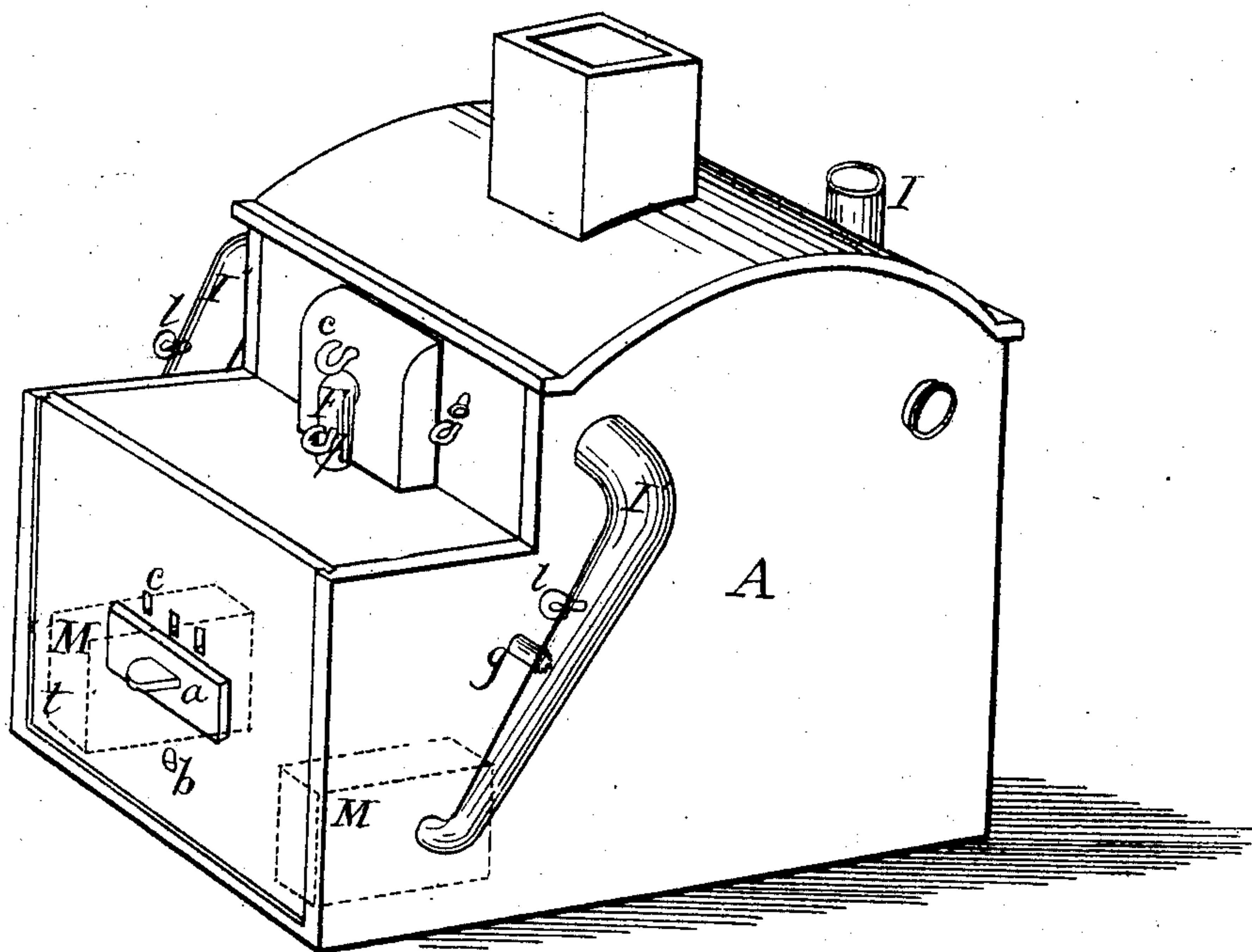


J. Jameson.
Making Iron & Steel.
N^o 76196
Patented Mar. 31, 1868

Fig. 1.

