

No. 767,243.

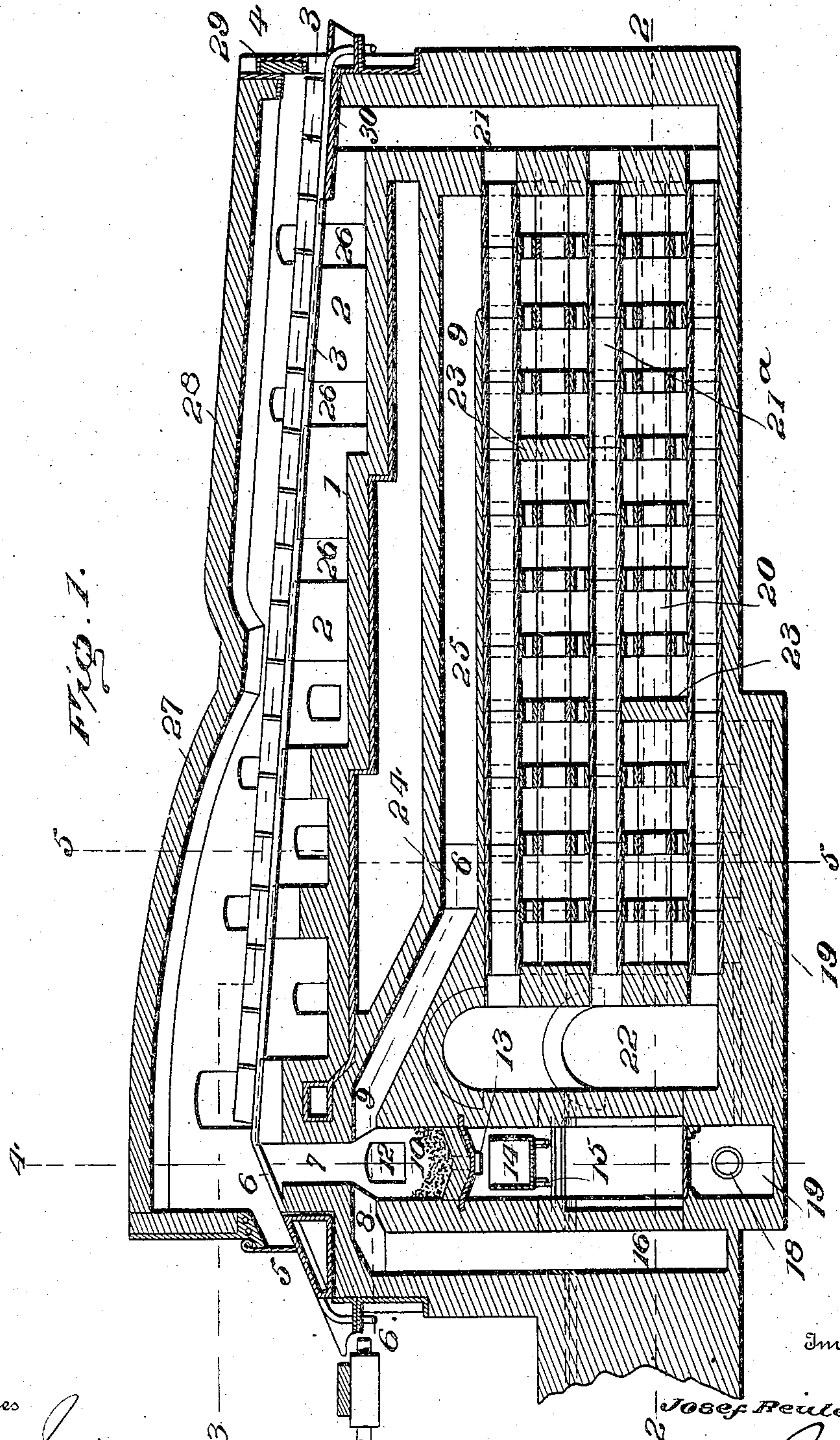
PATENTED AUG. 9, 1904.

J. REULEAUX.  
CONTINUOUS HEATING FURNACE.

APPLICATION FILED JAN. 30, 1904.

NO MODEL.

3 SHEETS—SHEET 1.



Witnesses

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By

Inventor

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3 SHEETS—SHEET 2.

