April 22, 1947. R. K. GOODLATTE 2,419,260

IMPREGNATING AND COATING MACHINE

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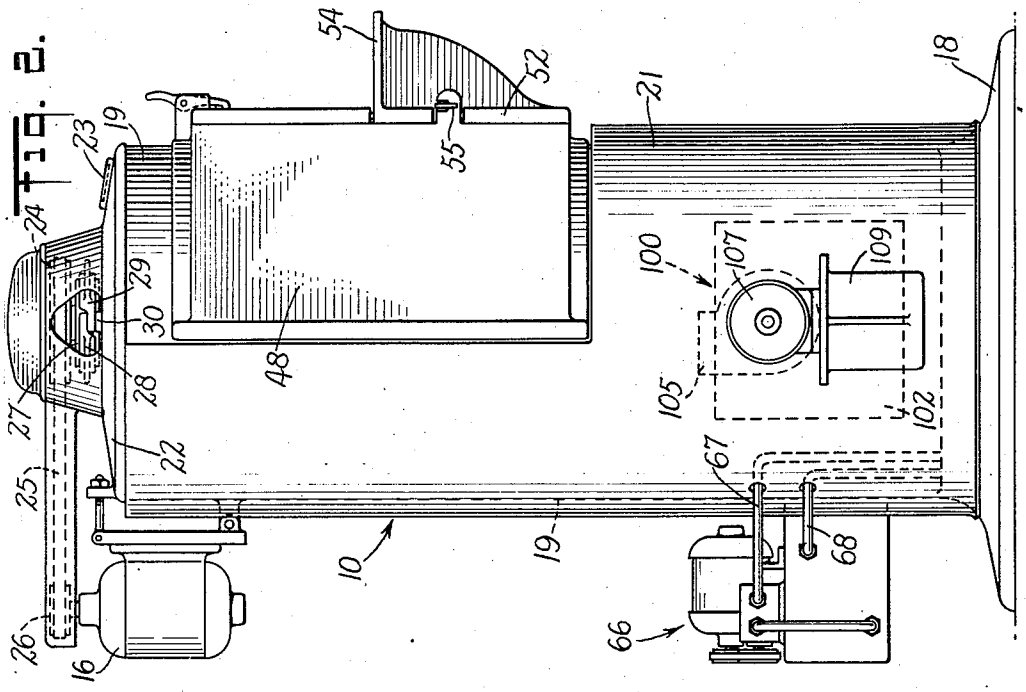


Fig. 2.

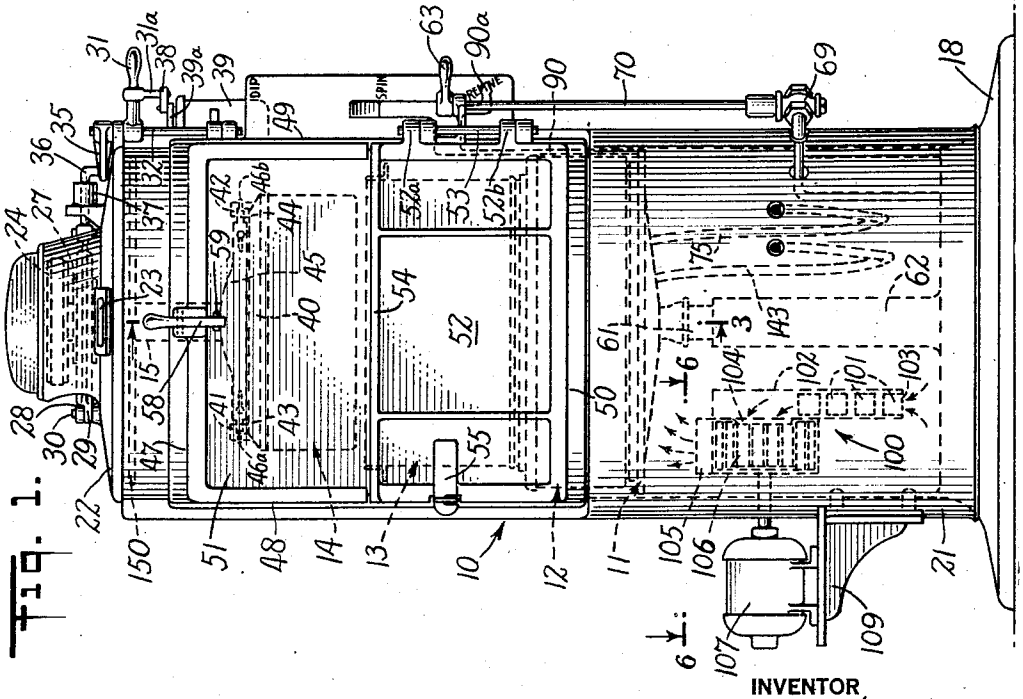


Fig. 1.

