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METHOD OF PRODUCING TIN-COATED SHEETS.

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To all whom it may concern:

Be it known that I, JOHN B. RUSS, a citizen of the United States, residing at Shelton, county of Fairfield, State of Connecticut, have invented a certain new and useful Improvement in Methods of Producing Tin-Coated Sheets, of which the following is a full, clear, and exact description.

My invention relates to a new method of producing a tin coated sheet of copper or copper alloy in which the coating, whether it is a flash coating or is of substantial thickness, is strongly adherent. It further has for its object to provide a method in which such coating is applied to the sheet by electrodeposition. It further has for its object to produce a tin coated sheet on which the coating is substantially uniform and in producing which the labor and expense involved is comparatively low.

The following is a description of a method of involving my invention.

In carrying out my invention in coating a sheet of copper, I take a sheet to be coated and prepare it for electroplating in the ordinary manner. When ready for plating I place the sheet in a suitable bath for electroplating with tin, preferably the bath described in U. S. Patent No. 1,397,222 granted to F. C. Mathers, Nov. 15, 1921 for improvements in electrolytic refining of tin and electrolytically deposit on its exposed surface a coating of tin of the thickness desired. After this coating has been applied I subject the tin coated plate to heat in a suitable oven such that it is raised to a temperature somewhat below the melting point of tin (which is 442° F.) and maintain the heat until the coating is softened so as to modify its crystalline structure. With 22 gauge copper sheet, having such a coating this can be done by placing it in a closed electric oven heated to a temperature of 390 F. and permitting the sheet to remain in the oven for a period of one and one-half hours at that temperature.

The heating results in softening without actually melting the tin and producing a closely adhering coating in which the crystalline formation is somewhat broken down and apparently entering to some extent into the surface pores of the base.

A thickness of three thousandths of an inch makes a durable coating for many purposes. It may be made of a thickness from that of a flash coating to five thousandths of an inch or more, if desired.

Where a soft sheet of copper is used as the base the result of the process up to this point is an annealed sheet of tin coated copper, a very desirable product.

In order to produce a polished surface upon the compound product thus produced, if desired, I pass it through ordinary rolls until the desired polish is obtained. To obtain a high polish I have found that two or three passes through the rolls is sufficient. These passes leave the copper comparatively soft, which is a great advantage over any process requiring a large number of passes, on account not only of the reduction of labor but also on account of the relatively soft condition of the copper in the finished product.

The heat treatment which I have specifically described may be varied as to degree of temperature or as to time or both, the specific heat treatment mentioned being simply a statement of treatment which I have found will produce satisfactory results. The essential point is to heat the coating so as to cause it to adhere more strongly and closely to the surface of the sheet coated. Fair results for some purposes can be obtained if the heating period is reduced to one-half hour and the heating temperature is as low as 275° F.

The heating can be carried out while the coated sheet is immersed in a heated oil bath, such as is used in oil tempering, and I prefer to use such a bath in the heating step. Such a bath is more easily kept at a uniform temperature so as to heat all portions of the sheet substantially equally and prevents surface oxidation during the heating period.

If one side only of the sheet is to be coated with tin I coat the other side with an asphaltum or other insulating varnish before immersion, removing the coating by a suitable solvent such as benzine before the heat treatment.

The product has a coating of a uniformity not hitherto obtained in satisfactory commercial tin covered sheets and the final coating applied and treated as described is resistant to the action of acids and corrosion to a remarkable extent, so as to be both durable and lasting.

As will be evident to those skilled in the

art, my invention permits of various modifications without departing from the spirit thereof or the scope of the appended claims.

What I claim is:

1. The improvement in the method of coating a cupreous metallic sheet with tin which consists in electrolytically depositing thereon a coating of tin of substantially the desired thickness and subsequently subjecting the coated sheet to a modifying heat somewhat below the melting point of tin.

2. The improvement in the method of coating a cupreous metallic sheet which consists in electrolytically depositing thereon a substantial coating of tin of the desired thickness, heating said sheet in an oil bath to a point below the melting point of tin and sufficient to modify the character of the coating.

3. The improvement in the method of coating a cupreous metallic sheet which consists in electrolytically depositing thereon a substantial coating of tin of the desired thickness, heating said sheet to a point below the melting point of tin and sufficient to modify the character of the coating, and then rolling the coated sheet.

4. The improvement in the method of producing a soft sheet of tin coated copper, which consists in electrolytically depositing upon a sheet of copper a substantial coating of tin of the desired thickness, heating said sheet to a point below the melting point of tin and sufficient to modify the character of the coating, and maintaining it in heated condition for an extended period of time.

5. The improvement in the method of producing a sheet of tin coated copper, which consists in electrolytically depositing upon a sheet of copper a substantial coating of tin of the desired thickness, heating said sheet to a point below the melting point of tin and approximating 400° F., and maintaining said sheet in heated condition for an extended period of time.

JOHN B. RUSS.