

(No Model.)

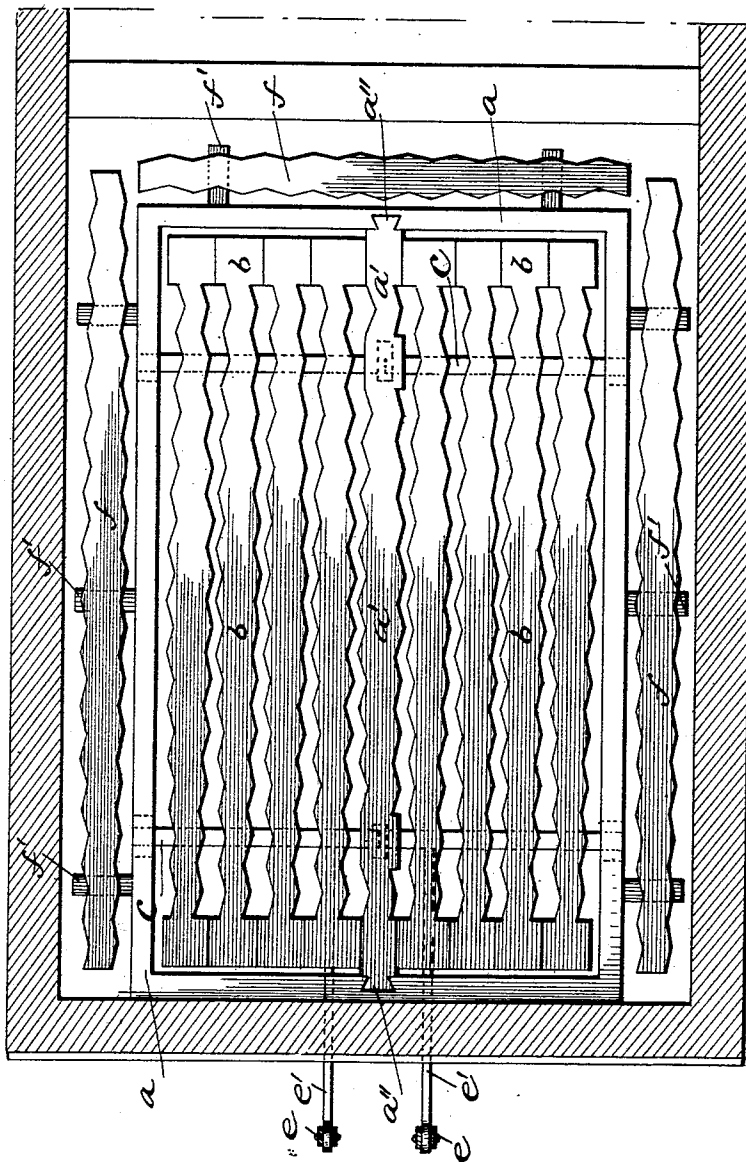
2 Sheets—Sheet 1.

H. TRUESDELL.
FURNACE GRATE.

No. 541,189.

Patented June 18, 1895.

Fig. 1.



