R. O. HOOD.

METHOD OF AND APPARATUS FOR ELECTROPLATING WIRE CLOTH.

APPLICATION FILED MAR. 1, 1916.

1,242,695.

Patented Oct. 9, 1917.

2 SHEETS—SHEET 1.

FIG. 1.

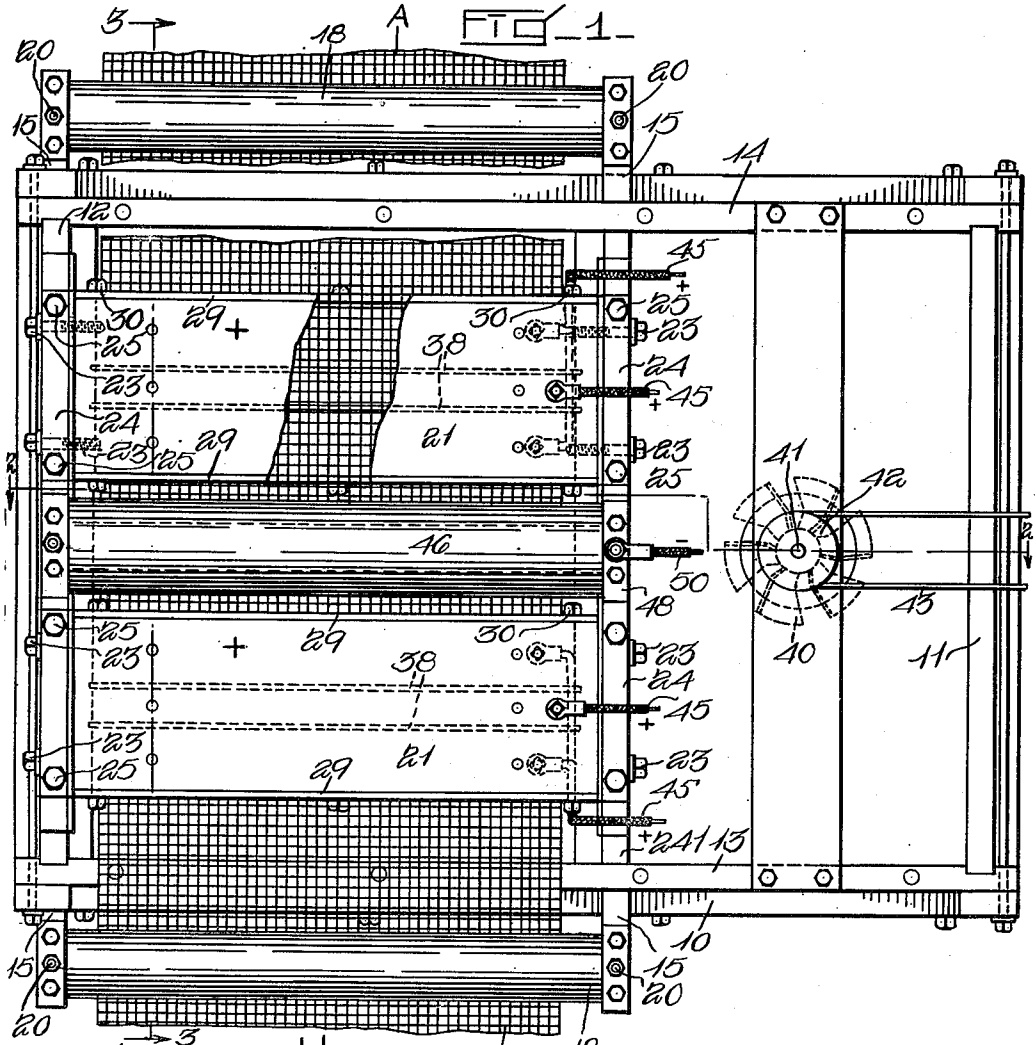
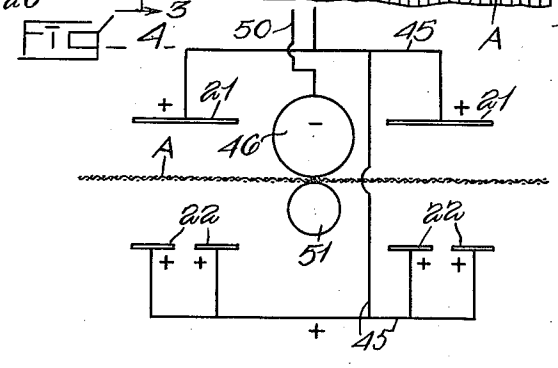


