(No Model.) 3 Sheets—Sheet 1.

J. KENNEDY.

SMELTING FURNACE.

No. 598,709. Patented Feb. 8, 1898.

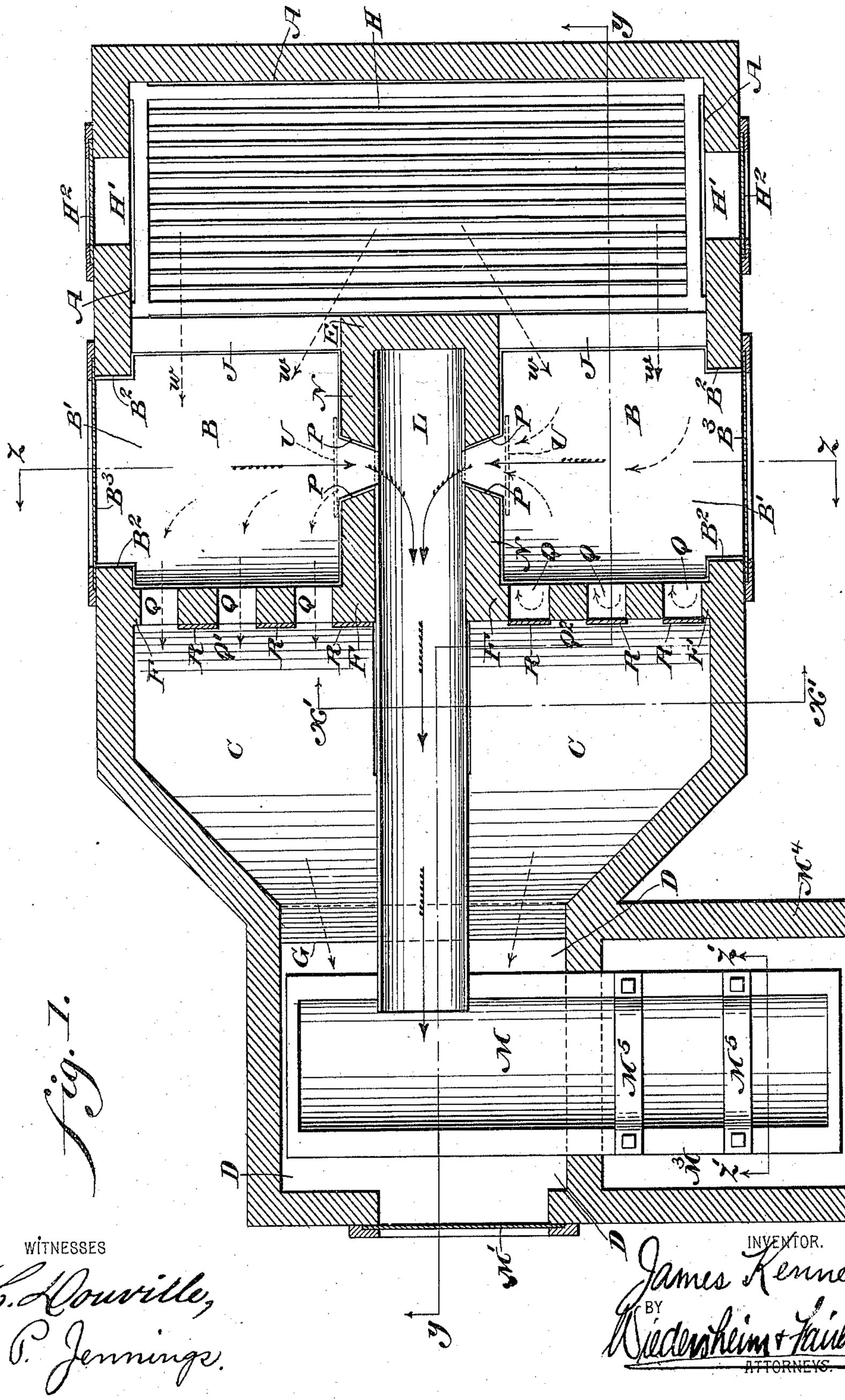

Fig. 1.

WITNESSES

L. Louville,

A. P. Jennings.

INVENTOR.

James Kennedy.

BY

Wiedenheim & Fairbanks.

ATTORNEYS.

(No Model.)

