

No. 709,173.

Patented Sept. 16, 1902.

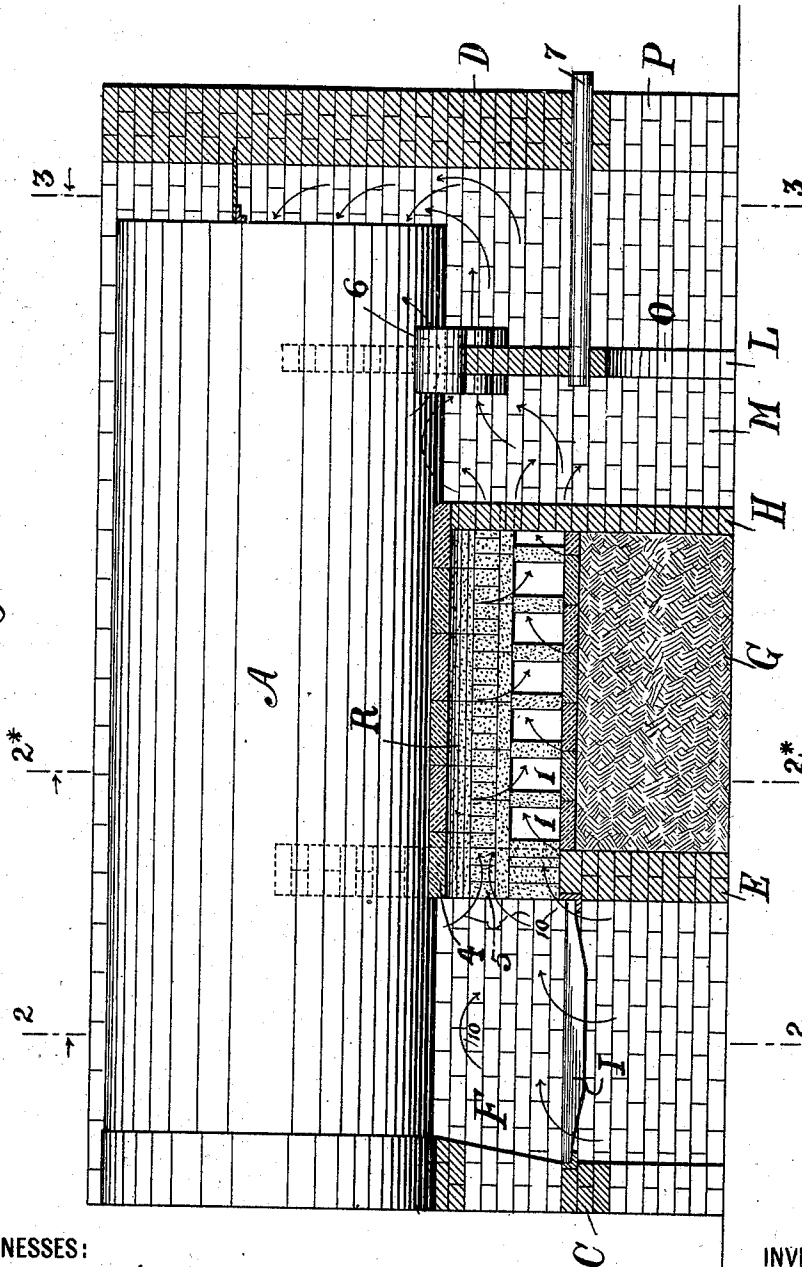
O. D. ORVIS.
STEAM BOILER FURNACE.

(Application filed Mar. 11, 1901. Renewed July 29, 1902.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1.



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2 Sheets—Sheet 2.

Fig. 3.