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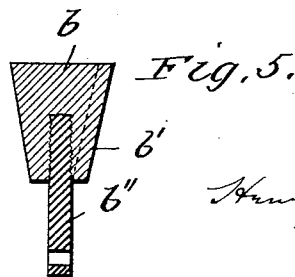
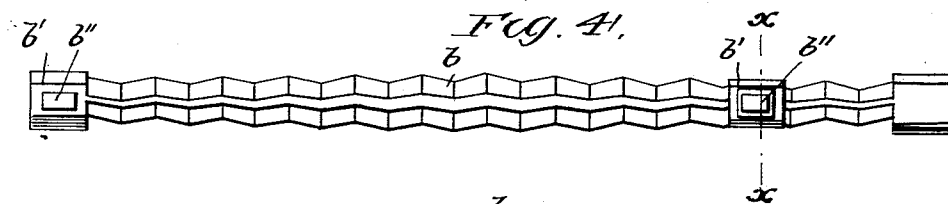
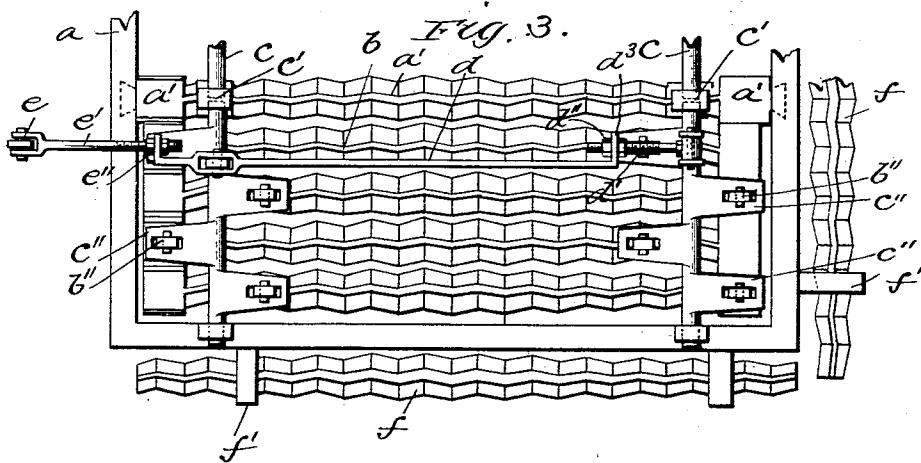
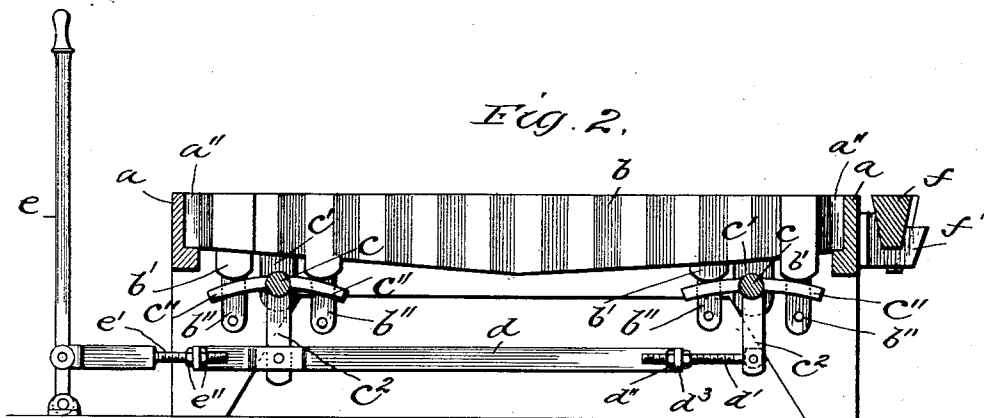
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2 Sheets—Sheet 2.

H. TRUESDELL.
FURNACE GRATE.

No. 541,189.

Patented June 18, 1895.



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UNITED STATES PATENT OFFICE.

HENRY TRUESDELL, OF HAWARDEN, IOWA, ASSIGNOR TO THE HAWARDEN
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FURNACE-GRATE.

SPECIFICATION forming part of Letters Patent No. 541,189, dated June 18, 1895.

Application filed February 28, 1894. Serial No. 501,813. (No model.)

To all whom it may concern:

Be it known that I, HENRY TRUESDELL, a citizen of the United States, residing at Hawarden, in the county of Sioux and State of Iowa, have invented certain new and useful Improvements in Furnace-Grates, of which the following is a specification, reference being had therein to the accompanying drawings.

10 Figure 1 is a plan view of one form of grate, showing it in position in a furnace; Fig. 2, a vertical section thereof, the furnace-walls being omitted; Fig. 3, a bottom view of a portion of the grate; Fig. 4, a detail bottom view
15 of one of the grate-bars, and Fig. 5 a transverse section thereof on the line *xx* of Fig. 4.

The object of this invention is mainly to improve the construction of the furnace-grate covered by reissued Patent No. 11,291, granted to Robert Rose November 29, 1892, said grate consisting of a series of zig-zag or serpentine bars and means for imparting to them a limited compound movement, as more fully hereinafter appears.

25 In the drawings, *a* designates a suitable frame supported within the furnace in a suitable manner; *a'*, a stationary grate bar extending down the middle of the frame, flush with the grate-surface, and connected rigidly
30 at its ends to the front and rear end-bars of the frame, said connection consisting preferably of a suitable dove-tail tongue *a''* formed on each end of the bar and fitted in a similarly-shaped recess in the inner side of the
35 adjacent end-bar of the frame. The movable grate-bars *b* are arranged in two series, one on each side of the central rigid bar, said bars being provided with the depending arms *b'*, rounded at their lower ends and provided
40 with the depending tips or pins *b''* which are made of wrought metal and cast in the bar at the time of molding the same.

Journalled below the grate-bars, in bearings formed in the side-bars of frame *a* and in depending lugs *c'* on the central bar are the transverse rock-shafts *c*, one pair being employed for each series of bars and each having the lateral slotted supporting-arms *c''*, upon which rest the lugs or arms *b'* and
50 through whose slots pass the pins or tips *b''*.

