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FURNACE

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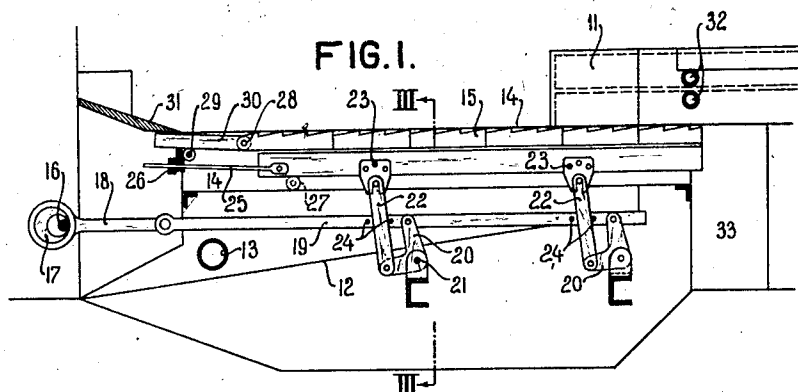
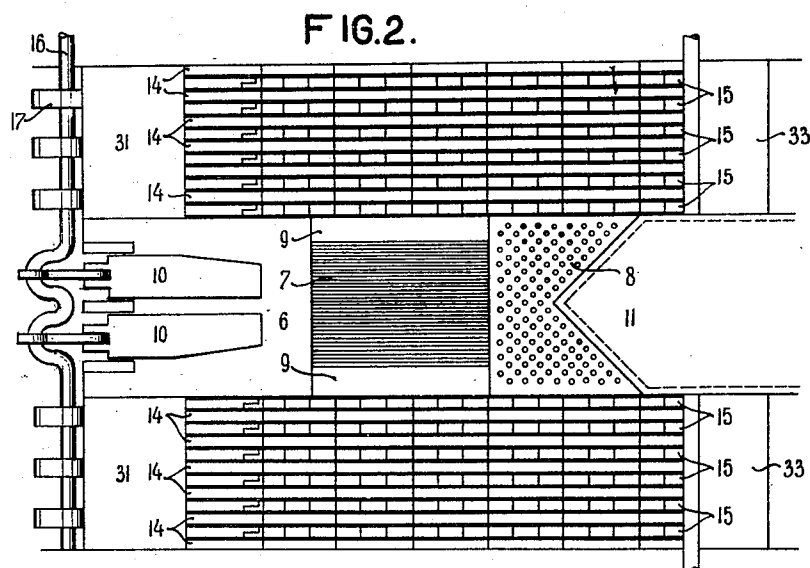
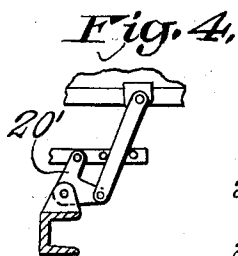
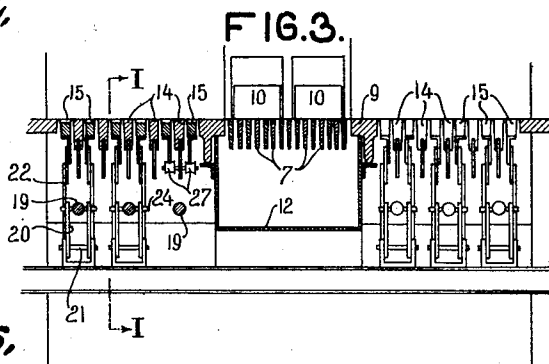
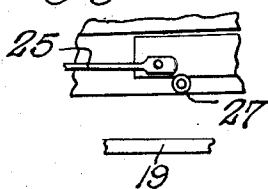
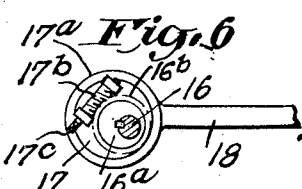


Fig. 5.



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FURNACE

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This invention relates to an improved arrangement of an automatic furnace.

The furnace arrangement of the present invention comprises a mechanical stoking appliance of the type in which the coal is supplied over a grate and at the same time spread laterally over the grate, and movable grate bars mounted adjacent (i. e. to one side or both sides of) the main grate and movable in such manner that they feed the coal and ash and slag in the same direction as that in which the coal is supplied by the said appliance.

Preferably the movable grate bars are first raised, then moved forward, then lowered and finally moved back again, the heights of the stroke both at the forward end and at the rear end of the bar being adjustable. In addition, the length of the forward and rearward strokes of each grate bar may be separately regulatable.

