N. H. RAYMOND.

APPARATUS FOR ELECTROPLATING TUBES.

APPLICATION FILED AUG. 1, 1914.

1,215,856.

Patented Feb. 13, 1917.

2 SHEETS—SHEET 1.

Fig. 1.

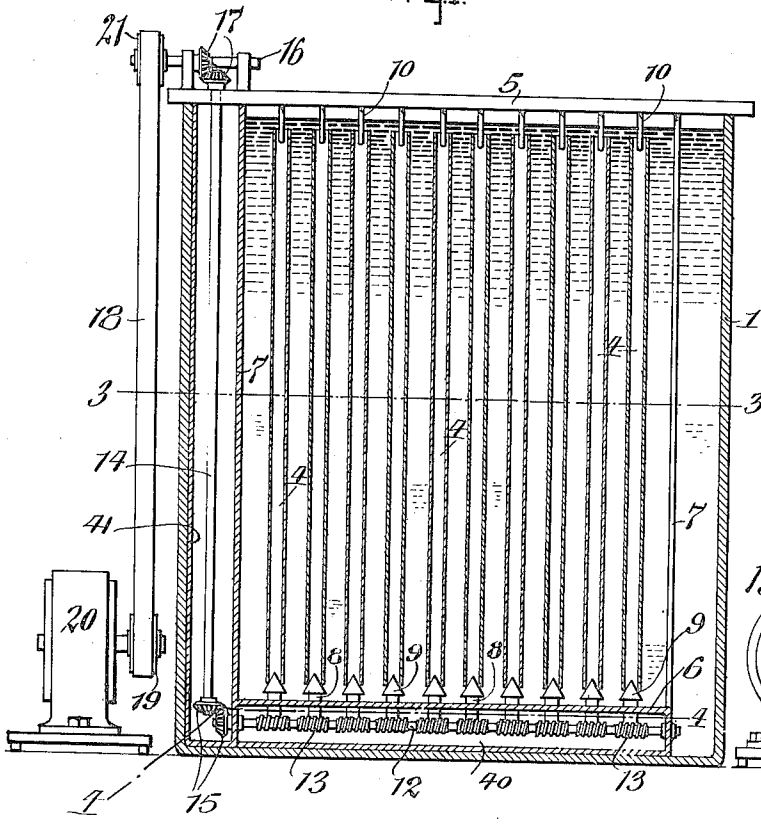


Fig. 2.

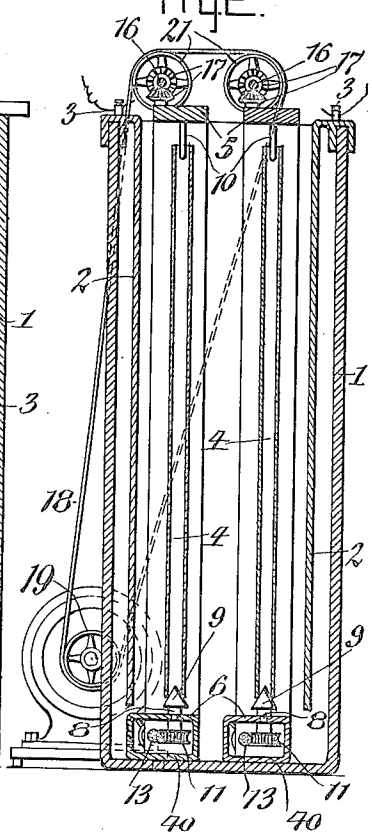


Fig. 3.

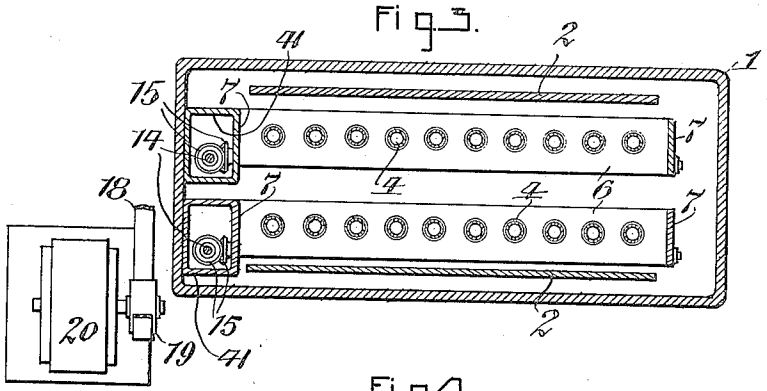
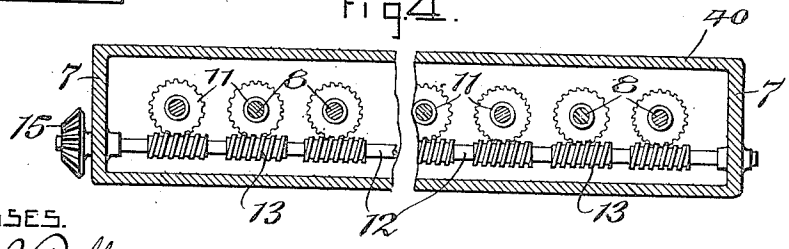