FIG. 4.



INVENTOR:
RALPH O. HOOD.

by Albright Brown Dunlap & Clay
ATTORNEYS

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FIG. 2.

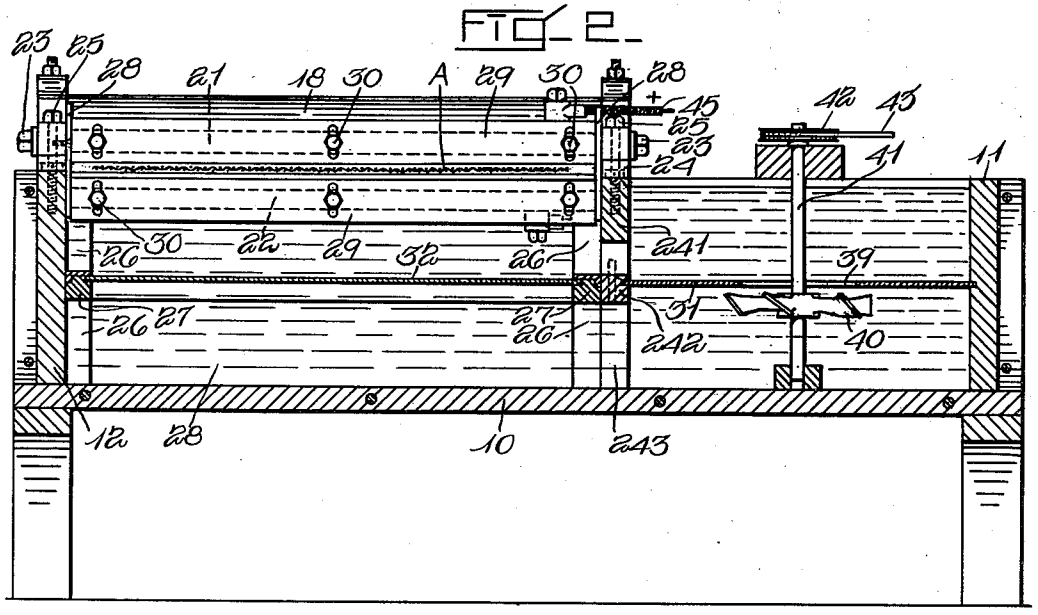
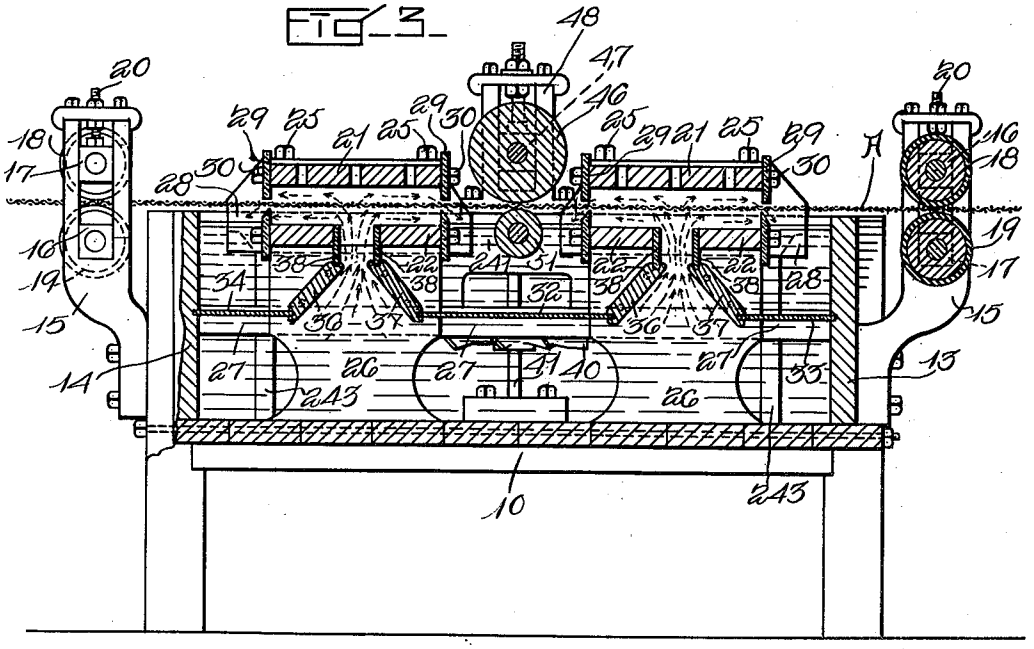


