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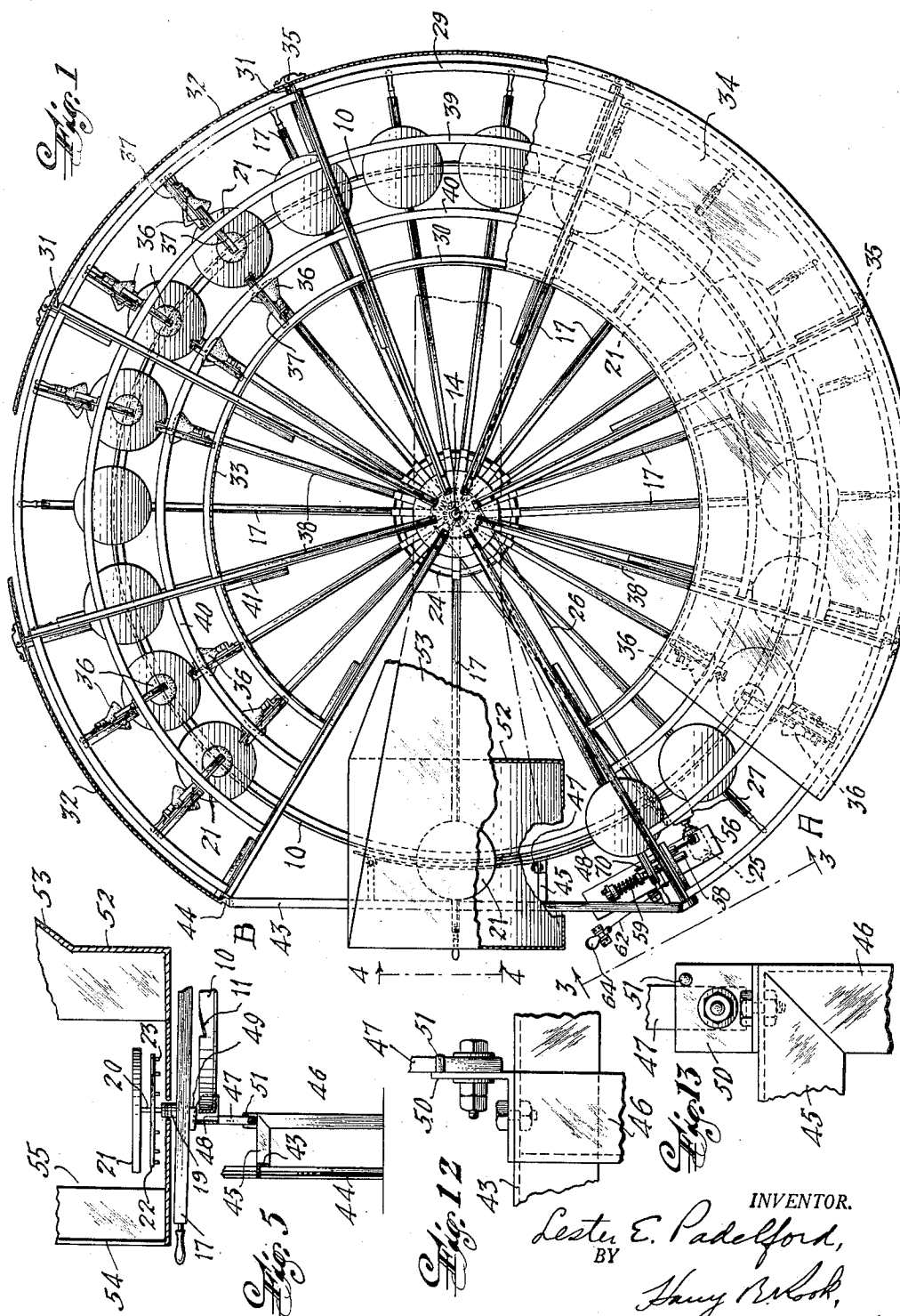
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COMBINATION SPRAYING BOOTH AND DRYING CHAMBER

