Jan. 26, 1926. 1,570,949

F. H. CUNNINGHAM ET AL

METAL COATING MACHINE

Filed Feb. 20, 1924 4 Sheets-Sheet 1

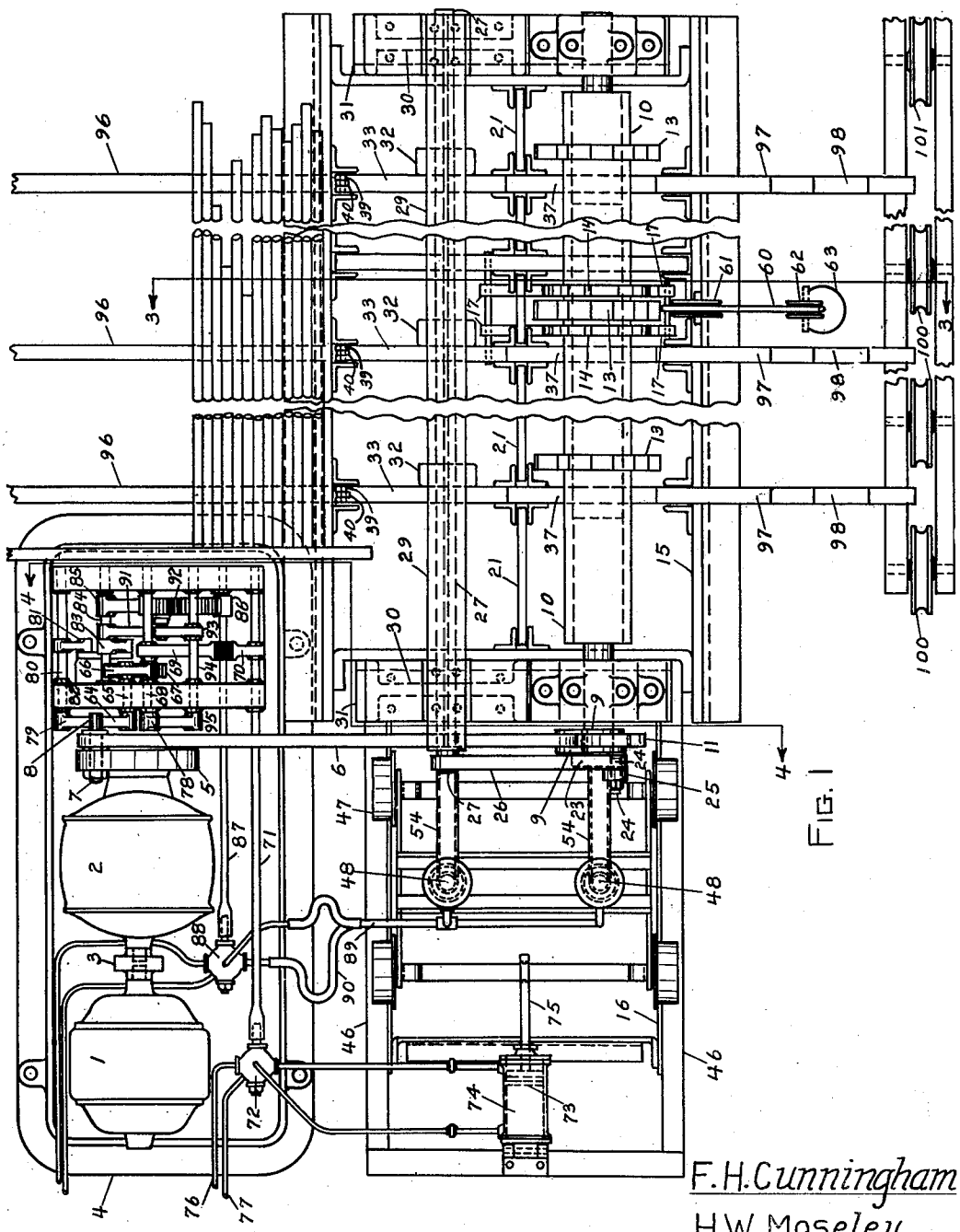


FIG. 1

F. H. Cunningham
H. W. Moseley
INVENTORS

BY C. A. Harpman
ATTORNEY.