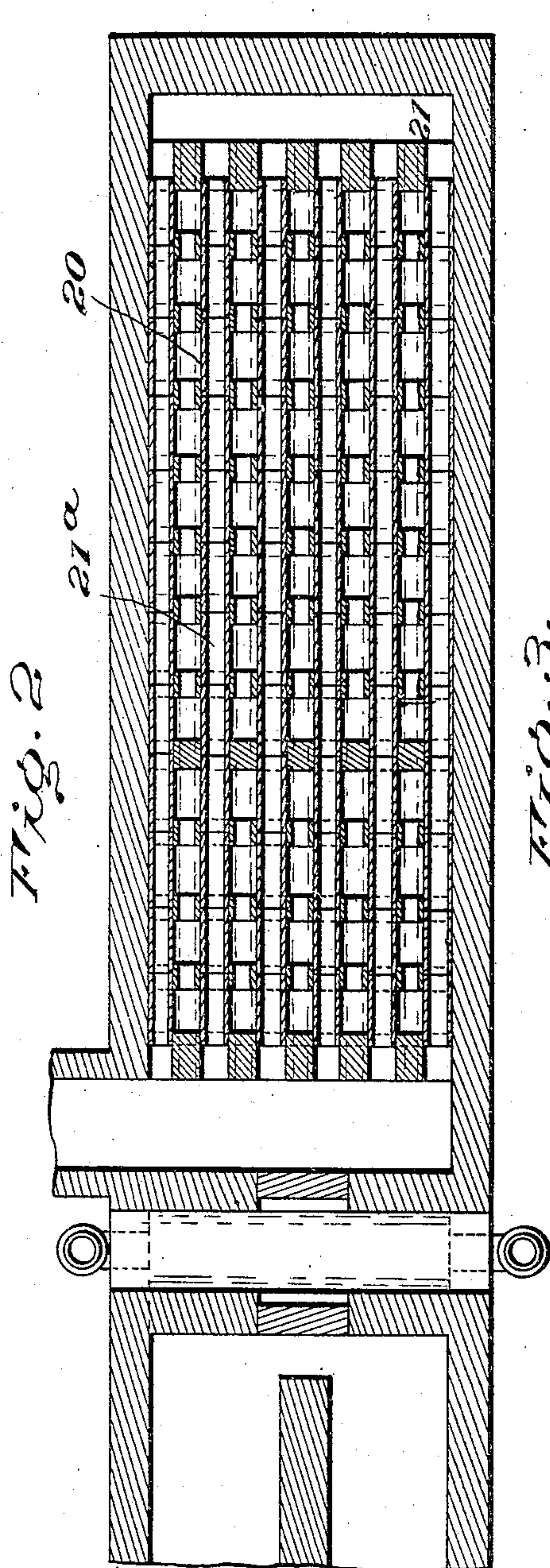
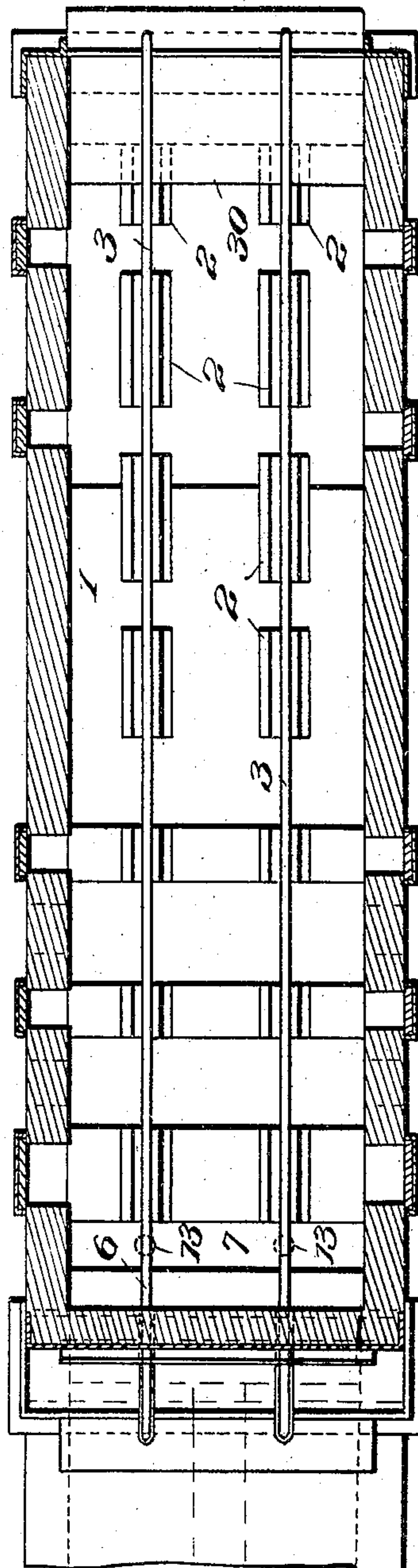


Fig. 3.



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3 SHEETS—SHEET 3.

Fig. 4.