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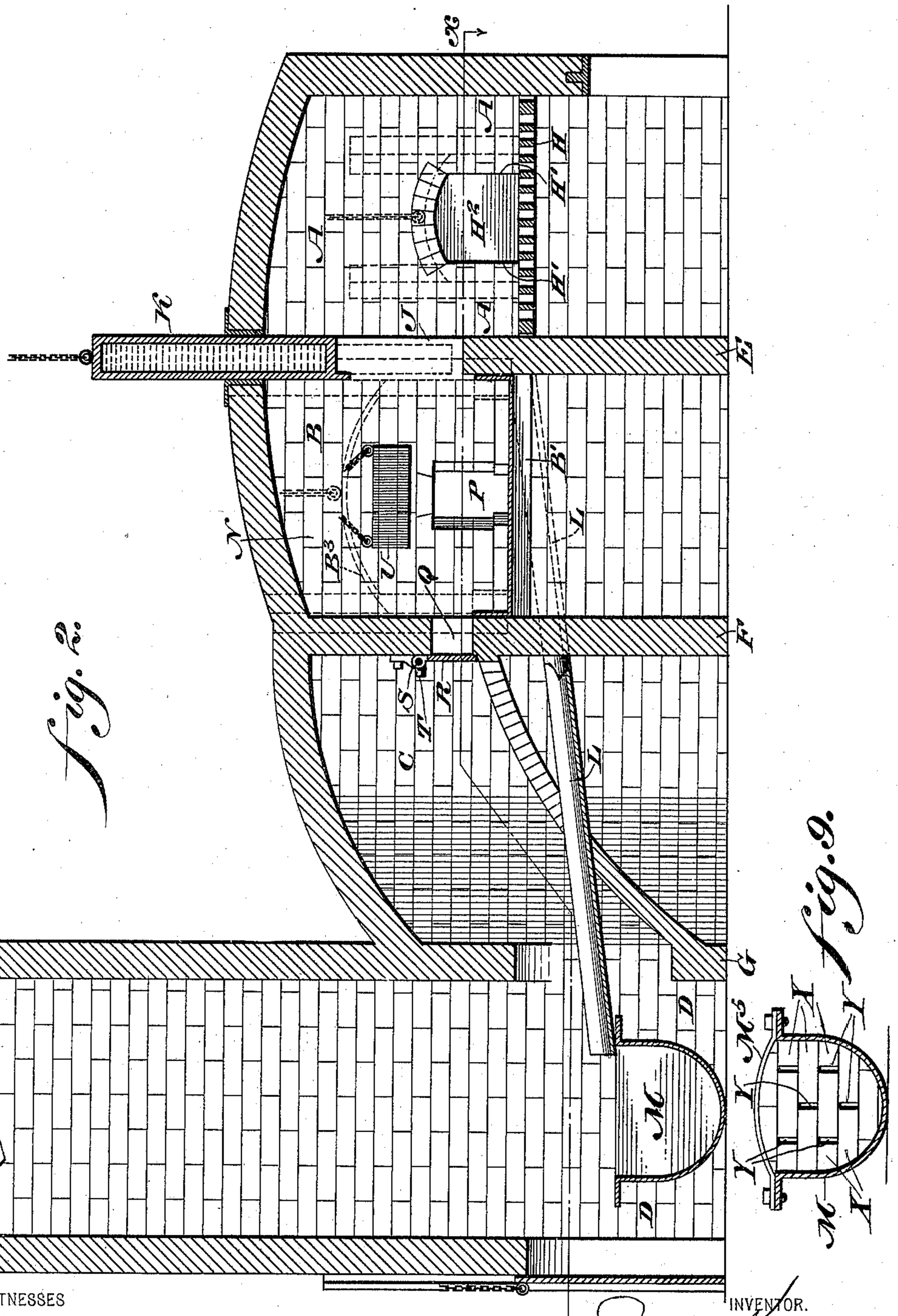
J. KENNEDY.

SMELTING FURNACE.

No. 598,709. Patented Feb. 8, 1898.



WITNESSES

L. Louville,

A. P. Jennings.

INVENTOR.

James Kennedy.

BY

Wedderburn & Fairbanks.

ATTORNEYS

(No Model.)

3 Sheets—Sheet 3.

J. KENNEDY.

SMELTING FURNACE.

No. 598,709. Patented Feb. 8, 1898.

Fig. 5.

