

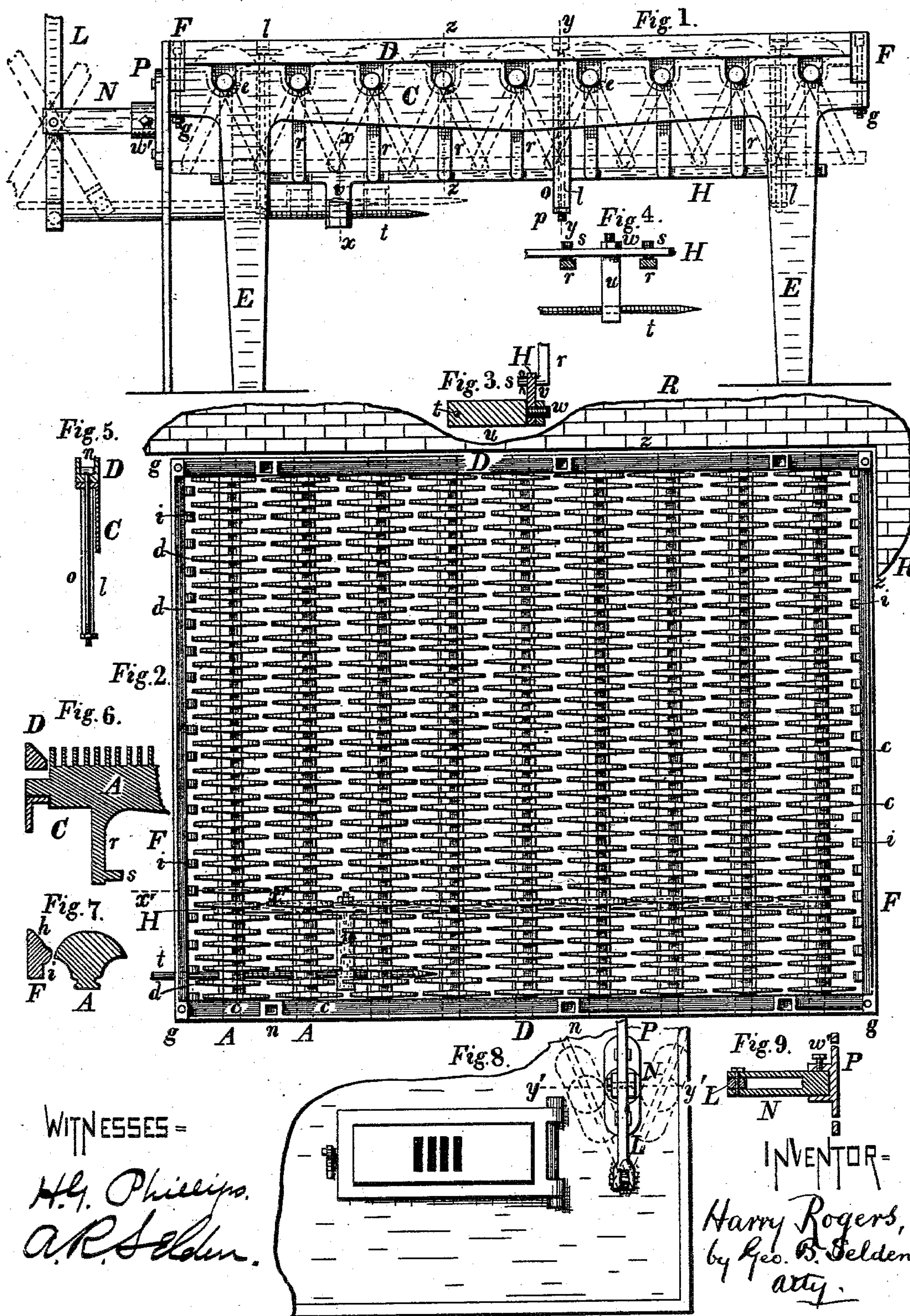
(No Model.)