FIG. 3.



INVENTOR:
RALPH O. HOOD
By Albright Brown Cushman & Albright
ATTORNEYS

UNITED STATES PATENT OFFICE.

RALPH O. HOOD, OF DANVERS, MASSACHUSETTS, ASSIGNOR TO CLINTON WIRE CLOTH COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

METHOD OF AND APPARATUS FOR ELECTROPLATING WIRE-CLOTH.

1,242,695. Specification of Letters Patent. Patented Oct. 9, 1917.

Application filed March 1, 1916. Serial No. 81,385.

To all whom it may concern:

Be it known that I, RALPH O. HOOD, a citizen of the United States, residing at Danvers, in the county of Essex and State of Massachusetts, have invented new and useful Improvements in Methods of and Apparatus for Electroplating Wire-Cloth, of which the following is a specification.

This invention has relation to electroplating elongated materials, such as wires, perforated sheets, wire cloth or netting, and the like.

One of the objects of the invention is to provide a method and apparatus which may be employed for electroplating wire and wire cloth of different sizes from fine screens to cloths or fabrics made of thick wires or rods which are bent only with great difficulty.

It has heretofore been proposed to electroplate wires and wire cloth by passing the material into and out of the electrolyte, by conducting it alternately over and under rolls or guides, some of which were submerged in the electrolyte and the remainder arranged above the body of electrolyte. But such method and apparatus are limited to use in the treatment of wires and fabrics which can easily be caused to travel in a tortuous path and can therefore easily be bent, and have the infirmity that the bending of the fabric and the consequent relative movement of the warp and weft wires interferes with the smoothness of the electrolytic deposit and tends to rub away those portions of the deposit immediately surrounding the contact points at the crossing of the wires.

According to my invention, the article to be plated, whether it be a wire, a fabric or a perforated plate, is caused to travel in a straight line or plane through the electrolyte in proper relation to the anodes, and hence the objectionable bending thereof is obviated.

In the particular apparatus which I have illustrated and shall subsequently describe in detail, the article is caused to travel horizontally above the normal level of a body of electrolyte between, or in the presence of, anodes of suitable construction, and the electrolyte, by suitable means, is raised so as to flood the article and make proper contact with the anode or anodes.

On the accompanying drawings—

Figure 1 represents a plan view of an electroplating apparatus embodying the invention.

Fig. 2 represents a transverse section through the same.

Fig. 3 represents a longitudinal section on the line 3—3 of Fig. 1.

Fig. 4 represents a diagram of the electric circuit.

