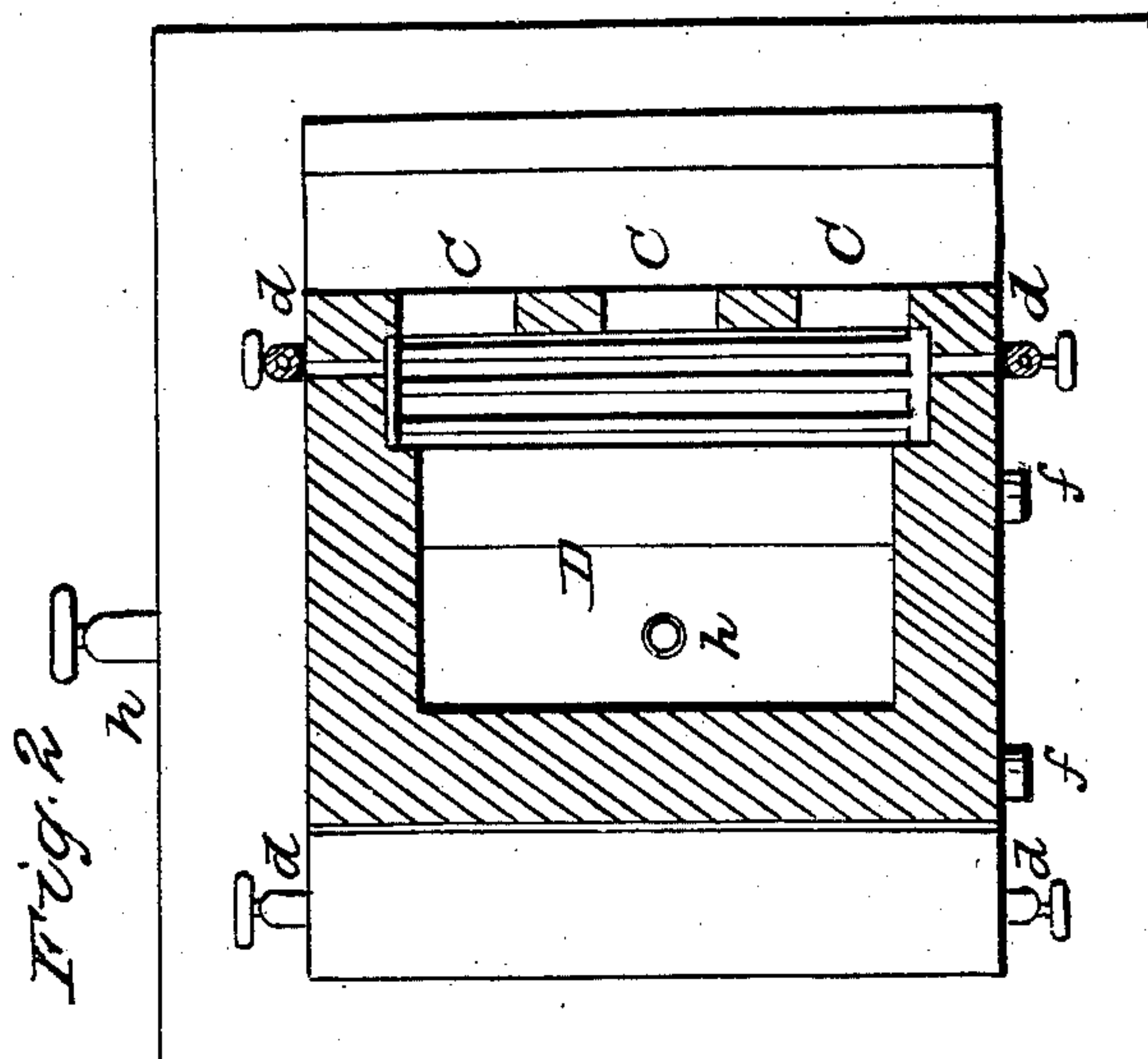
