

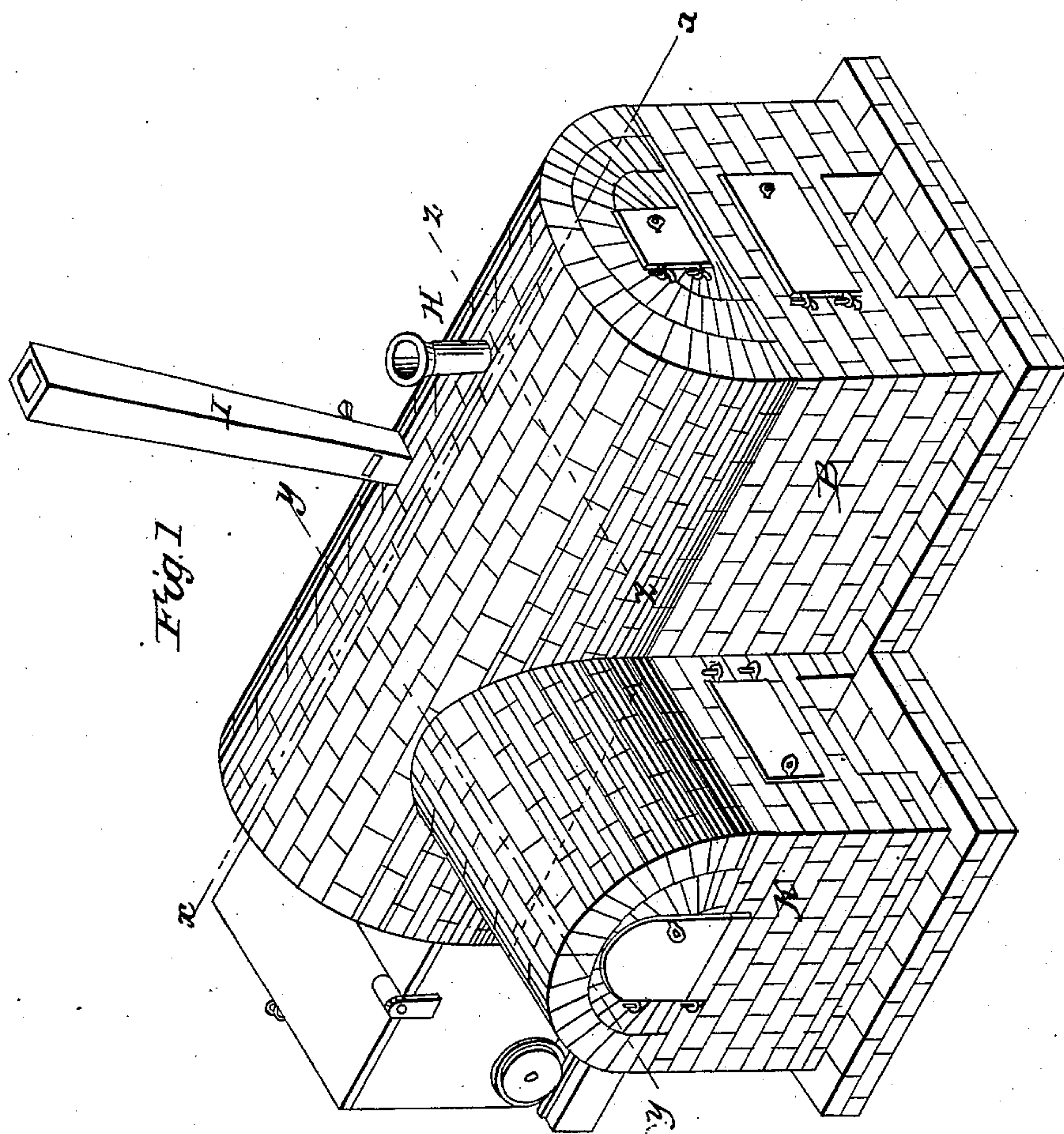
2 Sheets—Sheet 1.

H. TINDALL.

Furnace for Roasting and Chloridizing Ores.

No. 83,122.

Patented Oct. 13, 1868.