Jan. 26, 1926. 1,570,949

F. H. CUNNINGHAM ET AL

METAL COATING MACHINE

Filed Feb. 20, 1924 4 Sheets-Sheet 2

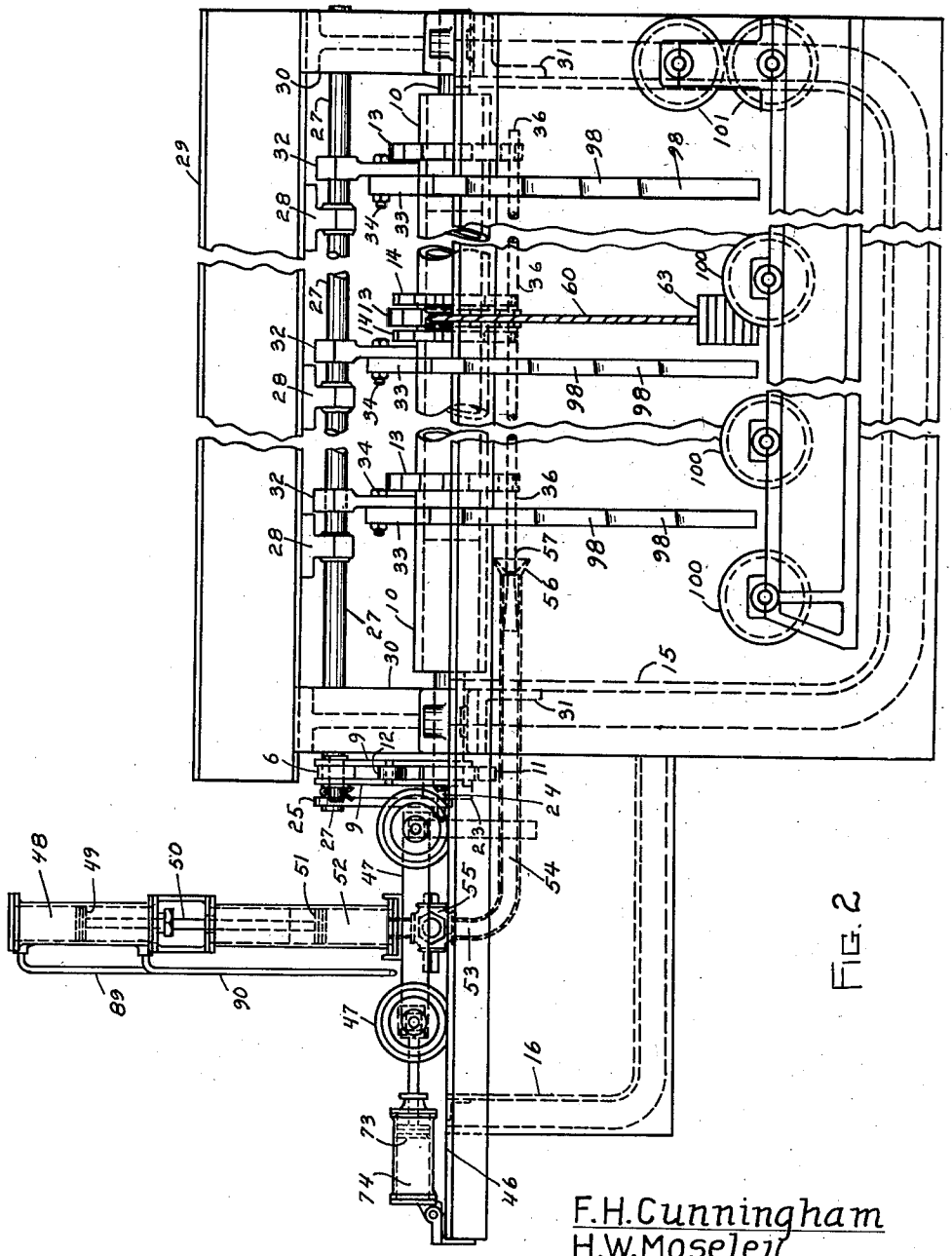


FIG. 2

F.H. Cunningham
H.W. Moseley
INVENTORS

BY C.A. Harpman
ATTORNEY.

