

March 10, 1942.

H. C. HOPKINS

2,275,437

CAN SPRAYING MACHINE

Filed March 27, 1940

4 Sheets-Sheet 1

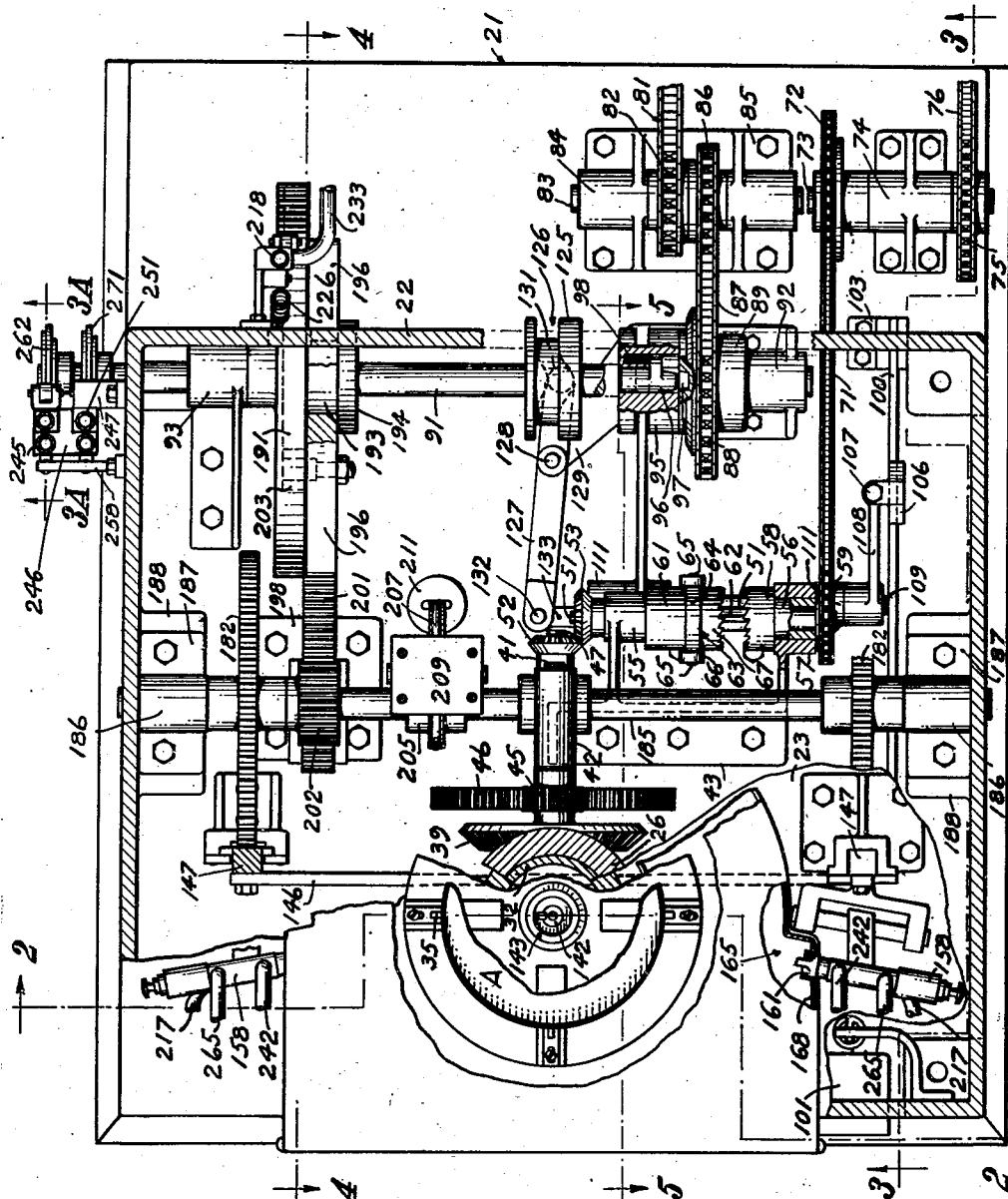


Fig. 1

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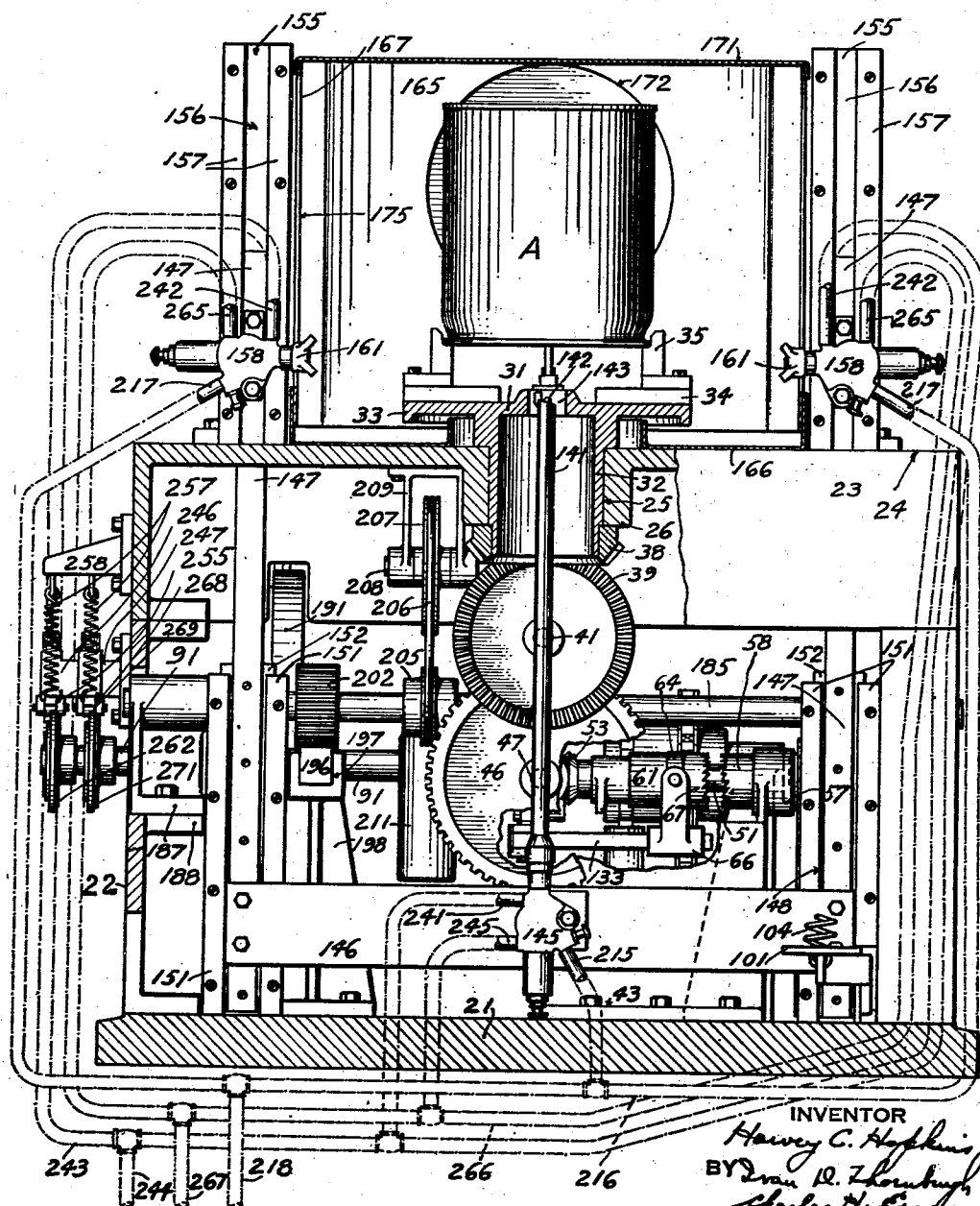
