

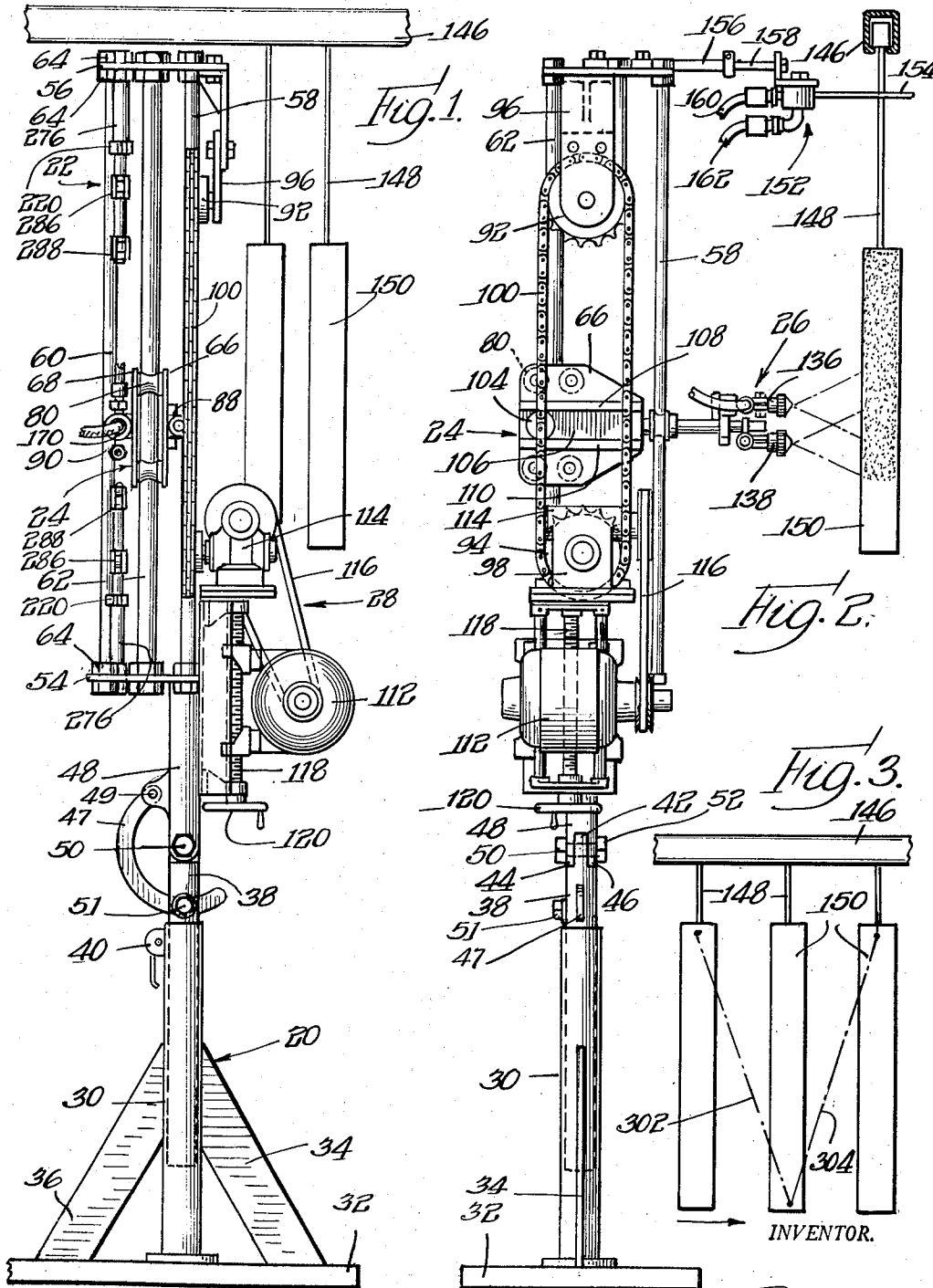
Jan. 15, 1957

J. A. PAASCHE
SPRAYING APPARATUS FOR SUCCESSIVE
ARTICLES CARRIED BY A CONVEYOR

2,777,419

Filed April 5, 1951

