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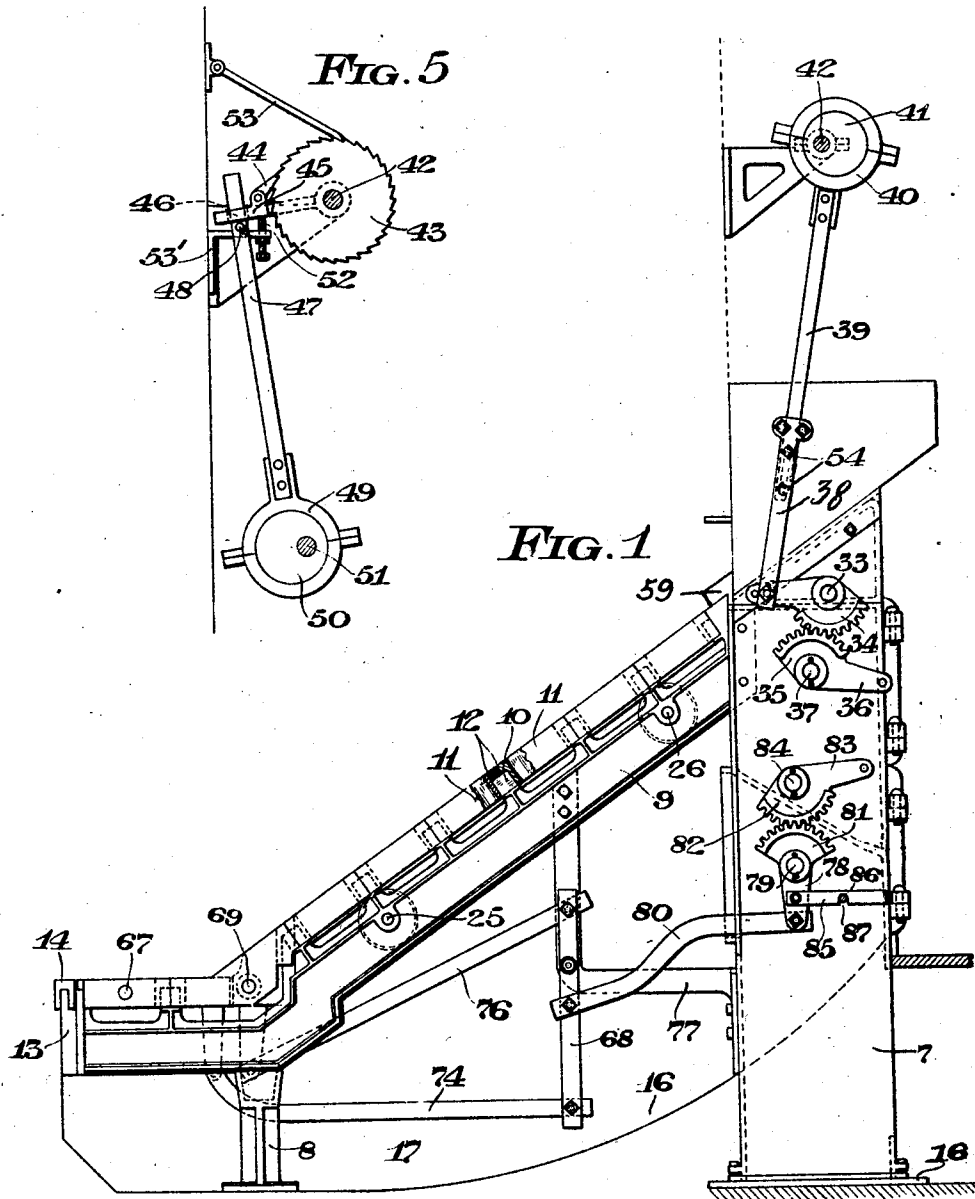
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J. A. PACKARD

