(No Model.) 2 Sheets—Sheet 1.

A. STROH.

GRATE BAR AND SHAKER THEREFOR.

No. 589,629. Patented Sept. 7, 1897.

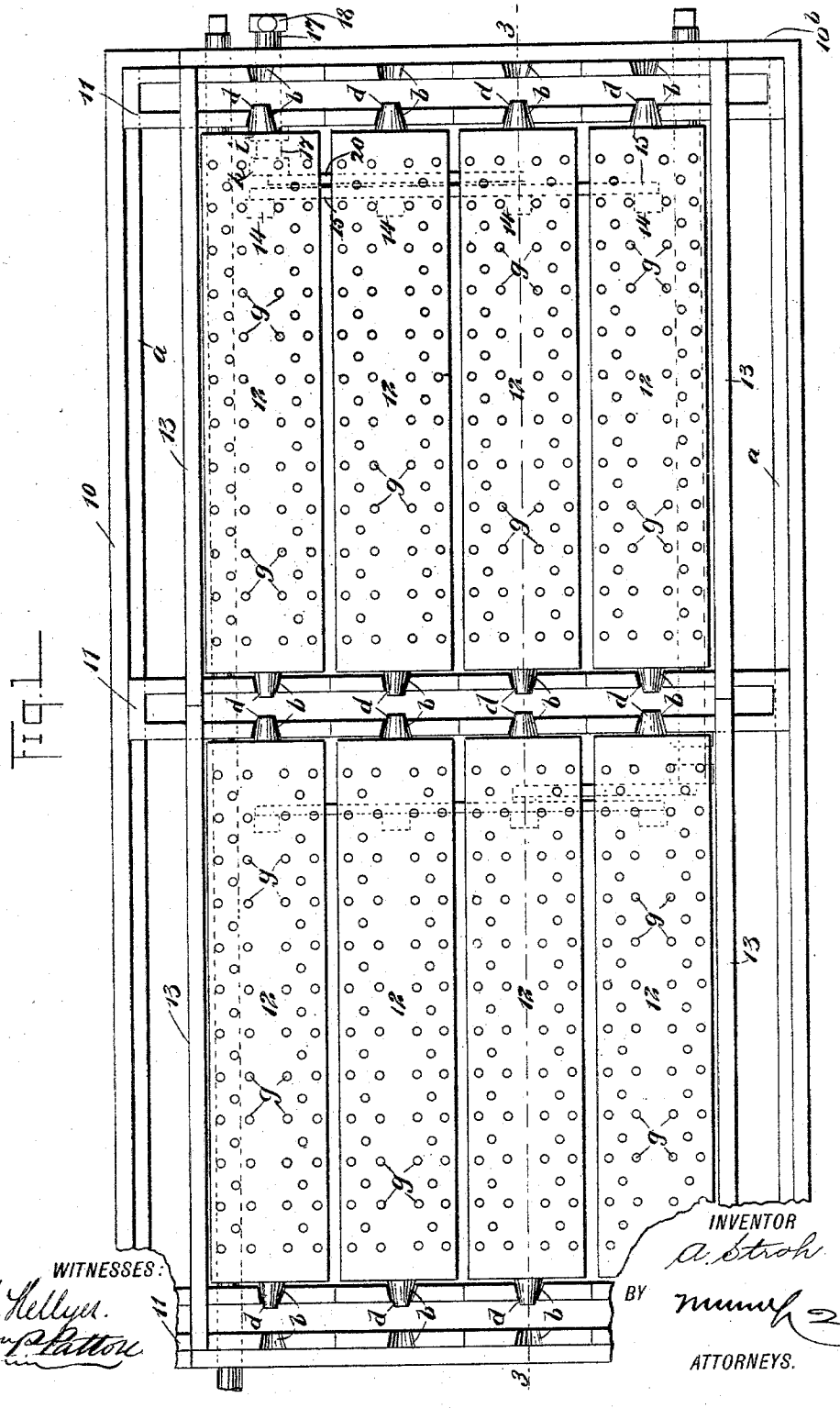


Fig. 1.

WITNESSES:
H. Kellyer.
Wm. P. Patton

INVENTOR
A. Stroh
BY
ATTORNEYS.

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

(No Model.) 2 Sheets—Sheet 2.

A. STROH.

GRATE BAR AND SHAKER THEREFOR.

