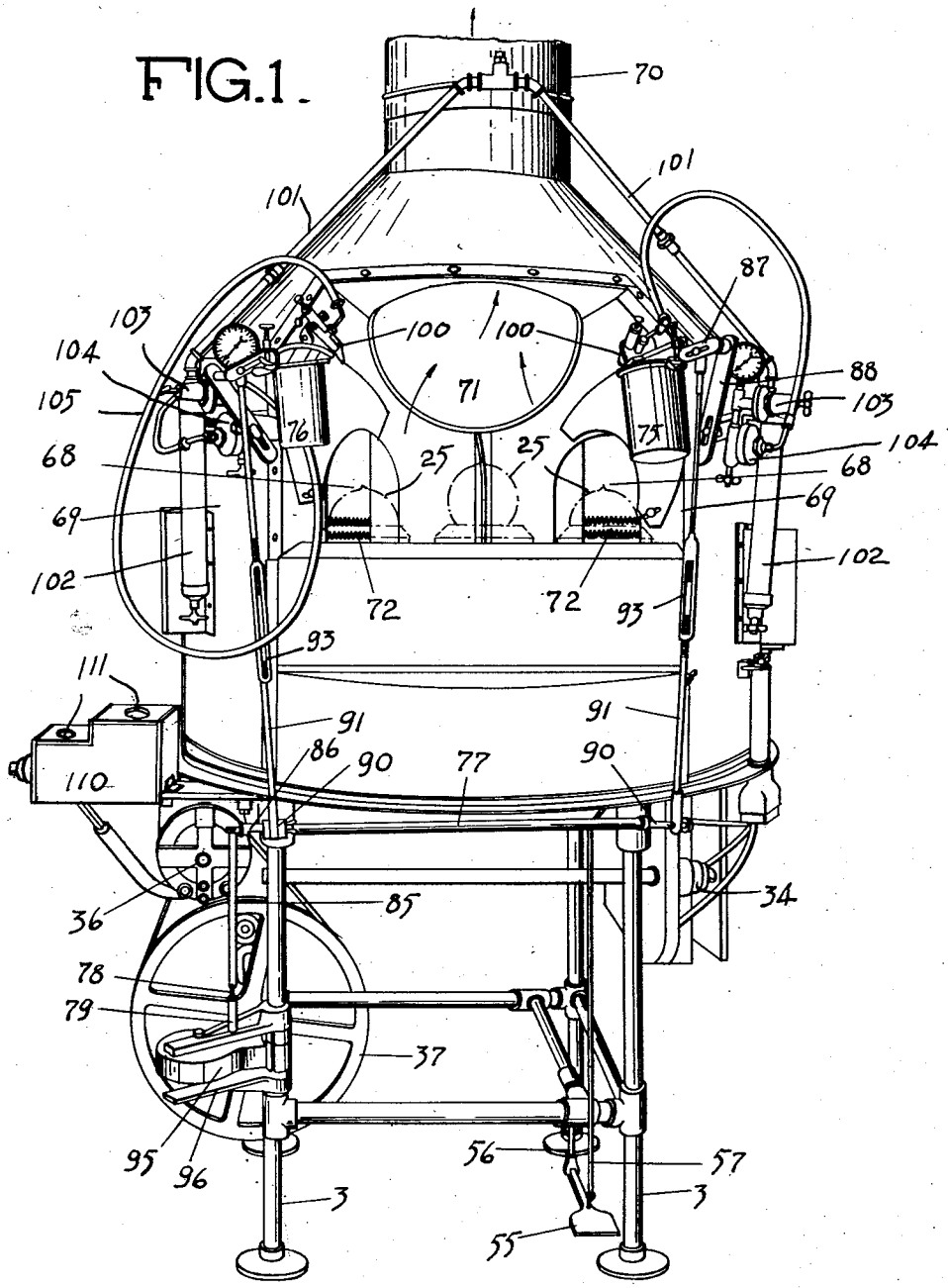
July 28, 1925. 1,547,704

J. B. WHITMORE ET AL

METHOD AND MACHINE FOR ENAMELING BOWLS

Filed March 23, 1921 4 Sheets-Sheet 1

FIG. 1.



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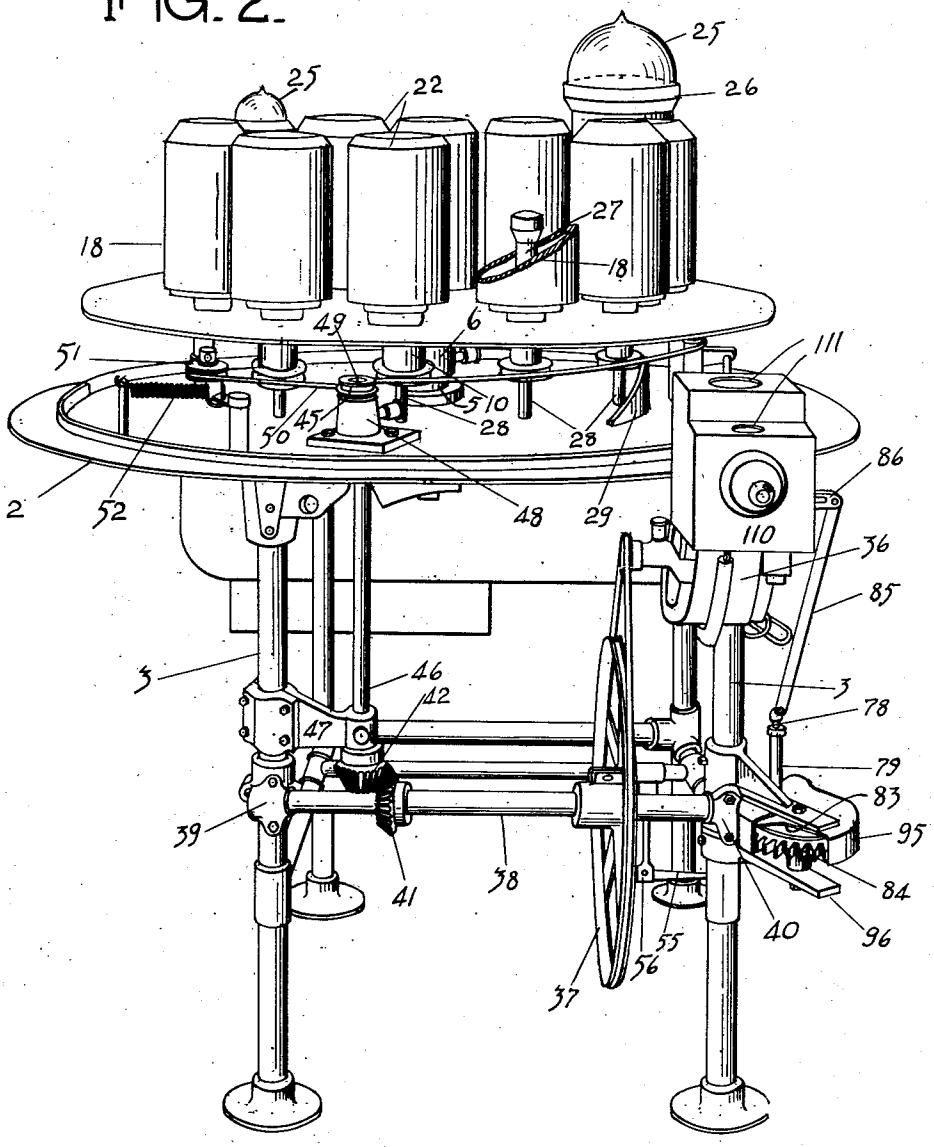
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METHOD AND MACHINE FOR ENAMELING BOWLS

