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BLACKENING COPPER ALLOYS

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The present invention relates to a process for blackening copper alloys having substantial copper content.

There have been numerous oxidizing processes for producing a black finish on copper and copper alloys which involve the use of various oxidizing agents.

The process which produces the most satisfactory finish and is most commonly used makes use of a solution composed of sodium or potassium hydroxide and sodium or potassium chlorite dissolved in water, operated at or near boiling temperature.

The normal procedure followed to oxidize the copper or copper alloy parts is to clean the parts of grease and dirt by any of the well-known means, and then further clean the parts of surface impurities by etching in a suitable etching solution.

After the surface preparation is complete, the parts are immersed in the oxidizing solution until a uniform black oxide is formed. Parts are then rinsed and dried, after which oil or wax may be applied to improve the appearance.

Copper is very readily oxidized by the method described, and copper alloys of very high copper content can also be so oxidized. However, copper alloys become increasingly difficult to satisfactorily oxidize as the copper content of the alloy diminishes. The present invention relates particularly to the oxidation of copper alloys wherein the copper content is substantial but is nevertheless too low to enable satisfactory oxidation to be attained by heretofore existing methods. Such alloys include brass, bronze, Phosphor bronze, Muntz metal and beryllium copper. The term "copper base alloy" is to be understood as designating an alloy such as those last above referred to.

Another difficulty exists in connection with the oxidization of some copper alloys. For instance, when brass, with high copper that permits satisfactory blackening, is processed, the zinc content of the brass rapidly weakens the oxidizing solution so that frequent renewal is necessary which results in high finishing cost.

In order to overcome the difficulties above outlined, it has been common practice to copper plate copper alloys of the class described which were troublesome and to then oxidize the copper plate.

The object of the present invention is to provide a process which will permit the oxidization of copper alloys of the class described without copper plating, and which will extend the life of

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the copper oxidizing solution when used for coloring copper alloys which tend to weaken the oxidizing bath.

The present invention solves the problem of oxidizing copper alloys of the class described by means of a predip which is used following the customary cleaning operation and just before immersion in the oxidizing bath.

The predip used consists of an aqueous solution of sodium or potassium hydroxide and sodium or potassium bromate.

The pieces to be blackened are immersed in the predip solution with a temperature ranging from 210° to the boiling point of the solution. After from three to fifteen minutes' immersion, the surface color changes to a brownish color in the range from grey-brown to purple-brown, depending on the alloy. When the surface color is uniform, the parts are rinsed and transferred to the oxidizing bath where they rapidly require the desired black oxide finish. Copper alloys of the class described impossible to oxidize directly may be colored by this method, and alloys so processed will not excessively weaken the oxidizing bath. Another advantage of this method is that total finishing time is substantially reduced.

A satisfactory predip is an aqueous solution consisting essentially of an alkali selected from the group comprising sodium hydroxide and potassium hydroxide and of an oxidizing agent selected from the group comprising sodium bromate and potassium bromate. Sodium hydroxide rather than potassium hydroxide is ordinarily preferred and potassium bromate rather than sodium bromate is ordinarily preferred, but the invention is not so limited. The concentration may advantageously be 100 g./l. hydroxide and 100 g./l. bromate, but the concentration is not critical and may range from 10 g./l. hydroxide and 15 g./l. bromate to 800 g./l. hydroxide and 400 g./l. bromate. The concentration may be adjusted to best meet the requirements of the alloy being processed. The solution is maintained at a temperature at or just below the boiling point. The solution is stable with satisfactory life. There is no gassing and no harmful fumes are generated.

A composition conforming to the invention and adapted for making a predip solution incorporating the invention consists essentially of an alkali selected from the group comprising sodium hydroxide and potassium hydroxide and of an oxidizing agent selected from the group comprising sodium bromate and potassium bromate.

In such a composition the ratios of the hydroxide to the bromate may range from 2:3 for weak solutions and 2:1 for strong solutions.

The present invention is not limited to the coating of copper alloys, but may be used to coat surfaces of other metals which have been plated with a copper alloy.

The invention claimed is:

1. The process of preparing a copper base alloy for black surface oxidization, the process comprising immersing the alloy in an aqueous solution which is approximately at the boiling temperature and which consists essentially of an alkali selected from the group comprising sodium hydroxide and potassium hydroxide and of an oxidizing agent selected from the group comprising sodium bromate and potassium bromate, the concentration of the solution ranging from 10 g./l. hydroxide and 15 g./l. bromate to 800 g./l. hydroxide and 400 g./l. bromate, and continuing the immersion until the surface color of the alloy is uniformly changed to a brownish color in the range from grey-brown to purple-brown.

2. The process of preparing a copper base alloy for black surface oxidization, the process comprising immersing the alloy in an aqueous solution which is approximately at the boiling temperature and which consists essentially of an alkali selected from the group comprising sodium hydroxide and potassium hydroxide and of an oxidizing agent selected from the group comprising sodium bromate and potassium bromate, the concentration of the solution being approximately 100 g./l. hydroxide and 100 g./l. bromate, and continuing the immersion until the surface color of the alloy is uniformly changed to a brownish color in the range from grey-brown to purple-brown.

3. The process of preparing a copper base alloy for black surface oxidization, the process comprising immersing the alloy in an aqueous solution which is approximately at the boiling temperature and which consists essentially of sodium hydroxide and potassium bromate, the concentration of the solution ranging from 10 g./l. hydroxide and 15 g./l. bromate to 800 g./l. hydroxide and 400 g./l. bromate, and continuing the immersion until the surface color of the alloy is uniformly changed to a brownish color in the range from grey-brown to purple-brown.

4. The process of producing a black surface on

a copper base alloy, the process comprising immersing the alloy in an aqueous solution which is approximately at the boiling temperature and which consists essentially of an alkali selected from the group comprising sodium hydroxide and potassium hydroxide and of an oxidizing agent selected from the group comprising sodium bromate and potassium bromate, the concentration of the solution ranging from 10 g./l. hydroxide and 15 g./l. bromate to 800 g./l. hydroxide and 400 g./l. bromate, continuing the immersion until the surface color of the alloy is uniformly changed to a brownish color in the range from grey-brown to purple-brown, and thereafter immersing the alloy in a second hot aqueous solution consisting essentially of an alkali selected from the group comprising sodium hydroxide and potassium hydroxide and of a chlorite selected from the group comprising sodium chlorite and potassium chlorite.

5. The process of producing a black surface on a copper base alloy, the process comprising immersing the alloy in an aqueous solution which is approximately at the boiling temperature and which consists essentially of an alkali selected from the group comprising sodium hydroxide and potassium hydroxide and of an oxidizing agent selected from the group comprising sodium bromate and potassium bromate, the concentration of the solution being approximately 100 g./l. hydroxide and 100 g./l. bromate, continuing the immersion until the surface color of the alloy is uniformly changed to a brownish color in the range from grey-brown to purple-brown, and thereafter immersing the alloy in a second hot aqueous solution consisting essentially of an alkali selected from the group comprising sodium hydroxide and potassium hydroxide and of a chlorite selected from the group comprising sodium chlorite and potassium chlorite.

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Certificate of Correction

Patent No. 2,457,480.

December 28, 1948.

EARLE B. LEWIS

It is hereby certified that errors appear in the printed specification of the above numbered patent requiring correction as follows:

Column 1, line 33, for "oxidation" read *oxidization*; column 2, line 20, for "require" read *acquire*;

and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 12th day of April, A. D. 1949.

[SEAL]

THOMAS F. MURPHY,
Assistant Commissioner of Patents.

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