

E. L. Seymour

*Sheet 1,
21 Sheets.*

Refining Iron & Steel.

N^o 85,701.

Patented Jan. 5, 1869.

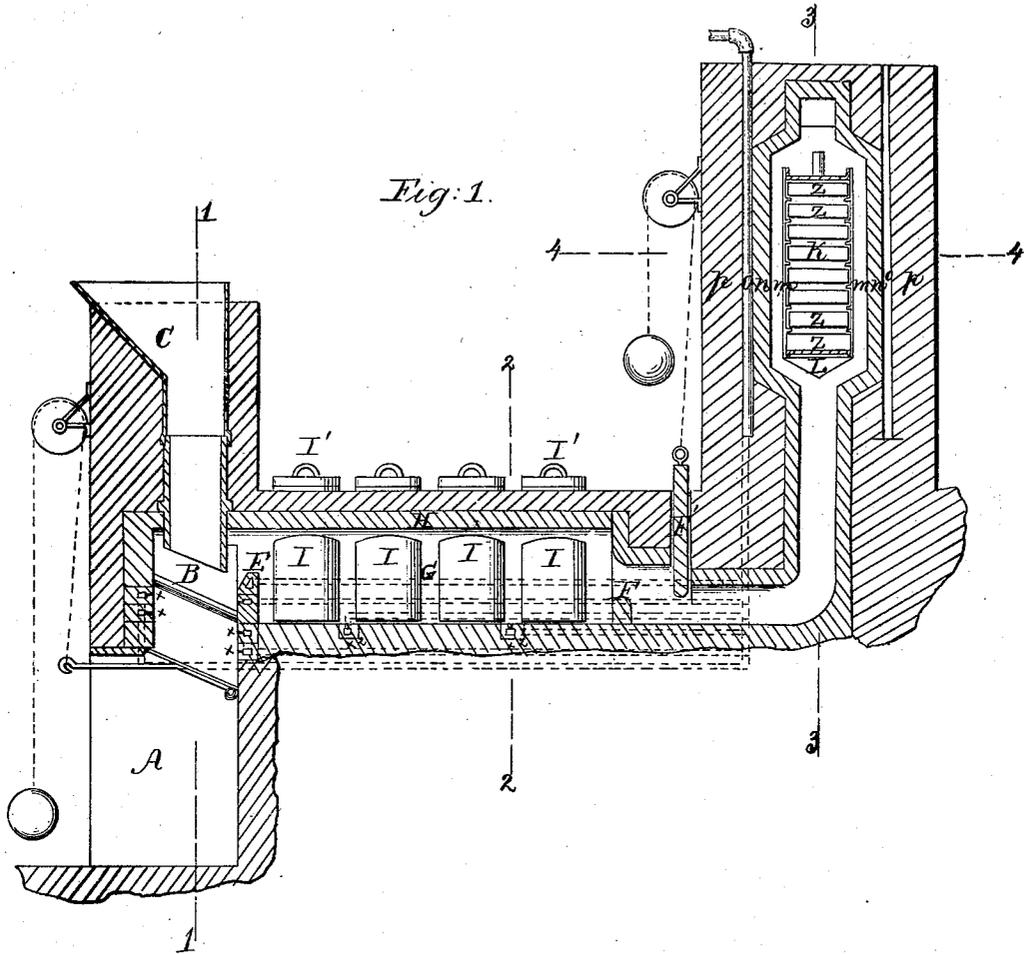
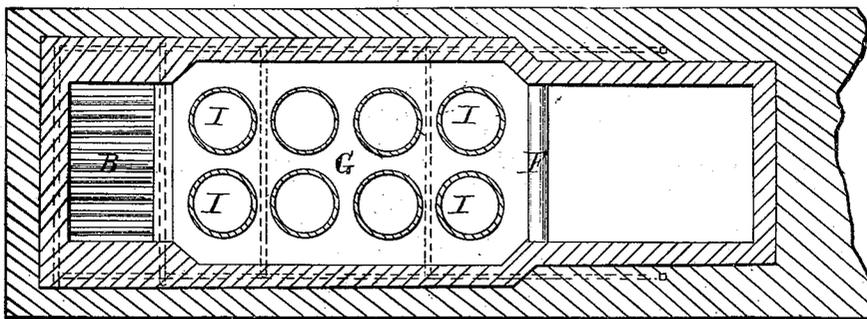


Fig. 2.



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Fig. 3.

