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METHOD OF AND AUTOMATIC APPARATUS FOR COATING BOTTLE NECKS

Filed Sept. 11, 1934

4 Sheets-Sheet 1

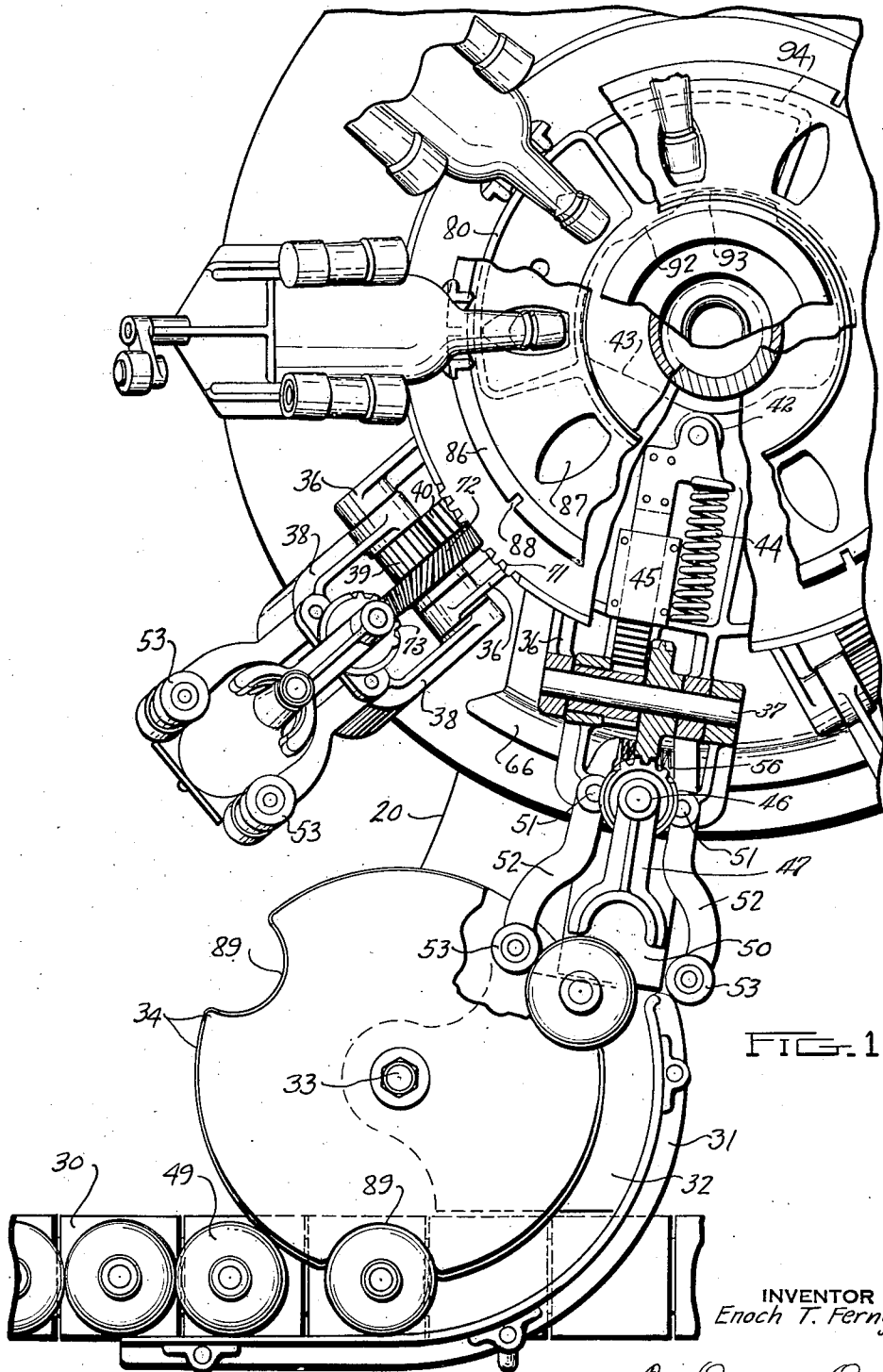


FIG. 1.