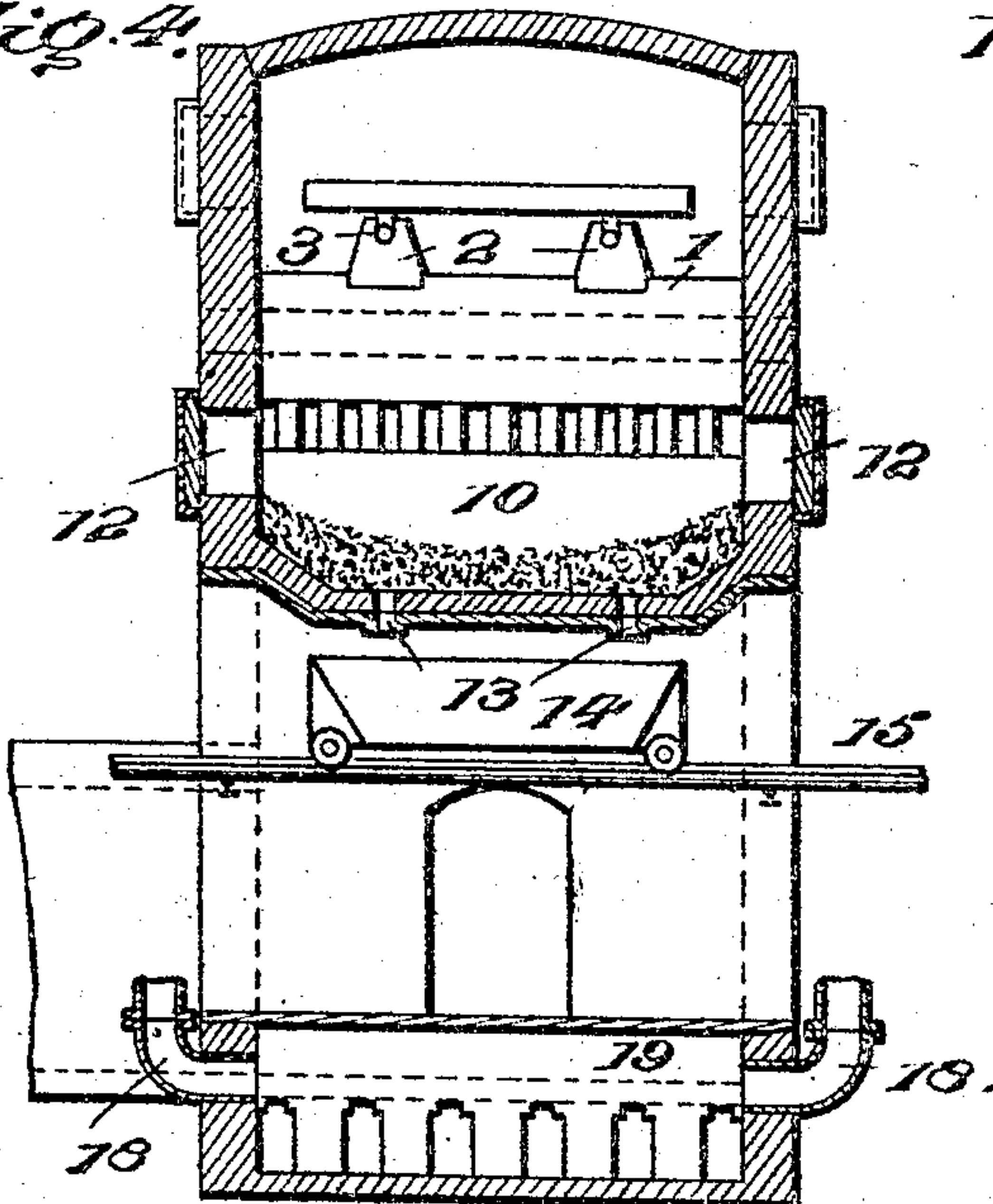


Fig. 5.

