

April 8, 1930.

A. B. SCHUPP

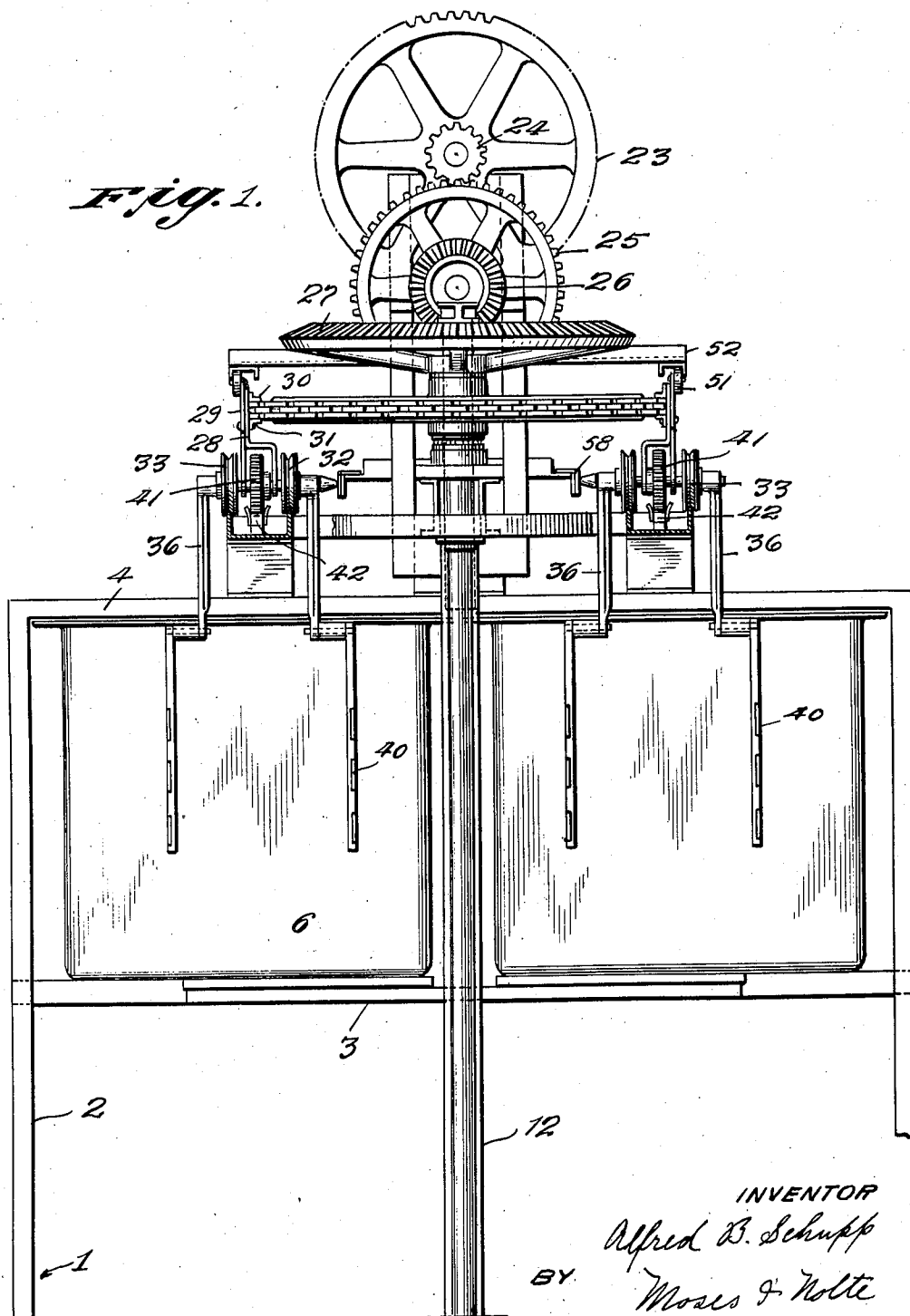
1,753,350

NICKEL PLATING APPARATUS

Filed Dec. 18, 1925

4 Sheets-Sheet 1

Fig. 1.