No. 589,629. Patented Sept. 7, 1897.

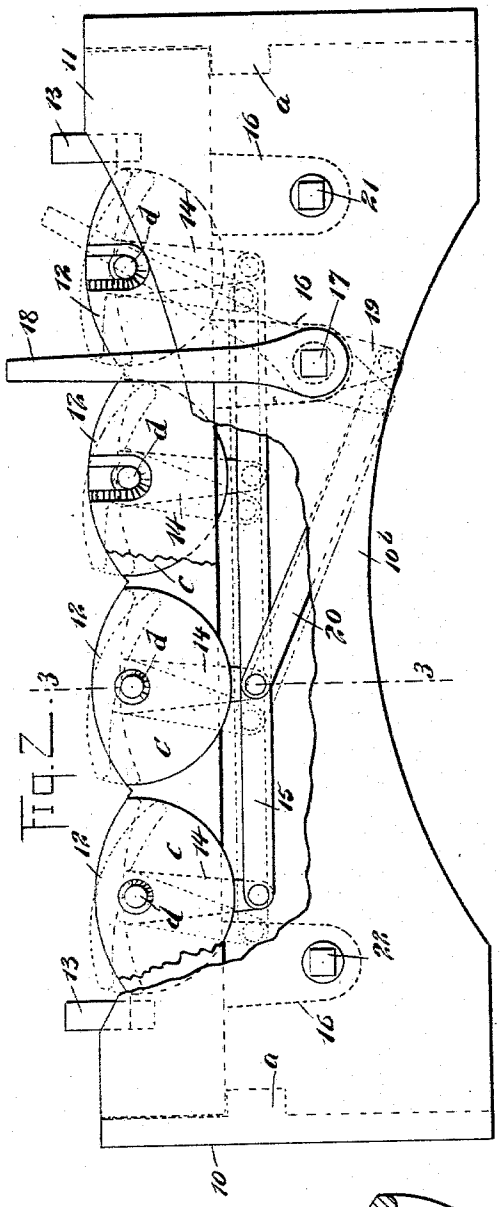


Fig. 2.

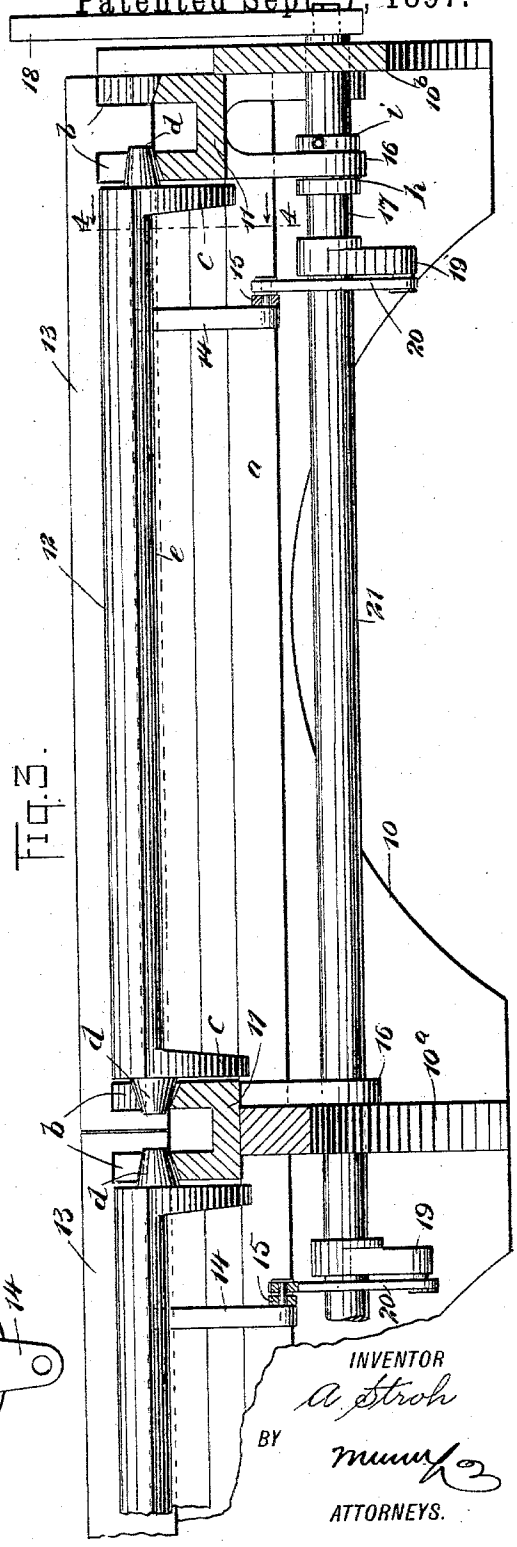


Fig. 3.

