M. M. MERRITT.

ELECTROLYTIC APPARATUS AND METHOD.

APPLICATION FILED AUG. 2, 1918.

1,335,175. Patented Mar. 30, 1920.

Fig. 1.

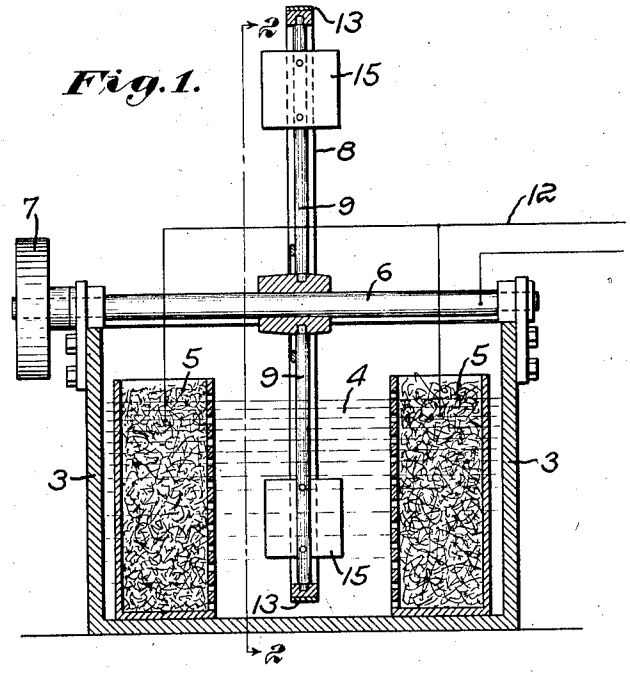
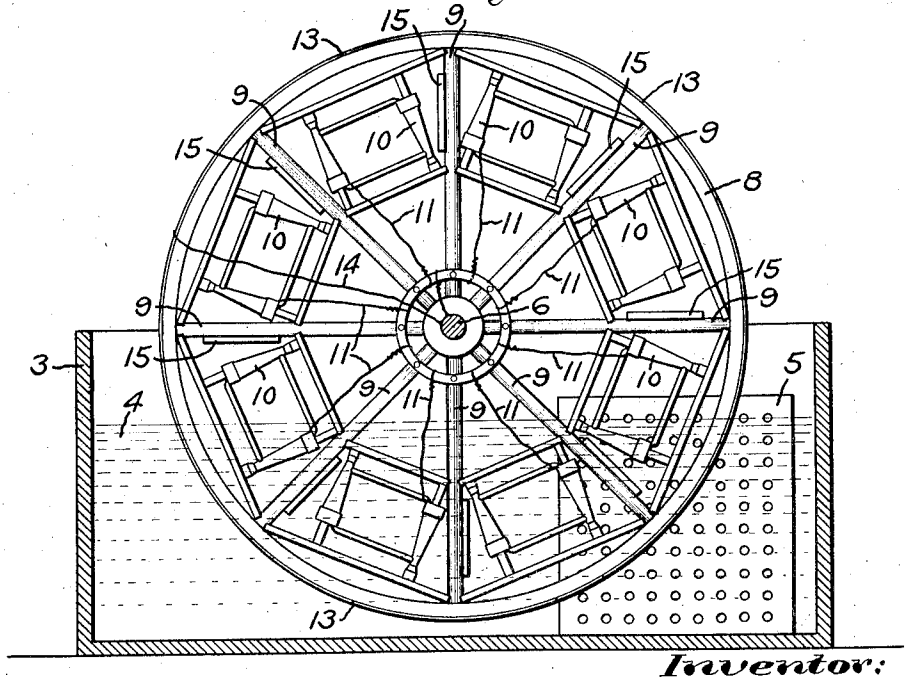


Fig. 2.



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UNITED STATES PATENT OFFICE.

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ELECTROLYTIC APPARATUS AND METHOD.

1,335,175. Specification of Letters Patent. Patented Mar. 30, 1920.

Application filed August 2, 1918. Serial No. 247,966.

To all whom it may concern:

Be it known that I, MATTHEW M. MERRITT, a citizen of the United States, and a resident of South Middleton, county of Essex, and Commonwealth of Massachusetts, have invented an Improvement in Electrolytic Apparatus and Methods, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention pertains to improvements in electrolytic apparatus and methods. I have elected to disclose the invention in connection with the manufacture of miscellaneous articles such as Venturi tubes for aeroplane speedometers, though the invention is equally applicable to the manufacture of numerous other articles such, for instance, as propeller tips, radiator tubes, artificial members and the like.

In the drawings, in which I have shown one form of apparatus constituting an illustrative embodiment of a preferred form of my invention, and wherewith my improved method may be practised:—

Figure 1 is a vertical section, partly in elevation, through my improved electrolytic apparatus; and

Fig. 2 is a vertical section, partly in elevation, on the line 2—2 of Fig. 1.

Referring to the drawings, I have shown a tank 3 containing the electrolyte 4 and anode boxes 5, and having a horizontal shaft 6 driven in any suitable way, typified by the pulley 7, and carrying a wheel 8 constituting a preferred form of cathode carrier. The wheel 8 is preferably immersed about one-third in the electrolyte, and is preferably rotated at such a rate that any given portion of the periphery thereof will be under the electrolyte approximately two seconds and out of the electrolyte approximately four seconds.