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Fig. 3.

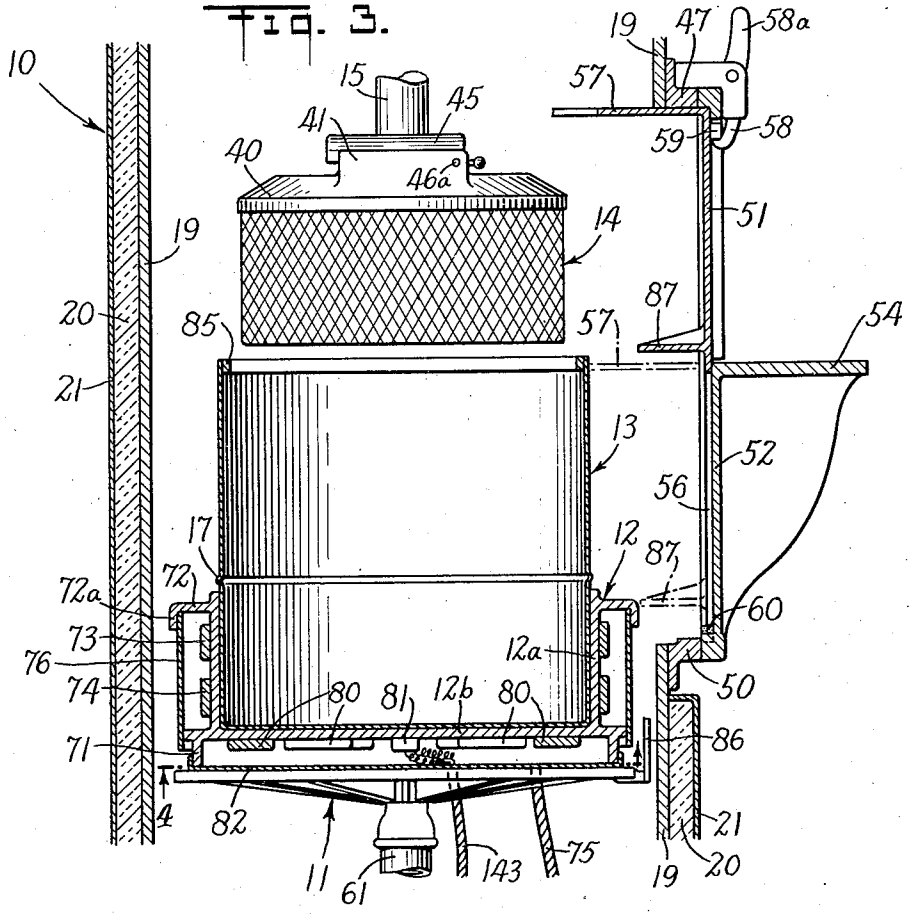
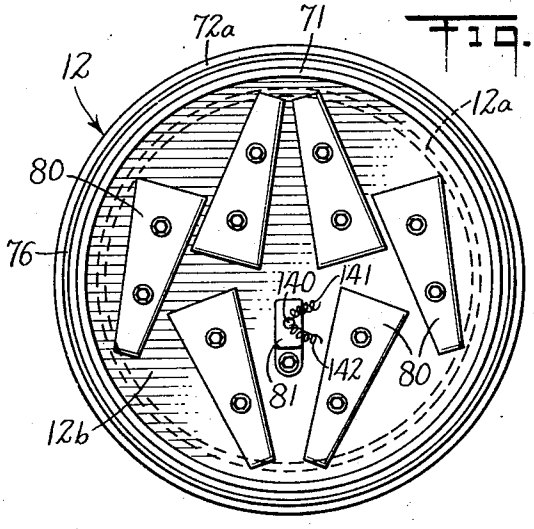


Fig. 4.



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Fig. 5.

