(No Model.) 2 Sheets—Sheet 1.

L. BANNISTER.

GRATE.

No. 273,437. Patented Mar. 6, 1883.

Fig. 1.

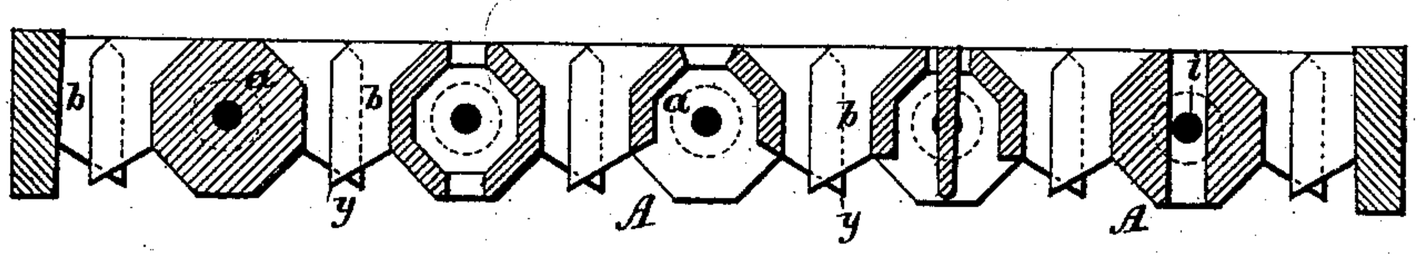


Fig. 2.

