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ELECTROPLATING AND LACQUERING APPARATUS.

APPLICATION FILED OCT. 9, 1915.

1,210,663.

Patented Jan. 2, 1917.

2 SHEETS—SHEET 1.

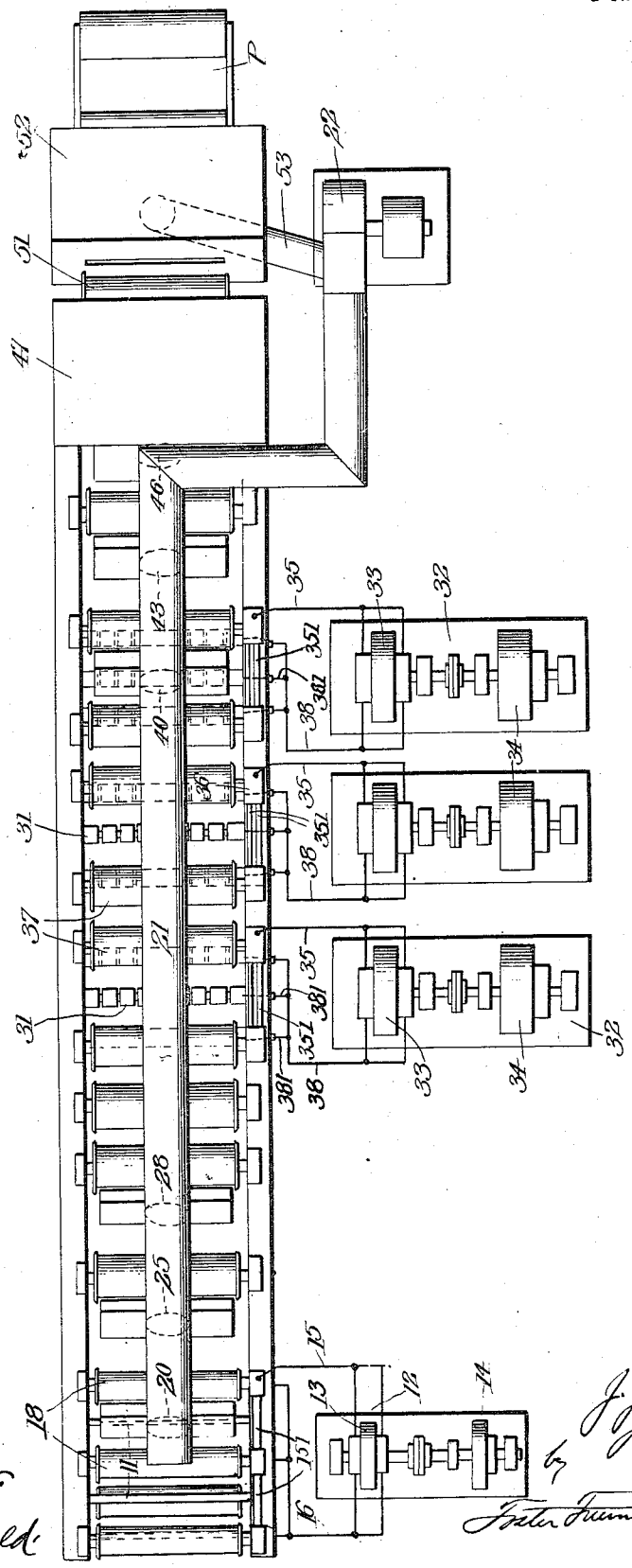


FIG. 1.