Thus, the fuel is brought by means of an impeller or in other manner, over a feed trough to the hearth. Ignition and partial combustion take place on the central stationary portion of the grate. From this stationary portion the coal is forced on to the movable lateral grates, where it is completely burnt. The coal is moved laterally by the lateral pressure of the impeller or by the inclination of the lateral grate. The motion of the lateral grates assists the spreading of the coal since smaller frictional resistances are offered to the movement of the coal by the moving surfaces.

As the volume of the fuel diminishes in the course of combustion and the undergrate blast air escapes through craters or holes in the coal bed, the rate of feed over the grate should not be uniform over the whole surface of the grate.

Under the present invention not only can the coal be thoroughly distributed, but the rate of feed can be reduced as the distance between the fuel or the combustion residues and the discharge end decreases. If the height of stroke of the grate bars at the forward end (at the front) is made greater than at the rear end (at the discharge end) the

coal at the front is fed more quickly than at the rear.

Also on tracks laterally adjacent one another the feeding movement should be non-uniform since the fuel passing from the feed trough and main stationary grate to the lateral grate bars has to travel over a longer or shorter path according as the transfer point is at a greater or smaller distance from the discharge end. This inequality in the distances of the green coal from the discharge end plays an important part.

In general the movable grate bar directly adjacent the stationary grate should give a slower movement to the coal than do the outer grate bars. The correct speeds can be obtained throughout by correspondingly selecting the lengths of stroke as also the heights of stroke at the front and at the rear.

The accompanying drawings illustrate by way of example one embodiment of the invention. Fig. 1 is a vertical longitudinal section of one of the lateral grates on the line I—I of Fig. 3. Fig. 2 is a plan showing the whole of the fire bottom and Fig. 3 a part rear view and part section on the line III—III of Fig. 1.

Fig. 4 is a fragmentary elevational detail of a slightly modified arrangement,

Fig. 5 is a fragmentary elevational detail of the modified mounting for the movable bars, and

Fig. 6 is a side elevational detail of an adjustable eccentric.

Referring to the drawings, the central part of the fire bottom consists of a dead plate 6, a set of grate bars 7, a perforated plate 8 and two blind or unperforated plates 9. The two impellers or plungers 10 operated in a conventional manner as indicated in Fig. 2 push the coal on to the fire bottom and feed it both forwards and laterally. A water-cooled wedge-shaped box 11 causes the partly burnt coal to move left and right on to the lateral grates. Beneath the grate 7 is mounted an air box 12 into which air is introduced under comparatively high pressure. Through lateral openings 13 adapted to be closed by dampers or the like air passes be-

neath the lateral grates, on which the coal burns relatively more quietly

Each lateral grate consists of alternate flat stationary grate bars 14 and movable serrated grate bars 15. The grate bars 15 are actuated by means of a shaft 16 and variable eccentrics 17, the eccentric rods 18 of which are each connected to a connecting rod 19. To the connecting rods are pivoted the upwardly extending arms of bell crank levers 20 which turn about fixed pivots 21 and are pivotally connected with push rods 22.

On the push rods the grate bars 15 are supported by means of brackets 23. Each connecting rod 19 actuates two successive grate bars 15 and is provided at both sides of the rod 22 with laterally extending pins 24 spaced apart a distance which is somewhat greater than the width of the bar 22.

When the eccentric 17 is rotated the corresponding bell crank levers 20 turn about their pivots an amount corresponding to the degree of eccentricity to which the eccentric has been set.

As shown in Fig. 6 an eccentric disk 16a is keyed to shaft 16 and carries a second eccentric 17 adapted for rotation thereon, the eccentric 17 having a strap 17a associated therewith. Disk 16a, which laterally projects from eccentric 17, has a worm gear rim 16b cooperating with a worm 17b rotatably mounted in bearings on one side face of eccentric 17. The shaft of said worm has a square 17c, by means of which the worm can be rotated. As a result of this rotation, the eccentricity of the eccentric 17 relative to shaft 16 and thereby the length of stroke of the eccentric rod 18 will be adjusted. It may be added that shaft 16 rotates very slowly, so that worm 17b can be turned during operation.

