L. SCHULTE.

PLATING MACHINE.

APPLICATION FILED JULY 23, 1913.

1,154,660.

Patented Sept. 28, 1915.

2 SHEETS—SHEET 1.

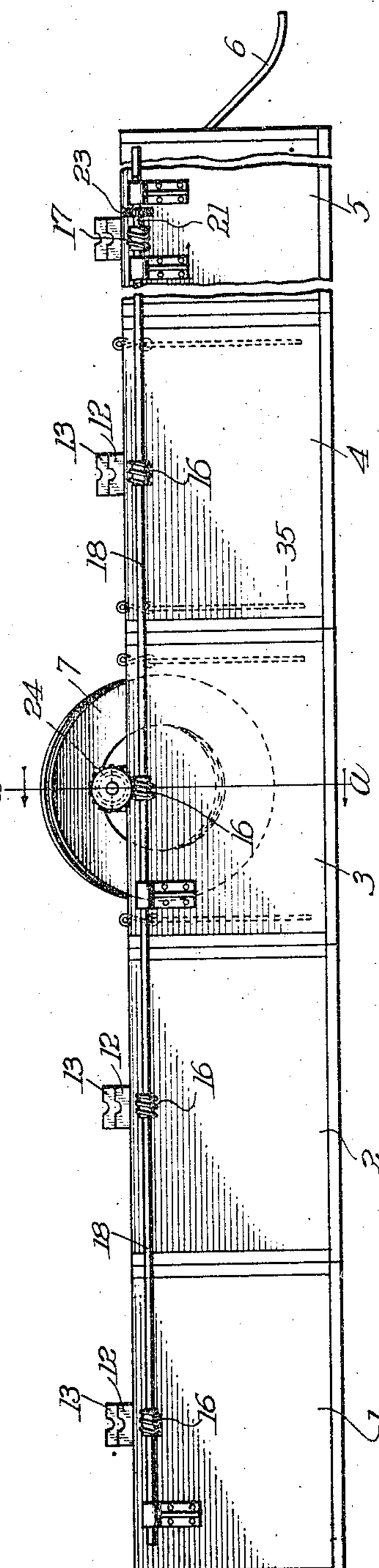

Fig. 1.