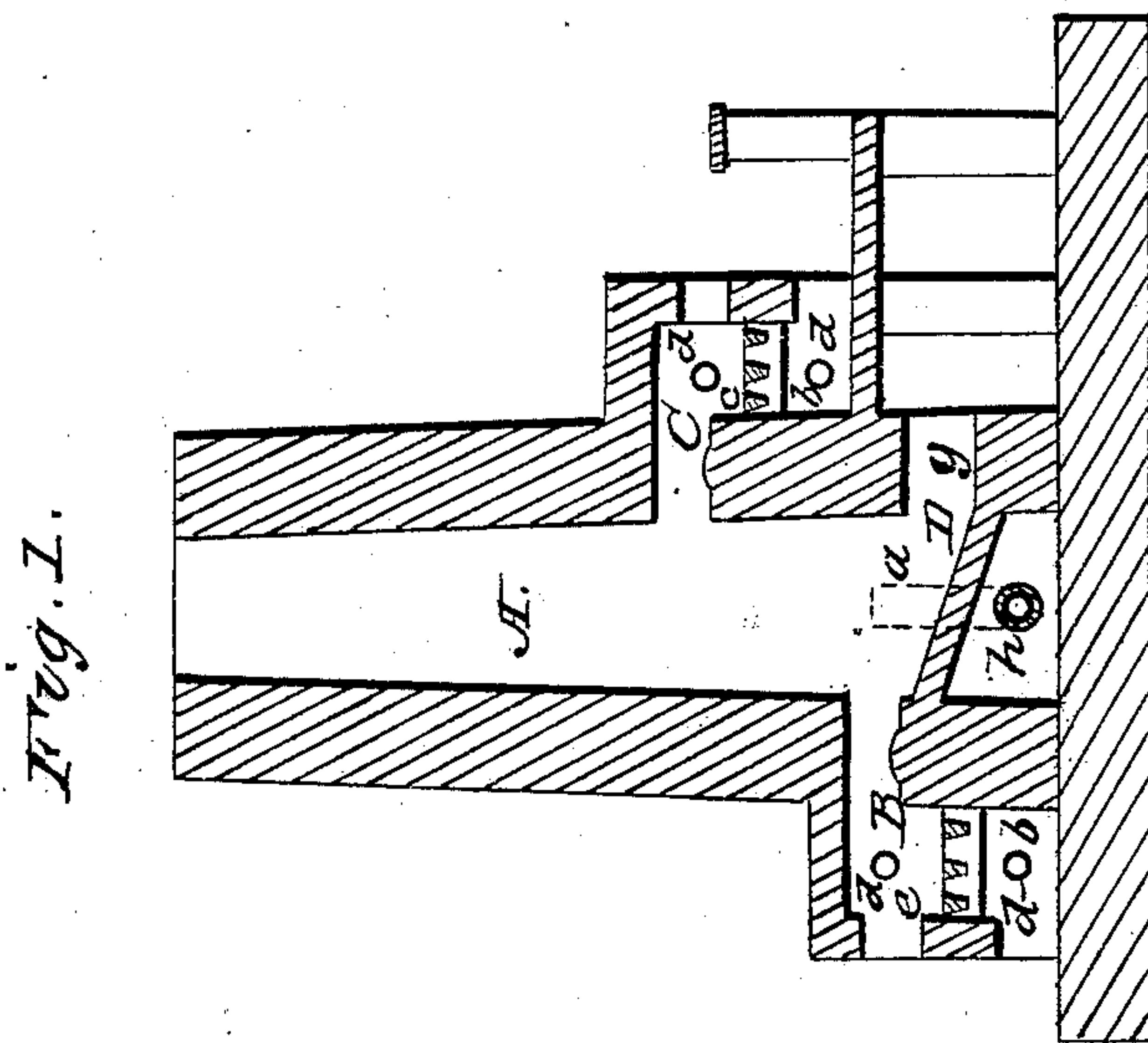


