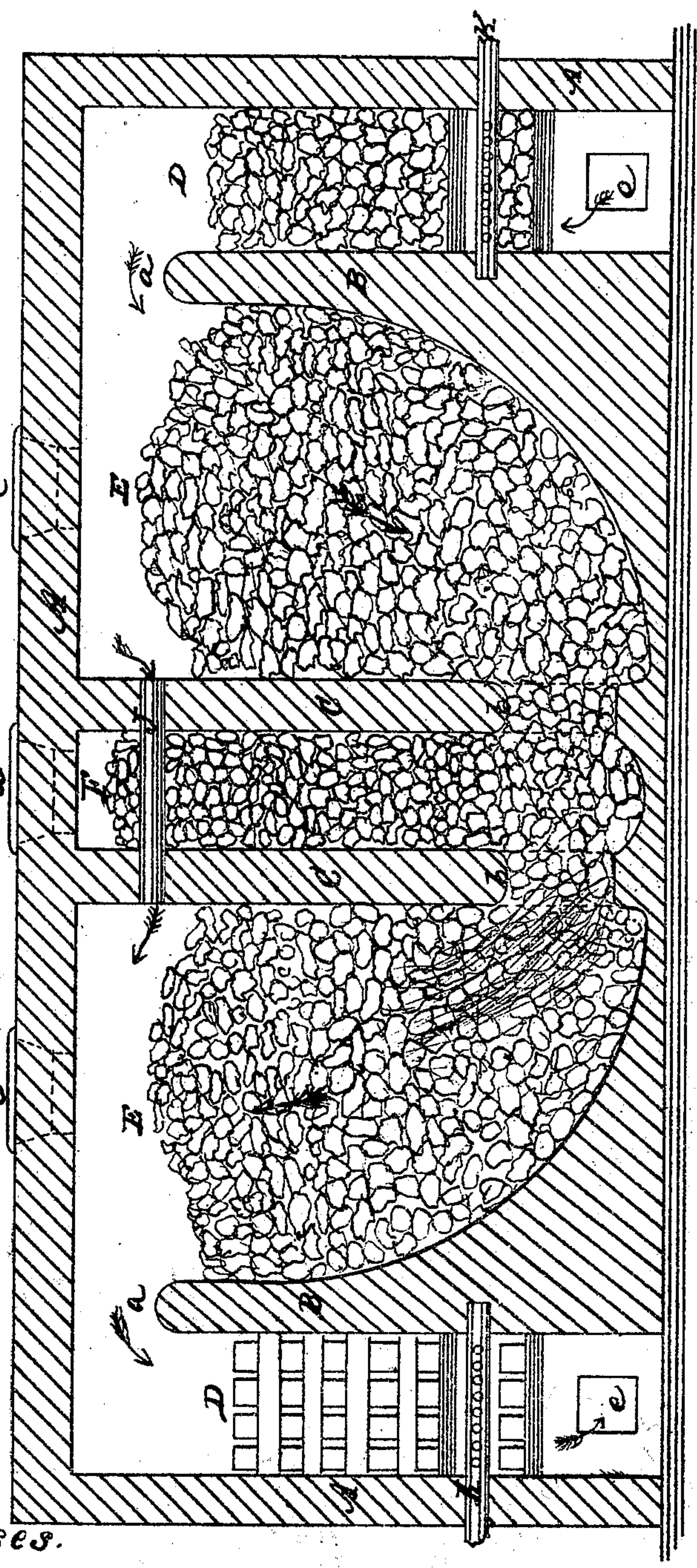


J. Maunton.
Treating Ores.

Nº 71776

Patented Dec. 3, 1867

Fig. 1



Witnesses.

