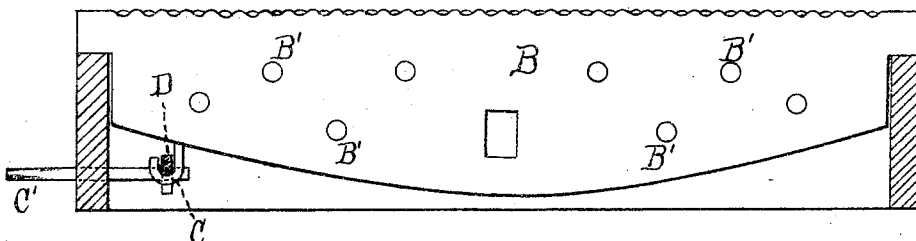
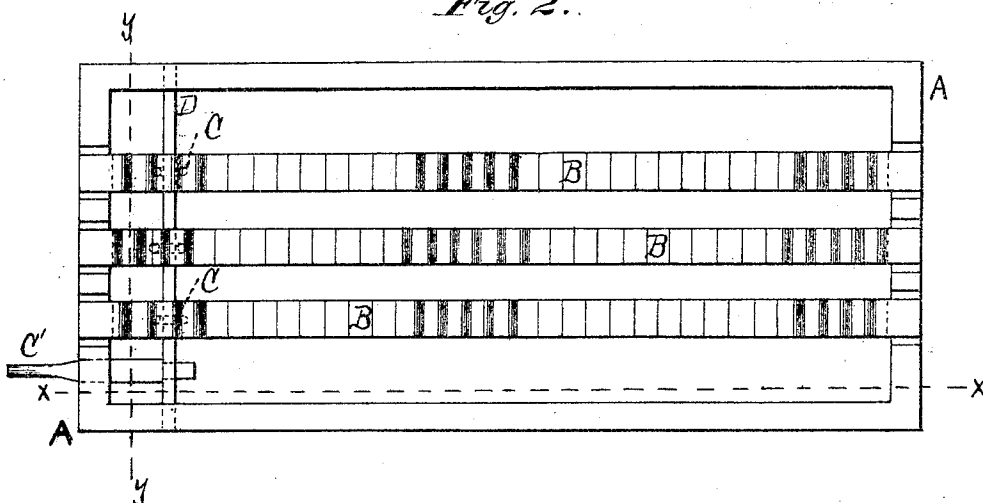
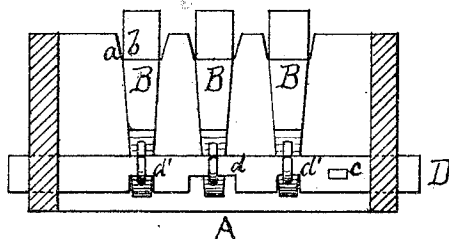


BENJAMIN F. SMITH.
Improvement in Furnace Grates.

No. 118,884.

Patented Sep. 12, 1871.

Fig. 1.*Fig. 2.**Fig. 3.*

Witnesses:

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UNITED STATES PATENT OFFICE.

BENJAMIN F. SMITH, OF NEW ORLEANS, LOUISIANA.

IMPROVEMENT IN FURNACE-GRATES.

Specification forming part of Letters Patent No. 118,884, dated September 12, 1871.

To all whom it may concern:

Be it known that I, BENJAMIN F. SMITH, of the city of New Orleans, in the parish of Orleans and State of Louisiana, have invented certain new and useful Improvements in Furnace-Grates, of which the following is a full, clear, and exact description, reference being had to the accompanying drawing and the letters of reference marked thereon making part of this specification, in which—

Figure 1 is a longitudinal sectional view on the line *x x*, Fig. 2. Fig. 2 is a plan view. Fig. 3 is a cross-sectional view on the line *y y*, Fig. 2.