2 Sheets—Sheet 1.

H. ROGERS.
FURNACE GRATE.

No. 283,419.

Patented Aug. 21, 1883.



WITNESSES =

H. Phillips.
A. R. Selden.

INVENTOR =

Harry Rogers,
by Geo. B. Selden,
atty.

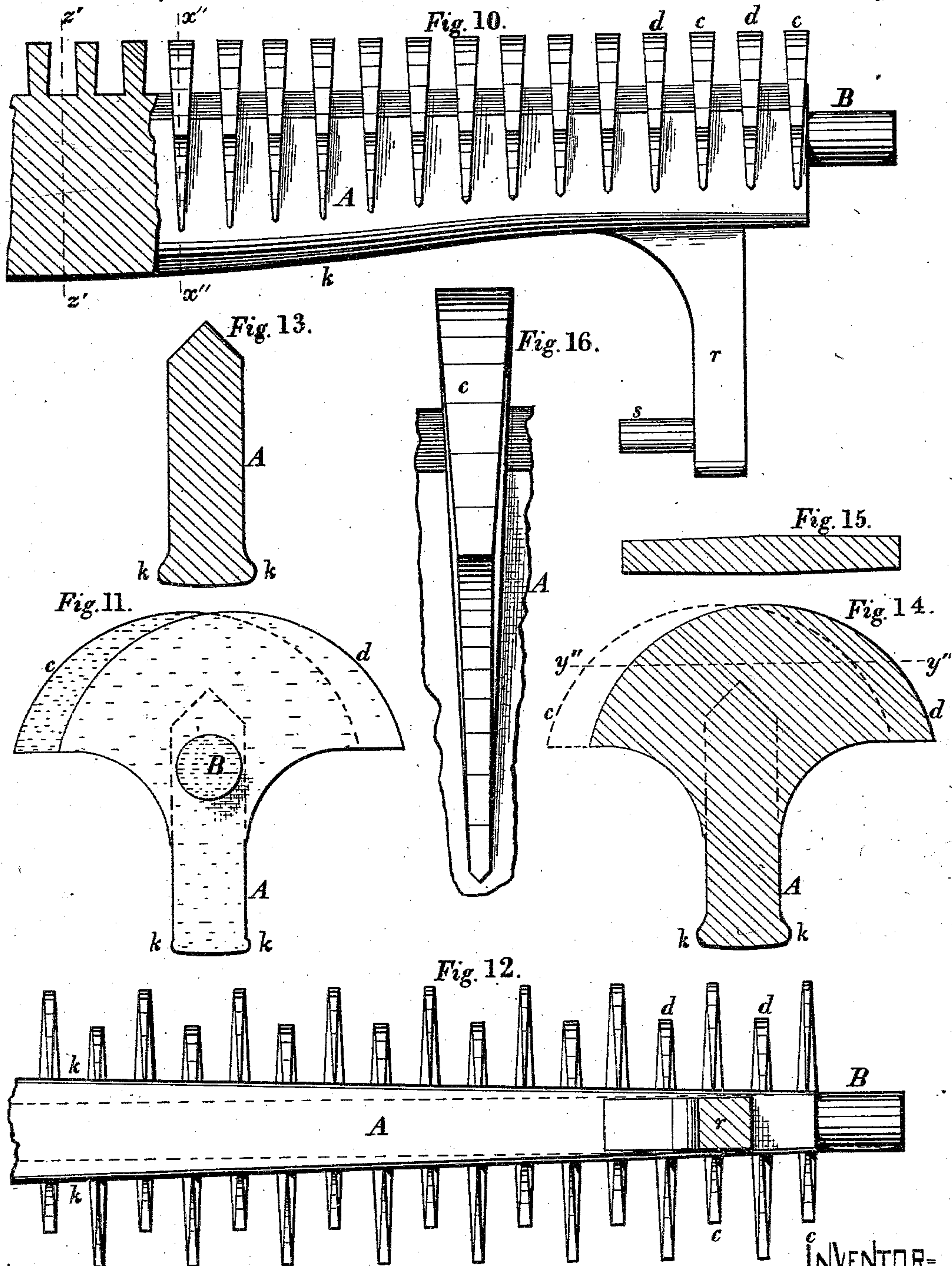
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UNITED STATES PATENT OFFICE.

