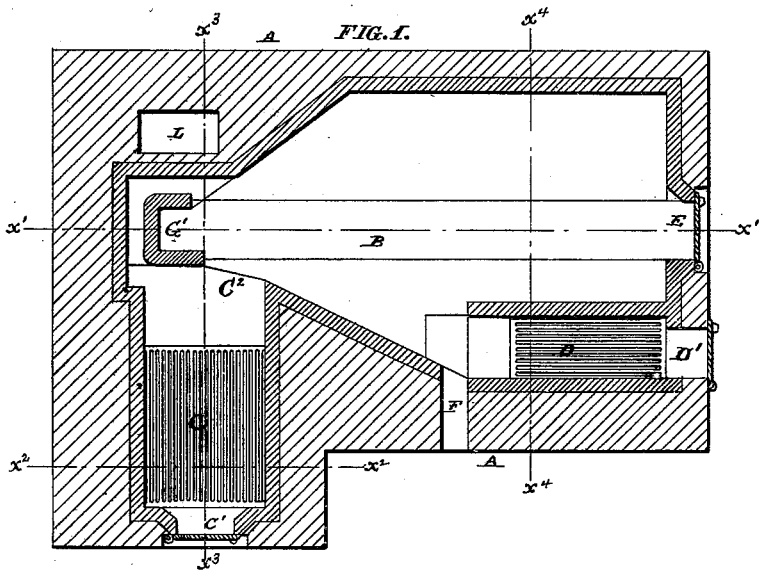
2 Sheets—Sheet 1.

M. D. BRETT.

SHAFT-FURNACES FOR TREATING ORE.

No. 188,098. Patented March 6, 1877.

FIG. 1.



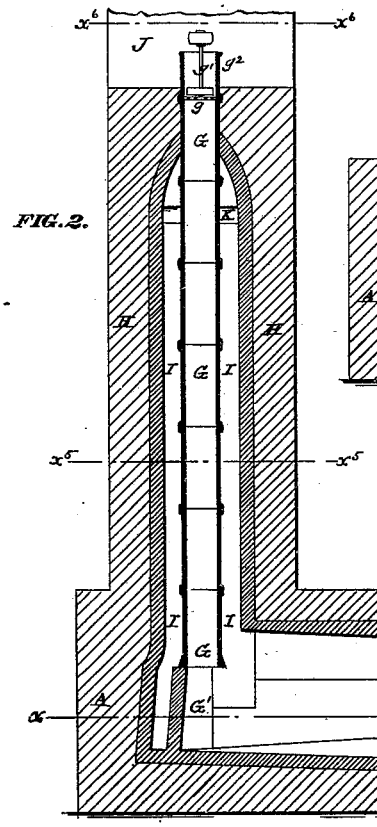
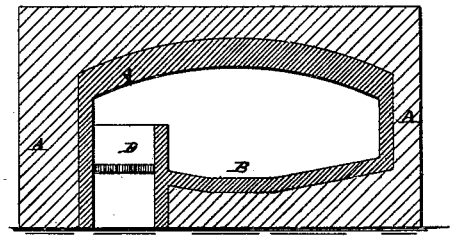


FIG. 2.

FIG. 5.



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2 Sheets—Sheet 2.

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SHAFT-FURNACES FOR TREATING ORE.

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FIG. 6.

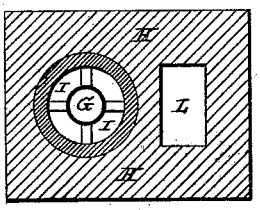


FIG. 7.

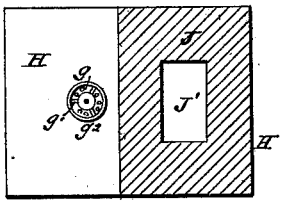


FIG. 3.

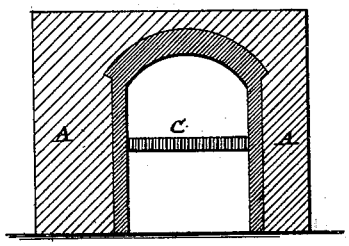
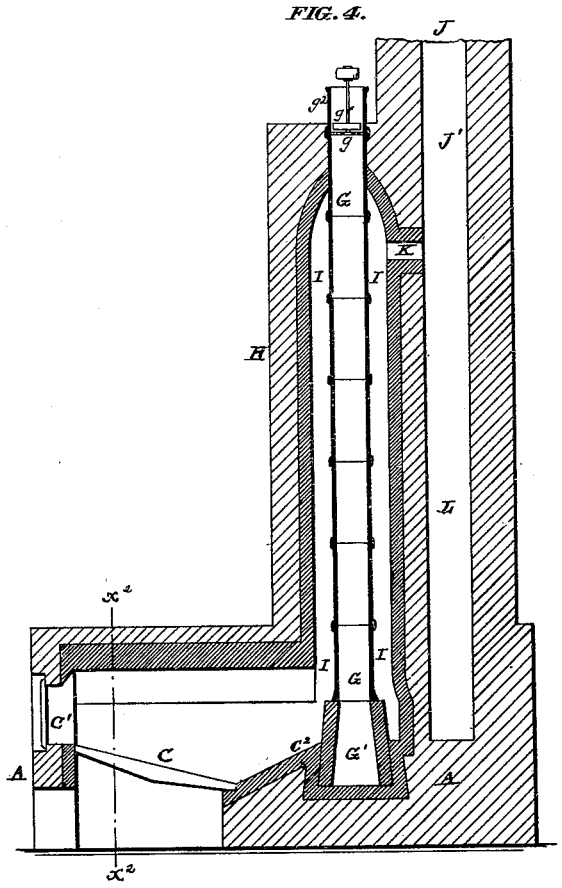


FIG. 4.