MECHANICAL STOKER

Filed Jan. 24, 1921

4 Sheets-Sheet 1.



WITNESSES

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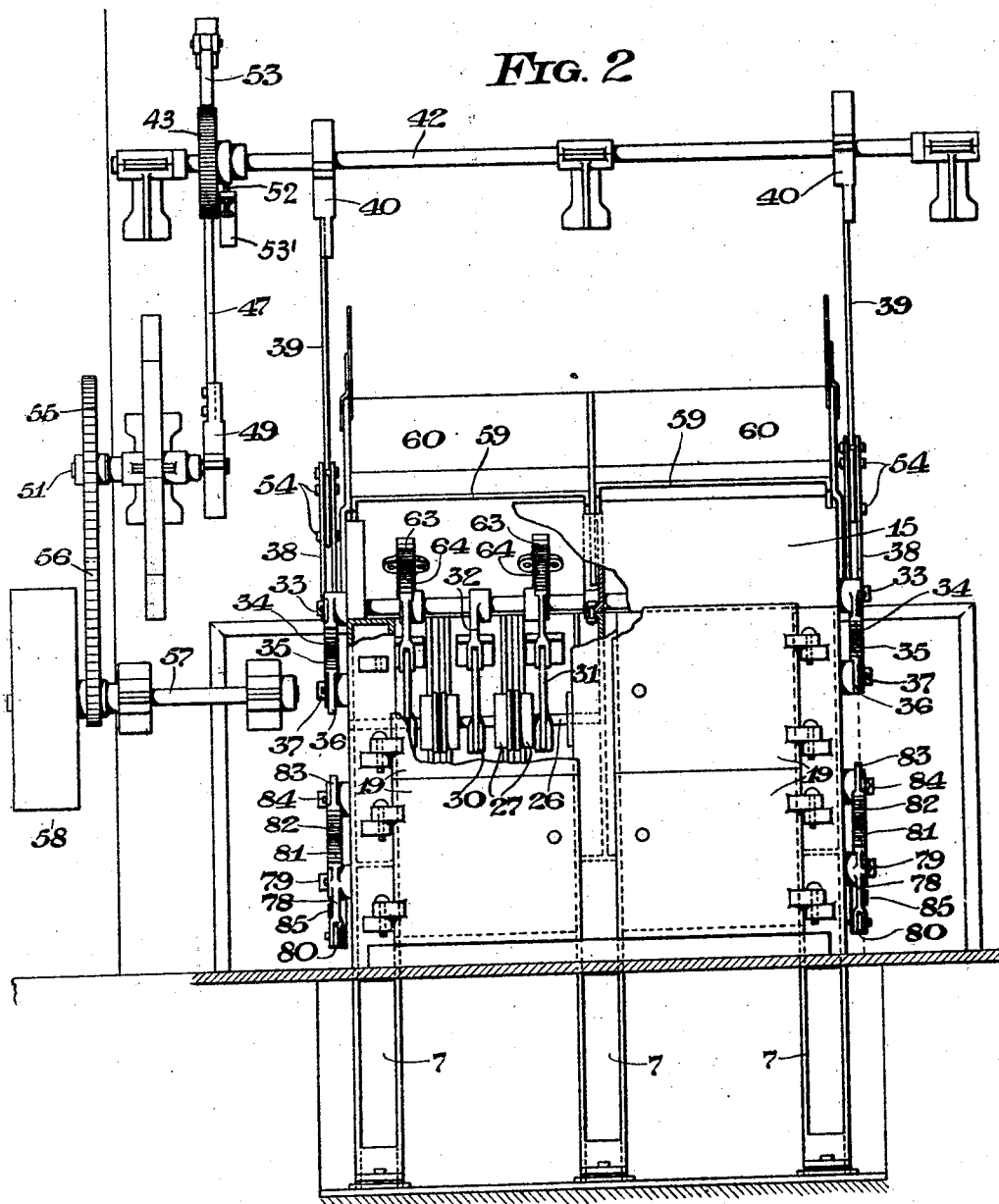
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FIG. 2



