No. 666,155. Patented Jan. 15, 1901.

A. REYNOLDS.

METALLURGICAL FURNACE.

(Application filed May 29, 1900.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.

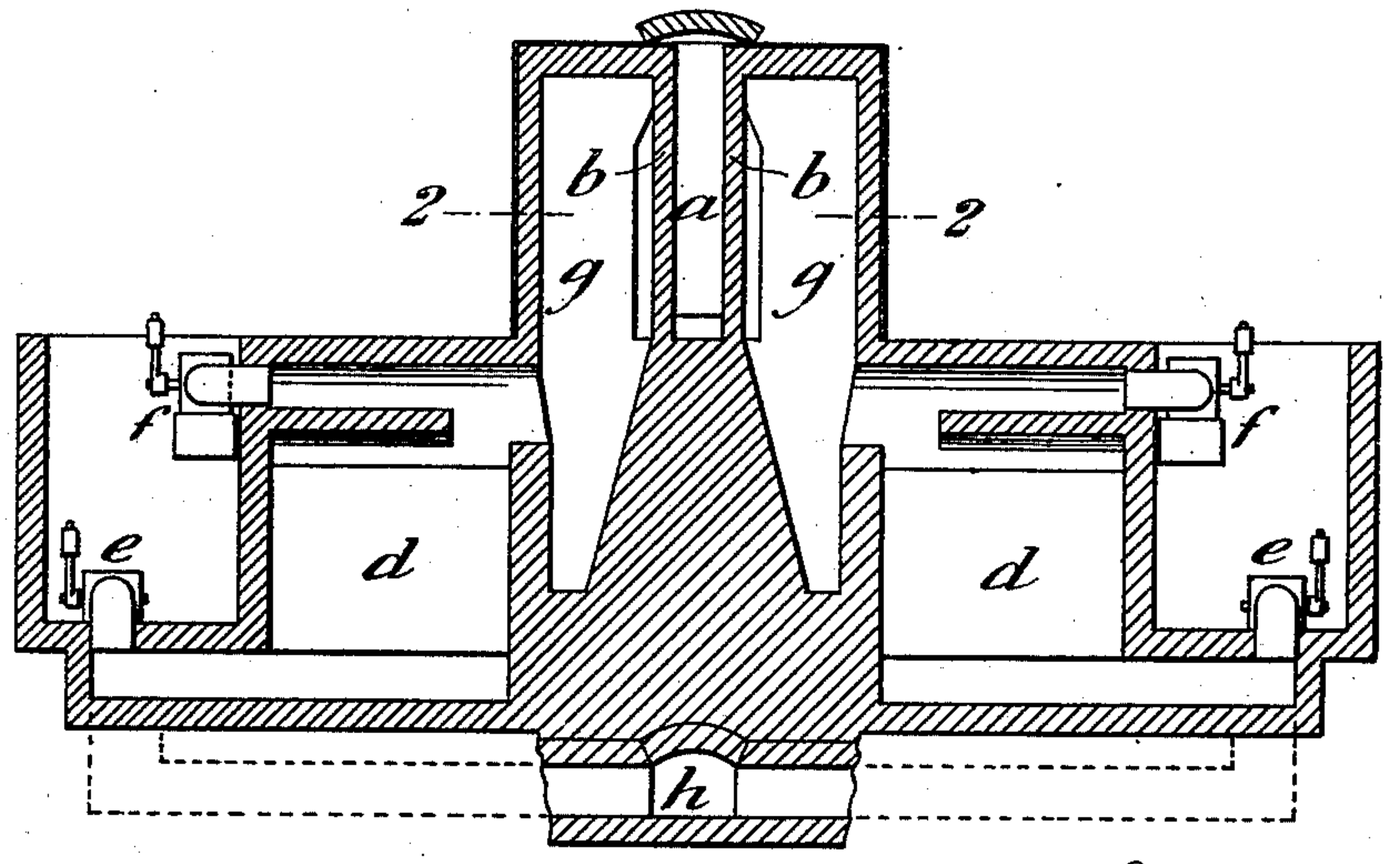


Fig. 3.

