

EDGAR PECKHAM'S IMPROVEMENTS IN FORGE FIRES AND CONVERTING FURNACES.

No. 120,318. **FIG. 1** Patented Oct. 24, 1871.

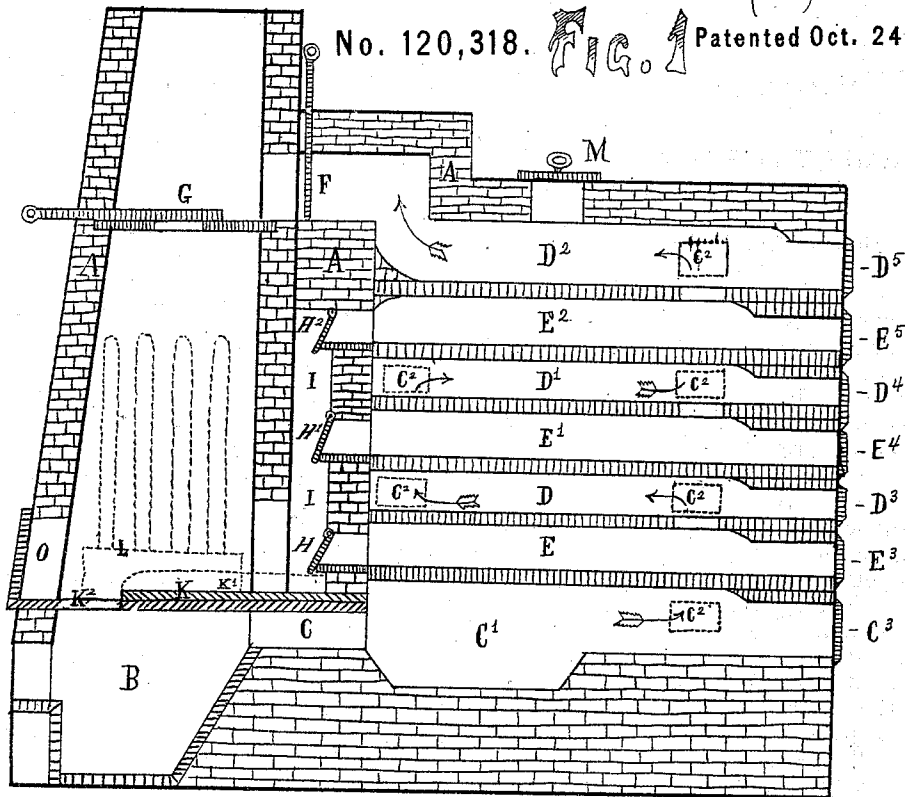


FIG. 2

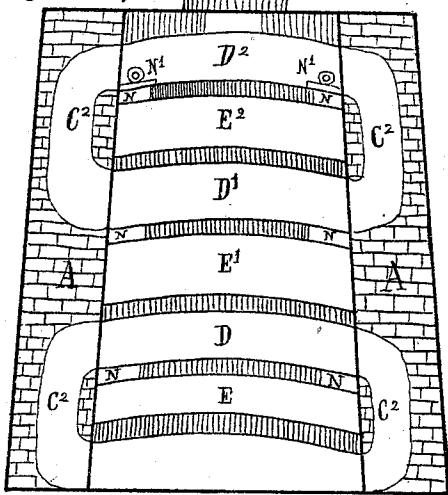


FIG. 3

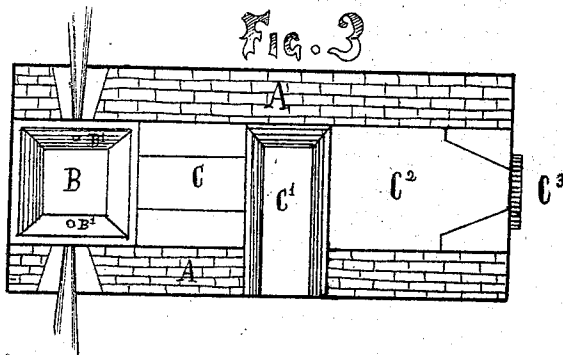
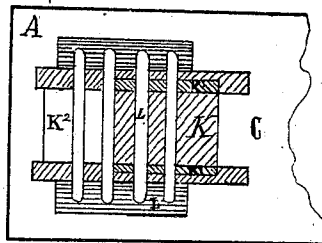


FIG. 4



WITNESSES.

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IMPROVEMENT IN FURNACES FOR THE MANUFACTURE OF IRON.

Specification forming part of Letters Patent No. 120,318, dated October 24, 1871.

To all whom it may concern:

Be it known that I, EDGAR PECKHAM, of Antwerp, Jefferson county, New York, have invented certain Improvements in Forge-Fires and Converting-Furnaces for Manufacturing Iron and Steel directly from the Ore, of which the following is a specification:

The first part of my invention relates to the use of a horizontal or nearly horizontal chimney for the forge, with a pit or trap therein for collecting the emery formed in the forge-fire as well as the ashes. The second part relates to the construction and combination of the retorts and chambers for preparing the ore for the forge. The third part relates to the combination and arrangement of the retorts and chambers with the flame and heat-passages for conveying the heat through the chambers and around the retorts. The fourth part relates to combining with the forge a hearth above the fire, to serve to retain the prepared ore after leaving the retorts ready to be carried down to the fire by the workman as wanted, and also to serve as a hood or protection to the hot-air pipes from the forge-fire. The fifth part relates to the arrangement of the chimney and flues and dampers, by which the heat may be passed up the chimney directly, or be carried through the chambers and around the retorts, as may be desired, or it may be allowed to pass both ways at the same time, to enable the workmen to keep the required heat on the retorts at all times. The sixth part relates to the combination of the vertical passage in front of the retorts and the hearth over the fire by which the prepared ore from the retorts is passed down to the hearth till drawn into the fire.

