No. 626,657. Patented June 6, 1899.

G. S. LEE.

HOLLOW GRATE BAR.

(Application filed Mar. 1, 1899.)

(No Model.)

Fig. 1

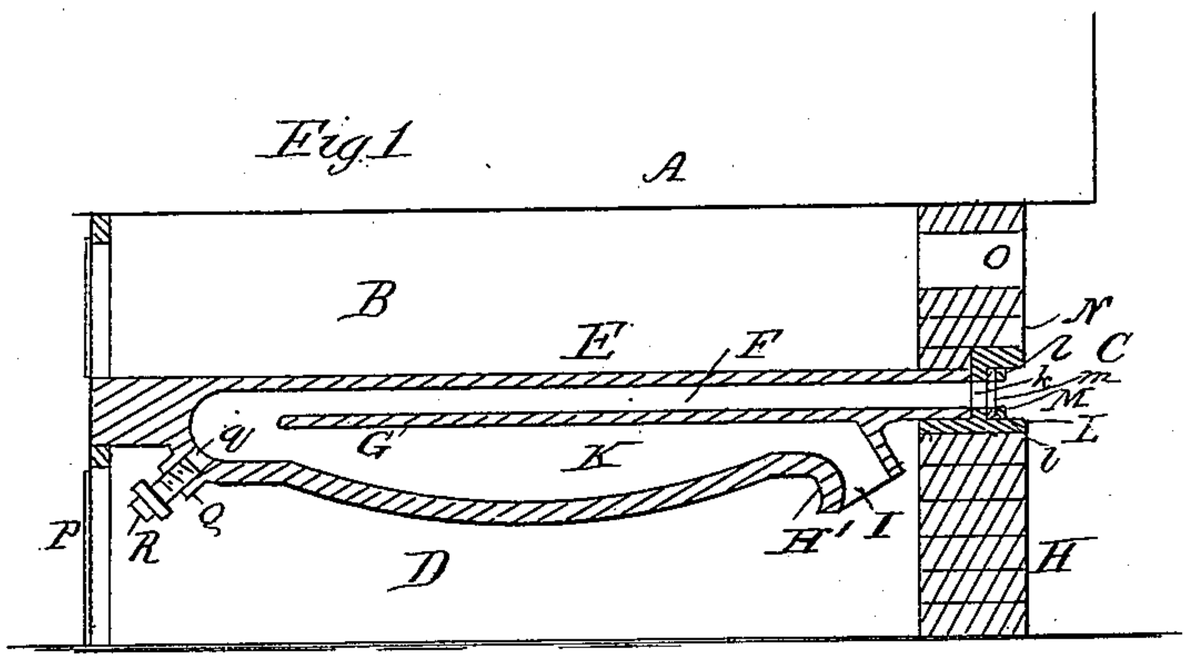


Fig. 2

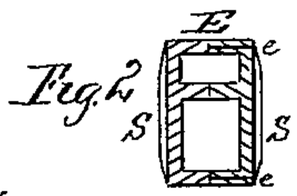
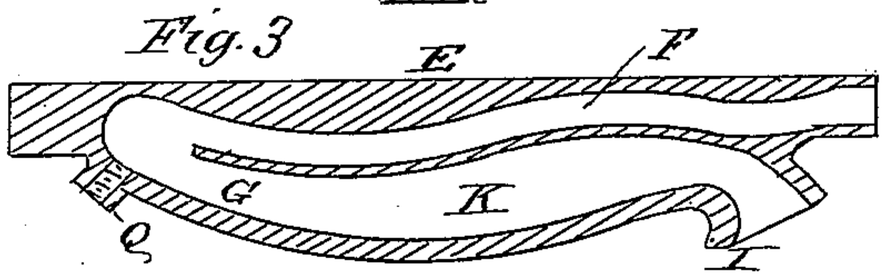


Fig. 3



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GEORGE S. LEE, OF HAWTHORNE, NEW JERSEY, ASSIGNOR TO THE NATIONAL GRATE BAR COMPANY, OF NEW JERSEY.

HOLLOW GRATE-BAR.

SPECIFICATION forming part of Letters Patent No. 626,657, dated June 6, 1899.

Application filed March 1, 1899. Serial No. 707,385. (No model.)

To all whom it may concern:

Be it known that I, GEORGE S. LEE, a citizen of the United States, residing at Hawthorne, in the county of Passaic and State of New Jersey, have invented certain new and useful Improvements in Hollow Grate-Bars; 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.

