

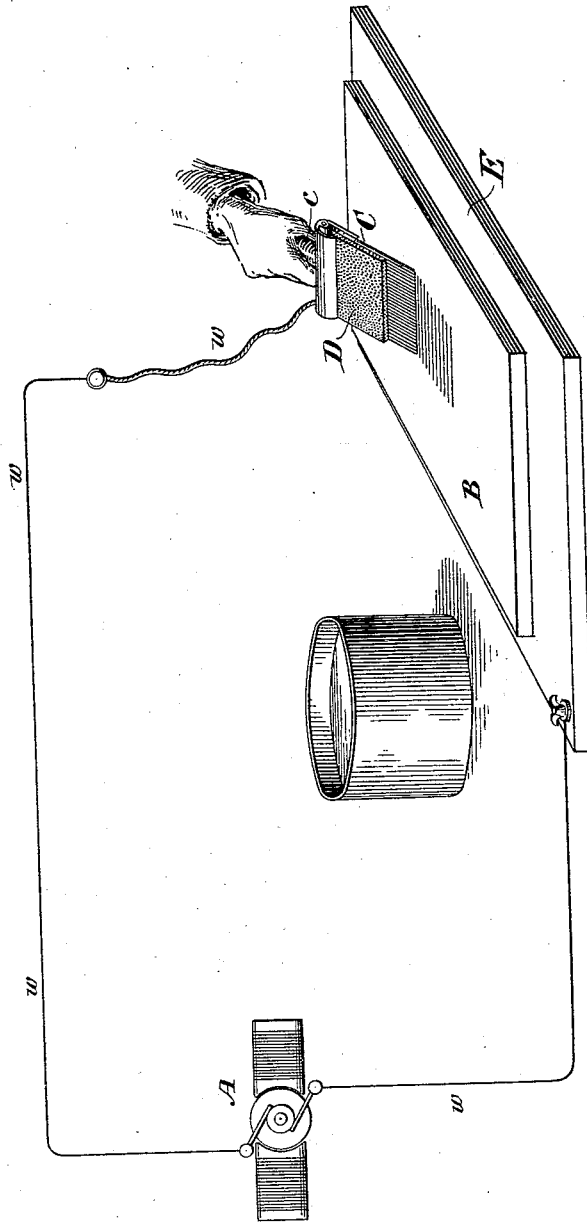
(No Model.)

O. LUGO.

METHOD OF ELECTRO DEPOSITING METALS.

No. 493,277.

Patented Mar. 14, 1893.



Witnesses
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UNITED STATES PATENT OFFICE.

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METHOD OF ELECTRO-DEPOSITING METALS.

SPECIFICATION forming part of Letters Patent No. 493,277, dated March 14, 1893.

Application filed January 8, 1892. Serial No. 417,400. (No specimens.)

To all whom it may concern:

Be it known that I, ORAZIO LUGO, a citizen of the United States, and a resident of the city, county, and State of New York, have invented or discovered certain new and useful Improvements in the Method of Electro-Depositing Metals, of which the following is a specification.

My improvements relate, first, to the constitution of the liquid from which the metal is to be deposited, and the properties and conditions which such liquid must possess; and second, to the method or process of precipitating the metal from such liquid, and of applying the electric current therein.

The art of electro-plating, which is the most useful application of the general process of electro-deposition, consists in precipitating a permanent coating of one or more metals upon a base or body of the same or of different metals. The complete success of this process requires, first, that the metal shall be deposited in a reguline state, and second, that a perfect union shall be effected between the base and the deposited metal. The last named result, though heretofore possible to be accomplished in the case of certain metals, has been found to be difficult, and in some cases impossible, with other metals, when attempted by any of the methods and processes heretofore known in the art. So far as I am aware, all these methods and processes contemplate the deposition of a given metal from an aqueous solution of some one of its soluble salts, in which solution is immersed an anode of the same metal, as practiced for example, in the ordinary process of copper plating. In my improved process on the contrary, I make use of insoluble salts of the metal to be deposited. If for example, it be required to deposit an adherent coating of copper, the object which is to be coated is first cleaned in the usual manner (or if it be a non-conductor of electricity it is provided with a conductive surface). It is then connected with the negative terminal of a dynamo or other suitable generator of electricity. The positive terminal of the same generator may then be connected with a plate or electrode, preferably of platinum or of platinized carbon, and affixed to a brush, such for example as a

common paint-brush, provided with a suitable insulating handle. This brush with its electrode, may be dipped into a thin paste or liquid, composed of water into which has been stirred a sufficient quantity of carbonate of copper in the form of fine powder, and then repeatedly applied to the object, in the same manner that a paint-brush is used upon an object which is to be painted. If the distance between the movable anode and the cathode which is being operated upon is not too great, and the electromotive force of the current is sufficient the metallic constituent of the salt will be deposited upon the surface of the object, and will adhere firmly thereto.