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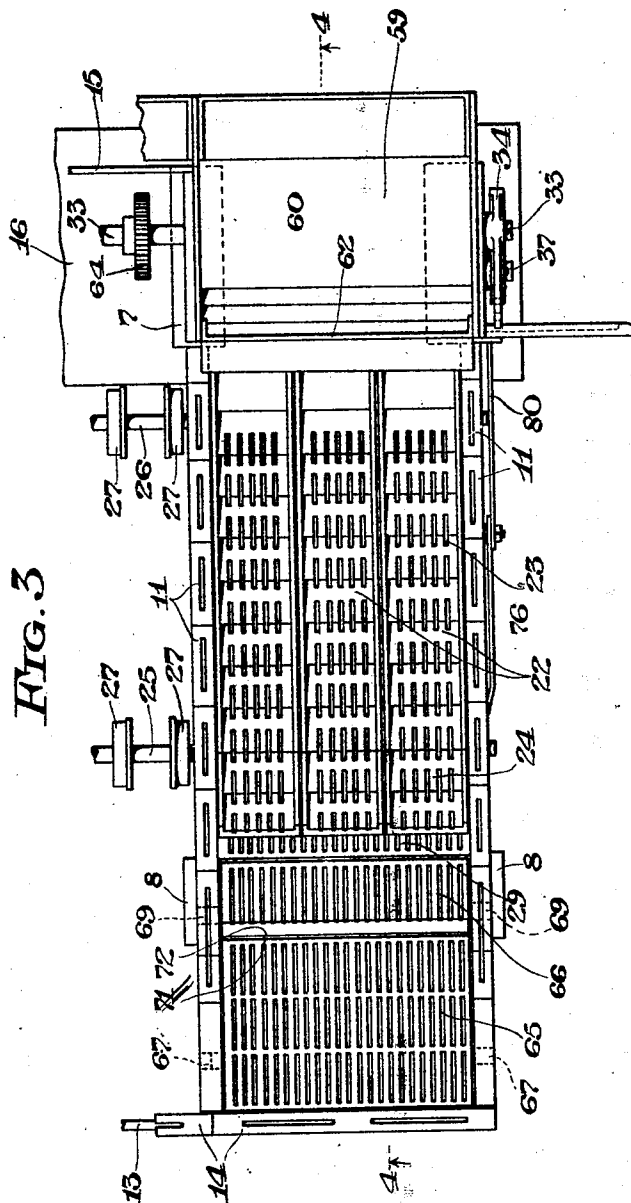
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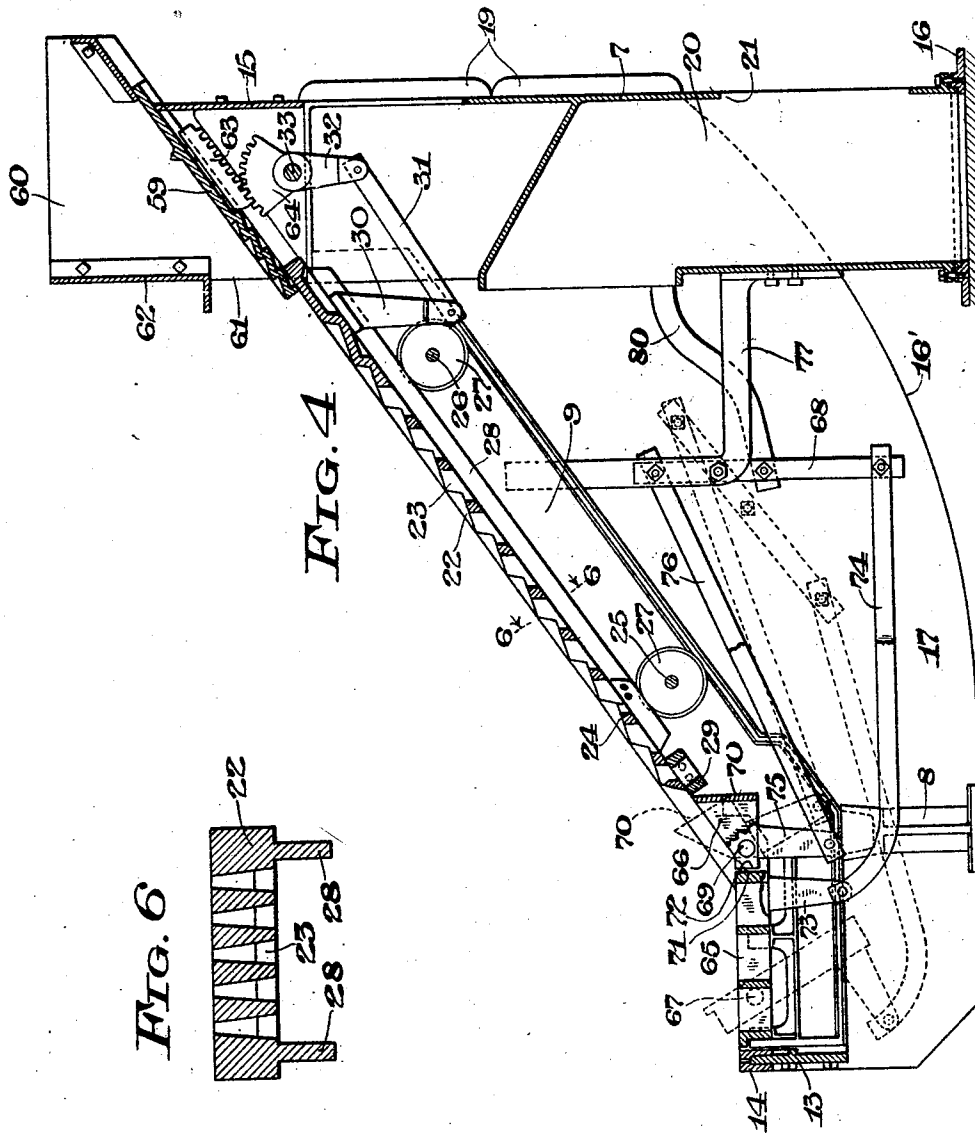


