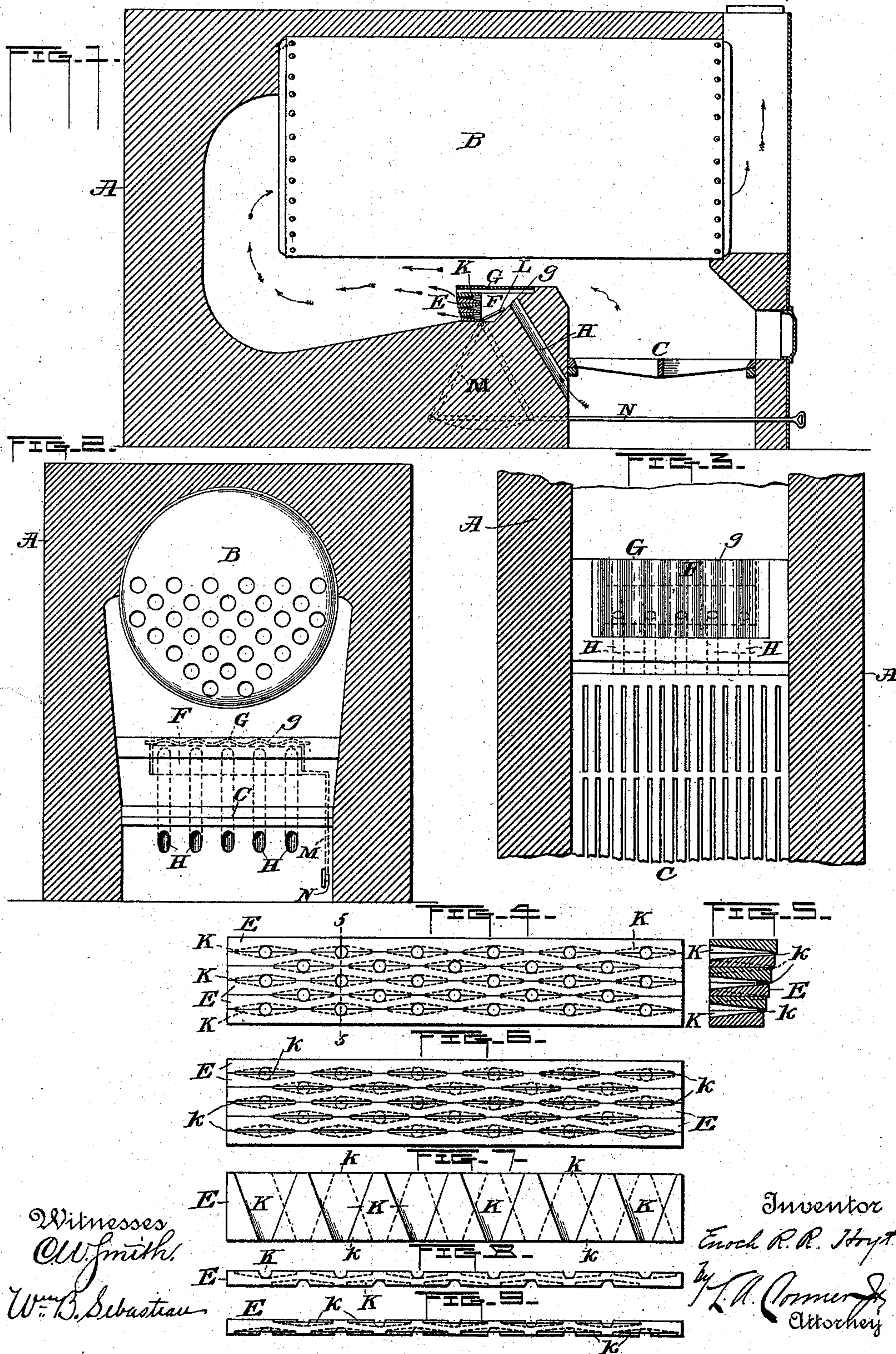


(No Model.)

E. R. R. HOYT,  
STEAM BOILER FURNACE.

No. 528,229.

Patented Oct. 30, 1894.



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# UNITED STATES PATENT OFFICE.

