

J. HEBERLING.
 AUTOMATIC FUEL FEEDING MECHANISM.
 APPLICATION FILED MAR. 27, 1917.

1,348,414.

Patented Aug. 3, 1920.
 3 SHEETS—SHEET 1.

Fig. 1.

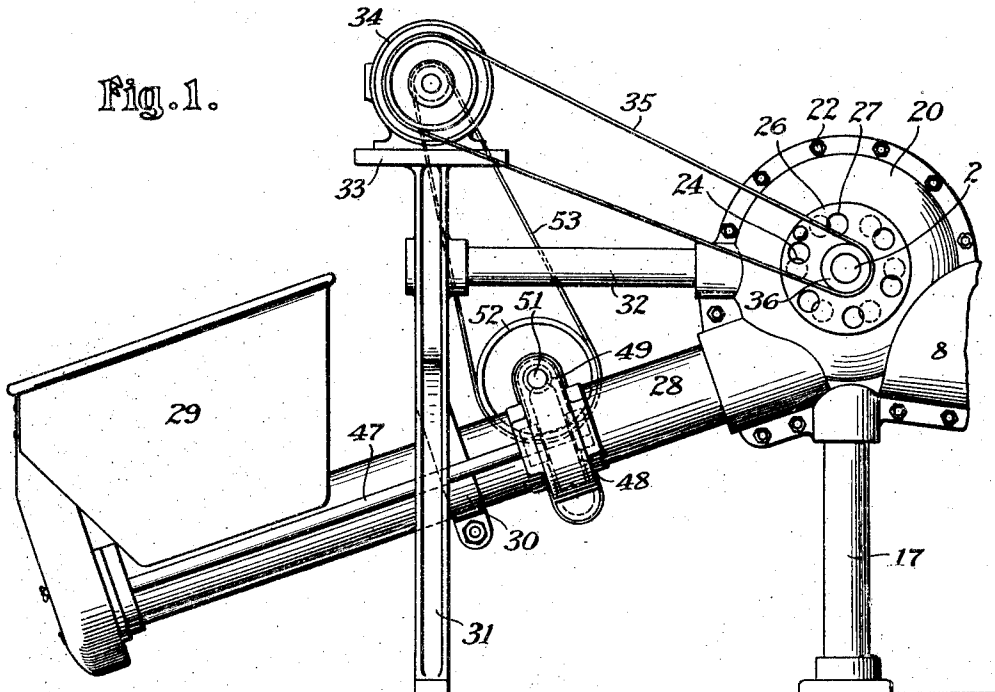
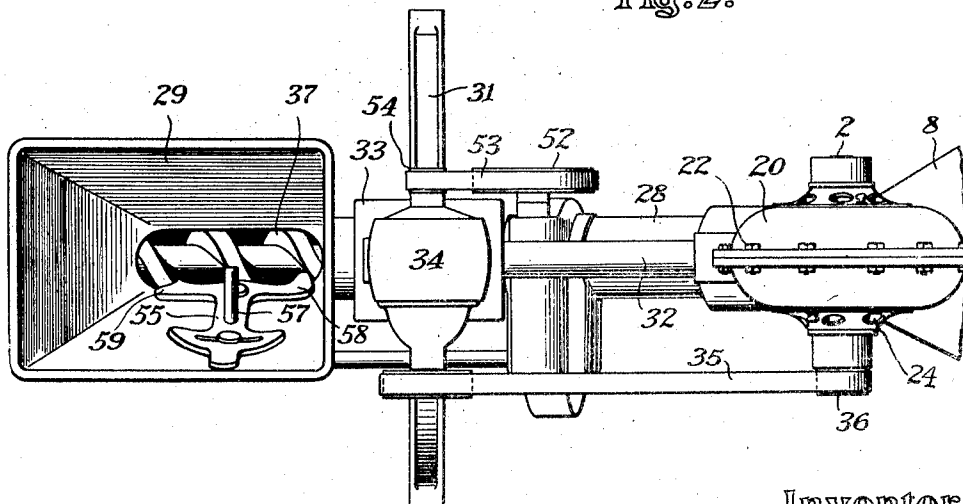


Fig. 2.



