

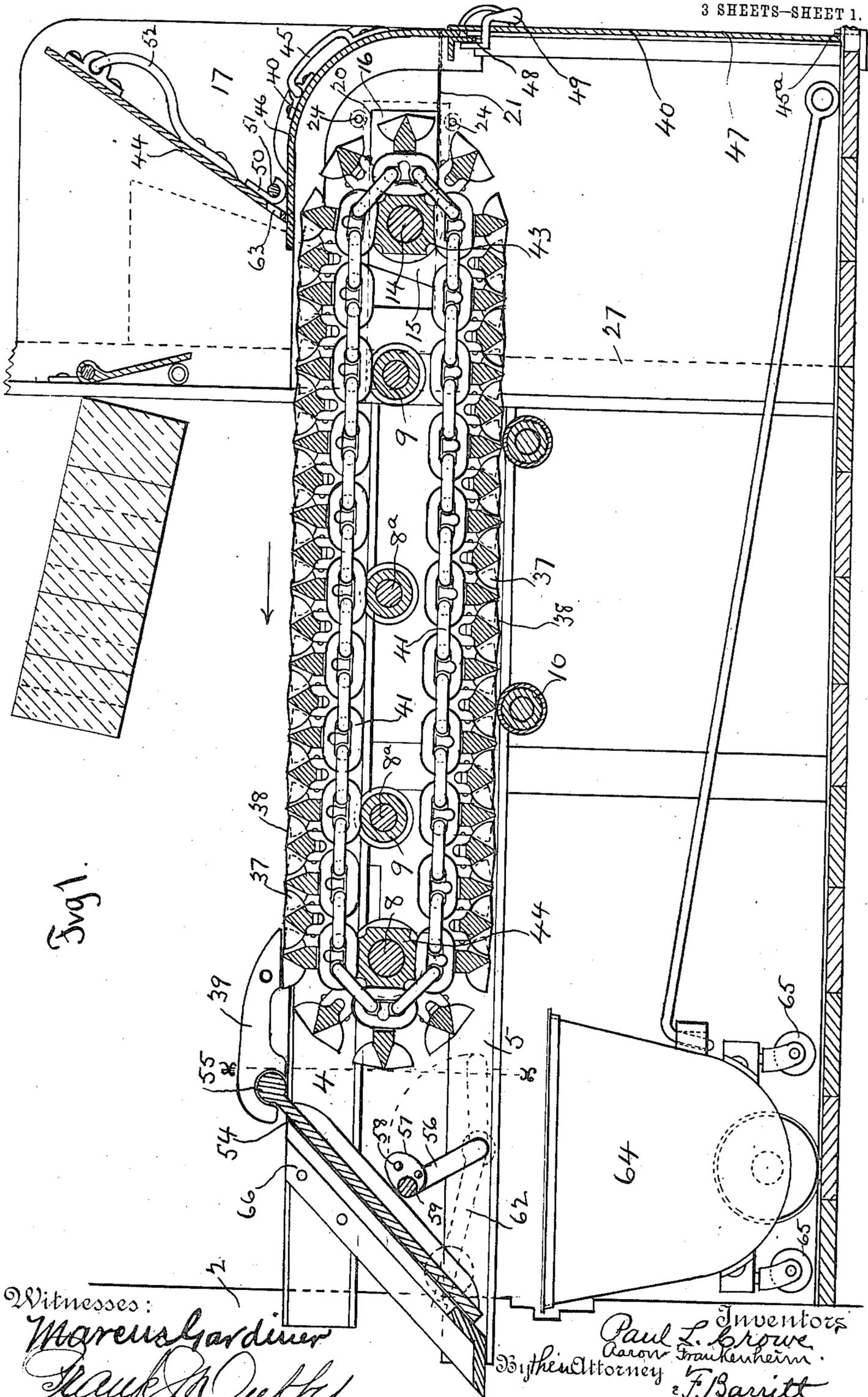
P. L. CROWE & A. FRANKENHEIM.  
STOKER MECHANISM.

APPLICATION FILED FEB. 21, 1908.

984,077.