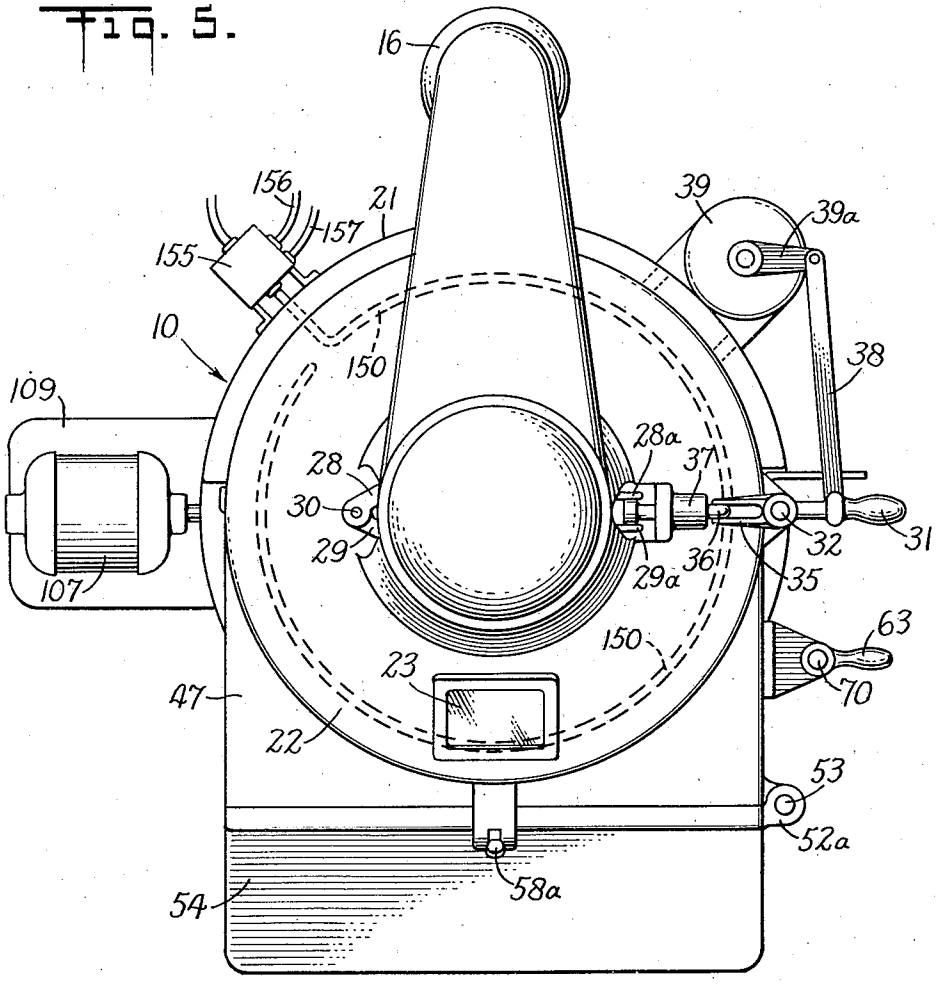


Fig. 6.

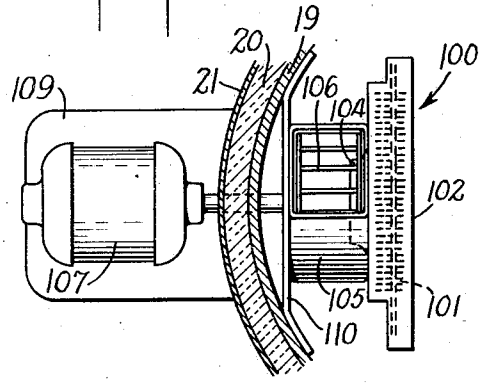
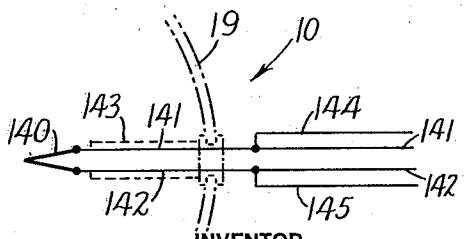


Fig. 7.



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2,419,260

IMPREGNATING AND COATING MACHINE

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Application July 9, 1943, Serial No. 494,948

8 Claims. (Cl. 91—42)

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This invention relates to a machine for coating and impregnating articles with a moisture-proofing material.

One of the objects of this invention is to provide a coating machine which is simple, practical, and thoroughly durable. Another object of this invention is to provide a device of the above character which will coat a maximum of articles in a minimum of time. Another object is to provide a construction of the above character which is efficient in operation. Another object is to provide a construction of the above character which unskilled labor may be readily taught to operate. Another object of this invention is to provide a construction of the above character by which a thin, even coating of wax may be placed on the articles being waxed. A further object is to provide a construction of the above character which, in addition to coating the articles, may be utilized to impregnate them with the coating material. A still further object is to provide a construction of the above character having efficient and practical apparatus for heating the coating material. Other objects will be in part obvious and in part pointed out hereinafter.

