

# UNITED STATES PATENT OFFICE.

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## PROCESS OF MANUFACTURING MANGANIFEROUS METAL.

SPECIFICATION forming part of Letters Patent No. 580,766, dated April 13, 1897.

Application filed October 12, 1896. Serial No. 608,671. (No specimens.)

*To all whom it may concern:*

Be it known that we, JOHN W. CABOT, a resident of Johnstown, and SAMUEL W. VAUGHEN, a resident of Coopersdale, in the county of Cambria, State of Pennsylvania, citizens of the United States, have invented certain new and useful Improvements in the Process of Manufacturing Manganiferous Metal; and we do 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.

In our Patent No. 556,457, issued March 17, 1896, we described and claimed a process of manufacturing the manganiferous metal known as "spiegeleisen" or "spiegel" from the waste product or slag from the converters in the Bessemer-steel practice known as "converter-slag" or "converter-cinder," which process consists in smelting a charge of this slag mixed with limestone and coke or other carbonaceous fuel.

In the production of spiegel it is usually required to obtain a product which shall have a certain content of iron and a certain content of manganese, the different grades being designated by the per cent. of manganese which they contain. Thus a "ten-per-cent. spiegel" is one containing ten per cent. of manganese; a "twenty-per-cent. spiegel," one containing twenty per cent. of manganese, &c.

In the practice of the process described in the said patent, we find that the converter-slag employed varies considerably in the per cent. of iron and manganese which it contains, and that some slag has an excess of iron over the manganese, so that the spiegel produced therefrom will also contain an excess of iron and may therefore not be suitable for the purpose for which it is to be used.

The object of the present invention is to provide a method of reducing in such cases the per cent. of iron, and consequently raising the per cent. of manganese; and it consists in adding to the charge of slag, limestone, and fuel introduced into the blast or other furnace a certain per cent. of manganese-bearing material in order to raise the manganese ratio of the charge and thereby the grade of the spiegel produced. In the prac-

tice of this method we have used for the purpose a manganese-bearing slag, a waste product of blast-furnaces which make spiegel directly from the ores and known as "spiegel-slag;" also the product known as "spiegel cupola-slag," which usually carries a large per cent. of manganese. The rule which is approximately followed is to add about two per cent. of manganese-bearing material to the charge for each one per cent. which it is desired to raise the grade. For instance, with a converter-slag which worked under the terms of the said patent would produce an eight-per-cent. spiegel four per cent. of the manganese would be required to raise the resultant product to a ten-per-cent. grade. In this manner by the use of two materials which have usually been regarded as waste products and disposed of as such we are enabled to produce a valuable spiegel of any desired grade. We may, however, instead of the spiegel or cupola slag above mentioned, use any manganese-bearing material in which the proportion of manganese to iron is such that it will have the effect of raising the manganese ratio of the charge and correspondingly the grade of the metal produced.

When any material or materials are employed for the purpose having both iron and manganese, both these elements act to increase the per cent. of the spiegel produced as well as its grade, but, as above stated, the ratio between the manganese and iron added must be such as to give a resultant product of the desired grade.

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. The herein-described process of treating the waste product, or slag from Bessemer converters known as "converter-slag," or "converter-cinder" to produce therefrom a manganiferous metal of certain grade, which process consists in smelting a charge of such slag carrying manganese and iron with the latter in excess, with limestone and coke, or like fuel, and in adding to the charge a certain amount of spiegel or cupola slag which also carries manganese, substantially as specified.

2. The herein-described process of treating the waste product or slag from Bessemer con-

verters known as "converter-slag" or "con-  
verter-cinder" and carrying iron and manga-  
nese, to produce therefrom a manganiferous  
metal of a certain grade, which process consists  
5 in smelting a charge of such material contain-  
ing iron in excess of the desired per cent. with  
limestone and coke, and in adding to the  
charge another manganese-bearing material  
in a proportion sufficient to give about two  
10 per cent. of added manganese for each one per

cent. which it is desired to raise the grade of  
the metal produced, substantially as specified.

In testimony whereof we affix our signa-  
tures in presence of two witnesses.

JOHN W. CABOT.

SAMUEL W. VAUGHEN.

Witnesses:

JAMES B. O'CONNER,

R. E. CRESSWELL.