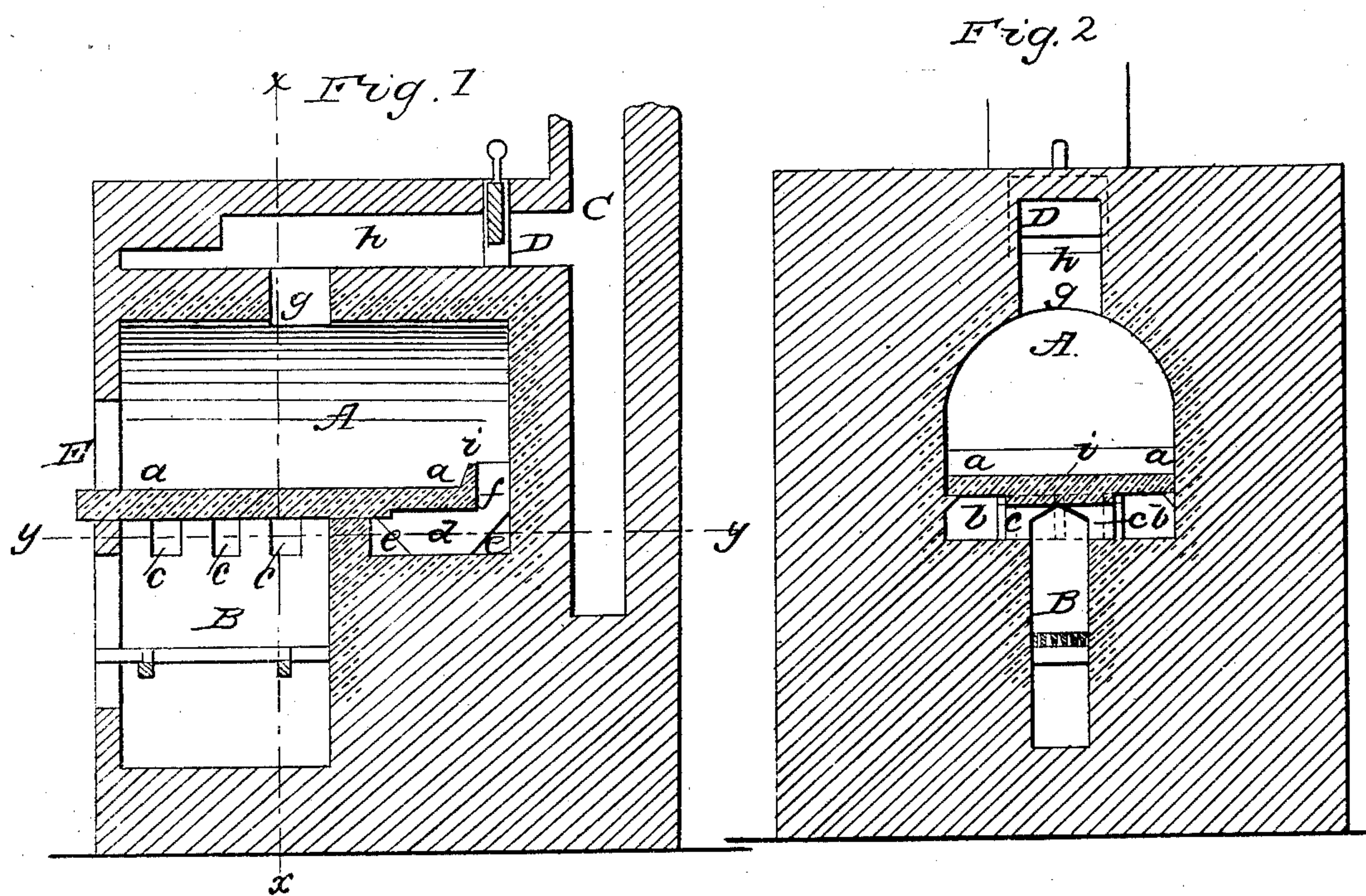


R. B. NORMAN.

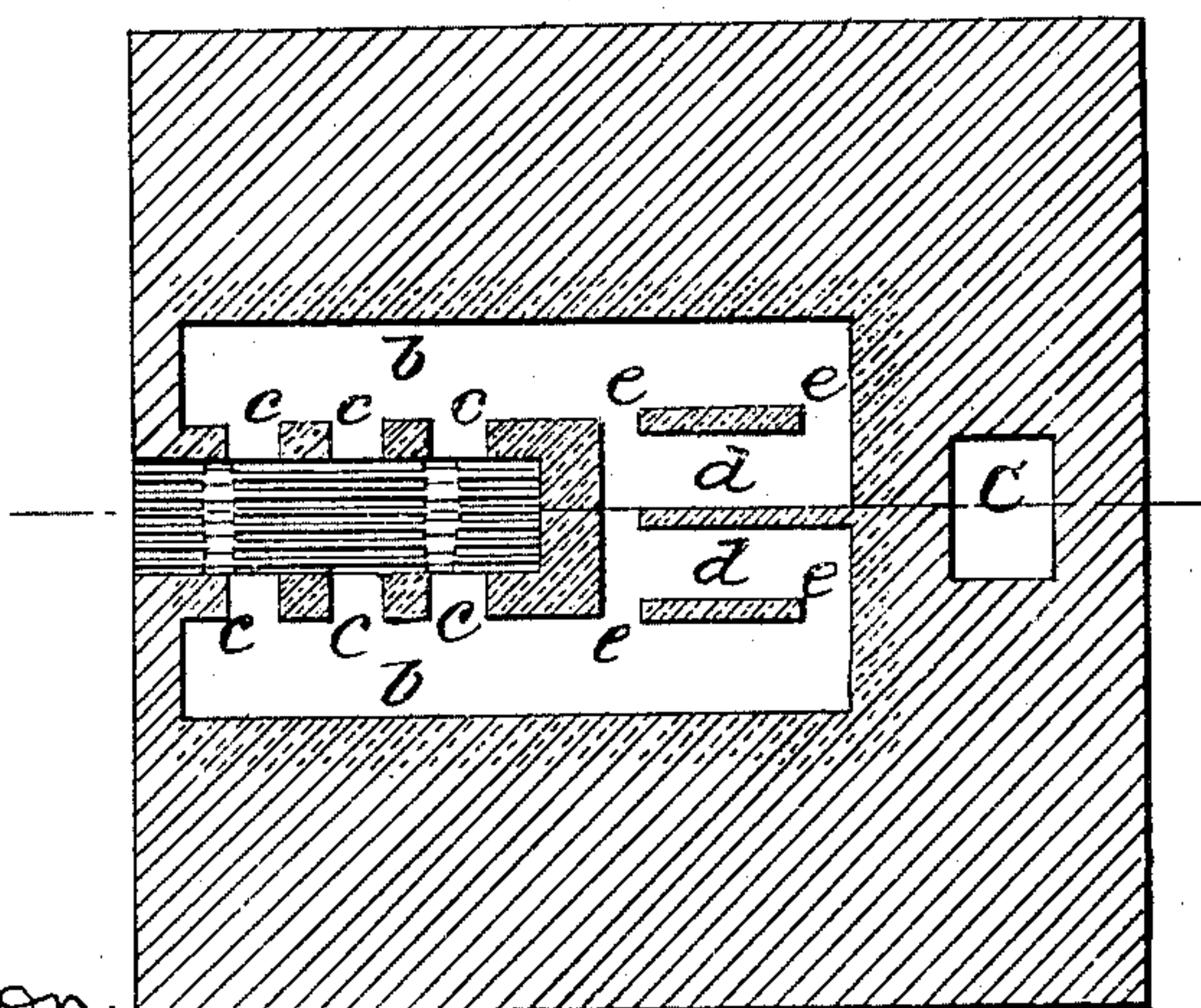
Ore Roaster.

No. 34,901.

Patented April 8, 1862.



*Fig. 3*



witnesses

J. A. Beulow

J. W. Prohidge

Inventor

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# UNITED STATES PATENT OFFICE.

ROBERT B. NORMAN, OF SACRAMENTO, CALIFORNIA.

## IMPROVED FURNACE FOR ROASTING ORES.

Specification forming part of Letters Patent No. **34,901**, dated April 8, 1862.

*To all whom it may concern:*

Be it known that I, ROBERT BIRD NORMAN, of the city of Sacramento, in the county of Sacramento and State of California, have invented a new and Improved Furnace for Desulphurizing, Oxidizing, and Calcining Ores; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a central longitudinal vertical section of the furnace. Fig. 2 is a transverse vertical section of the same in the plane indicated by the line *x x* of Fig. 1. Fig. 3 is a horizontal section of the same in the plane indicated by the line *y y* of Fig. 1.

