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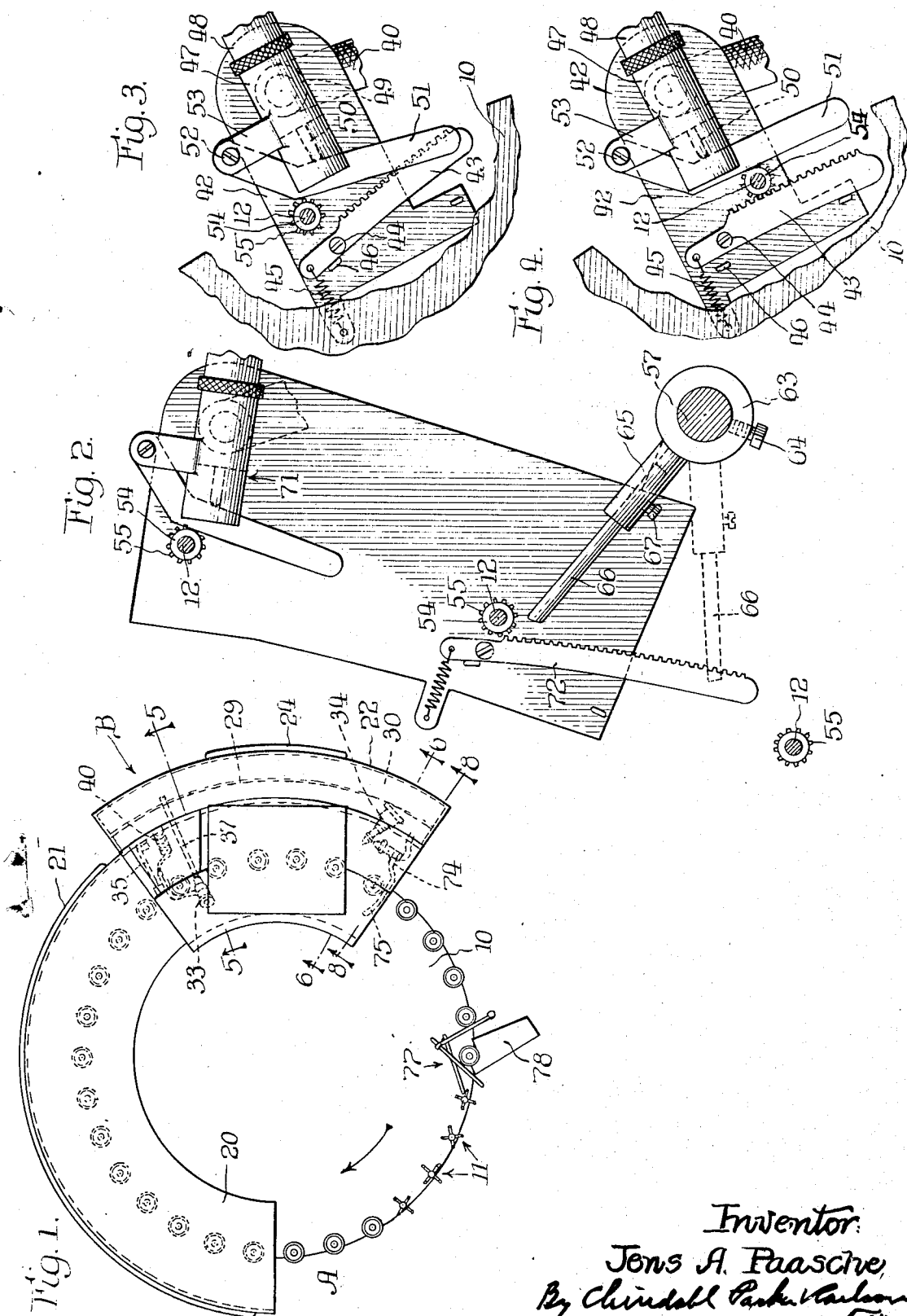
J. A. PAASCHE

2,069,845

COATING MACHINE

Filed Feb. 2, 1933

2 Sheets-Sheet 1



Inventor:
Jens A. Paasche
By Chas. A. Parker
Attys.

