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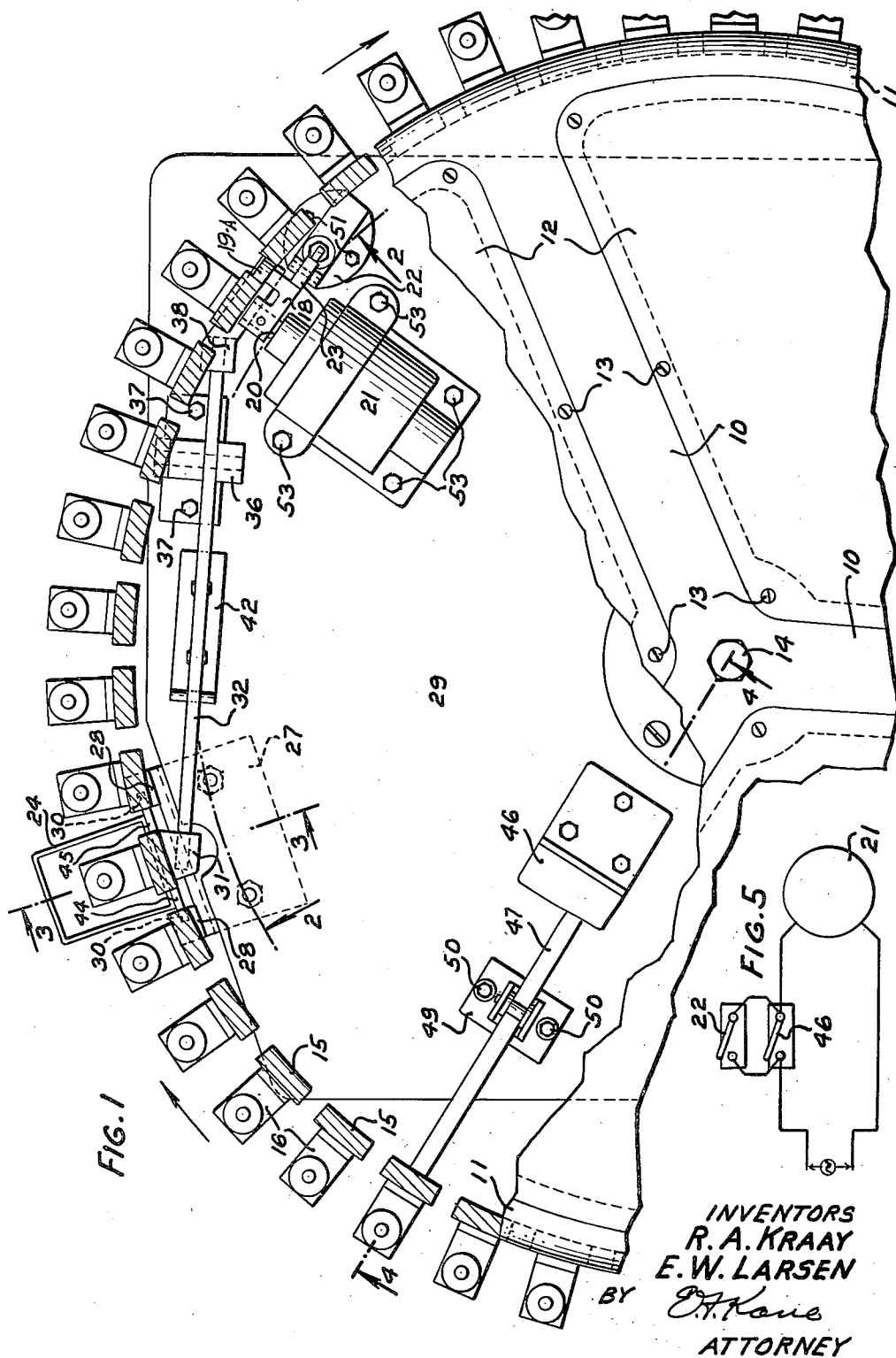
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APPARATUS FOR DIPPING ARTICLES IN LIQUID