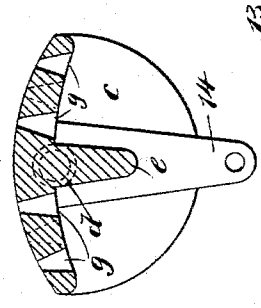


Fig. 4.

WITNESSES:

H. Kellyer.

Wm. P. Patton

INVENTOR

A. Stroh

BY

Munn & Co

ATTORNEYS.

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

UNITED STATES PATENT OFFICE.

ABRAHAM STROH, OF FREELAND, PENNSYLVANIA.

GRATE-BAR AND SHAKER THEREFOR.

SPECIFICATION forming part of Letters Patent No. 589,629, dated September 7, 1897.

Application filed September 23, 1896. Serial No. 606,695. (No model.)

To all whom it may concern:

Be it known that I, ABRAHAM STROH, of Freeland, in the county Luzerne and State of Pennsylvania, have invented a new and useful Improvement in Grate-Bars and Shakers Therefor, of which the following is a full, clear, and exact description.

This invention relates to grate-bars for fire-chambers under boilers and for analogous uses, and more particularly to a class of grate-bars that are connected for rocking movement to agitate the bed of coals or other incandescent material thereon.

The object of my invention is to provide novel details of construction for grate-bars and shaking devices therefor which will be simple, be practical, and durable, as well as very efficient in operation.

My invention consists of certain details and combinations of the same, which will be hereinafter described, and particularly pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a plan view of two sets of the improved grate-bars supported to rock on a suitable frame and a rocking device therefor, shown mainly by dotted lines. Fig. 2 is an end elevation of the grate-supporting frame, the novel grate-bars thereon, and a device connecting the grate-bars for a simultaneous rocking movement, the frame being broken away to expose portions of the said rocking device. Fig. 3 is a transverse sectional view of the grate-supporting frame substantially on the line 3 3 in Figs. 1 and 2, two of the novel grate-bars being shown in position on the frame and longitudinally alined, and a rocking device for the grates; and Fig. 4 is an enlarged transverse sectional view of one grate-bar substantially on the line 4 4 in Fig. 3.

In carrying into effect the features of improvement a rectangular bearing-frame 10 is provided that is cast from metal and has substantial walls that are preferably scalloped on their lower edges to remove material between the corners of the frame, and thus render it as light as is consistent with necessary strength.

The bearing-frame 10, that is to support in a level condition one or more sets of grate-bars, may be afforded such dimensions as will adapt it to occupy the entire area of a walled fire-chamber and be therein suitably supported for maintenance of the grate-bars. Should, however, the dimensions of the fire-chamber be so large as to render such a proportion of the bearing-frame objectionable, then two or more of said frames may be furnished and held in the masonry fire-chamber in the same horizontal plane.

There are two inwardly-extending ledges *a*, formed on the inner surface of each frame 10 at a correct distance from its upper edge on opposite sides thereof, which ledges receive and support the similar carrier-bars 11, whereon a set of grate-bars 12 are supported by a journaled engagement of their ends therewith, as will be further explained.

Each carrier-bar 11 consists of two parallel side walls integrally joined together at their lower edges by a bottom wall, as best shown in Fig. 3, and in these side walls, at suitable distances apart, notches *b* are formed in their upper edges, which notches are preferably disposed oppositely in pairs.

The channeling of the carrier-bars 11 renders them light and strong, and in service ashes which accumulate therein protect them from burning or warping and also keep the journal ends of the grate-bars from direct contact with the fire on the grate-surface.

The carrier-bars 11 are arranged parallel in pairs on the bearing-frame 10, and where two series of grate-bars 12 are to be supported aside of each other, so that respective pairs of bars in the duplicate series will be longitudinally alined, then there is to be a transverse wall 10^a, formed or secured in the frame 10 at a proper distance from an outer side wall of the bearing-frame and parallel therewith, and the carrier-bar 11, that sustains adjacent ends of the grate-bars in both series, is seated on said wall 10^a, thus insuring necessary stability of the two sets of grate-bars at contiguous ends of the same.