Filed May 30, 1945

3 Sheets-Sheet 1



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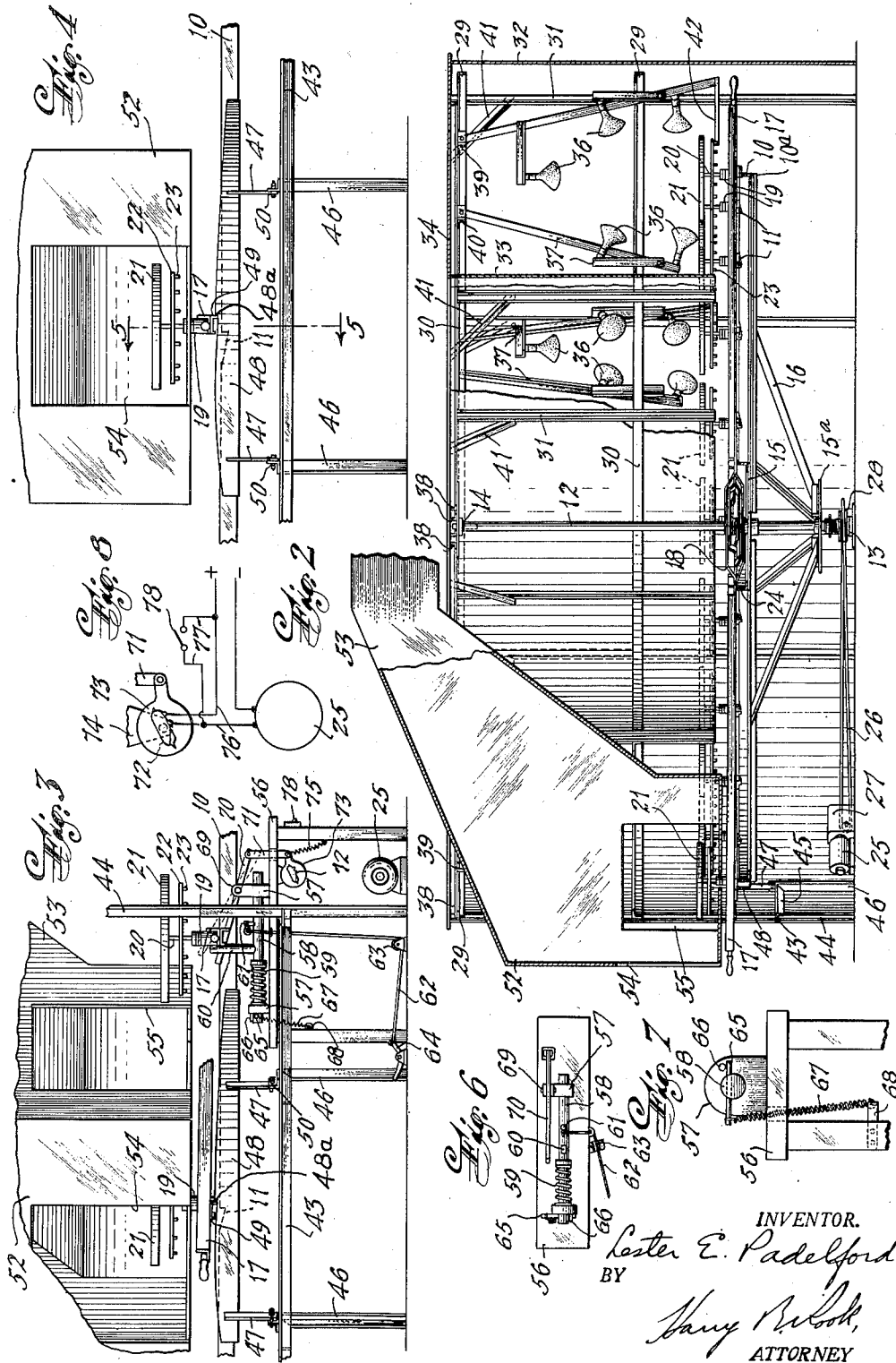
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COMBINATION SPRAYING BOOTH AND DRYING CHAMBER

