J. WESTERMAN.

Reverberatory Furnaces.

No. 133,688. Patented Dec. 3, 1872.

Fig. 1.

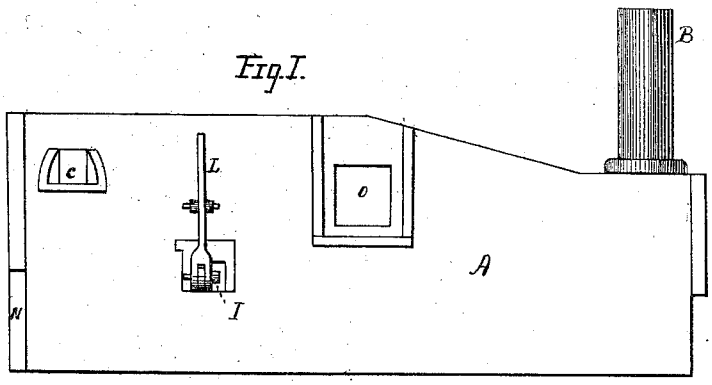


Fig. 2.

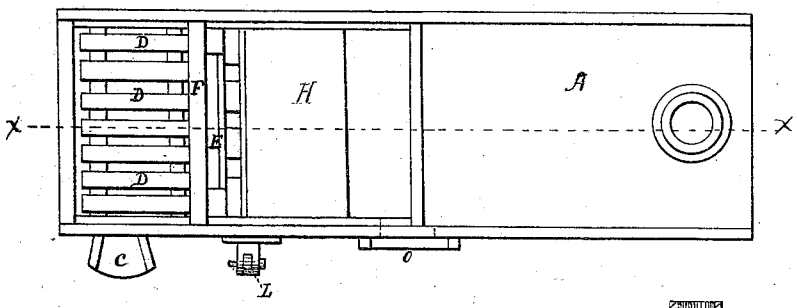


Fig. 3.

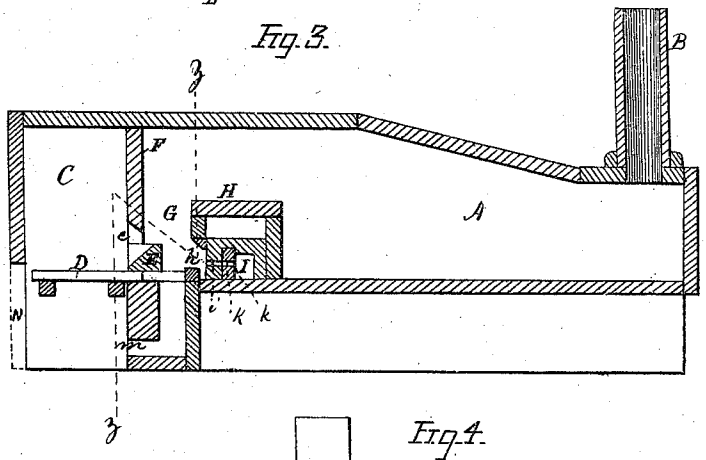
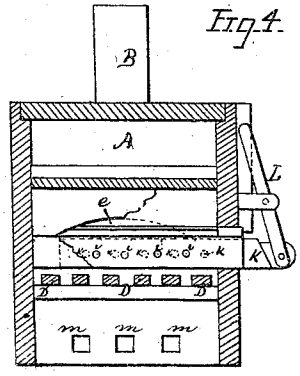


Fig. 4.



Witnesses

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UNITED STATES PATENT OFFICE.

JAMES WESTERMAN, OF SHARON, PENNSYLVANIA.

IMPROVEMENT IN REVERBERATORY FURNACES.

Specification forming part of Letters Patent No. **133,688**, dated December 3, 1872.

To all whom it may concern:

Be it known that I, JAMES WESTERMAN, of Sharon, in the county of Mercer and State of Pennsylvania, have invented certain new and useful Improvements in Furnaces; and I do hereby declare that the following is a full, clear, and exact description thereof, that will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawing and to the letters of reference marked thereon which form a part of this specification.

My invention relates to improvements in furnaces for puddling, boiling, or heating iron or steel, &c.; and the invention consists in the the construction and arrangement of devices whereby the carbon or smoke is readily and completely consumed, while at the same time the metal is more readily decarbonized, purified, and refined, all as hereinafter more fully set forth.