Filed March 23, 1921 4 Sheets-Sheet 2

FIG. 2.



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METHOD AND MACHINE FOR ENAMELING BOWLS

Filed March 23, 1921 4 Sheets-Sheet 3

FIG. 4.

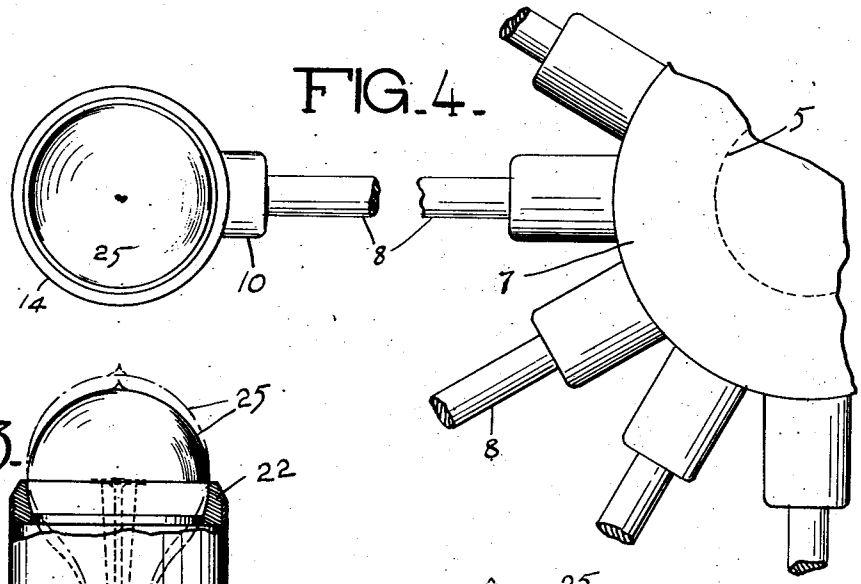
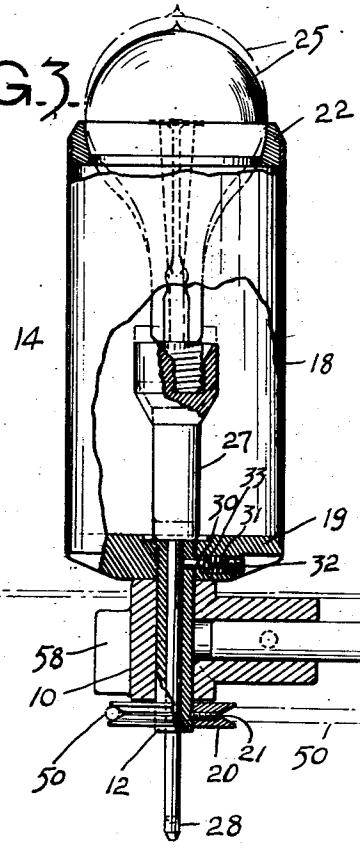


FIG. 3.



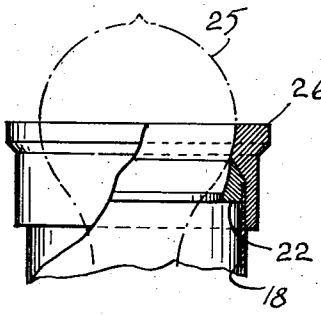
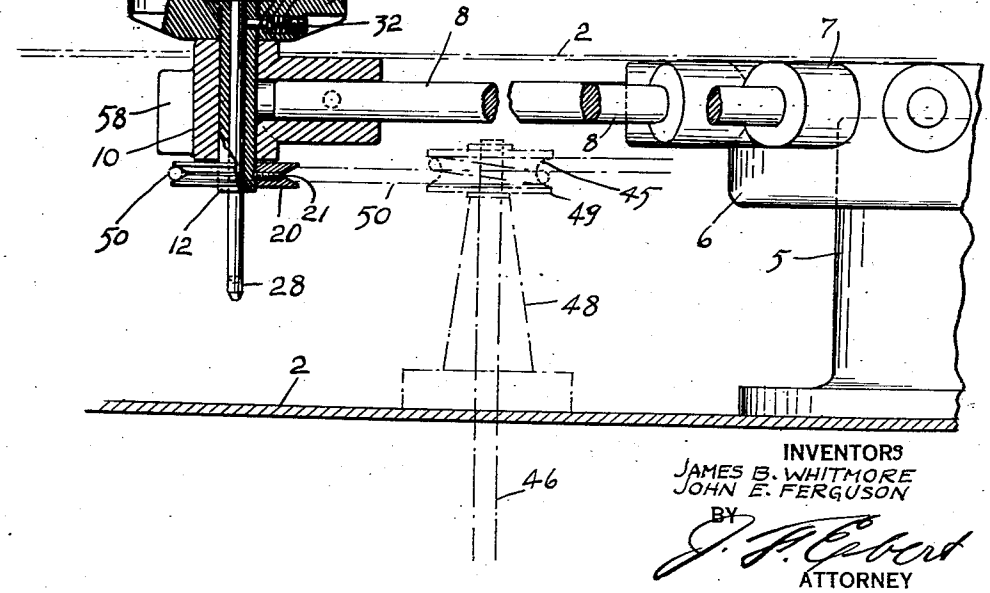


FIG. 5.