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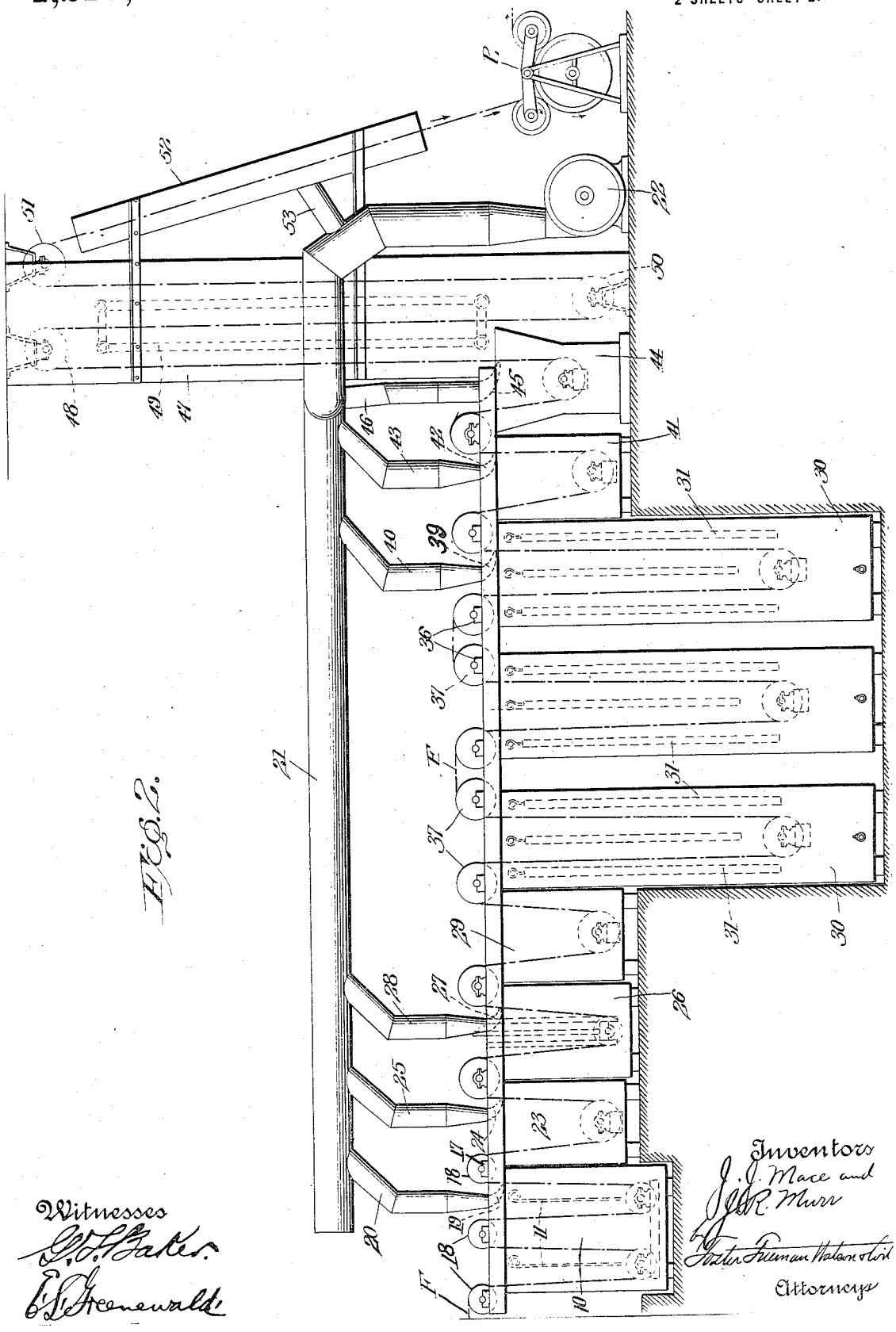


FIG. 2.

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UNITED STATES PATENT OFFICE.

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ELECTROPLATING AND LACQUERING APPARATUS.

1,210,663. Specification of Letters Patent. Patented Jan. 2, 1917.

Application filed October 9, 1915. Serial No. 55,038.

To all whom it may concern:

Be it known that we, JOHN J. MACE and JOHN ROY MURR, citizens of the United States, and residents of York, county of York, State of Pennsylvania, have invented certain new and useful Improvements in Electroplating and Lacquering Apparatus, of which the following is a specification.

This invention relates to an apparatus for electro-plating or galvanizing wire cloth and lacquering the same and its objects are to produce a more reliable and flexible means of electrically depositing metals on wire cloth.

To that end we provide an apparatus which comprises a plurality of electric generating units each complete in itself, the units being arranged so that they may be run separately or simultaneously to supply electric current to the anodes in the galvanizing tanks of the apparatus.

The apparatus also includes means for cleaning the material before it enters the galvanizing tanks and drying and lacquering the material after it leaves the galvanizing tanks, so that the material is galvanized and lacquered in one continuous operation as a finished product.

The above and other objects and the novel features of the invention will be apparent from the following description taken in connection with the drawings in which—

Figure 1 is a plan view of the electroplating and lacquering apparatus and Fig. 2 is a side elevation of the apparatus.

