S. S. JACOBSEN.

ELECTROPLATING APPARATUS.

APPLICATION FILED FEB. 15, 1910.

981,196. Patented Jan. 10, 1911.

2 SHEETS—SHEET 1.

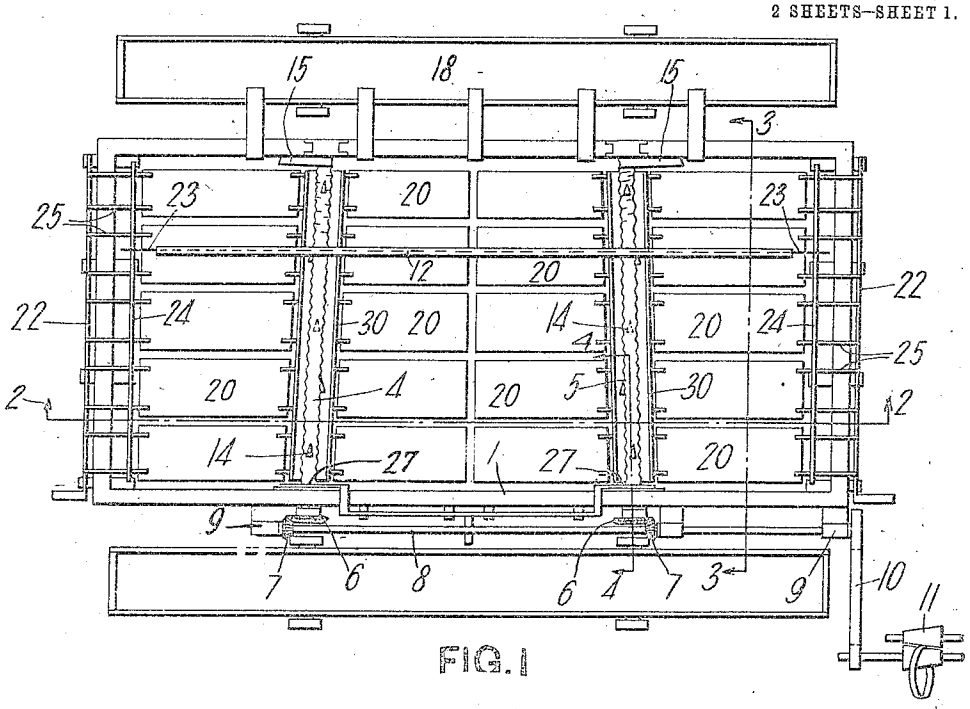

FIG. 1

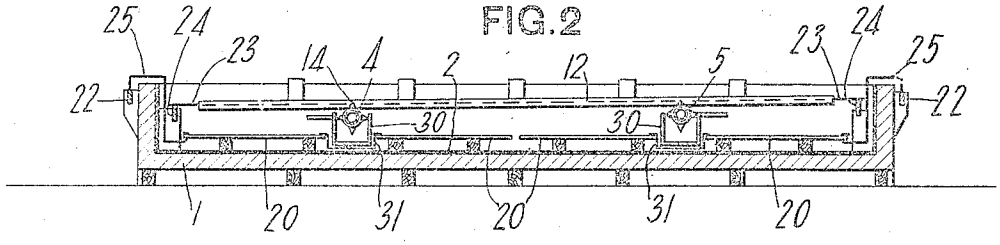

FIG. 2

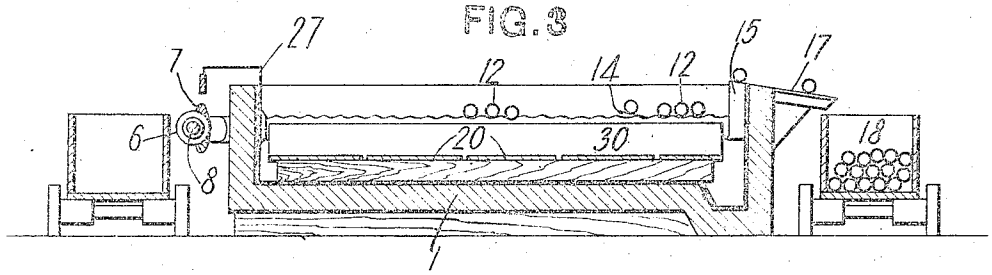

FIG. 3

WITNESSES.

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2 SHEETS—SHEET 2.