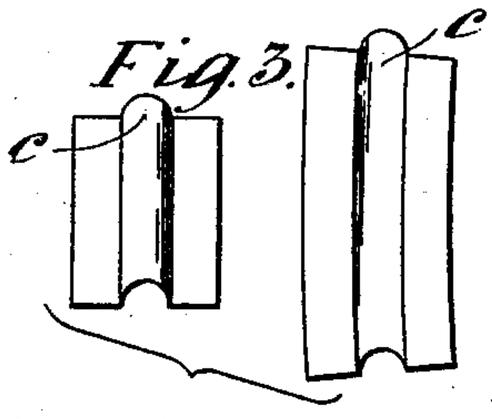
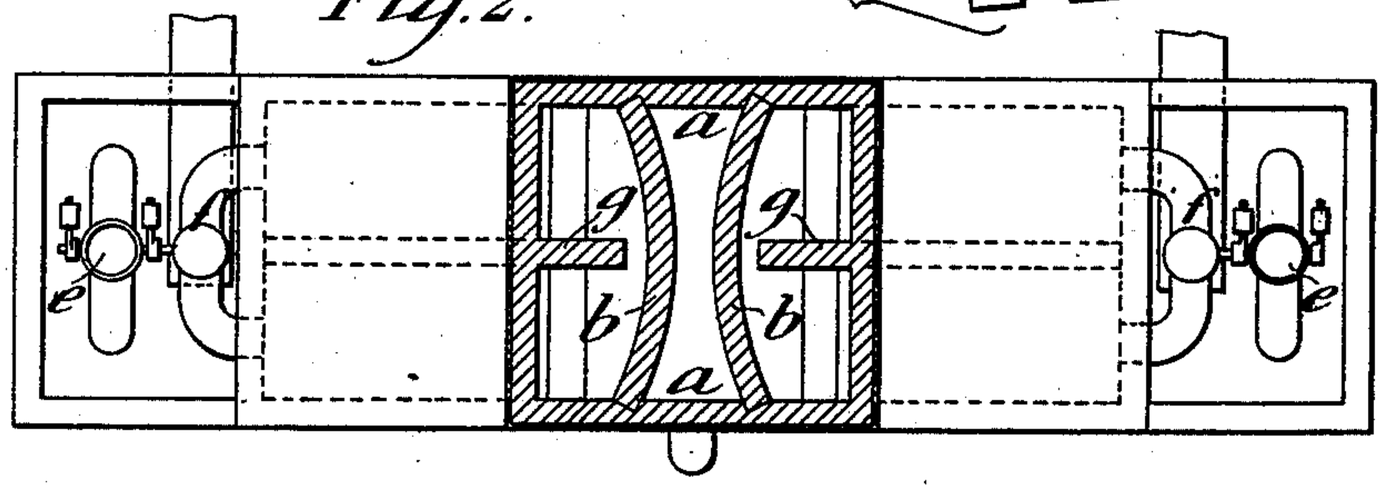


Fig. 2.



WITNESSES

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No. 666,155. Patented Jan. 15, 1901.

A. REYNOLDS.

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(Application filed May 29, 1900.)

(No Model.) 3 Sheets—Sheet 2.

Fig. 4.

