

(No Model.)

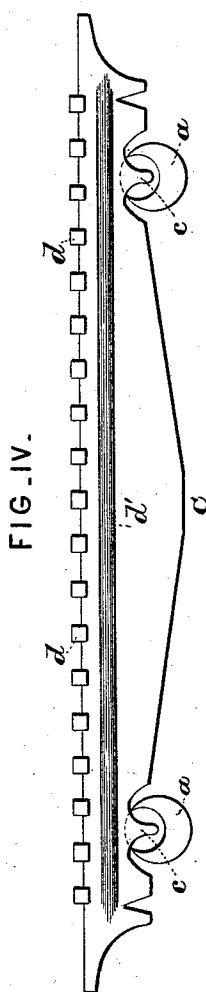
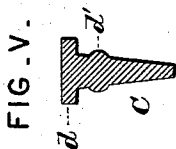
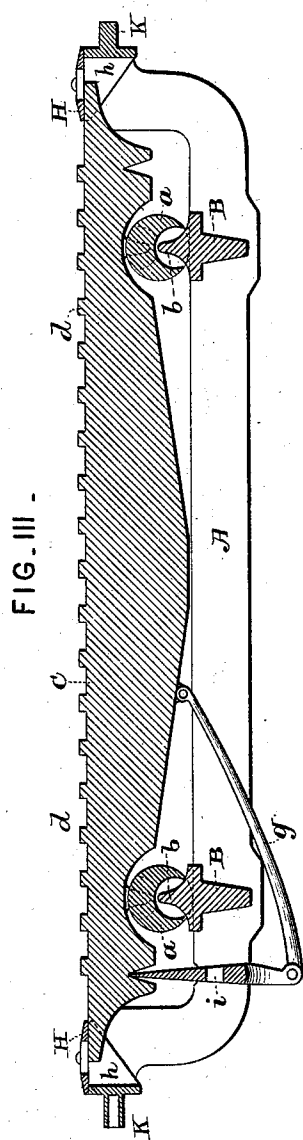
2 Sheets—Sheet 2.

H. S. WILLIAMS.

FIRE GRATE.

No. 361,036.

Patented Apr. 12, 1887.



Attest:

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UNITED STATES PATENT OFFICE.

HENRY S. WILLIAMS, OF BOSTON, MASSACHUSETTS.

FIRE-GRATE.

SPECIFICATION forming part of Letters Patent No. 361,036, dated April 12, 1867.

Application filed May 4, 1866. Serial No. 201,087. (No model.)

To all whom it may concern:

Be it known that I, HENRY S. WILLIAMS, of Boston, in the county of Suffolk and State of Massachusetts, have invented a new and useful Improvement in Fire-Grates, which improvement is fully set forth in the following specification.

This invention has reference more particularly to that form or description of furnace-grates wherein the grate-bars are reciprocated horizontally to sift out ashes and cinder; and the invention consists in certain improvements in such grates, as hereinafter particularly pointed out.

According to the present invention the entire grate is supported by hanging bars or hangers (two in number) placed in the furnace longitudinally and supported therein in any suitable way. Near the ends of these hangers are placed two cross-bars, herein called "track-bars," on which are formed ways or tracks for anti-friction rollers, upon which the grate-bars rest, each bar being free to move back and forth on its own independent rollers. The grate-bars are made deep and thin, and are provided on their upper surface with transverse sections or lugs extending beyond the bar proper on both sides. These transverse sections strengthen and protect the bars, and when in motion they assist in stirring the fire, breaking up clinkers, and sifting out the ashes. By their use apertures or air-passages are formed crosswise as well as lengthwise of the grate. They enable the grate-bars to be placed farther apart than usual, the air-openings on the fire-bed being regulated thereby to suit different sizes of coal. The bars are strengthened and warping prevented by longitudinal ribs on each side of the bar. The rollers on which the bars rest are provided on the lower part of their peripheries with sockets or slots, in which are inserted teeth or projections on the track-bars. Above the rollers are recessed on both sides, and are held between fingers depending from the grate-bars. The rollers are thus held upright and retained in proper place relatively to the track and grate-bars, but at the same time are free to oscillate, so that the grate-bars can roll freely thereon. Near the front ends of the hangers, and resting thereon, is a rock-bar, by means of which the grate-bars are reciprocated. This

bar has a number of levers projecting alternately upward and downward, there being one lever for each grate-bar. The upper levers fit into notches in the under edge of alternate grate-bars, while the lower levers are connected to the other bars by means of links, so that when the rock-bar is oscillated all the grate-bars are reciprocated, half of them moving in one direction and half in the other. At the extreme ends of the hanging bars, which curve upward, are bolted cross-bars or headers provided on their under sides with webs or partitions, forming between them spaces of just sufficient width to permit the ends of the grate-bars to play freely therein. These partitions thus form guides for the grate-bars and hold them in an upright position. The headers are perforated vertically, so as to allow the passage of air around the ends of the bars into the fire.