My invention has relation to hollow grate-bars, and has for its object the provision of means whereby air may be conveyed through the grate-bar, so as to become highly heated in its passage therethrough, and then mixed with the gases and other products of combustion to produce a very high degree of heat from a given amount of fuel and promote perfect combustion, so as to entirely or almost entirely prevent the egress of smoke from the stack.

My invention consists in the novel construction of the grate-bar hereinafter described, and, further, consists in the novel construction, combinations, and arrangements of parts in a furnace or fire-box employing hollow grate-bars, hereinafter described.

Referring to the accompanying drawings, Figure 1 is a vertical longitudinal sectional view of a steam-boiler and furnace fitted with my improvements. Fig. 2 is a vertical sectional view of one of my improved grate-bars, and Fig. 3 a vertical longitudinal section of a modified form of the same.

A designates the boiler; B, the fire-box; C, the combustion-chamber, and D the ash-pit.

E designates one of the grate-bars, which are composed of two equal halves, being divided longitudinally and vertically on a central line, each half being of the same form as the other and the two halves being united by pins cast in one half and passing into or through holes in the other half and riveted on the outside of the same, one of said pins *e* being shown in the sectional view Fig. 2. The two halves of the grate-bar are cast with longitudinal channels, which when the halves are united to form the complete bar constitute a passage for the air, composed of the upper and lower conduits F G, which communicate near one end of the bar. The conduit G opens toward the inner end of the ash-pit near the bridge or wall H (as the air close to the bridge-wall is heated) through a neck H′, and this conduit is enlarged at K to form a supply or accumulating chamber for the already-heated air. The conduit F communicates by a bend with the conduit G near the forward end of the bar and extends from that point completely through the bar, where it registers with a hole *k* in a channel-bar that rests upon the wall H and constitutes a part of the fire-bridge. A sliding bar M is arranged to slide within the channel of the bar L, being supported and guided in its movements by lugs *l l* at top and bottom, and this bar M is pierced with holes *m*, that correspond with the holes *k* in the channel-bar, the purpose of the sliding bar being to regulate the size of the air-exit from the hollow bars of the grate, such regulation being accomplished by moving the sliding bar longitudinally by means of a prolongation extending through the side wall of the furnace and operated from the outside by a suitable screw or lever.

Courses of brick N N are built up on the ends of the grate-bars and on top of the channel-iron L, so as to protect them from the flame, and constitute the fire-bridge proper, an arch of fire-brick O being thrown over the fire-bridge, so as to deflect the flames downwardly in the combustion-chamber and toward the outlets of the hollow grate-bars, where the products of combustion meet the highly-heated air issuing from the grate-bars and are thoroughly commingled therewith.

Near the forward end of the bar and on the bottom thereof just inside the door P of the ash-pit the grate-bars E are formed with a cast bushing Q, that has a port *q* leading into the hollow of the grate-bar at the junction of the conduits F G. The bushing *q* is closed normally by a nipple and plug, and the purpose of the bushing is to provide for the attachment of a steam-pipe, from which steam may be blown through the conduits F G when it is desired to blow out the dust and fine ashes that may accumulate from time to time.

Each of the double grate-bars is formed with lugs S S on each side, so as to maintain the bars at proper distance apart, such lugs being shown in Fig. 2.

In operation the air is taken in at I from the ash-pit, where it has been already heated to a considerable degree, and passing into chamber K is allowed to expand and accumulate, and then passes through conduit G to or near to the forward end of the grate-bar, and then passes to the rear of the same through conduit F and enters the combustion-chamber through the holes in the channel-iron L, the amount of air so entering the combustion-chamber being regulated by the sliding bar M. The air in its passage forward and then backward through the hollow grate-bar becomes heated to a very high degree and issues from the grate-bar in such condition and mingling with the products of combustion and gases from the fire produces a degree of heat and perfect combustion not hitherto accomplished by grate-bars of ordinary form.

In the modified form shown in Fig. 3 the conduits are of sinuous form, the purpose being to lengthen the passage through the bar, and thereby increase the heating-surface with which the air comes into contact.

Having described my invention, I claim—

1. In a hollow grate-bar, the combination with the inlet-port I, the chamber K, and conduit G, of the conduit F, communicating with conduit G, and opening out through the rear end of the bar, substantially as described.

2. The combination with a furnace having a bridge-wall between the fire-space and combustion-chamber, of a hollow grate-bar, having direct and return flues, both opening at or near the bridge-wall, the return-flue having communication only with the combustion-chamber, whereby all the air admitted to the interior of the grate-bar, will be directed through both flues, substantially as described.

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

GEORGE S. LEE.

Witnesses:

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