

No. 652,968.

Patented July 3, 1900.

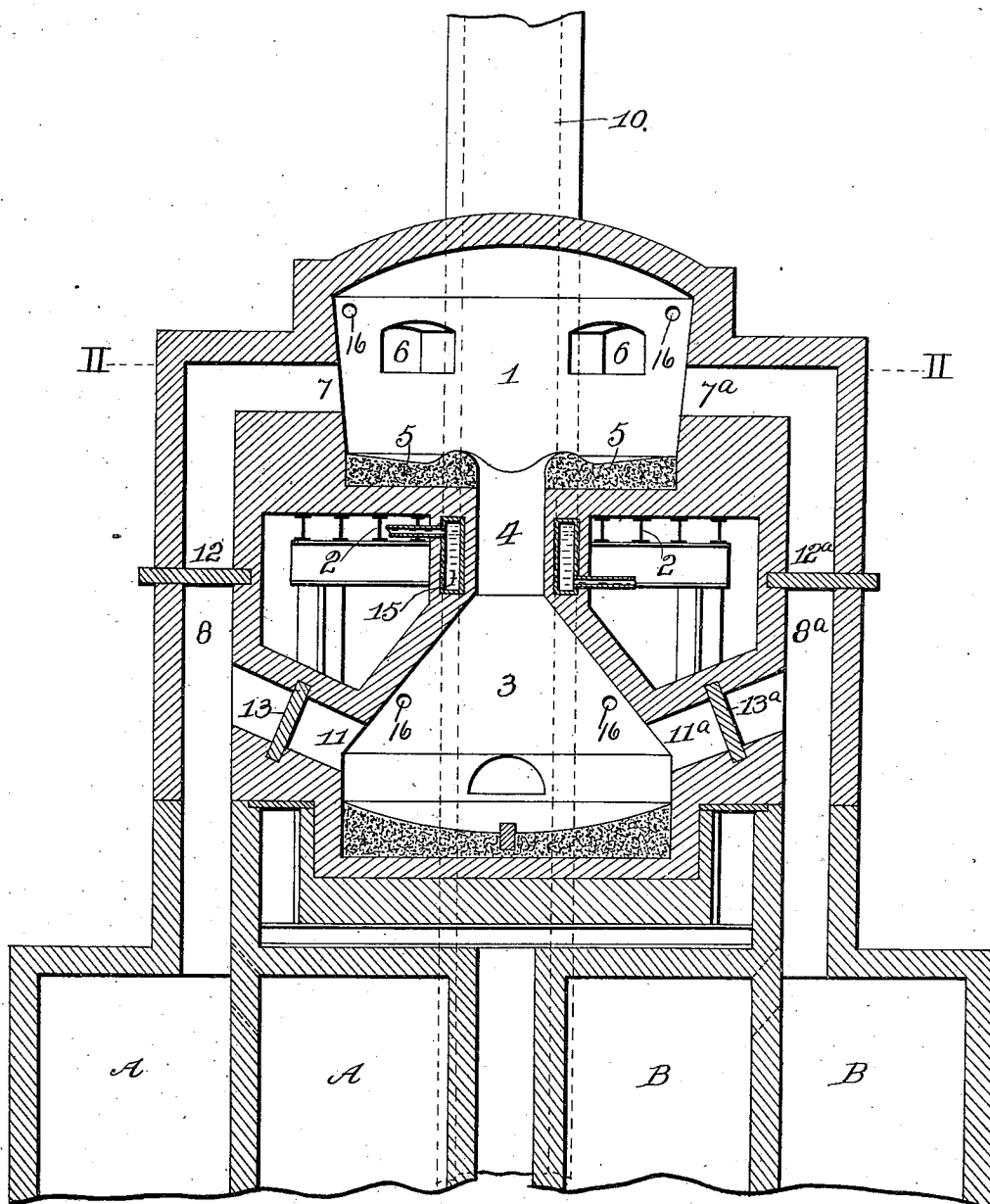
E. KERR.
METALLURGICAL FURNACE.

(Application filed Aug. 1, 1899.)

(No Model.)

4 Sheets—Sheet 1.

FIG. 1.