FIG. 4

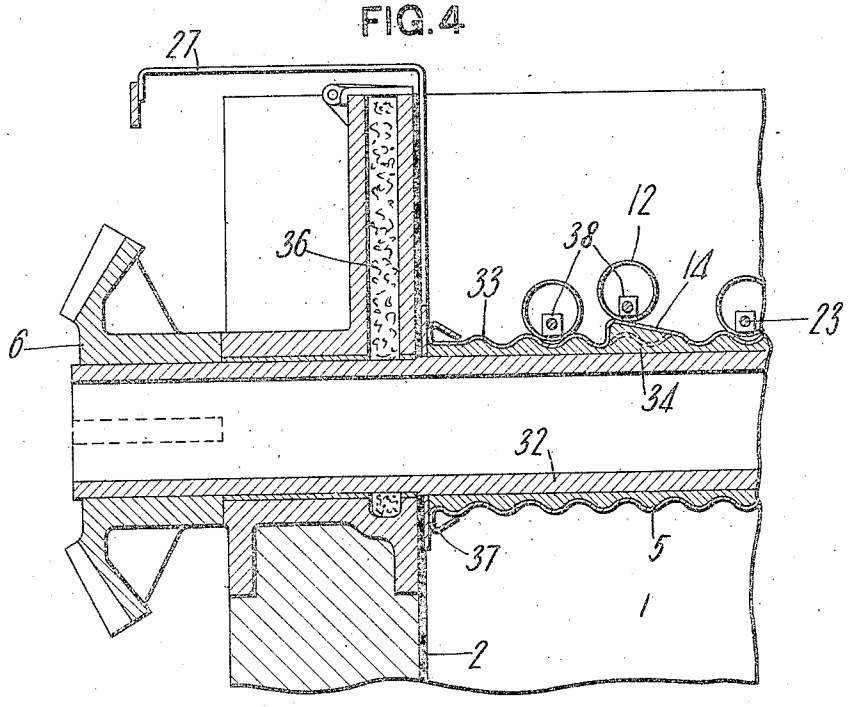


FIG. 6

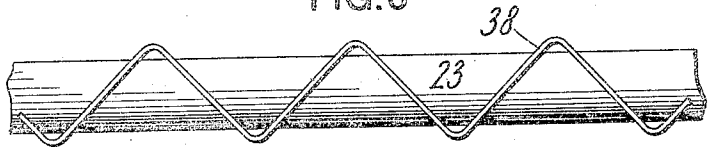
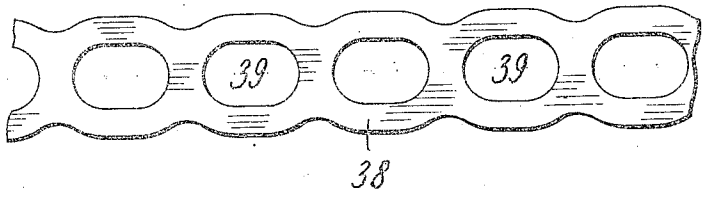


FIG. 5



WITNESSES.

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ELECTROPLATING APPARATUS.

981,196. Specification of Letters Patent. **Patented Jan. 10, 1911.**

Application filed February 15, 1910. Serial No. 544,060.

To all whom it may concern:

Be it known that I, SÓREN SANNE JACOBSEN, a resident of Beaver, in the county of Beaver and State of Pennsylvania, have invented a new and useful Improvement in Electroplating Apparatus, of which the following is a specification.

This invention relates to electro-plating apparatus and more particularly to apparatus for electro-plating long cylindrical or circular objects such as rods, tubes, etc.

The object of the invention is to provide apparatus for the purpose stated which is of simple construction, practically automatic in the feeding and delivery of the articles to be plated and whereby tubes can be plated either inside or outside, or both inside and outside.

The invention comprises the construction and arrangement of apparatus hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a plan view of the apparatus; Fig. 2 is a longitudinal section thereof on the line 2—2 of Fig. 1; Fig. 3 is a transverse section on the line 3—3 of Fig. 1; Fig. 4 is a sectional detail view on the line 4—4 of Fig. 1; and Figs. 5 and 6 are detail views of the means for insulating the core.

The apparatus comprises a suitable tank 1 which may be constructed of any suitable material and which is preferably provided with a lining 2 of suitable insulating material, such lining being preferred no matter of what material the tank may be constructed and being necessary when the tank is constructed of conducting material.

