A. R. SELDEN.

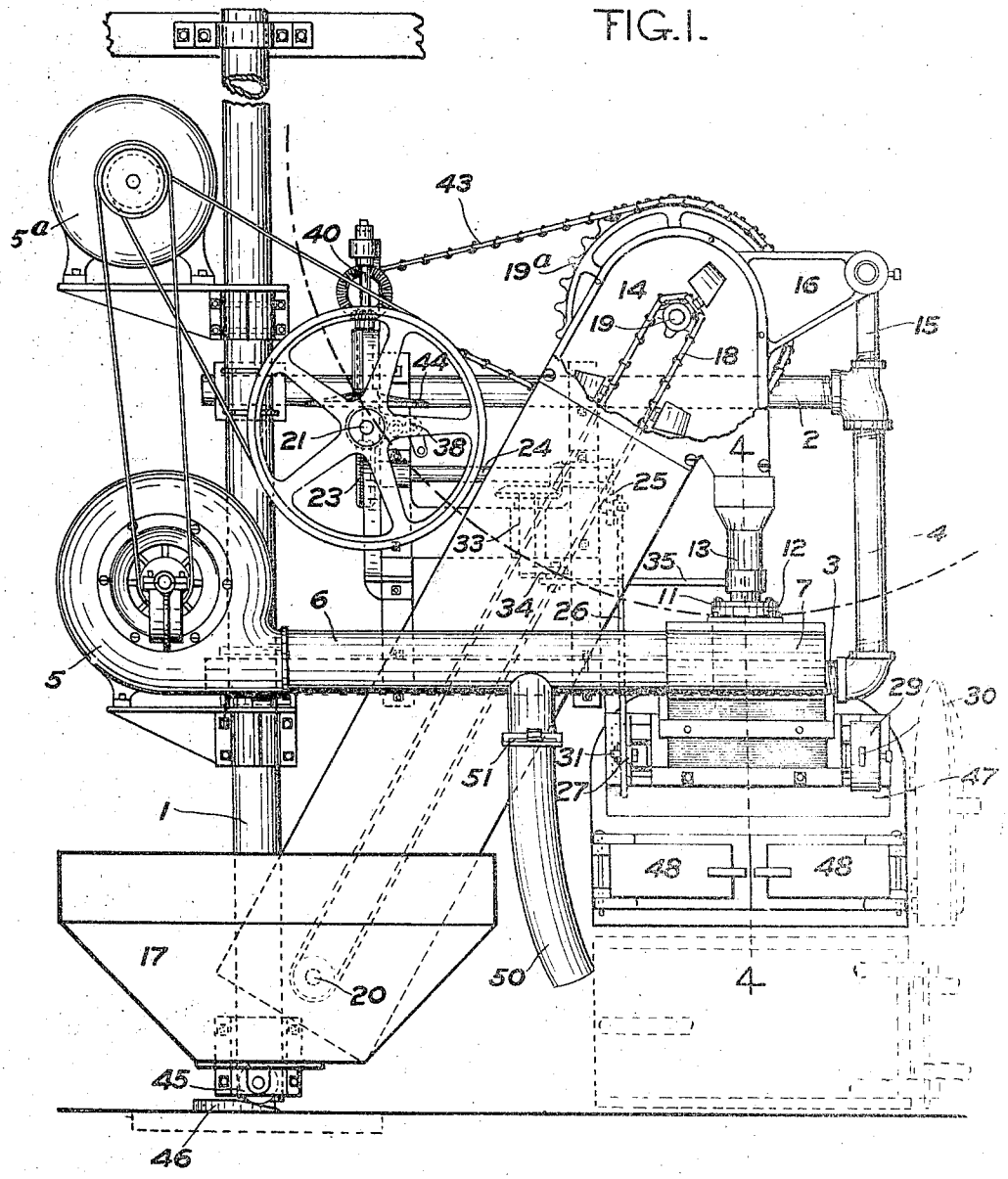
MECHANICAL STOKER.

APPLICATION FILED FEB. 23, 1907.

987,834. Patented Mar. 28, 1911.

6 SHEETS—SHEET 1

FIG. 1.



WITNESSES

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6 SHEETS—SHEET 2.

FIG. 2.