The invention accordingly consists in the features of construction, combinations of elements, and arrangements of parts, all as will be illustratively described herein, and the scope of the application of which will be indicated in the following claims.

In the accompanying drawings in which is shown one of the various possible embodiments of this invention,

Figure 1 is a front elevation of the machine;

Figure 2 is a side elevation of the machine;

Figure 3 is a vertical section taken on the line 3—3 of Figure 1;

Figure 4 is a horizontal section taken on the line 4—4 of Figure 3;

Figure 5 is a top plan view of the machine;

Figure 6 is a horizontal section taken on the line 6—6 of Figure 1; and

Figure 7 is a diagrammatic showing of a portion of the circuit of the tank heating apparatus.

Similar reference characters refer to similar parts throughout the several views of the drawings.

Referring first to Figures 1 and 3, the machine includes a housing, generally indicated at 10, having a platform, generally indicated at 11, mounted therein for vertical movement with respect thereto. Platform 11 carries heating apparatus, generally indicated at 12, within which the lower portion of a tank, generally indicated at 13, is seated. A basket, generally indicated at 14 (Figure 3), which is loaded with the articles to be moisture-proofed with a coating of wax, is mounted on a shaft 15 which is rotated by a motor 16 (Figure 2) through suitable belt and pulley connections. Tank 13 (Figure 3) is filled to the bead 17 with wax which is maintained in a liquid state by heating apparatus 12. The platform 11, and thus the tank 13, is hydraulically raised until the basket 14 is immersed in the wax in tank 13. Next the platform is lowered to an intermediate position and the basket is spun, and the excess wax thrown off striking the upper side wall of tank 13. Finally, the spinning is stopped and the platform is lowered to its lowermost position at which time the basket may be removed.

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Housing 10 has a cylindrically shaped side wall (Figures 1, 2, and 5) which is connected to a base 18 (Figures 1 and 2) closing the lower end of the housing. The housing side wall 19 (Figure 3) is covered by suitable insulation material 20, which is held in place thereon by metal shell 21. The upper end of the housing is covered by a top plate 22 (Figures 1 and 2), which has a window 23 in the front portion thereof to permit the operator of the machine to examine the waxing process during the operation of the machine.

Plate 22 has a thrust bearing (not shown) mounted thereon, which mounts and supports shaft 15 and basket 14 (Figures 1 and 3). Shaft 15 has a pulley 24 connected to its upper end which is driven through belt 25 by motor pulley 26. A brake drum 27 (Figures 1 and 2) is mounted on and connected to shaft 15 beneath pulley 24. A pair of arms 28 and 29 (Figures 1 and 5) carrying brake shoes (not shown) are pivotally mounted on plate 22 by a pin 30 for movement in a horizontal plane with respect to the machine. Arms 28 and 29 extend around opposite sides of drum 27 and are resiliently urged toward each other by a spring (not shown) to hold their respective brake shoes in contact with opposite sides of the brake drum.

The operation of both the motor and the brake are controlled by handle 31 (Figures 1 and 5), which moves in a horizontal plane with respect to the machine. Handle 31 is connected to a shaft 32 (Figure 1) pivotally mounted on housing 10. A yoke member 35 is connected to the upper end of shaft 32 and extends inwardly over the top of the machine. The arms of yoke member 35 (Figures 1 and 5) extend around the downwardly extending portion, as viewed in Figure 1 of a crank 36 pivotally mounted on plate 22 by a

bearing 37. The inner end of crank 36 is preferably enlarged (Figure 5) and so shaped that when crank 36 is turned in a clockwise or counterclockwise direction, the arms 28 and 29 are spread to move the brake shoes out of contact with the brake drum 27 (Figure 1). The motor 16 is controlled through a link 38 pivotally connected to a downwardly extending portion 31a (Figure 1) of handle 31 and to the control lever 39a of switch 39 (Figure 5). Switch 39 is so constructed that when the control lever 39a is in a neutral position as shown in Figure 5, the motor is off, that when the control lever is moved counterclockwise from a neutral position, as viewed in Figure 5, the motor rotates the basket in one direction, and that when the control lever is moved in a counterclockwise direction, the motor rotates the basket in the opposite direction. Thus, whenever handle 31 is moved upwardly or downwardly, as viewed in Figure 5, the brake shoes are moved out of contact with the brake drum 27 (Figure 1), and the circuit to the motor is completed.

