

UNITED STATES PATENT OFFICE.

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GRATE-BAR.

SPECIFICATION forming part of Letters Patent No. 635,808, dated October 31, 1899.

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To all whom it may concern:

Be it known that I, JAMES REAGAN, a citizen of the United States, residing in the city and county of Philadelphia, in the State of Pennsylvania, have invented a new and useful Improvement in Grate-Bars, which improvement is fully set forth in the following specification and accompanying drawings.

My invention relates to that type of furnace-grate known as a "shaking" or "rocking" grate, in which the burning fuel is supported upon a series of longitudinal-apertured fire-bars and movable hollow choppers, the office of the bars being to sustain or bridge the fire when the choppers are operated to remove the ashes or clinkers.

The principal objects of my invention are, first, to increase the efficiency and durability of the fire-bars, enabling them to resist the action of heat, to avoid burning out, or becoming warped or twisted; second, to so construct the fire-bars as to serve as guides in keeping the choppers in proper alinement and prevent them, when oscillated, working under and lifting the bars from their seats, and, third, to support the ends of the fire-bars upon single lugs instead of duplex lugs, as heretofore, by which means the ends of the choppers are permitted to pass between the sides of the bars without meeting with any obstruction, and at the same time ashes or clinkers are prevented from accumulating at the extremities of the bars to interfere with the expansion of the same.

To attain the objects above mentioned, the fire-bars are each made hollow and of reduced length, with the sides or wings extended downward to a considerable depth, so as to present relatively large heat-radiating surfaces, and provided with vertical air-passages leading through the top (of the bars) for the admission of air to the fire and with lateral openings for air to pass through to prevent them becoming overheated. The bars are also provided with recesses at each end, which engage with single lugs formed on the transverse bridge-bars and on the bearing-bars at the front and rear ends of the grate, so that when the bars are properly seated on the lugs the lugs will not extend into the path of and interfere with the movements of the choppers

which oscillate between the bars and so that owing to the fact that the side wings of the fire-bars extend below the axis of the choppers the tops of the choppers, which may have some lateral movement, cannot swing under and come in contact with the lower edges of the fire-bars.

The exact nature and details of my invention will be fully understood by the following description and appended claims, in connection with the accompanying drawings, in which—

Figure 1 is a vertical longitudinal section of a portion of a grate embodying my improvement. Fig. 2 is a vertical transverse section on the line A B of Fig. 1, the choppers and fire-bars on the right being omitted. Fig. 3 is a side elevation, enlarged, of one of the fire-bars, one-half of which is in section, and represents the same properly seated on the supporting-lugs. Fig. 4 is a bottom plan view of the bar detached from the lugs. Fig. 5 is a vertical cross-section on the line C D of Fig. 3. Fig. 6 is also a vertical cross-section on the line E F of Fig. 3.

A and A', Figs. 1 and 2, are the side bars of the grate, between which are journaled the rocking shafts carrying the choppers C.

D and D', Fig. 1, are the transverse bearing-bars at the front and rear ends of the grate, which are provided with lugs E, projecting inwardly to support the fire-bars F at these points.

G and G' are the bridge-bars, which span the side bars and are similarly furnished with supporting-lugs on each side thereof to sustain the inner or abutting ends of the fire-bars. The bridge-bars in this case are placed so as to divide the grate lengthwise into three sections, or there may be more, if desired, thus permitting short fire-bars and choppers to be used, and thereby increasing the efficiency of the grate. Inasmuch as the short bars resist vertical deflection and are not affected by expansion and contraction to the same extent as longer ones, they are therefore much stronger and not liable to warp, and as the choppers are in short lengths the operation of shaking or cleaning the fire is rendered easy.

