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Racz et al.

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[45] **June 19, 1973**

[54] **SPRAY ASSEMBLY MEMORY**

[76] Inventors: **Nick S. Racz,** 4800 Chicago Beach Drive, Chicago, Ill. 60615; **David M. Higgins,** 121 Washington Boulevard, Hoffman Estates, Ill. 60172

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[21] Appl. No.: **90,738**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 23,890, March 30, 1970, abandoned.

[52] **U.S. Cl.** **118/2,** 118/8

[51] **Int. Cl.** **B65g 49/02**

[58] **Field of Search** 118/2, 8, 3

[56] **References Cited**

UNITED STATES PATENTS

3,444,839	5/1969	Ellul	118/8
3,356,061	12/1967	Wiggins	118/2
3,593,308	7/1971	Fagan	118/2
2,754,795	7/1956	Enssle	118/8 X
2,781,738	2/1957	Paasche	118/2
2,961,990	11/1960	Wruck	118/8
3,192,796	7/1965	Peeps et al.	118/2 X
3,491,718	1/1970	Ebbert et al.	118/2

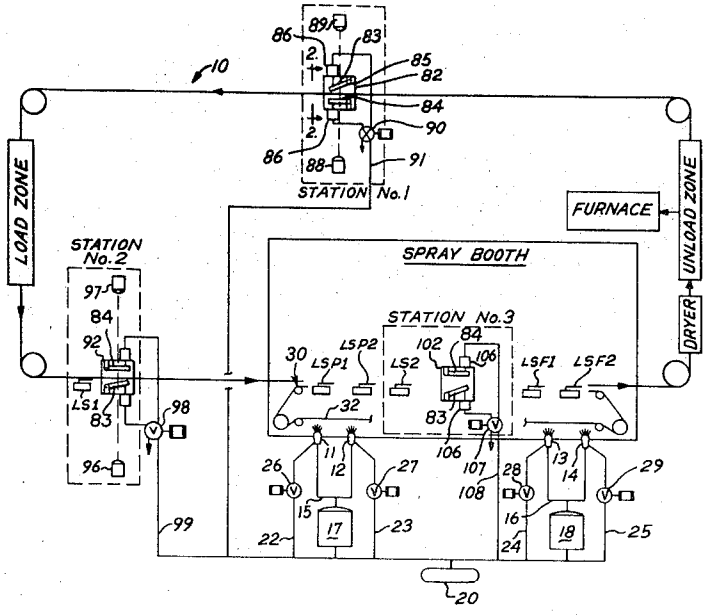
Primary Examiner—Mervin Stein

Attorney—Molinare, Allegretti, Newitt & Witcoff

[57] **ABSTRACT**

In a spray assembly, a single spray booth is provided for spraying different coats on a given article and a memory determines which coat is to be sprayed upon the article and the presence of articles of differing configuration is indicated or sensed, whereby different coats as well as articles of differing configuration may be sprayed on the same spray assembly at the same time.

24 Claims, 8 Drawing Figures



Patented June 19, 1973 3,739,742

4 Sheets-Sheet 1

Fig. 1

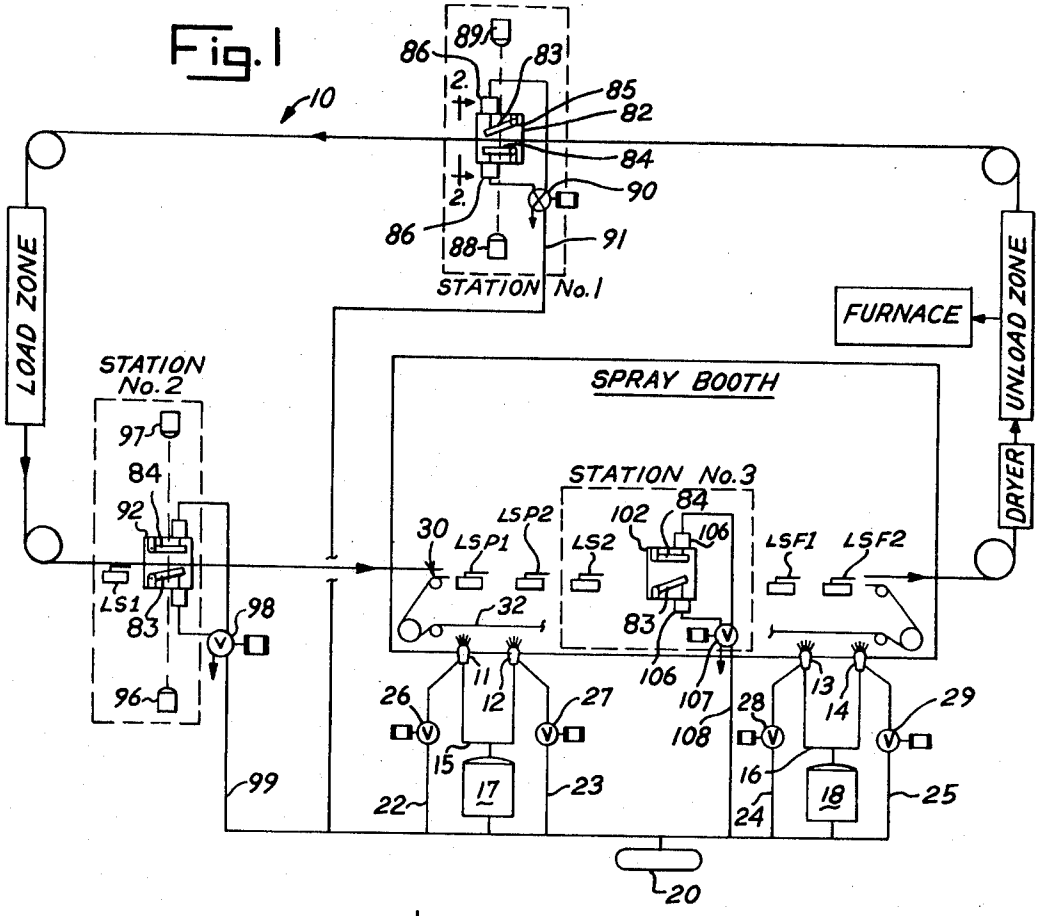
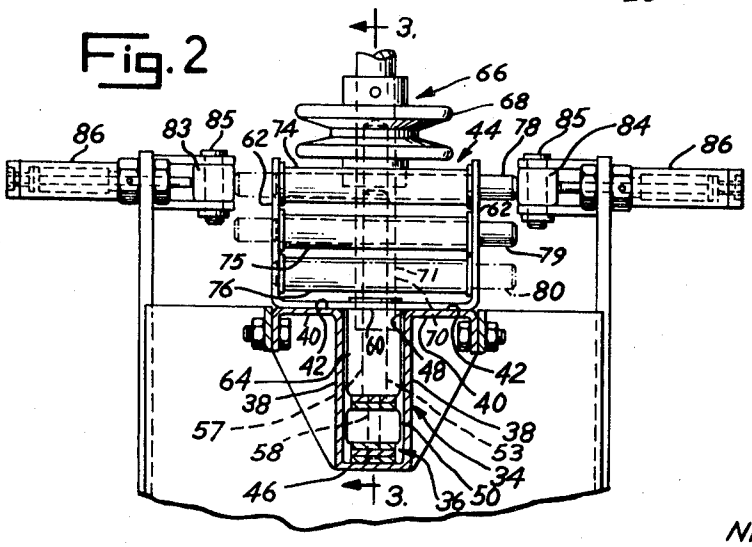


Fig. 2



INVENTORS
NICK S. RACZ &
DAVID M. HIGGINS
BY Molinare, Allegretti, Newitt & Witcoff
ATTORNEYS