Before proceeding to describe the apparatus shown, I desire it to be understood that the invention is not limited to the details of construction and arrangement thereof, save as may be specifically mentioned in the claims, that many changes may be made therein without departing from the spirit and scope of the invention, and that the phraseology which I employ herein is for purposes of description and not of limitation.

The electrolyte or solution is contained within a tank formed of suitable material. As shown, the tank may with convenience be boxlike in construction with a bottom 10, front and rear walls 11 and 12, and end walls 13, 14. At each end of the tank are mounted suitable feeding or guiding means for the article to be coated. In the present case, to the exterior of each end wall are secured brackets 15, slotted to receive the square boxes 16, 17, in which are journaled the pairs of rolls 18, 19, shod with rubber, felt, or other cushioning material. The boxes 17 may be adjusted by screws 20 to effect a relative adjustment of the rolls of each pair. If desired, each pair of rolls may be rotated by any suitable means (not shown) though in the present case they are represented as idlers and serve merely to support and guide the article to be plated. It will be observed that a plane tangent to all four rolls is above and parallel to the plane of the top of the tank, so that said article (in this case a wire fabric A) passes across and above the electrolyte in the tank.

The anodes are arranged above and below the path of travel of the wire fabric. They are preferably, though not necessarily, arranged in pairs so that the fabric can pass between those of each pair, and it is quite apparent that as many pairs may be employed as may be deemed convenient or necessary. In the present instance, I have

shown two pairs, but it is evident that one pair may be omitted. The anodes are indicated at 21 and 22, the former being above the plane of travel of the wire fabric, and the latter being below it. For a purpose to be explained, each anode 22 consists of two separated sections. The anode 21 is secured at its ends by screws 23 to brackets or blocks 24 which are vertically adjusted by screws 25. One of said brackets is supported by the rear wall of the tank, and the other by a standard 241 placed on a longitudinal bar 242 resting on legs 243. The sections of the anode 22 rest upon wooden blocks or supports 26, resting on the bottom of the tank as shown in Figs. 2 and 3. Cleats or bars 27 extend between the blocks as shown. The anodes extend forwardly from the rear wall part way across the tank toward the front wall. To each side of each of the anodes is adjustably secured a plate 29 by means of screws 30 passed through slots therein, as shown in Fig. 2. These plates may be made of glass or other inert material, and they are so located as to leave a narrow slot between each pair thereof. At the ends of the anodes are the plates 28, secured to the upper brackets 23, and projecting downwardly past the ends of anodes 22.

I will now explain how the electrolyte is raised to flood the space between the anodes of each pair and completely to submerge that portion of the fabric which is passing between the anodes. This result may be secured by the means of any suitable pump. Across the tank I arrange a horizontal partition. This partition consists of plates 31, 32, 33, 34, of glass or other inert material, that at 31 being supported by the front wall 11, and by the longitudinal bar 242, and those at 32, 33 and 34 being supported by the cleats or bars 27, and the blocks or supports 26. Said plates 32, 33, 34 are spaced apart as shown in Fig. 3, the openings coinciding with the spaces between the sections of the anodes 22, but being somewhat wider. Two pairs of inclined converging plates 36, 37, extend toward the inner edges of the anode sections, and support plates 38 which project into the space between said sections. Said plates 38 are preferably made of glass, while those at 36, 37 may be made of wood or other inert material. The plate 31 of the partition is shown as having an aperture 39, below which is a pump 40 consisting in the present case of a bladed propeller on a rotary shaft 41 driven by a pulley 42 and a belt 43 from any suitable source of power. By virtue of the construction described, when the pump is in operation, there is a constant circulation of the electrolyte, which normally stands at approximately the level indicated, down through the aperture 39, and thence up through the converging ports or conduits formed by the plates 36, 37 and the plate 38, into the spaces between the anodes 21, 22, completely filling said spaces and submerging the wire fabric therein. The electrolyte escapes through the narrow openings between the edges of the plates 29 to that portion of the tank above the partition, and is again caused to circulate through the path just described. The spaces between the anodes, which are partially closed by the plates 29, and by cover plates 28 (at the ends of the anodes), form what may be termed anode chambers located above the normal level of the electrolyte in the tank. Electric current of the desired density may be conducted to the anodes in any suitable manner, as by conductors indicated at 45. The current is conducted away from the wire fabric by any suitable means, such for example as by wire brushes, or by rolls, at one or more points along the length of the wire. As a convenient instrumentality for this purpose, I have illustrated at 46 a metallic roll journaled in boxes 47 vertically adjustable in standards 48. One of said standards is supported by the rear wall 12 of the tank, and the other on the standard or support 241. Connected to one of the bearings for the roll is a conductor 50.