FIG. 6

FIG. 4

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UNITED STATES PATENT OFFICE.

JAMES A. PACKARD, OF MILWAUKEE, WISCONSIN, ASSIGNOR TO PACKARD STOKER CORPORATION OF AMERICA, OF MILWAUKEE, WISCONSIN, A CORPORATION OF WISCONSIN.

MECHANICAL STOKER.

Application filed January 24, 1921. Serial No. 439,598.

To all whom it may concern:

Be it known that I, JAMES A. PACKARD, a citizen of the United States, and resident of Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented new and useful Improvements in Mechanical Stokers, of which the following is a description, reference being had to the accompanying drawings, which are a part of this specification.

10 The invention relates to mechanical stokers, more particularly for boilers and having inclined grates over which the fuel passes during the process of combustion.

One of the important objects of this invention is the gradual downward feed of the coal upon the grate bars without turning the burning fuel.

A further object of the invention is to provide feed slides moving in an opposite direction from that of the grates and overlapping the upper portion of the grates to advance the material onto and along the grates.

A further object of the invention is to provide mechanism for discharging the ash into the ash pit and to prevent the coke on the lower ends of the moving grates from falling into the ash pit.

A further object is to provide for ready renewal of those parts of the grate which may need replacement.

A further object of the invention is to provide a simple and efficient adjustable driving mechanism for the moving parts.

The invention further consists in the several features hereinafter described and more particularly defined by claims at the conclusion hereof.

In the drawings: Fig. 1 is a side elevation of a stoker embodying the invention, part of the driving mechanism being removed; Fig. 2 is a front end view of the stoker, parts being broken away; Fig. 3 is a plan view of one-half of the stoker; Fig. 4 is a section taken on the line 4—4 of Fig. 3; Fig. 5 is a detail view of the drive mechanism; Fig. 6 is a section through one of the grate bars on line 6—6 of Fig. 4.