Fig. 4

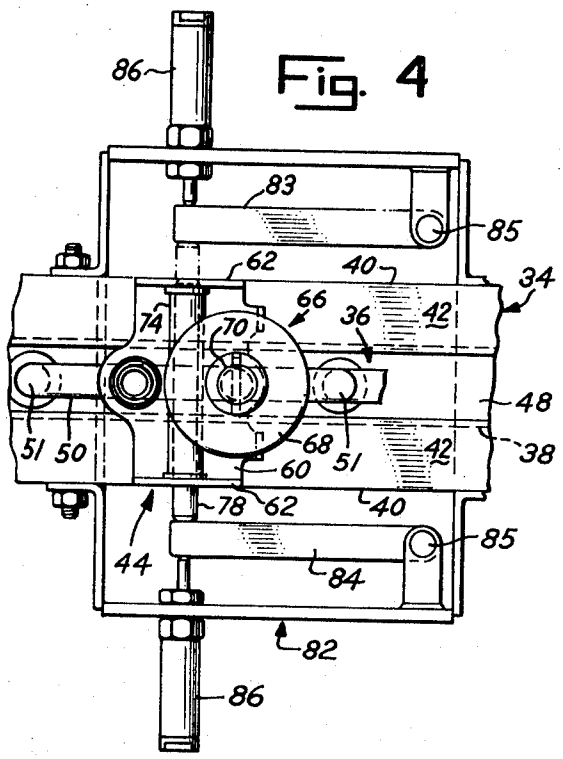


Fig. 5

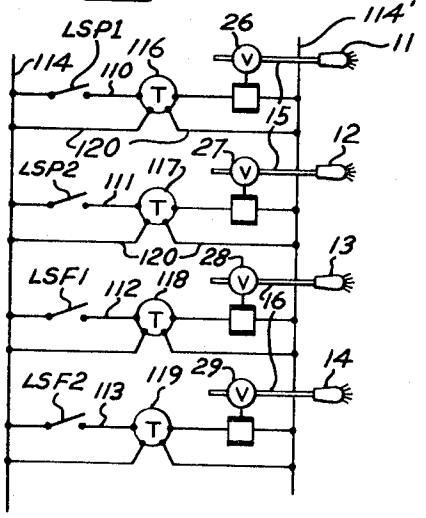


Fig. 6

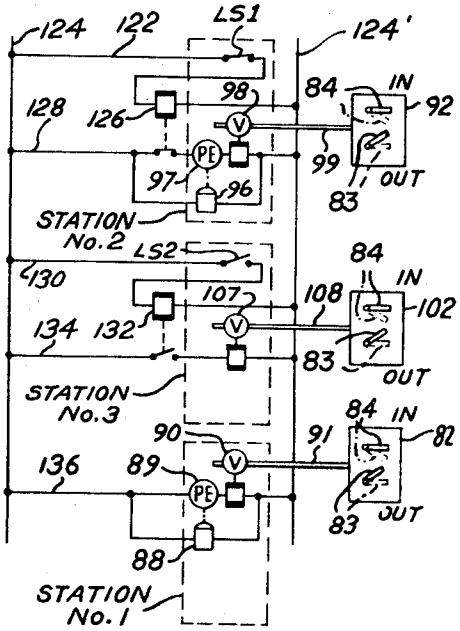
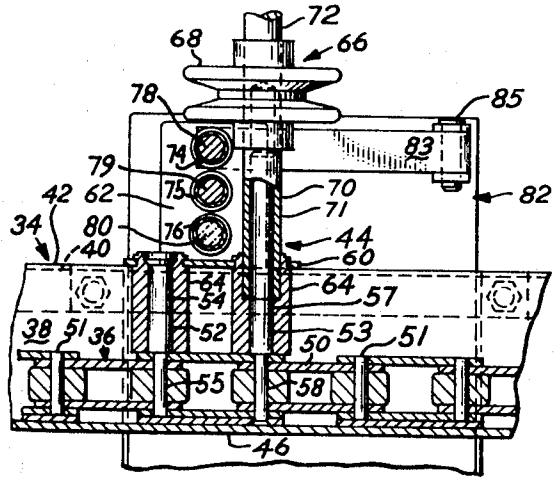


Fig. 3



INVENTORS
NICK S. RACZ &
DAVID M. HIGGINS
BY Molinare, Allegretti, Newitt & Witcoff
ATTORNEYS

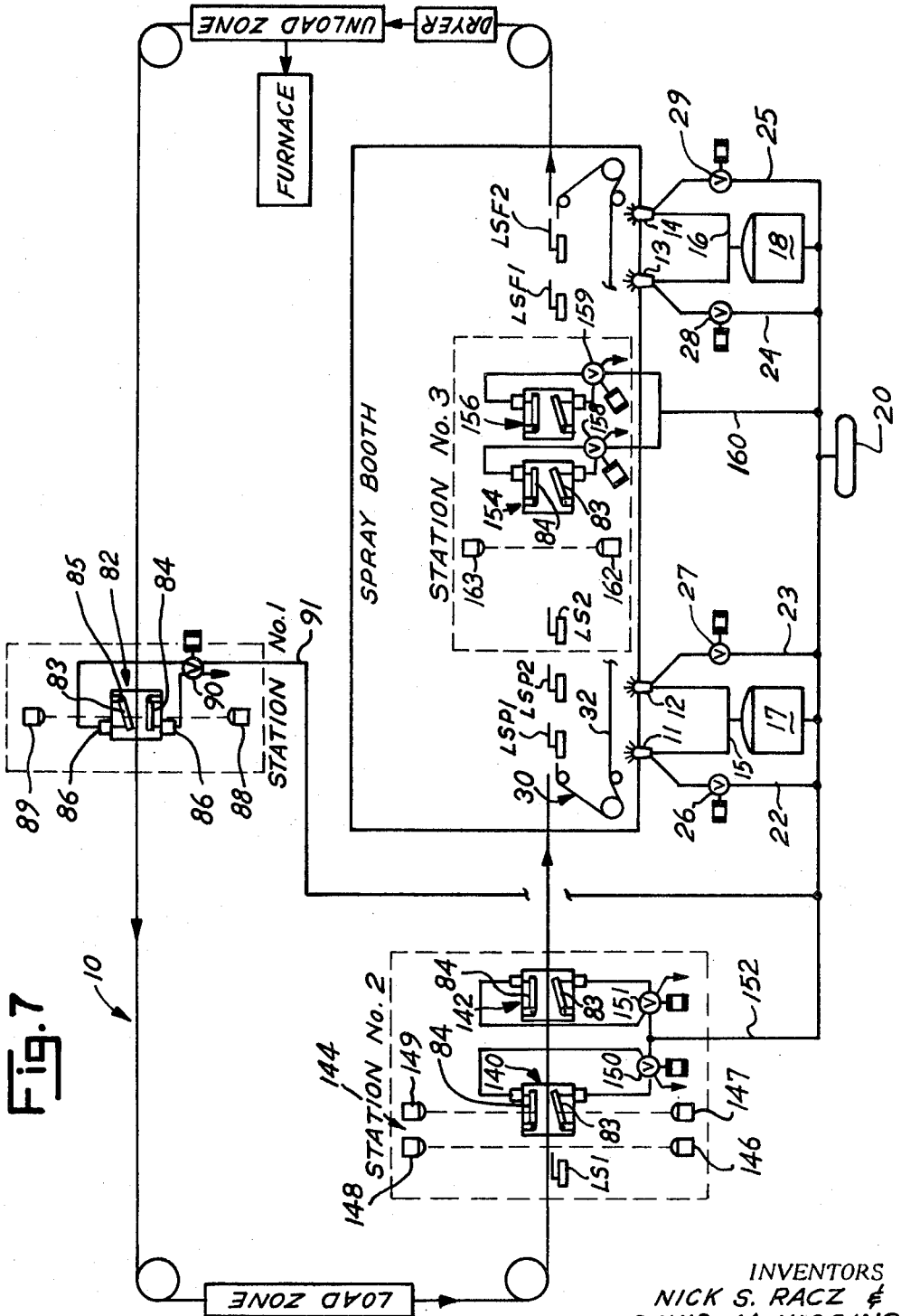


Fig. 7

INVENTORS
NICK S. RACZ &
DAVID M. HIGGINS
BY Molinare, Allegretti, Newitt & Witcoff
ATTORNEYS