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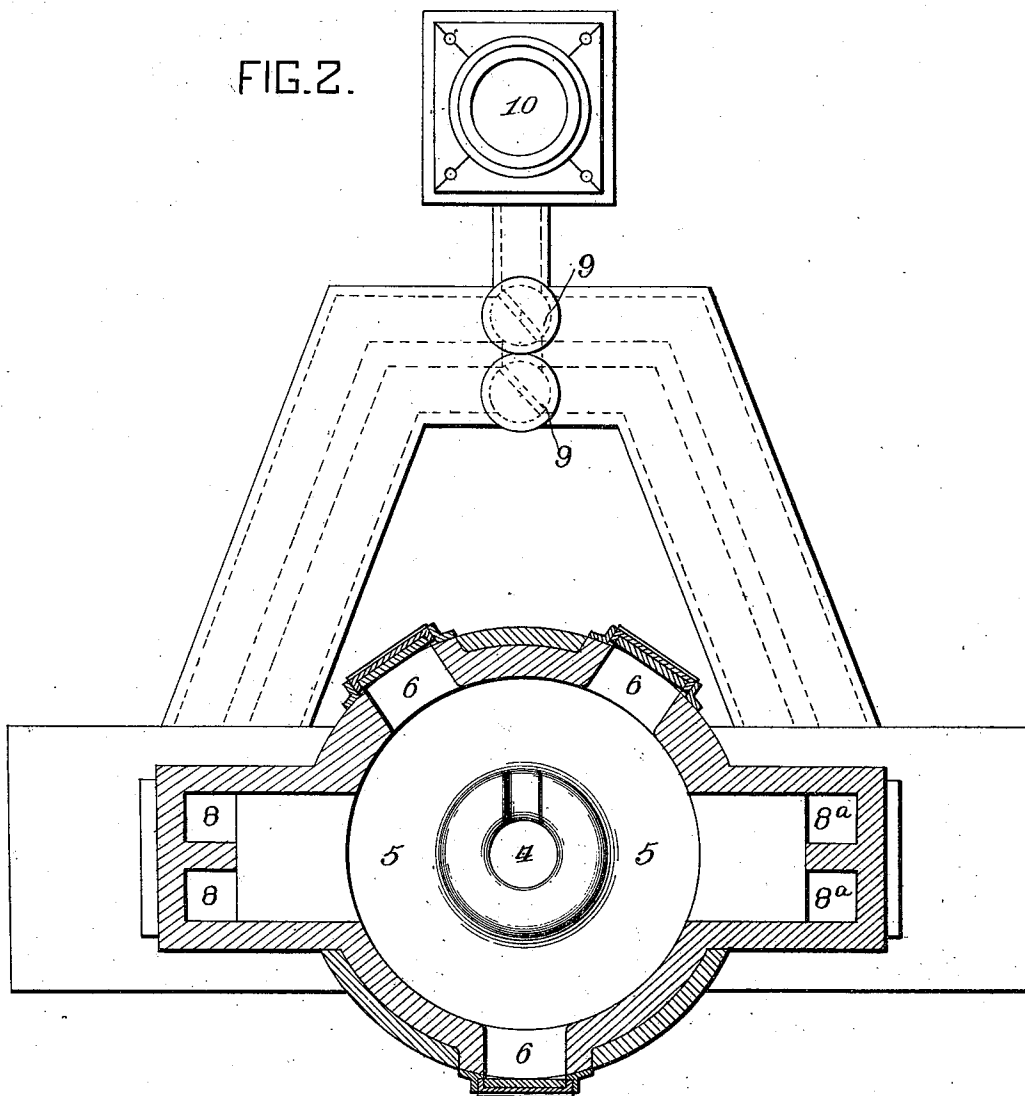
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FIG. 2.