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METHOD AND MACHINE FOR ENAMELING BOWLS

Filed March 23, 1921 4 Sheets-Sheet 4

FIG. 6.

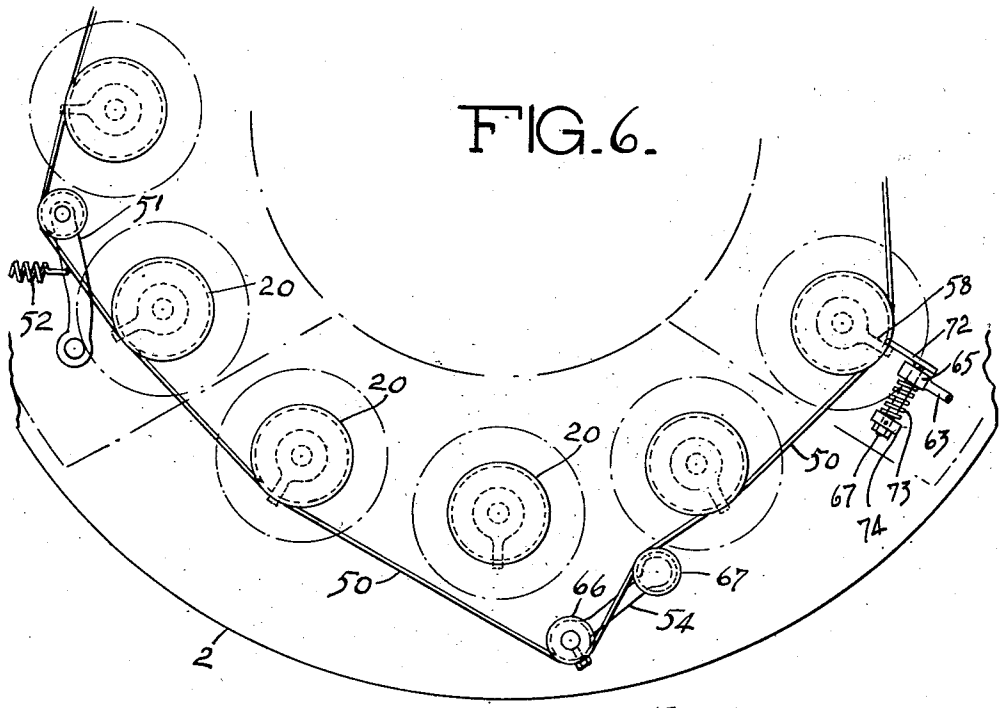


FIG. 7.

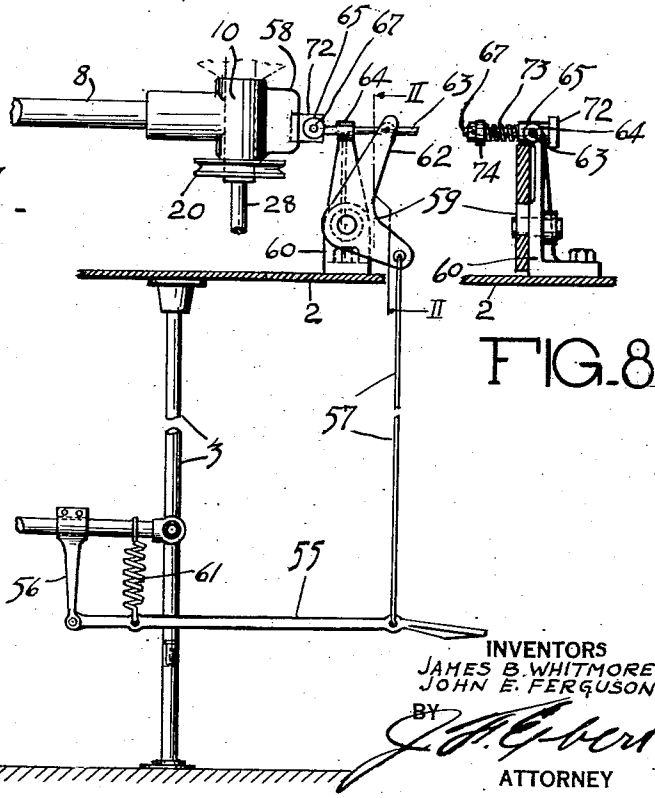


FIG. 8.

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Patented July 28, 1925. 1,547,704

UNITED STATES PATENT OFFICE.

JAMES BRYANT WHITMORE AND JOHN EBLING FERGUSON, OF BLOOMFIELD, NEW JERSEY, ASSIGNORS TO WESTINGHOUSE LAMP COMPANY, A CORPORATION OF PENNSYLVANIA.

METHOD AND MACHINE FOR ENAMELING BOWLS.

Application filed March 23, 1921. Serial No. 454,756.

To all whom it may concern:

Be it known that we, JAMES BRYANT WHITMORE, a citizen of the United States, and a resident of Bloomfield, in the county of Essex and State of New Jersey, and JOHN EBLING FERGUSON, a citizen of the United States, and a resident of Bloomfield, in the county of Essex and State of New Jersey, have invented a new and useful Improvement in Methods and Machines for Enameling Bowls, of which the following is a specification.

This invention relates to a machine for automatically applying and affixing one or more coatings of one or more substances to objects, and more particularly the invention relates to the application of a coating to vitreous objects such as the bulbs of incandescent electric lamps.

In the manufacture of incandescent electric lamps various expedients have been resorted to for the purpose of controlling the distribution of the light emanating from the filament. One of these expedients has been to frost the bulb, or to produce a frosted effect thereon. Another expedient is that of making the bulb of a glass having desired or predetermined properties of reflection or refraction, such as opalescent, colored glass, and the like. Recently it has been proposed to use a coating, applied to the bulb in a suitable manner, such as by dipping or spraying, as a substitute for frosting, heretofore produced by etching. By modifying the consistency of this coating, it has been possible to very closely imitate or approach the characteristic of opalescent or colored glasses, and thereby derive all of the advantageous features of such glasses relating to light control.

It is an object of the present invention to provide an apparatus for applying a coating of predetermined thickness to a surface of a given object which may vary in size, and in particular the coating may be applied to the bulb of an incandescent lamp or similar object in an expeditious manner.

It is another object of our invention to provide means whereby the coating having once been applied may be rendered impervious to moisture, resistant to the impurities of the air, and of a durable character to resist mechanical rubbing.

