H. J. HUTTNER & R. SCOTT.

ORE ROASTING FURNACE.

No. 183,934. Patented Oct. 31, 1876.

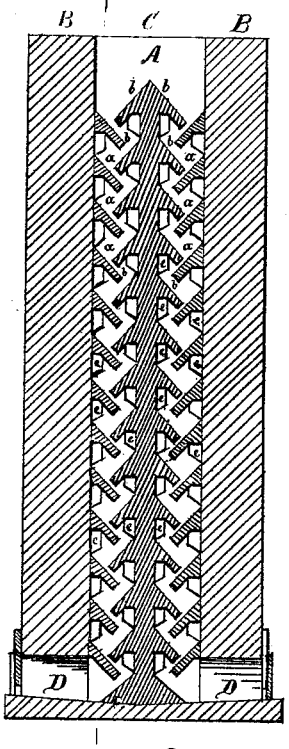

Fig. 2

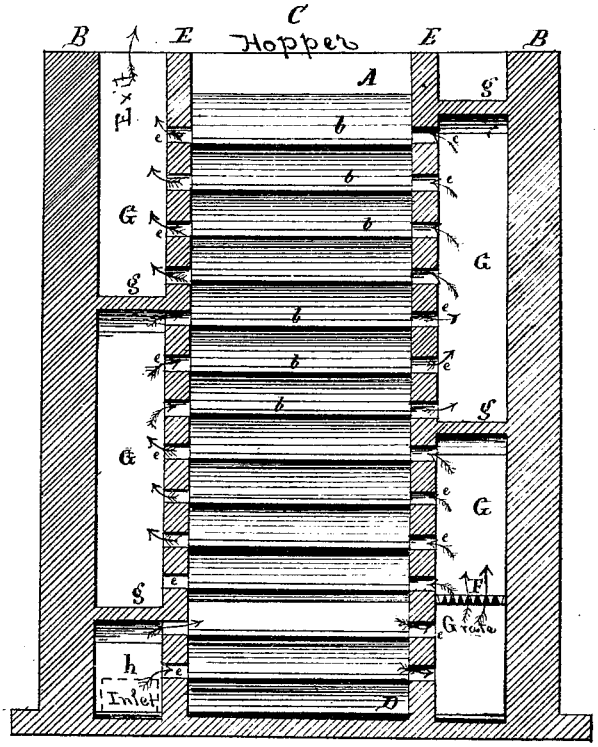

Fig. 1

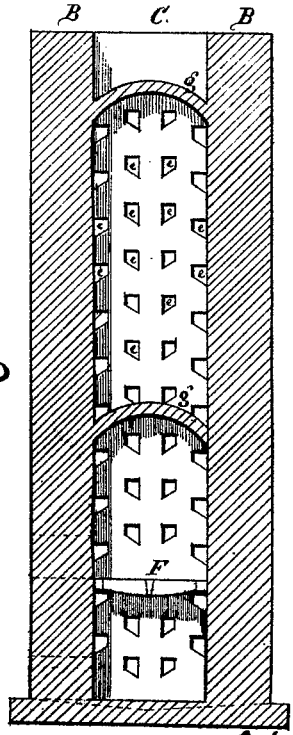

Fig. 3

Witnesses:
Edward Osborn
Alf Anthony

Inventors:
Robert Scott
Henry J. Huttner
By C. W. M. Smith Jr.

UNITED STATES PATENT OFFICE.

HENRY J. HUTTNER, OF SAN FRANCISCO, AND ROBERT SCOTT, OF NEW ALMADEN, CALIFORNIA; SAID SCOTT ASSIGNOR TO SAID HUTTNER.

IMPROVEMENT IN ORE-ROASTING FURNACES.

Specification forming part of Letters Patent No. **183,934**, dated October 31, 1876; application filed March 13, 1876.

To all whom it may concern:

Be it known that we, HENRY J. HUTTNER, of San Francisco, and ROBERT SCOTT, of New Almaden, both of the State of California, have invented an Improved Furnace and Process for Roasting and Desulphurizing the Ores of Quicksilver; and we do hereby declare that the following description and accompanying drawing are sufficient to enable any person skilled in the art or science to which it most nearly appertains to make and use our said invention and improvements without further invention or experiment.

Our invention relates to an improvement in the process and the construction of furnaces for roasting and desulphurizing the ores of quicksilver and other ores, and principally the finer quicksilver ores, known as "Tierras," differing greatly in size, and found from the grain of sand to pieces of two and three inches in diameter, without the necessity of stamping or screening the same; and it consists in a novel process, and in the construction of furnace, whereby the ore is fed regularly and by the force of gravity without the aid of mechanical means, and during its descent becomes roasted and burned, while the fresh or unburned ore is supplied from the hopper as fast as the roasted ore or slag is withdrawn from the bottom, a wall of ore thus being formed within the furnace with proper spaces or channels through it for the passage of the fumes and gases from the fire, as also the vapors and gases produced by the roasting of the ores; and, further, for the passage of heated air, as will be more fully described hereinafter.