The body of each plate-like bar 12 is essentially lunulate in cross-section, as represented in Fig. 4, the convex side of the same being uppermost in service.

At each end of the grate-bar body a flange *c* is formed, which flanges project consider-

ably below the concave lower side of the bar, and preferably their edges are rendered substantially semicircular.

At each end of a grate-bar 12 a journal-stud *d* is formed, which is in the form of a cone-frustum, these similar journal projections being directly opposite each other, and the diameter of the studs is proportioned to the width of the notches *b* in the sides of the carrier-bars 11, so as to adapt them to loosely occupy the opposite notches in two carrier-bars, as is clearly shown in Figs. 1 and 3. The journals *d* are at the radial centers of the circular-edged depending flanges *c*, so that said flanges on adjacent grate-bars will be adapted to rock with their edges close together and avoid interference with each other.

The notches *b* are preferably concave curved on their lower sides and their side walls and bottom and flared outward, the degree of flaring being sufficient in each notch to allow the cone-frustum-shaped journal-studs *d* of the grate-bars 12 to have their outer end portions only in contact with the inner edges of the notches they occupy, as is shown in Fig. 3, which construction and arrangement of parts will reduce the frictional contact of the journals *d* with the notched carrier-bars to a minimum.

The bodies of the grate-bars 12 are each stiffened by a longitudinal rib *e*, that is integral therewith and projects from the lower surface at the transverse center, and at each side of the said rib the body of the grate-bar is numerously perforated, which perforations *g* are coniform and of the greatest diameter at their lower ends, this provision being made to facilitate the passage of ashes through the perforations and avoid clogging of the said holes.

The breadth of the grate-bars 12 is so proportioned to the number in each set of the same and their journals are so spaced apart in the notched carrier-bars 11 that adjacent grate-bars will have their edges nearly in contact when said bars lie with the crowns of their convex top faces in the same horizontal plane.

Preferably the upper edges of the notched sides of the carrier-bars 11 are convex-curved opposite the end of each grate-bar, so as to conform with the arched faces of the latter when the series of bars are arranged essentially level on their upper surfaces.

The pair of carrier-bars 11 for each series of grate-bars 12 are held spaced apart, so as to prevent cramping contact with the ends of the latter, by a pair of spacing-bars 13. Each spacing-bar is in the form of a rectangular metal strip that is slotted near each end on the same side edge, which slots permit the spacing-bars to be hooked upon the end portions of the carrier-bars 11 at right angles therewith and near their ends.

It will be seen in Fig. 3 that the spacing-bar 13, which engages with both of the carrier-bars 11, has at its right-hand end an open notch at the lower corner of the said end and also is slotted at a correct distance from the notch, the slot extending from the same edge as does the notch. The slot and notch are adapted to respectively engage with the spaced side walls of the carrier-bar at the right-hand side of the bearing-frame 10, which construction and arrangement of parts enables the pair of spacing-bars 13, that engage each pair of carrier-bars, to hold the latter parallel, preventing their displacement in any direction.

It is essential that means be provided for rocking together all the grate-bars of a series, and to this end the following-described apparatus is furnished.

On the lower side of each grate-bar an arm 14 is downwardly projected, said arms being near like ends of the grate-bars of a series, and all are in the same vertical plane, having their sides essentially parallel with the transverse depending flanges *c* at the ends of the grate-bars. All the arms 14 of the grate-bars in a series are pivotally attached to a connecting-bar 15, which, if longitudinally moved, will correspondingly rock the grate-bars, as indicated by dotted lines in Fig. 2.

At a suitable distance from an end of one carrier-bar 11 the depending hanger-arm 16 is formed or secured on the carrier-bar, which arm is transversely perforated near its lower end for the reception of a short rock-shaft 17, that has a fixed collar *h* near its inner end and another collar *i*, securable on said shaft.

The adjacent side wall 10^b of the bearing-frame 10 is perforated opposite the perforation in the arm 16 to permit the shaft 17 to be projected outwardly through the wall mentioned, and thus receive support near each end of the same, and it will be seen that a proper adjustment of the securable collar *i* will retain the rock-shaft 17 in position free to rock.