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CAN SPRAYING MACHINE

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Fig. 2



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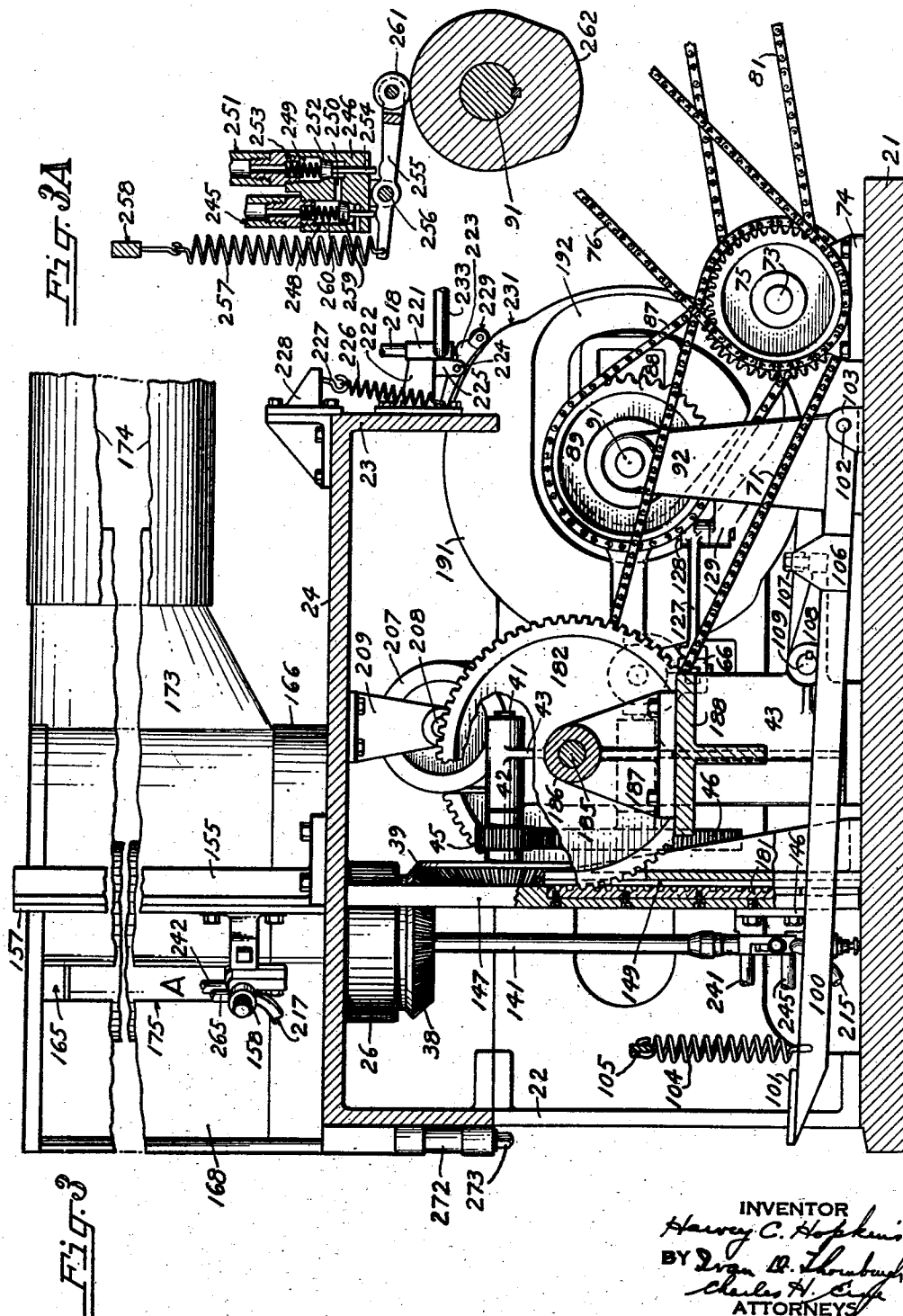
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CAN SPRAYING MACHINE

