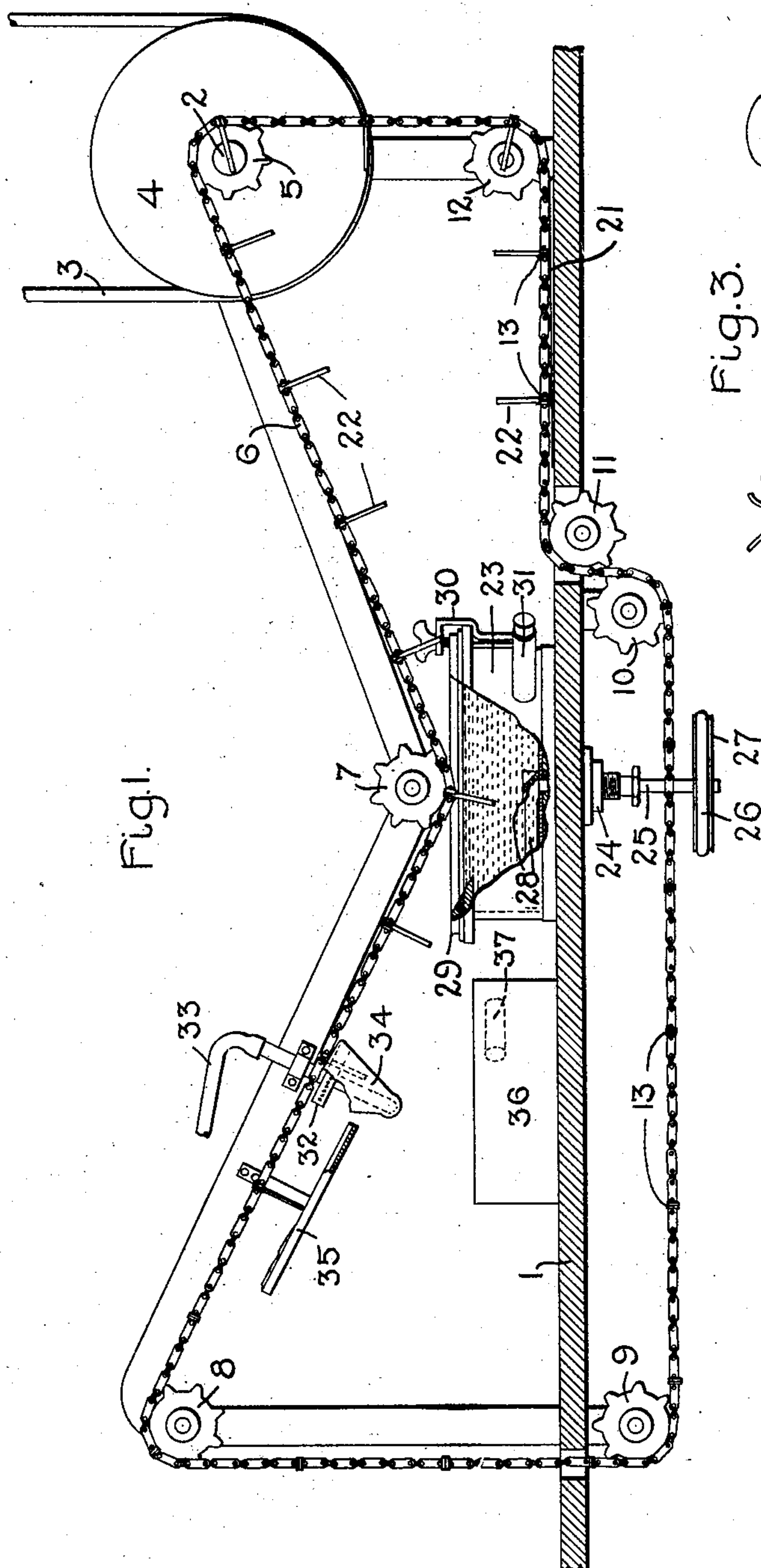


No. 755,777.