Fig. 4.



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2 SHEETS—SHEET 2.

Fig 5.

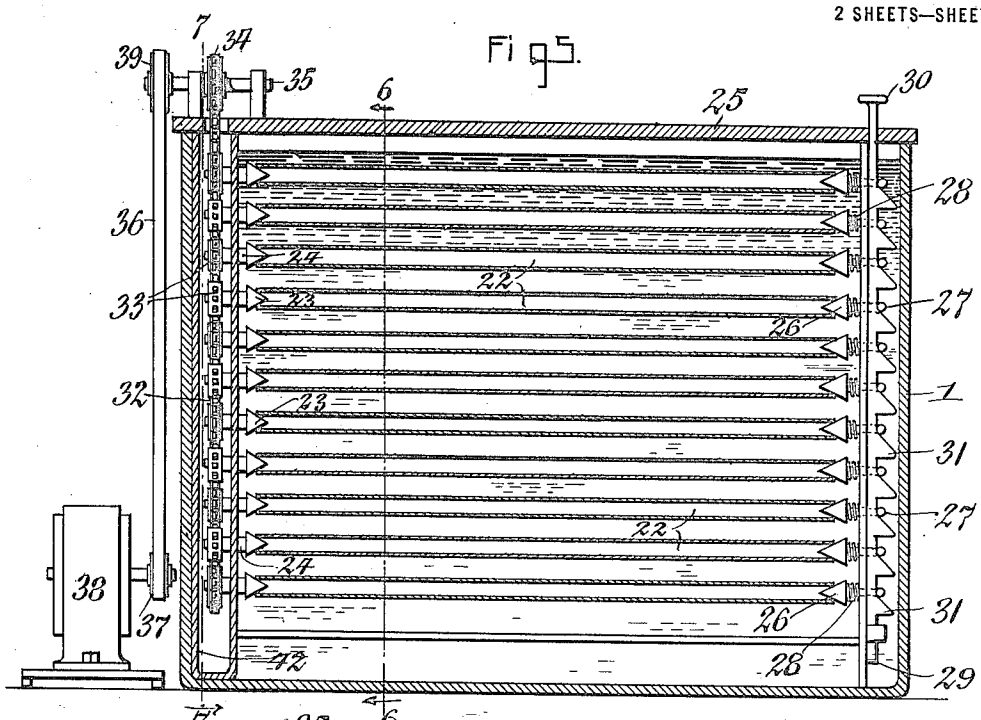


Fig 6.

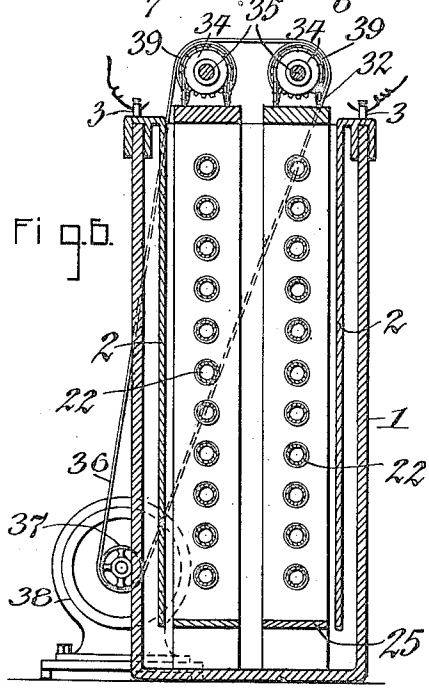
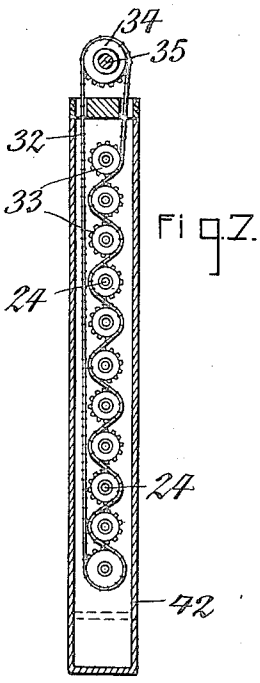


Fig 7.



