Aug. 21, 1934. F. X. LAUTERBUR ET AL 1,970,858

MECHANICAL STOKER

Filed April 4, 1929 2 Sheets-Sheet 1

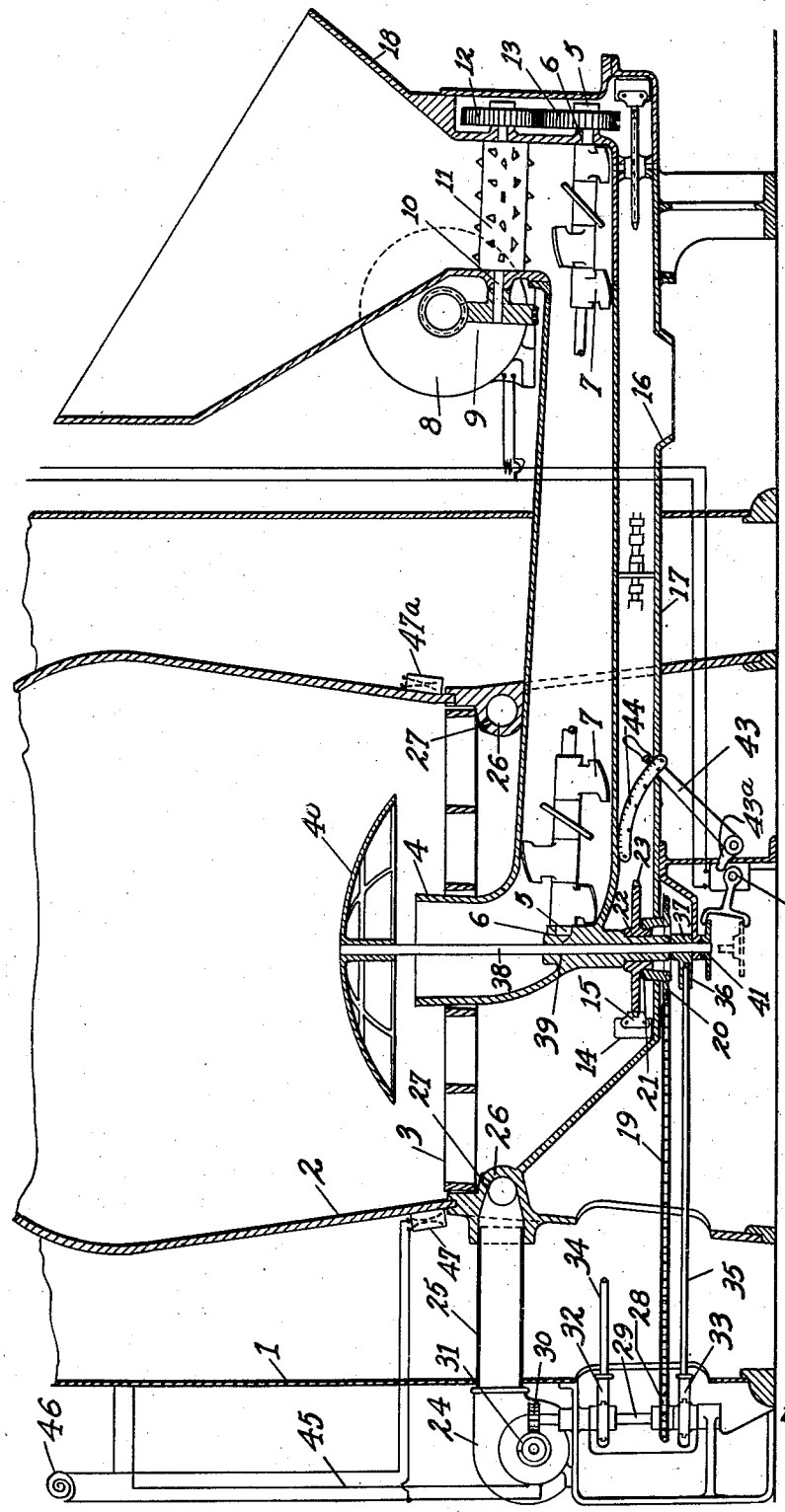


Fig. 1.

