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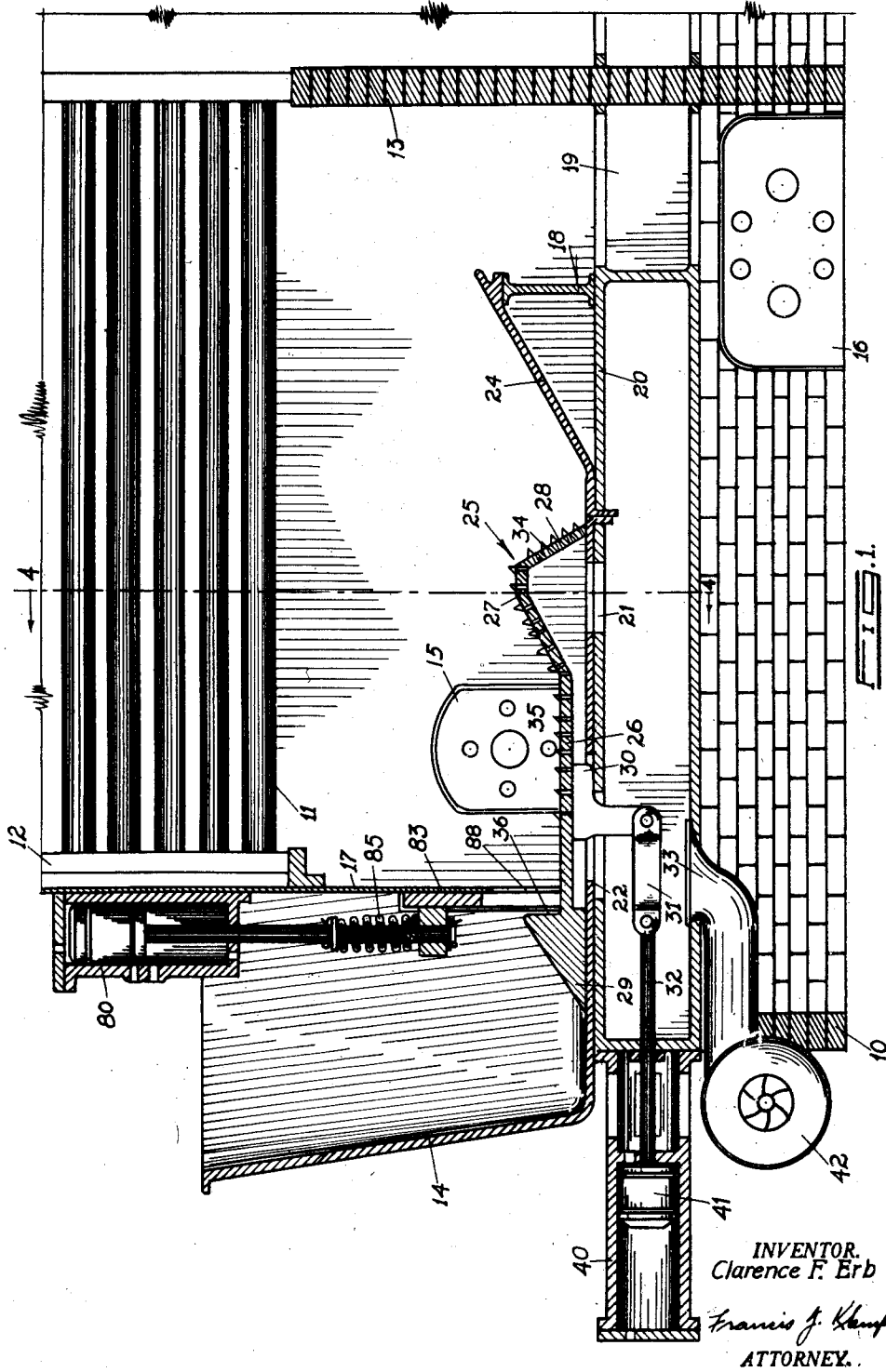
C. F. ERB

