Sept. 4, 1951 P. BEAUCHESNE ET AL 2,566,548

PROCESS FOR THE PRODUCTION OF METAL FROM OXIDE ORES

Filed July 23, 1947

Fig. 1.

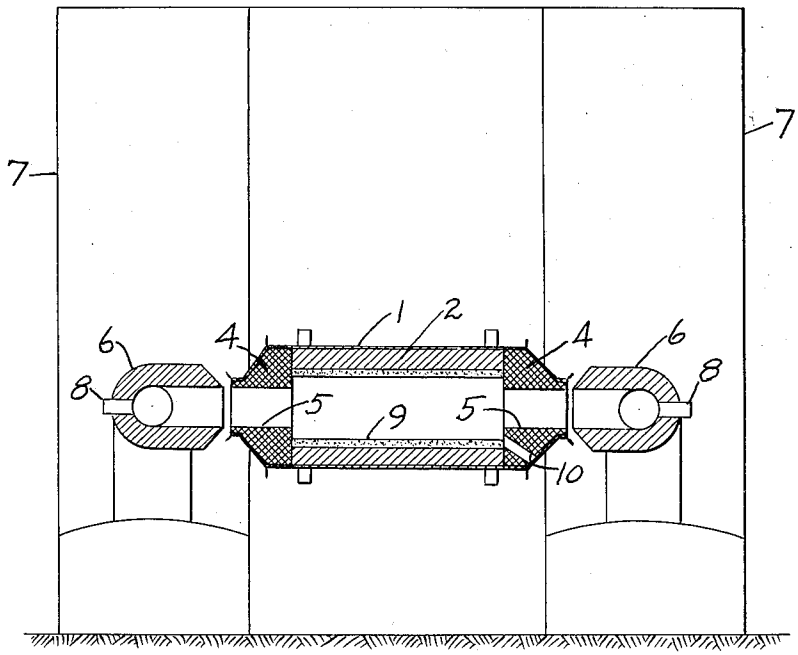
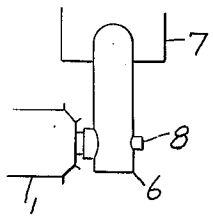


Fig. 2.



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Patented Sept. 4, 1951

2,566,548

UNITED STATES PATENT OFFICE

2,566,548

PROCESS FOR THE PRODUCTION OF METAL FROM OXIDE ORES

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Application July 23, 1947, Serial No. 763,138
In France March 27, 1944

Section 1, Public Law 690, August 8, 1946
Patent expires March 27, 1964

4 Claims. (Cl. 75—29)

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This invention relates to a process for the production of metal, for example ferrous metals such as cast iron or steel, from metallic oxide ores.

It has previously been proposed to produce more or less carbonised iron by treating a charge of ore, coal, and flux in a rotation oven heated by a slack-coal burner provided at one end of the oven.

An object of the present invention is to provide an extraction process whereby, in a given period of time, the output of an oven of given capacity will be greater than that obtained by process heretofore used.

According to one conception of the invention there is provided an extraction process in which separation is effected in a heated rotatable oven, the substances to be treated being distributed as a fine layer within the oven and the oven rotated at a speed such that said substances adhere centrifugally to the walls of the oven.

According to another conception of the invention there is provided an extraction process for metallic oxide ores in which separation of the metal is effected in a heated rotatable oven, a mixture of metallic oxide ore, reducer-coal and flux being distributed as a fine layer within the oven and the oven rotated at a speed such that the mixture adheres centrifugally to the walls of the oven. The metallic oxide may consist of an iron ore from which ferrous metal, e. g. cast iron or steel, is produced, or the oxide may consist of calamine for the production of zinc.

The oven used in the process according to the invention may have the inner walls thereof faced with coke breeze.

A process embodying the invention will now be described by way of example, reference being made to the accompanying drawing in which: Fig. 1 is a vertical longitudinal section of an oven for use in carrying out the process in accordance with the invention, and Fig. 2 is a fragmentary schematic plan of the apparatus on a smaller scale.

In the embodiment of the invention now being described an oven consisting of a sheet metal cylinder, 2 metres in length and 60 centimeters in diameter, is mounted for rotation about a horizontal axis and has its inner surface faced with coke breeze to a thickness of 15 centimetres. Any suitable method is employed to rotate the oven at a speed of 100 revolutions per minute

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and the oven is heated by a burner containing pulverized anthracite. In the embodiment illustrated in the drawings, the oven is shown as comprising a rotatable cylindrical shell 1 having a coke-breeze lining 2 and chromite brick end portions 4. The oven is provided at both ends with openings 5 which communicate with movable elbows 6 projecting from regenerators 7 and comprising air inlets and gas outlets. The elbows are provided with burners 8.

A mixture of iron oxide ore, reducer-coal and flux is distributed in a thin layer 9 over the breeze-lined walls of the oven and, due to the speed at which the oven is rotated, the mixture, particularly the reducer-coal, adheres centrifugally to the breeze-lined walls. The rotation of the oven is stopped periodically to permit the separated metal and dross to be removed from the oven.

With the oven through a discharge opening 10 just described an hourly rate of extraction of 80 kilogrammes of metal, equal to 4 tons a day per cubic metre oven capacity, can be obtained.

The metal obtained from the iron oxide ore is carbonised to a greater or less degree according to proportions of the substances contained in the mixture and to the period of and temperature prevailing during the extraction.

Thus by suitably proportioning the ingredients of the mixture and by appropriately determining the roasting period and temperature, the metal obtained may be cast iron or steel, or it may be a metal intermediate between cast iron and steel.

Although in the example given above the process is described with relation to the treatment of iron oxide ores, the process can be employed with all oxide ores, particularly poor calamine, and it can also be employed for the rapid smelting out of other substances.

We claim:

1. A process of extraction for metallic oxide ores comprising depositing a mixture of metallic oxide ore, reducer coal and flux in a thin layer on the walls of an oven having an inner surface which is a surface of revolution, the proportions of the ingredients of said mixture being predetermined according to the desired degree of carbonization of the metallic oxide ore, rotating the oven at a rate of the order of 100 revolutions per minute whereby centrifugal force will effect an adherence of said layer to said walls, and heating

said layer during rotation by a flame fed from outside the furnace and applied to said layer.

2. A process according to claim 1, wherein said oxide ores comprise iron oxide ores.

3. A process according to claim 1, including the step of facing the walls of said oven with coke breeze before the deposition of said mixture.

4. A process according to claim 1, wherein said ores comprise calamine.

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