J. M. Coombs
Geo Reed

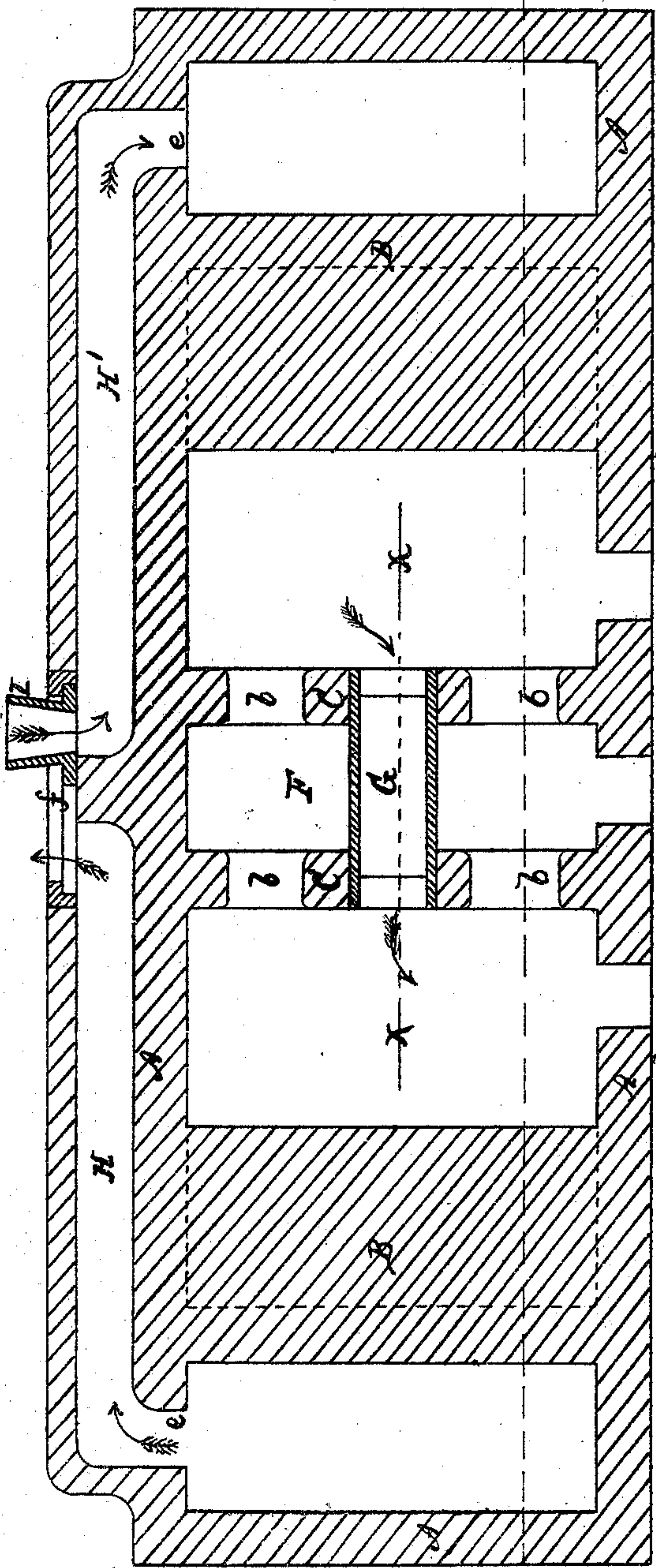
Inventor
Jabez Maunton

J. Maunton.
Treating Ores.

N^o 71776

Patented Dec. 3, 1867.

Fig. 4.



Witnesses.

J. M. Combs
G. W. Reed

Fig. 3.