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UNITED STATES PATENT OFFICE

2,275,437

CAN SPRAYING MACHINE

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Application March 27, 1940, Serial No. 326,273

8 Claims. (Cl. 91—45)

The present invention relates to an apparatus for coating cans and has particular reference to a coating machine for simultaneously spraying both interior and exterior surfaces of a can in a manner to insure uniform coating results on successive cans.

An object of the present invention is the provision of a coating apparatus for cans wherein sprayed material is projected simultaneously on interior and exterior surfaces of a can while it is revolved on its axis.

Another object is the provision of a can coating apparatus which includes an interior spraying device adapted for movement inside of a can being coated, the can being revolved and the interior spraying device projecting spraying material in a manner to cover the interior wall of the revolving can with a uniform coating and also includes an exterior spraying device located outside of the revolving can, such exterior spraying device being moved to cover the outside can wall with a uniform coat of spraying material.

A further object of the invention is the provision, in a coating machine of the character described, of control devices for supplying the interior and exterior spraying devices with spraying material only as needed so that only the proper amount of coating is applied to the can surfaces being coated.

Yet another object is the provision of a coating apparatus for cans which provides for revolving the can on its longitudinal axis while projecting the spraying material against its interior and exterior surfaces, an interior spraying device located inside of the can having movement along the longitudinal axis of the can whereby spraying material is projected against the inside surface of the can as a uniform film and exterior spraying devices arranged outside of and spaced on opposite sides of the revolving can having movement parallel to the can's axis whereby the spraying material applied to the outside of the revolving can is uniformly distributed as a coating film.

Numerous other objects and advantages of the invention will be apparent as it is better understood from the following description, which, taken in connection with the accompanying drawings, discloses a preferred embodiment thereof.

Referring to the drawings:

Figure 1 is a combination top plan and horizontal sectional view of a coating apparatus embodying the present invention with parts broken away;

Fig. 2 is a transverse vertical sectional view

taken substantially along the broken line 2—2 in Fig. 1 and also showing schematically certain of the pipe connections with the spraying devices;

Fig. 3 is a longitudinal vertical sectional view taken substantially along the broken line 3—3 in Fig. 1, the upper part of the apparatus appearing as a side elevation when so viewed but with parts broken away;

Fig. 3a is a detail in vertical section of one of the valve control devices as viewed substantially along the section line 3a—3a in Fig. 1, drawn to an enlarged scale;

Fig. 4 is a longitudinal vertical sectional view taken from the opposite side of the machine along the section line 4—4 in Fig. 1; and

Fig. 5 is a longitudinal vertical sectional detail taken substantially along the line 5—5 in Fig. 1.

The present invention is exemplified in the apparatus shown in the drawings as a preferred form and comprises a structure for automatically spraying both the interior and exterior of a can A at one and the same time, together with actuating valves and other control mechanism whereby only a predetermined amount of spraying material is used on each can.

A base 21 (Figs. 1, 2 and 3) provides the support for the machine parts. A housing 22 is carried directly on the base and surrounds much of the gearing and other working parts of the machine. A table 23 is mounted on the base housing and provides a top for the housing.

The table 23 (Fig. 2) is formed with a horizontal flat top 24 which is cut through in a vertically disposed opening 25 and the top wall extends down around this opening as a hub 26. A turn-table can support 31 is mounted on the table top 24 and extends down through the table opening 25 as a sleeve 32. This can support rotates within the opening when the can A is being sprayed.

Can support 31 extends laterally as a flat head or disc 33 and radially disposed grooved blocks 34 are formed on the upper surface of the disc. Can support fingers 35 are bolted to the blocks, the latter being slotted for the bolts so that the fingers may be moved in toward the center of the disc for the smaller cans and further out for the larger sizes of cans.

The can A is held on the turn-table support 31 centrally of the support and in inverted position. In such a position the open end of the can is at the bottom and is spaced above the support. Turning of the support 31 thus rotates the inverted can on its own axis for both the

interior and exterior spraying operations. This rotation of the can will be considered first.

A ring gear 38 is secured to the lower end of the support sleeve 32 directly beneath the table hub 26. Gear 38 meshes with a gear 39 mounted on a horizontal shaft 41 (Figs. 1, 2 and 4) which is journaled in a bearing 42. This and other bearings to be described later are formed in a main bracket frame 43. The shaft 41 also carries a pinion 45 which meshes with a gear 46 mounted on a lower shaft 47 which is journaled in the bracket frame 43 and is directly beneath and parallel to the shaft 41.

The shaft 47 is driven by connection with a clutch shaft 51 by means of mitre gears 52, 53 secured to the respective shafts. Shaft 51, adjacent the gear 53, is journaled in a bearing 55 and its opposite end extends through a sleeve clutch member 56 which in its turn rotates in a bearing 57 also formed as a part of the bracket 43. The clutch member 56 is free on the shaft 51 and at the inside of the bearing 57 is enlarged. The inner face of this section is serrated to form the section as a tooth-clutch drive member 58. Outside of the bearing, the clutch member 56 is preferably formed into an integral sprocket part 59.

