

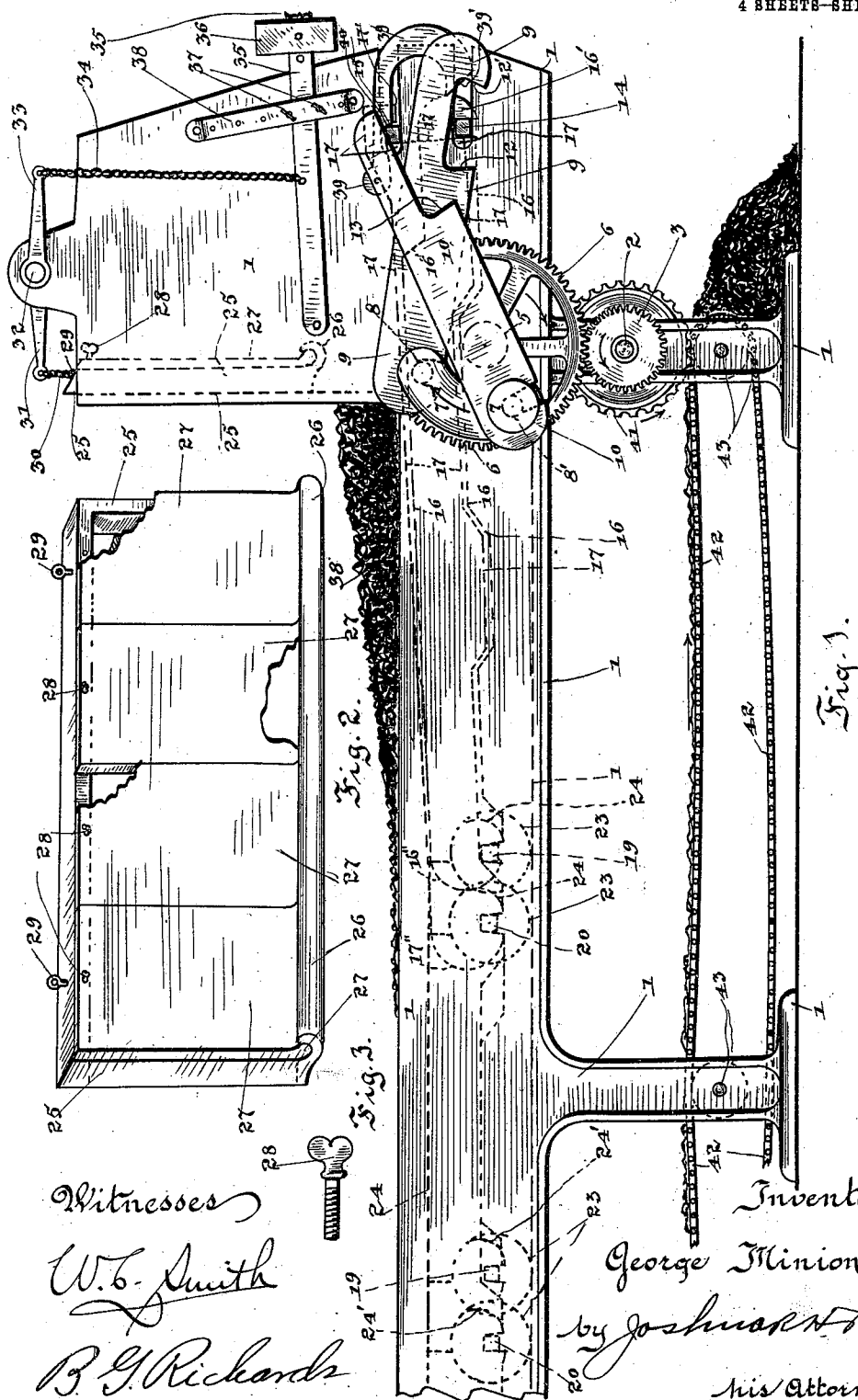
G. MINION.
FURNACE GRATE.

APPLICATION FILED JUNE 8, 1910.

979,783.

Patented Dec. 27, 1910.