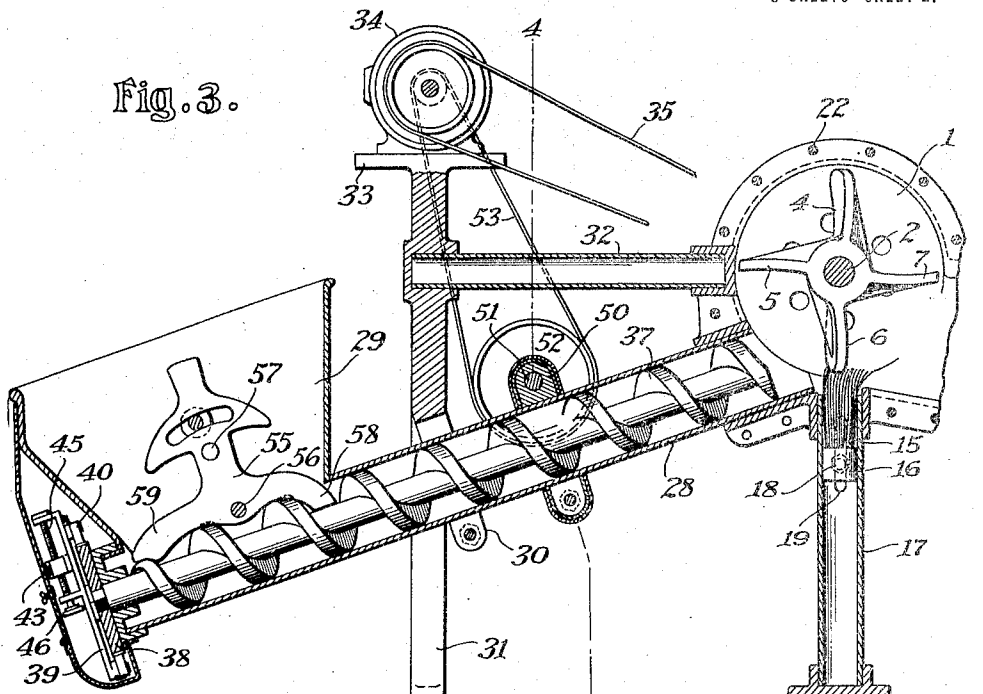
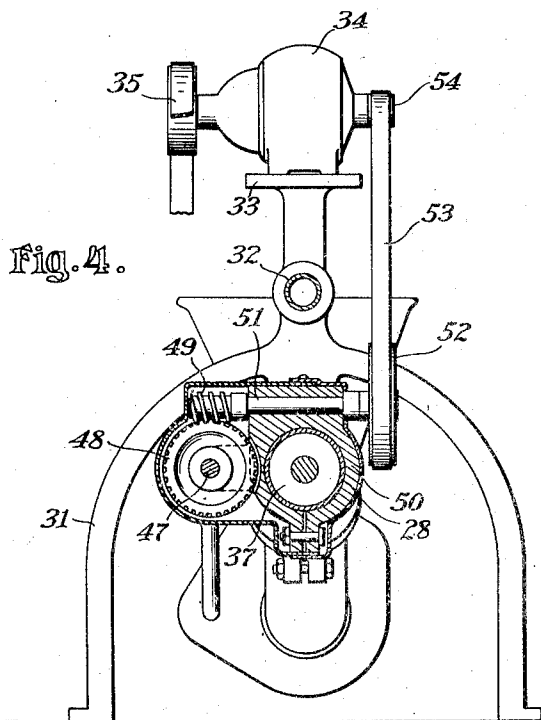
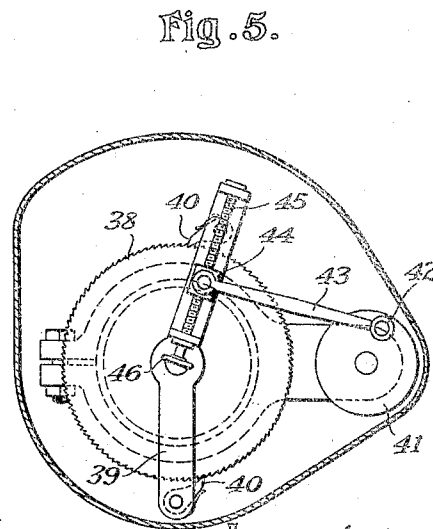
Inventor:

John Heberling
 by *Davis & Thomas*
 his attorneys

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 3 SHEETS—SHEET 2.