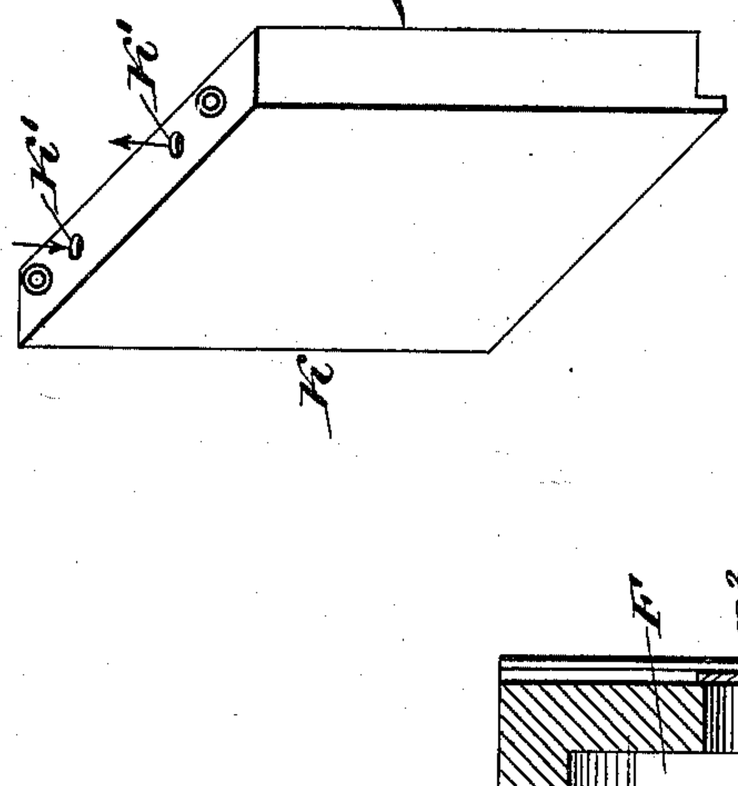


Fig. 6.

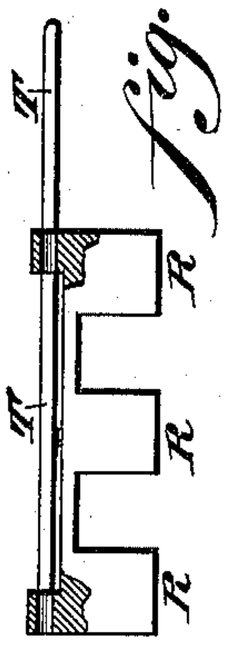
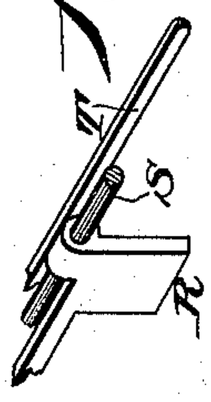


Fig. 7.



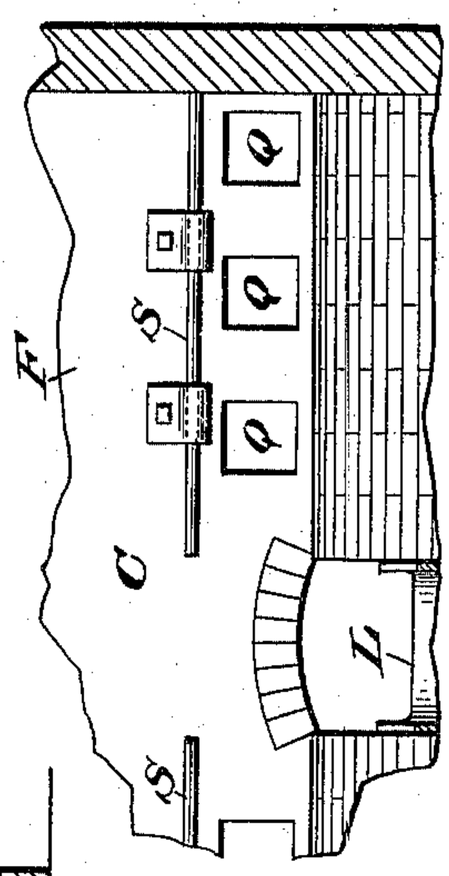


Fig. 3.