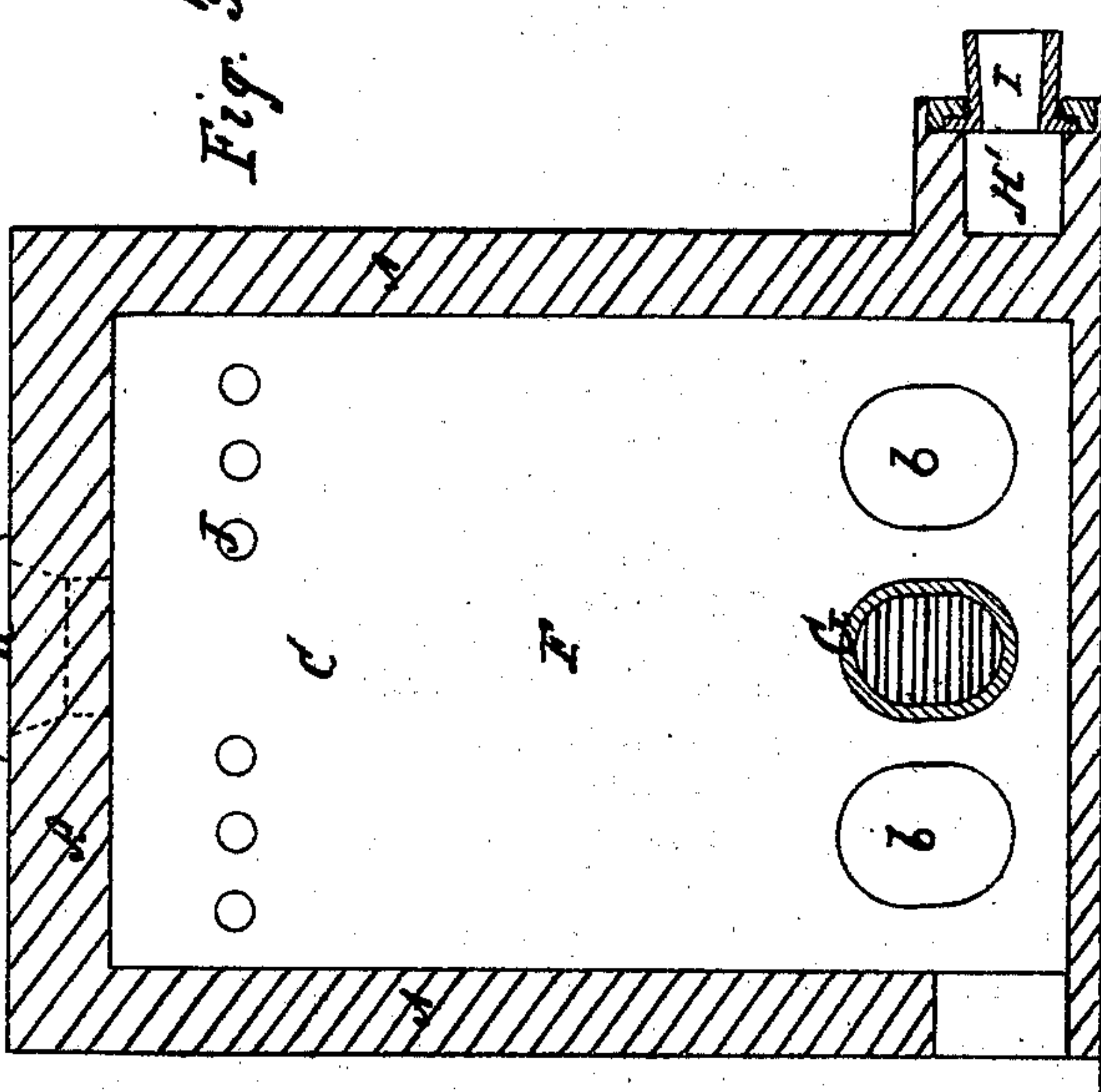
