M. B. MASON.

Furnace for Roasting Ores.

No. 45,804. Patented Jan. 3, 1865.

Fig. 1,

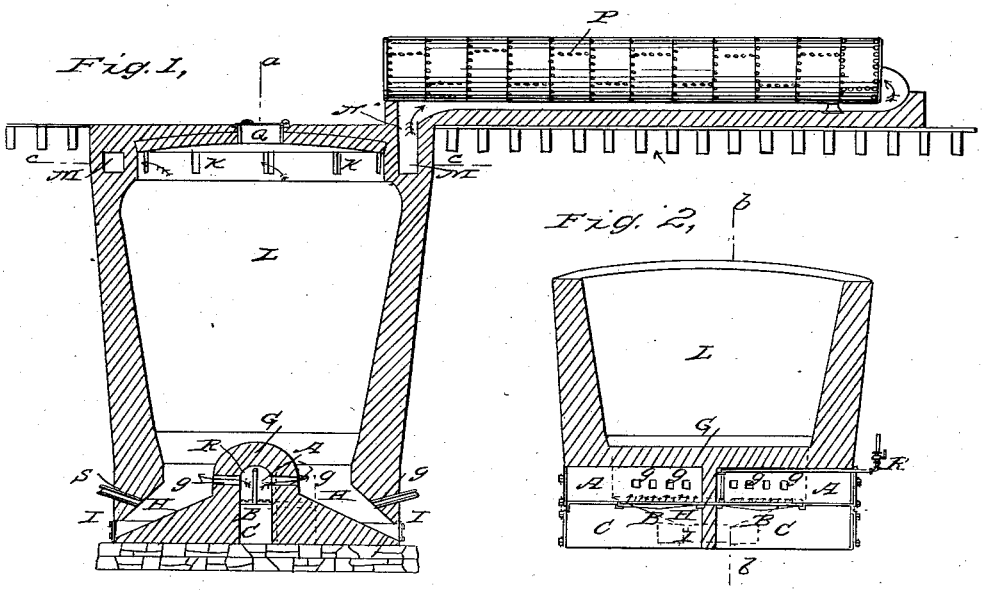
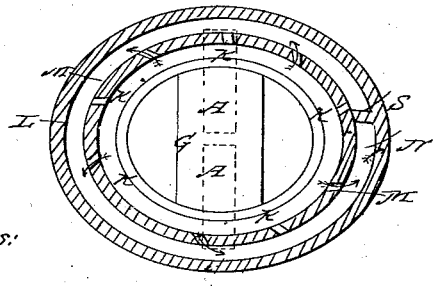


Fig. 2,

Fig. 3,



WITNESSES:

Thomas Adams

Rudolph Boyle

INVENTOR:

Melchora B Mason

N. PETERS. Photo-Lithographer, Washington, D. C.

UNITED STATES PATENT OFFICE.

MELCHOR B. MASON, OF NEW YORK, N. Y., ASSIGNOR TO C. V. DE FOREST, AMOS HOWES, AND GEO. E. VAN DERBURGH, OF SAME PLACE.

IMPROVED FURNACE FOR DESULPHURIZING AND TREATING AURIFEROUS AND OTHER METALLIC ORES.

Specification forming part of Letters Patent No. **45,804**, dated January 3, 1865.

To all whom it may concern:

Be it known that I, MELCHOR B. MASON, of the city, county, and State of New York, have invented certain new and useful Improvements in Apparatus for Desulphurizing and Oxidizing Auriferous and other Metallic Ores; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a vertical section of one form or arrangement of my improved apparatus drawn through the center thereof, in the line *b b* of Fig. 2; Fig. 2, a vertical section in the line *a a* of Fig. 1; and Fig. 3, a horizontal section through the upper portion of the ore-chamber in the line *c c* of Fig. 1, showing the position and arrangement of the apertures and flues for the discharge of the smoke and gases.

Similar letters indicate like parts in all of the drawings.

The nature of my invention consists, primarily, in the arrangement of an independent furnace or fire-chamber for generating the heat and peculiar gases necessary for desulphurizing and oxidizing metallic ores, in connection with a distinct chamber in which to treat the ores; secondly, in so constructing said ore-chamber and connecting and combining it with a furnace or fire-chamber as that the contained ore shall be gradually heated and acted upon by the inflamed gases from the combustion-chamber with an intensity constantly increasing to the point at which the desired chemical changes will be entirely accomplished, and to that point only; and, thirdly, in preventing an excessive or fusing heat in said ore-chamber by the admission of steam thereto.