The basket 14 (Figures 1 and 3) which holds the articles being treated is cylindrically shaped and has a perforated side wall and bottom. The upper edge of the side wall is connected to a rim 40 which slants inwardly and upwardly from the edge of the basket. A support 45 connected to the lower end of shaft 15 has a pair of tongues 43 and 44 formed on opposite edges. These tongues coact with tracks 41 and 42 formed on basket rim 40 to mount basket 14 so that its vertical axis is in alignment with the axis of shaft 15. The tongues and tracks are so formed that when support 45 is correctly positioned within the housing, the basket may be readily mounted on or disconnected from the support through an opening in the housing to be described hereinafter. To hold the basket on support 45, a pair of spring pressed pins 46a and 46b are provided (Figure 1). These pins are manually retracted when the basket is being mounted on support 45 and when the tongues 43 and 44 strike stops at the rear ends of tracks 41 and 42, the pins are released and enter holes in tracks 41 and 42.

Referring to Figures 1, 2, and 5, top, bottom, and side plates 47, 48, 49, and 50 extend outwardly from the side wall 19 of the housing to form a rectangular shaped opening in the front of the machine. Walls 48 and 49 are parallel and are preferably spaced from each other a distance substantially equal to the diameter of housing side wall 19, thus permitting full access to the interior of the housing. The rectangular shaped opening formed by plates 47, 48, 49, and 50 is closed by a sliding door 51 and a pivotally mounted door 52. Door 52 is pivotally connected by knuckles 52a and 52b (Figure 1) to a pin 53 mounted on side wall 49. This door is provided with a shelf 54 (Figure 2) which extends outwardly from the machine in a horizontal plane from the upper edge of the door (Figure 3) and also has a latch 55. Door 52 is provided with a pair of tracks, one of which is shown at 56 in Figure 3, adjacent the outer edges thereof as viewed in Figure 1. The outer edges of sliding door 51 extend into these tracks, thus mounting door 51 for vertical movement with regard to door 52. Walls 48 and 49 are also provided with tracks which are aligned with the tracks in door 52 when door 52 is closed. This permits sliding door 51 (Figure 3) to be raised to close the upper half of the rectangular shaped opening.

Sliding door 51 also has a shelf 57 which extends inwardly into the housing from the upper edge thereof, and this shelf is positioned in the same plane as shelf 54 when door 51 is in its lower position, as shown in Figure 3. These shelves form a working surface to aid the operator in placing a basket in or removing one from the housing. Door 51 is held in its closed position by a catch 58, which coacts with a lug 59 formed on door 51. When the operator presses inwardly upon the handle 58a of catch 58, door 51 is released and it may be manually lowered into the dotted line position shown in Figure 3. Rubber cushions, one of which is shown at 60 (Figure 3), are provided to prevent the sliding door from striking against the stops at the bottom of the tracks in door 52.

Platform 11 is mounted in any suitable manner upon the upper end of a hydraulically operated piston 61 (Figures 1 and 3). This piston is mounted in a cylinder 62 which, in turn, is mounted upon base 18. A motor, pump, sump, and release valve unit, generally indicated at 66 (Figure 2), is mounted on the rear of housing 10. This unit supplies fluid under pressure through pipe 67 to the cylinder 62 and the fluid returns to the pump through pipe 68. The flow of fluid to and from cylinder 62 is controlled by valve 69 (Figure 1) which, in turn, is operated by handle 63 through rod 70. By moving handle 63 to the correct position, the platform may be raised or lowered as desired, and when the desired position is reached, the position is maintained by moving handle 63 to a neutral position.

