H. G. LIVERMORE.

FURNACE FOR ROASTING ORES.

No. 181,083. Patented Aug. 15, 1876.

Fig. 1.

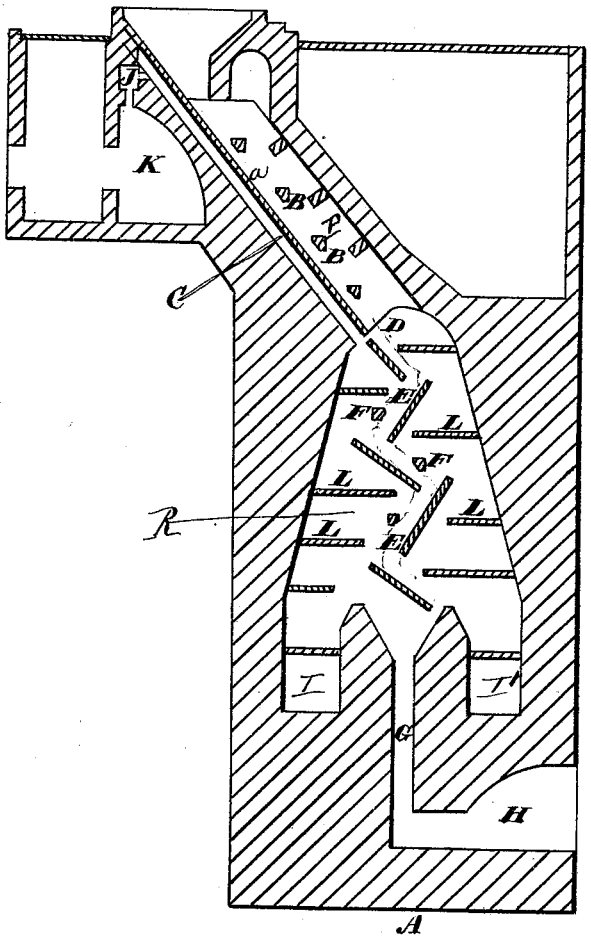
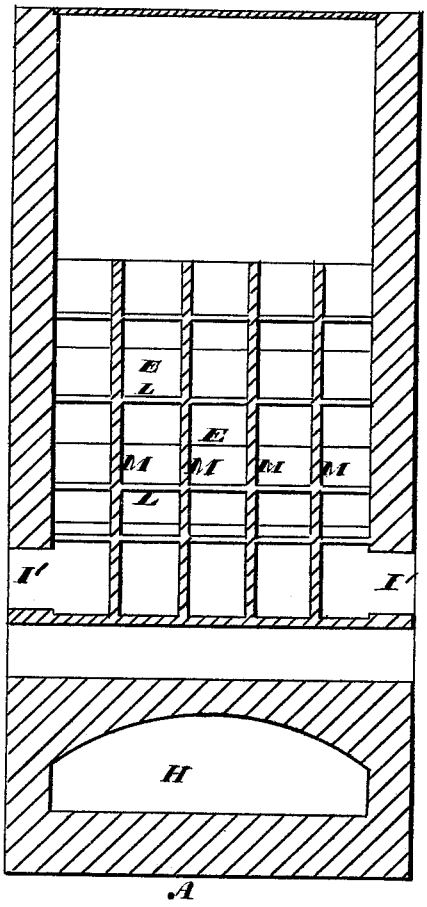


Fig. 2.



Witnesses

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UNITED STATES PATENT OFFICE.

HORATIO G. LIVERMORE, OF SAN FRANCISCO, CALIFORNIA.

IMPROVEMENT IN FURNACES FOR ROASTING ORES.

Specification forming part of Letters Patent No. **181,083**, dated August 15, 1876; application filed June 2, 1876.

To all whom it may concern:

Be it known that I, HORATIO G. LIVERMORE, of San Francisco city and county, State of California, have invented certain new and useful Improvements in Ore-Furnaces; and I do hereby declare the following description and accompanying drawings are sufficient to enable any person skilled in the art or science to which it most nearly appertains to make and use my said invention without further invention or experiment.

My invention relates to certain improvements in furnaces for roasting ores, said improvements being especially applicable to the furnace for which Letters Patent were issued to me November 9, 1875, and numbered 169,713.

My present improvements are intended to be used as a continuation of certain improvements for which I have recently filed an application for Letters Patent; and they consist, principally, in the continuation of the inclined ore-floors, these floors being carried alternately to the right and left down through a vertical stack, having vertical partition-walls corresponding with the divisions between the channels beneath the upper inclined floor. Fire-places extend through the lower part of this stack, so that the fire will pass up between the vertical partitions, and it is deflected so as to heat both the upper and lower surfaces of the ore as it passes over the floors. Passages from the waste-chamber (not shown) are carried up through the walls to utilize the heat and fumes, as in my former patent.

Referring to the accompanying drawings for a more complete explanation of my invention, Figure 1 is a vertical longitudinal section of my furnace. Fig. 2 is a vertical transverse section of my furnace.

A is my inclined furnace, which is built with an ore-floor having the interrupting-dams B above it, and the supplemental heating-chamber C beneath it, as shown in my other pending application. In the present case, instead of building the fire-place at the foot of the long incline, I continue the incline a short distance, as shown at D. Another inclined floor, E, receives the ore from the end of the floor D, and carries it beneath the first floor and in an opposite direction, as shown. From this floor it is delivered to a third floor, and thus the floors are continued alternately from side to side as they descend, until as many have been built as may be desired.

These floors may be provided with the interrupting dams or abutments F, in the same manner as shown at B, so that the ore will be allowed to flow in a thin sheet until it reaches the discharge-passage G, through which it passes to the waste-chamber H. The ore will thus move down the inclines as fast as it is withdrawn from the waste-chamber.

The fire-places I I′ are placed at each side of the discharge-passage G, and the heat from them passes up alternately beneath one floor and above the next, according to their inclination, until it reaches the upper one, when, owing to the inclination of floors E, the heat from the fire-places will pass partially above the floor *a*, and partially beneath it. The products from both fire-places will be conveyed, as in my former patent, to the fume-chamber J, and thence to the condensers K.

In order to deflect the heat so that it will pass close to the upper and lower surfaces of the floors, I employ deflecting-plates L, which extend from the walls of the furnace toward the lower end of each incline, as shown, and by this means I cause the heat to pass close to the floors. These plates are made removable, if desired, so as to allow the furnace to be easily cleaned.

The portion of the furnace which contains the zigzag inclined floors is divided vertically by walls M, which may be continuations of the diaphragms which separate the channels beneath the floor *a*. This arrangement divides the ore in the furnace, (which may be of considerable width,) so that it can be easily handled. The fire-places, however, extend entirely through from side to side, so that the heat passes from them directly into each space between the partitions, and thus all the ore will be equally heated directly from the fires.

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

1. The upper inclined chamber P, provided with the dams or ribs B, in combination with the vertical lower chamber R, provided with

the alternately-inclined floors D E, and abutments F, as set forth.

2. In combination with the ore-floors D E, inclined, as shown, the fire-places I I′, situated upon opposite sides of the furnace, and the deflecting-plates L, whereby the floors are heated alternately upon their upper and lower sides, substantially as herein described.

3. The plates or diaphragms L, extending from the walls toward the inclined floors E F, so as to deflect the heat upon both surfaces of these floors, substantially as herein described.

In witness whereof I have hereunto set my hand and seal.

HORATIO G. LIVERMORE. [L. S.]

Witnesses:

GEO. H. STRONG,

CHAS. G. PAGE.