Patented Feb. 14, 1911.

3 SHEETS—SHEET 1.



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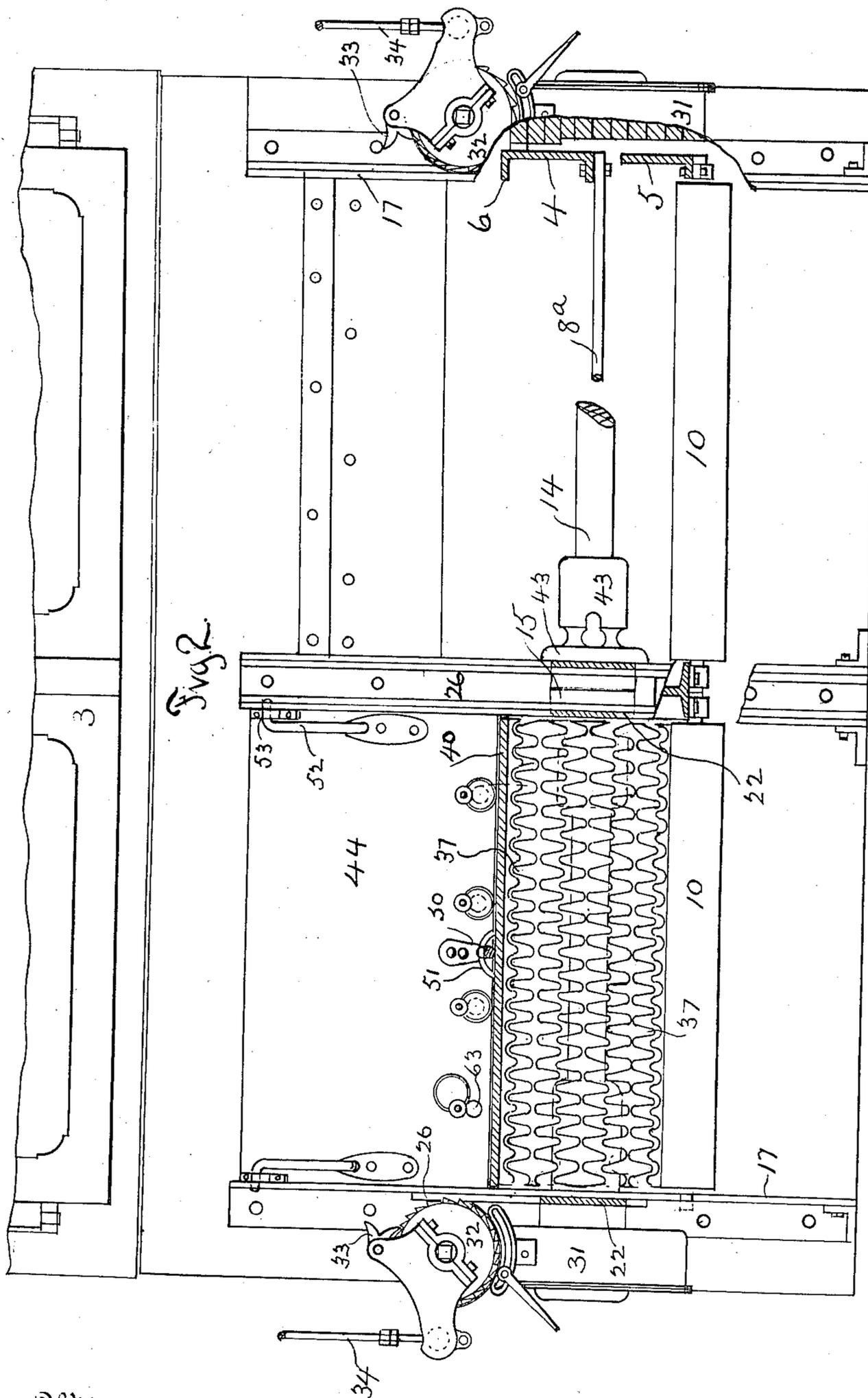
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3 SHEETS-SHEET 2.



