

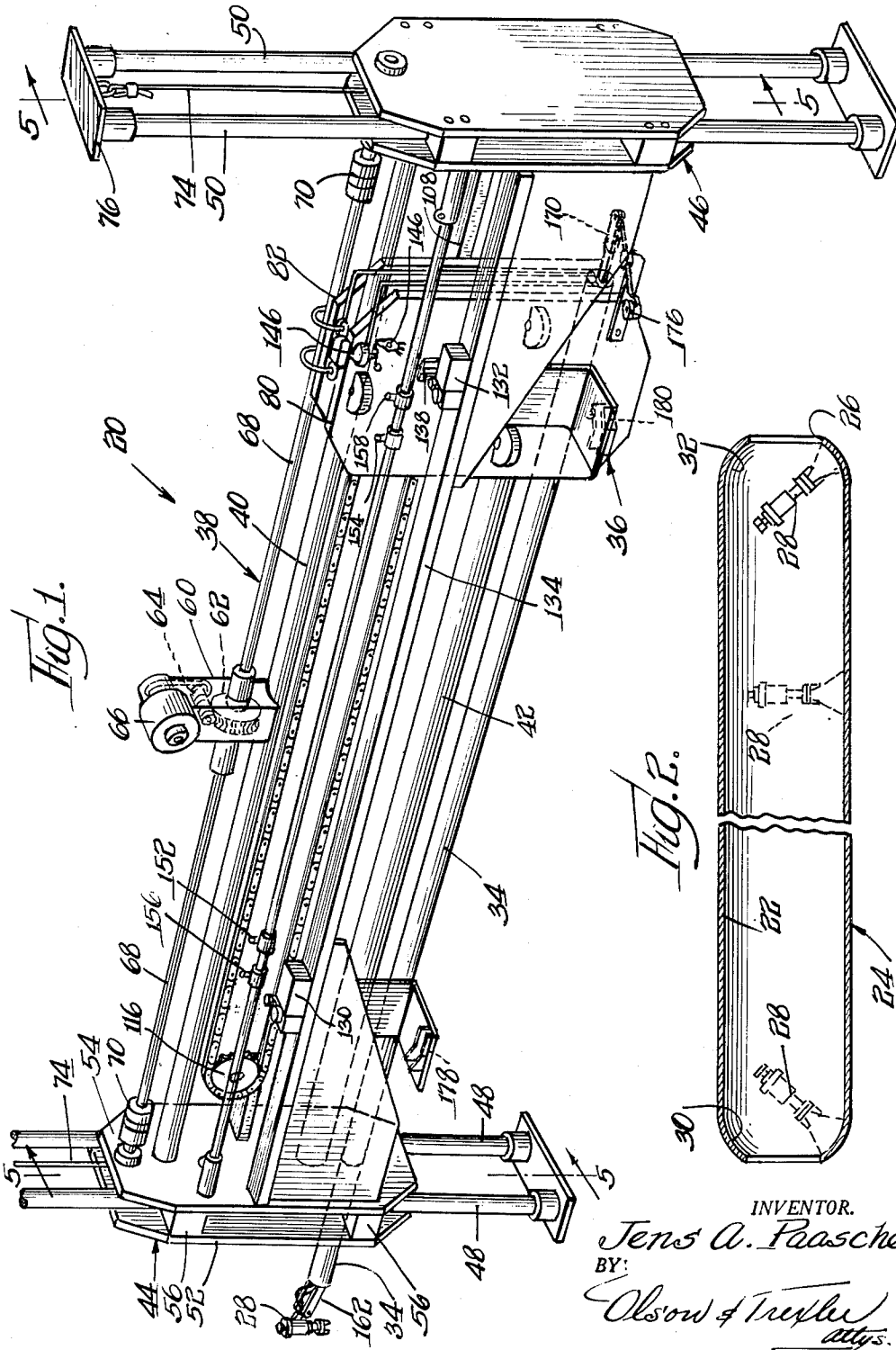
March 27, 1962

J. A. PAASCHE
SPRAY COATING MACHINE

3,027,095

Filed March 22, 1961

5 Sheets-Sheet 1



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