3 Sheets-Sheet 1



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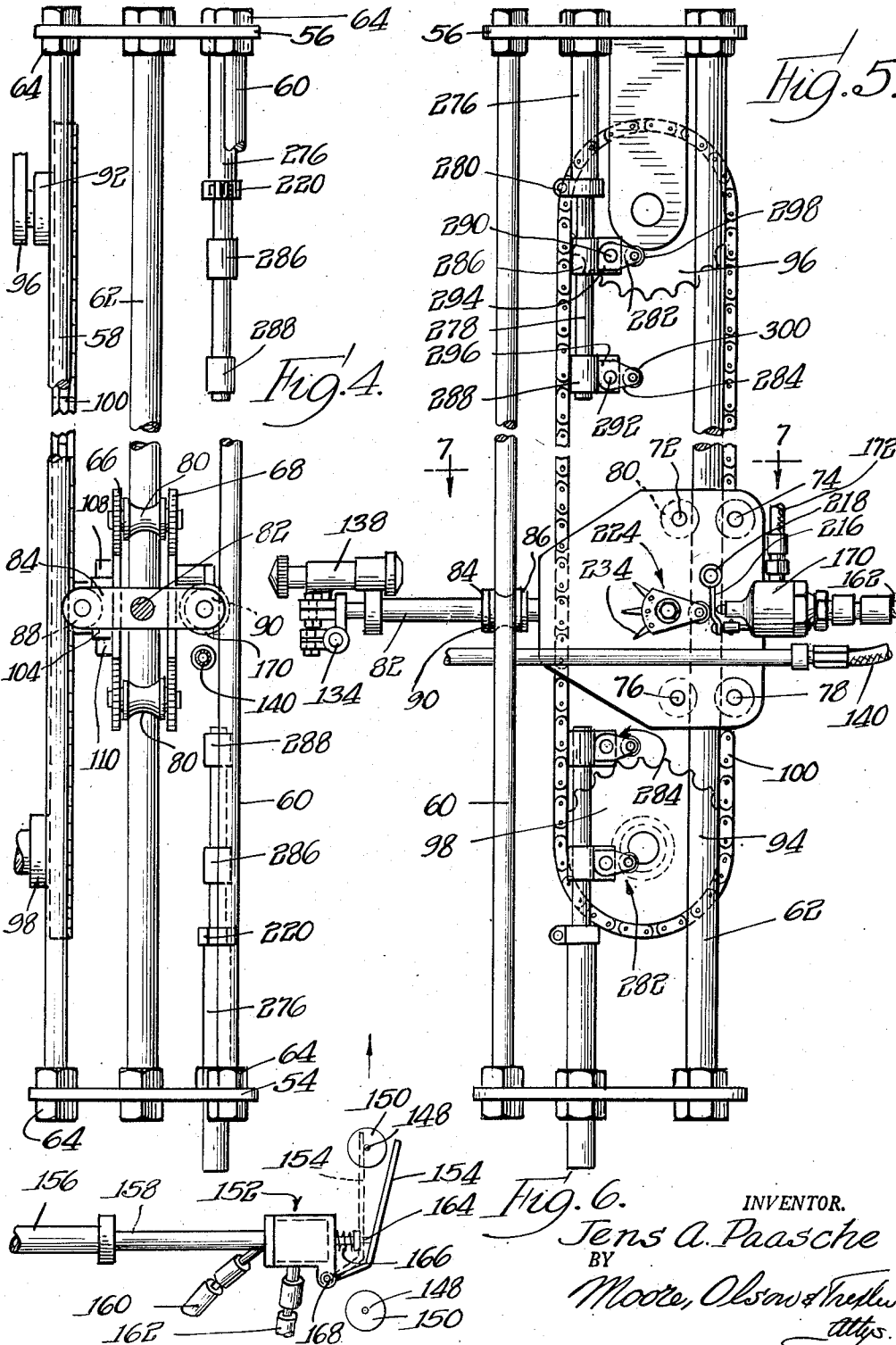
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3 Sheets-Sheet 2