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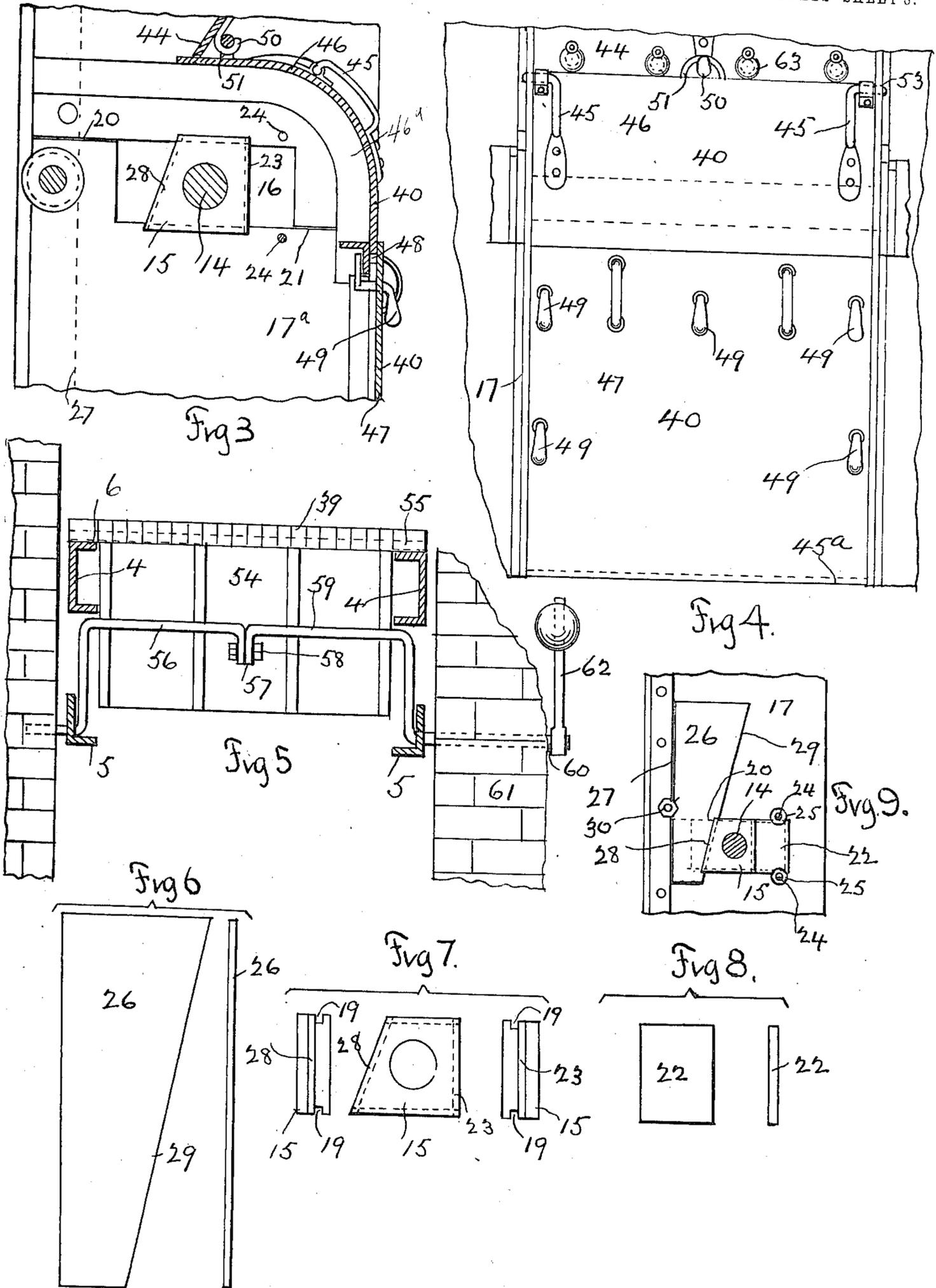
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3 SHEETS—SHEET 3.



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# UNITED STATES PATENT OFFICE.

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## STOKER MECHANISM.

984,077.