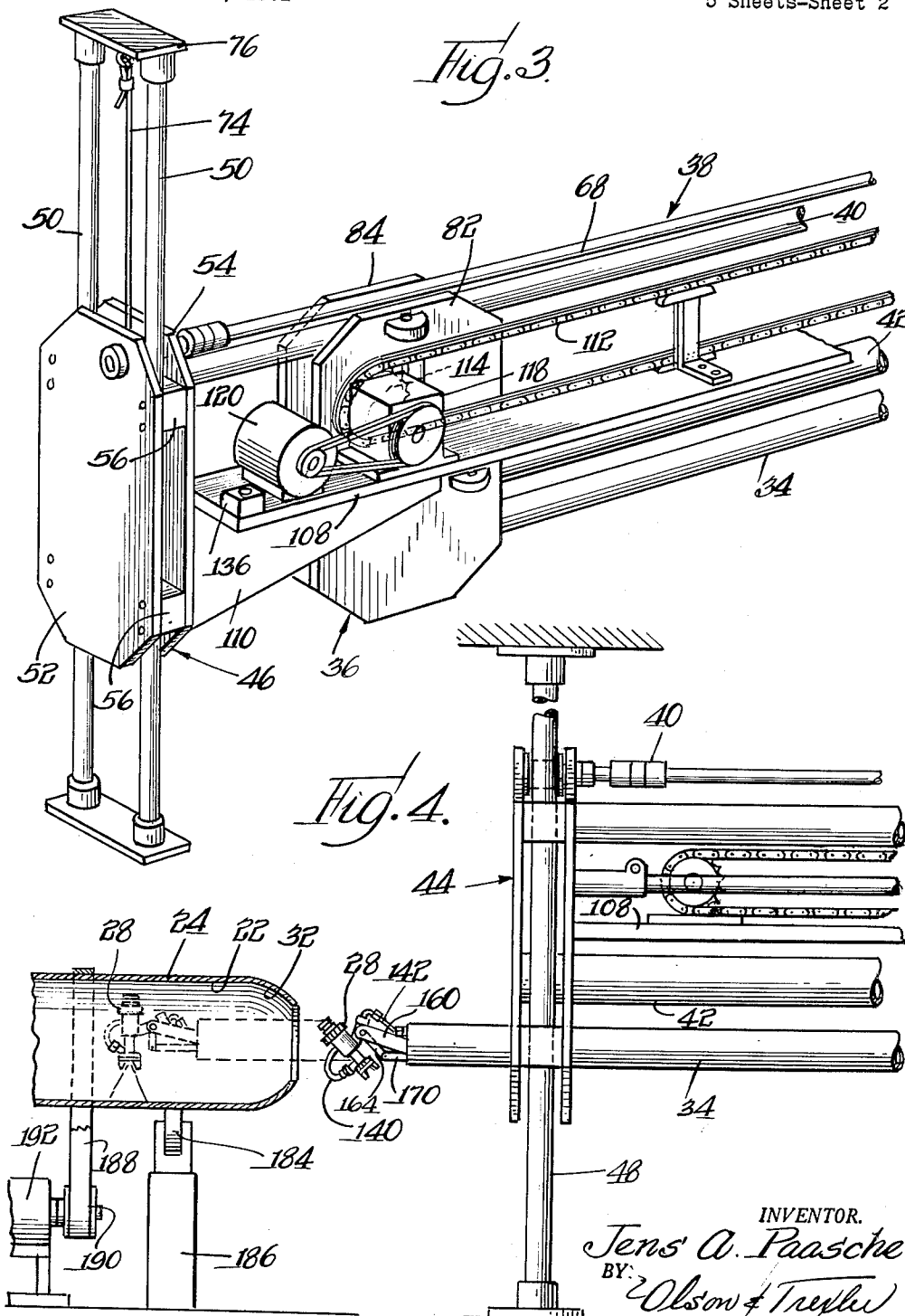
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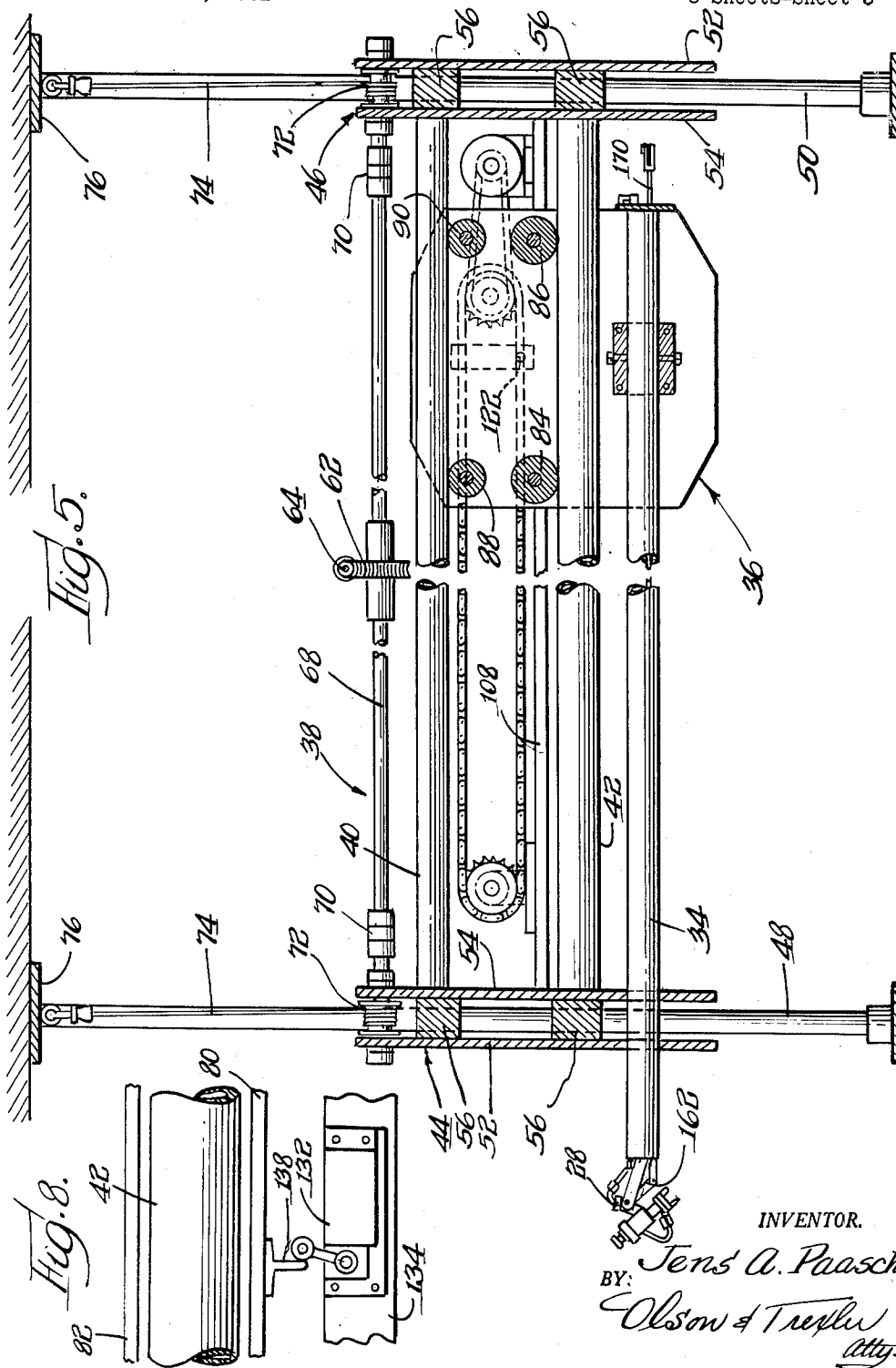
J. A. PAASCHE