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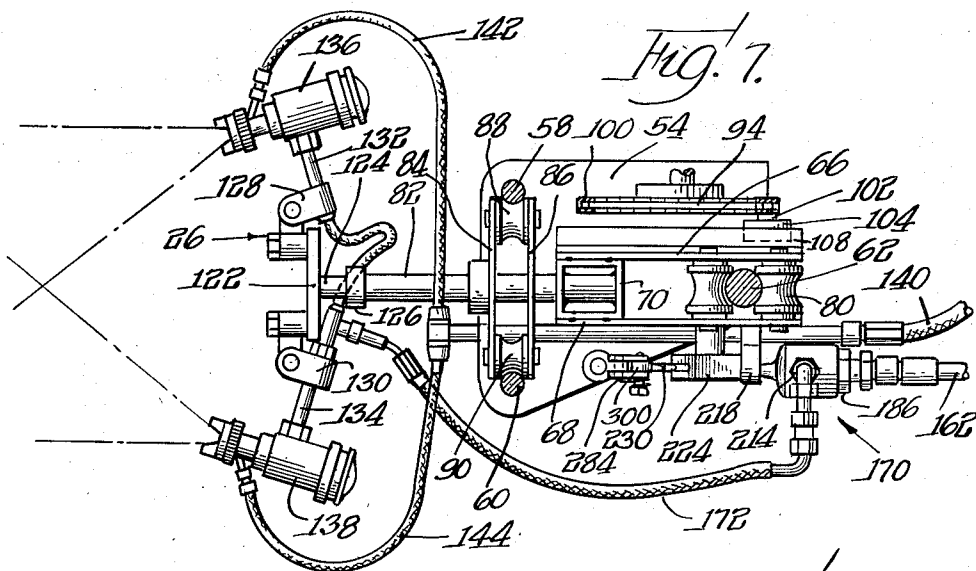
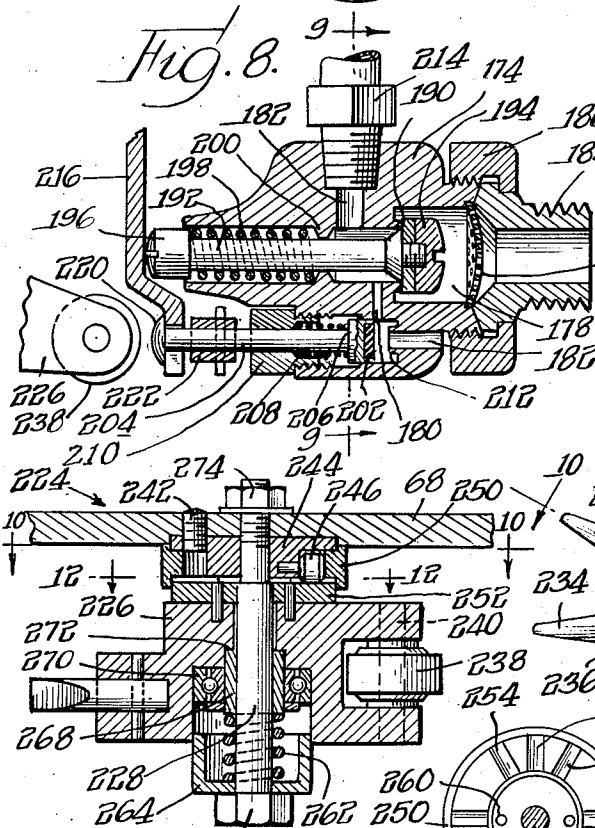
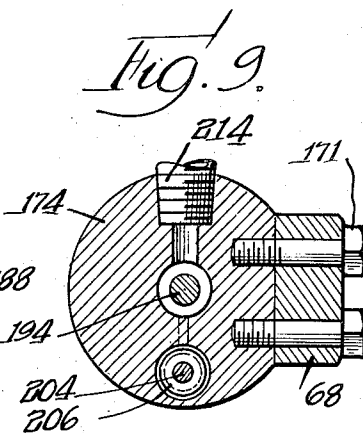
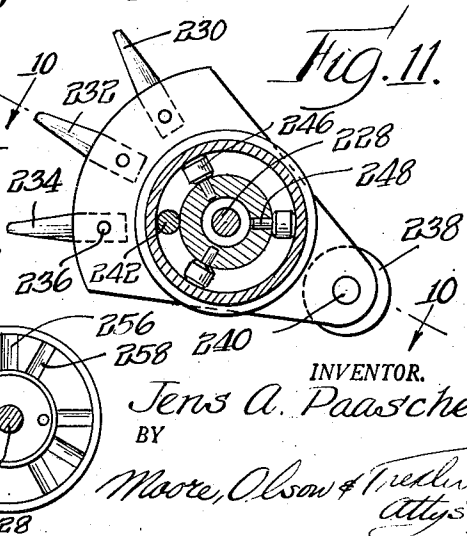
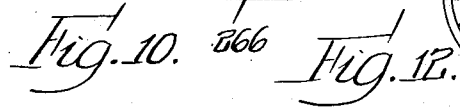
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3 Sheets-Sheet 3



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SPRAYING APPARATUS FOR SUCCESSIVE ARTICLES CARRIED BY A CONVEYOR

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Application April 5, 1951, Serial No. 219,439

6 Claims. (Cl. 118—323)

This invention relates to spraying and coating apparatus and, more particularly, to spraying apparatus to be used in conjunction with conveyors carrying the articles to be sprayed or coated.

It is desirable in many industries to spray a coating of material on articles as they are being conveyed along a production line. Certain of these objects to be sprayed are relatively large and accordingly the spray gun must be moved during the spraying operation in order to cover the entire surface of the article. In such installations it is particularly important to provide a spraying mechanism in which the spray guns are operative only when the spray guns are in a position to spray the coating material on the article. More specifically, it is desirable to operate the spray guns only when an article to be sprayed is positioned on the conveyor in front of the spray guns and only during that portion of the stroke of the spray gun in which the spray guns are aimed directly at the article. Furthermore, it is important to provide a steady support for the spray guns during their oscillatory motion in order to prevent inadvertent misdirection of the stream of coating material.

Accordingly it is an important object of the present invention to provide an improved oscillatory spraying mechanism; more specifically, it is an object of the invention to provide an improved mounting for the spray guns of an oscillatory spraying mechanism.

It is another object of the invention to provide an improved cam follower structure for use in a spray gun actuating mechanism.