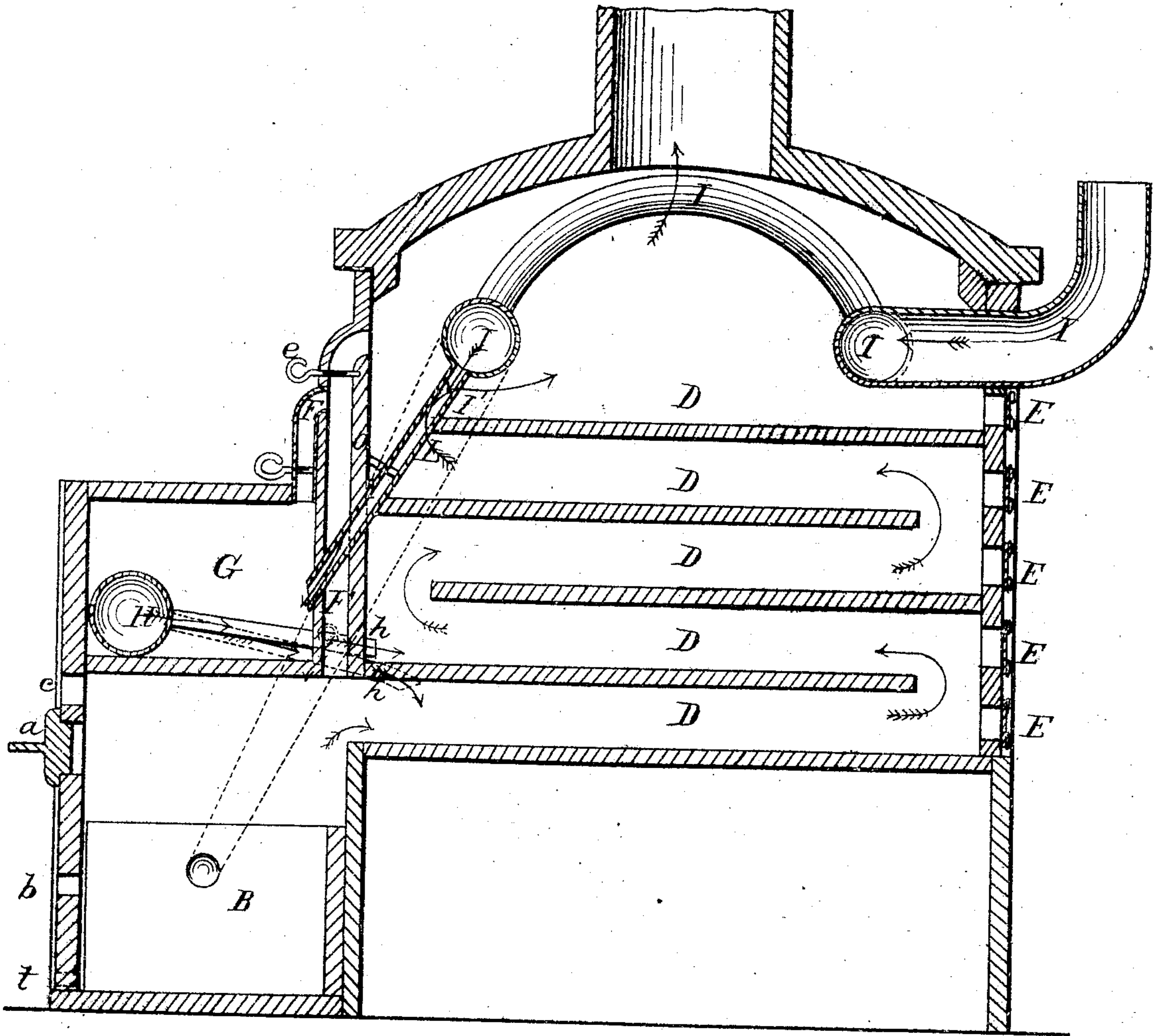


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Fig. 2.



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JACOB JAMESON, OF PHILADELPHIA, PENNSYLVANIA.

Letters Patent No. 76,196, dated March 31, 1868.

IMPROVEMENT IN PROCESSES AND APPARATUS FOR THE MANUFACTURE OF IRON AND STEEL

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that I, JACOB JAMESON, of Philadelphia, in the county of Philadelphia, and State of Pennsylvania, have invented certain new and useful improvements in the process and blast, and reducing-furnace for making cast iron and steel direct from the ore; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making part of this specification, and to the letters of reference marked thereon, like letters indicating like parts wherever they occur.

To enable others skilled in the art to construct and use my invention, I will proceed to describe it.

My invention relates to "blast and reducing-furnaces," and consists in certain new, useful, and important improvements in the manner of their construction by which I am able to subject iron ores to a novel process for producing cast iron or steel direct from the ore by a single process or operation. In the drawings—

Figure 1 is a perspective view of my furnace, and

Figure 2 is a longitudinal vertical section through the centre of the same.

I construct my furnace A of any desired size, with any suitable material, and in form substantially as shown in fig. 1. The furnace B, I make long and narrow, and place the tuyeres C in the ends, and charge the furnace B with coal and suitable fluxes through the door *a*, which is placed above the slag-hole *b*. Over the door *a*, I make three or more openings *c* for the admission of air, which, passing into the furnace B, directly over the fire, becomes quickly heated, mixes with the gases, and aids and increases the combustion. The tap I place at *t*. In the rear of the furnace B, which is properly the reducing-furnace, I construct two or more deoxidizing or desulphurizing-chambers D, and arrange them one above the other, as shown in fig. 2, so that the flame arising from the fire in the reducing-furnace B, and the combustion of the gases, shall pass entirely through the chambers D, as shown by the red arrows; and on the side of the furnace A, opposite to that in which the reducing-furnace B is located, I provide each of the chambers D with a door, E, as is also shown in fig. 2, so as to have convenient access to the chambers.