4 SHEETS-SHEET 1.



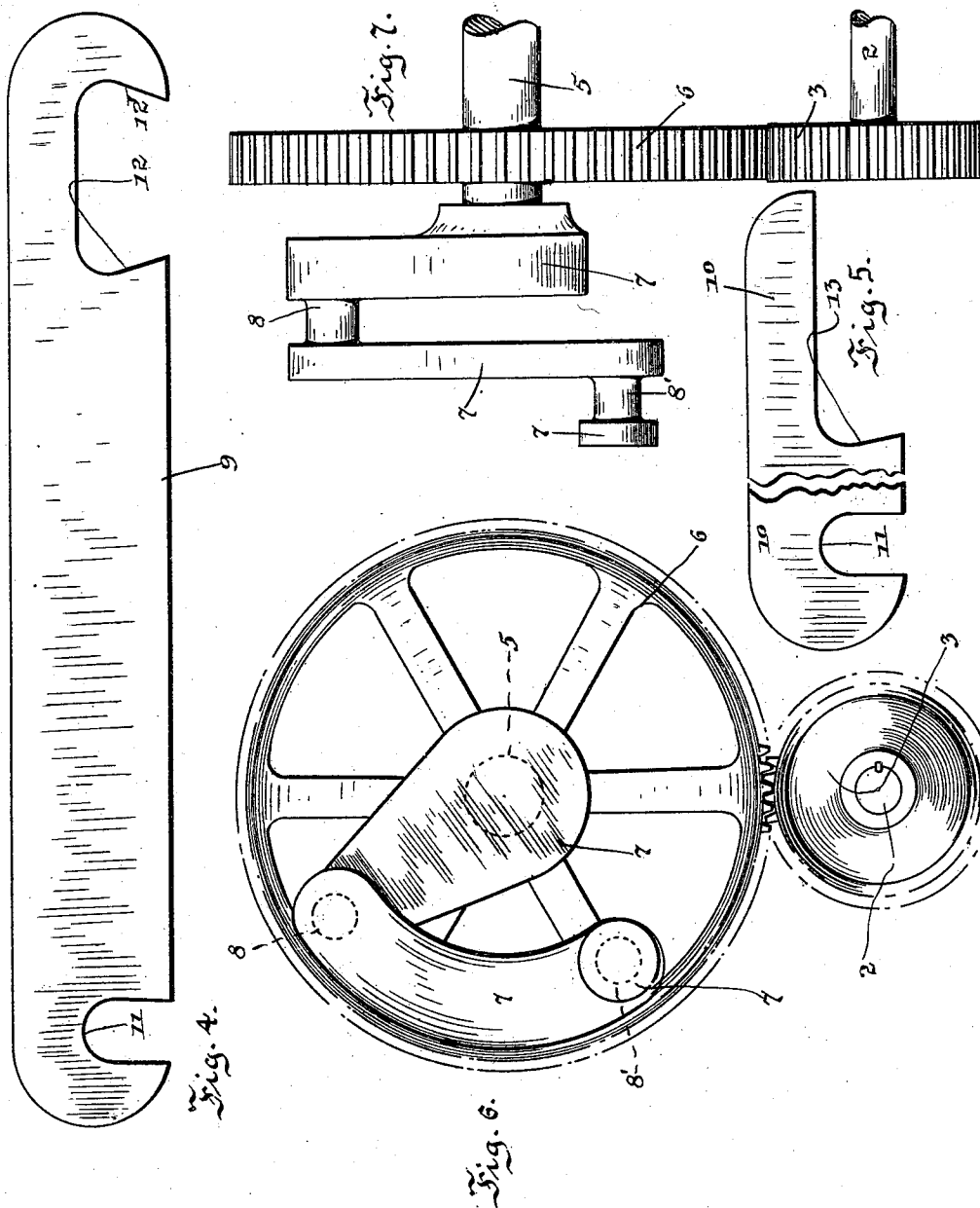
Witnesses
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Inventor