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3 Sheets-Sheet 2



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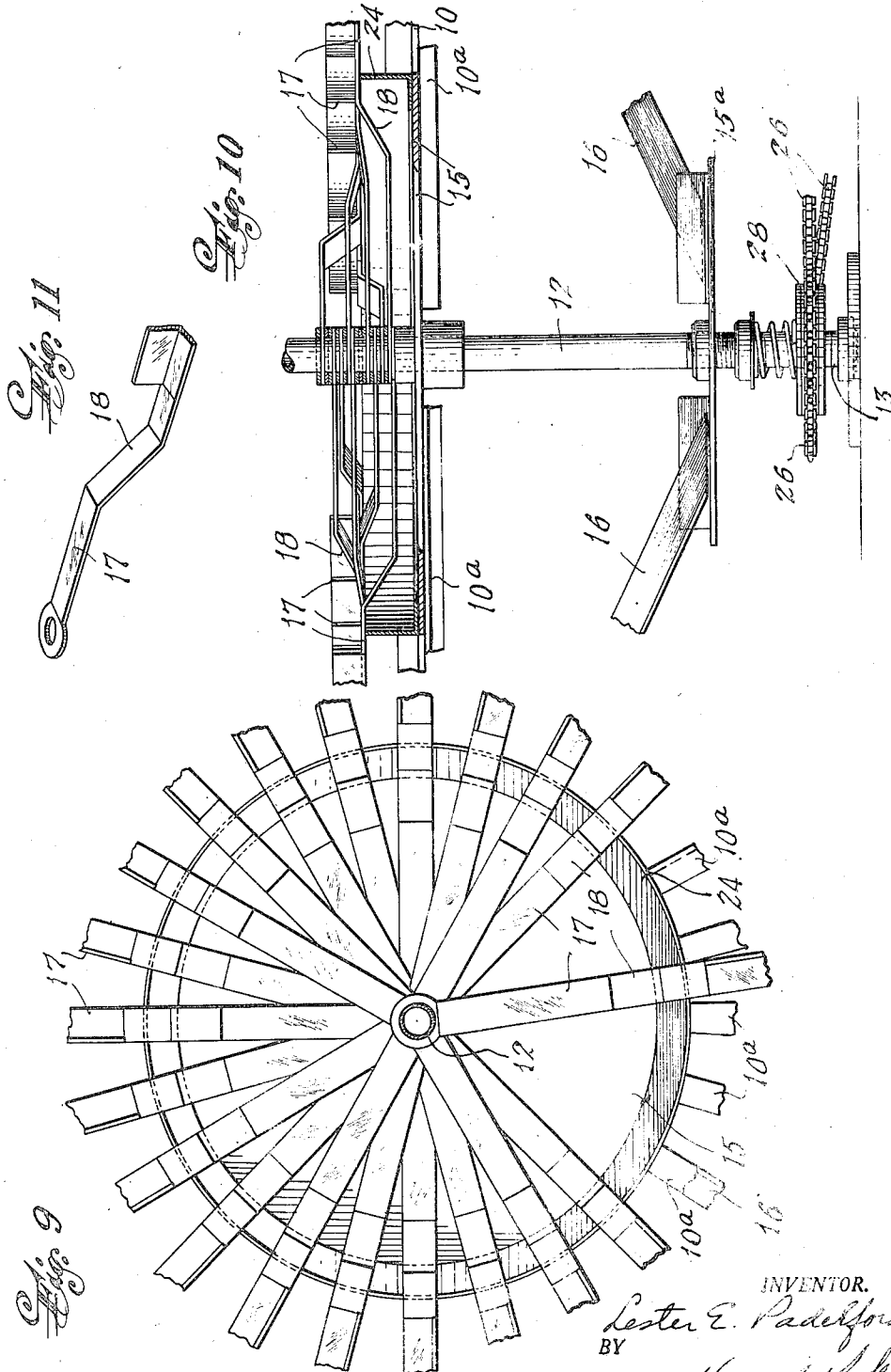
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COMBINATION SPRAYING BOOTH AND DRYING CHAMBER

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3 Sheets-Sheet 3



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COMBINATION SPRAYING BOOTH AND
DRYING CHAMBER

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8 Claims. (Cl. 91—60)

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The present invention relates to the enameling of articles of manufacture and more particularly to a combination spraying and drying machine for such purposes.

Objects of the present invention include the provision of a semi-automatic structure whereby articles of manufacture, e. g., metal waste-baskets are manipulated by an operator or attendant during spraying of the enamel or lacquer thereon so as to avoid the heretofore practically unavoidable spraying of articles adjacent the one being sprayed, and thereafter the articles are automatically advanced through an associated drying oven under controlled conditions; the provision of an improved structure of greatly increased efficiency by means of which the articles of manufacture can be relatively rapidly and uniformly finished under the control of the operator, and the various combinations and subcombinations of structural and procedural features as hereinafter more fully described and claimed.