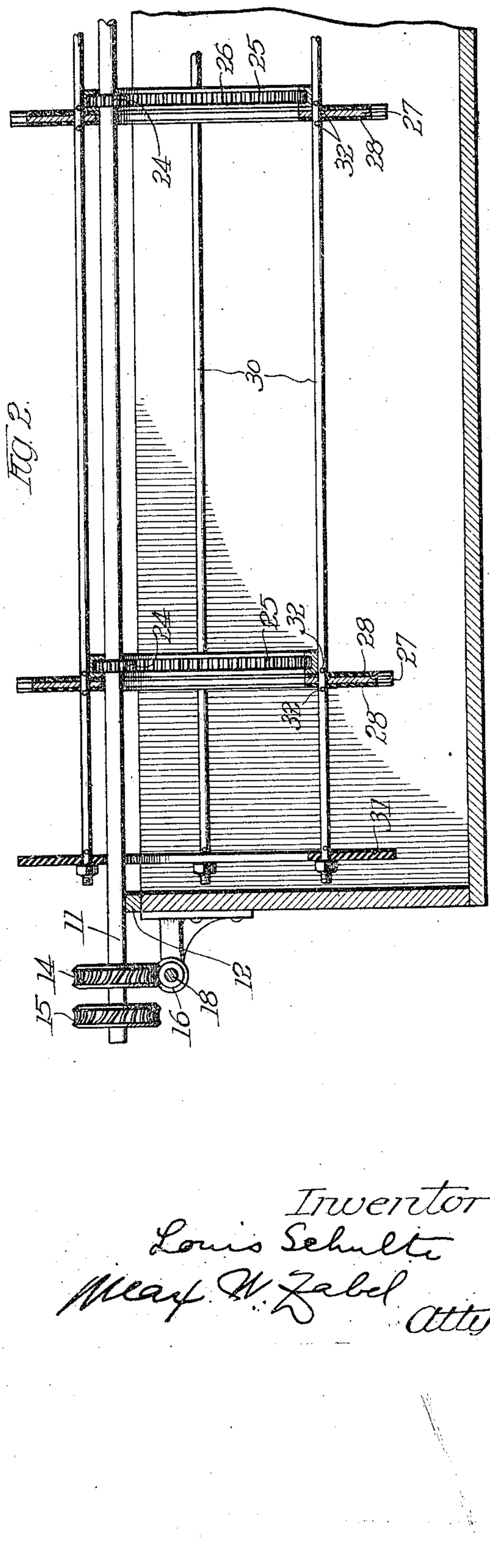

Fig. 2.

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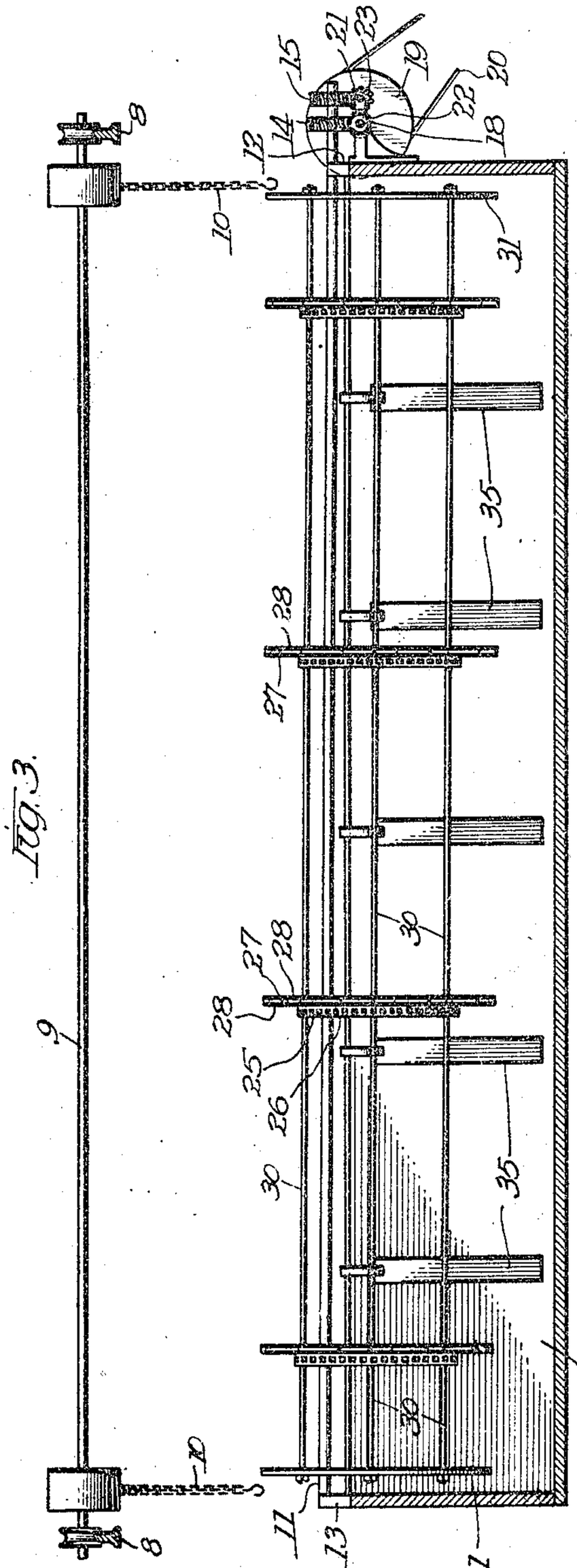

Fig. 3.