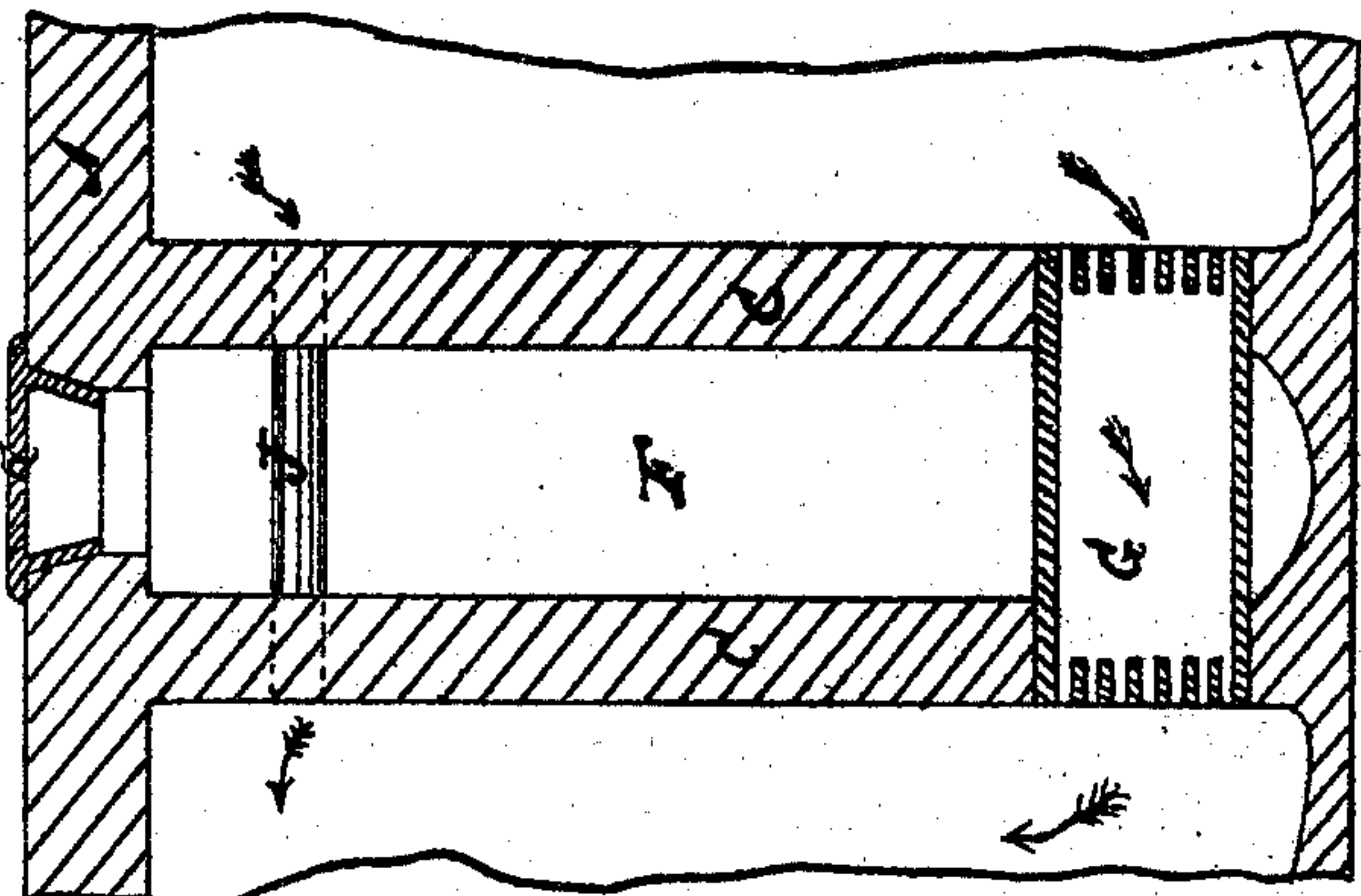