Referring to the drawings the apparatus comprises a series of tanks and chambers placed side by side and through which the material to be plated passes. The material 10 is in the form of a continuous flexible web of fabric and is drawn through the tanks and chambers by a pulling mechanism of any ordinary or preferred construction which is placed at the outlet end of the machine where the finished product comes out. In passing through the tanks and chambers and from one tank to the other the wire cloth or fabric passes over rollers at the tops of the tanks and under rollers at the bottoms of the tanks which serve to properly guide the fabric through the tanks and chambers.

Referring to Fig. 2 particularly, the fabric 10 is first treated in the tank 10 at the entrance end. This tank contains a lye solution in which are suspended two anodes 11 which receive electric current from a suitable machine 12 whereby the grease and dirt on the fabric is removed. The current supplying unit 12 consists of a low voltage high amperage electrolytic generator 13 driven by a suitable electric motor 14 mounted on the generator shaft. The current from the generator 13 is supplied by the main 15 to the bearings 17 of the upper rolls 18, the bearings 17 being connected together by the conductors 15, 15 and of suitable conducting material such as copper and the stub shafts which fit in the bearings 17 being of copper and connected to a copper hub and shaft in the center of the rolls 18 whereby the metal part of the fabric is electrically charged. The other main 16 of the generator is connected by means of a suitable distributor to the anodes 11, 11 which are suspended in the lye solution. In this way a current of electricity is caused to flow through the solution to clean the fabric. After the fabric 10 leaves the lye solution in the tank 10 it moves past a nozzle 19 from which a stream of air issues under pressure. The nozzle 19 is located at the end of a branch pipe 20 which is connected to an air pressure main 21 located substantially centrally above the series of tanks. Air under pressure is delivered to the main pipe 21 by a blower 22 and the air issuing from the nozzle 19 serves to blow the fabric free of the solution carried by it from the tank 10. After the fabric or wire cloth leaves the tank 10 it passes through a tank 23 of cold running water which is for the purpose of rinsing the cloth and removing therefrom the substances and lye solution carried by it from the tank 10. The excess water on the fabric as it leaves the tank 23 is blown off by air pressure through the nozzle 24 connected by the branch pipe 25 with the main air pipe 21. From the tank 23 the wire cloth passes into and through a tank 26 which contains an acid solution and is for the purpose of removing oxide from the wire cloth. After the wire cloth emerges from the tank 26 it moves past the nozzle 27 which directs a stream of air against the wire cloth and blows off the excess acid solution thereon. The nozzle 27 is connected to the main air pipe by a branch pipe 28. The wire cloth next passes through a tank 29 of cold running water which removes the excess acid from the wire cloth. The wire cloth is now prepared to be elec-

tro-plated. The electro-plating means comprises a plurality of serially arranged tanks 30, three in the present apparatus. They are substantially similar so a description of one of them will answer for all. The present machine is used for the purpose of galvanizing wire cloth but it is to be understood that the wire cloth may be coated with any suitable metal. For use in galvanizing wire cloth the tank 30 contains a solution of sulfate of zinc in which are suspended the zinc anodes 31, one anode on each side of the loop which the fabric describes in the tank and one within the loop.

In order to supply suitable electric current to the three tanks 30 we provide three separate electro-plating units 32 each consisting of a low voltage high amperage electro-plating generator 33 and an electric motor 34 for driving the same. The mains 35 of the generators are connected to the bearings 36 of the rolls 37 at the top of the tank, the bearings 36 being of suitable conducting material such as copper and the shafts at the ends of the rolls 37 also being conductors to conduct the current through the copper heads on the rolls to the copper sheets thereon, which sheets come into contact with the wire cloth which passes through the tanks 30. The pair of rolls at the top of each tank have the bearings 36 thereof electrically connected together by the conductor plates 351. The pairs of rolls are also connected together through the wire cloth. The other mains 38 of the generator are severally connected to the anodes 31 in the tanks 30 opposite the particular units by the branch wires 381.