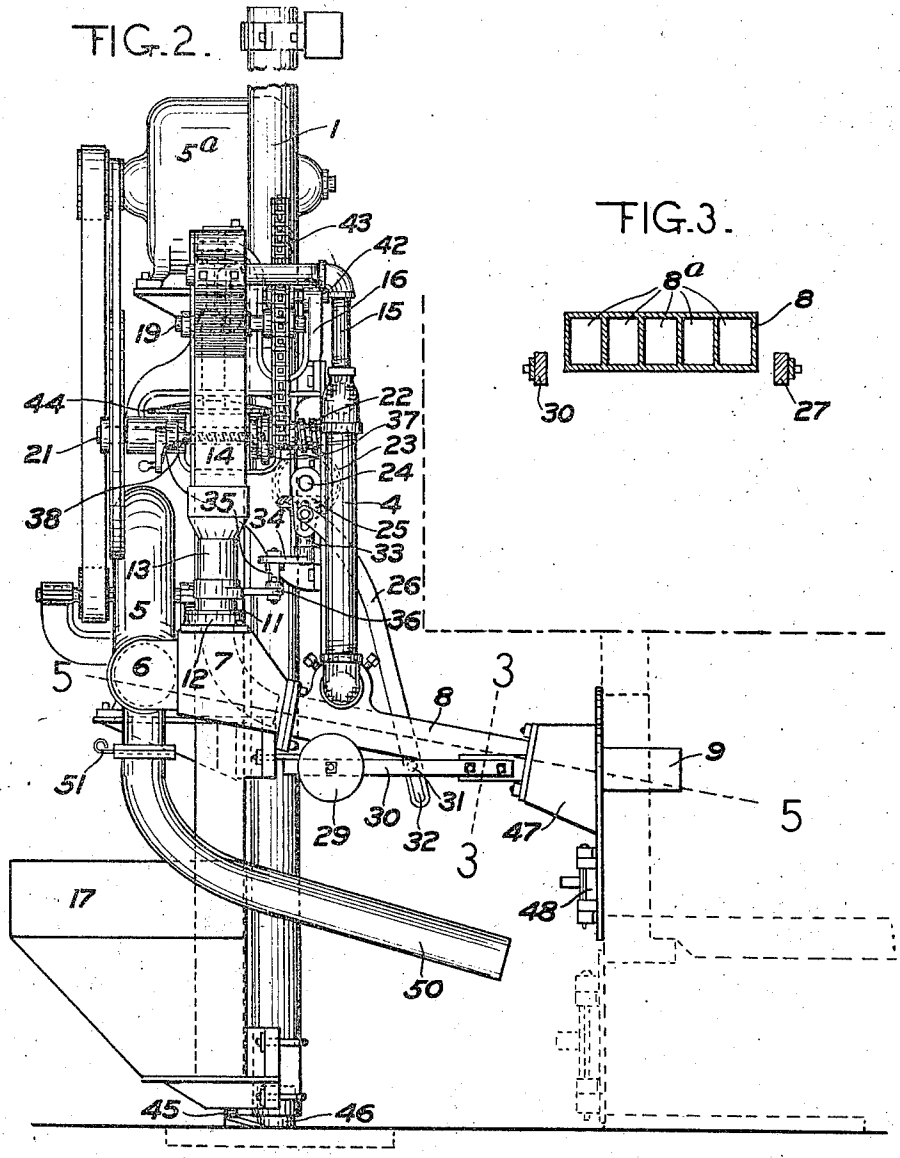

FIG. 3.

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6 SHEETS—SHEET 3.

FIG. 4.