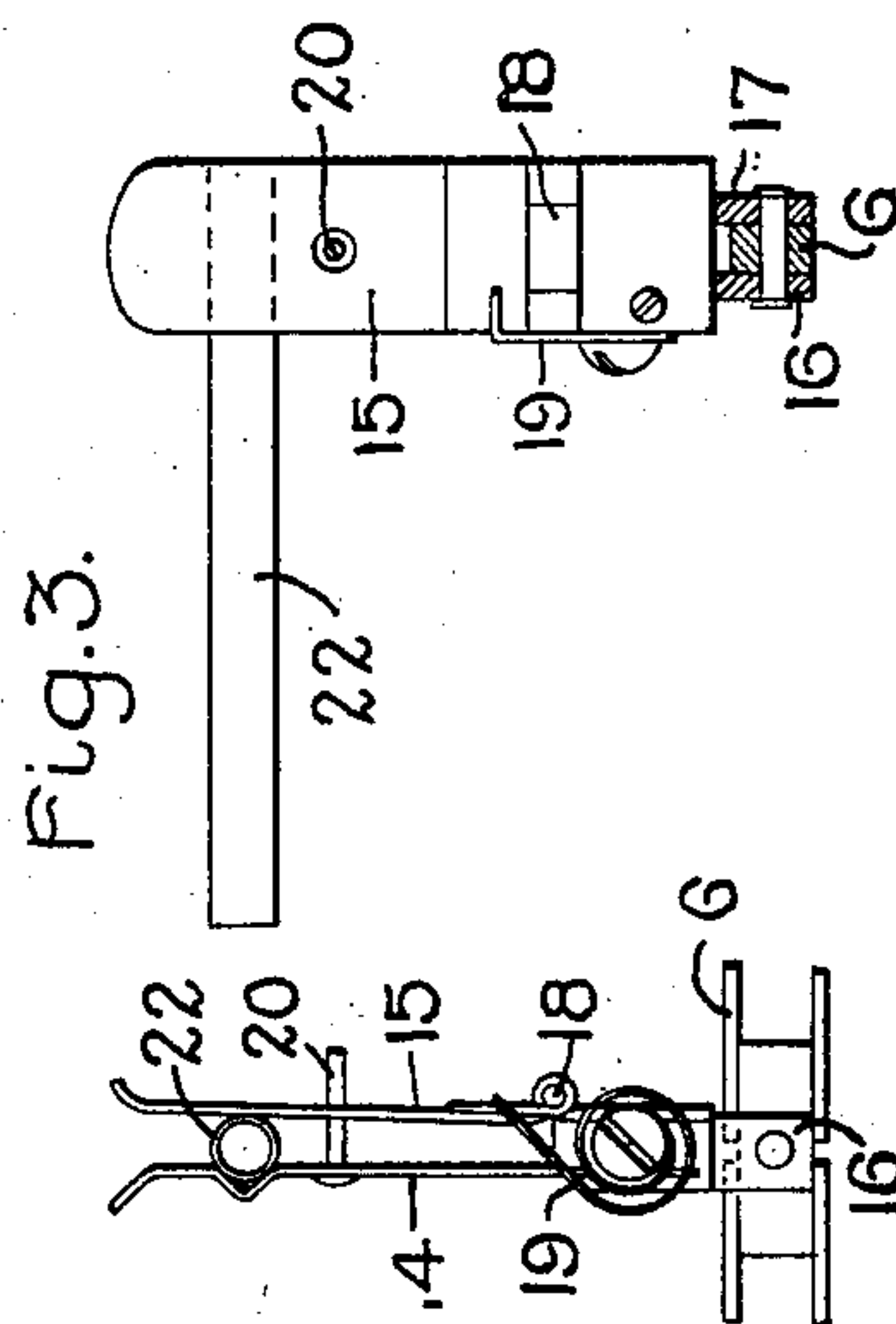
PATENTED MAR. 29, 1904.

J. W. HOWELL.  
TUBE COATING MACHINE.  
APPLICATION FILED JUNE 25, 1903.

NO MODEL.



