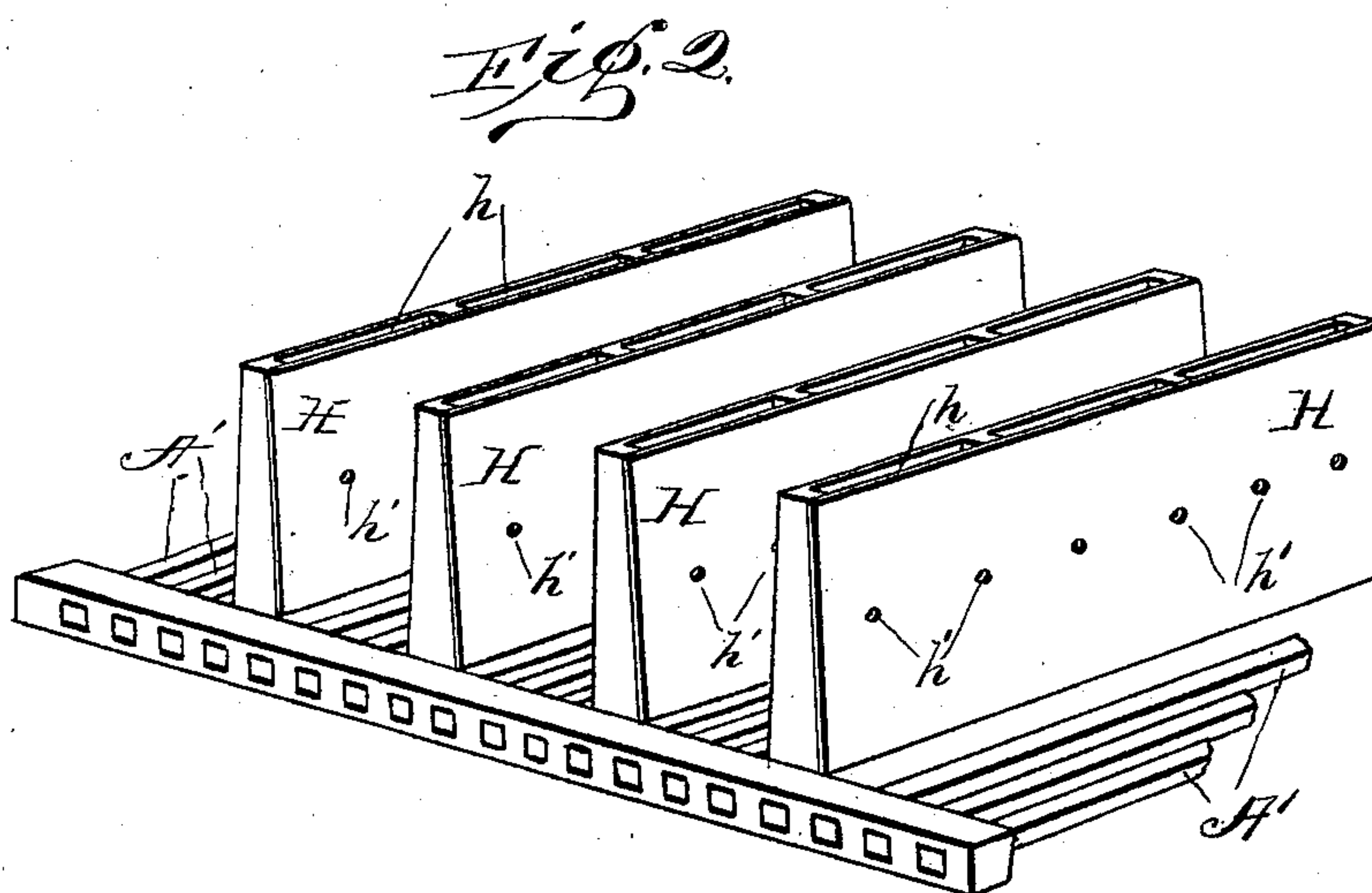
