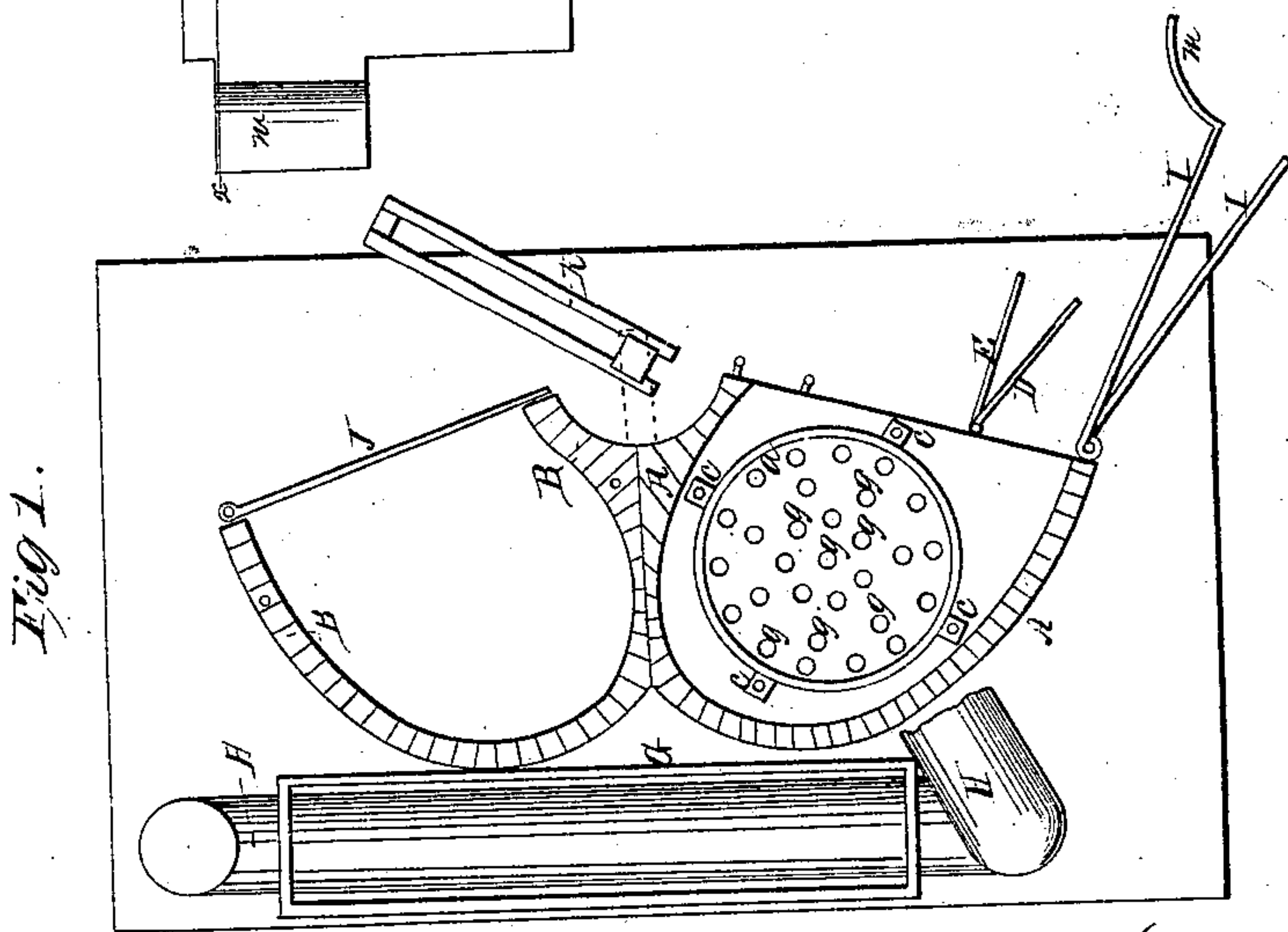
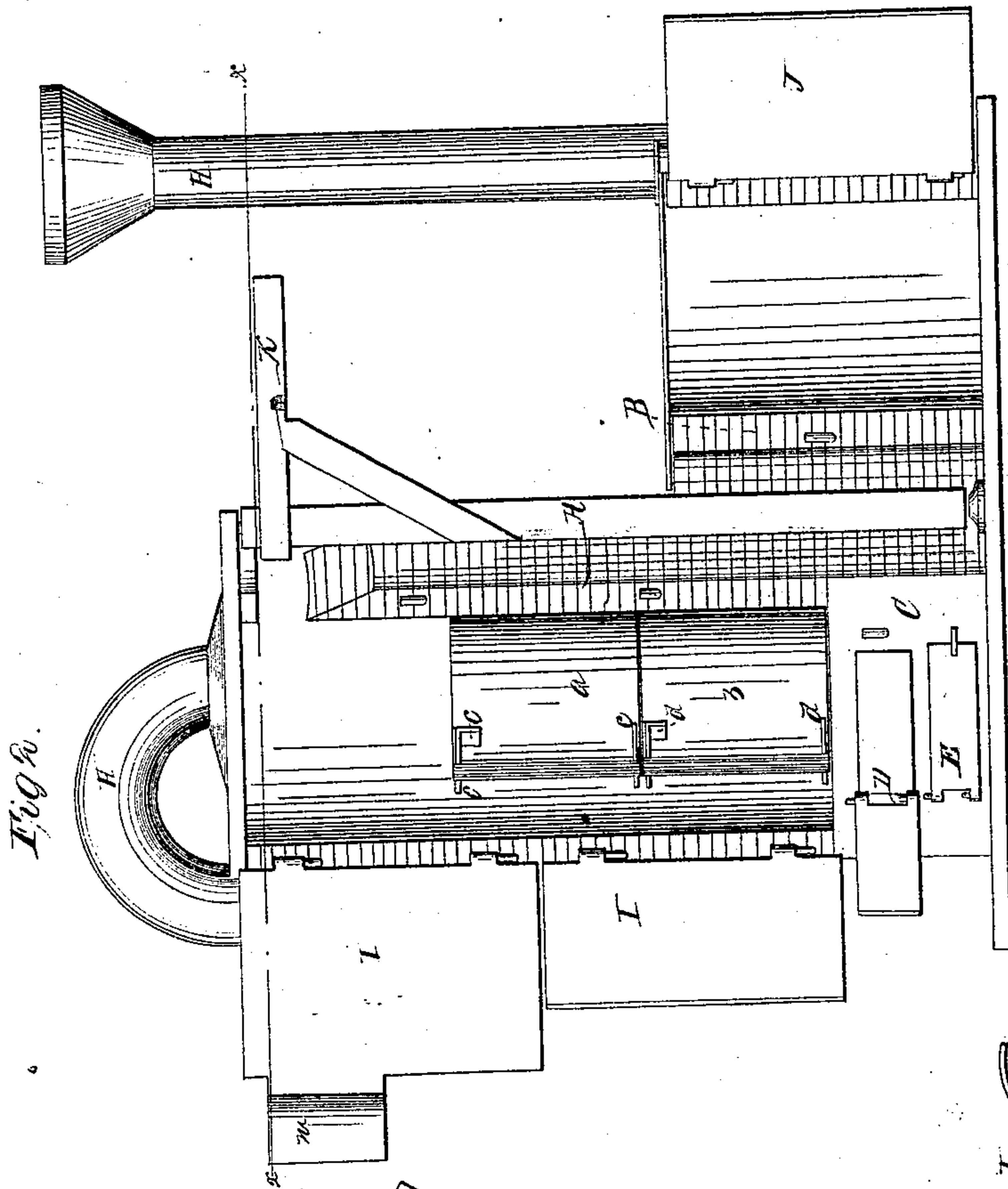