I have illustrated an eminently satisfactory structural embodiment of my invention in the accompanying drawings in which:

Figure 1 is a plan view of the invention with portions broken away to expose the underlying structure;

Figure 2 is in part an elevational and in part a sectional view of the structure of Figure 1;

Figure 3 is an elevational view taken along line 3—3 of Figure 1;

Figure 4 is an elevational view taken along line 4—4 of Figure 1;

Figure 5 is in part a sectional and in part an elevational view taken along line 5—5 of Figure 4;

Figure 6 is a plan view and

Figure 7 is an end elevational view of a detail of construction;

Figure 8 is a diagrammatic view of the electrical control circuit forming a part of the invention;

Figure 9 is a fragmentary plan view illustrating the article supporting arms and the manner of mounting the same;

Figure 10 is an elevational view, partly in section, of the structure of Figure 9 and the means for rotating the same;

Figure 11 is a perspective view of a typical article supporting arm and

Figures 12 and 13 are enlarged views of mounting details.

Like numerals designate corresponding parts throughout the various views of the drawings.

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Referring to the drawings a circular rail 10, the upper edge of which is provided with spaced notches 11, is mounted for rotary movement by being suitably secured about a standard 12, the ends of which cooperate with bottom thrust bearing 13 and top bearing 14. The rail 10 is supported by radial bars 10a connected to a fixed disc 15 on the shaft, and angular braces 16 which extend between certain of said bars 10a and another disc 15a fixed on the shaft. A plurality of radially arranged bars 17 rests on circular rail 10 and each such bar has its inner end offset, as indicated at 18, and pivotally connected to standard 12. Bars 17 may thus rotate about standard 12 and also swing relatively to each other. Each bar 17 normally rests in a notch 11 so as to move with the rail as the latter is rotated. Each bar 17 is provided with a hollow upstanding socket piece 19 fixed thereon in the position shown and projecting from the recess in which is a rod 20 on the upper end of which a turntable 21 is mounted. Beneath each turntable a disc 22 is mounted on rod 20 and from the underside of each such disc a circular row of pins 23 depends. Near their inner ends bars 17 rest upon the upstanding flange of annular member 24 which maintains and supports them in proper position and alignment.

Means is provided for rotating circular rail 10 at a predetermined rate. Such means comprises an electric motor 25 which actuates the belt or chain 26 through gear reduction box 27 by means of which the rate of movement is reduced to the desired value. Chain 26 also passes around sprocket 28 mounted on standard 12 and is twisted through an angle of 90° for the usual purposes. It will thus be appreciated that standard 12 is driven at a geared down rate and that the diameter of rail 10 is so chosen as to produce a predetermined rate of rotation depending on the drying time required under the particular conditions of operation as will be hereinafter referred to again in connection with the description of the drying portion of the device.

A circular skeletal framework is made up of circular structural elements 29 and 30 which are connected to and held in spaced relationship by uprights 31. A tunnel or oven is formed on this skeletal framework by outer wall member 32, inner wall member 33 and flat roof 34. Outer wall member 32 is divided into a plurality of parts which are separably connected at 35 so that they can be individually removed to provide access to

the interior of the tunnel or oven at a plurality of points and to vary the length of the tunnel. Batteries of infra-red lamps 36 are located at intervals in the tunnel or oven and are accessible through the openable portions of wall member 32 above described. Lamps 36 are mounted on framework 37 which depends from the oven top structural members 38 which are radially disposed as shown in Figure 1. Intermediate circular structural elements 39 and 40 are arranged between members 29 and 30 and annular strengthening braces 41 complete the structure, although it is to be understood that I may vary the details of the skeletal framework in any suitable or desired manner and that the particular structural details illustrated and described do not constitute a limitation on the invention. It will further be noted that the supporting members 37 for lamps 36 are so constructed that the positions of the lamps can be adjusted or changed depending on the shape and size of articles being dried by the heat rays generated by such lamps, no additional heating means being employed although such could be utilized if so desired. It will further be observed that members 42 extend radially inwardly from the lower end of each lamp support structure in such manner as to engage with successive depending pins 23 on discs 22 as those discs move past members 42 due to the movement of rail 10. In this manner the turntables 21 are revolved step-by-step so as to turn the articles thereon and expose all surfaces thereof to ensure rapid, uniform and complete drying, baking, or the like. Only a few of the lamps are shown in the interest of clarity, but for efficiency and economy preferably a gang of lamps is located at each of the locations in the oven at which the articles are temporarily stationary during the step-by-step operation of the device and only where the articles are temporarily stationary. This will be more fully appreciated hereinafter.

