UNITED STATES PATENT OFFICE.

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ELECTROLYTIC PROCESS.

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To all whom it may concern:

Be it known that I, HENRY L. HOLLIS, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Electrolytic Processes, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to tinning processes, particularly to processes for coating sheet iron with tin.

Sheet iron is usually coated with tin by the dipping process; that is, by dipping it in molten tin, the sheet iron being then drawn out through rollers and the surplus tin squeezed off. The blank sheets are not perfectly uniform in gage, and consequently after this treatment, the higher portions contain less tin and the hollow parts more tin, it being practically impossible to obtain a coating of uniform thickness. For certain classes of work the requirements are that the amount of plating tin shall not contain less than 1.8 grains for each four square inches, and to meet these requirements an excess of tin must be used in the dipping process. These requirements, however, can readily be met and uniformity of plating can very readily be obtained without using an excess of tin, by depositing the tin by electrolytic means, and the main object of my invention is to provide a simple and efficient method for uniformly tinning sheet iron or other iron without using an excessive amount of tin.

In accordance with my method, I first obtain a proper electrolyte or plating solution. The electrolyte I thus obtain is in the form of a tin salt of a fluorin acid. One method of obtaining this is as follows: A solution of hydro-fluosilicic acid is first prepared by taking seven parts by volume of hydro-fluosilicic acid and adding to this ninety-three parts of water. This solution is then used as an electrolyte in which tin is immersed as an anode and any suitable metal, preferably iron, as a cathode. Upon current flow between the anode and cathode and through the solution, tin is dissolved at the anode and deposited on the cathode, but the rate of solution will be greater than the rate of deposition, and as the amount of tin in solution gradually increases, the difference in rates will decrease until a point is reached at which the rate of solution is about equal to the rate of deposition, and the solution is then ready for tin plating. The iron sheets to be plated are first thoroughly cleaned, if necessary, by the pickling process or any other well-known process, and are then immersed in the plating solution and connected with the cathode terminal. The iron cathode used in preparing the plating solution having been removed, the entire deposit of tin will take place on the plates to be tinned. The amount and time of current flow can be very readily and nicely adjusted in any well-known manner to give the desired quality and quantity of plating. I also add a small amount of a colloid, preferably gelatin or glue, as I find that the addition of a small amount of such colloid renders the deposited metal much more dense and prevents loose and non-adherent deposition on the iron. In practice I dissolve the gelatin or glue in hot water and add this to the solution in the proper proportion of about one part by weight of gelatin or glue to one hundred parts by weight of the electrolyte.

The exact proportions expressed above for the forming of electrolyte are not necessary, as good results can be obtained with different strengths of acid and different quantities of colloid and with smaller amounts of tin in solution. I do not, therefore, want to be limited to the proportions expressed. Neither is it imperative to use tin as an anode after the electrolytic solution has been prepared, and I obtain good results by using an insoluble anode. In this case the quantity of tin in the solution can be maintained by adding, as required, fresh electrolyte previously electrolytically or otherwise prepared. I also find that I can perform zinc plating in the same manner by simply substituting zinc for tin throughout the process.

Having thus described my invention, I desire to secure the following claims by Letters Patent:

1. The process of coating iron sheets with tin, which consists in immersing the sheets in an electrolyte in the form of solution of a tin slat of a fluorin acid, and connecting the sheets as cathodes with an electrolytic circuit.

2. The process of coating sheet iron with tin, which consists in preparing a solution comprising hydro-fluosilicic acid and water, immersing in said solution an anode of tin

and a suitable cathode, causing current flow through the solution from the anode to the cathode whereby tin is liberated from the anode and deposited on the cathode, causing the rate of dissolution of tin from the anode to be greater than the deposition of tin on the cathode whereby the solution becomes impregnated with tin, then using said solution as an electrolyte, and immersing therein the iron sheets as cathodes.

3. The process of coating iron sheets with tin, which consists in immersing the sheets as cathodes in an electrolyte consisting of a solution of a tin salt of a fluorin acid and a colloid, and causing current to flow through the solution.

In witness whereof, I hereunto subscribe my name this 12th day of August A. D., 1907.

HENRY L. HOLLIS.

Witnesses:
HARVEY L. HANSON,
GEORGE E. HIGHAM.