2 Sheets—Sheet 1.

M. A. SUTHERLAND.

METALLURGIC FURNACES.

No. 186,178. Patented Jan. 9, 1877.

Fig. 1.

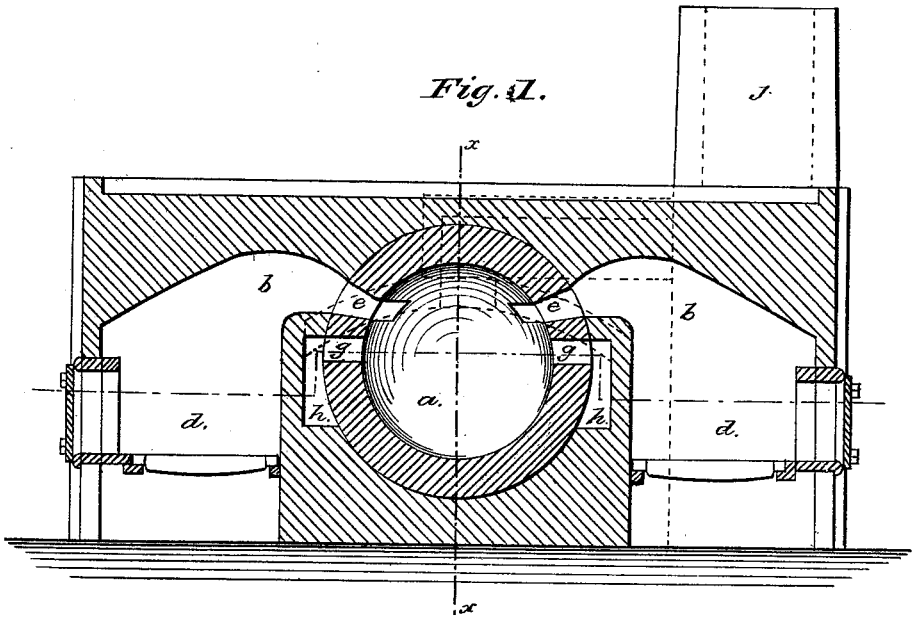
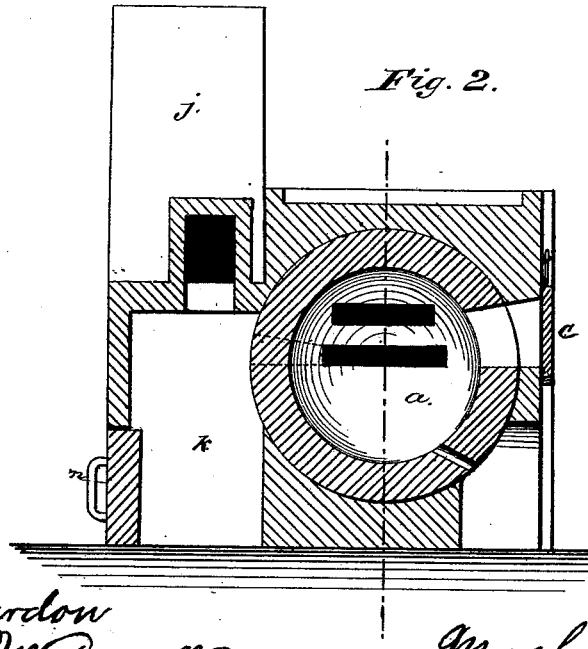


Fig. 2.



Witnesses:

John Bardon

John W. Darrall

Inventor:

Mosher A. Sutherland

2 Sheets—Sheet 2.

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Fig. 3.

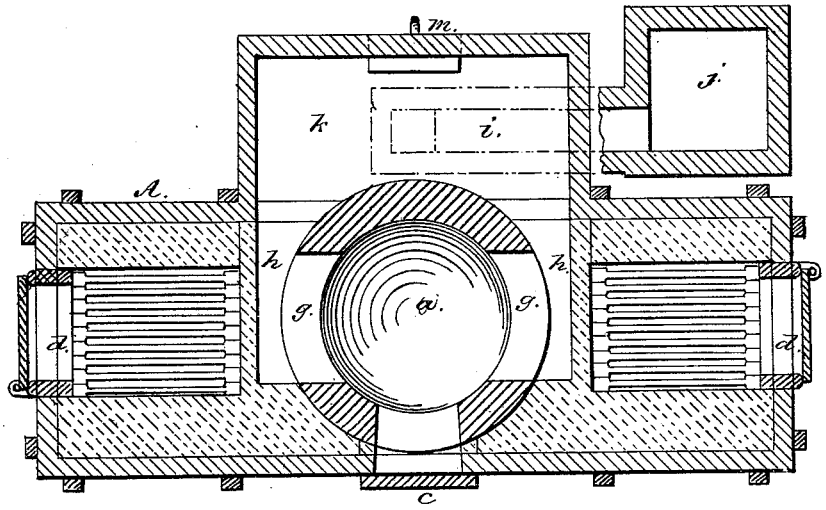
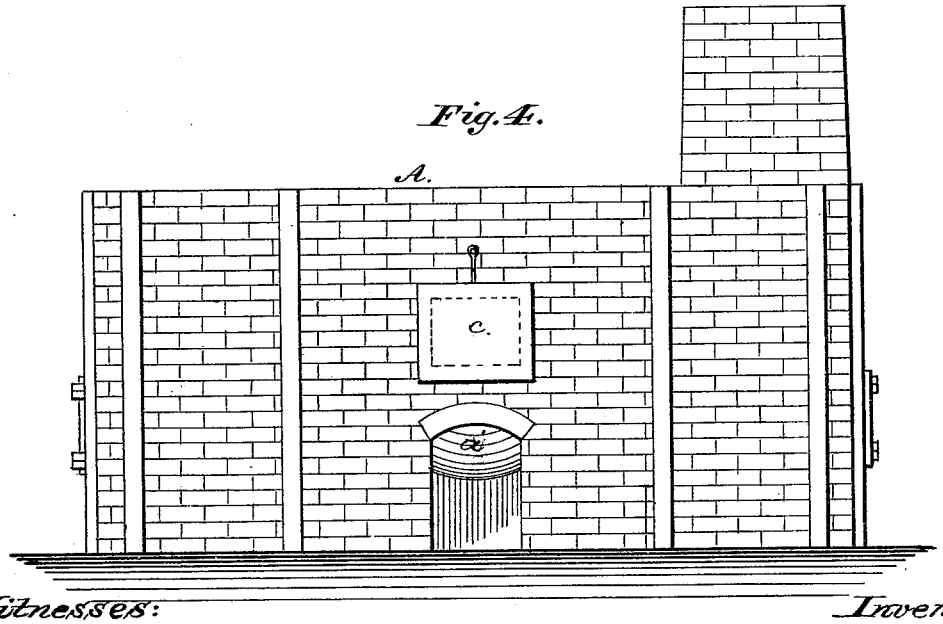


