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PRODUCTION OF BRIGHT COPPER

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The present invention relates to a method for producing bright surfaces on copper and its alloys and more particularly to a bath which may be employed to produce a bright finish on such metals. The term "copper" as used hereafter and in the appended claims is intended to include alloys of copper as, for example, brass, bronze and the like.

In forming a bright surface on copper, it has heretofore been common practice to use an aqueous acid bath containing sulfuric and nitric acids in varying proportions. In some instances a small amount of hydrochloric acid or its salts also was included. Baths formed of such acids produce a bright finish on copper but have several objectionable features. When the work is dipped in the bath a strong evolution of nitric oxide takes place, necessitating the use of very powerful exhausts to protect the workman against it. Furthermore, in exhausting this gas special non-corrosive exhaust ducts are required, since the gas rapidly corrodes ordinary metals. Such equipment adds to the installation costs and the operation of the exhaust fans increases operating expenses. Also, due to the rapid action of dipping solutions of this kind, the work must be transferred quickly from the brightening bath to the water rinse in order to prevent excessive attack of the work. As a result, adequate drainage of the dipped parts is not possible and large acid losses are incurred.

We have discovered a bright dipping solution for brightening copper or copper-surfaced articles whereby the above objections to the conventional baths may be avoided. More particularly we have found that, by incorporating chromic acid in a solution containing nitric acid, sulfuric acid, and a chloride such as hydrochloric acid (hydrogen chloride) or a salt thereof, the evolution of nitric oxide is retarded when the work is immersed in the resulting solution. Further, the etching action of the bath is so decreased that the work can be drained adequately before rinsing. Hence less make-up solution is required to keep the bath at a constant volume.

We have obtained satisfactory results with aqueous bright dipping solutions containing, by weight, from 80 to 20 parts concentrated sulfuric acid, from 20 to 80 parts concentrated nitric acid, from 0.1 to 10 parts concentrated hydrochloric acid (or an equivalent amount of a chloride of a metal), and from 5 to 200 parts chromic acid. In preparing the above solution the volume of added water is from 0.2 to 3 times the combined volume of the sulfuric and nitric acids. The optimum values of the ingredients, per gallon of

water, are approximately as follows: 2780 grams concentrated sulfuric acid (specific gravity about 1.84), 535 grams concentrated nitric acid (specific gravity about 1.42), 23 grams concentrated hydrochloric acid (specific gravity about 1.18) and 1134 grams commercial chromic acid.

The work to be brightened may be precleaned, if desired, or it may be dipped directly into the brightening bath for a few seconds. It is removed from the bath, drained for a few seconds, and rinsed in running cold water, followed by one or more hot water rinses.

Articles formed of solid copper or alloys thereof, or formed of a foundation metal plated with copper, are effectively and economically brightened by dipping in the brightening solution of this invention.

What we claim as new and desire to secure by Letters Patent of the United States, is,

1. A solution adapted for the production of bright copper, said solution being composed, by weight, of from 80 to 20 parts concentrated sulfuric acid, from 20 to 80 parts concentrated nitric acid, from 0.1 to 10 parts concentrated hydrochloric acid, from 5 to 200 parts chromic acid, and water in an amount corresponding to from 0.2 to 3 times the combined volume of the sulfuric and nitric acids.

2. A method of brightening a copper-surfaced article which comprises dipping such article in a solution composed, by weight, of from 80 to 20 parts concentrated sulfuric acid, from 20 to 80 parts concentrated nitric acid, from 0.1 to 10 parts concentrated hydrochloric acid, from 5 to 200 parts chromic acid, and water in an amount corresponding to from 0.2 to 3 times the combined volume of the sulfuric and nitric acids.

3. A solution for brightening a copper-surfaced article consisting of an aqueous solution containing per gallon of water approximately 2780 grams concentrated sulfuric acid of about 1.84 specific gravity, approximately 535 grams concentrated nitric acid of about 1.42 specific gravity, approximately 23 grams concentrated hydrochloric acid of about 1.18 specific gravity and approximately 1134 grams chromic acid.

4. A composition adapted for the production of bright copper surfaces, said composition consisting of an aqueous solution of, by weight, from 80 to 20 parts concentrated sulfuric acid, from 20 to 80 parts concentrated nitric acid, a chloride in an amount equivalent to from 0.1 to 10 parts concentrated hydrochloric acid and from 5 to 200 parts chromic acid.

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