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, 1988.

Application filed May 16, 1887. Renewed March 24, 1888. Serial No. 268,325. (No specimens.)

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 cer-5 tain 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 cop-

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 15 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 20 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 25 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 cop-30 per, or to form bronzes of the various grades. For the fusing and refining of copper the following is the preferred formula: Take fluorspar, thirty parts; phosphorus, ten parts. Thoroughly mix the same into a pasty mass. 35 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 40 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; 45 phosphorus, ten parts; oxides of aluminum and zine, thirty-five parts in all; pulverized carbon or similar deoxidizing agent, twentyfive parts, (preferably,) and thoroughly mix these together in a pulverized condition and 50 add them to ninety parts of copper. The oxide of aluminum (fifteen to twenty parts) may be used instead of oxides of aluminum and zine, as above specified. This alloy of aluminum and copper may be varied by adding to the charge nickel, tin, or other similar 55 metals, so as to grade the bronze and produce different color and hardness or rigidity of

When it is desired to make a bronze having a less per cent. of aluminum, a corresponding 60reduction 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, 70 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 treat-75 ment 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 80 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 85

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 pres-

ence of a deoxidizing agent, such as carbon, 95 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 100 presence of a deoxidizing agent, such as carbon, substantially as set forth.

Intestimony whereof I have hereuntoset my

hand.

FREDERICK J. SEYMOUR.

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m Witnesses:}$

M. M. WHITELEY, JOHN F. HASTINGS.