The platform 11 (Figure 3) carries the heating apparatus, generally indicated at 12, the body of which is of heavy metal construction. The body includes a cylindrically shaped side wall 12a and a bottom 12b, both of which are preferably of substantial thickness. Bottom 12b extends outwardly from side wall 12a and an annular flange 71 extends downwardly from bottom 12b adjacent the edge thereof. Another annular flange 72 extends outwardly and then downwardly from side wall 12a adjacent the top thereof. Two ring heating elements 73 and 74 extend around the outside of side wall 12a and are mounted thereon in any suitable manner. These elements are covered by a cylindrically shaped shell 76 which fits over the edge of base 12b and extends upwardly under the downwardly extending portion 72a of flange 72. A series of heating elements 80 (Figures 3 and 4) are mounted on the under side of bottom 12b so that they evenly heat this portion of the heating apparatus. These elements and the elements extending around the side wall 12a (Figure 1) are connected to a flexible electric cable 75, which is of sufficient length to permit platform 11 to move freely and which extends outwardly through the side wall of housing 10 (Figure 1) to a source of current. The energization of all of the heating elements in heating apparatus 12 is controlled by a thermocouple 140 (Figure 7) seated in base plate 12b (Figures 3 and 4) and held by a clamp 81. The thermocouple lead wires 141 and 142 (Figure 7) extend through a flexible cable 143 (Figures 1 and 3) which is of sufficient length to permit free movement of platform 11. The lead wires 141 and 142 (Figure 7) pass through the side wall 19 of the housing and act through a thermostatic controller (not shown) to control the energization of the heating elements 73, 74, and 80 (Figures 3 and 4) and thus the temperature of the body of heating apparatus 12.

To automatically break the circuit to the heating elements 73, 74, and 80 if either of lead wires

141 or 142 is broken between the housing wall 19 and the thermocouple or if the thermocouple breaks, a pair of wires 144 and 145 are connected to lead wire 141 and 142 at a point immediately outside of housing 10. A circuit of which these wires form a part is completed through the portions of lead wires 141 and 142 within housing 10 and the thermocouple. Thus if either of these lead wires or the thermocouple breaks, the electrical connection between wire 144 and 145 is broken. Wires 144 and 145 form part of the circuit of suitable electrical control mechanism (not shown) which automatically breaks the circuit to heating elements 73, 74, and 80 when wires 144 and 145 are no longer electrically connected.

Tank 13 is cylindrically shaped and its lower portion fits snugly within the well formed by wall 12a and bottom 12b of heating apparatus 12. The tank is provided with a bead 17 to indicate the depth to which it should be filled with wax and the side wall of the tank extends a substantial distance above this point. The upper edge of the tank preferably has a ring 85 extending inwardly therefrom, for purposes to be disclosed fully hereinafter. When platform 11 is in its lowermost position, the upper edge of the tank is positioned beneath the basket 14 so that the basket may be removed from the machine (Figure 3). Platform 11 has an arm 86 (Figure 3) extending upwardly therefrom which is adapted to strike a bracket 87 on sliding door 51 so that when the platform and thus the tank is raised, the sliding door is moved upwardly into a closed position where it is retained by catch 58. Platform 11 (Figure 1) also coacts with an indicator, generally indicated at 90, which is mounted for vertical movement with respect to housing 10. As the platform is raised and lowered, the indicator finger 90a moves upwardly and downwardly in front of the face of an index plate marked to show the different positions of tank 13 with respect to basket 14.

To heat the interior of the casing, a heating unit, generally indicated at 100 (Figures 1 and 6) is used. This heating unit includes a series of heating elements 101 connected to a suitable source of current. These elements are mounted in a housing 102 having one opening 103 in its bottom adjacent base 18 and another 104 leading into a blower housing 105. The fan 106 within the blower housing is driven by a motor 107 mounted on a bracket 109 connected to the side wall of the machine and housings 102 and 105 are mounted on the side wall 19 by a bracket 110. In operation, the fan 106 draws air into the lower end of housing 102 where it is heated by heating elements 101 and then discharges the heated air upwardly into the interior of the machine.

The operation of heating unit 100 is controlled by an air thermostat. This air thermostat includes a tube 150 (Figures 1 and 5) which is positioned in the upper portion of housing 10 and which is filled with a gas, the pressure of which acts upon suitable thermostatic control mechanism (not shown) to control the operation of heating unit 100. Suitable control mechanism 155 responsive to the pressure within tube 150 is mounted on side wall of housing 10. This control mechanism, whenever the pressure within tube 150 falls below a certain point, breaks a circuit of which wires 156 and 157 form a part. When this circuit is broken, a switch in the circuit of heating unit 100 is closed. Thus an automatic control for maintaining the temperature within housing 10 is shown, and furthermore automatic mechanism is described for preventing the operation of the heating unit whenever there is a leak in tube 150.