Witnesses
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A. Ruppert

Inventor
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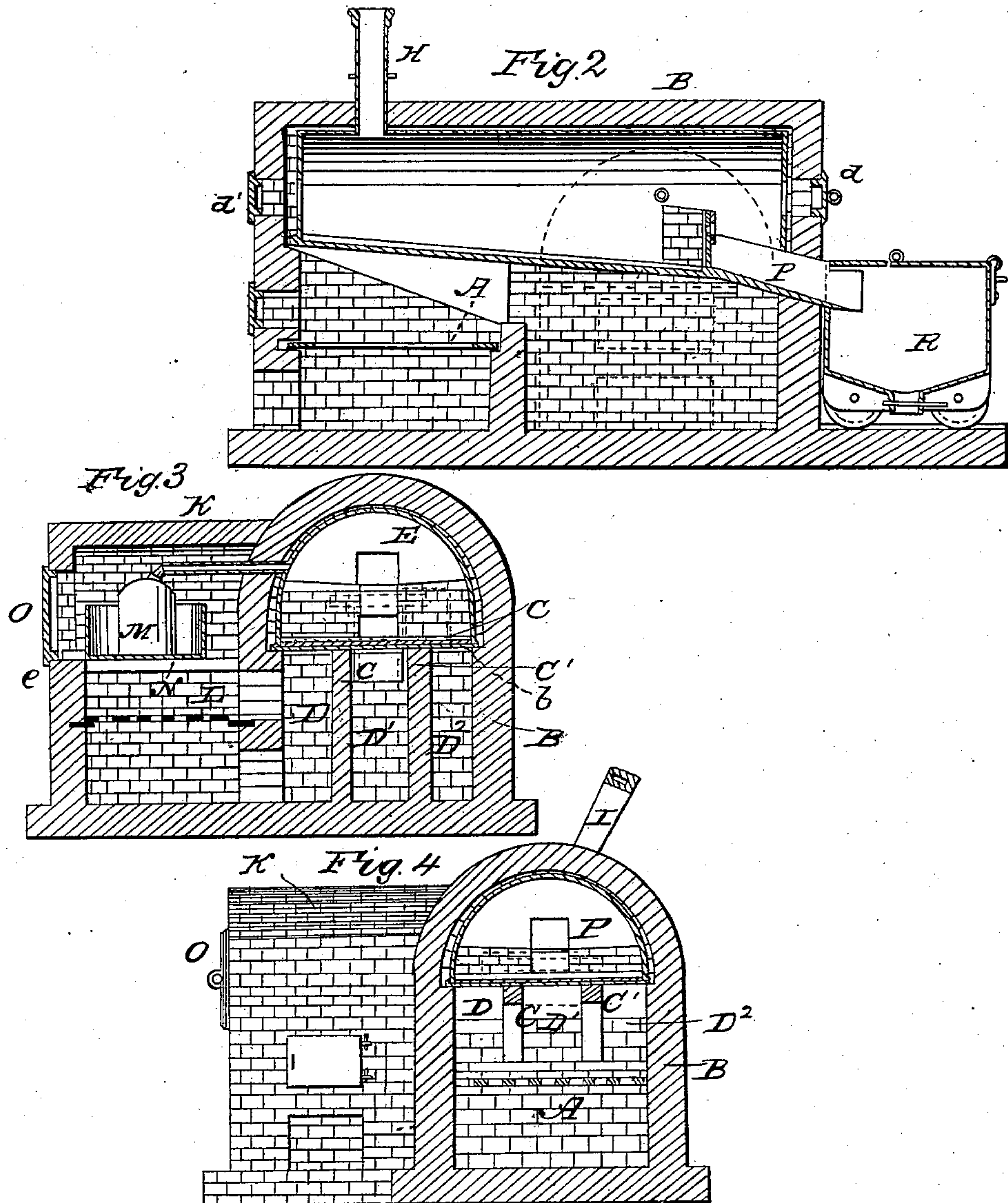
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United States Patent Office.

HENRY TINDALL, OF CHICAGO, ILLINOIS.

Letters Patent No. 83,122, dated October 13, 1868.

IMPROVED FURNACE FOR ROASTING AND CHLORIDIZING ORES.

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, HENRY TINDALL, of Chicago, Cook county, State of Illinois, have invented a new and improved Furnace for Desulphurizing Metallic Ores, "tailings" for furnaces, and other similar purposes; and I hereby declare the following to be a full, clear, and exact description thereof, which will enable those skilled in the art to make and use the same, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 is a perspective view of my improved furnace, showing also the car for removing the ores when they are delivered from the furnace;

Figure 2 is a longitudinal section on line *x x* of fig. 1;

Figure 3 is a vertical transverse section on line *y y*; and

Figure 4 is a vertical transverse section on line *z z*.