It is still another object of the invention to provide improved article detecting means which are so constructed as to render the spray guns operative only when an article to be coated is properly positioned before the spray guns.

In connection with the foregoing object, it has been found that the article detecting mechanism may be several feet removed from the spray gun whereby to provide a long length of hose carrying the motive fluid which is air under pressure. As a result of this structure the spray guns tend to "spit" and "sputter" after the article detecting mechanism has moved to a position to render the guns inoperative due to the pressure remaining in the line interconnecting the article detecting mechanism and the spray guns.

Accordingly, it is yet another object of the invention to provide means for immediately rendering the spray guns inoperative regardless of the distance between the article detecting mechanism and the spray guns.

A further object of the invention is to provide in an oscillatory spraying mechanism of the type set forth above a pivotal mounting whereby the path of the spray guns can be adjusted to follow the movement of articles on a conveyor at whatever speed it may be traveling.

These and other objects and advantages of the invention will be better understood from the following description when taken in conjunction with the accompanying drawings. In the drawings wherein like reference numerals have been used to indicate like parts throughout:

Figure 1 is an elevational view of a spraying mechanism made in accordance with and embodying the principles of

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the present invention, the spraying mechanism being shown positioned adjacent a section of an article conveyor;

Figure 2 is a side elevational view of the spraying mechanism shown in Figure 1;

Figure 3 is a diagrammatic view showing the manner in which the oscillatory spray guns of the present invention can follow the center of an article to be coated along a conveyor;

Figure 4 is a partial enlarged view of the carriage and carriage track shown in Figures 1 and 2, certain parts being broken away for purposes of illustration;

Figure 5 is a side view similar to Figure 4;

Figure 6 is a plan view of the article detecting mechanism shown in Figure 2;

Figure 7 is a view in horizontal section substantially as seen in the direction along the line 7—7 of Figure 5, certain parts being shown broken away;

Figure 8 is a view in vertical section of an improved valve for spray guns which forms a part of the present invention;

Figure 9 is a view in vertical section of the valves shown in Figure 8 substantially as seen in the direction of the arrows along the line 9—9 thereof;

Figure 10 is a view in vertical section of an improved cam follower which forms a part of the present invention;

Figure 11 is a view in horizontal section of the cam follower shown in Figure 10 substantially as seen in the direction of the arrows along the line 11—11 of Figure 10; and

Figure 12 is a second horizontal section of the cam follower shown in Figure 10 substantially as seen in the direction of the arrows along the line 12—12 thereof.

Referring to the drawing, and particularly to Figure 1, there is shown a spraying mechanism made in accordance with and embodying the principles of the present invention, the spraying mechanism being shown adjacent a section of a conveyor. The advantages of the present invention are realized to the fullest when used in the application shown in the drawings, but it is to be understood that the invention is suitable for other uses.

The spraying mechanism comprises generally a base 20, a track 22 mounted upon base 20, a carriage 24 positioned upon track 22, a spray gun assembly 26 mounted upon carriage 24, and a drive mechanism 28 for moving the carriage 24 along track 22.

Base 20 includes an upstanding holder sleeve member 30 which is supported by a foundation member 32 that is preferably anchored to the supporting surface, a pair of braces 34 and 36. There is received in sleeve 30 a post 38 which is adapted to slide within an aperture formed within sleeve 30. There is provided a locking mechanism 40 which clamps sleeve 30 about post 38 to lock post 38 in a predetermined position. The upper end of post 38 is recessed to form a hinge portion 42, see Figure 2, which cooperates with a pair of hinge members 44 and 46 formed on a second post 48. A bolt 50 having a nut 52 passes through suitable apertures formed in the members 42, 44, and 46 to interconnect posts 38 and 48. The hinge connection so formed permits tilting between the posts 38 and 48 for a purpose which will be more fully set forth hereinafter.

An arcuate arm 47 is pivotally connected at one end thereof as at 49 to post 48. The other end of arm 47 is adapted to pass through an aperture formed in the lower post 38. A set screw 51 is threadedly connected to lower post 38 and has the end thereof bearing against the arcuate arm 47. The arm 47 aids in holding the posts 38 and 48 in the desired angular relationship, the set screw 51 being loosened during adjustment of the angularity between posts 38 and 48 and thereafter tightened when the posts 38—48 are in the desired position.

Mounted upon the upper end of post 48 is a plate 54 having a shape which can be best seen in Figure 7. Plate 54 forms a part of the track 22. Track 22 also includes a second plate 56 positioned at the upper end thereof and shaped similarly to plate 54, and three upstanding rods 58, 60, and 62 which extend between plates 54 and 56. Referring to Figure 7, it will be seen that rods 58 and 60 are circular in cross section and have substantially the same diameters. Rod 62 is also circular in cross section but has a diameter substantially twice the diameter of rods 58—60. The rods 58, 60, and 62 are suitably attached to the plate 54 and 56 by a plurality of nuts 64.

