

L. RYAN.

CONSTRUCTION OF NECKS OF PUDDLING FURNACES.

No. 176,410.

Patented April 18, 1876.

Fig. 2.

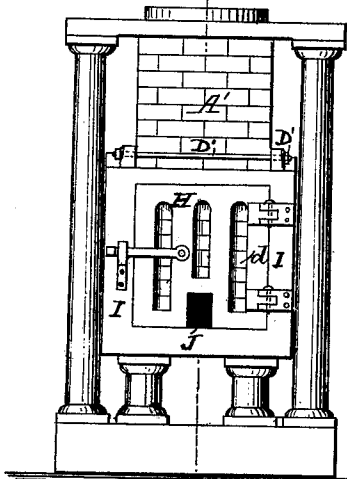


Fig. 1.

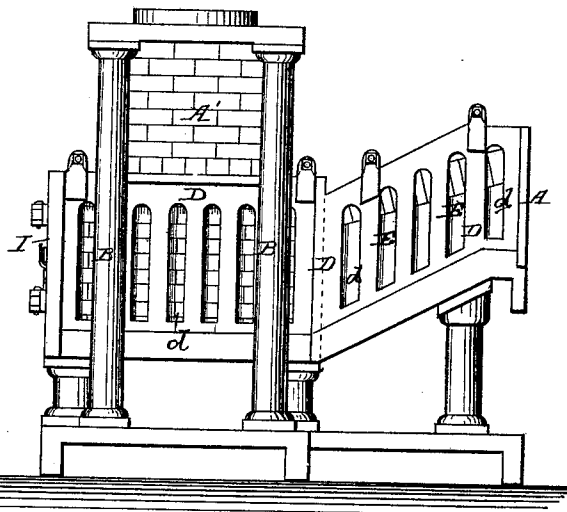


Fig. 4.

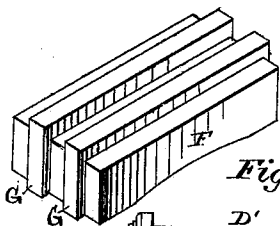


Fig. 5.

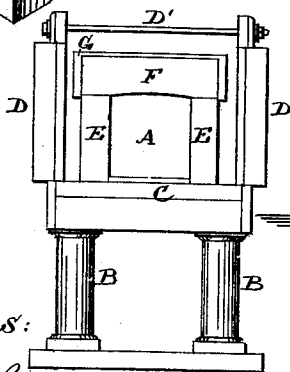
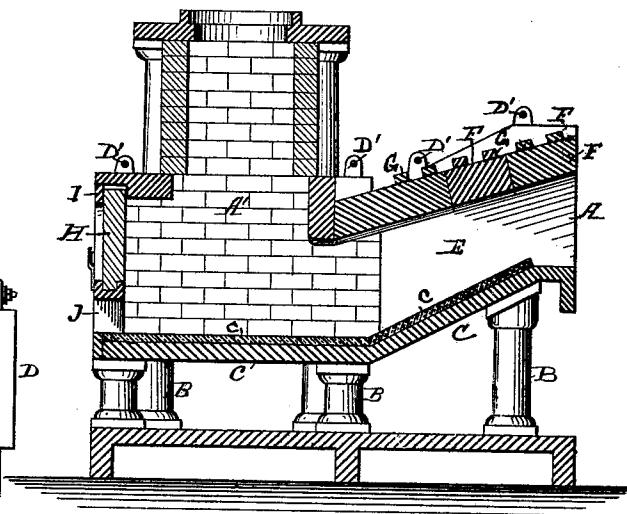


Fig. 3.



Witnesses:

A. G. Stuart
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Inventor:

Lucas Ryan
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UNITED STATES PATENT OFFICE.

LUKE RYAN, OF SHARON, PENNSYLVANIA, ASSIGNOR OF ONE-HALF HIS
RIGHT TO GEORGE WESTERMAN, OF SAME PLACE.

IMPROVEMENT IN CONSTRUCTION OF NECKS OF PUDDLING-FURNACES.

Specification forming part of Letters Patent No. **176,410**, dated April 18, 1876; application filed
July 26, 1875.

To all whom it may concern:

Be it known that I, LUKE RYAN, of Sharon, in the county of Mercer and State of Pennsylvania, have invented certain new and useful Improvements in the Construction of Furnaces for puddling, boiling, and heating iron; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form part of this specification.

