

(No Model.)

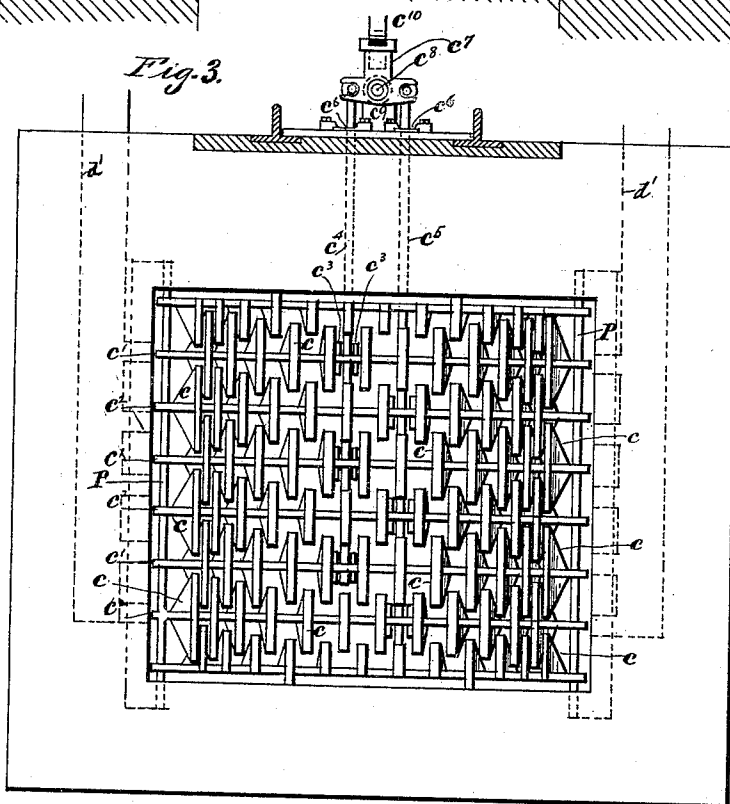
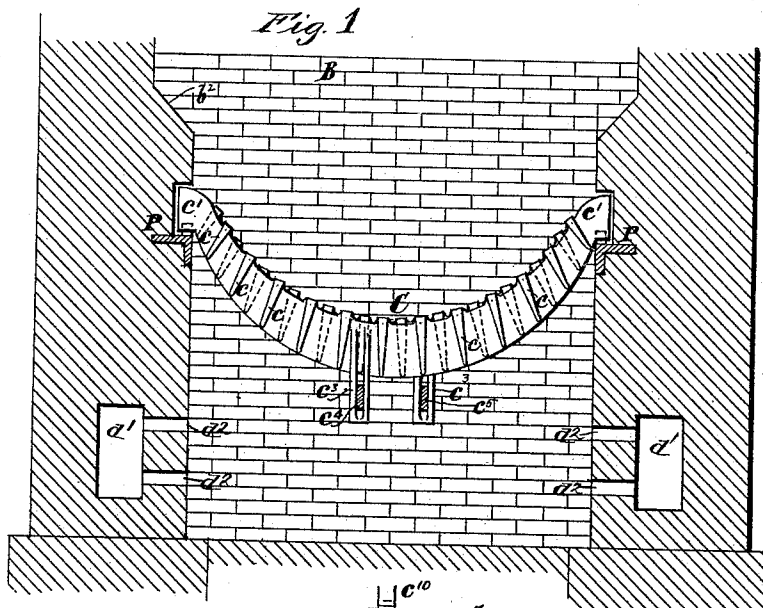
E. M. HUGENTOBLE.

2 Sheets—Sheet 1.

FURNACE GRATE.

No. 465,527.

Patented Dec. 22, 1891.



Witnesses
C. R. Ferguson
George Thomas

Inventor
Emil M. Hugentobler
By his Attorney
Edwin H. Brown

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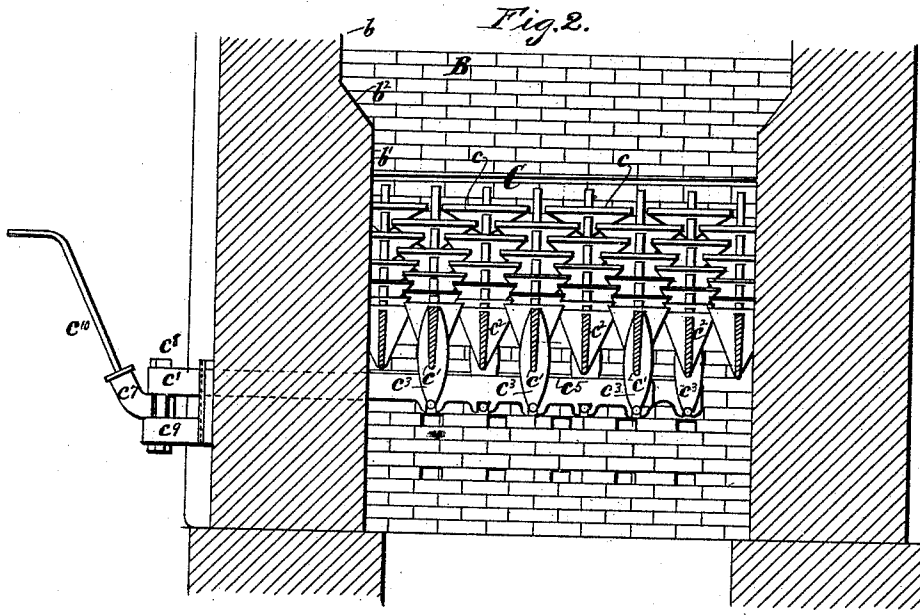
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UNITED STATES PATENT OFFICE.