Jan. 26, 1926. 1,570,949

F. H. CUNNINGHAM ET AL

METAL COATING MACHINE

Filed Feb. 20, 1924 4 Sheets-Sheet 3

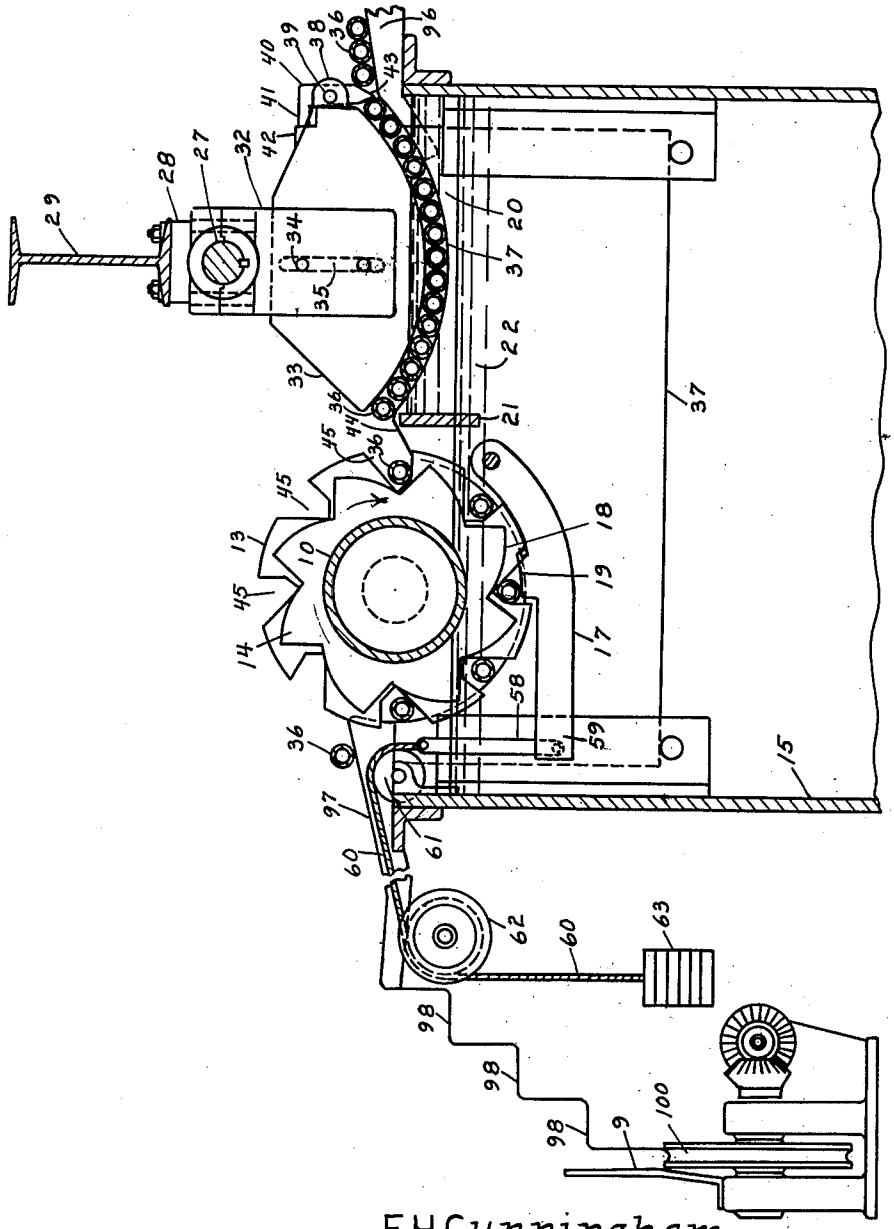


FIG. 3

F.H.Cunningham
H.W.Moseley
INVENTORS

BY C. A. Harpman
ATTORNEY.

