S. CADDICK.

Burning Fuel in Metal-Working Furnaces.

No. 201,223. Patented March 12, 1878.

Fig. 1.

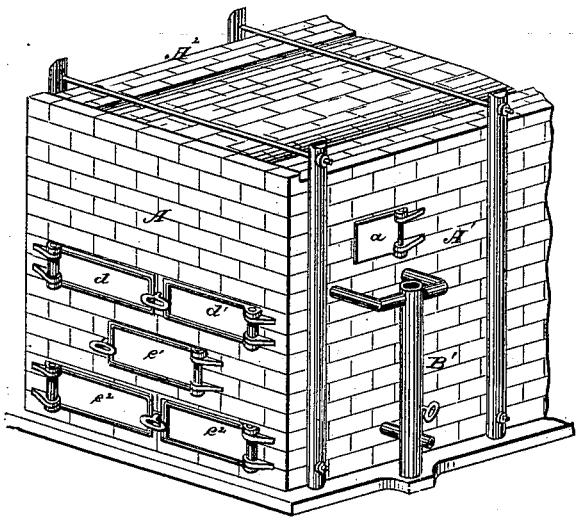


Fig. 3.

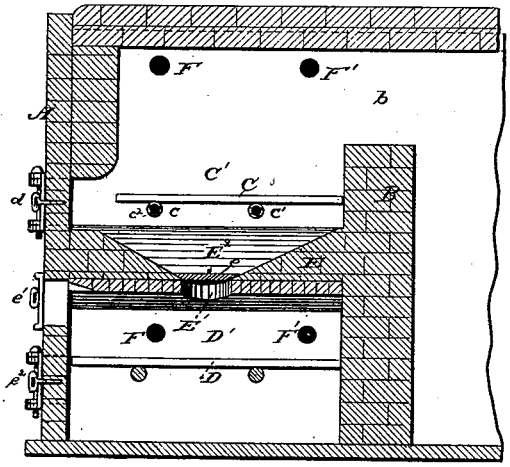
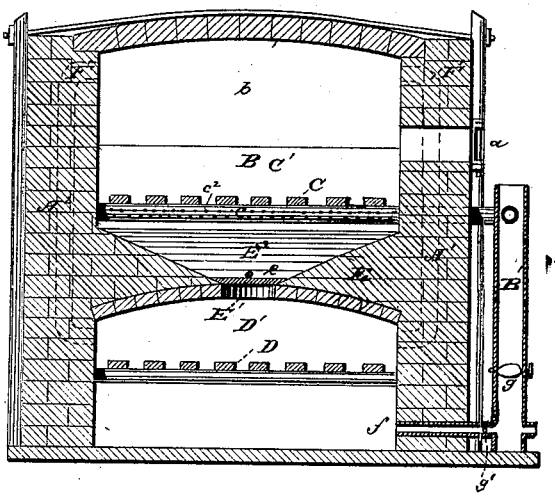


Fig. 2.



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SAMUEL CADDICK, OF PEMBROKE, MAINE.

IMRROVEMENT IN BURNING FUEL IN METAL-WORKING FURNACES.

Specification forming part of Letters Patent No. **201,223**, dated March 12, 1878; application filed October 23, 1877.

To all whom it may concern:

Be it known that I, SAMUEL CADDICK, of Pembroke, in the county of Washington and State of Maine, have invented a new and useful Improvement in Burning Fuel in Metal-Working Furnaces; and I do hereby declare that the following is a full and exact description of the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

The object I have in view is to provide puddling, heating, reheating, or other metal furnaces with means for consuming the smoke and promoting combustion of the gases, which will be simple in construction and efficient in operation; and my invention therein consists, mainly, in the method of burning fuel and consuming the smoke and gas resulting from the combustion of the same in a metallurgic furnace, consisting in burning the partly-consumed coals discharged from the main grate in cleaning in a supplementary fire-box, admitting the blast into the supplementary fire-box, and forcing, by the blast, the hot gases of combustion generated in the said supplementary fire-box, together with the surplus heated air, into the main fire-box above the grate; and, further, in the apparatus or means for carrying out this method, all as more fully hereinafter explained.

To enable others skilled in the art to make and use my improvement, I proceed to describe the same, having reference to the drawings, in which—

Figure 1 is a perspective view of a portion of a puddling, heating, or reheating furnace embodying my invention; Fig. 2, a vertical cross-section, and Fig. 3 a central longitudinal section, of the same.

Like letters denote corresponding parts.