Inventor:
 John Heberling
 by David V. Linn
 his attorneys

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3 SHEETS—SHEET 3.

Fig. 6.

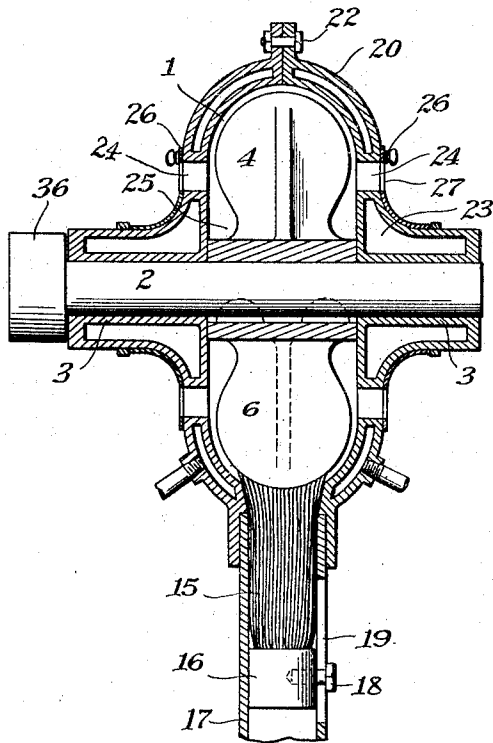


Fig. 7.

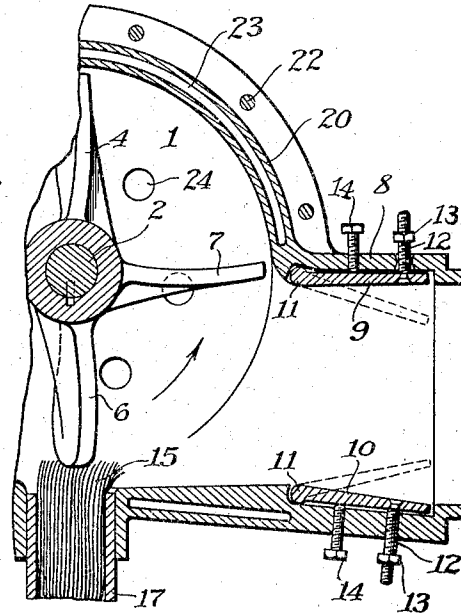
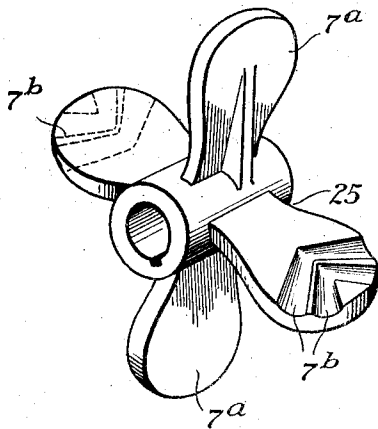


Fig. 8.



Inventor:
John Heberling
 by *David J. Thomas*
 his attorneys

UNITED STATES PATENT OFFICE.

JOHN HEBERLING, OF ROCHESTER, NEW YORK.

AUTOMATIC FUEL-FEEDING MECHANISM.

1,348,414.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, JOHN HEBERLING, 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 Automatic Fuel-Feeding Mechanisms, of which the following is a specification.

The present invention relates to automatic fuel feeding mechanisms of the type commonly called "stokers," for the purpose of feeding fine or comminuted fuel into a furnace, and an object thereof is to provide a mechanism which will employ a minimum amount of fuel and will evenly spread such fuel over the entire bed of fire while at the same time combining with such fuel an amount of air which will effect a perfect combustion of the gases, while conserving the heat units of the fuel, so that all smoke is eliminated.