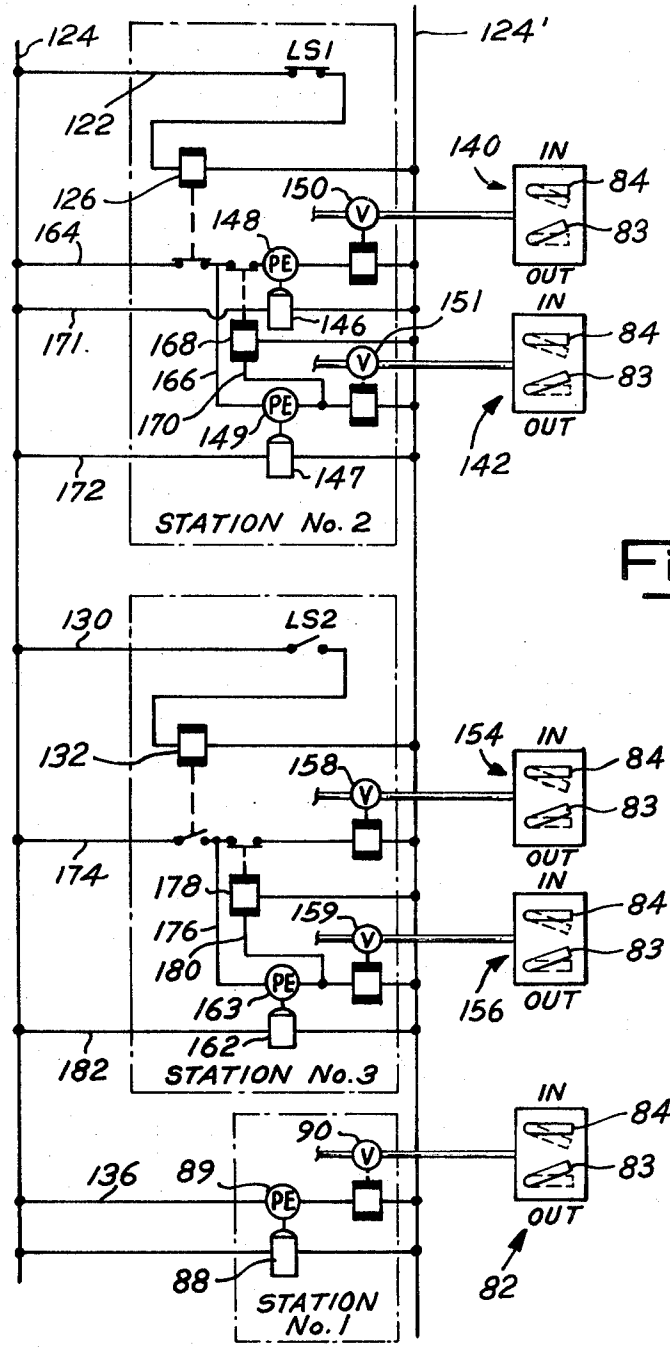


Fig 8

INVENTORS
NICK S. RACZ
& DAVID M. HIGGINS
BY Molinare, Allegretti,
Newitt & Witcoff
ATTORNEYS

SPRAY ASSEMBLY MEMORY

RELATED APPLICATIONS

This application is a continuation-in-part of our copending U.S. application Ser. No. 23,890, filed Mar. 30, 1970 and now abandoned.

BACKGROUND AND SUMMARY OF THE INVENTION

This invention relates to a spray assembly and, more particularly, to a spray coating assembly for spraying articles having differing characteristics.

Modern product finishing frequently requires the application of two or more coats of finishing or coating material to an article on a conveyorized finishing line. Frequently these coats, as well as the article or product configuration, differ from each other. In present practice, the application of two or more coats to a given article or product is usually accomplished by way of two complete individual coating stations and sets of equipment for drying the coatings. Where the products to be finished differ in configuration, coating is usually accomplished in either one of two ways. The different configurations are either coated in separate runs, the coating equipment being readjusted between runs to accommodate the different configurations, or a complete separate finishing line is employed for each product configuration.

The memory of the invention obviates the need for separate complete coating stations, equipment or finishing lines and also obviates the need for separate finishing runs with readjustment of the equipment between the runs. The memory of the invention makes it possible to apply any number of different coats to a product or article using only one coating station, the article being passed through the same coating station for each coat. In the invention, the coat or coats which have previously been applied are remembered by the memory and the coating station is directed to apply the next required coat. The memory of the invention also makes it possible to coat different article configurations which are intermixed with each other on a single coating line using a single coating station. Moreover, in one preferred form of the invention, articles of differing configurations may be placed upon any given article holder without necessitating further special attention by the operator and the invention will not only sense the product or article configuration, but will also direct the coating station to use that coating method appropriate to the particular configuration as well as that method which is appropriate to the particular stage of the coating operation. Thus, this embodiment of the invention not only makes it possible to use a single uniform design of carriage or conveying work holder for articles of differing configuration, but enables the operator to place an article on any one of the carriages without the need to discriminate between carriages or without the need to take any additional steps to insure that the given configuration which has been placed on the carriage is coated in a manner which is correct for that configuration.

The memory device of the invention is particularly useful where two or more coats of finishing material are to be applied to the article and at least one coat requires drying prior to the application of the next coat, such as for example where solvents or suspension vehicles are to be evaporated from the first or final coats

prior to either applying the final coat or to bringing the article to the curing temperature of the coatings. Moreover, the memory device of the invention also has particular utility where more than one article configuration is to be coated with the same coating or more than one coating, such as where two differently configured coated pieces are integral but separate parts of a final assembly, for example a cookware container and its cover. In the latter instance, color matching of the two product parts is assured as they will always be coated with coatings from the same lot.

In addition, the logistics of the operation are greatly simplified, by the memory of the invention since inventory and manufacturing lead time may be substantially reduced. Storage area requirements and fabrication and assembly time are also greatly reduced or eliminated. In the past, where two different configurations were to be coated, one was first coated while the other was stored, the other configuration was then coated while the first was stored, and finally the two coated individual configurations were then assembled together. Such intermediate storing required the provision of substantial storage areas. The invention obviates the need for this intermediate storage of parts between coating of the individual configurations and final assembly, coating of both configurations being accomplished at the same time and, in one embodiment of the invention, without even the need for particular attention of the operator to be given to which configuration is being placed on a carriage or work holder for coating.

In the spray assembly of the invention, spray means is provided for spraying an article as conveying means moves the articles to be sprayed past the spray means. Memory means remembers at least one characteristic of the article and actuates selection means to select a predetermined one of the spray means in response to characteristic remembered to selectively spray the articles which differ in said characteristics.

In one preferred form of the invention, the presence of articles of differing configuration may be automatically sensed and the articles may be sprayed selectively depending upon their configurations as well as other characteristics.

These and other objects, features and advantages of the present invention will be more clearly understood through a consideration of the following detailed description.

BRIEF DESCRIPTION OF THE DRAWINGS

In the course of this description, reference will frequently be made to the attached drawings in which:

FIG. 1 is a schematic view of one preferred embodiment of spray assembly incorporating the principles of the invention;

FIG. 2 is a cross sectioned elevation view of the conveyor of the assembly taken along line 2 — 2 of FIG. 1 and showing, in elevation, a preferred embodiment of carriage assembly and a shuttling mechanism of the invention;

FIG. 3 is a cross sectioned elevation view of the conveyor and carriage assembly taken along line 3 — 3 of FIG. 2;

FIG. 4 is a plan view of the conveyor and carriage assembly;

FIG. 5 is an electrical circuit diagram of a portion of the memory of the invention and showing a suitable

control circuit for selectively controlling the spray coating nozzles;

FIG. 6 is an electrical circuit diagram of a preferred embodiment of sensing and memory circuit of the invention;

FIG. 7 is a schematic view of another preferred embodiment of spray assembly incorporating the principles of the invention; and

FIG. 8 is an electrical circuit diagram of another preferred embodiment of sensing and memory circuit of the assembly shown in FIG. 7.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

One preferred embodiment of the invention is shown in FIGS. 1–6. In FIG. 1, a schematic is shown of a spray assembly and product finishing line which incorporates the principles of the invention. The spray assembly may be of the type employed for the coating of cookware or the like, by way of example. The assembly or finishing line includes an endless conveyor, generally 10, which conveys the articles to be spray coated from a load zone, through a spray booth in which the articles are coated, through a dryer and thence to an unload zone. Where one or more of the coatings are of a type which must be heat dried, the dryer serves the purpose of evaporating solvent. After drying and upon unloading after the final coat, the articles may be sent to a furnace for heat curing the coating if necessary.

The spray booth includes a plurality of spray nozzles 11, 12, 13 and 14 which are directed so as to selectively coat the articles as they pass through the spray booth on the conveyor. Nozzles 11 and 12 may be employed, for example, in a first coat operation, such as a prime coat, and nozzles 13 and 14 may be employed in a second coat operation, such as a finish coat. Nozzles 11 and 13 are preferably especially constructed and positioned to coat articles of one configuration and nozzles 12 and 14 to coat articles of another configuration. It will be understood that even though a single nozzle is shown for coating an article of a given configuration with a given coat, several nozzles may be employed as necessary for each coating.