Other objects of the invention have to do with various features of construction and arrangement of parts which will manifest themselves upon a reading of the following description and appended claims.

We have discovered that a very effective way of applying a coating, such as described above, to a glass object as, for example, an incandescent lamp bulb, is by first spraying a suitable liquid upon an exposed surface of the object and then baking the coated portion of the object. Accordingly, the machine contemplated by the present invention involves primarily two operations, one of which is a spraying and the other a baking operation.

Although our machine may be used for applying a variety of coatings to variety of glass ware or vitreous objects, it will hereinafter be described in connection with enameling the bowl of an incandescent lamp bulb. In most of the so-called mazda C, or gas filled lamps, it is a feature of construction to provide a coiled filament usually mounted normal to the axis of the lamp bulb and positioned in a plane where the bulb is of the greatest diameter. Roughly, that portion of the bulb from the tip of the lamp to the plane of the filament is customarily designated as the bowl. The intensity of the light cast from the bowl requires that the eye be shaded from the glare thereof. It is, therefore, desirable to intercept this light with an object or substance having low light transmission, such as by providing a suitable reflector or coating the bowl with an enamel. Previous to the present invention, no satisfactory method or machine has been provided for setting the enamel so that it would not be affected deleteriously by the elements, or scale off when heated or by contacting with other objects, etc.

Referring to the accompanying drawings, Fig. 1 is a front perspective view of the loading and unloading side of the machine. Fig. 2 is a side elevational view of the machine of Fig. 1 with the hood and certain other parts removed to show rotary heads, one of which is partly broken away; Fig. 3 is a view in side elevation, parts being broken away, showing one of the heads carried on an arm of a conveyor; Fig. 4 is a

plan view of the arrangement of Fig. 3; Fig. 5 is a view, partially in elevation and partially in section, of a portion of one of the heads, showing an adapter by means of which bulbs of another size may be supported in the heads; Fig. 6 is a diagrammatic plan view of several heads associated with a driving belt and idlers; Fig. 7 is a fragmentary view of an indexing mechanism; and Fig. 8 is a sectional view taken on line II—II of Fig. 7.

The machine as contemplated by the invention includes a supporting structure or table having a circular plate 2 secured preferably in a horizontal position to a frame 3, which also supports various other operating mechanism. Centrally disposed upon and rigidly secured to the upper side of the plate is a stud 5 upon which a spider 7 is rotatably mounted by means of its central hub 6. See Figs. 3 and 4. The spider is preferably constructed with a plurality of radial arms 8 terminating in hubs 10 which constitute bearings for hollow shafts 12 of twelve rotatable heads 14. The spider and its parts will hereinafter be termed a conveyor. Each head preferably comprises a cylindrical casing or shield 18 positioned with its vertical axis coincident with the axis of its supporting hub 10 and having secured in the lower end a closure consisting of a cast iron plate 19, to the center of which the above mentioned shaft 12 is rigidly fixed. The lower end of each of these shafts is provided with a pulley 20 fastened thereto by means of a set-screw 21.

Fitted to the upper end of the casing 18 is an interiorly extending flange 22 removably fitted to the casing and having its inner surface shaped with a contour to accommodate that portion of an object, such as a bulb 25 of an incandescent lamp, which is circumscribed when seated thereon. Preferably, when an object such as a lamp bulb is in the desired position in the head, the upper end of the flange 22 lies in the plane of the greatest diameter of the bulb, thus leaving exposed the upper portion or bowl of the bulb, to which the coating in this instance is to be applied. The flange 22, as shown in Fig. 3, accommodates bulbs of a given size and in cases where bulbs of other sizes are to be treated, a so-called bulb adapter 26 is provided, consisting of an annulus having an internal taper to contact with the outer side of the casing 18 for the purpose of frictional engagement therewith. The inner surface of the adapter, for contacting with the bulb, is of a contour proportionately changed but of the same general construction as that of the flange 22. By the employment of the adapters it is obvious that bulbs of a vast range of sizes may be readily treated without modifying the machine.

For the purpose of facilitating the removal of a lamp from the casing, there is provided a post 27 having a recess at its upper end for receiving the threaded base of a lamp, and this post will be hereinafter termed a socket post. Integral with the lower end of the post is a plunger 28 movable within the hollow shaft 12, and the upward movement of this plunger and the socket post is effected by a suitable means such as an inclined surface 29 disposed in a suitable position in the circular course of travel through which the conveyor moves the heads 14. The upward movement of the plunger and socket post lifts the bulb from the head, thus enabling the operator to more readily grip the same for removing the bulb from the machine. The socket post is retained in an upper position by means of the frictional engagement of a pin 30 normally held in contact with the plunger 28 by means of a helical spring 31 positioned in a recess between a screw plug 32 and head 33 of the pin 30. The spring is adjusted to move the pin against the plunger with only sufficient force to support the socket-post 27 and bulb when seated thereon.

When a lamp is removed from the head, the socket post remains in its upper position, and the operator places the base of another bulb in the socket and presses the bulb to its seated position upon the flange of casing 18 or upon the adapter 26. The post is thus returned to its lower position and in readiness to eject a bulb at a given point, which may be the unloading stage.

Any suitable power may be employed for driving the spider or conveyor 7 and the various operative parts of the machine. In the present embodiment of the invention, the necessary power is derived from a motor 36 carried on the frame 3 and is responsive to control switch 34. Preferably, the motor shaft drives a relatively large grooved split pulley 37 clamped to a horizontal shaft 38 that is rotatably mounted in bearings 39 and 40 which in turn are held by the frame. Suitably positioned on the shaft 38, is a miter gear 41 in mesh with a similar gear 42 secured to the end of a vertical shaft 46 mounted rotatably in a bracket 47 fixed to the frame 3 and in a bearing 48 bolted to the upper side of the plate 2. The upper end of the shaft 46 extends above the bearing 48 and has fastened thereto a pulley 49 provided with a grooved surface 45 of sufficient width to accommodate an endless belt 50 which preferably encircles the pulley 49. The belt engages the pulleys 20 fixed to the heads and thereby effects the rotation of the same as well as rotating the conveyor thus performing a double function. The belt is preferably maintained taut by an idler 51 subject to suitable helical spring 52.