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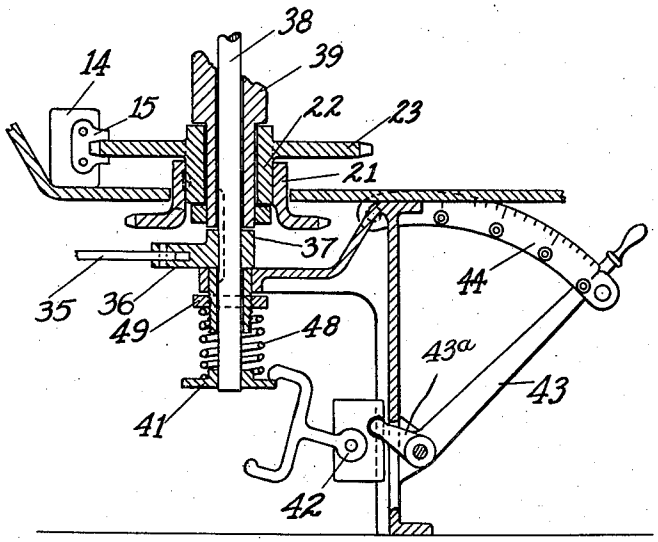


Fig. 2.

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MECHANICAL STOKER

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Application April 4, 1929, Serial No. 352,578

10 Claims. (Cl. 110—45)

Our invention relates to mechanical stokers of the full or semi-automatic type, and particularly to stokers adapted for use with domestic heating plants wherein the services of an attendant are not required.

It is the object of our invention to provide, in combination with a mechanical stoker, for a volume control preferably constructed and arranged to act as a spreader and packer for the fuel bed. A further object is the provision of a blower having a motor therefor which may be controlled by a house thermostat in conjunction with a thermal element suitably located near the grate line of the furnace, which will prevent the operation of the blower fan during such times as might result in burning out the grates.

Another object is the provision of an adjustable volume control device which can be set for different rates of quantitative distribution for different seasons. We also have as an object, the provision of an ash shaking device, which preferably operates in conjunction with the blower fan so that when the fan is inhibited by the thermostat or thermal element the shaking of the grates will be automatically stopped to allow the bed of fuel to build up, and so avoid the chance of burning out the grates.

It is our object to so construct our volume control device that movement will be imparted to the fuel distributor, which will insure an even spreading of the fuel, and at the same time, avoid the chance that the volume control will fail to operate due to channeling of the fuel.

We have as another object the introduction of blast air around the outer edge of the fuel bed, so that the centrally located feeding device will not be unduly exposed to extreme heat. We may also selectively control the distribution of blast air by means of thermal elements located at different positions in the heating plant.

The above and other objects to which reference will be made in the ensuing disclosure we accomplish by that certain combination and arrangement of parts of which we have shown one preferred modification.

Referring to the drawings:

Figure 1 is a sectional view of the mechanical stoking assembly.

Figure 2 is a sectional view, on a slightly enlarged scale in which a modified type of volume control is illustrated.

The furnace is encased in a shell 1 within which we have shown the fire pot 2, grates 3, and centrally located stoking conduit 4. The conduit flares from its inlet end to its discharge end so that the greatest tendency to block will occur nearest the driving end of the conveyor. The conveyor has a shaft 5 journaled in bearings 6, and in order to advance the fuel and at the same time crush it, we provide staggered flights of screw conveyor sections 7. The drive for the fuel feeding device is provided by a motor 8, which drives a worm wheel 9, which is mounted on a shaft 10 of a feeding device 11. A pair of gears 12, and 13 provide the driving connection with the conveyor shaft 5.

We have shown a drag link ash conveyor having projections 14 mounted on a chain 15. The ashes are carried to a discharge opening 16 in the ash conveyor casing 17. A hopper bottom chute 18 provides space for the storage of a supply of fuel for the stoking mechanism. The drive for the ash conveyor may, as indicated, be provided by a chain 19 passing around a sprocket wheel 20, which is mounted on a collar 21 which is attached to the hub 22 of the sprocket wheel 23 around which the ash conveyor chain passes.