INVENTOR
Alfred B. Schupp
BY
Moses F. Nolte
ATTORNEYS

April 8, 1930.

A. B. SCHUPP

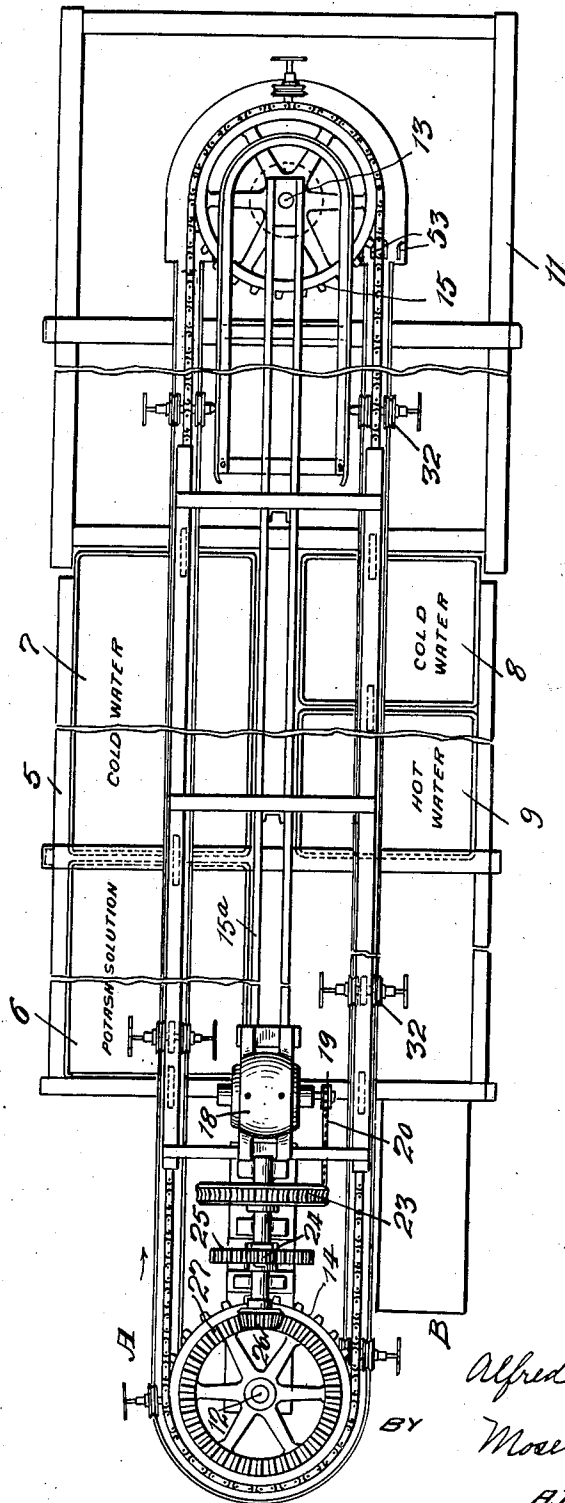
1,753,350

NICKEL PLATING APPARATUS

Filed Dec. 18, 1925

4 Sheets-Sheet 2

Fig. 2.



INVENTOR

Alfred B. Schupp

BY

Morris & Nolte

ATTORNEYS

April 8, 1930.