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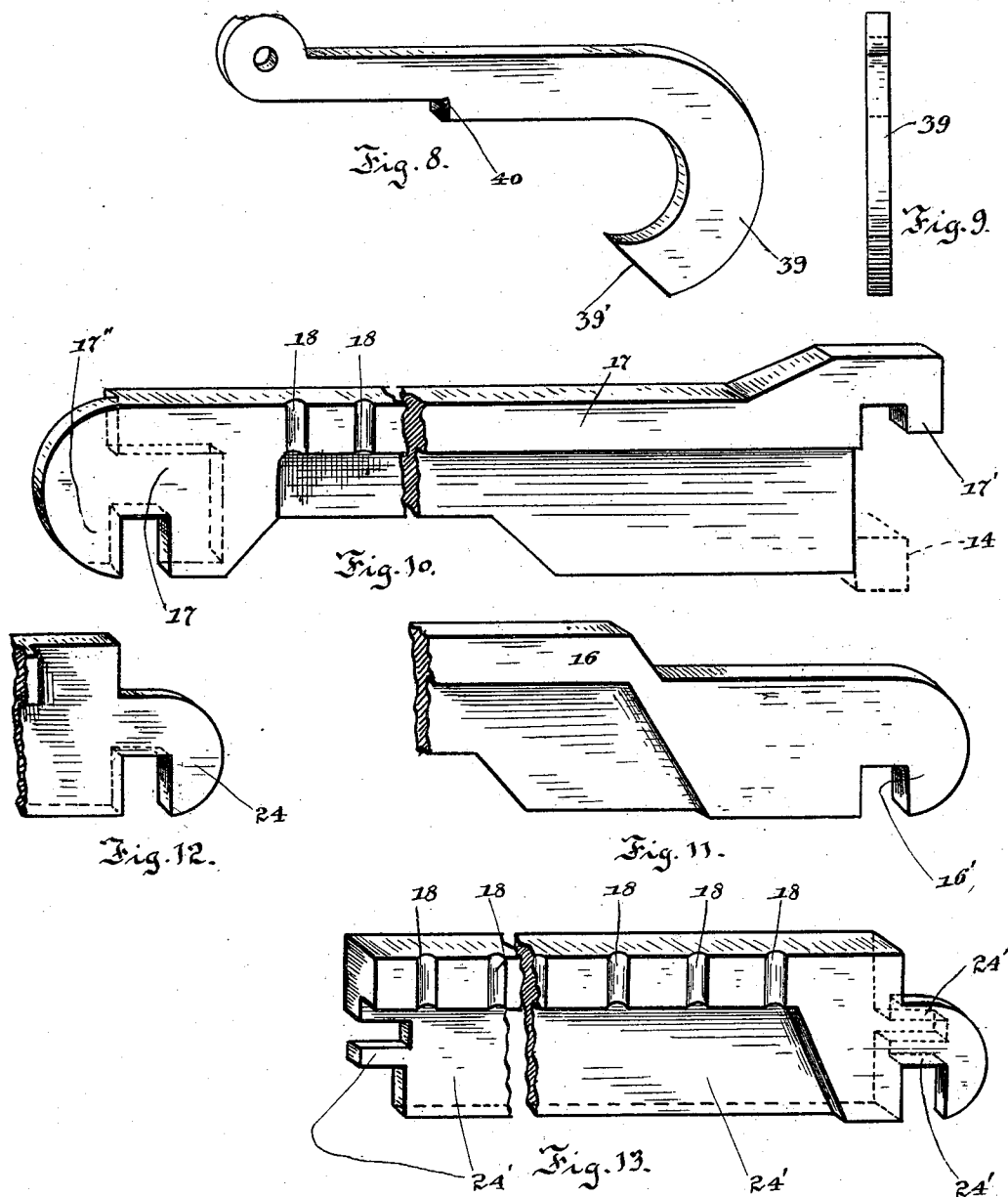
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4 SHEETS—SHEET 3.