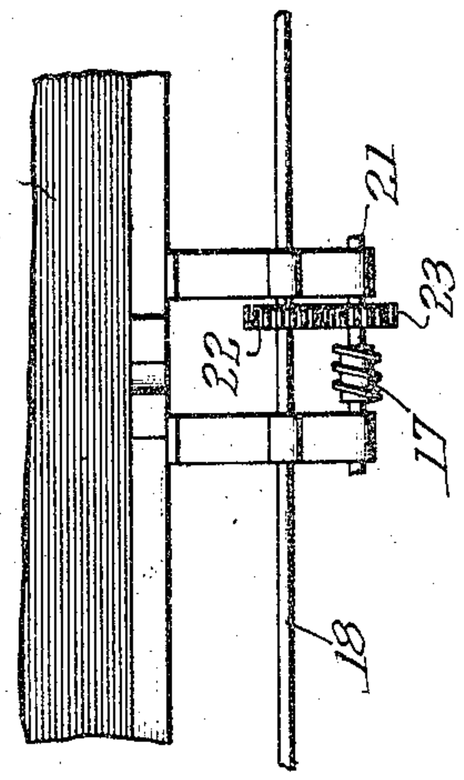

Fig. 5.

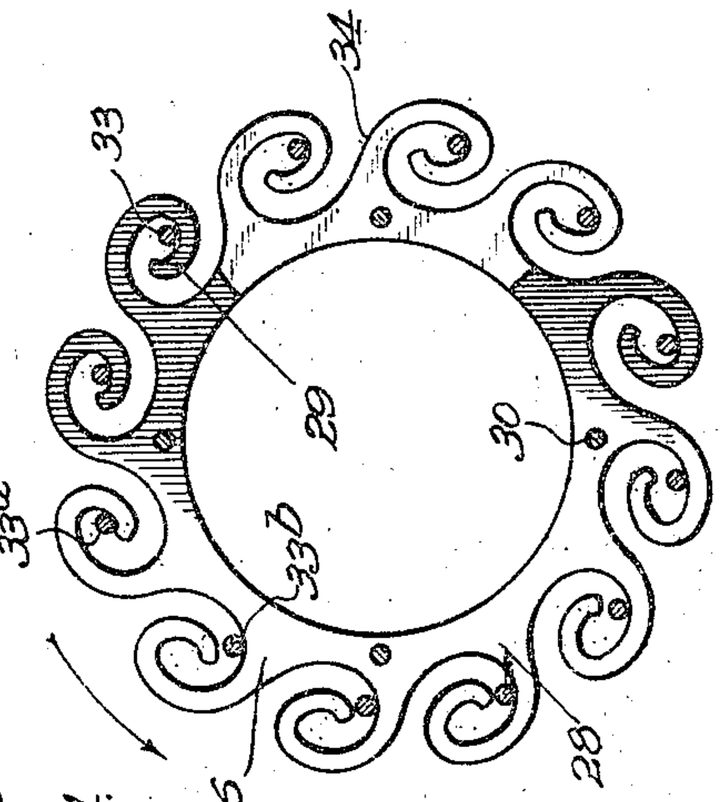

Fig. 4.

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UNITED STATES PATENT OFFICE.

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PLATING-MACHINE.

1,154,660. Specification of Letters Patent. Patented Sept. 28, 1915.

Application filed July 23, 1913. Serial No. 780,746.

To all whom it may concern:

Be it known that I, LOUIS SCHULTE, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Plating-Machines, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to plating machines and has for its object the provision of a machine which may be advantageously used for the plating of sheets, bars, tubes or other sections of such a character.

My invention is of such a character that the apparatus can be readily utilized to perform various cleaning, plating, washing and drying operations on devices above set forth in a most expeditious manner.

In one form of my invention to accomplish this result, I provide a carrier which can be successively inserted into a plurality of tanks, thus to perform the operations above outlined.

My invention contemplates further the continual movement of the device while in any given tank, the carrier apparatus being of such construction that when revolving in one given direction of rotation, it will continually rotate the devices, thus changing their position, while when being rotated in the opposite direction it will discharge the devices after the completion of the operations referred to.