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SPRAY COATING MACHINE

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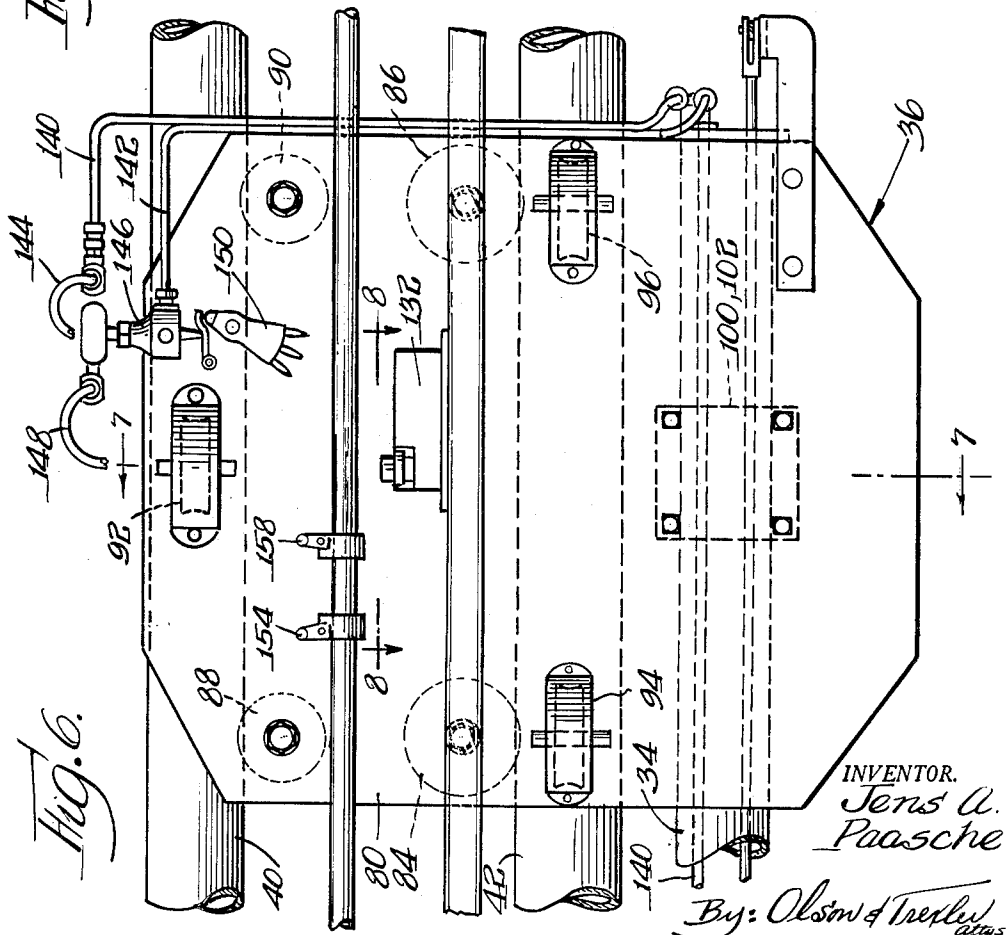
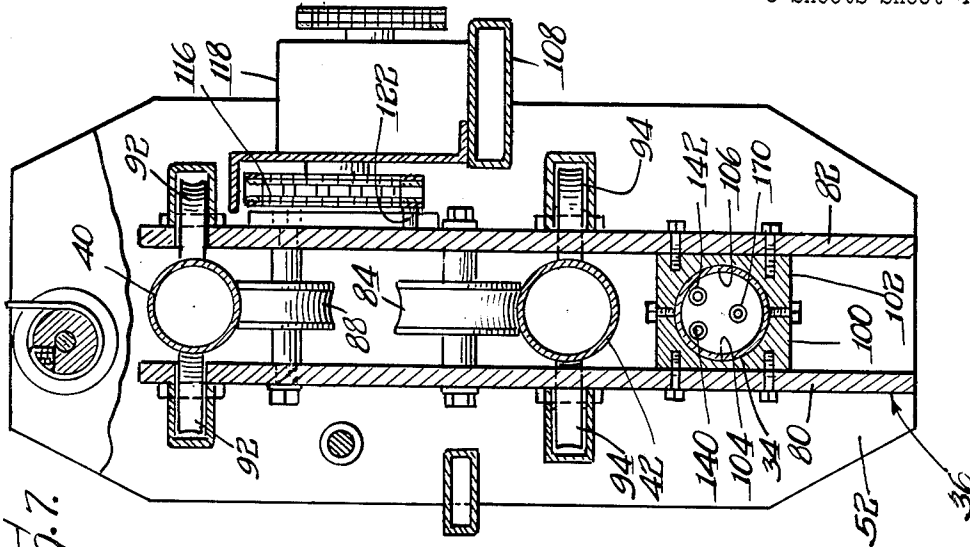
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SPRAY COATING MACHINE

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5 Sheets-Sheet 4



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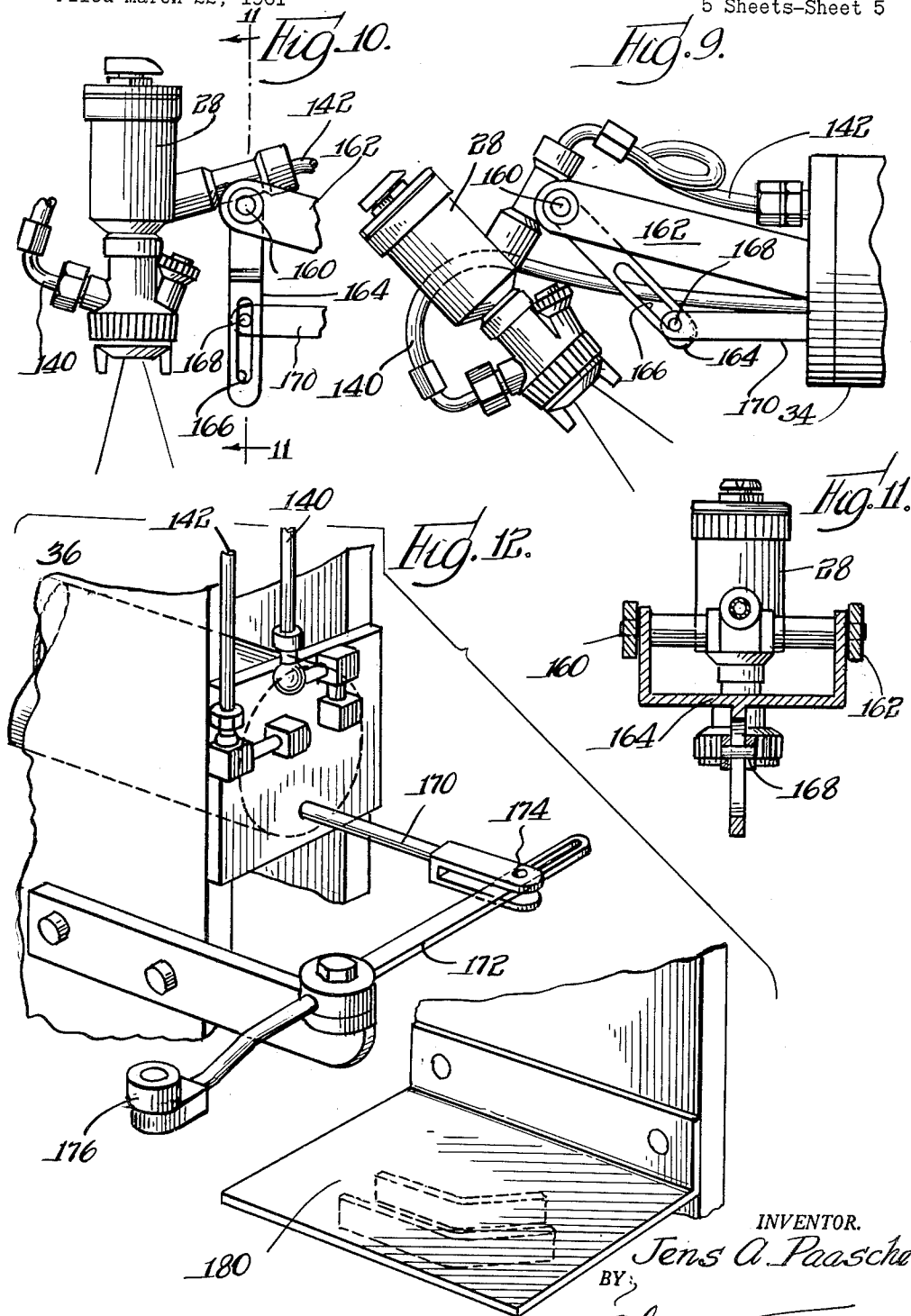
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5 Sheets-Sheet 5