Fig. 2.



Inventor.

Jabez Maunton

UNITED STATES PATENT OFFICE.

JABEZ MAUNTON, OF NEW YORK, N. Y., ASSIGNOR TO HIMSELF, WRIGHT DURYEA, WILLIAM ENNIS, J. H. VAN RIPER, A. P. CUMMINGS, AND J. WENDELL COLE, OF THE SAME PLACE.

IMPROVEMENT IN FURNACES FOR ROASTING AND REDUCING ORES.

Specification forming part of Letters Patent No. **71,776**, dated December 3, 1867; antedated November 27, 1867.

To all whom it may concern:

Be it known that I, JABEZ MAUNTON, of the city, county, and State of New York, have invented a certain new and useful Improvement on Furnaces, of which the following is a full, clear, and exact description, reference being had to the accompanying drawing, forming part of this specification, and in which—

Figure 1 represents a vertical longitudinal section of a furnace constructed according to my improvement, taken as denoted by the line *yy* in Fig. 4; Fig. 2, a similar view, in part, through the line *xx* in Fig. 4; Fig. 3, a vertical transverse section taken mainly through the center of the furnace, and Fig. 4 a horizontal section through the base or lower portion thereof.

Similar letters of reference indicate corresponding parts.

My invention, which is here shown as applied to reducing or separating by heat metals in or from quartz or other ore—as, for instance, the precious metals—is equally applicable to the reduction of other substances, and may be used for other than metallurgic operations. Said invention combines the base-burning with a regenerating principle of action—that is to say, as concerns the latter the reversal at intervals of the draft, in order that the heat passing off with the products of combustion may be utilized by the incoming current of air. Such furnace is designed to attain, among other advantages, economy of fuel with concentration, and, when required, great intensity, of heat. It is applicable to the combustion of various kinds of fuel, including, among others, coal, coke, charcoal, peat, wood, in which may be classed underbrush, wild sage, &c.; also petroleum, or what may be termed “liquid fuel.”

The nature of the invention consists, first, in a novel arrangement or combination of reducing-chambers with an intermediate vertical fuel-chamber and passages, so arranged that the combustion is kept up at the base, and the current of air or blast made to pass alternately in opposite directions through the mass contained in the reducing-chambers;

also, in combination with such an arrangement, the application of separate regenerating-chambers, preferably of a vertical character or order, whereby the heat has a downward course or low travel given to it in the escape; likewise, in an arrangement for utilizing the sulphur generated in metallurgic operations as an article of fuel.

By this my improvement increased economy and durability of the furnace are secured and other advantages obtained.

In the following description the invention will be explained, by way of illustration, in connection with the reduction of certain ores, or extraction from quartz of the precious metals, and constructed for burning coal or coke.

Referring to the accompanying drawing, *A* are the outer walls and roof of the furnace, and *B B C C* inner transverse walls or partitions. The inner walls or partitions, *B B*, stop short of the roof, so as to form communications or passages *a* between chambers *D D* and *E E*. The one pair of these chambers, *D D*, contained between the walls or partitions *B B* and outer end walls, are designed as regenerators and will here be so termed, and which are preferably vertically arranged, and may consist of broken quartz for their lower portion or strata, and their upper portions of more refractory substances, or may be built of fire-bricks, arranged for circulation of the draft through or between them. The reducing quartz or ore chambers *E E*, contained between the walls *B B* and *C C*, communicate the one with the other by base-passages *b b*, through an intermediate vertical fuel-chamber, *F*, a separate covered passage, *D*, if desired, of a grating construction at its ends to exclude the quartz; also connecting the reducing-chambers *E E* near their base, and serving to establish a free course to the draft of one of said chambers to the other. The fuel and quartz or ore may be supplied these chambers by openings *c c* and *d* in the roof, covered by suitable stoppers or caps. The one regenerator, *D*, connects below by back opening, *e*, with a passage, *H*, while the regenerator at the opposite end communicates by a similar

