(No Model.) 2 Sheets—Sheet 1.

M. R. CONLEY.

METALLURGICAL FURNACE.

No. 477,623. Patented June 21, 1892.

Fig. 1.

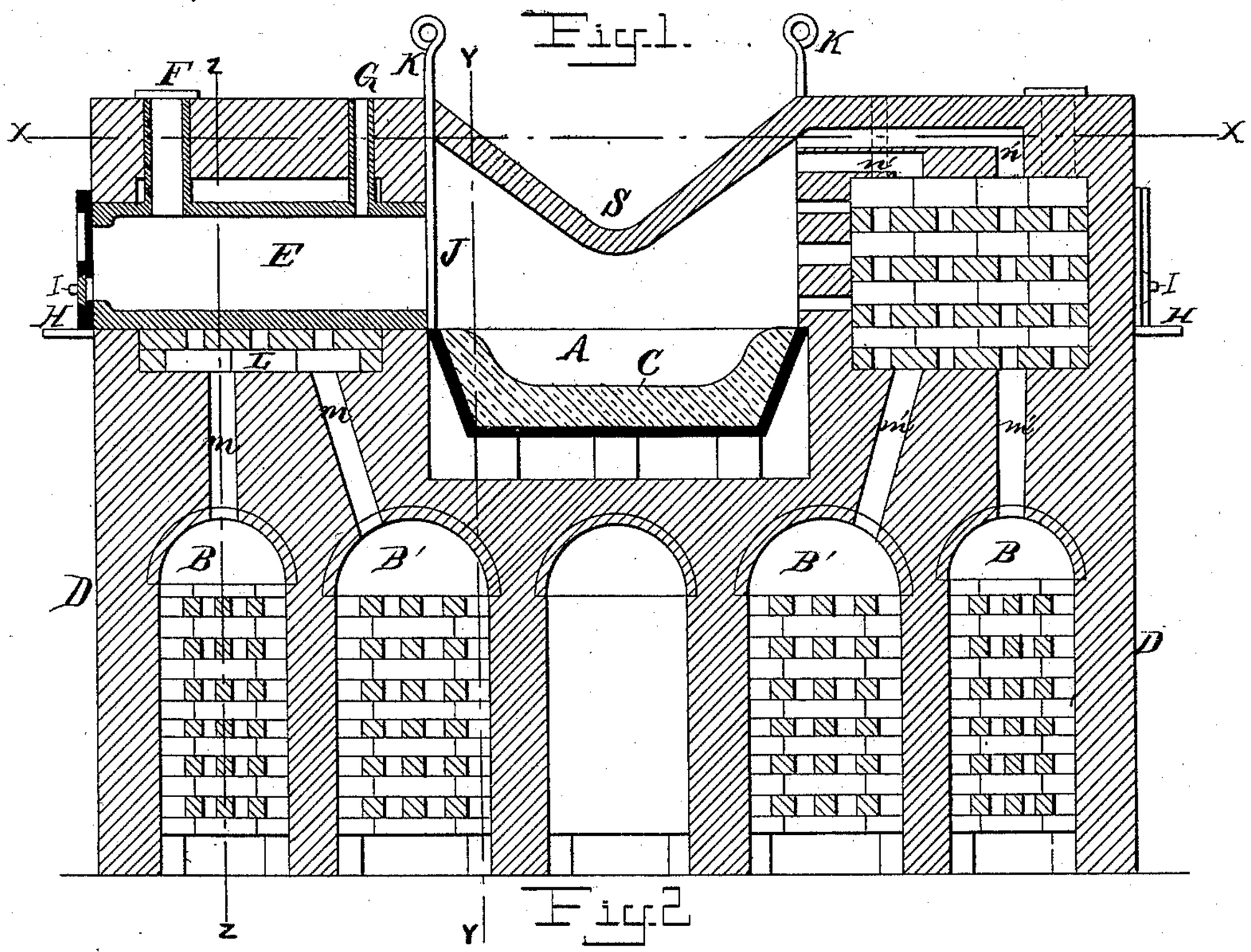


Fig. 2

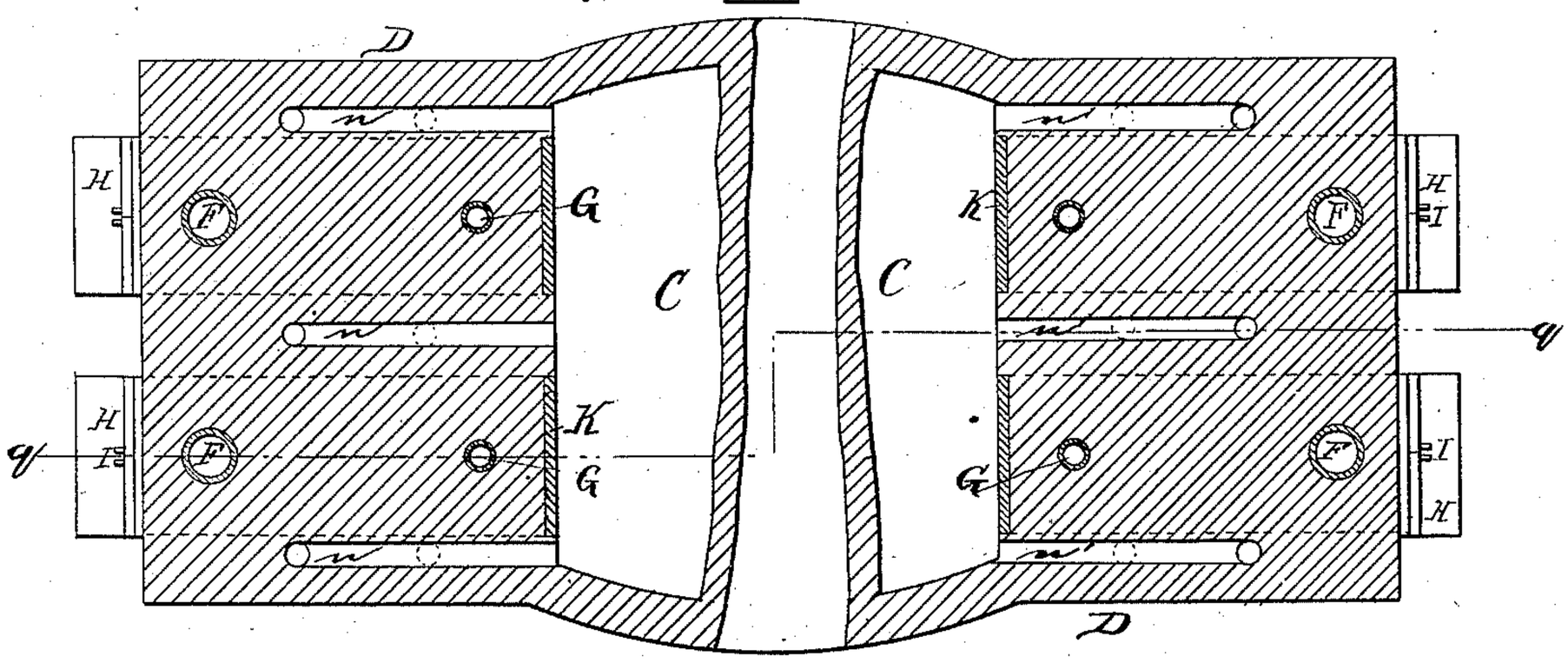
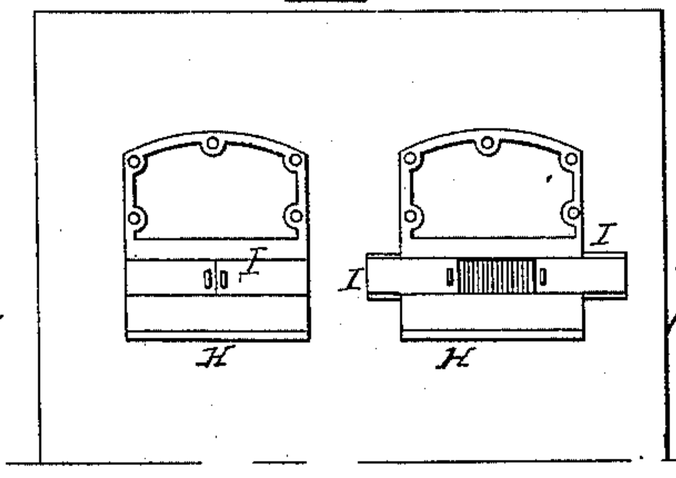


Fig. 5.