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3,027,095

SPRAY COATING MACHINE

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7 Claims. (Cl. 239-187)

The present invention relates to air as spray coating equipment.

One object of the invention is to provide a new and improved coating or air painting machine which affords many advantages in the coating of surfaces by airbrush or spray gun means movably supported and operated from a remote position.

Another object is to provide an improved coating machine, as recited in the preceding object, which affords special advantages in the coating of relatively inaccessible surfaces including internal surfaces within hollow bodies.

Another object is to provide an improved coating machine, as recited in the preceding objects, which operates to effect even coating of surfaces of complex shape even though the surfaces are located deep within a hollow body.

Another object is to provide an improved coating machine of the character recited which effects an automatic coordination of translatable and angular movement of an airbrush or spray gun mounted on the free end of a cantilever support to effect an even coating of a surface of complex shape.

A further object is to provide an improved coating machine as recited in the preceding objects which will operate fully automatically through complete operating cycles each of which effects a complete coating of a complex surface on an object to be coated.

An additional object is to provide a spray coating machine of the character recited which is inherently capable of operating dependably and efficiently over a long service life.

Other objects and advantages will become apparent from the following description of the exemplary form of the invention illustrated in the drawings, in which:

FIG. 1 is a perspective view of a spray or air coating machine forming the exemplary embodiment of the invention illustrated;

FIG. 2 is a transverse sectional view of a long hollow body defining an internal surface of complex shape which is coated by means of the machine illustrated in FIG. 1, a number of successive positions of the airbrush of the machine in relation to the surface to be coated being illustrated in phantom in FIG. 2;

FIG. 3 is a fragmentary perspective view of the machine as viewed from the rear side with reference to FIG. 1 and showing the right-hand end of the machine as it appears in FIG. 1;

FIG. 4 is a fragmentary side view showing the left end of the machine as it appears in FIG. 1 and illustrating the relationship of the machine to a long hollow body supported rotatably in position to be internally coated by the machine;

FIG. 5 is a vertical longitudinal sectional view taken generally along a plane through the line 5-5 of FIG. 1;

FIG. 6 is a front side elevational view of the translatable bridge on the machine;

FIG. 7 is a vertical sectional view taken along the line 7-7 of FIG. 6;

FIG. 8 is a fragmentary sectional view taken with reference to the line 8-8 of FIG. 6;

FIG. 9 is a side elevational view on an enlarged scale showing the coating airbrush and the adjacent end of its cantilever support, the airbrush being shown in an extreme position within its angular range of swinging movement;

FIG. 10 is an elevational view generally similar to FIG.

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9, but showing the airbrush turned to another position within its range of angular movement;

FIG. 11 is a simplified transverse sectional view taken along the line 11-11 of FIG. 10 and showing the pivotal support for the airbrush; and

FIG. 12 is a fragmentary perspective view showing the lower right end portion of the carriage as it appears in FIG. 1 and cam structure which coacts with airbrush actuating structure carried by the carriage.

The spray coating or air painting machine 20 constructed in accordance with the invention and illustrated in the drawings provides special advantages in the spray coating of relatively inaccessible surfaces, such for example as the internal surface 22 of a long hollow cylinder 24, illustrated in FIG. 2. The machine is capable of working through a relatively small end opening 26 in the cylinder 24, for example, to automatically translate an automatic airbrush or spray gun 28 along the surface 22 and effect angular movements of the airbrush which are automatically coordinated with the translatable movements of the airbrush to effect an even coating of the surface 22, even though it has a complex shape or contour.

As shown in FIG. 2, the cylindrical object 24 to be internally coated is constricted at its opposite ends, thus producing a progressive reduction in the diameter of the internal surface 22 within opposite end portions of the cylinder. Thus, the internal surface 22, which is cylindrical throughout the major portion of the length of the cylindrical object 24, includes two surface end portions 30, 32 which have a concave curvature in longitudinal section, as illustrated in FIG. 2.

Automatic operation of the airbrush or spray gun 28 within the cylinder 24 to effect the desired uniform coating of the internal surface 22 is effected through a long cantilever support 34 for the airbrush which is operated automatically by the machine 20 to move the automatic airbrush through the opening 26 in the body 24 and produce the necessary movements and control of the airbrush within the cylinder. Moreover, the structure used to manipulate the airbrush 28 and to supply operating fluid to the airbrush to effect the desired controlled operation of the airbrush is designed to extend through the cantilever support 34 for the airbrush in a manner which permits a highly advantageous minimization of the overall transverse sectional area of the cantilever support. Preferably, the cantilever support 34 comprises a cylindrical tube containing elements which actuate and service the airbrush 28 and having a relatively small diameter in relation to the size of the airbrush which facilitates working of the cantilever support through a small opening into an object to be internally coated.

