

# UNITED STATES PATENT OFFICE.

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## IMPROVEMENT IN ELECTROPLATING WITH TIN.

Specification forming part of Letters Patent No. 115,926, dated June 13, 1871.

I, JOHN EDWARD BINGHAM, of Victoria Park, Sheffield, in the county of York, in the Kingdom of Great Britain, manufacturer, have invented certain Improvements in the Electro-Deposition of Tin, which improvements are applicable to the prevention of the oxidization or tarnishing of silver surfaces and as a coating for other metals.

### *Nature and Objects of the Invention.*

In carrying out my invention of improvements in the electro-deposition of tin I first take a given quantity of tin, by preference in a pure state; but what is commercially known and sold as tin may be employed, which I dissolve in chlorhydric, and precipitate the same by means of a solution of crude potassic hydrate. I then wash the precipitated tin free from acid, after which I add a quantity of potassic hydrate and also of cyanide of potassium, and then raise the temperature by preference to a point just below that at which the solution will boil. This, however, may be varied; and when the solution has thus been heated I add a quantity of solution of calcic hydrate. In the solution thus obtained I suspend sheets of tin and also the articles to be coated with the same, which will be previously prepared as is usual when coating articles by the electro-deposition of metal, and will be understood by persons acquainted with the electro-deposition of metals. The tin and the articles to be coated are then connected with the battery in the usual manner, and the articles to be coated are retained a greater or lesser time in the solution, according to the quantity or thickness of tin required to be deposited on their surface.

The quantity of ingredients may be varied; but I have used a bath of the following composition: In ten gallons of water, eight hundred and twenty-six grains tin in solution, two and one-half pounds potassic hydrate, one-half pound cyanide of potassium, and one hundred grains of calcic hydrate. These proportions will be constantly varying, according to the heat of the solution and the state of electric current, and the quantity of metal becoming dissolved and deposited; thus a variation in

the quantities of the several ingredients will be caused, which can only be determined and altered by a practical operator in accordance with the requirements of his solution. In the event of the equilibrium of the solution not being maintained in so far as regards the heat, quantity of metal, electricity, or chemicals used, the deposit obtained from this solution is liable to become rough, in which event the articles should be taken out and brushed with wire brushes, as is usual in the manufacture of electro-coated or plated articles, and again passed into the solution; and in the case of large articles the granular soft or surplus deposit must be removed by an ordinary brush, or a cloth and sand, or by any other convenient method.

The metals and alloys which I am enabled to coat by this process are copper, brass, silver, iron, nickle, zinc, lead, britannia metal, alloys of manganese, gold, steel, platinum, or any useful alloys of the above.

This invention is also applicable to the prevention of the oxidization or tarnishing of silver surfaces by the deposition of slight or heavy coatings of tin upon the surface of the silver exposed to atmospheric influence.

The solution hereinbefore described may be made from several precipitates of tin, provided always that potassic hydrate, cyanide of potassium, and calcic hydrate are left in the final solution; and also the same result may be obtained by dissolving the tin into the solution above named by the aid of electricity; but the means I have quoted I believe to be the most convenient for the chemist.

Having thus described the nature of my invention and the means by which the same may be carried into effect, I claim—

The solution composed of tin, potassic hydrate, cyanide of potassium, and calcic hydrate, substantially as and for the purpose herein specified.

JOHN EDWARD BINGHAM.

Witnesses:

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