Specification of Letters Patent.

Patented Feb. 14, 1911.

Application filed February 21, 1908. Serial No. 416,965.

*To all whom it may concern:*

Be it known that we, PAUL L. CROWE, a resident of Jersey City, county of Hudson, and State of New Jersey, and AARON FRANKENHEIM, a resident of New York, county of New York, and State of New York, citizens of the United States, have invented certain new and useful Improvements in Stoker Mechanism, of which the following is a specification.

This invention relates to mechanical stokers, and the object is to provide the endless chain grate construction of this class of stokers with new and useful improvements which will make the stoker more efficient.

Referring to the drawings: Figure 1 is an enlarged sectional elevation of the furnace showing the chain grate and its adjustable bearings and also the dump plate and ash cart. Fig. 2 is a front elevation of a twin furnace showing in one half the endless chain grate, the hopper-plate and the hood or apron, and in the other half the front of the furnace removed to show the internal mechanism including offset in the furnace wall. Fig. 3 is a detached side view of part of the housing and hopper end plate showing the slotted portion between the housing and end plate upon and in which bearing of the sprocket wheel shaft is mounted and showing the curved portion of the hood in section. Fig. 4 is a front view of the stoker showing the apron and hopper plate on the front thereof. Fig. 5 is a section on line *x x*, Fig. 1, looking in direction of arrow and showing the dump plate, and the operating rod thereof. Fig. 6 is a side and end view, respectively, of the wedge. Fig. 7 is a side and end view, respectively, of one of the bearings. Fig. 8 is a side and end view, respectively, of the shutter. Fig. 9 is a side view of part of the hopper end plate showing the wedge and the sliding bearing.

The furnace consists of a bridge wall 2, and of a boiler, all of which may be of any construction.

Between the front of the furnace and the bridge wall are mounted the upper channel irons 4 and the lower angle irons 5. The channel irons 4 have their parallel sides extending inwardly so as to permit the air to more freely circulate at the ends of the grate bars contiguous to said channel irons. The channel irons are positioned adjacent to the side walls, the upper edges of which are

located slightly higher than the offsets in the side walls, thus forming a slight depression between the channel and the wall, which fills with ashes and tends to keep the walls cooler than they otherwise would be. The angle irons 5 are so placed that one side of the irons extends inward and the other side extends upward from the first named side. The dump plate actuating rod passes through the upwardly extending sides of the angle irons and when the plate is allowed to dump the actuating rod may be brought to rest upon the inwardly extending sides of the angle irons, thereby preventing the interfering of the rod with the ash cart. The channel and angle irons are each supported at their front ends by the front wall of the furnace by any suitable means, at their rear ends, in the bridge wall of the furnace, and intermediately as shown. The channel irons 4 support the rear shafts 8 and the cross rods 8<sup>a</sup> upon which the grooved wheels 9 revolve. The angle irons 5 support the rods forming the bearings of the lower rollers 10.

The sprocket wheel shaft 14 is supported in the adjustable bearings 15, which rest and slide in the apertures or slots 16 formed between the hopper end plates 17 and the housing. This housing has an angled rear portion extending up to the upper portion of the hopper end plates. This extended portion 27 is formed for receiving the rear portion of the end plates 17 so that the said plates may rest directly over and in line with the housing. The extended portion 27 also permits the housing being securely fastened to the front of the furnace. At the rear of the aperture or slot 16 the housing extends upward the full width of said slot (see 20, Fig. 3). Upon this rear extension the rear portion of the hopper end plates rest, and are firmly bolted to the upper portion of the angled extension of the housing. The lower edge of the end plates forms the upper portion of the slot, and the front portions of the end plates extend downward the width of the said slot or aperture 16, and continues farther downward on the inside of the housing to a point below the lower edge of the slot 21, to permit of the end plate and housing being firmly secured together.

To permit the bearings to slide easily in the slots 16 they are each provided with top

and bottom grooves 19 (see Fig. 7). In order to keep the apertures or slots 16 closed and permit the adjustment of the bearings 15, sliding shutters 22 are placed 5 outside of the casings and in front of the bearings, which are each provided with the additional grooves 23 for receiving the said shutters. The shutters are each supported in place by the studs 24 mounted on each 10 side of the casing. Over these studs are placed the tightening nut 25 for fixedly holding the shutters in place on casing when desired.

