Nov. 17, 1959 J. SEDLACSIK, JR 2,913,186

ELECTROSTATIC SPRAY COATING APPARATUS AND METHOD

Filed Dec. 1, 1955 4 Sheets-Sheet 1

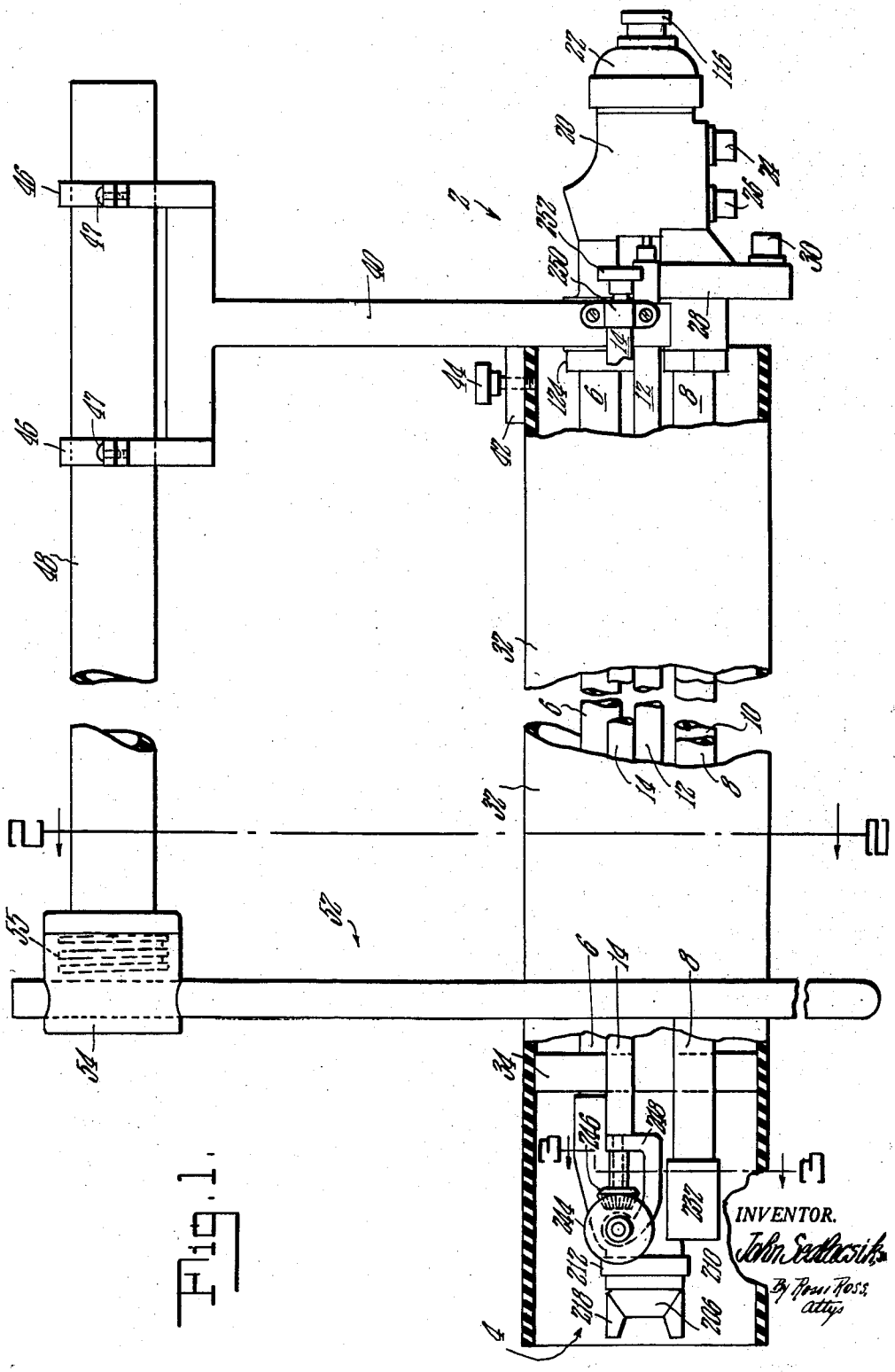


Fig. 1.

