

UNITED STATES PATENT OFFICE.

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PROCESS FOR ELECTRICALLY COATING WITH TIN OR ALLIED METALS.

No. 921,943.

Specification of Letters Patent.

Patented May 18, 1909.

Application filed June 27, 1907. Serial No. 381,003.

To all whom it may concern:

Be it known that I, JAY CARL BENEKER, a citizen of the United States, and a resident of the city of Waukegan, in the county of Lake and State of Illinois, have invented certain new and useful Improvements in Processes for Electrically Coating with Tin or Allied Metals, of which the following is a specification.

The use of a solution containing a salt of tin or allied metal such as antimony, platinum, gold or mercury or mixture of any two (2) or more of these when an alloy is to be deposited that can form a so-called sulfo-salt of an alkaline or alkaline earth metal.

The object of the invention is to render the process more expeditious, considerably cheaper, and to afford a homogeneous coating of uniform thickness and density.

In carrying out my invention I use a solution containing an "ous" or an "ic" salt of tin or an allied metal capable of forming a so called sulfo-salt of an alkaline or alkaline earth metal, of a mixture of any two or more of such salts when an alloy is to be deposited. An alkaline or an alkaline earth hydrate, preferably sodium hydroxid and an alkaline thio sulfate such as sodium thio sulfate better known as hyposulfite, are used.

While I do not limit this application to definite proportions, these may of course be varied and I recommend the following formula as giving satisfactory results for tin coating: 25 parts sodium hydrate, 15 parts sodium thio sulfate, 10 parts crystallized stannous chlorid, 200 part water. Preferably a solution is made of each, mixing the solution of stannous chlorid and sodium hydrate. When the solution is complete add the sodium thio sulfate. The solution thus formed may be used either hot or cold as an electrolytic bath when plating, but I prefer to use it hot. The reaction that takes place is probably as follows: The tin chlorid combined with the sodium hydrate forming sodium stannite,



The thio sulfate then transforms this stannite to a sulfo-salt changing all or most of the

stannous to the stannic form. Probably the chief ingredient in the final solution is sodium thio-stannate $\text{Na}_2\text{—SnS}_3$. This compound in a high degree can be electrolyzed without the tin separating in a spongy or "tree" form.

For tin coatings I employ thio sulfate for the purpose of transforming alkaline or alkaline earth stannites to alkaline or alkaline earth thio stannates, thus changing the valency from the "ous" to the "ic" form in which form only are the thio salts of tin known. These sulfo compounds are also formed even when the valency is not changed as in the case where mercuric or stannic salts are made the starting point.

With this solution using any convenient anode, but preferably one containing the metal to be plated out, excellent deposits of tin or any allied metal can be plated out without the formation of a spongy or tree-like deposit, even when using high current densities. The solution containing a goodly excess of caustic soda as in the above stated proportions permits the tin or any suitable metallic anode used, to go into solution quite readily even when using high current densities thus assuring a solution of fairly constant metallic content.

Of course my process is applicable to the plating of metals from their ores in which case a carbon or other insoluble anode is preferably used.

I claim as my invention:—

1. An electrolytic solution for tin comprising a solution formed of solutions of sodium hydrate and sodium thio sulfate to which a solution of stannous chlorid in proper proportions is added.

2. An electrolytic plating solution of tin comprising approximately 25 parts sodium hydrate, 15 sodium thio sulfate and 10 parts stannous chlorid and 200 parts of water.

In testimony whereof I have hereunto subscribed my name in the presence of two subscribing witnesses.

JAY C. BENEKER.

Witnesses:

K. E. HANNAH,
J. W. ANGELL.