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STOKER FOR BOILER FIRE BOXES

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Att'y.
This invention relates to an automatic fuel stoker for boiler fire boxes and more particularly to a device which is time controlled and thermostatically controlled for supplying fuel to the boiler fire box and also to a device which will automatically and simultaneously poke the fire while the fuel is being supplied.

One of the objects of the present invention is to provide a novel form of a fuel stoking device for a boiler fire box by means of which the steam pressure in the boiler may be maintained in a predetermined uniform pressure by reason of the fuel being properly supplied thereto, and the fire poked therein, obviating the necessity of constant attention by an attendant.

A further object of the invention is to provide a novel form of stoker for a boiler fire box by means of which the size of the fire is considerably reduced over the normal size of the fire and yet at the same time the heat efficiency of the fire is still maintained thereby, increasing the efficient operation of the boiler and reducing the consumption of fuel.

Another object of the invention is to provide a novel construction of a stoker for a boiler fire box in which the stoking mechanism is operatively related to a poking mechanism so that they are simultaneously actuated to poke the fire and feed the fuel.

These and other objects are accomplished by providing a construction and arrangement of the various parts in the manner hereinafter described and particularly pointed out in the appended claims.

Referring to the drawings:

Fig. 1 is a longitudinal side-elevational view partly in cross-section, of a conventional form of fire box and boiler construction showing my improved fuel stoking mechanism embodied therein.

Fig. 2, is a front elevational view of the same.

Fig. 3, is a horizontal cross-sectional view taken on the line 3-3 in Fig. 1.

Fig. 4, is a perspective view showing the manner in which the partition is guided in its movement within the fire box.

Fig. 5 is a longitudinal cross-sectional view of the clutch mechanism for driving the pokers, and

Fig. 6 is an elevational view of a portion of the clutch mechanism shown in Figure 5.

In illustrating one form of my invention, I have shown the same in connection with the conventional form of boiler which comprises the usual brick supporting structure or base, and boiler, having the usual longitudinally extending flues mounted therein.

The boiler is provided with the usual fire box, generally indicated by the reference character, pivoted grate, which comprises the plurality pivoted members, operatively connected by longitudinally extending bars. The grate is shaken by the usual form of hand lever, pivoted at 18 and a bracket 19, means of a connecting bar 20, connected at 21 to the lever and at 22 to the longitudinally extending bar 16. The fire box is also provided with a conventional form of baffle plates 23. The boiler is also provided with the usual fire box doors 24 which are pivoted on suitable pins 25 on the opposite sides of the fire box.

One of the essential features in connection with my improved form of a stoker comprises a partition wall in the form of a vertically extending plate 26 which is mounted substantially midway between the front and rear ends of the fire box and is adjustable to and from the mid position of the fire box by means of two oppositely disposed channel-shaped members 27, secured to the opposite side walls of the fire box and engageable with suitable lugs 26' formed on the opposite ends of the vertically extending wall 26. The vertical partition wall 26 is provided with a plurality of spaced apart apertures as shown at 28, through which is adapted to be reciprocated, a plurality of longitudinally reciprocable pokers 29. The pokers 29 are connected at their rear ends by means of a transverse bar 30. The opposite ends of the transverse bar 30, are adapted to be guided by and reciprocated in the grooved or channel members 27, secured to the opposite sides of the fire box 13. The pokers 29 are reciprocated in the operation of poking the fire by means of a pitman connection 31 which has one end...
thereof, pivotally connected at 32 to a bevelled gear 33, and the other end thereof, pivotally connected to a bevelled gear 33, and the other end thereof, pivotally connected at 34 to a link 35. The link 33 is pivotally connected by means of a pin 36 to rearwardly extending ears 37 formed integrally on the transverse bar 30. The bevelled gear 33 is journalled on a shaft 38 secured in a bracket 39, which in turn is secured by means of bolts 40, to the front end of the fire box. The pokers 29 are normally withdrawn from the fire by means of two springs 41 which have their forward ends connected in any well known manner as shown in 43, to a casing 43 and their rearward ends connected as shown in 44, to forwardly extending portion or arms 45 which are secured to the transverse bar 30 in any well known manner. The casing 43 is secured to the forward side of the fire box or boiler in any well known manner. Mounted in suitable bearings 46 and 47, supported on standards 48 and 49, respectively, are two shafts which sections are indicated by the reference characters 51 and 52. The shaft 52 is provided on one end with a pinion 53, which meshes with the bevelled gear 33, within the casing 43. The other end of the shaft 52 is provided with a reduced hexagonal portion 54, which is adapted to be engaged by and between clamping portions 55 and 56 of the shaft 51. The clamping portion 55 of the shaft 51 is provided with a semi-circular recess as shown at 57 which is slightly larger than the diameter of the hexagonal portion 54. The clamping member 56 is provided with a flat or disc-like portion 56 which is pivotally mounted in a slot 57 by means of a pin 58 extending through the shaft 51, adjacent the semi-circular extension 55. The clamping member 56 has its inner surface as shown at 52 cut away so as to conform with at least three surfaces of the hexagonal portion 54 of the shaft 52, in order that the same may positively grip the hexagonal portion 54 when operatively driving the shaft 52. Secured to the semi-circular extension 55 by means of rivets 53', is a helical coil spring 54' which has its outer end provided with a weight 55'.