To these and other ends, the invention consists of certain parts and combinations of parts all of which will be hereinafter described, the novel features being pointed out in the appended claims.

In the drawings:—

Figure 1 is a side view of a stoker embodying the present improvements;

Fig. 2 is a top view of the construction shown in Fig. 1;

Fig. 3 is a longitudinal vertical section through the construction shown in Fig. 1;

Fig. 4 is a section on the line 4—4, Fig. 3;

Fig. 5 is an enlarged view of the means for effecting the rotation of the feed screw;

Fig. 6 is a transverse vertical section through the spreader and its casing, the parts being enlarged;

Fig. 7 is an enlarged vertical section, showing the discharge opening of the stoker; and

Fig. 8 is a perspective view of another embodiment of the rotary spreader.

Constructions have been suggested in which the fuel has been delivered into the furnace under a blast of air, but in such constructions the blast has either chilled the fire, driving off unconsumed gases, or caused the burning out of the grate or fire-pot. Other constructions have been suggested in which bulks of fuel have been periodically discharged on the bed of fire at different points on the surface thereof. Such constructions not only require complicated mechanism for shifting the discharge open-

ing of the stoker so that the material will be discharged at different points, but a thin spreading of the material on the bed of fire is not obtained.

According to this invention, a continuous and thin even spreading of the fuel on the bed of fire is obtained without shifting the discharge opening of the stoker, and at the same time an amount of air is delivered to the fire-pot which is sufficient to consume the gases without cooling the fire, and driving off unconsumed products, or causing the rapid burning of the latter. Furthermore, the feeding of the fuel is substantially continuous, so that a substantially even heat is obtained from the fire.

In the illustrated embodiment of the invention, there is provided a chamber 1, to which fine fuel, either powdered or comminuted coal, or the fine coal of commerce, is delivered in any suitable manner. In this chamber operates a mechanical spreader which engages the coal in the chamber, and throws such coal through the discharge of the chamber into the furnace. Preferably, this mechanical spreader is in the form of a rotary device mounted on a shaft 2 journaled in the side walls of the chamber 1 at 3, the rotary device having, preferably, a plurality of blades 4, 5, 6 and 7, it being understood that any number of such blades may be employed. In this instance, the blades 4 and 6 have their operative or impact faces arranged at angles to the plane of rotation of the rotary spreader, one being disposed in one direction, while the other is disposed in the opposite direction, so that material will be deflected to opposite sides of the discharge opening of the chamber 1. The blades 5 and 7 have their operative faces at right angles to the plane of operation of the rotary spreader, and tend to throw the material in a straight line in the direction of the plane of the rotary spreader. In Fig. 8 the blades 7^a have their effective faces at right angles to the plane of operation of the blade, and every other blade has grooves 7^b which diverge toward the free ends of the blades and tend to spread the material as the latter is discharged by the blade.

The form of the discharge from the chamber 1 may be of any suitable construction. However, a preferred construction herein shown and claimed tends to give a better spreading action of the material. The preferred construction is illustrated in Fig. 7,

where the casing of the chamber 1 is provided with an extension 8 flaring horizontally and extending tangentially with reference to the rotary spreader. To the end that the effective area of the opening of the discharge may be varied or changed, two members 9 and 10 may be hinged respectively, to the top and the bottom wall of the extension, the hinges 11 being in proximity to the rotary spreader, while their free ends extend toward the mouth of the discharge extension 8. These hinged members 9 and 10 may be held at different angles to each other, so that the distance between their free ends may be changed. Any means may be employed for effecting this adjustment. In this instance, each hinged member carries a screw 12, projecting through the adjacent wall of the extension 8 and carrying a nut 13 which limits the forward movement of the member. A set screw 14 extends through the extension 8, and coöperates with the hinged member to hold said member in its adjusted position.