Nozzles 11 and 12 are connected, by way of conduits 15, to a suitable prime coat supply tank 17 and nozzles 13 and 14 are connected by conduits 16 to a finish coat supply tank 18. In addition, each of the nozzles includes a compressed air or other compressed gas input for the purpose of initiating flow through the nozzles and atomization of the coating liquid during spraying. Each of the nozzles 11, 12, 13 and 14 is connected to a suitable compressed air source 20 by way respectively of conduits 22, 23, 24 and 25 having solenoid valves 26, 27, 28 and 29. The coating supply tanks 17 and 18 may also be connected to the compressed air line for pressurization of the tanks.

Positioned within the spray booth adjacent the conveyor 10, is an article rotating member 30, which may take the form of a driven V-belt 32 for engaging a portion of the carriage of the conveyor which carries the article about the conveyor loop 10 to rotate the article during the spraying operation. The carriage will be more fully described later.

Referring now to FIGS. 2–4, the conveyor 10 preferably comprises an endless channel member 34 which is stationarily attached to the floor or other structure (not shown) of the building in which the spray assembly is housed and which forms a housing in which a moving endless flexible chain 36 is housed. The channel member 34 includes a pair of spaced upstanding sidewalls 38 each having a flat flange 40 extending horizontally outward from their top edges, the upward facing surface of the flanges forming guide surfaces 42 upon which a plurality of carriages 44 ride. The bottom portion of the channel is preferably closed by a web 46, upon which the chain 36 runs, and the top of the channel housing is open so as to form an elongated slot 48 extending around the conveyor loop.

The chain 36 is positioned in the housing formed by the channel 34 and preferably comprises a plurality of elongated links 50 which are pinned to each other by pins 51, such that a given link is pivotable relative to its adjacent link. At selected spaced points along the length of the endless chain 36, certain of the adjacent pivot pins 51 are replaced by elongated pins 52 and 53.

Pin 52 preferably comprises an enlarged diameter portion 54 and a somewhat reduced diameter distal end 55, the latter of which extends through the chain links to act as the pivot connecting pin of the links. The enlarged portion of pin 52 extends upward and slightly out of the slot 48. Pin 53 also includes an enlarged diameter portion 57, which extends out of the slot 48 of the channel 34 for a substantial distance, and a somewhat reduced diameter distal end 58 extends through the drive chain links to provide the pivot pin at the other end of the link.

The carriage 44 for holding and moving the article to be coated is positioned over pins 52 and 53 and comprises a U-shaped member having a web 60 which rests upon and slides along the guide surfaces 42 of flanges 40, and a pair of spaced upstanding side flanges 62 formed integral with the web. Spacer bushings 64 extend between the chain 36 and the web 60 and attach the carriage to the chain, such that the carriage is slideably driven along the guide surfaces 42 by the moving chain and pins 52 and 53.

A spindle assembly 66 is provided on the carriage which includes a rotating sheave 68, fixed intermediate to the ends of an elongated rod 70, and which is adapted to engage the belt 32 while the carriage is enroute through the spray booth. The lower end 71 of the rod 70 is annular in cross section and is journaled upon the upper end of pin 53 for rotation relative thereto. The other end 72 of the rod extends above the sheave and is adapted to receive a work holding fixture (not shown) for holding the article of work which is to be coated.

Only a single spray booth need be provided for the spraying of different coatings, as well as the application of the coatings to articles of differing configuration. A first preferred embodiment of memory of the invention, which will now be described, will insure that the correct coat is applied to the correct article in this single booth.

Referring again to FIGS. 2–4, a plurality of tubular cylinders 74, 75 and 76 are vertically spaced from each other and extend transversely across the leading end of the carriage 44 between the upstanding sides 62, each end of the tubular cylinders being fixedly attached to the sides. An indication pin 78 is slideably positioned in cylinder 74 and one of the two indication pins 79 or 80 is slideably positioned in cylinder 75 or 76 respectively, depending upon which of two different article configurations are to be carried by the carriage. Pin 79

is shown in FIGS. 2 and 3 as solid and pin 80 as dot and dash. If more than two configurations are to be sprayed, an additional cylinder may be added for each additional configuration. The pins 78, 79 and 80 are slightly longer than the maximum width between the upstanding sides 62 such that they extend to one side or the other of the sides.

As shown in FIG. 1, the memory also includes a Station No. 1 positioned between the unload zone and the load zone, a Station No. 2 positioned between the load zone and the spray booth and a Station No. 3 positioned in the spray booth between the precoat spray nozzles 11 and 12 and the final coat nozzles 13 and 14.

Station No. 1 includes a shuttling mechanism 82 having a pair of shuttling arms 83 and 84 which are attached for pivotal movement at one end by a pivot pin 85 and which are movable about their pivotal attachment by way of pneumatic or other fluid actuated cylinders 86 such that each of the arms are selectively movable toward and away from the axis of the conveyor 10. The purpose of the shuttling mechanism in Station No. 1, is to move pin 78, which will hereafter be referred to as the qualifying pin, such that it extends either to one side or the other of the carriage 44. Also included in Station No. 1 is a lamp 88 and photocell 89 which, by way of the electrical circuit shown in FIG. 6 which will be described later, operates a solenoid valve 90 in air conduit 91 to selectively admit air to one or the other of the shuttling mechanism's cylinders 86 for pivoting the arms 83 and 84 in response to the presence or absence of any article on the carriage.

Like Station No. 1, Station No. 2 also includes shuttling mechanism 92 also having shuttling arms 83 and 84, and a lamp 96 and photocell 97 which actuates a solenoid valve 98 in air conduit 99 to operate the shuttling arms 83 and 84 about their pivot points. The shuttling arms of Station No. 2 are positioned, in elevation, slightly below shuttling arms 83 and 84 Station No. 1 and the shuttling arms 83 and 84 of Station No. 2 are positioned at the same elevation as the pin cylinders 75 and 76 and their pins 79 and 80. Pin 79, if it is present, will hereafter be referred to as the first configuration spray pin and pin 80, if it is present, will hereafter be referred to as the second configuration spray pin. In addition, Station No. 2 also includes a limit switch LS1 which is arranged to be actuated by the qualifying pin 78 as it passes. Station No. 2 will sense the coating condition of the articles enroute to the spray booth, e.g. whether it is uncoated or prime coated, and will move one of the pins 79 and 80 outward depending upon which pin is present.

Station No. 3 also includes a shuttling mechanism 102 having arms 83 and 84 arranged to operate the spray pins 79 and 80 pneumatically by way of cylinders 106, solenoid valve 107 and air conduit 108. In addition, Station No. 3 includes a limit switch LS2 which is arranged to be actuated also by the qualifying pin 78 as the qualifying pin passes.

Two additional limit switches are provided in the spray booth for each article configuration to be coated to actuate the proper spray nozzle in response to the position of the spray pins 79 and 80. Limit switches LSP1 and LSF1 are positioned so as to be actuated by the first configuration spray pin 79 to open one of the precoat nozzles 11 or finish coat nozzles 13 respectively, and switches LSP2 and LSF2 are positioned so as to be actuated by the second configuration spray pin 80 to open the other of the precoat nozzles 12 and finish coat nozzles 14, respectively.

Referring to FIG. 5, each of the actuating coils of the solenoid valves 26, 27, 28 and 29 of the spray nozzles 11, 12, 13 and 14 are located in a parallel lead 110, 111, 112 and 113 respectively between the main conductors 114, 114' of a power source. Each of these leads also includes a timer 116, 117, 118 and 119 respectively for timing the length of operation of the nozzles and also includes one of the limit switches LSP1, LSP2, LSF1 and LSF2 respectively. Limit switches LSP1 and LSF1 are selectively actuated by spray pin 79 when it is positioned in its cylinder 75 and limit switches LSP2 and LSF2 are selectively actuated by spray pin 80, if present, from their normally open position to a closed position so as to complete a circuit through the leads 110, 111, 112 and 113 depending upon the position of the qualifying pin 78. Additional leads 120 may be provided between the main conductors 114, 114' for operating the timer 116, 117, 118 and 119 where the timers are electrical.

Referring to FIG. 6, the sensing and memory circuit of Station No. 2 includes a first lead 122 which extends between the main conductors 124, 124' of the power supply. The normally closed limit switch LS1 is positioned in lead 122 along with the coil of a switching relay 126. The switching contacts of relay 126, are preferably of the instant open-delay close type. A second lead 128 includes the normally closed switching contacts of the relay 126, the photocell 97 and the actuating coil of solenoid valve 98. In order to provide continuous power to the lamp 96, the lamp may be connected in parallel across the switching contacts of relay 126, the cell 97 and the coil of valve 98.

