

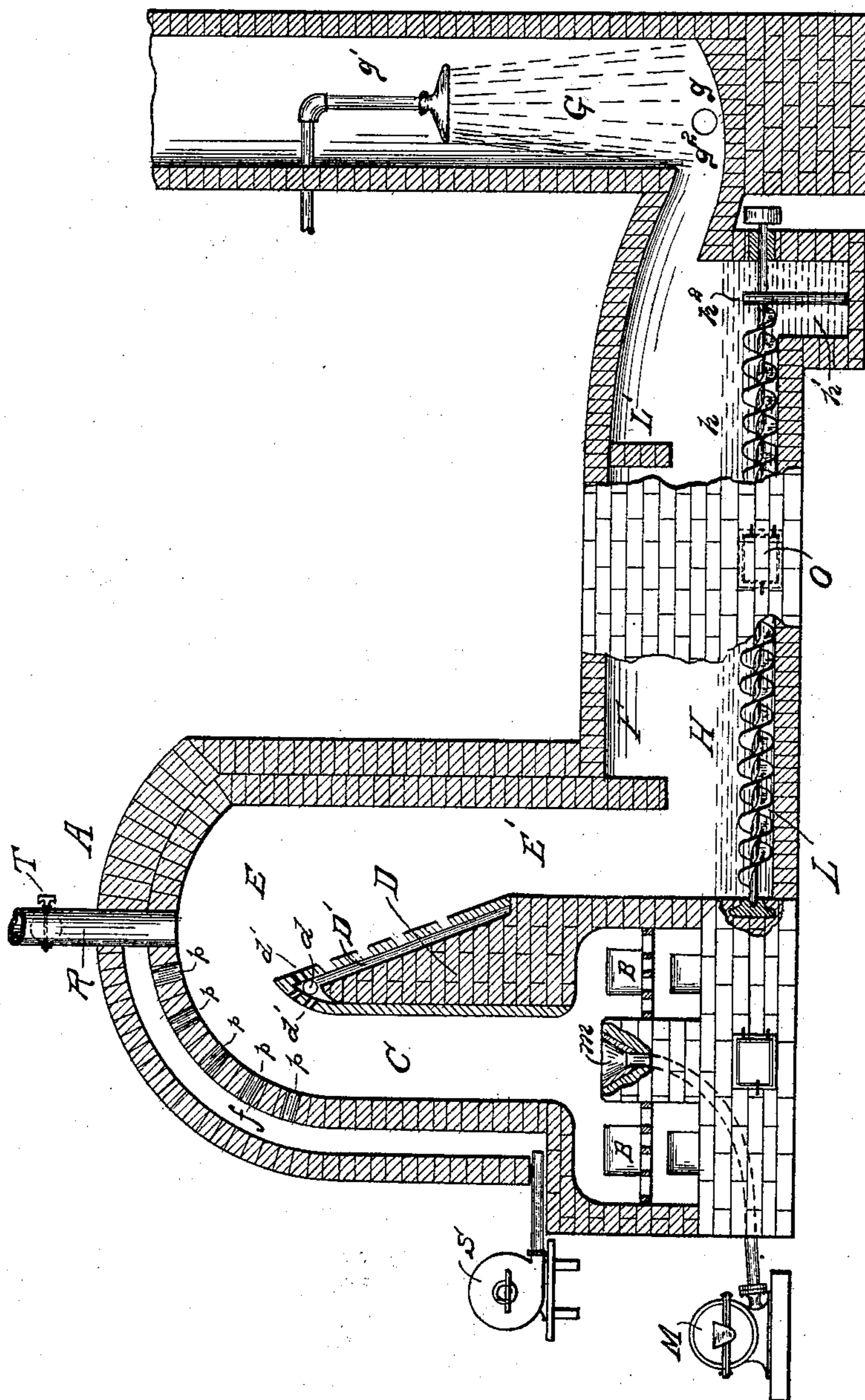
No. 613,828.

Patented Nov. 8, 1898.

J. J. STORER, F. MARTIN & G. O. EATON.
FURNACE FOR TREATING ORES.

(Application filed June 23, 1897.)

(No Model.)



WITNESSES:

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UNITED STATES PATENT OFFICE.

JACOB J. STORER, OF NEWTON, AND FRANK MARTIN, OF BOSTON, MASSACHUSETTS, AND GEORGE O. EATON, OF NEW YORK, N. Y., ASSIGNORS TO THE UNITED MILL AND FURNACE COMPANY, OF MONTANA.

FURNACE FOR TREATING ORES.