The vertical oscillation of the corresponding grate bars 15 is also dependent on the amount of eccentricity and further upon the ratio between the lengths of the upwardly directed and the approximately horizontal arms of the bell crank levers. If this ratio be properly selected it can be arranged that the forward end of the grate bar will be raised to a greater extent than the rear end. If the stroke of the upwardly directed arm of the bell crank lever 20 is greater than the play between the pins 24 and the rod 22, the grate bar will also perform an intermittent movement in horizontal direction. Due to this horizontal movement, the fuel is fed forwards while the vertical movement prevents the coal from caking on the grate bars.

A rod 25 passing through a stuffing box 26 provides a certain amount of frictional resistance so that the grate bar 15 will remain at rest horizontally at the point to which one of the pins 24 has moved it. If there were not sufficient resistance, the grate bar would tend to tilt forwards or backwards as it rests

with its push rods 22 in unstable equilibrium on the pivots of the horizontal bell crank lever arms. By adjustment of the eccentrics each pair of movable grate bars may have imparted to it its individual range of movement, while by regulation of the speed of rotation of the shaft 16 the rate of movement of all the grate bars will be correspondingly regulated. If desired each grate bar 15 may be arranged to be driven by an individual eccentric 17 with connecting rod 19; or larger groups of grate bars can each be actuated from one common eccentric. Moreover, all the grate bars of the lateral grates may be movable.

In Fig. 4 is shown how one bell crank lever 20' can be arranged differently from the other bell crank levers. If this bell crank lever is arranged to act on a grate bar in the same way as the others by means of a push rod 22 and stop pins 24, this grate bar will prevent the fuel from being fed too rapidly under the action of an impeller or a conveyor worm and the fuel will be better spread in a lateral direction over the wide fire bottom.

If the rate of feed at the end of a grate bar is to be practically zero, this end is preferably mounted on a roller 27 as shown in Fig. 5, the spindle of which is carried by a stationary grate bar. This roller then replaces the second push rod 22 which otherwise serves to support the movable grate bar.

Each movable grate bar is provided at its forward end with an extension 30 pivotally connected thereto at 28 and supported on a roller 29, all said extensions sliding to and fro under a sealing plate 31 which seals off the air to a sufficient extent.

The box 11 is provided with water inlet and outlet branches 32, which also form a bridge beneath which the rear ends of the grate bars extend, so that the ash and slag themselves form a seal before passing into the pit 33. The latter is covered over, so that flue dust cannot fall into it.

The eccentrics 17 can each be adjusted separately, so that the fire bottom may provide different rates of feed over its whole width. As a result it is possible to ensure that at the discharge end only ash and slag will be discharged and the last particles of coal will still be consumed directly in front thereof. Complete combustion of the coal under all conditions of operation is thus ensured.

What I claim is:—

1. In a furnace the combination, a central stationary grate, cooperating means for feeding coal to the central portion of the grate and spreading it laterally therefrom, an ash-pit at the rear end of the furnace, movable grate means arranged on opposite sides of the feeding means and the stationary grate and forwardly of the ashpit and embodying a plurality of parallel arranged longitudinally and vertically movable grate bars, means

for actuating the bars, and means for varying the stroke of some of the bars with respect to the other bars so that the speed with which the coal on said grate bars is conveyed toward the ashpit will have different values at different lateral distances from the central line of the feeding means and the stationary grate.

2. In a furnace as claimed in claim 1, operating and supporting means for carrying out the raising and longitudinal movement of the grate bars and including means for imparting a raising inward movement and lowering movement and return movement of the bars, said means being connected with the bars in such manner that the portions adjacent the outer ends of the bars are raised to a higher extent than the inner ends of the bars.

3. In a furnace as claimed in claim 1, wherein stationary bars are alternately arranged between the movable grate bars, reciprocating rods arranged beneath the stationary bars, pivotally mounted bell crank levers having their vertical portions connected to the rods, links connected to the horizontal portions of the bell crank levers and pivotally connected to the under surface of the movable grate bars, and means on the rods for guiding the links.

4. In a furnace as claimed in claim 1, wherein stationary bars are alternately arranged between the movable grate bars, reciprocating rods arranged beneath the stationary bars, pivotally mounted bell crank levers having their vertical portions connected to the rods, links connected to the horizontal portions of the bell crank levers and pivotally connected to the under surface of the grate bars, means on the rods for guiding the links and the horizontal portions of the bell crank levers adjacent the outer ends of the bars at the front of the furnace being longer than the horizontal portions of the innermost disposed bell crank levers, substantially as and for the purpose set forth.

In testimony whereof I affix my signature.

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