(No Model.)

W. L. CHURCH.

GRATE.

No. 588,395. Patented Aug. 17, 1897.

FIG. 1.

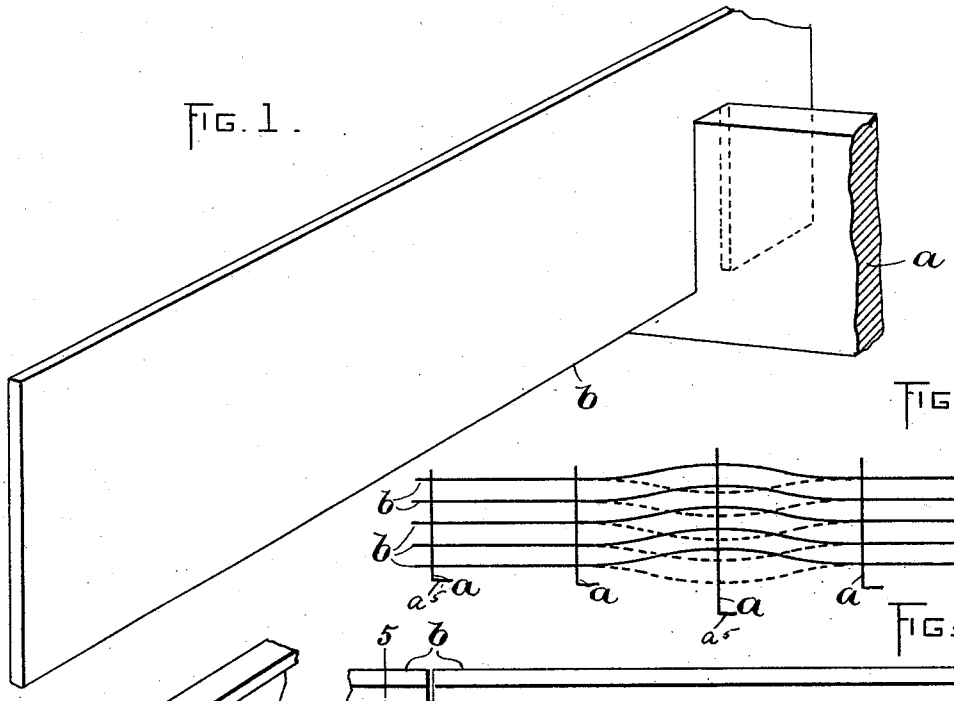


FIG. 2.

FIG. 4.

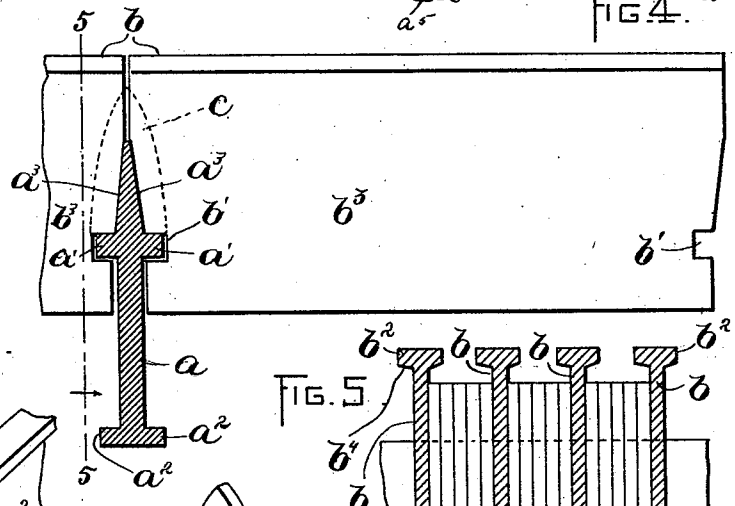


FIG. 3.

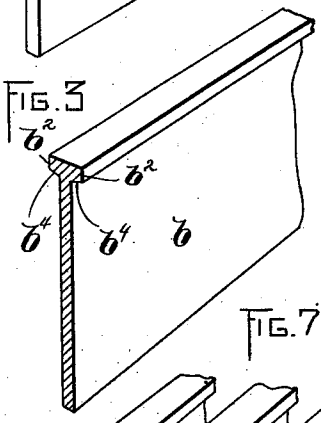


FIG. 7.