The accompanying drawing shows a simple form of apparatus by which my invention may conveniently be carried into effect.

A represents a dynamo-electric machine or other suitable source of electricity.

B is the object to be electroplated, here shown as a plate of metal.

C is a brush, made of bristles, secured in the usual manner to a handle *c* of wood or other non-conducting material.

D is the anode, formed of conducting material, preferably carbon, secured to the handle *c* and being in electrical contact with the surface of the mass of bristles forming the brush C.

The anode D and the cathode B (the latter through the base plate E), are respectively connected with the positive and negative poles of the generator by flexible conductors *w w*.

When the cathode is, for example, of iron, and copper is deposited upon it by the above process from carbonate of copper, the coating is found to be so strongly adhesive at the surfaces of contact, that it virtually if not actually, effects a perfect union of the two dissimilar metals.

The deposit of metal obtained by the process I have described is reguline in character, perfectly solid and coherent, and of uniform thickness, especially when applied by means of the mechanical device which I have hereinbefore described. In such case the deposit presents an appearance as if burnished, and is moreover fibrous and tough in structure.

I sometimes prefer to employ the cyanides of certain metals, either alone or in conjunction with the carbonates.

In the deposition of copper according to my improved process, I have obtained good results with a mixture of five to ten parts cyanide of copper with ninety to ninety-five parts carbonate of copper, using an electromotive force of fifty to one hundred volts or even less.

My process may also be employed for the deposition of alloys composed of two, three or more different metals. In depositing brass, for example, I have used, with good results, a mixture of forty-five parts carbonate of zinc; forty-five parts carbonate of copper, and five to ten parts, either of cyanide of zinc or cyanide of copper.

In case it is required to deposit metals of which the carbonates are not obtainable, as for example gold, tin, &c., I make use of the oxides, and employ in conjunction with said oxides the carbonates of the alkalies, or preferably of the alkaline earth, as for example, the carbonate of lime or carbonate of magnesia.

I have also discovered that in certain cases, in which the carbonate of a metal is of such character as to strongly resist dissociation, or requires for such dissociation an inconveniently high electromotive force, the presence of one of the earth-carbonates materially facilitates the conduction and rapid decomposition of the metallic salt. The processes of depositing metals from their carbonates, in the presence of the carbonates of the alkalies or of the alkaline earth, or from their oxides under similar conditions, are not herein specifically claimed.

I have succeeded in depositing an adherent metallic coating by the hereinbefore described process, upon cast and wrought iron, steel, zinc, aluminium, lead, tin, brass, graphite and many other conducting substances.

Instead of the brush hereinbefore described, other insoluble non-conducting cellular or capillary substances, may be employed to hold

the electrolyte in place while it is being applied to the body to be coated.

The specific form of brush hereinbefore described is claimed in another application for Letters-Patent of the United States (Serial No. 417,751) filed January 11, 1892.

I claim as my invention—

1. The hereinbefore described process of electro-deposition, which consists in depositing a metal from a liquid electrolyte or paste composed of a mixture of one or more insoluble salts of such metal with water, by passing an electric current through the same in connection with a suitable anode, as set forth.

2. The hereinbefore described process of electro deposition, which consists in the repeated application to the surface of the object which is to receive the deposit, of a liquid electrolyte or paste, composed of a mixture of water with one or more insoluble salts of the metal to be deposited, and in causing the same to be traversed by an electric current, as set forth.

3. The hereinbefore described process of electro-deposition, which consists in simultaneously depositing two or more metals from a liquid electrolyte or paste, composed of a mixture of water with one or more insoluble salts of each of said metals, by causing an electric current to traverse said electrolyte, as set forth.

4. The hereinbefore described process of electro-deposition, which consists in depositing a metal or metals from a liquid or paste, consisting of a mixture of water with one or more insoluble salts of such metal or metals, by spreading or painting the same upon the cathode while subjected to the decomposing effect of a current of electricity, as set forth.

In testimony whereof I have hereunto subscribed my name this 7th day of January, A. D. 1892.

ORAZIO LUGO.

Witnesses:

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