This construction it will readily be seen that when the shaft 51 reaches a pre-determined speed, the spring 54 will completely encircle and clamp the clamping member 56 upon the hexagonal extension 54 of the shaft 51 so as to form a positive driving connection between these two shafts, and when the motor ceases to drive the shaft 51 the tension of the spring 54' will be released, thereby permitting the shaft 52, as well as the hexagonal extension 54, to rotate independently of the shaft 51. The centrifugal action of the revolving shaft causes the weight to swing out laterally from the shaft and thereby exerting pull on the spring in such a manner as to clamp the member 56 upon the hexagonal portion of the shaft 52. This clutch or driving mechanism is mounted within a casing which comprises two concave disc-like members 59 and 60 which are secured together by means of bolt 61 which extend through corresponding registered ears formed on each of these casing members. These disc-like members 59 and 60 are provided with bearing portions 62 and 63 which engage the corresponding adjacent portions of each of the shafts 51 and 52. The shaft 50 derives its power from a motor 62 which is preferably an electric motor, which in turn drives a worm 62' mounted in suitable bearings 63. The worm in turn meshes with a worm wheel 64, secured to shaft 65 which in turn is journaled in suitable bearings 66. The shaft 65 is provided with a sprocket wheel 67 which in turn drives a sprocket wheel 68 secured to shaft 52 by means of a chain 69.

From the construction thus far described, it will be seen that when the motor is thrown into operation by turning on the current of electricity, the worm 62' drives the worm wheel 64 which in turn drives the shaft 51 through the medium of the chain 69, sprocket wheels 67 and 68.

This drives the shaft 52 through the medium of clutch mechanism. As the shaft 52 revolves, the pinion 53 secured thereon, drives the bevelled gear 33 forcing the pitman connection 31, whereby in turn forces the pokers 29, through the apertures 28 formed in the vertical partition wall 26 thereby poking the fire. When the pokers 29 reach a position in which they extend into the fire and the motor ceases to operate, the clutch releases its grip on the hexagonal portion 54', and the shaft 52 is free to rotate independently of the shaft 51, at which time the springs 41 will withdraw the pokers from the fire and cause the bevelled gear 33 and pinion 31 to revolve or be free of the movement of the shaft 51 by reason of the clutch mechanism.

My novel form of fuel feeding mechanism comprising a hopper 70 which is normally positioned in an inclined position and supported on the front wall of the boiler by being bolted thereto in any well known manner. The hopper 70 is provided adjacent its lower ends with a cylindrical portion as shown in 73 which in turn communicates with an opening as shown at 74 into the fire box of the boiler. Mounted within the cylindrical chamber 73 is a rotary fuel feeding member 75, which comprises four vane-like blades 76 which extend across substantially the entire opening 74, forming the entrance to the fire box. This rotary feeding member 75 is mounted on a suitable shaft as shown at 77, which in turn is journaled in suitable bearings, (not shown) in the opposite sides of the hopper. One end of the
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shaft 77 is provided with a sprocket wheel 78 which in turn is operatively geared to the shaft 51 by means of a sprocket wheel 79 and chain 80. The lower side of the cylindrical portion 73 of the hopper 70, is provided with an inclined portion as shown at 81, which terminates in a hook-like portion 82 which forms a support for engagement for the right-angularly bent portion 83 formed on the adjustable chute extension 84. The chute 84 is provided with supplemental extensions 85 and 86 which are secured together by bolts 87 mounted in registering slots in each of these extensions. The lower extension 86 is pivotally supported as shown at 88 on the vertically disposed partition or division wall 26. This construction permits the chute 84 with its supplemental extensions 85 and 86 to be lowered to the dotted line position shown in Fig. 1, so that the doors 24 of the fire box may be opened to permit easy access to the flues of the boiler when the occasion arises for the purpose of cleaning out or inspecting the flues. The hopper 70 is also further supported by a chain 89 which has one end thereof, engaging the hopper as shown at 90 and the other end thereof, engaging the brick construction as shown at 91.