The fire or grate bars F, as stated, are each

made in short lengths and consist of a central longitudinal web *h*, Figs. 4 and 6, on each side of which are depending bracing and cooling wings *i* and *i'*, between which and the said web *h* are tapering air-spaces leading up and through elongated slots *k* at the top of the bar for admission of air to the fire. The upper portion of the bar is curved, and the ends for a certain distance are made solid and provided with rectangular recesses or cavities *l l'*, Figs. 4 and 5, extending from the bottom surface upward to within a short distance of the top to accommodate the lugs *E*, upon which they rest. The upper longitudinal edges of the said lugs *E* instead of being flat are made angular, and the upper portion of the cavities *l l'* are made to conform therewith, and to insure a proper seating on the inclined sides *m m'* a small recess *n* is made to receive the upper sharp corner or vertex on the lugs, as shown in Figs. 2 and 5. The lugs *E* are narrower than the cavities *l l'* of the bars, and the bars are so disposed with reference to said lugs that there is nominally a space between the end of each lug and the inner end of each cavity, the objects being to admit of a universal sliding movement of the bar and to provide for its free longitudinal expansion. The fire-bars at each end were formerly supported upon double lugs spaced so as to leave a vertical opening between them, into which passed the depending lugs underneath the bars to retain them in position. These lugs projected somewhat beyond the sides of the bars, and the choppers in their descent were liable to strike them to such an extent as to interfere with a free movement of the grate. Pieces of hard clinkers or ashes also became jammed in the openings in such manner as to hold the ends of the fire-bars in a fixed position, so that when expansion of the bars took place they were liable to warp or curve upward in the middle. The strength and rigidity of the fire-bars are materially increased by the addition of metal at the wings, which is so distributed as to thoroughly brace all parts, as well as to expose relatively large areas of the bar to the cooling action of the air in the ash-pit of the furnace, and by making openings transversely through the same for the passage of air the cooling effect is enhanced and the possibility of their becoming overheated, warped, or twisted avoided. The side wings *i* and *i'* on the fire-bars also form guides for the choppers, which are loose on the shafts, to prevent them working under the lower edges and lifting the bars from their seats when the choppers are oscillated in the act of shaking or dumping the fire. The said depending wings *i i'* have arches *o o'* formed on their lower edges to pass over and clear the rocking shafts when the fire-bars are in proper position. The ends of the fire-bars are arranged to overlap the bridge-bars as well as the bearing-bars to prevent ashes or clinkers becoming packed on the upper edges of the same, and a small cavity or pocket *r*

to retain particles of ashes is formed on the upper surface or crown at or near the extremities, Figs. 3 and 5. As these ashes are a non-conductor of heat, they will protect the metal and prevent the bars burning out at these particular points.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A grate-bar having a body portion provided with a plurality of perforated bracing webs or wings, the said webs or wings having a relatively larger area of exposed surfaces and being provided with recesses for the reception of rock-shafts, substantially as described.

2. A grate or fire bar consisting of a body portion having a curved top, a central longitudinal web, and depending wings, adjacent to said web, the bars having tapering air ports or slots arranged in parallel order and extending vertically through the same on each side of the central web, and provided with a series of openings or air-passages extending laterally through the side wings and central web and the said wings or webs having a relatively large area of exposed surface, substantially as described.

3. The combination of fire-bars having their body portion made solid at each end and provided with recesses or cavities extending inward from the ends and open at the bottom, supporting-lugs for the fire-bars, and choppers lying between said fire-bars, substantially as described.

4. The combination of fire-bars having their body portion made solid at each end and provided with recesses or cavities of triangular form at the top extending inward from the ends and open at the bottom, supporting-lugs for the fire-bars corresponding in form with said recesses or cavities and choppers lying between said fire-bars, substantially as described.

5. The combination in a rocking or shaking grate of fire-bars, end bars or supports provided on the inner sides with single lugs, arranged the proper distance apart to sustain the front and rear extremities of the fire-bars; bridge-bars placed intermediate of said end bars and furnished on both sides thereof with similar lugs, to support the abutting ends of the fire-bars, said fire-bars having longitudinally-disposed recesses at the ends adapted to rest upon said lugs, and choppers situated between the said fire-bars, substantially as described.

6. The combination in a shaking or rocking grate of fire-bars, each of the said bars consisting of a central longitudinal web, side wings of considerable depth, said wings having vertical and transverse air-passages, and longitudinal end recesses or sockets to pass over the supporting-lugs on bridge and end bearing bars, and choppers situated between the said fire-bars, substantially as described.

7. The combination in a rocking or shaking

grate of side bars, bridge and end bars provided on their inner faces with single independent angular supporting-lugs; fire-bars constructed to admit of longitudinal expansion on said lugs and movable hollow choppers located intermediate of said fire-bars, substantially as described.

8. The combination of floating fire-bars intervening choppers and supporting-bars having angular lugs on their faces, the fire-bars having end recesses which freely receive the supporting-lugs, substantially as described.

9. A fire-bar consisting of a main body portion, depending wings and a web disposed between the wings the body portion having vertical air-passages which are in communication with the open spaces between the wings and the web, and the wings and the web having transverse air-passages which communi-

cate with said spaces, substantially as described.

10. A fire-bar having depressions or pockets in its ends for the reception of ashes, and provided with end sockets below said depressions, in combination with supporting-bars having lugs on their inner faces extending into the sockets and supporting the bars, the bars being shorter than the distance between the faces of the supporting-bars, and adapted to have a longitudinal expansive movement upon said lugs.

In testimony whereof I have hereunto signed my name in the presence of two subscribing witnesses.

JAMES REAGAN.

Witnesses:

ROBERT OSBORNE, Jr.,
RICHARD MCELROY.