Dec. 25, 1923. 1,478,853

H. L. HAAS

ANODE AND CARRIER THEREFOR

Filed Sept. 17, 1920

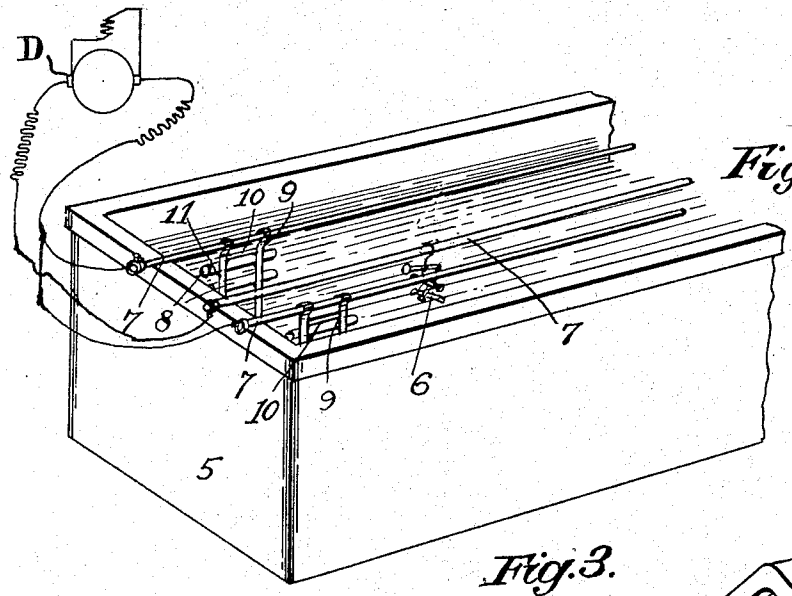


Fig. 1.

Fig. 2.

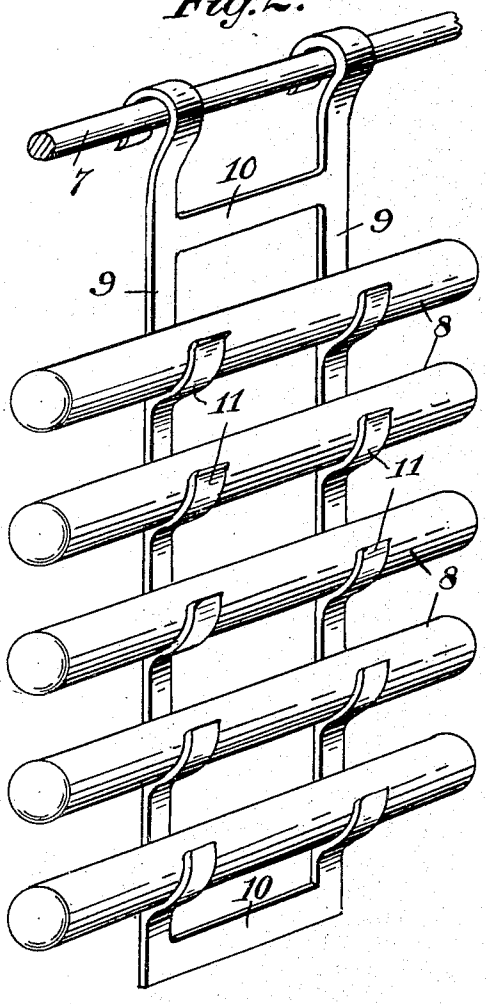


Fig. 3.



Fig. 4.

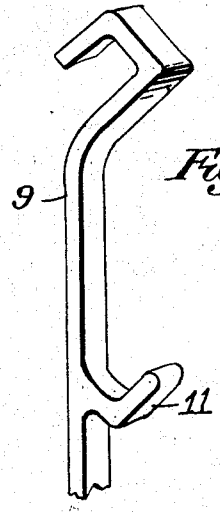


Fig. 5.

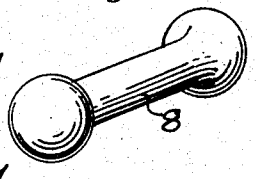
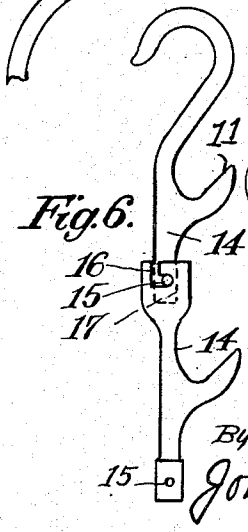


Fig. 6.



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UNITED STATES PATENT OFFICE.

HARRY L. HAAS, OF NEW YORK, N. Y.

ANODE AND CARRIER THEREFOR.

Application filed September 17, 1920. Serial No. 411,023.

