UNITED STATES PATENT OFFICE.

ALBERT STRASSER, OF RORSCHACH, SWITZERLAND.

PROCESS FOR DEOXIDIZING COPPER AND ITS ALLOYS.

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To all whom it may concern:

Be it known that I, ALBERT STRASSER, a citizen of Switzerland, residing at Rorschach, Canton of St. Gall, Switzerland, have invented certain new and useful Improvements in Processes for Deoxidizing Copper and Its Alloys, of which the following is a specification.

This invention has for its object to provide an improved process for deoxidizing copper and its alloys which consists in adding to the copper heated above its melting point, first a copper cartridge containing potassium phosphid ("kalium phosphoricum") for the purpose of converting the impurities (consisting of Si and As and also protoxid of copper) into phosphorus compounds, and then, when the copper has reached a still higher temperature, adding a second copper cartridge charged with one of the metals of the alkaline earths, for the purpose of oxidizing the phosphorus compounds the resulting reaction being such that the phosphorus compounds burn at the expense of the alkaline earth metal used, and the oxids form slag which floats on top of the copper being insoluble in copper.

Example.

The copper is heated to a temperature above its melting point, for instance to 1100 degrees centigrade. Then a copper cartridge filled with potassium phosphid ("kalium phosphoricum") is added to the bath of molten metal. Since the cartridge has a higher specific gravity than the liquid copper the cartridge sinks to the bottom of the crucible and is melted there. The potassium phosphid becoming thereby released, diffuses throughout the bath of molten metal, and the impurities are converted by the phosphorus entering into reaction, into phosphor metals without affecting the copper, because the affinity of the phosphorus to copper is not so great as to the aforesaid metals Si and As.

The temperature of the copper is now raised to about 1400 degrees C., whereupon the second copper cartridge filled with one of the alkaline earth metals, such as for instance, calcium, barium, strontium, lithium, etc., is added to the bath of molten metal. The alkaline earth metal combines (with generation of heat) with the oxygen present as an impurity in the copper, and also with the impurities constituted by the phosphids of Si and the copper protoxid, while the oxids of the metals Si and Cu, and the oxygen compounds of the copper rise, together with the respective metallic oxid, to the surface of the metal bath and are no longer soluble in the latter.

This deoxidization of copper produces a finer structure and a higher density of the metal. The tenacity of the deoxidized copper is increased without affecting its conductivity which is, in fact, rather increased as compared with silico-copper. The deoxidized copper has moreover a high degree of hardness without loss of its capacity for elongation.

As a consequence of mechanical treatment of the deoxidized metal its tensile strength is twice that of the metal before deoxidization.

Its electrical resistivity is diminished, whereas its conductivity is increased, which is an important advantage especially in the case of electric line wires.

The additions are used only in quantities of up to 0.5 per cent., so that the whole of the metal is consumed in the reaction, and none of the alkaline earth metal remains in solution in the copper.

What I claim is:—

1. A process for deoxidizing copper and its alloys, which consists in first adding a copper cartridge containing a phosphorus compound to the copper heated above its melting point, for the purpose of converting the impurities into phosphorus compounds, and then, when the copper has reached a higher temperature, adding a second copper cartridge filled with one of the metals of the alkaline earths, for the purpose of oxidizing the phosphorus compounds, the reaction being such that the phosphorus compounds burn at the expense of the alkaline earth metal, and the oxids being insoluble in copper, float on the top of the latter.

2. A process for deoxidizing copper and its alloys, which consists in first adding a copper cartridge containing potassium phosphid ("kalium phosphoricum") to the copper heated above its melting point, for the purpose of converting the impurities (consisting of Si and copper protoxid) into phosphorus compounds; and then when the copper has reached a higher temperature, adding a second copper cartridge filled with

one of the metals of the alkaline earths, for the purpose of oxidizing the phosphorus compounds, the reaction being such that the phosphorus compounds burn at the expense of the alkaline earth metal, and the oxids being insoluble in copper, float on the top of the latter.

3. A process for deoxidizing copper and its alloys, which consists in first adding a copper cartridge containing potassium phosphid (kalium phosphoricum) to the copper heated to 1100 degrees C. for the purpose of converting the impurities (consisting of Si and copper protoxid) into phosphorus compounds; and then when the copper has reached a higher temperature, adding a second copper cartridge filled with one of the metals of the alkaline earths, for the purpose of oxidizing the phosphorus compounds, the reaction being such that the phosphorus compounds burn at the expense of the alkaline earth metal, and the oxids being insoluble in copper, float on the top of the latter.

4. A process for deoxidizing copper and its alloys, which consists in first adding a copper cartridge containing potassium phosphid (kalium phosphoricum) to the copper heated above its melting point, for the purpose of converting the impurities (consisting of Si and copper protoxid) into phosphorus compounds; and then, when the copper has reached a higher temperature, adding a second copper cartridge filled with calcium, for the purpose of oxidizing the phosphorus compounds, the reaction being such that the phosphorus compounds burn at the expense of the calcium, and the oxids being insoluble in copper, float on the top of the latter.

In testimony whereof I have affixed my signature.

ALBERT STRASSER.