UNITED STATES PATENT OFFICE.

JOHN STEVENSON, JR., OF SHARON, PENNSYLVANIA.

ALLOY.

SPECIFICATION forming part of Letters Patent No. 724,141, dated March 31, 1903.

Application filed December 2, 1902. Serial No. 133,559. (No specimens.)

To all whom it may concern:

Be it known that I, JOHN STEVENSON, Jr., of Sharon, in the county of Mercer and State of Pennsylvania, have discovered and invented a certain new and useful Metallurgical Alloy, of which the following is a full, clear, and exact description.

The object of this invention is the production for use in the art of the metallurgy of iron and steel of a new metallurgical product—namely, a highly-phosphoric ferromanganese consisting of a combination of iron, phosphorus, and manganese, the latter two elements being present in much larger proportions than are found in pig-irons of ordinary qualities and the product differing from ferromanganese and spiegel in the largely-increased percentage of phosphorus present. The product may be used for various purposes in the metallurgical art; but it is especially useful for the purpose of restoring or adding phosphorus to iron or steel.

It is well known that manganese and phosphorus separately will combine with iron in any or all proportions. Thus ferromanganese consists of, roughly, eighty per cent. manganese and twenty per cent. iron (including impurities) and spiegel twenty per cent. manganese and eighty per cent. iron and impurities, and both of these compounds contain phosphorus in very small proportions—for example, less than one per cent. Ordinary pig-irons contain manganese and phosphorus in relatively small proportions, the upper limits of phosphorus being from three to four per cent. and for manganese about two per cent. Phosphorus and iron will also combine in almost all proportions. For example, a commercial product is known containing twenty-five per cent. phosphorus and seventy-five per cent. iron, (including impurities;) but the manganese is about one per cent. only. In any combination of either one of these two elements with iron the other element of the two is either absent or is present only in an insignificant amount. By combining both these elements—phosphorus and manganese—together in relatively large proportions with iron according to my invention I obtain a new product of commercial value. In this product the phosphorus is not less than six per cent., preferably about fifteen to twenty-five per cent., the manganese is not less than fifteen per cent., preferably about fifty to sixty per cent., and the iron and impurities about twenty-five per cent.

In making the alloy I preferably proceed as follows: I use an ore containing iron and a high percentage of manganese and smelt the same in a blast-furnace of proper construction with coke and a suitable flux. As most manganiferous ores are low in phosphorus, to obtain a relatively high percentage of this element in the product I use as a flux instead of limestone, as is ordinarily utilized, a natural phosphate limestone, called "phosphatic rock" or "apatite," or other suitable phosphoritic flux, which will flux off the impurities in the ore and coke and at the same time transfer the contained phosphorus to the previously-reduced or reducing elements—iron and manganese—to form phosphides. This product can also be obtained by resmelting ferromanganese or spiegel in a cupola with apatite or other suitable phosphoritic flux to flux the coke-ash; but the amount of phosphorus that can be obtained in this way will be smaller on account of the small amount of flux required in a cupola as compared to a blast-furnace. The same product can also be produced by resmelting ferromanganese or spiegel in a cupola or reverberatory furnace with ferrophosphorus and using as a flux either the phosphoritic limestone or a non-phosphoritic limestone, as generally used in blast-furnace practice.

There are in existence large quantities of highly-phosphatic manganese ores containing iron which are considered unsuited for the production of ferromanganese and spiegel for the usual uses to which these products have been put. For the production of my phosphoric ferromanganese these same ores are too low in phosphorus to yield a concentration of the phosphorus to the point desired; but by smelting such ores with apatite or phosphate rock or other suitable phosphoritic flux the high percentage of phosphorus in one will be added to that in the other, resulting in the product described.

My new alloy may be produced by other methods, and I therefore do not limit myself to its production by the processes above described.

By the word "large" in the claim as applied to the proportions of phosphorus and manganese I mean in the case of phosphorus not less than six per cent. and in the case of manganese not less than fifteen per cent.; but preferably these proportions should be exceeded.

I claim—

A new metallurgical product consisting of iron in combination with the elements phosphorus and manganese in large proportions.

In testimony whereof I have hereunto set my hand.

JOHN STEVENSON, JR.

Witnesses:
K. J. STEINER,
W. H. LEWIS.