Station No. 3 includes another lead 130 connected across conductors 124, 124'. Positioned in lead 130 are normally open limit switch LS2 and the coil of another switching relay 132 which has normally open switching contacts. Relay 132 is preferably of the instant close-delay open type. The switching contacts of the switching relay 132 are positioned in lead 134 which includes the actuating coil of solenoid valve 107.

Finally Station No. 1's photocell 89 is positioned in lead 136 between conductors 124, 124' along with the actuating coil of solenoid valve 90. Like Station No. 2, the lamp 88 may be connected in parallel to the cell 89 and coil of valve 90 to receive continuous power.

The operation of the above described memory embodiment of the invention will now be described.

Let it be assumed that one of the carriages 44 is empty and has just left the shuttling mechanism 82 of Station No. 1 and is traveling in the direction indicated by the arrows in FIG. 1. Let it also be assumed that the qualifying pin 78 and the spray pin 79 and 80, whichever is present, are positioned inward of the conveyor loop as viewed in FIG. 1. As the carriage 44 continues to move around the loop and enters the load zone, an article will be positioned upon the work holder of the carriage 44. If the carriage has a pin 79 but does not have a pin 80, an article of one configuration A, for example a cookware container cover, will be placed on the carriage and if the other pin 80 is present and pin 79 is absent, an article of the other configuration B, for example the container itself, is placed on the carriage.

The loaded carriage with its article will now proceed around the conveyor loop until it reaches Station No. 2. Since the qualifying pin 78 is still in its inward posi-

tion, it will miss limit switch LS1 and the limit switch will not be actuated from its normally closed position as shown in FIG. 6. Therefore, the coil of relay 126 will remain energized through lead 122 and its switching contacts will remain closed. Although the switching contacts of relay 126 are closed, the photocell 97 will still "see" the light from the lamp 96, and will maintain the circuit open through lead 128 to the actuating coil of solenoid valve 98 to close the valve and position the arms 83 and 84 of the shuttling mechanism 92 as shown solid in FIGS. 1 and 6. However, as the loaded carriage continues to move, the article, whatever its configuration, will move into the path of the light beam in Station No. 2 and the beam will be broken to actuate the photocell and complete the circuit through the already closed switching contacts of relay 126 and the actuating coil of the solenoid valve 98. The valve 98 will now admit air to the cylinders of the shuttling mechanism 92 to shift its arms 83 and 84 to the dot and dash position as shown in FIG. 6. Since arm 84 is now closer to the conveyor axis, as the carriage moves between the arms, spray pin 79 or 80, whichever is present, will be shifted outward to the dot and dash position shown in FIG. 2.

As soon as the carriage and its article leave the light beam in Station No. 2, the actuating coil of the solenoid valve 98 will again be deactuated, closing the valve 98 and returning the arms of shuttling mechanism 92 to their normal solid line position shown in FIG. 6 in readiness for the next carriage.

Now as the carriage 44 proceeds into the spray booth, the outward extending spray pin 79 and 80 will actuate either limit switch LSP1 or LSP2, respectively depending upon which pin is present. Actuation of one of these switches will complete a circuit through the actuating coil of either solenoid valve 26 or 27 to admit air to spray nozzle 11 or 12 to spray the article of a given configuration for a predetermined amount of time depending on the setting of the timer 116 or 117. During spraying, the sheave 68 comes into contact with the moving drive belt 32 so as to rotate the work holder and the article which is being sprayed to insure a uniform application of coating material from nozzle 11 or 12.

The carriage then proceeds to Station No. 3, and since the qualifying pin 78 is still positioned inward, it misses limit switch LS2. Thus limit switch LS2 remains open, deenergizing the coil of switching relay 132 and its switching contacts remain open as shown in FIG. 6 to deenergize the actuating coil of solenoid valve 107. With valve 107 closed, the shuttling arms 83 and 84 of the shuttling mechanism 102 remain in the solid line position as shown in FIG. 6 and, as the carriage passes between the shuttling arms, arm 83 will return spray pin 79 or 80, whichever is present, automatically to the inward position. With the spray pin 79 or 80 in its inward position, limit switches LSF1 and LSF2 will be missed and the final coat spray nozzles 13 or 14 will not be actuated.

The prime coated article will now leave the spray booth and pass through the dryer where solvent or the like in the first coat will be evaporated, and will continue through the unload zone and enter Station No. 1. At this point both the qualifying pin 78 and the spray pin 79 or 80 will be in their inward position. Since the carriage 44 is now loaded with an article, the light beam in Station No. 1 will be broken to complete a circuit through the actuating coil of the solenoid valve 90, admitting air to the shuttling mechanism 82 and shifting the shuttling arms 83 and 84 from the solid line position to the dot and dash line position shown in FIG. 6. Now the arms are positioned such that arm 84 will urge the qualifying pin 78 into its outer position as shown in the dot and dash lines in FIG. 2. Again, when the article leaves the light beam, the shuttling arms 83 and 84 will be returned to their normal solid line position in anticipation of the next following carriage.

The loaded carriage will again proceed around the conveyor loop 10, through the load zone, and will enter Station No. 2 for a second time. At Station No. 2, the now outward extending qualifying pin 78 will contact and actuate limit switch LS1. Upon actuation, switch LS1 will open to deenergize the coil of the switching relay 126 and the switching contacts of the relay will open the circuit through lead 128 to cancel the signal generated by the photocell 97 as the article passes through the light beam. Thereby, even though the light beam in Station No. 2 will be broken by the article, the solenoid valve 98 will remain closed and the shuttling mechanism 92 will not be actuated and will leave the spray pin 79 or 80 in the inward position.

With the spray pin 79 or 80 in the inward position, the carriage proceeds into the spray booth and the spray pins miss limit switches LSP1 and LSP2. As the carriage enters Station No. 3, its now outward extending qualifying pin 78 will actuate limit switch LS2 to close the switch and complete a circuit through lead 130 and the coil of switching relay 132 to close its switching contacts. The closing of the switching contacts of relay 132 will energize lead 134 and the actuating coil of solenoid valve 107 to open the valve, and the shuttling arms 83 and 84 of the shuttling mechanism 102 will be shifted from the solid line position shown in FIG. 6 to the dot and dash position. Arm 84 thereby now positions the spray pin 79 or 80, whichever is present, in the outward position and as the carriage leaves Station No. 3, the outward positioned spray pin 79 or 80 will close limit switch LSF1 or LSF2, depending upon which pin is present, to actuate the final coat spray nozzle 13 or 14 for a period of time determined by the timer 118 or 119.

The article then leaves the spray booth for a second time and passes through the dryer, where any solvent in the final coat is evaporated, and thence to the unload zone where the finally coated article is unloaded. Upon unloading, the article may be sent to a curing furnace if necessary for the curing of its coating or coatings.

The now empty carriage will again proceed to Station No. 1. Since no article is present on the carriage, the light beam remains uninterrupted and transfer arm 83 will return the qualifying pin 78 to its inward position. The carriage will then leave Station No. 1 with its qualifying pin 78 in and its spray pin 79 or 80 out.

It will be seen that if the carriage passes through the load zone without being loaded, no spraying will occur, since the carriage will proceed through Station No. 2 with the qualifying pin 78 in and the spray pin 79 or 80 out. Thereby, the qualifying pin 78 will miss the limit switch LS1, but the shuttling mechanism will not be energized since the light beam of lamp 96 is not broken and the photocell 97 will open the circuit through lead 128 to deenergize the coil of solenoid valve 98. The shuttling arms 83 and 84 of shuttling mechanism 92 therefore will remain in their solid line position as shown in FIG. 6 and will return the spray pin 79 or 80

to its inward position. With both the spray pin 79 or 80 and the qualifying pin 78 in the inward position, none of the limit switches in the spray booth will be actuated as the empty carriage passes the respective switches.

In the above described embodiment of the invention, only one or the other of pins 79 or 80 are carried on a given carriage and the presence of one pin and absence of the other provides an indication of the identity of the particular configuration of the article on the given carriage. In the second preferred embodiment of invention which will now be described, both pins 79 and 80 are carried at all times on any given carriage and either configuration of article may be placed on any given carriage, as the particular configuration of the article on the carriage will be automatically sensed.

The construction of the second preferred embodiment of assembly is shown in FIG. 7 and is identical to that of the assembly shown in FIG. 1, except for Station Nos. 2 and 3 and the presence of both indication pins 79 and 80 on any given carriage at the same time. Accordingly, like reference numerals will be employed with like components.