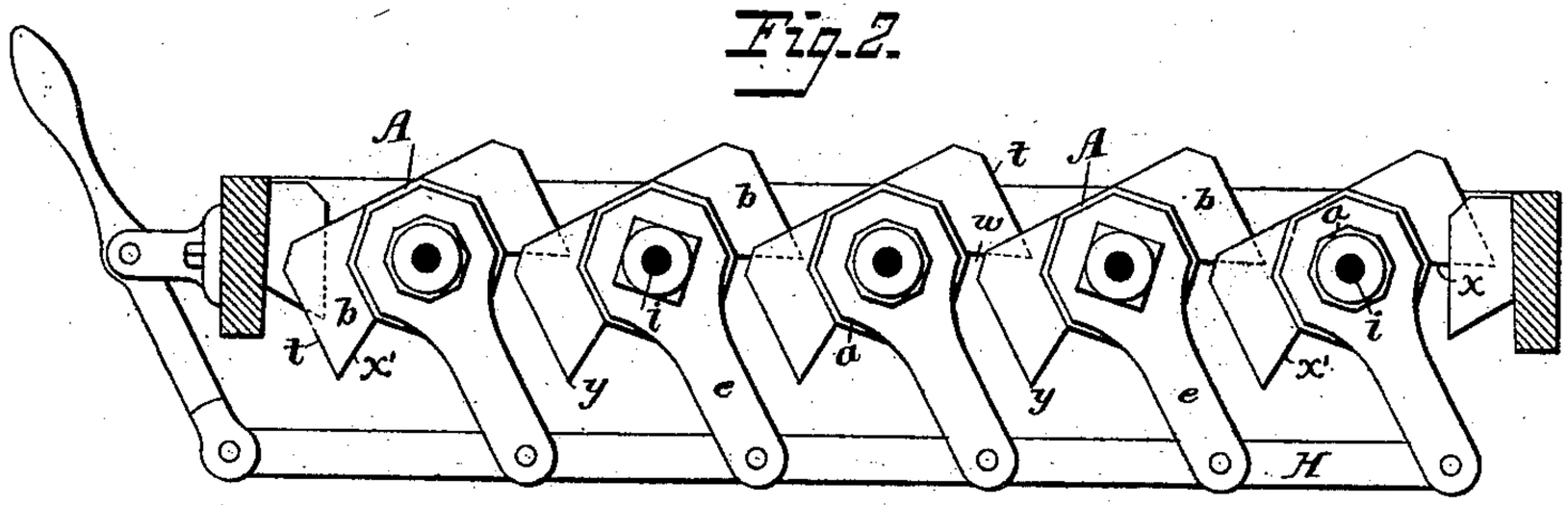
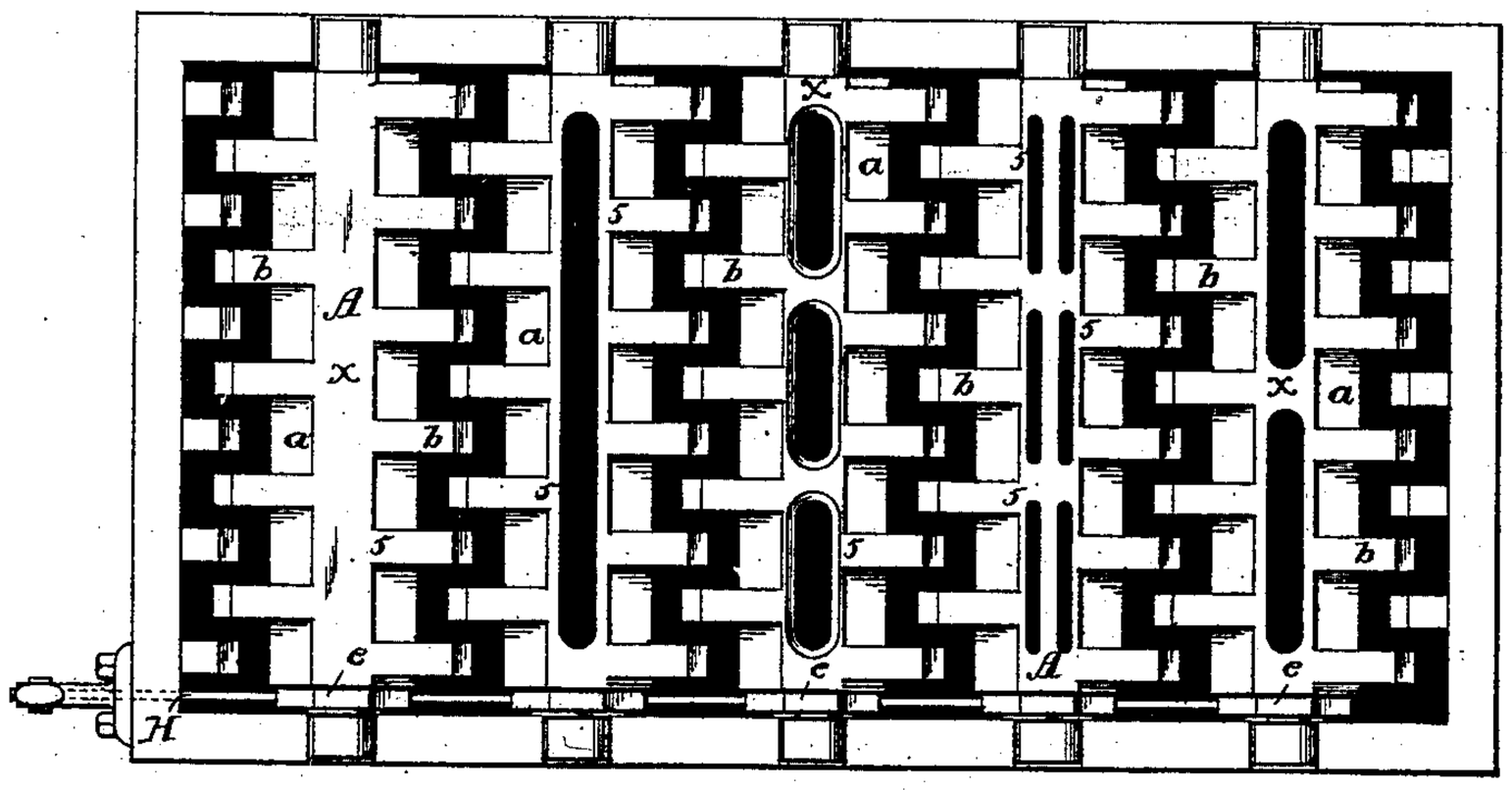


Fig. 3.



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(No Model.) 2 Sheets—Sheet 2.

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GRATE.

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Fig. 4.

