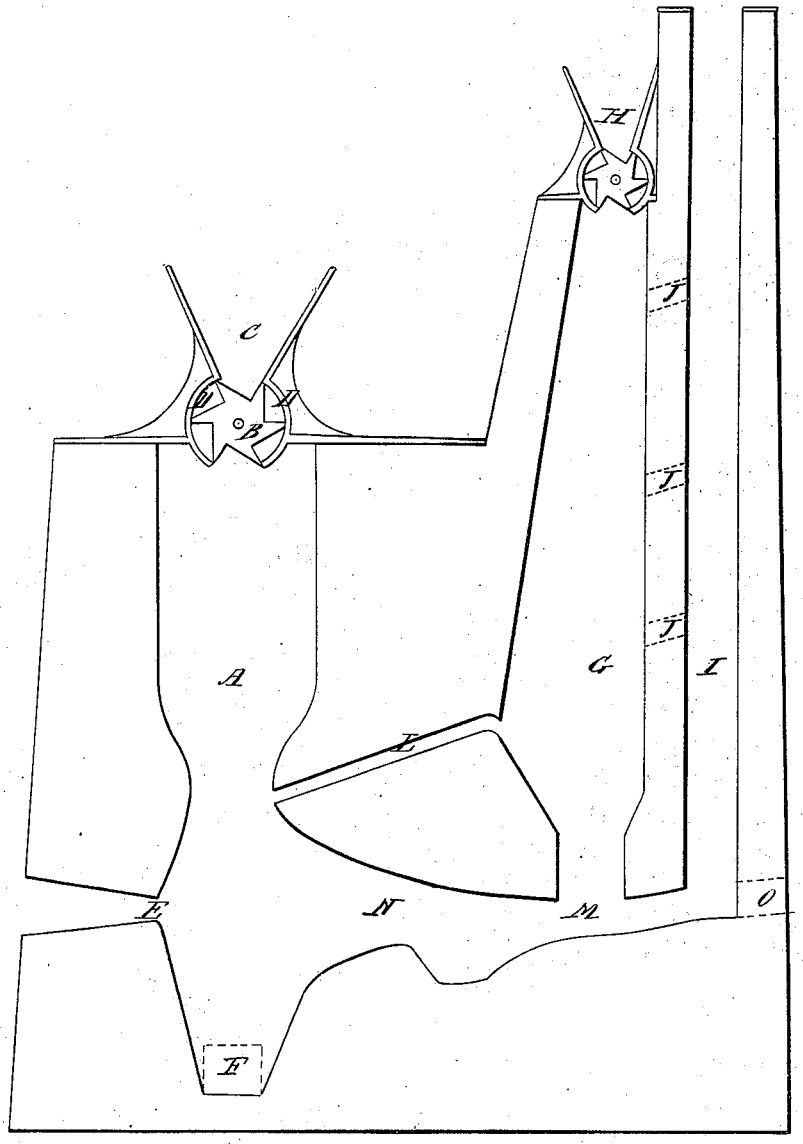
G. E. Sellers,

Blast Furnace,

No. 170. Patented Apr. 20, 1837.



UNITED STATES PATENT OFFICE.

GEO. E. SELLERS, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN CONCENTRATING-FURNACES FOR SMELTING IRON ORES BY THE USE OF ANTHRACITE COAL IN WHICH OTHER KINDS OF FUEL CAN BE USED.

Specification forming part of Letters Patent No. 170, dated April 20, 1837.

To all whom it may concern:

Be it known that I, GEORGE ESCOL SELLERS, of the city of Philadelphia and State of Pennsylvania, have invented an Improved Concentrating-Furnace for the Smelting of Iron Ores by the Use of Anthracite Coal, and in which coke or any of the other kinds of fuel applicable to the purpose of smelting may be advantageously employed; and I do hereby declare that the following is a full and exact description thereof, reference being had to the drawing which accompanies and makes a part of this specification.

To show the arrangement of the interior of the furnace a vertical and longitudinal section of it is given in the drawing.

A is the main furnace for the reception of coal, which is to be supplied to it by means of the feeder B or any analogous contrivance. This feeder resembles a ratchet-wheel in its transverse section. As shown in the drawing, it is placed and revolves within a curved casing under the hopper C, which is to be kept filled with coal. The outer points of B should be made to fit as closely as practicable to the cylindrical casing D D to prevent the escape of the heated air within the furnace. Beside this, there are other kinds of feeders well known to machinists, which will answer the purpose equally well.

