

UNITED STATES PATENT OFFICE.

WILLIAM L. DUDLEY, OF COVINGTON, KENTUCKY, ASSIGNOR TO THE
AMERICAN IRIIDIUM COMPANY, OF CINCINNATI, OHIO.

PROCESS OF DEPOSITING IRIIDIUM AND PRODUCT OF THE SAME.

SPECIFICATION forming part of Letters Patent No. 362,257, dated May 3, 1887.

Application filed February 1, 1883. Serial No. 83,717. (Specimens.)

To all whom it may concern:

Be it known that I, WILLIAM L. DUDLEY, a citizen of the United States, residing at Covington, in the county of Kenton and State of Kentucky, have invented certain new and useful Improvements in Electro-Deposition of Iridium, of which the following is a specification.

The object of this invention is to obtain a bright, flexible, adherent, reguline deposit of iridium upon metallic surfaces, for the purpose of ornament and protection of such surface from wear and corrosion. This object I accomplish by the battery process by the means hereinafter described.

Prior to my invention all efforts to obtain an electro-deposition of iridium have only resulted in a black powdery deposit which is of no practical use in the arts. I have succeeded in obtaining a bright, flexible reguline deposit, by which I am enabled to plate the different metals with an adherent coating. The salts of iridium which I employ in the electro-deposition of the metal may be made by any of the well-known methods.

I use either an aqueous solution of the double chloride of iridium and sodium or of the double chloride of iridium and ammonium, containing about two ounces of metallic iridium to the gallon, and acidified with about one-half an ounce of sulphuric acid to the gallon.

The solution of the double chloride of iridium and sodium I prefer to prepare as follows: The hydrate of iridium is dissolved in the least possible quantity of hydrochloric acid and evaporated in a water bath to expel the excess of acid. The residue is then dissolved in water and an amount of sodium chloride is added sufficient to combine with all of the chloride of iridium present to form the double salt. The solution is then diluted to the required amount, so as to contain about two ounces of metal to each gallon of liquid. The required amount of sulphuric acid is then added, and the solution is ready for the electro-deposition.

The solution of the double chloride of iridium and ammonium I prefer to prepare as follows: The hydrate of iridium is dissolved in the least possible quantity of hydrochloric acid and carefully neutralized with ammonium hy-

drate. It is then acidulated with sulphuric acid until all of the precipitate produced by the ammonium hydrate is dissolved, and finally diluted with water until each gallon of the liquid contains about two ounces of the metal. The solution is then ready for work when acidified, as before mentioned.

From both of these solutions I have obtained a thick, bright, and reguline deposit of iridium; and I have found that a plate of iridium or phosphide of iridium, if used as an anode, will dissolve in these solutions while the current is passing.

As in electroplating with other metals, it is essential, to obtain good results, that the articles to be plated should be perfectly clean. A brighter and smoother deposit is obtained if the articles are highly polished before they are introduced into the iridium bath.

In plating articles which are readily attacked by the solution it is of course desirable to first coat them with some metal not appreciably affected by such solutions.

In the deposition of iridium from any of its solutions it is necessary to avoid battery-power of too great intensity; and in case the intensity be too great, it can be recognized by the deposit becoming dark and powdery, and also by an excessive evolution of gas from the surface of the anode and cathode. In managing the solution, alkalinity should be avoided, although neutral solutions may be employed; but acid solutions are preferred.

During deposition, where a thick deposit is required, it may be found necessary to remove the articles from the solution from time to time, and to wipe them in case the deposit should have a tendency to become black; but this blackness may be avoided by proper manipulation of the solution and battery-power, and also by proper cleansing of the articles. It is also found that when the articles to be plated are kept in gentle motion during deposition the deposit will take place faster and be brighter and thicker than if they are allowed to remain stationary.

I do not claim that the plating produced by my process will resist the action of acids which will dissolve finely-divided iridium, for a coating of metal produced by electro-deposition is

but a net-work of the metal in a finely-divided state.

It should be understood that when I speak of iridium I mean the iridium of commerce, or the metal as found in its natural state, whether pure or alloyed with other metals. The phosphide of iridium referred to is the product of the Holland process, which is iridium combined with a portion of the phosphorus used in the process of fusing it, as described in Patent No. 240,216, of May 10, 1881.

The plating is hard and practically non-corrodible. It is not attacked by acids, except, of course, those in which finely-divided iridium is soluble.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The process of keeping the solution saturated with the metal during the operation of plating by an anode in the form of a plate or ingot of the phosphide of iridium.

2. A solution for electroplating with iridium, as hereinbefore set forth, consisting of an aqueous solution of the double chloride of iridium and sodium, or the double chloride of iridium and ammonium, said solution containing about two ounces of the metal to the gallon, and acidified with about one-half ounce of sulphuric acid to the gallon.

3. For the electro-deposition of iridium in a reguline state, the process herein described, which consists in preparing an acidified solution of a salt of iridium, then depositing the metal by the aid of a battery with an anode of phosphide of iridium and a suitable cathode for electroplating.

4. A metallic article having a coating of compact, coherent, tenacious, flexible iridium.

WILLIAM L. DUDLEY.

Witnesses:

GEO. J. MURRAY,

JACOB J. GESSERT.