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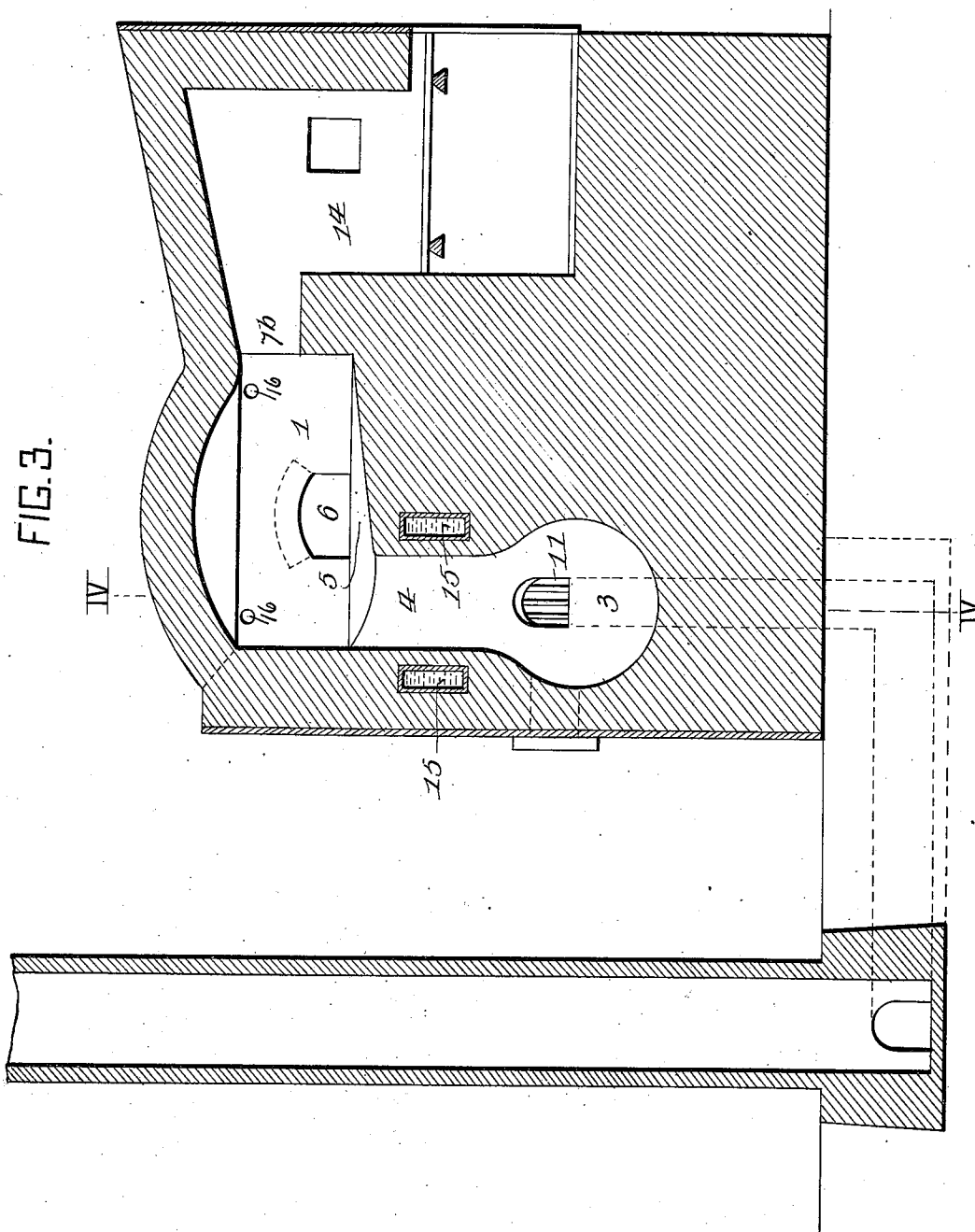
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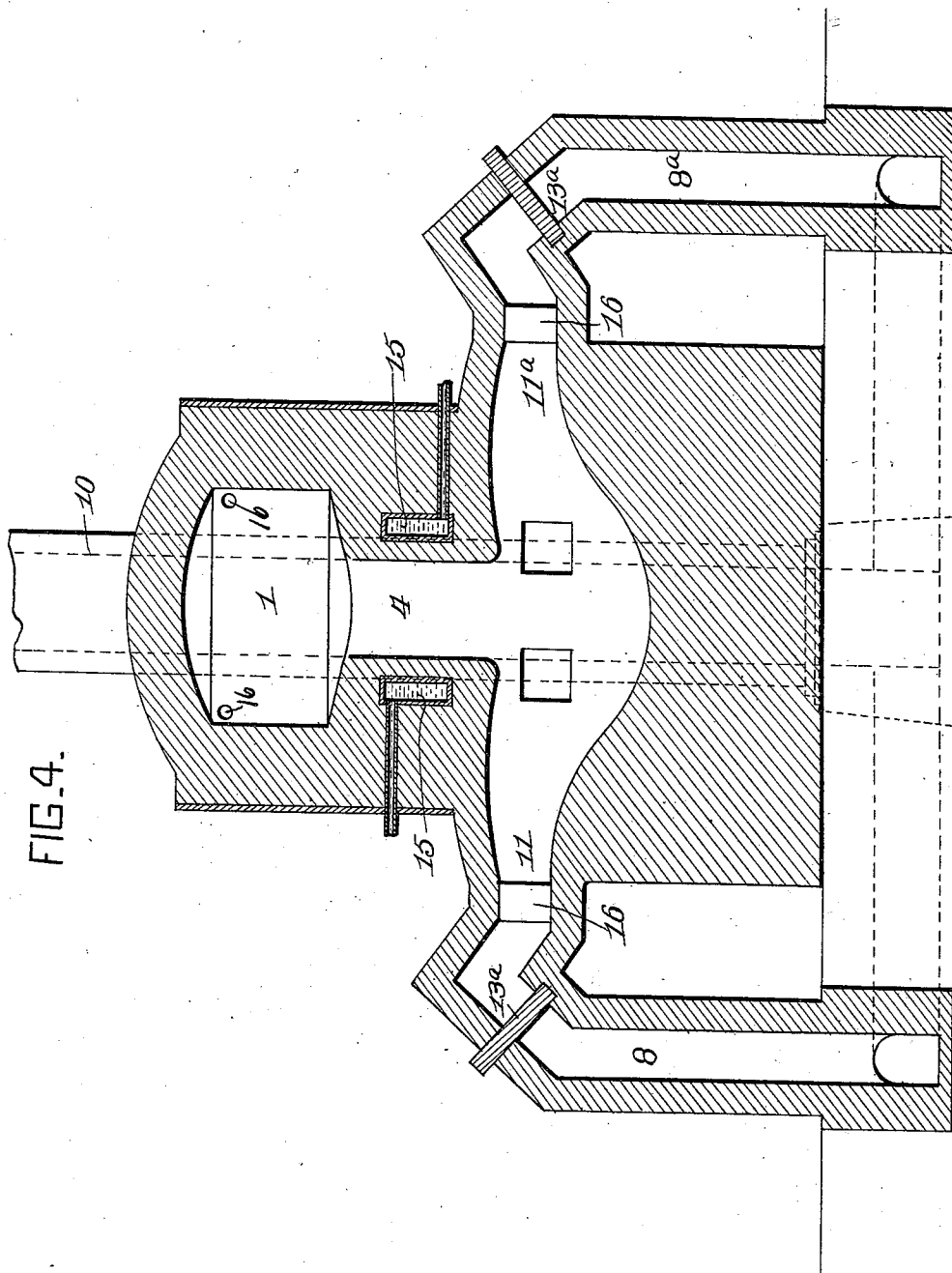
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4 Sheets—Sheet 4.



