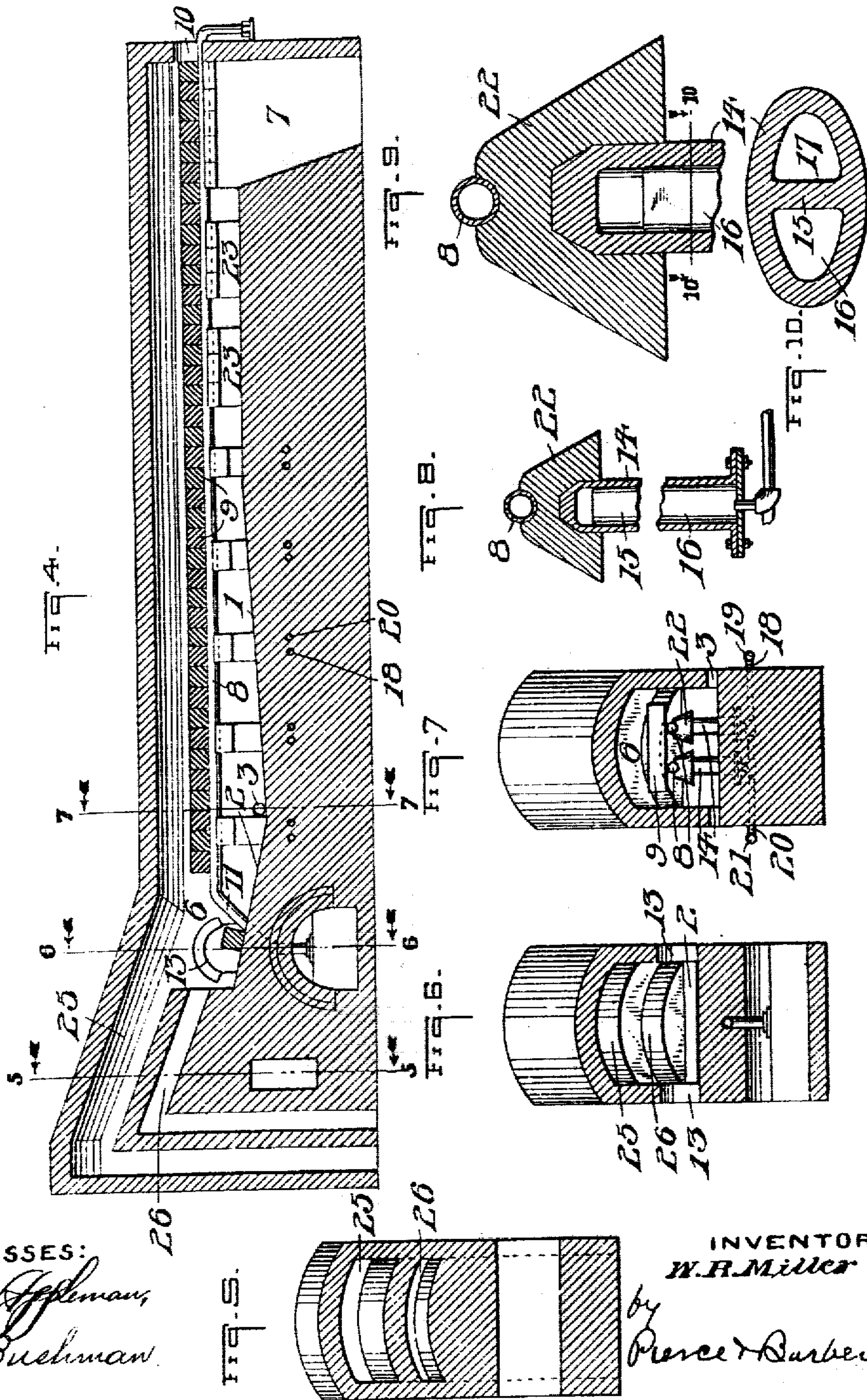


W. R. MILLER.
CONTINUOUS HEATING FURNACE.

APPLICATION FILED DEC. 24, 1904.