Jan. 26, 1926. 1,570,949

F. H. CUNNINGHAM ET AL

METAL COATING MACHINE

Filed Feb. 20, 1924 4 Sheets-Sheet 4

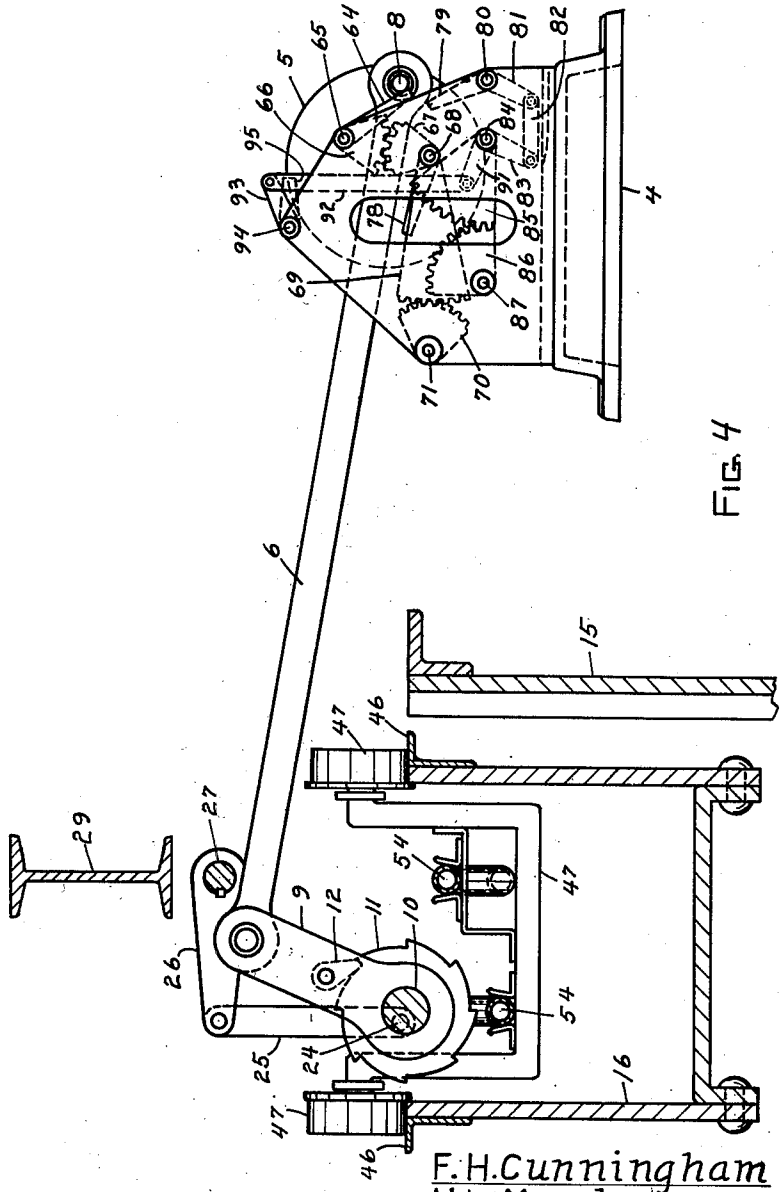



FIG. 4

F. H. Cunningham
H. W. Moseley
INVENTORS

BY L. A. Harpman
ATTORNEY.

Patented Jan. 26, 1926. 1,570,949

# UNITED STATES PATENT OFFICE.

FRANK H. CUNNINGHAM, OF YOUNGSTOWN, AND HARRY W. MOSELEY, OF STRUTHERS, OHIO.

## METAL-COATING MACHINE.

Application filed February 20, 1924. Serial No. 694,178.

*To all whom it may concern:*

Be it known that FRANK H. CUNNINGHAM and HARRY W. MOSELY, citizens of the United States of America, residing at Youngstown and Struthers, respectively, in the county of Mahoning and State of Ohio, have invented certain new and useful Improvements in Metal-Coating Machines, of which the following is a specification.

This invention relates in general to a metal coating machine for tubes, containers, or other receptacles, and has more particular reference to the provision of a machine for the purpose of coating tubes and the like, with a metallic coating, preferably of zinc.

The principal object of this invention is the provision of a machine for coating tubes and the like, whereby, the article to be coated is first automatically carried through a flux bath and then through a bath containing the liquid coating material to be used. While the article is immersed in each of these baths a portion of the material used is automatically forced through the interior of the tube in order that the interior may be completely subjected to the coating material before leaving the baths.

The drawings illustrate the preferred embodiment of the invention, however, it is to be understood that in adapting the same to meeting these conditions, various changes in the form, and minor details of construction may be resorted to without departing from the nature of the invention as classed and set forth in the drawings:

Figure 1 is a top plan view of the device with sections cut away, yet showing complete working parts.

Figure 2 is a side elevation of Figure 1.

Figure 3 is a cross section taken on line 3—3 of Figure 1.

Figure 4 is a cross section taken on line 4—4 of Figure 1.

By referring to Figure 1, it will be seen that I have provided a motor 1 attached to a speed reducer 2, by means of a flexible coupling 3. This motor 1 being used to energize the train of movements about to be described.

