

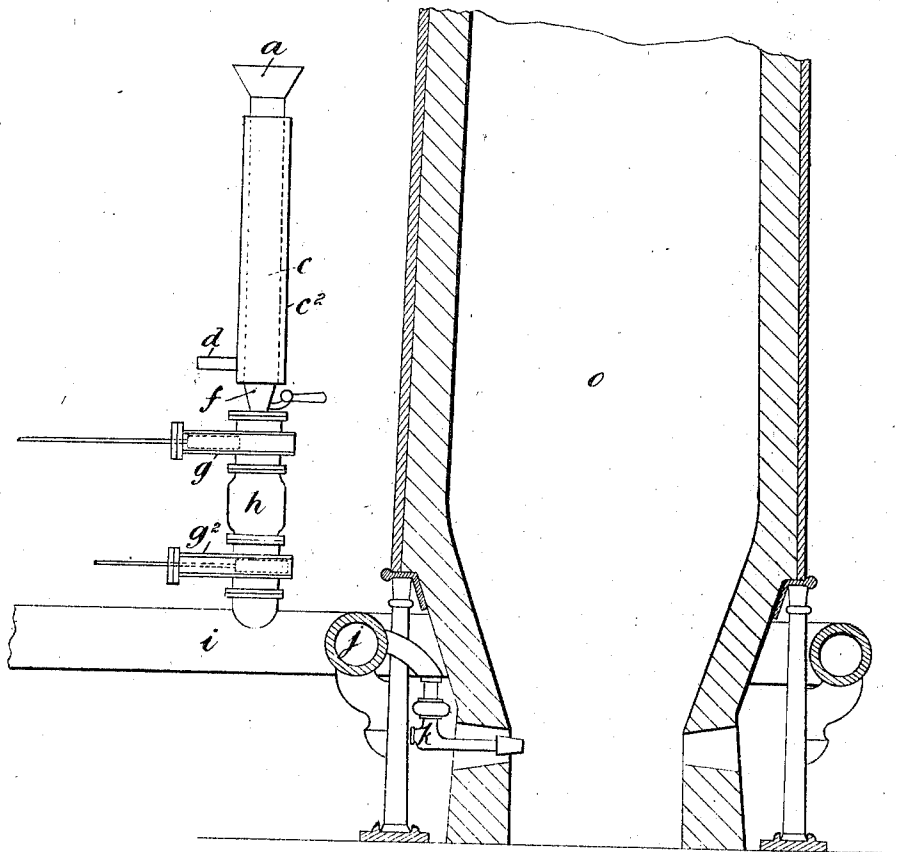
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PATENTED JAN. 27, 1903.

W. J. FOSTER.
METHOD OF INTRODUCING CARBON, FLUXES, &c., INTO
BLAST FURNACES.

APPLICATION FILED APR. 11, 1901.

NO MODEL.



Witnesses.

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UNITED STATES PATENT OFFICE.

WILLIAM JAMES FOSTER, OF DARLASTON, ENGLAND.

METHOD OF INTRODUCING CARBON, FLUXES, &c., INTO BLAST-FURNACES.

SPECIFICATION forming part of Letters Patent No. 719,320, dated January 27, 1903.

Application filed April 11, 1901. Serial No. 55,387. (No specimens.)

To all whom it may concern:

Be it known that I, WILLIAM JAMES FOSTER, blast-furnace manager, a subject of the King of Great Britain, residing at Arnside House, Gordon street, Darlaston, in the county of Stafford, England, have invented certain new and useful Improvements in Methods of Introducing Carbon, Fluxes and Mixtures Thereof into Blast-Furnaces in the Manufacture of Iron, of which the following is a specification.