2 SHEETS—SHEET 2.



WITNESSES:

J. B. Hoffman,
M. A. Bushman.

INVENTOR

W. R. Miller

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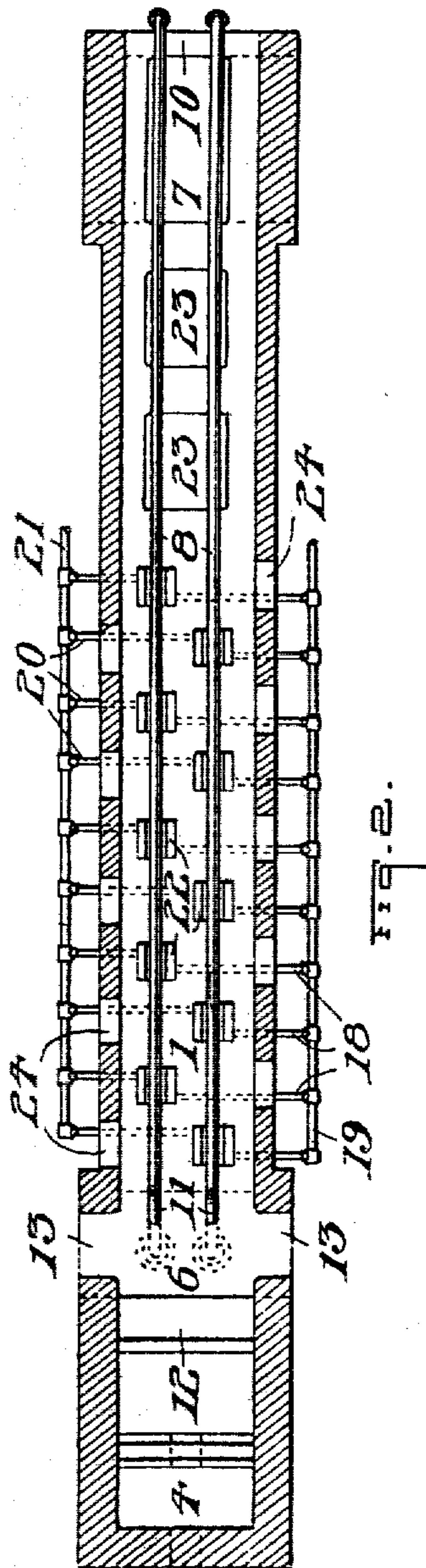
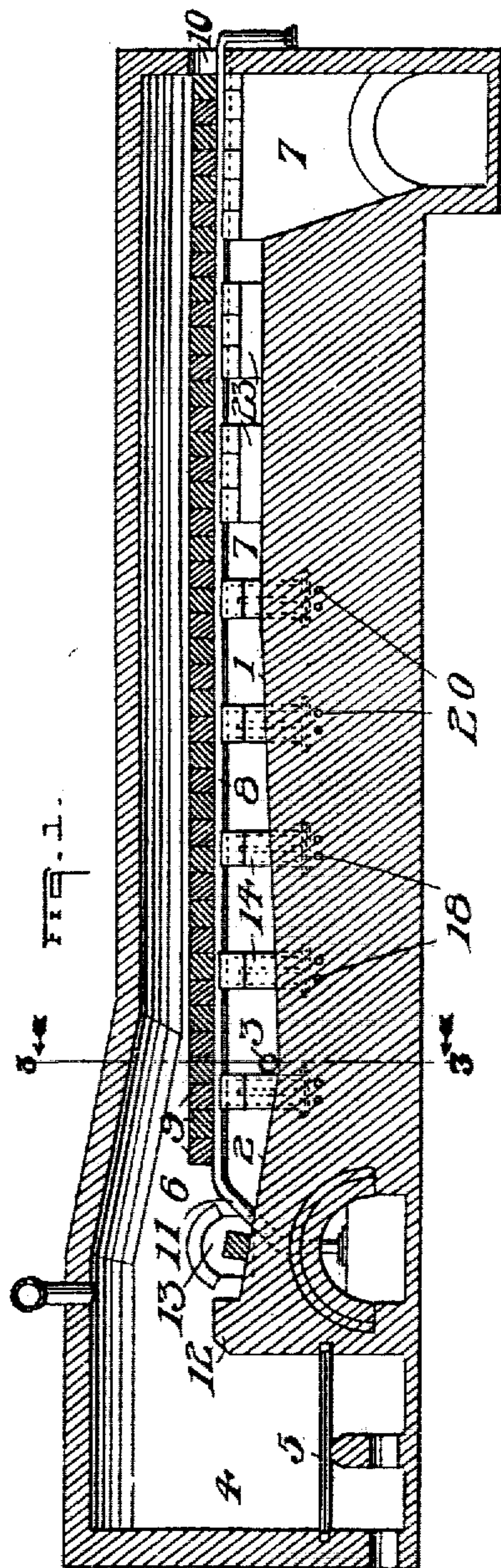
No. 815,198.