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(No Model.) 2 Sheets—Sheet 2.

M. R. CONLEY.

METALLURGICAL FURNACE.

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Fig. 3.

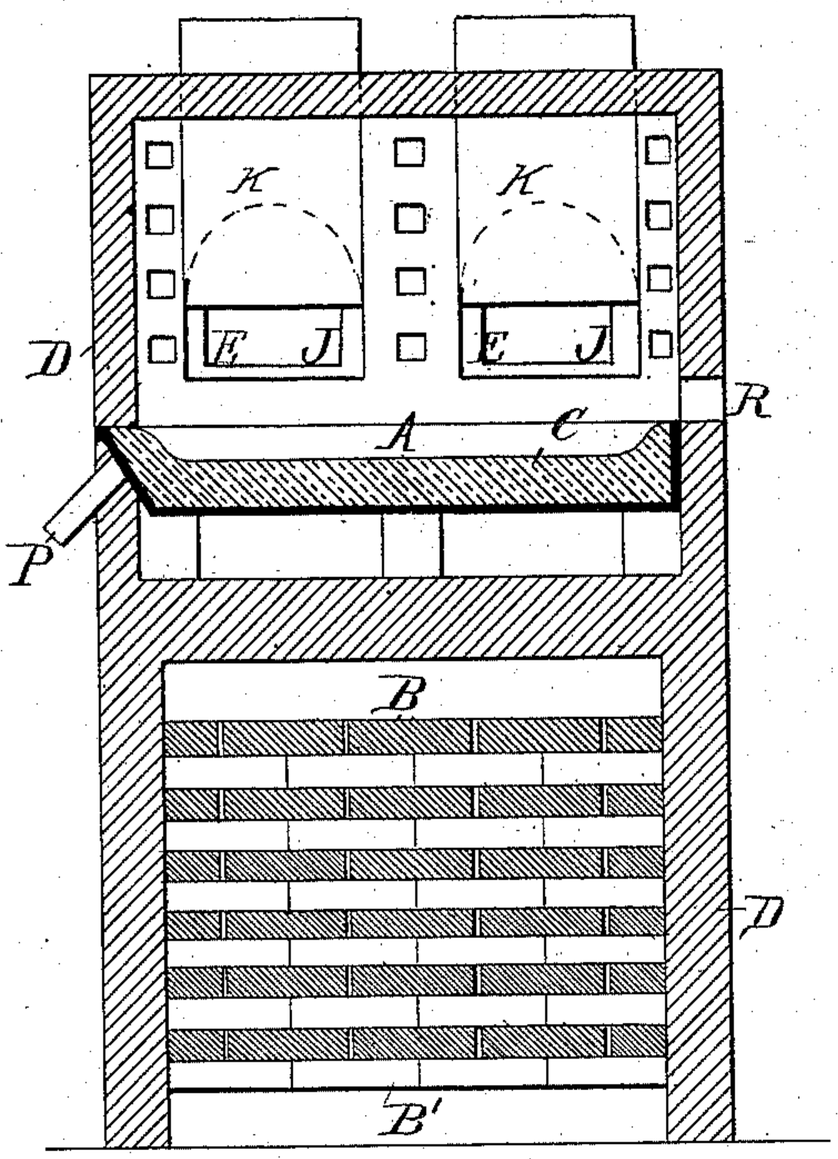
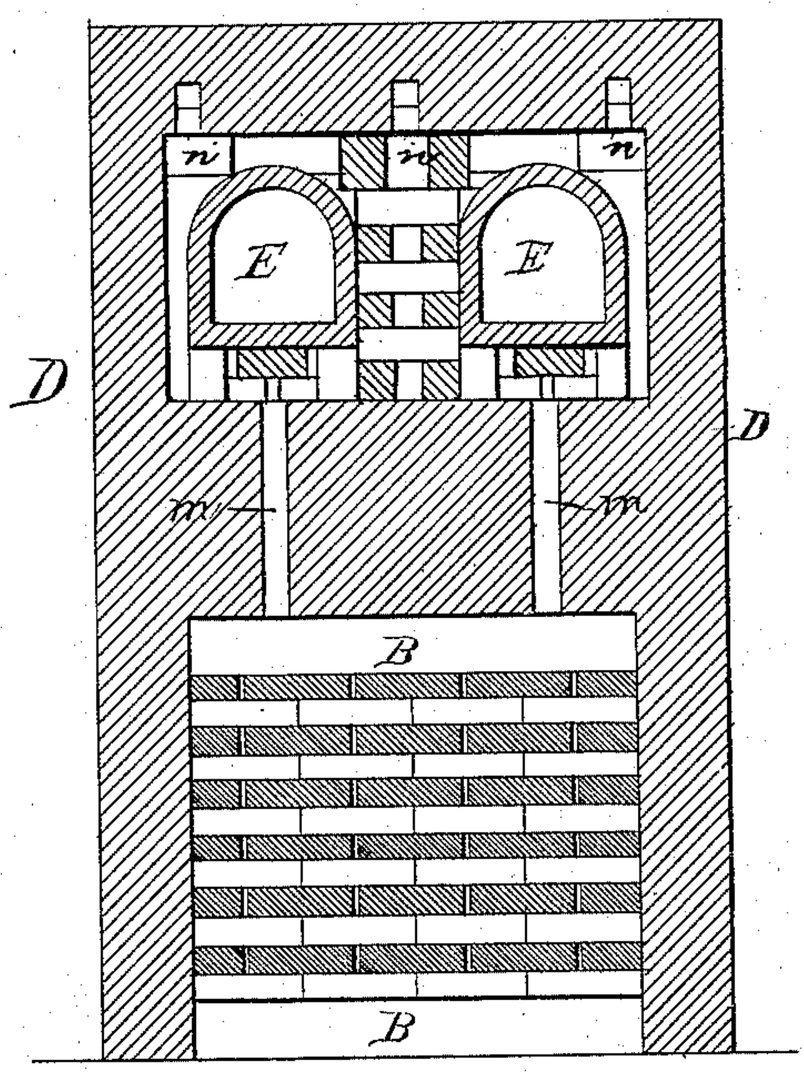