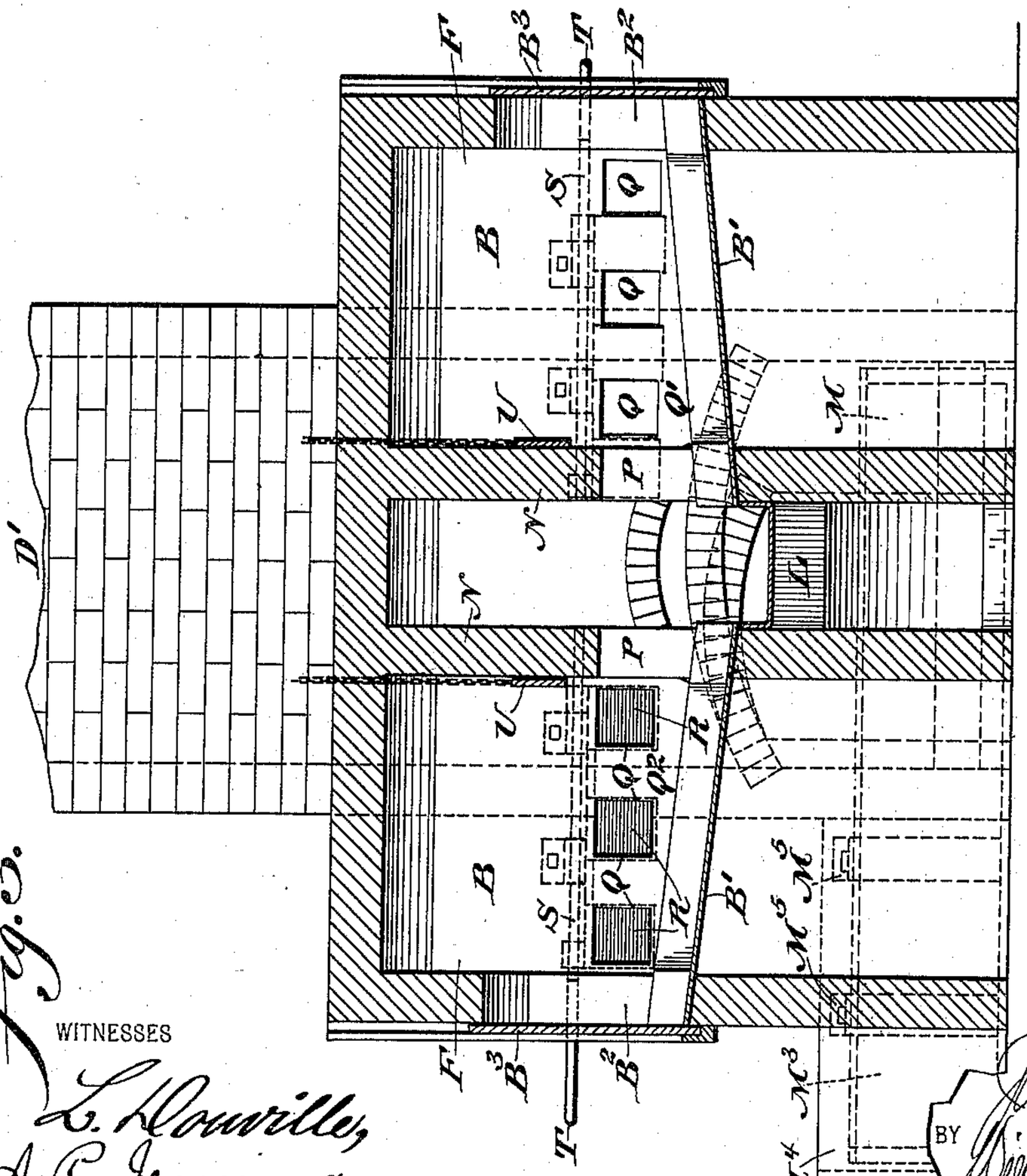


Fig. 4.