To all whom it may concern:

Be it known that I, HARRY L. HAAS, a citizen of the United States, and a resident of the borough and county of Queens, in the city and State of New York, have invented certain new and useful Improvements in Anodes and Carriers Therefor, of which the following is a specification.

This invention relates to the electro-deposition of metals or electro-plating in which an anode of the metal to be deposited is connected in circuit with the positive pole of an electric circuit and the article upon which the metal is to be deposited, to constitute the cathode, is connected in circuit with the negative pole of such electric circuit, and both the anode and the cathode suspended in a suitable solution of a metallic salt, commonly termed the "depositing solution". It is essential in the efficient electrodepositing of metals that the anode, constituting the metal to be deposited, shall have a surface as great, and preferably greater, than the area of the surface of the cathode or article upon which the metal is to be deposited, and this is especially true in nickel plating, in order to supply the bath or solution with as much of the metal as is deposited upon the work, otherwise certain component parts of the solution will be taken up by the cathode and the solution made lean or weak of such elements and enriched by other elements of the solution which is detrimental to the efficient electro-plating of articles, and necessitating the addition to the bath or solution of such elements which are taken up in excess by the cathode from the solution. Furthermore, by the use of an anode having a large surface there is less resistance to the electric current and an electric current of low voltage may be used with a more rapid deposition of the metal of the anode. To overcome the above disadvantage and provided an anode having a large surface the anode has been made of various forms and shapes, as by making the anode in the form of a plate and corrugating the opposite faces thereof, or arranging the anode in the form of a plurality of prongs.

Various methods have been employed for suspending the anode in the solution in circuit with the positive pole of an electric conductor, as by passing a hooked rod of metal, such as copper, through an opening in the anode, but this method is unsatisfactory as the metal of the rod becomes corroded preventing the free flow of the electric current, or by affecting the solution by the dissolving of the metal of the rod. To overcome this disadvantage of suspending the anode by rods of metal different from the anode the anode was provided with hooks of the same material as the anode cast integral therewith or welded thereto. However, as decomposition of the anode by electrolytic action takes place at the terminus of the anode this necessitates the waste of that portion of the metal of the anode constituting the hooks and the adjacent portion thereof.

It is the object of the invention to overcome the foregoing disadvantages by providing an improved anode having an increased anode surface and an improved manner of suspending the anode in the solution, whereby the entire anode surface will be immersed in the solution, and the dissolving or dissipation of the metal of the anode will be substantially equalized from the whole surface of the anode, thereby maintaining the solution of constant richness of metal.

It is a further object of the invention to provide an anode unit consisting of a series of elements, and to provide a carrier which is a good conductor of electricity and immune from attack by the electrolytic action of the solution or bath for releasably supporting the elements of the anode unit in series.

In the drawing accompanying and forming a part of this specification, Figure 1 is a perspective view showing in a diagrammatic manner an arrangement of an electro-plating plant with an embodiment of my invention applied thereto.

Figure 2 is an enlarged perspective view showing the improved anode unit and means for suspending the same in the solution.

Figure 3 is a side elevation of a portion of a modified form of anode support.

Figure 4 is a perspective view of a portion of a further modification of the anode support.

Figure 5 is a side elevation of an anode support in accordance with my invention consisting of releasably connected sections; and

Figure 6 is a modified form of anode.

In carrying out the invention I provide

a suitable tank 5 to carry a solution of a metallic salt the composition of which may vary in accordance with the metal to be deposited, in which an article or articles, shown in a general way at 6, which constitute a cathode or electrode, the surface of which is to be covered, are suspended from a rod 7 and connected by said rod in circuit with the negative pole of a suitable source of electricity, shown at D in a diagrammatic manner as a shunt wound dynamo. The anode or electrode consisting of the metal to be deposited is suspended in the solution from and connected by rods 7 in circuit with the positive pole of the dynamo.

To assure the efficient depositing of metal upon the surface of the cathode or article to be plated or covered, it is essential that the anode or metal to be deposited shall have a surface as great, if not greater, than the surface of the article to be covered and whereby the electrolytic decomposition of the anode will be facilitated. For this purpose I provide an anode unit consisting of a series of members in the form of bars 8 shown of circular shape in cross section, although they may be of any other cross sectional form.

To support the anode unit in separated relation immersed in the solution in the tank 5 and connected in series in circuit with the positive pole of the dynamo through a supporting rod 7 a carrier for the anode unit is provided consisting of a metal which is a good conductor of electricity and which is immune from and will not be attacked by the solution and will not be decomposed through the electrochemical action of the solution. It has been found that highly silicious iron, or iron containing a large quantity of silicon, such as duriron and tantiron, or nickel containing chromium, such as nichrome, will answer this purpose.