Nov. 17, 1959 J. SEDLACSIK, JR 2,913,186

ELECTROSTATIC SPRAY COATING APPARATUS AND METHOD

Filed Dec. 1, 1955 4 Sheets-Sheet 2

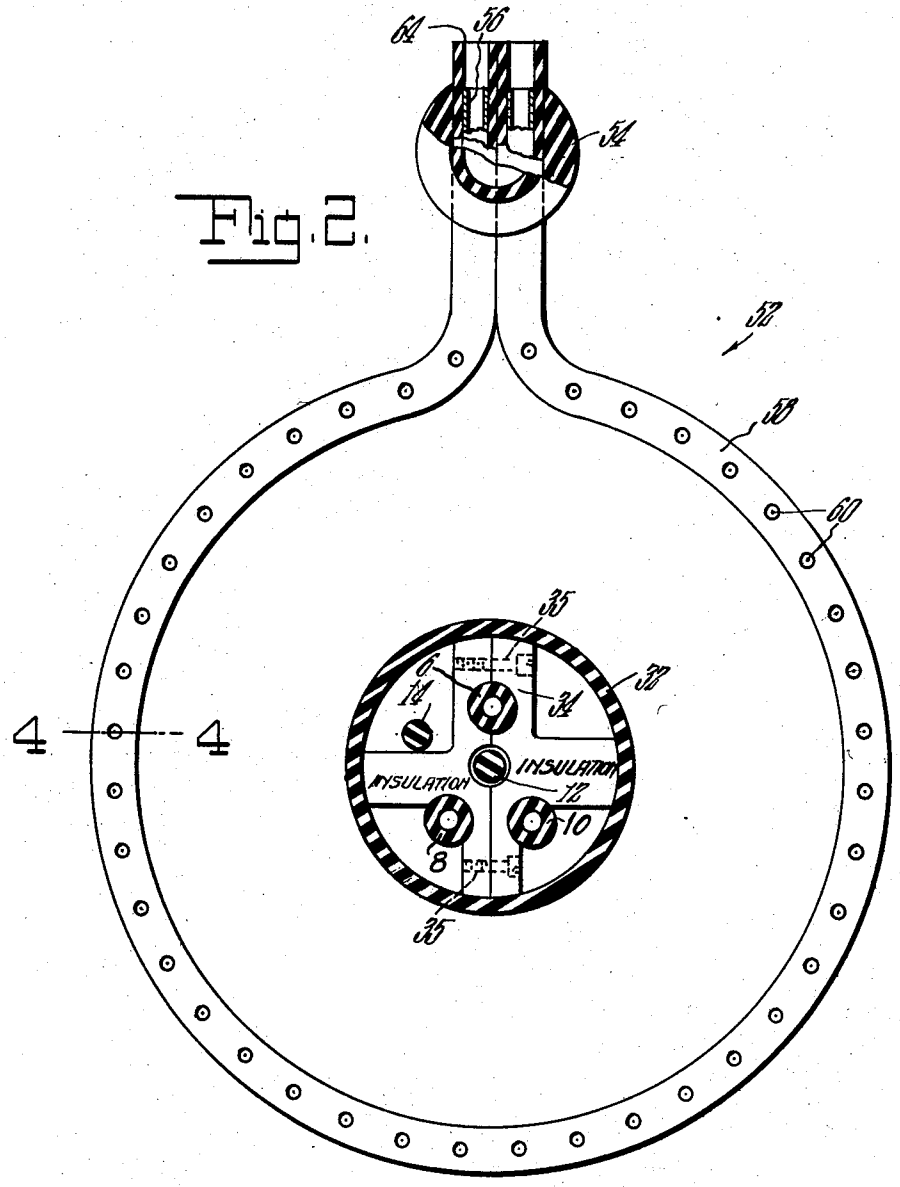
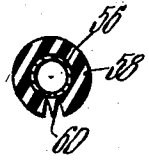


Fig. 2.

Fig. 4.



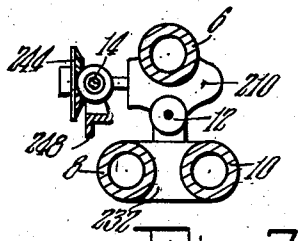


Fig. 3.

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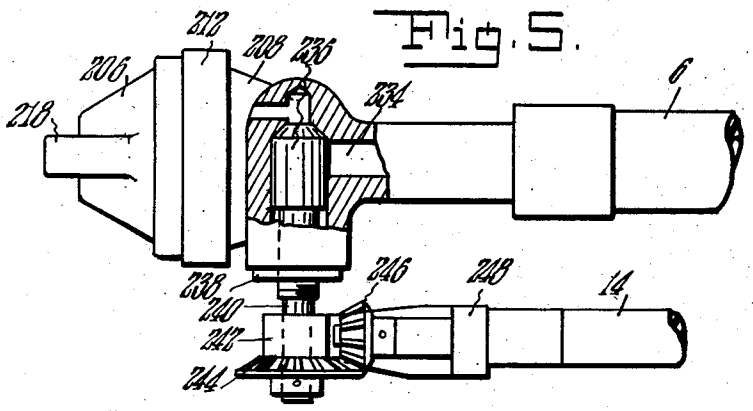
Nov. 17, 1959 J. SEDLACSIK, JR 2,913,186

ELECTROSTATIC SPRAY COATING APPARATUS AND METHOD

Filed Dec. 1, 1955 4 Sheets-Sheet 3

Fig. 5.



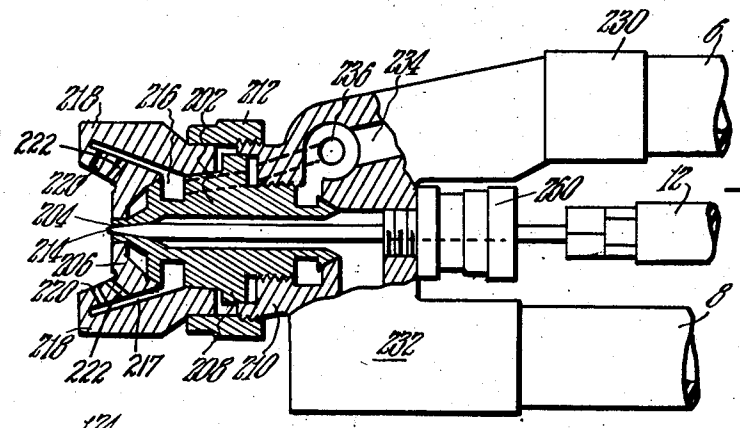


Fig. 6.