SPECIFICATION forming part of Letters Patent No. 613,828, dated November 8, 1898.

Application filed June 23, 1897. Serial No. 642,003. (No model.)

To all whom it may concern:

Be it known that we, JACOB J. STORER, residing at Newton, county of Middlesex, and FRANK MARTIN, residing at Boston, county of Suffolk, State of Massachusetts, and GEORGE O. EATON, residing at New York, county of New York, and State of New York, citizens of the United States, have invented a furnace for treating certain ores preparatory to obtaining contained metals therefrom by subsequent processes and apparatus, of which the following is a specification.

The object of the invention is to provide an improved furnace especially adapted for the preliminary treatment of ores containing the more valuable metals—such as, for instance, gold and silver—though it is applicable to other ores.

The accompanying drawings show a partly-sectional elevation of our improved furnace.

In the drawing, A represents the furnace, constructed with opposite fireplaces B B in the base thereof whose throats open into a flue which is vertical for a short distance, as shown at C, and then is curved over a partition-wall D and at that point is expanded into a large gas mingling and combustion chamber, and then is gradually contracted and carried perpendicularly down, as shown at E', to communicate with a horizontal flue F, at the further end of which is a communicating smoke-stack G.

In the partition-wall D is an air-chamber D', into which air may be admitted through an opening *d*, and the inclined faces of said wall are provided with numerous perforations *d'*, communicating with said chamber D' and opening into chamber E. The wall of the vertical flue C is also constructed with an air-space *f*, which communicates with flue C through several perforations *p*, so that, if desired, air injected by a fan-blower S into space *f* may be made to impinge upon the air-borne column of ore moving up said flue C.

In the top of the chamber E is a smoke-pipe R, provided with a damper T. When the fires are started in the fireplaces, this damper is opened and kept so until the flue C is sufficiently heated for beginning the intro-

duction of the ore into the furnace, the smoke and gases from the said fires passing out of the said smoke-pipe R; but as soon as the introduction of the ore commences said damper T is closed and the smoke-stack G creates the necessary draft.

The bottom of the horizontal flue F is formed by an ore receiver or tank H, extending from the furnace-base nearly to the smoke-stack. This receiver or tank is designed, when a certain class of ores is to be operated upon, to be filled, up to the dotted line *h*, with water alone or with water holding suitable chemicals in solution, making thereby a water-hearth to the furnace. In the farther end of the tank is a well *h'*, and arranged longitudinally in said tank is a screw conveyer L, and one or more deflecting-walls L' are arranged in said horizontal flue above the tank. The bottom of the smoke-stack is preferably bowl-shaped, as shown at *g*, and a rose jet or sprinkler *g'* is fixed in the upper part of said stack.

M represents a suitable machine—such as a fan-blower, for instance—for forcing the finely-pulverized ore which may be fed into it into the furnace on a current of air, or the machine may be such as will pulverize and introduce the ore.

In working certain ores for obtaining chlorides of the metals the operation is as follows, viz: The tank is filled with water to the dotted line shown at *h* and free chlorine, chlorid of lime, or chlorid of sodium is introduced therein. Fires are then made in the fireplaces B B and urged until the flue portion C is sufficiently hot, the damper T in smoke-pipe R being kept open during this period. Then the said damper is closed and the finely-pulverized ore is introduced into the machine M and air also admitted therein, and together and intermingled the ore and air are forced through the pipe *m* of the machine M up between the fireplaces axially into the vertical portion of said flue, where the sulfur and other oxidizable elements of the ore ignite. The ascending column of ignited ore when in the upper part of flue C and as it turns over the partition-wall D may be attacked by

jets of air issuing from the air-chambers f and D' through the perforations p and d' on that side, a branch pipe (not shown) from blower S furnishing the necessary air through the opening d . The ore-column then passes into the expanded portion of the flue—the gas mixing and combustion chamber E —and there is supplied with more air from the perforations d' on that side, and in this chamber E the gases and air have ample room for expansion, intimate mingling and complete combustion, and for the oxidation of all oxidizable elements, and thence the non-volatile constituents of the ore—*i. e.*, most of the metallic oxids, the earthy matters, and the non-oxidizable metals—fall directly into the water or bath in the tank, while the sulfur and other gases and fumes, together with a small portion of the finest ore-dust, pass on to the smoke-stack, where they are wetted down by water from the sprinkler and fall into the bottom of the stack, whence they may be removed for subsequent use or treatment through a suitable opening g^2 .

The deflecting wall or walls L' serve to arrest and deflect a considerable portion of the escaping dust down into the bath in the tank, so that but little passes on to the stack.