Filed Oct. 5, 1949

2 SHEETS—SHEET 1



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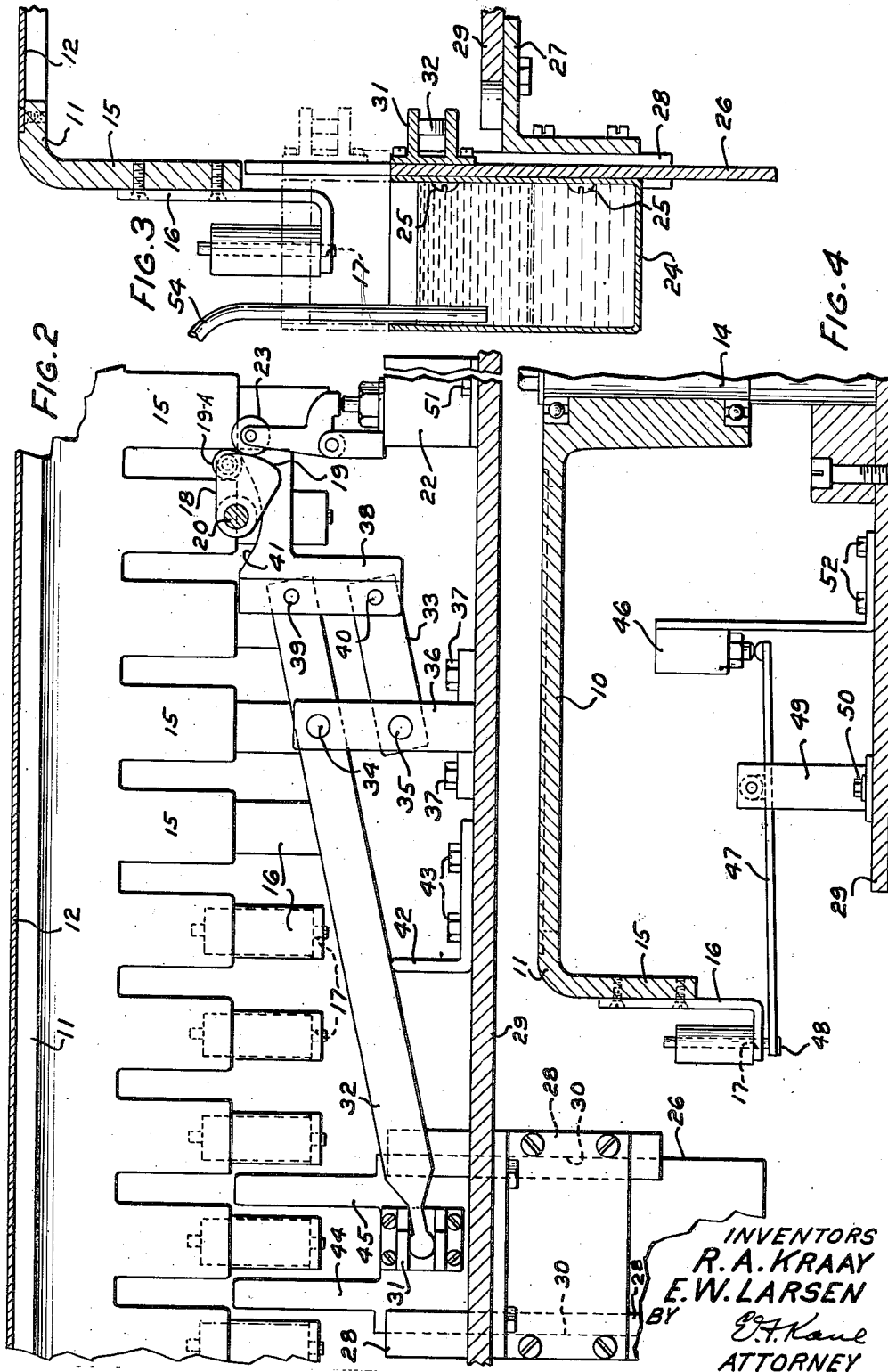
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2 SHEETS—SHEET 2



UNITED STATES PATENT OFFICE

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APPARATUS FOR DIPPING ARTICLES
IN LIQUID

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This invention relates to dripping apparatus and more particularly to apparatus for applying a coating to portions of a plurality of articles in automatic succession.

In the manufacture of many articles it is necessary or desirable to apply a coating to a part or all of each article for various well-known reasons.

It is an object of this invention to provide an improved device for automatically coating portions of articles.

It is another object of the invention to provide a dipping device, the cycle of operation of which is interrupted automatically by the absence of an article on one of the carriers approaching the dipping position.