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4 Sheets-Sheet 2

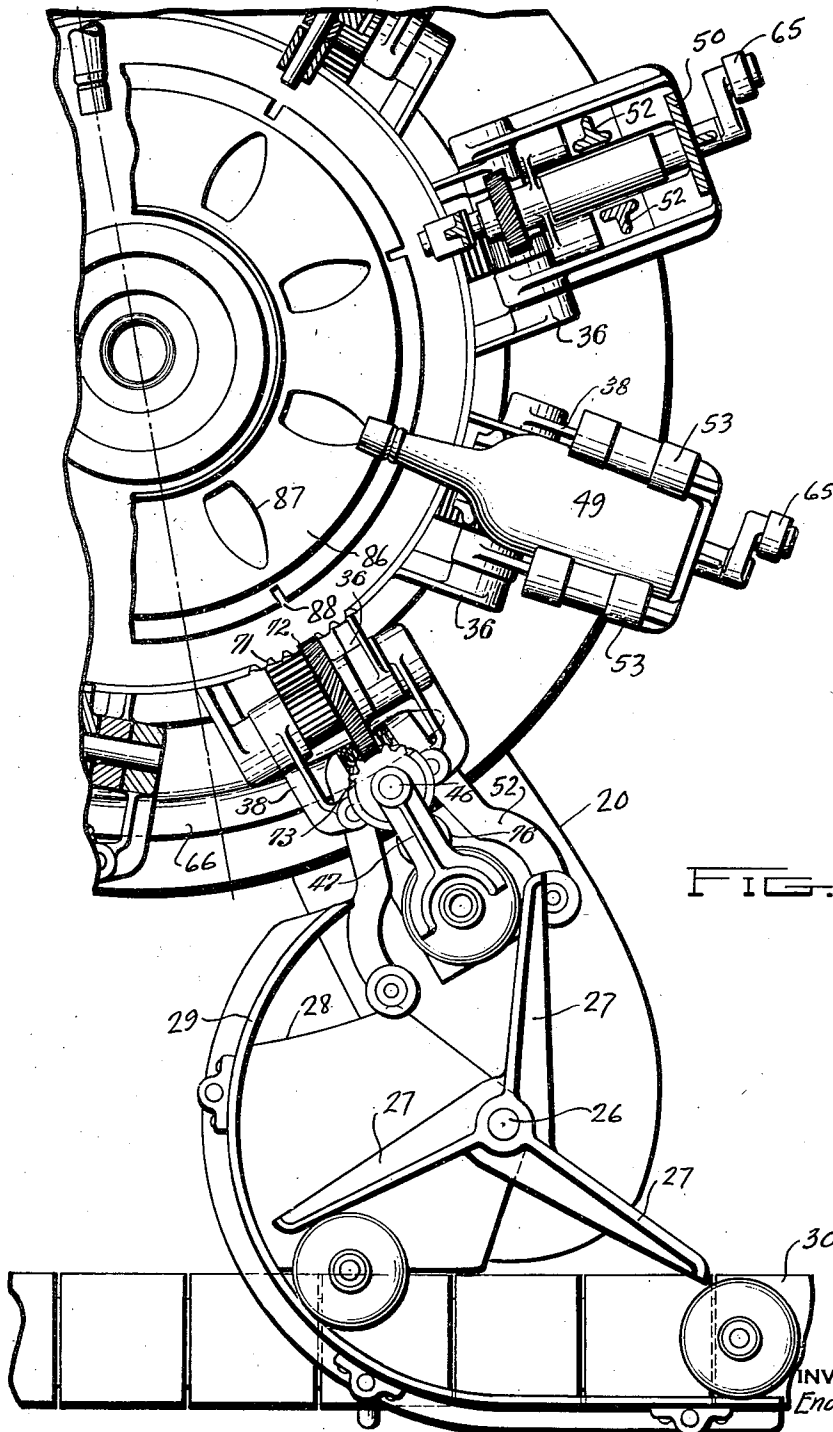


FIG. 2.