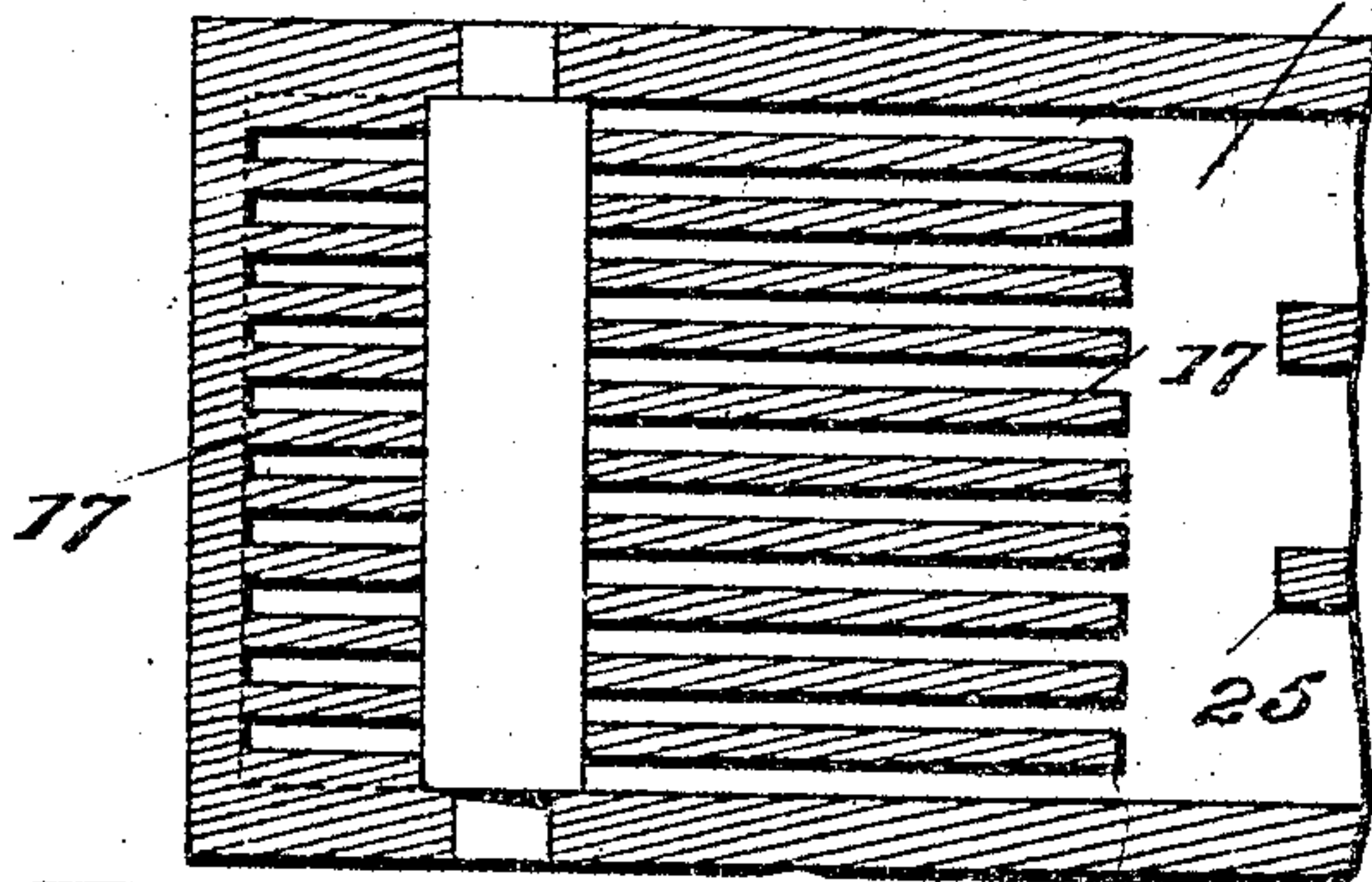
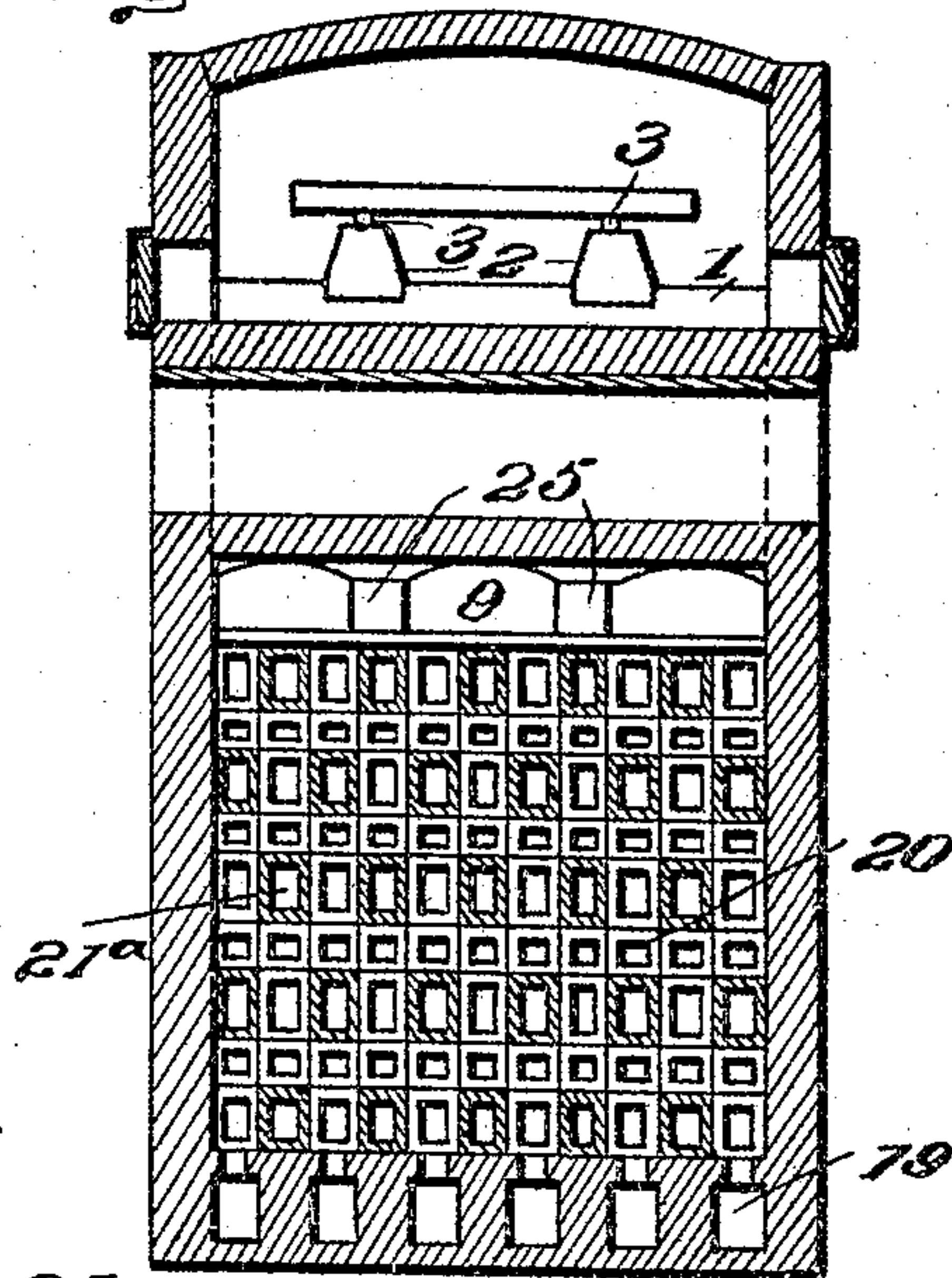


Fig. 7.