The preferred form of cathode carrier may be an ordinary wagon wheel having the iron tire removed therefrom and having spokes 9, herein shown as eight in number. The articles on which electrolytic deposit is to be formed may be supported between the spokes 9, and I have elected to show Venturi tubes 10 forming the cathode and preferably of fusible metal adapted to be readily melted from the copper shell after electro-deposition. The cathodes 10 may be connected to the shaft 6 by a wire 11, and the shaft 6 may receive current from any suitable source, the negative wire being connected by a wire 12 to the anodes 5, 5.

I have found that evenness of deposit is promoted by providing a conductive band 13, constituting one form of "thief", connected by a wire 14 to the shaft 6. The "thief" 13 takes up the excess of deposit and prevents the forming of nodules on that portion of the cathode farthest removed from the axis of the wheel 8. I have also found that smoothness of deposit is greatly assisted by providing plows or baffles 15, which may be conveniently attached to the spokes 9. These plows serve to create cross-currents of the electrolytic fluid as the various cathodes pass through the bath.

The method of operation of the preferred form of apparatus comprises the alternate immersion and emersion of each cathode, the period of emersion being approximately twice that of the periods of immersion, which preferably do not exceed two seconds for any given cathode. The plows 15 provide cross-currents of the electrolytic fluid which effectively prevent the adhesion of occluded hydrogen, cuprous oxid or dirt to the cathode, and the "thief" 13 takes up that excess of copper which would formerly tend to deposit on the outer portions of the cathodes.

The preferred operation of the apparatus is as follows. The various cathodes are fastened between the spokes in any suitable way and connected by suitable wires to the shaft 6. The "thief" 13 is also connected to the shaft 6. The anodes 5, 5, which are preferably formed of scraps of copper held in any suitable anode containers, are connected to the negative pole of a direct current circuit, and the shaft 6 is connected to the positive pole of said circuit. Before current is turned on, I preferably start the shaft 6 in rotation by applying power to the pulley 7. After current is turned on, the electrodeposit is continued until the desired thickness of copper has been deposited on the cathode. I have found that, by my improved method and with my preferred form of apparatus, I can secure copper of very

superior toughness and smoothness, and at the same time that I can utilize a considerably greater amount of current than where the cathode is constantly immersed in the bath or where the "thief" is omitted or plows are omitted.

Other applications of the method herein claimed are shown and claimed in my copending applications, Serial No. 247,967 filed August 2, 1918, Serial No. 254,633, filed September 18th, 1918, and Serial No. 247,964, filed August 2, 1918.

While I have disclosed a preferred form of apparatus it will be understood that changes therein involving alteration, substitution, omission and reversal of parts, and even changes in the method, may be effected without departing from the scope of my invention, which is best defined in the following claims.

Claims:

1. Electrolytic apparatus including a cathode support having provision for rapid and recurrent alternate immersion and emersion of the cathode in the electrolyte.

2. Electrolytic apparatus including a cathode support having provision for alternate immersion and emersion of the cathode in the electrolyte and a "thief" adjacent the cathode.

3. Electrolytic apparatus including a cathode support having provision for rapid and recurrent alternate immersion and emersion of the cathode in the electrolyte and a plow adjacent the cathode.

4. Electrolytic apparatus including a cathode support having provision for alternate immersion and emersion of the cathode in the electrolyte and a "thief" and plow adjacent the cathode.

5. Electrolytic apparatus comprising, in combination, a rotary cathode support for carrying a plurality of cathodes, said cathode support being partially immersed in the electrolyte, and a "thief" carried by said rotary cathode support at a greater distance from the axis thereof than the cathodes.

6. Electrolytic apparatus comprising, in combination, a rotary cathode support for carrying a plurality of cathodes, said cathode support being partially immersed in the electrolyte, and plows secured to the rotary cathode support in front of and behind the cathodes, and means for rapidly rotating said cathode support to stir the electrolyte by said plows and rapidly and recurrently to immerse and emerse the cathodes.

7. Electrolytic apparatus comprising, in combination, a rotary cathode support for carrying a plurality of cathodes, said cathode support being partially immersed in the electrolyte, a "thief" carried by said rotary cathode support at a greater distance from the axis thereof than the cathodes and plows secured to the rotary cathode support in front of and behind the cathodes.

8. The method of depositing metal on cathodes which comprises alternately immersing and emersing the cathode, while preventing excess deposit on any portion of the cathode by passing current through a "thief" adjacent the cathode.

9. The method of depositing metal on cathodes which comprises rapidly, recurrently and alternately immersing and emersing the cathode, while preventing roughness of deposit on the cathode by stirring the electrolyte adjacent the cathode by a plow.

10. The method of depositing metal on cathodes which comprises alternately immersing and emersing the cathode, while preventing excess deposit on any portion of the cathode by passing current through a "thief" adjacent the cathode and preventing roughness of deposit thereon by stirring the electrolyte adjacent the cathode by a plow.

11. The method of depositing metal on miscellaneous articles used as cathodes which comprises alternately immersing and emersing each cathode.

12. The method of depositing metal on miscellaneous articles used as cathodes which comprises alternately immersing and emersing each cathode by rotating a cathode support having one portion thereof constantly immersed in the electrolyte and another portion thereof constantly out of the electrolyte.

13. The method of depositing metal on miscellaneous articles used as cathodes which comprises alternately immersing and emersing each cathode by rotating a cathode support having a lesser portion thereof constantly immersed in the electrolyte and a greater portion thereof constantly out of the electrolyte.

In testimony whereof I have signed my name to this specification.

MATTHEW M. MERRITT.