The bearings are each adjusted in the slots 15 by wedges 26 placed on the outside of casing between the said bearing and the rear angled portion 27 of the furnace. That portion of each of the bearings against which the wedges act have cut in them a groove 20 28 which is on an angle corresponding with the slant of the wedges. Thus by raising and lowering the wedges the bearings may be proportionally moved inward or outward or set inward or outward. To prevent the wedges from accidentally moving so 25 as to disturb the position of the bearings when the stoker is operating, we secure said wedges in position by the nuts 30 on studs supported in the rear angled portion of 30 the housings.

One end of the sprocket wheel shaft 14 passes into the gear box 31 supported on the outside of the furnace, and that portion of the shaft within the box is mounted with 35 a worm wheel (not shown). The gear box supports the bearings of the ratchet wheel shaft, said shaft having a worm pinion meshing with worm wheel on sprocket shaft (said worm and pinion not shown). 40 The ratchet wheel 32 is revolved by a pawl 33 suitably connected to the rod 34 of the eccentric and power mechanism. The movement of the eccentric will thus be felt upon the sprocket shaft and also upon the end- 45 less traveling grate.

The grate bars 37 in cross section are each formed with beveled fuel surfaces 38 (see Fig. 1) which assists or facilitates the said grate bars passing under the lap bars 39 50 of the bridge, because the said lap bars will when resting upon the fuel surface of the grate bars only touch the central raised portion of the grate bar, leaving the lower edge of the bevel portion of the bar away 55 from the nose of the lap bars which nose would obstruct the travel of the grate should the said grate bars have no bevel fuel surfaces. Another object in beveling the grate bars in cross section, is that the said bars 60 are facilitated in passing beneath the apron 40 positioned in front of the stoking mechanism. There is still another object and that is that it is a better protection to the bar teeth by the ashes lying upon the teeth 65 and between the teeth of the contiguous

bars. The bars are mounted on the links 41 of the endless chain, all of which moves in the direction of the arrow, Fig. 1, over the sprocket wheel 43 on shaft 14 and also 70 over the grooved wheels 44 on the rear shaft 8. As the chain grate travels in the direction of arrow, inward, it is supported by the idlers 9 but when it returns or travels outward it is supported by the rollers 10 75 (see Fig. 1).

The wear and tear upon the chain grate will in time cause a small amount of slack to same. This slack is taken up by the sliding bearing 15 by first unloosening the wedges and shutters, so that the said wedges 80 may be driven down, which will move the bearings sufficiently to take up the aforementioned slack. When the wedges are satisfactorily adjusted to take up the slack the wedges and shutters are again set and 85 tightened.

That portion of the grate surface located under the hopper plate 44<sup>a</sup> and stoker front is covered by an apron or hood 40 which serves to prevent the air escaping when a 90 force draft is used. This apron is divided in two parts 46—47. The upper portion 46 is made curved to conform itself to the shape of the stoker. This curved portion rests at 95 each end, upon a curved strip mounted on the hopper end plates (see 46<sup>a</sup>, Fig. 3.) This curved portion 46 of the hood is first inserted into a groove 48 formed at the junction of the housing and hopper end plates. It is then positioned between and attached 100 to the hopper end plates by the spring handles or draw bolts 45 and rests upon said strip 46<sup>a</sup>. The lower half 47 of the casing or hood is positioned upon the lower angle iron 45<sup>a</sup> and then locked against the curved 105 upper half 46 by the lever locks 49. The hopper plate 44 is then positioned above the curved portion 46 of the hopper 40 by passing the hook on said plate into the eye 51 on the portion 46. Then by raising the 110 said plate to its normal position (see Fig. 1) where the spring handles 52 on the plate will instantly latch themselves into the apertures 53 formed in the hopper end plates. There may be more than one hook 50 and 115 eye 51 if the width of the furnace requires it. The hook 50 and eye 51 support the apron at intermediate points and keep it from sagging upon the grate bars and close 120 the joints between apron and bar to prevent the air escaping.