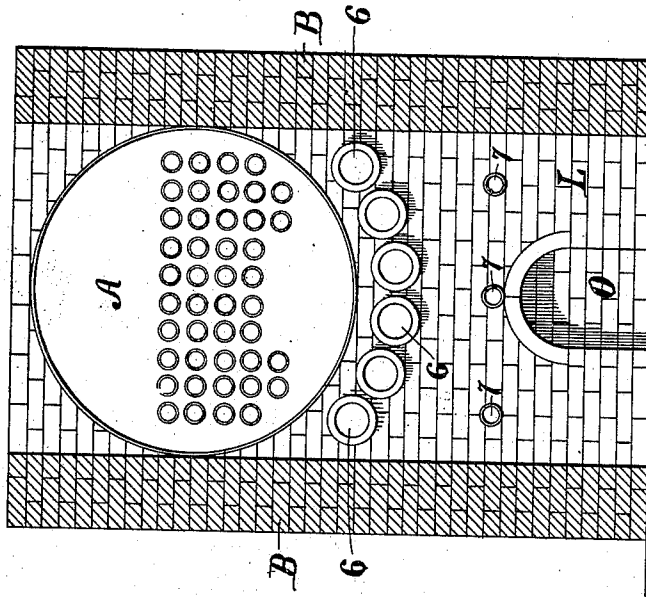
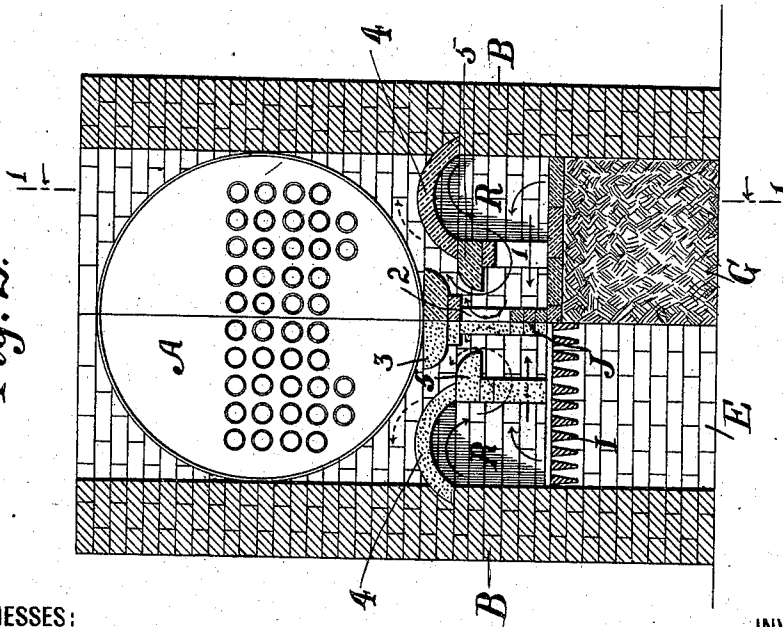


Fig. 2.



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UNITED STATES PATENT OFFICE.

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STEAM-BOILER FURNACE.

SPECIFICATION forming part of Letters Patent No. 709,173, dated September 16, 1902.

Application filed March 11, 1901. Renewed July 29, 1902. Serial No. 117,533. (No model.)

To all whom it may concern:

Be it known that I, OREL D. ORVIS, a citizen of the United States of America, residing at the borough of Manhattan, New York city, in the county of New York and State of New York, have invented certain new and useful Improvements in Steam-Boiler Furnaces, of which the following is a specification.

My invention has reference to improvements in boiler-furnaces, and has for its object to provide a furnace for the generation of steam or for other purposes in which the gases resulting from the distillation and partial combustion of solid fuel are completely consumed at a high even temperature after leaving the fire-chamber.

With this object in view my invention consists, essentially, in a furnace comprising a fire-chamber and grate, retorts located beyond the grate opening into the fire-chamber above the grate and provided with lateral apertures for the discharge of the products of combustion, and a longitudinal wall intermediate of said retorts and having apertures corresponding with those of the retorts.

The nature of my invention will best be understood when described in connection with the accompanying drawings, in which—

Figure 1 represents a longitudinal section of a steam-boiler furnace embodying my invention, the section being taken on the line 1 1, Fig. 2. Fig. 2 is a sectional elevation of which half is on the line 2 2, Fig. 1, and the other half on the line 2* 2*, Fig. 1. Fig. 3 is a transverse section on the line 3 3, Fig. 1.

Similar letters and numerals of reference designate corresponding parts throughout the several views of the drawings.

In the example illustrated I have shown my improvements applied to an ordinary return tubular boiler A, having a usual setting consisting of side walls B B, a front wall C, and a rear wall D, although it must be understood that my improvements may be applied to boilers of other constructions or may be embodied in furnaces adapted for other purposes. In place of the usual bridge-wall, which permits the passage of the products of combustion over its top, I substitute a wall E, which is made high enough to close off the rear of the fire-chamber F and the ash-pit. This wall may serve as a support for the rear end of the grate I in the usual manner.

R R designate two retorts which extend backwardly from the wall E and open through said wall, their inner or rear ends being closed. Said retorts are located directly adjacent to the side walls B B of the boiler, and one of their walls may be formed by such side walls. The retorts are provided with lateral apertures 1, opening toward the center of the furnace. Centrally between the inner apertured walls of the retorts R R is located a longitudinal partition-wall J, having the same length as the retorts and provided with a series of apertures 2, similar to those in the retorts and arranged in line with the same, but at a greater height, so that the apertures are practically staggered. The upper portion of the partition-wall is provided with a head 3, forming a deflector and contracting the passages between said wall and the arches 4 of the retorts. The retorts are provided with longitudinal ledges 5, extending inwardly above the apertures 1 and forming with the deflector 3 contracted passages. The space G beneath the retorts is filled up in the usual manner.