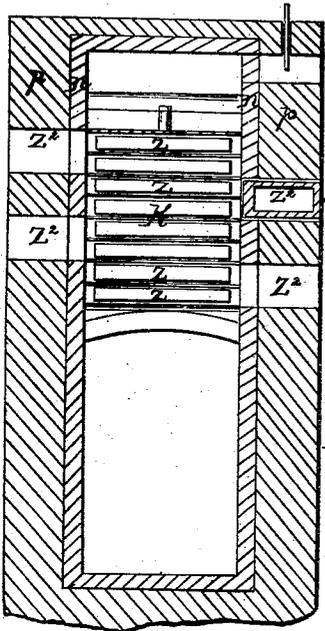


Fig. 4.

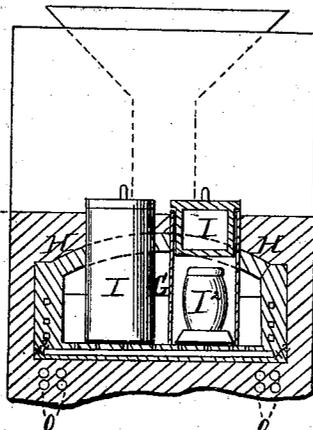


Fig. 5.

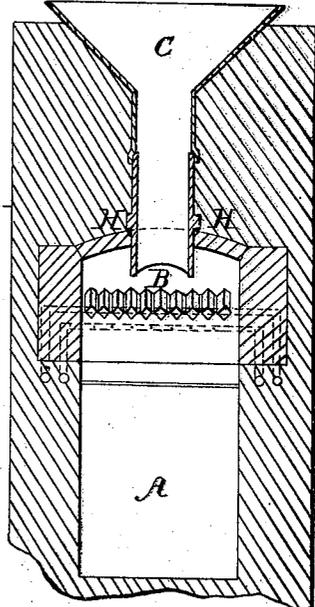
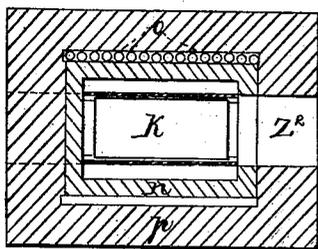


Fig. 6.



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EDWARD L. SEYMOUR, OF NEW YORK, N. Y.

Letters Patent No. 85,701, dated January 5, 1869.

IMPROVED FURNACE FOR PRODUCING STEEL AND OTHER METALS.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, EDWARD L. SEYMOUR, of the city and State of New York, have invented a new and improved Reverberating Furnace for the Production of Cast-Steel; and, though applicable to the production of other metals, I shall describe it in the following specification as having reference only to the making of the first.

My present invention, of which this specification embraces a full and clear description, relates, mainly, to the best form of construction and arrangement of a furnace for producing cast-steel upon a principle or system heretofore patented to me, under date of November 19, 1867, the main feature of which consists in preventing the access, either of air or of the gaseous products of combustion, to come in contact with the steel being made, or with the crucible or crucibles containing it.

In my improved furnace, to be presently described, I employ the heat passing from the chamber or furnace proper, where the steel is made, to roast or metallize the ore necessary for another charge of the crucibles.

For full explanation of this and other characteristics of my improved furnace, I will now refer to the accompanying drawings, of which—

Figure 1 represents a vertical longitudinal section.

Figure 2, a horizontal longitudinal section.

Figure 3, a vertical cross-section through line 3 3 of fig. 1.

Figure 4, a vertical cross-section through line 2 2 of fig. 1.

Figure 5 is a vertical cross-section through line 1 1 of fig. 1.

Figure 6 is a horizontal cross-section through line 4 4 of fig. 1.

Like letters of reference refer to the same parts in the different figures.

The combustion-chamber and main body of my furnace I propose to erect in the ground, its top being on a level with it.

A is the ash-pit, having a proper means of access for the removal of ashes, &c., as may be necessary, and so arranged as to be tightly closed meantime.

B is the grate, inclined, upon which the solid fuel is burned.

C is a hopper or "chute," into which the fuel is placed, and which is of such form as to feed it properly by the fuel's gravity to the fire.

In the brick-work, and flush with the inside back and front walls of the ash-pit, are two or more pieces of fire-clay or other proper material, X X, &c., extending across the breadth of the grate, and more, through each of which pieces there is an opening or conduit, opening from which, toward the grate, are series of smaller perforations, to deliver air as "blast" under the grate in diffused jets.

On each side of the ash-pit are two of these conduits, as shown, each supplied from separate pipes, or branches from one pipe, the latter again being sup-

plied with some convenient device to regulate the force of the flow, relatively, from them, according to the nature of the fuel and the rate of combustion required.

E is a bridge-wall, also having longitudinal openings or conduits and perforations, similar to X X, from which jets of much hotter air, similarly supplied, are projected above the grate and the incandescent fuel, to intensify the combustion, it being scarcely necessary to remark that, other things equal, as is the rapidity of combustion, so will be the intensity of the heat.