HARRY ROGERS, OF NEW YORK, N. Y.

FURNACE-GRATE.

SPECIFICATION forming part of Letters Patent No. 283,419, dated August 21, 1883.

Application filed October 23, 1882. (No model.)

To all whom it may concern:

Be it known that I, HARRY ROGERS, of New York, N. Y., have invented certain Improvements in Furnace-Grates, of which the following is a specification, reference being had to the accompanying drawings.

My invention relates to certain improvements on the shaking and dumping grate described in my Patent No. 193,897, dated August 7, 1877; and it consists in an improved form of grate-bar, whereby warping is effectually obviated, and the clogging of the grate from ashes or clinkers is prevented; in improvements in the means of connecting the rocking grate-bars with an actuating-lever, and in various details of the arrangement, all as hereinafter more fully set forth.

My present improvements in furnace-grates are represented in the accompanying drawings, in which—

Figure 1 is a side elevation. Fig. 2 is a plan view. Fig. 3 is a section on the line $x x$, Fig. 1. Fig. 4 is a plan view of a portion of the connecting-bar, showing the offset-arm and screw-rod. Fig. 5 is a section on the line $y y$, Fig. 1. Fig. 6 is a section on the line $z z$, Fig. 1. Fig. 7 is a section on the line $x' x'$, Fig. 2. Fig. 8 is an elevation of a portion of the front of the furnace. Fig. 9 is a section on the line $y' y'$, Fig. 8. Fig. 10 is an elevation of one-half of my improved grate-bar. Fig. 11 is an end view of the same. Fig. 12 is an inverted view of the same. Fig. 13 is a section on the line $z' z'$, Fig. 10. Fig. 14 is a section on the line $x'' x''$, Fig. 10. Fig. 15 is a section on the line $y'' y''$, Fig. 14. Fig. 16 is a view of one of the fire-bars as seen looking at the side of the grate-bar.

My improved furnace-grate consists of a series of rock-shafts or grate-bars, A A, supported parallel to each other in suitable bearings in the side frames, C C, each grate-bar being provided with a number of upwardly-projecting circular flanges or fire-bars, $c c d d$, which form the fire-supporting surface. The fire-bars $c c d d$ are located on the shafts eccentrically in the horizontal direction, and each series of flanges on one shaft alternates with the flanges on the neighboring shafts, the long flanges on one being placed opposite the short flanges on the next, as represented in the plan view, Fig. 2, so that the grate-sur-

face is practically continuous throughout, and without openings of sufficient area to allow the coals to pass downward. At each end the shafts are provided with journals B B, which rest loosely in the recesses $e e$, Fig. 1, in the upper edge of the side plates, C C. The side plates are supported on suitable legs, E E, Fig. 1, and are connected together at each end by the bars F F. The side frames are provided at their upper edges with a flange, which is preferably arranged to project inward, and extends the whole length of the frame, being bent downward around the recesses $e e$. At the corners the side frames are connected to the end bars by the bolts $g g$, which are provided with nuts on their lower ends, so as to be accessible from the under side of the grate. The upper surfaces of the end bars are beveled inward and downward toward the grate to prevent the accumulation of dust or other refuse, as represented at h , Fig. 7. Lugs $i i$ are also formed on the inner surface of the end bars, in positions to correspond with the shorter curved flanges on the grate-bars. The upper surface of these lugs is also beveled inward. The side frames are extended upward to a point even with or slightly above the fire-surface formed by the curved fire-bars $c c d d$ by the triangular pieces D D, which are fastened to the side frames by the bolts $l l$, Figs. 1 and 5. Recesses $n n$ are formed in the side bars, D D, to receive the heads of the bolts l , which extend downward through the flanges on the side frames, being inclosed below the latter by tubes $o o$, Figs. 1 and 5, which serve to bring the nuts p on the lower ends of the rods some distance below the side frames to a point where they are protected from the heat and are readily accessible from below the grate. Provision is thus made for changing the grate-bars, which is accomplished by removing the nuts from the rods $l l$ and taking off the side bars, D D, after which the grate-bars can be lifted up and taken out. Except at the recesses $n n$, the upper surface of the side bars is beveled inward and downward. The side bars protect the journals B B from ashes and dirt, and prevent clinkers from forming at the ends of the grate-bars, so as to render the shaking device inoperative.

