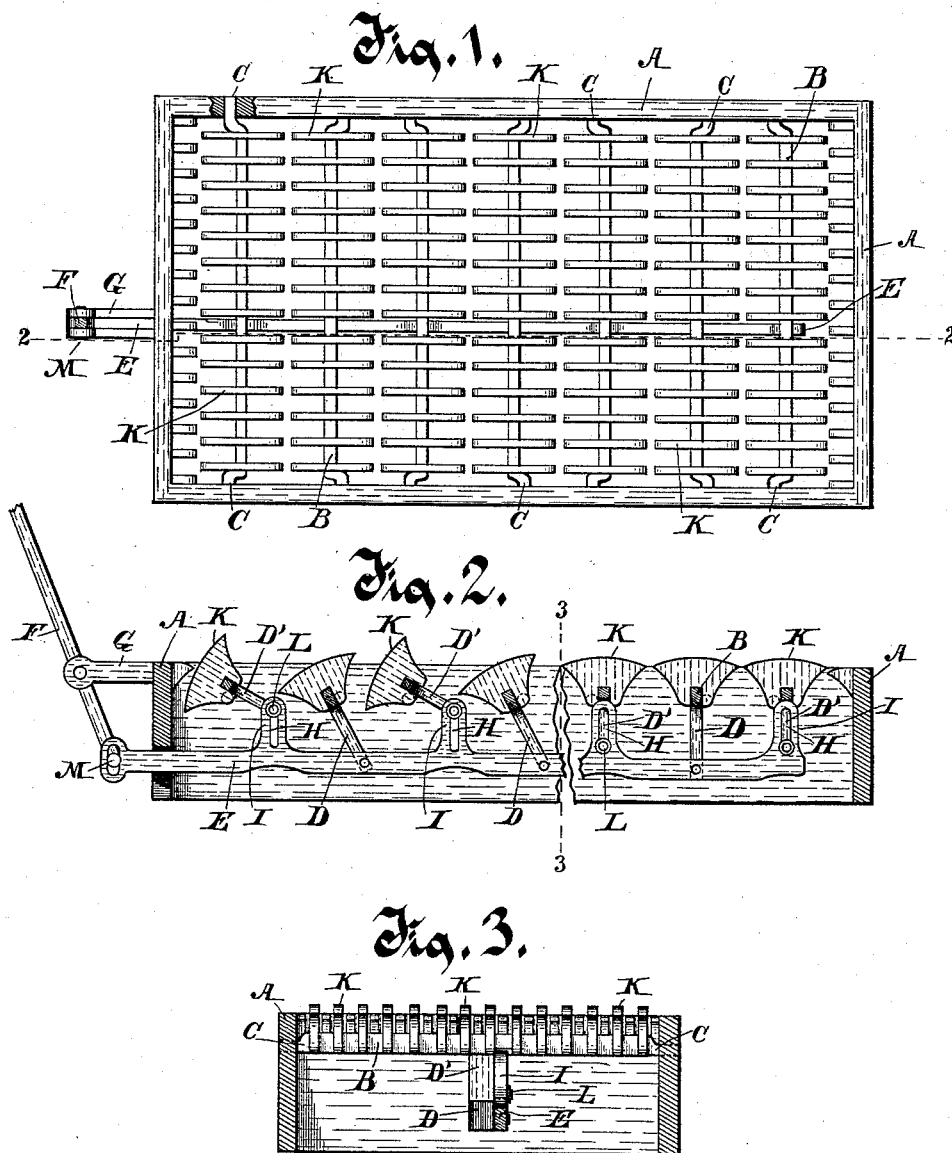


(No Model.)

F. D. LIVERMORE.
FURNACE GRATE.

No. 422,954.

Patented Mar. 11, 1890.



Witnesses.

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UNITED STATES PATENT OFFICE.

FREDERICK D. LIVERMORE, OF ROCHESTER, MINNESOTA.

FURNACE-GRATE.

SPECIFICATION forming part of Letters Patent No. 422,954, dated March 11, 1890.

Application filed October 7, 1889. Serial No. 326,205. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK D. LIVERMORE, of Rochester, in the county of Olmsted and State of Minnesota, have invented new and useful Improvements in Furnace-Grates; and I do hereby declare the following to be a full, clear, and exact description of said invention, 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 furnace-grates; and it pertains to that class of grates in which the grate-supporting bars are adapted to be rocked upon pivotal supports.

The invention consists, especially, in the peculiar construction and arrangement of the several grate-bars upon which the fuel is supported relative to each other and to their pivotal and operating supports, whereby a differential, as well as an oscillating, motion is communicated to said bars when they are rocked.