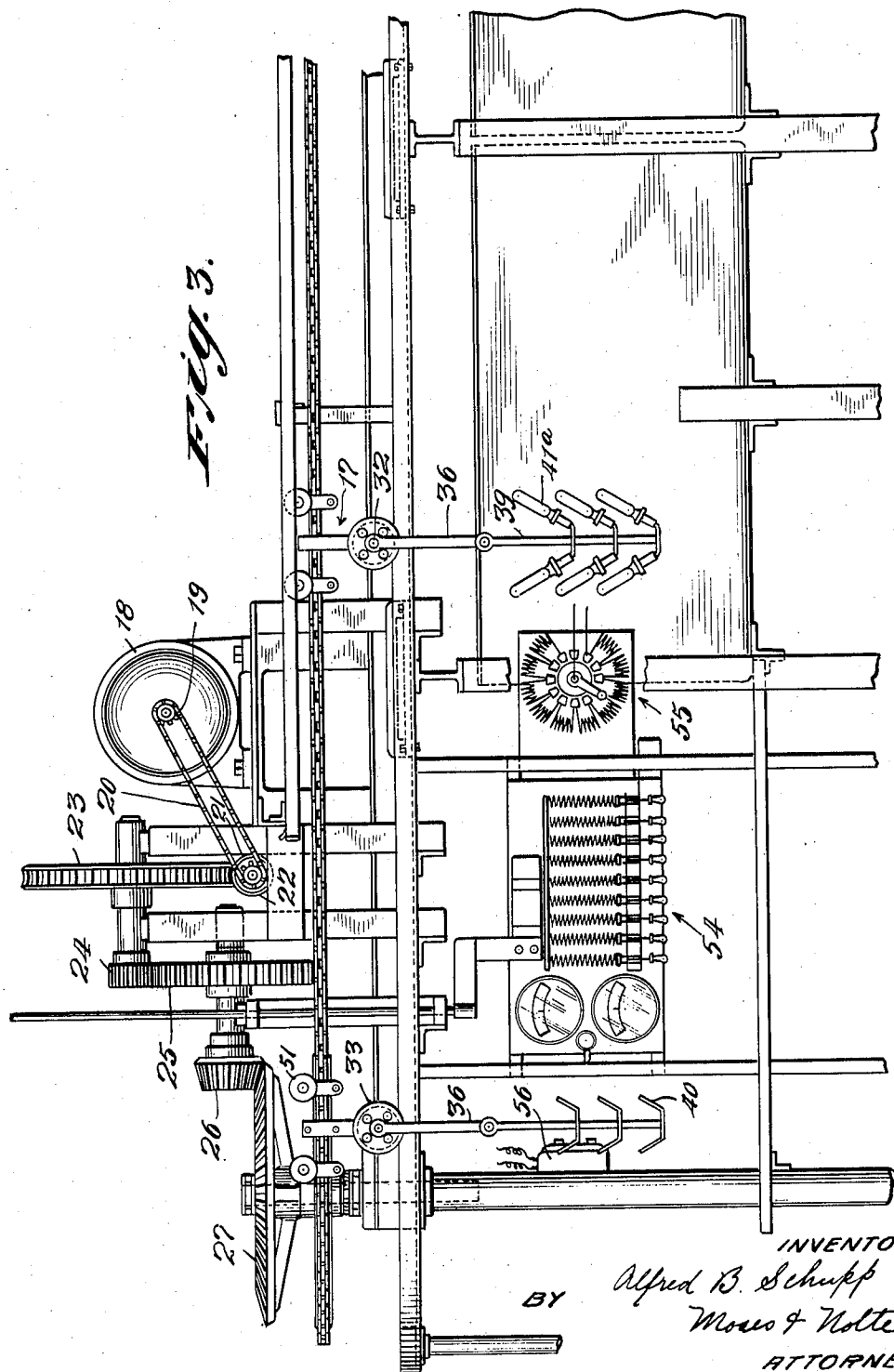
A. B. SCHUPP

1,753,350

NICKEL PLATING APPARATUS

Filed Dec. 18, 1925

4 Sheets-Sheet 3



April 8, 1930.

