

UNITED STATES PATENT OFFICE.

JOHN MILLER, OF STUART, IOWA, ASSIGNOR OF ONE-FOURTH TO E. E. GATCHELL, OF SAME PLACE.

PROCESS OF HARDENING COPPER.

SPECIFICATION forming part of Letters Patent No. 566,462, dated August 25, 1896.

Application filed February 17, 1896. Serial No. 579,537. (Specimens.)

To all whom it may concern:

Be it known that I, JOHN MILLER, a citizen of the United States of America, residing at Stuart, in the county of Guthrie and State of Iowa, have invented a new and useful Metallurgical Process of Hardening Copper, of which the following is a specification.

My object is to prepare ductile copper so as to adapt it for making articles that require strength and durability, to adapt it to be burnished, and to prevent oxidation and deterioration.

My invention consists in the composition and process hereinafter set forth, and pointed out in my claims.

The ingredients required to practice my method and to produce the alloy or composition adapted for the uses and possessing the qualities as set forth are chemically united in about the following proportions by successive steps, as hereinafter stated, to wit: one (1) pound of copper, half ($\frac{1}{2}$) an ounce of particles of tin, three-fourths ($\frac{3}{4}$) an ounce of pulverized carbon, three-fourths ($\frac{3}{4}$) an ounce of comminuted horn, half ($\frac{1}{2}$) an ounce of dry animal blood. These ingredients are united by the following process: I first melt the copper in a suitable crucible and while partly melted or during the melting thereof I add pulverized carbon of such quality as is used in electric lighting. I next add the comminuted horn of animals and then dry animal blood, and when all these ingredients are melted together I put in the particles of tin

and leave the molten mass in the crucible about two (2) minutes and then pour it in molds (of such forms and sizes as may be desired) and let the composition cool and harden therein. The blood and horn serve as a flux that is free from alkali and prevent oxidation and deterioration of the minerals, and consequently no poisonous verdigris will form on the surface of the hardened copper, a desideratum of much importance in the use of copper in the manufacturing arts. To increase the degree of hardness and compactness, I next subject the composition or copper thus hardened to pressure by hammering or by means of rollers under pressure.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The herein-described composition of elements for the purposes stated, to wit; tin, carbon, horn, and blood, in about the proportions stated.

2. The hereinbefore-described method or process of hardening copper which consists in first melting copper and adding carbon, next adding horn and blood of animals, next adding tin, then pouring the molten metallurgical composition into molds and cooling it and finally compacting it by pressure.

JOHN MILLER.

Witnesses:

PHILIP MORGAN,
ISAAC H. TWOMBLY.