L. P. RIDER.

GRATE-BARS FOR FURNACES.

No. 186,436. Patented Jan. 23, 1877.

fig. 1.

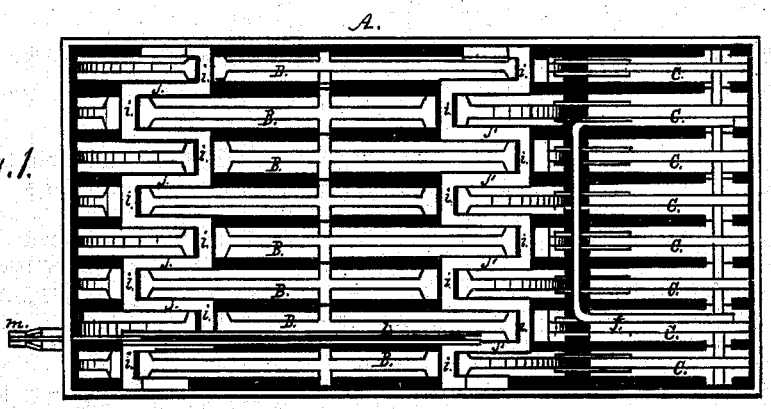


fig. 2.

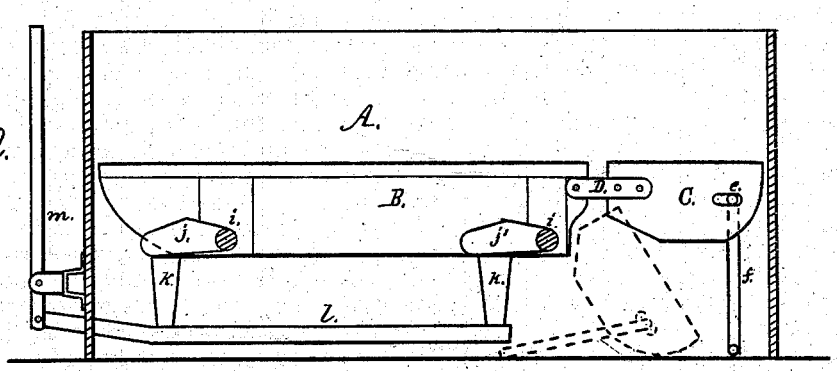


fig. 3.

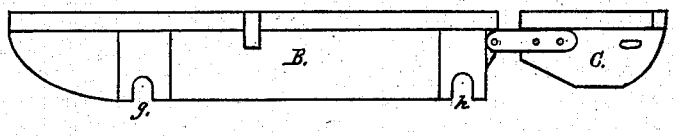
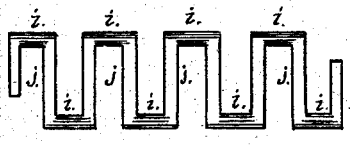


fig. 4.

fig. 5.

fig. 6.



Witnesses

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UNITED STATES PATENT OFFICE.

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IMPROVEMENT IN GRATE-BARS FOR FURNACES.

Specification forming part of Letters Patent No. **186,436**, dated January 23, 1877; application filed September 23, 1876.

To all whom it may concern:

Be it known that I, LEMAN P. RIDER, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Grates for Furnaces; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

My invention relates to an improvement in grates for furnaces; and consists in the peculiar construction, suspension, and arrangement of the grate-bars with relation to the vertical walls of the fire-chamber of the furnace, and also in the means and manner of manipulating the said grate-bars with relation to each other and the body of the burning fuel resting on them, the whole being so constructed, arranged, and operating that the necessary and proper quantity of air is admitted under, into, and around the burning fuel, thereby securing a uniform and complete consumption of it, and generating an intense heat by the proper commingling of atmospheric air with the gases evolved by the burning fuel, and the formation of clinkers prevented, and the walls of the fire-chamber protected.

To enable others skilled in the art with which my invention is most nearly connected to make and use it, I will proceed to describe its construction and operation.

In the accompanying drawings, which form part of my specification, Figure 1 is an inverted view of the grate. Fig. 2 is a vertical section of the grate and furnace at line *y* of Fig. 1. Fig. 3 is a side view of the grate-bar. Fig. 4 is an end view of the same. Fig. 5 is a transverse section of the same. Fig. 6 is a top view or plan of the crank-shafts upon which the grate-bars are suspended in the fire-chamber of the furnace.

In the accompanying drawings, A represents the furnace; B, the grate-bars, which are constructed in two sections, and hinged together at D. The sections C of the grate-bars are provided with openings, through which passes a shaft, *e*, the ends of which are supported and held in position by a support, *f*, which can be moved at will for dropping the sections C of the bars B, for the purpose of cleaning out the fire-chamber, or for removing the refuse of combustion. The grate-bars B are provided with recesses *g h*, into which are placed the wrist-pins *i* of the crank-shafts *j j'*, which shafts are pivoted in suitable bearings in the side walls of the furnace. From the crank-shafts *j j'* project downward arms *k*, to which is pivoted a connecting-rod, *l*, to the outer end of which is attached an operating-lever, *m*. That part of the crank-shafts *j j'* which is between the grate-bars, or between the openings formed by them, is beveled on the upper surface, for the purpose of preventing the cinders or other matter which pass down between the bars from lodging and remaining on the shafts *j j'*, which would, if allowed to remain on the shafts and between the grate-bars, prevent the proper inflow of air to the burning fuel resting upon the bars.

I wish it to be observed that by the arrangement of the crank-shafts *j j'* with relation to the grate-bars B and the sections C, hinged to them, the operator imparting to the lever *l* a reciprocating motion, the bars B will be elevated alternately and vertically, their upper surface retaining a horizontal plane, while the sections C will also be moved alternately, but at an acute angle to a horizontal plane. By this peculiar movement of the bars B and sections C the under surface of the burning fuel becomes corrugated, so as to form a series of channels for the inflowing air, and by the sections C being moved at an acute angle to the plane of the bars B the fuel is parted, forming a series of crevices or vents, which are at right angles to the corrugations formed by the vertical and horizontal movements of the bars B, thereby causing a full and free flow of air into and among the burning particles of fuel, and at the same time allowing the refuse of combustion to drop down from among the burning fuel, thus giving a full and free ingress for the air, and allowing it to act unimpeded on the burning fuel, and also to commingle with the gases evolved therefrom, whereby complete combustion follows, and an intense heat is generated.

By reference to Fig. 1 it will be seen that an open space is formed between the walls of the furnace and the grate-bars. By this arrangement a current of air is made to pass up

between the walls of the furnace and grate, causing a concentration of the flame and heat toward the center of the grate; hence there will be no formation of clinker on the walls of the furnace, and this outer current of air will so inclose and envelop the fuel, flame, and gases evolved as that complete combustion is insured, and the walls of the furnace perfectly protected, and the warping common to the walls of the locomotive-furnace entirely obviated.

By the construction of the grate hereinbefore described, the formation of clinkers is prevented, for the matter which usually forms the clinker flows down in the form of a glossy substance, which, lodging on the surface of the grate, is, by the peculiar movement of the bar, broken into small pieces, which drop down into the ash-pit of the furnace.

Having thus described my improvement, what I claim as of my invention is—

1. A grate-bar consisting of two sections, B C, the latter being hinged to the former, and capable of being turned downward without affecting the horizontal position of the section B, substantially as set forth.

2. The combination of the sections B C, connected by links D and the crank-shafts *j j'*, supporting them, and arranged with relation to the walls of the furnace, and operating the section B, as specified.

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Witnesses:
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