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2,654,331

STOKER APPARATUS

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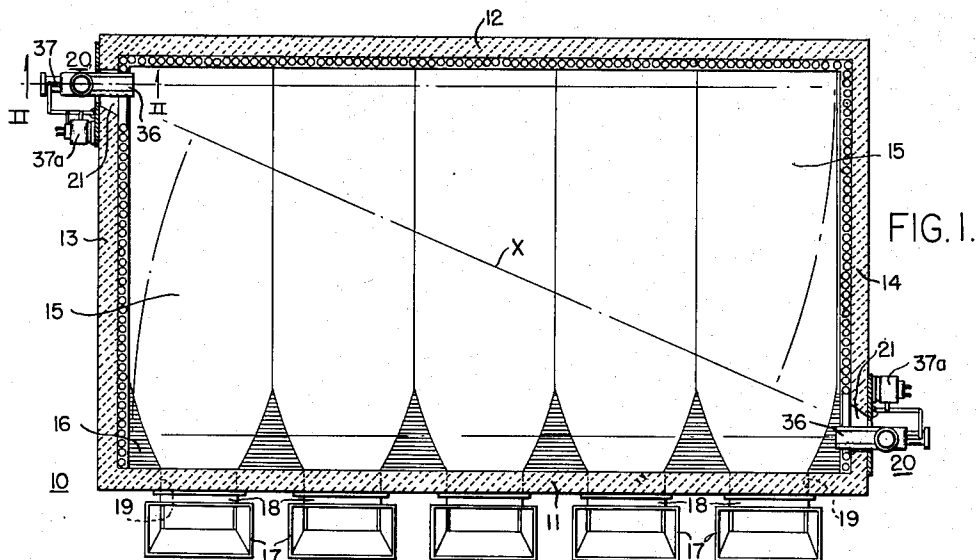


FIG. 1.

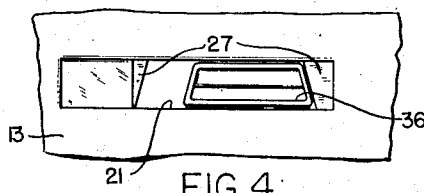


FIG. 4.

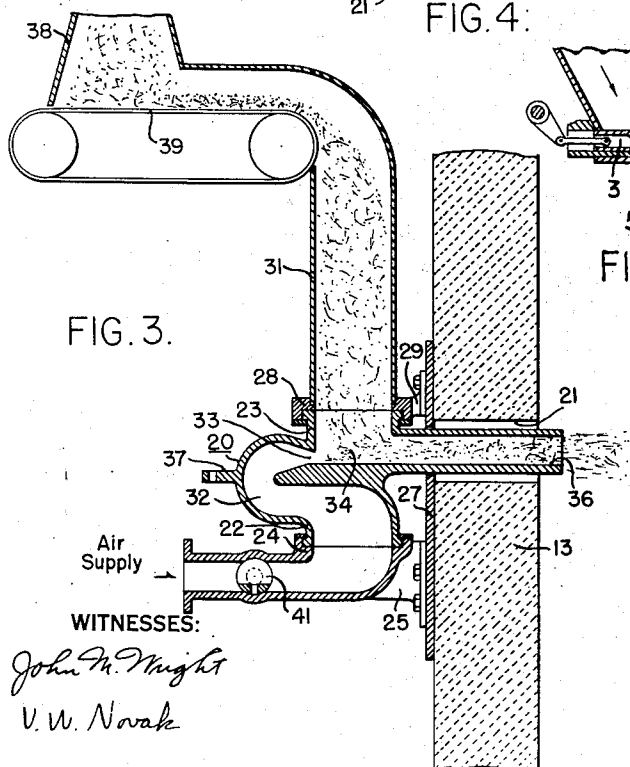


FIG. 3.

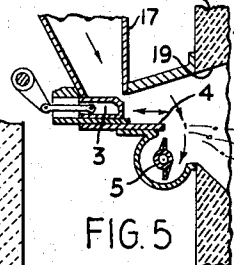


FIG. 5.