The chamber for containing the ores to be treated in my improved apparatus may, as shall be found most expedient, be built either in an upright, inclined, or horizontal position. When an upright ore-chamber is used, I prefer to construct the same around and over the combustion and gas-generating chamber A substantially in the manner represented in Figs. 1 and 2 of the drawings. This combustion-chamber A is fitted, as usual, with a grate, B, over an ash-pit, C, but is fitted besides with one or more hollow and perforated grate-bars, R, or with equivalent pipes or tubes, which are connected with a steam-boiler or other suitable steam-generator. The ends of this combustion-chamber, extending outwardly through the walls of the ore-chamber L, are closed by suitable doors and furnished with draft-openings for the admission of atmospheric air, and its top G may be arched, as illustrated in the drawings, Fig. 1. I usually construct the ore-chamber L in the form of an inverted frustum, so as to be larger at the top or feeding end than at the bottom, whence the ore is discharged. The heat, gases, &c., pass out from the combustion and gas-generating chamber A directly into the ore-chamber L through a series of lateral openings, *g g g g*, pierced in the side walls of the combustion-chamber, as illustrated in Figs. 1 and 2 of the drawings, so as to be evenly and uniformly diffused in and throughout said ore-chamber.

When my improved apparatus is in operation, superheated steam escapes in fine jets from the hollow bar or bars R (or their equivalent) into the actively-ignited fuel in the combustion-chamber, and this superheated steam will, by its decomposition, in connection with the carbon of the fuel and the draft of atmospheric air passing into the furnace, rapidly generate both hydrogen and carbonic-acid gases at a very high temperature, which, when conducted or allowed to escape into the ore-chamber in their intensely-heated state, will accomplish the desired desulphurization and oxidation of the ores contained therein.

To prevent an excessive degree of heat in any portion of the ore-chamber L, steam is admitted thereto from a suitable number of apertures or nozzles, S S, Fig. 1, or from any other distributing apparatus connected with a steam-generator.

The raw ore to be desulphurized and oxidized is to be fed into the ore-chamber L through a door, Q, placed in the top thereof, and, after being exposed to the action of the hydrogen, carbonic-acid gases, and other agents in passing down through the same, is removed through the discharging-apertures H H, formed on either side of the combustion-chamber A, as seen in Fig. 1. The inflamed gases and products of combustion pass-

ing out with a powerful blast from the combustion and gas-generating chamber A into the ore-chamber L through the eduction-apertures *g g g g* will force their way up through the entire mass of ore contained therein, and finally escape through a series of openings, *k k*, formed in the wall of the ore-chamber, near its top. These openings *k k* communicate with an encircling-flue, M, extending around the top of the chamber, as seen in Fig. 3, and connected with a suitable chimney, or, if it be desirable, continued out to a boiler, P, as represented in Fig. 1, so as to utilize the heat escaping therefrom to generate steam. The enlargement of the ore-chamber L from its bottom or point of connection with the gas-generating chamber A outwardly permits the inflamed gases so to expand as that they will lose a portion of their intense heat in passing through the same, so that the fresh ore last thrown into the ore-chamber is first submitted to a comparatively low degree of heat; but as the ore drops down gradually, so as to approach more nearly the primary source of the heat, it is exposed to a constantly-increasing temperature, which reaches its greatest intensity at or near the point of discharge on either side of the gas-generating or combustion chamber or of the eduction-flues therefrom.

I wish it to be distinctly understood that I do not limit myself to any specific form or position of either the ore-chamber or combustion and gas-generating chamber of my improved apparatus, provided only, in the first place, that said chambers, although connected, be distinct from each other, and, in the next place, that said distinct and connected chambers, of whatever form, position, or arrangement, be properly supplied with steam, as required, and be so combined with each other as that the gases generated in the combustion-chamber may pass freely into and through the ore-chamber.

I am aware that steam has heretofore been injected into furnaces and fire-chambers for the purpose of facilitating and perfecting the combustion of the fuel and for generating hydrogen and other gases, and also directly upon heated ores for the purpose of purifying them; hence I do not claim, broadly, the introduction and use of steam for the purpose of generating gases or of increasing combustion in my improved apparatus; but

What I claim as my invention, and desire to secure by Letters Patent, is—

1. A fire-chamber for generating gases by the decomposition of steam therein, substantially as described, arranged in combination with a separate chamber for containing and treating metallic ores, substantially in the manner and for the purpose herein set forth.

2. The generation of gases by the decomposition of superheated steam within a suitable fire-chamber, when said gases and like products of combustion in the fire-chamber are conducted into and through a separate chamber containing metallic ores, for the purpose of desulphurizing and oxidizing said ores, substantially as herein set forth.

3. When a fire-chamber for generating gases is combined with a separate chamber for treating ores, substantially as hereinbefore described, the introduction and use of steam in said ore-chamber for the purpose of preventing excessive heat therein, substantially as herein set forth.

This specification of my improved apparatus for desulphurizing and oxidizing metallic ores signed by me this 10th day of December, A. D. 1864.

MELCHOR B. MASON.

In presence of—
THOMAS ADAMS,
RANDOLPH COYLE, Jr.