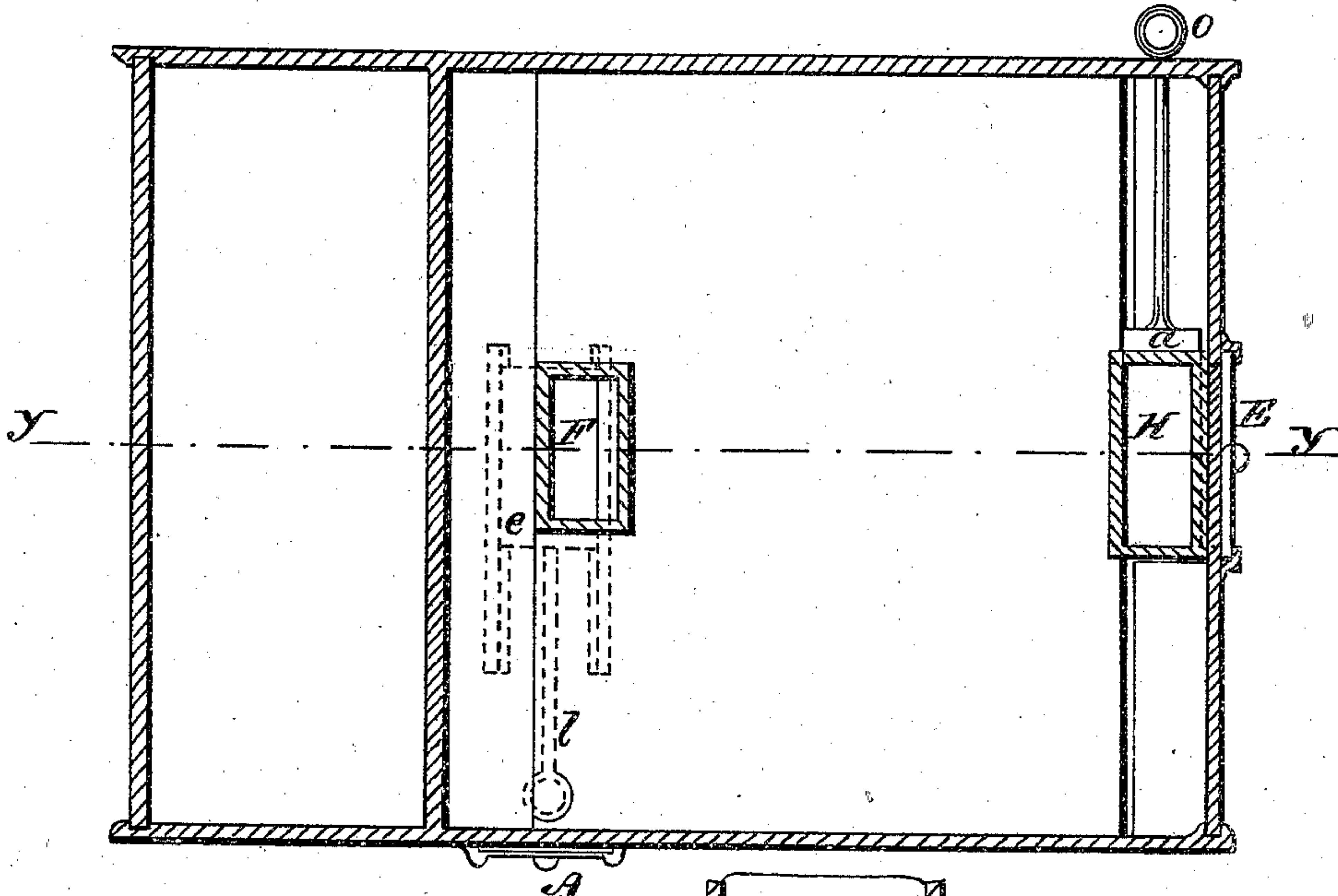
