

T. COOPER.
Refining Iron.

No. 1,733.

Patented Aug. 25, 1840.

Fig. 1.

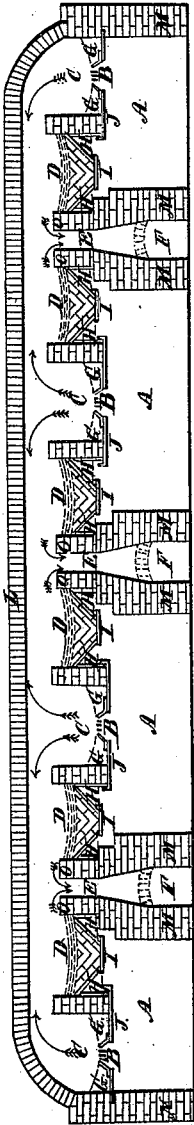


Fig. 3.

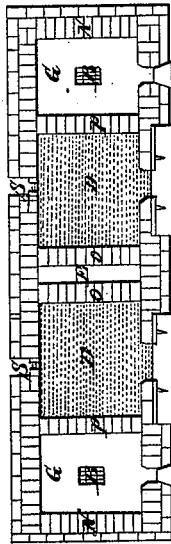


Fig. 4.

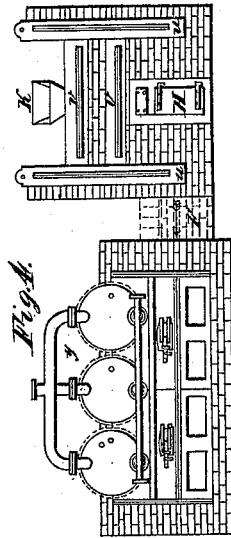


Fig. 2.

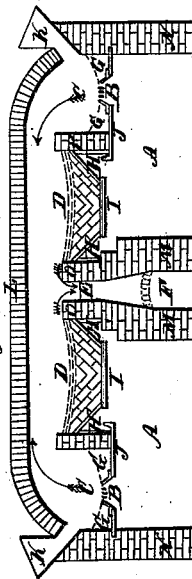


Fig. 6.

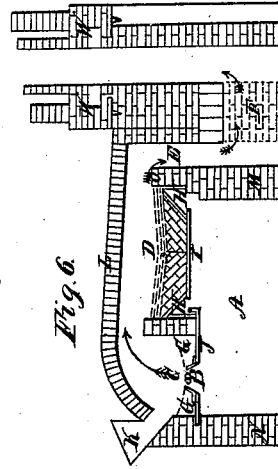


Fig. 5.

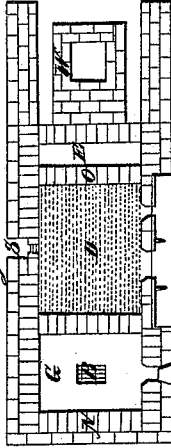
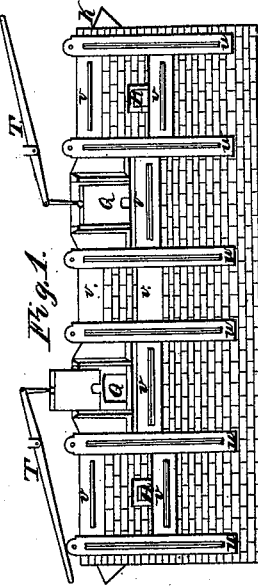


Fig. 1.



UNITED STATES PATENT OFFICE.

THOMAS COOPER, OF NEW YORK, N. Y.

IMPROVEMENT IN PUDDLING-FURNACES FOR MANUFACTURING IRON WITH ANTHRACITE COAL.

Specification forming part of Letters Patent No. 1,733, dated August 25, 1840.

To all whom it may concern:

Be it known that I, THOMAS COOPER, of the city of New York, in the county and State of New York, have invented a new and improved furnace for scrapping, puddling, billeting, and heating iron and other metals, and smelting lead and other ores with anthracite and other coals; and I do hereby declare that the following is a full and exact description.

The nature of my invention consists in providing a reverberatory furnace with a hearth, space, or dead-work around the grate or fire bars, by which the brick-work of the fire-chamber is protected from intense heat, and the clinker is easily removed; with a vertically-descending flue when applied to puddling, scrapping, billeting, or heating iron with anthracite coal, and in the combination of two or more heating-bottoms and fire-chambers in one furnace.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation, reference being also made to drawings hereunto annexed, of vertical and horizontal views and sections of the furnace, laid down upon a scale of one-fourth of an inch to the foot.