PATENTED MAR. 13, 1906.

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CONTINUOUS HEATING FURNACE.

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2 SHEETS--SHEET 1.



WITNESSES

J. C. Hoffman,
M. L. Buchanan

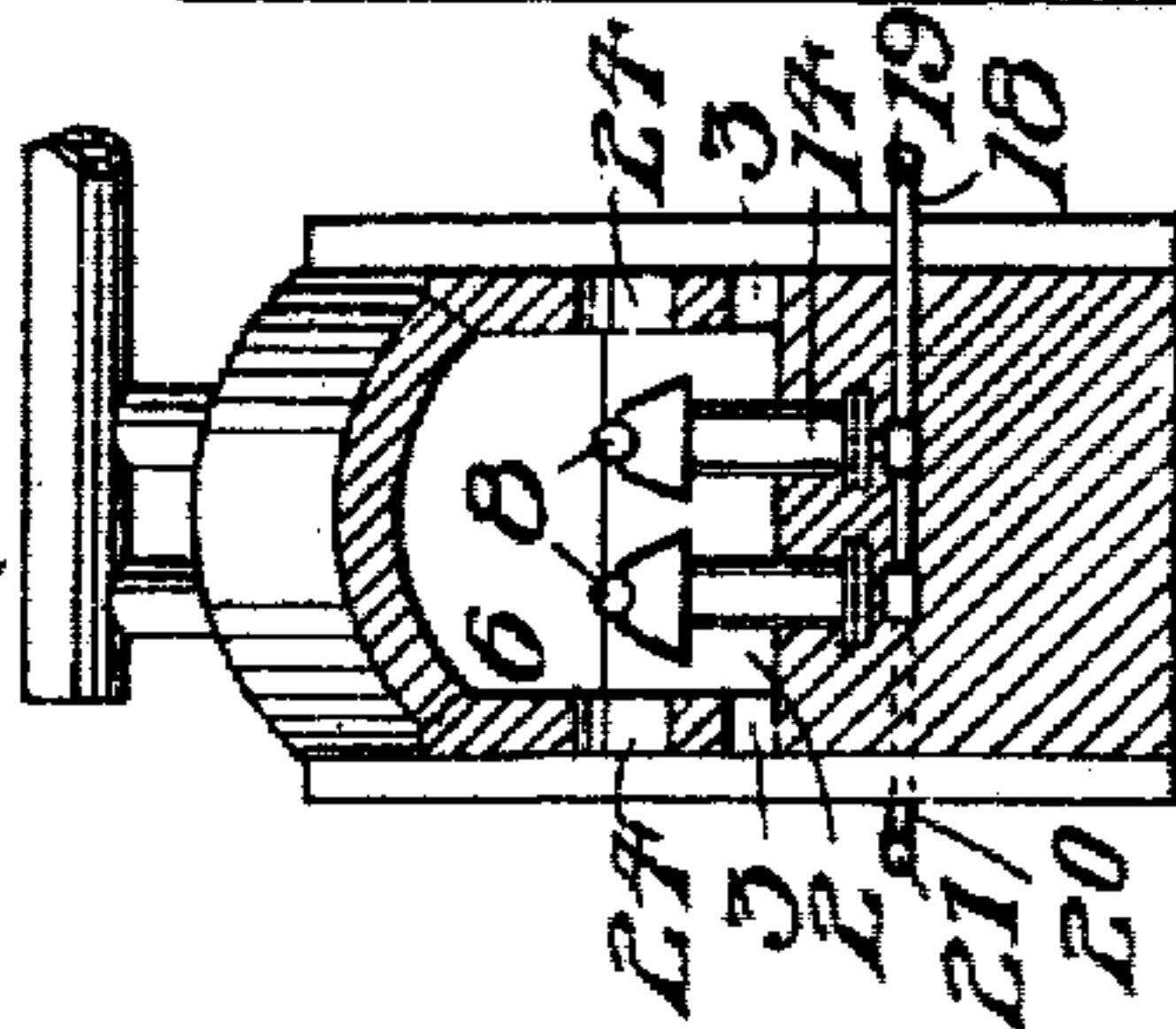


FIG. 3.