The operation of my improved combination fuel stoker and poker for boiler fire boxes is as follows:

Let us assume that the hopper 70 is filled with fuel, with the fire between the division wall 26 and the wall supporting the inner ends of the flues. Let us also assume that the temperature or steam pressure has dropped below a pre-determined point and the thermostat (not shown) is actuated to close the switch and start the motor, which in turn, through the gearing mechanism above described, operatively rotates the rotary fuel feeding member 75 which discharges the fuel onto the inclined chute 84 and extensions 85 and 86 to the fire. Simultaneously with the operation of the feeding of the fuel to the fire the pokers 29 are operated or reciprocated by the pinion 53 and beveled gear 52 through the means of the clutch. This structure permits the pokers to be forced inwardly by the operation of the shaft 51 and should the motor cease to operate by reason of the steam pressure reaching a predetermined point in which the pokers have reached their furthestmost position inwardly, the action of the springs 41 withdraw the pokers from the fire preparatory to the next operation of again poking the fire.

From the above description it will be seen that I have provided very efficient and novel construction of an automatic stoker, and one in which the same may be applied to the conventional form of boiler and fire box construction with slight modification which, by reason of the construction of my vertically disposed wall, the size of the fire may be reduced so that the efficiency of the boiler will be maintained and the consumption of fuel reduced. While in the above specification, I have described one embodiment which my invention may assume in practise, it will, of course, be understood that the same is capable of modification and that modification may be employed without departing from the spirit and scope of the invention as expressed in the following claims.

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

1. A device for feeding fuel to a fire box of a furnace comprising a hopper mounted on said furnace, a rotary feeding member mounted in said hopper, an inclined extensible chute mounted in said fire box, means for supporting said chute adjacent the lower end of said hopper, an adjustable wall mounted in said fire box for supporting the inner end of said chute, and means whereby said chute may be lowered so that easy access to the fire box may be had.

2. The combination of a boiler fire box of a hopper mounted on said fire box, a rotary feeding member mounted in the lower end of said hopper for feeding fuel into said fire box, a division wall adjustably mounted in said fire box, and an inclined extensible chute pivoted to said division wall and connected with the lower end of said hopper for conveying the fuel to the fire in said fire box.

3. The combination with a boiler fire box of a hopper mounted thereon, a vertically disposed division wall adjustably mounted in said fire box for regulating the size of the fire in said fire box and a normally inclined extensible chute pivoted to said division wall and detachably connected to said hopper.

4. The combination with a boiler fire box of a hopper mounted thereon, a feeding member mounted in the lower end of said hopper for feeding fuel into said fire box, an adjustable division wall vertically mounted in said fire box, an extensible chute pivoted mounted on said division wall and detachably connected to said hopper for conveying the fuel from said hopper to the fire in said fire box.

5. The combination with a boiler fire box of a hopper therefor, a power operated fuel feeding member mounted in the lower end of said hopper for feeding the fuel into said fire box, a vertically disposed division wall adjustably mounted in said fire box and having a plurality of apertures therein, a plurality of pokers mounted in said fire box and reciprocable in the apertures in said vertically disposed wall, means for forcing said pokers through the apertures in said wall and means for withdrawing the pokers therefrom.

6. The combination with a boiler fire box of a hopper mounted thereon, a rotary fuel feeding member mounted in the lower end of said hopper for feeding fuel to said fire box, a vertically disposed adjustable division
wall mounted in said fire box for regulating the size of the fire in said fire box, an inclined adjustable chute pivotally connected to the upper end of said vertically disposed wall and detachably connected to the lower end of said hopper, whereby said chute may be disconnected from said hopper and lowered for permitting easy access to said fire box.

7. The combination with a boiler fire box of a hopper mounted on said fire box, means mounted in said hopper for feeding fuel to said fire box, a vertically disposed adjustable division wall mounted in said fire box for reducing the size of the fire in said fire box, a normally inclined chute having one end thereof, mounted on the lower end of said hopper and the other end thereof, connected to the upper end of said division wall for delivering fuel forwardly of said wall, reciprocable means mounted in said fire box for poking the fire therein and power operated means for simultaneously actuating said poking means and said fuel feeding means.

In testimony whereof he has signed his name to this specification, on this 24th day of May, A. D. 1927.

JOHN YOUNG.