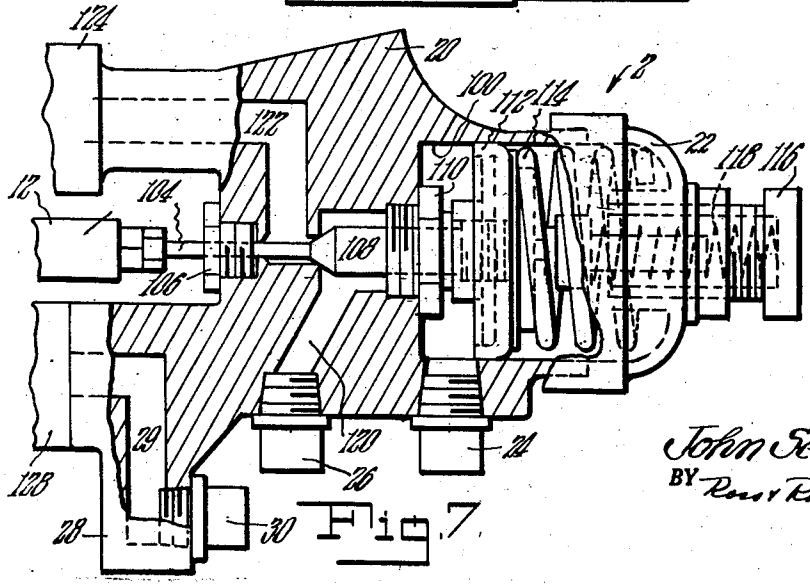


Fig. 7.

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Nov. 17, 1959 J. SEDLACSIK, JR 2,913,186

ELECTROSTATIC SPRAY COATING APPARATUS AND METHOD

Filed Dec. 1, 1955 4 Sheets-Sheet 4

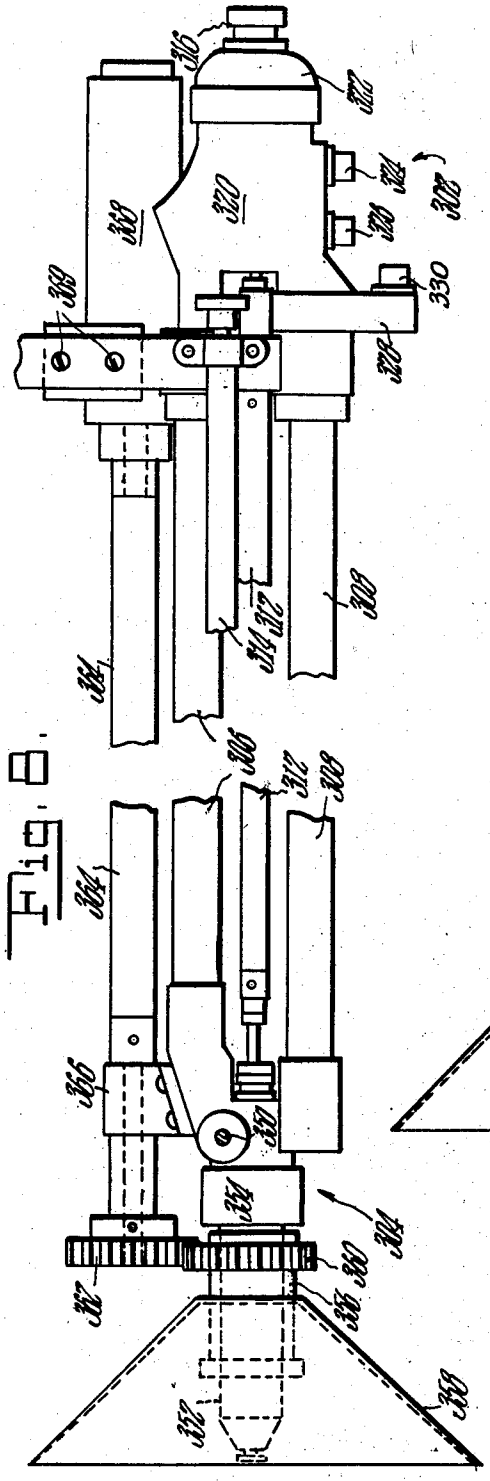

Fig. 4

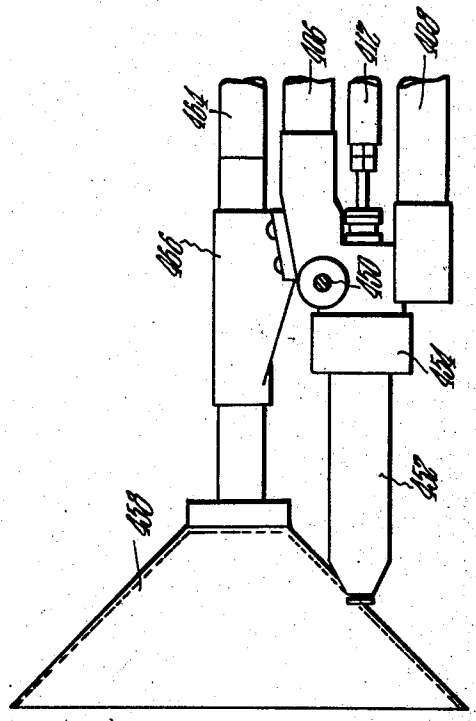

Fig. 5

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United States Patent Office 2,913,186 Patented Nov. 17, 1959

2,913,186

ELECTROSTATIC SPRAY COATING APPARATUS AND METHOD

John Sedlacsik, Jr., Garfield, N.J.