At the rear of the furnace is mounted the dump plate 54 pivotally mounted on the channel irons 4, and suitably secured thereon. This dump plate acts against the dump 125 plate frame 66, which is secured at the upper end to the said channel irons 4 (see Fig. 1) and at the lower end to the angle irons 5, in the inclined position as shown in Fig. 1. The dump plate frame is provided with 130

heavy end pieces which are adapted to the inner portion of the channel irons and protect the same from the severe effects of the heat, between the ends of the frame and at its lowest portion it has a flange which is supported in the bridge wall of the furnace and forms an opening to allow the ashes to fall through when the dump plate is opened. This dump plate frame serves to connect the channel and angle irons together at the rear of the furnace.

Over the rounded portion of the dump plate fulcrumly resting upon the top of the channel irons, are placed a plurality of lap bars 39, which are each provided at their rear portions with a circular cavity which fits loosely over the rounded portion of the dump plate to allow said bars to freely move on same, and also allow dump plate to freely turn on the lap bars. The forward ends of said lap bars rest upon the fuel surface of the grate bars (see Fig. 1).

The dump plate 54 is kept closed by the divided rod 56, the halves held together at their inner ends by bolt 58 passing through flanges 57 of each half. From the uniting point each half of the rod 56 is carried on a straight line 59 along the dump plate (see Fig. 1) and outside said plate the straight portions are bent downward on a right angle to the angle irons 5, where they are again bent outward at a right angle and pass through said angle irons 5 on a straight line parallel with straight portion 59, one end of which passing through the side walls 61 of the furnace where it is made square at the end to receive the weighted lever arm 62. The hopper plate 44 at or near the lower edge is provided with one or more apertures 63, which are each covered, on the outside, with swinging lids. The apertures are used to insert a steel stirring bar—not shown.

To facilitate the removal of the ashes or the refuse as it falls from the dump plate a two-wheeled ash cart 64 is employed, which is applied to the ash pit, and is provided with wheels made to follow the raised or a grooved portion of the floor of said pit. The cart is mounted with casters 65 to insure its erect position and is wheeled in and out of the pit by an operating rod which is long enough for the operator to handle outside the furnace.

What we claim is:

1. The combination of a furnace, a chain grate mounted to operate in said furnace and having the front end portion extending outside the said furnace, said chain grate provided with stationary bearings at its rear end and movable bearings at its front end, an air excluding casing inclosing the front projecting portion of said chain grate, said casing provided with slots for the reception of the said movable bearings and in which

said bearings may be adjusted, wedges interposed between said furnace and said movable bearings, said bearing and wedges serving to close the slot, and means for feeding fuel on the grate.

2. The combination of a furnace, a chain grate mounted to operate in said furnace and having its front end portion extending outside the furnace, the chain grate provided with stationary bearings at its rear end and movable bearings at its front end, an air excluding casing inclosing the front projecting portion of the chain grate and provided with slots for the reception of the said movable bearings, said casing consisting of divided end plates, a front plate and a detachable hood, means for securing the hood in place, wedges interposed between said furnace and bearings, said wedges serving to adjust said bearings in said slots, and also to close said slots, means for locking said wedges and means for feeding fuel to the grate.

3. The combination of a furnace, a chain grate mounted to operate in said furnace and having the front end portion extending outside the furnace, the chain grate provided with stationary bearings at its rear end and movable bearings at its front end, an air excluding casing inclosing the front projecting portion of the chain grate, said casing comprising end plates, said end plates being divided, said division forming a slot for the reception of the said movable bearings in which said bearings may be adjusted, wedges interposed between said furnace and movable bearings, means for locking said wedges, shutters mounted on said casing in front of said bearings, serving to close said slots, means for holding said shutters in place, and means for feeding fuel to the grate.