In operation sufficient wax is placed in tank 13 to fill it to the bead 17 (Figure 3). The heating elements of heating apparatus 12 heat side wall 12a and bottom 12b to a temperature sufficient to maintain the wax in tank 13 in a fluid state. Because of the thickness of side wall 12a and bottom 12b and because the temperature of side wall 12a and bottom 12b are controlled by the thermocouple 140, the wax in tank 13 is not carbonized by excess heating when wax is being melted therein. In other words, because the thermocouple controls the temperature of the heating apparatus and not the temperature of the wax, the heating apparatus is never heated to a temperature sufficient to injure the coating material. At the same time the circuit to heating apparatus 12 is completed, the circuits to motor 107 and heating elements 101 are closed. By heating unit 100, the interior of the machine is heated to a point above the melting point of the wax being used and is maintained at this point by the thermostatic control described hereinabove. The insulated housing 10 is of material aid in maintaining the temperature within the housing constant.

Next a basket having a load of articles to be waxed therein is mounted on support 45. Then the valve control handle 63 is turned to a position which causes the hydraulic fluid to act on piston 61 and raise platform 11 and thus tank 13 until the articles in the basket are immersed in the coating material. During the upward movement of the tank, arm 86 coacts with bracket 87 (Figure 3) on sliding door 51 to automatically move the sliding door upwardly to a closed position. When the basket is in the coating material, the indicator finger 90a is at the point marked "dip" on the index plate 120.

After the articles have been immersed in the coating material for a period sufficient to allow the material to thoroughly cover all of the articles, valve 69 is again operated by handle 63 to lower the platform and thus tank 13 until the indicator finger 90a is opposite the place marked "spin" (Figure 1). At this time the handle, which controls the operation of the motor 16 (Figure 2) and the braking mechanism, is thrown which causes the basket to be rotated at a high rate of speed. This rotation causes excess wax to be thrown off of the articles through the utilization of centrifugal force, and at the same time centrifugal force causes the wax to impregnate the articles being coated if they are capable of impregnation. The heating of the interior of the housing materially aids both the throwing off of the excess wax and the utilization of centrifugal force to impregnate articles capable of being impregnated with wax as the wax on the articles is maintained in a highly fluid condition. Thus, in the case of wire coils, the wax penetrates the layers of wire insuring thorough moisture-proofing.

The spinning preferably is done first in one direction and then in the other and each time the handle is moved to reverse motor 16, the brake shoes act upon drum 27 (Figure 1) to stop the rotation of the shaft 15 and thus basket 14 as the handle has to move through the braking or neutral position before the motor can be reversed. During the spinning period, the wax being thrown off the basket strikes the upper portions of the side wall of tank 13 and flows downwardly into the bottom of the tank. The ring 85 around the upper

edge of tank 13 prevents the wax from flowing over the tank's edge. After the basket has been spun for a period sufficient to throw off the excess wax, the rotation of the basket is stopped by moving handle 31 (Figure 1) to a neutral position. Next platform 11 and thus tank 13 are lowered by exhausting the hydraulic fluid from cylinder 62, and the basket is then removed through door 51.

Thus, a practical and efficient coating machine has been disclosed in which articles may be coated and impregnated with wax. Furthermore, a type of housing and heating unit have been shown which coact in producing a thin, even coating of wax on the articles within the basket. Furthermore, heating apparatus for maintaining the wax in a molten state has been disclosed which will efficiently maintain the wax at the correct temperature and which will prevent undue heating of the wax at any time. Furthermore, automatic breakdown controls are provided for both heating unit 100 and heating apparatus 12 which automatically operate whenever there is a breakdown in either of the thermostatic control systems. Thus, a machine has been disclosed in which the several objects hereinabove mentioned, as well as many others, have been accomplished.

As many possible embodiments may be made of the above invention, all without departing from the scope of the invention, it is to be understood that all matter hereinabove set forth or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

I claim:

1. In a machine for coating articles with a coating material, in combination, a housing, a basket for holding a plurality of articles, a container for holding a coating material of a type requiring the application of heat to maintain the coating material in a fluid state, said housing completely enclosing said basket and said container, means for dipping said basket and the articles therein in said coating material, means for rotating said basket after the articles have been dipped in said coating material to remove the excess coating material from the articles through the utilization of centrifugal force, heating means positioned within said housing, means for circulating the air within said housing, and heating apparatus for maintaining the coating material in said container in a fluid condition.