In addition to the draught running through the chambers D, from the reducing-furnace B, I provide a flue, F, arranged, as shown in fig. 2, to run from the reducing-furnace vertically and enter the draught passing through the chambers, above the highest one. By this arrangement I have virtually two chimneys from the reducing-furnace. In the flue F, I place a damper, *e*, so as to cut off the draught through it when desired.

Over the reducing-furnace B, I construct a chamber, G, so as not to interfere with the flue F, and provide it with the flue *f* having a damper, *p*. The flue F is arranged, so that the flue *f* from the chamber G may enter it below the damper *e*, as shown in fig. 2. From the chamber G, I also extend two other pipes or flues *g*, and arrange them so as to enter the blast-pipes I laterally, as shown in figs. 1 and 2. In the chamber G, I place a boiler, H, and provide it with two pipes *h h'*; the latter, *h'*, is shown in red lines. These pipes *h h'* are arranged so that the latter will open into the lowest of the chambers D, and the former into the chamber next above, as shown in fig. 2. The blast-pipe I enters the upper part of the furnace A. It is then divided into a number of smaller pipes for heating purposes. These smaller pipes are again united, and the blast-pipe is divided into two parts I' I', which lead to the tuyeres on each side of the reducing-furnace B. From that part of the blast-pipe which is within the furnace A, I extend a pipe, L, to the chamber G, and provide it with a damper, *o*.

In operating my furnace for the production of cast or pig-iron, I charge the reducing-furnace B with coal and flux through the door *a*, and place the ore mixed with suitable fluxes on the floors of the deoxidizing or desulphurizing-chambers D through the doors E. The boiler H, within the chamber G, I fill with water, so as to produce steam for introduction into the draught through the chambers by means of the pipes *h h'*.

By the use of the double or divided chimney which provides for the draught through the chambers D, and also for the draught through the flue F, the operator can equalize the heat, flame, and combustion of the gases as well as the draught through the chimneys. These chimneys may be both used at the same time, or the draught cut off or regulated by means of dampers. The ore on the floors of the chambers D, will, by the intensity of the heat produced by the flame, and the combustion of the gases, as well as by the reverberatory character of these chambers, be deoxidized or desulphurized, as may be required, and during the process the ores are moved, by means of a bar worked through the doors E, from one chamber to the one next lower, until it passes into the reducing-furnace B. In this process I use the damp-blast, and also admit sufficient air through the openings *c*

to secure the combustion of the gases rising from the furnace, as well as gases generated in the chambers. When desired, the metal can be drawn from the tap *t*, and it will be found superior in quality to that produced from similar ores by any process now in use.

In operating my furnace for the production of steel by a single process, I reduce the size and change the form of the furnace B, by inserting two blocks, M, as shown in fig. 1, one at each end of the reducing-furnace. These blocks M are shown in dotted lines, and, as clearly appears, reduce the size and make the furnace B less oblong. In the chamber G, I place substances of any kind that will produce an abundance of carbon, such as animal charcoal, potash, salt, and similar substances containing carbon, shut off the draught through the flue F, and turn the dampers *l* in the blast-pipes I' I'', and the damper *o* in the pipe L, and the damper *p* in the pipe *f*, so that the blast may be turned into the chamber G, and pass out through the pipes *g*, into the pipes I' I'', and to the furnace B, through the tuyeres. By this means I am enabled to thoroughly charge the blast with carbon, and so have it carried into the reducing-furnace. The different dampers in the different pipes and flues will be managed by the operator as his experience in the art will readily suggest. In the manufacture of steel in this way directly from the ore, I do not use the boiler H. The furnace and the deoxidizing or desulphurizing-chambers are charged and managed for the production of steel, in other respects in the same manner as for producing cast iron. The steel produced by this method is of a very superior quality, and is the result of this single process.

I have found, by long-continued and exhaustive experiments, that a furnace constructed after the above-described plan, with the deoxidizing or desulphurizing-chambers, double chimneys, and air-holes, and with the other parts arranged as I have shown, produces cast iron or steel in greater quantities and of better quality, under the management of those skilled in the art, than any of the furnaces now in use for a similar purpose, and does it at less cost.

Having thus described my invention, what I claim, is—

1. The reducing-furnace B, in combination with the chambers D and chimney-flue F, constructed and arranged for operation, substantially as described, and for the purposes set forth.
2. The chamber G, boiler H, and pipes *h h'*, in combination with the reducing-furnace B and chamber, D, constructed and arranged for operation, substantially as described, for the manufacture or production of cast iron direct from the ore.
3. Reducing the size and changing the form of the reducing-furnace by blocks M, arranging the chamber G for the production of large quantities of carbon, and introducing the carbon into the blast, and so into the reducing-furnace B, substantially as described, for the purpose of producing steel direct from the ore, as set forth.
4. The process of treating ores, for the purpose of making cast iron or steel, in the manner and by the means substantially as herein described.

In witness whereof I have hereunto set my hand.

JACOB JAMESON.

Witnesses:

H. B. MUNN,
P. T. DODGE.