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UNITED STATES PATENT OFFICE.

MATHEW D. BRETT, OF BOULDER, COLORADO.

IMPROVEMENT IN SHAFT-FURNACES FOR TREATING ORES.

Specification forming part of Letters Patent No. **188,098**, dated March 6, 1877; application filed September 8, 1876.

To all whom it may concern:

Be it known that I, MATHEW D. BRETT, of Boulder, in the county of Boulder and State of Colorado, have invented certain new and useful Improvements in Shaft-Furnaces for Treating Ores, of which the following is a specification:

My invention relates to that class of furnaces used for oxidizing and reducing metallic ores.

My improvement consists, first, in the combination of a vertical pipe, down which the ore is showered onto the hearth, and a base having an open front, the pipe being surrounded by an annular flue, through which the products of combustion pass upwardly.

My improvement consists, secondly, in combining with the pipe and base two furnaces arranged in a peculiar manner—one furnace so located as to direct the product of combustion in front of and around the base, and the other furnace in such a position as to maintain a flame at the exit of the pipe.

My improvement consists, thirdly, in combining a hearth and furnace with an annular flue, for the passage of the products of combustion, a side flue communicating with a smoke-stack, and a dust-chamber formed by the continuation of the stack, opening downwardly past the side flue.

My improvement consists, fourthly, in a combination of devices forming an improved construction of ore-furnace, as hereinafter more fully explained.

A process in which this apparatus is employed forms the subject of a separate application for Letters Patent.

In the accompanying drawings, Figure 1 is a horizontal section on the line $x\,x$, Fig. 2. Fig. 2 is a vertical longitudinal section on the line $x^1\,x^1$, Fig. 1. Fig. 3 is a vertical longitudinal section on the line $x^2\,x^2$, Figs. 1 and 4. Fig. 4 is a vertical transverse section on the line $x^3\,x^3$, Fig. 1. Fig. 5 is a vertical transverse section on the line $x^4\,x^4$, Fig. 1. Fig. 6 is a horizontal section on the line $x^5\,x^5$, Fig. 2. Fig. 7 is a horizontal section on the line $x^6\,x^6$, Fig. 2.

A is the main furnace-wall, inclosing a hearth, B, main furnace-grate C, and auxiliary furnace-grate D, as shown in Fig. 1. E is a door, through which the reduced ore is raked from the hearth B. F is an opening in the wall A, through which air is admitted into the furnace to assist in the oxidation of the ore, &c. Air is also admitted through furnace openings or doors D′, C¹, and E for the same purpose. G is a pipe, arranged in a tower, H. This pipe, at top, has a perforated plate or partition, g, through which the ore is showered into the pipe by a stirrer, g^1, turning in the hopper g^2.

The ore-pipe G is surrounded by an annular flue, I, up which the products of combustion pass to the stack J, through side flue K. L is a dust-chamber, formed by the continuation of the stack-opening J′ down past the flue K, as shown in Fig. 4.

It will be seen that by my construction the ore is dropped down through the pipe G without being subjected to contact with the products of combustion while within the pipe. The pipe G is supported on a base, G′, having an opening onto the hearth B.

The operation of my improved furnace is as follows: On the grate C is the main fire, and on the grate D a moderate fire, so that the fire at C will supply a large per cent. of carbureted hydrogen, which passes over the bridge-wall C², (with or without a supply of air from opening C¹,) to the open side of the base G¹, where it meets with a supply of heated air admitted into the furnace through openings D′ E F, and an intense heat is generated at that point, the products of combustion ascending the annular flue I, then through flue K into the stack J.

It is evident that the intensity of the heat at the mouth of the base G′ can be regulated and controlled by the amount of fuel used, and the quantity of air supplied through openings C¹ D′ E F. The heat in the annular flue I keeps the ore-pipe G very hot, especially at the bottom, and the pulverized ore being fed in at the top of said pipe G is subjected to a gradually-increasing heat as it is showered down through said pipe, its velocity being in proportion to the amount of gases evolved from the ore, combined with the amount of draft, which is downward in this pipe. The ore, when it reaches the opening in the base G, has acquired sufficient momentum to carry it through the flame at that point

onto the hearth B, from which it is removed through door E.

Having thus described my invention, the following is what I claim as new, and desire to secure by Letters Patent:

1. The combination of the vertical pipe G, surrounded by an annular flue, I, and a base, G^1, having an open front, as and for the purpose set forth.

2. The combination, with the pipe G, having open base G^1, of the furnaces C and D, the furnace C arranged to direct the products of combustion in front of the opening in said base and around the same, and the furnace D arranged to maintain a flame at the exit of said pipe, as and for the purpose set forth.

3. The hearth B and furnace C, in combination with the flues I and K, stack J, and dust-chamber L, as and for the purpose set forth.

4. The hearth B, furnaces C and D, pipe G, open base G′, annular flue I, perforated partition g, stirrer g^1, and hopper g^2, in combination with the flue K, stack J, and dust-chamber L, as and for the purpose set forth.

MATHEW D. BRETT.

Witnesses:

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C. W. H. BROWN.