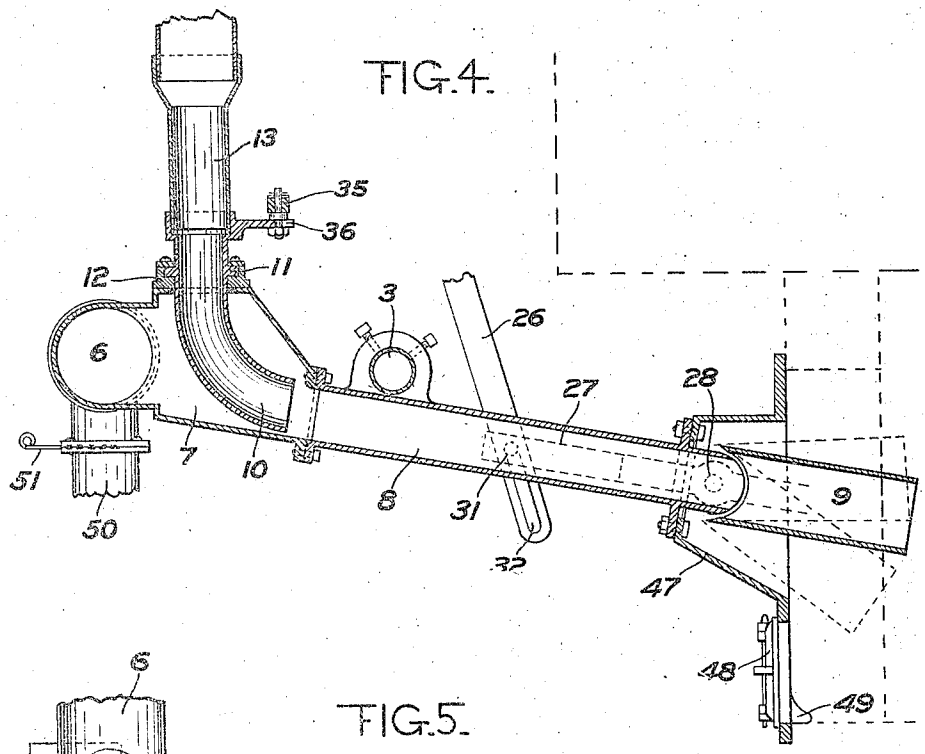
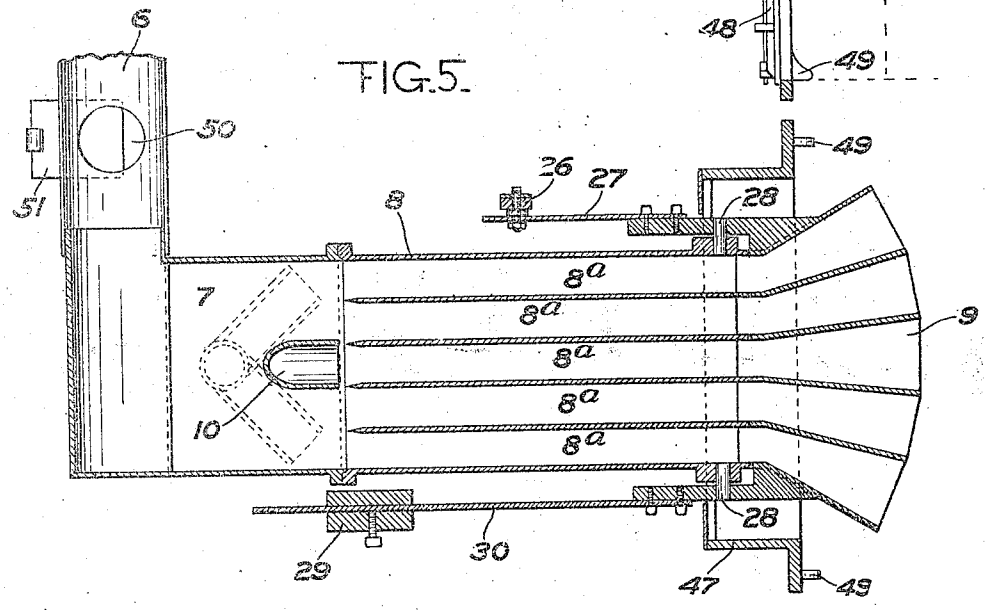


FIG. 5.