The conveyor is interrupted in its travel

by a suitable control mechanism such as an indexing mechanism which comprises a treadle 55 pivoted to a depending arm 56 secured to the frame and connected to a movable rod 57 extending above the plate 2 and connected to one arm of a bell-crank 59 which is arranged to oscillate in a bearing provided in a standard 60. The bell-crank is so positioned that its arm 62 in its movement operates a cushion stop projection 72 which intercepts the conveyor in its rotary movement. The stop preferably comprises a rod 63 pivoted at the end of the arm 62 and projects toward the conveyor as illustrated in Figures 7 and 8.

Preferably, the rod 63 is guided in a bearing 64 constituting part of the standard 60. A hub 65 is provided at one end of the rod 63 and slidably mounted in said hub is a pin 67 movable at right angles to the rod 63 and provided with a projection 72. As heretofore stated, the projection 72 is positioned in the path of lugs 58 which are integral with the respective spider arms, and operative to relieve any shock which may be caused by impact between the lugs 58 and the projection 72. This impact is absorbed by means of a spring 73 disposed between a collar 74 and the hub 65. The bell-crank 59 is maintained in a given position by a spring 61 secured to the frame and to the treadle, thus the projection 72 normally interrupts the movement of the conveyor.

At each actuation of the treadle 55, the crank 59 moves the stop 72 from contact with one of the lugs 58 and the conveyor is permitted to rotate under the power delivered by the belt 50 until the next lug or rigid member 58 engages the stop, in this instance the movement is one twelfth of a revolution as twelve heads are employed although this number may be varied. At a given place in the operating cycle of the conveyor it is, for operating reasons, necessary to disengage the belt 50 from a pulley 20 to permit one of the heads to come to a state of rest for loading or unloading or other purposes. This disengagement is accomplished by providing a double idler 54 (see Fig. 6) having a pulley 66 which guides the belt out of contact with the pulley and another pulley 67, bracketed to the first, and positioned to guide the belt on to the pulley as the head is again moved in its circular path by the rotation of the conveyor.

The foregoing description has considered a revolving conveyor which carries the rotary heads and mechanism connected therewith as one form of means for moving the casings or lamp holders. In carrying out the invention it is desirable to provide zone of heat in the path of the objects carried by the moving heads, or a heated region in which the objects supported by the heads may be maintained for a given period of time. A preferred form of heat zone is shown in Fig. 1 as being composed of an oven or kiln 68 through which the heads are moved. The oven 68 comprises a circular shaped passage between a cylindrical hood 69 and a concentric wall which also constitutes a gass outlet pipe or flue 70 through which any obnoxious gas or dust may be drawn through aperture 71 by a suitable draft means. The oven is closed at the bottom by the plate 2, upon which the hood and flue rest, and at the top by a convex closure connected to the hood and to the outer side of the flue. The wall of the hood is removed at the front to permit access to the rotary heads for applying a coating and for readily loading and unloading.

The oven may be heated by any desirable means which, in the appended drawings, is shown as consisting of a resistant wire 72 which may be covered. It is obvious, however, that the oven may be heated by other means, such as a plurality of gas flames arranged about the oven, or by the provision of a hot air blast in which an object may be maintained for a given interval by manipulation of the conveyor or by any other suitable means. The enclosed passage or oven as illustrated in connection with this invention affords an economical and effective method of providing an enclosure in which heat may be confined, and which may be suitably insulated to prevent excess radiation.

As above mentioned, three heads are accessible at the same time at the open part of the machine and are disposed in a common circular path at the front of the machine. The head which takes the intermediate position is permitted to come to a state of rest through the agency of the double idler which guides the belt 50 away from the driving pulley 20 of the head as explained above. This stationary position of the head is the one at which the loading and unloading operations are effected.

In the process of coating, the enamel or other preparation is sprayed from containers 75 and 76 which are preferably oscillated during the spraying operation. Each sprayer applies a coating to the object carried in the heads when they are rotating and the containers and sprayers are preferably located on opposite sides of the position at which the heads cease to rotate.

The coating fluid is automatically sprayed upon the exposed portion of the object by means of any suitable spraying apparatus connected to each container, and the initial coating may consist of an enamel or other preparation which is dispersed upon the object at the second stage of its movement, subsequent to the loading and unloading stage. A final coating, which may consist

of a varnish, is applied to the object when at the stage just previous to the loading and unloading stage. This arrangement of the sprayers, adjacent to the position at which the heads are loaded and unloaded, permits the operator to observe the operation of the nozzles and to conveniently regulate them when necessary.

The selected spraying apparatus illustrated in the drawing preferably comprises a nozzle 100 and fluid containers 75 and 76 connected thereto. Air is forced through pipe 101 and into condensers 102 and is regulated by valve 103 to give the desired working pressure. The air is then passed through a filter 104 from which it is conducted by means of a flexible tube 105, to the nozzles to effect a dispersion of the fluid. The fluid containers may be mounted in any desired manner to have the preparation properly sprayed onto the lamp bulbs, and the apparatus provided is adjustable to permit the preparation to be sprayed onto a predetermined part of the object held by the traveling head.

The apparatus selected provides for each fluid container to be positioned to rock in substantially a vertical arc by means of links 91 connecting a rocking shaft 77 which is oscillated by means of its connection with a vertical reciprocating plunger 78 guided in a sleeve 79 and adapted to be moved upwardly by reason of its lower end being retained in contact with a cam 83 upon the upper surface of a worm wheel 84. A rotation of the worm wheel thus effects the reciprocation of the plunger 78 and a link 85 having one end connected thereto, and having its opposite end pivoted to an arm 86 secured to the shaft 77. Adjacent to each end of the shaft 77 is provided an arm 90 to which the lower ends of rods 91 are pivoted. The upper ends of the rods are provided with crank pins movable in slots disposed in cranks 87 to which the containers 75 and 76 are fastened, said cranks being hinged to an adjustable bracket 88 secured to the body of the machine and in this way the positions of the containers may be varied. The selected arrangement of the cam 83 moves the link 85 through four identical cycles per revolution of the worm wheel 84 and during each cycle the plunger 78 moves upwardly at a uniform rate, remains at rest for a given period, and then moves downwardly at the same rate that it moves upwardly. The worm wheel is mounted in an extended bearing 96 fastened to the frame. Positioned in mesh with the worm wheel is a worm (not shown) secured to the end of the continuously rotating shaft 38. This worm gearing provides a speed reduction of a suitable ratio as to cause a predetermined number of revolutions of the wheel 84 and a consequent given number of reciprocations to the rods 91 which in turn effect an oscillation of the sprayer containers.