For the purpose of insuring a good electrical contact of the roll with the wire fabric, I employ a second or supporting idler roll 51 journaled in suitable bearings and located under the said fabric.

In Fig. 4, I have illustrated diagrammatically the electric circuit including the anodes, the wire fabric (which forms the cathode) and the roll which conducts away the current, and the conductors.

In operation, the wire fabric, the wires, the perforated sheet, or other elongated article to be plated, is fed lengthwise by any suitable means in a horizontal plane through the anode chambers, and, current being supplied from a proper source, the electrolyte is started in circulation by the pump and is caused to flood the said chambers and submerge the fabric therein. I have found that, by the method and apparatus described, I am able smoothly and expeditiously to coat the article with a deposit of the desired depth. The upper anode 21 may be provided with apertures as at 55, through which the operator may look, to assist him in properly adjusting it with reference to the lower anode, and through which some of the electrolyte can escape, when the apparatus is in operation, thus indicating to the operator that the electrolyte is being delivered in sufficient volume to the anode chamber completely to fill it. By adjusting the upper anodes, the rolls 18, and the roll 46 vertically, upward or downward as the case may be, the apparatus may be conditioned for operation on articles of different thicknesses.

It is quite evident that, in lieu of employing two spaced or separated anode chambers, with a single device between them for conducting the electrical current from the article to be treated, only one of said chambers, or else a greater number of said chambers, may be employed.

The rapidity of circulation of the electrolyte accomplishes several purposes. It insures that no portion of the solution or electrolyte becomes weakened or impoverished, and furthermore it causes a more rapid and smoother deposit than would otherwise be possible.

Having thus explained the nature of my said invention and described a way of making and using the same, although without attempting to set forth all of the forms in which it may be made or all of the modes of its use, what I claim is:

1. The herein described method of electroplating wire cloth which consists in passing the same in a horizontal direction through spaced horizontally arranged electrodes having flat confronting faces located above the normal level of a body of electrolyte, circulating said body of electrolyte in a constant stream through the space between said anodes, passing an electric current from said anodes to said wire fabric through that portion of the stream of electrolyte which is located between said anodes, and conducting away the current from said wire cloth.

2. The herein described method of electroplating elongated metal articles which consists in passing the same horizontally above the normal level of a body of electrolyte in the presence of an anode, flooding said article and the anode by raising the electrolyte above its normal level, and passing an electric current from said anode through said raised electrolyte to the said article.

3. The herein described method of electroplating elongated metal articles which consists in passing the same horizontally above the normal level of a body of electrolyte between spaced confronting horizontal anodes, and flooding the space between said anodes by forcing the electrolyte from the tank therethrough.

4. The herein described method of electroplating an elongated article which comprehends passing the same horizontally above the normal level of a body of electrolyte between horizontally arranged anodes, and circulating said body of electrolyte between said anodes to submerge the said article.

5. The herein described method of electroplating wire cloth which comprehends feeding said cloth longitudinally in a horizontal plane above and across a body of electrolyte and between spaced confronting anodes, and circulating the electrolyte through the space between said anodes to submerge that portion only of the cloth which is located between said anodes.

6. The combination of a tank adapted to contain a body of electrolyte, means for guiding an elongated article horizontally above the normal level of the electrolyte, a horizontally arranged anode located above the path of said article, and means for forcing a portion of said body of electrolyte into contact with said article and said anode.