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2 Sheets-Sheet 2

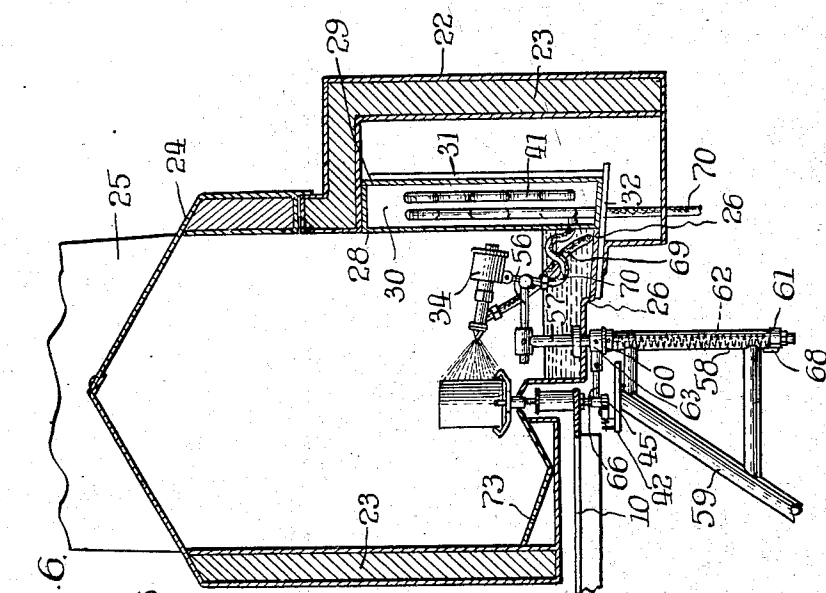


Fig. 6.

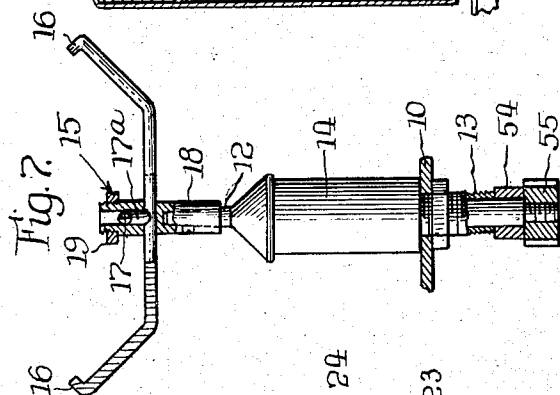


Fig. 7.

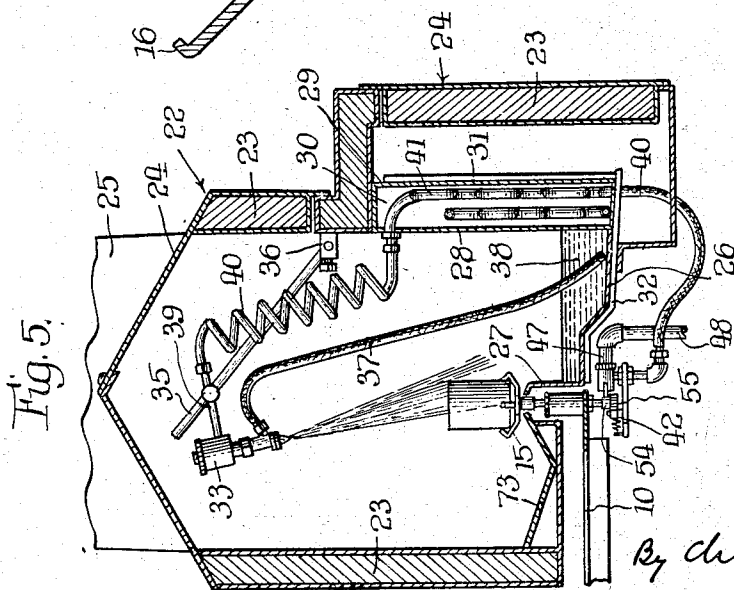


Fig. 5.

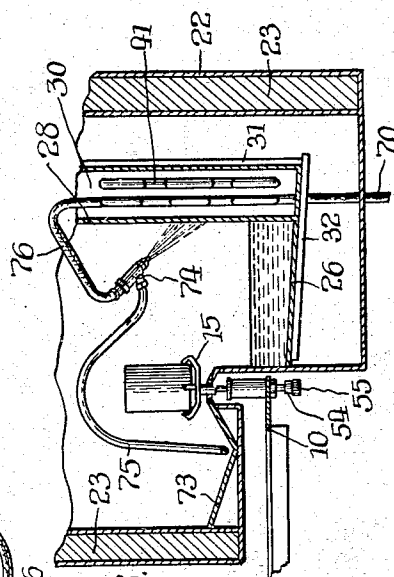


Fig. 8.

Inventor:
Jens A. Paasche,
By Christell Parker Carlson
Attys.

UNITED STATES PATENT OFFICE

2,069,845

COATING MACHINE

Jens A. Paasche, Wilmette, Ill.

Application February 2, 1933, Serial No. 654,816

21 Claims. (Cl. 91—45)

The invention relates generally to coating machines and more particularly to a machine for automatically applying coatings of material to a succession of articles.

5 A general object is to provide a simple machine of this nature which involves few structural parts, is automatic and efficient in operation, and in which waste of coating material is practically eliminated.

10 Another object is to provide a novel machine for applying a coat of material to an article which embodies mechanism for effective relative movement of the article past a coat-applying device, during which movement said device is always directed toward said article to apply coating material most effectively thereto.