Application December 1, 1955, Serial No. 550,373

3 Claims. (Cl. 239—15)

My invention relates to new and useful improvements on electrostatic spray coating and, more particularly, to coating apparatus and coating methods to be used in electrostatic coating systems.

In electrostatic coating systems of the present known types, a field of electrostatic force is created which includes the article being coated, the atomized coating material particles in movement toward such article, and the projection means by which the particles are set into motion in flight.

Normally, the article is mounted on a grounded conveyor so as to make the article itself (if it is of conducting material) or an electrode adjacent the same, an electrode at ground potential. Another electrode at high electrical potential is provided, same normally being the spraying device.

This invention relates to improvements in apparatus for applying a liquid coating to an article by electrostatically charging and depositing the comminuted coated material upon the article within an electrostatic field created between the article to be coated and the issuing source of the coating material. The coating material is issued from a spray gun or similar suitable atomizing device preferably utilizing air under pressure as a vehicle to convey the finely divided or atomized particles onto the surface of the article to be coated.

It is directed particularly to providing means whereby arcing at the spray gun is obviated, direct contact between the high electrical potential and the gun being eliminated, the gun being charged, if at all, by induction only. In this invention, the gun is at a low voltage potential.

Specifically, this invention relates to an electrostatic atomizer capable of electrostatically atomizing liquids emerging from an orifice in the form of a jet or spray.

In the use of spray guns or the like of known prior art types, the gun is usually limited to a comparatively small field of dispersion. It carries the coating material to be discharged in non-uniform sized particles and in variable patterns. Thus there is an uneven dispersion of the coating particles over the surface to be coated due to the inertia generated in the discharge, causing the larger particles to travel further in the field than the more finely divided particles. Sometimes a variable pattern of spray is created and reproduced on the surface to be coated, the heavier coating particles being caused to impinge over one area and the more finely divided particles over another area.

By reason of such variance, it has been found necessary under certain conditions of coating to arrange a sizeable battery of spray guns with particular regard to their variable patterns of coating application so that the several guns complement each other to even out the pattern as a battery.

One object of the present invention is to provide means for controlling the deposit of the sprayed material on the surface to be coated, thereby reducing and minimizing the waste of material due to loss by dispersion into the atmosphere, and effecting substantial savings in labor and equipment while simultaneously increasing the coverage of the coating material.

In prior art spraying devices, the spray mixture issuing from the spray nozzle spreads outwardly or expands uniformly taking the form of a generally conical mist-like stream. The sides of the stream travel outwardly in diverging paths in the general direction of the surface to be coated. Upon impact therewith, considerable of the coating material, entrained with the air, is deflected in a swirling action away from this surface and is dispersed into the atmosphere. A great deal of the coating material discharged from the nozzle is thus lost and more material than actually needed is used to produce the desired coating.

To avoid some of this waste and to eliminate attendant fire hazards, where inflammable coating materials are used, it has been the practice to provide expensive spray booths equipped with high powered suction or blower systems in which to conduct the spray operations.

Here is an improved spray coating device capable of reducing this loss and waste of coating materials, of increasing the amount of effective coverage which may be obtained from a given quantity of coating material, of reducing the fire hazards, and of generally improving the character of the coating produced by the spray device by offering uniform dispersion without objectionable ripples and concentrations.

A more specific object of the invention is to provide safeguards against arcing between the discharge electrode (in this instance, a grid ring) and the discharge end of the gun apparatus.

Where metallic materials are employed, such as metallic paints, and where the head or discharge end of the gun itself functions as the discharge electrode, there is a dangerous tendency of the gun to backfire, leading to a dangerous fire hazard as well as a dangerous instrumentality insofar as operators thereof are concerned.

Here, there is no direct contact between the discharge electrode and the head end of the spray gun, the head end being charged by induction.

The invention also provides means for controlling the diverging column or stream of atomized coating material after issuance from the spray nozzle so that lateral deflection and dispersion of the mixture along the margin of impact of the stream with the surface to be coated is appreciably reduced and so that a greater percentage of the material dispersed into the atmosphere is directed onto the article surface itself.

The invention contemplates the employment of a paint spray gun mechanism wherein the forward atomizing elements are isolated from the rearward control elements. The rear portion of the mechanism is at ground potential whereas the forward portion thereof is connected to the high electrical potential. Insulating means between these forward and rearward elements prevent the possibility of a transmittal of an electrical charge rearwardly from the forward area, all for the convenience and safety of the operator.

By isolating the atomizing head or gun tip from the support or control elements of the gun by insulating members, the desideratum of maintaining the smallest portion or area of the gun at a high potential is attained. In order to separate or insulate the high voltage nozzle or atomizing head from the control end of the gun mechanism, I employ connections between the gun tip and the support or control elements of the gun which comprise non-conductors of electricity, they being of rubber, glass, ceramic, plastic, or similar non-conducting material. Thus, the support and control mechanisms, as well as the operator, are safeguarded against dangerous backfiring from the nozzle or head end.