E. P. HUDSON.

Roasting Ores.

No. 78,456.

Patented June 2, 1868.



Witnesses  
A. S. L. L.  
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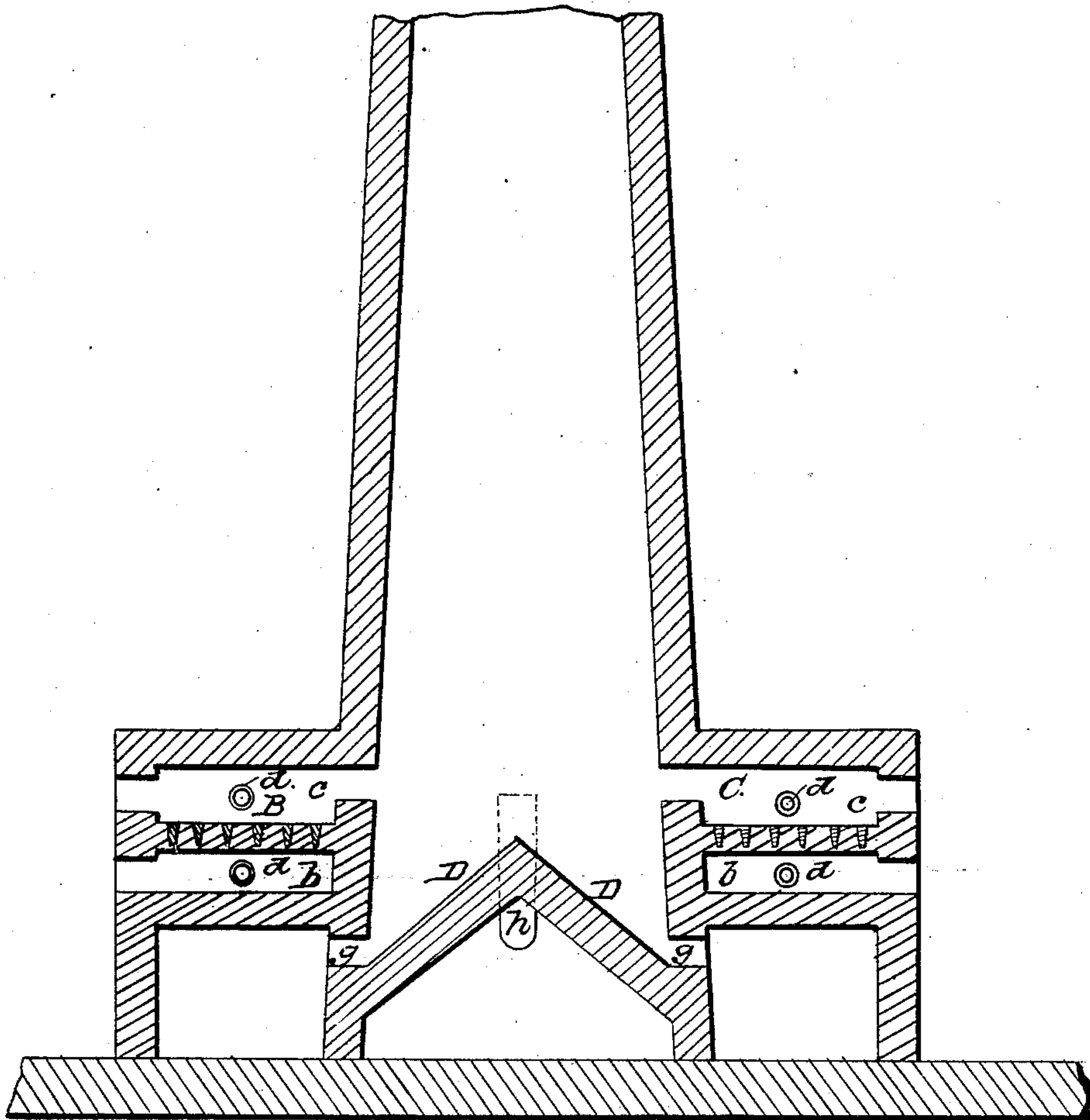
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Fig. 3.



Witnesses  
and sent to  
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# UNITED STATES PATENT OFFICE.

EDWARD P. HUDSON, OF NEW YORK, N. Y.

## IMPROVED FURNACE FOR ROASTING ORES.

Specification forming part of Letters Patent No. 78,456, dated June 2, 1868.

*To all whom it may concern:*

Be it known that I, EDWARD P. HUDSON, of New York, in the county and State of New York, have invented an Improved Furnace and Resulting Process for Roasting and Desulphurizing Ores; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, making part of this specification—

Figure 1 being a central vertical section of the furnace through the fire-chambers; Fig. 2, a horizontal section thereof in a plane indicated by the line *x x*, Fig. 1; Fig. 3, a vertical section, corresponding with Fig. 1, of a modified form of the furnace.

Like letters designate corresponding parts in all of the figures.

The object of my invention is to thoroughly remove sulphur, phosphorus, arsenic, and other noxious substances from ores with economy, so that ores containing such ingredients, after treatment by my improved process, may be successfully reduced to their metallic bases in a pure state.