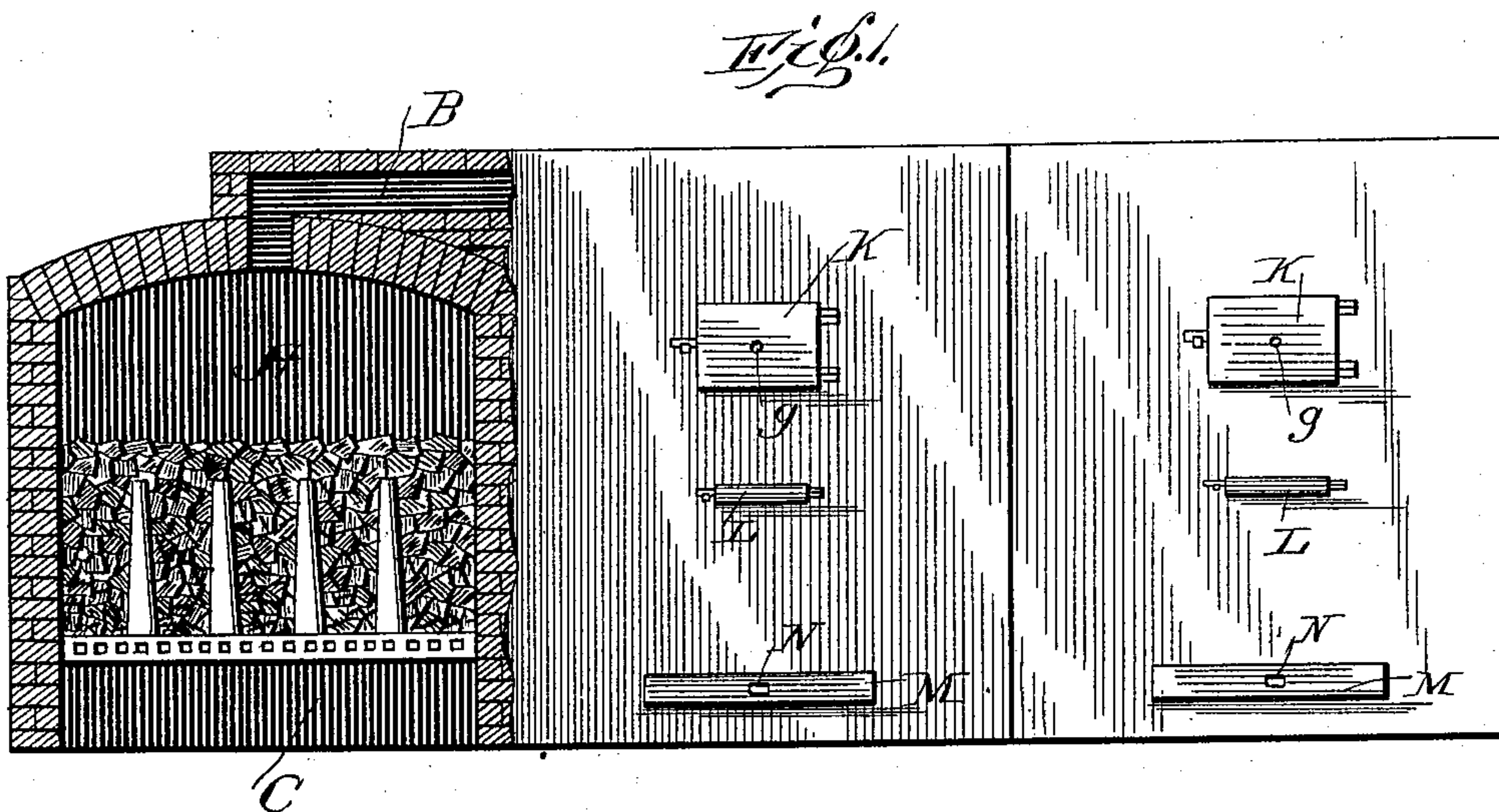