In the description herein and in the claims I will use the word "tube" as covering any bars, sheets or other devices to be plated, as the action of my machine would of course be the same irrespective of the cross-section of the devices utilized.

My machine also is of such a character that the tubes are slid lengthwise in the course of the operation so that the tubes will be plated all over.

I have used my machine successfully with tubes sixteen feet or more in length.

I will explain one form of carrying out my invention more in detail by referring to the accompanying drawings, in which—

Figure 1 is a side view in general assembly of a plurality of tanks used in connection with my improved plating device; Fig. 2 is a sectional view on line *a—a* of Fig. 1; Fig. 3 is a view similar to Fig. 2, but showing the full width of a tank; Fig. 4 is a detail of the carrier elements, and Fig. 5 is a detail of construction.

Referring more particularly to Fig. 1, I show a series of tanks 1, 2, 3, 4 and 5, of which tank 1, for instance, may be an acid pickling tank; tank 2 may be a cold water washing tank; tank 3 may be an electro cleaning tank; tank 4 may be an electric galvanizing tank, and tank 5 may be a hot water washing tank. A chute 6 leads away from tank 5 to receive tubes that have been fully treated.

My improved device shown generally at 7 in Fig. 1 is removable from a tank, to be deposited successively into the tanks shown, for which purpose (Fig. 3) a track consisting of the rails 8, 8 is provided with a traveler 9 having chains 10, 10 to raise the said device 7 and lower it in carrying it from one tank to the next. The complete structure 7 includes a rotatable shaft 11 which is adapted for mounting in bearings 12 and 13, bearings 12 being on one side of the tank, and bearings 13 on the other, bearings 13 being higher than the bearings 12 so as to tilt the shaft and consequently the structure, and permit the tubes to slide lengthwise as the device is being rotated. The shaft 11 carries two worm wheels 14 and 15, the worm wheel 14 being adapted to engage worms 16 whenever said device is placed into the tanks 1, 2, 3 or 4, and the worm wheel 15 being adapted to engage the worm 17 whenever the structure is mounted in tank 5. A driving shaft 18 suitably driven by means of the pulley 19 and belt 20 causes the rotation of the worms 16 and a countershaft 21 through the interposition of the gears 22 and 23, causes the worm 17 to revolve in the opposite direction.

In view of this construction the plating device 7 rotates say clockwise when in the tanks 1, 2, 3 and 4, and rotates in a contra-clockwise direction when in the tank 5, or vice versa depending upon the arrangement of the structure, as will be readily apparent. The shaft 11 carries a plurality of gear wheels 24 which mesh with annular gears 25 constructed preferably of channel irons having openings 26 therein to accommodate the teeth of the gear 24. These annular channels 25 are mounted upon carrier plates 26 consisting preferably of a central metallic ring 27 and outer rings 28, 28 of insulating

material. These individual carriers consisting of the elements 27 and 28 are then cut out to form bent retainers 29 as more clearly shown in Fig. 4. Rods 30 fixedly secured to end rings 31 pass through the carriers 26 and hold them by means of pins 32 against lateral displacement.

It will thus be seen that the shaft 11 by reason of the pins 24 carries the channels 25, which channels form part of a framework including the carriers 26, end plates 31, and rods 30. As the shaft 11 is being revolved, the entire structure is carried around, and thus immerses one of the fingers 29 after the other to thereby bring the tubes 33 successively into the solution and out of it, at the same time rotating these tubes, as will be readily apparent from an inspection of the illustration thereof in Fig. 4. So long as the device is rotating in the direction of the arrow shown in Fig. 4, the tubes cannot fall away from their inclosing fingers. The tubes may be inserted of course at any point on top of this structure to the left of the center line of Fig. 4. Now when the structure however is in the last tank 5, the device is rotated oppositely to that shown in Fig. 4, and it will be readily apparent that then the tubes would leave the device somewhere near the point marked 34 to be caught by the chute 6. The end plates 31 are preferably further apart than the greatest length of the tubes to be used, and it will thus be seen that as the structure is tilted as shown in Fig. 3 as the device is being rotated, the tubes which ordinarily touch the left hand end plate 31 will gradually slide downwardly to engage the right hand end plate 31, thus to insure plating the entire area of these tubes. Now the traveler 9 is so arranged that the right hand chain 10 is shorter than the left hand chain 10 and thus when the structure is lifted from one tank into the succeeding tank, the device is tilted oppositely to that shown in Fig. 3, and thereupon the tubes which then engage the right hand end plate 31 slide backwardly to engage the left hand end plate 31, before being immersed in the next tank so that the sliding action in this following tank may again take place. In this manner the structure is carried successively from one tank into the next until finally when it reaches tank 5, the direction of rotation is changed to permit the tubes to be discharged from the machines. The tanks may of course, when necessary, be provided with a plurality of anodes 35 for purposes of plating or pickling as the case may be. They can be supplied in the usual manner.

