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PROCESS OF TREATING COPPER

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This invention relates to a process of treating metal for improving certain characteristics thereof and pertains particularly to an improved process of treating copper, this application constituting a continuation-in-part of my prior application, Ser. No. 318,750, filed February 13, 1940.

The present invention has for its primary object to provide an improved process of treating copper such as the commercially pure type of copper used in the manufacture of copper tubing, buss bar and the like, by which definite improvements are obtained in the structure of the metal, which increase the elasticity or toughness of the same, so that the metal shows a very marked increased resistance to being bent.

The present process makes it possible to increase the resistance of copper tubing and copper wire and buss bar material to bending as a result of which such material may be used in locations where its use would not otherwise be desirable or where it would be necessary to make use of carriers or supports for preventing the material, particularly tubing, from sagging or bending under its own weight. By the application of the present process, such tubing appears to have the inner and outer surfaces thereof toughened or altered in such a manner as to resist bending and also to resist corrosion under the action of fluids or other chemicals which ordinarily have a corroding action upon copper metal.

In carrying out the present invention, use is made of a commercial product which is obtained under the name of 85% magnesia cement, such product comprising 85% by wt. of basic magnesium carbonate, commonly called "magnesia" and 15% by wt. of finely comminuted asbestos. In association with this composition or with these ingredients there are employed potassium nitrate or saltpeter and vinegar, all the ingredients being combined in an aqueous carrier. This forms the basic preparation for the treatment of thin copper material such as copper tubing, but where treatment of heavier or solid bodies of copper is to be made such as buss bar material, a certain proportion of potassium cyanide is added to the other ingredients.

In the preparation of the basic mixture consisting of the magnesia cement, potassium nitrate and vinegar, the magnesia cement is first thoroughly mixed with a prescribed proportion of water and allowed to stand for approximately 24 hours, after which it is brought to a boil in a suitable receptacle. The use of soft water is preferred. The potassium nitrate and vinegar are then added to the mixture and the metal tubing is immersed therein in cold condition and boiled in this mixture for a period of from 30 min. to 1 hr., the time of boiling being regulated according to the use to which the tubing is to be put and the degree of increased elasticity desired. If buss bar copper or similar material is to be treated, the cyanide of potassium is added to the mixture before the copper is introduced.

While I do not pretend to understand exactly what change or changes take place in the copper or what action the mixture of the stated ingredients has upon the metal whereby the stated improved qualities are obtained, it is my belief that the heat of the solution opens the grain of the metal so that the active ingredients, particularly the asbestos, enters into the pores or grain of the metal and brings about not only the improved condition of elasticity and increased resistance to bending, but also forms a protection for the metal whereby its ability to resist corrosion or other change which might be brought about by contact with the atmosphere or chemicals, is greatly increased.

As a specific illustration of the procedure, the following formula may be set forth together with the steps for treating the metal therewith.

For the preparation of 4 gal. or 16 qts. of the treating solution, there is added to this quantity of water, preferably soft water, 12 oz. of the 85% magnesia cement, previously referred to, and this mixture is allowed to stand for about 24 hrs. The water cement mixture is then brought to a boil and then has added thereto 1 oz. of saltpeter or potassium nitrate and 8 oz. of vinegar. The copper tubing in cold condition is then added to the boiling mixture and the tubing is boiled in this mixture for a suitable period as, for example, from 30 min. to 1 hr.

If buss bar copper is to be treated, there is added to the mixture before the copper tubing is immersed therein, 1 oz. of cyanide of potassium.

It has been found that after subjecting copper material such as tubes of commercially pure copper or buss bar copper to the treatment herein set forth, the metal seems to age or undergo additional changes as to its elastic limits over a period of time after it has been subjected to boiling in the solution. In other words, while the copper after being removed from the solution shows by actual test to have an increased resistance to being bent or an increased elasticity, this change continues to take place or such in-

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creased resistance to bending appears to proceed or become greater as time passes.

While reference has been made to the application of the present process to copper tubing prepared from commercially pure copper or to copper buss bar, the process is also applicable to copper alloy tubing to produce therein the changes herein stated.

In addition to the fact that copper treated according to the present process shows an increase in elasticity by which is meant that there is an increase in the power of resistance to change of form of the metal and an increased ability of the metal to recover from any change which may be made in its form, it is found that the metal will take and retain a much higher polish than ordinary copper which has not been treated according to the present process.

What is claimed is:

1. The herein stated process of treating articles consisting predominantly of copper, for the purpose of toughening and increasing the resistance of the same to bending, which comprises subjecting the article to boiling for a predetermined period of time in an aqueous bath containing asbestos, magnesium carbonate, potassium nitrate and vinegar.

2. The herein described process of treating articles consisting predominantly of copper, for increasing resistance of the same to bending, which comprises subjecting the articles to boiling for a predetermined period of time in an aqueous bath consisting of asbestos, magnesium carbonate, potassium nitrate, vinegar and potassium cyanide.

3. The herein described process of treating articles consisting predominantly of copper for increasing resistance of the same to bending, which comprises boiling the articles for a period of from 30 min. to 1 hr. in a bath comprising water, 16 qts., magnesia cement, 12 oz., consisting of magnesium carbonate, 85% and asbestos fibre, 15%, potassium nitrate, 1 oz., and vinegar, 8 oz.

4. The herein described process of treating articles consisting predominantly of copper for increasing resistance of the same to bending, which comprises boiling the articles for a period of from 30 min. to 1 hr. in a bath comprising water, 16 qts., magnesia cement, 12 oz., consisting of magnesium carbonate, 85% and asbestos fibre, 15%, potassium nitrate, 1 oz., vinegar, 8 oz., and potassium cyanide, 1 oz.

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