Another object of the invention is to provide, in a new and improved machine of this nature, a device for applying a coat of material to an article, said device being mounted for reciprocatory or oscillatory movement to follow an article as it passes thereby, and means for actuating the device as long as the article and device are moving together.

25 In conjunction with the foregoing, another object is to provide a simple adjusting means for adapting the operation of the coating device for articles of different kinds and dimensions.

More specifically stated, an object is to provide a novel machine embodying means for mounting an article on a moving table or conveyor for independent spinning movement relative thereto which is produced as the article moves into a coat-receiving position at which a coating device is normally arranged so as to be directed toward the article as it moves into said position, and operation-controlling means for automatically actuating said device substantially as the article begins to spin and for moving the actuated device according to the conveyed movement of the spinning article until the article has been completely coated.

Still another object is to provide a novel means for reclaiming unused material and returning it to the source of supply for subsequent use.

More specifically stated an object is to provide a reservoir for a supply of material, an auxiliary collecting reservoir located to receive excess or unused material, and means acting positively to return collected material from the auxiliary to the supply reservoir.

Another object is to provide a novel article-supporting means which is easily adjustable to accommodate different articles.

55 Other objects and advantages will become ap-

parent in the following description and from the accompanying drawings, in which:

Figure 1 is a somewhat diagrammatic plan view on a reduced scale of a coating machine embodying the features of the invention.

Fig. 2 is an enlarged fragmentary plan view showing a detail of the mechanism for controlling operation of the movable coating device.

Figs. 3 and 4 are similar views of the control means for another coating device showing the parts in two positions.

Figs. 5 and 6 are fragmentary transverse sections through the housing in which the coating operation is performed and are taken respectively along the lines 5—5 and 6—6 of Fig. 1.

Fig. 7 is a detail in elevation of the article-supporting assembly.

Fig. 8 is a fragmentary transverse section similar to the sections shown in Figs. 5 and 6 and is taken on the line 8—8 of Fig. 1.

In Figs. 5, 6, and 8 mechanism appearing in the background has been omitted for the sake of clarity.

While the invention is susceptible of various modifications and alternative constructions, I have shown in the drawings and will herein describe in detail the preferred embodiment, but it is to be understood that I do not thereby intend to limit the invention to the specific form disclosed, but intend to cover all modifications and alternative constructions falling within the spirit and scope of the invention as expressed in the appended claims.

The features of the invention are illustrated as being embodied in a machine which is generally similar to that described in my copending application Serial No. 523,393, filed March 18, 1931. Such a machine includes a circular table or conveyor 10 which is supported on a vertical axis and is driven in any suitable manner. About the periphery of the table is a series of members generally designated 11 for supporting articles or objects to be coated and one preferred form of such member is illustrated in Fig. 7. Each of these members comprises a spindle 12 which is journaled in a bushing or bearing 13 affixed to the table. Above the table surface the bearing and a major portion of the spindle are enclosed by a removable protective casing 14 through the upper end of which the spindle extends.

A suitable article holder 15 adapted to support the object to be coated is detachably carried on the upper end of the spindle. In the present embodiment, a preferred form of an ar-

ticle holder, which is adjustable to accommodate articles of various dimensions and shapes, is shown as comprising four arms 16 of semi-circular cross section having upturned, article-engaging ends. The arms are arranged in pairs and each pair extends through a suitable oval-shaped aperture 17 in a supporting stud 18. The apertures 17 for each pair of arms are disposed at substantially right angles so that each pair of arms is likewise disposed at right angles to the other pair. The apertures 17 are axially spaced and are connected by an axial bore in which a pin 17^a is slidably mounted. One end of the stud is fashioned to fit upon the spindle 12 while the other end is externally screw-threaded to receive a nut 19 which may be screwed inwardly of the stud into engagement with one of the pairs of arms 16, thereby moving the pin 17^a to bind the other pair of arms securely in place. Thus, both pairs of arms may be clamped by the single nut 19 while each individual arm is capable of separate adjustment when the nut 19 is loosened.

The present machine will be described as being adapted for the application of internal and external coats of paraffin or like material to a cup-like container, although it will be evident that the machine may be readily employed for applying coatings of other materials to different articles.

It has been found that in applying coats of paraffin or, in general, of a material which is fluid by heat, improved results may be obtained if the articles are preheated prior to application of the material thereto. For this purpose, a compartment 20 encloses a large portion of the periphery of the table and has a heating unit 21 therein. The heating compartment preferably extends from a point adjacent to the loading station A to what may be termed the coating station B, which latter station is defined by a casing 22 considerably larger than the compartment 20 and communicating therewith. Thus, as the articles are placed on the successive spindles at the station A, the table will convey them through the compartment 20 where the articles are preheated before they pass to the coating station B.