In the accompanying drawing, Figure 1 is a side elevation of a furnace suitable for puddling or heating iron or steel; Fig. 2 is a plan view with part of the top removed to show interior; Fig. 3 is a longitudinal section on the line *x x*, Fig. 2; and Fig. 4 is a vertical cross-section on the line *z z*.

A represents the furnace in which the metal is puddled or heated; B, the smoke-stack leading from furnace A. C is the fuel-chamber, the fuel being introduced through the hole *c*. D is the grate. E is the grate-wall, built with an angular or beveled face, so as to prevent the fuel from entering or falling into the combustion-chamber. F is a wall built between the fuel-chamber and the combustion-chamber, an arched passage, *e*, being formed between it and the grate-wall E of sufficient capacity to allow the smoke and flames to pass into the combustion-chamber G. This arched passage or opening may be increased or lessened as found desirable or convenient. H is the bridge-wall of the furnace, against which the products of combustion strike in passing from the fuel-chamber. On the face of this wall an offset or cavity, *h*, is formed for the purpose of breaking up or diffusing the current of smoke coming from the burning fuel. While the current is thus diffused a supply of oxygen is introduced and thoroughly combined with the smoke and other inflammable gases, enabling them to ignite more readily and pass upward and over the bridge into the body of the furnace in shape of flame, thereby insuring complete combustion of the carbon of the fuel and at the same time affording sufficient oxygen for decarbonizing, refining, and purifying the metal in the furnace. This I accomplish by means of a valve-chamber arranged within the bridge H, having a flue or opening, I, communicating with the outer air. K is a valve having a series of holes, *k*, pierced through it, which corresponds with a series of holes, *i*, pierced through the wall of the valve-chamber and leading into the recess *h* of the combustion-chamber. This valve K is so arranged within the valve chamber that it may be moved back and forth by means of a lever, L, pivoted to the outer wall of the furnace, as shown by Figs. 1, 2, and 4 of the drawing. *m m m* are flues leading to the combustion-chamber for the purpose of cleaning it out when necessary. N is a movable door or gate for the purpose of removing the ashes and cleaning the grate-bars when necessary. O is the charging-door of the furnace.

The operation of my improved furnace is as follows: The furnace is charged with the metal to be operated on through the door O or any other suitable opening. Fire is kindled on the grate D and supplied with fuel through the hole *c* or other similar or suitable opening. The smoke and other products of combustion, after filling the chamber C, will pass in a current through the opening *e*, and, striking against the wall of bridge H, become diffused in the cavity *h*. At this point, through the openings *i k* and I, air is admitted. The oxygen, combining with the carbon gases, incites combustion, resulting in a flame, which completely consumes the smoke and increases the heat within the furnace, at the same time introducing a sufficiency of oxygen for the purpose of purifying and decarbonizing the metal under treatment in the furnace. When the fuel in the fuel-chamber has become hot enough to burn without generating smoke, the valve K may be adjusted, by means of the lever L, so as to decrease the volume of air admitted to the combustion-chamber, or shut it off altogether, if desired; and when fresh fuel is added to the furnace the valve can again be adjusted to admit the air necessary to insure complete combustion.

To those skilled in the art further description of the operation of my improved furnace is deemed superfluous; and it will be obvious that the devices which I have herein shown and described may be applied to all furnaces of this or similar construction where the consumption of smoke and a thorough combustion and utilization of all the heat-producing elements of the fuel are considerations of importance.

What I claim as my invention is—

1. A furnace having the walls E and F, constructed, substantially as described, with passage *e*, operating in combination with a bridge-wall having a cavity or recess, *h*, and air-passages *i*, for the purpose specified.

2. The adjustable valve K, constructed, substantially as described, with air-passages *k*, operating in combination with the openings *i* and I, substantially as and for the purpose specified.

3. The combination of the chambers C and G with walls E, F, and H, and valve K, constructed and operating substantially as and for the purpose specified.

In testimony that I claim the foregoing I have hereunto set my hand.

JAMES WESTERMAN.

Witnesses:

A. B. RICHMOND,

ROE REISINGER.