Patented Dec. 23, 1930 1,786,393

UNITED STATES PATENT OFFICE

PAUL SCHWARZKOPF, OF REUTTE, AUSTRIA

METHOD OF PRODUCING FERROMOLYBDENUM AND FERROTUNGSTEN

No Drawing. Application filed April 29, 1929, Serial No. 359,181, and in Germany May 22, 1926.

The invention relates to a method of producing ferromolybdenum by incorporating molybdic acid with molten iron in the presence of reducing agents. According to the invention, a very homogeneous and complete alloy is obtained by using a molybdic acid—and in the production of ferro-tungsten a tungstic acid—of very fine grain and maximum surface development, which is obtained by vaporization from the molten ore and if desired subsequent condensation in a manner known per se.

A molybdic or tungstic acid of this kind satisfies all the preliminary chemical and physical conditions required for the production of a complete, homogeneous, solid solution of iron and molybdenum or tungsten.

The extreme importance of the invention will be clear from the fact that it is a question here of alloys, in which the content of molybdenum or tungsten is very small, and in which moreover, one single defective point, that is to say one point insufficiently alloyed with molybdenum or tungsten, may give rise to very great practical inconvenience.

A further advantage of the invention consists in this that a molybdic or tungstic acid chosen according to the invention, is pure and uniform, so that the amount of carbon necessary for its reduction, can be accurately measured and consequently the carbon content of the steel obtained can be accurately adjusted. Similarly any desired percentage of molybdenum or tungsten can be reliably adjusted.

The alloy obtained according to the invention differs from those produced by other industrial methods, by its great purity and complete freedom from copper and sulphur. The latter is more particularly assured if use is made of a method in which the molybdic or tungstic acid is vaporized so to speak in fractional distillation from the ore in the presence of air or oxygen, as proposed by the same inventor for instance in his U. S. Patent No. 1,629,004. In that case in the first distillation stage all the impurities are expelled, the vaporization point of which is below that of molybdenum or tungsten, so that in actual practice at the vaporization temperature of molybdenum or tungsten, these metals alone are expelled from the ore. If the ore is then maintained in a molten state during the evaporating out of the molybdenum or tungsten, there is also no possibility of any impurities being carried along by mechanical agencies.

This method of obtaining molybdic or tungstic acid is also particularly inexpensive, since use may be made both of ungraded ores and ores which contain natural impurities and are therefore less expensive than pure ores.

Pure molybdic or tungstic acid vapors of this kind are introduced with particular advantage directly into the iron bath, since by this means obviously the largest possible surface is presented and the finest distribution obtained. The invention enables such a procedure, since use is made for alloying with iron, of these vapors of molybdic or tungstic acid requiring no purification, and at the same time another known proposal is utilized, according to which the molybdic or tungstic acid is introduced into iron which is already provided with reducing agents for this acid, but without using in such a case the vapors of molybdic acid known per se.

What I claim is:—

1. A method of producing ferromolybdenum or ferro-tungsten consisting in evaporating molybdic acid or tungstic acid of very fine grain and maximum surface development from molten ore and introducing the acid vapors directly into a bath of iron containing a reducing agent, as set forth.

2. A method of producing ferromolybdenum or ferro-tungsten consisting in evaporating molybdic acid or tungstic acid of very fine grain and maximum surface development from molten ore, subsequently condensing the same and introducing the said acids into a bath of iron containing a reducing agent, as set forth.

3. A method of producing ferromolybdenum or ferro-tungsten consisting in evaporating molybdic acid or tungstic acid of very fine grain and maximum surface development from molten ore and introducing the

said acids into a bath of iron containing reducing agents, as set forth.

4. A method of producing ferromolybdenum or ferro-tungsten consisting in evaporating molybdic acid or tungstic acid of very fine grain and maximum surface development from molten ore, subsequently condensing the same and introducing the said acids into a bath of iron containing reducing agents, as set forth.

In testimony whereof I have signed my name to this specification.

PAUL SCHWARZKOPF.