The insulating annular extension 37 of the ring 32 encloses the conductive means leading to the atomizing disc and, in particular, the threaded end of the driving shaft. This results in a cutting off of any fortuitous discharge between said conductive means and other articles lying too near the head, in particular when the disc 21 has been removed with a view to replacing it by another disc or to cleaning the atomizing head.

In a modification, illustrated in FIGS. 6 and 7, corresponding parts of the atomizing head carry the same reference numbers as in the FIG. 5 embodiment. The rods 33 of FIG. 5 are omitted in FIGS. 6 and 7, and the resistant members 35 are in direct contacting relationship with the conductive or semi-conductive plate 30 and are fed without any drop in voltage in the effluvia which are now transferred directly on to the ionizing pins 34.

Obviously, our invention is not limited to the embodiments described, and it covers all the modifications thereof falling within the scope of the accompanying claims.

What we claim is:

1. A spray-coating apparatus for the coating of surfaces with liquid, comprising an atomizing head, a rotary member carried by the latter, means for rotating said rotary member at a high speed, means feeding the liquid to be sprayed to said rotary member, means producing an electric field of a high intensity between the atomizing head and said surface to be coated, said field conveying the liquid particles forwardly from the rotary member to the surface to be coated, and means producing an ionized area to the rear of the atomizing head across a rear extension of the axis of the rotary member and adapted to form a screen against any rearward travel of liquid particles in a direction opposed to the direction leading from the rotary member to the surface to be coated, said last-mentioned means maintaining the ions in said ionized area separate from said electric field to prevent said ions from influencing said field.

2. A spray-coating apparatus for the coating of surfaces with liquid, comprising an atomizing head, a rotary member carried by the latter, means for rotating said rotary member at a high speed, means feeding the liquid to be sprayed onto the rotary member to be atomized forwardly by the latter onto the surface to be coated, means produc-

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ing an electric field of a high intensity between the atomizing head and said surface to be coated, said field conveying the liquid particles atomized by the rotary member to said surface, means producing an ionized area to the rear of the atomizing head and including an annular series of ionizing projections arranged radially with respect to the rotary member to the rear of the rotary member, said last-mentioned means maintaining the ions in said ionized area separate from said electric field to prevent said ions from influencing said field, and means subjecting said projections to a potential of the same sign as the atomizing head.

3. A spray-coating apparatus for the coating of surfaces with liquid, comprising an atomizing head, a rotary disc carried by the latter, means for rotating said rotary disc at a high speed, means feeding the liquid to be sprayed onto the disc to be atomized forwardly by the latter onto the surface to be coated, means producing an electric field of a high intensity between the atomizing head and said surface to be coated, said field conveying the liquid particles atomized by the rotary disc to said surface, means producing an ionized area to the rear of the atomizing head and opposing the rearward motion of any liquid particle atomized by the rotary disc, said last-mentioned means maintaining the ions in said ionized area separate from said electric field to prevent said ions from influencing said field, and an annular protecting screen of insulating material coaxial with and lying slightly to the rear of said disc.

4. A spray-coating apparatus for the coating of surfaces with liquid, comprising an atomizing head, a rotary disc carried by the latter, means for rotating said disc at a high speed, means feeding the liquid to be sprayed onto the disc to be atomized forwardly by the latter onto the surface to be coated, ionizing means producing an ionized area to the rear of the atomizing head and opposing the rearward motion of any liquid particle atomized by the rotary disc, an annular protecting screen of insulating material coaxial with and lying slightly to the rear of said disc, the edge of said annular screen facing the rotary disc being bevelled, a semi-conductive sleeve fitted in said annular screen and including a front bevelled edge matching that of the screen, a high D.C. voltage source, and at least one electrically resistant element connected to said source for supplying voltage to said semi-conductive sleeve, the voltage supplied to said semi-conductive sleeve producing an electric field of a high intensity between the atomizing head and said surface to be coated, said field conveying the liquid particles atomized by the rotary member to said surface, said ionizing means maintaining the ions in said ionized area separate from said electric field to prevent said ions from influencing said field.

5. A spray-coating apparatus for the coating of surfaces with liquid, comprising an atomizing head, a rotary disc carried by the latter, means for rotating said disc at a high speed, means feeding the liquid to be sprayed onto the disc to be atomized forwardly by the latter onto the surface to be coated, ionizing means producing an ionized area to the rear of the atomizing head and opposing the rearward motion of any liquid particle atomized by the rotary disc, an annular protecting screen of insulating material coaxial with and lying slightly to the rear of said disc, the edge of said annular screen facing the rotary disc being bevelled, a semi-conductive sleeve fitted in said annular screen and including a front bevelled edge matching that of the screen, and a plurality of longitudinally extending electrically resistant elements uniformly distributed around the rotary axis of the disc through which a high D.C. voltage is applied to said sleeve.