Figure 1 is a top view of the grate. Fig. 2 is a vertical longitudinal section of the grate on line 2 2 of Fig. 1, the grate being shown in two parts, in one of which the bars are in the normal position for supporting coal and in the other they are tilted, being in a position they occupy while being rocked. Fig. 3 is a transverse vertical section of the grate on line 3 3 of Fig. 2.

The same reference-letters refer to like parts in all the views.

The grate is supported in the frame A. The several grate-bars B B are located transversely of the frame, and are each provided with journals C C at their respective ends, which have their bearings in apertures therefor in the frame. The axis of the journals C C of each bar is parallel with the medial line of the grate-bar; but the journals of each bar are at one side of the medial line of the bar, and in the arrangement of the bars in the frame the bars are located at equal distances from each other, while the journals which support them and on which they rock, and which on each bar are at one side of the medial line, are arranged in the grate alternately at the right and left of adjoining grate-bars, the journals and grate-bars being in the same horizontal plane when the grate-bars are in their normal position for supporting fuel thereon.

Each of the grate-bars is provided with several upwardly-projecting and laterally-extending heads K K, adapted for receiving coal thereon and forming a coal-supporting grated surface, which heads are preferably arranged at equal distances apart on each bar and opposite to each other on the several bars. Each of the grate-bars is also provided with a rigid arm, preferably formed integral therewith, projecting downwardly at right angles to the horizontal plane of the several bars, which arms, lettered alternately D and D', are pivoted at their lower ends, respectively, in a horizontal reciprocating shaking-bar E, whereby the grate-bars, which, with their downwardly-extending arms, are severally at one side of their journal-axis, are supported in position, and whereby they, with their thereon-carried heads K K, may be rocked, as hereinafter described.

It will be understood that with this construction, if the shaking-bar E were forced to the right, (that is, into the frame,) the first bar would be so tilted that the surface of its head would be inclined considerably more than the surface of the head of the second bar would be inclined by the same movement of the shaking-bar, because the downwardly-projecting arm D', being at the right of the axis of the journals of its bar, would be at once carried still farther to the right and upwardly or away from the vertical passing through the axis of the journals, while in the second grate-bar the arm would be carried to the right, but at first downwardly or toward the vertical passing through the axis of the journals, so that the difference in the inclination of the top surface of the heads K K, caused by this movement, would be considerable, merely by reason of the arrangement of the grate-bars with reference to their journals; but in order to increase this differential or eccentric movement I construct the arms D' considerably shorter than the arms D, and pivot them severally to the bar E by a pin L, passing through a slot H in a lug I integral with the bar. It will be seen that with these long and short arms, while the shaking-bar E is supported in its normal position on the arms D D and retains all the arms D and D' in a vertical position, when this shaking-bar is forced endwise, carried

on the arms D D in the arc formed by such movement with those arms as radii, the short arms D'D' will be caused to move an equal distance; but being considerably shorter than the arms D D, the arcs described by their extremities will be parts of circles much less in diameter than the circle of the arc through which the outer ends of the arms D D and the shaking-bar E is carried, and that the result of this movement of these differently constructed and arranged grate-bars and arms is to tilt the coal-carrying heads on each alternate grate-bar in an eccentric or differential arc as compared with its adjoining bar, thus breaking up the normally even and regular surface of the grate to a great extent, in the manner shown at the left in Fig. 2.

The shaking-bar E is conveniently reciprocated by a lever-handle F, pivoted medially in a bracket G, rigid on the frame, the handle being pivoted at its lower end by a pin M in a slot therefor in the end of the shaking-bar E.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a furnace-grate, the combination, with a bar-supporting frame, of a series of transverse grate-bars arranged parallel to each other at equal distances apart, and provided with coal-supporting heads supporting journals on the grate-bars at their respective ends, the journals on each bar being at one side of the medial line of its bar, and the journals on the several bars being arranged

alternately nearer to and farther from each other than the grate-bars are to each other, and in the same horizontal plane with the bars when in their normal position, arms extending downwardly from the medial line of the grate-bars at right angles thereto and at the same equal distances from each other that the grate-bars are apart, and means for communicating equal motion simultaneously to said grate-bars through said downwardly extending arms, substantially as described.

2. In a furnace-grate, the combination, with a supporting-frame, of a series of transverse grate-bars arranged parallel to each other at equal distances apart, bar-supporting journals at one side of the medial line of the bar, and arranged alternately nearer to and farther from each other than the grate-bars are apart, arms extending downwardly directly from the medial lines of the grate-bars at the same equal distances apart, and a reciprocating bar to which the lower extremities of the arms are pivotally connected, each alternate arm being shorter than the adjoining arm, and being pivoted in a vertical slot provided in the bar to permit the eccentric swinging of such alternate short arm, substantially as and for the purpose set forth.

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

FREDERICK D. LIVERMORE.

Witnesses:

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E. N. HOPKINS.