To secure the thorough combustion of the carbonic oxide or carburetted hydrogen that might, nevertheless, escape unconsumed, I have, at two or more places in the bottom of my furnace, jet-suppliers of heated air, similar in character to X X. These are marked X² in the figures.

The jet-holes, however, are smaller next to the supply-pipes and conduits or channels on either side, (for there is one on each side of my furnace to all these air-passages referred to,) and increasing in diameter toward the centre of the furnace, which plan properly regulates the distribution of the air-jets.

F is another bridge-wall, for more thoroughly effecting reverberation, as will be readily understood by experts, G being the reverberatory chamber.

The top of the reverberatory chamber is an arch, H, figs. 4 and 5, composed of, say, two or more pieces, properly fitted, of fire-clay or other refractory material.

The span of the arch may be from three to four feet, and, from its chord to its crown, say, six inches; the depth of the reverberatory chamber, say, eighteen inches; the arch, say, four to five inches thick; the exterior walling of the furnace being of common brick, and being arranged as previously explained.

Over the arch H may be, say, eighteen inches of ordinary brick-work, level on top. Through the top I insert, as permanent fixtures, what I call shields or jackets, I I, made of fire-clay or similar refractory material, extending to the bottom of the furnace-chamber. These are to prevent the contact of air or the products of combustion with the crucibles or their contents, as before mentioned.

Ordinarily, I propose to have, in each furnace, two longitudinal rows of these, say four in each row. In these are placed the crucibles, containing the ore, in a finely-granular state, metallized, by my plan, in part of the same furnace, and by a continuous process, as explained, mixed with a proper amount of carbon, to make the steel, as described.

X² X² are arranged to cross between a transverse row of the jackets.

Each of the jackets I I are closed by tompions, lids, or covers I', made hollow, for lightness, of similar material, and extending down to the arch H, to prevent the escape of heat, and to facilitate the removal and the replacing of crucibles, as I', fig. 4, shows, such an arrangement being a great improvement upon any system of side-openings, both for the comfort of the worker and quickness of work.

As the products of combustion pass from the furnace-chamber, they ascend, in contact with two sides of the chamber K, wherein I roast and metallize the ore.

This chamber is made of cast-iron, fire-clay, or other suitable materials, and is supported on an arch, L, (of angular form, in cross-section,) or on some equivalent support.

In this chamber, on proper ledges or angle-irons, are supported movable pans, Z Z, say, of cast-iron, and a small distance apart, in which the ore, in a granular state, is spread.

On each of the sides of this metallizing-chamber, not covered by the flues opposite its other sides, there are alternating doors or removable covers to apertures Z² Z², say, one opposite every three pans, through which to remove and replace the pans holding the ore to be metallized.

The drawings, in connection with these explanations, will make this arrangement clearly understood.

Above the metallizing-chamber the products of combustion may join in a single flue, leading to a chimney.

The walls of that portion of my furnace embracing the metallizing-chamber I purpose to have as follows:

The space on either side, say, four inches, marked *m*; wall of fire-brick, four and one-half inches, marked *n*; space for pipes to supply the different air-blasts, hot, two inches, marked *o*; sixteen-inch outer wall, of common brick, marked *p*.

Any convenient means may be employed for forcing the air to supply the different jet-blasts hereinbefore described, and it will be understood that the heated surfaces, along which the air-supply pipes and conduits or channels pass, will bring the current-air to a higher

and higher temperature, until it is united at the jet-holes described, at a temperature corresponding to the white-heat of iron.

Beyond the farther bridge-wall F there is a damper or gate, F¹, to regulate the flow of the products of combustion from the reverberatory chamber and its heat, and in the flue, beyond the metallizing-chamber, is another damper, F², (see fig. 3,) to regulate the heat of the latter.

As before mentioned, each air-supply pipe has its own regulating-cock, so as to govern the heat in this respect.

Having now fully described the features of my improved furnace for the production of cast-steel from the ore, &c.,

What I claim therein, and desire to secure by Letters Patent, is—

1. The employment of the jackets or crucible-receptacles, inserted from the top, with their tompons, lids, or covers, substantially in the manner and for the purpose explained.

2. In combination with a furnace, arranged with crucible-chambers, substantially as described, the metallizing-chamber K, arranged in relation to it, substantially as shown, and constructed substantially as described, for the purposes explained.

3. The jetting-air conduits X² in the bottom or floor of the reverberatory chamber of my furnace, located and employed as described, for the purpose explained.

E. L. SEYMOUR.

Witnesses:

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WM. FILENE.