The walls of the casing 22 are preferably insulated as at 23 and the casing includes one or more appropriately located inspection doors 24. Preferably an exhaust conduit 25 communicates with the casing. Within the casing and beyond the periphery of the table 10 is an elongated supply reservoir for coating material, said reservoir comprising a bottom wall 26, inner side wall 27, outer side wall 28, and end walls (not shown). Spaced outwardly from the outer side wall 28 is a false wall 29 providing a small compartment 30. Heating elements 31 and 32, preferably of the resistance wire type, extend along the wall 29 and bottom 26 respectively, said elements having ample capacity to heat the supply reservoir, the small chamber 30 and the interior of casing 22 to required temperatures.

Within the casing 22 is mounted a pair of pneumatically operated and pneumatically controlled coat-applying or spray devices 33 and 34 preferably of the type shown in my said copending application and arranged so that one device, in this instance the device 33, coats the article internally while the other device 34 applies the external coat. The coating device 33 is accordingly directed downwardly from an upper portion of the casing across the axis and toward one edge portion of the article (as shown in Fig. 5) and is

adjustably supported in that position by a rod 35 mounted in a bracket 36 which is fixed to a stationary part such as the wall of the casing.

The material inlet to the device 33 is connected through a conduit 37 with the liquid material 38 in the supply reservoir and the air intake 39 communicates through a conduit 40 with a source of compressed air (not shown). The air conduit 40 passes into the casing through the small compartment 30 where the conduit may be bent upon itself a number of times, as shown at 41, to thoroughly preheat the air before it passes to the coating device.

It is preferred that the device 33 be actuated only while an object to be coated is within the effective range thereof so that wasted material is minimized. In order to completely coat the interior of the article, a spinning or rapid rotational movement is imparted thereto during the coating operation. To this end, as shown in Figs. 3, 4, and 5, a stationary and horizontally disposed plate 42 is supported in a position underlying the peripheral edge of the table 10. At one side of the path of travel of the spindles 12 an elongated rack 43 is pivoted, as at 44, to the plate 42. A spring 45, connected with one end of the rack 43 and with the plate 42, exerts a force normally urging the rack into a position angular with respect to the path of travel of the spindle and extending thereacross, this position being limited by a suitable stop 46. On the opposite side of the path of travel of the spindles, the plate 42 supports an air control valve 47 having an air inlet 48, leading from the source of compressed air supply, and an outlet 49 to which the air conduit 40 is connected. A valve operator 50 is arranged for actuation by a cam arm 51 which is pivotally supported, as at 52, upon a stationary part 53 of the valve assembly, and extends across the path of spindle travel. The parts are arranged so that the cam arm 51 overlies the rack 43. Reference is here made to my copending application Serial No. 523,393 filed March 18, 1931, in which are described and covered certain generic features of the present structure.

Referring to Fig. 7, the spindle 12 projects downwardly below the table 10 and the lower part of the spindle beyond the bushing 13 carries an anti-friction roller 54, rotatable with respect to the spindle, and a pinion 55 fixed to the spindle. This arrangement so disposes the anti-friction roller 54 and pinion 55 that, as the spindle moves with the table, the cam arm 51 and rack 43 are respectively engaged thereby. Thus, the lower part of the spindle serves as a projection, the movement of which produces operation of the valve 47 in actuation of the coating device 33. At approximately the same time, or just prior thereto, engagement of the pinion and rack occurs to impart a rotary or spinning movement to the spindle and article supported thereby. The rotation or spinning of the article while the interior is sprayed causes the paraffin to accumulate in the corners thereby forming a heavier coat where it is most needed.

The relationship of the parts in their normally idle position, in which the coating device 33 is inactive, is shown in Fig. 3, while the positions assumed by the parts in operation of the device 33 and rotation of the spindle is shown in Fig. 4. The normally angular position of the rack 43 across the path of travel of the spindles definitely produces a proper engagement of the pinion with the teeth on the rack which is maintained by the spring 45. Should, however, the spindle become

so jammed that rotation thereof is impossible, the spring 45 will permit the rack 43 to be moved out of engagement with the pinion, thereby eliminating the possibility of breakage of the parts.

5 It is preferred to support the external coat-applying device 34 for following movement with respect to an article during a coating operation whereby the spray of material from the device may be directed substantially at a vertical center
10 line of an article throughout the coating operation. This insures the efficient application of an evenly distributed coat in an operation of minimum duration. To this end (see Fig. 6) the coating device 34 is supported by adjustable connecting rods 56 upon the upper end of a shaft 57.
15 As shown the spray device is directed at the side walls of the article but if the bottom is also to be coated the device will be adjusted so that the spray is directed upwardly to coat both the bottom and the side walls. The shaft 57 is journaled for movement in an upright tubular sleeve 58
20 which is stationary with a supporting member 59. The shaft 57 extends through the sleeve and at the upper and lower ends of the sleeves are collars 60 and 61, respectively, which are rigidly yet adjustably fixed to the shaft. Within the sleeve and embracing the shaft 57 is a coil spring 62, one end of which is affixed to one of the collars, in this instance the upper collar 60, the other
25 end of the spring being secured to the sleeve or other stationary part.