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5.6.5

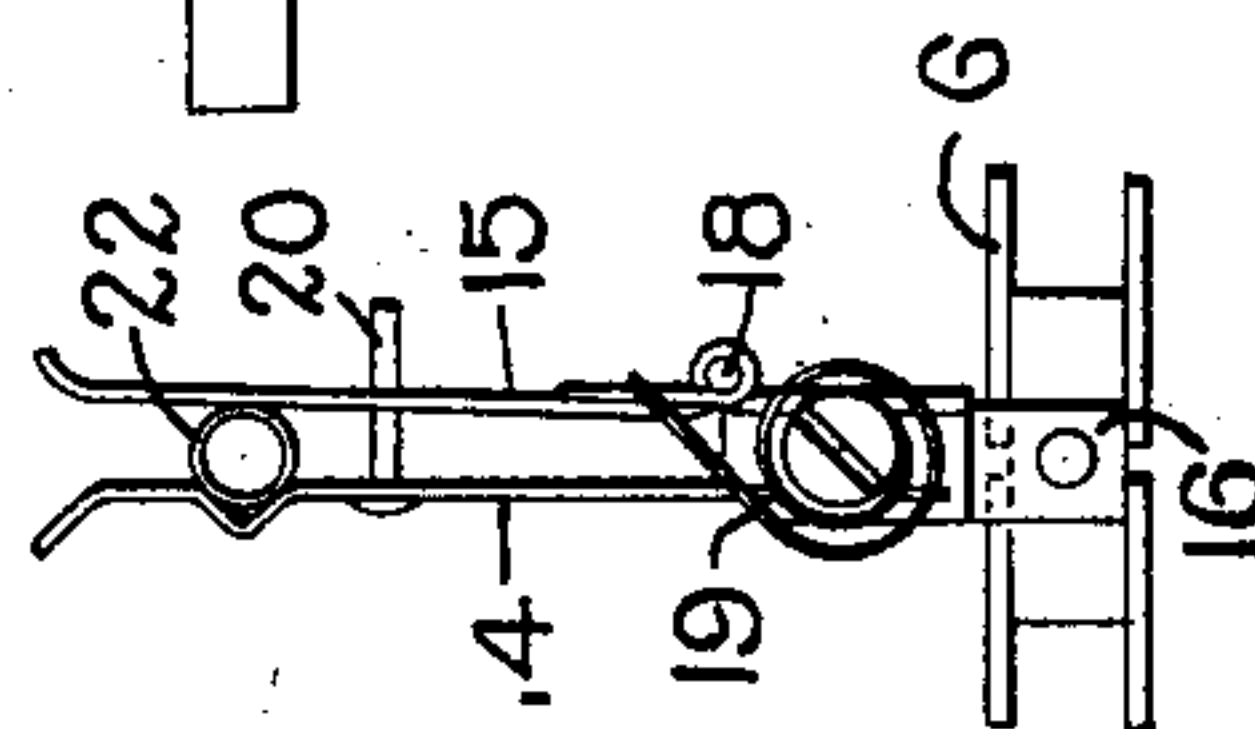


Fig. 2.

Witnesses.

Erving Plummer.  
Allen Oxford

Inventor:

John W. Howell.

by Allen H. Bavin  
Atty.



# UNITED STATES PATENT OFFICE.

JOHN W. HOWELL, OF NEWARK, NEW JERSEY, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

## TUBE-COATING MACHINE.

SPECIFICATION forming part of Letters Patent No. 755,777, dated March 29, 1904.

Application filed June 25, 1903. Serial No. 163,021. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN W. HOWELL, a citizen of the United States, residing at Newark, county of Essex, State of New Jersey, have  
5 invented certain new and useful Improvements in Tube-Coating Machines, of which the following is a specification.

This invention relates to a machine for coating the interior of tubes with a compound, arranged so that the quantity of the compound  
10 received by the tubes can be regulated as desired and when once regulated shall be uniform for all the tubes. One use for which such a machine is particularly adapted is in  
15 the manufacture of incandescent lamps for coating the interior of the tubes, through which the bulbs are exhausted with the chemical compound, which after exhaustion is utilized to dissipate the air remaining within the  
20 bulb.