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## STEAM-BOILER FURNACE.

SPECIFICATION forming part of Letters Patent No. 528,229, dated October 30, 1894.

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*To all whom it may concern:*

Be it known that I, ENOCH RENSLOW ROLFE HOYT, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Steam-Boiler 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 to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

My invention relates to improvements in steam boiler furnaces and the object of the invention is to provide a furnace in which the carbon distilled by the combustion of fuels commonly employed will be combined with heated oxygen and thus form carbonic acid or carbon dioxide.

A further object of my invention is to insure the uniform heating of the air admitted into the furnace for the purpose of supplying the necessary oxygen.

With these and other ends in view my invention consists in the combination with the combustion chamber and bridge wall of a furnace, of a series of heating plates arranged in rear of the bridge wall and forming a series of air passages, a cover plate arranged over the space between the bridge wall and heating plates, a flue arranged to conduct air to the chamber between the bridge wall and heating plates, and a damper for regulating the exit of air from such chamber.

My invention further consists in the peculiar construction and arrangement of parts as will be hereinafter more fully pointed out and claimed.

In the accompanying drawings:—Figure 1 is a vertical, longitudinal, sectional view through a tubular steam boiler and its furnace with my improvements applied thereto. Fig. 2 is a front elevation of the same with the front wall removed. Fig. 3 is a plan view of the bridge wall and a portion of the combustion chamber. Fig. 4 is a front elevation of the series of heating plates. Fig. 5 is a transverse, vertical, sectional view on the line *xx* of Fig. 4. Fig. 6 is the rear elevation of the heating plates. Figs. 7, 8 and 9 are, re-

spectively, detail plan, front elevation and rear elevation of one of the interior plates of the series of heating plates.

Like letters of reference denote corresponding parts in all the figures of the drawings, referring to which—

A designates the walls of the furnace and support or setting for the boiler, B, both of which and the grate, C, in the combustion chamber of the furnace may be of any suitable and desired size, style and material. The rear face of the bridge wall is, preferably, inclined as shown in Fig. 1, and in rear of such wall I arrange a series of heating plates, E, and the chamber, F, formed between the bridge wall and said heating plates is covered by a metallic cover plate, G. The upper surface of the bridge wall is cut away at the rear end thereof to form a seat for the forward end or edge of the plate, G, which is preferably provided with a series of longitudinal grooves or corrugations, *g*.

The heating plates, E, are arranged to form a series of horizontal air passages, K, and in the bridge wall are formed a series of flues, H, which connect the chamber, F, with the space below the grate, C.

The air passages, K, are formed by aligned grooves formed in the contiguous faces or sides of adjacent heating plates; and, as shown in Figs. 5 and 7 of the drawings, such passages gradually increase in breadth and decrease in height from their forward to their rear ends. Thus, the forward ends of the air passages, K, are substantially circular in cross section while at the rear of the heating plates such passages appear as narrow slits or elongated parallelograms. The grooves on the faces of the plates (except the outside ones) are not opposite each other but are intermediate between those on the other side of the plate, so that when the plates are assembled the air passages between every pair of plates will lie in different vertical planes from the horizontal rows of air passages next above and below. The top and bottom plates of the series are provided with grooves on only one face as shown.

The plates, E, are made of different widths and so arranged that the rear end or edge of each plate projects slightly beyond the corresponding end or edge of the next lowest plate



of the series. By this construction, which is more clearly shown in Fig. 5 of the drawings, the air escaping from the air passages formed by said plates comes in contact with these  
 5 overhanging or projecting ends, which are the hottest portions of the plates, the air being therefore subjected to the greatest heat as it escapes from the air passages. Such projecting edges also prevent the narrow rear  
 10 ends of the air passages from being filled or clogged by dust.

In order that the volume of air passing through the passages, K, formed by the plates, E, and that all of the air may be deflected  
 15 against the cover plate, G, I arrange a damper, L, within the chamber, F, between the bridge wall and heating plates. To the damper is connected one end of an arm, M, the other end of which is connected to an operating rod, N, which extends through the front  
 20 wall of the furnace, so that the damper may be easily operated.

