

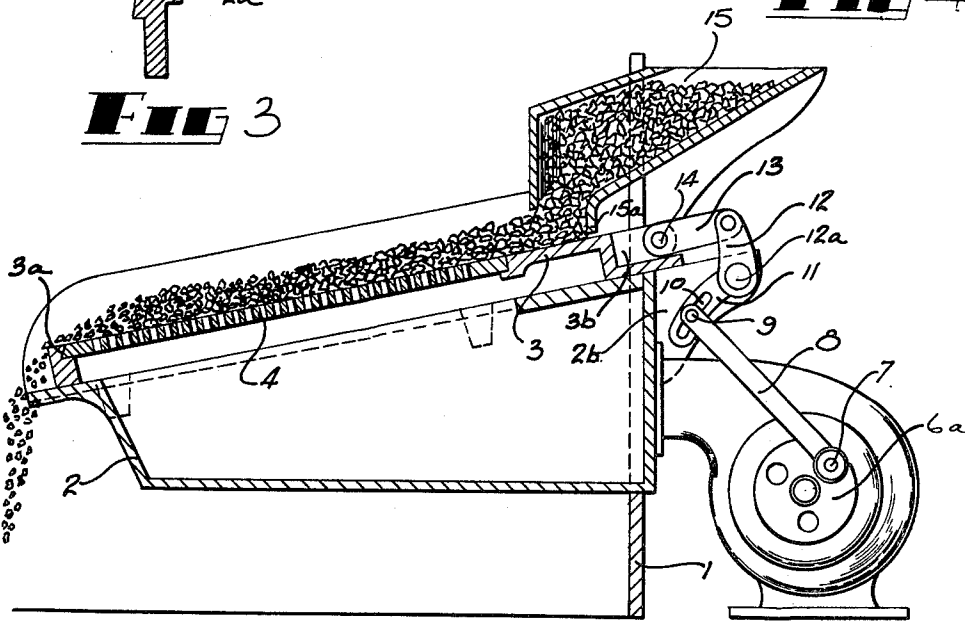
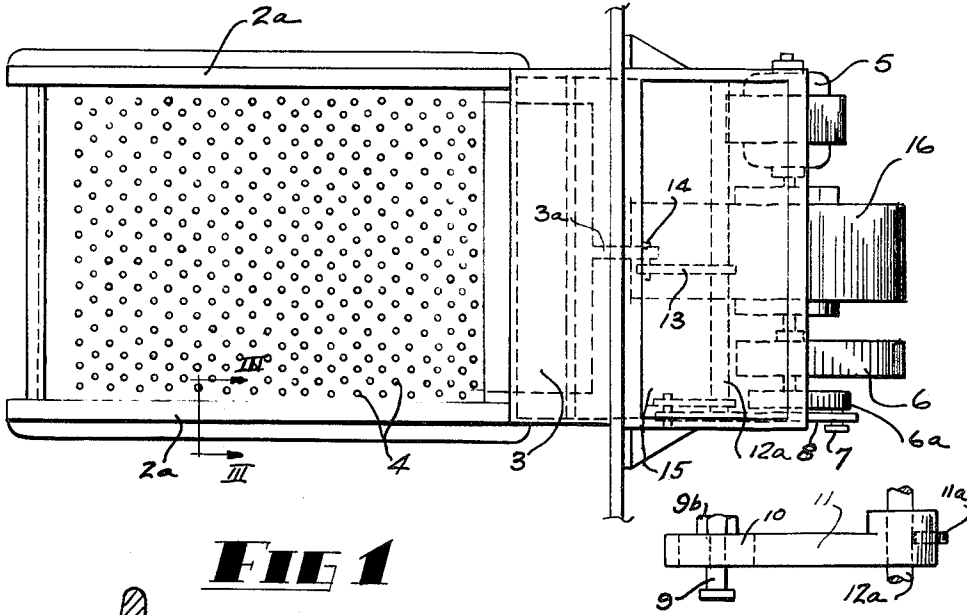
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J. I. HURST

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STOKER

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INVENTOR.
JOHN IRA HURST
BY
William J. Ruano
ATTORNEY

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STOKER

John Ira Hurst, Schuylkill Haven, Pa.

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2 Claims. (Cl. 110—38)

My invention relates to a stoker, and more particularly to means for automatically feeding and displacing coal on a grate in a manner so as to effect complete combustion of the coal and convenient disposal of the ashes.

