

UNITED STATES PATENT OFFICE.

WILLIAM JOHN KNOX, OF WEST FAIRLEE, VERMONT, ASSIGNOR TO
GEORGE WESTINGHOUSE, OF PITTSBURG, PENNSYLVANIA.

PROCESS OF MAKING CUPROUS MAGNETIC OXID.

SPECIFICATION forming part of Letters Patent No. 743,732, dated November 10, 1903.

Application filed April 15, 1903. Serial No. 152,705. (No specimens.)

To all whom it may concern:

Be it known that I, WILLIAM JOHN KNOX, a citizen of the United States, and a resident of West Fairlee, county of Orange, State of Vermont, have invented a certain new and useful Process of Making Cuprous Magnetic Oxid, of which the following is a specification.

In the usual method of copper reduction the copper produced is what is known as "blister" copper. This copper is remelted in a reverberatory furnace and is oxidized to burn out the traces of sulfur and iron in a silica-lined furnace. The iron unites with the silica and is skimmed off. At this stage the copper is overoxidized, and it is necessary to "pole" it by thrusting a small tree-trunk into the molten bath, so that the hydrocarbon gases bubbling through the copper will reduce the cuprous oxid to a metallic condition and produce what is known in the trade as "tough pitch" or refined copper.

In certain Letters Patent of the United States, Nos. 710,588, 710,589, and 710,916, issued to me on the 7th day of October, 1902, I show and describe a smelting process and apparatus for reducing copper in which the reduction takes place within a basic-lined vessel. In carrying out this process also the copper is first produced in the form of blister copper containing a small amount of sulfur and iron. When the copper thus produced is slightly overblown or "overcooked," it is no longer black and blistered in appearance, but is of a brighter cleaner color and is denser. In the process described in my patents there is developed a new compound, known as "oxysulfid of iron," containing a small percentage of sulfur with a separation or precipitation of copper sulfid. The oxysulfid may be poured off at this stage, leaving a bath of the heavier cuprous sulfid or white metal. If now the oxidation be continued, the sulfur will be further eliminated and the copper precipitated as metallic blister copper. Should a portion of the oxysulfid be allowed to remain in the vessel in the pouring off, it will be found that this remaining oxysulfid will have had its sulfur removed almost to a

trace when the cuprous sulfid has all been converted into blister copper. The magnetic oxid thus remaining in the vessel then becomes so infusible or refractory that it is solid even at the highest temperature of the converter. If repeated blows were made in this manner, it would result in the fouling of the converter-lining and the twyers; but if in blowing to metallic copper the point at which blister copper is produced is somewhat exceeded, so as to produce some oxid of copper, it is found that this copper oxid has a very rapid solvent action upon any magnetic oxid that may be present, and leaves the converter in a clean condition and also removes any obstruction of magnetic oxid that may have stuck to the twyers.

The present invention relates to the process whereby a new compound is produced by the action of this cuprous oxid upon the magnetic oxid, and it also relates to the product itself. The value of the product is that it cleans the vessel in the manner above described and hastens the Bessemerizing process, and while it is not an essential of the said process it is a valuable addition to it. In regard to the exact composition of this compound it may be said that by analysis and physical appearance it is the cuprous oxid carrying in homogeneous solution the magnetic oxid of iron. It seems to be in fact a cuprous magnetic oxid, a compound hitherto unknown to the art. Physically the cuprous magnetic oxid shows a reddish-brown color. As in all chemical compounds, the mass naturally shows traces of other oxids and of some small amount of foreign and entrained matter. The solubility of magnetic oxid in cuprous oxid varies within wide limits, but the resulting compound is homogeneous.

In another application filed by me of even date herewith, Serial No. 152,706, I have made claim to the product herein described.

I claim as my invention—

1. The process of producing cuprous magnetic oxid, which consists in oxidizing molten copper in the presence of magnetic oxid.
2. The process of producing cuprous mag-

netic oxid, which consists in dissolving magnetic oxid in a molten bath of cuprous oxid.

3. The process of producing cuprous magnetic oxid, which consists in oxidizing molten
5 copper in the presence of magnetic oxid in a basic or neutral lined vessel.

Signed at New York, in the county of New

York and State of New York, this 9th day of April, A. D. 1903.

WILLIAM JOHN KNOX.

Witnesses:

WM. H. CAPEL,

GEORGE H. STOCKBRIDGE.