The bars are formed zigzag in horizontal

section and wedge-shape in cross-section, as in the former patent, but they are also gradually thickened from their ends to a point midway their length and they are also deepened
55 toward the same point; the advantage of this construction over the old one being that "buckling" or distortion at the middle of the bars is avoided. It is found in practice that thus tapering the bars toward their ends keeps
60 them straight during long usage, whereas the former bars were liable to distortion from intense and prolonged heating. It was also discovered that the pins or tips that work through the slotted arms frequently broke off when
65 subjected to considerable strain, thereby necessitating the removal of the broken bar. This is obviated by forming the tips separately of wrought metal and casting around their ends the metal of the bars, whereby they
70 are rendered very strong and fully able to withstand heavy strains. The central rigid bar braces the frame and at the same time enables the grate-surface to be made into two sections whenever it is desirable on account
75 of its area. The central bar, being formed like the movable bars, does not interrupt the continuity of the grate-surface or the draft-area. The dovetail connection (or its equivalent) enables the bar to be inserted with ease,
80 without the use of bolts or other fastening devices. Of course, more than one stationary bar may be employed should the grate-surface be too large to form into two sections.

Each rock-shaft is provided with a depending arm *c²* and the arms of each pair are connected by a horizontal rod *d*, the inner end of which is connected adjustably to the arm
85 *c²* by a screw *d'*, one end of the screw being pivotally attached to the depending arm and
90 the other rigidly but adjustably connected to the rod by means of clamping-nuts *d'' d''*, said nuts clamping between them a suitable projection *d³* on the rod. The arm *c²* near the front of the grate preferably works through
95 a slot in the rod *d*, but it may be otherwise pivotally connected if desired. The forward ends of bars *d* are adjustably connected to the operating-levers *e*, by screw-bolts *e'*, which are secured rigidly in their adjusted positions
100 by nuts *e'' e''*, which clamp between them a projection *e³* on the end of rod *d*.

In practice it was found practically impossible to construct the grate-bars so that the alternate bars would exactly balance each other when placed on the rock-shafts, in consequence of which it was rarely the case that the ends of the bars would come flush with each other. It is to avoid this difficulty that the present shaking-mechanism was devised. When the bars are put in place and it is found that their upper surfaces are not level, particularly at their ends, this may be remedied by simply shortening or lengthening the connection *d* which action raises and lowers the ends of the alternate grate-bars and thereby enables the bars to be brought flush with each other.

It will be seen that the frame of the grate is constructed and set so as to leave narrow spaces between its sides and rear end and the furnace walls. In each of these spaces a grate bar *f* is supported by brackets *f'* connected to the frame-bars, or by other suitable means, draft spaces being left between the furnace-walls and the frame-bars. The objection to placing the frame close to the furnace-walls was that clinkers would form on the walls and frame-bars and interfere seriously with the shaking movements of the bars, the clinkers having been too firmly fixed and not projecting from the walls far enough to be readily broken off. By the present arrangement the clinkers will not interfere with the operation of the shaking-bars, as any clinkers projecting inwardly far enough to be struck by the bars may be readily broken off by the same and deposited in the ash-pit.

Having thus fully described my invention, what I claim is—

1. The combination of a frame, a rigid grate bar connecting its end bars, a section of movable grate bars supported on each side of and flush with said rigid grate bar, rock shafts

having bearings in the frame and the rigid grate bar and connected to the movable grate bars, and means for rocking said rock shafts, substantially as described.

2. A cast iron grate-bar provided with integral depending supporting lugs and wrought metal pins cast in and depending from said supporting lugs, substantially as described.

3. The combination of a frame, rock-shafts journaled therein and provided with lateral supporting arms and operating arms, grate-bars supported on said lateral arms, a connecting rod between the operating arms, said rod being capable of being shortened or lengthened, and means for operating the rock-shafts, substantially as described.

4. The combination of a grate-frame, rock-shafts provided with alternating lateral arms and also operating arms, as at *c*², a rod *d* pivotally connecting arms *c*², one of its ends being connected to one of said arms *c*² by a screw connection, an operating lever, an adjustable connection between the rod *d* and the operating-lever, and grate-bars supported on the lateral arms, substantially as described.

5. The combination of a frame, two sets of bars adapted to move alternately in vertical planes, a stationary coupling bar having journal bearings and rigidly attached at its ends to the frame and interposed between the two sets of grate-bars, rock-shafts mounted in the journal bearings of the coupling bar and having means for alternately moving the grate-bars vertically, and means for operating the rock-shafts, substantially as described.

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

HENRY TRUESDELL.

Witnesses:

W. D. HUNT,

J. W. ANDERSON.