It is a further object of the invention to provide an indexing and immersing device wherein the indexing and immersing operations are controlled by the same mechanism in an orderly predetermined manner.

Another object of the invention is to provide positive means for preventing the device from indexing during the immersing operation.

Other objects and advantages of the invention will be apparent from the following description, and although this invention is capable of use with many and varied types of articles which require coating with a liquid, the description herein will be confined, for simplicity, to a coil having a core extending coaxially therethrough and having a contact strip appended thereto. It will be assumed that it is desired to coat the contact strip and a small portion of the lower end of the coil and core with the liquid for purposes of improving the life of the contact strip and for other electrical and physical purposes.

In accordance with one embodiment of the invention a turntable is provided having spaced around the periphery thereof a plurality of article carriers. The turntable is automatically indexed in a step-by-step manner by a cam arrangement which also serves to cause an immersing tank to be raised into dipping engagement with one of the articles after each indexing operation. The indexing mechanism is driven by a motor which is in turn controlled by a pair of microswitches connected in parallel. Thus, the continuity of the motor circuit is dependent on the closure of at least one of the microswitches at all times. By using an arrangement wherein one of the microswitches is normally closed but is opened immediately after the indexing operation and before the immers-

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ing operation, and wherein the other microswitch is closed at the time the first microswitch is opened by the presence of an article on one of the carriers approaching the immersing tank, continuous operation of the motor is provided when articles are present and in place for immersion on all of the article carriers approaching the immersing tank.

A more complete understanding of the invention may be had by referring to the following detailed description when read in conjunction with the accompanying drawings, wherein:

Fig. 1 is a partial plan view of the invention showing a preferred arrangement of the various parts;

Fig. 2 is a vertical sectional view taken along the line 2-2 of Fig. 1;

Fig. 3 is a vertical sectional view taken along lines 3-3 of Fig. 1;

Fig. 4 is a vertical sectional view taken along lines 4-4 of Fig. 1; and

Fig. 5 is a schematic diagram of the electrical circuit involved in the invention.

Referring now to the drawings, a turntable is provided which comprises a spider 10 and a ring portion 11. The top of the turntable is provided with plates 12 which are secured to the spider 10 and ring 11 by screws 13 to provide a solid top for the turntable. The spider 10 is rotatable about a shaft 14 mounted in suitable bearings and the outer ring portion 11 has a series of depending arms 15 thereon. Each of the arms 15 carries a bracket 16 having an aperture 17 formed therein for receiving the core of a coil to be dipped during its transportation in a clockwise direction about the shaft 14 (Fig. 1). The indexing mechanism consists of a crank arm 18 (Fig. 2) having a cam surface 19. Mounted on the crank arm 18 is a small roller 19A which is adapted to ride between the depending arms 15. The crank arm 18 is mounted for rotation on a shaft 20, which shaft is in turn driven by a motor 21. A normally closed microswitch 22, the contacts of which may be opened by movement of a cam follower 23, is mounted so that the cam follower is under control of cam surface 19.

The immersing mechanism consists of a vertically movable tank 24 which is mounted by screws 25 on a plate 26. A main base plate 29 of the machine which supports the shaft 14 also carries a bracket 27 on which ways 28 are suitably fixed in position to slidably receive the plate 26 which carries the tank 24. The ways 28 thus have guideways 30 in them so that the

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tank 24 on the plate 26 may have vertical movement imparted to it.

The plate 26 has a bracket 31 mounted on the side thereof opposite to the side on which the tank 24 is mounted for receiving the end of a lever 32. The lever 32 forms one arm of a pantograph linkage, a second arm 33 being parallel thereto. The arms 32 and 33 are pivoted at 34 and 35, respectively, pivots 34 and 35 being carried by a vertical bracket 36 which is secured to base plate 29 by bolts 37. The actuating portion of the pantograph consists of an inverted L-shaped plate 38 which is connected by pivot pins 39 and 40 to the arms 32 and 33, respectively. The inverted L-shaped plate 38 has a concave configuration 41 formed in the upper horizontal portion thereof. This concave portion 41 acts as a cam follower and causes the right-hand portion of the pantograph linkage to be depressed when cam roller 19A is in position to contact the concave portion 41. Another L-shaped plate 42 is secured to the base plate 29 by bolts 43, and this plate serves to limit the downward movement of the left-hand end of lever 32 thereby limiting the downward movement of the tank 24 when the tank 24 is lowered out of dipping engagement with an article to be dipped. It has been found desirable to prevent any unwanted indexing of the turntable while the tank is in its upward position, and for this reason a pair of elongated portions 44 and 45 are formed on the plate 26. These portions 44 and 45 move into the spaces between the depending arms 15 to prevent indexing of the turntable while the tank 24 is in its upward position.