In the past, various feed mechanisms have been devised for stokers, such as inertia and impulse feeders, electromagnetic actuated feeders, and the like. But these have the outstanding disadvantage of being complicated in construction and involving a large number of parts, such as movable grate elements, which have a great tendency toward mechanical failure or troublesome operation, also requiring frequent cleaning, replacement of parts and expensive maintenance.

An object of my invention is to provide, in a stoker, a novel grate feed device which is devoid of the above-named disadvantages and which comprises a minimum number of parts of relatively simple construction, and which are inexpensive to manufacture and maintain in operating condition.

Another object of my invention is to provide a novel means for feeding coal onto a grate and displacing it laterally while disposed on the grate to allow complete combustion of coal and replacement with fresh coal, also which exactly compensates for burned coal or ashes and disposes ashes at the end of the grate.

Other objects and advantages of my invention will become apparent from a study of the following description taken with the accompanying drawing wherein:

Figure 1 is a top or plan view of a stoker coal feeding and displacing mechanism embodying the principles of my invention;

Figure 2 is a vertical cross-sectional view of the device shown in Figure 1;

Figure 3 is an enlarged cross-sectional view taken along line III—III of Figure 1, and;

Figure 4 is an enlarged top view of parts of the crank drive shown in Figure 2.

Referring more particularly to the drawing, numeral 1 denotes a front base plate of a boiler, having supported thereon a support housing or air chamber 2 having walls closing all sides except the top wherein a large opening is provided to allow passage of air to the grate. Supported on the top wall of chamber 2, and guided by grooves formed in the sides 2a thereof, and on side shelves 2b there is slidably mounted a grate bar carrier or frame 3 having a narrow, rectangular shelf portion for supporting the margin of grate or grate bar 4. The lower end of the grate 4 is beveled and fits into a correspondingly bevelled edge portion 3a of carrier 3. The grate bar carrier 3 is provided with a central arm portion 3b for connection to an oscillatory feed mechanism to be described hereinafter.

A motor 5, such as a fractional horsepower electric motor, through a drive shaft, drives a reducing gear of any well-known type enclosed in reducing gear box 6 which gear, in turn, drives a crank disc or shaft 6a having a crank pin 7 mounted thereon and to which is at-

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tached one end of a connecting link 8. The other end of the connecting link 8 is provided with pin 9 having a shouldered portion, as shown more clearly in Figure 4, from which emerges a pin portion of sufficiently small diameter to extend through a slot 10 formed in a link 11 of variable length. One end of link 11 has connected thereto, by means of a set screw 11a, or other fastening means, a rocker shaft 12a to which one end of a rocker arm 12 is connected. The other end of rocker arm 12 is pivotally connected to a link 13 which, in turn, is provided with a pin 14 at the other end which is connected to the handle portion 3b of the grate bar carrier 3.

It will be apparent that upon rotation of the driving motor 5 and drive shaft, crank disc 6a will rotate slowly and effect crank movement of connecting link 8 which, through link 11, will cause oscillation of the rocker arm 12 about rocker shaft 12a, thus reciprocating link 13 and the grate bar carrier 3 connected thereto. When it is desired to shorten or lengthen the stroke of the reciprocating grate bar carrier, the distance between pin 9 and rocker shaft 12 may be varied by loosening a nut 9b at the opposite end of pin 9 and adjusting the position of pin 9 along the slot 10 until the desired length of stroke of carrier 3 is obtained.

A fan or blower contained within a housing 16 is also driven by motor 5 and forces air into the air chamber 2 and through the grate 4 and coal bed to supply the necessary draft.

An important feature of my invention resides in the manner of feeding coal by low speed reciprocation of the grate bar—also its timing and correspondence with the rate of combustion of the coal, as well as the manner of disposing of burned ashes.