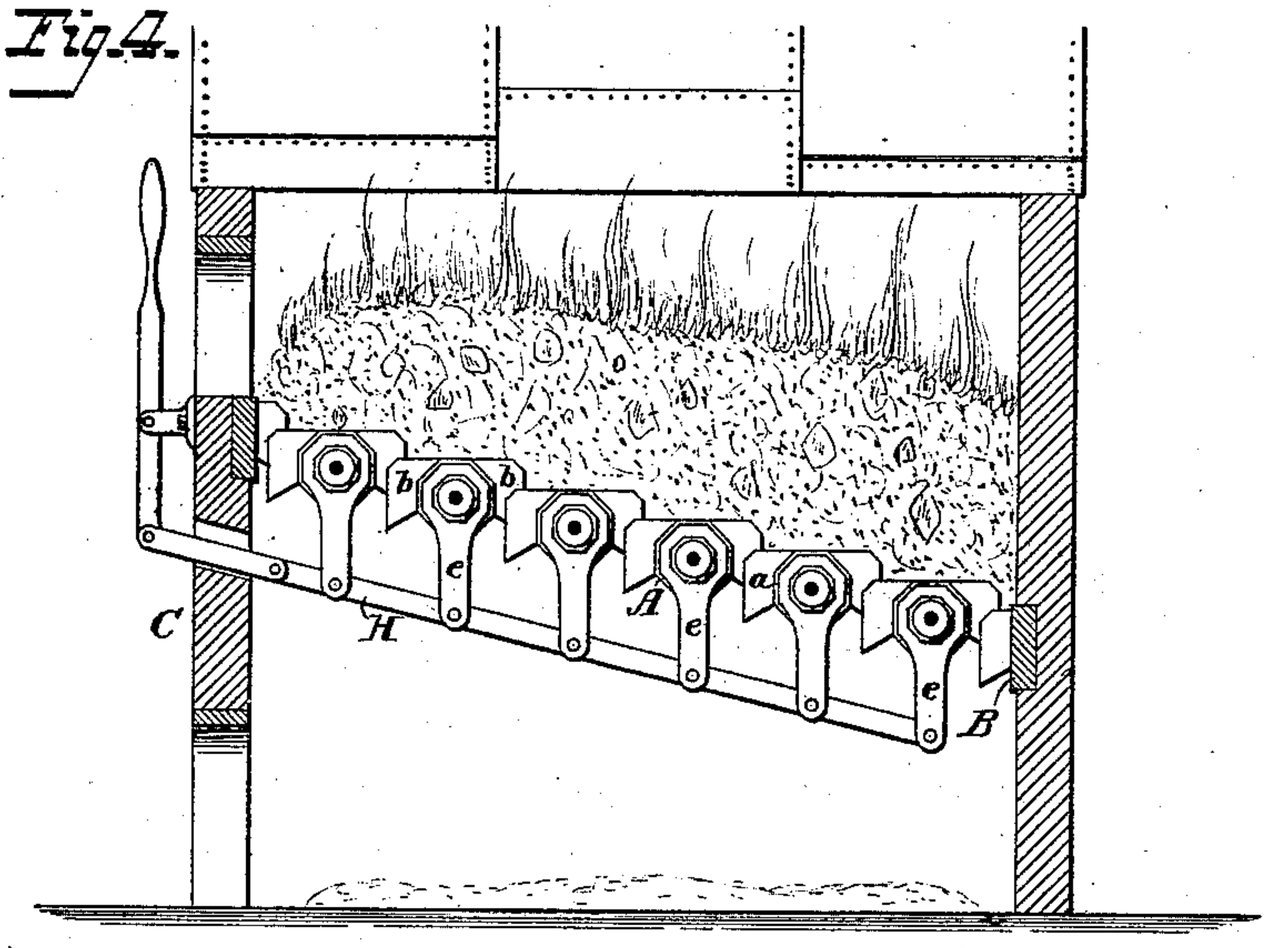


Fig. 5.