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4 Sheets-Sheet 3

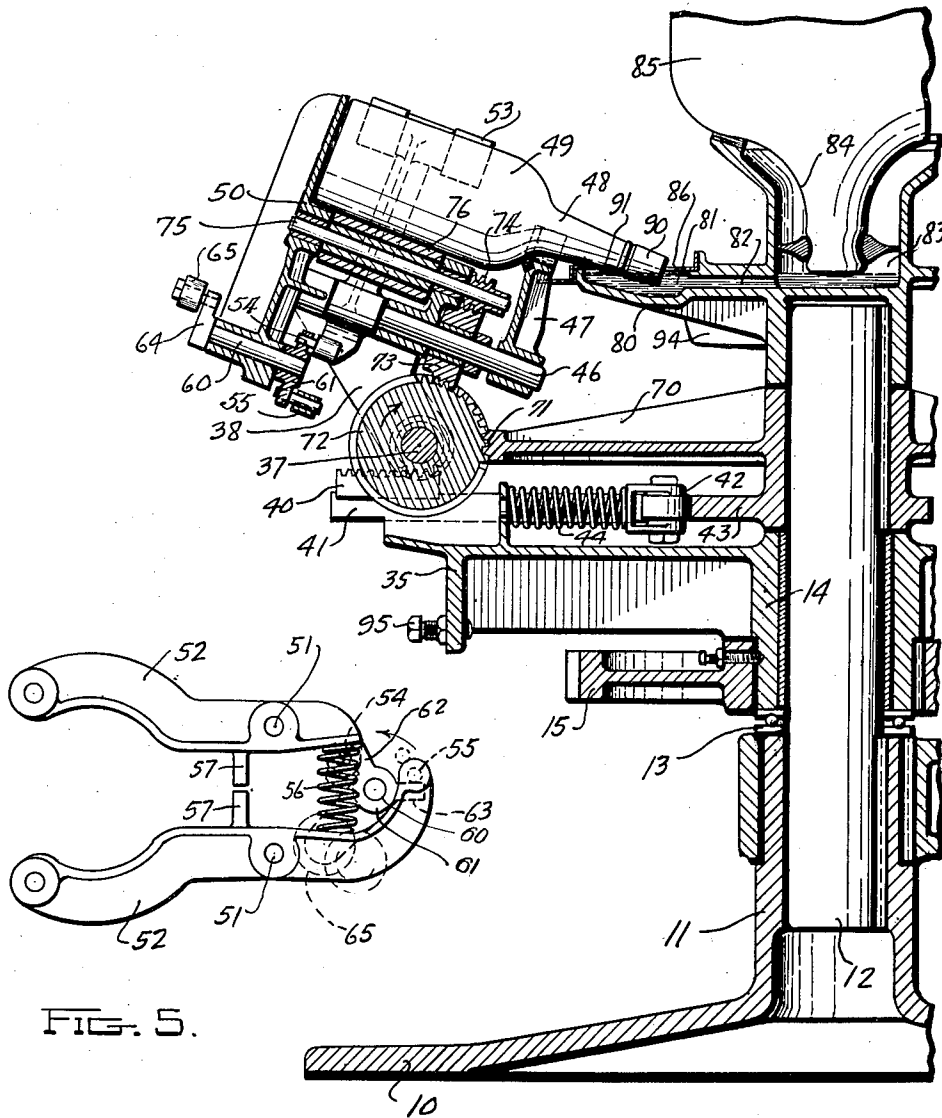


FIG. 5.

FIG. 3.