As a consequence of the gear reducer in housing 6, crank disc 6 rotates at very slow speed to cause slow reciprocation of the grate bar carrier 3 and grate 4. The length of stroke is between $\frac{3}{8}$ and 1" depending upon the adjustment of pin 9 within slot 10. One reciprocation takes place in about one minute. For example, if the adjustment is for a $\frac{1}{2}$ " stroke, a complete reciprocation of the grate over a half inch stroke will take place in one minute. Upon movement of grate 4 to the left, as viewed in Figure 2, a void will be created between the rear wall 15a of the chute 15 and the coal bed thereby causing the void to be filled by fresh coal from the hopper 15. As grate 4 is moved to the right it pushes the upper end of the bed of coal against the back stop 15a so that the latter will push the entire bed of coal to the left and longitudinally relative to grate 4, so as to discharge ashes at the extreme left or lower end thereof, as shown in Figure 2. About 8 to 25 pounds of coal may be fed per hour, depending upon the adjustment of the length of stroke and the speed reduction.

The angle of grate 4 with respect to a horizontal plane is of the order of 10° to 15° and rarely exceeds 15°. With such angle, optimum use of the force of gravity is obtained to aid the coal in its movement leftwardly with respect to grate 4. The adjustment of the stroke is made so as to correspond to the rate of burning of the coal, that is, to the rate that ashes are developed—optimum operating conditions being attained when the rate of feed of fresh coal exactly compensates for the rate of burning of the coal on the center and lower portion of the grate. Reciprocating movement of grate 4 need not be continuous but may be in response to a thermostat as a control element to provide on-and-off periods for operation of motor 5. However, to prevent abnormally long off periods it is desirable to provide a timer operated control mechanism to cause a minimum

amount of feed and operation of the blower so as to prevent dying out of the fire.

The openings in grate 4 may be about $\frac{1}{8}$ " in diameter. The cleaning of clinkers or other lodged burned coal in grate 4 is a relatively simple matter, either by application of a tool for lifting clinkers out of the openings formed in the grate, or by complete removal of the grate.

An important and distinguishing feature of the particular means for feeding and displacing coal resides in the fact that grate 4 is not vigorously reciprocated at high speed, as is conventionally done, because this has the outstanding disadvantage of allowing ashes as well as unburned coal particles to fall through the grate openings. Instead, the entire coal bed including the ashes is moved as a body to the left relative to grate 4 and practically none of the coal or ashes falls through the grate openings. Thus coal remains on the grate until it is completely burned. Moreover, ashes are pushed off rather than shaken through the grate and are discharged at the lower end into a can or other receptacle (not shown).

Thus it will be seen that I have provided an efficient stoker embodying means for very slowly reciprocating a grate and feeding coal as well as ashes longitudinally with respect to the grate at a rate to compensate for burning of the coal and in a manner to insure complete burning of all of the coal on the coal bed; furthermore I have provided a means for varying the stroke and rate of reciprocating movement of the grate carrier so as to correspond to different rates of burning of different coal beds; furthermore I have provided a coal feeding and ash disposing device comprising a relatively small number of very simple and inexpensively manufactured parts and which eliminates the necessity of of vigorous movement of the grate or incorporation of complicated movable elements which add considerably to the cost and maintenance of the mechanism; furthermore, I have provided a feed mechanism which eliminates dropping of unburned coal through the grate and waste of coal, and which discharges ashes at the end of the grate, rather than through it, so as to facilitate collection and removal thereof.

While I have illustrated and described an embodiment of my invention, it will be understood that this is by means of illustration only, and that various changes and modifications may be made within the contemplation of my invention and within the scope of the following claims.

I claim:

1. An automatic stoker comprising a support having an open top inclined at an acute angle relative to a horizontal plane, grate bar means slidably mounted on said top at said acute angle, sidewalls extending above said top including guide means for guiding opposite sides of said grate bar means, driving means including a driving motor, speed reducing means and a crank mechanism for effecting longitudinal, reciprocatory movement of said grate bar means on said top at a speed of the order of one inch per minute, a hopper disposed above the end portion of said grate bar means of higher elevation for feeding coal onto said grate bar means and including a rear wall projecting downwardly almost in contact with said grate bar means to serve as a back stop for longitudinally displacing a bed of coal in a downwardly inclined direction when said grate bar means is moved in an upwardly inclined direction, so as to discharge ashes from the bottom portion of the grate bar means, said hopper also including a front wall substantially spaced above an intermediate portion of said grate bar means to allow coal to fall freely thereon when said grate bar means is moved in said downwardly inclined direction.
2. An automatic stoker as recited in claim 1 together with adjustable means intermediate said speed reducing means and said crank mechanism for selectively adjusting the length of stroke of said grate bar means to permit matching of the rate of discharge of said ashes with the rate of consumption of said coal.

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