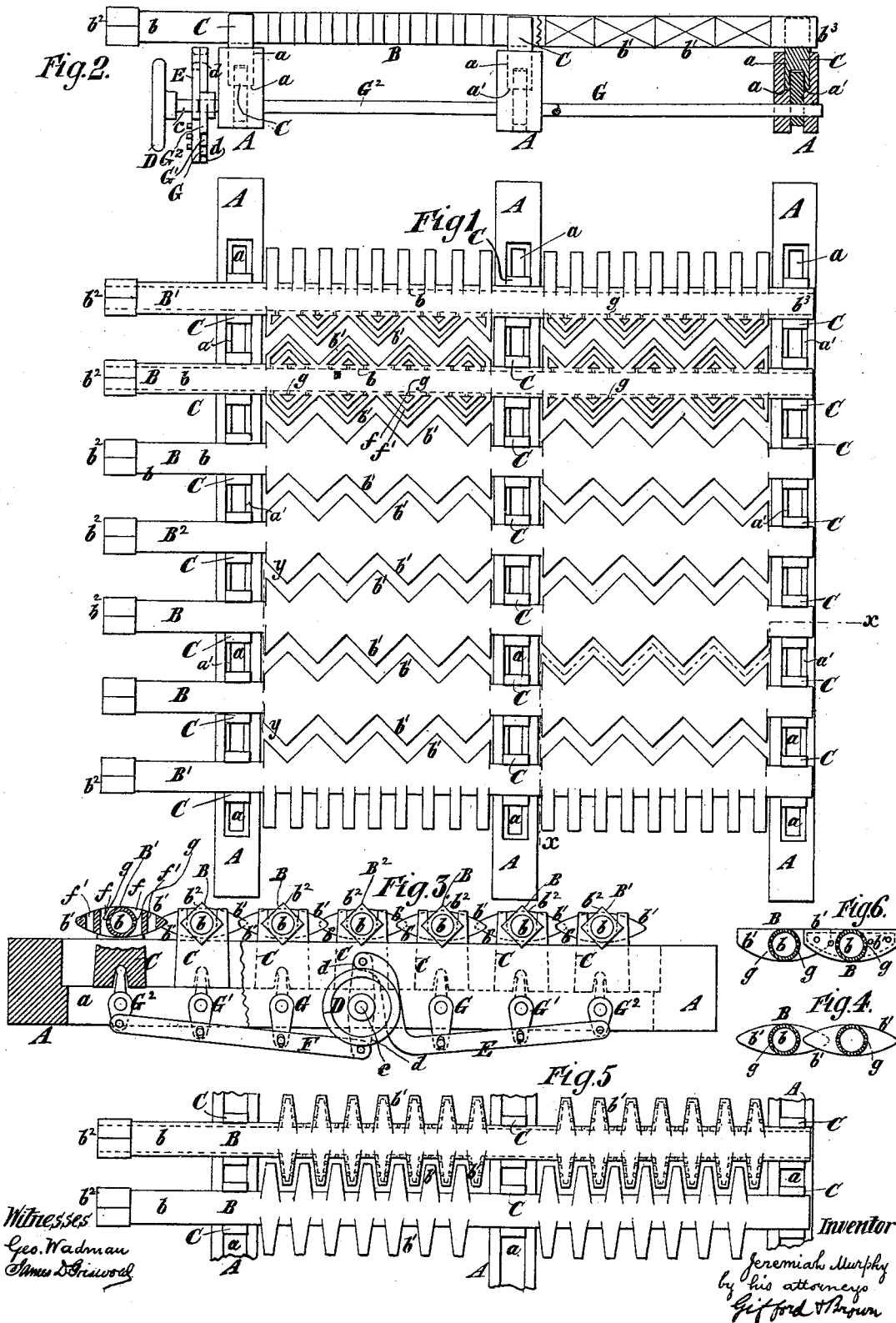


J. MURPHY.
GRATE.

No. 344,491.

Patented June 29, 1886.



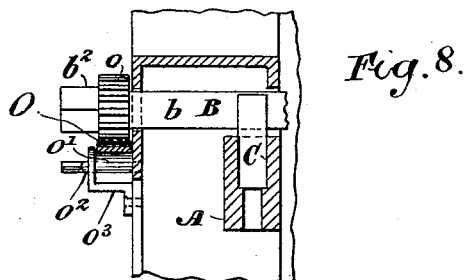
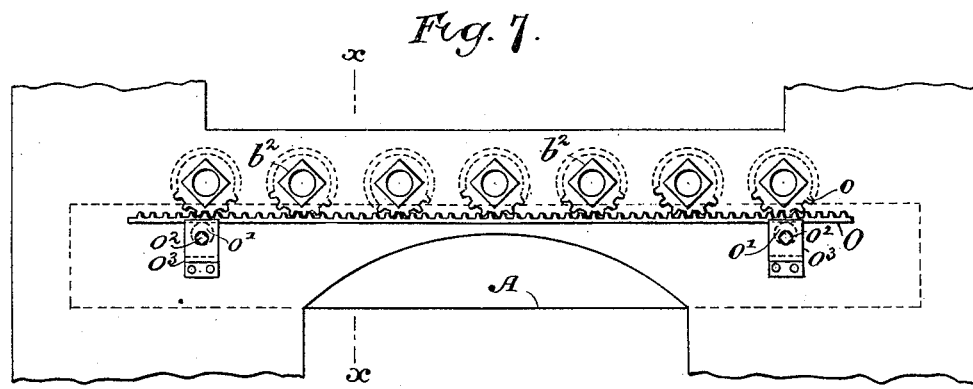
Witnesses
Geo. Wadman
James D. Griswold

