G. R. MOORE.

Furnace-Grate.

No. 165,943. Patented July 27, 1875.

Fig. 1.

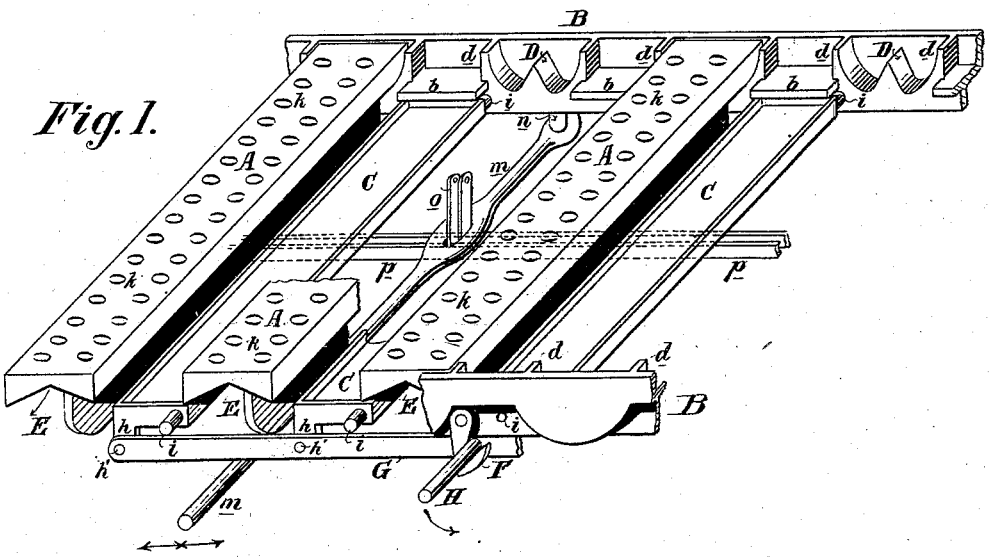
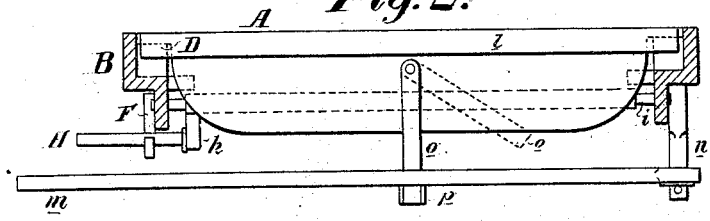


Fig. 2.



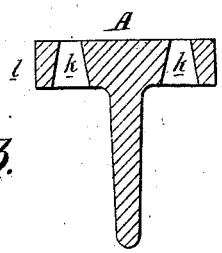


Fig. 3.

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UNITED STATES PATENT OFFICE.

GEORGE R. MOORE, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN FURNACE-GRATES.

Specification forming part of Letters Patent No. **165,943**, dated July 27, 1875; application filed February 9, 1875.

To all whom it may concern:

Be it known that I, GEO. R. MOORE, of the city and county of Philadelphia and State of Pennsylvania, have invented Improvements in Fire-Grates, of which the following is a specification:

The object of my invention is twofold: I aim, first, to provide such a form for grate-bars used in fire-beds as to increase their effectiveness, durability, and convenience; and, second, to improve the whole fire-bed in form, construction, and accessories, that ashes, cinder, slate, and stone may be discharged freely through it into the ash-pit for cleaning the fire, causing at the same time no leakage or waste of coal in the process.

I aim to provide a serviceable and convenient fire-bed, complete in all respects, and applicable to all varieties of situations where fire-beds are used. I use two series of very wide bars, placed on horizontal lines above each other, and relatively to perpendicular lines, so arranged that the bars in one series shall fill the spaces of those in the other series.

The drawings herewith presented show three main bars in the upper series and three thin bars in the lower series. It is obvious that any number of bars desired in one set may be combined substantially as shown, and that any number of sets may be placed together to constitute larger fire-beds to any extent.