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4 Sheets-Sheet 4

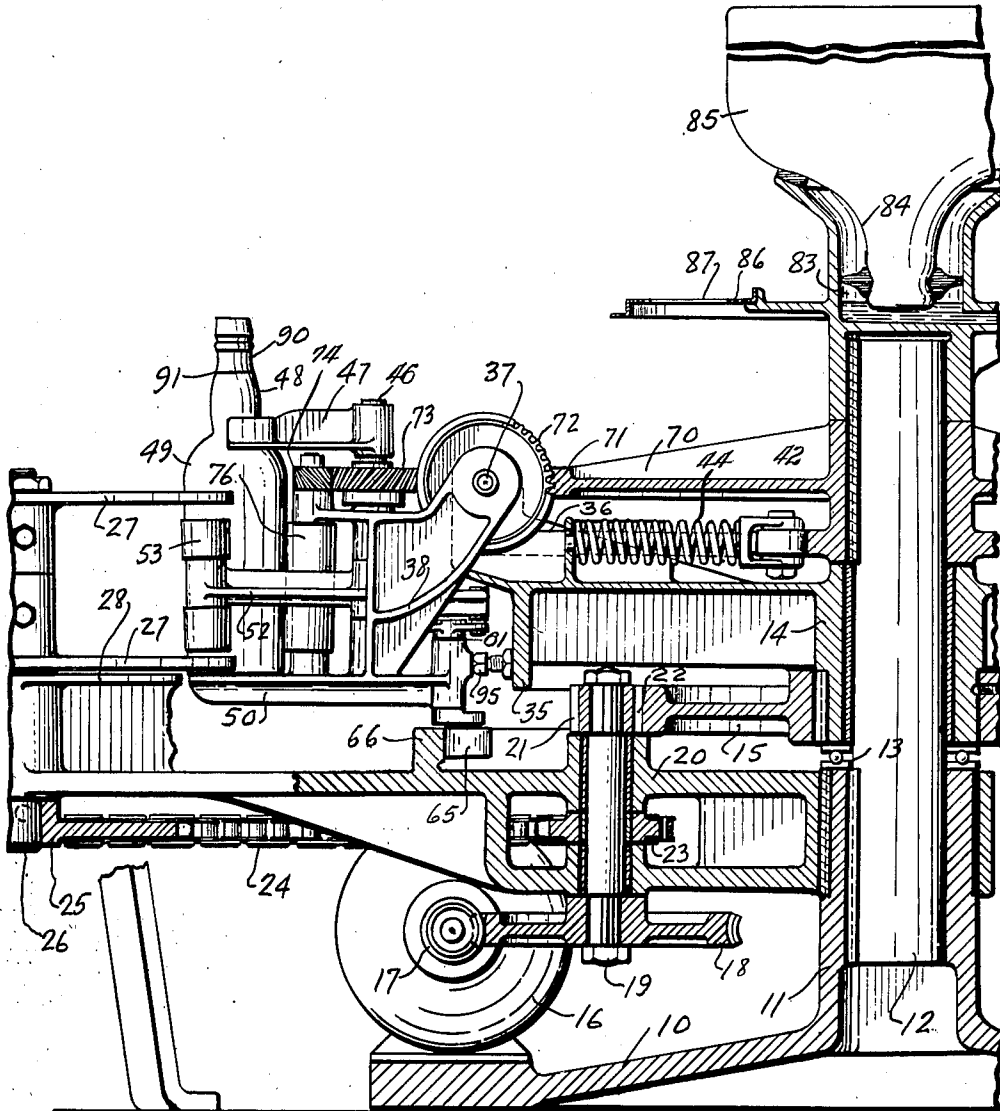


FIG. 4.