*H. Goulding,
Roasting Dreg.*

N^o 70,995.

Patented Nov. 19, 1867.



*Witnesses.
Cyrus Smith
Geo A. Manta*

*Inventor
Henry Goulding
By his Atty's Derry & Co.*

United States Patent Office.

HENRY GOULDING, OF SILVER CITY, NEVADA.

Letters Patent No. 70,995, dated November 19, 1867.

IMPROVEMENT IN FURNACES FOR ROASTING ORES.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that I, HENRY GOULDING, of Silver City, county of Lyon, State of Nevada, have invented certain new and useful Improvements in Furnaces for Roasting Ores; 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 or improvements without further invention or experiment.

The nature of my invention is to provide a furnace for roasting ores containing the precious metals, and consists in placing the ore, pulp, or tailing, in a plastic or wet state, in cylindrical moulds, having vertical pipes or plugs through them, which form flues for the heat and flames of the furnace to pass up through, which roasts and dries the ore, rendering it fit for easy amalgamation. The bases of the moulds are provided with plates, either separate or attached to them, and are furnished with lugs with which to raise or lower the moulds, changing their position from top to bottom of the furnace, or transferring them to a cooler placed at one side of the furnace by means of a crane. The object of the cooler is for the purpose of utilizing the waste heat, and when the lower mould in the furnace becomes sufficiently roasted it is removed by means of the crane into the cooler, and a freshly-filled mould or moulds are placed upon it, so that it may become partially dry before being placed in the furnace. A pipe is placed at the top of the furnace for conducting away the gases and volatile matter from the ore, which passes through a horizontal water-tank, which condenses the volatile parts, and saves the quicksilver, as in case of working tailings.