Mounted upon and carried by track 22 is the carriage 24. Referring to Figure 7, it will be seen that the carriage includes a pair of side plates 66 and 68 which are connected at one side by a bracket 70 and on the other side by four shafts 72, 74, 76, and 78 (see Figure 5).

Mounted on each of the shafts 72, 74, 76, and 78 are rollers 80 which have a concave recess on the periphery thereof adapted to engage and conform with the surface of rod 62. Suitably attached to bracket 70 as by welding is a forwardly extending rod 82 having a pair of laterally extending plates 84 and 86 fastened thereto. The opposed ends of plates 84—86 carry rollers 88 and 90 which engage the rods 58 and 60, respectively. It will be seen that the engagement of the rollers 80, 88, and 90 with rods 62, 58, and 60, respectively, provides a three point support in the horizontal plane. Such a support is usually rigid and provides for steady and smooth travel of carriage 24 along track 22. Similarly in a vertical plane three point support is provided, as can be best seen from Fig. 5.

Means is provided for driving the carriage 24 in an oscillatory manner upon track 22 in the form of drive mechanism 28. A pair of sprocket wheels 92 and 94 are mounted on the upper and lower ends respectively of the track 22 by means of brackets 96 and 98. Encircling the sprockets 92 and 94 and drivingly engaged therewith is a flexible link chain 100 which is of the endless or continuous type. There is provided on one of the links of chain 100 a post 102 (see Figure 7), on which is rotatably carried a wheel 104. Wheel 104 is adapted to be positioned in a groove 106 formed on plate 66 of carriage 24, the groove 106 being formed by a pair of flange members 108 and 110 suitably attached to plate 66. It will be seen that as chain 100 rotates, the engagement between wheel 104 and groove 106 will move the carriage 24 in the direction of the movement of wheel 104, and when the carriage reaches one of the sprocket wheels, the wheel 104 will be moved along groove 106 to the other side thereof for a return movement of the carriage. By this arrangement the carriage 24 is moved in a reciprocating or oscillatory manner along track 22.

Chain 100 is moved by rotating sprocket wheel 94. To rotate sprocket wheel 94, there is provided a motor 112 which drives a gear reducing mechanism 114 by means of a belt 116 interconnecting the motor 112 and gear reducer 114. The output shaft of gear reducer 114 is directly connected to sprocket wheel 94. Motor 112 is mounted upon a screw 118 operated by handle 120 whereby the distance between motor 112 and gear reducer 114 can be varied whereby to tighten or loosen the belt 116. Preferably the gear reducer 114 is of the variable output type so that the rate of travel of carriage 24 can be regulated.

Referring to Figure 7, the construction and mounting of the spray gun assembly 26 will be described. Mounted on the outwardly extending end of rod 82 is a support bracket 122. Attached to support bracket 122 is a shaft 124 which extends into an opening formed in the end of rod 82. A clamp 126 is provided at the end of rod 82 whereby the position of shaft 124 can be adjusted. On either end of bracket 122 is formed a pair of adjustable clamps 128 and 130 which are adapted to grasp conduits 132 and 134. The conduits 132 and 134 sup-

port spray guns 136 and 138, respectively and, in addition, provide a passage for air which is used to operate the spray guns 136—138. The spray guns 136—138 are of the type which are operated by introducing air thereto under pressure from conduits 132—134. When the air supply is interrupted, the spray guns are inoperative. By this mounting it will be seen that the spray guns 136—138 can be positioned and pointed in substantially all directions and that the mounting can be truly called a universal mounting. The material to be sprayed is conducted to the spray guns from a source (not shown) connected to a line 140 which divides into branches 142 and 144 which are connected to the spray guns 136 and 138, respectively.

Referring to Figures 1, 2, and 3, there is shown an application in which the spray mechanism of the present invention has particular utility. More specifically, there is shown a conveyor 146 from which depends a plurality of article carrying hooks 148. Suspended from hooks 148 are the articles 150 which are to be sprayed. Preferably the hooks 148 are mounted for rotation about their longitudinal axes so that the article 150 can be rotated as they are carried past the spray guns. It will be noted that there has been shown for the purposes of illustration an elongated article 150, the shape of such an article being such that it is necessary to have a vertically disposed track for the carriage 24 carrying the spray guns 136—138.

In order to insure that the spray guns spray only when articles are positioned in front of the guns, means is provided for interrupting the supply of air to the guns in the form of a valve, generally designated by the numeral 152, see Figures 2 and 6. Valve 152 is provided with an actuating arm 154 and is mounted on a bracket 156 in such a position that arm 154 extends into the path of hooks 148 positioned on conveyor 146. Bracket 156 has an adjustable portion 158 whereby the position of valve 152 is adjustable within limits. Air is conveyed to valve 152 from a source (not shown) through a line 160 and air also under pressure is conveyed from valve 152 through line 162 when valve 152 is actuated. A plunger 164 and a spring 166 are mounted on valve 152 in a position such that spring 166 urges plunger 164 against arm 154.