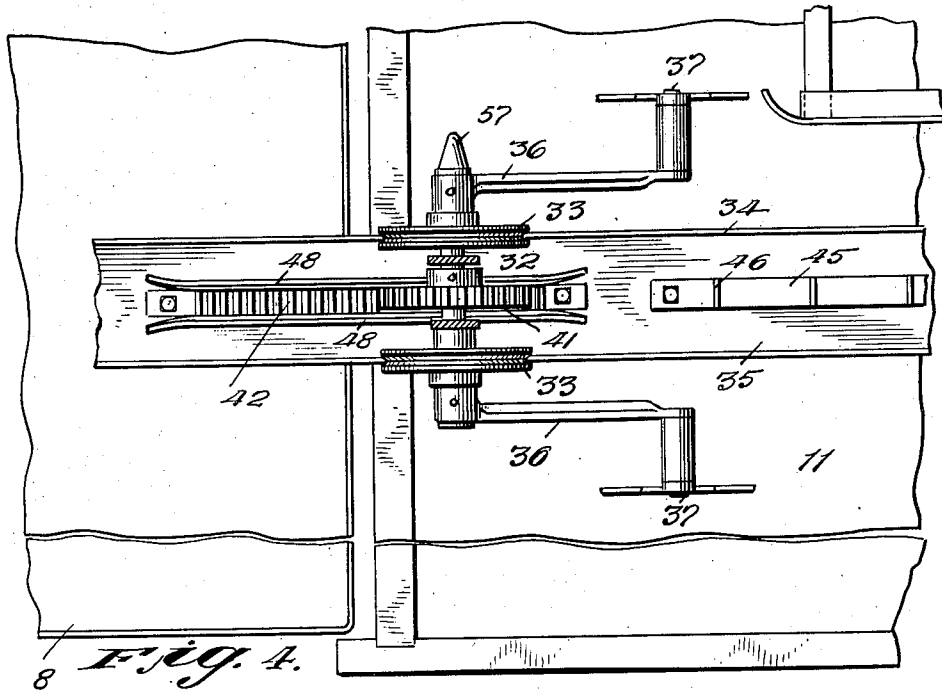
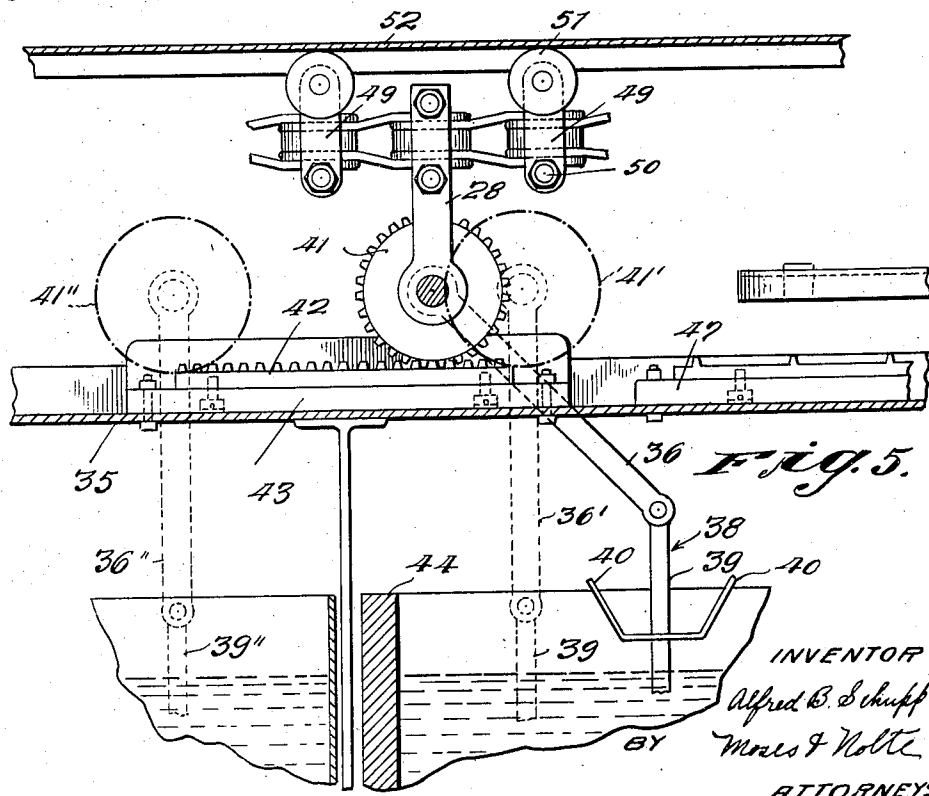
A. B. SCHUPP

1,753,350

NICKEL PLATING APPARATUS

Filed Dec. 18, 1925

4 Sheets-Sheet 4



UNITED STATES PATENT OFFICE

ALFRED B. SCHUPP, OF RICHMOND HILL, NEW YORK, ASSIGNOR, BY MESNE ASSIGNMENTS, TO MOTO METER GAUGE & EQUIPMENT CORPORATION, OF LONG ISLAND CITY, NEW YORK, A CORPORATION OF DELAWARE

NICKEL-PLATING APPARATUS

Application filed December 18, 1925. Serial No. 76,164.