The cantilevering airbrush support tube 34 is mounted on and projects longitudinally from a carriage 36 which is supported for translation along a horizontally elongated frame assembly 38 parallel to the airbrush support tube. The frame assembly 38 comprises two cylindrical support rails 40, 42 disposed in parallel vertically spaced relation to each other and extending horizontally between two end slides 44, 46 on the assembly.

The respective end slides 44, 46 of the frame assembly 38 slidably engage two pairs of vertical standards or columns 48, 50 for vertical translation along the columns to effect vertical adjustment of the frame assembly 38, as will presently be described.

Each slide 44, 46 comprises two vertical plates 52, 54 secured to opposite sides of intervening guide block means 56 which slidably engage the coacting pair of vertical columns to guide the slides for vertical movement along the columns.

Vertical adjustment of the airbrush 28 is effected by vertical adjustment of the track assembly 38 on which

the automatic airbrush is supported through the carriage 36 and the cantilever support 34.

Vertical adjustment of the track assembly 38 along the guide columns 48, 50 to any desired level is effected through power operated elevating and lowering means of extremely simple yet reliable construction which operates to effect smooth, easily controlled vertical movement of the track assembly to any desired level. The elevating means for the track assembly 38 is energized by a power drive supported on a drive housing 60 secured to the upper cylindrical surface of the rail 40 at the longitudinal center of the rail and projecting upwardly from the rail, as shown in FIG. 1. A worm gear 62 journaled in the housing 60 in parallel relation to the rails 40, 42 is controllably rotated in either direction by a self-locking worm 64 meshing with the worm gear 62 and being driven by an explosion proof electric motor 66 surmounting the housing 60, as shown. The self-locking character of the worm 64 in relation to the gear 62, which is achieved by virtue of the lead of the worm, enables the worm to hold the gear 62 against rotation by the weight of the track assembly and structure supported on the track assembly, as will presently appear.

A long, thin drive shaft 68 extends in opposite directions from the worm gear 62 in vertically spaced parallel relation to the track 40 into proximity to the two slides 44, 46. The shaft 68 connects through couplings 70 with support windlasses 72 journaled within the upper ends of the respective slides 44, 46. A support cable 74 is wound around each of the windlasses 72 and extends upwardly to connect with an anchor plate 76 resting on the upper ends of the associated guide columns for the slides. See FIGS. 1, 3 and 5.

Energization of the motor 66 to rotate the shaft 68 in one direction causes the windlasses 72 to wind up the cables 74 to raise the track assembly 38. Upon de-energization of the motor 66, the windlasses are held against retrograde rotation and support the track assembly in its adjusted position by virtue of the self-locking action of the worm 64 on the gear 62. Lowering of the track assembly is effected by energizing the motor 66 to cause driving of the shaft 68 in the opposite direction, whereupon the track assembly is stopped and held in its adjusted position by deenergization of the motor.

It is noteworthy, in connection with the above, that the track assembly 38 is relatively long and can be constructed to have any length necessary for providing the desired range of translatable movement of the airbrush 28. The operating characteristics of the windlasses 72 which support the two widely spaced ends of the track assembly are such that it is feasible to use a highly simplified structure for controllably rotating the windlasses, while at the same time achieving smooth, precisely controlled vertical movement of the track assembly. By virtue of the operating characteristics of the support windlasses used in this environment, it is feasible to use a rather thin drive shaft 68 for the windlasses and to leave the drive shaft free of supporting structure between the gear 62 and the slides 44, 46, even though the over-all length of the shaft 68 is substantially equal to that of the track assembly.

In the preferred construction illustrated, the carriage 36 supported for translation along the track assembly 38 comprises a pair of side plates 80, 82 disposed in opposing spaced relation to each other on opposite sides of the rails 40, 42, as shown in FIGS. 1 and 7. Two grooved self-lubricating support rollers 84, 86 are journaled between the plates 80, 82 in horizontally spaced relation to each other, as shown in FIGS. 5, 6 and 7, and are supported on the lower rail 42. A smaller pair of grooved self-lubricating rollers 88, 90 are journaled between the plates 80, 82 in overlying relation to the respective rollers 84, 86 to engage the underside of the upper rail 40, as shown in FIGS. 5 to 7.

The rollers 84, 86, 88 and 90 thus support the carriage 36 and prevent tipping the carriage in the plane of the

rails 40, 42, even under the cantilevering load of the airbrush support 34 on the carriage.

Two grooved self-lubricating rollers 92, journaled about vertical axes on the respective carriage plates 80, 82, as shown in FIGS. 6 and 7, project through the respective plates and engage opposite sides of the upper guide rail 40. Two horizontally spaced rollers 94, 96 journaled about vertical axes in each of the carriage plates 80, 82 engage opposite sides of the lower rail 42, as shown in FIGS. 6 and 7, to provide further assurance of proper tracking of the rollers 84, 86, 88 and 90 along the support rails.

The two side plates 80, 82 depend below the lower rail 42 and support two intervening blocks 100, 102 which are clamped against opposite sides of the carriage end of the cantilever support 34, as shown in FIGS. 6 and 7. The blocks 100, 102 define semicylindrical faces 104, 106 which fit against the cylindrical cantilevering tube 34 to provide powerful, unyielding support to the tube which normally has a length at least equal to that of the track assembly 38.

Controlled translatable movement of the carriage 36 along the track assembly 38 is effected by power translating means mounted on a horizontal shelf 108 extending longitudinally along the rear side of the track assembly, as shown in FIGS. 1, 3, 4, 5 and 7, and being supported at opposite ends on the respective slides 44, 46 by brackets 110. An endless sprocket chain 112 is trained around two sprocket wheels 114, 116 supported on the shelf 108 near the respective slides 44, 46, as shown in FIGS. 1, 3, 5 and 7. The sprocket wheel 114, FIGS. 3 and 7, is driven in opposite directions by a speed reducing transmission 118 energized by an electric motor 120. The lower run of the endless sprocket chain 112 is connected to the carriage 36 by a driving connection 122 between the plate 82 and adjacent links on the lower run of the chain.

Hence, upon energization of the motor 120 to circulate the sprocket chain 112 in the clockwise direction with reference to FIG. 1, for example, the carriage 36 is advanced along the track assembly toward the slide 44. Energization of the motor 120 to circulate the chain 112 in the opposite direction retracts the carriage 36 along the track assembly.