Inventor
Jeremiah Murphy
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UNITED STATES PATENT OFFICE.

JEREMIAH MURPHY, OF BROOKLYN, NEW YORK.

GRATE.

SPECIFICATION forming part of Letters Patent No. 344,491, dated June 29, 1886.

Application filed June 11, 1885. Serial No. 163,317. (No model.)

To all whom it may concern:

Be it known that I, JEREMIAH MURPHY, of Brooklyn, in the county of Kings and State of New York, have invented a certain new and useful Improvement in Grates, of which the following is a specification.

My improvement relates to grates such as are used in burning fuel beneath steam-boilers, and pertains particularly to the bars employed in such grates and the means for manipulating the same.

I will describe in detail a grate embodying my improvement, and then point out the novel features in claims.

In the accompanying drawings, Figure 1 is a plan or top view of a grate embodying my improvement. I have only shown the two bars nearest the top of the figure fully drawn out. The rest of the bars are in outline only. Fig. 2 is a sectional side view of the same, taken on the dotted line *x x*, Fig. 1. Fig. 3 is an end elevation of the same, partly in section, showing means for manipulating the grate-bars. Fig. 4 is a sectional view of certain parts of a pair of grate-bars, the section being taken on the plane of the dotted line *y y*, Fig. 1. Fig. 5 is a view of a grate of modified form, certain portions being broken away to save space. Fig. 6 is a sectional view of grate-bars of modified form. Fig. 7 is a view of a portion of the outside of a furnace, showing a means of imparting a rocking motion to the grate-bars. Fig. 8 is a sectional view thereof taken on the dotted line *x x*, Fig. 7.

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

A designates the main bearer-bars. As shown, they are made of castings, and have in them longitudinal openings *a*, extending vertically through them, but stopping short of the ends of the bars. The walls of the openings *a* are provided with shoulders *a'*, extending lengthwise of the openings and to the ends thereof. These bearer-bars may be supported in any suitable manner.

As shown in the example of my improvement illustrated in Figs. 1, 2, 3, and 4, B B' B² designate the grate-bars. Each of the grate-bars, as shown, consists of a casting comprising a hollow portion or tube, *b*, extending throughout the length of the bar and laterally-extending portions or projections *b'*.

The bars B B² have the projections *b'* upon both sides and the bars B' upon one side only. The hollow portion or tube *b* of all the bars is preferably open at each end, and air, steam, or other gas may be passed into them, if desirable, in any well-known manner. One of the ends *b²* of each of the tubular portions *b* extends for a considerable distance beyond the bearing-bar A, to which it is adjacent, and is provided at its outer end with a squared head for the reception of a suitable instrument by which it may be rocked, if desirable. The other of their ends *b²*, as shown, extend only to a line coincident with the outer side of the adjacent bar A.

C designates bearing-pieces, upon which the grate-bars B B' are supported. These bearing-pieces are fitted within the longitudinal openings *a* in the bearing-bars A. The shoulders *a'* support the bearing-pieces C, and aid in guiding them when moved along. Portions of the tubular portions *b* of the grate-bars constitute journals therefor. These journals are received by the bearing-pieces C, and the bars may be rocked or rotated upon them when desirable. It will be observed that each of the bearing-bars A is provided with bearing-pieces C.

The grate-bars B B' may be moved bodily toward or from the center bar, B², which last is preferably stationary, and also toward and from each other by sliding the bearing-pieces C along upon the bearing-bars A. One object of this movement is to provide for lessening or increasing the distance between the grate-bars for the purpose of accommodating fuels of different size or qualities. I have shown means for accomplishing this movement most fully in Fig. 3 of the drawings, consisting in a hand-wheel, D, mounted upon a shaft, *c*, which is journaled in bearings in the bearing-bars A. An arm, *d*, is fast upon the shaft *c*. One end of the arm *d* has pivotally connected to it the end of a curved arm upon a link, E, and the other end of the arm *d* has pivotally connected to it one end of a link; F. The links E and F extend in reverse directions at an upward incline, and are parallel with the vertical plane of the bearing-bars A. Pivotally connected to the links E F at points in their length coincident with a line drawn vertically through the center of the grate-bars B B' are levers G