In order to prevent indexing of the turntable and subsequent dipping when no article is on a carrier approaching the dipping position a normally open microswitch 46 (Figs. 1 and 4) is connected in the circuit to the motor 21. This microswitch 46 is positioned to be closed by an arm 47 which extends to a position in the path of an article on a selected one of the carriers 16 and is terminated in an enlarged portion 48, which portion when contacted by an article being transported on the particular carrier passing thereover causes the microswitch 46 to be closed by virtue of the fact that the arm 47 is fulcrummed in a bracket 49 intermediate the enlarged portion 48 and the microswitch 46. The bracket 49 is in turn secured to the base plate 29 by means of bolts 50. The microswitches 22 and 46 are suitably secured to the base plate 29 by bolts or screws 51 and 52, respectively, and the motor 21 is secured to the base plate 29 by bolts 53.

In the operation of the device, assuming that the cam surface 19 has just contacted the cam roller 23 to open the normally closed microswitch 22, such action interrupts the energizing current to the motor 21 through this circuit. However, assuming that the operator has placed a coil to be dipped on each of the carriers approaching the enlarged portion 48 of the arm 47 at what may be termed a loading station, a core extending through the aperture 17 comes in contact with the enlarged portion 48 at substantially the same instant that the cam surface 19 contacts the cam roller 23. In this case the arm 47 is actuated around its fulcrum in bracket 49 to close microswitch 46. Since microswitch 46 is in parallel with microswitch 22 (Fig. 5), the circuit through microswitch 46 provides an energizing circuit for motor 21. As the shaft on the motor 21 continues to rotate, roller 19A continues to move the turn-

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table clockwise carrying one of the carriers 16 into position over the tank 24. The roller 19A then comes in contact with the concave portion 41 on the inverted L-shaped plate 38 of the pantograph linkage thus causing the plate 38 to be depressed. At this time the coil and core in contact with the enlarged portion 48 of the arm 47 have been carried far enough so that the core no longer contacts the enlarged portion 48 thus allowing the microswitch 46 to open its contacts. At this instant, however, the cam surface 19 has moved sufficiently to allow the cam roller 23 to become free thus closing the contacts of the microswitch 22 and continuing the energization of the motor 21. As the roller 19A continues its downward travel, the lever 32 coacting with the bracket 31 causes the plate 26 to travel upward in the guideways 30 thus bringing the liquid in the tank 24 into dipping engagement with the coil assembly positioned thereabove and at the same time locking the turntable in position by virtue of the extensions 44 and 45 riding into positions between the depending arms 15. Further rotation of the shaft 20 and the roller 19A causes the roller to ride off the concave surface 41 allowing the plate 38 to rise, thus returning the tank 24 and the extensions 44 and 45 to their downward position. At this time the roller 19A contacts the next depending arm 15 thus carrying it in a clockwise direction to index the machine for another cycle of operation. After an article has been dipped to apply a coating on a part of it, the articles may be permitted to stay on the carrier until they reach a position adjacent the loading station, and this position where they are removed may be termed an unloading station.

It is to be understood that although the invention has been described in conjunction with a plurality of carriers adapted to carry coil and core assemblies the invention may be adapted to many other uses, the only limitation being that some portion of the article being carried must be capable of contacting the enlarged portion 48 of the arm 47 while approaching the indexing position. Such an arrangement is advantageous in dipping operations wherein it is undesirable to waste the dipping liquid by having the liquid come in contact with an empty carrier.

Any suitable means may be used for maintaining the liquid in tank 24 at the proper level. For example, a rigid or flexible tube 54 communicating with a supply of liquid may be inserted in the open top of the tank in such a manner that the tube is not disturbed by the vertical movement of the tank. As a further alternative, it is entirely feasible where the level of the liquid is not unduly critical to maintain the level by manual means.