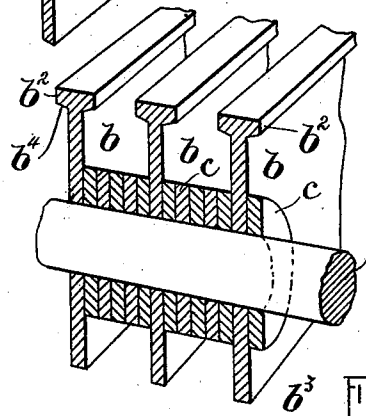
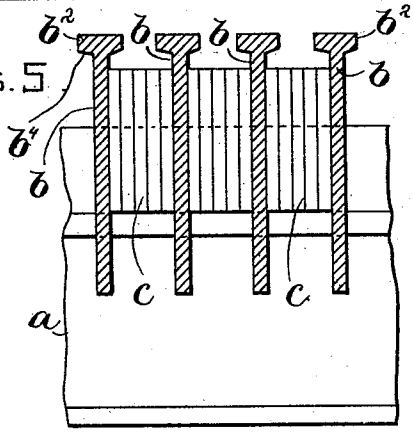


FIG. 5.



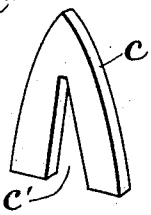
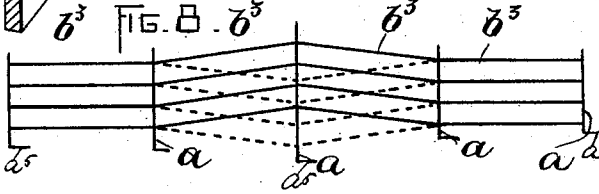


FIG. 6.

FIG. 8.



WITNESSES:
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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

WILLIAM LEE CHURCH, OF NEW YORK, N. Y.

GRATE.

SPECIFICATION forming part of Letters Patent No. 588,395, dated August 17, 1897.

Application filed March 25, 1897. Serial No. 629,179. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM LEE CHURCH, of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Grates, of which the following is a specification.

This invention relates particularly to furnace and fire-box grates, and has for its object to provide a grate in which the liability of the bars to be burned out shall be reduced to the minimum and which shall be of simple and inexpensive construction and capable of being readily shaken and of being adjusted as to the spaces between the bars to suit the requirements of different sizes, kinds, or qualities of fuel.

The invention consists in the improvements which I will now proceed to describe and claim.

Of the accompanying drawings, forming a part of this specification, Figure 1 represents a perspective view showing a portion of an elementary form of grate-bar and a portion of one of its supports, these parts forming elements of a grate embodying one part of my invention. Fig. 2 represents a top view of a portion of a grate-surface of the construction indicated in Fig. 1 in its elementary form—namely, of continuous thin and flexible bars. Fig. 3 represents a perspective view of a portion of a grate-bar embodying one part of my invention in its preferred form. Fig. 4 represents a longitudinal section of a portion of a grate embodying my invention in its preferred form. Fig. 5 represents a section on line 5 5 of Fig. 4. Fig. 6 represents a perspective view of one of the bar-spacing washers shown in Figs. 4 and 5. Fig. 7 represents a view of a modification. Fig. 8 represents a diagrammatic plan view of a portion of a grate-surface constructed, as shown in Figs. 4 and 5, of short bars abutting at their ends, making in effect a flexible grate-surface without actual flexibility in the bars themselves.

The same letters of reference indicate the same parts in all the figures.

In carrying out my invention I provide suitable transverse supports or bearers *a*, which are adapted to support the grate-bars hereinafter described, and may be of any suitable form and construction and supported in any suitable way. For example, the said supports may be stout iron bars suitably connected at their ends with the walls of the ash-pit and extending across the upper portion of the ash-pit. In Fig. 1 I show one of the supports *a* as a flat bar with flat parallel sides and edges. In Figs. 4 and 5 I show the bar provided with ribs or flanges a' a' near its upper edge and similar ribs or flanges a^2 a^2 at its lower edge, the support being extended above the ribs a' and provided with tapering sides a^3 a^3. In Fig. 7 I show a support *a*, composed of a cylindrical rod. There may be any suitable number of these supports or bearers, the number being dependent on the length of the grate.

Upon the supports *a* are mounted a plurality of grate-bars *b*, each of which is relatively very thin and very wide, as indicated in Figs. 1, 3, 5, and 7, and is mounted edgewise upon the supports *a*, the upper edges of the bars collectively constituting the fuel-supporting surface. The bars are proportioned so that the surface exposed to contact with the burning fuel is relatively extremely narrow, while the surfaces exposed to contact with the indraft of cold air and therefore free from contact with the fuel and capable of radiating heat are relatively very wide. By thus proportioning and mounting the grate-bars I gain four important results, namely: first, I secure a sufficiently rapid radiation of heat from the large cooled surface to prevent the burning of the bars by contact with the incandescent fuel; secondly, I secure a very much larger proportion of air-opening than in any other construction, thus getting better combustion; thirdly, I give each bar sufficient flexibility to enable portions of it to be moved laterally for the purpose of shaking the grate, and, fourthly, I provide means for the ready removal of any single bar without disturbing the grate as a whole. The grate may be shaken by actual local flexure of the bars, the latter extending continuously the entire length of the grate, and in this case suitable tie-rods may be attached to the bars at suitable intervals and may project from one edge of the grate, or preferably the bearers themselves may be capable of end motion and serve as tie-rods, so that the bars may be sprung along a portion of the length of the grate, as indicated in Fig. 2, without movement of the bars along their entire length.