The frame of the stoker comprises front columns 7, rear columns 8 and inclined side frame members 9 supported by these columns. The frame members 9 are provided with upstanding spaced lugs 10 forming

supports for hollow metal blocks 11 provided with recesses 12 to receive the lugs and forming a siding for the grates. A transverse frame member 13 connects the lower ends of the members 9 together and has hollow lining blocks 14 mounted thereon in a manner similar to the mounting of the blocks 11 on the lugs 10. A front plate 15 connects the columns 7 together. A bottom plate 16 forms the floor of the ash pit 17. The lining blocks may be readily renewed, if necessary.

A pair of doors 19 are hingedly connected to each of the end columns 7 and extend over to the center column and are adapted to be opened to provide a natural draft. Where such draft is not sufficient for the proper combustion of the fuel the hollow columns 7 form conduits 20 which may be connected at their lower ends 21 to a forced draft supply (not shown).

The grates are arranged between the end and middle side frame members 9, one set of grates being shown in Fig. 3. Each set of grates includes an inclined reciprocating grate consisting of a plurality of grate bars 22 of step formation, having slots 23 extending through the steps and tapered, as shown in Fig. 6, to form narrow openings at the top so as to prevent the fuel falling through. The lower ends 24 of these grate bars are formed separately from the remainder and are bolted to the main portions of said bars so that said ends may be readily renewed if they burn out.

Transversely disposed shafts 25 and 26 are secured to the frame members 9 and carry a plurality of sets of rollers 27 upon which the depending flanges 28 of each grate bar ride as said bars are reciprocated upon the inclined supporting frame. The lower ends of the movable grate bars 22 slide upon a fixed slotted grate bar 29.

Each grate bar 22 has a depending arm 30 connected by a link 31 with a crank arm 32 upon a rock shaft 33. By this connection the grate bars 22 are moved up and down on the rollers 27, this movement aiding in gradually feeding the fuel in a burning condition from one step to another down the inclined grate bars.

The shaft 33 carries a segmental gear 34

meshing with a similar gear 35 on a crank arm 36 mounted on a short shaft 37. The arm 36 is adapted to be moved by a pipe lever or other suitable bar applied thereto for hand movement in case of breakdown or shut down of the power drive. The power drive includes an adjustable two-part connecting rod 38, 39 connected to an eccentric strap 40 on an eccentric 41 carried by a shaft 42 which is given a step by step rotation through a ratchet feed, shown in Fig. 5. This feed includes a ratchet wheel 43 on the shaft 42, a feed pawl 44 mounted on an arm 45 loosely mounted at one end upon the shaft 42 and having a slot 46, an eccentric rod 47 passing through said slot 46 and provided with a pin 48 engageable with said arm 45 to move the pawl, an eccentric strap 49 to which said rod 47 is connected, and an eccentric 50 mounted upon a driven shaft 51. An adjustable stop 52 on a stationary bracket 53 limits the lowermost movement of the arm 45 and consequently the stroke thereof imparted to it from the loose rod 47 so that the pawl 44 turns the shaft 42 through a greater or less angle for each revolution of the shaft 51, a retaining pawl 53 engaging the ratchet. The part 39 of the two-part connecting rod above referred to is slotted and bolts 54 on the part 38 pass through the slot. By removing the lower bolt 54 the drive from the shaft 42 is disconnected as the parts 38 and 39 of the eccentric arm are then free to move relatively to each other. The shaft 51 carries a gear 55 meshing with a gear 56 upon a shaft 57 carrying a pulley 58 adapted to be connected by belt to any suitable prime mover.

For each set of inclined movable grate bars 22 forming a single inclined grate a feed slide 59 is provided. These slides form the bottom of a feed hopper 60 for each set of grate bars, a discharge opening 61 being provided between each slide and the rear wall 62 of each hopper. Each slide overlaps at the forward portion the set of inclined movable grate bars with which it cooperates and is slidable over the upper ends of said bars and provided with racks 63 meshing with segmental gears 64 on some of the arms 32. The relation between the feed slide and the set of inclined movable bars with which it cooperates is such that the slide moves down while the bars move up and moves up while the bars move down, with the result that the coal passing through the discharge opening 61 is deposited on the inclined movable grate bars and that already on these grate bars is pushed down along the steps of said bars when the furnace is in operation. Thus successive charges of fuel are advanced along the grates formed by the bars from one step to another, the new charges pushing the older charges

ahead of them down the steps of the bars 22 without turning the fuel. This action keeps the burning fuel in motion as it passes down the grate bars 22 without turning the fuel.