Three important results are attained by the construction of this furnace: First, a high degree of heat is secured, with economy in fuel; second, an excess of oxygen, the desulphurizing agent, is presented to all parts of the mass of ore without detracting from the temperature; third, the ore, when sufficiently treated, is readily removed from the furnace without obstructing the continuous operations in the treatment of succeeding charges of ores.

Let A represent the interior or ore-treating chamber; B C, the fire-chambers, and D the hearth of the furnace. The width of the chamber A, between the fire-chambers, should not be so great as not to allow a complete circulation of the heated air into the center of the mass of the ore.

First, the fire-chamber B, on one side, is located just above the upper edge of the inclined hearth D, opposite to the side where the treated ore is drawn out at the door *g*; and the fire-chamber C, on the opposite side, is located at a higher level than the chamber B, so as to give sufficient room below for taking out the ores, and in order to more easily and effectually distribute the heat and air of the

blast to the ore. The arrangement is substantially represented in Fig. 1.

Second, the hearth D is inclined from below the lower fire-chamber, B, downward to the door *g*, where the ore is drawn out after treatment. This inclination of the hearth from one side to the other enables the treated ores, as they settle to the bottom, to be removed quite equally from the middle and both sides. It also furnishes a chamber or reservoir, *a*, at the bottom of the main ore-chamber A, into which the ore, as it becomes completely desulphurized or treated, settles below the furnaces, wherein it can partially cool before being removed.

Instead of the singly-inclined hearth and fire-chambers at different heights, as shown in Fig. 1, an arrangement indicated in Fig. 3 may be adopted. Here the hearth inclines both ways to two doors, *g g*, for removing the ore, and both fire-chambers, B C, are at the same height, at least entirely above the highest part of the hearth D, so that a chamber or chambers is furnished below the fire-chambers, as in the first-described arrangement.

Third, air is introduced into the ore-chamber through the hearth D, or near the same, at the side or sides of the furnace, or at least below the fire-chambers, by a pipe or pipes, *h*, so that it is heated by the cooling ore on the hearth, whereby, in turn, the ore is assisted in cooling. Thus, also, the air is introduced into the ore undergoing treatment without first passing through the fuel, which would deprive the air of its oxygen, and thus prevent its becoming a desulphurizing agent, and thereby act in the most efficient manner for desulphurizing the ore at the moment of being decomposed.

Fourth, besides the introduction of air as a desulphurizing agent through the desulphurized ores in the cooling chamber or reservoir, atmospheric air is introduced into the ore through the fire-chambers B C, each of which has one or more pipes or passages, *d*, extending from the air-chamber *b*, below the fire-grate, into the space *c* above the fuel, through which the air is conducted in excess above the fire without being decomposed in the fuel, and is thence forced, in a heated state, into the mass of ore by the pressure from the blast-



pipe *f*, which leads into the air-chamber below the fire.

The pipe or passage *d* is controlled by a valve, so as to regulate the amount of free air thus admitted into the furnace, or cut it off entirely; and the air passage or pipe or passages *h* is also provided with a valve to regulate or cut off the flow of air into the furnace through or at the hearth. Thus free air may be introduced into the ore either at the bottom or above the fire chamber or chambers, or through both, or both may be cut off, as when first heating a charge of ore for treatment, or the amount and relative proportion of air at the different inlets may be regulated. This regulated variation of the introduction of air is desirable, if not necessary, to the proper treatment of different kinds or qualities of ores, as well as in different stages of the process of desulphurization.

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

1. Forcing heated air or oxygen, in addition to the products of combustion, through ores,

for the purpose of removing sulphur, phosphorus, and similar injurious substances therefrom, substantially as herein specified.

2. The chamber or reservoir *a*, below the bottom of the fire chambers or flues, with a passage or passages, *h*, at or near the base thereof, through which air is forced and heated by the roasted ores therein, and in turn cools the said ores ready for withdrawal, substantially as herein specified.

3. Introducing air in excess of that required for combustion, but regulated in quantity, into the ores through the fire-chambers, over the fires, so as to be heated thereby before passing through the ores, substantially as herein specified.

4. The arrangement of one fire-chamber higher than the other, substantially as and for the purpose herein specified.

EDWARD P. HUDSON.

Witnesses:

SETH ALLEN,  
F. A. ALLEN.