2,197,428

AUTOMATIC STOKER

Filed June 11, 1937

4 Sheets-Sheet 1



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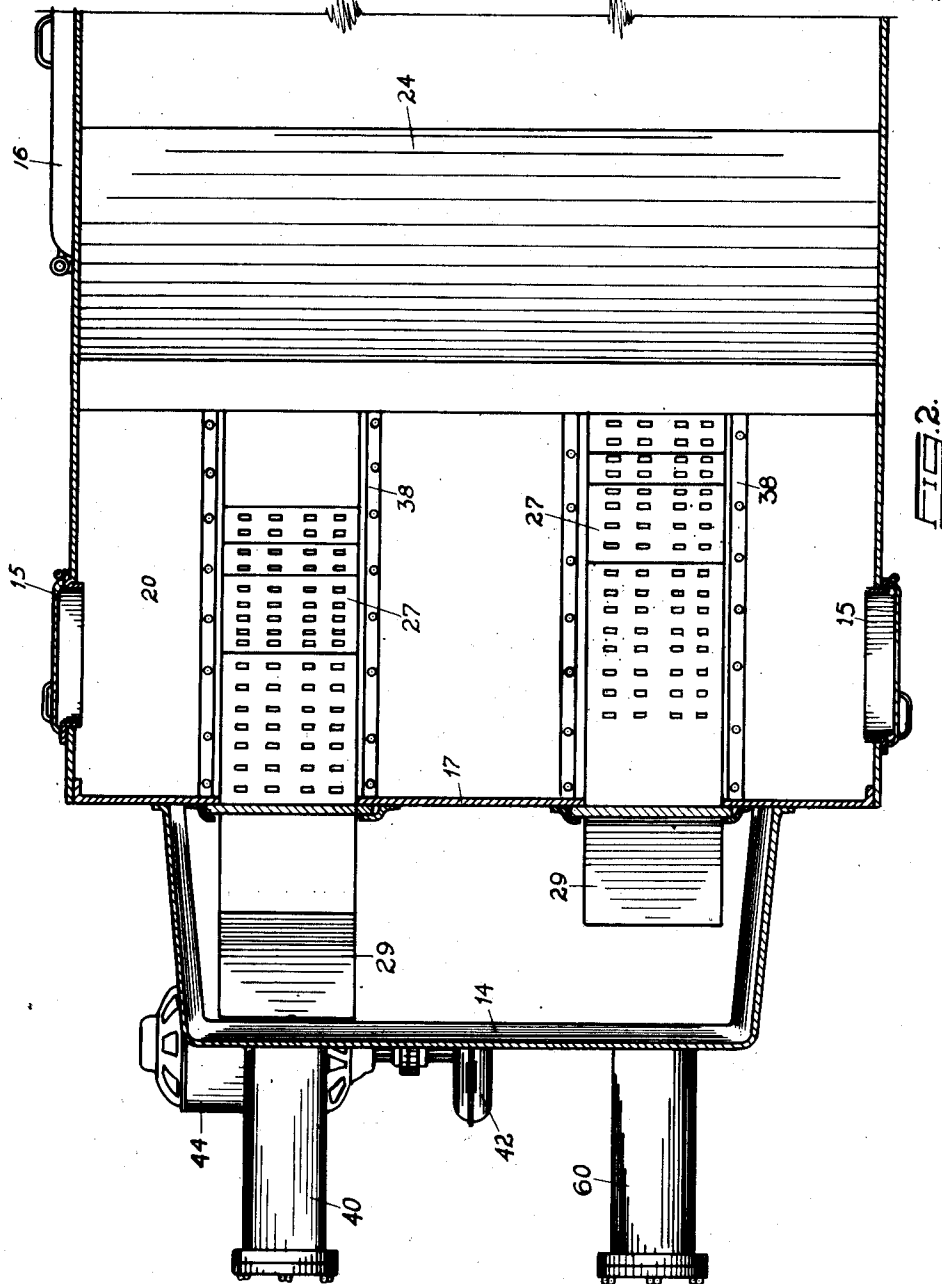
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AUTOMATIC STOKER

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4 Sheets-Sheet 2



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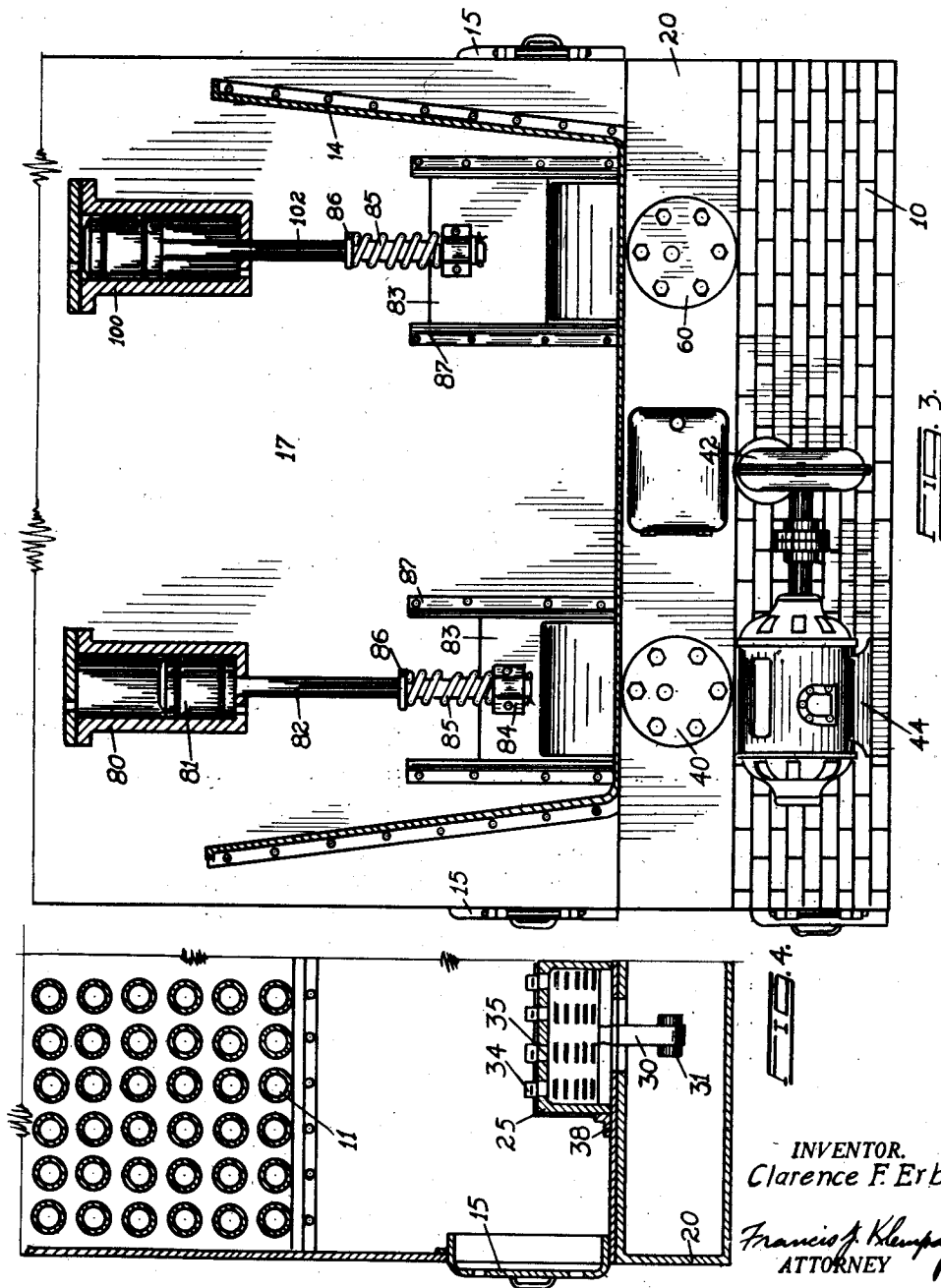
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AUTOMATIC STOKER