In practice, the conveyor is revolved in a counterclockwise direction and a lamp is inserted in the stationary or non-rotating head, with the base portion in the socket of the post 27. It is then pressed downwardly and seated in a normal position for treatment. The treadle of the indexing mechanism is operated and, as the lamp moves into the second position and is rotated with the head, a spray of enamel or other preparation is caused to impinge against a given portion of the lamp bulb; the motions of the container and of the rotating bulb permits a coating to be deposited upon the entire or a portion of the exposed surface of the bulb. The operator then again actuates the indexing mechanism and another bulb having previously been inserted, moves into coating position. At each successive movement of the conveyor a lamp is inserted in the head in the stationary position and at each successive stage the heads are advanced through the heat zone which may be regulated to the proper intensity so that upon reaching the next to the last position of the cycle the bulb has been subjected to a predetermined heat treatment at which point another spraying apparatus coats, if desired, the bulb with another liquid. In this instance a coating of varnish is found to be advantageous as a second coating. The bulb is now moved to the last or unloading stage and is raised to extracting position, as shown in dotted lines in Fig. 1, by the movement of the rod of the socket post 27 as it rides up the inclined surface of cam 29 and lifts the socket post, thereby raising the bulb from its seat to facilitate its removal by the operator.

It is desirable for practical reasons to produce what may be termed a feather or disappearing edge on the rim or edge of the coating. The said feathering consists in producing a coating with an edge which gradually increases in thickness from its outermost edge toward the tip of the lamp bulb. This is produced by the action of the cam 83 which causes the spray to be directed against the exposed edge of the bowl of the lamp bulb for a shorter interval than against the other exposed part of the bulb. The positioning of the spraying arc is controlled through the adjustment of the rods 91 by means of turn buckles 93 which permit a variation in the lengths of the rods and a consequent adjustment of the position of the spraying arc. The movement of the sprayer may thus be so regulated that when the edge of the dispersed or sprayed enamel reaches the edge of the bowl portion of the lamp the movement of the sprayer is reversed and it moves in the opposite direction. The main surface, or a portion of the surface, of the bowl of the lamp bulb thus

receives substantially a backward and forward sweep of the spray except the said edge or margin thereof thus producing a reduction in the thickness of the layer as it approaches the margin.

The coating or preparation may be applied to any desired portion of the bulb by adjusting the positions and movements of the containers. By these adjustments coatings of varying thicknesses and widths with or without substantial feathered edges, may be obtained.

In order to check the quality of the coating during the treatment of the lamps, a lamp testing block 110 is provided and is supported upon the frame of the machine. The said testing block is disposed in a position convenient to the operator and is provided with sockets 111 connected to a lighting circuit in order that the operator may, from time to time, light a coated lamp to inspect the same to ascertain whether or not the lamps are receiving a coating of the proper consistency thus permiting the timely regulation of the spraying apparatus, if for instance a coated lamp, when lighted, shows a variation from the properties desired in the coating.

While we have illustrated a preferred embodiment of our invention, it is to be understood that many structural changes may be effected therein. For instance, the number of heads may be multiplied to increase the capacity of the machine; or the heads may be adapted to support objects of greater or less magnitude than that of the incandescent lamp bulbs. It is also evident that the heads may be conveyed in other than a circular path. All such modifications are considered to be within the scope of the invention as outlined by the subjoined claims.

What is claimed is:—

1. A machine for coating incandescent electric lamps comprising a support for a bulb, a material dispersing device, means for effecting a relative movement between said device and said support to cause a discharge of material upon one portion of a bulb in said support for a different time interval than on other portions of the bulb to provide a coating of different degrees of thickness.

2. A machine for coating incandescent electric lamps comprising a support for a bulb, a material dispersing device, means for effecting a relative movement between said device and said support to cause a discharge of material upon one portion of a bulb in said support for a different time interval than on other portions of the bulb to provide a coating of different degrees of thickness, a heat zone and means for moving the coated bulb through said zone.

3. A machine for coating incandescent electric lamps comprising a support for a bulb, means for rotating the support, a material dispersing device, means for causing a relative movement between said device and said rotating support to direct a discharge of material upon a bulb in said support to deposit a coating of said material of a predetermined thickness upon one portion of the bulb and a coating of a different thickness on another portion of the bulb.

4. A machine for coating incandescent electric lamps comprising a support for a bulb, means for rotating the support, a material dispersing device, means for causing a relative movement between said device and said rotating support to direct a discharge of material upon a bulb in said support to deposit a coating of said material of a predetermined thickness upon one portion of the bulb and a coating of a different thickness on another portion of the bulb, a heat zone and means for moving said coated bulb through said zone.

5. In a machine for coating electric incandescent bulbs, the combination of a support for said bulbs, and a material dispersing device, means for rotating the supported bulbs, means for oscillating said device during the dispersion of a given material therefrom and means associated with said support for maintaining a given area of said bulbs exposed to said spray.

6. In a machine for coating electric incandescent lamp bulbs, the combination of a casing for surrounding a portion of a bulb, a seat associated with said casing for engagement with the bulb, a material dispersing mechanism, said mechanism being disposed in operative relation with said supported bulb, means for rotating the bulb and means for oscillating said mechanism during the dispersing of the material on the bulb.

7. In a machine for affixing a coating of a given substance to electric incandescent bulbs, the combination of a support for said bulbs, means associated with said support for accommodating different size bulbs, a material dispersing means, said support and dispersing means being disposed in movable operative relation whereby the bulbs may be coated with the dispersed material, means for creating a zone of heat, and means for moving said bulbs within said zone.

8. In a machine for affixing a coating to electric incandescent lamp bulbs, the combination of a casing for surrounding a portion of a bulb, a seat for the bulb removably associated with said casing, a material spraying device, said seated bulb and device being disposed in cooperative relation to produce a coating of dispersed material on the bulb, means for creating a heat zone and means for maintaining said coated bulb in said zone for a predetermined period.

9. In a machine for treating electric incandescent bulbs, the combination of a conveyor adapted to move said bulbs in a given path, means for applying a coating to the bowl portions of said bulbs, means for manipulating said coating, means to apply a coating of diminishing thickness at the border thereof and means for supplying heat to said bulbs while moving them in said path.

10. In a machine for coating electric incandescent bulbs, the combination of a conveyor having a plurality of heads rotatably mounted thereon, a common driving means for the conveyor and heads, said heads including means for shielding a portion of said bulbs means for coating the unshielded portion of said bulbs, and means for creating a heat zone in the path of travel of said heads.