In the side walls of the tank, or in a suitable frame or support, are suitable bearings in which are journaled transversely arranged feeding screws 4 and 5. These screws may be driven from any suitable mechanism, the drawing showing the screw shafts provided with bevel gears 6 meshing with similar gears 7 on a longitudinal shaft 8 mounted in bearings 9 secured to the side walls of the tank and arranged to be driven from any suitable source. One of the screws 4 and 5 is right hand and the other is left hand; and the gears 7 engage respectively on opposite sides with the gears 6, in order to rotate the screws in opposite directions and prevent feeding the tubes or rods being coated endwise. Preferably, the driving means will be arranged to secure varying speeds so as to vary the rate of travel of the articles through the tank in order to secure a coating of greater or lesser thickness. As shown, the shaft 8 is driven by means of belt 10 from suitable and reversely arranged cone pulleys 11 or any suitable means whereby a change of speed can be secured.

In order that the screws do not bear continually against the same portions of the tubes or other articles being coated, said screws are arranged slightly diagonally or converging toward one end. The pipes or bars to be coated are shown at 12.

In order to rotate the articles being coated while carrying them sidewise through the tank, the screws are provided at intervals with projections 14 which incline toward the delivery ends of the screws, and which, when they come underneath the pipe or bar, lift the same and cause the same to roll down the said projections, as will be readily apparent. The screws, at their delivery ends are provided with lifting arms 15 which have their ends inclined so that when in vertical position they slope outwardly, as is shown in Fig. 3. These arms lift the tubes or bars being coated above the side wall of the tank and allow the same to roll off the same and down inclined guides or ways 17 to any suitable receiving means, such as the truck or wagon 18. Preferably, one of the screws 4 and 5 is slightly higher than the other, or one slightly larger in diameter than the other, in order to allow air to escape from the tubes being coated and permit the plating solution to enter. So, too, one of the lifting arms 15 is slightly longer than the other, so that when the tube is lifted, it will be slightly inclined in order that the plating solution may drain out.

The anodes are shown in form of plates 20 arranged longitudinally of the tank and connected by means of conductors 21 to an external bus-bar 22 which will be connected to the positive terminal of the circuit. When tubes are to be coated internally, I provide internal anode cores 23, the ends of which are arranged to roll along internal bus-bars 24, which are connected by conductors 25 to the external bus-bars 22. The tubes or bars being coated form the cathode. To this end the screws upon which the articles are supported are connected by conductors 27 to the negative terminal of the circuit. By the arrangement described tubes can be coated internally as well as externally, as will be readily understood by those

skilled in the art. In order to prevent excessive coating of the screws on which the articles are supported, said screws are somewhat protected by means of transverse shells or boxes 30 formed of insulating material and extending up into proximity to the top surfaces of the screws. These boxes break the direct flow of current from the anode plates 20 to the screws. On account of these boxes, the anode plates 20 are formed in sections, adjacent ends of which are united by means of conductors 31 extending underneath the insulating boxes 30.

To prevent leakage of current the screws 4 and 5 are not made solid but as shown in Fig. 4, that is, composed of an internal shaft 32 and an external metal, such as copper, sleeve or shell 33 in which the screw threads are formed. The sleeve is separated from the shaft by a layer of insulating material 34, such as cement, asphaltum, or the like. The circuit connectors 37 are connected to the sleeves 33 and are located just inside of the insulating lining of the tank. To prevent portions of the bath or solution leaking out around the journals of the screw shafts 32, the bearings of the latter are provided with transverse seats 36 which are filled with waste or the like, saturated with oil or grease and which acts as a stopper or stuffing-box for the solution. An ordinary stuffing-box may also be used.

In order to prevent the anode cores 23 from contacting with the interior of the tubes, I provide suitable non-conducting spacers, shown in the drawings as a strip 38 of some non-conducting fabric, preferably sheet rubber, having holes or slots 39 cut therethrough at intervals, through which holes the anode cores are threaded, thereby giving said strip a wavy or fluted shape, and forming projections which hold the anode core spaced from the walls of the tube.

The apparatus illustrated and described is of simple construction, requires no considerable power to operate, and provides for the automatic feeding of the articles through the tank and the delivery therefrom. The articles may be moved across the tank at any desired rate of speed in order to secure any desired thickness of coating thereon. All parts are thoroughly insulated and the parts are so arranged as to get perfect coating. The labor cost of operating is reduced to a minimum, as a single operator can attend to a number of tanks. The feeding of the material is effected entirely by engagement therewith from below, so that the machine cannot break or get out of order if several tubes should come too close to each other.

The feeding screws and their mechanism may be mounted in a frame which is loose in the tank, so that they can be lifted out of the solution for repairs or over night. Since the feeding means engage the articles entirely from below, it leaves the top entirely free and unobstructed for inspection, and in case of a break down in the driving mechanism the articles may be fed by pushing them along with a stick or the like.

Various changes may be made in the construction and arrangement of parts without departing from the spirit of the invention.