Members 29, 30, 39 and 40 are not completely circular but terminate (see Figure 1) to leave a free sector about 60°. Rail 10 passes through the open sector (cf. Figure 4) across which extends horizontal beam 43 which is supported by vertical uprights 44. Members 45 extend inwardly from beam 43 and form mitre joints with vertical posts 46. Extensions 47 support arcuate bar 48, the upper edge of which is profiled in a cam-like manner and provided with a notch 48a. The cam edge and notch are adapted to cooperate with a plate 49 on the underside of each bar 17 under the conditions later explained. Members 46 and 47 are connected as best shown in Figures 12 and 13 by an angle piece 50 bolted to members 46 and 47. A small amount of relative movement or "play" is permitted between such members and is limited by pin 51.

A spray booth 52 is disposed in the free sector referred to and is connected via a conventional hood or duct extension 53 to a suitable source of negative pressure to exhaust fumes and excess droplets, etc. in the spray booth during the spraying operation and to prevent a health hazard to the operator. The booth is suitably cut out as at 54 to provide for convenient manipulation by the operator and is also provided with openings 55 so that turntables 21 can readily pass through the booth. A control bench 56 has a pair of spaced bearings 57 on its upper surface through which extends the rod 58. A spring 59 keeps the rod 58 urged from left to right in Figures 3 and 6. A post 60 extends upwardly from rod 58 as shown

intermediate the bearings 57 and is normally in the path of movement of the bars 17 to serve as a shock-absorbing stop or decelerator for the bars. Rod 58 also has a pin 61 to which is attached one end of a cord or cable 62 which passes down through a chuck or eyelet in the side of the bench top, around a roller 63 and thence to a treadle 64 to which its other end is secured. The end of rod 58 behind rear bearing 57 has a locking pin 65 one end of which is forced up under lug 66 on rear bearing 57 and the other end of which is urged downwardly by spring 67 which is secured to a bracket 68 on an upright of the bench 56. A fulcrum 69 is provided on bench 56 adjacent rod 58 the bifurcated upper end of which receives a lever 70 held in the fulcrum by a pintle. One end of lever 70 is free (the distal end) and the other end is jointed to a link 71 which is also connected to a mercury capsule switch 72 (which controls motor 25) mounted on a member 73 connected to link 71 and to a depending bracket 74. A spring 75 normally urges the member 73 into a position in which conductors 76 are bridged by the mercury in the capsule and thus also normally urges lever 70 into the dotted line position of Figure 3. Auxiliary conductors 77 form a shunt in the circuit when auxiliary switch 78 (normally open) is closed. The purpose of such will be understood from what follows.

In operating the device and with motor 25 running and switch 78 open, it will be appreciated that rail 10 slowly rotates carrying turntables 21 gradually through the oven but as each successive turntable emerges from the oven at station A the bar 17 of that turntable rides up on lever 70, moving it into full line position and tilting the mercury capsule 72 to break the circuit and stop motor 25. The article (such as a wastebasket) is removed and another article to be sprayed and dried is placed on the same turntable. The operator manually moves that bar 17 onto cam bar 48 until it drops into the notch 48a therein which indicates that the bar has been moved to its proper position the bar 17 being manually lifted over the stop post 60 or said post being swung out of the way momentarily by stepping on the treadle 64 in spray booth 52 and out of contact with the rail 10. Such movement of the bar 17 releases lever 70 which resumes its dotted line position, restarts motor 25 because of the re-positioning of mercury capsule 72 and causes circular rail 10 to be moved far enough to cause the next bar 17 to ride up on lever 70 and stop motor 25 again. The operator sprays the article in the spray booth which is spaced from adjacent articles sufficiently to prevent spray from reaching any article except the one in the booth. By manually actuating pins 23 the particular turntable is revolved so that the article is fully sprayed with any suitable coating material such as lacquer or enamel or any other material. The bar 17 is then moved to point B and the next succeeding bar put through the same sequence of operations, whereupon the next article is brought to point A and so on successively and for a long period of time as it is desired to operate the device.