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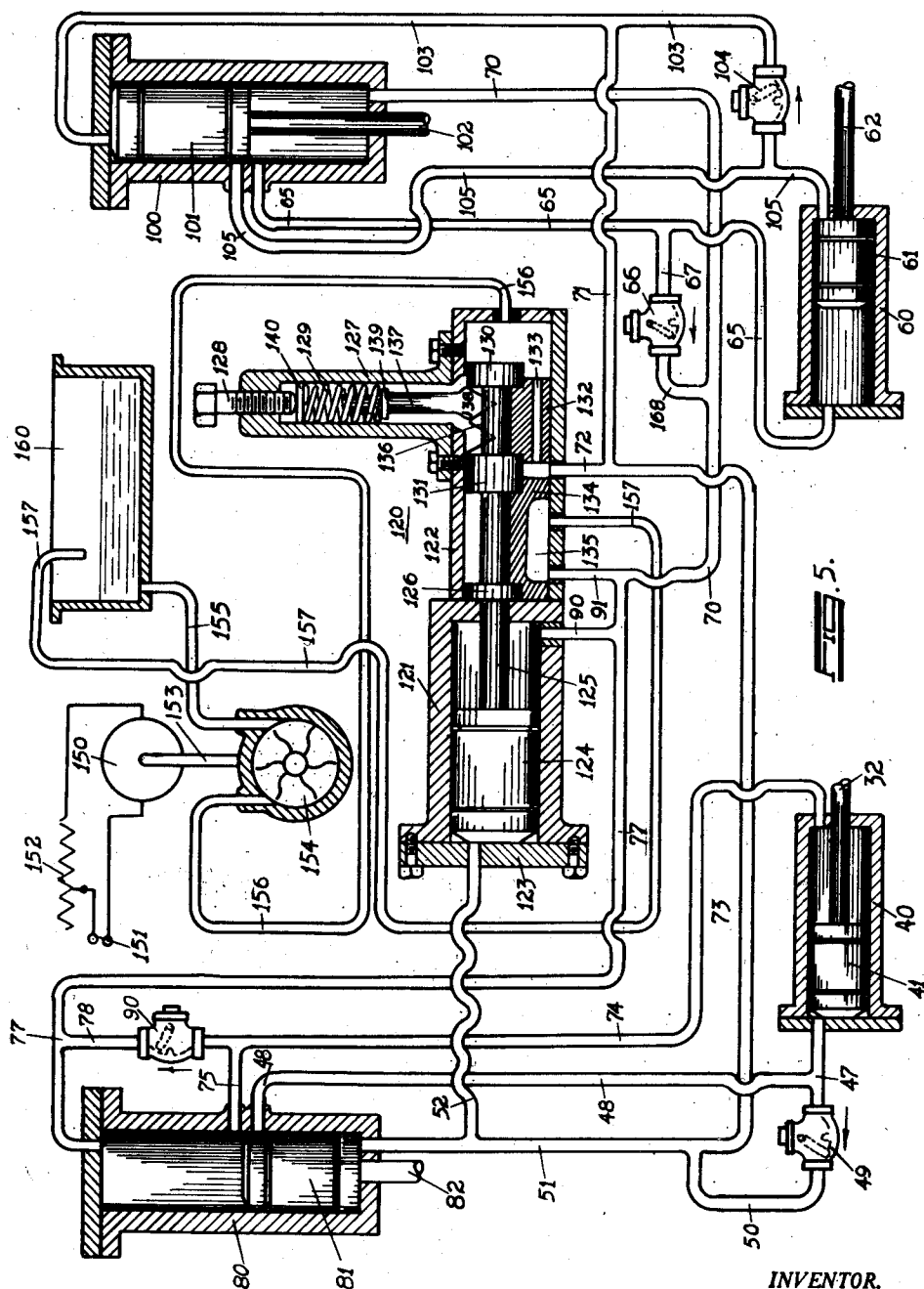
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AUTOMATIC STOKER