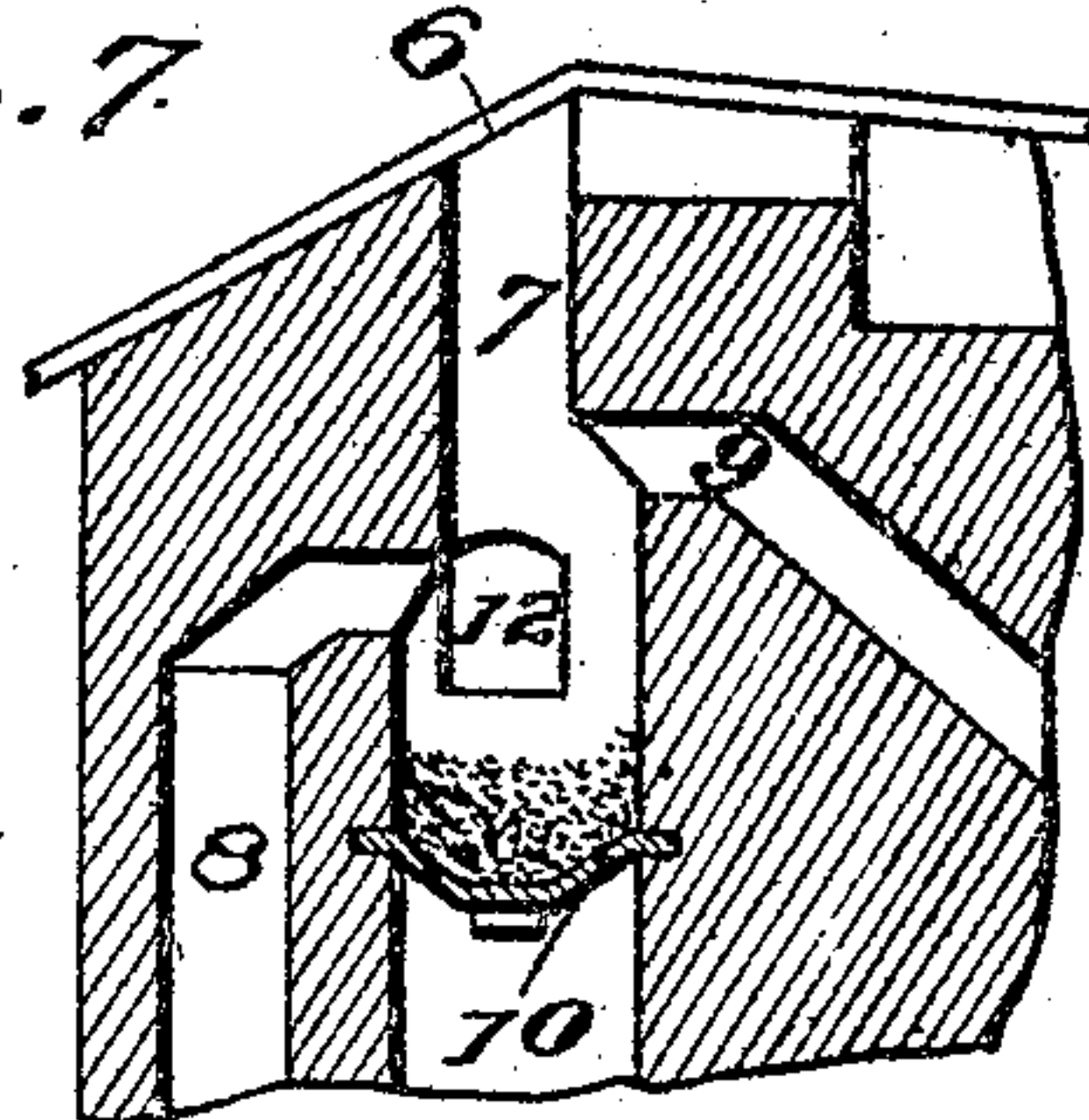


Fig. 8.

Fig. 9.