It is to be understood that the above-described arrangements are simply illustrative of the application of the principles of the invention. Numerous other arrangements may be readily devised by those skilled in the art which will embody the principles of the invention and fall within the spirit and scope thereof.

What is claimed is:

1. An article coating machine comprising in combination a turntable having a plurality of article supporting members disposed about its periphery, a driving motor, first switch means controlled by an article on a selected one of said members to energize said driving motor during a predetermined amount of movement of the article, indexing means driven by said motor to cause a step-by-step rotation of said turntable,

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second switch means in parallel with said first switch means and controlled by said indexing means to continue energization of said driving motor after said movement of said article, a liquid container movable vertically to apply a liquid coating to one of said articles, a mechanical linkage carrying said container, and a cam controlled by said indexing means to actuate said linkage and thereby vertically reciprocate said container in timed relation with said indexing means.

2. An article coating machine comprising in combination a turntable having a plurality of article supporting members disposed about its periphery, a driving motor, a first switch closable by an article on a selected one of said members to energize said driving motor during a predetermined amount of movement of the article, indexing means driven by said motor to cause a step-by-step rotation of said turntable, a second switch in parallel with said first switch and closable by said indexing means after said movement of said article, a liquid container movable vertically to apply a liquid coating to one of said articles, means operated by said indexing means to vertically reciprocate said container, and means for locking said turntable during the coating operation.

3. An article coating machine comprising in combination a turntable having a plurality of article supporting members disposed about its periphery, a driving motor, a first switch closable by an article on a selected one of said members to energize said driving motor during a predetermined amount of movement of said article, indexing means driven by said motor to cause a step-by-step rotation of said turntable, a second switch in parallel with said first switch and closable by said indexing means after said movement of said article, a liquid container movable vertically to apply a liquid coating to one of said articles, means operated by said indexing means to vertically reciprocate said container, and projecting arms carried by said container and movable into engagement with said supporting members to prevent rotation of said turntable during the coating operation.

4. An apparatus for dipping articles in a liquid comprising a turntable having a plurality of holders in spaced relation to each other for holding a plurality of articles to be dipped and for guiding said articles for movement in a predetermined path, a plurality of members on said turntable equal in number to said holders disposed in spaced relation to each other to provide slots therebetween, means for indexing said turntable including a rotatable crank movable into said slots and engageable with successive ones of said members, a tank for holding a supply of liquid therein into which said articles are to be dipped, means supporting said tank below one of said holders and the article thereon and for guiding said tank for movement upwardly, and means including a lever operatively connected to said tank and actuated by said crank for reciprocating said tank in timed relation to the indexing of said turntable to effect the dipping engagement of said articles with the liquid in said tank.

5. A machine for immersing articles comprising an intermittently movable carrier having a plurality of holders thereon in spaced relation to each other for supporting the articles to be immersed and for advancing said articles through a predetermined path, a tank for holding a liquid into which said articles are to be immersed disposed beneath one of said holders, motor-driven means

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including a rotatable crank engageable with successive article holders to alternately index said carrier and raise and lower said tank to effect the dipping engagement of the article with the liquid in said tank, control means including a normally closed switch and a normally open switch connected in parallel to said motor-driven means, means mounted in the path of movement of the articles on the holders approaching said tank and actuated by successive ones of said articles to close said normally open switch for predetermined intervals of time, and a cam rotatable in timed relation with said crank for opening said normally closed switch for short periods of time while said normally open switch is adapted to be closed by the movement of said articles.

6. An apparatus for successively immersing a plurality of articles into a liquid comprising an intermittently movable turntable having a plurality of holders on said turntable in spaced relation to each other for holding articles to be dipped, a tank containing a liquid into which said articles are to be immersed disposed below one of said holders on said turntable, and means including a rotatable crank operable alternately for indexing said turntable to advance successive holders into alignment with said tank and for raising and lowering said tank to effect the immersion of said article into said liquid between successive indexing operations.

7. A device for successively dipping a plurality of articles into a liquid which comprises a carrier having a plurality of article holders in spaced relation to each other for holding and advancing said articles, a tank containing liquid into which said articles are to be dipped mounted beneath one of said holders, a plurality of members on said carrier in spaced relation to each other and equal in number to said article holders, drive means including a rotatable crank engageable with said members for indexing said carrier to advance successive holders and articles thereon in alignment with said tank, and means operatively connected to said tank and actuated by said rotatable crank after each indexing movement for raising and lowering said tank to effect the dipping engagement of the article in the holder with said liquid.