Similar letters of reference indicate corresponding parts in the several figures.

My improved furnace is more especially intended for desulphurizing and oxidizing or calcining iron pyrites or copper pyrites or other sulphurets, or for calcining other auriferous substances.

The object of my invention is to apply the heat uniformly, or nearly so, throughout the whole body of material upon the sole, bottom, or shelf of the furnace, while permitting the combustion of as great a portion as is desirable of the liberated sulphur, to prevent the combustion of the whole or a sufficient portion of it to produce a sufficiently intense heat to cause the fusion or agglutination of the material.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

A is the desulphurizing, oxidizing, or calcining chamber, having an arched top or roof and a bottom or sole, *a a*, of fire-brick, fire-clay, or other refractory substance, below the center of which is situated the fire-place B and a series of flues, *b b*, *c c*, and *d d*, the flues *b b* being arranged at the sides of and parallel with the fire-place and communicating therewith by the short transverse flues *c c*, and the flues *d d* being in rear of the fire-place and communicating with *b b* by side openings, *e e*.

At the back of the sole or bottom *a a* there is a bridge-wall, *i*, behind which there is an opening, *f*, which extends all across the furnace and forms a communication from the

flues *b b* and *d d* to the chamber A. This chamber is made with an arched roof and much higher than the ordinary construction of a reverberatory chamber. The outlet from the chamber A is an opening, *g*, in the roof, leading to a flue, *h*, above, which flue communicates with the chimney C, and is furnished with a damper, D, to regulate the draft.

The chimney may be provided with a pipe for supplying a jet or jets of cold water for the condensation of the sulphur and precipitation of any light matters that may escape thereinto.

It will be perceived that the base of the chimney is provided with a chamber for the reception of such volatilized particles of ore or other matters that may be driven off by heat or carried over by the draft.

E is a door in front for charging the chamber A, and to permit any necessary manipulation.

The fuel used in this furnace may be either coal, coke, or wood.

The operation is as follows: Fire having been made in the fire-place B, and the door E having been closed, the flame and heated products of combustion pass from the fire-place through the flues *c c b b d d*, and the passage F, into the chamber A, and thence through the opening *g* and flue *h* to the chimney, and the sole or bottom *a a* of the chamber A soon becomes heated to a dull-red heat. The door E is then opened and the charge of ore (in a granulated state) is put into the chamber and spread evenly over the sole *a a*, after which the door E is then closed again. The sole being at so low a heat at the commencement of the process, there is no chance for the sulphurets to agglutinate, and as the sulphur is disengaged slowly from the outside of the grains it does not fuse while resting upon them, but rises to the crown of the arch as fast as liberated, and is carried through the opening *g* and flue *h* into the chimney by the draft of the latter. The charge is from time to time stirred by a rake or rakes introduced through suitable openings, and by this stirring is caused to split open and crumble almost to dust, and when the sulphur has been all expelled (which will be readily known by a skillful operator) the fire is so managed as to raise the heat of the sole *a a* and the charge to a bright red, and air is admitted through the door E or



other suitable openings, to effect oxidation. Owing to the great height of the chamber A as compared with that of a reverberatory furnace and the use of the bridge-wall *i* in front of the opening *f*, the flame and heated gaseous products of combustion in the fire-place on entering the said chamber rise to the top thereof and escape through the opening *g* without impinging upon the charge, though they will in some degree aid in heating it. The height of the chamber also permits the sulphur to rise from the charge as fast as it is liberated, and though a portion of it will be unavoidably consumed before it can reach the opening *g*, such portion will not be sufficient to produce any injurious effects, but, on the contrary, will aid in heating the charge. The charge is, however, mainly heated from below through the medium of the sole *a a*.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

So constructing a desulphurizing-furnace for roasting the ores of precious metals as that the heat shall be applied first beneath the sole of the furnace and afterward on the surface of the ore, when the same is combined with a chamber arranged in the base of the chimney for the reception of such volatilized particles of ore, &c., as may be driven off by heat or carried over by the draft, substantially as described.

ROBERT B. NORMAN.

Witnesses:

SAMUEL CROSS,

W. B. MARSHALL.