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METHOD OF AND AUTOMATIC APPARATUS
FOR COATING BOTTLE NECKSEnoch T. Ferngren, Toledo, Ohio, assignor to
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ware

Application September 11, 1934, Serial No. 743,559

7 Claims. (Cl. 91—42)

This invention relates to a method of and automatic apparatus for coating bottle necks and has for its general object the provision of a method by which bottle necks may be coated accurately, uniformly and quickly and automatic apparatus for carrying out the method. For example, previously closed bottles may be sealed or decorated by this operation. Minor objects and details of the invention will appear as the description proceeds.

In the accompanying drawings forming a part of this specification, Figure 1 is a partial plan view of one form of apparatus embodying the invention and disclosing particularly the loading portions of the apparatus; Figure 2 is a view similar to Fig. 1, but showing the discharge portion of the apparatus; Figure 3 is a partial vertical section showing particularly a bottle in the coating position and associated apparatus; Fig. 4 is a partial vertical section of the apparatus taken adjacent to the discharge position, and Fig. 5 is a detail view in plan illustrating the apparatus for opening and closing the bottle holder.

In the form of apparatus illustrated there is a base 10 on which there is formed a pedestal 11 having fixed therein an upright post 12. At the upper end of pedestal 11 there is a bearing 13 upon which there is mounted a sleeve 14 rotatable about post 12. A gear wheel 15 is fixed to the lower end of sleeve 14.

Mounted at one side of base 10 there is a motor 16 driving a worm 17, which engages with a worm wheel 18 fixed upon the lower end of a shaft 19 journaled in a bracket 20 mounted upon the upper end of pedestal 11. On the upper end of shaft 19 there is a gear 21 meshing with the teeth 22 of gear 15. By this means it will be seen that sleeve 14 is rotated constantly.

Upon the central portion of shaft 19 there is mounted a sprocket wheel 23 driving a chain 24, which in turn drives a sprocket wheel 25 on the lower end of a shaft 26 mounted in an extension of bracket 20. The upper end of shaft 26 carries a plurality of arms 27 sweeping over a table 28 and within a guide 29, which is directed over a conveyor 30.

The structure just described is shown in Figs. 2 and 4 and comprises a part of the discharge apparatus, as will be explained later.

The charging apparatus shown in plan view in Fig. 1 is similar in some respects to the discharging apparatus. It comprises a guide 31 curving around from the conveyor 30 and over a support 32. A shaft 33 similar to shaft 26 is

driven in any suitable manner and carries charging discs 34, as will be described more fully later.

The upper portion of sleeve 14 carries a table 35 on which there are mounted a plurality of brackets 36. In each pair of brackets 36 there is rotatably mounted a shaft 37 to which are fixed arms 38 of a bottle carrier.

Shaft 37 likewise has affixed thereto a gear 39 meshing with a rack 40. Rack 40 is mounted upon a slide 41 on the inner end of which there is a roller 42 pressed against a cam 43 by a spring 44. Cam 43 is mounted stationarily on post 12 above the rotatable sleeve 14. Slide 41 is guided in a suitable slideway 45 on table 35.

On arms 38 there is mounted a shaft 46 carrying a guide 47 adapted to receive the neck 48 of a bottle 49 resting upon a platform 50, which is also supported from brackets 38. Likewise mounted on arms 38 are pivot pins 51 for arms 52, the outer ends of which arms carry rollers 53 adapted to contact a bottle. The rear end of one arm 52 is provided with a downwardly projecting pin 54 (see Fig. 5), while the rear end of the other arm is provided with a downwardly projecting pin 55. A compression spring 56 between the rear ends of the arms 52 normally urges the front ends of the arms towards each other, so as to press the rollers 53 against the bottle. Lugs 57 are provided on the arms to prevent the rear ends from spreading too far in case a bottle should not be placed in the holder.