A represents the end wall, and A^1 A^2 the side walls, of the furnace, the furnace-door being shown at *a* as situated near the top of the side wall A^1. B is the bridge-wall, which extends nearly to the top of the side walls, leaving the throat *b* above it, through which the products of combustion pass into the iron chamber. C is the fire-grate, which is supported near the top of the bridge-wall on hollow supports *c* c^1. These supports, if hollow, are connected with the blast-pipe B′, and have perforations c^2 for admitting the air or blast under the grate C. The fire-box in which the grate C is placed is shown by the letter C′. In the end wall A, doors *d* *d*′ open into the fire-box C′, and give admittance both to the space above and below the grate C.

In the bottom of the furnace is situated a supplementary fire-box, D′, having a grate, D, (which I term a "supplementary grate,") suspended about centrally therein. The two fire-boxes C′ D′ are separated by a horizontal dividing-wall, E, supported by an arch, and this partition has a central opening, E^1, connecting the fire-boxes. The upper surface of the wall E is sloped from all sides toward the opening E^1, forming a hopper, E^2. The opening E^1 is closed by a damper, *e*, which is adapted to be withdrawn from such opening and placed in position over it by any suitable means. A door, e^1, in the end walls opens into the supplementary fire-box above its grate, and ash-pit doors e^2 open below such grate. A pipe, *f*, connected with the blast-pipe B′, enters the side of the supplementary fire-box below the grate. F F′ are pipes opening out of the supplementary fire-box, rising through the side walls A^1 A^2, and entering the sides of the fire-box C′ near enough to the top of the side walls to be above the fire on the grate C. These pipes F F′ are preferably four in number, and may either open out of the fire-box D′ in the side walls, near the corners, or in the arch of the dividing-wall E. The blast-pipe B′ is provided with a valve, *g*, for shutting off the blast from the fire-box C′, and the pipe *f* has a valve, *g*′, for closing the blast-entrance into the supplementary fire-box.

The operation of my device is as follows: The fire is built on the grate C, and the opening E^1 covered by its damper, if required. When it is desired to clean the grate C, the damper *e* is withdrawn from the opening E^1, and the ashes and partially-consumed coals which are raked down fall through such opening into the supplementary fire-box, the ashes dropping through the grate D, the bars of which are closer together than those of the upper grate, and the coals being supported by such grate. The damper *e* is then replaced, if required, over the opening E^1. The blast in the supplementary fire-box supports the com-

bustion of the coals on the supplementary grate, and the hot gases generated by this combustion are forced up the pipes F F′, and discharged with the hot-blast into the smoke and unconsumed gases rising from the fire on the grate C, igniting such smoke and gases, and causing a complete combustion thereof. Every time the grate C is cleaned a new lot of partly-burnt coals will be thrown onto the grate D, and the ashes from this grate are removed, as often as is found necessary, through the doors e^2. By burning the coal in this manner a great saving in fuel is made, since more of the coal will be reduced to ashes and the smoke will be more perfectly consumed.

By my apparatus the main or upper grate is also protected from the intense heat which would be caused by passing the products of combustion from the supplementary fire-box directly through it.

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

1. The method of burning fuel and consuming the smoke and gases resulting therefrom in a metallurgic furnace, consisting in burning the partly-consumed coals discharged from the main grate in cleaning in a supplementary fire-box, admitting the blast into the said supplementary fire-box, and forcing by the blast the hot gases of combustion and surplus heated air from such supplementary fire-box into the main fire-box above the grate in the same, substantially as described.

2. In a metal-working furnace, the combination, with the main fire-box, of the supplementary fire-box placed directly below the same, and adapted to receive the coals and ashes therefrom, and pipes connecting the said supplementary fire-box with the main fire-box above the grate, whereby the products of combustion and surplus heated air from the supplementary fire-box are discharged into the main fire-box above its grate, substantially as and for the purposes set forth.

3. In a metal-working furnace, the combination, with the main fire-box, of the supplementary fire-box situated directly below the same, a horizontal dividing-wall, having central opening, and a damper for closing such opening, substantially as described.

4. The combination, with the fire-box C′, of the supplementary fire-box D′, situated directly below the same, and receiving the coal and ashes therefrom, the blast-pipe *f*, leading into the supplementary fire-box, and the pipes F F′, connecting the two fire-boxes, substantially as described and shown.

This specification signed and witnessed this 17th day of September, 1877.

SAMUEL CADDICK.

Witnesses:

GEORGE A. HENDERSON,

ALFRED MILLS.