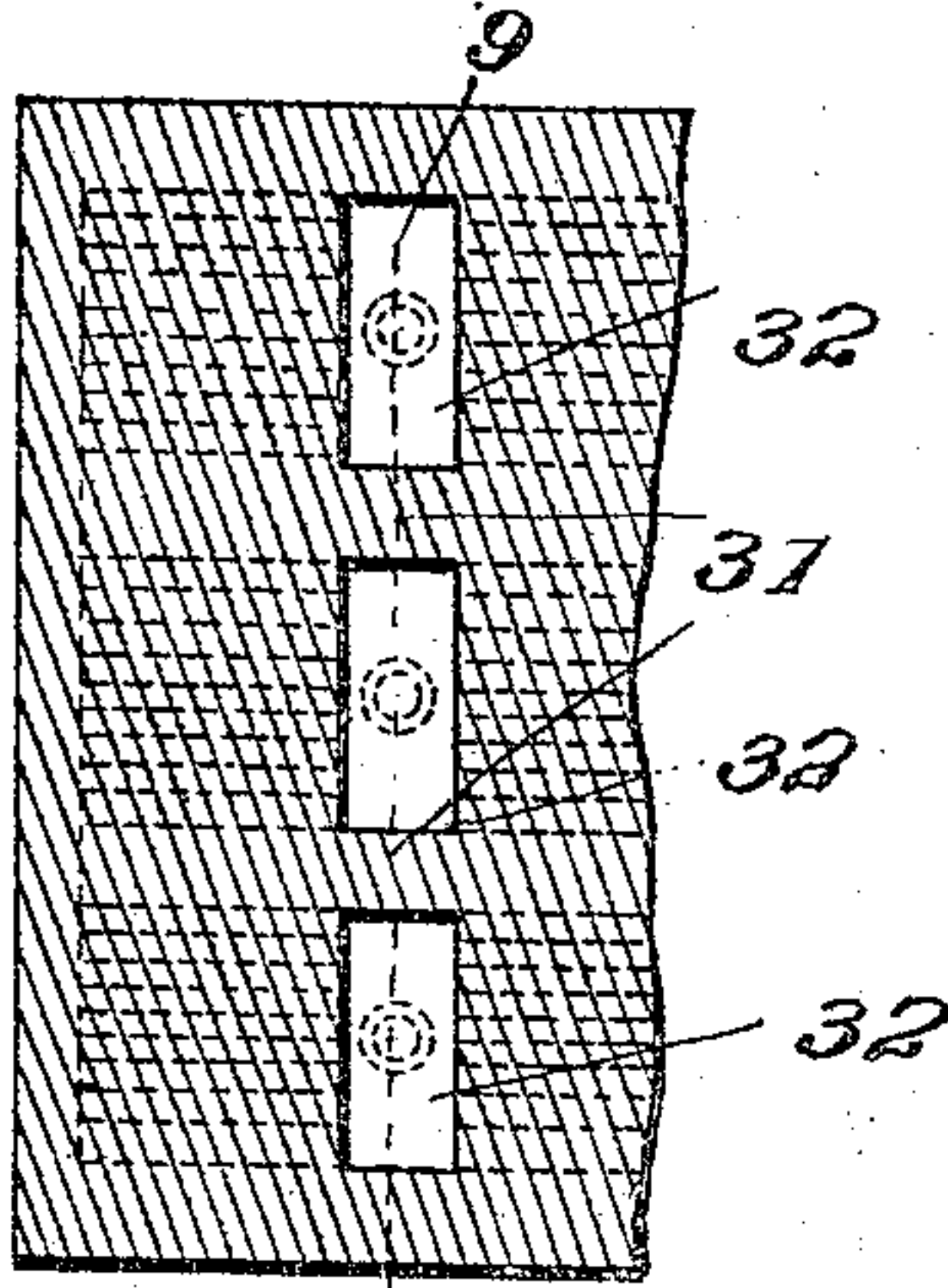
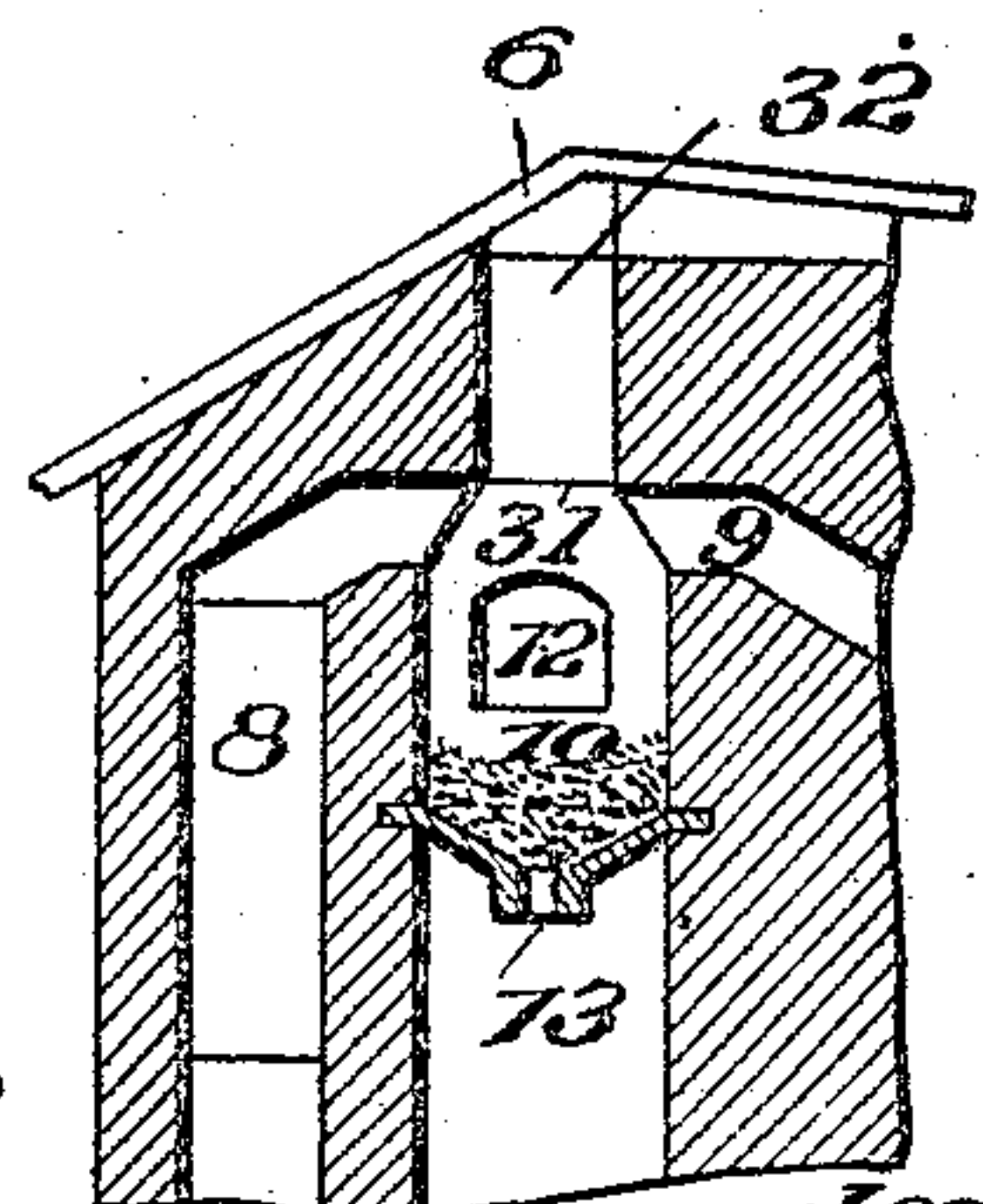


Fig. 9.



Witnesses

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# UNITED STATES PATENT OFFICE.