Above the collar 60 is a hub 63 (Figs. 2 and 6) which may be adjustably secured as by a set screw 64 to the shaft 57 and has a radially extending
35 tubular boss 65 thereon. A rod or arm 66 is receivable in the bore of said boss and may be adjustably secured therein through a set screw 67 to vary the overall length of the arm and boss. The arrangement of parts is such that the outer
40 end of the arm 66 extends into the path of movement of the projections on the conveyer provided by the anti-friction rollers 54 on the spindles. The spring 62 is arranged to exert a force tending to move said shaft and said arm in a direc-
45 tion contrary to the movement of said spindles or, as the device is illustrated in Fig. 2, in a clockwise direction. The collar 61 on the bottom end of the shaft 57 carries a stop means 68 engageable with a stationary part for limiting the spring
50 urged rotational movement of the shaft. The stop means therefore defines the normal or idle position of the shaft and its associated parts.

The coating device 34 has a material supply conduit 69 communicating with the material in
55 the supply reservoir and an air conduit 70 which also enters the casing 22 through the air pre-heating compartment 30 (as shown in Fig. 6).

For controlling the actuation of the coating device 34, a valve and cam mechanism 71 (Fig.
60 2) substantially similar to the mechanism previously described and shown in Fig. 3 is provided. Rotation of the spindle is likewise accomplished as has been previously described by a rack 72. It is preferred, however, in order to
65 avoid complicating the structure to dispose the valve mechanism 71 so that its associated cam engages a spindle in the rear of or following that spindle which carries the object being coated.

In adjusting the coating device 34 for proper
70 operation, the arm 66 is set with respect to the boss 65 so that the duration of engagement between the arm 66 and the spindle continues for at least one complete rotation of the spindle. The coating device is properly adjusted relative
75 to the shaft 57 so that in the idle position of

the shaft, the spray from said device will be directed toward the position assumed by the vertical center line of the article at the instant the spindle and arm 66 engage. The rack 72
is so disposed as to engage the pinion for rota-
tion of the spindle upon or immediately prior to
engagement of the spindle and arm. The actu-
uating cam arm of the valve operating mecha-
nism 71 is fashioned to operate the valve in ac-
tuation of the coating device 34 substantially
10 simultaneously with the engagement between the spindle and arm and to discontinue operation of the valve upon release of the engagement be-
tween the spindle and arm 66.

Due to these several relationships, as an ar-
15 ticle is moved into the effective range of the coating device 34, the article starts to rotate, and the coating device is actuated to deliver a spray of material against the article and substantially on the vertical center line thereof.
20 Simultaneously a connection between the coating device and the conveyer is established to produce conjoint movement of these parts, during which the spray is continuously delivered upon the center line of the spinning article un-
25 til an even coat has been applied thereto. As the engagement between the spindle and arm 66 is broken by the continuous movement of the spindle with the table, the actuation of the coating device 34 is stopped as disengagement oc-
30 curs whereupon the spring 62 will return the shaft and parts associated therewith to their normally idle position thereby completing one cycle of operation.

In order to avoid waste of excess material, an
35 auxiliary reservoir 73 is provided which is located above the table and opposite to the supply reservoir. The adjacent walls of the supply and auxiliary reservoirs are arranged to define therebetween a narrow path through which the
40 spindles pass. Hence, substantially all of the material which is not applied to the articles by the coating devices 33 and 34 will be caught in one or the other of said reservoirs. Provision is made for the return of excess material from
45 the auxiliary reservoir 73 to the supply reservoir and this means, as shown in Fig. 8, may consist of an automatic suction device 74 arranged to draw excess fluid from the auxiliary reservoir
50 73 through a conduit 75 for return to the supply reservoir. Actuating air for the suction device 74 is delivered thereto through a conduit 76. Preferably, the suction device is intermittently actuated, which result may be obtained
55 by suitably connecting the conduit 76 with the air conduit 70 as shown in Fig. 8. Since the flow of air through the conduit 70 is intermittently produced upon actuation of the valve mechanism 71, the suction device 74 will be operated simultaneously with the actuation of the
60 coating device 34. Preferably the device 74 is positioned to direct the stream of returned liquid against the side wall 28 which is heated by the element 31 so that the liquid will reach the supply reservoir at a proper temperature.

In the operation of the machine, the articles
65 are placed upon the spindles at the loading station A, whereupon the movement of the conveyer table 10 carries the articles through the pre-heating compartment 20 to the spraying station B. As the articles pass through the spraying station, the internal surface of the articles will be successively rotated and coated by the syn-
70 chronized operation of coating device 33. Subsequently, the articles pass into the effective
75

range of coating device 34 which, during its actuation, moves with the article while directing its spray of coating material most effectively thereagainst. In this manner, articles are conveyed continuously through the machine without pause. After the articles have been coated they may be engaged by an automatic unloading means 77 comprising a pair of arms supported in the path of movement of the articles for successive engagement therewith to eject the articles into a chute 78 or the like.