What I claim is:

1. Electro-plating apparatus comprising a tank, a pair of right and left supporting and feeding screws mounted transversely therein below the level of the solution in the tank, electrical connections to said screws, and mechanism for rotating said screws in opposite directions.

2. Electro-plating apparatus comprising a tank, a pair of right and left supporting and feeding screws mounted transversely therein below the level of the solution in the tank and converging toward one end, electrical connections to said screws, and mechanism for rotating said screws in opposite directions.

3. Electro-plating apparatus comprising a tank, a pair of supporting and feeding screws mounted transversely therein below the level of the solution in the tank, projections on said screws having faces sloping longitudinally of the screws and arranged to lift the articles and cause the same to roll, and mechanism for rotating the screws.

4. Electro-plating apparatus comprising a tank, a pair of supporting and feeding screws mounted transversely therein, electrical connections to said screws, lifting and delivery arms on the delivery end of said screws, and mechanism for rotating said screws.

5. Electro-plating apparatus comprising a tank, a pair of supporting and feeding screws mounted transversely therein, mechanism for rotating the screws, projections having sloping faces arranged longitudinally of the screws and arranged to lift the articles and cause the same to roll, and lifting and delivery arms at delivery ends of said screws.

6. Electro-plating apparatus comprising a tank, a pair of right and left supporting and feeding screws mounted transversely therein below the level of the solution in the tank, mechanism for rotating said screws in opposite directions, connections from the negative terminal to said screws, and anodes arranged in said tank.

7. Electro-plating apparatus comprising a tank, supporting and feeding screws mounted transversely therein, negative circuit connections to said screws, anode plates in said tank, and insulating shells partly inclosing said screws.

8. Electro-plating apparatus comprising a tank, supporting and feeding screws

mounted transversely therein, and each comprising a shaft, a spiral conducting member, insulating material between said shaft and spiral member, and negative circuit connections to said spiral member.

9. Electro-plating apparatus comprising a tank, supporting and feeding screws mounted in said tank and each comprising a shaft, a shell provided with spiral grooves, insulating material between said shaft and shell, negative circuit connections to said shells, and mechanism for rotating said screws.

10. Electro-plating apparatus comprising a tank, journal bearings in the walls of said tank, supporting and feeding screws mounted in said bearings, said bearings being provided with recesses arranged transversely to the journal of the screws, and a filling of oily material in said recess.

11. An apparatus for electro-plating tubes or pipes, comprising a tank, transversely arranged supporting and feeding screws therein, negative circuit connections to said screws, anode cores arranged to be inserted in the tubes, and transversely arranged positive conductors contacted by said anode cores.

12. Apparatus for electro-plating pipes and tubes, comprising a tank, a pair of transversely arranged supporting and feeding screws therein, negative circuit connections to said screws, anode plates arranged in the bottom of the tank, anode cores arranged to be inserted in the tube, and transverse conductors to be contacted by the ends of said anode cores.

13. Electro-plating apparatus comprising a tank, a pair of rotatable supporting and feeding members mounted transversely therein below the level of the solution in the tank, a series of projections on each of said members having faces sloping longitudinally thereof and arranged to lift the articles and cause them to roll, and mechanism for rotating said members.

14. Electro-plating apparatus comprising a tank, a pair of rigid rotary supporting and feeding members mounted transversely therein, negative circuit connections to said members, anode plates in said tank, and insulating shells partly inclosing said supporting and feeding members.

15. Apparatus for electro-plating tubes or pipes, comprising a tank, transversely arranged supporting and feeding members therein, negative circuit connections to said members, anode cores arranged to be inserted in the tubes, and transversely arranged positive conductors contacted by said anode cores.

16. Apparatus for electro-plating tubes and pipes, comprising a tank, a pair of transversely arranged supporting and feeding members therein, negative circuit connections to said members, anode plates arranged in the bottom of the tank, anode cores arranged to be inserted in the tube, and transverse conductors arranged to be contacted by the ends of said anode cores.

17. In apparatus for electro-plating tubes and pipes, an anode core, and an insulating spacing member on said core comprising a flexible member formed to provide a series of openings or slots separated by portions uniting the sides of said member and adapted to have the anode core threaded through said opening or slots and be thereby given a zig zag form.

18. In apparatus for electro-plating pipes and tubes, an anode core, and an insulating spacing member comprising a fabric strip provided with a series of openings or slits separated by portions uniting the sides of said strip and adapted to have the anode core threaded through said openings and be thereby given a zig zag form.

In testimony whereof, I have hereunto set my hand.

SÖREN SANNE JACOBSEN.

Witnesses:
F. W. WINTER,
JAS. L. WELDON.