It will be seen that the motor 1, and immediate connected parts, rests upon a base plate 4. Secured to the speed reducer is a crank disc 5. There is a connecting rod 6, connected to the crank disc 5 by means of a wrist pin 7, having a projection 8 which is used to manipulate a series of arms which will be hereinafter described. The other end of the connecting rod 6 is secured to a pair of ratchet arms 9, between which is pivoted pawl 12, the free end of which rides on periphery of ratchet wheel 11, and engages with shoulders on same. Ratchet wheel 11 is secured to shaft 10, between ratchet arms 9 which idle on shaft 10. (See Figures 1 and 4.) Securely mounted upon the shaft 10 are a plurality of pocketed discs 13, which are used to engage articles carried into a liquid bath in the process of coating. There is also securely mounted upon the shaft 10, a plurality of gripper cams 14 for the purpose of functioning with gripper levers 17.

By referring to Figures 1 and 3, it will be seen that the curved portion 18 of the gripper cams 14 come in contact with shoulders 19, positioned on the upper surface of the gripper levers 17.

By referring to the drawings, it will be seen that there are two kettles, a primary kettle 15 for the purpose of containing the metal coating. There is also a secondary kettle 16, secured to the left end wall of the primary kettle 15, so constructed that the metal may freely flow in order to maintain a same level in both kettles. It will also be seen that there has been provided an upper level of flux 20 on the entering side, into which the articles to be coated are first immersed. (See Figure 3.) This upper level of flux 20 is maintained by means of flux guard 21, the flux being lighter than the metal coating 22. (See Figure 3.)

By referring to Figure 1, it will be seen that there is a disc 23 secured to the left ratchet arm 9. Near the circumference of this disc 23, there is secured an eccentric pin 24, upon which is secured a connecting link 25, the upper end of which is attached to a rocker arm 26. This rocker arm 26 is secured to a shaft 27.

By referring to Figure 2, it will be seen that this shaft 27 is supported by means of a plurality of bearings 28, which in turn are secured to a beam 29. This beam 29 is supported by means of brackets 30, which are mounted on supports 31 secured to the end walls of the primary kettle 15. It will also be seen that there are a plurality of arms 32, secured to the shaft 27.

By referring to Figures 2 and 3, it will be seen that there are a plurality of finger plates 33 slidably mounted upon the arm 32, in such a manner as to allow bolts or pins 34 to function in vertical slots 35, thus allowing for the handling of varied sizes of articles 36, which are carried through the flux 20, on a plurality of guides 37. Pivoted at point 38 by means of a pivot pin 39, there are secured to each finger plate 33, a finger 40 having a stop 41 functioning with a shoulder 42, in order to prevent the lower end 43 of the finger 40 from swinging outwardly.

By referring to Figure 3, it will be seen that the articles 36 pass between the lower portion of the finger plates 33, and the upper portion of the guides 37, from there they are allowed to roll down an incline 44 into pockets 45 and are carried downwardly into the metal coating 22 by means of the revolving of the shaft 10 in a clockwise direction to which are secured the pocketed discs 13.

By referring to Figures 1 and 4, it will be seen that as the crank disc 5 revolves, the connecting rod 6 causes the ratchet arms 9, carrying the pawl 12, to function with the ratchet wheel 11, causing the shaft 10 to revolve in a clockwise direction.

As the principal object of this invention is to subject the articles 36 internally and externally to the flux 20, and the metal coating 22, this machine is so constructed as to cause a charge of flux first to be forced through the interior of the article 36 at a fixed determined point in its movement through the machine and then to be subjected to a share of metal coating forced through the interior of the articles 36 at a fixed determined point, which will be more fully described in taking up the operation of the device.

By referring to Figures 1 and 2, it will be seen that there is a track 46 upon which is carried a carriage 47, upon which is centrally located two piston chambers 48, each of which contains a piston head 49 carrying a piston rod 50. At the lower end of this piston rod 50, there is a piston head 51 operating within a chamber 52. The extreme lower ends of the chambers 52 are connected to up-turned ends 53 of pipes 54, an ordinary three-way valve 55, being inserted in upper end of up-turned pipe 54. The other ends of the pipes 54 slidably project in a horizontal manner through holes in the end wall of the primary kettle 15. The ends of the pipes 54 which project through the end wall of the primary kettle 15 are provided with detachable cone-shaped members 56 which are used to facilitate the connecting of pipes 54 with ends 57 of the articles 36, when the same are in positions to receive the charges of flux and coating metal internally. This position to receive coating metal is directly underneath the shaft 10, articles 36 being held in a fixed position by means of the gripper levers 17 which are tensioned by means of metal links 58 secured to ends 59 of the gripper levers 17. The upper ends of the metal links 58 are secured to a cable 60 which passes over the sheaves 61 and 62, the end of cable carrying a weight 63. (See Figures 1 and 3).