I claim as my invention:

1. A coating machine for applying internal and external paraffin coats to a cup-like object comprising, in combination, a revolving table having a plurality of substantially equidistantly spaced spindles thereon, means on said spindles for supporting articles to be coated, a housing through which said spindles are successively conveyed, a spraying device mounted in said housing to direct a spray of paraffin into the interior of the object as it passes through the effective range of said device, means for actuating said device during such passage, means for intermittently rotating said spindle during actuation of said device, a second spraying device in said housing, a support therefor including an oscillatory shaft and an arm fixed thereto for engagement with a passing spindle whereby to swing said shaft and said second device according to movement of said table, a part on said spindles for engagement by said arm and adapted for minimizing friction and wear arising from contact with the arm, said second device being directed toward an object throughout such movement, means for actuating said second device during the swinging movement thereof, means for rotating the spindle toward which said second device is directed during the swinging movement of the device, and a common reservoir containing a paraffin supply for both of said devices.

2. A coating machine for applying internal and external paraffin coats to an object comprising, in combination, a revolving table having a plurality of spindles thereon, means on said spindles for supporting articles to be coated, a heated housing through which said spindles pass including a heated terminal portion near one end constituting a coating station, means located in said housing at said station for applying an internal paraffin coat to an article, a second coat applying means in said housing mounted for intermittent movement with said table and including a part extending to a point adjacent to said table for successive engagement with freely rotatable parts on said spindles to produce said intermittent movement, and means for actuating said second means substantially as long as said second means moves with said table and including a member intermittently actuated by engagement with said freely rotatable parts on said spindles.

3. A machine for applying a material which is fluid by heat to a surface of an object comprising, in combination, a housing having a reservoir therein and means for heating the interior of said housing and the contents of said reservoir, a moving conveyor for objects to be coated having a series of spindles thereon for supporting said objects for movement through said housing, said spindles being arranged on their upper ends for receiving the articles and having contact means near their lower ends, a spraying device disposed in said housing to coat objects passing thereby, a support for said device including an

oscillatory shaft having resilient means for urging said shaft toward a starting position, an arm rigid with said shaft and successively engageable with said contact means of said spindles for rotating said shaft upon each engagement away from said starting position, said parts being so related that the arm and a spindle become engaged as an object becomes aligned with said spraying device, means for supplying said device with coating material from said reservoir, and means for conveying air to said spraying device including an air conduit located closely adjacent to the heating means.

4. In an article coating machine, the combination of a moving conveyor for a series of articles and having a series of projections thereon, a standard having an oscillatory shaft therein, a part connected with said shaft and extending into the path of travel of said projections for engagement therewith in movement of said shaft, a coating device on said shaft directed toward the position reached by an object substantially as a projection is engaged by said part, operating means for actuating said device during the movement thereof resulting from such engagement, means for returning said shaft to its original position upon release of said engagement, and adjustable stop means for defining said original position.

5. In a coating machine, the combination of a coating chamber having a coating device therein, a conveyor traversing the lower portion of said chamber past said device and having means on the upper surface thereof for supporting articles to be coated, a supply reservoir for coating material on one side of the path of travel of said articles, a surplus receiving reservoir on the other side of said path, means for intermittently actuating said coating device, and a suction device for conducting material from said surplus reservoir to said supply reservoir connected for operation by said last mentioned means.

6. A device for supporting articles to be treated comprising a member arranged for connection with a conveying mechanism, and having transverse passages therein angularly disposed with respect to each other and a bore extending between said passages, article supporting arms extending through said passages, a pin in said bore, and a single element having screw threaded engagement with said member into engagement with the arms in one passage to exert through said pin a binding force on the arms in the other passage.

7. A device for supporting articles to be treated comprising a member arranged for connection with a conveying mechanism, and having transverse passages therein angularly disposed with respect to each other and a bore extending between said passages, article supporting arms extending into each passage from opposite sides thereof to provide a pair of arms in each passage, an element slidable in said bore and adapted for engagement with said arms, said arms having complementary engaging surfaces to prevent relative rotation therebetween, and a single element having screw threaded engagement with said member to force said first mentioned element into binding engagement with said arms.

8. An apparatus for applying material which is fluid by heat to the surface of an object, comprising in combination, a revolving table or the like having a plurality of article carrying members thereon at its periphery, a housing over a part of the periphery of said table through which

said article carrying members are successively carried, a pneumatically actuated spraying device adjacent the path of movement of said article carrying members and adapted to coat articles passing thereby, a reservoir within said housing at one side of the path of said article carrying members, a chamber beside said reservoir and spaced from the path of said article carrying means by the width of said reservoir, a conduit for delivering air under pressure to said pneumatically actuated device and passing through said chamber, and heating elements below said reservoir and at the side of said chamber to heat said material and to preheat the air passing through said conduit.