JOSEF REULEAUX, OF WILKINSBURG, PENNSYLVANIA, ASSIGNOR TO  
ALEXANDER LAUGHLIN, OF SEWICKLEY, PENNSYLVANIA.

## CONTINUOUS HEATING-FURNACE.

SPECIFICATION forming part of Letters Patent No. 767,243, dated August 9, 1904.

Application filed January 30, 1904. Serial No. 191,320. (No model.)

*To all whom it may concern:*

Be it known that I, JOSEF REULEAUX, of Wilkinsburg, in the county of Allegheny and State of Pennsylvania, have invented certain  
5 new and useful Improvements in Continuous Heating-Furnaces; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains  
10 to make and use the same.

In that class of continuous heating-furnaces of the type embraced by Letters Patent of the United States, Reissue No. 11,666, to Alexander Laughlin and myself, dated May 31,  
15 1898, the slabs or billets just before their discharge from the furnace pass adjacent to the fuel-ports or point of highest heat. Preferably, for many reasons, the fuel or heating medium is introduced through ports over and above  
20 which the slabs or billets have to travel as they are about to leave the furnace, such ports extending from a supply-chamber beneath or in the bottom of the furnace. It is well known that cinders will fall from the slabs  
25 or billets into the fuel-ports and lodge therein as well as in the supply-chamber. To prevent such cinders, whether in a dry or a fluid state, from interfering with the free passage of the fuel and to enable them to be readily  
30 removed without the necessity of putting the furnace out of use is the primary object of the present invention.

A further object is to keep the gases or products of combustion away from the charging-opening and also to minimize the quantity  
35 of cold air that may be drawn in at that point by the draft of the stack; and a further object is to provide improved means for thoroughly heating the air before it intermingles  
40 with the gas for combustion purposes.

The invention will be hereinafter fully set forth, and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is  
45 a vertical longitudinal sectional view of a continuous heating-furnace equipped with my improvements. Fig. 2 is a horizontal sectional view on line 2 2. Fig. 3 is a similar

view on line 3 3. Figs. 4 and 5 are vertical sectional views on lines 4 4 and 5 5, respectively. Fig. 6 is a section on line 6 6. All the sections are taken on Fig. 1. Fig. 7 shows a slight modification in the location of the air and gas ports. Fig. 8 shows in plan a series of fuel-ports. Fig. 9 is a section  
55 thereof on line 9 9.

Referring to the drawings, 1 designates the bed of the furnace, having raised supports 2 for the bearings 3 for the slabs or billets, which bearings extend longitudinally of the  
60 combustion-chamber from the charging-opening 4 to the discharge-opening 5, the arrangement of the bearings being such as to provide for the automatic discharge of the slabs or billets from the point of highest heat, as set forth  
65 in said Reissued Letters Patent No. 11,666.

Opening into the combustion-chamber beneath the inclined portions 6 of bearings 3 is a fuel-port 7, and into this at opposite sides open a gas-port 8 and air-port 9. The fuel-  
70 port 7 forms at a point beneath the entrance of ports 8 and 9 a pocket 10 for the accumulation of cinders. These latter, whether dry or in a fluid state, may be removed from the pocket either through openings 12 in the side  
75 walls of the furnace or through tap-holes 13 in the bottom, in which event they will fall into a car or other receptacle 14, preferably movable transversely of the furnace on tracks  
80 15. Thus it will be seen that while preserving all the advantages of having the fuel-port opening into the combustion-chamber beneath the line of discharge of the billets I am enabled to insure the free passage of the fuel  
85 and at the same time provide for the collection and ready removal of the cinders without interfering with the operation of the furnace. The gas-port 8 leads from a lower supply-  
90 chamber 16, which is out of vertical line with port 7. Both the gas and air ports are preferably equipped with parallel dividing-walls 17 (see Fig. 6) to insure the thorough inter-  
95 mixing of the gas and the air, the walls of one port being arranged in line with the spaces between the walls of the other port.

The cold air enters through pipes 18 into a



chamber 19 beneath the furnace, at or near the discharge end thereof, and thence passes into an air-heating chamber 20 and out into the end of air-port 9 at the receiving end of the furnace, such air-port being carried from the discharge to near the receiving end beneath the furnace-bed and above the air-heating chamber. Within this latter are preferably placed air and gas conduits constructed and arranged after the manner contemplated by my Letters Patent No. 742,740, issued to me October 27, 1903, the operation differing, however, from that set forth in said patent in that the air travels in opposite direction to the travel of the outward gases. The latter pass from the combustion-chamber into the chamber 21 at the receiving end of the furnace and travel through the continuous gas-conduits 21<sup>a</sup> to the smoke-flue 22. The cold air in its passage through chamber 20 is caused to travel up and down by spaced-apart solid walls 23 and by the time it enters the receiving end of port 9 is thoroughly heated. It will be noted that the dividing-walls 17 in the air-inlet port extend rearwardly from a space 24 in the horizontal portion thereof, the remaining portions being divided by partitions 25, as clearly shown in Figs. 5 and 6.

The raised supports 2 for the bearings 3 are not continuous—that is, they are spaced apart to form openings 26 (see Figs. 1 and 3) to permit the gases to pass from above the billets to the under side thereof in their travel to the end chamber 21, and thus to heat the billets more thoroughly on the under side, where most needed on account of the cold-water pipes composing the bearings 3.