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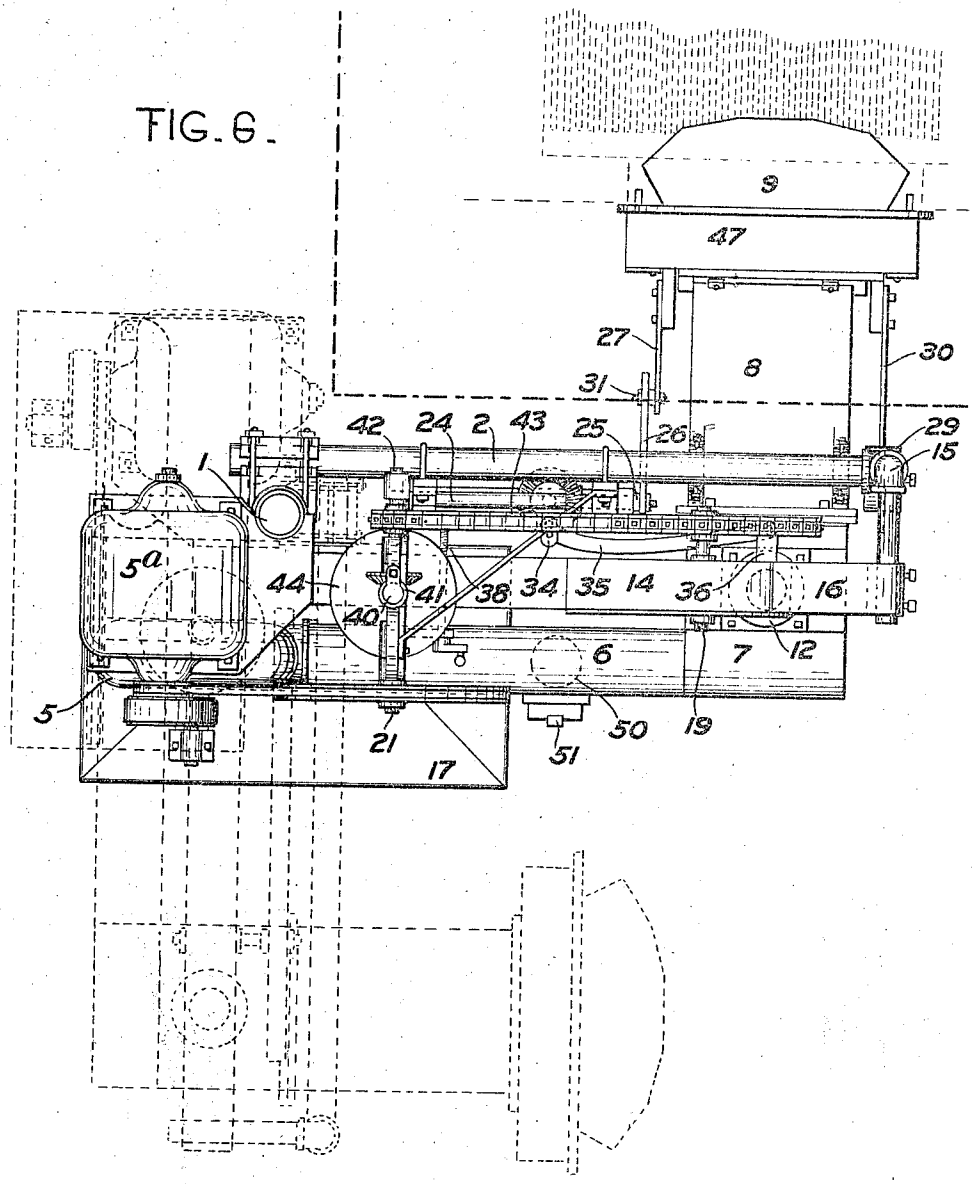
6 SHEETS—SHEET 4.

FIG. 6.



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6 SHEETS—SHEET 5.

FIG. 7.