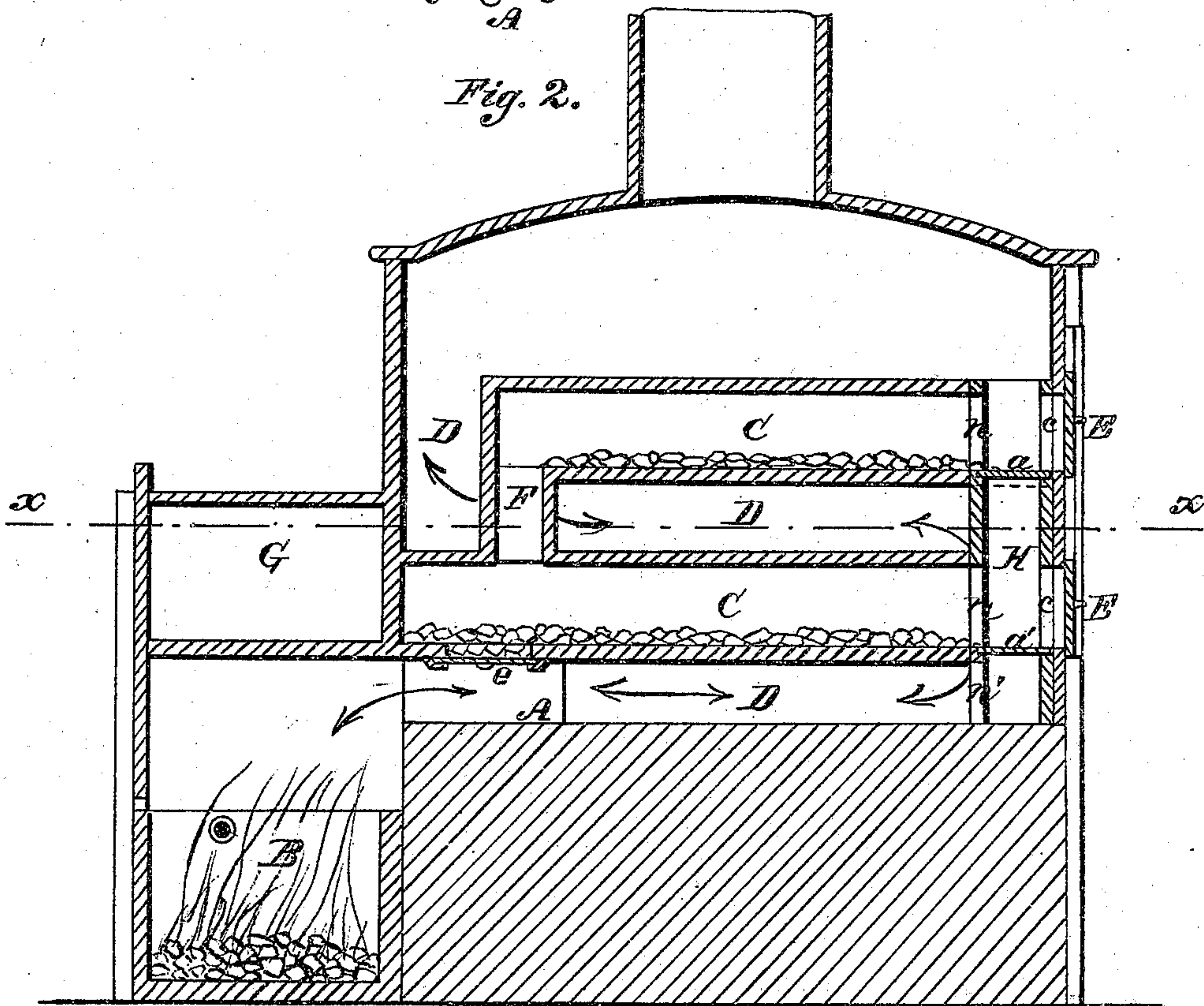


