UNITED STATES PATENT OFFICE.

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MIXTURE FOR REFINING COPPER AND ITS ALLOYS.

SPECIFICATION forming part of Letters Patent No. 413,535, dated October 22, 1889.

Application filed August 6, 1889. Serial No. 319,885. (No specimens.)

To all whom it may concern:

Be it known that I, GEORGE GATEWOOD MULLINS, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented certain new and useful Improvements in Mixtures for Refining Copper and its 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 object of this invention is to render more fusible, refine, and improve copper, or copper and other metals in admixture to form alloys, to remove the dross, scoria, or slag, to prevent porosity, to harden and toughen the metal, and greatly increase its tensile and resilient strength.

The invention relates to the treatment of copper alone, or of copper and its alloy metals, with a peculiar flux, detergent, and auxiliary, which is composed of certain parts of purest native silica, (SiO_2,) fluor-spar, ($CaFl_2$,) carbonate of potash, (K_2CO_3,) and tungstate of sodium, ($Na_2WO_4+2H_2O$.) These elements are first carefully crushed to a fine powder, and then all carefully compounded together in about the proportions of four (4) parts silica, three (3) parts fluor-spar, two (2) parts carbonate potash, and one (1) part tungstate of sodium.

Those skilled in the art to which this invention relates will understand that the compound is chiefly a flux and detergent, and will determine by trial what quantity of the mixture to use for any given charge.

In applying my invention I use this method for making what I call "silicated copper," "brass," or "bronze." On the bottom of crucible, or on the bed of reverberatory furnace, I place from one to ten per cent. of the said mixture, according to character and weight of metal charged. When all is molten, I stir the bath thoroughly, allow it to remain quiet a few moments, skim off the scoria or dross, then proceed in the usual manner; or I place from one to ten per cent. of the mixture carried in paper bags into the already molten metal, stir thoroughly, and then proceed as usual. However, I would not confine myself to any fixed proportion of the parts in the mixture, or to the use of any limited quantity of the mixture, or to any one special way of applying it to the metal. These must vary with different conditions. What may be the influences of these several elements, separate or combined, what chemical reactions may take place in the high temperature of crucible or furnace, are problematic questions belonging to scientific theory and have not yet been settled by adequate investigation; but as practical and important economical results I have noted that this treatment with said compound flux or detergent makes the whole charge more fusible, causes the adulterant material in the bath to rise quickly to the top, while the cleansed metal subsides, dissolves and removes the oxides, and thus enables the several metals to combine chemically and form a true alloy, which they cannot do so long as any oxidized substance is present. It removes porosity, toughens and adds greatly to the tensile and resilient strength of copper and of copper alloyed with other metals.

This special mixture and process for the treatment of copper and its alloying metals is the result of study and experiment through many years.

I am aware that artificial silicate—such as crushed glass—and fluor-spar have been used for certain purposes by copper and brass workers; but I do not know that either the mixture of powdered pure native silica and fluor-spar or the compound of silica, fluor-spar, carbonate of potash, and tungstate of sodium has ever been used by any one else for said purpose in metallurgy.

What I claim then as my invention is—

The mixture of silica, fluor-spar, carbonate of potash, and tungstate of sodium, in substantially the proportions set forth, to be used to cleanse, refine, and improve copper and its alloys.

In testimony whereof I affix my signature in presence of two witnesses.

GEORGE G. MULLINS.

Witnesses:
GRANVILLE E. HARRIS,
DWIGHT F. CAMERON.