Preferably the roof of the furnace is formed in two sections 27 and 28, after the manner contemplated by Letters Patent of the United States No. 672,381, issued to Alex. Laughlin April 16, 1901, to the end that the portion embraced by section 28 will, as pointed out in said patent, constitute the preheating-chamber. To avoid the waste gases in this chamber from injuring the door 29, controlling the charging or receiving opening, or at least to lessen the damage done thereby, and at the same time to minimize the quantity of cold air that may be drawn in at this point by the draft of the chimney, I place a deflector 30 over the upper end of gas-outlet chamber 21, such deflector being preferably in the form of a plate or flat arch extending from the charging-opening inwardly to and partly over the first set of raised supports 2. By this means the downward passage of the gases from above the line of slabs or billets is effected at a point some distance inwardly from the charging or receiving opening, with the result that the volume of the heat against door 29 is lessened and the quantity of cold air that may be drawn in by the gases passing downwardly into chamber 21 is minimized, thus

enabling me to preserve the full heating capacity of the waste gases and avoiding undue cooling of the same as well as of the preheating-chamber by the intruding cold air.

It is understood, of course, that in carrying out my invention the slabs or billets are pushed along the bearings from the receiving to the discharging end after the manner contemplated by said Reissued Letters Patent No. 11,666, that the discharge of each slab or billet is automatically effected at the point of highest heat by means independent of the pushing mechanism, and that the slabs or billets after leaving the furnace fall onto a suitable conveyer.

Changes may be made in the construction and relative arrangements of parts, instances of some of which are shown in Figs. 7, 8, and 9. In Fig. 7 I have shown the air and gas ports opening into the fuel-port at different levels. In very wide furnaces in lieu of a single fuel-port cross-walls divide the fuel-passage into a series of ports, as shown in Figs. 8 and 9, the cross-walls being marked 31 and the ports 32. These cross-walls prevent the long side walls of the fuel-passage from caving in when expanded under high heat. It is obvious that other changes may be made without departing from the scope of my invention.

I claim as my invention—

1. A continuous heating-furnace provided with receiving and discharge openings, bearings for a line of slabs or billets extending from the receiving-opening to the discharge-opening, and having inclined portions, a fuel-port opening into such furnace at a point beneath and intersecting said inclined portions, a cinder-pocket in line with the entrance of such port into the furnace, and means opening into the port intermediate the upper end thereof and said cinder-pocket for supplying fuel to said port.

2. A continuous heating-furnace provided with receiving and discharge openings, bearings for a line of slabs or billets extending from the receiving-opening to the discharge-opening and having inclined portions, a fuel-port opening into such furnace at a point beneath and intersecting said inclined portions, a cinder-pocket in line with the entrance of such port into the furnace, and air and gas ports opening into such fuel-port at points above said cinder-pocket.

3. A continuous heating-furnace provided with receiving and discharge openings, bearings for a line of slabs or billets extending from the receiving-opening to the discharge-opening and having inclined portions, a fuel-port opening into such furnace at a point beneath and intersecting said inclined portions, a cinder-pocket in line with the entrance of such port into the furnace, means for removing the cinders from such pocket, and means



opening into said port above said pocket for supplying fuel thereto.

4. A continuous heating-furnace provided with receiving and discharge openings, bearings for a line of slabs or billets extending from the receiving-opening to the discharge-opening and having inclined portions, a fuel-port opening into such furnace at a point beneath and intersecting said inclined portions, a cinder-pocket in line with the entrance of such port into the furnace, air and gas ports opening into such fuel-port at points above said cinder-pocket, and openings in the sides of the furnace above the cinder-pocket.

5. A continuous heating-furnace provided with receiving and discharge openings at opposite ends of the furnace, bearings for a line of slabs or billets extending from the receiving to the discharge openings, a fuel-supply port at the discharge end of the furnace, a gas-outlet chamber at the receiving end thereof, and a deflector located above said chamber and between it and the receiving-opening and extending into the furnace some distance in advance of the gas-outlet chamber, as and for the purpose set forth.

6. A continuous heating-furnace provided with receiving and discharge openings at opposite ends of the furnace, bearings for a line of slabs or billets extending from the receiving to the discharge openings, a door for said receiving-opening, spaced-apart supports for said bearings, a fuel-supply port at the discharge end of the furnace, a gas-outlet chamber between the receiving end thereof and the first of said spaced-apart supports, and a deflector located above said gas-outlet chamber, and extending from said receiving-opening

inwardly to the first set of supports, as and for the purpose set forth.

7. A continuous heating-furnace having a gas-outlet chamber at one end, a smoke flue or stack at the other, an air-heating chamber intermediate said gas-outlet chamber and smoke-flue, gas-conduits connecting said gas-outlet chamber with said smoke-flue, said air-heating chamber having a lower supply-inlet at or near one end, and an upper outlet at or near the other end, whereby the air will travel longitudinally and diagonally through said air-heating chamber from one end to the other in opposite direction to the outflowing gas.

8. In a continuous heating-furnace having receiving and discharge openings at opposite ends, a fuel-port at the discharge end, and a gas-outlet chamber at the receiving end, an air-heating chamber beneath said furnace, gas-conduits located within said air-heating chamber and forming communication between said gas-outlet chamber and the smoke-flue, means for supplying air to said air-heating chamber at the discharge end of the furnace, and an air-port opening into said fuel-port and leading from the end of the air-heating chamber at the receiving end of the furnace, the air in its travel passing longitudinally and diagonally through said air-heating chamber, as set forth.

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

JOSEF REULEAUX.

Witnesses:

F. CHARLES HERGET,  
G. A. CONNER.