By referring to Figures 3 and 4, it will be seen that the articles 36 are carried down into the flux 20. As each of the articles 36 reach the maximum depth of the flux 20, the same is connected to one of the pipes 54 carrying the cone-shaped members 56. It will be seen in Figure 4 that one of the pipes 54 is elevated in order to connect with the articles 36 as they pass through the flux 20, in order that each of the same may receive a charge of flux which is forced through the interior of each of the articles 36.

In order to show the manner in which the articles 36 and subjected to this charge of flux 20, and metal coating 22, the operation of the machine will be traced. As above described, the crank disc 5 revolves in a clockwise direction, carrying the projection 8 through a cycle in which it comes in contact with four arms, causing the same to move and to operate valves controlling the movement of the carriage 47 and the piston heads 51. The projection 8 first comes in contact with an arm 64 carried upon a shaft 65 to which is secured a segmental gear 66 which functions with a segmental gear 67, which is secured to a shaft 68 upon which is carried a segmental gear 69 which functions with a segmental gear 70, which is carried upon a valve control rod 71, which controls the four-way valve 72, causing the operation of a piston head 73, functioning within a chamber 74, to carry a piston rod 75 which is connected to the carriage 47. Compressed air or steam may be used in pipes 76 and 77, as desired. It will also be seen that there is an arm 78 carried upon and secured to the shaft 68, and as the segmental gear 66 travels in a clockwise movement, the arm 78 is caused to swing downwardly. As the projection 8 disengages the arm 64, it comes in contact with an arm 79 carried upon a shaft 80, upon which is mounted an arm 81, which is, in turn, attached to a link 82 connecting an arm 83, which is mounted upon a shaft 84, upon which is mounted a segmental gear 85, which functions with a segmental gear 86 which is secured to a valve control rod 87. This valve control rod 87 controls a four-way valve 88, which in turn controls the action of each of the piston heads 49, by means of air or steam in pipes 89 and 90.

By referring to Figure 2, it will be seen that this piston head 49, thus actuated, causes the piston head 51 to function in the chamber 52, thereby, forcing a charge of

flux and metal coating into each of the articles 36 as positioned as above described. It will also be seen that there is a second arm 91 secured to the shaft 84, the outer end of which is secured to a link 92, connecting with an arm 93, which is secured to a shaft 94. There is also secured upon the shaft 94, a second arm 95. It will be seen that the link 92 has caused the arm 95 to move downward. The projection 8 now comes in contact with the arm 78, raising the same, and causing a reverse action of the valve control rod 71, resulting in actuating the valve control rod 71, and bringing the arm 64 to its original position. The projection 8 now comes in contact with the downwardly extending arm 95, forcing the same upwardly and in turn causing the arm 93 to be moved upwardly. This, in turn, reverses the action of the valve control rod 87. It will also be seen that this moves the arm 79 into its original position.

By referring to the drawings, it will be seen that the rocker arm 26 actuates the shaft 27, giving the same a rocking movement.

By referring to Figure 3, it will be seen that the arms 32 and connecting parts are caused to rock back and forth. As the finger plates 33 swing outwardly to the right, the articles 36 are allowed room to clear the lower end 43 of the finger 40, by rolling down an incline 96. It will also be seen that as the plurality of finger plates 33 swing back, the lower end 43 of the finger 40, will force the articles 36 to the left, ejecting one of the same down the incline 44. As the shaft 10 and connecting parts revolve in a clockwise movement, the articles 36 are finally ejected upon an incline 97, allowing the same to roll down steps 98 until each comes in contact with a guard 99, which causes the same to be positioned upon grooved discs 100, which carry the articles 36 without the zone of operation.

By referring to Figure 2 it will be seen that there are a pair of grooved discs 101, positioned one above the other and in line with the grooved discs 100, through which the articles 36 must pass in order to remove the excess of metallic coating and to compress the coating which remains on the articles 36. It will also be seen that as the articles 36 descend the steps 98, one end of the same will be lowered more rapidly than the other, due to the varied height of the steps 98. The grooved discs 101, may be actuated by any ordinary or desired means.

What we claim is:—

In a device of the class described, means for automatically carrying an article to be metal coated through a flux, automatic means for causing a head of flux to be forced through said article, means for continuing said article through a bath of zinc, means for causing a head of zinc to be forced through said article, means for allowing said article to roll by gravity in an inclined plane to a conveyor, substantially as described for the purpose set forth.

In testimony whereof we affix our signatures.

FRANK H. CUNNINGHAM.
HARRY W. MOSELEY.