UNITED STATES PATENT OFFICE.

CRAIG RITCHIE ARNOLD, OF SHARON HILL, PENNSYLVANIA.

PROCESS OF COATING METALS WITH OXIDS.

SPECIFICATION forming part of Letters Patent No. 514,896, dated February 20, 1894.

Application filed April 29, 1893. Serial No. 472,405. (No specimens.)

To all whom it may concern:

Be it known that I, CRAIG RITCHIE ARNOLD, a citizen of the United States, and a resident of Sharon Hill, in the county of Delaware and State of Pennsylvania, have invented a certain new and useful Process of Coating Metals with Oxids, of which the following is a specification.

My invention relates to those processes of coating metals with oxides which consists in making the article to be coated the anode of a bath containing the material for the coating desired in solution, and is designed primarily as an improvement upon those processes which are employed to give the metal a coating of peroxide of lead.

My invention is designed for use with copper and its alloys, or with iron, steel or other metals.

It has heretofore been proposed to coat metals with a bi-oxide of lead by suspending the article in a bath containing nitrate of lead in solution and with or without other materials, and making the article to be coated the anode of the bath, and it has also been proposed in this process to suspend a cathode in a chamber containing a suitable depolarizing substance and separated from the chamber containing the bath proper by a porous diaphragm.

My invention consists in immersing the cathode in a solution of caustic soda or its equivalent as hereinafter described, separated from the bath proper by the porous diaphragm.

The oxidizing agents employed previous to my invention for oxidizing the hydrogen set free during the action of blackening or browning the metal with the oxide of lead have some of them been liable to the objection that if the process be carried on too rapidly metallic lead would be deposited on the cathode and its surrounding diaphragm or porous cup. This deposit of metallic lead on the cathode not only prevents the oxidation of the hydrogen, but it would so impoverish the solution by the withdrawal of lead that the bath would become very sluggish in its action and it would become necessary to suspend operations for the time being until a new diaphragm could be substituted, and the solution be replenished.

It has heretofore been proposed to use di-oxide of manganese as the oxidizing substance in connection with the bath containing nitrate of lead in solution for the anode.

My present invention consists in the substitution for the di-oxide of manganese of a concentrated solution of caustic soda (sodium hydrate) either alone or in combination with bichromate of soda. I find it preferable, however, to use caustic soda alone, though bichromate of soda might be used as the equivalent of the caustic soda. A solution of caustic soda I find will thoroughly remove all of the evolved hydrogen and will prevent the deposition of lead on the cathode or the surrounding diaphragm or porous cup, and permit the operation to be conducted much more rapidly than has heretofore been possible.

It has prior to my invention been proposed to employ a bath for the anode composed of nitrate of lead and caustic soda or potash.

My present invention consists in the addition to a bath containing the nitrate of lead in solution, of an oxide of lead or its equivalent (a hydrate). The oxide or its equivalent I add in quantities to produce a turbidity in the solution. During plating, the finely powdered oxide may be added and while the operation is going on thorough motion should be imparted to the solution.

To make a bath of the nitrate of lead, I proceed as follows:—In order to prepare twenty-two gallons of plating bath, dissolve twenty-two pounds of nitrate of lead in seven gallons of hot water. This solution is poured into eleven gallons of caustic soda of the specific gravity of 1.20, after having warmed it to 70° centigrade. This solution is kept at this temperature for say, thirty minutes and mixed well; and after cooling down, sufficient water is added to make up the required amount of bath. During plating, finely powdered litharge is added to the bath and during the operation thorough agitation should be imparted to the solution. The article to be plated is suspended from the anode pole. The article to be coated, after being carefully cleansed by any well known method employed in processes of electrical deposition, in order to remove all oxides and fatty material, is immersed in the bath and made the positive pole of a circuit of the dynamo electric ma-

chine or other source of energy, and electric current is passed through the bath until the article has obtained the required deposit. The results produced by this bath are much superior to those obtained with baths heretofore proposed.

What I claim as my invention is—

1. The herein described improvement in coating metals by making the article to be coated the anode of a bath containing nitrate of lead in solution to which oxide of lead or its equivalent, as described, is added, as and for the purpose described.

2. The herein described improvement in coating metals by making the article to be coated the anode of a bath composed of nitrate of lead and caustic soda or potash to which oxide of lead or its equivalent is added, as and for the purpose described.

3. The herein described improvement in coating metals with an oxide of lead consisting in making the article to be coated the anode of a bath containing lead, and immersing the cathode in a separate solution of caustic soda or its equivalent as described, as and for the purpose set forth.

Signed at Chester, in the county of Delaware and State of Pennsylvania, this 14th day of February, A. D. 1893.

CRAIG RITCHIE ARNOLD.

Witnesses:
J. LENTZ GARRETT,
MARY A. MARTIN.