It will of course be understood that when current is used in any of the tanks, the tubes may form the cathode for instance, being in electrical connection with the element 27 which through the interposition of the gear 24 is in electrical connection with the shaft 11, and thereby the bearing 12 to which one terminal of the source of current may be attached, the other terminal being attached to the anode 35. The tanks in such cases of course would contain electrolyte.

By referring more particularly to Fig. 4, it will be noted that the tubes 33 as they are being carried by the fingers 29 finally reach such a point where these tubes drop from the edge of these fingers as these carriers rotate. This dropping, however does not permit the tubes to fall away from the carrier, but merely to drop upon another portion of the rounded surface of the retainer. This may take place, for instance, with the rod 33^a, as the device was moving in a contra-clockwise direction, the tube occupying after a further period of rotation the position occupied by the tube 33^b, having fallen from the finger to the position shown at 33^b, to be thereupon further carried around into the successive positions shown. This dropping of the tubes 33 is very important in that it jars them and thus throws off any collections of gas such as hydrogen that may have been formed thereon, and which would be objectionable during the plating or other processes to which the tube is being subjected.

From what has been thus far described, it is thought the nature of my invention will be readily apparent to those skilled in the art.

It will also be clear that the invention is susceptible of many and various modifications without departing from its spirit.

Having however thus described one form which my invention may take, what I claim as new and desire to secure by Letters Patent is:

1. A machine of the character described comprising a plurality of tanks, a tube carrier adapted to be inserted successively into said tanks, means whereby said tube carrier is tilted when mounted in a tank, and means for tilting said tube carrier in the opposite direction when transferring the same from one tank to the next.

2. A machine of the character described comprising a plurality of tanks, and a tube carrier adapted to be successively inserted into said tanks, said tube carrier including a rotatable shaft, and a plurality of independent tube holders loosely carried thereby and rotated by said shaft, said tube holders each having means for independently supporting each of a plurality of tubes.

3. A machine of the character described comprising a plurality of tanks, a tube carrier adapted to be successively inserted into said tanks, said tube carrier including a rotatable shaft, a rotatable framework including a plurality of independent tube holders loosely carried thereby and rotated by said shaft, a pinion carried by said

shaft, and an annular gear carried by said framework, said tube holders each having means for independently supporting each of a plurality of tubes.

4. A machine of the character described comprising a plurality of tanks, a tube carrier adapted to be successively inserted into said tanks, said tube carrier including a rotatable shaft, a rotatable framework loosely carried thereby and rotated by said shaft, a pinion carried by said shaft, an annular gear carried by said framework, and tube supporting devices forming a fixed part of said rotatable framework.

5. A machine of the character described comprising a plurality of tanks, a tube carrier adapted to be successively inserted into said tanks, said tube carrier including a rotatable shaft, a rotatable framework loosely carried thereby and rotated by said shaft, a pinion carried by said shaft, an annular gear carried by said framework, and tube supporting devices forming a fixed part of said rotatable framework, said tube supporting devices being insulated throughout the major portion of their exposed surfaces.