The projecting end of the rock-shaft 17 is made polygonal on its periphery for the reception of the laterally-perforated end portion of the handle-lever 18, which is afforded sufficient length to adapt it for efficient service.

The rock-shaft 17 is provided with a rock-arm 19, that is fixed on the inner end thereof, and the free lower end of said arm is pivoted to one end of a link-bar 20, that at the other end is pivoted upon the connecting-bar 15, whereby the vibration of the handle-lever 18 will serve to rock all of the grate-bars with which it is connected.

When there are two or more sets of grate-bars placed upon the bearing-frame 10, so that opposite bars will be longitudinally alined, then it is advisable to provide a separate shaking apparatus for each set of grate-bars. In this case another rock-shaft 21 is provided, which extends from the same side of the bearing-frame as does the short rock-shaft 17 and across the bearing-frame below the set of grate-bars that are rocked by the apparatus

already described and in a like manner transmits rocking motion to the second set of grate-bars when rocked by the handle-lever 18, the rock-shaft 21 having its end that projects through the wall 10^b of the bearing-frame made polygonal to fit the apertured end of said lever.

Should there be three series of grate-bars laterally arranged on the frame 10, a third shaft 22, for actuating a shaking apparatus, that is independently connected with said third set of grate-bars, is provided, so that each series of grate-bars may be rocked to remove ashes and clinkers therefrom.

In operation it will be seen that the rocking motion communicated to the grate-bars 12, as hereinbefore explained, will effectively dislodge ashes and cinders that clog the fire on the grate-bars, and the arched form of the grate-bar bodies, together with the stiffening-rib on each bar, renders the grate-bars very strong and prevents warping from heat.

The perforations in each bar 12 afford free passages for air throughout the area of the fire-bed. By providing separate series of grate-bars and independent shaking devices therefor the fire can be cleaned in sections, and thus enable the maintenance of heat in the furnace-chamber while the fire is being renovated.

The provision of the channeled carrier-bars 11 is a feature of merit, as the retention of ashes in the channels of the same prevents them from being burned out, as before mentioned, while the free rocking movement of the grate-bars is permitted.

The end flanges *c*, formed on the grate-bars, strengthen them and enable their rocking movement to be effected without a liability of clinkers locking the bars at their ends, as when the bars are thrown to incline their upper surfaces, as shown by dotted lines in Fig. 2, the flanges *c* will rock up on the high side of said grate-bars and keep coal or cinders from getting between the bodies of the grate-bars and upper edges of the carrier-bars.

Owing to the novel form and peculiar disposition of material in the improved grate-bars it is evident that maximum strength with a minimum of the weight is secured.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. A furnace-grate, comprising a frame having inwardly-projecting ledges upon opposite sides, grate-carrying bars supported by and movable on said ledges, and spacing-bars adapted to hold the grate-carrying bars in their adjusted positions, substantially as described.

2. A furnace-grate, comprising a frame having inwardly-projecting ledges upon opposite sides, grate-carrying bars supported by and movable on said ledges, spacing-bars adapted to hold the grate-carrying bars in their adjusted positions, and grate-bars having coniform end journals, said grate-carrying bars having bearings therefor of a similar shape, substantially as described.

3. A furnace-grate, comprising a frame having inwardly-projecting ledges upon opposite sides, grate-carrying bars supported by and movable on said ledges, spacing-bars adapted to hold the grate-carrying bars in their adjusted positions, and grate-bars having a projecting pivot and transverse flange at each end, the lower edge of the flange being concentric with the pivots and the grate-carrying bars having notches forming bearings for said pivots, substantially as described.

4. A furnace-grate, comprising a frame having inwardly-projecting ledges upon opposite sides, grate-carrying bars supported by and movable on said ledges, spacing-bars adapted to hold the grate-carrying bars in their adjusted positions, grate-bars having coniform projecting end journals, said grate-carrying bars having bearings therefor of a similar shape, and means for rocking the grate-bars upon their pivots, substantially as described.

5. The combination with a bearing-frame, and transversely-disposed carrying-bars thereon, which are top channeled to provide parallel flanges thereon, of spacing-bars which are notched near their ends, and thus adapted to hook upon the carrier-bar flanges and hold said bars spaced apart, as specified.

ABRAHAM STROH.

Witnesses:
M. E. MOONEY,
CHAS. ORION STROH.