This invention relates to coating apparatus, and particularly to apparatus for electroplating metallic instrument frames and other articles.

One object of the invention relates to the provision of suitable carrier mechanism for conducting the articles to be coated through successive tanks, including means for lifting the articles automatically over the partitions between adjoining tanks.

It is a further object of the invention to provide for very definitely controlling the electroplating current, both through the provision of suitable control apparatus, and of means for assuring a closed circuit of substantially uniform resistance outside of the controlling means.

A feature of the invention relates to the provision in an organization of this kind, of a control located at the delivery station of the machine, where it can be observed and operated conveniently by the operator who removes the coated instruments from the carriers. The operator is thus in a position to change the current in accordance with the condition of the work as he observes it.

Other objects and advantages will hereinafter appear.

In the drawings:

Figure 1 is a front sectional elevation of the machine.

Figure 2 is a plan view of the machine broken away between its ends for compactness of illustration.

Figure 3 is a partial side elevation of the machine, showing the control board and other features.

Figure 4 is a fragmentary, detail, horizontal, sectional view on a larger scale than the preceding figures, showing the carriage about to pass beyond the delivery side of the electroplating tank, and

Figure 5 is a vertical, sectional view, showing substantially the same portion of the machine shown in Figure 4.

The machine may comprise a frame 1, including uprights 2, transverse members 3 and 4, and longitudinal side members 5 and 6. This frame supports a tank 6 containing a cleansing potash solution, and a tank 7 con-

taining rinsing water for preparing the instruments for the electroplating bath. It also supports a tank 8, containing cold rinsing water, and a tank 9, containing hot rinsing water for removing the electrolyte from the coated instruments. A large tank 11 at the right end of the machine, as seen in Figure 2, forms a container for a large electroplating cell.

Vertical posts 12 and 13, at opposite ends of the apparatus, rise from the floor and from the bottom of the tank 11, respectively, and rotatably support horizontal sprocket wheels 14 and 15, upon which an endless chain 16 runs in a horizontal path above the various tanks. A tie beam 15^a connects the posts 12 and 13 and forms the backbone of the conveyor mechanism. The chain 16 has a series of carriages 17 for the articles to be coated, secured to it. These carriages will be described in detail presently. The endless chain 16 is driven from a motor 18, through a train of mechanism comprising a pinion 19, chain 20, pinion 21, worm 22, worm wheel 23, pinion 24, gear 25, bevel pinion 26, and bevel gear 27, and the sprocket 14 at a very slow rate of speed, so that the carriages are caused to travel slowly in an orbital path above the tanks.

Each of the carriages comprises arms 28 and 29, which are bolted to one another, and to small angle brackets 30 and 31, secured to the upper and lower sides of links of the chain 16. As seen in Figure 1, the arm 28 is bent away from the arm 29, and is then turned downward parallel to it, so that the arms may form spaced bearing members for a shaft 32, rotatably carried by them. Flanged wheels 33, which are rotatable upon the shaft 32, travel upon spaced, parallel rails 34 that form turned up flanges of a track member 35, U-shaped in cross section, that is supported above the tanks by cross beams 36^a.

At the outer ends of the shaft 32, cranks 36 are fixed upon it and hang downwardly toward the tanks. These cranks are provided with outwardly extending bearing pins 37 at the outer ends, upon which carriers 38 for the instruments to be coated are pivotally mounted. Each of the carriers 38 comprises a de-

pending stem 39 and a series of oppositely extending branches 40, each branch 40 being designed to have the hollow stem of an instrument, such as a motor heat indicating instrument 41^a, fitted snugly upon it. When the cranks 36 and the stems 39 hang vertically downward, the instrument carrier and all of the instruments carried by the carrier are at an elevation to be immersed in the liquids contained in the tanks.

