UNITED STATES PATENT OFFICE.

AUGUST SCHAAG, OF BERLIN, GERMANY.

METHOD OF TINNING IRON CASTINGS.

SPECIFICATION forming part of Letters Patent No. 525,471, dated September 4, 1894.

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To all whom it may concern:

Be it known that I, AUGUST SCHAAG, of 28 Anklamerstrasse, Berlin, in the German Empire, have invented a new and useful Method of Tinning Iron Castings, of which the following is a specification.

My invention consists of an efficient and cheap process or method for producing an even and bright tinned surface on iron castings by dipping the same into molten tin after previous electrolytical treatment of their surfaces.

Heretofore the tinning of iron castings has been difficult and costly, as the surface had first to be softened or decarbonized. For this purpose the iron casting had to be exposed to great heat for a length of time while inclosed in an airtight vessel together with powdered oxygen-containing substances such for instance as red iron ore, magnetic iron ore or manganese ore. A partial superficial decarbonization of the cast iron rods was thus obtained which could then be tolerably well tinned, but never without faults. This process is however coupled with such great difficulties, especially in the case of large castings, that the tinning comes much too dear, and is at the same time unsatisfactory.

By a recently published process comprising a coating of pure iron by galvanism, the above defect was sought to be remedied, but various other defects are inherent in this new process, and these are intended to be obviated by my present improved process.

My process consists essentially in coating iron castings electrolytically with an alloy of iron and nickel or an alloy of iron and cobalt, and then to coat this surface with tin; such tin coating adhering exceedingly well.

The alloy consisting of iron and nickel, or of iron and cobalt has the characteristic that iron and nickel or iron and cobalt are deposited by way of electricity on the object to be tinned, these metals coming from the neutral solution. The alloy of iron and nickel, or of iron and cobalt, will vary as the proportions vary in which the mixture contains salts of iron with salts of cobalt.

I make a solution for the production of these alloys in the following manner: I take a mixture in or about the following proportions, viz.: one kilogram of sulphate, nitrate or hydrochlorate of nickel salt, three kilograms sulphate of protoxide of iron, and one kilogram of citric acid or grape acid or a mixture in or about the following proportions, viz., one-half kilogram sulphate, nitrate or hydrochlorate of cobalt salt, three kilograms sulphate of protoxide of iron, and one kilogram of citric or grape acid: which mixture is dissolved in about one hundred liters of water. I then add to this solution alkali, carbonate or caustic alkali, such as potash, soda or ammonia, until it is quite neutralized. The efficacy of the solution may be increased by adding about one-half kilogram bisulphite of potash, soda or ammonia. The casting, well cleaned, is suspended in this solution as the cathode, and opposite to the same, as anode, is suspended a sheet of nickel-iron or cobalt-iron of a size suitable for the cathode. An electric current is then turned on. The strength of this current should be about fifty ampères by seven volt tension upon one square meter of surface of casting. In consequence of the electrochemical decomposition, a firmly adhering whitish gray coating of nickel-iron or cobalt-iron is soon formed upon the casting and of a very close and steel-like hardness.

Chemical analyses prove that the coating consists of about ninety-five per cent. of iron and about three per cent. of cobalt, or about ninety-four per cent. of iron and about four per cent. of nickel. Such nickel-iron or cobalt-iron coating is much more even than a mere galvanically produced coat of pure iron. By means of the aforesaid solution containing salts of iron and of nickel or cobalt, I am enabled to coat evenly casting surfaces worked in rather strong relief, while without the addition of nickel or cobalt the raised parts only would be coated with deposit of pure iron but not the depressed parts; these latter would therefore in the dipping in molten tin not be coated with tin, thus rendering the work worthless.

The casting having been evenly coated by electrolysis as described, is first dipped into a flux consisting of chloride of zinc, and then into a bath of molten tin, which is covered with a layer of chloride of zinc or grease for preventing oxidation.

In order to keep the solution constant it is

necessary from time to time to replenish or strengthen it by the addition of sulphate of iron, salt of nickel or cobalt, and acid such as grape, citric, oxalic, acetic, formic or sulphuric.

What I claim, and desire to secure by Letters Patent of the United States, is—

1. The herein described process of tinning iron castings which consists in coating the same electrolytically with an alloy of iron and nickel or cobalt, and then dipping it in a bath of molten tin, substantially as set forth.

2. The herein described process of tinning iron castings, which consists in coating the same electrolytically in a neutralized acid solution with an alloy of iron having the character described, that is to say, capable of being deposited electrically from a neutral solution, and then dipping the coated casting into a bath of molten tin, substantially as set forth.

3. The herein described process of tinning iron castings, which consists in coating the same electrolytically with nickel or cobalt and iron by placing them in a watery solution of a suitable nickel or cobalt salt, sulphate of iron, citric acid and a suitable neutralizing agent and passing a current through them and finally dipping the coated casting in a bath of molten tin, substantially as set forth.

4. The herein described process of tinning iron castings, which consists in coating the same electrolytically with nickel or cobalt and iron by placing them in a watery solution of a suitable nickel or cobalt salt, sulphate of iron, citric acid, a suitable neutralizing agent, and bisulphite of potash, soda or ammonia, and passing a current of electricity through them, and finally dipping the coated casting in a bath of molten tin, substantially as set forth.

AUGUST SCHAAG.

Witnesses:
PEREGRINE VERNALS,
JOHANN BAPTIST ASTOR.