4. The combination of a furnace, channel irons located along the side walls of said furnace, angle irons located along the side walls of said furnace below the said channel irons, a dump plate frame located between and mounted on said channel and angle irons, said frame serving to rigidly secure the said irons together at the rear, a dump plate pivotally mounted on said channel irons, and acting against said dump plate frame, a dump plate operating rod, the horizontal portion of said rod which acts against said dump plate being divided, means for securing the halves of said rod together, said straight portions of said rod being bent downward at their outer ends, said vertical portion being pivoted on the said angle irons, the end of one of the pivoted members being extended through the side wall of said furnace, a weighted lever arm mounted on the extended portion of said extension of said rod.

5. A chain grate comprising a frame, said

frame being formed with side bars each comprising an upper channel iron with the parallel sides thereof extending inwardly of said frame and a lower angle iron with one side extending inwardly of the frame, a plurality of grate bars adapted to move at the upper grate run between the channel irons and at the lower grate run between the angle irons, said grate bars each formed with sloping fuel surfaces in cross section representing an inverted V, said surface sloping from an intermediate point downward to the sides of the bar, lap bars pivotally mounted on said upper channel irons, the front end of said lap bars resting on the highest central portion of the sloping fuel surfaces of said grate bars, the sloping portion permitting said grate bars to travel safely under said lap bars at the upper run.

6. The combination of a furnace, channel irons located alongside the walls of said furnace, angle irons located alongside the walls of said furnace below said channel irons, a dump plate frame mounted on said channel and angle irons, for rigidly securing together said irons, a dump plate pivoted on said channel irons and acting against said frame, a dump plate operating rod pivoted in the angle irons, said rod being so bent and formed that when in its inoperative position it is supported by the flange of the angle iron, permitting the dumping of ashes into a suitable ash receptacle.

7. The combination of a furnace, a chain grate mounted to operate in said furnace and having its front end portion extending outside said furnace, an air excluding casing inclosing said outside extending portion, said chain grate provided with stationary bearings at the rear end and movable bearings at its front end, said air excluding casing provided with a detachable hood, a hopper plate, said hopper plate having stirring bar apertures along its lower edge whereby a stirrer may be inserted for agitating the fuel on the grate surface.

8. The combination of a furnace, a bridge wall in said furnace, a chain grate mounted to operate in said furnace and having the front end portion extending outside the said furnace, an air excluding casing inclosing said outside extending portion, said chain grate provided with a frame comprising side bars, said side bars located along the side walls of said furnace, a dump plate frame located between and mounted on said side bars, said dump plate frame serving to rigidly secure the said side bars together at their rear end, said dump plate frame and said side bars having their support in the said bridge wall of the furnace, said side bars having their opposite ends supported by the front wall of the furnace.

9. The combination of a furnace, comprising side walls, front and rear walls, said side walls having offsets therein, a chain grate mounted to operate in said furnace and having the front end portion extending outside the said furnace, a stationary frame mounted permanently in said furnace, side bars comprising said framing, said side bars running along the side walls of said furnace and running short of the outside extending portion of the chain grate, and secured to the inside of the front wall of said furnace, said side bars of said framing positioned adjacent said offsets in side walls, the upper edge of said side bars located slightly above the upper edge of said offsets.

10. The combination of a furnace, a bridge wall in said furnace, a chain grate mounted to operate in said furnace and having the front end portion extending outside the said furnace, an air excluding casing inclosing said furnace, said chain grate comprising a grate frame of side bars consisting of channel irons supporting the upper grate run, and angle irons supporting the lower grate run, and spaced apart at the rear by a dump plate frame, and at the front by the front wall, the parallel sides of the irons extending inwardly of the frame adjacent to the side walls, said grate frame having its front end supported by the front wall, its rear end by said bridge wall, and means for immediately supporting said grate frame, a dump plate supported by said grate frame and adapted to rest against said dump plate frame when in closed position, and an operating rod for the dump plate pivoted in the lower side angle irons, said operating rod being so bent and formed that when in its inoperative position it is supported by the flange of the angle irons and permitting with the dump plate an unobstructed compartment for the use of an ash receptacle below them.

Signed at New York in the county of New York and State of New York this 19th day of February A. D. 1908.

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