Between the bearings 55, 57, a slidable clutch sleeve 61 is mounted on the shaft 51. This sleeve rotates with the shaft by reason of a feather and featherway connection which includes a feather 62 carried in the shaft. Such a construction allows the sleeve to slide freely along the shaft. Sleeve 61 is grooved at 63 and a collar 64 is loosely mounted in the groove. This collar supports two diametrically opposed pins 65 on which is mounted the upper end of a slide yoke 66. Yoke 66 forms a clutch operating feature for sliding the sleeve 61 on its shaft 51 as will be described fully hereafter.

Sleeve 61 along its inner face is serrated or in other words is formed with a notched or toothed end 67. Such a toothed face is adapted to cooperate with and engage within the teeth of the clutch member 56. Engagement is made when the sleeve is moved along its feather connection on the shaft through the medium of the yoke 66.

The sprocket 59 is driven by a chain 71 which passes over the sprocket at one side and over a drive sprocket 72 carried on a short drive shaft 73 journaled in a bracket 74 which is mounted on the base 21. Shaft 73 also carries a sprocket 75 and this latter sprocket is driven in any suitable manner as by connection with a motor or other prime mover not shown but through the medium of a chain 76 which takes over the sprocket. As long as the clutch parts 58, 67 are engaged the rotating clutch member 56 causes a corresponding rotation of the shaft 51 and through the various shaft and gearing already described a corresponding rotation of the turn-table can support 31. In this way the can to be sprayed is rotated on its own axis.

Movement for the spraying mechanism, control of the proper valves for the spraying material as well as the clutching of the parts 58, 67 are brought about through a driving connection with a second motor, not illustrated, which is designed to operate other drive shafts in the apparatus. Such a motor connection may be made through a chain 81 (Figs. 1 and 3) which operates over a sprocket 82 carried on a short shaft 83 which is journaled in bearings 84 formed in a bracket 85 which is mounted on the base 21.

Shaft 83 also carries a sprocket 86 over which

operates a chain 87 which engages and rotates a sprocket section 88 of a clutch member 89. This clutch member 89 is loosely mounted on a horizontal shaft 91 (see also Fig. 5) which is journaled in bearings formed in a bracket 92, adjacent the clutch member, and in a bracket 93 near the opposite end of the shaft, these brackets both being mounted upon the base 21.

The clutch member 89 is mounted adjacent to a second clutch member 95 (Fig. 5) which is keyed to the shaft 91. When the clutch member 89 is turning on the shaft 91 which is stationary at the time, the clutch members are disconnected. Provision is made, however, for connecting the clutch member 89 with the member 95 and this is effected by means of a standard pin clutch device which includes a slide clutch pin 96 (Figs. 1 and 5) carried in the clutch part 95.

The inner end of the pin under certain conditions is adapted to enter into a bore 97 formed in the adjacent face of the clutch member 89. A spring 98 in the outer end of a bore formed in the member 95 tends to push the clutch pin into the bore 97 but is normally held back by the pin clutch device.

The pin clutch device is manually controlled so that when it is desired to start the spraying for the can A after it has been properly positioned on the turntable support 31, it is merely necessary to actuate a foot lever in order to permit the clutch parts to be connected. This will also start the can rotating as will now be explained.

A foot treadle lever device 100 (Figs. 3 and 5) having a foot engaging tread 101 at one end is pivoted at 102 on a lug 103 which extends up from the base 21. The free end of this foot lever is normally held in raised position by means of a spring 104 which connects at its lower end with the treadle end of the foot lever and at its upper end with a post 105 carried in the base housing 22. Foot lever 101 carries a plate 106 which provides the seat for a bolt 107 which extends down to one side of the lever. The lower end of the bolt is adapted to engage the loose end of a lever arm 108 which is located alongside being keyed to a rock shaft 109 (see also Fig. 1) which is mounted for oscillation in a bearing 111 formed in the bracket 43.

The rock shaft 109 also carries a lever 112 (Fig. 5) which is pivotally connected to the lower end of a slide rod 113 which extends through a sleeve bearing 114 carried in the bracket 92. The rod 113 at its upper end is formed with a clutch pin block 116 and extends through a spring 117 also carried in the sleeve 114. This spring engages an enlarged upper section 118 of the rod 113 and normally holds the clutch block 116 in raised position where it extends into a peripheral groove 119 formed in the clutch member 95.

Normally when the spring 117 holds the clutch block 116 in its raised position (Fig. 5) the block which is wedge shaped, is in the path of rotation of the clutch pin 96 and the pin which is slotted near its head end is held depressed within its seat by the clutch block. When so held the clutch member 95 is disconnected from the clutch member 89.

When the foot treadle 101 is depressed the shaft 109 is rocked and this lowers the rod 113 against the action of the spring 117 and removes the clutch block 116 from its raised position within the groove 119 of the clutch member 95. The clutch pin 96 is thereupon allowed to move

forward under the action of its spring 98 and the forward end of the clutch pin thus snaps into the bore 97 of the rotating clutch member 89 as soon as the bore comes adjacent the pin. This locks the clutch parts 95, 89 together and the shaft 91 also rotates.

The foot treadle 101 usually is released at once and then the spring 117 returns the clutch block 116 into raised position. Its wedge shaped construction thereupon cams out the clutch pin when it is brought alongside and this disconnects the shaft 91 and its clutch part 95 from the rotating clutch member 89. The shaft and all parts connected therewith cease to rotate. This is a conventional form of press clutch and further description is thought to be unnecessary.