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UNITED STATES PATENT OFFICE.

EDWARD KERR, OF PITTSBURG, PENNSYLVANIA.

METALLURGICAL FURNACE.

SPECIFICATION forming part of Letters Patent No. 652,968, dated July 3, 1900.

Application filed August 1, 1899. Serial No. 725,737. (No model.)

To all whom it may concern:

Be it known that I, EDWARD KERR, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented or discovered certain new and useful Improvements in Metallurgical Furnaces, of which improvements the following is a specification.

The invention described herein relates to certain improvements in the class or kind of furnaces described and shown in Letters Patent Nos. 462,876 and 462,877, granted to me November 10, 1891. Generally stated, these furnaces consist of a melting-chamber provided with ports or openings for the admission of heating-gases and a crucible arranged below the melting-chamber and connected therewith by a passage through which the heating-gases and the molten metal can pass to the crucible, the latter being connected to the stack.

The object of this invention is to provide for the reversal of the flow of the heating-gases through the melting-chamber and crucible or through the melting-chamber or crucible only, whereby the furnace is especially adapted for the manufacture of steel.

The invention is hereinafter more fully described and claimed.

In the accompanying drawings, forming a part of this specification, Figure 1 is a sectional elevation of my improved furnace. Fig. 2 is a sectional plan view, the plane of section being indicated by the line II II, Fig. 1. Fig. 3 is a sectional elevation of a modified form of the furnace; and Fig. 4 is a similar view, the plane of section being indicated by the line IV IV, Fig. 3.

In the practice of my invention the floor of the melting-chamber 1 is supported upon beams 2 at a suitable height to permit of the arrangement of the crucible 3 underneath the same, the melting-chamber and crucible being connected by a throat or passage 4, through which the molten metal and products of combustion can pass from the melting-chamber into the crucible. This throat or passage may be so located as regards the melting-chamber that an annular ledge or shelf 5 will be formed around the throat or passage for the support of the charge or material to be heated, which is placed in the furnace through the doors 6.

On opposite sides of the melting-chamber are formed ports or openings 7 7^a, which are connected by flues or passages 8 8^a with regenerating-chambers A B, the flow of gas and air and products of combustion through the chambers being regulated and controlled in the usual manner by any suitable construction of valve mechanism 9, which also serves to direct the products of combustion from one of the flues to the stack 10. The flues 8 8^a are connected by ports or passages 11 11^a to the crucible 3, and in the flues 8 8^a and 11 11^a are located valves 12 12^a and 13 13^a of any suitable form or construction, whereby the flow of gas through such flues or ports may be controlled or checked, as will be hereinafter described. Air may be injected into the melting-chamber or crucible through ports, (indicated at 16 in Figs. 1 and 3.)

