No. 744,170. Patented November 17, 1903.

UNITED STATES PATENT OFFICE.

ANDRÉ DARLAY, OF PARIS, FRANCE.

PROCESS OF DEPOSITING METALLIC COATINGS ON METALLIC OBJECTS.

SPECIFICATION forming part of Letters Patent No. 744,170, dated November 17, 1903.

Application filed August 26, 1899. Serial No. 728,604. (No specimens.)

To all whom it may concern:

Be it known that I, ANDRÉ DARLAY, a citizen of France, residing at Paris, France, have invented a certain new and useful Improved Process of Depositing Metallic Coatings on Metallic Objects, (for which I have applied for patents in France, dated January 27, 1899, No. 285,354; in Germany, dated February 14, 1899; in England, dated July 27, 1899, and in Belgium, dated July 27, 1899,) of which the following is a specification.

My invention relates to an improved process for electroplating metal objects without the use of an electric battery; and it consists in bringing the object to be plated into contact with metallic aluminium in a bath containing a salt of the metal to be deposited and a salt adapted to insure the constant attack of the aluminium, which latter is kept constantly bright.

In carrying out my invention I prepare a solution of a chlorid, cyanid, or other compound of the metal to be deposited containing ammonium chlorid or other compound of ammonium and an alkali, an alkaline phosphate or pyrophosphate, or an alkali-metal cyanid. The continuous attack of the aluminium surface is assured by the alkaline character of the solution, while a deposit on the aluminium of the metal to be plated is prevented by the alkaline phosphate or pyrophosphate or by the alkali cyanid, respectively. The ammonium compound serves to improve the conductivity of the solution.

Suitable baths for practical purposes can be obtained in the following manner:

Type I.—Solutions of a double chlorid composed of ammonium chlorid and of the chlorid of the metal to be deposited, to which solutions a great excess of an alkaline phosphate or pyrophosphate is added, with or without addition of ammonium carbonate: In this case the alkaline phosphate or pyrophosphate serves the double purpose of attacking the aluminium and preventing the deposit thereon of the plating metal. As an example of such a bath the following proportions may be given: water, ten quarts; chlorid of ammonium and nickel, one pound; pyrophosphate of sodium, four pounds; carbonate of ammonium, ten ounces. Such a bath will electroplate small objects of about the size of a waist-belt fastener in about two minutes.

Type II.—Solutions of a double cyanid composed of cyanid of potassium and of the cyanid of the metal to be deposited, to which solutions a small quantity of an alkaline salt is added in the form of caustic alkaline compounds or of carbonate of alkaline salts: A bath of this type may be made by mixing ten quarts of water, three and one-half ounces chlorid of zinc. The chlorid of zinc in this bath is precipitated by means of cyanid of potassium and the resulting cyanid of zinc dissolved again in an excess of cyanid of potassium. To the solution eight ounces of carbonate of sodium are added. With such a bath hooks and eyes can be galvanized in two to three minutes.

The temperature of these baths may vary according to requirements, being, as a rule, between 35° to 100° centigrade.

The first type of bath is more particularly suitable for deposits of nickel and cobalt and the second type for zinc, tin, copper, brass, bronze, and silver. Gold can be deposited with equal success in baths of either type. Several substances can be deposited with either one or the other of the baths mentioned. The best results are, however, obtained by choosing the baths as above stated. In the case of brass can be used a solution of a double cyanid of zinc and cyanid of potassium mixed with a solution of a double cyanid composed of cyanid of copper and cyanid of potassium, to which mixture a small quantity of soda or the like is added. For bronze I use a mixture of cyanid of copper and potassium, together with cyanid of tin and potassium, which solution is rendered alkaline by means of soda or the like.

Instead of an aluminium contact a magnesium contact may be used with similar success in connection with the alkaline baths described above.

What I claim, and desire to secure by Letters Patent of the United States, is—

1. A process for depositing metallic coatings on metallic objects, consisting in bringing the objects to be plated into contact with metallic aluminium in an alkaline bath containing a double salt of an alkali metal and

of the metal to be deposited, a great excess of a phosphate of an alkali, and a carbonate of an alkali, substantially as set forth.

2. A process for depositing metallic coatings on metallic objects, consisting in bringing the objects to be plated into contact with metallic aluminium in an alkaline bath containing a double chlorid composed of ammonium chlorid and of the chlorid of the metal to be deposited, a great excess of a pyrophosphate of an alkali metal and ammonium carbonate, substantially as set forth.

3. A process for depositing metallic coatings on metallic objects, consisting in bringing the objects to be plated into contact with metallic aluminium in an alkaline bath containing a pyrophosphate of an alkali and a salt of the metal to be deposited in the presence of an alkali-metal chlorid, substantially as set forth.

4. A process for depositing metallic coatings on metallic objects, consisting in bringing the object to be plated into contact with metallic aluminium in an alkaline bath containing a pyrophosphate of an alkali metal and a salt of the metal to be deposited in the presence of ammonium chlorid, substantially as set forth.

In testimony whereof I have hereunto set my hand in the presence of two witnesses.

ANDRÉ DARLAY.

Witnesses:

ALFRED LÉVY,

ALFRED EIVOLY.