It will be understood that it is merely necessary to depress the foot treadle 101 in order to connect the clutch members together and start rotation of the shaft 91. Release of the foot treadle thereupon returns the clutch block 116 into its raised position so that only a single rotation of the shaft takes place. To obtain more than one revolution it is necessary to keep the foot treadle depressed. For most spraying operations this is not needed.

When rotation of the shaft 91 (Fig. 1) takes place, the yoke 66 for connecting the clutch members 67 and 58 is moved so that the can A to be coated and the turn-table can carrier 31 are rotated. This is brought about by a cam 125 which is keyed to the shaft 91. A cam groove 126 is formed in the periphery of the cam and causes oscillation of a lever 127 which is pivotally mounted on a pin 128 carried in a bracket 129 projecting inside of the housing 22. The inner end of the lever 127 carries a cam roller 131 which is engaged by the walls of the cam groove 126.

Lever 127 is pivotally connected at 132 to a slide bar 133 (Figs. 2 and 5) which extends into the clutch yoke 66. At a certain time in the rotation of the shaft 91, therefore, the clutch members actuated by the sliding of the yoke 66 unite the shaft 51 with the driving mechanism and the can carrier 31 and it can then rotate.

Provision is made for moving both the interior spraying head and the exterior spraying members, such movement being effected by gear, rack and cam connection with the shaft 91. This feature will now be considered first for the inside then for the outside spraying devices.

The interior spray device comprises a vertically disposed pipe 141 (Fig. 2) located on the vertical central axis of the can carrier 31. This pipe carries a spray nozzle 142 at its upper end. At the time that the can is being placed into position on the carrier for spraying and after the spraying operation the interior spray nozzle 142 is in lowered position. At such a time it is just inside of the mouth of an opening 143 formed centrally of the plate or disc 33.

The spray pipe 141 is connected at its lower end into an atomizing spray head 145 which may be of any suitable type for projecting liquid spray material as a fine mist or spray. Such a spray leaves the spray nozzle 142 in proper condition for application to the interior walls of the can. There are a number of satisfactory conventional spraying heads of this type and it is believed that details of such a mechanism are unnecessary for a clear understanding of the present invention. More consideration of its operation and control, however, will be presented later.

The spray device 145 is mounted on a horizontal bar 146 which extends across the machine below the can carrier 33, this being in the lower part of the housing 22. Bar 146 is secured at its ends to a pair of slide bars 147 (Figs. 2 and 3) one on each side of the machine. At its lower end, each slide bar 147 is carried in a slide post 148 which is mounted upon the base 21 and which extends from the base to a position near the lower edge of the table 23. Each slide post is formed with a groove 149 on the side which faces the cross bar 146 thus providing a slideway for the corresponding slide 147. Slide gibs 151 are fastened to the front face of each post and these hold side ribs 152, formed as an integral part of each slide bar at its lower end. This construction retains the lower part of the slide bar in sliding position within its post.

Each slide 147 extends up through suitable openings formed in the table top 24 and into an upper slide post 155 (Figs. 2 and 3) which is mounted upon each side of the table top 24. Each post 155 is slotted along its front face as at 156 and this provides a guideway for the upper end of the slide bar. Slide gibs 157 secured to the face of each post 155 retain their slide bar 147 in sliding position above the table 23.

Each slide 147 above the table top 24 carries an atomizing spray head 158 which may be of the same general construction as the spray device 145 used for the interior spray nozzle 142. Like the spray device 145, each spray head 158 atomizes a liquid spraying material by means of compressed air supplied to the spray head. Further description of the spraying operation and control will be given hereinafter.

Each spray device 158 moves vertically upwardly and downwardly with the corresponding slide bar 147 on which it is mounted. A spray nozzle 161 projects from one side of each spray device 158 and extends into close proximity to the outer wall of the rotating can carried on the can support. It is from such a nozzle that the atomized spray material is forcibly ejected and is directed onto the exterior body wall of the can A.

The can while held on its rotating carrier 31 is enclosed within a chamber 165 (Figs. 1, 2 and 3). Such a chamber is open at the front but is otherwise confined within a housing formed by a lower plate 166 which is mounted on the table top 24 and including top and side walls. At one side of the container the side wall is cylindrical as at 167 and this curved section connects with two rectangular side wall sections 168. A top wall section 171 is joined to the side walls of the housing.

At the rear end, that is adjacent the cylindrical wall part 167, there is an opening 172 which is cut through the rear wall and this opening communicates with the inside of a conical pipe 173 connected in turn to a suitable flue pipe 174. This provides for withdrawing any volatile fumes which may be present as an incident to the spraying operation.

The raising and lowering of the slide bars 147 with proper timing move the two exterior spraying heads 158 vertically in a direction parallel and relative to the side wall of the rotating can carried on its turn-table 31. In this movement nozzles 161 traverse vertical slots 175 cut in the side walls 168. These slots are only wide enough to accommodate free sliding movement of the nozzles.

This raising and lowering of the slide bars 147

is effected by a pinion rack mechanism best illustrated in Fig. 3. Each slide bar 147 at its lower end carries a rack 181 the teeth of which mesh with a gear 182 (see also Fig. 1). The two gears 182 for the two slide bars 147 are keyed to a horizontal rock shaft 185 which is journaled in bearings 186 formed in brackets 187 mounted on a side shelf 188 which extends inwardly from the walls 22 on the two opposite sides of the machine.