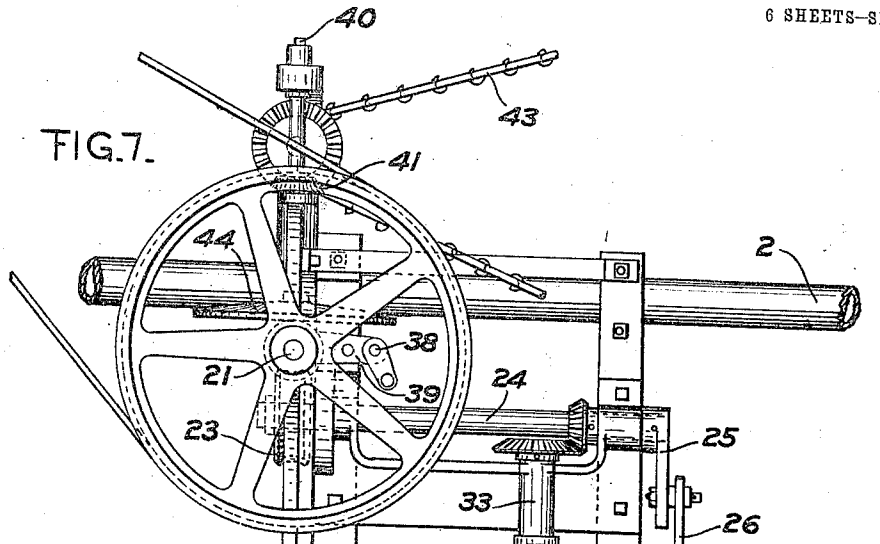
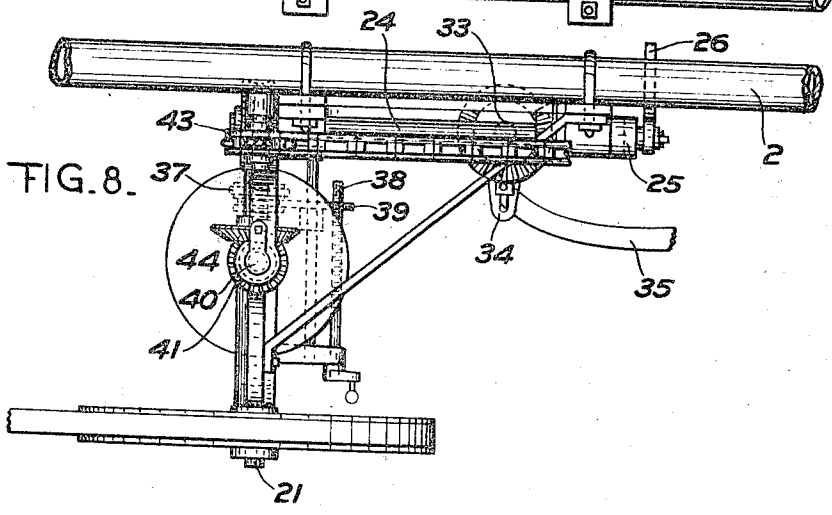


FIG. 8.



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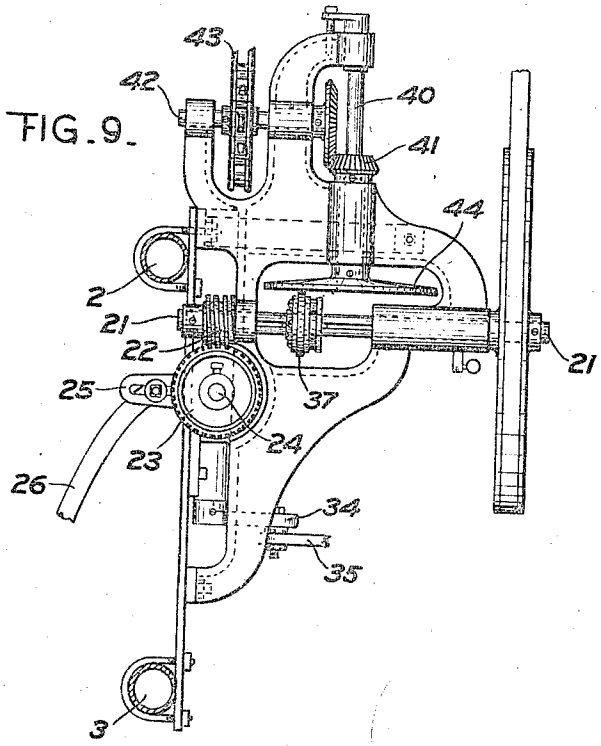
6 SHEETS—SHEET 6.

FIG. 9.



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UNITED STATES PATENT OFFICE.

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MECHANICAL STOKER.

987,834. Specification of Letters Patent. Patented Mar. 28, 1911.

Application filed February 23, 1907. Serial No. 359,000.

To all whom it may concern:

Be it known that I, ARTHUR R. SELDEN, a citizen of the United States, and resident of Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Mechanical Stokers, of which the following is a specification.

This invention relates to mechanical stokers.

The object of the invention is to provide a stoker which will use an inferior grade of coal (usually obtained in powdered form, or finely broken lumps), and which will automatically spread the same evenly over the grates of an ordinary furnace, in small quantities, and at regular intervals.