A shaft 60 is rotatably mounted at the rear end of platform 50 and on its upper end carries a head 61 with a lug 62 adapted to contact pin 54 and a lug 63 adapted to contact pin 55. The lower end of the shaft 60 carries a crank arm 64 provided with a roller 65. When the carrier is swung down to the positions in which it is shown in Figs. 1 and 2, roller 65 is moved behind a cam 66, which forces the roller to the position in which it is shown in Fig. 4 and thereby rocks head 61 to bring the rear ends of arms 52 towards each other, compressing spring 56 and spreading rollers 53 apart.

Immediately above cam 43 and in the form shown integral therewith there is a plate 70 having on its outer edge a spiral gear 71. A spiral gear 72 freely mounted upon shaft 37 meshes with spiral gear 71 and also with a spiral gear 73 loose upon shaft 46. The spiral gear 73 also meshes with a spiral gear 74 secured to a shaft 75, which carries a roller 76 engaging a bottle in the holder.

Mounted on the top end of post 12 there is a basin 80 providing a dipping pool 81, there being

a passage 82 from the pool to a socket 83 immediately above post 12 in which there fits the neck 84 of a suitable container 85 for the coating liquid to be employed. It will be readily seen that the liquid will be maintained in the pool at a height determined by the wall on the upper side of the passage 82, since additional liquid will flow from container 85 whenever air is admitted through passage 82.

Above the pool 81 there is a freely rotatable cover 86 provided with a plurality of openings 87 and with corresponding notches 88. A web on member 47 fits into a notch when the bottle carrier is swung by rack 40 to the position in which it is shown in Fig. 3 and there are always a plurality of carriers in position to engage certain of these notches, so that the cover 86 is continuously rotated with the bottle holders. The bottle necks, as will be readily seen from Figs. 1 and 2, swing over openings 87 and down into position in those openings.

The main features of the construction having been pointed out the operation of the device will now be described:

A plurality of bottles are placed upon conveyor 30 and, as shown in Fig. 1, are brought to disks 34 which are notched, as indicated at 89. These disks are driven in any suitable manner which may be similar to the manner in which shaft 26 is driven. The drive for shaft 33 and disks 34 is not shown. When a bottle enters notches 89 in the disks 34, it is moved from the belt 30 against guide 31 and over table 32 into position in a holder and upon platform 50 thereof.

As the carrier table 35 continues to rotate, roller 65 is moved beyond cam 66 and allows rollers 53 to be pressed against the bottle by spring 56. By reason of the engagement of the train of spiral gears with gear 71, the continuous movement of the holder about the central post continuously rotates roller 76 and accordingly rotates bottle 49 when it is clamped thereagainst.

When the bottle has been securely clamped in the holder, cam 43 actuates the holder to swing it about the axis of the shaft 37 to the position in which it is shown in Fig. 3 where the neck is dipped into the liquid of pool 81. It will be readily understood that the bottle is rotated so that its top side moves forward faster than its under side, the result being that the neck rolls over the surface of the pool somewhat in the manner of a wagon wheel, and accordingly picks up a coating from the surface with the least possible disturbance of the pool or movement of the film of material after it has contacted the bottle. In this way a coating 90 is formed upon the neck up to line 91.

After the bottle neck has been thus coated cam 43 recedes, as indicated in dotted lines at 92 on Fig. 1, thereby raising the bottle neck out of the end of the pool. Because of the relation of the holder to spiral gear 72 and drive gear 71, it will be seen that when the bottle neck is raised, the rotation of the bottle is speeded up. After the neck has passed beyond pool 80 it is lowered once more by a rise on cam 43, as indicated by dotted lines at 93 on Fig. 1. This lowering of the neck with its movement of the holder about shaft 37 slows up the rotation of the bottle neck, so that the excess liquid readily drops therefrom into a drain basin indicated by dotted lines at 94 on Fig. 1. After the excess liquid has drained from the bottle neck, it is once more raised as it reaches the end of rise 93 on cam 43, the

result being to temporarily speed up the rotation of the bottle during this lifting of the neck, thereby insuring the even spreading of any slight amount of liquid which is still fluid enough to run.