Each grate-bar A is provided with an arm, r , which projects downward and carries at its

lower extremity a journal, *s*, Figs. 3 and 6, arranged parallel with the length of the bar. The grate-bar, with its eccentrically-arranged fire-bars, journals, ribs, rocking arm, and journal, is cast in one piece. The journals *s s* of all the arms engage with openings in the connecting-bar *H*, being secured therein by spring cotters or pins, so that by giving the latter a vibration lengthwise a rocking motion will be transmitted to the grate-bars *A A*, as indicated by the dotted lines in Fig. 1. The connecting-bar is arranged to be vibrated from the lever *L* by means of the threaded rod *t* and offset *u*. An arm, *v*, projects downward from the connecting-bar, and receives the journal *w*, Figs. 3 and 4, on the end of the offset. By means of the arm *v*, I am enabled to increase the leverage applied to the arms *r r*, and practically secure the benefit of longer arms than could be used otherwise without in many cases cutting out the brick-work to permit this oscillating motion. The offset enables me to place the lever *L* and rod *t* at one side of the furnace-doors. The rod *t* is screw-threaded, and engages with a threaded hole in the offset *u*. The end of the rod is pointed to facilitate its insertion into the opening in the offset. By this device I am enabled to rapidly and easily connect the bar *H* with the hand-lever, which is done from the front of the furnace by inserting the pointed threaded rod *t* in the nut, without getting into the ash-pit. The rod passes through a slot in the front of the furnace. In some cases the offset *u* may be dispensed with, or it may be made very short; but I prefer always to use the arm *v*, as the shaking or dumping of the grate is much facilitated thereby.

The lever *L* is pivoted to the slotted arm *N*, which is fastened in the socket-plate *P*, attached to the front of the furnace. The inner end of the arm *N* is round and fitted to a circular opening in the socket-plate, and it is secured therein by a set-screw, *w'*. The socket-plate is fastened to the furnace-front by bolts or cap-screws. By this arrangement I am enabled, in applying my improved grate to furnaces already in use, to set the lever *L* at any angle, as indicated by the dotted lines in Fig. 8, as may be necessary to avoid doors, pipes, or other attachments.

In Fig. 2, I have represented a portion of the wall of the ash pit or furnace in which my improved grate is set. I construct the frame of such a size as to leave a narrow opening, *z*, all around it, between its outer sides and the inclosing-wall *R*, for the purpose of allowing for the expansion of the frame from heat, and to permit the passage of a current of air between the wall and the frame, in order to cool the latter as much as possible.

In Figs. 10 to 15, I have represented my improved grate-bar on a larger scale. The eccentric position of the upper surfaces of the curved fire-bars *c c d d* is represented in the end view, Fig. 11, and in the transverse section, Fig. 14. It will be observed also that

the sides or opposing surfaces of the fire-bars are inclined with the axis of the grate-bar *A*, so that the space between any two adjacent bars gradually increases from above downward, for the purpose of allowing clearance for ashes or clinkers on their passage into the ash-pit. Further provision for clearance may, if desired, be made by thinning the fire-bars in the horizontal direction from the grate-bar outward to the extremity of the curved surface, so that the distance between adjacent fire-bars increases from the central vertical plane of the grate-bar outward toward the point of the fire-bar. The surfaces of the fire-bars will in this case be inclined toward the axis of the grate-bar in both the vertical and horizontal directions, thereby affording ample clearance between them.