Again only a single spray booth need be provided for the spraying of different coatings, as well as the application of the coatings to articles of differing configuration. Also, Station No. 1 is of the same construction as previously described. Included in Station No. 1 is a lamp 88 and photocell 89 which, by way of the electrical circuit shown in FIG. 8 which will be described later, operates a solenoid valve 90 in air conduit 91 to selectively admit air to one or the other of the shuttling mechanism's cylinders 86 for pivoting the arms 83 and 84 in response to the presence or absence of any article in the carriage, whatever its configuration may be.

Station No. 2 includes a pair of shuttling mechanisms 140 and 142 having shuttling arms 83 and 84. Station No. 2 also includes an array 144 of photo lamps and cells having a pair of lamps 146 and 147 and photocells 148 and 149 which control solenoid valves 150 and 151 in air conduit 152 to selectively operate the shuttling arms 83 and 84 of the respective shuttling mechanisms 140 and 142. The shuttling arms of the mechanisms 140 and 142 in Station No. 2 are positioned, in elevation, slightly below shuttling arms 83 and 84 in the shuttling mechanism 82 in Station No. 1. The shuttling arms of mechanism 140 are positioned at the same elevation as the pin cylinder 75 and its pin 79 and the arms of mechanism 142 are positioned at the same elevation as cylinder 76 and its pin 80. Thus, the shuttling mechanisms 140 and 142 control the inward and outward positioning of the configuration A and B spray pins 79 and 80, respectively, as will be described in more detail later.

In addition, Station No. 2 also includes the normally closed limit switch LS1 which is arranged to be actuated by the qualifying pin 78 as it passes. Station No. 2 will sense both the coating condition of the articles enroute to the spray booth, e.g. whether a given article is uncoated or prime coated, and will also sense the configuration of the article, e.g. whether a container or a cover is present on the carriage, and will selectively control the inward and outward position of one of the pins 79 or 80 depending upon which configuration is present.

Station No. 3 also includes a pair of shuttling mechanisms 154 and 156 also having arms 83 and 84. Mechanisms 154 and 156 also operate the spray pins 79 and 80 respectively by way of solenoid valves 158 and 159 and air conduit 160. In addition, Station No. 3 includes the limit switch LS2 which is arranged to be actuated also by the qualifying pin 78 as the qualifying pin passes and a single lamp 162 and photocell 163 for determining what configuration of article is on the carrier.

The spray circuit shown in FIG. 5 is employed in this embodiment with its limit switches LSP1, LSP2, LSF1 and LSF2 for spraying the article sensed with prime and finish coats.

Referring now to FIG. 8, the sensing and memory circuit of Station No. 2 includes a first lead 122 which extends between the main conductors 124, 124' of the power supply and in which the normally closed limit switch LS1 is positioned in lead 122 along with the coil of a switching relay 126. A second lead 164 is connected between conductors 124, 124' and includes, in order, the normally closed switching contacts of the relay 126, a tap to another lead 166, the normally closed switching contacts of another relay 168, the photocell 148 and the actuating coil of solenoid valve 150. Lead 166 is tapped between conductor 124' to lead 164 between the normally closed switches of relays 126 and 168 and includes, in order, photocell 149, a tap to lead 170 for energizing the coil of relay 168, and the actuating coil of solenoid valve 151. In order to provide continuous power to the lamps 146 and 147, these lamps may be connected between conductors 124, 124' by leads 171 and 172.

Station No. 3 also includes lead 130 connected across conductors 124, 124' in which normally open limit switch LS2 and the coil of switching relay 132, having normally open switching contacts are positioned. Station No. 3 also includes another lead 174 which is connected between the conductors 124, 124' and which includes, in order, the switching contacts of relay 132, a tap to a lead 176, the normally closed switching contacts of another relay 178, and the actuating coil of solenoid valve 158. Lead 176 is tapped between conductor 124' to lead 174 between the switching contacts of relays 132 and 178 and includes, in order, photocell 163, a tap to a lead 180 for energizing the coil of relay 178, and the actuating coil of solenoid valve 159. Lamp 162 may be connected for energization between conductors 124, 124' by lead 182.

Station No. 1 is the same as described in FIG. 6.

The operation of the sensing memory of this embodiment of the invention will now be described.

Again let it be assumed that one of the carriages 44 is empty and as just left the shuttling mechanism 82 of Station No. 1 and is traveling in the direction indicated by the arrows in FIG. 7. Let it also be assumed that the qualifying pin 78 and the configuration spray pins 79 and 80 are positioned inward of the conveyor loop as viewed in FIG. 7. Finally, let it be assumed that the articles which are to be spray coated comprise a cookware container cover of configuration A and the cookware container itself of configuration B. As the carriage 44 continues to move around the loop and enters the load zone, an article of either configuration A or B may be positioned upon the work holder of the carriage 44. Care need not be taken as to which article configuration is placed on which carriage or in what order.

The loaded carriage with its article of given configuration will now proceed around the conveyor loop until it reaches Station No. 2. Since the qualifying pin 78 is still in its inward position, it will miss limit switch LS1

and the limit switch will not be actuated from its normally closed position as shown in FIG. 8. Therefore, the coil of relay 126 will remain energized through lead 122 and its switching contacts will remain closed. Although the switching contacts of relay 126 are closed, the photocells 148 and 149 will still "see" the light from the lamps 146 and 147 and will maintain the circuits open through lead 164 to the actuating coil of solenoid valve 150 and lead 166 to the actuating coil of solenoid valve 151 to close the valves and position the arms 83 and 84 of the shuttling mechanisms 140 and 142 as shown solid in FIGS. 7 and 8. However, as the loaded carriage continues to move, the article will move into the path of the light beam of one or both of the lamps 146 and 147, in Station No. 2.

Since the configuration A article is a cover, it will block the light from only one of the lamps due to the positioning of the lamps and cells in the array 144, whereas an article of configuration B will block both of the beams. If the article is a cover of configuration A, the beam will be interrupted to actuate the photocell 148 and complete the circuit through the already closed switching contacts of relays 126 and 168 and the actuating coil of the solenoid valve 150. The valve 150 will now admit air to the cylinders of the shuttling mechanism 140 to shift the arms 83 and 84 to the dot and dash position as shown in FIG. 8. Since arm 84 is now closer to the conveyor axis, as the carriage moves between the arms, spray pin 79 will be shifted outward to the dot and dash position shown in FIG. 2. Since for a configuration A article, the beam will remain uninterrupted to photocell 149, the coil of relay 168 will remain deenergized and its switching contacts will remain closed, and the coil of solenoid valve 151 will also remain deenergized. With valve 151 closed, the arms 83 and 84 of shuttling mechanism 142 will remain in their solid line position, as shown in FIG. 8, and the configuration B spray pin 80 will remain in its inward position, as shown in the dot and dash position in FIG. 2.

If the article which was positioned on the carrier was a cookware container itself of configuration B, it would move into both of the light beams in Station No. 2, interrupting the beams. Where both beams are interrupted, the photocell 149 completes a circuit through lead 166 to the coil of solenoid 151 to open that valve and shift the arms 83 and 84 of mechanism 142 from the solid position to the dot and dash position shown in FIG. 8. In the latter position, these arms will move the configuration B spray pin 80 to its outward position. Although the beam to photocell 148 is also interrupted, the coil of solenoid valve 150 will remain deenergized, since energization of lead 166 will also energize lead 170 and the coil of relay 168 to open the switching contacts of that relay which are positioned in lead 164. Thus, valve 150 will remain closed and pin 79 will remain in its inward position.

As soon as the carriage and its articles leave the light beams in Station No. 2, the actuating coil of the solenoid valve 150 or 151, whichever was energized, will again be deactuated, closing its valve and returning the shuttling arms 83 and 84 to their normal solid line position shown in FIG. 8 in readiness for the next carriage.

Now as the carriage 44 proceeds into the spray booth, the outward extending spray pin 79 or 80 will actuate either limit switch LSP1 or LSP2, respectively, depending upon which pin was positioned outward in Station No. 2. If the article on the carrier is a configuration A cover, the configuration A spray pin 79 will be in the outward position and will actuate switch LSP1 and a first coat will be sprayed on the article from nozzle 11 as previously described. If on the other hand, the article on the carrier is a configuration B container, the configuration B spray pin 80 will be in the outward position and switch LSP2, rather than LSP1, will be actuated and nozzle 12 will spray the article as previously described.