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APPARATUS FOR ELECTROPLATING TUBES.

1,215,856. Specification of Letters Patent. Patented Feb. 13, 1917.

Application filed August 1, 1914. Serial No. 854,552.

To all whom it may concern:

Be it known that I, NELSON H. RAYMOND, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented new and useful Improvements in Apparatus for Electroplating Tubes, of which the following is a specification.

This invention relates to an apparatus for electroplating tubes.

The means heretofore employed for electroplating tubes rendered it difficult to plate the tubes uniformly over the entire surface thereof inasmuch as the tubes were so arranged that the surfaces thereof were arranged different distances from the anode.

It is the object of the present invention to provide means for so mounting and operating the tubes which are to be electroplated that each tube presents all parts of its surface successively to the anodes in the same relation so that a uniform deposit of metal will be obtained over the entire surface thereof.

In the accompanying drawings: Figure 1 is a vertical longitudinal section of one form of tube electroplating apparatus which embodies my invention. Fig. 2 is a vertical transverse section of the same. Fig. 3 is a horizontal section thereof taken in line 3—3, Fig. 1. Fig. 4 is a fragmentary horizontal section, on an enlarged scale, taken in line 4—4, Fig. 1. Fig. 5 is a vertical longitudinal section of a tube electroplating apparatus showing another form embodying my invention. Figs. 6 and 7 are vertical transverse sections taken in the correspondingly numbered lines in Fig. 5.

Similar characters of reference indicate corresponding parts throughout the several views.

Referring to the construction shown in Figs. 1–4, 1 represents the tank which is adapted to contain the electroplating solution and the means for supporting the tubes to be plated within this tank for depositing the metal on the same. This tank may be constructed of any suitable material and form but as shown in the drawings the same is of oblong form and closed at the bottom, end and sides but open at the top.

Arranged lengthwise within the tank and preferably adjacent to the longitudinal walls thereof are two anodes 2 of the desired metal to be deposited upon the tubes. These anodes may be supported and connected with an electric generator in any suitable manner but as shown in the drawings the same are mounted at their upper ends on the upper edges of the side wall of the tank and provided with binding posts 3 for connection with the electric generator.

4 represents a plurality of tubes which are to be electroplated on their external surfaces. Although these tubes may be arranged in any suitable manner they are shown represented in Figs. 1, 2 and 3 as being arranged in an upright position in two rows arranged lengthwise and parallel between the two electrodes. Each of these rows of tubes is supported within the tank and provided with means for rotating each individually about its own axis. The means may be varied but those shown in Figs. 1, 2 and 3 comprise a movable rack capable of being lowered into the tank and raised out of the same and having lower and upper horizontal bars 5, 6 and upright end bars 7, 7 connecting the corresponding ends of the horizontal bars. The lower bar is provided with a plurality of upright driving spindles 8, journaled in a row in suitable vertical bearings on the lower bar and each provided at its upper end with an upwardly tapering conical chuck head, center or stem 9 which is adapted to enter the lower end of one of the tubes and engage the same frictionally with a sufficient grip to cause the tube to turn with the stem and its spindle by the weight of the tube resting on the stem. The upper ends of the tubes are held in alinement with the driving spindles and stems by a plurality of centering pins 10 depending from the underside of the upper rack bar and each engaging loosely with the upper end of one of the tubes to be plated. The tubes are mounted by first passing their upper ends upwardly around the centering pins, then swinging their lower ends over the stems and then lowering the tubes so that their lower ends surround the stems and rest on the same. The tubes are preferably mounted on the rack and removed therefrom while the latter is lifted out of the tank.

The rotation of the spindles may be effected by means which comprise a plurality of worm wheels 11 each secured to the lower

end of one of the spindles, a horizontal shaft 12 journaled lengthwise in suitable bearings on the lower part of the rack and provided with a plurality of worms 13 each of which meshes with one of the worm wheels, an upright shaft 14 journaled in suitable bearings at one end of the rack and connected at its lower end by intermeshing bevel gear wheels 15 with one end of the lower horizontal shaft, an upper horizontal shaft 16 journaled in suitable bearings on top of the rack and connected by intermeshing bevel gear wheels 17 with the upper end of the upright shaft, and a belt 18 passing around the pulley 19 of an electric motor 20 and a pulley 21 arranged on the upper horizontal shaft of the driving mechanism of both rows of tubes, as shown in Figs. 1 and 2.