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4 Sheets-Sheet 4



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AUTOMATIC STOKER

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17 Claims. (Cl. 110—38)

This invention relates to automatic furnace stokers and more particularly to stokers of the type utilizing reciprocating devices which move the fuel from the front to the rear of the furnace and supply primary air for combustion. Broadly stated, the objects sought to be accomplished by this invention are the simplification and economy of construction and maintenance of the constituent elements, flexibility of control, and highly efficient combustion of the fuel. To carry out these objects, the invention includes innovations in the design of the oscillating fuel feeding elements, commonly termed "stoker bars" and in the supporting means therefor, together with an improved apparatus for operating the fuel feeding bars.

Heretofore, in automatic stokers of the general type under consideration, the practice has been to form the entire fuel bed supporting surface of adjacent oscillating stoker bars which practice results in the use of a large number of elements and a consequent high cost of the installation. Moreover, the tendency of the contiguous bars to warp in use causes them to wedge one against the other, thus interfering with the normal operation of the stoker.

Therefore, the primary object of this invention is to provide an automatic stoker of the type utilizing stoker bars in which a relatively small number of such bars are used, whereby the initial cost of the installation is reduced and the liability of the system to failure is minimized.

Another object of the invention is to provide an improved support for the stoker bars, which support will not burn out in use and which preheats the primary air for combustion.

A further object of the invention is to provide an improved stoker bar which maintains the fuel bed in better condition for more efficient combustion.

A further object of the invention is to provide improved means for operating the stoker bars whereby the system is rendered more flexible and dependable in use.

A still further object of the invention is to provide improved means for operating the stoker bars whereby the stoker remains at least partially operative even though some obstruction prevents the normal movement of one of the bars. The construction of the operating mechanism is such that no damage results from the jamming of any movable parts of the stoker itself, this being achieved without the use of shear pin couplings or other frangible elements which must be re-

placed by expert workmen to render the stoker again operable.

These and other objects and advantages of the invention will become apparent from a consideration of the drawings and the following detailed specification.

In the drawings:

Figure 1 is a cross-sectional view of a stoker installation constructed in accordance with my invention;

Figure 2 is a top view of the stoker bars, showing their relation to other elements of the furnace and stoker;

Figure 3 is an end view of the stoker;

Figure 4 is a partial cross-sectional view taken along the line 4—4 of Figure 1; and

Figure 5 is a diagrammatic view of the stoker actuating mechanism, parts thereof being shown in section.

The stoker is illustrated as applied to a boiler furnace of conventional design having a masonry foundation 10, a front wall 17, water tubes 11 connecting with the header 12, and a transverse baffle wall 13. A hopper 14 having a flat bottom wall is affixed to the front of the boiler and the stoker bars 25 of my invention are adapted to propel solid fuel from the hopper to the fuel bed within the furnace.

To support the fuel bed and the stoker bars I provide a flat hollow box-like structure 20, horizontally disposed, and extending the entire width of the furnace, which may be conveniently made by casting integrally the top and side walls and welding or otherwise securing thereto a metal plate or sheet to form the bottom wall. As shown in Figure 1, the support 20 extends outwardly a considerable distance from the front wall 17 of the furnace and thus aids in supporting the hopper 14. To the front wall of the support 20 there is secured the horizontally disposed hydraulic cylinders 40 and 60 which are provided with the pistons 41 and 61 connected with the rods 32 and 62, respectively, which extend within the support and connect with the stoker bars 25.

As shown, the stoker bars 25 are slidably mounted on the upper surface of the support 20, suitable guides 38 being provided to insure the maintenance of proper position, and are two in number although it should be understood that any number may be used, depending on the width of the furnace and other specific conditions. The bars 25 each consists of a hollow metal body open on the bottom and having on its top wall a multiplicity of upstanding lugs 34 and a multiplicity of adjacent air delivery orifices 35 of compara-

tively small size. The longitudinal cross-section of the bar 25 in Figure 1 shows a horizontal portion 35 adjacent the furnace wall 17 and a humped portion 27 adjacent the rear end of the bar. Integral with the bar 25 is the wedge-shaped member 29 positioned within the hopper and being provided with a vertically extending shoulder 36 to move the fuel into the furnace upon the inward movement of the bar. The wall 17 of the furnace is provided with the openings 88 through which the bars 25 extend. The upper wall of the support 20 is provided with a pair of openings 21 and 22 for each bar which openings provide means for the conduct of air from within the support 20 to within the bars. The front opening 22 also allows passage of the bracket 30 which is rigidly attached to the bar 25 at its upper end and to the rod 32 or 62 at its lower end by means of the link 31. It is thus apparent that oscillation of the pistons 41 or 61 within the cylinders 40 or 60 results in oscillating movement of the connected bar 25.