My invention relates to that portion of reverberatory furnaces commonly known as the neck and square—that is, the portion which leads from the furnace to the smoke-stack, and through which the slag or cinder passes as it flows out of the furnace. Heretofore this portion of the furnace required to be renewed very frequently in consequence of the action of the ignited gases and molten cinder upon the fire-brick of which it is constructed. The molten cinder and gas have a most destructive effect on the fire-brick, eating it away and thereby enlarging the diameter or interior surface space of the neck, and rendering the furnace useless for the purpose of puddling or boiling iron in a very short time, a week or ten days being about as long as such a furnace can be used without a renewal or repair of the neck. It has also been the custom heretofore to build what is called the square or lower end of the flue of solid walls of fire-brick having only a small opening or notch for the cinder to flow out of, which soon became choked up with the material, and as the latter accumulates in the neck, it interferes with the draft and necessitates the removal of the bricks on the end wall of the furnace in order to get at the cinder and rake it out. The removal or repair of the neck and pulling out and rebuilding of the walls necessitates large outlay in labor and material, and much valuable time is consumed in repairs, during which the furnace stands idle.

My invention is designed to remedy these objections; and the invention consists in constructing the walls and roof of the neck with blocks of sandstone instead of fire-brick, as heretofore, the sandstone blocks being clamp-

ed or held together with metal bands, as hereinafter more fully set forth. It also consists in the use of a hinged door lined with fire-brick or other refractory material, said door being located in the cinder-notch end of the furnace, so that access can at all times be had to the interior of the neck without having to tear down the wall, as heretofore.

In the accompanying drawings, Figure 1 is a side elevation of the neck and square or lower portion of the flue of a puddling-furnace of my improved construction. Fig. 2 is an end view of the same, showing the hinged door. Fig. 3 is a longitudinal vertical section, showing the interior. Fig. 4 is a detached view, in perspective, of one of the stones of which the neck is formed. Fig. 5 is an end view, showing the opening into the neck of the furnace.

Referring to the parts by letters, A represents the neck of the furnace, and A' the square or lower end of the flue or smoke stack. Instead of being built of solid walls founded in the ground, as usual in the construction of this portion of the furnace, I support it above the ground by columns, so that a free circulation of air is maintained around the walls, and the escape of the heat, therefore, is thereby promoted. By this method of construction I also effect a great saving in fire-brick and clay. C is a plate of metal, which forms the bottom or floor of the neck A and square A', the metal being protected by a lining of sand, c. D D are metal plates, which form the casing or outer walls of the neck and square. These plates have openings d through them to facilitate the escape of the heat from the refractory material of the walls of the furnace. The openings d may be of any suitable or convenient form. The neck proper is formed of blocks of sandstone of suitable size and form, preferably of the form shown by Figs. 4 and 5, the side walls being formed of rectangular blocks E, and the roof by blocks F, slightly arched on the under side, the blocks F resting on the upper sides of the blocks E, and all being properly cemented together. G represents a series of metallic bands or bars having their ends bent at right angles. They are made to fit the outside of

the blocks F, as clearly shown by Fig. 4 of the drawings, so as to clamp and hold them together and prevent them cracking or breaking apart through the expansion and contraction consequent on the heating up or cooling of the furnace.

I have found that a sandstone neck constructed in the manner herein described, and clamped with metal bands, will withstand the action of the gases of the puddling-furnace without becoming disintegrated or crumbling away, and that the passage of the molten cinder through it does not eat or plane away its sides as it does when fire-brick is used, the effect being that the cinder adheres to the sandstone and protects it instead of cutting away its surface. As a result, therefore, the surface space or draft capacity of the neck is never increased by the destruction of the surface of the interior walls. The walls of the square A' may also be built of sandstone blocks, but I prefer to construct this part of the furnace of fire-brick, inclosed by the open frame plates D, as shown in the drawings. The plates D are connected and braced by rods D', having threaded ends and nuts so that they can be tightened up or unscrewed and removed when required.

H represents a hinged metallic door set in a metallic frame, I, which forms the flue end of the furnace. The door H is made like a frame, so as to hold and sustain a lining of fire-brick or other refractory material, and an

opening, J, is formed through it and its lining for the passage of the cinder. The door-plate is also made with openings through it, like the plates D, to facilitate the escape of the heat from the walls. With a door of this construction access can at all times be had to the interior of the neck and square, and should the cinder accumulate therein in such quantity as to interfere with the draft, it can be raked out through the door, thereby obviating the necessity for tearing down the end wall, as heretofore, and with the door the cinder may be raked out without stopping the operation of the furnace, which could not be done with the old style of puddling-furnaces.

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

1. The neck of a puddling or reverberatory furnace, constructed of blocks of sandstone clamped with metal, substantially as and for the purpose specified.

2. In a puddling or reverberatory furnace, the hinged door H having a lining of fire-brick or other refractory material, and an opening or hole, J, for the passage of the cinder, substantially as set forth.

LUKE ^{his} + RYAN.
mark.

Witnesses:

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JAS. NICHOLS.