11. In a machine for coating electric incandescent lamps, the combination of a movable conveyor, a source of power for driving said conveyor, a plurality of heads mounted on said conveyor, socket posts associated with said heads, casings disposed about said socket posts for shielding lower portions of lamps positioned in said posts, means associated with said source of power for rotating said heads and means for applying a coating to the exposed portions of said lamps.

12. In a machine for coating electric incandescent lamps, the combination of a movable conveyor, a source of power for driving said conveyor, a plurality of heads mounted on said conveyor, socket posts associated with said heads, casings disposed about said socket posts for shielding the lower portions of lamps positioned in said posts, means associated with said source of power for rotating said heads, means for applying a coating to the exposed portions of said lamps and means for producing a heat zone in the path of movement of said conveyed lamps.

13. In a machine for coating a portion of the surface of electric incandescent lamps, the combination of a rotatable conveyor, a plurality of heads rotatably mounted thereon, socket-posts associated with said heads to receive the base portions of said lamps, each of the said heads being adapted to shield all but a portion of a lamp, means for producing a heat zone, means for applying a coating of a given substance to the exposed portion of each of said lamps, and means for moving the lamps through said heat zone.

14. In a machine for coating a portion of the surface of an electric incandescent lamp bulb, the combination of a conveyor driven by a power unit, a bulb supporting head having a socket-post to receive the base portion of a lamp, the said head being adapted to hold a lamp with a portion of its bulb exposed, means for applying a coating of a preparation upon the exposed portion of said bulb, and means for creating a heat zone through which the lamp is moved.

15. In a machine for coating electric incandescent lamps, the combination of a rotatable head having a reciprocable socket-post associated therewith to receive the base of a lamp, said head comprising a casing having the upper end thereof adapted to seat the bowl portion of a lamp, means for applying a coating of a given preparation upon said lamps, means for providing a heat zone, and means for moving the coated lamps through said heat zone.

16. In a machine for coating a portion of the surface of incandescent lamp bulbs, the combination of a rotatable conveyor, a plurality of heads rotatably mounted on said conveyor, a belt adapted to provide a common drive for said conveyor and heads, said heads consisting of a casing in which bulbs may be supported with a portion thereof exposed, means within said casing for receiving the base portion of a lamp, means for spraying a coating of a given preparation upon the exposed portion of said bulbs, and means for providing a zone of heat in which said bulbs may be maintained for a given period.

17. In a machine for coating electric incandescent lamps, the combination of a conveyor, a plurality of heads rotatably mounted on said conveyor, a common driving belt for rotating the conveyor and heads, casings carried by said heads having seats to receive the bowl portion of said lamps with portions of said lamps exposed, means for automatically spraying a coating upon the exposed portion of said objects, means for subsequently heating said coating and means for moving said bulbs upwardly in said heads.

18. In a machine for coating a portion of incandescent lamp bulbs, the combination of a plurality of heads mounted on a conveyor driven by a source of power, a plurality of heads mounted on said conveyor and adapted to be rotated by said power, said heads having adjustable holders for supporting different sized bulbs in predetermined positions to receive a coating, means for coating said bulbs, means for creating a heat zone, means for maintaining the coated bulbs therein for a predetermined interval and means for automatically lifting said bulbs from said holders.

19. In a machine for affixing a coating to a given portion of the bulbs of incandescent lamps, the combination of a movable conveyor having a plurality of heads rotatably mounted thereon, a driving belt adapted to provide a common drive for said conveyor and heads to move them in given paths of travel, each head having a casing adapted

to shield a portion of the lamp bulb supported thereon, means for spraying a coating upon the exposed portion of the bulb, means for producing a heat zone in the path of said lamp bulbs, and means for automatically moving said bulbs upwardly in said heads to facilitate their removal.

20. In a machine for affixing a coating to the bulbs of incandescent lamps, the combination of a conveyor having a plurality of heads, means associated with said head for supporting and shielding a portion of a bulb, a socket-post for receiving the base portion of a bulb, sprayers disposed adjacent to said lamp bulbs, and means associated with said sprayers to oscillate them in substantially a vertical plane during the application of a coating to said lamp bulbs, means for producing a zone of heat, and means for maintaining said coated bulbs therein for a given time interval.

21. In a machine for coating an electric incandescent lamp, the combination of a support for said lamp, said support comprising a socketfor receiving the base portion of a lamp and means for shielding a portion of said lamp, a material dispersing device, means for moving said device with relation to said lamp to produce a non-uniform coating on the unshielded portion of said lamp.

22. In a machine for coating an object, the combination of a support for said object, a material dispersing device, said device and object being disposed in movable cooperative relation, whereby the dispersed material may be so deposited upon said object as to produce a coating of diminishing thickness toward the edge.

23. In a machine for coating an object, the combination of a support for said object, a material dispersing device, means for oscillating said device in a given arc, means for regulating the sweep of said arc to guide the dispensed material onto a given arc of said object.

24. In a machine for coating an object, the combination of a support for said object, a material dispersing device, means for moving said objects, means for oscillating said device in a given arc, means for varying the sweep of said arc, to produce a coating of non-uniform thickness.

25. In a machine for coating an object, the combination of a support for said object, a material dispersing device, means for moving said object, and means for oscillating said device in a given arc during the dispersion of a given material to produce a coating having a diminishing thickness at its edge.

26. In a machine for coating a portion of the bulbs of incandescent lamps, the combination of a conveyor, a plurality of rotatable heads mounted on said conveyor, means for driving the conveyor and heads, each head having a casing adapted to support a bulb with the enlarged portion thereof exposed, means for spraying a coating upon the exposed portion of said bulb, and means for actuating said spraying means to apply a coating of varied thickness to said lamp bulbs.

27. In a machine for coating a portion of the bulbs of incandescent lamps, the combination of a conveyor, a plurality of rotatable heads mounted on said conveyor, means for driving the conveyor and heads, each head having a casing adapted to support a bulb with the enlarged portion thereof exposed, means for spraying a coating upon the exposed portion of said bulb and means for actuating said spraying means to cause a diminishing thickness of said coating toward one of its edges.

28. In a machine for coating the bowls of incandescent lamp bulbs, the combination of a conveyor, a plurality of rotatable heads mounted on said conveyor, a common means for driving the conveyor and heads, each head having a casing adapted to support a bulb with all but the bowl portion thereof shielded, means for spraying a given substance upon the bowl, said spraying means operating to apply a coating to said bowl, a mechanism for actuating the spraying means to produce a coating having one edge of less thickness than the main portion of said coating.

