

No. 610,917.

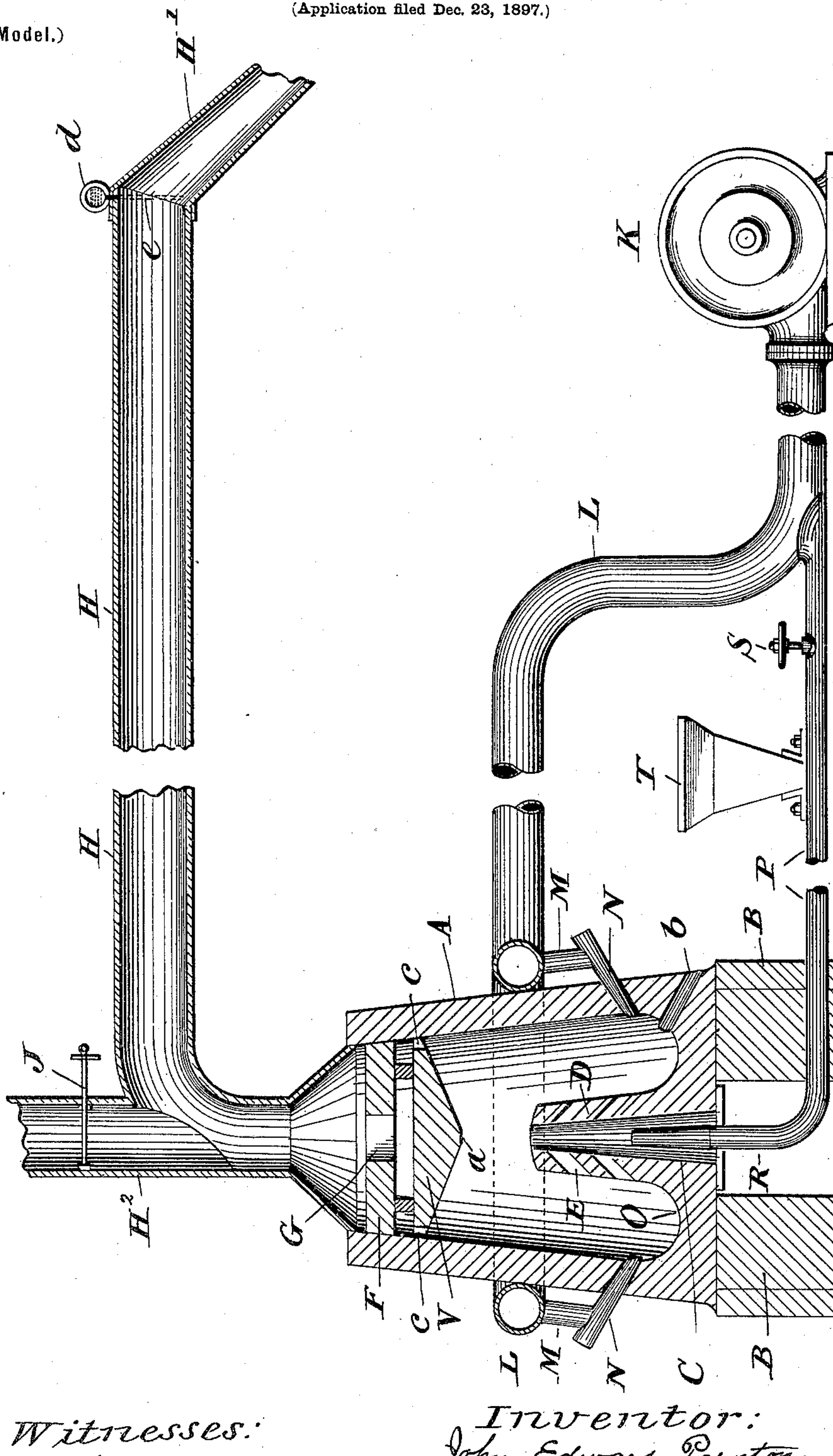
Patented Sept. 20, 1898.

J. E. PRESTON.

APPARATUS FOR TREATING REFRACTORY ORES.

(Application filed Dec. 23, 1897.)

(No Model.)



Witnesses:

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UNITED STATES PATENT OFFICE.

JOHN EDWARD PRESTON, OF LONDON, ENGLAND.

APPARATUS FOR TREATING REFRACTORY ORES.

SPECIFICATION forming part of Letters Patent No. 610,917, dated September 20, 1898.

Application filed December 23, 1897. Serial No. 663,245. (No model.) Patented in England March 8, 1897, No. 6,051.

To all whom it may concern:

Be it known that I, JOHN EDWARD PRESTON, engineer, a subject of Her Majesty the Queen of Great Britain, residing at 8 Burton road, Brixton, in the city of London, S. W., England, have invented certain new and useful Improvements in an Apparatus for Treating Refractory Ores, (for which I have secured a patent in Great Britain, No. 6,051, dated March 8, 1897,) of which the following is a specification.

My invention relates to a specially-constructed furnace or apparatus for the treatment of complex metallic ores, of which the denser metals having a high melting-point—such, for instance, as gold, silver, copper, nickel, &c.—would be caught in the bottom of the furnace at O, provision being made for running off the same through the passages *b*, while the other metals—such as zinc, antimony, sulfur, and the like—would be volatilized and caught in the form of oxid by a water curtain or condenser when led thereinto, the object of my said invention being to provide an apparatus and system that may attain the ends stated more rapidly, effectively, and at less cost than has been possible by the means hitherto employed for the same purpose.