A blower fan 24 has a discharge 25 through which blast air is directed through the manifold 26 having air passages 27 around the outer portion of the grates. The chain 19 is driven by a sprocket wheel 28 mounted on a vertical shaft 29 operatively connected by gearing 30 to the motor 31 which also drives the fan 24. The shaft 29 carries a pair of eccentric rings 32 and 33, the upper one having a connection by means of a rod 34 with a grate shaker, and the lower ring having a connecting rod 35 pivoted to the arm 36 having its hub fixed on the shaft 38 which is slidably and rotatably mounted in a bearing 39 so that, during its oscillation, through its connection with the blower fan motor it will in accordance with the feed of fuel alternately rise and fall within the stoker. The upper end of the shaft 38 carries an umbrella shaped spider 40, which acts to distribute and pack fuel within the furnace, and, through its connection with the disc 41, also controls the shutting off and the turning on of the switch 42, which controls the operation of the stoker motor 8.

We have provided a lever shifting rod 43 which by a short arm 43*a* engaging the switch box raises or lowers the switch 42, and by means of a series of graduations 44 on a sector, enables the operator to set the switch so that it will be tripped at different levels of fuel within the furnace in accordance with seasonal requirements.

The blower fan has wired connections 45 with a thermostat 46 which may be located in some convenient position, and a thermal element 47

located near the furnace grate line may be used to provide an auxiliary control for the blower fan motor. We have also shown another thermal element 47*a* which may be used for a desired purpose, such for example, as for driving another fan motor through which an air blast may be introduced into a different part of the fire.

It will be apparent that the volume control starts and stops the feeding device motor, and that the fan motor is independently controlled either by the house thermostat or the thermal element connected with the furnace. The ash conveyor is also actuated by the blower motor so that during inhibited periods of the blower motor no ashes will be withdrawn from the furnace, nor will the volume control structure spider be rocked, nor the grates shaken. While we have shown but one arrangement of actuating connections for the several elements of the stoking mechanism it will be apparent that other connections might be provided by the reversal of the driving and driven parts.

In Figure 2 we have shown a modified type of volume control in which the shaft 38 carries the disc 41 with a spring 48 which will cause the spider spreading device to press against the fuel during the feeding period. By means of an adjustment nut 49 any desired pressure may be brought to bear against the fuel which will aid in the effective spreading of the fuel, and also insure more uniform operation of the control. When the spider is raised with the rise of the fuel within the furnace, the control arm of the switch is elevated and the stoker motor is shut off. When the level of fuel is lowered, and the spider with it, the switch arm is lowered and the motor started up again.

Mechanical modifications in the particular arrangement which we have shown will occur to others skilled in the art, but insofar as such modifications represent only changes in the size and shape of parts, or in rearrangements of the driving mechanism therefor, we consider them within the scope of our invention.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent, is:—

1. In combination with a furnace having a grate, a stoker having a conduit with an outlet opening upwardly through said grate, mechanism for forcing fuel through said outlet to provide a mass of non-burning fuel thereat, to pass onto said grate for burning, a fuel-spreading member mounted for oscillation and up and down movement over said grate and said outlet, means below the outlet for oscillating said member, said member moving up or down as the fuel increases or diminishes above the outlet, and means interconnected with said member for controlling the operation of said mechanism in response to upward and downward movement of said member while lying on top of the non-burning fuel.

2. In combination with a furnace having a grate, a stoker having a conduit with an outlet opening upwardly through said grate, mechanism for forcing fuel through said outlet onto said grate, a fuel-spreading member mounted for oscillation and up and down movement over said grate and said outlet, means for oscillating said member, said member moving up or down as the fuel increases or diminishes above the outlet, and means interconnected with said member for controlling the operation of said mechanism in response to upward and downward movement of said member, said controlling means adjustable upwardly and downwardly to be operated at different heights of said member above said conduit opening.