opening, *e*, with a passage, *H'*, said two passages *H* and *H'* meeting in a general branch or opening, *f*, controlled by a blast or inlet-draft regulating valve, *I*, that, accordingly as it is moved to the right or left, serves to establish the current through the correspondingly-situated (right or left) regenerator, down through the material in the reducing-chamber adjacent to it, into and through the fuel-chamber at the base, and up through the material in the second reducing-chamber, and down through the second regenerator, and out by the opening *e* into the back passage, *H* or *H'*, which is in communication with the half or portion of the opening *f* out of connection with the blast, and constituting the escape. By reversing the position of the blast or inlet-draft valve *I*, so as to reverse the passages *H* or *H'* as inlet or outlet, of course the action will be correspondingly changed or draft through the furnace reversed. This alteration in the course of the current is made alternately, as the one regenerator becomes sufficiently heated by the escaping products of combustion and the opposite one correspondingly cooled by the incoming current of air, which is the general principle of action peculiar to all regenerating-furnaces, and whereby an intensity of heat is or may be produced by comparatively a small consumption of fuel by making available within the furnace the heat from the escaping products of combustion. But there are special advantages incidental to the construction of furnace here shown, which it will be necessary to direct attention to. Thus, in the working of the furnace, the ore or reducing chambers *E E* are recharged alternately at proper intervals, the fresh charge of ore being placed in that one of such chambers through which the gases of combustion have passed a sufficient period of time. The heated current from the regenerator nearest the fresh charge is now, by reversing the draft through the furnace, brought down through the ore or quartz, and, being charged with heat, liberates the sulphur contained in the mass, and which will pass down through the hottest part of the furnace and the fire, emerging with the gases of combustion at the upper part of the furnace, where it combines or may be combined with a further charge of heated air through an air passage or passages, *J*, to effect its combustion with any unconsumed combustible gases from the fuel. In this way the sulphur is made available as an element of heat. By this combustion of the sulphur the finer particles of the precious metals, which, in the open-flue furnace, pass off (or a large proportion of them) in a volatilized condition with the sulphur or other chemical agents, are liberated from it, and are or may be deposited in the lower strata of the ore in the furnace in a state of fusion or in the fire. In case, however, of all the finer particles of the precious metals not being thus arrested, they may be condensed and collected in the regen-

erators by providing the lower portions of the latter with spray-water pipes *K*, to keep such portions at a reduced temperature. It furthermore should be observed that, while the most intense heat may be generated to act upon the ore, the durability of the furnace, by the construction here shown, is enhanced; for as the reduction of the ore goes on in the lower portion of the furnace the cooler portion of the ore or upper strata will, by gradually working down to replace that which has been reduced, keep the sides of the reducing and fuel chambers comparatively cool, and thus protect them, as also the roof or upper portion of the furnace generally, which part, in regenerating-furnaces as usually constructed, is exposed to rapid destruction; and here it may be noted that by the vertical construction of the regenerators, the heat is drawn from the top and passed off below. Apart, however, from this arrangement or construction of the regenerators, the greatest heat, it will be seen, is generated in the lower portion of the furnace, and the combustion carried on where the fire is most sensibly felt in its action on the ore, thus adding to the economy of the process, and, without separate or special regenerators even, by this construction or arrangement of the fuel and reducing chambers in connection with a reversible draft, essentially as described, the same results are or may be to a great extent attained, inasmuch as the quartz or ore in the reducing-chambers will, especially if admixed with a material of more refractory character, make said reducing-chambers to operate also as regenerators. By the connection, as shown, of the fuel and reducing-chambers, an equilibrium of pressure, also, of the materials in each may be kept up to restrain the quartz from unduly penetrating the fuel-chamber, or the fuel the reducing-chambers, while the covered passage *G* secures a free course for the current uninterrupted by the fuel.

Any suitable openings may be provided the furnace for drawing off the refuse and precious metal.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination, in connection with a reversible draft in or through them, substantially as described, of reducing-chambers *E E* and an intermediate fuel-chamber, *F*, severally chargeable from above, and communicating with each other at or near the base, essentially as and for the purpose or purposes herein set forth.

2. The combination, with a reversible draft, essentially as specified, of regenerators *D D*, reducing-chambers *E E*, and fuel-chamber *F*, connecting with the reducing-chambers by passages at or near their base, and chargeable, as well as the reducing-chambers, from above, for operation as herein set forth.

3. In combination with a reversible draft and fuel and reducing chamber or chambers,

the vertical regenerators D D, having their inlet and outlet passages connecting with the draft arranged below, substantially as described.

4. The connection of the reducing-chambers E E with each other by a covered passage, G, arranged to pass through an intermediate fuel-chamber, essentially as herein set forth.

5. The arrangement, in connection with the

reducing-chambers E E, of an air pipe or passages, J, arranged to connect said chambers at or near their top, substantially as and for the purpose specified.

JABEZ MAUNTON.

Witnesses:

J. W. COOMBS,
G. W. REED.