$G' G^2$, consisting of rock-shafts journaled in the bearer-bars A, having arms extending above them and other arms extending below them. The ends of the upper arms of these 5 levers enter recesses formed in the undersides of the bearing-pieces C. The levers are connected by their lower arms to the link. The lower arms of the levers G' are shorter than the corresponding arms of the levers G, and 10 the lower arms of the levers G^2 are shorter than the corresponding arms of the levers G' . In other words, the lengths of the arms of these levers which are connected to the links E F lessen the farther they are from the shaft c. 15 It will be observed, therefore, that the leverage exerted by the levers G G' G^2 upon the bearing-pieces C is increased or decreased according to the distance of said levers from the shaft c. When the hand-wheel D is rotated, 20 the grate-bars B B' are moved toward the stationary grate-bar B² and also toward each other, the range of movement of the grate-bars B B' being increased the farther they are from the hand-wheel. By this means the spaces 25 between the grate-bars are made to correspond.

In order to impart a rocking motion to the grate-bars B B' B², I may employ a rack-bar, O, mounted in suitable slideways beneath the 30 portions b' of the tubular portions b of the grate-bars. This rack-bar will gear into pinions o, mounted on said portions b^2 of the grate-bars. It may be reciprocated in any well-known manner, and when reciprocated will 35 impart a rocking motion to the grate-bars, or it may be moved far enough to cause the grate-bars to perform a half-rotation. When it is desired to move the grate-bars bodily toward and from each other, this rack-bar may be 40 lowered out of engagement with the pinions on the grate-bars, and again returned to its position in engagement with the pinions when the grate-bars have been properly adjusted.

The rack-bar O may be moved vertically, 45 or toward and from the pinions o, by means of cams o' , mounted upon shafts o^2 at one of their ends in the side of the furnace, and near their other ends in brackets o^3 . These shafts have squared heads, whereby they may be rotated 50 to cause the cams o' to raise and lower the rack-bar.

In order to relieve the bars of clinkers, I may adjust them bodily into different positions nearer to or farther from each other, as 55 circumstances may require for various-sized clinkers, and then, by rocking the grate-bars, crush the clinkers. This is an important advantage of my improvement.

The portions b' upon the grate-bars are, as 60 shown, of obtuse angular projection, and are so arranged thereon that the projections upon one bar are opposite the spaces between the projections upon the bars next adjacent thereto. This arrangement provides for the bars 65 being moved very close together, if desirable,

and yet admits of a large air-space between the bars. The upper and lower surfaces of these projections are of curved outline, a cross-section thereof being in the form of an ellipse, as shown more clearly in Figs. 3 and 4. I may 70 reverse the grate-bars at pleasure, thus greatly prolonging their existence. Apertures $f f'$ extend vertically through the projections b' , whereby the air-space is increased. Passages g extend laterally from the tubular portions b 75 of the grate-bars into the apertures $f f'$. By this means air, steam, or other gases within the tubular portions b is afforded a free distribution to the fuel, which greatly aids combustion. 80

The grate-bars B', forming the end bars of the grate, are provided with obtuse angular projections b' upon one of their sides only, the projections upon the other sides being, as shown, of rectangular form, so that the grate 85 may fit evenly in a rectangular fire-chamber.

I may, if desirable, employ the form of grate-bars illustrated in Figs. 5 and 6, in which case the projection b' will be made hollow, and communicate directly with the tubular portions b . 90 Passages open from the hollow projections into the spaces between them, by which the air, steam, or gas, may be distributed. In this example of my improvement I prefer to make one surface of the projections flat and the other 95 curved, as shown more clearly in Fig. 6. I may then have either surface uppermost, as desired.

I do not limit myself to the particular form of the projections b' shown, nor to the identical 100 means employed for moving the grate-bars bodily toward and from each other, as the same may be varied without departing from the spirit of my invention.

What I claim as my invention, and desire to 105 secure by Letters Patent, is—

1. In a grate, the combination, with bearing-bars, of sliding bearing-pieces supported upon said bearing-bars and rocking grate-bars journaled in the sliding bearing-pieces, substantially as specified. 110

2. In a grate, the combination of the bearing-bars A, the grate-bars B B' B², bearing-pieces C, shaft c, arm d, links E F, and levers G G' G^2 , connected to said links, substantially as 115 specified.

3. In a grate-bar, the combination of bearing-bars comprising a tubular portion extending throughout their length and laterally-projecting portions of elliptical outline in the 120 cross-section, passages extending from said tubular portions into said projecting portions, and passages from the interior of said elliptical portions to the external atmosphere, substantially as specified.

JEREMIAH MURPHY.

Witnesses:

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DANIEL H. DRISCOLL.