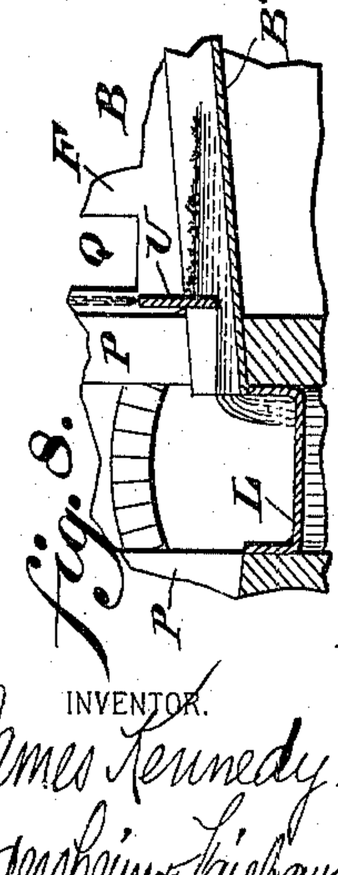


Fig. 8.

WITNESSES

L. Louville,

A. P. Jennings

INVENTOR.

James Kennedy.

BY Dieterich & Fairbanks

ATTORNEYS

UNITED STATES PATENT OFFICE.

JAMES KENNEDY, OF ALLENTOWN, PENNSYLVANIA.

SMELTING-FURNACE.

SPECIFICATION forming part of Letters Patent No. 598,709, dated February 8, 1898.

Application filed September 1, 1897. Serial No. 650,226. (No model.)

To all whom it may concern:

Be it known that I, JAMES KENNEDY, a citizen of the United States, residing at Allentown, in the county of Lehigh, State of Pennsylvania, have invented a new and useful Improvement in Smelting-Furnaces, which improvement is fully set forth in the following specification and accompanying drawings.

My invention consists of a novel construction of smelting-furnaces adapted to melt or fuse ore for the purpose of separating and refining metal.

It further consists of novel details of construction, all as will be hereinafter fully set forth, and particularly pointed out in the claims.

Figure 1 represents a horizontal section on line *x x*, Fig. 2. Fig. 2 represents a longitudinal vertical section on line *y y*, Fig. 1. Fig. 3 represents a transverse vertical section on line *z z*, Fig. 1. Fig. 4 represents a section on line *x' x'*, Fig. 1, showing particularly the rod for carrying the dampers. Fig. 5 represents a perspective view of a gate or valve for regulating the heat which enters the ore-chambers. Fig. 6 represents a front elevation, partly in section, of the dampers employed, which close the connection between the ore-chambers and flue-chamber, respectively. Fig. 7 represents a perspective view of a portion of the dampers shown in Fig. 6, showing particularly the manner of supporting said dampers. Fig. 8 represents a view of a portion of Fig. 3, showing the flow of molten metal as regulated by the skimmer. Fig. 9 represents a sectional view of the brick partitions in the extension of the metal-pan, line *z' z'*, Fig. 1.

Similar letters of reference indicate corresponding parts in the figures.

Referring to the drawings, the furnace consists of a fire-chamber A, ore-chambers B, flue-chamber C, stack D', and uptake-compartment D, separated, respectively, by partitions E, F, and G.

The fire-chamber A is provided with the grate H and stock or fuel holes H' for feeding the fire, said stock-holes having the doors H^2.

The partition E is provided with an opening J, entering each ore-chamber, each of which openings is controlled by water-holding frames or gates K, which are operated by suitable mechanism and so constructed as to contain and allow of the free ingress, circulation, and egress of water or other cooling fluid by the inlets and outlets K', the object of the gates K being to regulate the passage of heat from the furnace into the ore-chambers, while the circulation of water through said gates prevents undue heating thereof.

There are two ore-chambers, distinct from each other, for the purpose of enabling the furnace to operate continuously, it being evident that when one ore-chamber is closed and in full operation the other can be closed to the ingress of the hot air and thus cleared of dross and recharged, the said chambers thus being worked alternately.

The floors B' of the ore-chambers are inclined or so constructed that when the ore becomes fused it will flow toward and through the openings P in the walls or partitions N, each of said chambers being provided with ore-openings B^2 for charging, said openings having doors B^3, whereby the escape of hot air is prevented.

The channel L is located between the two ore-chambers and runs in the present instance longitudinally of the furnace, said channel inclining toward and terminating at or near the metal-pan M, located at the end of the furnace in the uptake and preferably beneath the stack D'.

U designates dross-arresters, which control or act in conjunction with the openings P, before referred to.

The partition F is provided with damper-orifices Q, which are controlled by the dampers R, the latter sliding longitudinally on the rod S and being actuated by the handle T, said dampers permitting the free circulation of the hot air when the desired ore-chamber is in operation and cutting off said air in conjunction with the proper gate K when said chamber is temporarily inoperative.

