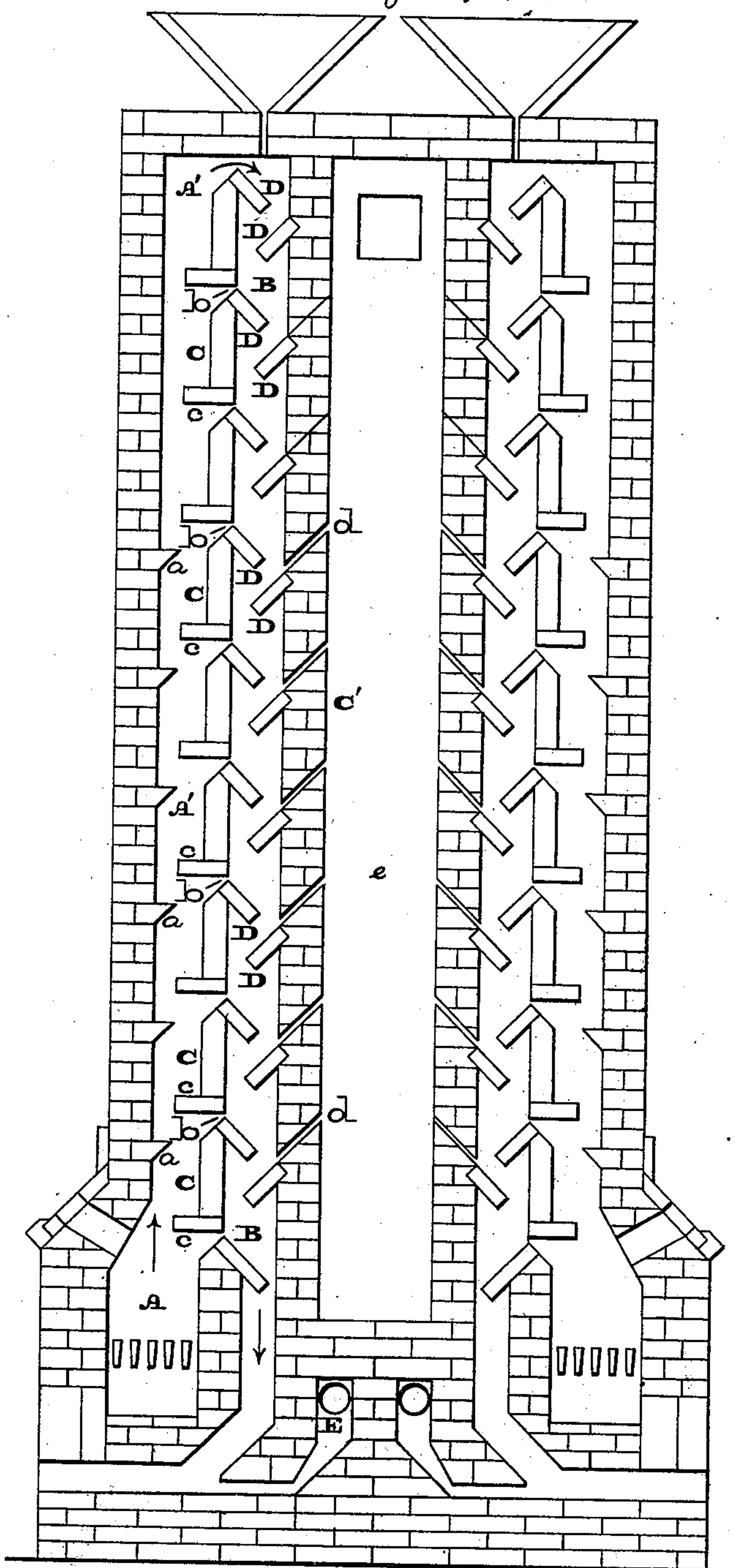
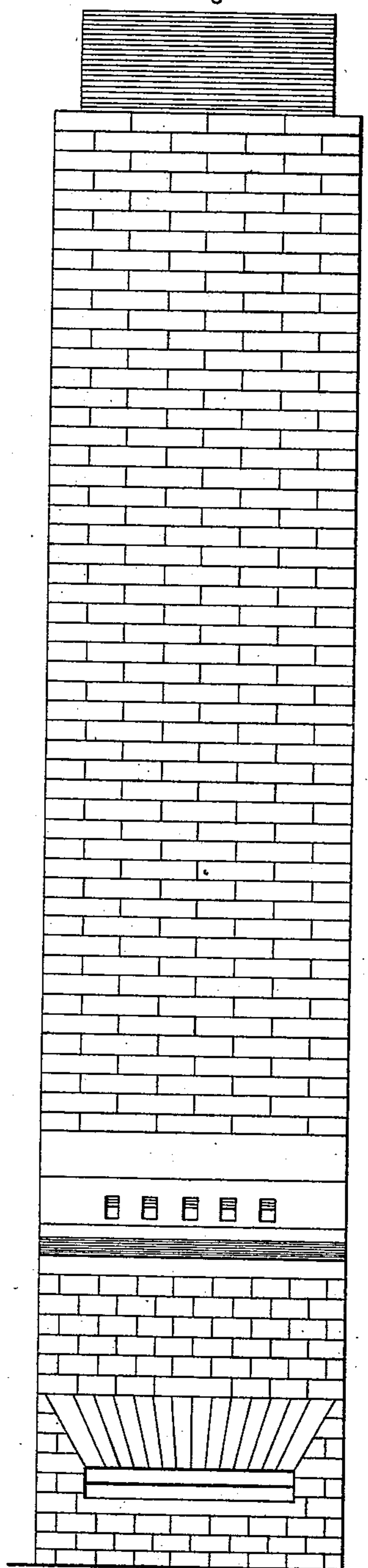


I. M. PHELPS.  
Desulphurizer.

No. 215,971.