It will be seen that a unit is provided for each separate tank in the present illustration and by suitable switches or other control means (not shown) any one or all of the units may be operated to supply current to the electro-plating apparatus. Heretofore only one dynamo has been provided for furnishing current to the electro-plating apparatus which in case of break down required the stoppage of the plant for repairs. By providing a plurality of units, if one breaks down the others will do the same work by running the cloth slower and thereby a stoppage of the plant is eliminated. By providing a plurality of galvanizing tanks connected to a plurality of electric generating units one or any number of the galvanizing tanks may be run depending on the thickness of the deposit desired. The solutions in the tanks may be progressively more concentrated beginning with the solution of the first tank into which the fabric enters, and the voltages of the current supplied to the series of tanks may also be progressively increased. Such an arrangement of tanks and generator units is therefore important since the initial deposit can be applied by a weak current and weak solution while the fabric is rapidly passing through the tank. This initial deposit prepares the fabric for rapid treatment in a more concentrated solution by a current of greater voltage, since if the fabric is initially treated by a current having a comparatively high electro-plating voltage the fabric may be damaged by arcing, whereas if the initial deposit is deposited by a lower voltage the fabric will already have a coating when it reaches the succeeding tanks and in the latter the voltage can be increased without injuring the fabric and the deposit of the desired thickness can be secured much more rapidly. A further important superiority in the quality is obtained by initially depositing the metal on the fabric from a weak solution by a low voltage, and this superiority in quality is due to the fact that the first coating according to tests appears to become more intimately united to the material composing the fabric than where the material is deposited from the concentrated solution by a current of comparatively high voltage. By the arrangement as indicated greater flexibility and reliability are attained, insuring a larger output from this apparatus than from those in which only one galvanizing tank and one electro-plating dynamo is provided.

Just after the wire fabric leaves the third galvanizing tank it passes a nozzle 39 connected by the branch pipe 40 to the main air supply pipe 21 and serving to blow off of the fabric the excess solution carried upwardly by it. The fabric then passes into and through a tank 41 of running water which rinses the galvanizing solution off of the fabric. As the wire cloth F leaves the tank 41 it passes a nozzle 42 connected by a branch pipe 43 with the main air supply pipe 21 and the excess water is blown therefrom.

The wire cloth passes into and through a tank containing lacquer whereby the galvanized cloth is covered with a lacquer coating. Just after the wire cloth passes from the lacquer tank 44 it moves past the nozzle 45 which is connected by a pipe 46 to the pipe 21 and which blows off the excess lacquer on the wire cloth. It will be seen that the lacquer is applied while the wire cloth is still wet, thus eliminating the ovens or drying apparatus heretofore thought necessary steps before lacquer could be applied. The wire cloth then moves upwardly into a chamber 47 and around a guide roller 48 at the top of the chamber which guides the fabric down through a vertically arranged drying and baking oven 49. The wire cloth in passing through the oven 49 has the lacquer baked on the wire at about 140 degrees F. and from there the wire cloth passes

around a guide roll 50 and upwardly again through the drying chamber 47. At the top of the drying chamber 47 there is another guide roll 51 which guides the wire cloth downwardly into a cooling chamber 52 in which the lacquer on the wire cloth is set and hardened. The cooling chamber 52 is open at the top and bottom and is supplied with a cold air blast from the main air supply pipe 21 by a branch supply pipe 53. From the cooling chamber 52 the wire cloth passes around the pulling machine P and is ready to be rolled in packages for the market.

While we have shown a machine adapted particularly for galvanizing wire cloth it is to be understood that the invention is not limited to the particular plating material used or the particular article plated as the apparatus is adapted to electro-plate with suitable substances similar continuous and flexible materials such as wire, woven wire fabric, wire netting, etc., and furthermore we do not wish to be restricted to the exact details of construction as shown and described, as numerous changes may be made therein without departing from the spirit of the invention.

Having thus described our invention, what we claim and desire to secure by Letters Patent is:

1. An electro-plating apparatus comprising a plurality of separate electro-deposition tanks containing electro-plating solutions, said tanks being arranged in series and containing anodes, and means for supplying electro-plating current to said anodes and solutions in the separate tanks at the voltage or amperage desired for each tank.

2. An electro-plating apparatus comprising a plurality of separate serially arranged electro-plating tanks containing electro-plating solutions and provided with anodes and with means for guiding through the solutions in the tanks the material to be electro-plated, and a plurality of separate electric generating units connected with said anodes and arranged so as to furnish electro-plating current to the solutions in the different tanks at the voltage or amperage desired for each tank.