Arm 154 is L-shaped and is hingedly connected as at 168 to the housing of valve 152. It is to be noted that the longer portion of arm 154 is disposed directly in the path of hooks 148 whereby hooks 148 will tend to push arm 154 in a counterclockwise direction, as viewed in Figure 6, as the hooks move in the direction of the arrows. When arm 154 is in the position shown in dotted lines, the valve 152 is opened and air is supplied to the output line 162. The strength of spring 166 is so chosen that an unloaded hook 148 will not move arm 154, but a loaded hook 148 will move arm 154 to the position shown in dotted lines. The hook engaging portion of arm 154 is of such a length and so arranged that it will be contacted during the time that an article 150 is in position to be sprayed by guns 136—138. As the article 150 passes beyond the spraying range of the spray guns, arm 154 is disengaged and spray 156 pushes the arm in position shown in solid line and valve 152.

Line 162 from valve 152 is connected to a second valve 170 which serves as a second control valve. The air from valve 170 is applied through line 172 to the conduits 132—134 which lead to the spray guns 136—138, respectively. The purpose of valve 170 is to render the spray guns inoperative at the lower and upper extremities of the path of travel thereof. Valve 170 is attached to a thickened portion on plate 68 by means of a pair of bolts 171.

The structure of valve 170 can be best seen by referring to Figures 7, 8, and 9. Valve 170 comprises generally a body 174 having a plurality of passages 176, 178, 180, and 182 formed therein. Air from line 162 enters valve

170 through a threaded coupling member 184 which is firmly attached to body 174 by means of a threaded ring 186. Positioned in valve 170 at the junction between the passage of coupling member and passage 178 is a screen or strainer 188 which will remove large particles of debris from the air stream. Positioned at the junction between passages 176 and 178 is a valve head or closure 190 mounted on a valve stem 192, valve head 190 being held in position by a screw 194 threaded on the end of stem 192. The other end of valve stem 192 has an enlarged head 196 formed integral therewith and a spring 198 is positioned between head 196 and a shoulder 200 formed in valve body 174, spring 198 serving normally to close the junction between the passages 176 and 178.

It will be noted that passages 176 and 180 are always in connection and that in the normal position shown in Figure 8, passage 180 is in connection with passage 182 which in turn is open to the atmosphere. Means is provided for closing the junction between passages 180—182 in the form of a valve head 202 mounted on one end of valve stem 204. Valve head 202 is preferably made of resilient material and is positioned in a recess formed in an enlargement 206 positioned at the end of valve stem 204. A spring 208 acts against enlargement 206 and a fitting 210 threadedly connected to body 174, whereby normally to urge valve head 202 against a rim 212 formed at one end of passage 182 thereby to close this passage.

Line 172 leading from valve 170 to the spray guns 136—138 is attached to body 174 by means of a threaded coupling member 214. It will be seen that in the normal position the connection between lines 162 and 172 will be interrupted by the valve head 190. Means is provided for moving valve head 190 to the open position in the form of a pivoted arm 216 pivoted at point 218, see Figure 5, arm 216 normally being positioned against head 196. The free end of arm 216 engages the underside of a head 220 formed on the end of valve stem 204, arm 216 being held in operative connection by means of a collar 222 positioned on stem 204. The spring 208 is so positioned as to tend to move arm 216 to the right as seen in Figure 8, but spring 198 is of such a size as to overcome spring 208 whereby normally to hold arm 216 in the position shown in Figure 8. When arm 216 is moved to the right whereby to open valve head 194, the force holding valve head 202 open will be removed and spring 208 will force valve head 202 to the closed position.

Means is provided for moving arm 216 to the open or operative position in the form of a cam follower generally designated by the numeral 224. Cam follower 224 is effective to move arm 216 to the open or spraying position when the cam follower is in the position shown in Figure 5. In all other positions of cam follower 224, the arm 216 is in the position shown in Figure 8 whereby to interrupt the operation of spray guns 136—138.

The structure of cam follower 224 can be best seen from Figures 10, 11, and 12. Cam follower 224 includes a body 226 rotatably mounted upon plate 68 of carriage 24 by means of a bolt 228. The body 226 is so mounted as to rotate in a plane parallel to the plane of plate 68. Extending from one side of body 226 are three legs 230, 232, and 234 which are held in position by pins 236. Disposed opposite legs 230, 232, and 234 is a roller 238 mounted upon a shaft 240 in a position such that roller 238 rotates in a plane parallel to plate 68.

