UNITED STATES PATENT OFFICE.

WILLIAM P. BARBA, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO THE MIDVALE STEEL COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

PROCESS OF MODIFYING THE ASH RESULTING FROM THE COMBUSTION OF POWDERED FUEL.

1,167,471. Specification of Letters Patent. Patented Jan. 11, 1916.

No Drawing. Application filed August 17, 1914. Serial No. 857,109.

To all whom it may concern:

Be it known that I, WILLIAM P. BARBA, a citizen of the United States, residing at Philadelphia, county of Philadelphia, and State of Pennsylvania, have invented a new and useful Improvement in Processes of Modifying the Ash Resulting from the Combustion of Powdered Fuel, of which the following is a full, clear, and exact description.

My invention relates to the process of burning powdered coal in a furnace containing billets or other articles of metal to be heat-treated or to be heated preparatory to forging. The known advantage of this process is that it supplies heat at a relatively low price. The process of course involves the deposition of the ash upon the walls of the furnace and the articles undergoing treatment, which has certain advantages so far as concerns the said articles in that it affords a coating that acts to reduce oxidation. The process, however, has certain deleterious effects, both upon the furnace walls and the articles undergoing treatment. While the coating of the articles with ash tends to reduce oxidation, the ash usually fails to fuse with the scale to such an extent as to form a perfectly satisfactory protective coating, which scale is not only therefore so great in depth as to involve a considerable loss of metal but often adheres so closely to the articles as to render its removal, necessary preparatory to forging, somewhat difficult. The process also has deleterious effects upon the furnace walls, arising from the deposit of fused ash, which reacts chemically and physically by lowering the melting point of the materials of which the furnace is composed and causing them to flux away and break down; and further, the continuous deposit and adhesion of the ash builds up the walls to an extent involving a serious reduction in the capacity and efficiency of the furnace.

My invention consists in adding to the coal an inorganic neutral substance, preferably clay, which should previously be dried and powdered and which may also be burnt. The kind of clay employed must be among those classed as refractory, and preferably should have a melting point of not less than 2400° F., although a clay less refractory in degree would be practicable under some conditions. The percentage of clay to the weight of ash-forming constituents of the coal should not be less than ten per cent. and I prefer to use from twenty to forty per cent. The effect of this addition to the coal of a powdered neutral substance is to raise the melting point of the ash and form a satisfactory protective coating for the billets or other articles undergoing treatment, thereby minimizing oxidation. Not only is the scale thus formed comparatively thin, but its toughness and brittleness is so modified that it possesses weak adherent properties and can be readily removed before forging. The substantial dilution of the basic constituents of the ash serves also to much diminish the physical reaction of the ash upon the furnace walls. The process is also applicable to the use of powdered coal for heating metals in a fluid state, as in an open hearth furnace.

Having now fully described my invention, what I claim and desire to protect by Letters Patent is:

1. The process of modifying the ash produced in burning powdered coal in a furnace which consists in adding to the powdered coal powdered refractory clay.

2. The process of modifying the ash produced in burning powdered coal in a furnace which consists in adding to the powdered coal powdered refractory clay in excess of ten per cent. of the ash forming constituents of the coal.

3. The process of modifying the ash produced in burning powdered coal in a furnace containing metal articles to be heated, which consists in adding to the powdered coal an inorganic neutral substance in quantity sufficient to raise the melting point of the ash to the extent required to form a modified ash which will act as a protective coating for said articles and thereby minimize the production of scale.

In testimony of which invention, I have hereunto set my hand, at Philadelphia, on this 27th day of July, 1914.

WILLIAM P. BARBA.

Witnesses:

JOSEPH ENTWISLE,

ARTHUR KRONEMANN.