The accompanying drawings represent a grate constructed in accordance with the invention, Figure I being a plan view with one of the grate-bars broken away; Fig. II, a front elevation; Fig. III, a longitudinal section on line *xx*, Fig. I; and Figs. IV and V, details showing the preferred form of the grate-bars with the supporting-rollers.

The hangers *A* support near their ends the track-bars *B*, upon which rest the anti-friction rollers *a*, supporting the grate-bars *C C'*. The rollers *a* are formed with a socket, in which is inserted a tooth, *b*, of the track-bar, which tooth keeps the roller in place, but permits it a limited oscillation with the grate-bars. The roller is recessed on each side from the top downward, and the fingers or prongs *c* on the grate-bar enter these recesses and clasp the middle part of the roller between them. The rollers *a* are thus held loosely between the track-bars *B* and grate-bars *C C'*.

The body part of the grate-bars is deep and thin, tapering in cross-section from the top downward. Each bar is provided on top with transverse sections or lugs *d*, which project beyond the bar on each side, and with longitudinal ribs *d'*, to strengthen the bar and prevent warping. Grate-bars cast in this form can be set a considerable distance apart, the size of the apertures in the fire-bed being determined by the length of the sections *d*, which may of course be made as long as desired. These sec-

tions or lugs also project above the surface of the bar, as shown, thereby forming cross-passages for currents of air. They also assist materially in stirring the fire and sifting out the ashes. Furthermore, by this construction a broad supporting-surface is presented for the fire, while a wide space is left between the bars for the descent of ashes, &c., and the ascent of air, which latter becomes partially heated between the deep grate-bars, and in that condition is distributed by the numerous air-passages in a manner to promote complete and uniform combustion.

Below the grate, and resting in notches in the hangers A, is the rock-bar F. This bar is provided with arms or levers of equal length, projecting alternately upward and downward, the upright arms being marked *f* and the depending arms *f'*. These arms or levers are for communicating motion to the grate-bars, and there is one arm for each bar. The arms *f* each fit in a notch in the under side of one of the bars, C. To the ends of arms *f'* are pivoted links *g*, connected at their farther ends to the bars C', these links *g* being in the same vertical planes as the grate-bars, to which they are severally attached.

Bar F may be rocked on its bearings in the notches in hangers A by an ordinary hand-lever, for insertion of which a hole, *i*, is provided in bar F, thereby reciprocating all the grate-bars, bars C moving in opposite directions to the alternating bars C'.

The ends of hangers A curve upward, and to them are bolted the cross-bars or headers H. These headers are cast with partitions or webs *h* on their under sides. The partitions or webs *h* form between them guideways for the ends of the grate-bars C C', whereby the latter are kept in an upright position. The guideways are sufficiently long to permit the reciprocation of the grate-bars to the desired extent, and also to permit the expansion and contraction of the bars due to heating and cooling.

The headers H are perforated vertically, as shown in Fig. 1, to admit air to the fire around the ends of the grate-bars.

The headers H, with the hangers A, constitute a frame by which all parts of the grate are carried. The whole structure can be supported in a furnace of any suitable description by means of journal-pins K, on which the

whole grate can be tilted or dumped. One of the pins K may be adapted to project through an opening in the shell of the furnace and to receive a suitable handle or lever for turning, or an opening may be left in the furnace-wall for such handle or lever, as common in dumping grates.

It will be understood that modifications may be made in details of construction and arrangement of parts without departing from the spirit of my invention, and that parts of the invention may, if desired, be used without others.

I do not claim, broadly, a grate-bar provided with transverse sections, this being the invention of another.

I claim as my invention—

1. The movable grate-bars having a thin tapering and deep body portion, with ribs on the sides thereof, and transverse sections or lugs projecting above and to each side of the same, substantially as described.

2. The combination, with the reciprocating grate-bars, of the anti-friction supporting-rollers recessed on each side from the top downward, said bars being provided with depending fingers or prongs which enter said recesses and embrace the middle part of the roller between them, substantially as described.

3. The combination of the grate-bars, the track-bars, and the anti-friction rollers held loosely between said grate-bars and track-bars by means of projections therefrom, substantially as described.

4. The combination of the hangers, the track-bars supported thereby, the movable grate-bars, the anti-friction rollers between said track-bars and grate-bars, and the rock-bar having bearings in said hangers, and provided with arms or levers projecting alternately in opposite directions and connected with said grate-bars, so that the oscillation of said rock-bar reciprocates alternate grate-bars in opposite directions, substantially as described.

In testimony whereof I have signed this specification in presence of two subscribing witnesses.

HENRY S. WILLIAMS.

Witnesses:

WM. H. BREWER,
G. N. HARRIS.