Cam follower 224 is so mounted that it can releasably assume any one of three positions with respect to plate 68. Positioned in a recess in plate 68 and attached thereto by means of a screw 242 is a roller bearing support 244 carrying three roller bearings 246. Each roller bearing 246 has a shaft 248 extending therefrom which fits into an aperture in support 244 and is held therein by means of a confining ring 250. Roller bearings 246 are adapted to engage a slotted plate 252 having three sets of slots

therein, each set including slots 254, 256, and 258. Plate 252 is fixedly attached to body 226 by means of pins 260. When the rollers are positioned in slot 256, the cam follower 224 is in the position shown in Figure 5 whereby to operate the spray guns and when the rollers 246 are in the slots 254 or 258, the cam follower is out of contact with arm 216 and the spray guns are inoperative.

In order to allow the roller bearings 246 to move from one slot to another it is necessary momentarily to move body 226 away from plate 252. This is accomplished by means of a spring 262 positioned between a cap 264 held in position by the head 266 of bolt 228 and a sleeve 268. Sleeve 268 is mounted upon ball bearing 270 but bears against a shoulder 272 formed in body 226 whereby body 226 is urged continuously toward plate 68. A nut 274 threadedly engages the other end of bolt 228 to hold the above described parts in assembled relationship.

The cam follower 224 is actuated by means of a pair of cams situated adjacent the extremities of the path of travel of carriage 24. These pairs of cams are identical in construction and accordingly, only one set will be described in detail. Each pair of cams is mounted on a bracket 276 attached to one of the plates 54 or 56. Extending from the bracket 276 is a rod 278 which may be adjustably positioned by means of a clamp 280. The cams 282 and 284 are attached to rod 278 by means of clamps 286 and 288, and are adjustable therealong. The cams 282—284 are pivotally mounted as at 290 and 292 but are capable of being pivoted only away from each other due to the presence of a shoulder 294 and 296 formed on one edge thereof. The outwardly extending portion of the cams 282—284 carry rollers 298 and 300 respectively, which actually contact the legs on the cam follower 224.

A cycle of operation of the cams and cam follower is as follows. As the carriage 24 moves upwardly as viewed in Figure 5, leg 234 will contact roller 300 and since cam 284 cannot pivot upwardly, will move the cam follower 224 to the inoperative position whereby to cut off the spray guns. Carriage 24 continues in its path of travel until leg 234 contacts roller 298; contact with roller 298 will not move cam follower 224 since the cam will pivot out of the path of cam follower 224. When carriage 24 begins to move downwardly, roller 298 will contact leg 230 and will move the cam follower to the operative position. Cam 284 will be ineffective to change position of cam follower 224 since it will be pivoted out of the path of cam follower 224. In short, the cam 284 is effective to move cam follower 224 to the inoperative position and cam 282 is effective to move cam follower 224 to the operative position. Two cams are used due to the fact that there is a slight lag between the time that the valve 170 is actuated and the spray guns begin operation.

A complete cycle of operation of the spray mechanism will now be given. The motor 112 is set into operation and the track 22 is placed into proper position by adjusting the hinge between posts 38—48 and clamp 40. If a loaded hook 148 strikes arm 154 of valve 152, air will be supplied to the inlet passage 178 of valve 170. During the time that carriage 24 is so positioned on track 22 that the cam follower is in the position shown in Figure 5, valve 170 will be opened and the spray guns will be operative. As the carriage passes the cams 284, the cam follower 224 will be moved to the inoperative position whereby by simultaneously to close passage 178 and open passage 180 to the atmosphere through passage 182. By immediately opening passage 180, all of the air pressure in the lines positioned between valve 170 and the spray guns will be released and thereby immediately cease operation of the spray guns. After the loaded hook 148 moves out of contact with arm 154 of valve 152, the spray guns will be inoperative no matter what position the carriage 24 may assume.

Referring to Figure 3 there is illustrated a manner in which the spray guns may follow the center of the article

as the article is carried by the conveyor. This is accomplished by tilting the track 22 using the hinged connection between posts 38 and 48. The dot and dash line 302 in Figure 3 illustrates the path of travel of the spray gun during the spraying operation, that is when the spray guns are operative, when the track 22 is inclined with respect to the vertical. The angularity of track 22 with respect to the vertical is such that the horizontal component of movement of the spray guns is equal to the distance travelled by the article in the time it takes to move the spray gun from one end of the track 22 to the other end thereof. The spray guns are turned on at the upper end of the stroke and are turned off at the lower end of the stroke as described above. The dot and dash line 304 indicates the return path of the spray guns, the spray guns being inoperative while travelling along this path.

Although a preferred embodiment of the invention has been shown for purposes of illustration, it is to be understood that various changes and modifications can be made therein without departing from the spirit and scope of the invention. Accordingly, the invention is to be limited only as set forth in the following claims.