The carriage will continue to Station No. 3 and, since the qualifying pin 78 is still positioned inward, it misses limit switch LS2. Thus limit switch LS2 remains open, deenergizing the coil of switching relay 132 and its switching contacts remain open as shown in FIG. 8 to deenergize the actuating coil of solenoid valves 158 and 159. Even though the article may trigger photocell 163, lead 176 and its valve 159 actuating coil remain deenergized due to the open switching contacts of relay 132. With valves 158 and 159 closed, the shuttling arms 83 and 84 of the shuttling mechanisms 154 and 156 will remain in the solid line position as shown in FIG. 8 and, as the carriage passes between these shuttling arms, whichever one of spray pins 79 or 80 which was previously pushed out, will automatically be returned to the inward position. With the spray pins 79 and 80 in their inward positions, limit switches LSF1 and LSF2 will be missed and the final coat spray nozzles 13 and 14 will not be actuated.

The prime coated article will now leave the spray booth and pass through the dryer where solvent or the like in the first coat will be evaporated, and will continue through the unload zone and enter Station No. 1. At this point the qualifying pin 78 and both of the spray pins 79 and 80 will still be in their inward positions. Since the carriage 44 is now loaded with an article, the light beam in Station No. 1 will be broken, whether the article is of configuration A or B, to complete a circuit through the actuating coil of the solenoid valve 90, admitting air to the shuttling mechanism 82 and shifting the shuttling arms 83 and 84 from the solid line position to the dot and dash line position shown in FIG. 8. Now the arms are positioned such that arm 84 will urge the qualifying pin 78 into its outer position as shown in the dot and dash lines in FIG. 2, while the position of spray pins 79 and 80 remains unchanged. Again, when the article leaves the light beam, the shuttling arms 83 and 84 of mechanism 82 will be returned to their normal solid line position in anticipation of the next following carriage.

The loaded carriage will continue around the conveyor loop 10, through the load zone, and will again enter Station No. 2 for a second time. At Station No. 2, the now outward extending qualifying pin 78 will contact and actuate limit switch LS1. Upon actuation, switch LS1 will open to deenergize the coil of the switching relay 126 and the switching contacts of the relay will open the circuit through leads 164 and 166 to cancel any signal which might be generated by the photocells 148 and 149 as the article passes through their light beams. Thereby, even though at least one of the light beams in Station No. 2 will be broken by the article, the solenoid valves 150 and 151 will remain closed and the shuttling mechanisms 140 and 142 will not be actuated, leaving the spray pins 79 and 80 in the inward position.

With the spray pins 79 and 80 in the inward position, the carriage proceeds into the spray booth and the

spray pins will miss limit switches LSP1 and LSP2. As the carriage enters Station No. 3, its now outward extending qualifying pin 78 will actuate limit switch LS2 to close the switch and complete a circuit through lead 130 and the coil of switching relay 132 to close its switching contacts. With the switching contacts of relay 132 closed, the actuating coil of either solenoid valve 158 or 159 will be actuated depending upon whether the article on the carriage is of configuration A or B.

If the article is a cover of configuration A, it will miss the light beam of photocell 163 and lead 176 will remain open. Since the coil of relay 178 thereby will remain deenergized, its switching contacts will remain closed and the coil of solenoid valve 158 will be energized to open valve 158. The opening of valve 158 will admit air to the shuttling mechanism 154, shifting its shuttling arms 83 and 84 from the solid line position shown in FIG. 8 to the dot and dash position. Arm 84 thereby will now position the configuration A spray pin 79 in the outward position and, as the carriage leaves Station No. 3, the outward positioned spray pin 79 will close limit switch LSF1 to actuate the final coat spray nozzle 13 as previously described.

On the other hand, if the article on the carriage is a container of configuration B, it will interrupt the light beam to photocell 163 and complete a circuit through the already closed switching contacts of relay 132, through lead 176 and through the coil of solenoid valve 159, opening the valve. Since lead 176 is now energized, lead 180 and the coil of relay 178 will also be energized to open its switching contacts in lead 174 and deenergize the coil of solenoid valve 158. The opening of valve 159 will admit air to the shuttling mechanism 156, shifting its arms 83 and 84 from the solid line position shown in Fig. 8 to the dot and dash line position. Arm 84 of the mechanism 156 thereby will now position the configuration B spray pin 80 in the outward position and, as the carriage leaves Station No. 3, the outward positioned pin 80 will close limit switch LSF2 to actuate the final coat spray nozzle 14 as previously described.

The article then leaves the spray booth for a second time and passes through the dryer, where any solvent in the final coat is evaporated, and thence to the unload zone where the finally coated article is unloaded.

The now empty carriage will continue to Station No. 1. Since no article is present on the carriage, the light beam remains uninterrupted and transfer arm 83 of the shuttling mechanism 82 will return the qualifying pin 78 to its inward position. The carriage will then leave Station No. 1 with its qualifying pin 78 in and one of its spray pins 79 or 80 out, depending on which pin was last positioned out in Station No. 3.

Again it will be seen that if the carriage passes through the load zone without being loaded, no spraying will occur even though one of the spray pins 79 or 80 is still out. Since the qualifying pin 78 has been pushed in, it will miss limit switch LS1 and also the later switch LS2. Even though pin 78 misses switch LS1, the shuttling mechanism will not be energized since the light beams of neither photocell 148 nor 149 will be broken and these photocells will open the circuits through leads 164 and 166 to deenergize the coils of solenoid valves 150 and 151. The shuttling arms 83 and 84 of shuttling mechanism 140 and 142 therefore will remain in their solid line positions as shown in FIG. 8 and will return the spray pin 79 or 80 to its inward position. With both the spray pin 79 or 80 and the qualifying pin 78 in the inward position, none of the limit switches in the spray booth will be actuated as the empty carriage passes the respective switches.

It will be understood that various delays may well be built into the circuits shown in FIGS. 5, 6 and 8 in order to take into account the travel time of the carriage between certain of the circuit components. These delay devices have not been shown for the purpose of clarity. The selection and placement of suitable delay devices will vary with different spray assemblies and will be readily obvious to one skilled in the art after he considers the above described principles of the invention.

It will also be understood that although the operation of the pins 78, 79 and 80 has been described in terms of the pins performing certain functions when positioned inward and certain functions when positioned outward, these positions may be reversed if accompanied by the reversal of various ones of the limit switches and shuttling mechanisms. Also it will be appreciated that solid state components may be employed in the circuitry of the invention and that other article presence or absence sensing devices may be employed in the place of the photocells, such as limit switches and the like, although photocells are preferred.

Finally, it should be understood that the embodiments of the invention which have been described are merely illustrative of some of the applications of the principles of the invention. Numerous modifications may be made by those skilled in the art without departing from the true spirit and scope of the invention.

What is claimed is:

1. In a spray assembly,
spray means for spraying articles,
conveyor means for conveying the articles to be sprayed by said spray means,
memory means including means on said conveyor means movable both with and relative to said articles as the articles are conveyed by the conveyor means, said memory means remembering at least one characteristic of the articles which are being conveyed to said spray means, and
selection means actuated by said memory means for selecting a predetermined one of said spray means in response to the characteristic remembered by said memory means, whereby articles differing in said characteristic are selectively sprayed.

2. In the spray assembly of claim 1, wherein said characteristic includes at least one of the coating condition and configuration of the article.

3. In the assembly of claim 1, wherein said memory means comprises,
first and second indication means movable with the article and also relative to the conveyor means as the article is conveyed by said conveyor means,
a station on said conveyor means before the spray means including altering means responsive to the first indication means when said first indication means is positioned in a first position, for moving said second indication means from a first to a second position, and
said selection means includes spray initiating means between said station and said spray means which is actuated by said second indication means when said second indication means is in said second position to initiate spray of said predetermined one of said spray means.

4. In the spray assembly of claim 3 wherein said station includes article presence sensing means responsive to the absence of an article in said station to position said second indication means in said first position, whereby said spray initiating means is not actuated by said second indication means.

5. In the spray assembly of claim 1, wherein said memory means comprises,

first, second and third stations on said conveyor means before, adjacent and after said spray means respectively,

first and second indication means movable with the article and also relative to the conveyor means as the article is conveyed by said conveyor means,

first, second and third shuttling means in each of said stations respectively for moving said indication means between first and second positions relative to the conveyor means,

said first shuttling means moving said first indication means to a first position in response to the absence of an article and to a second position in response to the presence of an article in said first station,

said second shuttling means moving said second indication means to a second position in response to the presence of an article in said second station when said first indication means is in said first position and to a first position in response to the presence of an article when said first indication means is in said second position,

said third shuttling means moving said second indication means to said first position in response to said first indication means being in said first position and to said second position in response to said first indication means being in second position, and

first and second spray initiating means before and after said third station which are actuated in response to said second indication means when the means is in said second position to initiate spray of said spray means.