Optimum results are obtained where the mass of the atomizing tip of the mechanism is as small as possible and where the mass of the article being coated is relatively larger. This relationship facilitates "leakage" of the atomized material from the high potential tip of the mechanism to the article. That is to say, the smaller the area at the high potential, the greater the rate of leakage of atomized material to the mass of the article being coated.

The inherent electrical effect in prior art guns is for the particles more or less to repel each other so that lateral spreading results. This spreading phenomenon is especially noticeable at the outer portion of the spray or jet area where an uneven, irregular and indistinct edge definition to the pattern of the coating material being deposited upon the article is observed.

By surrounding the atomizing mechanism with a sheath of electrostatic field which is substantially coextensive longitudinally with the former, the projecting spray is substantially stabilized and is made more definite in its shape and more constant in its direction. The scattered spreading effect upon the particles, particularly at the outer portions of the jet, is materially reduced resulting in a deposited pattern which is more uniformly dense throughout and which has the desired sharp edge definition.

In this invention, a source of electrostatic high potential, having one terminal grounded and its opposite terminal surrounding the atomizing head, creates a strong electrostatic field at the head by means of induction. The field extends between the head and the article to be coated, the article being grounded. The force of this field transforms the atomized coating material into a spray of charged particles and creates an attraction which pulls the spray toward the grounded article.

A potential difference of sufficient magnitude is maintained so as to create an electrostatic field with an atomizing corona discharge in the region adjacent the discharge end of the discharge electrode. The coating material is normally supplied to the discharge end of the gun and the region of corona discharge therearound at a rate at which it can be electrically atomized by the corona discharge most efficiently and effectively, following which the charged particles are projected in spray form toward and deposited upon the oppositely charge article.

Depending upon the viscosity and other characteristics of the material, the control of the supply is such as to permit the discharge of precisely the correct quantity and size of the particles so as to attain the greatest efficiency in the coating of the particular surface involved.

Other objects of this invention will appear in the following description and appended claims, reference being had to the accompanying drawings wherein:

Fig. 1 is a side elevational view of the device of my invention with certain parts thereof broken away for purposes of clarity;

Fig. 2 is an elevational view on the line 2—2 of Fig. 1 with parts broken away for purposes of clarity;

Fig. 3 is an elevational view on the line 3—3 of Fig. 1;

Fig. 4 is an elevational view on the line 4—4 of Fig. 2;

Fig. 5 is a top plan view of the head or discharge end of the gun mechanism;

Fig. 6 is a side elevational view of the head or discharge end of the gun mechanism;

Fig. 7 is a side elevational view of the rear or control end of the gun mechanism;

Fig. 8 is a side elevational view of a modified form of the apparatus of my invention; and

Fig. 9 is a side elevational view of another modified form of the apparatus generally shown in Fig. 8.

In the practice of this invention, there is provided a discharge member having an atomizing head, a spray gun mechanism with which said discharge member is associated, a source of liquid supply, sources of air supply, and distributing means for transferring the liquid and air

from their respective sources of supply to the control means of the spray gun and thence to the discharge member for atomization and dispersion.

For purposes of simplification, all of these members are not shown, they being more or less conventional in paint spraying apparatus but forming a part of this specific invention.

Referring to the drawings more in detail, and more particularly to the preferred form of my invention selected for illustrative purposes, I have shown an arrangement of apparatus which is suitable for coating articles which are preferably moved along a path of article movement into, through, and out of a coating zone which the device of the invention, normally fixed in location, projects.

What will be referred to as the control or rear end of the spray gun is generally indicated by the numeral **2** and what will be referred to as the discharge or forward end of the spray gun is generally indicated by the numeral **4**.

The metallic control end **2** and the metallic discharge end **4** are connected together in space relation by an insulating air conducting member **6**, a pair of insulating coating material conducting members **8** and **10**, an insulating needle actuating member **12**, and an insulating port control actuating member **14**. If desired, only one coating material conducting member may be employed.

By means of such insulating members **6**, **8**, **10**, **12** and **14**, the control end and the discharge end of the gun are integral and unitary, yet are separated from each other and held in spaced relation by the aforementioned insulating members for safety purposes.

The control end **2** includes a metallic body member **20** which contains an air cylinder closed by the cap or closure **22** at the rear end thereof.

Air inlets **24** and **26** for supplying pressured air to the air cylinder and atomizing air to the spray head respectively are provided.

Air supplied from sources of supply (not shown) is brought forwardly to the air inlets **24** and **26** through distributing means, such as connections (not shown).

Forwardly of the air cylinder, an L fitting **28** is provided having an inlet means **30** for the reception of the coating material into the gun mechanism.

Coating material from a source of supply (not shown) is brought forwardly to the inlet **30** through distributing means, such as a connection (not shown).

Pressurized air entering through inlet **24** serves to actuate the needle actuating member **12**.

Atomizing air entering through inlet **26** is conducted through the air conducting member **6** to the forward end of the gun.

Coating material entering through inlet **30** is conducted through the material conducting member **8** to the forward end of the gun. Such coating material as is not used thereat may be recirculated rearwardly through the material conducting member **10** for recirculation back into the member **8**. As aforesaid, if desired, this recirculation feature may be eliminated.