I construct a reverberatory furnace of good and substantial masonry, and such parts as are exposed to great heat I make of fire-brick or other material that will resist the action of the heat, the whole being bound firmly together with buckstuffs, clamps, and binders.

The double furnace, of which Figure 1. is a front elevation, Fig. 2 a vertical and longitudinal section, and Fig. 3 a horizontal plan, comprises or consists of coal-chambers or chambers of combustion C C, each of which has placed in the center of its floor a small grate or tuyere, B, surrounded by a hearth or dead-work, G, made with ashes or other non-conductor of heat, thereby protecting the side walls from the intense heat that is generated in the center of the mass of coal or that part of it immediately over the grate. To form the bottoms of the coal-chambers, and also to support the bridge-walls P P, between these and the puddling or heating chambers, I place cast-iron plates J J, extending from the front to the rear wall, being let into each wall to the depth of from four to six inches. A space is left in these plates for the grate or tuyere. The chambers are supplied with fuel by hoppers

K K, and each has a door, R, in front for regulating the fire. Puddling or heating chambers D D each have a supply-door, Q, in front, raised by a lever, T, and an opening, S, in the rear to let off the cinder. To form the bottoms of the puddling-chambers, I place angular cast-iron hollow bridges H H, connected with and partially resting upon a cast-iron plate, I, the whole extending from front to rear, and being let into the walls in the same manner as the plates under the coal-chambers. Spaces or ash-pits A A are arranged under the coal and puddling chambers. These spaces receive and heat the air-blast before it passes to the coal-chamber, and each has a door opening to it placed in the end wall N of the furnace. This door also serves, by means of a valve placed in it, to supply the coal-chamber with air when the blower is not in operation. A vertically-descending flue, E, leads to and connects with a horizontal flue, F, which may pass either under a set of boilers for the purpose of generating steam, or into a chimney-stack placed in the rear, opposite the flue. A damper is placed either under the boilers or on the chimney, that the workman may graduate the draft to the blast. The furnace is covered with a proper crown, L, and secured by buckstuffs or clamps U and iron plates or binders V V.

As further illustrations of my improved furnace, I have added an end elevation of a furnace, (see Fig. 4,) showing the ash-pit and valve-door X and the connection of the horizontal flue F with a set of steam-boilers, Y; a vertical and longitudinal section of a single furnace, (see Fig. 5,) with the flue passing into a chimney-stack, W; a horizontal plan of a single furnace, (see Fig. 6;) and a vertical and longitudinal section of a combination of several chambers, heating-bottoms, and flues, (see Fig. 7,) like parts in all these plans being designated by the same letters of reference.

—The furnace, before being used, should be dried with a moderate heat and rendered perfectly free from moisture. After charging it with coal, close the doors of the ash-pit and force into the space A a strong and steady current of air from a rotary fan or other effective blowing apparatus. In the pipe or tube through which the air passes to the furnace from the blower a throttle-valve should be placed, with its axis extending upward to the

height of the furnace, and surmounted by a small arm, by which the workman may regulate the blast. The air from the blower may enter the ash-pit at any convenient point, care being taken to make the passage sufficiently large to permit the air to pass freely.

It is important that the blast should be heated to the greatest degree compatible with safety to the iron bottoms and grates of the chambers. This may be effected, in a great degree, by surrounding that part of the horizontal flue that is without the furnace, and also the lower part of the chimney-stack, if steam-boilers are not used, with a parallel wall of masonry at a sufficient distance from the flue to permit the blast, before it enters the ash-pit, to circulate freely around the flue, either in the open space or through pipes arranged within it. The cinders should be assisted to flow out at the opening S by placing coals within the recess, secured or kept there by a cross-bar and plate

adapted to this use. In other respects the furnace is worked like the ordinary puddling or scrapping furnace.

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

1. Constructing the floor or bottom of the fire-chamber with a grate in the center, as set forth, surrounded by a dead-work for protecting the brick-work of the chamber, all as described.

2. Constructing the furnace with a vertical descending flue, in the manner and for the purpose set forth.

3. Combining two or more furnaces constructed with grates and dead-work and having a descending flue, all as described.

THOS. COOPER.

Witnesses:

JAS. J. MAPES,
WM. A. COX.