To provide primary air for combustion, I provide the blower 42 driven by motor 44, the blower discharging into the hollow support 20 through the duct 33. Since the support 20 is air tight except for the openings 21 and 22 it follows that the air coming into it will pass through the said openings, into the hollow grate bars 25 and through the orifices 35 thereof to the fuel bed. Since the hollow support 20 underlies the entire fuel bed, a considerable volume of turbulent air is always present which prevents the burning of the upper wall of the support. Moreover, the air passing through the support 20 is heated before it reaches the fuel bed, thus increasing the efficiency of the combustion. If desired, downwardly extending radiating fins may be attached to the upper wall of the support 20 to further the cooling of the upper wall and the preheating of the air.

Each opening 88 in the front wall 17 of the furnace is provided with a gate 83 slidably mounted for vertical movement on the outer surface of the wall 17 in the guides 87. Gates 83 are operated by the vertically positioned cylinders 80 and 100 secured to the outer surface of the wall 17 above the gates. Pistons 81 and 101 within the cylinders are each provided with a downwardly extending rod 82 and 102 the lower ends of which pass through apertures in lugs 84 rigidly attached to the gates 83. Each of the rods 82 and 102 have a cotter pin passed through their lower end below the lug 84 and a second pin passed through at a point spaced from the upper surface of the lug 84. A washer 86 abuts against the second mentioned pin and a strong helical spring 85, encircling the rod, is positioned between the washer and the upper end of the lug. The arrangement is such that upward movement of the rod results in the positive upward movement of the gate whereas downward movement of the rod results in a spring pressed movement of the gate. If some obstruction prevents the downward movement of the gate, the rod can continue its movement, the spring 85 taking up the necessary relative movement between the parts but continuing to exert an increasing amount of downward force on the gate.

Supported on the box 20 at the rear of the bars 25 is the dead pan 24 which extends entirely across the furnace and which is inclined to the rear. A strut 18 supports the elevated rear end thereof. As shown in Figure 1, the box

20 terminates short of the wall 13 allowing space 19 therebetween for an ash and clinker drop. The pan 24 may be of any desired construction, it may be provided with orifices or slots, it may receive air beneath from the box 20, and a portion thereof may overlie the drop 19. Suitable doors 15 are provided in the side walls of the furnace above the grate bars 25 and an ash cleanout door 16 may be provided below the support 20.

Figure 5 illustrates the operating and control system as applied to a stoker installation utilizing two stoker bars and two gates as described in connection with Figures 1 to 4, inclusive. Rod 32 connected with pistons 41 of cylinder 40 operates the upper bar of Figure 2 and rod 62 connected with piston 61 of cylinder 60 operates the lower bar of Figure 2. Rod 82 connected with 81 of cylinder 80 actuates the left gate 83 of Figure 3 which controls the opening about the stoker bar 25 operated by piston 41. Rod 102 connected with piston 101 of cylinder 100 operates the other of the gates 83. Cylinders 80 and 100 are identical and cylinders 40 and 60 are identical in construction.

Pistons 41, 61, 81 and 101 are hydraulically operated and to supply a quantity of fluid under pressure, I provide the pump 154 having an inlet 155, an outlet 156 and being driven through shaft 153 by the variable speed motor 150. A source of electrical power 151 is provided for motor 150 and a variable resistance 152 is interposed between the power source and the motor so that the speed of the motor and the rate of flow of fluid from the pump may be readily controlled.

The change-over valve generally indicated at 120 is provided to reverse the flow of the fluid to the cylinders 40, 60, 80 and 100 to effect the oscillating movement of the stoker bars and gates and consists generally of a cylinder 121 having therein a piston 124 and an integrally attached valve housing 122 having a valve 134 therein actuated by the piston 124. A rod 125 is rigidly attached at one end of the piston 124 and extends outwardly through the end wall of the cylinder 121 and into the housing 122. Each end of the cylinder 121 is provided with a port for a purpose to be later described. The lower wall of the valve housing 122 is provided with three longitudinally spaced ports to which are connected tubes 91, 157 and 72, respectively, and the end wall of the housing is provided with a port to which is connected the pump outlet tube 156.

Longitudinally slidable on the inner surface of the bottom wall of the housing 122 is the valve 134 which is provided with an arched recess 135 in its bottom wall to bridge two of the three spaced ports and a longitudinal slot (not shown) on its upper surface to receive a portion of the rod 125. The upper surface of the valve 134 is further milled to provide shoulders engaged by the spaced collars 126 and 131 rigidly fastened in any suitable manner to the rod 125. Another collar 130 spaced from the middle collar 131 is rigidly attached to the end of the rod 125 opposite the piston 124. A block 132 having a longitudinally extending bore 133 and being provided with a grooved and milled upper surface similar to that of the valve 134 is positioned between the collars 130 and 131 and between the intervening portion of the rod 125 and the upper surface of the bottom wall of the housing 122. As shown the block 132 is spaced from valve 134 to allow the port 72 to receive

fluid from within housing 122 when the parts are in the position shown.