The upper surface of the grate-bar *A* is beveled sidewise between the fire-bars, its central portion being brought up to an acute edge for the purpose of preventing ashes or clinkers from resting thereon, as they frequently did with the circular form of grate-bar shown in my previous patent. As represented in the drawings, the grate-bar is made of considerable depth relative to its width, and the depth is increased toward the middle of the bar. To prevent warping, I also provide the bar at the bottom, on each side, with the tapering curved ribs *k k*, which increase gradually in dimensions from each end of the bar toward the center of its length, following the downward inclination given to the center of the bar. I am enabled, by giving my improved grate-bars this improved form, substantially similar to that herein shown, to secure a pattern which is easily moulded, and, as the result of many practical experiments, can be submitted to the most severe trials with confidence that it will retain its shape without warping from the effects of the heat of the fire above it.

I do not claim herein anything shown or described in my previous patent.

The improved form given to my grate-bar, as represented in the drawings, is that which I have arrived at after a long series of practical trials in the efforts which I have made to secure the best distribution of the metal consistent with the proper performance of the functions of supporting the fire, and of removing the ashes and clinker therefrom without liability to clogging or warping or twisting. The tapering ribs *k k* on the lower corners of the grate-bar, made deeper toward its middle portion, enable the bar to be made thinner than would otherwise be necessary, while they effectually prevent the bar from being warped by the heat of the fire. I do not claim, broadly, however, a ribbed grate-bar, as I am aware that a vertically-corrugated bar provided with ribs on both its upper and lower corners has been shown in Patent No. 246,016, August 23, 1881. The beveled shape given to the opposing sides of the fire-bars reduces the weight of the metal employed, while at the same time preventing clogging with ashes, and facilitat-

ing the molding. The increased depth given to the grate-bar toward its center makes the bar lighter, while it affords greater strength to resist warping.

5 I claim—

1. The herein-described rocking grate-bar A, of a depth greater than its width and gradually decreasing in depth from the center toward its ends, provided with the eccentrically-
10 arranged curved fire-bars *c c d d*, having their opposite surfaces inclined toward each other, as described, and having at its lower corners the tapering ribs *k k*, substantially as and for the purposes set forth.

15 2. The rocking grate-bar A, of a depth greater than its width and gradually decreasing in depth from its center toward its ends, provided with the transverse eccentrically-arranged curved fire-bars *c c d d*, and having at its lower
20 corners the tapering ribs *k k*, substantially as and for the purposes set forth.

3. The combination, with the side frames, C C, of the rocking grate-bars A A, provided with the curved fire-bars *c c d d*, the side bars,
25 D D, bolts *l l*, and sleeves *o o*, substantially as and for the purposes set forth.

4. The combination, with a series of rocking grate-bars, A A, provided with the eccentrically-arranged curved fire-bars *c c d d* and arms *r r*, of the connecting-bar H, arm *v*, rod
30 *t*, and lever L, substantially as and for the purposes set forth.

5. The combination, with a series of rocking grate-bars A A, provided with the eccentrically-arranged curved fire-bars *c c d d* and
35 arms *r r*, of the connecting-bar H, arm *v*, offset *u*, rod *t*, and lever L, substantially as and for the purposes set forth.

6. The combination, with a series of rocking grate-bars A A, provided with arms *r r*
40 and connecting-bar H, and a vibrating lever L, of a connection between the connecting-bar and the lever, consisting of a pointed threaded rod, and nut, substantially as and for the purposes set forth.

HARRY ROGERS.

Witnesses:

GEO. B. SELDEN,

H. G. PHILLIPS.