8. A machine for immersing articles comprising a turntable having a plurality of holders thereon in spaced relation to each other for supporting said articles to be immersed and for guiding said articles through a predetermined path, an electrically controlled driving means including a rotatable crank engageable with said article holders to index said turntable, a tank for containing a liquid into which said articles are to be immersed disposed beneath one of said holders, means including a lever operatively connected to the tank and having a portion thereof disposed in the path of movement of said crank element and actuated thereby after each indexing operation for raising and lowering said tank to effect the dipping engagement of the article with said liquid, control means including a normally closed switch and a normally open switch connected in parallel to said electrically controlled driving means, means operable in timed relation with said crank for opening said normally closed switch during a predetermined portion of the movement of said crank, and means engageable with and actuated by articles on said holders moving through a predetermined zone as they approach said tank to effect the closing of said normally open switch during the interval

that said normally closed switch is open whereby both switches are caused to be open to stop said machine in the absence of an article on a holder as the holder traverses said predetermined zone.

9. An apparatus for dipping articles comprising a carrier having a plurality of article holders thereon in spaced relation to each other for receiving articles at a loading station and advancing said articles in a predetermined path to a dipping station, a vertically movable tank positioned beneath one of the article holders on said carrier for containing a liquid into which said articles are to be dipped, drive means including a motor and a rotatable crank operable alternately to advance said carrier step by step to align successive holders with said tank and to raise and lower the tank to effect the dipping engagement of the article with said liquid, and control means for said motor including a normally open switch and a normally closed switch connected in parallel, means engageable with and actuatable by an article on said carrier at a predetermined position during its movement from said loading station to said dipping station for closing said normally open switch, and means for opening said normally closed switch during a predetermined portion of each rotation of said crank while said normally open switch is adapted to be closed to render said drive inoperative in the absence of an article on said carrier in said predetermined position.

10. An article dipping machine comprising a turntable having a plurality of article supporting members disposed around the periphery thereof, a tank disposed below one of said article supporting members for holding a supply of liquid into which the articles are to be dipped, means for guiding said tank for vertical movement, drive means including a rotatable crank for alternately indexing said turntable to advance successive article supporting members in alignment with said tank and for raising and lowering said tank to effect a dipping engagement of successive articles with said liquid, and means movable with said tank and engageable with said article supporting members for locking said turntable against movement during the dipping of said articles.

11. An article dipping machine comprising an intermittently movable carrier having a plurality of article holders mounted thereon in spaced relation to each other for holding the articles to be dipped, a tank disposed beneath one of said holders for containing a supply of liquid into which the articles are to be dipped, a plurality of members on said carrier equal in number to said holders arranged in spaced relation to each other to form recesses therebetween, drive means including a rotatable crank movable into said

recesses and engageable with said members for indexing said carrier to advance successive ones of said article holders into alignment with said tank, means including a lever operatively connected to said tank actuated by said crank after each indexing operation for raising and lowering said tank to effect the dipping engagement of the article with the liquid in said tank, and a member movable with said tank into said recesses and into engagement with said members on said carrier to lock said carrier against movement during the dipping of said articles.

12. An apparatus for dipping articles into a liquid comprising an intermittently movable carrier having a plurality of holders thereon in spaced relation to each other for holding a plurality of articles to be dipped and for advancing said articles in a predetermined path, a tank for holding a supply of liquid into which said articles are to be dipped, means for supporting said tank below one of said holders and for guiding said tank for vertical movement, electrically operated drive means including an actuating crank engageable with successive article holders for alternately indexing said carrier and reciprocating said tank to alternately align successive holders with said tank and to effect the dipping engagement of the article on said holder with the liquid in said tank, control means including a pair of switch means cooperating to render said drive means inoperative in the absence of an article on one of said holders as it traverses a predetermined portion of said path of travel, one of said switch means having a normal position for rendering said drive means inoperative and being intermittently actuated to a second position for short intervals for rendering said drive operative by successive articles on said holders, the other of said switch means having a normal position for rendering said drive means operative, and means for actuating said other switch means in timed relation to the indexing of said carrier to a second position to render said drive means inoperative during the intervals that said one switch is adapted to be actuated to its second position.

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