If the ore be a pyritic ore and chlorid of lime or sodium be in the bath, the sulfur-gases wetted down in the stack may be constantly conducted therefrom into the tank, where, combining with the bases, they form sulfates of lime or sodium, as the case may be, and liberate the chlorin to combine with the gold or other metals. If, however, the ore does not contain sufficient sulfur for this purpose of liberating enough chlorin from its base or bases, a suitable quantity of sulfuric acid may be introduced into the tank to effect the desired reactions.

If free chlorin be in solution in the bath, no sulfurous or other reagent is required to be introduced therein.

As the work progresses the screw conveyer constantly agitates the pulp and solution and pushes the former into the well h' , whence it, together with some of the solution, is constantly being removed by a steam-siphon h^2 or other convenient device.

The water-level in the tank may be constantly maintained by a supply from any available source.

It will be seen that the fine particles of ore injected into the furnace can lodge nowhere therein excepting in the tank, for the air-jets issuing through the perforations in the inclined faces of the partition-wall prevent any lodgment thereon.

When operating upon certain other ores, water alone or water with any desired chemicals in solution may constitute the bath in the furnace, or the water or chemical solutions may be dispensed with and the dry hearth be used, in which latter case the screw conveyer L , siphon h^2 , and well h' may also be dis-

pensed with, and the oxidized ore, falling on the tank-hearth, may be removed by suitable tools through convenient openings or doors, one of which is indicated at O .

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

1. A furnace for treating ore constructed substantially as herein shown, comprising a vertical uptake-flue, fireplaces at the base of said vertical uptake-flue and communicating therewith, means for introducing ore above said fireplaces, a vertical downtake-flue substantially parallel with said uptake-flue, an enlarged flue section or chamber having its inner wall provided with an inclined face, and connecting the uptake and downtake flues at their tops, a chambered division-wall between the uptake and downtake flues, having means for the reception and distribution of air into said enlarged chamber, and a covered ore-receiver or water-tank, communicating with the bottom of said vertical downtake, and leading to a smoke-stack, substantially as described.

2. A furnace for treating ores, constructed substantially as herein shown and described, comprising a vertical uptake-flue, fireplaces at the base of said vertical uptake-flue and communicating therewith, means for introducing finely-perforated ore between said fireplaces, a vertical downtake-flue, an enlarged flue-section having its inner walls provided with an inclined face and connecting the uptake and downtake flues at their tops, a chambered division-wall between the uptake and downtake flues, having means for the reception of air and distribution of the same into said enlarged chamber, a covered receiver or water-tank communicating with the bottom of said vertical downtake, a smoke-stack at the opposite end of said tank, and means in said tank for wetting down dust and fumes, substantially as described.

3. An apparatus for treating ore consisting of a furnace comprising a vertical uptake-flue C , a vertical downtake-flue E' , an intermediate, enlarged, gas combustion and exhaustion chamber E , a partition-wall between flues C and E' , air-chambers in said wall communicating with the uptake C and chamber E through perforations in the faces of the partition-wall, fireplaces at the bottom of flue C with throats opening thereinto, a smoke-stack, a water-tank or ore-receiver between said flue E' and the stack, a revolving screw conveyer in said tank and means for continuously removing the contents of said tank, means for wetting down the gases, dust and fumes passing into the stack, and means for introducing above the fireplaces finely-pulverized ore on a current of air into and through the furnace, all constructed and arranged substantially as and for the purpose set forth.

4. A furnace for treating ores, comprising a vertical uptake-flue, a downtake-flue sub-

stantially parallel with the uptake, an enlarged chamber having its inner wall provided with an inclined face and connecting the two flues at their tops, a partition-wall
5 having an inclined face between said flues, an air-chamber in the inclined face of the wall communicating with the flues, means for driving air through said wall-face into the flue C and chamber E, fireplaces at the bottom of
10 the vertical uptake-flue with throats opening thereinto, a smoke-stack, a device in said stack for wetting down dust and gases, a horizontal flue connecting the downtake-flue with the smoke-stack and a tank or ore-receiver in
15 the bottom of said horizontal flue, all con-

structed and arranged substantially as shown and described.

In testimony that we claim the foregoing we have hereunto set our hands, in the presence of two witnesses, this 26th day of May, 1897. 20

JACOB J. STORER.

FRANK MARTIN.

GEORGE O. EATON.

Witnesses to signatures of Jacob J. Storer and Frank Martin:

GEORGE G. KELLOGG,

THOMAS L. NELSON.

Witnesses to signature of George O. Eaton:

H. H. FITZ,

E. L. PERKINS.