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UNITED STATES PATENT OFFICE.

WILLIAM R. MILLER, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR TO
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CONTINUOUS-HEATING FURNACE.

No. 815,198.

Specification of Letters Patent.

Patented March 13, 1906.

Application filed December 24, 1904. Serial No. 238,260.

To all whom it may concern:

Be it known that I, WILLIAM R. MILLER, a citizen of the United States of America, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented or discovered new and useful Improvements in Continuous-Heating Furnaces of which the following is a specification.

My invention relates to continuous-heating furnaces designed especially for billets and the like, but adapted for other articles as well.

It is the object of my invention to provide a furnace which will heat the line of traveling billets on both their upper and lower surfaces and prevent the cinder which drips from the billets from clogging up the heat-passage below the billets or the gas-ports or the grates of the furnace. In some furnaces the cinder or slag runs down over the gas-ports which enter the furnace below the furnace-bottom, and consequently interferes with the burning of the gases and clogs its entrance to the furnace. In other furnaces the cinder hardens beneath the billets to such an extent as to close entirely the heating-space there. This is due to having the furnace-bottom incorrectly constructed or to the using of billet-track supports which occupy this space to such an extent as to prevent the maintenance of the cinder in a molten condition or to the placing of cooling-pipes on the furnace-bottom or at such places as to chill the cinder beyond the capacity of the furnace to keep it melted or to other faulty engineering practice. By my invention I provide a large heating space or chamber beneath the billets and which will maintain the cinder in a molten state. I do not obstruct this chamber by piers of masonry or by pipes so arranged as to catch and chill the cinder. I provide for the escape of the cinder without permitting it to clog the grate or the gas-supply. I also provide a construction which causes the heat to be distributed properly to the spaces above and below the billets.

Other objects of my invention will appear in the detailed description thereof.

Referring to the drawings, Figure 1 is a longitudinal section of one form of my invention where I employ a grate. Fig. 2 is a horizontal section through the heating-chamber above the billet-track; Fig. 3, a vertical sec-

tion on the line 3 3 of Fig. 1 looking along the arrows at said line; Fig. 4, a view similar to Fig. 1 of a modified form of my invention wherein the furnace is heated by gas; Figs. 5, 6, and 7, vertical sections on the lines 5 5, 6 6, and 7 7, respectively, of Fig. 4 looking in the direction of the arrows adjacent to said lines; Fig. 8, a vertical section of one of the billet-track supports; Fig. 9, an enlarged view of the upper part of Fig. 8, and Fig. 10 a horizontal section on the line 10 10 of Fig. 9 looking along the arrows at said line.

Referring to Figs. 1, 2, 3, 8, 9, and 10, my furnace preferably has its bed or floor with the long front slope 1 and the short rear slope 2, one or more cinder notches or openings 3 being made through the sides of the furnace at the junction of the two slopes, through which the cinder or slag dripping from the billets may escape. In the recess 4, at the rear end of the furnace, I locate the grate 5, the recess opening upwardly and communicating with horizontal passage 6, which runs to the front of the furnace and connects with the outlet 7 to the stack. (Not shown.) Extending from the front of the furnace toward the rear thereof are the hollow billet-supports 8, which constitute a track along which the billets 9 are pushed from the opening 10. The supports 8 have their rear portions inclined, as shown at 11, down which the billets slide upon the portion 2 of the furnace-bottom a short distance in front of the bridge-wall 12, over which the flame passes from the recess or chamber 4 to the chamber 6. In the sides of the furnace opposite the ends of the billet 9, which lies at the foot of the incline 11, are openings 13 for pushing the billet endwise out of the furnace. The billet-supports are held from bending or sagging by the vertical supports 14, which are hollow and have a partition 15 therein, which extends from the bottom nearly to the top, whereby a watercourse therein is established up one passage 16 above the partition 15 and down the passage 17. The passages 16 in the several supports 14 are fed from the branch pipes 18, connected to a common feeder-pipe 19. The passages 17 are connected to the branch pipes 20, leading to the common outlet-pipe 21. The supports 14 are provided with caps or shields 22, composed of any refractory material, as fire-brick, or of iron or other metallic