9. In an article coating machine, a pneumatically actuated spraying device adjacent the path of movement of a plurality of article carrying members mounted on conveying means, means for substantially adjusting said device relative to said carrying members, a reservoir adjacent the path of movement of said article carrying members and below said device, and a flexible conduit attached at one end to said device and having its other end trailing in said reservoir, whereby said device may be freely moved without disturbing the liquid supply thereto.

10. In an apparatus of the character described, an article supporting spindle rotatably mounted in upright position on a conveying member, a portion of said spindle being above said conveying member and adapted to carry an article, a pneumatically actuated spraying device mounted adjacent the path of movement of said spindle and adapted to spray an article carried thereby, the lower part of said spindle extending below said conveying device, means for delivering compressed air to said spraying device and including a normally closed valve positioned adjacent the path of movement of the lower part of said spindle, an actuator cam arm associated with said valve and extending diagonally into the path of movement of said spindle, means on said spindle for engagement with said cam arm and adapted to force the same out of the path of said spindle whereby to open said valve and permit compressed air to be delivered to said spraying device, and a pivotally mounted rack opposite to said cam arm and having one end engaged by a spring to urge the other end into proximate relationship with the free end of said cam arm in the path of said spindle, and a pinion rigidly secured to the lower part of the spindle and engageable with the rack substantially simultaneously as said cam arm is engaged by the spindle, whereby said spindle is rotatably driven and said spraying device is actuated to coat an article carried by said spindle substantially simultaneously by movement of said spindle imparted by said conveying member.

11. In an article coating machine, the combination of a moving conveyer having a series of rotatable spindles thereon, said spindles including a part above said conveyer and adapted to support the articles to be coated and a part below said conveyer and having a rigidly secured pinion and a freely rotating anti-friction roller, an oscillatory shaft mounted adjacent said conveyer and having means extending into the path of travel of the lower part of said spindles for engagement with said rollers in the movement of said shaft, a coating device on said shaft directed toward the position reached by an object substantially as said roller is engaged by said means, and a rack mounted in the path of movement of said spin-

dles adjacent said means and adapted to engage with said pinion at substantially the same time as said means engages with said roller whereby to rotate said spindles.

12. In an article coating machine, the combination of a moving conveyer having a series of rotatable spindles thereon, said spindles including a part above said conveyer and adapted to support the articles to be coated and a part below said conveyer and having a rigidly secured pinion and a freely rotating anti-friction roller, an oscillatory shaft mounted adjacent said conveyer and having means extending into the path of travel of the lower part of said spindles for engagement with said rollers in the movement of said shaft, a coating device on said shaft directed toward the position reached by an object substantially as said roller is engaged by said means, a rack mounted in the path of movement of said spindles adjacent said means and adapted to engage with said pinion at substantially the same time as said means engages with said roller whereby to rotate said spindles, and operating means for actuating said device during the movement thereof resulting from movement of said shaft and including a valve having a cam arm actuating the same disposed in the path of movement of said spindles and engageable with the friction rollers thereon as each successive spindle is moved thereby.

13. A coating machine for applying internal and external paraffin coats to an object comprising, in combination, a rotatably driven table having a plurality of spindles thereon, article supporting means on said spindles, means mounted over a part of said table and defining a housing through which said article supporting means are transported as said spindles are conveyed by rotation of said table, a bottom on said housing arranged to define a narrow passage for the spindles below said article supporting means but above the table, means in said housing for applying a coat of paraffin to the interior of a cup-like object as said object is uninterruptedly conveyed past said means, a spraying device, a support therefor including an oscillatory shaft, interengageable means below said housing on said shaft and table operable periodically to swing said shaft as a spindle moves past said spraying device, said spraying device being connected to said shaft and directed toward an object on the passing spindle throughout such swinging movement, means for actuating said spraying device while it is so directed, and means for intermittently rotating the passing spindle during the swinging movement and actuation of said spraying device.

14. In an article coating machine, the combination of a moving conveyer having a series of rotatable spindles thereon, said spindles including a part above said conveyer and adapted to support the articles to be coated and a part below said conveyer and having rigidly secured engagement means and anti-friction means, an oscillatory shaft mounted adjacent said conveyer and having protruding means extending into the path of travel of the lower part of said spindles for engagement with said anti-friction means in the movement of said shaft, a coating device on said shaft directed toward the position reached by an object substantially as said anti-friction means is engaged by said protruding means, means mounted in the path of movement of said spindles adjacent said shaft and adapted for contact with said engagement means at substantially the same time as said protruding means en-

gages with said anti-friction means whereby to rotate said spindles, and operating means for actuating said device during the movement thereof resulting from movement of said shaft and including a valve having an actuator disposed in the path of movement of said spindles and engageable with the anti-friction means thereon as each successive spindle is moved thereby.