The shaft 185 is cam controlled from the clutch shaft 91 and the rotation of the shaft 91 is transmitted by means of a slide member and rack and pinion elements to cause one ascent and one descent of the two slide bars 147 for each revolution of the shaft 91. This will now be considered in further detail and reference should be had to Figs. 1, 3 and 4. Shaft 91 carries a face cam 191 which is formed with a cam groove 192. The hub of the cam on one face extends forward in a support section 193 and terminates in an enlarged head 194. An open slide box 195 is mounted on the support hub 193 and extends under the rock shaft 185 as a slide bar 196. The end of the slide bar opposite to the slide box is supported in a groove 197 (see also Fig. 2) formed in a support bracket 198 which is mounted on the base 21.

The upper edge of the forward section of the slide bar 196 is formed with rack teeth 201 which engage a pinion 202 carried on the shaft 185. The slide bar 196 also carries a cam roller 203 (Fig. 1) which operates in the cam groove 192 of the cam 191 and this causes forward and rearward movement of the slide with each rotation of the shaft 91.

Provision is made for counter-balancing the heavy slides 147 and the spraying devices 158 carried thereby so that the raising and lowering of these parts are facilitated. For this purpose the shaft 185 (Fig. 2) carries a grooved pulley 205. A cable 206 is secured into the pulley and extends vertically from its seat in the groove. The cable 206 passes over an idler pulley 207 (see also Figs. 1 and 3) which is mounted upon a short horizontal shaft 208 carried in brackets 209 secured to the under surface of the table top 24. The terminal end of the cable after passing over the idler pulley is connected to a suspension weight 211. This construction thus provides the desired counterbalance for the shaft.

The spraying devices 145 and 158 may be of a type of commercial spraying head which utilizes a chamber for lacquer or other spraying material from which a liquid is passed through a valve and united with atomizing air to produce the proper spraying effect. A convenient manner of controlling a valve of this nature is by compressed air suitably piped to the spray head. The internal valve mechanism permits discharge of liquid from the spray nozzle when the controlling air is introduced into the head to open the valve and when the air is cut off the valve automatically closes thus preventing any discharge of liquid. It is thought that since a particular type of spraying head is not a part of the present invention, a detailed description of such spraying head is unnecessary. However, in the drawings there is a schematic showing of various pipe lines leading to the inside spray device 145 and to the two outside spraying devices 158 and some description will now be given of this feature.

Each spraying device is thus provided with connections for three different pipe lines. One pipe line conveys a liquid spraying material to

the spraying head under slight pressure, as for example 5 to 15 pounds per square inch.

The second pipe line conveys an atomizing air to the spraying head and this air will be under a compression suitable to obtain the desired results. This will depend in large part upon the distance from the nozzle that the spray is to be projected and also as to the consistency of the spraying material. The third pipe line carries a high pressure air supply such as 45 pounds per square inch for opening the valve in the spray head in order to discharge the spraying material.

For convenience, the three spray heads are all connected into the same atomizing air pipe, as illustrated in Fig. 2. The interior spray head 145 carries a pipe connection 215 which leads to an air supply pipe 216. This pipe 216 connects with each of the exterior spraying heads 158, the end of the pipe being an integral part of or connecting directly with a nipple 217 of each spraying head 158. An atomizing pipe 218 connects into the pipe line 216 and supplies the proper pressure to the interior and exterior spraying heads.

In order to prevent waste of air when the spray heads are not in use, provision is made for shutting off the atomizing air entering into the supply pipe 218. This is illustrated in Fig. 3 and comprises an atomizing air control valve 221 which is mounted on a bracket 222 secured to a side wall of the table 23. The control valve 221 is operated by proper connection with a lever 223 which in turn is pivoted at 224 to a lug 225 extending down from the bracket 222.

One end of the lever 223 is connected to a spring 226, the opposite end of which is anchored in an eye bolt 227 carried on a bracket 228 mounted on the table 23. The opposite end of the lever 223 carries a cam roller 229 which is adapted to ride on a peripheral cam wall 231 formed on the face cam 191. The contour of this peripheral cam wall is such as to open the atomizer valve and permit the atomizing air to flow into the supply pipe 218 and thus to the spraying heads as desired.

This air is supplied to the valve 221 by a pipe 233 which may lead from a suitable source of compressed air such as a tank or a pump. Since one revolution of the shaft 91 imparts a single complete revolution to the cam 191, proper valve control in the atomizing air for one spraying operation is insured. The actual time for closing the air valve at the end of a spraying cycle is such as to cut off the air issuing from the nozzles just before the rotating and coated can comes to rest and at the time the spraying material is shut off. This prevents blowing air against the freshly coated surfaces.

Since the interior coating of the can A may well be different from the exterior coating it is desirable to provide different sources of supply for the interior spraying head 145 and the exterior spraying heads 158. This liquid material supply will now be considered first for the spraying head 145 and then for the spraying heads 158.

A pipe 241 (Fig. 2) which connects with the head 145 conveys the lacquer or other spraying material under the proper pressure into the spraying head. Since the control of discharge of the lacquer for the interior spraying nozzle 142 is effected in the spraying head 145 no other valve is needed in the supply line 241. This pipe therefore leads directly from any suitable reservoir or other source of lacquer supply.

In a similar manner lacquer is conveyed to the exterior spraying heads 158. For this purpose each head carries a lacquer spray pipe 242 and the two pipes 242 may be connected in or may be a part of a pipe line 243, as schematically shown in Figs. 1 and 2. Pipe line 243 in turn receives its supply of lacquer from a pipe 244 which leads directly from a reservoir or other source of supply of the coating material. As in the case of the interior spraying device 145, a valve is not needed in the pipe line 244.