Back of the wall H, closing the rear of the retorts R R, and in the combustion-chamber M is located a transverse wall L, which extends upwardly to form a closure with the boiler and is provided with a series of openings or passages 6, which may be in the form of tubes arranged concentrically with the periphery of the boiler. The wall L is provided with an opening O for the purpose of cleaning, preferably arranged in line with a similar opening P in the rear wall D. Atmospheric air is conducted to the combustion-chamber at or near its rear by means of a pipe or pipes 7, extending through the rear wall D of the furnace and through the combustion-chamber wall L. The volatile products of combustion arising from the grate I are drawn from the fire-chamber F into the retorts R R, as indicated by arrows 10, from which they pass through the lateral apertures 1 on opposite sides of the partition-wall J and mix to a greater or less extent at the apertures in said partition-wall, and then pass upwardly through the contracted passages formed by the deflectors 5 and 3 into the combustion-chamber M and from thence through the passages or openings 6 to the boiler tubes or flues and are then conducted

to the chimney by the usual uptake and draft connections. (Not shown.) Air is admitted to the products of combustion through the pipe or pipes 7 and mixes with the same near the wall L.

It will be readily understood that the retorts and partition-wall are at a high temperature and act as regenerators to supply heat to the gases, thus preventing substantial reduction of temperature when the furnace is being fired, and that in view of the course given to the gases a perfect combustion with increased temperature is obtained, since the gases in leaving the apertures of the opposite retorts come into contact with each other in the apertures of the partition-wall, whereby a breaking up of the gases is caused. It will also be readily understood that in view of the deflector 3 the gases do not directly strike the boiler, but are deflected laterally, thus avoiding condensation of the gases by contact with the boiler. By means of the tubes or orifices arranged concentric with the boiler I obtain, furthermore, an equal distribution to the tubes, and by the admission of air near the end of the combustion-chamber I provide the necessary oxygen for complete combustion and obtain an increased temperature at a point located near the entrance of the gases to the boiler tubes or flues.

What I claim as new is—

1. In a furnace, the combination with the fire-chamber and the grate, of retorts located beyond the grate opening into the fire-chamber above the grate and provided with lateral apertures for the discharge of the products of combustion, and a longitudinal wall intermediate of said retorts and having apertures corresponding with those of the retorts, substantially as described.

2. In a furnace, the combination with the fire-chamber and the grate, of retorts located beyond the grate opening into the fire-chamber above the grate and provided with lateral apertures for the discharge of the products of combustion, and a longitudinal wall intermediate of said retorts and having apertures corresponding with those of the retorts but located at a higher level, substantially as described.

3. In a steam-boiler furnace, the combination with the fire-chamber and the grate, of retorts located beyond the grate opening into the fire-chamber above the grate and provided with lateral apertures for the discharge of the products of combustion, a longitudinal wall intermediate of said retorts and having apertures corresponding with those of the retorts, and a rear wall located within the combustion-chamber and provided with a passage or passages arranged in proximity to the boiler, substantially as described.

4. In a steam-boiler furnace, the combination with the fire-chamber and the grate, of retorts located beyond the grate opening into the fire-chamber above the grate and provided with lateral apertures for the discharge of the

products of combustion, a longitudinal wall intermediate of said retorts and having apertures corresponding with those of the retorts, and a rear wall located within the combustion-chamber and provided with a passage or passages arranged concentric with the boiler in proximity to the same, substantially as described.

5. In a steam-boiler furnace, the combination with the fire-chamber and the grate, of retorts located beyond the grate opening into the fire-chamber above the grate and provided with lateral apertures for the discharge of the products of combustion, a longitudinal wall intermediate of said retorts and having apertures corresponding with those of the retorts, a rear wall located within the combustion-chamber and provided with a passage or passages arranged in proximity to the boiler, and means extending through said wall for introducing air to the combustion-chamber, substantially as described.

6. In a steam-boiler furnace, the combination with the fire-chamber and the grate, of retorts located beyond the grate opening into the fire-chamber above the grate and provided with lateral apertures for the discharge of the products of combustion, and a longitudinal wall intermediate of said retorts having apertures corresponding with those of the retorts and provided with a deflecting-head in proximity to the bottom of the boiler, substantially as described.

7. In a steam-boiler furnace, the combination with the fire-chamber and the grate, of retorts located beyond the grate opening into the fire-chamber above the grate and provided with lateral apertures for the discharge of the products of combustion, and a longitudinal wall intermediate of said retorts having apertures corresponding with those of the retorts and provided with a deflecting-head or deflector in proximity to the bottom of the boiler; and said retorts being provided with inwardly-projecting deflectors above their lateral apertures, substantially as described.

8. In a steam-boiler furnace, the combination with the fire-chamber and the grate, of retorts located beyond the grate opening into the fire-chamber above the grate and provided with lateral apertures for the discharge of the products of combustion, a longitudinal wall intermediate of said retorts and having apertures corresponding with those of the retorts, a rear wall located within the combustion-chamber and provided with a passage or passages arranged in proximity to the boiler, and with a cleaning-opening, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

OREL D. ORVIS.

Witnesses:

EUGENIE P. HENDRICKSON,
A. FABER DU FAUR, Jr.