Witnesses
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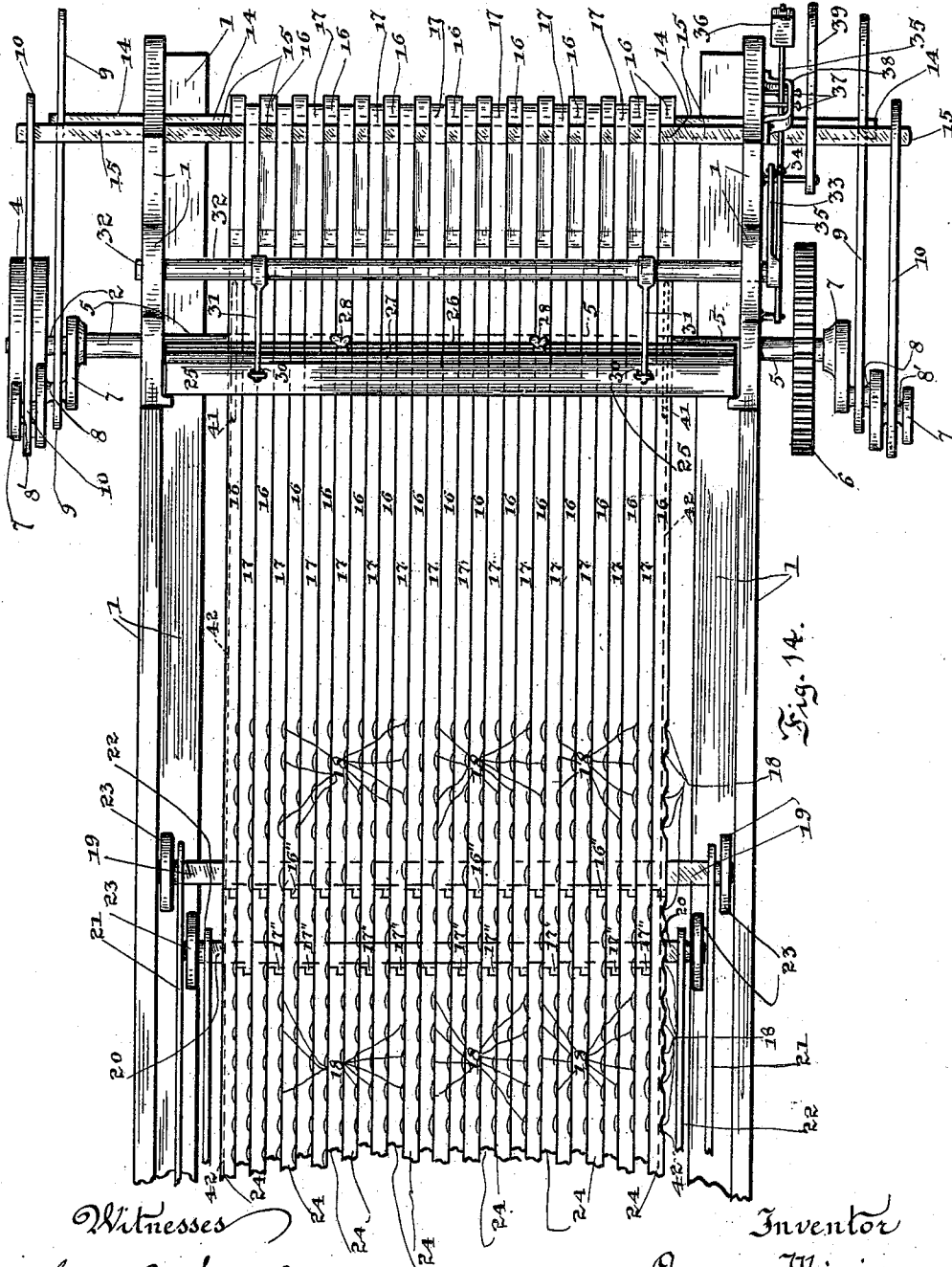
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4 SHEETS—SHEET 4.