6. In the spray assembly of claim 5, wherein said first and second indication means comprise a pair of axially movable elongated pins.

7. In the spray assembly of claim 5, wherein each of said shuttling means of said first and second stations include photoelectric means for sensing the presence and absence of an article in said stations, and the shuttling means of said second and third stations include switching means which are actuated by said first indication means when said first indication means is in said second position.

8. In the spray assembly of claim 1, including article configuration discriminating means for initiating separate ones of said spray means to selectively spray articles of one configuration and articles of another different configuration.

9. In the spray assembly of claim 5, wherein said conveyor means includes a carriage for holding and moving the article to be sprayed, and said first and second indication means comprise elongated pins movably mounted on said carriage for axial movement between their said first and second positions.

10. In the spray assembly of claim 1 including sensing means for discriminating between articles of different configuration while said articles are being conveyed on said conveying means, said spray means being responsive to the configuration sensed by said sensing means to selectively spray the articles of different configurations.

11. In a spray assembly having a conveyor for moving articles to be sprayed by spray means and a carriage associated with said conveyor for holding the articles, wherein the improvement comprises:

a pair of elongated pins movably mounted on said carriage for axial movement relative thereto between first and second positions.

a first station having shuttling means and article presence sensing means, said sensing means actuating said shuttling means to move one of said pins to said first position in the absence of an article in said first station and to said second position in the presence of an article in said station,

a second station having shuttling means, pin sensing means and article presence sensing means, both said pin sensing means and said presence sensing means actuating said shuttling means to move the other pin to said first position when either said one pin is in said second position or in the absence of an article in said station and to move the other pin to said second position when an article is present in said station and said one pin is in said first position,

a third station having shuttling means and pin sensing means, said pin sensing means actuating said shuttling means to position said other pin in said first position when said one pin is in said first position and to position said other pin in said second position when said one pin is in said second position, and

first and second spray initiating means before and after said third station respectively and responsive to said other pin being in said second position to initiate spray means before and after said third station respectively.

12. In the spray assembly of claim 11, wherein said first station is located on the conveyor after said spray means, said second station is located on the conveyor before said spray means, and said third station is between said first and second spray initiating means.

13. In the spray assembly of claim 11, wherein said spray means comprise both first and second coat spray nozzles and all of said nozzles are located in a single spray booth.

14. In the spray assembly of claim 11, including article configuration discriminating means, said configuration discriminating means actuating said spray initiating means to initiate separate ones of said spray means to selectively spray articles of one configuration and articles of another different configuration.

15. In the spray assembly of claim 11, including a third pin, movably mounted on said carriage for axial movement relative thereto between first and second positions,

the article presence sensing means of said second station including configuration sensing means which discriminates between articles of differing configuration, said configuration sensing means actuating said second station shuttling means to selectively move either said other pin or said third pin to said first or second positions in response to the configuration of the article,

said third station including configuration sensing means which discriminates between articles of differing configuration, said third station configura-

tion sensing means actuating said third station shuttling means to position said other pin and said third pin in said first position when said one pin is in said first position and to selectively position either said other pin or said third pin in said second position when said one pin is in said second position and in response to the configuration of the article.

16. In a spray assembly for spraying articles which may continuously differ in configuration and in coating condition from each other, comprising;

spray means for spraying the articles,

conveyor means for continuously conveying the articles of differing configuration and coating condition to said spray means,

memory means for remembering more than one of the differing coating conditions of the articles being conveyed to said spray means,

sensing means for automatically discriminating between articles of more than one of the differing configurations,

first and second movable indication means on said conveyor means and movable both with and relative to said articles, as the articles are conveyed by the conveyor means, said indication means being moved relative to said articles in response to said sensing means to indicate a first and second of said configurations of each said article, and

selection means actuated by said memory means and said first and second indication means for selecting a predetermined one of said spray means in response to the coating condition remembered by said memory means and the configuration indicated by said indication means, whereby the articles are selectively sprayed in response to their coating condition and configuration.

17. In the assembly of claim **16** wherein said conveyor means includes a plurality of article carriages each of which carries one of the articles to said spray means, said memory means includes a first pin and said indication means include second and third pins movably mounted on each of said carriages, and pin positioning means for positioning said first pin in first or second positions which are indicative of differing coating conditions respectively of the article on its carriage and for positioning said second and third pins in first or second positions which are indicative of differing configurations of the article on its carriage.

18. In a spray assembly,

spray means for spraying articles,

conveyor means for conveying the articles to be sprayed by said spray means,

memory means for remembering at least one characteristic of the articles which are being conveyed to said spray means, said memory means comprising first and second indication means movable with the article and also relative to the conveyor means as the article is conveyed by said conveyor means, and a station on said conveyor means before the spray means including altering means responsive to the first indication means when said first indication means is positioned in a first position, for moving said second indication means from a first to a second position, and

selection means actuated by said memory means for selecting a predetermined one of said spray means in response to the characteristic remembered by said memory means, said selection means including spray initiating means between said station and said spray means which is actuated by said second indication means when said second indication means is in said second position to initiate spray of said predetermined one of said spray means, whereby articles differing in said characteristic are selectively sprayed.

19. In the spray assembly of claim **18** wherein said station includes article presence sensing means responsive to the absence of an article in said station to position said second indication means in said first position, whereby said spray initiating means is not actuated by said second indication means.

20. In a spray assembly,

spray means for spraying articles,

conveyor means for conveying the articles to be sprayed by said spray means,

memory means for remembering at least one characteristic of the articles which are being conveyed to said spray means, said memory means comprising first, second and third stations on said conveyor means before, adjacent and after said spray means respectively,

first and second indication means movable with the article and also relative to the conveyor means as the article is conveyed by said conveyor means,

first, second and third shuttling means in each of said stations respectively for moving said indication means between first and second positions relative to the conveyor means,

said first shuttling means moving said first indication means to a first position in response to the absence of an article and to a second position in response to the presence of an article in said first station,

said second shuttling means moving said second indication means to a second position in response to the presence of an article in said second station when said first indication means is in said first position and to a first position in response to the presence of an article when said first indication means is in said second position,

said third shuttling means moving said second indication means to said first position in response to said first indication means being in said first position and to said second position in response to said first indication means being in second position, and

first and second spray initiating means before and after said third station which are actuated in response to said second indication means when the means is in said second position to initiate spray of said spray means, and

selection means actuated by said memory means for selecting a predetermined one of said spray means in response to the characteristic remembered by said memory means, whereby articles differing in said characteristic are selectively sprayed.

21. In the spray assembly of claim **20**, wherein said first and second indication means comprise a pair of axially movable elongated pins.

22. In the spray assembly of claim **20**, wherein each of said shuttling means of said first and second stations include photoelectric means for sensing the presence and absence of an article in said stations, and the shuttling means of said second and third stations include

switching means which are actuated by said first indication means when said first indication means is in said second position.

23. In the spray assembly of claim **20,** wherein said conveyor means includes a carriage for holding and moving the article to be sprayed, and said first and second indication means comprise elongated pins movably mounted on said carriage for axial movement between their first and second positions.

24. In a spray assembly for spraying articles which may continuously differ in configuration and in coating condition from each other, comprising;

spray means for spraying the articles,

conveyor means for continuously conveying the articles of differing configuration and coating condition to said spray means, said conveyor means including a plurality of article carriages each of which carries one of the articles to said spray means,

memory means for remembering more than one of the differing coating conditions of the articles being conveyed to said spray means, said memory means including a first pin movably mounted on each of said carriages,

sensing means for automatically discriminating between articles of more than one of the differing configurations,

first and second movable indication means operable in response to said sensing means to indicate a first and second of said configurations of each said article, said first and second indication means including second and third pins movably mounted on each of said carriages,

pin positioning means for positioning said first pin in first or second positions which are indicative of differing coating conditions respectively of the article on its carriage and for positioning said second and third pins in first or second positions which are indicative of differing configurations of the article on its carriage, and

selection means actuated by said memory means and said first and second indication means for selecting a predetermined one of said spray means in response to the coating condition remembered by said memory means and the configuration indicated by said indication means, whereby the articles are selectively sprayed in response to their coating condition and configuration.

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