Formed integrally with or suitably attached to the upper surface of the rod 125 between the collars 130 and 131 is the tooth 136 having inclined surfaces as shown which are adapted to be traversed by the complementary inclined surfaces of the wedge 138. The wedge 138 is carried by the shank 137 which is spring-pressed downwardly by the helical spring 129 housed within the casing 127 fastened to the upper wall of the valve housing 122. The washer 139 secured to the shank 137 transmits the force to the shank and confines the spring. In order that the downward force exerted on the wedge 138 may be varied, a screw 128 is in screw threaded engagement with the upper wall of the housing 127 and engages a washer 140 overlying the top of spring 127. Rotation of screw 128 alters the compression of the spring and the force exerted on the shank 137. Longitudinal movement of the rod 125 causes the contacting inclined surface of the wedge 138 to ride up the inclined surface of the tooth 136 against the expansive force of the spring. Consequently the force required to move the rod is determined by the expansive force exerted by the spring. When the tip of the wedge 138 passes the high point of the tooth 136, the spring, acting through the inclined surfaces, will aid the further movement of the rod thus giving a snap action to the movement of the parts.

The block 133 supports the end of the rod 125 against the force of the spring 129 and is moved along with the rod by the collars 130 and 131. Likewise, the valve 134 is held against the inner surface of the bottom wall of the housing 122 by the rod 125 and spring 129 and is moved along with the rod 125 by the collars 126 and 131. In the position of the ports, as illustrated, port 91 is connected with port 157 by the recess 135 which does not connect with the general space within housing 122. When the piston 124, valve 134 and block 133 are moved to the right of their strokes, port 157 is connected with port 72 and port 91 is connected with the general space within the housing so that it may receive fluid under pressure from the pump outlet 156.

In order that the stoker bars 25 and gates 83 may move in proper sequence, the cylinders 80 and 89 are each provided with two longitudinally spaced ports in the central part of their side walls. The opening and closing of these ports is controlled by the position of the pistons 81 and 101 within the cylinders and the result is that the pistons 81 and 101 act as valves to further control the supply of fluid under pressure to the cylinders 40 and 60. The valves 49, 66, 90 and 104 are one-way valves, allowing fluid to flow through them only in the direction of the arrows.

Assume the system of Figure 5 applied to a stoker installation, viewed from the front, with the cylinders in their proper relative positions. The left stoker bar is in its outward position and the left gate is in its lower position closing off the opening 88 above the bar. The right stoker bar is in its inward position and the upper position of piston 101 indicates that the gate above this bar is up. Now, in order that the left bar may feed fuel it is necessary to first raise the left gate and in order that the right bar may not withdraw live coals from the furnace, the right gate should be lowered before the bar begins its outward movement. This sequence is brought about by the following means. Fluid coming from the pump 154 reaches casing 122 through tube

156 and enters tube 72 from where it branches into tubes 73 and 71. The fluid in tube 73 flows into 81 and acts against piston 81, raising the same and consequently the left gate. As piston 81 reaches the upper end of its travel, port 49 is uncovered and the fluid under pressure flows through tube 47 and acts against the outer end of piston 41 to move the piston and the left stoker bar inwardly to feed a charge of fuel to the bed. At the same time the fluid in branch tube 71 passes through tube 103 and moves piston 101 downwardly thus closing the right gate and uncovering port 105. This enables fluid to reach the cylinder 60 and move the piston 61 and right stoker bar outwardly.

As piston 81 moves upwardly the fluid above it (not under pressure) is discharged through tubes 77, 91, recess 135, and tube 157 to the reservoir 160. As piston 41 moves inwardly, fluid in the inner end of the cylinder 40 discharges through tube 74, check valve 90, tubes 78, 77, 91, recess 135 and tube 157 to the reservoir. As piston 101 moves downwardly the fluid below it passes through tubes 70, 91, recess 135 and tube 157 to the tank 160. As the piston 61 moves outwardly, fluid in front of it moves through tubes 65, 67, check valve 66, tubes 168, 70, 91, recess 135 and tube 157 to tank 160.

It can thus be seen that the gate pistons 81 and 101 must reach the ends of their strokes before fluid is admitted to the stoker bar cylinders 40 and 60. If some obstruction prevents the downward movement of the gate, its piston continues its travel, the relative movement being taken up by the spring 83. Upon removal of the obstruction, by the inward movement of the stoker bar, for example, the spring 83 will close the gate.

Normally all pistons will reach the end of their strokes and further fluid coming into the distribution system through tube 72 will tend to flow through the tube 52. Pressure will build up within the system and an increasing force will be exerted on the head of piston 124. When this force overcomes the force of spring 129 acting through the inclined surfaces of wedge 138 and tooth 136, the piston will move to the right with a snap action, moving valve 134 to the right whereby the recess 135 will bridge ports 157 and 72 and the port 91 will be open to the general space within the housing 122 so that it may receive fluid coming into 122 through tube 156. Since tube 52 is always connected with port 72, the piston 124 will be moved to the right if sufficient pressure is reached, irrespective of the position of the pistons 41 and 61. Therefore, even if the movement of the stoker bars is obstructed, the reversing valve will operate and cause the bars to move in opposite directions. The advantages of this feature should be obvious. In many instances the reversal of movement will free the bar or remove the obstruction, allowing the stoker to continue its normal operation. No attention is required. Also it should be noted that if one of the bars becomes immovably jammed, the other bar will continue its normal operation, thus maintaining the fire.

