

UNITED STATES PATENT OFFICE.

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METHOD OF PLATING FERROUS METALS.

1,256,084.

Specification of Letters Patent.

Patented Feb. 12, 1918.

No Drawing.

Application filed November 11, 1914. Serial No. 871,583.

To all whom it may concern:

Be it known that I, WILLIAM E. WATKINS, a citizen of the United States of America, residing at the city of New York, county of New York, State of New York, have invented certain new and useful Improvements in Methods of Plating Ferrous Metals, of which the following is a specification.

My invention relates to the plating of one metal, such as iron or steel with another, such as tin, and consists, broadly stated, in the employment of a finely ground oxid or salt of tin to form a coating for the ferrous metal and then subjecting the metal, so coated, to a temperature at or above the melting point of the plating metal and sufficient to raise the ferrous metal to approximately its welding heat. As a result the oxid or salt, whichever is used, is reduced and a continuous plating of the metallic base thereof is deposited on the surface of the ferrous metal in a molecular union therewith, while an exterior layer containing a magnetic oxid of iron is formed on the plating metal which protects the same from oxidation during the cooling of the plated article. I do not herein claim the product of the process described as said product is described and claimed in my application filed November 18, 1914, Serial No. 872,835.

As an example of the best method at present known to me for carrying out my improved process, I would proceed as follows: I first grind a quantity of oxid of tin, or of one of the salts of tin, such as chlorid of tin to great fineness in a suitable inert, viscous, volatile vehicle such as a mixture of equal parts of Mexican crude oil and an American fuel oil. In practice I am using about 40 pounds of the tin oxid or salt for every 8 gallons, or approximately 64 pounds of the oil mixture, but these proportions may be varied to produce plating films of different thicknesses. I then apply this viscous mass in an even, dense coating to the ferrous metal to be plated. In the case of sheets I pass the same through rolls which are coated with the plating material. Such plating material can also be applied, though less advantageously, by brushing or pouring it on, or by dipping the article in a plastic mass of the oil and chlorid mixture.

The sheet or article so coated is then passed into or through a furnace in which

a temperature at or above the melting point of tin is maintained. The melting point of tin is comparatively low, and in order to raise the ferrous metal to a temperature at which a molecular union between the ferrous metal and the fused plating metal may be created, and also to start the reduction of the oxid or salt, it is obvious that a higher temperature must be maintained in the furnace. The furnace temperature required would depend in part on the length of time during which the ferrous metal is to be retained in the furnace. If the coated ferrous sheets or other articles are passed quickly through the furnace, a very high heat is needed to bring the ferrous metal up to the necessary temperature in the short period of exposure to such heat. If they are allowed to remain longer in the furnace, a lower temperature will serve the purpose. I find that with a furnace temperature of 2200 Fahrenheit or somewhat less, the operation can be carried on very rapidly. In a few seconds the heat of the furnace will bring the surfaces of a sheet of steel of about No. 28 gage up to the necessary temperature and institute and complete a reaction which results in the reduction to metallic tin of the oxid or salt, whichever is used, and deposit the same on the ferrous metal in a uniform film or layer of pure tin which is molecularly united to the ferrous metal. An exterior layer containing magnetic oxid of iron is formed on and covers the tin film, protecting it from any oxidation which might otherwise occur while the article is being withdrawn from the furnace and cooling. This outer layer can be subsequently removed in any convenient manner, as by an acid bath.

The final result of the above described process is a sheet or other article having a core or base of iron or steel and an exterior of pure tin molecularly deposited on the iron so evenly and closely that it cannot be scaled or cracked off either by mechanical action or by uneven expansion or contraction.

While I have mentioned chlorid of tin, other salts might be employed, and other volatile vehicles substituted for the oil mentioned.

Having therefore described my invention, I claim:

1. The method of plating ferrous metals which consists in subjecting the same, while

in surface contact with a compound of tin to a temperature above the melting point of tin and sufficient to raise the ferrous metal approximately to a welding heat.

5 2. The method of plating ferrous metals which consists in subjecting the same, while in surface contact with a compound of tin to a temperature above the melting point of tin and sufficient to raise the ferrous metal
10 approximately to a welding heat thereby converting the tin compound into tin in the shape of a substantially continuous plating layer molecularly deposited on the ferrous metal.

15 3. The method of plating ferrous metals which consists in subjecting the same, while in surface contact with a compound of tin to a temperature above the melting point of tin and sufficient to raise the ferrous metal
20 approximately to a welding heat thereby converting the tin compound into tin in the shape of a substantially continuous plating layer molecularly deposited on the ferrous metal and forming an exterior adherent
25 layer containing magnetic oxid of iron.

4. The method of plating ferrous metals which consists in subjecting the same, while

in surface contact with a compound of tin to a temperature above the melting point of tin and sufficient to raise the ferrous metal 30 approximately to a welding heat thereby converting the tin compound into tin in the shape of a substantially continuous plating layer molecularly deposited on the ferrous metal, forming an exterior adherent 35 layer containing magnetic oxid of iron and finally removing said exterior layer.

5. The method of plating ferrous metals which consists in subjecting the same while coated with an even layer of a mixture of 40 a finely divided oxid of tin in a viscous volatile vehicle to a temperature above the melting point of tin and sufficient to raise the ferrous metal approximately to a welding heat thereby converting the tin oxid into 45 tin in the shape of a substantially continuous plating layer molecularly deposited on the ferrous metal, forming an exterior layer containing magnetic oxid of iron and finally removing said exterior layer.

WILLIAM E. WATKINS.

Witnesses:

A. PARKER SMITH,
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