In the manufacture of incandescent lamps the lamp-bulb is exhausted through a short glass tube, the end of which is fused to the lip around a puncture in the end of the bulb.  
25 The interior of this tube is coated with a chemical and after the bulb has been mechanically exhausted this tube is heated, transforming the chemical to a gas or vapor, which unites with gases within the bulb generated by the  
30 filament when in an incandescent state, forming a liquid or solid precipitate. In coating these tubes with the chemical great difficulty has been experienced in getting the quantity of the compound received by each tube uniform,  
35 as the tubes are frequently dipped too far or not far enough in the tank containing the compound. I have provided a machine for coating the tubes in this manner by which I overcome this difficulty and prepare the  
40 tubes with the interior coating rapidly and at a very small cost.

In carrying out my invention I provide a link belt having a number of spring-clips secured thereto, into which the short tubes are  
45 inserted. Directly under the belt I mount a plate having its face inclined to the chain, so that the ends of the tubes protruding through the clips ride on the inclined face of the plate, and the tubes are forced upward through the

clips until the lower end clears the highest  
50 part of the plate. As the tubes are all cut to the same length, this arrangement insures each tube being held in the same position in the clips. The tubes are then carried by the belt to a tank containing the compound with which  
55 the interior of the tubes is to be coated, and each tube dips into the tank to a depth regulated by its position in the clips, thus receiving a coating of the compound on both the interior and exterior surfaces. After leaving  
60 the tank and before the compound has dried the tubes are carried before water-jets, where they are sprayed with water and the exterior coating removed.

My invention therefore comprises means  
65 for dipping tubes successively into a coating-bath and means for cleaning the outside of the tubes. It also comprises a machine for coating the interior of a tube having a belt carrying clips, in which the tubes are held, and a  
70 tank containing the material with which the tubes are to be coated arranged so that all the tubes dip into the tank a predetermined distance, and devices for removing the coating  
75 from the exterior of the tubes.

It comprises also other novel features, which will be set forth more fully hereinafter and which will be definitely indicated in the appended claims.

In the accompanying drawings, which illustrate one embodiment of my invention, Figure 1 is a front elevation of the tube-coating machine broken away and sectioned in part,  
80 and Figs. 2 and 3 are details of the clips.

In Fig. 1, 1 indicates the table on which the machine is mounted, and 2 is a shaft driven by a belt 3 and pulley 4 from any suitable source of power. Keyed to the shaft 2 is a sprocket-wheel 5, driving the chain belt 6,  
85 which runs over the idler-gears 7, 8, 9, 10, 11, and 12. Secured to the chain belt at equal distances throughout its length are the clips 13 13. (Shown in detail in Figs. 2 and 3.) These clips consist of two sheet-metal jaws  
90 14 and 15, mounted on two strips 16 and 17, which are riveted to the chain. The jaw 14 is rigidly mounted in the strips 16 and 17, and the jaw 15 is fastened thereto by a hinge



18, the spring 19 tending to hold the jaws in the closed position. A pin 20, secured to the jaw 14 and passing through a hole in the jaw 15, holds them in proper relative position.

5 Mounted on the table directly under the chain 6 is a plate 21, the face of which is inclined at a slight angle to the direction of the chain at that point. The tubes 22 are inserted in the clips as they come over the plate 21, and the lower ends of the tubes ride on the inclined face of this plate. As the tubes are held very lightly by the clips, they are forced upward as the clip passes over the plate 21 until the lower ends of the tubes clear the highest portion of the plate. After being adjusted in the clips by the plate 21 the tubes are carried by the chain to the tank 23, containing the compound with which the interior of the tube is to be coated. Mounted in a bearing 24, secured to the under side of the table 1 and extending upward through the table and the bottom of the tank 23, is a shaft 25, driven by a belt 26 and pulley 27 from any suitable source of power. On its upper end the shaft 25 carries two vanes 28 28 for stirring the compound, one of which is shown in elevation and the other in section in Fig. 1. The faces of these vanes are beveled at an angle of forty-five degrees to the bottom of the tank, and the lower edge of the vanes sweeps over the bottom, keeping the compound in motion constantly and preventing any of its ingredients from settling. The tank may be provided with a cover 29, slotted along the path of the tubes and held in place by one or more clamps 30 to prevent the entrance of dust. A drain-pipe 31 may also be provided for withdrawing the compound from the tank. The tubes carried by the chain 6 enter the slot in the cover 29 of the tank and dip into the compound, receiving a coating of the compound on both the interior and exterior surfaces. They are then carried by the chain before a water-jet 32, fed by a flexible tube 33 from water-supply mains. The jet 32 sprays water on the tubes before the compound has dried, and thus removes the exterior coating. A shield 34 is mounted opposite the jet 32 to protect the operator. Below the path of the tubes after leaving the jet 32 a drip-trough 35 is mounted to catch the drippings from the tubes and guide them, with the water, from the jet 32 into a tank 36, provided with a drain-pipe 37, and after passing the drip-trough 35 the coated tubes are removed from the clips by the operator.