My invention consists of a suitably-shaped furnace, built of fire-bricks or other fire-resisting material or an outer casing of iron lined with fire-bricks or other suitable material, and so constructed and arranged that the base or bottom is provided with a central opening surrounded by a fixed or integral conical perforated chamber extending upwardly into the said furnace, the finely-pulverized ore being fed by the force of a blast from a suitable blower through conduits terminating in a nozzle fixed within the said chamber, from which the said pulverized ore is caused to exude with great force out of the top of the said chamber and to impinge against the under surface of a block or diaphragm, of fire-clay or other suitable substance, fixed in such a position within the furnace as to become incandescent by the heat, and by impinging against this the said pulverized ore would become atomized and the metallic portions be deflected thereby in a downward direction into the body of the furnace, suit-

able exits *b* being provided through which the recovered metal may be led or drained from the furnace, while the fumes and dust would be conveyed by convection in an upward direction through suitable apertures in the said diaphragms into the atmosphere or caused to traverse a conduit leading past a water-curtain or into a suitable condenser, when such fumes or dust may be impregnated with such volatile metallic particles as may be worthy of recovery.

The apparatus is illustrated in the accompanying drawing, partly in side elevation and partly in section.

In carrying my invention into effect I prefer to construct the furnace proper, A, of circular formation in plan and slightly coned or tapered from the bottom to the top and constructed of any suitable material. By preference the said furnace would rest upon any number of suitable blocks B, and between and within these the bottom of furnace A would be provided with a central aperture C, surrounded by a conical or tapered chamber D, standing up within the furnace and provided with any number of perforations or holes E, inclined in an upward direction from the outer to the inner surface. The said chamber may conveniently be of the same material as A when the latter is constructed without a metallic casing, and may be either fixed in position by any suitable means or formed integrally with A, preferably the latter, as shown. The upper end of the furnace is closed by a fire-clay or other diaphragm F, having a central opening G, and upon the said diaphragm rests the funnel-shaped mouth of a fume and dust conduit or exhaust H, which may bend and extend in any direction, and in a direct line above the opening G in diaphragm F the said conduit H is provided with a branch H², leading to the atmosphere, in which a suitable damper J is provided, by means of which the said branch may be opened or closed at will. The conduit H is provided with a water-curtain, (indicated by dotted lines at *e*,) caused by a water-conduit *d*, having perforations through which the water falls. Below the diaphragm F is a diaphragm V, of inverted-cone shape, having openings *c* at the edges.

In any suitable position adjacent to the fur-

nace and convenient for operation by any available power I provide a suitable blower K, the air-current from which is conveyed by a pipe L, to surround or partly surround the furnace A, and at suitable intervals in this I provide any number of depending branches M, each connected to a suitable fire-clay or other nozzle or twyer N, leading through apertures in the wall of A into the fire-space O, and by means of the said conduit and nozzles the whole or part of the said blast may be employed when needed for imparting extra draft to the furnace. The conduit L is provided with a branch pipe P, which terminates in a nozzle R within the chamber D, and at any convenient part of the said branch pipe P a suitable hopper T is provided, which receives the finely-pulverized ore to be treated, and anywhere between the said hopper and the conduit L the said pipe P is provided with a screw-down or other suitable valve, such as S, by means of which the passage through pipe P may be wholly or partly closed or opened at will to regulate the force of the blast.

The manner of operation is as follows: Given that the fire in the furnace has been lighted and in a condition for work, the air-blast through conduit L may be wholly or partly closed, when the ore in a finely-pulverized condition would be fed into the hopper T and the valve S be opened, when the current of air passing through pipe P would convey with it the pulverized ore, which would be thereby forced up through the nozzle R and out at the top of the chamber D, and this forced draft through chamber D would create an updraft of superheated air through the perforations E in chamber D, thus superheating the powdered ore, which would be caused to impinge upon the point *a* of the under surface of the coned plate or diaphragm V, suspended beneath the diaphragm F, and now white hot or incandescent from the heat of the furnace, and this being

now the hottest part of the furnace such impact with the diaphragm V would vaporize or atomize the pulverized ore and deflect this in all directions from the center of the furnace, when the metallic portions would be melted and fall into the fire at O and pass out through suitable outlets *b*, while the fumes, dust, and more volatile portions would by the aid of convection (and may be by assisted draft through the nozzles N) pass upwardly through apertures *c* in the diaphragm V and through the opening G in diaphragm F into the conduit H, and by opening the damper J be allowed to pass out through pipe H² into the atmosphere, or by closing the said damper to pass along the conduits H and H' into a suitable condenser, according to the constituents of the fumes or as the ore under treatment is known to contain metal of greater or lesser density.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

An apparatus for treating powdered or pulverized ores comprising the furnace having a central opening in the bottom surrounded by a perforated annular wall, a deflector above of inverted-cone shape, a bustle-pipe twyers having communication with said bustle-pipe and leading into the furnace for supplying air thereto, an ore-supply pipe communicating with said central opening, an air-supply communicating with both the ore-pipe and bustle-pipe, and a discharge-pipe from the top of the furnace, substantially as described.

In witness whereof I have hereunto set my hand in presence of two witnesses.

JOHN EDWARD PRESTON.

Witnesses:

HENRY CONRAD HEIDE,
GEORGE THOMAS HYDE.