The high pressure air for operating the internal valve mechanisms in the various spray heads must be properly controlled and timed to produce best results. For such control for inside spraying a pipe 245 (Fig. 2) leads into the spray head 145. This pipe carries the compressed air used for opening its internal valve when the spraying liquid is to be dispensed and the air supply is indirectly controlled from the shaft 91, as will now be explained.

The pipe 245 leads into a valve casing 246 (see also Figs. 1 and 3a) which is mounted on one side of the machine being carried by a bracket 247. Bracket 247 is secured to the side of the base housing 22. The valve casing end of the pipe 245 leads into an air channel 248 extending vertically in the valve casing. On the other side of the valve casing is a second air channel 249 which is parallel to channel 248 and these two channels are connected by a cross-port 250.

Compressed air is brought into the valve casing 246 from a source of supply, such as a pump or a high pressure tank, by means of a pipe 251 which connects with the upper end of the air passage 249. A valve 252 is interposed in the air passage 249 just above the entrance to the cross-port 250 and is normally closed by means of a spring 253 located in the passage. This valve spring bearing on the valve tends at all times to seat the valve.

The valve 252 is provided with a depending valve stem 254 which extends down through the valve casing and projects beyond the bottom of the casing. Provision is made for engaging and lifting the valve stem 254 to raise the valve 252 from its seat so that air from the pipe 251 can pass freely from the air passage 249 through the port 250 into the air passage 248 and thence out of the pipe 245 to the spray head 145.

This valve actuation is effected by a lever 255 which is pivoted near its center on a pivot pin 256 carried in lugs extending down from the valve casing 246. One end of the lever 255 is connected to the lower end of a vertically disposed spring 257, the upper end of which is connected to a bracket 258 mounted on the side of the table 23. This spring tends to hold the lever in the position illustrated in Fig. 3a and when in such position the valve 252 is seated and its stem 254 is just clear of the lever.

This is the closed position of the parts which control the internal valve mechanism within the spray head 145 and at such time the lacquer or spraying material is blocked off and prevented from issuing from the spraying nozzle 142 of the spraying head. In coming into such a closed position it is desirable that the pipe 245 be vented to atmosphere and this is done in the valve casing 246.

A vent valve 259 is seated at the lower end of the air passage 248 below the cross-port 250 and is normally held in seated position by a spring 260 which presses down on the valve, said spring being also located in the passageway. A stem

of this valve 259 projects from the bottom of the valve casing and when the lever 255 is in the position shown in Fig. 3a the valve stem and the vent valve 259 are lifted and the valve is thus unseated. When in this position air from the pipe 245 and the passageway 248 is allowed to escape around the top of the valve stem and out of the valve casing through a small laterally extending port cut in the valve casing. This provides for venting the pipe line.

The end of the lever 255 which is opposite to its connection with the spring 257 carries a cam roller 261. This cam roller is adapted to ride on a peripheral disc cam 262 which is keyed to the shaft 91. The spring 257 insures that the roller 261 engages the cam 262 at all times and when the roller 261 is riding on the low peripheral portion of the cam, as illustrated in Fig. 3a, the two valve members 252, 259 are in the position shown in such figure.

When the lever 255 is shifted by the raised peripheral portion of the cam 262, the valve stem 254 of the valve 252 is engaged and lifted from its seat. At the same time the valve stem of the vent valve 259 is released by the lever 255 and its spring 260 closes off the vent port.

At such time therefore air coming into the valve casing 246 from the high pressure supply pipe 251 passes through the passageways 249, 250, 248 and into the pipe 245 leading to the spray head 145. This provides for the effective operation for the internal valve mechanism in the spray head so that lacquer or other spraying material is permitted to be discharged from the spray head.

This discharge continues as long as the compressed air remains in the pipe 245. Since the shaft 91 makes one complete revolution for a spraying cycle which begins when the clutch members 89, 95 are connected to rotate the shaft 91, a single rotation of the cam 262 insures opening and closing of the controlling internal discharge valves for the lacquer within the spraying head 145 all in proper time.

The air control for outside spraying comprises a pipe 265 (Fig. 2) for each spraying head 158 and these two pipes are connected into an air line pipe 266. This pipe connects with a high pressure supply pipe 267. Like the pipe 245, control of the air to pipe 267 is made through a valve cut-off operated from the shaft 91. For this purpose the pipe 267 also connects into the valve casing 246. The same valve casing thus provides for both interior and exterior spraying heads although the passageways for the two are separate and independent.

The control valve mechanism for the air supply leading to the heads 158 is identical with that already described in connection with the interior head 145 but is independently operated. Thus air leading into pipe 267 passes through the same character of passageways and cross-ports as those parts 248, 249 and 250 already described. Opening of the air and vent valves is effected by a second lever 268 (Fig. 2) which carries its cam roller 269. Cam roller 269 operates on a cam 271 which is secured to the shaft 91 just inside of the cam 262.

Since all of the spraying material projected onto the exterior wall of the can A cannot be entirely confined, there will be a certain amount which drains down onto the floor of the chamber 165. Provision is made for catching this excess material. The lower plate 166 is formed with side walls (as best illustrated in Fig. 2) so

that it acts as a drainage pan. At the forward corner of this pan there is connected a pipe 272 (Fig. 3) which acts as a catch basin. The lower end of the pipe may be temporarily closed by a plug 273 so that by removing the plug the drainage from the chamber 165 may be drawn off.