Upon turning the several tubes when thus mounted in the solution of the tank, these tubes and the anodes are connected to form part of an electric circuit so that a coating of metal will be deposited electrically on the tubes and distributed uniformly and evenly over the entire surface of each tube inasmuch as all parts of each tube are successively brought into the same relation to and the same distance from the companion anodes, thereby causing the electroplating action to be alike on all parts of each tube and insuring an even and uniform product.

If desired the tubes 22 to be plated may be arranged horizontally in the rack in form of vertical rows, as shown in Figs. 5 and 6. In this case one end of each tube engages with one of a plurality of live conical centers or stems 23 mounted on horizontal live spindles 24 which are journaled in a vertical row on the rack 25 which is removably arranged in the tank containing the electroplating solution while the other end of each tube engages with conical centers or stems 26 arranged on horizontal dead spindles 27 journaled in a vertical row in bearings on the rack and held yieldingly in engagement with the tubes by a plurality of springs 28 each of which surrounds one of the dead spindles and is interposed between the companion dead stem and the adjacent part of the rack, as shown in Fig. 5.

For mounting the tubes on the conical stems or centers or dismounting the same therefrom the dead spindles may be retracted by means of a vertically movable shifting bar 29 guided on the rack 25 and provided at its upper end with a handle 30 for manipulating the same and within the tank with a plurality of inclines or wedges 31 which engage the stems 27 and are so constructed that upon lifting the shifting bar the several dead spindles will be retracted to release the tubes while upon lowering the shifting bar the springs 28 are permitted to press the conical stems of the dead spindles against the adjacent tubes.

In the construction shown in Figs. 5, 6 and 7 the tubes are turned so that each rotates individually about its own axis by a chain belt 32 passing around sprocket wheels 33 on the several live spindles and a sprocket wheel 34 on a horizontal shaft 35 journaled in suitable bearings on the upper side of the rack 25, and a belt 36 passing around a pulley 37 on the shaft of an electric motor 38 and pulleys 39 on the shafts 35 forming part of the mechanism for driving the two vertical tiers of tubes, as shown in Fig. 6.

In order to prevent the gearing which rotates the tubes from becoming electroplated the same may be protected in various ways, for instance, as shown in Figs. 1–4 the worms, worm wheels and adjacent parts may be inclosed by a hood, casing or housing 40, and the upright shaft and associated gearing may be covered by a casing 41, and in the construction shown in Figs. 5–7, the sprocket chain and wheels on the live spindles may be housed in a casing 42.

My invention permits of electroplating tubes expeditiously, economically, uniformly and at low cost.

I claim as my invention:

1. An electroplating apparatus comprising a tank adapted to hold an electroplating solution, anodes arranged within said tank, and means for supporting a tube to be plated in said tank and turning the same about its axis comprising a rotatable driving spindle having a conical end adapted to engage with one end of said tube, a rack on which said spindle is journaled, and means for turning said spindle comprising a worm wheel arranged on said spindle, and a worm journaled on said rack and meshing with said worm wheel.

2. An electroplating apparatus comprising a tank adapted to contain an electroplating solution, and means for supporting a tube to be plated in an upright position in said tank and rotating the same about its axis comprising a rack arranged in said tank, a vertical driving spindle journaled on the lower part of said rack and provided at its upper end with a conical stem engaging with the lower end of said tube, a vertical centering pin arranged on the upper part of said rack and entering the upper end of said tube, and means for turning said spindle, comprising a worm wheel arranged on said spindle, a horizontal shaft journaled on the rack and provided with a worm wheel, and an upright shaft journaled on the rack and operatively connected at its lower end with said horizontal shaft.

3. An electroplating apparatus comprising a tank adapted to hold an electroplating solution, anodes arranged in said tank, and

means for supporting a tube to be plated in said tank and turning the same about its axis comprising a spindle rotatable about its own axis and having a conical end adapted to engage with an end of said tube, a support on which said spindle is journaled, and means for turning said spindle.

Witness my hand this 15th day of July, 1914.

NELSON H. RAYMOND.

Witnesses:
E. M. GRAHAM,
ANNA HEIGIS.