The embodiment of the form of this anode supporting carrier as shown in Figure 2 comprises a series of members 9, shown as two in number, arranged with a hooked end to engage over a rod 7. These bars 9 may be separately hung from the rod 7 or connected in parallel relation by cross bars 10 as shown. The bars 9 are arranged with lateral projections 11, which, as shown in Figure 2, form seats upon which the members of the anode unit are removably mounted. Furthermore, the hooked ends of the bars 9 are so arranged that as the anode is supported upon the seats 11 the center of gravity will come substantially in line with the axis of the supporting rod 7 thereby preventing the anode carrier from assuming a position inclined to the support 7 and the anode members from falling off from the seats 11. Through the electrolytic action decomposition of the anode takes place at the ends of the anode members, and to prevent the anode members from becoming unseated from the seats 11 of the carrier the carrier bars 9 are placed relatively close together with the ends of the anode members projecting from opposite sides of the carrier. Furthermore, as decomposition of the anode member adjacent the bottom of the solution or lower end of the carrier takes place more quickly than at the top by the present arrangement of anode and the manner of supporting the same the anode members adjacent the bottom of the carrier may be interchanged with the anode at the top. To further increase the anode surface the members 8 may have the cross sectional area at the ends increased by forming enlargements or knobs at the ends, these enlargements also serving to prevent the accidental displacement of the anode units from the carrier by endwise movement thereof.

In Figure 3 there is shown a modified form of the anode carrier. In this form of the carrier the carrier members 9 with the anode supporting seats are bent up of wire. In the construction of the anode carrier bar shown in Figure 4 I have shown a modified form of the supporting hook arranged at the ends of said carrier bars, as well as a modified form of the anode supporting seat.

The tanks in which the solution in electroplating is carried are of varying depth, and to adapt the anode carrier to tanks of different depths these carriers may consist of releasably connected sections 14 to provide an anode carrier of the required length as shown in Figure 6. The sections of the anode carrier may be connected in a suitable manner, and as shown in Figure 6 consists of a bayonet joint, one section of the carrier being arranged with oppositely extending pins 15 to engage in opposite angular slots 16 in a socket 17 at the end of another section. It will be obvious that by this arrangement anode carriers of variable length and of any desired length may be produced.

While I have shown and described an embodiment of carrying out my invention to provide a large anode surface to be subjected to the electrochemical action in the electrodepositing or plating of articles, and have provided an improved carrier for the anode to suspend the anode immersed in the solution, and such carrier as consisting of a material different from the material of the anode and which is not attacked by the solution and therefore may be used repeatedly, as well as being a good conductor of electricity, it will be obvious that various modifications may be resorted to and come within the scope of my invention.

Having thus described my invention I claim:

1. In an anode and carrier therefor for use in the electrodeposition of metals, an

anode unit consisting of a series of elements of the metal to be deposited, and means to support the anode elements in separated relation and connect the same in circuit with the positive pole of an electric current, said carrier being constructed of a material having the property of being a good electric current conductor and immune from the electrolytic action of the bath.

2. In the electrodeposition of metals, the combination with a solution of metallic salt and an electric current, of an anode, and means to suspend the anode in the solution and connect the same in circuit with the electric current, said means consisting of a metal which is different from the anode and immune from electrolytic action of the solution and being a good electric current conductor.

3. An anode and carrier therefor for use in the electrodeposition of metals consisting of a series of elements of the metal to be deposited, and a support upon which said elements are mounted in separated relation and adapted to be connected in circuit with an electric circuit through said carrier, said carrier being arranged with a body portion having integral laterally projecting hook seats for the anode and constructed of a metal different from the anode and having the property of being a good electric current conductor and immune from electrolytic action.

4. A support to suspend an anode in a solution in the electrodeposition of metals, consisting of a metal different from the anode which is immune from attack by the electrolytic action of the solution and a good conductor of electricity.

5. A support to suspend an anode in a solution in the electrodeposition of metals, comprising a series of parallel members arranged for arrangement of a support at one end and provided with integral and laterally projecting anode supporting hooks, said support being constructed of a metal which is immune from attack by the electrolytic action of the solution and a good electric current conductor.

6. An anode carrier in the electrodeposition of metals consisting of a series of releasably connected sections each section being arranged with a laterally projecting anode supporting seat.

7. An anode carrier in the electrodeposition of metals consisting of a series of endwise releasably connected sections, one section arranged with a supporting hook and each section arranged with a laterally projecting anode supporting hook.

8. An anode for use in the electrodeposition of metals, comprising an elongated member of greater length than cross sectional area, and having the extremities thereof of enlarged globular form.

Signed at the city of New York in the county of New York and State of New York, this 29th day of July, 1920.

HARRY L. HAAS.