The first necessity in providing a good fire-bed for large fires is to have bars that will not too much obstruct the large volume of air required to sustain rapid combustion, and at the same time be capable of keeping their proper form under the intense heat of use under a clean fire and strong draft. To meet this want I have taken a very wide and thick bar and braced it with a deep central rib below, and then pierced the bar on either side of this central rib with conical apertures of such size as to supply air abundantly. The air passing thus through these apertures tends to keep the lower portion of the bar cool, and thus the whole bar from changing form. The upper series of bars are hung on knife-edge bearings circumscribed with a flange upon and extending inward from the frame-work in which they are hung. Easy vibration of the bars and sure protection against displacement are thus secured by this combination bearing, which embodies a central frictionless working joint within the external form of a journal-box, loosely embracing the ends of the bars. If the central bearing were removed the ends of the bars would still be as journals properly boxed for oscillation. Further instrumentalities for oscillating these bars are, a hanger from each one down to a connecting-rod, crosswise with which they are loosely jointed, and all operated together; also, in this case a direct lever is pivoted to the frame-work back and below the fire-bed, from which it passes to the front, embracing at the center the hanger of one of the grate-bars. At the front it serves as a manual lever for vibrating all the bars in this set at once. The lower series of bars, though wide, are thin and light. They are protected from the fire by distance from it and by ashes from the fire above. They are hung on common journals near one side, at each end, so as to swing down when it is desired to empty them of the refuse products of combustion. They have hangers cast upon the lower side, near the front end, through which an arm is extended to the front, where it serves as a manual lever. It is also received by a hanging latch when the bars are to be held in a horizontal position. From one of these hangers to another a rod is connected for operating together as many bars as may be desired.

Figure 1 is a perspective view of the whole fire-bed with portions broken away, that all the mechanism employed in it may be seen and understood in its working condition. It shows an empty bearing, and is broken away at both ends to indicate that it may be extended at will. Fig. 2 is a vertical transverse section, in which every distinct piece of mechanism in the whole fire-bed is also indicated. Fig. 3 is a vertical transverse section of a single main bar. It is taken at right angles to Fig. 2.

A is the main fire-grate bar, thick and wide in its upper part, *l*, and strongly braced with a deep central rib below, and perforated with as many conical apertures *k* as may be desired for the draft; B B, the bed-plates, in which all the bars in both the upper and lower

series are hung, and to which the latch F is jointed and the hanger *n* rigidly attached. C C C are the light wide swinging bars, constituting the lower series of bars. Each one is journaled to the frame-work, as seen at *i*. They are all connected by the rod G, loosely pivoted to the hangers *h* at *h'*, and thus all are operated together by the handle H, which is latched upon the swinging hook F, to hold them all in a horizontal position. They are emptied by withdrawing F from H, when they swing down in the direction shown by the arrow near H. D, the knife-edge bearing, upon which the main fire-bars rest and are operated; *d*, the boxing, in which the bars work loosely and without friction, while at the same time protected by it from displacement, as before stated. *b* is a flange from the bed-plate, to shelve over the ends of C C C, so that no cinder can fall in wedgewise and obstruct the freedom of their working. E shows the form of the ends of the main bars for resting and operating on D; *o*, a hanger pivoted to the rib of the main bar, and connecting it with the operating-lever *m*, and by means of the connecting-rod P bringing all the bars in this set under the same control. As *o* would be in the way in handling bars for shipping it is so attached as to swing aside, as shown in dotted lines. The combination of *m* with all the main bars A through the connecting-rod P secures the vibration of all of them whenever *m* is vibrated by hand or otherwise.

The operation of cleaning the fire is as follows: First set free the bars C C C, to swing down and empty themselves of what ashes and cinder may be upon them. Then latch them up and oscillate the main bars briskly by the lever *m*, when ashes and cinder will be found again to load the bars C C C, when again they must be emptied, and this process continued until the fire becomes as clean as may be desired.

I claim—

1. The upper series of vibrating bars A, in combination with the lower series of swinging bars C, as and for the purpose herein set forth.
2. The bed-plates B, having each central bearing D provided with side flanges *d*, as and for the purpose specified.
3. The swinging bar C, in combination with an upper series of bars, as and for the purpose herein set forth.
4. The latch F, in combination with the bar C, as and for the purpose herein set forth.
5. In combination, the bars A, hangers *o*, and lever *m*, as and for the purpose herein set forth.

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Witnesses:
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