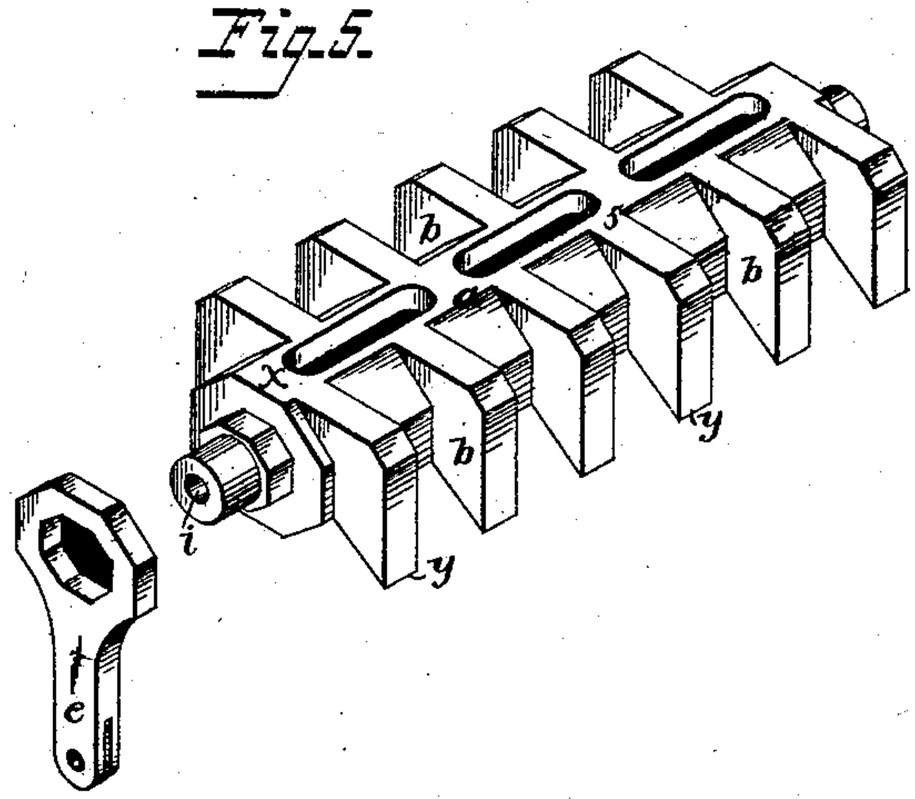
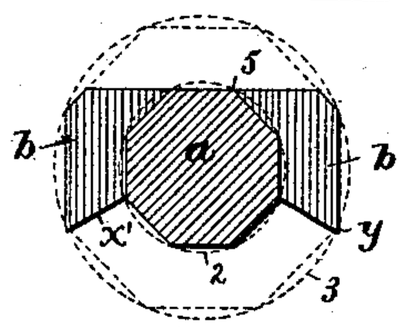


Fig. 6.



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UNITED STATES PATENT OFFICE.

LEMUEL BANNISTER, OF PHILADELPHIA, PENNSYLVANIA.

GRATE.

SPECIFICATION forming part of Letters Patent No. 273,437, dated March 6, 1883.

Application filed November 28, 1882. (No model.)

To all whom it may concern:

Be it known that I, LEMUEL BANNISTER, a citizen of the United States, and a resident of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Grates, of which the following is a specification.

My invention relates to that class of grates especially adapted for large furnaces for steam-boilers, &c., in which the bars are rocked for the purpose of cleansing the fire of ashes and cinders; and my invention consists in constructing, arranging, and operating the grate-bars, as fully described hereinafter, so as to afford a better bed than heretofore for the fire, facilitate the extraction of ashes and cinders without permitting the passage of unburned coal, avoid jamming the bars, and permit the use of rocking bars for the inclined grates of steam-boilers, &c.

In the drawings, Figure 1 is a transverse section of a grate, showing my improvements. Fig. 2 is an end elevation of the bars and connections. Fig. 3 is a plan. Fig. 4 is a sectional elevation, showing the grate applied to the furnace of a steam-boiler. Fig. 5 is a perspective view of a bar and arm detached, and Fig. 6 is a diagram illustrating the construction of the bar.

In ordinary grates with rocking bars it has been usual to make the bars with the bodies of cylindrical form and with side lugs. As thus constructed an imperfect support for the fire is secured, especially when using fine coals, the latter tending to slide over the rounded surfaces and between the bars into the ash-pit. Bars with rounded bodies have the further disadvantage of effecting but little agitation of the contents of the fire-pot when they are rocked, the agitation of the fire depending almost wholly upon the side lugs. The side lugs have been usually made tapering, and narrowest at the outer ends, so that when the bars are tilted the ends of the lugs will be so far lifted away from the opposite bar as to present extended channels for the passage of the contents of the fire-pot and spaces in which coals are jammed. To overcome these objections I make the bars with polygonal bodies, with flat faces on top. Thus the bodies *a* of the bars A may be octagonal in external form, with one of the flat faces *x* uppermost when the bar is in its normal position. This insures a flat, broad support for the contents of the fire-pot; but any movements of the bars will agitate the whole body of fire, and the faces *x*, being then inclined, will tend to move and discharge the ashes toward the openings between the bars.