Figure 1 is a sectional elevation of the forge and furnace taken longitudinally through the center. Fig. 2 is an end elevation of the upper part of the furnace, showing the chambers and retorts. Fig. 3 is a plan of the forge-fire, horizontal flue, and emery-pit or trap. Fig. 4 is a plan of the hearth above the fire and below the hot-air pipes.

A A represent the walls, which may be of brick or other suitable material. B is the forge-fire, which may be of any of the usual forms or almost any new form, and B' B' are the tuyeres. C is the horizontal draught or flame and heat-passages from the forge-fire; and C¹ C¹ are the passages in the walls, as seen in Figs. 1 and 2, for

conveying the flame and heat through the chambers D, D¹, and D², and around the retorts E, E¹, and E². The flame and heat pass from the horizontal passage C through the opening C² at the rear end, and pass up into the chamber D at the rear end, and, after traversing the chamber D, they pass out of D by the opening C² at the front end, and up into the chamber D¹, and then to the rear end of D¹, and out of the opening C², and up into D², and thence out through the chimney, as indicated by the arrows. Thus the upper and lower sides of each retort are exposed to the full heat from the forge-fire, while the full flame and heat traverse the interior of each chamber. To cause the heat and flame to traverse the chambers and around the retorts as described, the damper F must be open and the damper G closed or nearly closed. In the lower side of C is the emery-pit or trap C¹. In the forge process of manufacturing iron it is known that there is formed what the workmen term "emery," which cannot be reduced to the metallic state nor kept from mixing with the iron in the ordinary forge, for though it may be carried up by the draught it falls back again, and, becoming incorporated with the loup, prevents the adhesion of the parts and deteriorates the character of the iron. With the horizontal flue the emery is carried beyond the fire and is caught in the pit or trap C¹, which also serves to catch and retain the ashes. These may be removed through the door C⁴, Fig. 3. The retorts are each formed by arches of fire-brick or other suitable material, the top forming the bottom of the adjacent chamber and the top of such chamber forming the bottom of the next above, and so on. At the back end there is a door into each retort and chamber. The front ends of the chambers are closed, but the front ends of each retort has a door or damper, H H¹ H², suspended from above by hinges and resting on a sloping jamb, so that, while they may be readily pushed open when the ore is to be taken out, they are self-closing, and their weight keeps them closed and excludes all currents of air. These doors H, H¹, and H² lead into a vertical passage, I, in front of the retorts, directly over the hearth K. K is a hearth directly under the passage I, and is formed of iron, having sides K¹, so as to retain and hold the ore as it is forced out of the retorts through the doors H, H¹, and H². There may be an opening, K², through

the hearth, for allowing the flame and heat to pass directly up the chimney and for passing down through the ore to the fire, which may be closed when desired. Instead of forming the hearth of iron it may be of fire-brick or other suitable material. Over the fire are the hot-air pipes L. They do not require any particular description. They are shielded from the direct heat of the fire by the table or hearth K.

The ore is first to be separated, when necessary, or cleaned, and is then mixed with about an equal bulk of fine charcoal, and it is then charged through the door M into the upper chamber D², and through the door D⁴ into the chamber D¹, and through the door D³ into the chamber D. The ore in each chamber is exposed to the flame for a suitable time, to remove all sulphur and other impurities and to bring it to a proper uniform heat. The ore is then passed from the chamber to the retort immediately below, through the openings N N, first having covered the bottom of the retort with fine charcoal. It remains exposed to the heat of the retort for a length of time proportioned to the character of the ore and the iron or steel proposed to be made. It is then pushed through the front door of the retort, when it falls down through the vertical passage I onto the hearth K, from which it is removed to the fire through the opening K² as wanted by the workmen, through the door O, and so for each combined chamber and retort. When one chamber is emptied it may be refilled with fresh ore. By increasing the number and using the retorts

alternately the ore can be kept in sufficiently long to prepare it thoroughly, according to the kind of ore used or iron or steel to be made. The openings N may be covered by a plate, N'.

I hereby disclaim all covered by J. Jameson's first clause of claim in patent No. 88,299, dated March 30, 1869.

I claim as my invention—

1. The combination of the forge B, horizontal flue C, and pit or trap C¹, substantially as and for the purposes hereinbefore set forth.

2. The combination of the retort E, chamber D connected by the openings N N', substantially as and for the purposes hereinbefore set forth.

3. The combination of the hearth K and forge B, substantially as and for the purposes hereinbefore set forth.

4. The combination of the dampers F and G and flues C², substantially as and for the purposes hereinbefore set forth.

5. The combination of the doors H, one or more, and the passage I, substantially as and for the purposes hereinbefore set forth.

6. The combination of the retorts E, one or more, and the passage I and table K, substantially as and for the purposes hereinbefore set forth.

7. The combination of the door O and the table K, as and for the purposes hereinbefore set forth.

Witnesses:

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