Upon shifting of the valve 134 to the right, fluid passes from the pump 154 through tube 156 and casing 122 into tube 91 where it branches into tubes 70 and 71. From tube 77, the fluid flows against piston 81, moving it down, through tubes 75, 74 and into cylinder 40, moving piston 41 and the left stoker bar outwardly. From tube 70, the fluid flows into cylinder 100, moving piston 101 upwardly, through tube 65 and into cylinder

60, moving piston 61 and the right stoker bar inwardly. As piston 81 moves downwardly, fluid below it discharges through tubes 51, 73, 72, recess 135 and tube 157 to the reservoir 160. Fluid in front of piston 41 discharges through tube 47, check valve 49, tubes 50, 73, 72, recess 135 and tube 157 to 160. Fluid above piston 101 moves through tubes 103, 71, 72, recess 135 and tube 157 to 160. Fluid in the rear portion of cylinder 61 discharges through tube 105, check valve 104, tubes 103, 71, 72, recess 135 and tube 157 to reservoir 160. When the pistons all reach the ends of their strokes or when for other reasons no more expansion of the spaces takes place, pressure builds up in lines 91 and 90, exerting an increasing force on the right end of piston 124, moving the piston to the left against the force exerted by the spring 129, thus operating the reversing valve to cause the gates and bars to move in reverse directions. If desired, a pressure relief valve may be coupled between tubes 156 and 155 to prevent injury to the system because of excessive pressures.

In operation, the change-over device 120 is adjusted to operate at a pressure approximately twice that required for the normal operation of pistons 41, 61, 81 and 101. For example, if a pressure of 40 lbs. per square inch is found to be sufficient for the normal operation of the above mentioned pistons, the screw 128 is so set that a pressure of 80 lbs. per square inch is required to move piston 124 to the other end of its stroke. This arrangement insures the full operation of the stoker bars, if unobstructed, before their direction of travel is reversed. The speed of operation of the stoker is determined by the rate of flow of fluid from the pump 154 which rate may be controlled by manipulation of the rheostat 152. If desired, rheostat 152 may be automatically controlled by any of the known stoker control devices.

During the outward movement of the stoker bar 25, the wedge-shaped end 29 thereof passes under the fuel in hopper 14, stirring up the fuel and causing a quantity thereof to move over the high point of the wedge and fall on the bar thus insuring that some fuel will be fed with each inward movement of the bar. As the bar begins its outward movement the bed of coals will be squeezed between the gate 83 or wall 17 and the raised portion 27 of the bar which action will break up any incrustation which has begun, thus effectively preventing the formation of clinkers. At the same time some of the bed will be forced about and over the raised portion 27 where it will receive an increased supply of air to promote the thorough burning of the fuel. Before reaching the ash drop 19, unburnt particles of the fuel must traverse the inclined pan 24 through a region of high temperature, thus insuring the complete combustion of the fuel. Since the bars 25 operate in opposite directions at any one time, the entire fuel bed is periodically agitated. It can readily be seen, however, that the fuel on the bars adjacent the wall 17 is less disturbed than the fuel which has progressed to the raised portions 27. The fuel is at least partially coked before it reaches the raised portion 27.

The above specifically described embodiment of my invention should be considered as illustrative only. It is obvious that the basic concepts of my invention may be carried out by apparatus other than that described and that the stoker would be still operative without the

use of the gates 83 and their accompanying operating mechanisms.

Having thus described my invention, what I claim is:

1. In an automatic stoker, a hollow oscillating grate bar having side and top walls and an open bottom, said top wall having a raised portion adjacent one end of said bar, a wedge shaped member attached to the other end of said bar, said member being provided with a shoulder whereby fuel may be propelled along said bar towards said raised portion upon oscillation of said bar.

2. A device according to claim 1 further characterized by a multiplicity of upstanding lugs on said top wall.

3. A device according to claim 1 further characterized by a multiplicity of apertures in said top wall.

4. A stoker installation comprising a hollow closed support, a hollow grate bar slidably mounted on said support, apertures in said grate bar, a shoulder adjacent one end of said bar, a fuel hopper supported on said hollow support and encasing said shoulder, means to conduct air into said hollow support, means to conduct air from said support to said grate bar, and means on said hollow support to oscillate said grate bar to propel fuel from said hopper along said bar.

5. A stoker installation comprising a furnace having a front wall, a support within the furnace, a grate bar slidably mounted on said support and having a portion extending through an aperture in the wall, an upstanding shoulder on said bar on the portion outside said wall, said aperture extending above said bar, a fuel hopper outside said wall encasing the shouldered end of said bar, and a gate slidably mounted on said wall and adapted to close that portion of the aperture extending about said grate bar.

6. A stoker installation comprising a furnace having a front wall, an aperture in said wall, a support within said furnace, a perforated grate bar slidably mounted on said support and having a portion extending through the aperture, an upstanding shoulder on said bar on the portion outside said wall, said aperture extending above said bar, a fuel hopper outside said wall encasing the shouldered end of said bar, a gate slidably mounted on said wall and adapted to close that portion of the aperture extending above said grate bar, and means to first move said gate and thereafter move said grate bar.