In using this furnace the material is charged in upon the bed of the melting-chamber and gas is admitted through one of the flues, as 8, the valve 12 being opened. The products of combustion or heating-gases can pass either directly through the melting-chamber, the valve 12^a being opened and the reversing-valve mechanism 9 being also properly adjusted until the charge is melted, or the valve 12^a may be kept closed and the valve 13^a opened, so that the products of combustion and heating-gases will pass down through the throat or passage 4 into the crucible and thence escape by the port or passage 11^a and flue 8^a to the stack. As the metal is melted it will flow down into the crucible and be there stored.

If during the melting of the charge it is desired for any purpose to reverse the operation of the furnace, the valve 12 will be closed and the valve 12^a opened, so that the heating-gases will enter the melting-chamber through the ports 7^a and flow thence down through the throat or passage 4 into the crucible 3 and from thence by the port 11 and flue 8 to the stack, the valve 13^a having been closed and the valve mechanism 9 having been reversed.

If after the entire charge has been melted and collected in the crucible it is desired to further treat the metal, both valves 12 and 12^a are closed and valves 13 and 13^a opened, after which by the proper shifting of the re-

versing-valve mechanism 9 the heating-gases will flow first in one direction and then in the other through the crucible.

In lieu of forming the crucible directly below the heating-chamber it may be arranged a little to one side of the axis of the melting-chamber, as shown in Fig. 3. In such a construction the throat or passage 4 would extend down from one side of the melting-chamber 1 into the crucible 3 and the charging bed or shelf would lie entirely to one side of the axis of the throat or passage 4.

If preferred, a fire-chamber or furnace 14 may be connected directly to the port or opening 7^b, leading into the melting-chamber. The heating-gases will then flow through the melting-chamber and throat 4 into the crucible and from thence by the ports or openings 11 11^a to the flues or passages 8 or 8^a, or both, dependent upon the position of the valves 13 13^a in said flues. In order to effect the spreading out of the flames in the crucible, the port or passage 11 has arranged therein a series of vertical walls 16, dividing such port or opening into a series of small ports, so that the flame and products of combustion must be spread out laterally in escaping from the crucible, as shown in Fig. 3.

As will be readily understood by those skilled in the art, the walls of the throat or passage 4 are subjected to the greatest wear or cutting away by the flame and molten metal, especially near the upper end of said throat or passage. In order to protect such portions of the walls from too-rapid destruction or cutting away, water-boxes 15 are arranged in the brickwork around such throat or passage and are connected by suitable pipes to a source of cooling fluid under pressure and have suitable outlet-pipes for the escape of the fluid.

I claim herein as my invention—

1. A metallurgical furnace having in combination a melting-chamber, a crucible arranged below the melting-chamber, an opening or passage between the melting-chamber and crucible for the passage of products of combustion and the molten metal into the crucible, the melting-chamber having a port

or opening for the admission of heating-gases, 50 flues or passages leading to the stack and connected by ports or openings to opposite sides of the crucible and valves controlling the flow of products of combustion from the crucible, substantially as set forth.

2. A metallurgical furnace having in combination a melting-chamber, a crucible arranged below the melting-chamber, an opening or passage connecting the melting-chamber and crucible for the passage of products 60 of combustion and the molten metal into the crucible, regenerating-chambers, flues connecting said chambers with the melting-chamber and crucible, and valves controlling the flow of gases through said flues, substantially 65 as set forth.

3. A metallurgical furnace having in combination a melting-chamber, a crucible arranged below the melting-chamber, an opening or passage connecting the crucible and 70 melting-chamber for the passage of products of combustion and the molten metal into the crucible, ports or openings on opposite sides of the melting-chamber for the admission of heating-gases, valves controlling said ports or 75 openings, ports or openings on opposite sides of the crucible and valves controlling the flow of gases from the crucible, substantially as set forth.

4. In a metallurgical furnace, the combination of a melting-chamber, a crucible arranged 80 below the melting-chamber, an opening or passage connecting the crucible and melting-chamber for the passage of products of combustion and the molten metal into the cruci- 85 ble, the passage or opening being arranged to one side of the center of the melting-chamber, a port or opening for the admission of heating-gases to the melting-chamber, and a connection from the crucible to the stack, substan- 90 tially as set forth.

In testimony whereof I have hereunto set my hand.

EDWARD KERR.

Witnesses:

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F. E. GAITHER.