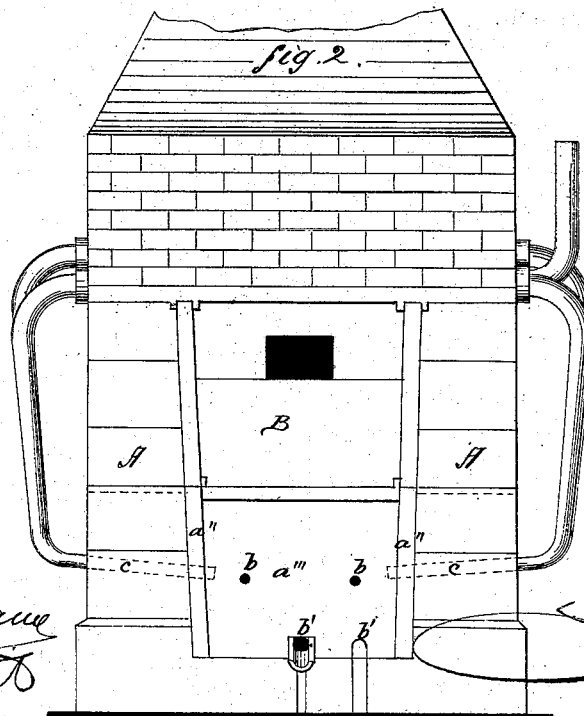
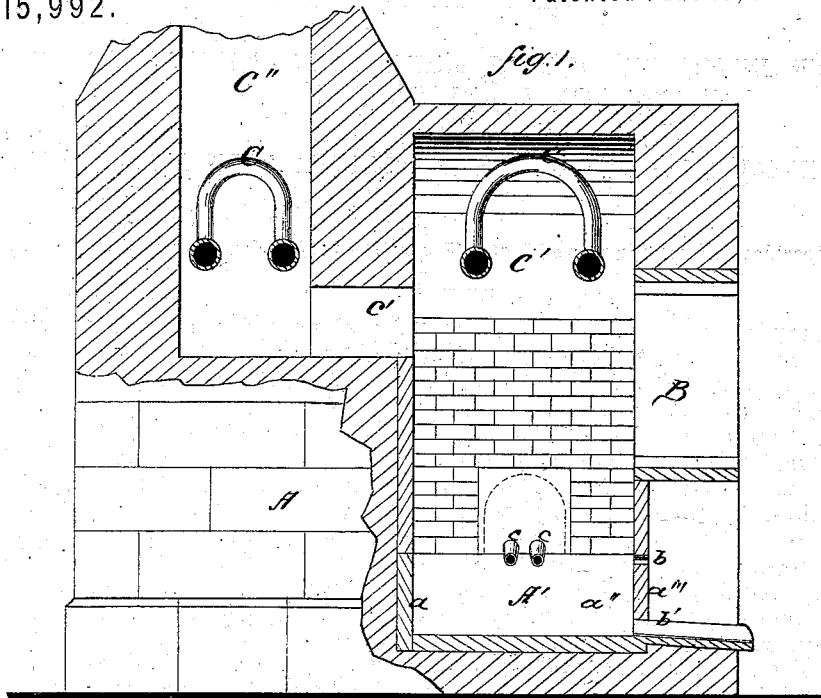


THOMAS TRAFFORD.

Improvement in the Manufacture of Cast Steel Direct from the Ore.

No. 115,992.

Patented June 13, 1871.



Witnesses:

Victor Hagmann
C. A. Petrus

Inventor:

Th. Trafford
per Allen & Co
Attorneys.

UNITED STATES PATENT OFFICE.

THOMAS TRAFFORD, OF DUBLIN, MARYLAND, ASSIGNOR TO HIMSELF,
JOHN S. BROWN, AND SAMUEL A. WORTH.

IMPROVEMENT IN THE MANUFACTURE OF CAST-STEEL DIRECT FROM THE ORES.

Specification forming part of Letters Patent No. 115,992, dated June 13, 1871.

To all whom it may concern:

Be it known that I, THOMAS TRAFFORD, of Dublin, in the county of Harford and State of Maryland, have invented a new and Improved Process for the Manufacture of Cast-Steel Direct from the Ore; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawing of a furnace which I have thus far used to carry out my process.

Figure 1 is a vertical section of the furnace, and Fig. 2 is a front elevation of the same.

This invention consists in a new and improved process of manufacturing cast-steel and refined iron direct from the ore.

In the drawing, A is a bed of masonry; A', the fire-box resting on the stone-work, the fire-box being composed of a cast-iron back plate, a, side plates a'' a'', and front plate a''', the bottom plate being of fire-stone. The dimensions of the fire-box may conveniently be arranged at a breadth of twenty-three inches and a length of twenty-eight inches at the bottom, and a height of twenty-five inches, the sides flaring outward at about the rate of three inches in every twenty-five. The slag-holes are shown at b b, and the tapping-holes at b' b'. The tuyeres c c are inclined downward from outside to inside, as shown in Fig. 1, so that the hot-blast strikes the fire in a slanting direction.

The advantage of this form of blast is that it separates, holds liquid, and decarbonizes the ore much better than any other.

B is the charging orifice, which is only twelve inches above the tuyere in a furnace of the described size. The mass of ore and coal is from twelve to fifteen inches deep above the molten metal in the fire-box.

In furnaces of the ordinary construction this mass, called the "stack," varies from thirty to seventy-five feet in height.

C are the hot-blast pipes. C' is an arch of masonry over the furnace. C'' is the chimney, into the bottom of which the arch C' opens by the orifice c'.

The fire being kindled, the furnace is first filled with coal; then ore, partially pulverized,

and coal are added at intervals, the blast being on from the start. The separation between the iron and the slag begins almost immediately. When the tuyere-irons clog with slag that indicates that the ore is being thrown in too fast. In order to remedy this the supply of ore is diminished, quartz is added as a flux, and slag drawn off until the tuyeres are clear and show a bright light, which indicates that the process is going on properly. When the supply of ore is insufficient the flame presents a yellowish appearance, and a powder resembling dust rises with it and may be seen at the top of the chimney. This shows that more ore should be thrown in, and the supply should not cease until the flame changes to the bluish color again. The process is carried on in this way until the fire-box is filled with molten metal or the required amount obtained. Then decarbonization takes place by slacking off the ore, increasing the supply of quartz in order to keep the slag as light as possible, and blowing as long as the tuyere can be kept bright. When the decarbonization has progressed to the required degree the tuyeres become clogged and will not remain bright. Thereupon the furnace is tapped and the steel drawn off into molds. The tapping-holes are then stopped up and the process resumed, as before explained. The result is the conversion of ore directly into cast-steel at one operation and in single fire-box.

By increasing the quantity of fuel and decreasing the quantity of ore and the force of the blast refined iron will be produced.

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

The process herein described of manufacturing cast-steel or refined iron direct from ore.

To the above specification of my invention I have signed my hand this 13th day of December, 1869.

THOMAS TRAFFORD.

Witnesses:

CHAS. A. PETTIT,
T. P. SIMPSON.