(No Model.)

H. HARLAN.
ORE ROASTING FURNACE.

No. 602,400.

Patented Apr. 12, 1898.



Witnesses,
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HOWARD HARLAN, OF RICHMOND, VIRGINIA, ASSIGNOR OF ONE-HALF TO
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ORE-ROASTING FURNACE.

SPECIFICATION forming part of Letters Patent No. 602,400, dated April 12, 1898.

Application filed November 10, 1897. Serial No. 658,014. (No model.)

To all whom it may concern:

Be it known that I, HOWARD HARLAN, a citizen of the United States, residing at Richmond, in the county of Henrico and State of Virginia, have invented certain new and useful Improvements in Ore-Roasting Furnaces; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to a roasting oven or furnace for the desulfurization of volcanic sulfur, sulfurous ores—such as iron pyrites and Sicilian sulfurets—and other ores containing a greater or less percentage of sulfur.

The object of the invention is to provide a furnace that will permit the desulfurization to go on continuously without clogging; and to this end it consists in the construction and arrangement substantially as shown in the accompanying drawings, in which—

Figure 1 is an end view of a battery of furnaces, one being shown in section; and Fig. 2 is a detail perspective view of the air-conduits.

It is well known that heat expels sulfur from the ores, the fumes being carried off and condensed in lead chambers in the presence of nitric acid and water to form sulfuric acid of commerce. The residue is generally iron oxid, which is ground to form a paint, or, if containing copper, it is "matted" and the copper separated by the electrolytic process. Heretofore in such operations there has usually been a deficiency of oxygen to support combustion, and the reduction is incomplete owing to the clogging of the air-ducts. Generally a charge of ore requires sixty hours to become desulfurized thoroughly.

Referring more specifically to the drawings, A represents a roasting-furnace of any suitable dimensions, the furnaces being arranged in series or "battery" the better to carry on the operation. I have found by experience that four-foot cubes give the best results. Each furnace will contain when first charged about three thousand pounds of ore, and every twenty-four hours a new charge of from five hundred to one thousand pounds of ore is added. There are some ores that

disintegrate rapidly under heat and the residue falls to the air-inlets, clogging them to such a degree that air is excluded and the burning retarded.

The furnace is constructed with a series of bars A', similar to grate-bars, to admit air from the pit C. These bars have secured to them and support air-conduits H, which are hollow and perforated at their sides. These conduits also open downwardly to the pit C and are carried up into the ore, separating it into divisions, so that the ore in burning will be divided and not have a tendency to fall into a compact mass.

It will be observed from the construction shown that air is not only admitted between the bars A', but through the conduits H and discharged through their top openings *h* and side openings *h'*, and as the sulfurous acid is gradually eliminated the residue falls down between the conduits and into pit C. The fumes pass off through the flue B to the condensing-chambers.

Each furnace is provided with a charging-door K, having a peep-hole *g* and a door or slide L, where a stirring-rod can be introduced. The doors M lead to the pit C and have openings N for the admission of air. By means of this construction and arrangement I am enabled to obtain a maximum of sulfurous acid with least labor in recharging and least residuum of ore not properly desulfurized. These conduits may be of fire-clay or any other suitable refractory material, and they may be carried up into the ore-body to a greater or less height, as the exigencies may require.

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

1. In a roasting-furnace of the nature described, a closed heating or roasting chamber, bars underneath the same to support the ore and spaced apart to give openings to admit air from below, an outlet-flue at top for conducting the gas to a condensing-chamber, a series of hollow air-conduits resting on the bars over the openings, and consisting of vertical pyramidal-shaped casings with smooth sides provided with perforations, substantially as described.

2. In a furnace of the nature described,
having bars to support the ore, and spaced
apart to give openings from below, and a flue
for conducting the gas to the condensing-
5 chamber, hollow pyramidal conduits resting
on the bars over the openings, extending ver-
tically into said chamber, said conduits hav-
ing smooth sides, a longitudinal opening at
top, and perforations in their sides whereby

air is admitted to the ore at top and sides of
the conduits, substantially as described.

In testimony whereof I affix my signature
in presence of two witnesses.

HOWARD HARLAN.

Witnesses:

G. E. MOSBY,
J. M. PARISH.