As the carrier progresses along one of the tanks toward a wall thereof, it is necessary for it to be lifted over the wall and then allowed to descend into the next succeeding tank. For this purpose each shaft 32 has fast upon it a pinion 41. As best seen in Figure 5, the pinion 41 is operated to rotate the cranks 36 for swinging the carrier 38 over a partition or tank wall by engaging a rack 42 stationarily mounted upon a block 43, fixed to the floor portion of the track 35. As the carriage approaches, the tank wall 44, the pinion, crank, and stem occupy the positions indicated at 41', 36', and 39'. As soon as the pinion 41 engages the rack 42, it is rotated in a counter-clockwise direction, as seen in Figure 5, swinging the cranks 36 rearwardly and upwardly. The crank is caused to swing through a complete revolution in this way, and to finally deposit the carrier 38 with its instruments in the next succeeding tank, the parts assuming the positions indicated at 41'', 36'', and 39''.

By providing racks of this kind above each tank wall, the instruments may be caused to progress automatically from tank to tank without attention from the attendants.

It will be observed that the flange wheels 33 are movable along the shaft 32 in the direction of the axis thereof, and hence that the pinion 41, which is fast on the shaft 32, may shift laterally of the track 35. Provision is made of side guides 48 at opposite sides of the racks 42, which guides are flared at their ends for intercepting the pinion and steering it into position to intermesh with the rack.

As the pinion 41 engages the rack 42, there is a tendency for the pinion to be lifted instead of moving in properly intermeshed relation with the rack. Hold-down and guiding means is provided to offset this tendency. Arms 49 are clamped by bolts 50 upon the chain 16 at approximately a link space in advance and a link space behind the connection of the carriage to the chain. These arms are provided above the chain with guide rollers 51 which run in an overhead track 52 for holding the carriage down and substantially square with the rack so that there will be no clashing or disengaging of the pinion 41 and the rack 42.

At the right hand end of the machine where the chain passes around the sprocket 15, its rails 34 are omitted, the material which is turned upward to form flanges or rails at the

straight portions of the track being left flat to provide a table-like support for the wheels 33 around the end of the sprocket. As the carriages clear the sprocket, their wheels 33, which have considerable freedom of movement laterally of the track, are guided back onto the rails 34 by means of flaring guides 53.

The instruments are placed upon the carriers by an attendant stationed at A (see Figure 2), and are carried by the continuously moving chain 16 in the direction indicated by the arrow. As they approach the tank 6, which contains potash solution, they are caused to rise over the partition of said tank in the manner already described, and then to be immersed in the potash solution. When they have travelled to the opposite end of the tank 6, they are again raised in a similar manner over the tank walls into a tank of cold rinsing water. They are similarly conducted from the rinsing water into the electrolyte of the electroplating tank, and pass thence into the tank 8 of cold rinsing water, and finally to a tank 9 of hot rinsing water, which causes the instruments to dry quickly as they pass on to a station B, at which an attendant removes them from the carriers.

It is desirable at times, in the travel of the instruments through the various baths, to agitate them slightly. The pinions 41 are utilized for imparting an oscillatory movement to the cranks 36, to agitate the instruments as desired. For this purpose there may be placed at any desired point along the tracks, to which it is desired to agitate the instruments, a rack 45, having only occasional teeth 46. This rack is secured upon a fixed block 47 that is bolted to the floor portion of the track 45. When the pinion 41 engages a tooth 46 of the rack 45, it is rotated in a counter-clockwise direction, as viewed in Figure 5, for a short distance, until the pinion tooth in engagement with the rack tooth has been turned to a position to clear said tooth. The weight of the cranks 36, carriers 38, and the instruments themselves then swings the parts in the opposite direction so that they oscillate until the vibrations are dampened by the fluid in the tank. This action is repeated as the pinion engages each succeeding tooth 46.

When the instruments finally emerge from the last rinsing tank, they are conducted for a suitable space to permit them to dry, and finally reach a removing station B. The attendant who removes the instruments from the carriers is able to judge by observing them whether the work is being done in a satisfactory manner, or whether more or less voltage is required. It is a point of the present invention that provision is made of means at the removing station for controlling the voltage generated and the voltage utilized in the electroplating tank. It will also be

obvious that, if desired, the articles may be placed upon the carriers at this station instead of at station A whereby the apparatus is managed by a single operator.