*J. Jameson.*  
*App's. for Making Iron & Steel.*  
*Nº 88,299. Patented Mar. 30, 1869.*  
*Fig. 1.*



*Fig. 2.*



*Witnesses. L. Hailer. Inventor. Jacob Jameson*  
*P. T. Dodge. by Dodge & Munro*



# UNITED STATES PATENT OFFICE.

JACOB JAMESON, OF PHILADELPHIA, PENNSYLVANIA.

## IMPROVED PROCESS AND APPARATUS FOR MAKING IRON AND STEEL.

*Specification forming part of Letters Patent No. 88,299, dated March 30, 1869.*

*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 Process and Apparatus for Making Iron and Steel; 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 consists in certain improvements in the furnace for manufacturing iron and steel direct from the ore, patented to me on the 31st day of March, 1868; and the invention consists in providing closed chambers for deoxidizing the ores with suitable flues and other devices for working the ore, and also in so constructing the furnace that it may be used for heating the blooms, and thus dispensing with the separate furnace ordinarily used for that purpose.

Figure 1 is a transverse horizontal section taken on the line *xx* of Fig. 2. Fig. 2 is a longitudinal vertical section taken on the line *yy* of Fig. 1.

The general construction of the furnace is the same as described in my patent above referred to, and need not therefore be herein further described.

In my former patent the ore was placed on a series of floors, placed one above another, and worked gradually over them and down to the reducing-furnace. In the present case, instead of this series of floors, I arrange a series of closed chambers, C, above each other, as represented in Fig. 2, there being any desired number of the chambers used.

At the rear end of these chambers I provide a vertical flue, H, having openings *n* opposite the chambers C, and also openings *e*, corresponding with the doors E, in the rear end of the furnace, as represented in Fig. 2, there being also an opening, *n'*, at the lower end of the flue H, communicating with the flame and smoke flue D. Slides *a* are inserted in the flue H, on a line with the lower floor of the chambers C, by which the communication between the flame-flues D and the chambers C may be

closed or opened at pleasure, as represented in Figs. 1 and 2; these slides being operated by rods *o*, extending out through the sides of the furnace, as shown in Fig. 1, or any other suitable manner.

The closed chambers C are also connected at their front end by another flue, F, as shown in Fig. 2, this flue F being provided with slides or not, for closing communication between the chambers C, as may be preferred, though in practice I do not find it necessary.

At the front end of the lower chamber C, in its bottom, I make an opening, as represented in Fig. 2, and arrange a slide, *e*, for closing and opening the same at pleasure; this slide being operated by a rod, *l*, which may extend out through the side of the furnace or stop short, as represented in Fig. 1, where it can be reached by a suitable tool.

In the side of the furnace I arrange a door, A, as shown in Fig. 1, this door being so located as to give access to the heat-flue D at the point where the flame or heat enters the same from the reducing or melting hearth B, as represented by the lines on Fig. 2; the object of this being to permit the insertion of blooms into the flue D for heating them by the same heat that is used for the other purposes of this furnace, and thereby dispensing with the use of a separate furnace for that purpose.

The operation is as follows: The flue H being closed by shoving in the slides *a*, the chambers C are charged with ore through the doors E at the rear, it being passed through the opening *e*, over the slide *a*, and through the opening *n* into the upper chamber C, suitable fluxes being mixed with the ore at or previous to its introduction. The ore is gradually worked forward through this chamber, and down through the flue F at its front, into the chamber below, and thence gradually through that to its rear end into and down the flue H, (the slide *a'* at the bottom being withdrawn,) and thence forward through the heat-flue D to the melting-hearth B. Or, the process may be varied by opening the slide *e* in the bottom of the lower chamber C and letting the deoxidized ore pass at once from the chamber C, directly to the melting-hearth, without passing it through the heat-flue D, except at its extreme front end. Or, as is obvious, the ore may be fed at once from the upper chamber C directly to the melting-hearth B by openin



the slide *e*, without passing it through the lower chamber *C* or the heat-flue *D*—these different plans of operating being intended to adapt the process to the varying conditions and qualities of the ores to be treated. In practice any number of the chambers *C* may be used, four being the number that I find to operate well in practice.

By this plan of deoxidizing the ores in closed chambers I keep them separated from the flame and gases of the furnace, and at the same time permit the escape of any gases evolved from the ore while being deoxidized, these gases escaping through the flue *H*, the slides *a* being closed or opened, as experience shall show is necessary.

By this construction of the furnace I produce one that is adapted to a much greater variety of conditions of ores, as the deoxidizing process can be varied very greatly, to suit different ores or different conditions of the same kind of ore.

I use in this furnace the damp blast, with all the fixtures described in my patent of March 31, 1868, with the exception of additions or improvements herein described.

For fluxes I use chloride of lime, black ox-

ide of manganese, and red clay, the quantity to be regulated according to the quality of the ore; the richer the ore the more clay to be used.

In this furnace I use charcoal, and make either wrought-iron or steel direct from the ore at one process, as described in my former patent.

By this improvement in the furnace and method of treating the ores, and by utilizing the heat of the furnace for heating the blooms, I am enabled to produce iron or steel direct from the ore, at greatly-reduced price or cost, and of a superior quality.

Having thus described my invention, what I claim is—

1. The process of treating or deoxidizing ores by means of a series of closed chambers, constructed and arranged to operate substantially as described.

2. A reducing-furnace so constructed as to be also used for heating blooms, substantially as set forth.

JACOB JAMESON.

Witnesses:

H. B. MUNN,  
W. C. DODGE.