UNITED STATES PATENT OFFICE.

DAVID LAMON, OF DENVER, COLORADO.

PROCESS FOR IMPROVING THE PHYSICAL PROPERTIES OF METALS AND THEIR ALLOYS.

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To all whom it may concern:

Be it known that I, DAVID LAMON, a citizen of the United States of America, residing at 2449 Hale street, in the city and county of Denver and State of Colorado, (post-office address 807 and 808 Continental Building, Denver, Colorado,) have invented certain new and useful Improvements in Processes for Improving the Physical Properties of Metals and Their Alloys; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The scope of usefulness of many of the metals and alloys is limited by reason of the fact that in their natural state they are not completely adapted to the conditions under which it would be desirable to use them. For example, it is recognized that increased hardness in the softer metals, such as gold, silver, copper and iron would widen the scope of their usefulness, providing none of their present valuable properties, such as conductivity, were substantially deteriorated.

My invention is a process for improving certain of the physical properties of the metals and their alloys without deteriorating any of the valuable properties which they may already possess.

In detail my process is as follows: The metal or alloy in any of its manufactured forms is heated to a suitable temperature and immediately subjected to the action of a properly proportioned mixture of the following substances, to-wit: boric acid and a double sulfate of aluminum, or in place of these I use a borate and a single sulfate of aluminum, the latter substance being in the class of compounds to which the general name of alums is applied. A sufficient quantity of the mixture is used to thoroughly cover the surface of the metal. The metal or alloy thus heated is maintained at a suitable temperature for a sufficient length of time, after which it is passed through a water solution of two or more of the substances mentioned above, together with a salt of copper such as the sulfate. After this the metal or alloy is cleaned and allowed to cool gradually. The proportions of the chemical agents employed are usually as follows: two parts of the double sulfate of aluminum to one part of boric acid. The temperature to which the metals treated is raised may vary, but in the case of copper it is about 900 F., and of brass about 1200 F.

For the purpose of carrying out the foregoing details, any suitable form of furnace may be used providing for continuous or intermittent operation, but it is preferable that the source of heat be an impinging non-luminous flame.

The aforesaid mixture of boric acid (or borate) and a single (or double) sulfate of aluminum may be used upon metals, especially copper and copper alloys while in process of manufacturing into wire and other articles, with gratifying results, namely, the product being hardened or strengthened to the required degree, without the admixture of alloy or without adding any alloy. Care, however, must be taken to apply the said mixture in suitable quantities, and at the proper heat or temperature of the metal. The passage of the treated metal through the solution above mentioned has not the importance of the other steps of the process.

I claim—

1. The process of improving the physical properties of metals and their alloys which consists in subjecting them while hot to the action of boric acid and a sulfate of aluminum, maintaining the metals thus treated, at a suitable temperature for a sufficient time, and passing them through a water solution of the substances above mentioned, substantially as described.

2. The process described consisting in subjecting metals while hot to the action of boric acid and a sulfate of aluminum and maintaining them at a raised temperature while being thus treated, as described.

In testimony whereof I have affixed my signature in the presence of subscribing witnesses.

DAVID LAMON.

Witnesses:
EMMA HORNBURG,
BERTHA JACOBS,
J. H. THOMAS.