Thereafter the holder continues to revolve about the central post until it approaches the discharge position, then the cam 43 allows the swinging of the holder back to discharging and receiving position. Roller 65 thereupon encounters cam 66 and releases the bottle from rollers 53, as indicated at Fig. 2. An adjustable screw 95 limits the movement of the holder in this direction and thereby accurately positions it in relation to the discharge device. Arms 27 thereupon shift the bottle from platform 50 to support 28 and continue to move the bottle over support 28 against guide 29 until the bottle is slid onto conveyor 30, on which it is conveyed to any desired point.

It will be readily understood that various changes and modifications may be made in the desired apparatus within the scope of the appended claims.

The described apparatus provides means by which a series of bottles may be automatically and successively fed to the dipping machine, their necks dipped and coated and then the bottles automatically discharged and carried off to a desired delivery point.

An important feature of the invention is the construction by which the bottles are carried in succession past the coating basin with their necks converging, so that the bottles may be moved with considerable rapidity and quite close together, while their necks are moved in the coating liquid at a sufficiently slow rate of speed so as to avoid undue disturbance of the coating liquid.

Another important feature is that by which the coating action is obtained with a proper rate of rotation of the bottle, the neck is raised from the coating pool while the speed of rotation is being increased so as to pick up on the neck the portion of the solution in contact therewith, while immediately thereafter the speed of rotation is once more decreased, so as to allow proper draining of the excess liquid from the neck, and finally the speed of rotation is again increased temporarily to spread the final drop of liquid clinging to the surface of the neck, so as to avoid any irregularity in the coating due to the final draining of the excess liquid from the neck.

While these important features have been pointed out, it will be understood that other features within the terms of the claims also contribute to the success of the invention.

What I claim is:

1. A method of coating a bottle neck which comprises dipping the neck of the bottle into a pool of coating liquid with the mouth of the bottle directed downward, rotating the bottle about its axis while the neck is dipped in the pool, removing the neck from the pool, speeding up the rotation of the neck as it is being removed from the pool, then slowing up the rotation of the neck and allowing excess liquid to drain therefrom, and finally speeding up the rotation of the neck and stopping the draining action.

2. Apparatus for coating a bottle neck comprising means providing a pool of suitable coating liquid, a holder for a bottle, means to actuate the holder to dip the neck of a bottle therein into the pool, means to rotate the bottle about its own axis

in the holder, and means to move the holder to carry the neck away from the pool and to draining position, the said bottle-rotating means including gearing coordinated with the dipping
5 means to rotate the bottle at a predetermined speed while it is being dipped, to speed up the rotation while the neck is being removed from dipping position, to slow up the rotation during draining and to speed up the rotation at the end
10 of the draining period.

3. Apparatus for coating bottle necks comprising a rotary carrier and an annular series of bottle holders mounted on the carrier, means providing a pool of suitable coating liquid within the
15 circle of holders, means for oscillating each holder from a position in which it holds a bottle with its neck directed upward to a position in which it holds a bottle with its neck directed inward toward said pool, said pool being in the path of movement
20 of bottle necks in said holders when the holders are in their last said position.

4. Apparatus in accordance with claim 3 and comprising means for loading bottles into said holders while they are in their upright position.

5. Apparatus in accordance with claim 3 and comprising means for discharging bottles from said holders while they are in upright position.

6. Apparatus in accordance with claim 3 and comprising a cover rotatable with the carrier and
5 over the pool, said cover being provided with a series of openings each in the path of movement of the neck of a bottle as the holder carries the bottle from upright position to a position in which
10 the neck is directed into the pool.

7. The method of coating the neck of a container which comprises moving the neck of the container horizontally over and in contact with
15 a pool of liquid coating material and simultaneously rotating the container at such a rate as to give its neck a peripheral speed of rotation substantially equal to its bodily horizontal speed, whereby said neck rolls over and along the liquid
20 substantially like a wagon wheel rolling along a road.

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