EMIL M. HUGENTOBLE, OF NEW YORK, N. Y., ASSIGNOR TO THE ABENDROTH
& ROOT MANUFACTURING COMPANY, OF SAME PLACE.

FURNACE-GRATE.

SPECIFICATION forming part of Letters Patent No. 465,527, dated December 22, 1891.

Application filed August 1, 1890. Serial No. 360,693. (No model.)

To all whom it may concern:

Be it known that I, EMIL M. HUGENTOBLE, of New York, in the county and State of New York, have invented a certain new and useful Improvement in Furnace-Grates, of which the following is a specification.

The object of my improvement is to provide a furnace and grate for a steam-boiler capable of burning bagasse—or, in other words, the refuse of sugar-cane—while in a green state, without previous drying.

I will describe a furnace and its appurtenances embodying my improvement, and then point out in the novel features in the claims.

In the accompanying drawings, Figure 1 is a vertical section taken parallel with the front of a boiler and illustrating the lower part of the furnace. Fig. 2 is a vertical section taken in a plane at right angles to Fig. 1, and also illustrating the lower part of the furnace. Fig. 3 is a horizontal section taken above the plane of the grate.

Similar letters of reference designate corresponding parts in all the figures.

B designates a furnace having a reverberatory arch (not shown) at its upper end sprung from the walls *b*. Its lower portion *b'* is more contracted than the upper and has the grate C arranged within it. A short distance above the grate there is an upwardly-flaring portion *b''*, which extends from the lower contracted portion *b'* to the upper portion of the chamber.

Conduits *d'*, receiving air from any desired source, are formed in the wall of the furnace, and each conduit *d'* communicates by a number of openings *d''* with the interior of the chamber of the furnace beneath the grate.

I will now explain the construction of the grate. It is composed of a number of bars *c'* *c''*, capable of swinging. The bars *c'* will be connected in one series and the bars *c''* will be connected in another series, and the two series will be made to rock independently and reversely. The end bars need not be connected with the others. All the bars are shown as supported upon plates P, consisting of vertical portions and horizontal portions. These plates are built into the masonry forming the walls of the furnace-chamber. Above them

the walls have notches formed in them of a size to receive the grate-bars. The upper edge of the vertically-extending portions of the plates P are notched to receive the end portions of the grate-bars. The bottoms of these notches and the contiguous portions of those grate-bars which are to swing will preferably be rounded to facilitate the swinging. It will be seen that each one of the bars is longitudinally depressed from the ends to the middle. Preferably they will be curved continuously throughout their length.

Several important advantages are obtained by the depression of the grate-bars. The area of penetration that the air-blast has, compared with the area of the bed of fuel measured in a horizontal line, is very much increased. Clinkers forming during combustion will while in a fluid state pass down to the middle portion of the grate-bars, whence they can be more easily removed. As the bars are capable of rocking, it is particularly desirable for the clinkers to descend to the depressed middle portions of the bars, because as these portions are very considerably removed from the axes of oscillation they will have a much greater movement in rocking than the more elevated portions of the bars. Not only will this extra motion tend to disintegrate the clinkers, but it will also afford facility for the passage of the clinkers between the bars. It will be seen that these bars are provided at intervals with plate-like portions *c*. I deem it advantageous to arrange these at approximately right angles to the length of the bars. Where the bars are curved, as in the present instance, they may be approximately in the position of radii of the curve. In the present instance the plate-like portions are of triangular form, one side of each being horizontal, while its bar occupies a normal position and the other two sides converging downwardly. The plate-like portions of all the bars, excepting those of the end bars, project in the present example of the improvement nearly from opposite sides of the bar and the plates of one bar alternating with or passing between those of an adjacent bar. Most of the plate-like portions of the end bars are shown as projecting only from the inner side, although some

have a slight projection from the outer side. In the present example of my improvement the end bars do not have any rocking movement. It will be seen that all of the bars c^1 5 c^2 have downward projections c^3 , provided with longitudinal slots in their lower portions. The bottoms of the slots are preferably rounded. Rods c^4 c^5 , having notches on their under 10 sides, are passed through the slots of the projections c^3 , and by means of their notches engage with the bottoms of said slots. Obviously a longitudinal movement of these rods will effect a swinging of the grate-bars. The two rods c^4 c^5 are shown as arranged to slide in 15 guides c^6 , provided on the front of the steam-boiler, and are engaged with a three-armed lever c^7 , which is fulcrumed by a pin c^8 to a bracket c^9 , affixed to the front of the steam-boiler. Two of these arms of this lever are notched to 20 receive projections, with which the ends of the rods are provided. The third arm is provided with a socket in which a rod c^{10} is inserted to form a handle.

What I claim as my invention, and desire to secure by Letters Patent, is— 25

1. The combination, in a furnace, of two sets of swinging grate-bars depressed longitudinally toward the middle, the bars of one set swinging in a reverse direction to those of the other, means for swinging the bars, and 30 transversely-extending plate-like portions on each of the swinging bars, substantially as specified.

2. The combination, with a furnace, of swinging grate-bars depressed toward the 35 middle, transversely-extending plate-like portions on said bars, and end bars stationary or unconnected to the others, substantially as specified.

In testimony whereof I have signed my 40 name to this specification in the presence of two subscribing witnesses.

EMIL M. HUGENTOBLER.

Witnesses:

S. O. EDMONDS,

THOMAS LITTLEJOHN.