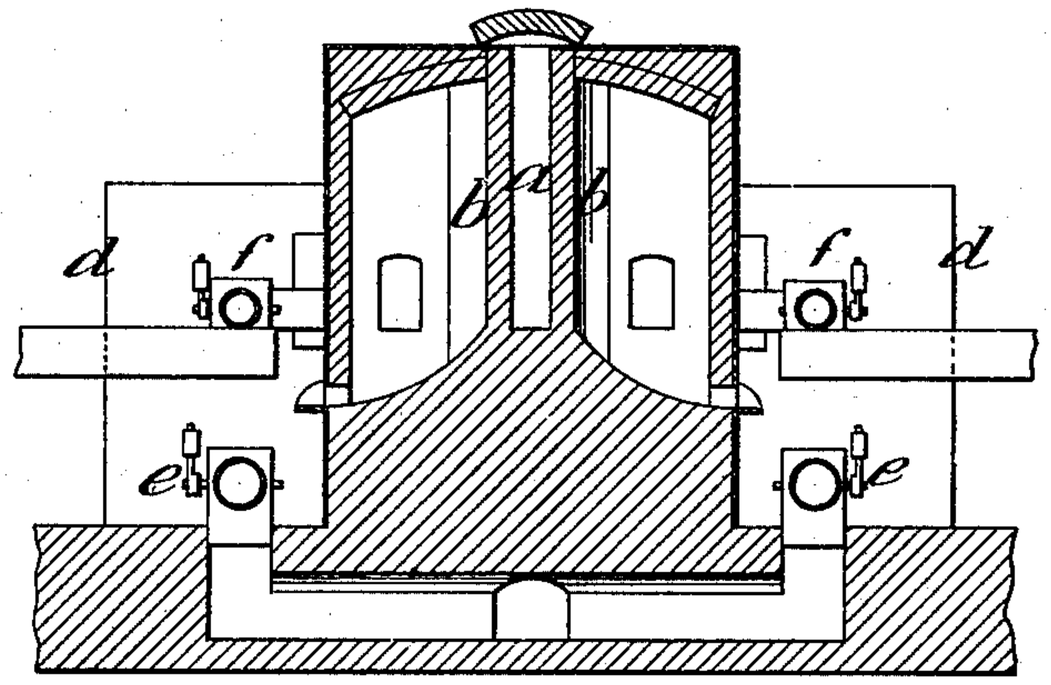
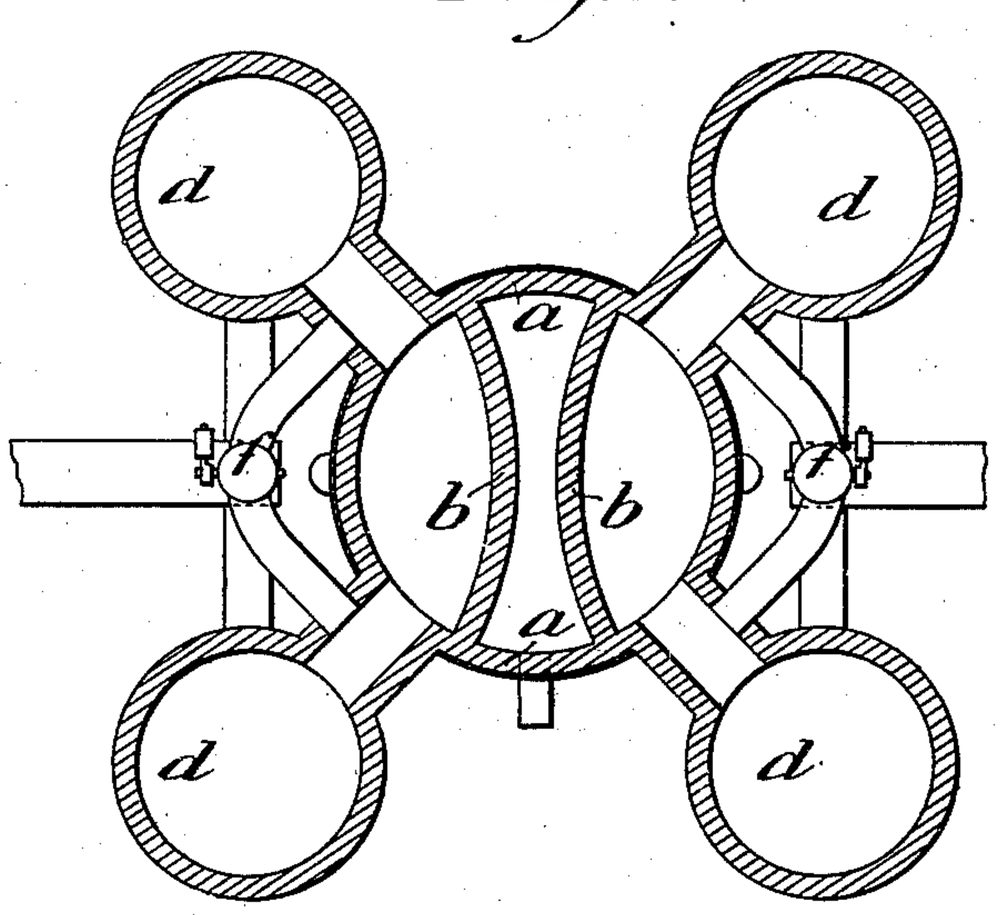


Fig. 5.



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METALLURGICAL FURNACE

(Application filed May 29, 1900.)