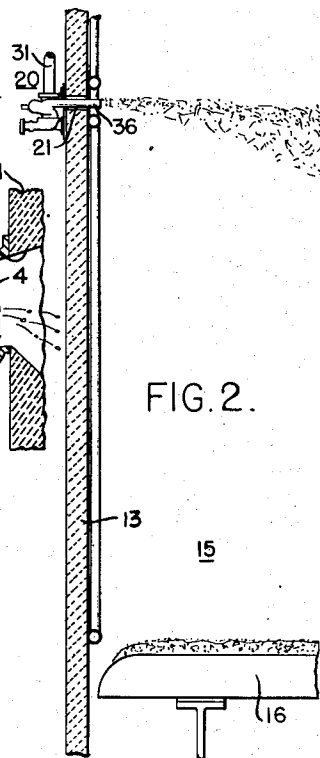


FIG. 2.

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3 Claims. (Cl. 110—104)

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This invention relates to stokers, more particularly to stokers of the spreader type and has for an object to provide an improved arrangement of spreader-type stokers for supplying both coal and wood to a furnace.

Yet another object of the invention is to provide novel mechanism for supplying fuel from a pair of spreader-type stokers to a rectangular grate surface in such a manner that substantially the entire area of the grate is uniformly supplied with fuel.

Another object of the invention is to provide novel means for varying the trajectories of fuel blown into a furnace, together with means for preventing furnace pulsations normally resulting therefrom.

These and other objects are effected by the invention as will be apparent from the following description and claims taken in connection with the accompanying drawings, forming a part of this application, in which:

Fig. 1 is a horizontal sectional view of a furnace equipped with the novel arrangement of fuel spreading mechanism constituting the subject matter of the present invention;

Fig. 2 is a vertical sectional view taken along the line II—II of Fig. 1, looking in the direction indicated by the arrows;

Fig. 3 is an enlarged fragmentary view of the nozzle structure shown in Fig. 2;

Fig. 4 is a fragmentary elevational view of the discharge end of the nozzle structure of Fig. 3, and,

Fig. 5 is a vertical sectional view through one of the fuel feeders of Fig. 1.

Referring now to the drawings in greater detail, the reference character 10 indicates, in its entirety, a furnace comprising front and rear walls 11 and 12, respectively, and opposed side walls 13 and 14 cooperating with the front and rear walls 11 and 12 to define a combustion chamber 15.

Conventional grate structure 16 extends between the four walls and defines a bottom for the combustion chamber 15.

Coal is fed to the fuel supporting surface of the grate in the usual manner from hoppers 17 by spreader type fuel feeders 18, the fuel being projected through openings 19 in the furnace front wall onto the fuel-supporting surface of the grate 16.

The fuel feeders 18 may be of any conventional form, for example, of the forms shown in applicant's previously issued Patents Nos. 2,386,336 and 2,387,600. As herein illustrated, the feeders

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18 may include a ram 3 for pushing fuel, fed from hopper 17, to the rear discharge edge of a spill plate 4 for gravity feed to the blades of a rotary impeller 5 which projects the fuel rearwardly through the opening 19 in the furnace front wall 11 to the grates 16.

In many installations wood is available to supplement the coal as a fuel supply and, in order to effectively feed such wood fuel to the grate surface, the furnace may be provided with a pair of nozzles, indicated in their entirety by the reference character 20. In accordance with the present invention, one nozzle 20 is associated with the side wall 13 near the rear wall 12 and another nozzle 20 is associated with the opposite side wall 14 but near the front wall 11 with the two nozzles in substantially diametrically opposed relation.

Each nozzle 20 is mounted for limited oscillatory motion about a vertical axis and extends through an opening 21 in the furnace side wall with which it is associated, the opening being of sufficient lateral extent to provide for the limited oscillatory motion desired.

Referring now to Fig. 3, each nozzle 20 includes a lower flanged inlet 22 for admission of air to the nozzle and a corresponding flanged upper inlet 23 for admission of fuel to the nozzle. The flanged inlet 22 is rotatably mounted in a mating air supply inlet fitting 24 which is supported in fixed position by bracket 25 to a plate 27 mounted on the outer surface of the furnace side wall 13. Similarly, the flanged fuel inlet 23 is rotatably mounted in a mating fuel supply fitting 28 which is secured by bracket 29 to the plate 27 which carries the lower air supply fitting 24. The fuel supply fitting 28 is secured to the lower end of a fuel supply conduit 31 which functions in a manner to be described later.