The carriage 36 is shown in its retracted position in FIGS. 1, 3 and 5. The airbrush support tube 34 cantilevers from the carriage 36 through the slide 44 in parallel relation to the rails 40, 42 and projects somewhat beyond the slide 44 when the carriage is in its retracted position, as shown in FIGS. 1 and 4. The degree to which the support 34 projects beyond the slide 44 when the carriage is retracted is, of course, determined by the length of the support 34 in relation to the track assembly 38. If desired, a bearing surface may be provided in the slide 44 to provide sliding support to the airbrush support tube 34 to supplement the cantilever support from the carriage 36. However, the carriage 36 is capable, in itself, of providing adequate support to the cantilevering tube 34.

Translation of the carriage 36 along the rails 40, 42 produces a corresponding linear movement of the airbrush 28 along a surface to be coated, as will presently appear. Automatic control of translatable movement of the carriage 36 to provide the desired linear motion of the airbrush in a coating operation is achieved through the agency of two control switches 130, 132 adjustably mounted on a longitudinal support shelf 134 extending along the forward side of the track assembly 38 between the slides 44, 46, as shown in FIG. 1. The switches 130, 132 are positioned on the shelf 134 to have a spacing from each other substantially equal to the desired range of linear movement of the airbrush 28, the position of the respective switches corresponding to the limits of linear movement of the airbrush in the opposite direction.

An operating cycle of the machine 20 normally starts with the slide 36 in its retracted position illustrated in FIG. 1.

Each operating cycle is initiated by actuating of a starting switch 136, FIG. 3, to energize the motor 120 to translate the carriage 36 in an advancing direction toward the slide 44. While the switch 136 is shown positioned on the shelf 103 for convenience in illustration, it should be understood that this switch can be located in any convenient position, even in a remote control station. As the carriage 36 reaches a position corresponding to the desired limit on linear advancing movement of the airbrush 28, a switch actuator 138 on the carriage plate 80 operates the switch 130 which is interconnected with the motor 120 to terminate forward movement of the carriage 36. Preferably, the switch 130 is a reversing switch and is operated by the actuator 138 to reverse the traversing motor 120 to effect automatic return movement of the carriage to its starting position where the actuator 138 engages and operates the switch 132. In this instance, the switch 132 is a stop switch and serves to deenergize the motor 120 to terminate the operating cycle with the carriage 36 in its starting position, the next operating cycle being initiated by the operation of the switch 136, as described. However, it should be understood that the switch 132 can be a reversing switch like the switch 130 and can serve to automatically reverse movement of the carriage to continue the next operating cycle automatically.

The airbrush 28 carried by the projecting end of the cantilevering tube 34 is supplied with coating liquid and with operating air under pressure through two conduits 140, 142 connected to the airbrush, as illustrated in FIGS. 4 and 9, and extending longitudinally through the tube 34, as illustrated in FIG. 7, to the carriage end of the tube 34 where the conduits continue through suitable couplings with lines also identified by the numbers 140, 142 leading to the upper side of the carriage where the line 140 connects with a coating liquid supply conduit 144 from a suitable source of coating liquid and the operating air conduit 140 connects to an air control valve 146. The valve 146 is continuously supplied with air under pressure through a line 148 leading from a suitable source of compressed air.

The airbrush or spray gun 28, itself, responds automatically to the supply of operating air under pressure to the airbrush to perform its function as an airbrush and responds to interruption in the air supply to the airbrush to terminate its coating action, the airbrush being continuously supplied with coating liquid. Automatic airbrushes of this character are commercially available from the Paasche Airbrush Company, of Chicago, Illinois. Since such airbrushes are well known in the art, it is unnecessary to describe here the detailed construction of the airbrush 28.

Starting and stopping of the airbrush 28 in timed relation to movement of the carriage 36 along the rail assembly 38 is controlled by automatic operation of the air supply valve 146, FIG. 6, as an incident to movement of the carriage 36 along the rails 40, 42. The valve 146 is operated by a swingable valve control element 150 mounted on the carriage plate 80 below the valve 146, as shown in FIG. 6. Automatic actuation of the valve control element 150 is effected by a pair of spaced valve cut-off abutments 152, 154 and a pair of valve opening abutments 156, 158 adjustably mounted on a support rod extending horizontally along the front of the track assembly 38, as shown in FIG. 1, to accommodate the machine to coating strokes of different length.

When the carriage 36 is in its starting position, the air valve 146 is closed and the control element 150 is swung to its closed valve position, FIGS. 1 and 6. When the carriage 36 starts to advance, the valve control element 150 strikes the adjacent valve opening abutment

158 which swings the element 150 to valve open position, thus establishing the air supply to the airbrush 28 which responds automatically to produce its spray coating action. The actuator 150 depresses the valve closing element 154 without being affected by the element 154 and continues the air supply to the airbrush until movement of the carriage brings the actuating element 150 into engagement with the other valve closing element 152 which actuates the element 150 to shut off the air supply to the airbrush 28. The shut-off abutment 152 is positioned in relation to the reversing switch 130 to cut off the spray coating action of the brush 28 shortly before the linear movement of the airbrush is reversed.

The forward movement of the carriage 36 carries the actuator 150 on past the valve opening abutment 156 which does not effect opening of the valve 146 until the control 150 moves past the abutment 156 in the opposite direction on the return movement of the carriage 36. The other valve closing abutment 154 closes the valve 146 automatically as the carriage 36 approaches its starting position. In this manner, the operation of the airbrush 28 is automatically controlled in timed relation to the translatory movement of the carriage 36 to provide a uniformity in the coating which is being applied that is not affected by reversals in the linear movement of the airbrush at opposite ends of its linear stroke. For a detailed disclosure of the construction of the valve control abutments 152, 154, 156 and 158 and the swingable actuator 150, as such, reference may be made to United States Patent No. 2,728,238, issued December 27, 1955, to the applicant in the present application.

Uniform coating of surfaces of complex shape is provided for by angular movements of the airbrush 28 which are automatically coordinated with linear movements of the airbrush in accordance with the changing shape of the surface being traversed by the airbrush for coating by the airbrush.