A very slight flexure of the bars produced in this way will be sufficient to properly agitate the fuel and separate the ashes therefrom, the representation of the flexure in Fig. 2 being considerably exaggerated beyond what it would be in practice.

The means by which the grate-bars are locally flexed or vibrated may be of any preferred form. In Fig. 2 I illustrate one form of such means, consisting of a handle a^5, attached to the front end of one of the tie rods or supports a, by means of which handle the middle portions of all the grate-bars may be laterally flexed to agitate the fuel supported by such portions. In practice each of the tie-rods or supports will be supplied with such a handle when this means of flexing the bars is employed.

In Fig. 4 I show each bar composed of a series of short independent sections b^3, placed end to end, the adjoining ends of two adjacent sections being movable independently of the other ends of the same bars. In this case the flexibility of the bars will be due to their sectional construction, the movable bearers serving as tie-rods connected with the sections, so that the adjacent ends of each group of sections may be moved laterally independently of the next group, the opposite ends of the sections remaining at rest on their supports as pivots, all as illustrated in Fig. 8.

When the grate is of the sectional construction last described, its ends are formed, as shown in Fig. 4, to fit the flanges a' and tapered sides a^3 of the supports, the ends of the bars having recesses b' to interlock with the flanges a' and thus prevent independent upward movement of the bars. Any one or more bars may be removed by removing enough spacing-washers to permit of the bar being turned enough to one side to disengage it from the flange a'.

I prefer to form ribs or flanges b^2 b^2 on the upper edges of the bars b for the purpose of contracting the spaces between the bars at their upper edges and thus preventing the entrance into the said spaces of hard fragments of cinder liable to become wedged between the bars, the spaces between the bars being wider at all points below the upper edges of the bars than between the ribs b^2. This form gives clearance for everything that passes between the upper edges of the bars. The ribs b^2 are preferably of the same thickness as the body of the bar, the under surface of each rib forming a shoulder b^4, projecting outwardly from the sides of the bar and radiating heat from the body portions of the ribs, so that all parts of the cross-section of the grate which are bounded by heat-radiating surface are of practically uniform thickness.

The bars are properly spaced on the supports a by means of suitable washers c, which in the construction shown in Figs. 4, 5, and 6 are formed to bestride the upper edges of the supports a, each washer being substantially V-shaped for ready removal and having a recess c', which receives the upper portion of the support. There may be a plurality of these washers between each bar and the adjacent bar, as shown in Fig. 5, so that the spacing between the bars may be varied to suit the requirements of the fuel in use by using a greater or less number of washers. When the supports a are formed as shown in Fig. 7, the washers may be annular disks.

The bars are preferably made of wrought iron or steel for the sake of flexibillty, durability, thinness, and lightness.

In both of the forms, which are illustrated diagrammatically in Figs. 2 and 8, the construction is such as to permit local flexure of the bars at a plurality of portions of the grate-surface by applying power at two or more points along said surface. Therefore parts of the bars may be flexed in independent locations, thus providing means adapted to agitate the fuel and separate the ashes therefrom at such point or points as may require the treatment without disturbing the fuel supported by other portions of the grate-surface.

I claim—

1. A grate comprising suitable transverse supports, a plurality of relatively thin and wide flexible bars mounted edgewise on said supports, and means for independently flexing portions of said bars at a plurality of points to shake the fuel supported by their upper edges.

2. A grate comprising suitable transverse supports, a plurality of relatively thin and wide flexible bars mounted edgewise on said supports, each bar being composed of a series of independent sections placed end to end, and means for independently flexing portions of said bars at a plurality of points to shake the fuel supported by their upper edges.

3. A grate comprising suitable transverse supports, a plurality of relatively thin and wide flexible bars mounted edgewise on said supports, spacing-washers removably mounted on the supports between the bars, and means for independently flexing portions of said bars at a plurality of points to shake the fuel supported by their upper edges.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 16th day of March, A. D. 1897.

WILLIAM LEE CHURCH.

Witnesses:
A. R. MILLER,
L. C. BULLINGTON.