It will be seen from the foregoing that the coating received by the tubes is the same in every case. The idler 7, over which the chain 6 passes and to which it is held tightly, is directly over the tank 23, so that all the clips pass over the tank at the same distance above it. As the plate 21 insures each tube being held in the clips in the same relative position, the length of each tube which dips into the

compound, and hence the coating received by each tube, is always the same. The compound being very thin runs up within the tube freely, and a great number of the tubes can be coated before there is any appreciable decrease of the depth of the compound within the tank.

The plate 21 may be made adjustable vertically, or a number of plates of different heights may be provided, so that the position of the tubes within the clips may be adjusted as desired. The idler-gear 7 may also be made adjustable vertically for this purpose, the slack in the belt being taken up by one of the other idlers.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. A tube-coating machine comprising means for successively dipping the tubes in a coating compound, and means for cleaning the outside of the tubes after being withdrawn from said compound.

2. A tube-coating machine comprising a belt for carrying the tubes, a tank containing the material with which the tubes are to be coated and into which the tubes dip, and means for removing the coating of the material from the exterior of the tubes.

3. A tube-coating machine comprising, in combination, a belt for carrying the tubes and a tank containing the material with which the tubes are to be coated arranged so that the tubes dip into the tank for a determinate distance, and a washing device for removing the material from the exterior of the tubes.

4. A coating-machine comprising a belt, holders carried thereby for the articles to be coated, and a plate in proximity to the belt having its face inclined thereto and arranged so that the articles held in said holders abut against the inclined face.

5. A tube-coating machine comprising a belt carrying clips in which the tubes are held, means for insuring each tube being held in the same relative position, a tank containing material with which the tubes are to be coated arranged so that the tubes dip into it, and means for removing the coating from the exterior of the tubes.

6. A tube-coating machine comprising a belt carrying clips in which the tubes are held, a tank containing material with which the tubes are to be coated arranged so that the tubes dip into it, means for effecting a uniform depth of immersion, and a washing device for removing the coating from the exterior of the tubes.

7. A tube-coating machine comprising a belt carrying clips in which the tubes are held, a tank into which the tubes dip, and a plate in proximity to the belt having its face inclined thereto and arranged so that the ends of the tubes held by the clips abut against the inclined face.

8. In a tube-coating machine, the combination of a belt, means carried thereby for holding the tubes, a plate having an inclined face



arranged so that the ends of the tubes held by the clips ride on the inclined face, a tank containing the material for the coating, and means for removing the material from the exterior  
5 of the tubes.

9. In a tube-coating machine, the combination of a belt, means carried thereby for holding the tubes, a plate having its face inclined to and crossing the path of the ends of the  
10 tubes, a tank containing the material for the coating, and a washing device arranged so that the tubes come before it after leaving the tank.

10. In a tube-coating machine, the combina-

tion of a belt, clips carried thereby for hold- 15  
ing the tubes, means for insuring each tube being held in the clips in the same position, a tank containing the material for the coating, a wheel on which the belt bears situated directly over the tank, and means for removing the 20  
coating from the exterior of the tubes.

In witness whereof I have hereunto set my hand this 18th day of June, 1903.

JOHN W. HOWELL.

Witnesses:

G. F. MORRISON,  
R. S. McNEIL.