

UNITED STATES PATENT OFFICE.

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PROCESS OF ELECTRO-DEPOSITING NICKEL.

SPECIFICATION forming part of Letters Patent No. 346,258, dated July 27, 1886.

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To all whom it may concern:

Be it known that I, EDWARD C. BATES, a citizen of the United States, residing at Salem, in the county of Essex and State of Massachusetts, have made a new and useful Improvement in Processes of Electro-Depositing Nickel, of which the following is a specification.

It has long been known that nickel could be deposited from certain solutions by electricity, and covering the article to be plated with a coating of white nickel of greater or less thickness, compactness, flexibility, and tenacity. The solutions which have been most successfully used in this way are, I believe, grain-nickel dissolved in nitric-acid, the so-called "single salts of nickel," and the double sulphate of nickel and ammonia or the double chloride of nickel and ammonium.

The object of my invention is the electro-deposition of a black nickel, which shall be as compact, coherent, tenacious, and flexible as the best deposit of white nickel, and entirely free from the sooty, brittle, or spongy qualities which have accompanied the black deposit heretofore produced by the presence of the peroxide of nickel in the solution.

My improvements relate, first, to the method of preparing the solutions from which the black nickel is to be deposited, and, second, to the character of the deposit obtained.

The process of nickel-plating and the formation of the ordinary solutions for white-nickel plating, as also the method of passing electricity through said solutions, are so well known that detailed description does not seem necessary. Suffice it to say that any of the solutions regularly used in the production of a white-nickel deposit may be used as the basis of my improved solution. These solutions are generally of a neutral character or have a quantity of free acid present, whereas my solution, as hereinafter explained, is of a very marked alkaline character.

The receipt for the process which I have found in practice to be the best for the production of good black-nickel plate is as follows: To two quarts of water add half a pound of nickel salts, and, when dissolved, add thereto five ounces of cyanide of potassium, and stir

the solution until the light-green curdy precipitate is formed and then again taken up, and the solution becomes of a dark amber color. Then add two ounces of aqua-ammonia, which turns the solution to a light-blue color and renders it ready for use. The nickel anodes are then introduced, being hung on both sides of the article to be plated, and I run a medium strong current of electricity through the solution. The longer the article is allowed to remain the blacker its color becomes.

The density of the current should not be allowed to reach a very high degree, but should be kept of about medium strength, as a very dense current is apt to burn the nickel and produce a sooty deposit, which is useless for nickel-plating purposes.

If a white precipitate begins to fall to the bottom of the tank while plating, the solution should be kept well stirred—that is, if it is desired to produce the extreme black color. If the latter is not desired, the precipitate may be allowed to form undisturbed. The solution is to be kept always of a strong alkaline character, in order to avoid the formation of any oxides.

I have found that when properly performed the coating of black nickel thus deposited on the articles plated is firm and tough, and thick enough to bear any ordinary degree of buffing, and will not tarnish or corrode, being in all respects as compact, coherent, tenacious, and flexible as the best deposits of white-nickel plate. I have also found that where the article to be plated is already highly finished it requires no buffing or any further finishing after the black nickel has been deposited thereon, but is simply to be dried off in hot sawdust. I have also found that the articles need not be cleaned before plating, as ordinary quantities of grease, oil, dirt, &c., are destroyed or removed by the strong alkaline action of the solution.

I am aware that cyanide of potassium, aqua-ammonia, water, and the single or double nickel salts have long been used in nickel-plating; but my proportions and my process are, so far as I know, distinctly novel.

I claim—

1. The electro-deposition of black nickel by means of a solution of nickel salts, cyanide of potassium, aqua-ammonia, and water, in the proportion of about two quarts water
5 to five ounces cyanide of potassium, two ounces aqua-ammonia, and half a pound of nickel salts, constantly stirred, which solution is afterward subjected to an electric current of medium strength, whereby a thick, coherent,
10 tenacious coating of black nickel is secured, as herein described, and for the purposes specified.

2. The above-described process of nickel-plating, which consists in dissolving the nickel
15 salts in water, and, when dissolved, adding

cyanide of potassium thereto, constantly stirring the same until a cream-like curd is first formed, and afterward becomes of a dark amber color; second, adding aqua-ammonia thereto until the solution becomes of a light-
20 blue color; third, introducing the anodes and the articles to be plated; and, lastly, passing a medium current of electricity through said solution, as herein described, and for the purposes specified.

EDW. C. BATES.

Witnesses:

T. F. QUEALEY,

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