

UNITED STATES PATENT OFFICE.

NATHANIEL SHEPARD KEITH, OF NEW YORK, N. Y.

IMPROVEMENT IN NICKEL-PLATING.

Specification forming part of Letters Patent No. 121,383, dated November 28, 1871.

To all whom it may concern:

Be it known that I, NATHANIEL SHEPARD KEITH, of the city, county, and State of New York, have invented certain Improvements in Process of Nickel-Plating; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same.

The object of this invention is to prepare solutions for depositing nickel by electricity, to be used as a coating to other metals, which will produce the deposit sufficiently flexible and tenacious for practical use.

The objection to nickel-plated goods thus far is that the deposit is so brittle that it cannot be bent, nor on many articles stand necessary wear even if not bent, and that it will also scale or peel off.

All these objections I overcome by my invention, which produces the nickel-plating so elastic and, at the same time, adhesive, that it may be advantageously employed even on the blades of knives or tools.

The nature of my invention consists in adding to the various solutions of nickel, whether formed of single or double salts, materials which, by their presence, prevent the decomposition of the solution of the plating-bath and the deposition of oxide of nickel and other impurities upon the articles receiving the coating of nickel.

The greatest care is necessary in the management of the solutions of nickel now used for plating, and in graduating the strength of the electric current to prevent decomposition of the solution and consequent failure of the deposit. Even with the greatest care the coating of nickel is always brittle, and easily cracks and peels off when exposed to usage, on account of decomposition of the solution by the electricity causing the deposit.

For preventing and overcoming this brittleness and otherwise improving the deposit of nickel I add to a solution of nickel—be the same sulphate of nickel, chloride of nickel, double sulphate of nickel and ammonia, double chloride of nickel and ammonium, ammonio-sulphate of nickel, ammonio-chloride of nickel, double sulphate of nickel and soda, double sulphate of nickel and potassa, double sulphate of nickel and alumina, or double sulphate of nickel and magnesia, or any other of the various salts of nickel—one or more

of the salts, either single or double, be they either acid or neutral or associated, which are formed by the union of the various organic acids, acetic, citric, and tartaric, with the alkalies and alkaline earths, ammonia, soda, potassa, magnesia, or alumina. These additions counteract the tendency to decomposition of the solution by action of the electric current. The result is a deposit possessing elasticity, toughness, and all the hardness, brilliancy, and other qualities of pure nickel, with the property of adhesion to the article upon which deposited not possessed by nickel deposited from solutions not containing these additions. The deposit made is particularly suited to polished steel and iron surfaces—for instance, cutlery and tools—though equally good for all other metallic surfaces. These various organic acid salts may be added interchangeably and collectively, though I prefer to use, in case of the double salts of nickel and alkalies and alkaline earths, the organic acid salts, which have for their bases the alkali or alkaline earth which is associated with the nickel in its double salt. Thus, when using a solution of nickel and ammonia, I prefer an organic acid salt of ammonia, though the similar salts of soda and potash or soda or potash will answer very well. In case of using a solution of a double salt of nickel and potassa or double salt of nickel and soda, I prefer to use an organic acid salt of soda and potash.

Of the salts which can be used to accomplish the desired effect I prefer the tartrates, though I do not limit my discovery to them. Neither do I limit my invention to the use of special quantities or proportions, as it is well known that plating solutions of all kinds are varied in the quantities of their component parts and in the strength and gravity of the solution to suit varied circumstances.

I have found that a comparatively small quantity of the organic salts is necessary to be added, though more will not change the character of the deposit.

I will make an illustration, which the experienced electro-plater can apply to all solutions of nickel. To twenty gallons of a solution in water of the double sulphate of nickel and ammonia of a gravity of 7° Baumé I add about one gallon of a solution of an equal gravity of neutral tartrate of ammonia in water. Mix well, and the bath will be ready after standing a few

hours. More or a little less of the addition does not injure the solution. This solution may be reduced, if necessary, by the addition of solutions of sulphate of ammonia and tartrate of ammonia.

The other organic acid salts—namely, the acetates, citrates, and tartrates of the alkalies and alkaline earths—may be used instead with beneficial results.

These solutions may for some purposes be made alkaline by the addition of an alkali—for instance, in the electro-plating of brass and iron,

wherein local action would interpose—provided the solutions were left in an acid condition.

What I claim as my invention, and desire to secure by Letters Patent, is—

Plating solutions made by the addition of the acid or neutral salts, formed by the union of organic acids with a base or bases, to the solutions of the salts of nickel, substantially as specified.

N. SHEPARD KEITH.

Witnesses:

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