

UNITED STATES PATENT OFFICE

2,125,458

METHOD OF BRIGHT-PICKLING ARTICLES OF COPPER-ZINC ALLOYS

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No Drawing. Application September 28, 1937, Serial No. 166,093. In Germany September 30, 1936

4 Claims. (Cl. 148-8)

My invention relates to a method of bright-pickling articles of copper-zinc alloys, such as die castings, sand castings, chill castings, etc., or half-finished products, such as bar or rod sections, die forgings, etc.

It is an object of my invention to provide an improved method of the kind referred to, by which a perfectly bright and silver-white surface is obtained on the articles pickled.

To this end, I treat the articles with an aqueous solution of chromic acid (CrO<sub>3</sub>) and hydrochloric acid (HCl), rinse them to remove the solution, and treat the rinsed articles with an aqueous solution of chromic acid.

Articles and half-finished products made of copper-zinc alloys by casting, die casting, drawing, pressing, rolling, etc., develop a dark and unsightly surface a short time after they have been made.

It has been attempted to impart a bright appearance to such articles or products by the pickling agents normally used for zinc and several alloys, i. e., acids, salts, acid salt solutions, etc. Such attempts, however, failed and the articles or products developed a dark coating either during pickling or during rinsing. This dark and unsightly coating consisted chiefly of copper or copper oxide, and was difficult to remove. The cause is that while the articles or products are pickled a certain percentage of the copper in the alloy is dissolved and immediately precipitated in powdered condition on the surface of the articles or products by cementation.

These drawbacks are eliminated by the two-stage pickling method according to my invention.

It has already been proposed to treat die castings made of alloys with or without copper by solutions of chromate or bichromate to which is added sulphuric or hydrochloric acid, or alkaline or ammonium salts of such acids. The object of these known methods, however, is to produce a colored anti-corrosion coating on the castings, as against the object of my invention which is to produce not a colored but a perfectly bright and silver-white surface which is not deteriorated by exposure to the air.

The composition of the pickling solutions for the first and for the second stage of my method can be varied within certain limits. I have found that the best results are obtained if the percentage, by weight, of the first solution is not less than 15 per cent of chromic acid (CrO<sub>3</sub>), and not more than 15 per cent of hydrochloric acid. The percentage, by weight, of the second solution

should be 10 to 70 per cent of chromic acid (CrO<sub>3</sub>) in order to obtain the best results.

The following examples are given for favorable compositions of the first and the second solution, in per cent by weight:

First solution		
Chromic acid (CrO <sub>3</sub> )	Hydrochloric acid (HCl)	Water
25	10	65
30	10	70
30	5	65
40	10	50
60	10	30
Second solution		
10	-----	90
30	-----	70
70	-----	30

The solutions are used at room temperature, i. e., 18° to 20° centigrade.

The method according to my invention is performed as follows:

An article is placed in the first solution which, by way of example, contains, by weight 25% chromic acid, 10% hydrochloric acid, and 65% water, as in the first line of the above table. The solution is cold, i. e., at room temperature, and the article is not cleaned from grease and other impurities. It remains in the first solution for about one minute, and grease and other impurities are removed from its surface during this period.

After having been treated in the first solution, the article has a slight coloring resembling the color of old brass.

It is thoroughly rinsed with water and is then placed in the second solution which is also at room temperature and contains, by way of example, 10 per cent by weight of chromic acid, and 90 per cent of water. The article is left in the second solution until the slight coloring produced in the first solution disappears and the bright metal surface is exposed. The duration of the treatment in the second solution is also about one minute.

When the coloring has disappeared the article is removed from the second solution, thoroughly rinsed, and dried. It then shows a pure metallic silver-white surface which is not affected by exposure to air.



As mentioned, the most favorable composition of the first solution is not less than 15 per cent, by weight, of chromic acid, and not more than 15 per cent of hydrochloric acid. If other acids, such as sulphuric or nitric acid, or sodium chloride, are used instead of the hydrochloric acid, results will be poor.

Results will also be poor if the content of chromic acid in the second solution is of the order of 5 per cent. It should be 10 to 70 per cent, by weight, as described.

The duration of the treatment in each solution is about one minute if the solutions are at room temperature, i. e., 18° to 20° centigrade. Heating the solutions to a higher temperature slightly reduces the duration but the temperature must not be higher than 30° centigrade as, if this limit is overstepped it is difficult to remove the coloring developed in the first solution, and the coloring does not disappear uniformly, so that stained surfaces may result.

Pickling loss in my method is very small as compared with the usual pickling methods, so that the two solutions are very durable and can be used again frequently.

I claim:

1. The method of bright-pickling products of copper-zinc alloys, comprising first pickling the products in an aqueous solution of chromic acid and hydrochloric acid, rinsing the products, and then pickling them in an aqueous solution of chromic acid only.

2. The method of bright-pickling products of copper-zinc alloys, comprising first pickling the products in a solution containing chromic acid in an amount of at least 15% of the total weight, and hydrochloric acid in an amount of at most 15%, the remainder being water, then rinsing the products, and then pickling the products in a solution containing chromic acid in an amount of 10%-70% by weight, the remainder being water.

3. As an article of manufacture, a product of a copper-zinc alloy which has been prepickled in an aqueous solution of chromic acid and hydrochloric acid, and finally pickled in an aqueous solution of chromic acid alone.

4. As an article of manufacture, a product of a copper-zinc alloy bright-pickled by a two-stage method according to claim 2.

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