As illustrated in FIGS. 4, 9, 10 and 11, the airbrush 28 is swingably supported on a support pivot 160 carried by arms 162 projecting at an angle from the free end of the support tube 34. The relationship of the pivot 160 to the airbrush 28 is such that the axis of the pivot 160 is perpendicular to the general direction in which a coating spray issues from the airbrush. Swinging movement of the airbrush 28 about the support pivot 160 is controlled by a link 164 swingably mounted on the pivot 160 and nonrotatably connected with the airbrush. A slot 166 in the link 164 receives an actuating pin 168 carried by a reciprocable control member 170 extending longitudinally through the cantilevering support tube to project beyond the supported end of the tube, as shown in FIGS. 4, 7, and 9 to 12. Longitudinal displacement of the actuator 170 in either direction from a center position illustrated in FIGS. 10 and 12, effects swinging movement of the airbrush 28 from a medial position illustrated in FIG. 10 in which the airbrush directs a spray in a direction generally perpendicular to the support tube 34. Location of the airbrush 28 in one extreme angular position is effected by a retraction of the control element 170 through the tube 34, as illustrated in FIG. 9.

As illustrated in FIGS. 1 and 12, the airbrush control element 170 is positioned longitudinally by means of a medially pivoted lever 172 having a pin and slot connection 174 with the control 170. The end of the lever 172 carries a cam following roller 176 which cooperates with stationary cam tracks 178, 180 mounted on the track assembly 33 to effect the desired coordination of angular and linear movements of the airbrush 28, as will be described.

As previously intimated, the machine 20, for the exemplary embodiment of the invention illustrated is designed to internally coat cylindrical objects having the form previously described in relation to FIG. 2. As illustrated in FIG. 4, a cylindrical object 24 to be coated is rotatably supported in a horizontal position on rollers 184 carried by pillow block means 186. Only one end of the

cylinder 24 and its coating support structure is illustrated in FIG. 4. Suitable means is provided for continuously rotating the cylinder 24 and is represented in this instance by a belt 188 trained over the cylinder 24, and being driven by a pulley 190 rotated by a speed reducer 192 driven by a constant speed electric motor (not shown).

The cylinder 24 is supported by the rollers 184 in parallel horizontally alined relation to the cantilevering airbrush support tube 34. The electric motor 66 is operated to move the track assembly 38 vertically as necessary to locate the airbrush 28 at the desired vertical height in relation to the underlying surface to be coated upon movement of the airbrush into the cylinder 24, as will be described. In this instance, the airbrush 28 is oriented to direct a coating spray in a generally downward direction, the support pivot 160 for the airbrush being substantially horizontal.

It will be recalled that each cylindrical object 24 to be coated is contracted adjacent its extreme ends to provide two internal surface portions 30, 32 which are concave in longitudinal section. The operation of the machine to effect even coating of these surface portions 30, 32, as well as the cylindrical portion of the internal surface 22, will be described.

An operating cycle of the machine starts with the automatic airbrush 28 retracted from the adjacent end of a cylindrical body 24 rotatably supported in a position of alinement with the airbrush support 34, as described. The airbrush 28 is at this time turned clockwise to the angular position illustrated in FIG. 4, the airbrush having been turned to this position near the end of the preceding operating cycle, as will be described.

Initiation of an operating cycle by actuation of the switch 136 causes the airbrush 28 to advance in a linear direction while turned at an angle, as shown in FIG. 4. As the airbrush enters the cylinder 24, the valve opening abutment 158 automatically opens the air valve 146 to automatically start operation of the airbrush 28 as it reaches a proper operating position in relation to the rotating concave surface segment 32, as illustrated in solid lines at the right-hand end of FIG. 2.

It should be made clear that the traversing motor 120 is also a constant speed motor and effects a relatively slow linear motion of the airbrush 28 in relation to the rotary motion of the object 24, thus causing the spray pattern from the airbrush 28 to cover the internal surface of the object 24 in a helical path.

As coating of the internal surface segment 32 of the object 24 progresses, the cam follower 176 on the lever 172, FIGS. 1 and 12, enters the cam track 180. It should be appreciated that at the beginning of the forward movement of the airbrush 28, the lever 172 is turned in a clockwise direction in relation to FIG. 12 from the position shown in FIG. 12 to locate the airbrush 28 in its angularly turned position, previously described in relation to FIG. 4. As linear movement of the airbrush 28 progresses, the cam following roller 176 coacts with the cam track 180 to progressively return the lever 172 to its mid-position. This causes a progressive swinging movement of the airbrush 28 in the counterclockwise direction with reference to FIG. 4, to bring the airbrush into a position generally perpendicular to the support tube 34 as the airbrush reaches a position alined with the cylindrical portion of the internal surface 22 to be coated.

The airbrush 28 remains at the angular position described until it approaches the more complex surface portion 30 adjacent the opposite end of the cylinder. At this juncture, the cam roller 176 on the lever 172, FIG. 12, enters the cam track 178, FIG. 1, to swing the lever 172 in the counterclockwise direction with reference to FIGS. 1 and 12. The effect of this is to swing the airbrush 28 in a counterclockwise direction with reference to FIG. 4 to bring it into generally perpendicular confronting relation to the opposing portion of the surface segment 30, as illustrated by the position of the airbrush

shown in phantom at the left-hand end of the cylinder in FIG. 2.

As the airbrush 28 reaches the end of the cylinder 24, the air valve closing abutment 152 effects termination of the spraying action and the reversing switch 130 effects a reversal of the carriage 36, whereupon a second coat is automatically applied to the internal surface of the cylinder.

During the second phase of the operating cycle, the first phase of the operating cycle is repeated in reverse. The abutment 156 automatically restarts spraying action, the cam track 178 returns the airbrush 28 to its perpendicular position progressively as the surface segment 30 is coated, the cam track 180 swings the airbrush back to its initial position as the surface segment 32 is coated, the abutment 154 automatically stops the spraying action and the switch 132 terminates the coating cycle.

It will be appreciated that the operating cycle can be readily modified to provide a variety of coating operations. If, for example, it is desired to apply only a single coat to the cylinder 24, this can be accomplished simply by eliminating the abutment 156 used to start the spraying action on the return cycle. Also, means can be readily provided to speed up return movement of the carriage 36 on the return cycle, if only a single coat is to be applied.

The switches 130, 132 and the air valve control abutments can be adjusted longitudinally along the track assembly to accommodate the linear stroke of the airbrush to different objects to be coated. Moreover, the cam tracks 178, 180 can be readily replaced with other cam tracks designed to provide a different pattern of coordinated angular movement of the airbrush to effect uniform coating of surfaces of different shapes.

The cam tracks 178, 180 illustrated are shaped to effect a uniform automatic coating of surfaces on an object having the form illustrated. To coat objects having a different shape or form cam tracks of corresponding shape are produced and installed in the machine to coact with the follower 176 and automatically effect the optimum angular movements of the airbrush 28 as it is progressed along the surface to be coated.