E is the tuyere through which the blast is to be supplied. The dotted line F shows the situation of the door for drawing off the slag; and I intend in general to use two doors directly opposite to each other, which, when opened, will allow the slag to be forced from the operator, enabling him to discharge it in a ready manner. These doors must be constructed of that kind of red sandstone which is well known to iron-masters as best adapted to such purposes, or of some other good fire-proof material.

G is the chamber which is to receive the ore intended to be smelted, and is supplied by means of a feeder at H, which may be like that employed over the main furnace.

I is the main flue or chimney by which the products of combustion are discharged into the atmosphere. The melted metal flows from the smelting-chamber into the receiving-bed J, the dotted lines K showing the door for the purpose of lading it out or for removing it in the form of loups or balls, according to circumstances. There may also be a tamp-hole at or near the bottom of the bed J for drawing off the metal when it is to be cast into pigs or otherwise. A suitable opening is also to be made for removing the slag of the ore.

L is a small flue through which the flame and heated air will rush and heat the ore preparatory to its being completely melted at the lower part, M, of the chamber G. This flue determines also the height to which the coal in the main furnace A shall be ignited, by which it is prepared to supply the vacancy made by the blast or by the clearing out of the slag or cinder by the door F. Any interruption of the process from these causes is thus obviated.

The flue N, I denominate the "concentrating-flue," and through this the main part of the blast from the tuyere will pass. It must rise at such an angle as to produce at the point M the full degree of heat required for the complete fusion of the ore. This is a point which must be left to judgment and experience, as it will vary with the force of the blast, the quality of the fuel, and the kind of ore to be smelted. It may be found best in some cases to cause the concentrating-flue to widen as it approaches the point M, while in others it may be diminished there so as to have a comparatively narrow aperture. The length of this flue, or, in other words, the distance between the main furnace A and the point M, it will undoubtedly be found best to vary from the same varying circumstances. From this cause I do not pretend to give any precise measurement or scale of parts, but have so proportioned the drawing as to furnish what I esteem a good general relative form, proportion, and arrangement. I intend sometimes to construct my furnace without the main flue or chimney I, in which case the chamber G will perform its office, there being no feeder upon it, but the ore being thrown in at its open top, or should it be found advantageous, to raise this through an opening in the side of it. I also intend, in some cases, to construct a flue or flues, J J J, leading from the upper part of the chamber G into the chimney I, for the purpose of allowing the heated air to escape into the chimney at such height as experience may show to be best for completing the carbonization of the iron in G.

In all the flues mentioned I of course employ such dampers as may be deemed necessary for their regulation.

It is not necessary to say anything upon the subject of the mixture to be used with the ores for the purpose of fluxing them, as there is not anything different from the usual procedure in this respect when my furnace is employed; but as the carbonization of the iron is a matter of vital importance in the process of smelting, I will here observe that the extent to which the carbonization is to be carried will determine the proportionate quantity of anthracite-coal dust or of the dust of charcoal or coke, which must be mixed with the ore in the receiver. When, for example, soft pig metal is to be produced, the quantity mixed must be proportionately large; but when bar-iron is to be made, the quantity must be proportionably less, such quantity only being used as may be requisite for the separation of the scoria or cinder. Upon this point it is not possible to speak otherwise than in general terms, as with every different kind of ore experience will show that the dose must be varied in order to produce the best results.

Having thus fully described the manner in which I construct my furnace, I do hereby declare that I do not intend to claim any of the parts so described in their individual characters. There is nothing new, for example, in the mode of feeding adopted by me, or in the principle of passing the blast through a stack containing fuel only and causing the flame and heated air therefrom to enter a second chamber containing the ore to be smelted, this having been previously proposed and essayed; but

What I do claim is—

1. That particular arrangement of the respective parts of the within-described furnace by which it may be distinguished from all those that have preceded it, intending by this particular arrangement the manner of connecting the main furnace for fuel with that containing the ore to be reduced by a concentrating-flue within which is contained, a receiving-bed for the reduced metal constructed and operating in the manner herein set forth, combining the same with the smaller flue, (marked L in the drawing,) for the purpose herein fully shown.

2. The provision for removing the slag from under the fuel in the main furnace A by means of one or two openings constructed for that purpose, upon the principle or in the manner described.

And I do further declare that I do not intend to limit myself by anything which I have herein said, or by the arrangement exhibited in the drawing, to any peculiar shape or proportion of the respective parts, but to vary these as may be found convenient in practice, while I attain the end proposed by means substantially the same.

GEO. ESCOL SELLERS.

Witnesses:
CHAS. SELLERS,
ROBT. KEMP, Jr.