Although I have shown and described my improvements as applied to a particular kind  
 25 of furnace I do not wish to be understood as intending to limit myself to the particular construction shown as I am aware that my improvements may be advantageously applied to other forms of furnaces and I there-  
 30 fore reserve the right to make such modifications as may fairly fall within the scope of my invention.

Having thus described my invention, what I claim as new, and desire to secure by Letters  
 35 Patent, is—

1. In a furnace, the combination with a combustion chamber and bridge wall, of a series of heating plates arranged in rear of the  
 40 bridge wall and forming the rear wall of a heating chamber a series of air passages, a corrugated plate arranged across the chamber between the bridge wall and heating plates, and a flue arranged to conduct air from below the grate of the furnace to the  
 45 chamber between the bridge wall and the wall formed by the heating plates, substantially as shown and described, for the purpose specified.

2. In a furnace, the combination with a combustion chamber and bridge wall, of a series  
 50 of heating plates placed upon each other arranged in rear of the bridge wall and provided with a series of air passages which increase in width and decrease in height from  
 55 their forward to their rear ends, a plate arranged over the space between the bridge wall and the wall formed by the heating plates, and a flue arranged in the bridge wall to conduct air from below the grate in the  
 60 furnace to the chamber between said bridge wall and heating plates, substantially as shown and described, for the purpose specified.

3. In a furnace, the combination with a combustion chamber and bridge wall, of a series

of heating plates arranged in rear of the bridge wall and forming the rear wall of a heating chamber a series of air passages, formed in said plates, a corrugated plate covering the space between the bridge wall and  
 70 the wall formed by the heating plates, a damper arranged in the chamber between such plates and bridge wall controlling the exit of the air from said heating chamber, and a flue arranged to conduct air to such  
 75 heating chamber, substantially as shown and described, for the purpose specified.

4. In a furnace, the combination with a combustion chamber and bridge wall, of a series  
 80 of heating plates arranged in rear of the bridge wall and forming a series of air passages, said plates being of different widths and arranged so that the rear end of each plate projects slightly beyond the corresponding  
 85 end of the next lowest plate in the series, a plate arranged over the space between the bridge wall and heating plates, and a flue arranged to conduct air to the heating chamber formed between the bridge wall and heating  
 90 plates, substantially as shown and described.

5. In a furnace, the combination with a combustion chamber and bridge wall, of a series  
 95 of plates arranged in rear of the bridge wall and having grooves formed in their upper and lower faces, whereby when the plates are assembled a series of air passages are formed between every pair of plates, said passages  
 100 increase in width, and decrease in height from their forward to their rear sides, a cover plate arranged over the space between the bridge wall and heating plates, and a flue arranged to conduct air from below the grate in the furnace to the heating chamber formed  
 105 between the bridge wall and heating plates, substantially as shown and described, for the purpose specified.

6. In a furnace, the combination with a combustion chamber and bridge wall, of a series  
 110 of heating plates arranged in rear of the bridge wall and having grooves formed in their faces, whereby when the plates are assembled a series of air passages are formed between each pair of plates, the passages between each pair of plates being out of vertical  
 115 alignment with the passages next above and below them, a cover plate arranged over the space between said plates and wall, and a flue arranged to conduct air from below the grate in the furnace to the heating chamber  
 120 formed between the bridge wall and heating plates, substantially as shown and described, for the purpose specified.

7. In a furnace, the combination with a combustion chamber and bridge wall, of a series  
 125 of plates arranged in rear of the bridge wall and forming a series of air passages which increase in width and decrease in height from their forward to their rear ends, said plates  
 130 being of different widths and so arranged



that the rear end of each plate projects slightly beyond the rear end of the next lowest plate in the series, a metallic plate arranged over the heating chamber formed between the  
5 bridge wall and heating plates, a series of flues arranged in the bridge wall to conduct air from below the grate in the furnace to the heating chamber between the bridge wall and heating plates, and a damper arranged

in said heating chamber, substantially as is shown and described, for the purpose specified.

In testimony whereof I affix my signature in presence of two witnesses.

ENOCH RENSLOW ROLFE HOYT.

Witnesses:

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