The machine thus provided is constructed largely from aluminum to avoid spark hazards.

It will be appreciated that the invention is not necessarily limited to use of the particular construction illustrated, but includes the use of variants and alternatives within the scope of the invention as defined by the claims.

The invention is claimed as follows:

1. In a machine for spray coating hollow bodies, the combination of a horizontally elongated carriage track, support means supporting said carriage track and including elevating means for controllably raising and lowering said track, a carriage supported on said track for translation therealong, an elongated airbrush support supported on said carriage to project therefrom in the general direction of translation of the carriage along said track, an automatic airbrush mounted on the projecting end of said airbrush support, means defining air supply and coating liquid supply passages extending along said airbrush support to said airbrush, operating means coacting with said carriage to translate the latter in opposite directions along said track to effect movement of said airbrush along a body to be coated, airbrush actuating means extending from said carriage to said airbrush to effect angular movement of the airbrush, and means for operating said airbrush actuating means to effect angular movement of said airbrush as an incident to movement of said carriage along a predetermined portion of said track.

2. In a spray coating machine, the combination of a horizontally elongated track assembly, guide means coacting with said track assembly to guide the latter for vertical movement, two windlasses journaled in opposite ends of said track assembly to support the latter, support cables wound on said respective windlasses and connect-

ed in supporting relation to said windlasses, an operating shaft extending between and connected at opposite ends to said respective windlasses, a self locking worm and gear transmission connected in driving relation to said shaft, a reversible motor connected to drive said worm and gear transmission in opposite directions, a support carriage mounted for translation along said track assembly, a hollow cylindrical airbrush support member mounted on said carriage and cantilevering away therefrom, an airbrush swingably mounted on the projecting end of said airbrush support for swinging movement in relation to said support, an air supply conduit and a coating liquid supply conduit extending through said hollow airbrush support to connect with said airbrush, an airbrush actuating rod extending through said airbrush support and connecting with said airbrush to effect swinging movement of the latter, linkage means on said carriage for moving said actuating rod longitudinally relative to said airbrush support, cam means supported on said track assembly in interfering relation to said linkage means to engage said linkage means and effect through said linkage means and said actuating rod swinging movement of said airbrush as an incident to movement of said carriage along said track assembly, valve means for controlling said airbrush, and means for operating said valve means automatically as an incident to movement of said carriage along said track assembly.

3. In a spray coating machine, the combination of an elongated carriage track, a carriage supported on said track for movement therealong, an elongated airbrush support supported on and cantilevering from said carriage, an airbrush mounted on said airbrush support, means defining air supply and coating liquid supply passages extending to said airbrush, means for moving said carriage along said track to effect movement of said airbrush along a body to be coated, airbrush actuating means extending from said carriage to said airbrush to effect movement of the airbrush in relation to the carriage, and means for operating said airbrush actuating means as an incident to movement of said carriage along a predetermined portion of said track to effect movements of the airbrush relative to the carriage which are automatically coordinated in relation to movements of the carriage along said track.

4. In a spray coating machine, the combination of a generally horizontal track assembly, a guide means coacting with opposite ends of said track assembly to guide the latter for vertical movement, two windlasses supporting opposite ends of said track assembly, means for operating said windlasses in synchronism to effect raising and lowering of the track assembly, a carriage supported on said track assembly for translation therealong, an elongated airbrush support connected to said carriage to cantilever beyond one end of said track assembly to a degree determined by the position of said carriage along said track assembly, actuating means coacting with said carriage to translate the latter in opposite directions along said track assembly, an airbrush mounted on the projecting end of said airbrush support, airbrush actuating means extending from said carriage along said airbrush support to said airbrush to effect angular movements of the latter, cam elements mounted on said track assembly and coacting with said airbrush actuating means as an incident to translation of said carriage along said track assembly to effect angular movements of said airbrush in timed relation to movements of said carriage along said track assembly, and means defining air supply and coating liquid supply passages extending along said airbrush support to said airbrush.

5. In a spray coating machine, the combination of an

elongated track assembly, a guide means coacting with said track assembly to guide the latter for vertical movement, windlass means providing vertically adjustable support to opposite ends of said track assembly, a carriage supported on said track assembly for translation therealong, an elongated airbrush support mounted on said carriage to cantilever therefrom beyond one end of said track assembly to a degree determined by the position of said carriage along said track assembly, means for moving said carriage along said track assembly, an airbrush mounted on said airbrush support in spaced relation to said carriage, airbrush actuating means extending from said carriage along said airbrush support to said airbrush to effect movement of the latter in relation to the carriage, means on said track assembly positioned to coact with and actuate said airbrush actuating means as an incident to movement of said carriage along said track assembly to effect movement of said airbrush relative to said carriage, and means for supplying air and coating liquid to said airbrush.

6. In a spray coating machine, the combination of a generally horizontal track assembly, a carriage supported on said track assembly for translation therealong, power translating means coacting with said carriage to translate the latter in opposite directions along said track assembly, an elongated airbrush support mounted on said carriage to cantilever therefrom in the direction of translation of said carriage along said track assembly, an airbrush pivotally mounted on said airbrush support in spaced relation to said carriage assembly, airbrush actuating means extending from said carriage along said airbrush support to said airbrush to control the angular position of the latter in relation to said support, means on said track assembly coacting with said airbrush actuating means as an incident to movement of said carriage along predetermined portions of said track assembly to effect angular movement of said airbrush in timed relation to translation of said carriage along said track assembly, operating air supply and coating liquid supply conduits extending from said carriage along said support to said airbrush, an air supply valve control carried by said carriage and connected in controlling relation to said air supply conduit, and valve actuating means mounted on said track assembly in interfering relation to said valve control to operate the latter automatically as an incident to translation of said carriage along said track assembly.

7. In a spray coating machine, the combination of an elongated carriage track, a carriage supported on said track for translation therealong, an elongated airbrush support supported on said carriage to project therefrom in the general direction of translation of the carriage along said track, an airbrush mounted on said projecting airbrush support, means defining air supply and coating liquid supply passages extending to said airbrush, operating means coacting with said carriage to translate the latter along said track to effect movement of said airbrush along a body to be coated, airbrush actuating means extending from said carriage to said airbrush to effect movement of the airbrush in relation to the airbrush support, and means for operating said airbrush actuating means in timed relation to movement of said carriage along a predetermined portion of said track.

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