Corresponding letters refer to corresponding parts in the several figures.

This invention relates to furnaces for roasting ores containing the precious metals, and it consists in a furnace in which the process of desulphurizing and chloridizing such ores is simultaneously carried on, and in the construction, combination, and arrangement of the parts thereof, as will be hereinafter described.

A is a furnace, which is provided with a grate in the usual manner, and which may be of brick alone, or any refractory material. It is erected upon a suitable foundation, and consists of two parallel vertical walls, B, which terminate in an arch at the top, the end enclosing walls being of the same material as the sides. This mason-work also surmounts and encloses the remaining portion of the furnace, as will be more fully described hereafter.

B are the vertical walls above referred to.

C C' are partition-walls, running parallel to the side walls, and which divide the passage for the products of combustion into three, more or less, distinct flues. From the front to the rear of the furnace, they may be of brick, stone, or iron, or they may be partly of masonry and partly of iron, and they also serve as supports for the sole or hearth upon which the ores rest while being roasetd.

D D' D² are the flues or passages from the furnace to the rear end of the hearth, through which the heated products of combustion, arising from the fuel on the grate, pass, for the purpose of heating the lower portion of the ores on the hearth, to the depression in their upper surface, as shown at G G, fig. 4, from where they unite in a short vertical flue, and ascend to the chamber or flue E, where they are further utilized, in heating the upper surface of the ore, and from which they escape to the atmosphere through the pipe H, as seen in fig. 2.

E is a flue or channel, which is formed of a flat sheet or plate of any suitable metal, which is covered with an

arched plate of similar material, and is to be of any size required to meet the views of the constructor.

The plate *b*, composing the bottom of this chamber, may rest upon projections formed in the side walls of the furnace. Its lower surface is exposed to the action of the escaping gases, while its upper surface is covered with a plate or plates, or slab of soapstone, which serve the purpose of preventing injury to the metal, consequent upon the presence of the sulphur which is found in the ore. The metal arch comprising the roof of this chamber is protected from the action of the sulphur by means of the blocks of soapstone, or it may be fire-brick, for a distance vertically of, say, six inches, or as far up upon its sides as it is intended to have the charge of ore to be roasted extend; and, should it be found necessary, the whole interior surface of the chamber may be thus protected.

G G are the depressions in the partition-walls above referred to.

H is the pipe through which the products of combustion pass, together with any vapor that may arise from the ores, after such vapor has passed through an atmosphere or stratum of chlorine gas, as will be hereinafter described.

I is a pipe or tube, through which the ore is to be fed to the desulphurizing or roasting-chamber, from any suitable receptacle therefor, to be located at a proper height. It consists of a box or tube of suitable dimensions, which is inserted into the upper portion or roof of the roasting-chamber, and is provided with a valve or grate for regulating the passage of the ore to said chamber.

d d' are apertures formed in the end of the roasting-chamber, for the purpose of inserting a rod or shovel, for agitating the ores while the operation of desulphurizing and chloridizing them is being performed. These apertures are to be closed with doors or plates of metal, of any suitable construction.

K is a furnace, which is constructed of masonry, similar to the one already described, and may be arranged with reference thereto, as shown in fig. 1, fig. 3, and fig. 4 of the drawings. It is provided with a grate, L, fig. 3, and with suitable doors, for the insertion of fuel and the removal of the ashes. This furnace is divided into two compartments (an upper and a lower one) by means of a plate, N, of metal, or it may be of soapstone, or any suitable material, the lower partition forming the furnace in which the fuel is burned, and the upper, the furnace or chamber in which the chlorine gas is generated for use, as will be more fully described. The upper portion or chamber of this furnace is provided with a door, O, which covers an aperture through which may be inserted a metallic cup or basin, *e*, of sufficient capacity to receive the gas-generating vessel M. This cup rests upon the plate composing the bottom of the chamber, and may be filled or partially filled with water, for

the purpose of forming a bath in which the vessel M, with its contents, is to be placed, for the purpose of being heated, so as to convert the contents of said vessel into gas.