Witnesses
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UNITED STATES PATENT OFFICE.

GEORGE MINION, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-FIFTH TO JAMES BELLE, ONE-FIFTH TO CHARLES H. SCHEUER, ONE-FIFTH TO ERNEST H. MILLER, AND ONE-FIFTH TO JOHN ROBERTSON, ALL OF CHICAGO, ILLINOIS.

FURNACE-GRATE.

979,783.

Specification of Letters Patent.

Patented Dec. 27, 1910.

Application filed June 8, 1910. Serial No. 565,772.

To all whom it may concern:

Be it known that I, GEORGE MINION, a citizen of the United States, residing at Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Furnace-Grates, of which the following is a specification.

My invention relates to improvements in furnace grates and more particularly to the class ordinarily used in connection with steam-boilers.

The object of my invention is the production of a grate of the character mentioned which shall feed fuel in such a manner that the same shall be thoroughly consumed, consequently producing a minimum of smoke.

A further object of my invention is to provide an automatic feed grate which shall be simple of construction, inexpensive to manufacture, strong and durable, and efficient in operation.

Other objects will appear hereinafter.

With these objects in view my invention consists in the novel construction and arrangement of parts which will be hereinafter fully described and more particularly pointed out in the appended claims.

My invention will be more readily understood by reference to the accompanying drawings forming a part of this specification, and in which—

Figure 1 is a side elevation of my improved grate in its preferred form, Fig. 2 is a detail perspective view showing a fuel-feed regulating gate employed in connection with the grate, Fig. 3 is a detail side elevation of a screw employed in said gate, Figs. 4 and 5 are detail side elevations showing connecting-rods employed to transmit motion to the grate, Figs. 6 and 7 are respectively a side and front elevation of the main driving mechanism, Fig. 8 is a detail perspective view, Fig. 9 is a detail front elevation, Figs. 10, 11, 12 and 13 are detail perspective views showing the construction and manner of interlocking the grate bars, and Fig. 14 is a top plan view.

The preferred form of my invention as illustrated in the accompanying drawings comprises a main frame 1 in which a transversely disposed shaft 2 is journaled. This shaft carries a driving spur gear 3 at one end and a pulley 4 at the other, the latter being shown in Fig. 14. Disposed above

the shaft 2 and arranged parallel therewith is a shaft 5 which carries a spur gear 6, driven by the spur gear 3 and two-throw cranks 7 provided at either end thereof. The cranks 7 have crank pins 8 and 8' disposed at ninety degrees to each other as clearly shown in detail in Figs. 6 and 7, the connecting rods 9 being adapted to engage the former and the connecting rods 10 the latter pins by means of recesses 11 formed therein. Each connecting rod 9 is provided with a recess having a thrust shoulder 12 and a draw shoulder 12', and each connecting rod 10 with a thrust shoulder 13. The connecting rods 9 are adapted to actuate the transversely arranged rod 14, and the connecting rods 10 the rod 15, the latter being arranged above the rod 14 as shown in Figs. 1 and 14. Grate bars 16 and 17 are provided with hooks 16' and 17' respectively as shown in detail in Figs. 10 and 11. Said hooks are adapted to engage respectively the rods 14 and 15, by means of which the grate bars are reciprocated longitudinally. Each grate bar 17 is provided with a hook 17'' at the end thereof opposite the hook 17' and with lateral recesses 18 which are provided to admit air to the burning fuel supported by the grate bars, thus permitting the necessary draft. Ashes and cinders may fall through the recesses 18 on to a chain conveyor which will be described hereinafter.

Each grate bar 16 is provided with a hook 16'' similar to hook 17'', as shown in Fig. 14 and indicated by dotted lines in Fig. 1. The hooks 16'' and 17'' engage respectively bars 19 and 20 which are members of grate-bar supporting carriages having independent longitudinal movement. Each carriage of which the bars 19 are members have side distance-rods 21 and each carriage of which the bars 20 are members have side distance-rods 22, said bars serving as axles which carry at their extremities small wheels or trucks 23 which travel on inwardly extending flanges of the main frame 1 as clearly shown in Fig. 14. Only a portion of each distance-rod 21 and 22 is shown, but it is understood that they serve to effect rigid connection of all the parts 19 and 20 respectively. The series of grate bars 24 are adapted to interlock with the bars 16 and 17 and to engage the bars 19 and 20 as indicated by dotted lines in Fig. 1. The next

series of bars 24', as indicated by dotted lines in Fig. 1, are similar to the bars 24 except that they are not formed to interlock with the bars 16 and 17, the construction being such that they may be arranged in alinement with interlocking ends.

The fuel feed regulating gate 25 comprises a substantially rectangular frame having a longitudinal flange 26 at the lower edge thereof which is adapted to retain the lower edges of removable tile-bricks 27, thumb-screws 28 tapped into said frame being provided to lay said tile-bricks in position. A tile-brick 27 when damaged by heat or otherwise may be readily removed and a new one inserted in its place. In order to adjust the height of the gate 25 to regulate the amount of fuel passing thereunder, eyelets 29, adapted to receive the hoisting chains 30 are provided, the latter being connected to arms 31 projecting from the shaft 32. The shaft 32 is journaled in the main frame 1 as shown in Figs. 1 and 14 and is provided at one end with an arm 33 to which is connected a chain 34, the lower end of which connects with a lever 35 carrying an adjustable weight 36. The position of the lever 35 determines the height of the gate 25, and in order to vary the position thereof, removable retaining pins 37 are provided which are adapted to engage perforations of a loop 38 secured to the main frame as shown in Figs. 1 and 14.