This invention is an improved method of introducing or supplying solid carbon, fluxes and mixtures of such carbon and fluxes into blast-furnaces in the manufacture of iron, the desideratum being greater economy in the working of the furnaces and a better regulation of the quality of iron produced. Taking, for example, carbon, which is the most important of the substances in question, the present method of supplying it to a blast-furnace is to tip it in at the top or mouth of the furnace with the ore and fluxes, the said carbon, which is usually in the form of coke, gradually falling down with the burden into the boshes or upper part of the hearth. This method is a very wasteful one, due to the oxidation of the carbon in its passage from the mouth of the furnace down to the boshes or hearth, the said carbon acting upon the CO₂ passing upwardly through the shaft of the furnace to convert it into CO, thus delaying to a very great extent the reduction of the oxids of iron and allowing a large portion to pass away from the furnace with the gases as carbonic oxid, the consequence being that at such time as the carbon in the coke or other fuel reaches the boshes and passes to the point of the blast-twyers, where it is most desired, a large amount of its serviceableness has been lost, the frequent result being that the molten iron is of an inferior grade.

In the accompanying drawing, forming a part of this specification, is shown in cross-sectional elevation an apparatus suitable for carrying out the invention.

Now according to this invention solid carbon, as free as possible from hydrocarbons and moisture, heated to a temperature at least that of the hot blast is introduced into a blast-furnace directly into the boshes or hearth before its temperature is lowered near the

twyers and under the furnace burden, preferably with the blast, but always so that it enters the boshes or hearth adjacent to the melting zone. A particular feature according to the invention is to superheat the solid carbon—say to at least 1,000° Fahrenheit—in a retort of ordinary construction and feed the same into the blast trunk or main supplying the blast to the twyers, in this way introducing the carbon at a high temperature with the blast and without absorbing any of the heat of the blast, it being understood that the retort is of that class which will insure the carbon being heated and fed to the blast-trunk being kept free from contact with the atmosphere and so avoid combustion. The carbon so treated may be introduced into the boshes or hearth independent of the blast, suitable mechanical arrangements (forming no part of this invention) being provided to effect the same automatically; but in every instance it must be practically free from hydrocarbons and moisture. Cold blast may be used, and the heated solid carbon may either go in with it or independent of it. The solid carbon may take the form of coke, breeze charcoal, or anthracite; but the moisture and hydrocarbons from it must practically be always extracted, preferably by the use of the retort, as defined, before it enters the furnace, although it may be injected into the hearth or boshes either horizontally, in line with the blast, or obliquely.

One of the chief characteristics of this method of introducing carbon into blast-furnaces in the manufacture of iron is that the amount of carbon supplied can be regulated in view of the requirements in order to produce a first class or grade or any other desired class or grade of iron, it being understood that if the slag should show to the attendant that the iron being treated requires it, additional carbon in the condition defined can be put into the boshes or hearth. I do not propose, however, according to this invention to do away entirely with the putting of carbon into the furnace from the top with the material, although it may in practice be found that in some instances such may be; but in either case the working of the furnace according to this invention will show a greater efficiency than hitherto.

In a similar way and condition as carbon is introduced into a blast-furnace, as hereinbefore described, the usual fluxes, as oxides or any other slag-making material, may be injected into the boshes or hearth and this either as a mixture with carbon or independent thereof, according to the requirements of the working.

I wish it to be understood that there is nothing in the construction of the furnace, the twyers, the blast main or trunk, the retort, or other appliance for carrying the invention into effect which is according to the invention.

In the drawing, *a* indicates the hopper that receives the carbon when cold; *c*, the internal retort wherein the carbon is heated, it having an external casing, as *c*², of suitable material, or the retort may be of any other suitable form. The retort has a discharge-spout, as *f*, leading into the heated-carbon receiver *h*, from which latter the heated carbon passes into the hot-blast-supply pipe *l*,

connected with the bustle-pipe *j*, from which the mingled products flow into the blast-furnace *o* through the blast-pipe *k*. *d* is an inlet for gas employed for heating the contents of said retort.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

A process of the class described, which consists in heating carbon in a retort to a temperature of approximately 1,000° Fahrenheit, and in feeding the said carbon before its temperature is lowered into the hot-blast main of a blast-furnace and blowing it into the melting zone through the twyers with the hot blast.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

WILLIAM JAMES FOSTER.

Witnesses:

GEO. SEERY,
A. F. BIDDLE.