UNITED STATES PATENT OFFICE.

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PROCESS OF HARDENING COPPER.

984,137. Specification of Letters Patent. Patented Feb. 14, 1911.

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To all whom it may concern:

Be it known that we, ROBERT A. HAMILTON and JOSHUA HENRY, citizens of the United States, residing at Connellsville, in the county of Fayette and State of Pennsylvania, have invented certain new and useful Improvements in Processes for Hardening Copper, of which the following is a specification.

This invention relates to the subject of processes for hardening copper, and compounds employed in connection therewith.

To this end the invention has in view a simple and thoroughly practical process for effectually hardening copper so that the same may be manipulated and utilized in the same manner as and for some of the purposes of other metals, particularly steel. In this aspect the invention contemplates an improved means for attaining the much sought for object of imparting to metallic copper that degree of hardness, toughness, flexibility, and elasticity which renders the same available for many purposes which metallic copper of commerce cannot now be employed for. Furthermore, the treatment which copper undergoes in accordance with the present invention is of such a character as to enable the copper to be manipulated in the ordinary rolling and hammering processes without losing its stability or hardness. Furthermore, copper treated by the present process may be varied in its degree of hardness to suit the conditions of use.

In carrying out the present invention, the first step in the process is to heat metallic aluminum in a crucible to a high temperature and while in this highly heated condition, there is added to the same a sufficient amount of iron pyrites to form a compound that will break brittle under the hammer when cool. The aluminum and pyrites are thoroughly stirred and mixed while in the highly heated condition until completely combined, after which the compound thus produced is poured from the crucible into convenient forms for subsequent handling.

To harden metallic copper, according to the present invention, the compound referred to is combined therewith in the following manner: First: the copper is heated to a molten condition in a crucible, after which from one to three ounces of the said compound is added to each pound of copper, according to the hardness of the copper desired, it being understood that the greater the amount of said compound added, the harder the copper becomes. Under all conditions, however, the copper is the predominant metal and is greatly in excess of the said compound. Second: in addition to said compound, there is added borax and charcoal, one half ounce each. Third: after the introduction of the said compound, borax and charcoal, according to the proportion indicated, the heat is continued until the constituents of the molten mass become thoroughly combined, after which the resultant substance is poured from the crucible into molds or shapes desired.

We claim:

1. A process for hardening copper which consists in first making a compound by heating together metallic aluminum and iron pyrites, and subsequently incorporating this compound into a molten mass of metallic copper whose proportion is in excess of that of the said compound.

2. A copper composition, consisting of copper and a compound resulting from the heating together of aluminum and iron pyrites, the copper being in excess of said other two ingredients.

In testimony whereof we hereunto affix our signatures in the presence of two witnesses.

ROBERT A. HAMILTON.
JOSHUA HENRY.

Witnesses:
P. W. O. HUMMEL,
S. S. KERN.