To prevent the passage of unburned coal, while allowing free egress for the ashes and cinders, I extend the lugs *b* so that the outer lower corners, *y*, will be nearly on a line with the bottom of the bar-body. When the bar is tilted such corners, therefore, will not pass above the inclined faces of the opposite bars, as shown in Fig. 2, thus checking the movements of solid particles toward the interstices, yet affording ample space for the passage of cinders, &c. To further afford space for the discharge of ashes, yet prevent the passage of coals, I incline or cut away the lower sides of the lugs at *x*, so that the outer portions will depend below the connection with the body. This forms spaces *w* near the faces of the opposite lugs when the bars are tilted, but so arranged that no large coal can pass. By making the outer edges, *t*, of the lugs straight, in connection with bars having flat sides, I secure a better crushing effect than if the edges were curved.

While the bars may be constructed with the faces of different proportions, the diagram, Fig. 6, illustrates a systematic plan of construction which will produce a bar having the best effects. The body *a* of the bar is an octagon formed within a circle, 2, having its center coincident with the axis of the bar. The lugs conform to another octagon drawn in a concentric circle, 3, and about double the diameter of the circle 2, the top line of the body *a* coinciding with the upper faces of the lugs and the outer edges of the latter terminating at the points *y*, as shown, instead of completing the octagon.

Heretofore with rocking-bars it has been usual to place the bars in the fire-box with their ends toward the front. This is not objectionable or may be advantageous in stoves; but in large furnaces the necessity of cutting away the front wall for the passage of the shafts when the operating devices are arranged

outside is a great objection, while it is almost impossible to set the grate at an angle and then operate it in the fire-box. To obviate this objection I set the bars in a frame, B, which I arrange in the fire-place, with the bars parallel to the front wall, C, the pendent operating-arms *e* at the ends of the bars being connected to a rod, H, extending through the front wall. I can thus arrange the grate at any angle and avoid all cutting of the walls except for the passage of the rod H. The setting of a rocking-bar grate at an angle in a fire-place with the bars all horizontal effects a result not attained with ordinary stationary bars, as the rocking of the bars feeds the fire by successive steps down toward the rear, yet affords a series of bearings preventing any sliding of the fire downward when the bars are not moved.

To prevent the burning away of the trunnions or journals of the bars, apt to occur in this class of apparatus, I make each with an opening or channel, *i*, through which the air can pass, keeping the journal cool and supplying hot air to the fire.

To render the bars interchangeable and reduce the length of the bearing-faces of the lugs, I arrange the lugs on one side of each bar opposite the spaces between the lugs on the opposite side. Thus all the bars are alike, and the upper flat lug-faces, instead of extending from the point of one lug to the point of another, terminate each at a point, 5, on the bar-body.

It will be apparent that the bar-body may be hollow and slotted at the upper surface and with or without the usual central web.

I am aware that agitating-bars having blades with wide curved ends have been combined with flat slotted grates, and do not claim, broadly, a bar having blades with wide curved ends.

I claim—

1. The combination, in a grate, of parallel bars and devices for rocking them simultaneously, said bars having each side lugs and a body flat on the upper face, and with inclined or beveled faces between said lugs, as set forth.

2. A rocking grate-bar provided with lugs having straight outer ends and extending downward at the outer corners, *y*, substantially as set forth.

3. The combination of the transverse rocking bars, all connected to appliances for rocking them, as set forth, and having axial journals, side teeth, and flat upper faces, level with the side teeth, and a frame supporting said bars one above the other to form an inclined bed with flat steps for the fire of a furnace, substantially as set forth.

4. The rocking grate-bars provided with end journals and with angular hubs between the journals and ends of the bars to receive detachable arms *e*, as set forth.

5. The combination, in a grate, of rocking bars having lugs widened at the outer ends, the lugs of one bar extending past those of the next and nearly to the body thereof, as set forth.

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

LEMUEL BANNISTER.

Witnesses:
CHARLES E. HENRY,
ROBERT INGRAM.