The roof of the furnace has preferably an inclined or convex contour in order to more thoroughly utilize or obtain the full effects of the heat by keeping the hot air in close contact with the ore and metal.

The operation is as follows: A fire having been ignited, the desired ore-chamber is

charged with ore, its door B^3 tightly closed, and the dampers R moved out of alinement with their respective orifices, as shown at Q'. The opposite chamber is closed to the ingress of hot air by its gate K, and the orifices Q are closed by means of their dampers, as shown at Q^2, while the passage to the channel is also closed, it then being possible to clean and recharge the inoperative ore-chamber while the other ore-chamber is in operation. The heated air passes from the fuel-chamber into the proper ore-chamber, as indicated by the arrows, thereby fusing the ore, which latter passes through the opening P into the channel L, while the hot air, &c., passes through the damper-orifices Q into the flue-chamber C, to the uptake D, and thence up and out of the stack D'. The molten metal flows down the channel L, as indicated by the arrows in full lines, into the metal-pan M, the arresters U skimming from the surface of the molten metal all dross as it passes through the opening P, as shown in Fig. 8.

The metal-pan M extends beyond the uptake, as shown at M^3, which extension is inclosed within casings M^4 and is divided into compartments by partitions held in place by straps M^5, the object of which extension is not only to furnish a dipping-fount easy of access, but also as an additional means for extracting dross or other impurities from the molten material and render the metal pure to a maximum degree when ready for use, which latter object is accomplished by partitions built up of bricks *x*, Fig. 9, without the use of mortar, with space *y*, Fig. 9, left between each brick at their adjacent ends, through which the molten metal passes, the said walls thereby acting as filters or strainers, arresting or preventing the dross which has, perchance, escaped dross-arresters U from accompanying the metal to its final station—to wit, the dipping-fount or last chamber in the pan—from which the pure metal is dipped for use, said walls being firmly held in position and prevented from becoming disarranged or displaced by the before-mentioned straps. The first partition is relieved by removing the heavier alloy or dross from the metal through the opening controlled by the door M' as its progress is retarded by the said first partition, the further purpose of which opening is to keep the channel L free from obstructions.

The metal is maintained in a molten condition in its passage in the pan by the use of fires located on each side of the extension of said pan.

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

1. In a smelting-furnace, a fire-chamber, a flue-chamber, a plurality of distinct ore-chambers intermediate of and connected with said fire-chamber and said flue-chamber, an uptake-compartment, a pan located in said uptake-compartment, and a chamber common to said ore-chambers and leading to said pan.

2. In a smelting-furnace, a fire-chamber, a plurality of ore-chambers, a flue-chamber and an uptake-compartment provided with a stack, a gate between each of said ore-chambers and said fire-chamber, dampers between each of said ore-chambers and said flue-chamber, and a common channel leading from each of said ore-chambers to a pan in the said uptake-compartment.

3. In a smelting-furnace, a fire-chamber, a plurality of ore-chambers provided with gates between each ore-chamber and said fire-chamber, a flue-chamber provided with dampers between it and said ore-chambers, an uptake-compartment having a stack above the same, a channel leading from said chambers to a metal-pan in said uptake-compartment, and dross-arresters at the discharge-openings of said ore-chambers.

4. In a smelting-furnace, a fire-chamber, ore-chambers, openings between said fire-chamber and ore-chambers, fluid-holding gates having inlet and outlet openings, a flue-chamber, uptake and stack compartment, a pan, a channel communicating therewith, said ore-chambers being provided with openings communicating with said channel, dross-arresters operating in connection with said openings, and orifices provided with dampers situated intermediate of the ore and flue chambers.

5. In a smelting-furnace, a fire-chamber, ore-chambers, openings between said fire-chamber and ore-chambers, fluid-holding gates having inlet and outlet openings, a flue-chamber, uptake and stack compartment, a pan having an extension inclosed within a casing and divided into compartments, a channel communicating with said pan, the ore-chambers being provided with openings communicating with said channel, dross-arresters operating in connection with said openings, and orifices provided with dampers situated intermediate of the ore and flue chambers.

JAMES KENNEDY.

Witnesses:
MICHAEL P. MCCLOSKEY,
MICHEAL MCGEE.