It is thought that the invention and many of its attendant advantages will be understood from the foregoing description, and it will be apparent that various changes may be made in the form, construction and arrangement of the parts without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the form hereinbefore described being merely a preferred embodiment thereof.

I claim:

1. In an apparatus for coating cans, the combination of a rotatable element for supporting the can, means for rotating said can supporting element, an interior spraying device for spraying the inside of the can while it revolves, an exterior spraying device located to one side of and adjacent to the revolving can for discharging spraying material on the outside wall of the can, and means for moving said exterior spraying device parallel to the can body wall while the can revolves to distribute the spraying material over the exterior of the revolving can; thus coating both interior and exterior surfaces simultaneously.

2. In an apparatus for coating cans, the combination of a rotatable element for supporting the can, means for rotating said can supporting element, an interior spraying device adapted for movement within the can held on said support for spraying the inside while the can revolves, means for moving said interior spraying device relative to said can as the latter revolves, an exterior spraying device located to one side of and adjacent to the revolving can for discharging spraying material on the outside wall of the can, and means for moving said exterior spraying device parallel to the can body wall while the can revolves to distribute the spraying material over the exterior of the revolving can, thus coating both interior and exterior surfaces simultaneously, and means connected to said can supporting element rotating means and having separate connection with said interior and said exterior spraying devices for individually controlling discharge of the spraying material from the said spraying devices.

3. In an apparatus for coating cans, the combination of a rotatable element for supporting the can, means for rotating said can supporting element, an interior spraying device adapted for movement within the can held on said support for spraying the inside while the can revolves, means for moving said interior spraying device relative to said revolving can, a liquid supply pipe connected to said interior spraying device for conducting the spraying material to said device, an exterior spraying device located to one side of and adjacent to the revolving can for discharging spraying material on the outside wall of the can, a liquid supply pipe connected to said exterior spraying device for conducting the spraying material to said exterior device, means for moving said exterior spraying device parallel to the can body wall while the can revolves to distribute the spraying material over the exterior of the revolving can, and valve means connected in said interior and in said exterior supply pipes

for controlling discharge of the spraying material from said spraying devices.

4. In an apparatus for coating cans, the combination of a rotatable element for supporting the can, driving means for rotating said supporting element, an interior spraying device adapted for movement within the can held on said support for spraying the inside while the can revolves, an exterior spraying device located to one side of and adjacent to the revolving can for discharging spraying material on the outside wall of the can, and means including a rack and pinion connected by gearing to said can support driving means for moving said interior and exterior spraying devices parallel to the can body wall while the can revolves to distribute an even amount of spraying material over the exterior of the revolving can, thus coating both interior and exterior surfaces simultaneously.

5. In an apparatus for coating cans, the combination of a rotatable element for supporting the can, driving means for rotating said supporting element, an interior spraying device adapted for movement within the can held on said support for spraying the inside while the can revolves, means for conducting spraying material and atomizing air to said interior spraying device, an exterior spraying device located to one side of and adjacent to the revolving can for discharging spraying material on the outside wall of the can, means for conducting spraying material and atomizing air to said exterior spraying device, instrumentalities including a rack and pinion connected by gearing to said can support driving means for moving said interior and exterior spraying devices parallel to the can body wall while the can revolves to distribute an even amount of spraying material over the exterior of the revolving can, and means for controlling the discharge of spraying material and the discharge of atomizing air from said spraying devices.

6. In an apparatus for coating cans, the combination of a rotatable element for supporting the can, means for rotating said can supporting element, an interior spraying device adapted for movement within the can held on said support for spraying the inside while the can revolves, a housing surrounding said revolving can and having a slot extending parallel to the axis of said revolving can, an exterior spraying device located to one side of and adjacent to the revolving can and projecting inside of said housing slot for discharging spraying material on the outside wall of the can, and means for moving said exterior spraying device back and forth along said slot while the can revolves to distribute the spraying material over the exterior of the revolving can, said moving means also moving said interior spraying device relative to the revolving can, thus coating both interior and exterior surfaces of the can simultaneously.

7. In an apparatus for coating cans, the combination of a rotatable element for supporting the can, driving means for rotating said supporting element, an interior spraying device adapted for movement within the can held on said support for spraying the inside while the can revolves, means connected with said can support driving means for imparting a sliding motion to said spraying device to project it into said can and to successively apply an even spray coat to different parts of the interior of the can, a housing surrounding said revolving can and having a pair of diametrically opposed slots

arranged on opposite sides of the can, a pair of opposed exterior spraying devices located to one side of and adjacent to the revolving can and projecting inside of said housing slots for discharging spraying material on the outside wall of the can, and means also connected with said can support driving means for moving said exterior spraying devices along said slots and in synchronism with said rotating can and parallel to the can body wall to distribute an even amount of spraying material over the exterior of the revolving can, thus coating both interior and exterior surfaces simultaneously.

8. In an apparatus for coating cans, the combination of a rotatable element for supporting the can, a power shaft operatively connected with said can supporting element to rotate the same, an interior spraying device adapted for movement within the can held on said support for spraying the inside while the can revolves,

5 said interior spraying device being slidably mounted for insertion into the can along its longitudinal axis for more uniform coating on the interior walls of the held can, exterior spraying devices located to one side of and adjacent to the revolving can for discharging spraying material on the outside wall of the can, means for moving said exterior spraying devices parallel to the can body wall while the can revolves to evenly distribute the spraying material over the exterior of the revolving can, valve means operatively connected with said power shaft for controlling the supply of spraying material to said interior and said exterior spraying devices, manual means for starting the operation of said power shaft and automatic means for stopping rotation of the same when spraying operations have been completed for a single can.

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