M is a vessel, of lead or glass, the capacity of which will be determined by the amount of gas which it is desirable to generate in a given time. Said vessel is placed within the cup or basin e, and is provided with an aperture in its top, head, or upper surface, for the insertion of the materials from which the gas is generated, which aperture is provided with a stopper, which screws tightly therein, so as to prevent the possibility of leakage. It is also provided with a pipe, which is secured to its upper surface, and which communicates directly with the ore-chamber in the first-mentioned furnace, and is for the purpose of conducting the gas generated in said vessel to said chamber when the apparatus is in operation.

N is the plate which separates the fuel-burning portion of the furnace from the heating or gas-generating chamber.

O is the door covering the passage, through which the vessel M and cup e may be inserted and removed.

This furnace is provided with doors for the insertion of fuel and the removal of ashes, in the usual or any convenient manner.

P is a trough or chute, which is attached to the rear and of the roasting-chamber, and is for the purpose of conveying the contents of such chamber to car R, which conveys the same to the amalgamators, or to any other desired location. This chute passes through the rear wall of the furnace, and across the vertical flue at the rear end of the roasting-chamber, and is firmly secured to the rear end of the chamber E, so that as soon as the charge of ore is ready for delivery, the shovel or scraper may be inserted through the door O, and such contents readily removed through the same chute into the car.

It will be observed that the bottom plate, b, of the chamber E has an inclination downwards, from its front to its rear end, which form of construction is designed to facilitate the removal of the ores from said chamber.

R is a car, which is so arranged upon suitable rails, that it will pass directly under the spout or chute P, and so that the contents of the furnace will be discharged directly into said car, and the car then be run to any desired point, and its contents at once discharged; or they may be allowed to remain therein until they have become cooled.

It is apparent that any desired number of roasting-furnaces may be arranged contiguous to each other, and that the gas-generating furnace, with its vessels, may be of such dimensions as to supply the requisite amount of gas for such furnaces, the only change in such a case necessary being to provide several pipes in connection with the gas-retort, for carrying the gas to the several furnaces.

The operation of my improved furnace is as follows:

The furnace having been constructed as above described, the ore to be treated is passed through the chute I, and is evenly distributed over the sole or

hearth. When the fire is kindled in the furnace A, and as the heated gases pass to the rear, they impinge against the bottom plate of the sole, thus imparting a portion of their heat to the lower portion of the ore. They then pass up through the vertical flue at the rear of the chamber E, and into the space in said chamber above such ore, and to the outlet H, in the front end or top of said chamber, thus imparting the remaining portion of the heat, or a large part thereof, to the upper surface of the ore upon the hearth. Simultaneously with the kindling of the fire in the furnace A, a fire is lighted in furnace L, in order that so soon as the ore commences to be heated in A, a stream of chlorine gas, generated from the muriatic acid and manganese, or other suitable materials contained in the vessel M, shall commence passing into the space in the chamber E, thus enveloping the upper surface and filling the interstices between the parts or particles of the ore upon the hearth. It being a well-known fact that chlorine gas is heavier than the products of combustion which arise from burning fuel, or the vapors which arise from the ore while being roasted or treated in the furnace, it follows, as a consequence, that the gas will remain in intimate contact with the ore upon the hearth, while the vapors from such ore, and gases from the fuel, will be compelled to rise through a much heavier and more dense medium, and it is believed that, as a consequence, a very large portion, if not all, of the particles of metal which usually pass off with the vapor or fumes of the metal, will be arrested by the enveloping or intervening strata of gas, and be retained and mingled with the ore in the form of chlorides.

Having thus described my invention,

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

1. A furnace for treating ores, in which the operation of desulphurizing and chloridizing or chlorinating such ores is performed simultaneously with the roasting of the same, substantially in the manner described.
2. The chamber E of the furnace, as composed of a metal bottom, with metal sides and roof, said bottom and sides being protected from the action of the sulphur, substantially as shown and described.
3. The combination of the chamber E and the gas-generating apparatus, substantially as shown and described.
4. The combination of the ore-supplying conduit and the chamber E, substantially as shown and described.
5. The arrangement of the sole or hearth with reference to the chute P, substantially as shown and described.
6. The arrangement of the walls or partitions C C', by which they are made to support the sole or hearth, substantially as shown and described.
7. The arrangement of the car R, with reference to the chute P and chamber E, substantially as shown and described.

HENRY TINDALL.

Witnesses:

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