2. In a machine for coating articles with a coating material, in combination, a housing, a perforated container for holding a plurality of articles, a container for holding a coating material, said housing completely enclosing both of said containers, heating apparatus for maintaining said coating material in a fluid condition, said heating apparatus including a heavy metal side wall and bottom positioned in close proximity to the side wall and the bottom of said second-mentioned container, heating means for heating the side wall and the bottom of said heating apparatus, and temperature control means for controlling the temperature of the side wall and the bottom of said heating apparatus, means for dipping said perforated container and the articles therein in said coating material, and means for rotating said perforated container after it has been dipped in said coating material to remove the excess coating material from said articles through the utilization of centrifugal force.

3. In a machine for coating articles with a coating material, in combination, a housing, means for insulating said housing, a perforated container for holding a plurality of articles, a container for holding wax, said housing completely enclosing both of said containers, heating apparatus for maintaining said wax in a fluid condition, said heating apparatus having a heavy metal side wall and bottom positioned in close proximity to the side wall and the bottom of said second-mentioned container, heating means for heating the side wall and the bottom of said heating apparatus, temperature control means for controlling the temperature of the side wall and the bottom of said heating apparatus, means for dipping said perforated container and the articles therein in said wax, means for rotating said perforated container after it has been dipped in said wax to remove the excess wax from said articles through the utilization of centrifugal force, and a heating unit for maintaining the temperature within said housing at a point above the melting point of said wax.

4. In a machine for coating articles with a coating material, in combination, a housing, a basket for holding a plurality of articles, a container for holding a liquid coating material, said housing completely enclosing said basket and said container, means for dipping said basket and the articles therein in said coating material, means for rotating said basket after the articles have been dipped in said coating material to remove the excess coating material from the articles through the utilization of centrifugal force, heating means positioned within said housing, and means for circulating the air heated by said heating means within the interior of said housing.

5. In a machine for coating articles with a coating material, in combination, a housing, a basket for holding a plurality of articles, a container for holding a liquid coating material positioned in the upper portions of said housing, said housing completely enclosing said basket and said container, means for dipping said basket and the articles therein in said coating material, means for rotating said basket after said basket has been removed from said coating material to remove the excess coating material from the articles in said basket through the utilization of centrifugal force, heating means positioned in the lower portions of said housing, and circulating means associated with said heating means for blowing the air heated by said heating means into the upper portions of said housing.

6. In a machine for coating articles with a coating material, in combination, a housing, a perforated container for holding a plurality of articles, a container for holding a coating material, said housing completely enclosing both of said containers, a supporting member, means for raising and lowering said supporting member, heating apparatus for maintaining said coating material in a fluid condition mounted on said supporting member, said heating apparatus supporting said second-mentioned container on said supporting member, said heating apparatus including a heavy metal side wall and bottom positioned in close proximity to the side wall and bottom of said second-mentioned container, a plurality of electrical heating elements positioned on the side wall and bottom of said heating apparatus for heating said heating apparatus, and thermocouple control means for controlling the temperature of the side wall and bottom of said heating apparatus, said first-mentioned container with the articles therein being dipped in said coating material when said supporting member is raised, and means for rotating said perforated

container after it has been dipped in said coating material to remove the excess coating material from said articles through the utilization of centrifugal force.

7. In a machine for coating articles with a coating material, in combination, a housing, a perforated container for holding a plurality of articles, a container for holding a coating material, said housing completely enclosing both of said containers, heating apparatus for maintaining said coating material in a fluid condition, said heating apparatus including a heavy metal side wall and bottom positioned in close proximity to the side wall and bottom of said second-mentioned container, a plurality of electrical heating elements positioned in close proximity to the side wall and bottom of said heating apparatus, and a thermocouple seated in the bottom of said heating apparatus for controlling the temperature of the side wall and bottom of said heating apparatus, means for dipping said perforated container and the articles therein in said coating material, and means for rotating said perforated container after it has been dipped in said coating material to remove the excess coating material from said articles through the utilization of centrifugal force.

8. In a machine for coating articles with a coating material, in combination, a housing, a perforated container for holding a plurality of articles, a container for holding a coating material, said housing completely enclosing both of said containers, heating apparatus for maintaining said coating material in a fluid condition, said heating apparatus including a heavy metal side wall and bottom positioned in close proximity to the side wall and bottom of said second-mentioned container, heating means for heating the side wall and bottom of said heating apparatus, and temperature control means for controlling the temperature of the side wall and bottom of said heating apparatus, means for dipping said perforated container and the articles therein in said coating material, means for rotating said perforated container after it has been dipped in said coating material to remove the excess coating material from said articles through the utilization of centrifugal force, heating means positioned within said housing, and means associated with said heating means for circulating the air heated by said heating means through the interior of said housing.

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