All of the above described mechanisms will be described more in detail in connection with the description subsequently to be made with reference to Fig. 7. Reference is made momentarily to the general construction of the apparatus shown in Fig. 1, however, in order that the broad features of the invention may be initially understood.

At the head end of the gun, the insulating members **6**, **8**, **10**, **12** and **14** are connected to the discharge end **4** in a manner subsequently to be described in detail in connection with a description of Figs. 5 and 6.

A plastic tubular sleeve **32** encloses the insulating members **6**, **8**, **10**, **12** and **14** and the head end **4** of the gun mechanism and is supported relative thereto by one or more spider members **34** made from a suitable insulating material, such as plastic, glass or the like. The

spider member may be of two pieces held together as by screws 35 or the like as shown in Fig. 2.

The control end 2 of the gun mechanism supports an upwardly extending post member 40 from which a horizontally projecting rim 42 extends. A stud member 44 is threadedly engageable through the member 42, as shown, and is additionally engageable with the sleeve 32 so as to aid in the support thereof in an axis parallel to the axes of the members 6, 8, 10, 12 and 14.

The upper extremity of the member 40 is provided with a pair of spaced clamping rings 46 which hold a longitudinally extending support member 48 which may be of plastic, glass or similar non-conducting material. Tightening nuts 47 may be adjusted so as to ensure the clamping of the member 48 by the rings 46.

At the forward end of the support members 48, a more or less annular grid ring or discharge electrode, generally indicated by 52, is located, same being held relative thereto by means of an insulating coupling member 54, which may be internally threaded as at 55 so as to be threadedly engaged with the free end of the member 48, as shown.

The grid ring 52 comprises a copper tube 56 which is completely enclosed throughout its length by a plastic covering 58. At spaced intervals throughout its length, metallic needles 60 are disposed, they being fixed to the copper tube 56 and extending outwardly therefrom through the covering 58. The electrical charge is directed outwardly through the exposed portions of the needles, optimum results being obtained when the points of the needles only are exposed so that increased ionization results.

The needles 60 do not extend outwardly beyond the outer surface of the covering 58 whereby wiping of the annular grid discharge member 52 as by a cloth or the like is facilitated.

At the uppermost extremities or ends of the member 52, openings 64 and 66 are provided into which the free end of a high potential lead line may be inserted. The lead line is inserted into an opening 64.

Ordinarily, where only one such gun mechanism is employed, the other opening 66 would be plugged by an insulated stopper (not shown).

If it is desired to connect the discharge grid to another discharge grid adjacent another gun apparatus, as in a series, a lead line could be run from the opening 66 to the related opening in a second discharge grid.

The grid discharge 52, being annular in configuration, surrounds the tubular sleeve 32, as best shown in Fig. 2, and may be adjusted forwardly and rearwardly relative to the head end of the gun in order to vary the degree of induction at the head end of the gun. The discharge electrode 52 is preferably set far enough back relative to the sleeve 32 that arcing over to the front or head end of the gun within the open front end of the sleeve is prevented.

The grid discharge member 52 provides a primary guard against arcing between the high potential and the head of the gun. The sleeve member 32 provides a secondary guard thereagainst. These safeguards are particularly desirable in the case of metallic coating materials where undesired arcing from the discharge electrode to the head of the gun could and often does result in backfiring of the electrical potential rearwardly to the control end of the gun and possibly even to the source of supply of the coating material.

The heart of this invention lies in the feature above described. By means thereof, the head end of the gun is grounded thereby making it possible to get closer to the work with the head end, all to the end that the coating material can be more efficiently and effectively "pushed" into areas which are restricted such as areas between closely spaced walls and the like, as for example in the case of radiator fins. The principle involves setting the grid rearwardly of the head end of the gun so as to permit the use of a regular paint spray gun. The high potential grid discharge being an integral member, separate and apart from the head end of the gun, the same can be adjusted forwardly and rearwardly relative thereto, all as desired, without effecting any changes or adjustments in the head end per se.

The higher the voltage employed, the further to the rear the grid discharge 32 is disposed, it being appreciated that the voltage may conceivably reach as high as 250,000 volts.

The general features of the apparatus having been described, particular reference will now be made to Figs. 3–7 for an explanation of the details of construction of the various components of the gun mechanism.

The control or rear end of the spray gun 2 is best shown in Fig. 7 and comprises a body member 20 which encloses an air cylinder bore 100. The bore is closed at the rear end of the body member 20 by means of the cap or closure 22 which is threadedly engaged with the member 20.

Air inlet 24 is in communication with the bore 100, and admits pressurized air thereinto for the purpose of actuating the needle valve actuating member 12 which is provided with a rearward extension 104 extending rearwardly from the member 12, through a packing nut 106 into the body 20. The opposite end of the extension 104 constitutes an axially positioned valve member 108 which moves longitudinally through a packing nut 110. An annular plunger 112 is threadedly engaged with the free end of the valve member 108 and reciprocates within the bore 100.

The plunger 112 and member 108 are urged forwardly by means of a spring 114 disposed between the plunger 112 and the cover member 102. The spring 114 urges the needle valve forwardly to keep it in a normally closed position.

When the air enters the inlet 24, it travels to the bore of the air cylinder at the forward side of the plunger and forces the plunger rearwardly against the action of the spring 114.

A needle adjusting screw member 116 is threadedly engageable with the cover member 102 for manual adjustment relative thereto. This member maintains a manually variable tension on a small compression spring 118 disposed therein as shown. The spring 118 resists the opening movement of the plunger 112.