The nozzle 20 includes a main oscillatory casing 32 provided with an air passage which leads from the inlet fitting 22 to a Venturi passage 33, the latter discharging into a mixing chamber 34 from which combined air and wood particles are discharged through an exhaust nozzle 36 to the combustion chamber 15 of the furnace. The main nozzle body 32 may be provided with a bracket 37 or similar means to which suitable mechanism, such as a servo-motor 37a may be connected for imparting the desired oscillatory motion to the nozzle 20.

Wood particles may be supplied from any suitable storage device (not shown) to a vertical conduit 38 from which they are deposited upon the upper run of an endless belt 39 conveying

them horizontally any required distance to the upper or inlet end of the vertically disposed supply conduit 31 which communicates, as previously indicated, with the mixing chamber 34 and the nozzle 20.

It will be apparent that when wood and air are supplied to the nozzle 20, the airborne wood particles will be projected into the combustion chamber and, as the nozzle is oscillated, the trajectories of the wood particles will be swept through an arc which arc will be between limits which at one side will be either the front or rear wall of the furnace and at the other side will be a diagonal connecting the two nozzles, as indicated by the dot-and-dash line "X" in Fig. 1. As indicated in the latter figure, this arrangement provides for supply of wood particles to substantially the entire area of the grate surface.

In installations where the width of the furnace is fairly long, it will doubtless be desirable to provide means for varying the trajectories of the wood particles to vary the distances they travel and hence the points at which they fall to the grate surface. In any event, the nozzles should be located a substantial distance above the grate surface in order that the fuel particles will not fall upon the grate until they have traveled the desired distance transversely of the grate. Also, with relatively wide grates, means should be provided for varying the air pressure in order to vary the trajectory of the fuel, and to the end, there is shown schematically at 41 in Fig. 3, a device which, when constantly rotated, will continually vary the amount of air admitted to the nozzle and hence will continually vary the trajectories of the airborne fuel particles.

In order to prevent furnace pulsations resulting from variations in the air pressure supplied to the nozzle, the installation should include suitable mechanism (not shown but obvious to one skilled in the art) for increasing the air pressure supplied to one nozzle while decreasing the pressure of air supplied to the other nozzle so that the total pressure and quantity of air supplied to the furnace will remain substantially constant for any given set of operating conditions.

While the drawings and above description relate to a preferred embodiment of the invention wherein the nozzles are utilized for supplying wood as a supplemental fuel, it will be apparent to those skilled in the art that the nozzles may be used for wood alone or for any other fuel alone, or in combination with coal. Consequently, while the invention has been shown in but one form, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various changes and modifications without departing from the spirit thereof.

What is claimed is:

1. In a furnace, front, rear and side walls defining a combustion chamber; grate structure forming a bottom for said chamber; one or more spreader-type stokers associated with said

front wall for feeding fuel to the grate structure through corresponding openings in said front wall; a nozzle associated with each of said side walls, one of said nozzles being near the front wall and the other nozzle being near the rear wall; means mounting said nozzles for limited oscillatory movement about substantially vertical axes; means for feeding airborne fuel through said nozzles to the grate structure; and means for imparting oscillatory motion to said nozzles to feed the airborne fuel to the grate over two segments of circles covering substantially the entire grate surface.

2. In a furnace, first and second opposed side walls; third and fourth opposed side walls joining the first and second walls and defining therewith a combustion chamber rectangular in horizontal cross section; rectangular grate structure forming a bottom for said chamber; one or more fuel-feeding devices associated with the first side wall for feeding fuel to the grate; a nozzle associated with each of said third and fourth side walls, one of said nozzles being near the first side wall and the other nozzle being near the second side wall whereby they are located substantially diagonally opposite each other; means for feeding airborne fuel particles through said nozzles to the grate; and means mounting said nozzles for oscillatory movement about substantially vertical axes between limits such that one nozzle feeds fuel particles to approximately one half the total area of the grate and the other nozzle feeds fuel particles to approximately the other half of the total area of the grate, said halves lying substantially at opposite sides of a line joining the diagonally-disposed nozzles.

3. In a furnace, four walls defining a rectangular combustion chamber; grate structure forming a bottom for the combustion chamber; a nozzle associated with each wall of an opposed pair of the four walls, each of said nozzles being disposed near an end of its wall and the two nozzles being near diametrically-opposed corners of the rectangular combustion chamber; means mounting said nozzles for limited oscillatory movement about substantially vertical axes; means for feeding fuel through said nozzles to the grate structure, and means for imparting oscillatory motion to said nozzles to feed the fuel to the grate over two segments of circles covering substantially the entire grate surface.

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