The device is so constructed that it may be applied to the ordinary type of boiler furnace without changing the grates, or otherwise modifying it, and may be swung back out of the way at any time, and hand firing substituted.

The stoker consists of six main elements, viz: (1) the hopper, in which fuel is placed; (2) an elevator, which carries the fuel in small quantities, and at regular intervals dumps it into a discharge pipe; (3) a chute that delivers the fuel to the discharge spout; (4) an oscillating spout or nozzle which directs the fuel to different parts of the furnace, and so spreads it evenly over the grates; (5) a blower, which delivers a powerful blast of air into said spout with the fuel, thus fulfilling the dual function of assisting in carrying the fuel into the furnace, and supporting its combustion; and (6) a motor to drive the blower, elevator, and other moving parts of the apparatus.

In the drawings:—Figure 1 is a front elevation of the complete apparatus; Fig. 2 is a side elevation looking from the right in Fig. 1; Fig. 3 is a cross-section of the distributing spout on the line 3—3 of Fig. 2; Fig. 4 is a sectional elevation on line 4—4 of Fig. 1; Fig. 5 is a plan view of a section taken on line 5—5 of Fig. 2; Fig. 6 is a plan view of the complete apparatus; Fig. 7 is an enlarged front elevation of a portion of the apparatus; Fig. 8 is a plan view of the same; and Fig. 9 is a left side elevation of the parts shown in Figs. 7 and 8.

The six elements of the machine, named above, which make up its working parts are all supported upon a rectangular frame, which is rigidly attached to a vertical shaft 1, supported in suitable bearings. Accordingly the machine can be swung into position before the furnace, and back out of the way, without disconnecting any of the parts, or otherwise disturbing the driving connections. The rectangular frame is composed of two horizontal members 2 and 3 and a connecting piece 4. These, and also the shaft 1, are represented as constructed of iron pipe, held together by ordinary pipe fittings.

The shaft 1, or its frame, carries a blower 5, arranged to be driven by a motor 5^a, which may also be carried by said shaft, as shown in Fig. 1. The discharge pipe 6 from the blower leads to the side of a box or mixing chamber 7. From the rear of this chamber a flat pipe 8, divided by lengthwise partitions into several passages 8^a (Fig. 5), extends to a spout 9. The passages through said spout are divergent, so that the blast of air from the blower is directed over the whole fire box.

Within the box 7 is a pipe or nozzle 10 (see Fig. 4), supported by a flange 11 on the top 12 of said box. Fuel, preferably coal in small lumps, or in powdered form, is brought down into the nozzle 10 through a pipe 13. Mechanism is arranged to swing the said nozzle back and forth from side to side across the ends of the passages 8^a, and so to deliver the coal to each passage in turn. The nozzle thus constitutes means for conveying fuel from the fuel supply to said passages successively. The pipes 13 and 8 are inclined at an angle that carries the coal into the furnace with the momentum that it acquires as it falls through these pipes. The air blast from the blower 5 assists in carrying the coal into the furnace, discharging it with considerable force. The diverging ends of the spout 9 spread it evenly across the grates, from side to side, while the air is delivered constantly to all of the passages 8^a. Provision is also made for distributing the coal along the grates from front to rear, and this is done by mechanism which rocks the spout 9 in a vertical plane (see dotted lines in Fig. 4), which will presently be described.

The coal may be conducted to the pipe 13 by any suitable means. In the present instance an elevator 14 (see Fig. 1), supported on a pipe 15 and bracket 16, is shown, which extends into a hopper 17 on the floor. The elevator comprises a series of small

buckets on a continuous chain 18, and the latter runs over sprockets on shafts 19 and 20.

The mechanism for oscillating the spout 9 and nozzle 10 is operated from a shaft 21 (see Figs. 7 and 9), which is driven directly by the motor 5^a. Said shaft carries a worm 22, engaging a worm wheel 23 on a transverse shaft 24 (Fig. 9). A crank 25 on the opposite end of this shaft is connected by a pitman 26 with an extension or arm 27 on the spout 9. The latter is usually a single casting, and is pivoted on a pair of horizontal trunnions 28.

As the shaft 24 rotates, the crank 25 and pitman 26 will cause the spout 9 to rock up and down on the trunnions 28 (see Fig. 4). As the inner end of said spout rises, the stream of coal, which is blown through it, will be directed to the rear of the furnace; and when the opposite movement occurs, the coal will fall nearer the front.