It is desirable to provide some means which will coöperate with the blades of the rotary spreader for the purpose of maintaining a substantially close coöperation between the blades and the means, so that coal cannot become wedged between the blades and the wall of the chamber in which the rotary spreader operates. In this instance, a wire brush has its fibers 15 arranged to be engaged by the ends of the blades 4, 5, 6, 7, the head 16 of the brush being preferably adjustably mounted within a tubular standard 17, which also acts as a support for the casing of the chamber 1. The brush head 16 carries a screw-threaded pin 18 working in the slot 19 in the tubular standard 17, a nut on the screw-threaded projection 18 serving to hold the brush head 16 in its adjusted position. It is apparent that the fibers 15 may be raised or lowered to secure proper coöperation with the ends of the blades 4, 5, 6, 7.

It is preferred to form the casing 20 of the chamber 1 in two sections connected in the plane of rotation of the rotary spreader. These sections are connected together by bolts 22, and each is provided with a chamber 23 in its walls surrounding those parts which are liable to become warm due to the proximity of the stoker to the furnace, this chamber serving to receive cold water for the purpose of maintaining the casing in a cool condition, and particularly the bearing portions thereof in which the shaft 3 turns.

In stokers of this class, it is desirable to admit a certain amount of air to the furnace with the charge of fuel. This air should not be so admitted that it will cool the fire and drive off the unconsumed gases, nor should it be concentrated at any particular point. The admission of air, in this

instance, is secured by providing the casing 20 of the chamber 1 with an annular series of openings 24 on opposite sides thereof, said openings surrounding the axis of the rotary spreader. By this arrangement, air will pass into the chamber 1 through the openings 24, and from said chamber will pass into the furnace by way of the fuel discharge. The blades of the rotary spreader do not tightly fit the interior walls of the chamber 1, but are cut away at 25 so as to provide spaces between the blades and the walls of the chamber 1. By this arrangement, the blades, during their rotation, create a slight draft of air through the openings 24, the casing chamber 1, and the discharge of the chamber into the furnace, but this draft is not strong enough to produce a blowing action which would be present if the blades tightly fitted the walls of the chamber. To the end that the amount of air admitted to the furnace may be varied, means is provided for varying the effective area of the openings 24, this means, in this instance, comprising two rings 26 journaled on opposite sides of the casing 20, and each having an annular series of openings 27, the diameters of which are substantially the same as those of the openings 24. When the openings 27 are brought into exact registration with the openings 24, no restriction is imposed to the passage of air through the openings 24, but the rings 26 may be turned to partially or wholly close the openings 24.

Any suitable means may be employed for feeding fuel to the chamber 1. In the illustrated embodiment, an inclined tubular drum or passageway 28 connects with the lower portion of the chamber 1 at a point below the turning axis of the rotary spreader, said drum or passageway leading from a hopper 29. This drum and hopper are preferably supported by fitting the end of the drum into the casing 20 of the chamber 1 and connecting a split clamp 30 with the drum at a point in proximity to the hopper 29. This clamp is supported by a frame 31 which, by a horizontal piece 32, connects with the casing 20 of the chamber 1. The frame 31 has a head 33 which may serve as a support for a motor 34, the latter being connected by a belt 35 to the pulley 36 on the shaft 3 of the rotary spreader, so that the latter may be driven by the motor.

The feeding of the fuel from the hopper 29 to the casing 1, by way of the drum 28, is preferably effected by means of a spiral or screw 37, which extends from the hopper to a point in close proximity to the path of movement of the rotary spreader, so that the passage of the fuel from the hopper to the spreader is insured. Rotation of the screw may be effected in any suitable manner. In this instance there is provided a toothed wheel 38 which coöperates with two spring

pressed pawls 40 carried by an oscillatory frame 39 mounted to turn about an axis common to said frame and the wheel. When the frame is swung in one direction these pawls engage with the teeth of the wheel and when the frame is turned in the other direction, the pawls ride over the teeth. Oscillation of the frame is preferably effected by a rotary disk 41 having a wrist pin 42 thereon connected to a pitman 43 which, in turn, is connected to the oscillatory frame 39. Preferably, this connection is so formed that the amplitude of the oscillations of the frame 39 may be varied, in order that the speed of rotation of the screw 37 may be changed. In this instance, the pitman 43 is connected to a nut 44 mounted to move longitudinally of a screw 45, which is journaled on the oscillatory frame 39 to rotate, but not to move axially. One end of the screw may be provided with a hand wheel 46, said wheel being preferably positioned in line with the axis of the oscillatory frame 39, in order that the adjustment of the nut 44 may be effected while the frame 39 is oscillating. The disk 41 is preferably mounted on a shaft 47 which also carries a worm wheel 48. This worm wheel is engaged by a worm 49 journaled in a frame 50 which is clamped to the drum 28. On the shaft 51 of the worm wheel 49, a pulley 52 is arranged, and this pulley may be driven by a belt 53 which also passes about a pulley 54 on the shaft of the motor 34. It follows, therefore, that at the same time that the rotary spreader is turned, motion will be communicated by means of the belt 53, worm 49, worm wheel 48, disk 41, pitman 43, oscillatory frame 39, and toothed wheel 38, to the screw 37, in order to feed the material to the casing 1.