3. In combination with a furnace and a stoker comprising a conduit with an outlet opening upwardly in the furnace, and mechanism for forcing fuel through said outlet to provide a mass of non-burning fuel at said outlet inside the furnace, a fuel-spreading member mounted for resting on top of said fuel for up and down movement therewith over said outlet, to spread the fuel for burning, and to move up and down as the fuel increases or diminishes over the outlet, means interconnected with said member operated in response to said upward and downward movement for affecting operation of said mechanism, and means resiliently resisting the upward movement of said member, to increase its effectiveness as a fuel spreader.

4. In combination with a furnace and a stoker comprising a conduit with an outlet opening upwardly in the furnace, a concave fuel-spreading member mounted over said outlet, extending outwardly and downwardly around the outlet, whereby fuel entering through the outlet has free escape over the outlet but is guided downwardly and outwardly to various surrounding parts of the furnace, around the outlet, by the lower outer edges of the member.

5. In combination with a furnace and a stoker comprising a conduit with an outlet opening upwardly in the furnace, a concave fuel-spreading member mounted over said outlet, extending outwardly and downwardly around the outlet, whereby fuel entering through the outlet has free escape thereover but is guided downwardly in the furnace, around the outlet, by the lower outer edges of the member, and means for oscillating said member relatively to said outlet, to effect a scattering action by the said outer edges of the member.

6. In combination with a furnace and a stoker comprising a conduit entering a side of the furnace and having an outlet upturned and opening upwardly in the furnace, a shaft journaled vertically in the bottom of said outlet and extending above the top thereof, means engaging with said shaft below said outlet bottom for oscillating said shaft on its vertical axis, and a fuel-spreading member mounted on said shaft over said outlet and oscillated therewith.

7. In combination with a furnace having a grate and an ash pit below the grate with an ash chute opening laterally therefrom, and a stoker comprising a conduit entering a side of said ash pit and having an outlet upturned and opening upwardly through said grate, a shaft journaled vertically in the bottom of said outlet, extending above the top of the outlet and extending below said bottom, a rotary member rotating around said shaft below said bottom in the ash pit, an ash conveyer operating through said chute and driven by said rotary member, a second rotary member rotating around said shaft below the ash pit and operatively connected to the first mentioned rotary member through the bottom of the ash pit, means for rotating the second rotary member, means engaging said shaft below said second rotary member to oscillate said shaft, and a fuel-spreading member mounted on said shaft over said outlet and oscillated therewith.

8. A combination as described in claim 6, in

which the fuel-spreading member is of concave shape and extends outwardly and downwardly around the outlet, whereby fuel entering through the outlet has free escape thereover but is guided downwardly and scattered in the furnace, around the outlet, by the oscillating lower edges of the member.

9. A combination as described in claim 7, in which the means for rotating the second rotary member comprises a shaft journaled vertically at one side of the furnace, a member rotating with this shaft, and an operative connection from this member to said second rotary member, and said means for oscillating said spreading member shaft comprises an arm fixed thereto, an eccentric fixed on the shaft that is at one side of the furnace, and a link connecting said arm and said eccentric.

10. In combination with a furnace and a stoker comprising a conduit entering one side of the furnace and having an outlet upturned and opening upwardly into the furnace, and mechanism for forcing fuel through said conduit into the furnace, comprising a motor to drive said mechanism, a member over said outlet to engage the fuel, a connecting member extending down from said fuel engaging member through the bottom of the conduit outlet and slidable upwardly and downwardly therein and having engaging means below the bottom of the outlet, a device to affect supply of energy to said motor, mounted on said furnace to slide up and down adjacent to said engaging means and having an operating element in the path of said engaging means for operating said device incident to up and down movement of said connecting member, a shaft adjacent to said device, an arm fixed on said shaft and engaging said device, said shaft extending to the exterior of the furnace, a lever fixed on said shaft outside the furnace, by means of which said device is slid up or down to vary its normal position with respect to said engaging means, and means for holding said lever in adjusted positions.

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