A weight 29 (see Fig. 5), intended to nearly counterbalance the spout 9, is adjustably supported by an arm 30 on the opposite side of the spout from the arm 27. The latter is connected to the pitman 26 by a pin 31 resting in a slot 32 in said pitman, the purpose of the slot being to prevent breakage of the parts in case the spout 9 encounters an obstruction while moving downward.

To swing the nozzle 10 from side to side, the following mechanism is provided: A vertical shaft 33 (see Fig. 7), driven by bevel gearing from the shaft 24 and supported in suitable bearings on the frame, has at its lower end a crank 34. A pitman 35 forms a connection to an arm 36 on the top of the nozzle 10 (see Fig. 8). As the shaft 33 revolves, the said nozzle will be swung from side to side, directing the stream of coal to each of the passages 8^a in succession. Both the cranks 34 and 25 may be slotted, so that the pitmen 35 and 26 may be adjusted to give a longer or shorter movement to the nozzle 10 and spout 9, respectively.

In order to vary the proportion of coal and air delivered to the furnace, adjustable means are provided for regulating the speed of the elevator, thus delivering a greater or less quantity of coal with a certain number of cubic feet of air, while maintaining the speed of the blower constant. This elevator regulator comprises the driven shaft 21, a small friction-wheel 37 held thereon by a feather key, and a screw-spindle 38 parallel thereto engages a yoke 39 which rests in a slot in said friction-wheel. Above the shaft 21 is a vertical shaft 40. A bevel gear 41 on its upper end drives a short horizontal shaft 42, from which a chain 43 runs directly to the elevator sprocket 19^a. On the lower end of the shaft 40 is a friction disk 44, resting on the wheel 37, and driven thereby. Upon turning the spindle 38, the wheel 37 will be moved toward or away from the center of the disk 44, and the speed of the elevator will increase and decrease correspondingly as said wheel is moved.

Means for retaining the apparatus in its operative position before the furnace, are also provided. For this purpose a roller 45 is set in a frame at the bottom of the pipe 1 (see Fig. 1), and the whole weight of the entire apparatus is carried thereby when swung away from the furnace front. The roller rests on a floor-plate 46, which has an inclined portion on its upper side. When the roller is on the inclined face, as shown in Fig. 1, the apparatus is held tightly against the furnace-front, and considerable force is required to swing it around on the pipe 1, as in doing so the roller must be pushed up the incline.

The doorway of the furnace is closed by a box frame 47, which is supported upon the multi-passaged pipe 8. The box 47 has a pair of doors 48 that give access to the fire-box, and these have on their inner side lugs 49 which engage the bottom of the door frame and carry part of the weight of the apparatus when in operative position (Fig. 4).

In order to control the quantity of air fed to the furnace, an air pipe 50 (see Figs. 1 and 2) leads from the main air passage 6 to the outer atmosphere, and is located in a position to direct the air into the ash door of the furnace if the latter is left open. This air tube 50 is a shunt to regulate the amount of air passing from the pipe 6 into the multi-passage pipe 8 and thence to the fire chamber 7, and the amount of air shunted into the pipe 50 is regulated by a blast gate 51.

The fact that the top of the elevator, whence the coal falls into the box 7, is located some distance above said box, gives the coal sufficient momentum to carry it well into the furnace even when the minimum air blast is used. Thus, though the air blast contributes toward delivering the coal into the furnace, it is so assisted by the momentum of the coal that the air blast may be varied at pleasure with reference to the air supply for combustion, and without regard to the delivery of the coal.

What I claim is:—

1. In a mechanical stoker, the combination of a vertically-oscillating deflector, divided longitudinally into a plurality of passages for the discharge of fuel into a furnace; means for discharging fuel through said passages successively; and means for oscillating said deflector.

2. In a mechanical stoker, the combination of a vertically-oscillating deflector, divided longitudinally into a plurality of passages for the discharge of fuel into a furnace; a

hopper for a fuel supply; and means for conveying fuel from said hopper to an elevation, and thence discharging it into said passages in the deflector successively.

3. In a mechanical stoker, the combination of a vertically-oscillating deflector divided longitudinally into a plurality of passages for the discharge of fuel into a furnace; a hopper for a fuel supply; a horizontally oscillating pipe, adapted to discharge fuel into the passages of said deflector successively; means for conveying fuel from said hopper to an elevation, and thence to said pipe; and means for oscillating said pipe and said deflector, respectively.