When the fuel reaches the lower ends of the grate bars 22 it is in the form of ash and is dumped into the ash pit by means of dumping ash grates 65 and 66. The grate 65 is pivotally mounted at 67 near its rear end and tips downwardly, as shown in Fig. 4. The grate 66 is pivotally mounted at 69 near its rear end and tips upwardly, as shown in Fig. 4, its front face when in its upper position forming a stop to prevent the fuel on the lower end of the grates 29 and 22 from falling into the ash pit. By a rocking movement of these ash grates from partially open to closed position any clinkers collecting upon them may be crushed between the faces 71 and 72 before being discharged into the ash pit.

To move the dumping grates provided for each side of the furnace an arm 73 on the grate 65 is connected by a link 74 to one end of a lever 68 and an arm 75 on the grate 66 is connected by a link 76 to the other end of said lever 68 which is pivotally mounted intermediate its ends upon a bracket 77. A crank arm 78 on a shaft 79 is connected by a link 80 to the lever 68, said crank arm being provided with a segmental gear 81 meshing with a similar gear 82 upon a crank arm 83 mounted on a shaft 84. The crank arm 83 is adapted to be moved by a pipe lever or other suitable bar applied thereto, the rocking of said lever being transmitted through gears 81 and 82 to the linkage above described to swing the grates 65 and 66 in opposite directions. A latch 85 mounted on the crank arm 78 is provided with a notch 86 receiving a pin 87 on the frame of the stoker to hold the grates in closed position. The dotted line position of the ash grates 65 and 66 in Fig. 4 shows them in dumping position.

I desire it to be understood that this invention is not to be limited to any specific form or arrangement of parts except in so far as such limitations are specified in the claims.

What I claim as my invention is:

1. In a stoker, the combination of an inclined supporting frame, a grate movable up and down said inclined frame, a feed hopper, a feed slide below the hopper and movable up and down on an incline parallel to the line of movement of the grate and overlapping said grate, and means for moving the grate and feed slide in opposite directions.

2. In a stoker, the combination of an inclined supporting frame, a stepped apertured grate movable up and down said inclined frame, a fixed grate over which the

lower end of said stepped grate moves, a feed slide movable parallel to and overlapping the upper end of the stepped grate, means moving the stepped grate and feed
5 slide in opposite directions, and a hopper supplying fuel to said feed slide.

3. In a stoker, the combination of a reciprocating stepped grate disposed on an incline, a feed slide movable on an incline
10 parallel to the line of movement of the grate and overlapping said grate, means for moving the grate and feed slide in opposite directions, and means for supplying fuel to the feed slide.

15 4. In a stoker, the combination of a reciprocating stepped grate disposed on an incline, a feed slide disposed on a similar incline and overlapping said grate, a rock shaft, connections between said grate and
20 shaft and between said slide and shaft for

moving the grate and feed slide in opposite directions, and means for rocking said shaft.

5. In a stoker, the combination of an inclined supporting frame, transverse shafts mounted on said frame at different eleva- 25 tions, rollers mounted on said shafts, a stepped grate bar mounted on said rollers and movable up and down on an incline; a hopper, a feed slide at the bottom of said hopper and overlapping the upper end of 30 said bar, and means for moving said grate bar and feed slide in opposite directions comprising a rack on said feed slide, a rock shaft, a gear on said rock shaft meshing with said rack, an arm on said rock shaft, 35 and a link connecting said arm with said grate bar.

In testimony whereof, I affix my signature.

JAMES A. PACKARD.