Owing to the fact that powdered coal is, in many instances, moist, and when moist has a tendency to pack, it is desirable to provide some means to agitate the material within the hopper 29, and to this end an agitator is provided comprising an oscillatory member 55 pivotally supported on one of the side walls of the hopper, and having a finger 57 projecting laterally therefrom into the material, and eccentric with reference to the pivot 56. This oscillatory member preferably has two oppositely-extending arms 58 and 59, projecting into engagement with the coils or convolutions of the spiral 37 on opposite sides of the pivot 56. The engagement with the screw or spiral is such that the arms are laterally swung in opposite directions, thus producing an oscillation of the agitator 55. These arms also operate at times in the depressions between the coils, and tend to disturb the material in such depressions, thereby preventing the material from sticking to the coils or convolutions of the spiral and stopping the feeding action.

In the use of the stoker, fine coal, either

powdered or commercial, is deposited in the hopper 29, and from the latter is fed by the spiral 37 to the chamber 1. The communication between the drum 28 and the chamber 1 is constantly open, so that fuel is being constantly fed into the chamber 1. It is true this feeding is effected by the intermittently driven spiral, but the speed of the oscillations of the frame 39 is such that the feeding action is substantially constant. As the material enters the chamber 1, it is engaged by the blades 4, 5, 6 and 7, and by the latter is thrown through the discharge extension 8. The rotary spreader turns at such a speed that there is a substantially constant stream issuing from the discharge of the stoker, and the formation of the blades of the spreader produces a spreading of the fuel in a thin film over the entire bed of fire. With the throwing of the fuel, an amount of air enters which can be so regulated as to correspond exactly with the amount required for consuming the gases to prevent smoking of the fire, without producing any cooling action or choking action in the furnace, and without interfering with the normal draft of the furnace. This air is not concentrated at any one point, but is substantially mixed with the stream of fuel.

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

1. An automatic fuel feeding device comprising a chamber having a discharge, a spreader operating in said chamber and having blades engaging the fuel to throw the latter through said discharge, and a yielding device coöperating with the ends of said blades.

2. An automatic fuel feeding device comprising a chamber having a discharge, a spreader operating in said chamber, and having blades engaging the fuel to throw the latter through said discharge, and a brush coöperating with the ends of said blades.

3. An automatic fuel feeding device comprising a chamber having a discharge, a spreader operating in said chamber, and having blades engaging the fuel to throw the latter through said discharge, and a brush coöperating with the ends of said blades, said brush being adjustable toward and from the blades.

4. An automatic fuel feeding device comprising a casing having a chamber provided with a discharge, a tubular standard supporting said casing, a brush adjustable in said standard to project into the casing, and a spreader operating in said casing and having blades coöperating with the brush and adapted to engage fuel within the casing to throw such fuel through the discharge.

5. An automatic fuel feeding device comprising a chamber having a discharge, and a spreader operating in said chamber, said

spreader having a plurality of blades provided with grooves diverging toward the ends of the blades.

6. An automatic fuel feeder comprising a
5 circular chamber having a substantially tangentially arranged discharge spout, a rotary spreader in said chamber, an inclined drum leading to the chamber, means for

feeding the fuel through said drum to the chamber, and yielding means with which 10 said rotary spreader coöperates arranged to be engaged by the rotary spreader as the latter moves the fuel from the drum to the spout.

JOHN HEBERLING.