4. In a mechanical stoker, the combination of a deflector, divided longitudinally into a plurality of passages for the discharge of fuel into a furnace; a fuel supply; means for conveying fuel from said supply to said passages successively; and means for discharging fluid under pressure into the passages of said deflector.

5. In a mechanical stoker, the combination of a deflector, divided longitudinally into a plurality of passages for the discharge of fuel into a furnace; a fuel supply; means for conveying fuel from said supply to said passages successively; and means for discharging fluid under pressure into all of said passages simultaneously.

6. In a mechanical stoker, the combination of a deflector, divided longitudinally into a plurality of passages, for the discharge of fuel into a furnace; a hopper for a fuel supply; means for conveying fuel from said hopper to an elevation and thence discharging it into said passages in said deflector successively; and means for discharging fluid under pressure into the passages of said deflector.

7. In a mechanical stoker, the combination of a deflector, divided longitudinally into a plurality of passages for the discharge of fuel into a furnace; a fuel supply; means for conveying fuel from said supply to said passages in said deflector successively; a blower; a pipe adapted to discharge air from said blower into said deflector; a shunt pipe leading from the air pipe last mentioned; and a damper in said shunt pipe.

8. In a mechanical stoker, the combination of a deflector, divided longitudinally into a plurality of passages, for the discharge of fuel into a furnace; a hopper for a fuel supply; means for conveying fuel from said hopper to an elevation and thence discharging it into said passages in said deflector successively; a blower; a pipe adapted to discharge air from said blower into all of said passages in said deflector; a shunt pipe leading from the air pipe last mentioned; and a damper in said shunt pipe.

9. In a mechanical stoker, the combination of an oscillating deflector, divided longitudinally into a plurality of passages for the discharge of fuel into a furnace; a stationary box having corresponding longitudinal passages leading to the passages in said deflector respectively; a fuel supply; means adapted to convey fuel from said supply, through said box and deflector, into the furnace; and means for oscillating said deflector.

10. In a mechanical stoker, the combination of an oscillating deflector, divided longitudinally into a plurality of passages for the discharge of fuel into a furnace; a stationary box having corresponding longitudinal passages leading to the passages in said deflector successively; an oscillating pipe adapted to discharge fuel into the passages of said stationary box successively; a fuel supply; means adapted to convey fuel from said supply to said oscillating pipe; and means for oscillating said deflector and said pipe, respectively.

11. In a mechanical stoker, the combination of a deflector, [illegible] longitudinally into a plurality of passages for the discharge of fuel into a furnace; a vertical pipe having its lower end turned at an angle toward said deflector, and movable about its vertical axis whereby it may discharge fuel through any of the passages of the deflector; a fuel supply; means for conveying fuel from said supply to said vertical pipe, and discharging it therein; and means for oscillating said vertical pipe.

12. In a mechanical stoker, the combination of a vertically-oscillating deflector, divided longitudinally into a plurality of passages, for the discharge of fuel into a furnace; a vertical pipe, having its lower end turned at an angle toward said deflector, and rotative about its vertical axis whereby it may discharge fuel through any of the passages of the deflector; a hopper for a fuel supply; means for conveying fuel from said hopper to the top of said vertical pipe and discharging it therein; and means for oscillating said deflector and vertical pipe, respectively.

13. In a mechanical stoker, a supporting frame attached to a substantially vertical rotary standard; means on said frame for delivering fuel to the furnace and connected with and arranged to support the standard; and a track arranged in an arc about the axis of rotation of the standard and engaged by said roller, the track being inclined downwardly in the direction of rotation of the frame toward the furnace, so that the weight of the frame and the parts carried thereby tends to cause the roller to move upon the track in a direction to hold the stoker in operative position with respect to the furnace.

14. In a mechanical stoker, a furnace; a

horizontally swinging supporting-frame, having vertical stationary bearings; means thereon for delivering fuel to the furnace; and a track set in an arc around the axis of rotation of said frame, and having a portion inclined downwardly; and a part on said frame running on said inclined portion of said track, whereby pressure between said part and said inclined portion of said track holds the stoker against the furnace.

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