

J. H. BOYD.
Furnaces for Reducing the Ores and Extracting
the Precious Metals.
 No. 144,186. Patented Nov. 4, 1873.

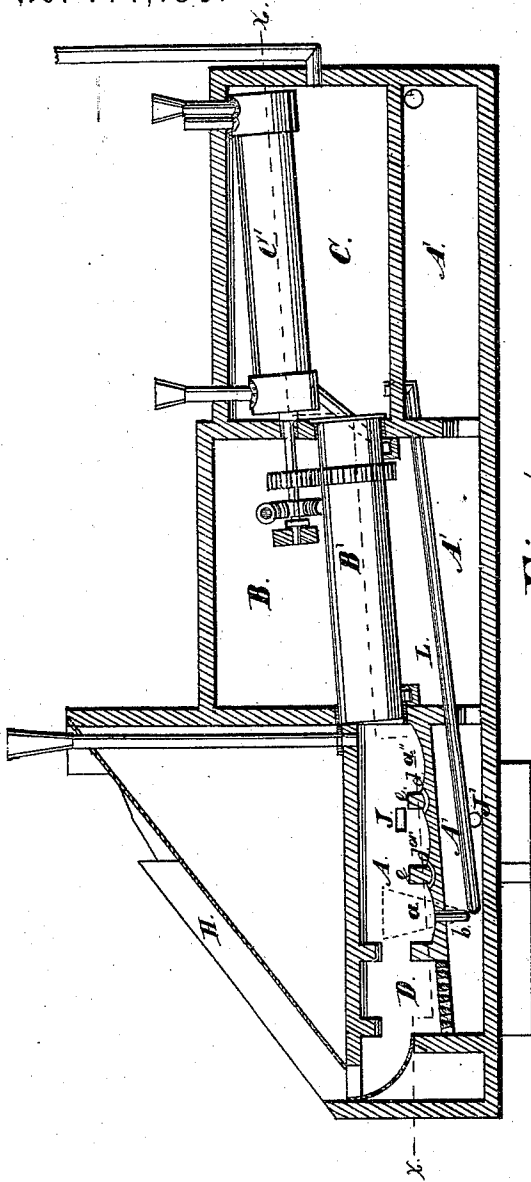


Fig. 1.

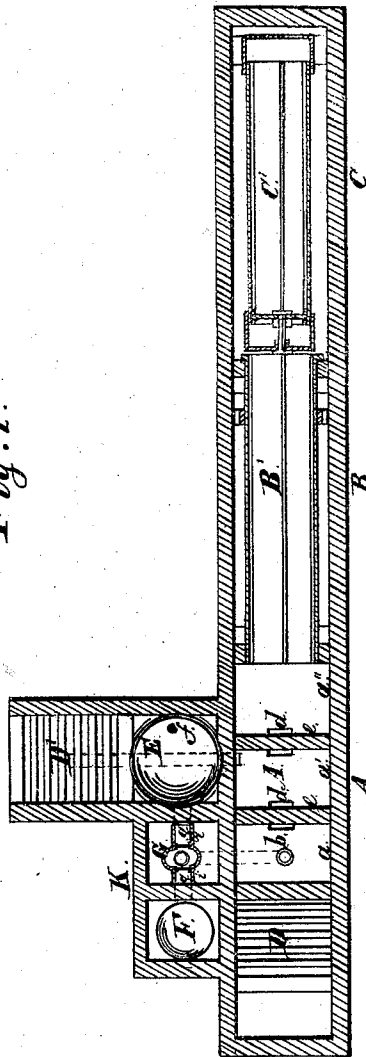


Fig. 2.

Witnesses:

Heinrich F. Bruns.
J. L. Rockey.

Inventor:

James H. Boyd
 by *his attys*
Coburn & Murray

J. H. BOYD.
Furnaces for Reducing the Ores and Extracting
the Precious Metals.
 No. 144,186. Patented Nov. 4, 1873.

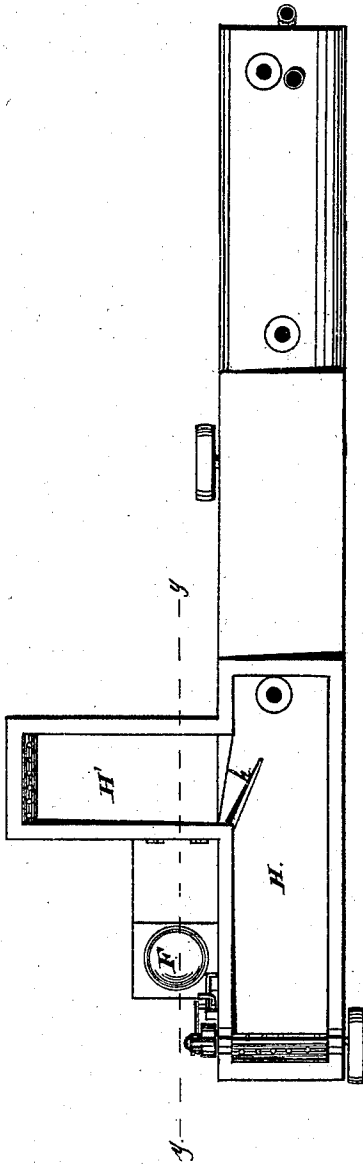


Fig. 3.

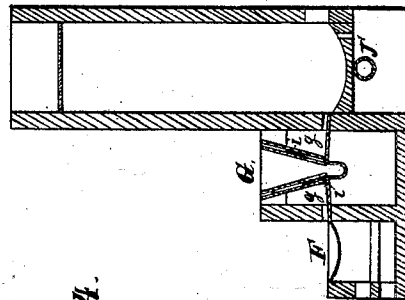


Fig. 5.

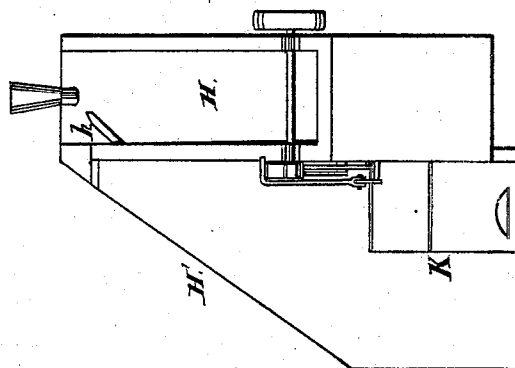


Fig. 4.

Witnesses:

Heinrich F. Bruns.
J. L. Rocky.

Inventor:

James H. Boyd
 by his attys.
Coburn & Lundberg

UNITED STATES PATENT OFFICE.

JAMES H. BOYD, OF CHICAGO, ILLINOIS.

IMPROVEMENT IN FURNACES FOR REDUCING THE ORES AND EXTRACTING THE PRECIOUS METALS.

Specification forming part of Letters Patent No. **144,186**, dated November 4, 1873; application filed October 14, 1873.

CASE C.

To all whom it may concern:

Be it known that I, JAMES H. BOYD, of Chicago, in the county of Cook and State of Illinois, have invented certain Improvements in Furnaces for Treating Ores Containing the Precious Metals, of which the following is a specification:

This invention relates to a furnace for treating ores containing the precious metals; and it consists of a reducing-furnace in which the ore is first desulphurized, then roasted, and then reduced to a liquid state, in combination with a cupelling-furnace, so arranged relatively thereto that the bullion from the reducing-hearth may flow while still hot, through an overflow-pot, into the cupelling-furnace, whereby the reheating and handling of the metal is saved; and it consists, further, in joining the two furnaces together in such manner that the waste heat and products of combustion from the cupelling-furnace shall pass directly into the reducing-hearth, and be there utilized in the conversion of the ore, in connection with air-pipes so arranged that the grate of the cupelling-furnace shall be supplied with air from the warm-air space below the reducing-hearth; and it further consists of the combination, with the reducing and cupelling furnaces so arranged, of an overflow-pot connected with the reducing-hearth and made with outlets, which may be bridged or heightened by a sliding gate, one at each side, leading into the cupelling-furnace upon the one side, and into a warming or waste pot upon the other, whereby the bullion may be removed from the reducing-hearth to the cupelling-furnace, or simply withdrawn into the waste-pot, to be treated in some other way than by cupellation; and it further consists of the combination, with the reducing and cupelling furnaces, of a double-inclined feedway, consisting of two inclined ways, leading from each of the fire-places up to a common apex or center, at which point the fuel, consisting, usually, of coal, is fed to both furnaces at the same time, the size of the ways and position of a division-board affording a means of governing the relative amount fed to each furnace, all of which will be more fully hereinafter explained.