29. In a machine for coating the bowls of incandescent lamp bulbs, the combination of a driving belt, a conveyor, heads rotatably mounted on said conveyor, said belt constituting a common drive for said conveyor and said heads, each of said heads comprising a casing adapted to support a lamp with the bowl portion thereof exposed, a socket post disposed within each casing and positioned to receive the base of an inserted lamp, means for spraying a coating upon said bowl portions, means for producing a zone of heat, means for moving said coated bowls into said heat zone, and means for actuating the socket posts to lift said lamp bulbs.

30. In a machine for coating the bulbs of incandescent lamps, the combination of a movable conveyor, a plurality of heads carried by said conveyor and being provided with removable lamp adapters, a belt constituting a common driving means for actuating said conveyor and for rotating said heads, a reciprocable socket post centrally disposed within each head, said socket post being adapted to receive the base of a lamp when seated in the head, means for maintaining said socket in an upper position for unloading and for guiding an uncoated lamp to operable position, means for spraying a fluid upon the bowl portion of a lamp during its rotation, adjustable means for os-

cillating the spraying means in a vertical arc to direct a fluid onto said lamp to produce a coating of a predetermined thickness, means for producing a zone of heat, and means for maintaining the said lamps therein for a given period.

31. In a machine for coating the bulbs of incandescent lamps, the combination of a movable conveyor, a plurality of heads carried by said conveyor and being provided with removable lamp adapters, a belt constituting a common driving means for actuating said conveyor and for rotating said heads, a reciprocable socket post centrally disposed within each head, said socket post being adapted to receive the base of a lamp when seated in the head, means for maintaining said socket post in an upper position for unloading and for guiding an uncoated lamp to operable position, means for spraying a fluid upon the bowl portion of a lamp during its rotation, adjustable means for oscillating the spraying means in a vertical arc to direct a fluid onto said lamp, to produce a coating of a predetermined thickness, having a portion thereof of uniform thickness and another portion thereof of decreasing thickness, means for producing a zone of heat, and means for maintaining the bulbs therein for a given period.

32. In a machine for handling incandescent lamps, the combination of a conveyor, means for driving said conveyor, rigid members spaced at intervals about the conveyor, a shock absorbing stop positioned in the paths of said rigid members for interrupting their movements, said stop comprising a rod having a projection rigidly secured thereto and adapted to contact with said rigid members, and a resilient member associated with said rod to absorb shocks caused by the impact between said members and projections.

33. In a machine for coating the bowl portion of incandescent lamp bulbs, the combination of a belt driven conveyor, a cushion member for interrupting the movement of said conveyor, rotary lamp holders disposed at intervals upon said conveyor, means for actuating said cushion member to cause a step by step movement of the conveyor, means for applying a coating to the bowls of lamps during one or more steps, and means for heating the said coated bowls.

34. The method of coating an electric incandescent lamp bulb which comprises moving a spray of coating material in one direction over a predetermined area of the bulb and in effecting a rapid change in the direction of movement of said spray to cause a deposit of varying thickness on a given portion of the bulb.

35. The method of coating an incandescent electric lamp bulb which comprises directing a spray of coating material upon the bulb, moving said spray in a given direction and in effecting a rapid reversal in the direction of movement of said spray to cause a deposit of less thickness than the deposit upon the major portion of the coated area and moving said sprayed bulb through a heat zone.

36. The method of coating an incandescent electric lamp bulb which comprises rotating the bulb, directing a spray of coating material upon the bulb, moving the spray through a given path to coat a predetermined area of the bulb and in effecting a rapid reversal in the direction of travel of said spray to cause a deposit of reduced thickness at the border of said coated area.

37. The method of coating an electric incandescent lamp bulb which comprises shielding a portion of a rotating bulb, directing a spray of a coating material upon the bulb and in manipulating the spray to deposit a coating of diminishing thickness toward the edge of the unshielded portion.

38. The mehod of coating an electric incandescent lamp bulb which comprises shielding all but the bowl portion of a rotating bulb, directing a spray of coating material upon said bowl and manipulating the spray to deposit a coating of varying thickness upon said bowl portion.

39. The method of coating an electric incandescent lamp bulb which comprises shielding all but the bowl portion of a rotating bulb, directing a spray of coating material upon said bowl and manipulating the spray to deposit a coating of diminishing thickness toward the edge of said bowl.

40. The method of coating an incandescent electric lamp bulb which comprises directing a spray of coating material upon the bulb, moving the spray through a given path, rapidly changing the direction of movement of said spray to cause a deposit of varying thickness on a given portion of said bulb and passing the coated bulb through a heat zone.

41. The method of coating a predetermined area of an incandescent electric lamp bulb which comprises rotating the bulb, directing a spray of coating material upon said bulb, moving the spray in a given direction, rapidly reversing the direction of movement of said spray at the border of said area, passing the coated bulb through a heat zone and in applying another coating upon said coated area.

42. The method of coating the bowl portion of an electric incandescent lamp which comprises rotating the lamp, directing a spray of coating material upon said lamp, moving the spray through a given path between the tip portion of the lamp and the edge of the bowl portion, and in rapidly reversing the direction of movement at the said edge to produce a circumferentially dis-

posed band of coating material of gradually increasing thickness from its outer to its inner boundaries.

43. The method of coating the bowl portion of an electric incandescent lamp which comprises rotating the lamp, directing a spray of coating material upon said lamp, moving the spray through a given path between the tip portion of the lamp and the edge of the bowl portion, and in rapidly reversing the direction of movement at the said edge to produce a circumferentially disposed band of coating of gradually increasing thickness from its outer to its inner boundaries and in passing the lamp through a heat zone.

44. The method of coating the bowl portion of an electric incandescent lamp which comprises rotating the lamp, directing a spray of coating material upon said lamp, moving the spray through a given path between the tip portion of the lamp and the edge of the bowl portion, and in rapidly reversing the direction of movement at the said edge to produce a circumferentially disposed band of coating of gradually increasing thickness, passing the lamp through a heat zone and subsequently manipulating a spray to apply a coating to said coated portion.

In testimony whereof, we have hereunto subscribed our names this twenty-second day of March, 1921.

JAMES BRYANT WHITMORE.
JOHN EBLING FERGUSON.