15. In an article coating machine, the combination of a moving conveyer having a series of article supporting members thereon, said supporting members having a part above the conveyer and adapted to support the articles to be coated, an oscillatory shaft mounted adjacent the conveyer and having an arm extending laterally in a direction substantially opposite to said article carrying members, a coating device on said arm directed toward the position reached by an object as it is brought into the range of said device by a carrying member, engagement means on said shaft extending substantially opposite to said arm into the path of travel of said article carrying members, and a part on each of said article carrying members embodying anti-friction means arranged to be contacted by said engagement means, said engagement means being arranged to follow the movement of the article carrying member with which it is in contact during the time the article on the member is within the range of said coating device and serving to move said shaft to swing said arm and carry said device bodily in an arcuate path relative to the path of the article so as to maintain the device directed toward the article.

35 16. A machine for applying material to the surface of an object comprising, in combination, a housing having a reservoir therein, a moving conveyer for transporting objects to be coated through said housing having a series of object-supporting spindles thereon, an adjustable spraying device movable in an arcuate path and disposed in said housing to coat objects passing thereby, a movable support for said device including a shaft having means exerting a force for urging said shaft toward a normal position in which the spraying device is adapted to throw a spray stream in a predetermined direction toward an article, an arm rigid with said shaft and engageable with a spindle for turning said shaft in one direction away from said normal position thereof whereby said support and spray device will be moved correspondingly to shift the direction of spray stream, said parts being so related that the arm and spindle engage as an object becomes aligned with said spraying device, and means for supplying said device with coating material from said reservoir including a conduit with one end connected to and movable with said spraying device and having its other end trailing in the coating material in said reservoir.

65 17. In a coating machine, the combination of a coating chamber having an air coating device therein, a conveyer traversing said chamber exteriorly thereof and having means thereon extending into said chamber for supporting articles to be coated, a supply reservoir for coating material in the bottom of said chamber on one side and close to the path of travel of said articles, a surplus receiving reservoir on the other side and close to said path, constantly operating air actuated means for returning material from said surplus reservoir to said supply reservoir, and means for supplying air to said coating device and to said air actuated means.

18. In a machine for coating an article with a

material liquid when heated, the combination of a coating chamber having an air coating device therein, a conveyer traversing said chamber past said device and having means thereon for supporting articles to be coated, a supply reservoir for coating material on one side and positioned close to the path of travel of said articles so as to receive some of the surplus material issuing from said device, a surplus receiving reservoir on the other side and close to said path, a heated wall defining said supply reservoir opposite said path of travel, and air actuated means for returning material from said surplus reservoir to said supply reservoir and directed to discharge said surplus material against said heated wall so that the temperature of said surplus material will be substantially equal to that within the supply reservoir when the same returns thereto.

19. In a machine of the character described, the combination of a coating chamber having a coating device therein, a rotary conveyer passing beneath a part of said chamber and having a plurality of upstanding article supports upon which articles to be coated are carried past said coating device extending upwardly into the chamber, a pair of reservoirs in the bottom of said chamber spaced apart to provide a narrow passage for said article supports and being adapted to collect coating material dripping from the coated articles, one of said reservoirs overlying said conveyer and the other extending beyond the edge of the conveyer and being arranged to contain a quantity of coating material forming a supply for said coating device.

20. In combination in apparatus for applying a uniform coating of material to an article, a conveyer movable in a fixed path and having a rotatable article carrying spindle extending in part to one side and in part to the opposite side of said conveyer, one end of said spindle having means thereon for carrying an article to be coated, an oscillatory shaft mounted on an axis substantially parallel with said spindle and adjacent the margin of said conveyer, the end of said shaft opposite said article carrying means having a spraying device thereon movable with said shaft, means for normally maintaining said spraying device trained substantially in opposition to the direction of movement of said conveyer and toward an article carried by said spindle, an arm extending laterally from the opposite end of said shaft and into overlapping relation with said conveyer to engage the corresponding end of said spindle substantially when the article is brought into the range of said spraying device, said arm remaining in engagement with the spindle substantially throughout the period that the article is within the range of said spraying device so as to maintain said device trained upon the article by movement of said shaft, and means at the point at which said shaft is contacted by said arm for minimizing friction and wear from repeated contact between the parts.

21. In an article coating machine, the combination of a moving conveyer having a series of article supports thereon, said supports being mounted for rotary movement while the conveyer is in motion, a standard having an oscillatory shaft coactive therewith, means including an elongated arm adjustably connected to said shaft and extending into the path of travel of said supports for engagement therewith to effect movement of said shaft in the travel of said supports with the conveyer, each of said supports having a freely movable part arranged to be

5 contacted by said arm and permitting free relative movement between the arm and said supports during such engagement, a coating device on said shaft directed toward the position reached by an object substantially as its support is engaged by said arm, means for rotating the support while said coating device is directed to-

ward the object, operating means for actuating said device during the movement thereof resulting from such engagement, and means for returning said shaft to its original position upon release from said engagement.

JENS A. PAASCHE.