To more fully illustrate and describe my invention, reference is had to the accompanying drawings and letters marked thereon, of which—

Figure 1 is a horizontal section, taken through the line *x x*.

Figure 2, a front elevation.

Similar letters indicate like parts in each of the figures.

A and B represent the brick-work of my furnace and cooler, C the iron front, D the fire-door, and E the ash-door. The furnace has a round hole above the fire-grate, of the size of the inner circumference of the cylinders or moulds. The grate-bars are similar to those of any furnace, and wood, coal, or any good fuel, may be used. The moulds or chambers *a b* are each provided with lugs, *c* and *d*, at the top and bottom, for the purpose of connecting them together in withdrawing from the furnace. Also, the base of each chamber is furnished with a plate, either separate or attached to the chamber, which is perforated with the holes *g g*. These holes are provided with plugs, to be withdrawn after the chambers are filled with ore or have become partially dry. If the ore is soft and pulpy by reason of containing much water, tubes may be employed instead of plugs, and be withdrawn after it has become sufficiently dry to stand. By this means flues are obtained, so that the heat and flame may pass through them. The inner surface of the chambers may be luted, so as to prevent corrosion or decomposition, but the outer surface, not coming in contact with the gases, need not be luted. The smoke pipe or flue H, at the top of the furnace, is carried down on a plane with the foundation of the furnace, and passes through a water-tank, G, for condensing the volatile substance, more especially quicksilver. At the right of the furnace is constructed a cooler, B, with a door, J, the top being covered by a movable plate. In this cooler are placed the moulds, after the ore has become sufficiently roasted in the furnace, by means of the crane K, provided with the necessary chains and pulleys, and attached to a winch and cross, that may be easily connected to the four lugs on the upper edge of the moulds. The doors I are for the purpose of closing the furnace, and the upper one should have a flap, *m*, to allow the crane to swing over the centre of the moulds.

The operation may be described as follows, to wit: Say three moulds or chambers, having been filled with the ore, and so dried as to admit of withdrawing the plugs, are placed on the plate in the furnace, in which a fire has been kindled, and when the mould next the fire-grate has become sufficiently roasted, or brought to a red heat, the three are transferred, by means of the crane, to the cooler, where the lower one, after having been disengaged, is left, and the other two returned to the furnace, which brings mould No. 2 into more immediate contact with the flame; and to fill the space occupied by No. 3, a freshly-filled mould is raised to the top, and so on, as fast as the lower one has become sufficiently roasted and removed, another one may be placed on the

top. The plugs from the freshly-filled ones so placed need not be drawn until the ore has become nearly dry, or of sufficient consistency that the flues will remain entire.

If slum or thin pulp is to be treated, tubes will be found much better than plugs, but they should be withdrawn as soon as the ore around them becomes hard enough to form the flue without their support, as decomposition will take place by the action of the gases coming in contact with the iron.

To facilitate the operation of drying and utilize the waste heat, I place a freshly-filled mould upon the top of the one which has been recently removed from the furnace to the cooler. By this means a mould will become nearly or completely dry, so that the plugs or tubes may be withdrawn before transporting it to the furnace; and as each mould or chamber becomes cool, the ore may be emptied, and easily disintegrated or slackened, and ready to be amalgamated.

I am well aware that ores have been formed into bricks and dried, after which they are roasted, after the manner of burning brick; but great disadvantages must occur by this mode of treatment, the principal ones of which are, first, the great expense of making and drying the brick sufficiently to lay them up in a kiln for roasting; second, the difficulty of sufficiently roasting the bricks farthest from the fire without vitrifying those nearest to it, causing great labor before the ore can be properly prepared again for amalgamation; also, in working tailings, the quicksilver is all lost, and to carry on the brick process a large amount of space is required, and a great quantity of ore must be at hand, as well as the necessity of having propitious weather. But by my process and furnace I am enabled equally well to treat the soft or clayey ore, which all mill-men know to be the richest, and most difficult to work by the present known processes; also, by my process, the quicksilver is saved when working tailings or other ores.

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

1. The roasting of ores in moulds or chambers, substantially as described.
2. The arrangement of moulds containing ores to be roasted, so that they can be gradually brought nearer the fire or removed from it, substantially as described.
3. Removing the moulds containing ores from the fire while undergoing the process, so that the decomposition may be conducted without additional heat, substantially as described.
4. The placing of a freshly-filled mould containing unroasted ore upon the top of a mould that has been removed from the fire, for the purpose of utilizing the excess of heat, substantially as described.
5. The arrangement of furnace, cooler, and crane, as described, for the purpose described.
6. The conducting of the flue through water, or its equivalent, for the purpose of condensing the volatile matter, when used in connection with ores roasted in moulds, substantially as described.

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

HENRY GOULDING. [L. s.]

Witnesses:

JNO. W. GRIER,
ALFRED HONER.