3. In a machine for electro-plating and lacquering flexible material, the combination with the electro-plating apparatus, of means adapted to lacquer the flexible material after it leaves the electro-plating apparatus and while the material is still wet.

4. In apparatus of the class described, the combination with a series of tanks containing solutions, of means for guiding a continuous web of flexible material through the solutions in said tanks, and means for removing from said web the excess solution carried by it out of said tanks, comprising a main fluid supply pipe extending longitudinally of the series of tanks, and branch pipes connected to said main pipe, said branch pipes terminating in nozzles extending across said web near the places where the web leaves the solutions and adapted to remove from said web the excess solution carried thereon out of said tanks.

5. In a machine for electro-plating and lacquering wire cloth, the combination of an electro-plating tank containing an electro-plating solution having anodes therein and provided with means for guiding wire cloth through the tank, a lacquer tank provided with means for guiding the wire cloth therethrough, and means for removing from the wire cloth the excess solution carried by it out of the electro-plating tank and the excess lacquer carried on it out of the lacquer tank.

6. In a machine for electro-plating and lacquering lengths of flexible material, the combination of a tank containing an electro-plating solution, said tank having means for guiding said flexible material through the solution therein, a lacquer tank provided with means for guiding the flexible material therethrough, and means for guiding the flexible material from the electro-plating tank to the lacquer tank and delivering the material to the lacquer tank while it is still wet.

7. In a machine for electro-plating and galvanizing wire cloth and similar material comprising means for removing the grease and dirt from said cloth, means for removing the oxid from said cloth, means for electro-plating said cloth, means for coating said cloth with lacquer, means for drying and baking the lacquer on said cloth, means for cooling the lacquered cloth to set and harden the lacquer and means for drawing the wire cloth through all of the foregoing means.

8. In a machine for electro-plating and lacquering wire cloth and similar material, the combination of a cleaning tank containing a solution for removing the grease and dirt from said cloth, a tank containing a solution for removing the oxid from said wire cloth, an electro-plating tank containing a solution and anodes and connected to electric generating means for depositing a metal covering on said wire cloth, a tank containing lacquer for coating the wire cloth with lacquer, means whereby the excess liquid carried out of each of said tanks on the wire cloth is removed therefrom just after it leaves each tank, means for drying and baking the lacquer on the wire cloth, means for cooling the wire cloth after it leaves the drying and baking means and means for pulling the wire cloth through the machine.

9. In a machine for electro-plating and lacquering wire cloth and similar material, the combination of a cleaning tank containing a solution for removing the grease and

dirt from said cloth, a tank containing a solution for removing the oxid from said wire cloth, an electro-plating tank containing a solution and anodes and connected to electric generating means for depositing a metal covering on said wire cloth, a tank containing lacquer for coating the wire cloth with lacquer, means for drying and baking the lacquer on the wire cloth, a cooling chamber through which said wire passes and in which the lacquer is set and hardened, an air pressure main, means connecting said air pressure main with said cooling chamber to supply a cold air blast thereto and branch pipes leading from the main pipe and terminating in nozzles adjacent the wire cloth at the points where it leaves the successive treating liquids, said nozzles directing a blast of air against the surface of said wire cloth to blow therefrom the excess liquid carried on the wire cloth.

10. In a machine for electro-plating and lacquering wire cloth and similar material the combination of an electro-plating apparatus, a lacquer tank, means for guiding the material from the electro-plating apparatus to the lacquer tank, an oven for drying and baking the lacquer on the material after it leaves the lacquer tank, a cooling chamber through which the material passes from the baking oven and in which the material is set and hardened and means for supplying cold air to said cooling chamber.

11. In a machine for electro-plating and lacquering wire cloth and other flexible material, the combination of a tank containing an electro-plating solution, said tank having anodes therein and means for guiding said flexible material through the solution therein, a lacquer tank provided with means for guiding the wire cloth therethrough, a wash tank between the electro-plating tank and the lacquer tank for washing the electro-plating solution from the wire cloth, means for leading the wire cloth directly from the wash tank to the lacquer tank so as to eliminate the drying of the wire cloth before the same enters the lacquer tank, and means for drying the lacquer on the wire cloth after the same leaves the lacquer tank.

In testimony whereof we affix our signatures.

JOHN J. MACE.
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