Patented May 27, 1879.



Witnesses:

Lo. P. Grant,  
W. P. Kieker

Inventor:

Ira M. Phelps,  
by John A. Diederichsen  
ATTORNEY.



# UNITED STATES PATENT OFFICE.

IRA M. PHELPS, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR OF ONE-HALF HIS RIGHT TO JOHN SHILLITO, JR., OF CINCINNATI, OHIO.

## IMPROVEMENT IN DESULPHURIZERS.

Specification forming part of Letters Patent No. 215,971, dated May 27, 1879; application filed March 17, 1879.

*To all whom it may concern:*

Be it known that I, IRA M. PHELPS, of the city and county of Philadelphia, and State of Pennsylvania, have invented a new and useful Improvement in Desulphurizers, which improvement is fully set forth in the following specification and accompanying drawings, in which—

Figure 1 is a side elevation of the desulphurizer embodying my invention. Fig. 2 is a view of the interior thereof.

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

My invention relates to that class of furnaces used in roasting sulphuretted ores, with the view of eliminating the sulphur.

The specific objects sought to be accomplished are, first, the introduction of pulverized ore into the upper end of an oxidizing-flue, in which the draft is made to descend, thus causing or permitting the ore to move with the draft and not against it; second, the admission of powdered ore into the furnace where the temperature is lowest, and cause it to pass gradually to the hotter part as the quantity of sulphur diminishes; and, third, to cause the ore to fall repeatedly and alternately into jets of flame and currents of air.

The invention consists of a vertical desulphurizing-furnace, having a fire-flue, an oxidizing-flue, and air-chamber, the fire-flue rising from a fire-box at the bottom of the stack and extending to the top, the oxidizing-flue joining the fire-flue at top and extending to the bottom, and the air-chamber extending the length of the stack, said air-chamber and fire-flue communicating with the oxidizing-flue at intervals on opposite sides thereof. The oxidizing-flue is provided with alternately-arranged terraces.

In operation the ore moves with the draft, and is subjected to jets of flame and currents of air, and gradually passed to the hottest part of the flue.

A is the fire-box at the bottom of the stack, and A' is the fire-flue, which extends to the top, where it bends downward and becomes the oxidizing-flue B.

*a a a* are projecting ledges or deflectors, beveled on the under side, for the purpose of di-

recting the flame to the thin slots *b b b* in the partition C, through which slots small portions of the flame and hot air from the fire-flue are drawn and pass into the adjacent flue, in consequence of the partial vacuum produced at the bottom, as hereinafter described.

*c c c* are caps or bridge-plates in the partition C, and project slightly into the fire-flue. Against these bridge-plates the flame is made to impinge by the deflectors on the opposite side, and, without materially obstructing the draft, they assist in diverting portions of flame and hot air through the slots beneath them into the oxidizing-chamber, as above specified.

D D are shelves or terraces, inclining downward and inward from opposite sides of the oxidizing-chamber, their inclination (about forty-five degrees) being sufficient to allow the finely-pulverized ore to run down them by its own gravity.

*d d* are thin slots in partition C', communicating with the adjacent air-chamber, and from which they convey air into the oxidizing-flue, and thus supply all the oxygen necessary to complete the combustion of the sulphur and oxidize the base metals contained in the ore.

In the base of the stack, underneath the air-chamber, is a cavity or box, E E, into which a powerful blast of air is driven by a suitable fan or pressure-blower. From this box a passage or pipe passes obliquely downward underneath the oxidizing-flue, thence horizontally beneath the ash-pit of the fire-box, whence it emerges, and is continued as a pipe leading to the dust-chamber. (Not shown in the drawings.)

The oxidizing-flue extends obliquely and joins the horizontal portion of the passage beneath the ash-pit, the angle of confluence being such that the blast carries with it the superincumbent air in the connecting and terminal portion of the oxidizing-flue, thereby partially exhausting the latter, and to supply which the fire-flue on one side and the air-chamber on the other contribute their contents.

I have described a single stack or furnace, having one fire-box and one set of flues; but it is evident, as shown in the drawings, that



the stack may be built double—that is, with two fire-places and two sets of flues—in which case the air-chamber *e* is in the center, and supplies air to either side.

The operation is as follows: The fan is started, so as to create a draft in the flues. When the furnace is sufficiently heated, ore in a finely-pulverized condition is admitted into the hopper, from which it falls into the oxidizing-flue in a continuous stream, and, running down the inclined terraces, falls into flame and air alternately, as hereinbefore described. When the ore reaches the foot of the flue it falls into a powerful air-blast, by which means it is conveyed to the dust-chamber.

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

1. A vertical desulphurizing-furnace, having a fire-flue, an oxidizing-flue, and an air-chamber, the fire-flue rising from a fire-box at the bottom of the stack and extending to the top, the oxidizing-flue joining the fire-flue at

the top and extending to the bottom, and the air-chamber extending the length of the stack, said air-chamber and fire-flue communicating with the oxidizing-flue at intervals on opposite sides thereof, substantially as and for the purpose set forth.

2. A fire-flue and an air-chamber on opposite sides of an oxidizing-flue, which is provided with alternately-arranged terraces, constructed and combined substantially as described, whereby the ore moves with the draft, and is subjected to jets of flame and currents of air, and gradually passed to the hottest part of the flue, as set forth.

3. The oxidizing-flue B, having terraces D D, the fire and air slots *b d*, and the fire-flue A', having deflectors *a*, combined and operating substantially as and for the purpose set forth.

IRA M. PHELPS.

Witnesses:

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SAML. M. GRICE.