Fig. 4.



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UNITED STATES PATENT OFFICE.

MOSHER A. SUTHERLAND, OF NEW YORK, N. Y.

IMPROVEMENT IN METALLURGIC FURNACES.

Specification forming part of Letters Patent No. **186,178**, dated January 9, 1877; application filed July 10, 1876.

To all whom it may concern:

Be it known that I, MOSHER A. SUTHERLAND, of the city, county, and State of New York, have made certain new and useful Improvements in Furnaces for Melting Metals and Reducing Ores, of which the following is a specification:

My invention has reference to furnaces for reducing ores and melting metals; and the improvements consist in constructing the reducing-chamber with means for admitting more than one flame into the chamber at opposite points at the same time, for the purpose of creating an intense heat in the chamber by the reverberation of the flame, and with side exit-orifices below these inlet-orifices, for the uniform withdrawal of smoke from the chamber; and, also, in the combination, with this chamber and smoke-escape, and interposed between the two, of a depositing-chamber, all of which features will be hereinafter more particularly described.

In the accompanying drawings, Figure 1 represents a longitudinal vertical section of the furnace; Fig. 2, a transverse section through *x x*, Fig. 1; Fig. 3, a horizontal section through *y y* of Fig. 1, and Fig. 4 a side view of the furnace.

The letter A indicates the walls of the furnace. The reducing-chamber (indicated by the letter *a*) is represented as of a spherical shape in the present instance, and is built of fire-brick or other refractory material. Fire-boxes *d* are placed on two sides of the reducing-chamber, and communicate with the interior of the same by flues *b*, and by orifices *e*, formed in the wall of the chamber at a point above its equator, preferably near the top of the chamber. These orifices are placed at such relative angles to each other that the one flame, acting on the other after their discharge into the chamber, and not before, causes the two to reverberate and produce an intense heat in the chamber. At or about the equator of the melting-chamber, and formed in its walls below the flame-inlets *e*, are smoke-exits *g*, designed to permit the smoke to pass into flues *h* at the sides of the chamber, and thence into a condensing-chamber, *k*, interposed between the melting-chamber and the smoke flue and stack *i j*. The condensing-chamber communicates with the smoke-stack by an opening in the wall that separates the two, or by a flue, as represented in Fig. 3. The flues which conduct the flames to the reducing-chamber may come up flush with the inlet-orifices of the chamber.

It is hardly necessary here to state that the number of such flues may be more than two.

Instead of two fire-boxes one only can be used, provided the flame be conducted from this box to the plurality of inlets in the reducing-chamber by flues.

When fine or refuse scrap-iron is to be melted the reducing-chamber is brought to a white heat, after which the metal, together with suitable flues and other chemical agents, according to the kind and quality of the metal to be reduced, is introduced through the door *c*. The metal, when its reduction is completed, is drawn off at the tap *c'*. The condensing-chamber is interposed between the reducing-chamber and smoke-flue for the purpose of collecting any volatile oxides or salts of metals that would otherwise be carried off by the escaping smoke from the reducing-chamber. A large proportion of these salts is deposited in the condensing-chamber, and removed therefrom through the door *m*.

This furnace is applicable as a heating, melting, oxidizing, or reducing furnace, and as such has a wide application in the arts.

It will be observed that the flame from each fire pot is thrown down upon the lower portions of the furnace-bed, and there thoroughly mixed and evenly drawn off from each side.

The melting-chamber is substantially a globe, and this I deem the best form, though an approximation thereto will answer, and be in accordance with my invention.

I have shown the ordinary fire-chambers or gas-generators. Any other means for producing a volume of flame or flame-producing gas may be substituted, such as a carbonic-oxide generator or water-gas apparatus, or any oil or gas burner.

Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. A furnace for melting, oxidizing, and reducing, composed of a chamber in the form of a hollow sphere, with two or more downward-

ly-projecting gas-flues, located to opposingly impinge one flame against another within the chamber, and two or more draw-off flues to carry off the smoke, substantially as set forth.

2. In a furnace for oxidizing, melting, and reducing, the combination of a fire box or boxes, a reducing-chamber with induction-orifices above, located to opposingly impinge one flame against another within the chamber, and eduction-orifices below, and a smoke-escape, substantially as set forth.

3. In a furnace for oxidizing, melting, and reducing, the combination of a fire box or boxes, a reducing-chamber with flame-inlets above and smoke-exits below, a condensing-chamber, and smoke-escape, substantially as set forth.

MOSHER A. SUTHERLAND.

Witnesses:
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JOHN W. CARROLL.