The member 116 is adjustable whereby the resistance of the spring 114 may be increased or decreased.

As the valve member 108 is withdrawn rearwardly away from its seat, atomizing air entering through the inlet 26 is conducted through passages 120 and 122 through a coupling 124 which is engaged with and in communication with the member 6. In this manner, the atomizing air is communicated to the forward end of the gun mechanism.

Coating material passes through the inlet 30 into and through passage 29 in the fitting 28, in communication therewith, and through a coupling 128 engaged with and in communication with the fitting 28. The member 8 is connected to the fitting 28.

The head or discharge end of the apparatus is best shown in Figs. 5 and 6. It comprises an inner fluid metallic nozzle 202 formed with a tip 204 through which the coating material is emitted and an outer metallic nozzle 206 which controls the air.

The rear end portion of the nozzle 202 is enlarged at 208 and is connected in any suitable manner with the metallic body member 210.

The enlarged portion 208 of the nozzle 202 is formed with a suitable seat against which the air nozzle 206 is held by a union nut 212 or other suitable means.

The fluid tip 204 is provided with a central orifice through which the emission of the spray material is controlled by a needle 214.

The central outer portion of the air nozzle 206 is in

the form of a cap enclosing an annular air space **216** having a main discharge orifice **217** surrounding the fluid tip **204**.

The nozzle **206** is provided with a pair of forwardly and outwardly projecting horns **218** provided with oppositely disposed orifices **220** through which flattening air jets are discharged at an angle to the spray stream in a well known manner.

The central cap-like portion of the air nozzle **206** is also provided with a pair of opposed orifices **222** disposed at angles to the orifices **220**. The orifices **222** are located comparatively close to the main discharge air orifices **220** and have a smaller angle of convergence than the orifices **220** so that the air jets emitted from the orifices **222** impinge at a comparatively small angle against the spray streams between the fluid tip **204** and the region in which the flattening jets from the orifices engage and flatten the spray streams.

The smaller air jets from the orifices **222** impinge against the spray streams between the end of the tip **204** and the vertex of the flattening jets from the orifices **220**.

The smaller jets also add to the atomizing air emitted from the orifice **217** in such a manner as to reduce the forward blow of the center air. This reduction of velocity helps to eliminate the wavy effect which occasionally appears as a result of the force with which the spray hits the surface being coated.

The body member **210** is provided with coupling members **230** and **232** whereby the members **6** and **8** and **10** respectively may be connected therewith.

Passageway **234** in communication with the passageway in member **6** leads the air therethrough past a control member **236** to the air space **216**.

The control member **236** is adjustable transversely so as to open or close the passageway **234**. The member **236** is held relative to the body member **210** by means of a nut **238** with which it is in threaded engagement. It has an outer free end portion **240** which carries a journal member **242**. Member **242** has a gear **244** integral therewith.

Gear **246** supported by a journal in a bracket **248**, is fixed to the forward end of the member **14** so as to be rotated thereby.

Gears **244** and **246** are in mesh so that upon manual rotation of member **14**, the opening through the passageway **234** may be adjusted as desired.

At the control end of the gun, the member **14** is journalled in bracket **250** on post **40**. A manually engageable handle **252** at the free inner end of the member **14** thus permits the adjustment of the control member **236**.

A stuffing box **260** is disposed rearwardly of the body **210** and the needle **214** is extendable therethrough whereby the extending free end thereof is fixed to the member **12**.

A modified form of the invention is shown in Fig. 8 wherein the rear end portion, generally indicated by **302**, and the forward or discharge end portion, generally indicated by **304**, are connected by an insulating air conducting member **306**, an insulating coating material conducting member **308**, an insulating needle valve actuating member **312**, and an insulating port control actuating member **314**.

In this modified form, only one coating material conducting member is shown instead of two, for purposes of simplification, although it will be understood that the two members (of the recirculating type) can be employed, if desired.

The control end includes the body member **320** containing the air cylinder closed by the closure or cap **322** at the rear end thereof.

The adjusting screw **316** is associated with the closure **322** as before.

Air inlets **324** and **326** for supplying pressurized air to the air cylinder and atomizing air to the spray head are provided.

An L fitting **328** is provided having an inlet means **330** for the reception of the coating material into the gun mechanism.

As in the case of the disclosure above, air entering inlet **24** serves to actuate the needle actuating member **312** and air entering inlet **326** is conducted through the body **320** to the air conducting member **306** and thence forwardly to the head end of the gun.

Coating material entering through inlet **330** is conducted through the L member **328** and the material conducting member **308** to the head of the gun.

At the head end of the gun, the body member **350** supports and is connected with the members **306**, **308**, **312** and **314**.

At the forward end of the body member **350** an atomizing head **352** of the type shown in my copending application, Serial Number 481,162 filed January 11, 1955, is employed and is secured thereto by means of a union nut **354**.

The head **352** is enclosed within a cylindrical sleeve member **356** to which is fitted a conical shaped dispersing member **358**. Members **356** and **358** are unitary and are rotatable relative to member **352**, the outer wall of member **352** functioning as a journal for the sleeve member.