7. The combination of means for guiding wire cloth in a horizontal plane, a horizontally arranged anode having a flat face parallel to the plane of the path of movement of said cloth, a tank for the electrolyte, and means for forcing said electrolyte from said tank through said cloth into contact with said anode.

8. The combination with a pair of horizontally arranged spaced anodes, means for guiding an elongated article to be coated between said anodes, and means for so circulating electrolyte through the space between said anodes as to submerge only that portion of the said article which is located in said space.

9. The combination with a tank adapted to contain a body of electrolyte, an anode chamber located above the normal level of the electrolyte in said tank but communicating with said tank, means for guiding an elongated article in a horizontal plane through said chamber, and means for circulating electrolyte from said tank through said chamber.

10. The combination of a tank adapted to contain a body of electrolyte, an anode chamber comprising flat parallel spaced anodes located above the level of the electrolyte in said tank, means for guiding an elongated flat article to be plated through said chamber, and means for circulating the electrolyte from said tank upwardly through said chamber.

11. The combination of a tank adapted to contain a body of electrolyte, spaced anode chambers arranged in the same horizontal plane, means for guiding an elongated article horizontally through said chambers, means for circulating the electrolyte from said tank upwardly through said chambers, and means located between said chambers adapted to contact with said article for conducting the electric current therefrom.

12. The combination of a pair of confronting anodes spaced apart to form a chamber, means for guiding an elongated article to be plated between said anodes, means for closing the ends of said chamber, and means for circulating electrolyte through said chamber.

13. The combination of a pair of horizontally arranged anodes spaced apart one over the other, to form a chamber, one of

said anodes being formed with an inlet opening, means for guiding an elongated article to be coated horizontally through said chamber, and means for forcing a stream of electrolyte through said inlet opening into and through said chamber.

14. In combination, a tank adapted to contain a body of electrolyte, a pair of horizontally arranged confronting anodes, spaced to permit wire cloth to be plated to be fed between them in a horizontal plane above the normal level of the electrolyte in said tank, and means for forcing said electrolyte in a stream through the space between said electrodes.

15. In combination, a tank adapted to contain a body of electrolyte, a horizontal partition arranged in said tank and having an opening, an anode chamber comprising horizontally arranged spaced confronting anodes, communicating with that portion of the tank below the partition, and a pump at said opening for circulating said electrolyte beneath the partition, thence through the said anode chamber, and thence through said opening in said partition.

16. An anode chamber comprising parallel anodes, cover plates at the ends of said anode plates, and plates at the sides of said anodes forming a slot for the passage of the article to be plated; in combination with means for circulating electrolyte through said chamber.

17. The combination of parallel anodes having a space between them, means for guiding an article to be plated between them, means for circulating electrolyte through said space, and means for effecting a relative adjustment of said anodes toward and from each other.

18. An apparatus for electroplating wire cloth, comprising a tank for containing a body of electrolyte and having end walls, means for guiding said cloth in a horizontal plane above the said end walls, confronting anodes above and below the path of travel of said cloth, and means for flooding the space between the anodes with electrolyte from said tank.

19. An apparatus for electroplating wire cloth, comprising a tank for containing a body of electrolyte, a horizontal partition across said tank, an anode compartment above said partition arranged to permit the passage of the wire cloth horizontally therethrough, a port or conduit leading from the space below the partition to said anode chamber, and means for forcing the electrolyte from below the partition upwardly into and through said anode chamber.

20. An apparatus for electroplating wire cloth, comprising a tank for containing a body of electrolyte, means for guiding wire cloth across the top of the tank, spaced confronting anodes having their active faces parallel to and respectively above and below the plane of said wire cloth, and means for forcing the electrolyte from said tank into the space between the anodes.

In testimony whereof I have affixed my signature.

RALPH O. HOOD.