7. A stoker installation comprising a hollow closed support, a hollow perforated bar slidably mounted on said support, a shoulder on said bar adjacent one end thereof, a fuel hopper about said shouldered end, means to conduct air into said support, means to conduct air from said support into said bar, a cylinder mounted on said support, a piston in said cylinder connected with said bar, and means to supply operating fluid to said cylinder.

8. A stoker installation comprising an oscillating stoker bar, a hopper, a portion of said bar extending into said hopper, an aperture in said hopper through which said bar extends, said aperture extending above said bar, a gate slidably mounted on the wall of said hopper adapted to close said extended portion of the aperture, a closed cylinder having a port at either end and a port in its side wall, a piston within said cylinder connected with said gate, fluid pressure means to operate said bar, a tube connecting said second

mentioned port with said fluid pressure means, said piston when in one position closing said second mentioned port, means to supply fluid under pressure to one of said first mentioned ports, the arrangement being such that the piston must first be moved a predetermined distance before fluid can flow through the second mentioned port and the tube into the said fluid pressure means.

9. Apparatus for the sequential operation of oscillating elements comprising fluid pressure motors connected with said elements, means to supply fluid under pressure to said motors, means controlled by the actuation of one of said motors in control of the flow of fluid to the other of said motors, and a pressure responsive element connected with said fluid supplying means operable to reverse the direction of flow of the fluid through said motors.

10. A stoker installation for a furnace comprising a hollow closed support having a horizontally disposed upper surface extending through the front wall of the furnace, a plate inclined toward the rear of the furnace and mounted on the rear portion of said support, a hollow grate bar having side and top walls and an open bottom slidably mounted on said support forwardly of said plate, said top wall being apertured and having a raised portion adjacent the end nearest the plate, said top wall sloping downwardly from the top of said raised portion toward said plate, a fuel hopper above the outer end of said support, means to longitudinally oscillate said grate bar, means on said bar to propel fuel from said hopper toward said raised portion upon oscillation thereof, means to supply air to within said support, and means to conduct air from said support to said grate bar.

11. A stoker installation for a furnace comprising a hollow closed support having a horizontally disposed upper surface extending through the front wall of the furnace, a hollow grate bar having side and top walls and an open bottom slidably mounted on said support, said top wall being apertured and having a raised portion adjacent the one end thereof, said top wall sloping downwardly from the top of said raised portion to the end of said bar, the other end of said bar being wedge shaped and having an upwardly extending shoulder, a fuel hopper supported on the outwardly extending end of said support and encasing said shoulder, means to supply air to within said support, means to conduct air from said support to said grate bar, and means to oscillate said grate bar longitudinally.

12. A stoker installation for a furnace having a front wall comprising a hollow closed support having a horizontally disposed upper surface extending through the front wall of the furnace, a fuel hopper supported on the outwardly extending end of said support, a hollow grate bar slidably mounted on said support, apertures in said grate bars, a shoulder adjacent the outer end of said bar within said hopper, means to supply air to within said support, means to conduct air from said support to said bar, and means to oscillate said bar longitudinally.

13. A stoker installation comprising a support

having a horizontally disposed supporting surface and a contiguous upwardly inclined surface, a grate bar having side and top walls and an open bottom slidably mounted on said horizontal surface, said bar extending in the direction of said inclined surface, the end of said bar adjacent said surface having a raised portion, said top wall sloping downwardly from the top of said raised portion to the end of said bar, a series of apertures in said top wall, means to oscillate said bar longitudinally, means adjacent the other end of said bar to propel fuel toward said raised portion upon oscillation of said bar, and an opening in said horizontal surface communicating with the space within said bar.

14. A stoker installation for a furnace comprising a fuel hopper adjacent one wall of the furnace, a grate bar extending from within said hopper to within said furnace and having a shoulder on the portion within the hopper, an opening in said wall extending above said bar, a slidable gate for said opening, a fluid pressure operated motor for operating said gate comprising a cylinder having a port at either end and a third port in its side wall, a piston in said cylinder yieldably connected with said gate, a second fluid pressure operated motor to oscillate said bar, means to conduct fluid under pressure to one of the first mentioned ports, and means to connect the third port with said second motor.

15. A stoker installation for a furnace comprising a fuel hopper adjacent one wall of the furnace, a grate bar extending from within said hopper to within said furnace and having a shoulder on the portion within the hopper, an opening in said wall extending above said bar, a slidable gate for said opening, a fluid pressure operated motor yieldingly connected with the gate and movable between two definite limiting positions, a second fluid pressure operated motor for oscillating said bar, means to conduct fluid under pressure to the first of said motors and thence to said second motor, the arrangement being such that the first of said motors must move to one of its limiting positions before the fluid passes to the second motor.

16. A structure according to claim 14 further characterized by a fluid pressure responsive valve connected with the said means to conduct fluid under pressure to the first of said motors for reversing the direction of flow of fluid through said motors.

17. A stoker installation comprising a pair of grate bars each provided with means to propel solid fuel therealong upon oscillation thereof, a fluid pressure operated motor for each of said bars, a source of fluid pressure, means connecting said source with said motors whereby said bars will move in opposite directions, means connecting said source with said motors whereby said bars will move in reversed opposite directions, a reversing valve determining the means connected, and fluid pressure responsive means connected with said first and second mentioned means in control of said valve.

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