substance, having sockets in their under sides fitting over the upper ends of the said supports. The tops of the shields have grooves in which the supports 8 rest and are but little larger than the supports. From the tops the shields have their sides diverge beyond the supports 14, so as to lead the dripping cinder away from said supports to prevent it from adhering thereto and narrowing the heating-chamber. The supports 14 may be used to support the whole length of the supports 8; but as the cinder does not drop until the billets are some distance toward the rear I provide piers or supports 23, of masonry or the like, at the front end. Opposite the supports 14 I place openings 24, through which the supports 14 may be seen and cared for, if necessary.

The supports 8 are well above the furnace-floor, so as to give the heat free access to the under side of the billets, and the rear end of the supports 8 are at such a height in the passage 6 that the flame and heat which travel toward it divides, so as to properly heat all the exposed parts of the billets. The supports are not carried through the sides of the furnace, but pass through the furnace-floor, beneath which they are connected to the branch pipes 18 and 20, as aforesaid. By this construction the cooling effect of the water in the supports and pipes is removed from the cinder which falls on the furnace-floor. I have no horizontal pipes on or near the said floor on which the cinder can fall and become chilled, thereby clogging the furnace. The best construction requires all the water circulation within the chamber to be in the planes of the supports or rails 8, as they will then be less liable to be engaged by the cinder.

The billets are charged in at the opening 10 and shoved along in a manner well known in the art toward the rear of the furnace. When the billets reach the discharge-openings 13, they are discharged endwise by any suitable means, also well known in the art. It will be noted that the incline 3 of the furnace-bottom extends rearwardly to the vicinity of the billet-discharge opening 13, so that the cinder which drips from the billet up to the time of its discharge will run down this incline.

Figs. 4 to 7 do not differ from Figs. 1 to 3 except in the heating means. In Figs. 4 to 7 the passage 6 communicates rearwardly with the air and gas ports 25 and 26, which are inclined so as to direct the flame into the chambers above and below the billets.

In my invention the cinder cannot run into

or over the gas and air ports nor into the fire-box, but is directed to another place and drawn off. The cinder will be kept melted on the furnace-floor, as the heat has ample space and freedom to seek out all the cinder. The shields will keep the cinder away from the vertical supports 14; but the flame would not in any case permit it to gather to any injurious extent.

Many changes may be made in my invention both in the elements selected or devised and the combinations of the same. I do not, therefore, desire to be restricted to the precise elements or combination shown, but desire a liberal interpretation of my claims, so that they shall include everything within the spirit thereof.

Having described my invention, I claim—

1. In a continuous-heating furnace, a hollow track, hollow supports therefor extending through the floor of the furnace below the furnace-chamber, and means for leading a cooling fluid to and from said supports.

2. In a continuous-heating furnace, a hollow track, and vertical supports in pairs beneath the same having a fluid circulation therethrough, the members of the pairs extending through the furnace-bottom.

3. In a continuous-heating furnace, a hollow track, and supports beneath the same, having means for conducting a cooling fluid to and from the upper end thereof, said supports passing through the floor of the furnace.

4. In a continuous-heating furnace, a hollow track, hollow supports therefor having their axes in the vertical plane including said track, and means for supplying a cooling fluid to the hollows of said supports.

5. In a continuous-heating furnace, a hollow track, supports therefor, having means for leading a cooling fluid wholly in the vertical plane including said track.

6. In a continuous-heating furnace for billets, a hollow track, hollow fluid-cooled supports for the same, and shields on the supports extending laterally beyond the latter.

7. In a continuous-heating furnace for billets, a track, supports therefor having a fluid circulation therethrough shields on the supports consisting of a track-supporting portion and portions diverging downwardly therefrom.

Signed at Pittsburg, Pennsylvania, this 19th day of December, A. D. 1904.

WILLIAM R. MILLER.

Witnesses:

F. N. BARBER,
A. M. STEEN.