(No Model.) 3 Sheets—Sheet 3.

Fig. 6.

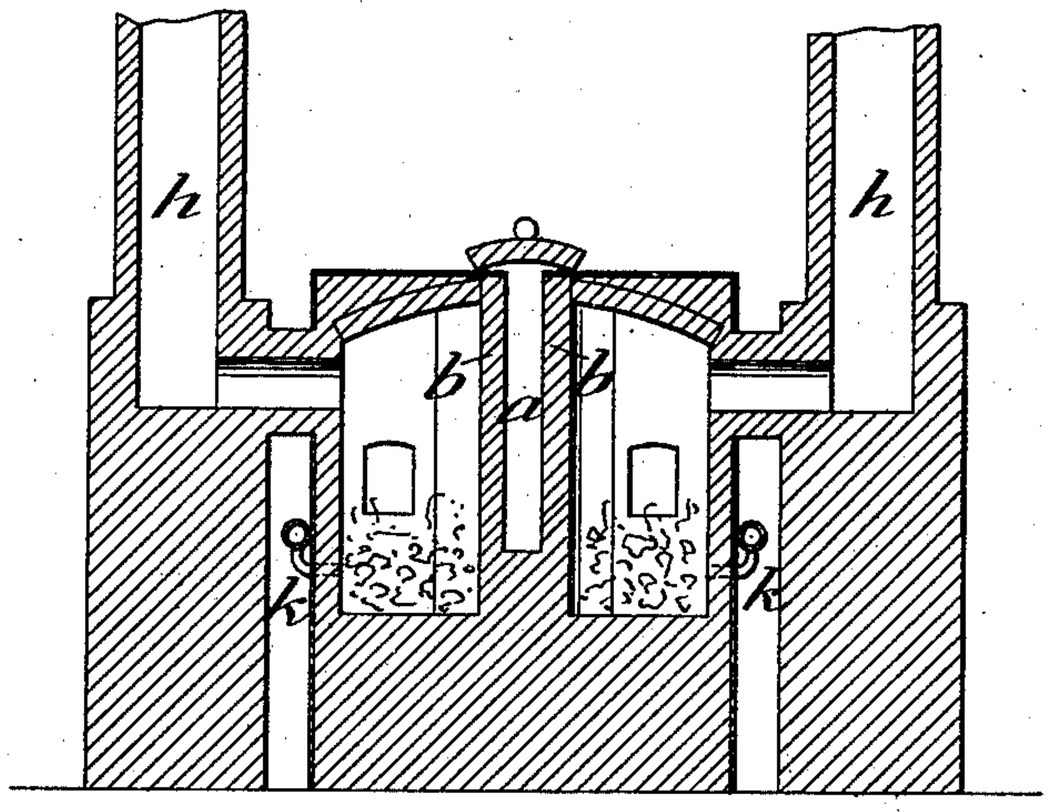
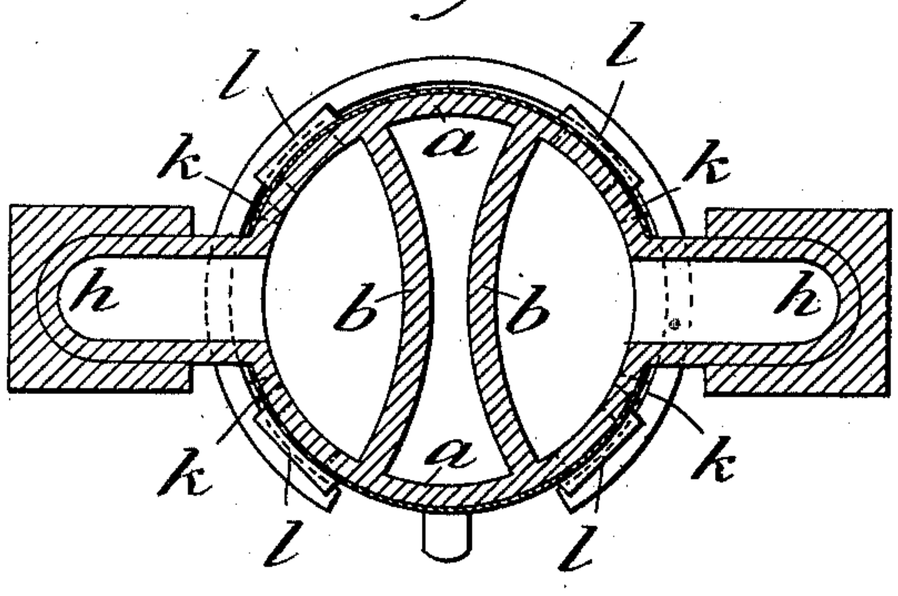


Fig. 7.