Thus it will be clear that the rotation of rail 10 is intermittent or step-by-step and that the starting and stopping results automatically from the position of lever 70 but manual movement of each bar through the open sector must be effected. I therefore term the device as a whole semi-automatic. The "waiting" position of each bar 17 which is next to be manually moved into

the spray booth is controlled by abutment against post 60 of rod 58, rearward movement of which is resisted by spring 59. Thus each successive bar 17 is gradually decelerated and stopped in proper position without danger of jarring the articles off the turntable. When it is desired to operate the machine continuously, e. g. to clear the drying chamber of articles, or whenever it is desired to inactivate this control, the treadle 64 is depressed by the operator's foot, thus turning rod 58 enough to move post 60 to a position in which it will not be impacted by the bars 17. Locking pin 65 prevents undue movement of rod 58 under the urging of spring 59 and thus prevents accidental disassembly of the parts or inoperativeness of the bar stopping function. At the end of a "run" and when it is desired to discontinue operation, it is desired to clean out the oven of all articles. For this and analogous purposes, switch 78 is closed whereupon motor 25 is maintained running independently of the mercury switch and rail 10 thus turns continuously. Also the cam bar or rest 48 is swung toward the operator into an out-of-the-way position. The articles are removed rapidly as they emerge and cleaning or allied operations can be carried out, etc. When this has been accomplished switch 78 is again opened, placing motor 25 once again under the control of the mercury switch.

It is to be understood that the foregoing is illustrative and not limitative and that various additions, omissions, substitutions and modifications may be made without departing from the invention. Various articles may be variously treated and references to enameling or lacquering of wastebaskets are for convenience only and to indicate the character of the operations which I have in mind to show their primary utility. The invention is rather that defined by the subjoined claims.

I claim:

1. A spraying apparatus comprising a spraying chamber, a plurality of article supports, means mounting said article supports for movement in a path in predetermined spaced relation to each other with the space between two contiguous supports greater than the other spaces between said supports and so that each support is movable in said path relatively to the other supports, power means for moving said mounting means, and control means for causing step-by-step actuation of said mounting means by said power means.

2. Apparatus for spraying articles which comprises a circular rail having notches, a plurality of bars resting on said rail and separably engaging said notches, a turntable mounted on each bar, a spraying chamber having an entrance and an exit for said support elements and articles, means enabling manual swinging of each bar relatively to said rail through a limited arc of a circular path about the axis of said rail to move the corresponding turntable through said chamber, and means for rotating said rail to move said turntables through substantially the remainder of said circular path.

3. Apparatus for spraying and drying articles which comprises a circular rail having notches, a plurality of bars resting on said rail and separably engaging said notches, a turntable mounted on each bar, a spraying chamber having an entrance and an exit, means enabling manual swinging of each bar relatively to said rail through a limited arc of a circular path about the

axis of said rail to move the corresponding turntable through said chamber, means for rotating said rail to move said turntables through substantially the remainder of said circular path, and a drying chamber through which said turntables pass during said movement thereof through said remainder of said circular path.

4. The spraying and drying apparatus as defined in claim 3 with the addition of means controlled by each bar for automatically stopping the movement of said rail as said bar reaches said entrance to said spraying chamber.

5. The spraying and drying apparatus as defined in claim 3 wherein said means for rotating said rail is power-driven, and with the addition of means actuated by each bar for automatically stopping movement of said rail by said power-driven means as said bar reaches said entrance to said spraying chamber, the last named means being automatically actuated upon said manual swinging of each bar for starting the movement of said rail by said power-driven means.

6. Apparatus for spraying articles which comprises a circular rail, a plurality of support elements resting on said rail, a spraying chamber, means enabling moving of each support element relatively to said rail and the other supports through a limited arc of a circular path to move the support element through said chamber, and means for rotating said rail to move said support elements simultaneously through substantially the remainder of said circular path.

7. The apparatus for spraying articles as defined in claim 6, with the addition of an arcuate bar mounted in front of and below the spraying chamber, the upper edge of which is adapted to cooperate with the underside of each support element to hold the latter out of contact with said rail.

8. A spraying apparatus comprising a spraying chamber, means for moving articles to be sprayed successively to a point at one side of said spraying chamber and from a point at the opposite side of said chamber, means enabling each article to be moved relatively to the other articles from said first-mentioned point into said chamber and from said chamber to the second-mentioned point, said means for moving the articles including a coaxially rotatable circular rail, a plurality of radial bars pivoted at the axis of the rail and resting on such rail near their outer ends, means for releasably holding said bars against movement relatively to said rail, an article supporting turntable on each bar, and a bar-actuated mechanism for bringing successive bars to a stop at a predetermined point in their circular path of travel.

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