6. A spray-coating apparatus for the coating of surfaces with liquid, comprising an atomizing head, a rotary disc carried by the latter, means for rotating said disc at a high speed, means feeding the liquid to be sprayed onto the disc to be atomized forwardly by the latter onto the surface to be coated, means producing an ionized area to

the rear of the atomizing head and opposing the rearward motion of any liquid particle atomized by the rotary disc, an annular protecting screen of insulating material coaxial with and lying slightly to the rear of said disc, the edge of said annular screen facing the rotary disc being bevelled, a semi-conductive sleeve fitted in said annular screen and including a front bevelled edge matching that of the screen, electrically resistant elements uniformly distributed around the rotary axis of the disc and the front end of which engage said sleeve, a non-insulating plate perpendicular to the axis of the rotary disc engaging the rear ends of said resistant elements and the edge of which faces the ionizing means, and means feeding said plate with a high D.C. voltage to produce an electric field of a high intensity between the atomizing head and said surface to be coated and conveying the liquid particles atomized by the rotary member on to said surface, said plate producing effluvia towards the ionizing means.

7. A spray-coating apparatus for the coating of surfaces with liquid, comprising an atomizing head, a rotary disc carried by the latter, means for rotating said disc at a high speed, means feeding the liquid to be sprayed onto the disc to be atomized thereby, means producing an ionized area to the rear of the atomizing head, including an annular series of ionizing projections arranged coaxially with the rotary disc to the rear of the rotary disc, and opposing the rearward motion of any liquid particle atomized by the rotary disc, an annular protecting screen of insulating material coaxial with and lying slightly to the rear of said disc, the edge of said annular screen facing the rotary disc being bevelled, a semi-conductive sleeve fitted in said annular screen and including a front bevelled edge matching that of the screen, electrically resistant elements uniformly distributed around the rotary axis of the disc and the front ends of which engage said sleeve, an annular series of non-insulating rods coaxial with the rotary disc the front ends of which engage the rear ends of the corresponding resistant elements and the rear ends of which engage the corresponding ionizing projections and a non-insulating plate perpendicular to the axis of the rotary disc the outer edge of which faces the annular series of non-insulating rods with a gap therebetween, and means feeding a high D.C. voltage to the plate to transmit said voltage to the resistant elements, sleeve and ionizing projections.

8. A spray-coating apparatus for the coating of surfaces with liquid, comprising an atomizing head, a rotary member carried by the latter, means for rotating said rotary member at a high speed, means feeding the liquid to be sprayed onto the rotary member to be atomized forwardly by the latter onto the surface to be coated, said feeding means having an end facing said rotary member for discharging said liquid thereon, means for insulating the end of the feeding means facing the rotary member, means producing an electric field of a high intensity between the atomizing head and said surface to be coated, said field conveying the liquid particles atomized by the rotary member to said surface, and means producing an ionized area to the rear of the atomizing head across a rear extension of the axis of the rotary member and adapted to form a screen against any rearward travel of liquid particles in a direction opposed to the direction of atomization leading from the rotary member to the surface to be coated, said last-mentioned means maintaining the ions in said ionized area separate from said electric field to prevent said ions from influencing said field.

9. A spray-coating apparatus for the coating of surfaces with liquid, comprising an atomizing head, a rotary disc carried by the latter, means for rotating said rotary disc at a high speed, means feeding the liquid to be sprayed onto the disc to be atomized forwardly by the latter onto the surface to be coated, means producing an electric field of a high intensity between the atomizing head and said surface to be coated, said field conveying the liquid particles atomized by the rotary disc to said surface, ionizing means

including a plurality of ionizing projections extending outwardly from said ionizing head for producing an ionized area to the rear of the atomizing head and opposing the rearward motion of any liquid particle atomized by the rotary disc, said ionizing means maintaining the ions in said ionized area separate from said electric field to prevent said ions from influencing said field, an annular protecting screen of insulating material coaxial with and lying slightly to the rear of said disc, and a common support for the annular screen and the ionizing means.

10. A spray-coating apparatus for the coating of surfaces with liquid, comprising an atomizing head, a rotary disc carried by the latter, means for rotating said rotary disc at a high speed, means feeding the liquid to be sprayed onto the disc to be atomized forwardly by the latter onto the surface to be coated, means producing an electric field of a high intensity between the atomizing head and said surface to be coated, said field conveying the liquid particles atomized by the rotary disc onto the said surface, ionizing means including a plurality of ionizing projections extending outwardly from said ionizing head for producing an ionized area to the rear of the atomizing head and opposing the rearward motion of any liquid particle atomized by the rotary disc, said ionizing means maintaining the ions in said ionized area separate from said electric field to prevent said ions from influencing said field, an annular protecting screen of insulating material coaxial with and lying slightly to the rear of said disc, and an annular support rigid with the rear end of the annular screen and carrying the ionizing means.