In the accompanying drawing, which forms a part of this specification, Figure 1 represents a longitudinal vertical section of the reducing-furnace. Fig. 2 is a horizontal section of the two furnaces on the line *xx* of Fig. 1. Fig. 3 is a top or plan view of the combined furnaces. Fig. 4 is an end elevation of the same, and Fig. 5 is a section on the line *yy* of Fig. 3.

Like letters of reference made use of in the several figures indicate like parts wherever used.

In the said drawings, A represents the reducing-chamber, provided with several hearths, *a a' a''*, separated from each other by the bridge-walls *e*, and placed in communication, so that the liquid metal or mat may flow from one to the other by means of the ducts *d*. B and C are chambers in connection with the reducing-chamber, wherein the ore is treated in cylinders B' C', preparatory to being treated in the hearths *a a' a''*. It is not necessary to a full understanding of this invention to particularly describe said chambers B C and cylinders B' C', as they only form a part of the entire reducing-furnace, and are sufficiently illustrated in the drawings. D is the fire-grate of the reducing-furnace, located at the end of the series of hearths *a a' a''*. E is a cupelling hearth or furnace, placed contiguous to the reducing-furnace, as shown in the drawing. This cupelling-furnace is of the ordinary construction, being provided with doors, (not shown in the drawing,) opening to the outside, to give access to the interior, and fitted with a fire-grate, D', and the aperture *f*, for the discharge of litharge. The exit-flue J of this hearth and furnace opens or discharges directly into the reducing-chamber A, whereby the waste heat from the cupellation is saved and applied to the reducing of the ore. The pure air to supply the grate D' of the cupelling-furnace is drawn, by means of the pipe J', from the warm-air space A', which underlies the whole of the reducing apparatus, by which means the heat of this warm-air space is saved. This same warm-air space supplies the air for the grate D of the reducing-furnace. G is an overflow-pot, surrounded by a suitable warming-furnace, K, and connected by the pipe *b* to a vent-hole

in the lowest part of the lowest of the reducing-hearths *a*. This overflow-pot is made with two sliding gates or outlets, *i i*, one leading to the cupelling-hearth *E*, and one to a waste-caldron or warming-pot, *F*, by the two ways *g g*, whereby the bullion from the reducing-hearth may be caused to flow, at pleasure, either into the cupelling-furnace or into the waste or warming caldron. The exit-flue of the warming-furnace *K* is shown at *L*, a pipe leading into the draft of the reducing-furnace. Above the reducing-chamber *A* is made the inclined feedway *H*, which is warmed through its metal flooring by the waste heat arising from the reducing-chamber, whereby the coal for the grate *D* is warmed before being fed to the fire. Above the cupelling-furnace is located a similar inclined feedway, *H'*, emptying into the grate *D'*. This feedway is warmed in like manner by the waste heat arising from the cupelling-furnace. These two inclined feedways unite at their highest part, so that they may both be supplied with coal at the same time at a single point. The division-board *h* affords a means of regulating the relative amount of fuel fed to each furnace.

An elevating device (not shown in the drawing) may be employed to deliver the coal upon the junctional apex of the feedways, while any mechanical feeding apparatus may be placed at the emptying of the feedways into the grates, to govern the speed of the flow.

Having thus fully described my invention,

what I claim as new, and desire to secure by Letters Patent, is—

1. The combination and arrangement of the reducing-furnace *A B C D* and the cupelling-furnace *E D'* with the overflow-pot *G*, the exit-flue *J* from the cupelling-furnace being located to open into the reducing-chamber, and with or without the warm-air pipe *J'*, arranged to draw the air-supply for the grate of the cupelling-furnace from an air-space, *A'*, warmed by the waste heat of the reducing-furnace, whereby the bullion may pass, while still hot, from one furnace to the other, and the waste heat of both furnaces may be utilized, substantially as specified.

2. The overflow-pot *G*, fitted with the slides *i i* and ways or spouts *g g*, in combination with the reducing-furnace, cupelling-furnace, and receiving-pot *F*, substantially as specified.

3. The combination and arrangement of the two inclined feedways *H H'*, provided with the division-ridge *h*, with the grates *D D'*, substantially as and for the purpose specified.

4. The combination and arrangement of the reducing-furnace and cupelling-furnace, conjoined and arranged substantially as specified, that the bullion may be drawn, while still hot, from the reducing-chamber directly into the cupelling-furnace, to save reheating the bullion for cupellation.

Witnesses:

JAMES H. BOYD.

JOHN W. MUNDAY,

HEINRICH F. BRUNS.