UNITED STATES PATENT OFFICE.

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PURIFICATION AND ALLOYING OF COPPER.

SPECIFICATION forming part of Letters Patent No. 382,198, dated May 1, 1888.

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To all whom it may concern:

Be it known that I, FREDERICK J. SEYMOUR, a resident of Findlay, in the county of Hancock and State of Ohio, have invented a certain new and useful Improvement in the Purification and Alloying of Copper, of which the following is a specification.

The object of my invention is to refine copper.

It is a great desideratum in the treatment of copper, either to be used singly or with an alloy, to have it thoroughly deoxidized and made fluid when fused. It is desirable, also, to use as a flux a material which will not tend to waste or drive off the copper when in a fused condition. It is very important that fused copper be poured at the right degree of heat. A flux which increases the fluidity of the copper, and which also serves as a deoxidizing agent, increases the range of heat at which it may be poured without injuring the texture and condition of the product. I have found that these various results can be accomplished by the use of a flux composed of fluor-spar and phosphorus. This flux is very advantageous also in the making of copper bronzes, in which aluminum or aluminum and nickel or other similar metals are added to increase the fineness and tensile strength of the copper, or to form bronzes of the various grades.

For the fusing and refining of copper the following is the preferred formula: Take fluor-spar, thirty parts; phosphorus, ten parts. Thoroughly mix the same into a pasty mass. This proportion is used to about one hundred parts of copper, which is fused and the flux added to the fused metal, which is boiled for a few minutes to allow the flux to perform its work. The alloys of copper with various metals are advantageously treated in the same manner and by the same flux.

To produce a bronze of five parts of aluminum to ninety of copper, I prefer the following formula: Take fluor-spar, thirty parts; phosphorus, ten parts; oxides of aluminum and zinc, thirty-five parts in all; pulverized carbon or similar deoxidizing agent, twenty-five parts, (preferably,) and thoroughly mix these together in a pulverized condition and add them to ninety parts of copper. The oxide of aluminum (fifteen to twenty parts) may be used instead of oxides of aluminum and zinc, as above specified. This alloy of aluminum and copper may be varied by adding to the charge nickel, tin, or other similar metals, so as to grade the bronze and produce different color and hardness or rigidity of alloy.

When it is desired to make a bronze having a less per cent. of aluminum, a corresponding reduction may be made in one or more of the other parts of the alloy; or in the process of manufacture a reduction may be made in the relative amount of the oxide of aluminum alone.

According to my invention carbon or some deoxidizing agent is employed when metallic oxides are treated. Thus in the use of an oxide of a metal—such as aluminum—carbon can be employed to deoxidize the same. If, however, a metal or metals instead of oxides are treated, the carbon or deoxidizing agent is not required.

I am aware that fluor-spar and also phosphorus have been separately used for the treatment of metal, and I do not claim their separate use, but only in the form substantially as pointed out. By the present invention the phosphorus is divided (or diluted) before use, and this is effected by an agent which has a useful reaction in the process, and it is found that the alloys produced as above set forth are fine metal, excelling in luster and free from liability to tarnish.

Having described my invention, what I claim as new is—

1. The method of purifying metals, which consists in fusing one or more of them with a flux composed of phosphorus and fluor-spar, substantially as specified.

2. The method of purifying and alloying a metal, which consists in fusing it with a flux composed of phosphorus and fluor-spar, and with one or more metallic oxides in the presence of a deoxidizing agent, such as carbon, substantially as specified.

3. The method of purifying and alloying copper, which consists in fusing it with a flux composed of phosphorus and fluor-spar, and with the oxides of aluminum and zinc in the presence of a deoxidizing agent, such as carbon, substantially as set forth.

In testimony whereof I have hereunto set my hand.

FREDERICK J. SEYMOUR.

Witnesses:

M. M. WHITELEY,

JOHN F. HASTINGS.