The invention is hereby claimed as follows:

1. In a spraying mechanism, a base, track means including three rods mounted upon said base in triangular relationship with the longitudinal axes of the rods substantially parallel, means fixing said rods against longitudinal movement relative to each other and to said base carriage, means for carrying a spraying device movable along said rods and relatively to said base including a pair of spaced apart plates, one of said rods being disposed between said plates, a pair of wheels mounted between said plates and embracingly contacting said one rod at points spaced longitudinally therealong, and a wheel means attached to and disposed from said carriage means and contacting each of the other of said rods whereby to provide three point support for said carriage means in directions both longitudinal and transverse with respect to the axes of said rods.

2. In a spraying mechanism, a base, track means including three rods mounted upon said base in triangular relationship with the longitudinal axes of the rods substantially parallel, means fixing said rods against longitudinal movement relative to each other and to said base carriage means for carrying a spraying device movable along said rods and relatively to said base including a pair of spaced apart plates, one of said rods being disposed between said plates, two pairs of wheels mounted between said plates and engaging said one rod at points spaced longitudinally therealong, and two wheels attached to said carriage means so as to contact the other of said rods, one of said last mentioned wheels being disposed at one side of said carriage means in a direction transverse to the axis of said one rod and the other of said last mentioned wheels being disposed at a side of said carriage means generally opposite said one side, to provide three point support for said carriage means in directions both longitudinal and transverse with respect to the longitudinal axes of said rods.

3. A spraying mechanism comprising a base, three generally vertically disposed rods mounted upon said base in triangular relationship with the longitudinal axes of the rods being substantially parallel, means for tilting said rods as a unit with respect to said base, a carriage movable along said rods and including a pair of spaced apart plates, one of said rods being disposed between said plates, a pair of wheels mounted between said plates and embracingly contacting said one rod at points spaced longitudinally therealong, and a wheel attached to and disposed from said carriage on each side thereof in position to contact the other of said rods whereby to provide three point support for said carriage in directions both longitudinal and transverse with

respect to said rods, drive means for reciprocally moving said carriage along said rods, and spray gun means mounted on said carriage.

4. In an oscillatory spraying unit including a spray gun connected through a line to a source of air under pressure, the spray gun being attached to a carriage mounted on a support for oscillatory motion therealong, the combination comprising a valve mounted on the carriage for controlling the operation of the spray gun, a plurality of cams fixed adjacent one extremity of the path of travel of the carriage, a cam follower positioned on the carriage to be actuated by said cams, means for venting to the atmosphere the section of the line connecting said valve and the spray gun, and means actuated by said cam follower for simultaneously opening said valve and closing said venting means, and closing said valve and substantially simultaneously positively opening said venting means.

5. In an oscillatory spraying unit including a spray gun connected through a line to a source of air under pressure, the spray gun being attached to a carriage mounted on a support for oscillatory motion therealong, the combination comprising a valve mounted on the carriage for controlling the operation of the spray gun, a plurality of cams fixed adjacent one extremity of the path of travel of the carriage, a multiple position cam follower disposed on said carriage to be actuated by said cams, means for venting to the atmosphere the section of the line connecting said valve and the spray gun, said cam follower in one of said positions simultaneously opening said valve and closing said venting means and in another of said positions closing said valve and substantially simultaneously positively opening said venting means whereby to vent said section of the line to the atmosphere.

6. An oscillatory spraying unit comprising a track, a carriage translatable mounted on the track, means for causing said carriage to oscillate on said track, a spray gun mounted on the carriage, a line interconnecting said spray gun and a source of air under pressure, a valve in said line for controlling the operation of the spray gun, means for venting to the atmosphere the section of said line interconnecting said spray gun and said valve, cams fixed adjacent each extremity of the path of travel of said carriage, a cam follower disposed on said carriage to be actuated by said cams, said cam follower in one position serving to open said valve and close said venting means and in another position to close said valve and substantially simultaneously positively open said venting means.

References Cited in the file of this patent

UNITED STATES PATENTS

55	1,222,915	Anderson	Apr. 17, 1917
	1,502,589	Rafferty	July 22, 1921
	1,696,385	Coles	Dec. 25, 1928
	2,069,150	Holder	Jan. 26, 1937
	2,141,630	Westin	Dec. 27, 1938
60	2,215,668	Smith	Sept. 24, 1940
	2,216,154	Blaschke	Oct. 1, 1940
	2,246,502	Bramsen et al.	June 24, 1941
	2,274,917	Carlson et al.	Mar. 3, 1942
	2,293,881	Bailey	Aug. 25, 1942
65	2,321,983	Brackett	June 15, 1943
	2,325,162	Goodwin et al.	July 27, 1943
	2,345,834	Schweitzer	Apr. 4, 1944
	2,385,733	Schroer	Sept. 25, 1945
	2,443,995	Snyder	June 22, 1948
70	2,459,682	Carrie	Jan. 18, 1949
	2,505,179	Gaythwaite	Apr. 25, 1950
	2,555,237	MacPherson	May 29, 1951
	2,564,816	Rehwal	Aug. 21, 1951
	2,565,655	Girando	Aug. 28, 1951
75	2,610,605	Paasche	Sept. 16, 1952