WITNESSES

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UNITED STATES PATENT OFFICE.

ALLEYNE REYNOLDS, OF SHEFFIELD, ENGLAND.

METALLURGICAL FURNACE.

SPECIFICATION forming part of Letters Patent No. 666,155, dated January 15, 1901.

Application filed May 29, 1900. Serial No. 18,378. (No model.)

To all whom it may concern:

Be it known that I, ALLEYNE REYNOLDS, metallurgical engineer, a citizen of England, residing at Riverdale, Sheffield, in the county of York, England, have invented certain new and useful Improvements in Metallurgical Furnaces, of which the following is a specification.

My invention relates to the construction of metallurgical furnaces in such a manner that the minerals or metals smelted or melted do not come in contact with the fuel or fuel gases. Such treatment is usually effected in an expensive manner in crucibles which are necessarily small, owing to the difficulty of making and handling crucibles of large size and the weakness of such crucibles when they are highly heated rendering it impossible to employ in their construction materials of a basic character, which would in many cases be absolutely necessary for the intended treatment. My invention has for its object to overcome these difficulties by so constructing a smelting or melting vessel to take the place of a crucible that its heated walls, which are not supported externally, are subjected to a compressive stress by the fluid-pressure in its interior, as I shall describe, referring to the accompanying drawings, which show various arrangements by which a vessel of this kind can be constructed and heated.

Figure 1 is a vertical section, and Fig. 2 is a horizontal section on the line 2 2 of Fig. 1, of a regenerative gas-furnace with melting vessel according to my invention, Fig. 3 being an end view and plan, drawn to an enlarged scale, of one of the bricks employed. Fig. 4 is a vertical section, and Fig. 5 is a horizontal section, of a modified form of regenerative gas-furnace. Fig. 6 is a vertical section, and Fig. 7 a sectional plan, of a blast-furnace with melting vessel according to my invention.

In all the figures the melting vessel has its end walls *a* supported against the external furnace-casing and its side walls *b*, which are not so supported and are directly heated, made curved, with their convexity toward the interior, so that by the internal fluid-pressure they are subjected to compressive stress, which merely forces the bricks of which they are constructed more firmly together. In order to give firmness and tightness to these walls, I prefer to employ in their construction bricks, such as are shown in Fig. 3, each having on its one side and one end a projecting bead *c* and on the opposite side and end corresponding hollows, so that each brick interlocks with those adjacent to it.

As shown in Figs. 1 and 2, the furnace is provided at each side with air-regenerating chambers *d* and reversing-valves *e* and is supplied with producer or other gas by valves *f*. In the combustion-compartments there are partitions *g*, projecting toward, but not quite meeting, the walls *b*, so that the gas and heated air from the one generator entering at one side in each compartment form a flame, which by the partition *g* is caused to sweep closely against the curved wall *b*, the products of combustion passing through the other regenerator to the chimney-flue *h*. When the one regenerator is more or less cooled and the other heated, the current is reversed in the usual way.

As shown in Figs. 4 and 5, the regenerators *d* are of circular form and the inlets and outlets of the combustion-chambers are oblique, so as to direct the flames against the curved walls *b*, rendering partitions, such as *g*, unnecessary.

Figs. 6 and 7 show a furnace burning fuel in its combustion-chambers with blast supplied by twyers *k*, the fuel being supplied by doors *l*.

Having thus described the nature of my said invention and the best means I know of carrying the same into practical effect, I claim—

A metallurgical furnace having therein a vessel to contain the mineral or metal treated, said vessel having end walls supported against the furnace-casing, and unsupported side walls which are curved inwardly, and means for directly heating said side walls, substantially as described.

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

ALLEYNE REYNOLDS.

Witnesses:
GERALD L. SMITH,
EDWARD GARDNER.