The accompanying drawing shows, in Fig. 1, a vertical section of our furnace through M N in Fig. 2, with the front wall removed; Fig. 2, a vertical section through O P in Fig. 1. Fig. 3 represents a section of Fig. 1 on the line R S.

The sectional view in Fig. 2 of the drawing shows a space or chamber, A, between the walls B B of the furnace, with a series of inclined shelves, *b b*. The spaces or openings *a a* in A, between the shelves, communicate not only with each other, but also with the ore-hopper at C on the top of the furnace, and with the outlet D at the bottom of the same. The wall formed by the ore from the hopper C to the outlet D in its uniform descent, and filling the spaces between the shelves *b b* at their point of communication with each other, divides the space A into channels or compartments *a a*. These channels are connected with the chambers G G through openings *e e* in the end walls E E. (Shown in section in Fig. 1.) The chambers G G at either end of the ore-chamber A are divided by a series of partitions, *g g*, as shown in Figs. 1 and 3. *h* is an inlet for air, and F is a grate-surface for combustion of the fuel. Now, therefore, the air which enters at the inlet *h* is guided over the cooling ore, through and over the grate-surface F, where it mingles with the heat, flames, and gases from the fuel used, and then enters the lower chamber G on the right-hand side of the furnace, passes then through the openings *e e* in the right-hand wall E, over and under the ore which rests on the shelves *b b*, enters then, together with the gases, vapors, and fumes arising from the heating and roasting of the ore, into the lower chamber G on the left-hand side of the furnace; then rises to the upper part of this chamber G; then is led back through the upper openings *e e* in said chamber, over the shelves *b b* to the right-hand side of the furnace, into the second chamber G on that side; and in this manner all the heated air, vapor, gases, and fumes pursue a curved path back and forth, and upward from one side of the furnace to the other, over the inclined shelves *b b* to the top of the furnace, where the products from the roasting of the ores are conducted into proper condensers.

The arrangements of these channels—formed partly by the inclined shelves *b b* and partly by the wall of ore in its descent over the same, allowing the heated air to pass over and to come in intimate contact with the ore in process of roasting—are shown in Fig. 2 of the drawing.

Proper outlets for the removal of the burned ore are provided at the bottom of the ore-chamber.

The shelves *b b*, placed lower than the grate-surface F, as seen in Fig. 1, serve for the cooling of the roasted ore.

Atmospheric air is admitted only at *h*, and is then guided over the already-roasted ore into the fire-place. By this means not only the heat which is contained in the burned ore is made useful, but, if any metallic fumes should remain in the roasted ore, they are carried back into the furnace, thereby avoiding all possible loss.

Grate-surface and ash-pits are arranged in connection with the two sets of ore-chambers A.

Our improved furnace operates to sustain a column of ore to be roasted in such a manner that it remains always in place, and forms a wall or column that gravitates downward over and upon the inclined shelves *b b* as often as the burned ore is drawn from the outlet at the bottom, and a new supply of unburned ore is fed down to supply the place of that withdrawn. A constant supply of ore is thus kept up in the ore-chamber without the aid of mechanical means; yet the ore does not fall in a shower, but is held to receive the action of the flames and heated air in a stationary position upon the inclined shelves, and in a mass or wall, as it were, that moves downward as the burned portion at the bottom is withdrawn.

The position of the shelves *b b* is such, as seen in Fig. 2, that each shelf forms the roof of the chamber immediately underneath it, and therefore becomes heated from the flames, gases, and vapors passing through said chamber, and communicates this heat to the ore placed on its upper surface, securing thereby not only the roasting of the ore from its surface, but also allowing the heat to pass through it in the manner described.

The furnace is further provided with an ore-hopper and condensers of ordinary construction, and it can be made not only of any suitable height, but can also be put up with a single chamber, A, or double chamber A, as shown in the drawing; or, on account of its peculiar construction, two furnaces with two double ore-chambers, A, can be put up in juxtaposition, and connect in the middle by a flue common to both, for the outlet of the fumes into the condensers, saving thereby a great expense in construction, as the building of two heavy outside walls is done away with, and, instead, only a thin partition-wall will be required to divide the chambers G of the two furnaces.

Having thus fully described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. The process of roasting and desulphurizing the ores of quicksilver, which consists in passing currents of air through the lower part of a wall or column of roasted and cooling ore, to reduce the temperature of the same and to take up any remaining fumes, and then passing the air, in a highly-heated condition, from side to side through the upper parts of the said wall or column, to roast and desulphurize the said ore, substantially as described.

2. An ore-roasting furnace, consisting of a central chamber, A, provided with a series of inclined shelves, *a b*, side flues or chambers G, divided by the alternating partitions *g*, fire-grate F, and air-inlet *h*, the arrangement of these several parts being such that the entering air-current is made to pass through a body of calcined and cooling ore, thence through the fire-grate, and, finally, to and fro across the furnace with the products of combustion, and through the roasting ore, substantially as shown and described.

In witness whereof we have hereunto set our hands and seals this 31st day of January, A. D. 1876.

HENRY J. HUTTNER. [L. S.]
ROBERT SCOTT. [L. S.]

Witnesses:
RALPH LOWE,
RICHARD TURNER.