6. In a machine of the character described the combination with a plurality of tanks, and a framework bodily removable from one tank to the next, said framework including two supporting devices having a plurality of substantially spiral shaped carrying fingers.

7. A machine of the character described comprising a plurality of tanks, and a tube carrier adapted to be successively inserted into said tanks, said tube carrier including a rotatable shaft, a rotatable framework loosely carried thereby and rotated by said shaft, means associated with some of said tanks for rotating said framework in a given direction of rotation, and means associated with another of said tanks for rotating said framework in the opposite direction.

8. A machine of the character described comprising a plurality of tanks, and a tube carrier adapted to be successively inserted into said tanks, said tube carrier including a rotatable shaft, a rotatable framework loosely carried thereby and rotated by said shaft, a pinion carried by said shaft, an annular gear carried by said framework, means associated with some of said tanks for rotating said framework in a given direction of rotation, and means associated with another of said tanks for rotating said framework in the opposite direction.

9. A machine of the character described comprising a plurality of tanks, a tube carrier adapted to be successively inserted into said tanks, said tube carrier including a rotatable shaft, a rotatable framework loosely carried thereby and rotated by said shaft, a pinion carried by said shaft, an annular gear carried by said framework, tube supporting devices forming a fixed part of said rotatable framework, and means for rotating said framework in opposite directions.

10. A machine of the character described comprising a plurality of tanks, a tube carrier adapted to be successively inserted into said tanks, said tube carrier including a rotatable shaft, a rotatable framework loosely carried thereby and rotated by said shaft, a pinion carried by said shaft, an annular gear carried by said framework, tube supporting devices forming a fixed part of said rotatable framework, said tube supporting devices being insulated throughout the major portion of their exposed surfaces, and means for rotating said framework in opposite directions.

11. In a machine of the character described the combination with a plurality of tanks, a framework bodily removable from one tank to the next, said framework including two supporting devices having a plurality of substantially spiral shaped carrying fingers, and means for rotating said framework in opposite directions.

12. In a device of the character described the combination with a plurality of tanks, a tube device adapted for insertion successively into said tanks, means associated with one tank for rotating said device in a given direction, and means associated with another tank for rotating said device in the opposite direction.

13. A device of the character described comprising a plurality of tanks, a tube carrier adapted for successive insertion into said tanks, and means associated with said tanks for rotating said tube carrier.

14. A plating device comprising a tank, and a movable tube carrier, said tube carrier having means to permit said tubes to fall a short distance to thereby remove bubbles of gas or other foreign substances formed on said tubes.

15. A machine of the character described comprising a plurality of tanks, a tube carrier adapted to be inserted successively into said tanks, and means whereby said tube carrier is tilted when mounted in a tank.

16. A machine of the character described comprising a plurality of tanks, a tube carrier adapted to be inserted successively into said tanks, means whereby said tube carrier is tilted when mounted in a tank, and means for confining the longitudinal movement of said tubes.

17. A device of the character described comprising a plurality of tanks, a tube carrier adapted for successive insertion into said tanks, means associated with a plurality of tanks for rotating said tube carrier in a given direction, and means associated with another tank for rotating said carrier in the opposite direction to thereby discharge the tubes carried thereon.

18. In a machine of the character de-

scribed the combination with a tank, and a framework bodily removable and insertible in said tank, said framework including two supporting devices having a plurality of substantially spiral shaped carrying fingers adapted to retain the work thereon throughout a complete revolution when moved in a given direction of rotation.

19. In a plating machine a tube carrier having means adapted with a given direction of rotation to retain tubes placed thereon, and with the opposite direction of rotation to discharge said tubes.

20. In a plating machine a tube carrier having a plurality of substantially spiral-shaped carrying fingers adapted with a given direction of rotation to retain tubes placed thereon, and with the opposite direction of rotation to discharge said tubes.

In witness whereof, I hereunto subscribe my name this 11th day of July, A. D. 1913.

LOUIS SCHULTE

Witnesses:
OTTO M. WERMICH,
JOHN J. SCHAYER.