Fig. 4.



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METALLURGICAL FURNACE.

SPECIFICATION forming part of Letters Patent No. 477,623, dated June 21, 1892.

Application filed March 26, 1891. Serial No. 386,419. (No model.)

To all whom it may concern:

Be it known that I, MICHAEL R. CONLEY, a citizen of the United States, and a resident of Brooklyn, Kings county, New York, have invented Improvements in Metallurgical Furnaces, of which the following is a specification.

My invention consists of a combined open-hearth, reverberatory, deoxidizing, and melting furnace for the direct process, whereby the ore can be treated in retorts and the sponge transferred therefrom to the molten bath on the bed of the melting-hearth without exposure to atmospheric air.

The main object of my invention is to utilize the waste gas of the open-hearth melting-furnace to heat the retorts without interfering with the reversing principle of the reverberatory open-hearth furnace and without using any other regenerators than those needed for the melting-hearth.

Referring to the drawings, Figure 1 is a sectional elevation of my improved furnace on the line *q q*, Fig. 2. Fig. 2 is a plan sectional view of the same on line *x x*, Fig. 1. Fig. 3 is a sectional view on line *y y*, Fig. 1. Fig. 4 is another sectional view on line *z z*, Fig. 1. Fig. 5 is an end view showing the retort-doors.