An annular driven gear **360** is fitted to the sleeve member **356** and is engaged by a driving gear **362** which is fitted to the forward free end of an insulating driving rod **364** supported relative to the body member **350** by means of a journal **366**. The rearward free end of the member **364** is engaged with a driving motor **368**.

The atomized spray of coating material and air emanating from the tip of the spray head **352** is directed onto the inner wall of the conical dispersing member **358**.

This member **358** extends coaxially of the spray head and serves as an outer spray head in that its outer opening has an enlarged diameter. That is, the member **358** is provided with a wall that tapers outwardly.

The cone member being hollow, the atomizing coating material is metered at the desired rate to the apex thereof. Rotation of the cone member spreads the material uniformly over its inner surface causing the material to flow evenly to the outer edge thereof to effect an even coating on the article sprayed.

In operation, the liquid material and air issue from their respective orifices in the atomizing head in the form of high velocity streams where they mix with each other under pressure. The resulting mixture is directed outwardly with high turbulence in the form of a finely divided stream.

Certain of the atomized material is caught by the inner surface of the rotating cone member where the same flows evenly toward the outer edge thereof from which it is attracted to the object to be coated.

As the stream is directed outwardly away from the nozzle, it is subject to the ionizing effect of the discharge grid, heretofore described, which surrounds the gun mechanism. By such means, the finely divided particles comprising the spray are each charged with electrical charges of like polarity and of substantially equal potential with respect to the electrode.

The positively charged particles are attracted to the nearby grounded objects to be coated. The particles are attracted to and precipitate in a layer upon the grounded surface.

In Fig. 9, I have shown a modified form of the invention shown in Fig. 8 wherein the atomizing head **452** is fixed to the body member **450** by means of a coupling member **454**.

As in the case of the other modified forms of the invention the head end of this gun member is supplied with material through conducts **406** and **408** and is provided with a needle actuating valve member **412**.

The driving rod **464** is journaled to the body member **450** by means of a bracket **466** and the forward free end

of the member 464 is provided with a conical member 458.

The atomized spray of coating material and air emanating from the tip of the spray head 452 is in this instance directed onto the outer wall of the conical dispersing member 458.

While certain modifications of my invention have been disclosed herein, it is understood that other changes and variations therein may be made without departing from the spirit of the invention as set forth in the following claims.

What I claim is:

1. An electrostatic coating device adapted to electrostatically charge a spray of coating material comprising an air actuated spray apparatus having metallic front and rear end body members, said front end body member and said rear end body member each having a coating material inlet and outlet and an air inlet and outlet, insulating tubular members for coupling respective openings in said front and rear end body members, a metallic annular discharge electrode spatially disposed about said front end body member but supported by said rear end body member and being substantially enclosed throughout its length by a coating of insulating material, said discharge electrode having a plurality of metallic needles secured thereto and extending outwardly therefrom to expose only the ends thereof and which terminate within the confines of the outer surface of the coating of insulating material, a sleeve of insulating material substantially axially surrounding the front end body member of the spray apparatus and insulatedly supported by the rear end member, said annular discharge electrode having means of connection to a high voltage source to establish an electrostatic field adapted to effect deposition of the sprayed coating material, whereby electrical contact between said annular discharge electrode and the front end body member is mitigated and the hazard of explosion of electrically conducting liquid coating material is minimized while spraying electrostatically.

2. An electrostatic coating device adapted to electrostatically charge a spray of coating material comprising an air actuated spray apparatus having metallic front and rear end body members, said front end body member and said rear end body member each having a coating material inlet and outlet and an air inlet and outlet, tubular members for coupling respective openings in said front and rear end body members, a metallic annular discharge electrode spatially disposed about said front end but supported only by the rear end member and being substantially covered throughout its length by a coating of insulating material, said annular discharge electrode having a plurality of metallic needles secured thereto and extending outwardly therefrom to expose only the ends thereof and which terminate within the confines of the outer surface of the coating of insulating material, a sleeve of insulating material substantially axially surrounding the front end body member of the spray apparatus and insulatedly supported by the rear end member, but terminating beyond the outer extremity of the front end member, said annular discharge electrode having connecting means for connection to a high voltage source to provide an electrostatic field adapted to effect deposition of the sprayed coating material, whereby electrical contact between said annular discharge electrode and the front end body member is mitigated and the hazard of explosion of electrically conducting liquid coating material is minimized while spraying electrostatically.

3. An electrostatic coating device adapted to electrostatically charge a spray of coating material comprising an air actuated spray apparatus having metallic front and rear end body members, said front end body member and said rear end body member each having a coating material inlet and outlet and an air inlet and outlet, insulating tubular members for coupling respective inlet and outlet openings in said front and rear end body members, a discharge electrode spatially disposed adjacent said front end but supported by said rear end member and being substantially enclosed throughout its length by a coating of insulating material, said discharge electrode having a plurality of metallic elements secured thereto and extending outwardly therefrom to expose only the ends thereof and which terminate within the confines of the outer surface of the coating of insulating material, a sleeve of insulating material substantially axially surrounding the front end body member of the spray apparatus and insulatedly supported by the rear end member, said discharge electrode having means for coupling to a high voltage source to establish an electrostatic field adapted to effect deposition of the sprayed coating material, whereby direct electrical contact between said discharge electrode and the front end body member of the spray apparatus, due to contact with a work piece by the spray apparatus, is mitigated and the hazard of explosion of coating material is minimized while spraying electrostatically.

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