The operation of the grate is as follows: In general the operation consists in bringing the grate-bars 16 and 17 a stroke to the left simultaneously, and in returning the same alternately. The first movement will obviously carry the fuel 38' a certain distance to the left, and it has been found that the latter alternate movements will not return the fuel, consequently if these movements are repeated in proper succession the fuel will be moved intermittently to the left, thus feeding the fire. The mechanism of which the connecting rods 9 and 10 are members produces the above named movements as follows: Suppose the crank pins 8 and 8' carrying the connecting rods 9 and 10 respectively are rotating as indicated by arrows in Fig. 1, then the thrust shoulders 12 will engage the rod 14 and cause the same to move in the guide slots provided therefor to the front end of the main frame 1, in other words to make its return stroke which moves the grate-bars 16 to the right. Just before the end of this return stroke of the connecting rods 9 the cam surface 39' of the curved lever 39 will contact with the rod 14. This will cause the lever 39 to rise and to throw out of engagement the stop 40 with the rod 15 which stop restrains the grate-bars 17 from returning with the grate-bars 16. The rod 15 is now free to make its return stroke which will be effected when the thrust shoulders 13 contact therewith. After the latter

movement, the rods 14 and 15 are simultaneously moved to the left, the former by contact with the draw shoulder 12' and the latter by rod 14 through the medium of the grate-bars 17, corners of which engage the rod 14 as shown in Fig. 1 and by dotted lines in Fig. 10. The entire mass of fuel supported by the grate-bars is moved to the left simultaneously with this latter movement of the rods 14 and 15 and the grate-bars connected thereto. Thus an intermittent feeding of the fuel is effected, the amount of which is regulated by the gate 25 as aforesaid.

In order to convey ashes and cinders which fall from the grate-bars to the front of the grate and to deposit the same as shown in Fig. 1, chain sprockets 41 are mounted on shaft 2 and a chain conveyer 42 meshing with said sprockets is provided, said conveyer being adapted to travel over idler rollers 43 which are journaled in the main frame 1.

While I have shown what I deem to be the preferable form of my improved furnace grate I do not wish to be limited thereto as there might be various changes made in the details of construction and arrangement of parts described without departing from the spirit of the invention, and hence I desire to avail myself of such variations and modifications as will fairly fall within the scope of the appended claims.

Having described my invention what I claim as new and desire to secure by Letters Patent is:

1. A device of the class described comprising a main frame, two series of alternately arranged grate-bars mounted to reciprocate longitudinally in said main frame, transversely disposed reciprocable bars connected with each series of grate-bars, projections on one series of grate-bars set in the path of the reciprocable bar of the other series, means for causing alternate movement of said reciprocable bars in a rearward direction, and means for causing return movement of said projection engaging bar, substantially as described.

2. A device of the class described comprising a main frame, two series of alternately arranged grate-bars mounted to reciprocate longitudinally in said main frame, a single acting transversely disposed reciprocable bar connected with one of said series of grate-bars, a double acting transversely disposed reciprocable bar connected with the other series of grate-bars, projections on the grate-bars connected with said single acting bar and lying in the path of the other reciprocable bar, means for causing alternate movement of said reciprocable bars in a rearward direction, means for causing return movement of said double acting bar, and a latch connection for said single act-

ing bar arranged to hold the same stationary during the independent movement of the other bar, substantially as described.

3. A device of the class described comprising a main frame, two series of alternately arranged grate-bars mounted to reciprocate longitudinally in said main frame, a single acting transversely disposed reciprocable bar connected with one of said series of grate-bars, a double acting transversely disposed reciprocable bar connected with the other series of grate-bars, projections on the grate-bars connected with said single acting bar and lying in the path of the other reciprocable bar, means for causing alternate movement of said reciprocable bars in a rearward direction, means for causing return movement of said double acting bar, a latch pivoted to said main frame and engaging said single acting bar to hold the same stationary during the independent movement of the other bar, and a releasing cam projection of said latch arranged to contact with said double acting bar at the

end of its independent movement to release said latch, substantially as described.

4. A device of the class described comprising a main frame, two series of alternately arranged grate-bars adapted to reciprocate longitudinally on said frame, a transversely disposed rod connected to one of said series of grate-bars and a similar rod connected to the other, said rods being adapted to reciprocate with the grate-bars to which they are connected, connecting rods having shoulders adapted to contact with and actuate said rods, and means for imparting motion to said connecting rods comprising a power-driven two-throw crank and crank pins of which are set at ninety degrees to each other, substantially as described.

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

GEORGE MINION.

Witnesses:

HELEN F. LILLIS,
JANET E. HOGAN.