The open-hearth furnace A may be constructed in general after the manner of the Siemens reverberatory steel-melting furnace, with its gas and air checker-work or regenerators B B′ and melting-hearth C, with depressed roof S to throw the flame onto the bath in the hearth. The end walls D D of this open-hearth furnace are made thicker or more extended than usual in order to receive and support at each end one or more deoxidizing-retorts E E, made of the shape shown or any other suitable shape and of fire-clay or any other similar material. These retorts are each provided with a filling-chute F and gas-outlet pipe G. Each is also provided with a muffle-door H, secured to the end of the retort, and in this door is a small opening for the introduction of the slice-bar and closed by slides I.

In Fig. 5 the slides on the left-hand door are shown as closed, while on the right-hand door they are shown as opened for the introduction of a suitable slice-bar. Each retort has likewise a rear outlet J, opening directly into the melting-hearth C, but normally closed by a fire-clay-slab gate K. These retorts are surrounded by checker or open work L, the object of which will be presently explained. Gas and air flues *m m′* lead from regenerators B B′ into the checker-work L, and from the checker-work chamber around the retorts there are flues *n n′* formed in the masonry, which open into the combustion-chamber on the melting-hearth. The latter is provided with a suitable tapping-spout P, and at the opposite side suitable openings R may be provided.

The working of this combined furnace is as follows: The retorts being shut off from the melting-hearth by the gates K are then filled with ore mixed with carbon through the chutes F, which are closed after filling. The bed of the open-hearth furnace is then prepared in the ordinary manner by scrap or pig iron to form a molten mass. The action of the open-hearth furnace is then set in motion—that is, the gas and air are admitted into the furnace at one side, and from the regenerators on that side they pass up the flues *m* or *m′*, as the case may be, into and through checker-work L out through flues *n* (*n′*) to the melting-hearth C, where combustion takes place. The waste gases or products of combustion from the hearth C pass through the flues *n′* (*n*) on the opposite side of the hearth, through checker-work L, around the retorts, and down flues *m′* (*m*) into the regenerators B B′ at the opposite end of the furnace. The heat of the waste gas is intense enough to heat the retorts sufficiently to deoxidize the ore within them, and the checker or open work around the retorts facilitates this result. By reversing the action of the gas and air the retorts on the other end can be heated in a similar manner. When the ore in any one of the retorts is properly deoxidized, the gate K is lifted and the sponge from the retort is discharged into the molten mass on the melting-hearth C. When the retort is emptied, the gate is closed and the retort recharged.

One of the important features of the construction described is that the same regenerators which supply the air and gas to the

melting-hearth and which carry off the products of combustion also serve for the deoxidizing-retorts.

I am aware that it has been proposed to arrange retorts for the ore at one end of a puddling-furnace in the flues leading from the puddling-chamber; but my invention is an open-hearth melting-furnace, so that as the ore is deoxidized in the retorts it may be pushed directly onto the melting-hearth and sink into the molten metal and be melted therein, while protected from the action of the gases by the slag covering. I have one or more retorts at each end of the melting-hearth with reversible regenerators, so that the retorts may be kept continually heated without interfering with the reverberatory or reversing action of the gas and air, and consequently the proper working of the melting-hearth of the furnace.

I do not confine myself to any particular way of running the flues, so long as the objects for which they are used are carried out.

I claim as my invention—

1. A metallurgical regenerative furnace having a melting-hearth with regenerators and flues connecting the regenerators with the opposite ends of the said melting-hearth, in combination with retorts having their inner ends opening directly onto the melting-hearth, but normally closed by gates, these retorts being interposed in the said flues between the regenerators and the hearth at the opposite ends of the latter, whereby the same regenerators serve for both melting-hearth and retorts and on the opening of the latter the ore may be pushed directly into the molten metal on the hearth, substantially as described.

2. A metallurgical reverberatory furnace having a melting-hearth and regenerators with flues connecting the regenerators with the hearth, closed deoxidizing-retorts in the said flues having their inner ends opening directly onto the melting-hearth, but normally closed by gates, and checker-work L around the retorts, substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

MICHAEL R. CONLEY.

Witnesses:

JOHN REVELL,

GEORGE BAUMANN.