My present invention relates to an improvement in furnace-grates; and consists in constructing, arranging, and operating the oscillating bars in such manner as to avoid or remedy the defects heretofore invariably experienced in inventions of this class and character. Independently considered, there is nothing particularly new or novel in the general contour or form of these bars; but instead of rigidly bolting or connecting them to the shaker-bar so as to insure their uniform action or movement, I so secure them to this bar as to avoid this; and it is the arrangement of the mechanism by which this is accomplished that constitutes the essence as well as the great advantage and superiority of my invention. The bars are constructed with square bearing-heads, and are seated and work in square journals or recesses in the furnace-plates. The advantage of this form over the circular or the convex and concave is, that it insures a more sudden or abrupt jerk or movement, and which secures consequently a more thorough agitation or raking of the mass. On the lower face of each bar is secured a lug or equivalent support. In these lugs rests and works the horizontal shaker-bar. This bar is secured in these lugs by means of a series of slots equal in number to the lugs, one fitting in each of the lugs, but varying in dimensions or size—that is, each alternate slot is nearly double or twice the width of those of the series which is immediately next or adjoining. The advantage of this arrangement is this: each alternate bar remains perfectly stationary during the partial movement of those at its opposite sides. This imparts an uneven and varying instead of an even and uniform rocking movement of the mass, and which secures a more thorough disintegration of the bank or mass, and,

by the widening of the passage between the bars and the alternate opening and closing of the bottom of the grate, accomplishes a more free and perfect discharge of the ashes, &c.; and, besides, as the narrowest section of the passage between the bars with my arrangement, and during the oscillation of the same, is at their upper face or the point at which the burned coals or clinkers are compelled to enter, when this point is passed all danger of the grate being choked by their detention between the bars is securely guarded against. My invention also consists in so serrating the upper faces of the bars that when they are arranged in a parallel series the rib of the one shall be opposite the recess of the adjoining one. This secures numerous interstices or air-passages through the burning coal or other fuel, which not only has a tendency to prevent its solidifying or consolidating, but which also adds greatly to its combustion.

To enable others skilled in the art to make and use my invention, I will now proceed to describe its construction and operation.

A A represent the furnace-plates which furnish the bearing or supports for the grate. B B are the grate-bars, and are arranged on the plates A A in parallel rows. The form of the bars is clearly shown in Figs. 1 and 3, and consists of a wide upper face, gradually tapering to its lower face in a wedge-shaped style, while its lower section is curved. This form of grate-bar practical experience has shown to be admirably adapted for the purposes designed, combining, as it does in a remarkable degree, strength and lightness. These bars B B, as well as their bearing-plates A A, are provided with numerous openings, B' B', which allow for the expansion of the metal, and thus guard against any permanent warping of the metal. These bars B B are provided with square bearing-shoulders, *b b*, which rest and work in square shoulders or recesses, *a a*, as shown in Fig. 2. The ends of the bars B B, instead of running out flush with the plates A A, as clearly shown in Fig. 1, may be slightly inclined from the point at which the corrugation ends. But as these all relate to construction rather than invention, I will give no minute description, but remark that instead of the square shoulder and recessed bearing a slot and pin can be substituted and the rocking movement be thus secured. The upper faces of these bars B

B are so serrated that the rib of the one shall be opposite the recess of the other. This furnishes a series of air-passages that will communicate with the fuel at various points, aiding combustion to some extent—at least preventing the bitumen and other like ingredients from concreting the mass. C C is a series of lugs, and is generally of the ordinary hook form. These are arranged in a row on the under side of the bars B B. These furnish a suitable support and working bearing for the shaking or raking-bar D. This bar is provided with a series of slots, *d* and *d'*, and instead of being permanently connected to the bars B B it rests in the lugs C C, one slot, either *d* or *d'*, fitting over each lug. This permits either of the bars to be removed with the greatest facility, and which is often a very important advantage. But the chief advantage is this: By reference to Fig. 3 it will be seen that these slots are not of uniform dimensions, but, on the contrary, *d* is nearly twice the size of *d'*. The result is, when the bars are oscillated by the horizontal bar D, the slots *d'* drawing on the lugs much sooner than do the slots *d*, the lugs, and consequently the bars connected with the slots *d'*, are moved a considerable distance before those connected with the slots *d* are acted on. This not only secures an uneven movement

of the bars, which is desirable, as this motion more thoroughly shakes and disintegrates the mass, but also affords tapering passages for the discharge of the coal, the bars gradually widening from their upper to their lower surface. *e* is a slot cut through the center of the bar D, to which is secured the hand-lever C' that operates the grate.

Having thus fully described my invention, what I claim therein as new, and desire to secure by Letters Patent of the United States, is—

1. The grate-bars B B, having lugs or equivalent bearings, C C, and detachable shaker-bar D, when provided with slots *d d'* of different dimensions, substantially as described, as and for the purpose specified.

2. The bars B B when the same are arranged in parallel rows and their upper faces so serrated that the ribs of one shall be opposite the recesses of the other, substantially as described.

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

BENJ. F. SMITH.

Witnesses:

JOS. T. K. PLANT,
EDWIN JAMES.