11. Electrostatic coating apparatus comprising spraying means including an atomizing member, a supply of coating material, means for feeding material from said supply to said atomizing member, said atomizing member dispersing said material to form a spray of atomized particles, means for applying an electrostatic charging potential to said atomizing member, said atomizing member comprising first electrode means for establishing a high intensity electrostatic field which extends in a forward direction between the atomized particles and an article to be coated, said field conveying atomized particles in said forward direction from said atomizing member to said article, and second electrode means including a plurality of ionizing projections carried by said spraying means for producing an ionized area which extends rearwardly therefrom to form a protective screen against rearward travel of atomized particles, said second electrode means maintaining the ions in said ionized area separate from said electrostatic field to prevent said ions from influencing said field.

12. Electrostatic coating apparatus comprising spraying means including an atomizing member, a supply of coating material, means for feeding material from said supply to said atomizing member, said atomizing member dispersing said material to form a spray of atomized particles, first electrode means for establishing a high intensity electrostatic field which extends in a forward direction between the atomized particles and an article to be coated, said field conveying atomized particles in said forward direction from said atomizing member to said article, second electrode means carried by said spraying means for producing an ionized area which extends rearwardly therefrom to form a protective screen against rearward travel of atomized particles, said second electrode means maintaining the ions in said ionized area separate from said electrostatic field to prevent said ions from influencing said field, at least one electrically resistant element supported by said spraying means in electrical contact with said first electrode means and in spaced relationship with said second electrode means, a high D.C. voltage source, and means for connecting said source to said electrically resistant element, to supply voltage from said source to said first electrode means.

13. Electrostatic coating apparatus comprising spraying means including an atomizing member, a supply of coating material, means for feeding material from said

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supply to said atomizing member, said atomizing member dispersing said material to form a spray of atomized particles, first electrode means for establishing a high intensity electrostatic field which extends in a forward direction between the atomized particles and an article to be coated, said field conveying atomized particles in said forward direction from said atomizing member to said article, second electrode means carried by said spraying means for producing an ionized area which extends rearwardly therefrom to form a protective screen against rearward travel of atomized particles, said second electrode means maintaining the ions in said ionized area separate from said electrostatic field to prevent said ions from influencing said field, a plurality of electrically resistant elements supported by said spraying means in electrical contact with said first electrode means, a non-insulating plate in engagement with said electrically resistant elements and in spaced relationship with said second electrode means, and a high D.C. voltage source connected to said plate, said source supplying voltage through said plate and said electrically resistant elements to said first electrode means, the voltage on said plate producing effluvia in the space between said electrically resistant elements and said second electrode means.

14. Electrostatic coating apparatus comprising spraying means including an atomizing member, a supply of coating material, means for feeding material from said supply to said atomizing member, said atomizing member dispersing said material to form a spray of atomized particles, first electrode means carried by said spraying means and including a semi-conductive sleeve for establishing a high intensity electrostatic field which extends in a forward direction between the atomized particles and an article to be coated, said field conveying atomized particles

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in said forward direction from said atomizing member to said article, second electrode means including a plurality of ionizing projections carried by said spraying means for producing an ionized area which extends rearwardly therefrom to form a protective screen against rearward travel of atomized particles and said second electrode means maintaining the ions in said ionized area separate from said electrostatic field to prevent said ions from influencing said field, a plurality of longitudinally extending electrically resistant elements in electrical contact with said semi-conductive sleeve, said elements being supported by said spraying means in spaced parallel relationship with each other, a non-insulating plate extending perpendicular to the axis of said sleeve, said plate engaging each of said electrically resistant elements and being spaced from said second electrode means, and a high D.C. voltage source connected to said plate, said source supplying voltage through said plate and said electrically resistant elements to said semi-conductive sleeve, the voltage on said plate producing effluvia in the space between said electrically resistant elements and said second electrode means.

References Cited by the Examiner

UNITED STATES PATENTS

2,877,137	3/1959	Juvinall et al.	117—93.44
2,955,565	10/1960	Schotland	239—18 X
2,989,241	6/1961	Badger	118—621 X
3,049,092	8/1962	Sedlacsik et al.	118—629
3,059,613	10/1962	Nakaya	239—15 X
3,075,706	1/1963	Point	239—15

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