5 The electroplating current is produced by a direct current motor generator (not shown). This unit comprises an alternating current motor and a direct current generator driven thereby. As the instruments emerge from
10 the tank, the operator is able, by observing them to determine whether they have been subjected to the proper voltage for producing the desired results. Provision is made of a rheostat 54 in the electroplating circuit
15 whereby the voltage directed through the electrolyte may be varied by switching in successive resistances. The operator is also enabled to further control the voltage of the current generated by altering the voltage of
20 the current passing through the field of the direct current generator. For this purpose provision is made of a rheostat 55, also located within convenient reach of the operator who removes the instruments.

25 The motor 18 for driving the chain conveyor is controlled from a motor switch 56, also located at the removing station of the machine. It will be seen, therefore, that the operator who removes the instruments may
30 vary the generated current, or the portion of it which is utilized, at will, and may also control the stopping and starting of the machine.

It is important not only to carefully control the current generated and the use of such
35 current, but in addition to provide a normal path of uniform resistance for the flow of the current. To this end the current is delivered to the nickel anodes by low resistance insulated conductors (not shown), and provision
40 is made of means for supplying an easy return path from the instruments to the generator. The path of the current is from the instruments 41^a through the stem 39 and
45 crank 36, to the shaft 32. The shaft 32 is provided with a conductive contact shoe 57 that engages a conductive rail 58 which is connected through an insulated conductor
(not shown) with the generator. The shaft
50 is pressed longitudinally to hold the shoe in firm conductive contact with the rail 58 by the inner wheel 33 running on the guide rail 34. The independent conductive third rail constitutes an easy path of substantially uniform resistance for transmitting the electro-
55 plating current, and so avoids the interposition of variable resistance due to operating conditions at different points along the travel of the carriages. By the means described the maintenance of uniform conditions is made
60 easy and the production of a uniform standard of work is assured.

What I claim is:

1. In a coating apparatus, the combination
65 with a plurality of tanks including partitions between them of a carriage for conducting the

objects to be coated through the tanks, an object support depending from the carriage, a double rail track supporting the carriage, wheels on the carriage running upon the rails of said track, a fixed rack between the rails
70 of said track, a gear mounted on the carriage above the rack, and engageable with the rack for lifting the object support over the partitions between adjacent tanks and a guide at
75 either side of said rack for bringing said pinion into register therewith.

2. In a coating apparatus, the combination with a tank having partitions therein of an endless conveyor above the tank, a carriage driven by the conveyor, an article support carried by the carriage, a pinion on the
80 carriage operable to lift the support over the partitions of the tank, a rack in the path of the pinion at the lower side thereof, and an overhead track engaging the carriage for
85 holding the pinion down in meshing relation with the rack.

3. In a coating apparatus, the combination with a tank of a carriage guided above the tank, a crank on the carriage supporting the
90 articles to be coated, a pinion for turning the crank, stationary means in the path of the pinion for causing it to rotate to lift the articles over the tank walls, and stationary means
95 also in the path of the pinion for operating it to cause the crank to oscillate without lifting the articles from the tank.

4. In a coating apparatus, the combination with a tank of a carriage guided above the tank, an article carrier mounted on the carriage, a pinion on the carriage operable to
100 lift the article carrier over a tank wall, a rack mechanism for operating said pinion, and means additional to said rack mechanism for operating the pinion to agitate the article
105 carrier without lifting the articles from the tank.

5. In a coating apparatus, the combination with a tank of a carriage guided above the tank, an article carrier mounted on the carriage, means for lifting the article carrier
110 over a tank wall, comprising a pinion on the carriage, and a fixed rack, and an occasional toothed rack cooperative with the pinion to agitate the article carrier in the tank.
115

6. In an electroplating apparatus, the combination with an electroplating tank, of a carriage movable above the tank to conduct articles through it, an electrical conducting rail running along one side of the path of the carriage, forming part of a closed circuit for the electroplating current, a shoe on the carriage projecting laterally therefrom, and means pressing the shoe endwise into contact
125 with the rail.

In testimony whereof I have affixed my signature to this specification.

ALFRED B. SCHUPP.