

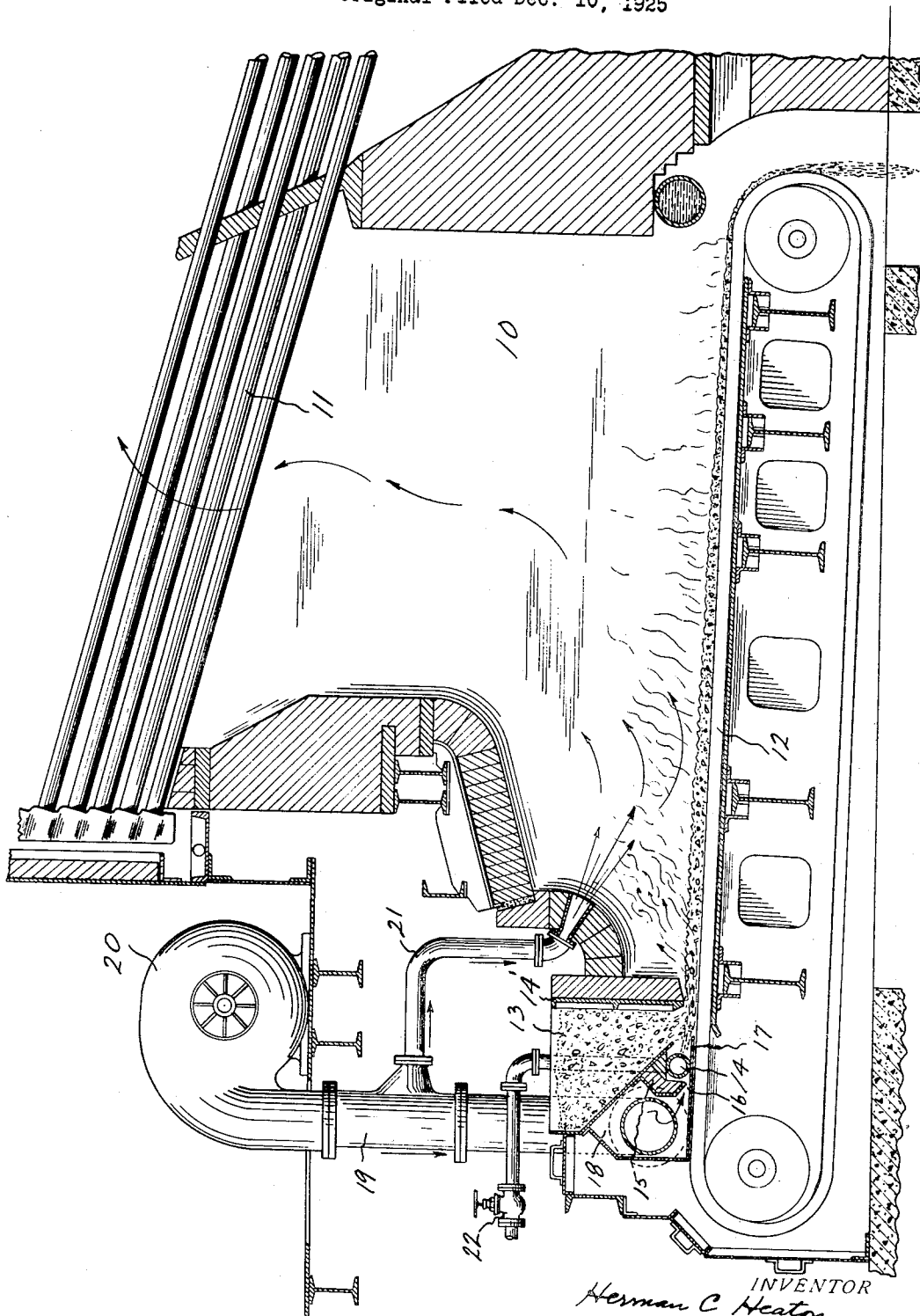
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FURNACE

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FURNACE

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My present invention relates to furnaces, particularly such as burn primarily solid fuel and are provided with apparatus for carrying the fuel into the furnace, and will be best understood from the following description and the annexed drawing, the drawing showing a longitudinal section of a steam boiler furnace by which my invention may be carried out.

In the furnace illustrated, a main combustion chamber 10 is located beneath a water tube boiler having water tubes 11. A chain grate stoker 12 of a well-known design is positioned in the usual manner at the bottom of the furnace chamber, the fuel for the chain grate being delivered thereto from the hopper 13, such fuel flowing beneath the gate 14' which may be adjusted to regulate the rate of such flow.

By my present invention, I pre-ignite the fuel at or about the time it is delivered to the chain grate and by such pre-ignition moreover, I drive off a considerable quantity of the more readily volatile matter into the furnace chamber 10.

In the specific form of furnace which I have chosen for purpose of illustration, I provide a fluid fuel supply pipe 14 just above the upper run of the grate 12, the pipe 14 extending transversely of the grate and having a number of openings in its side directed toward the fuel being delivered to the grate from the hopper 13, the front or forward edge of the hopper being elevated above the upper run of the grate a sufficient distance for this purpose. Surrounding the pipe 14 is a refractory wall 15 forming a small combustion chamber around the pipe 14, and preferably I supply combustion air to this small combustion chamber through the space 16 between the plate 17, positioned just above the upper run of the grate, and the lower edge of the refractory wall 15. An air chamber 18 extends along the lower part of the hopper 13 transversely of the grate and in front of the wall 15, air from this chamber 18 flowing through the space 16 into the small combustion chamber, where it mingles with the fluid fuel from the pipe 14. This combustion air may be supplied to the air chamber 18 through the duct 19 by a fan 20. Additional combustion air may be supplied directly into the main combustion chamber 10 at a point adjacent the entrance of the solid fuel into such combustion chamber through the branch pipe 21.

In operation, the chain grate carries the solid fuel from the hopper 13 toward the right in the figure. The fluid fuel, the rate of supply of which is controlled by the valve 22, projects

a flame (supported by the combustion air from the fan 20) against the fuel flowing from the hopper 13 and ignites the same substantially as it is being carried beneath the gate 14'. The combustion air flowing upwardly through the grate 12 then continues this combustion and the gases, which will arise in considerable quantity from the fuel as soon as it passes the gate 14', receive additional combustion air from the branch pipe 21.

In some cases, particularly with certain kinds of fuel, the supply of liquid fuel through the pipe 14 may be discontinued after the ignition of the solid fuel has been fully developed, the heat from the igniting fuel being sufficient to ignite the fresh supply coming from the hopper 13.

If desired, a surplus amount of combustion air may be supplied through the space 16 and the supply through the branch 21 will then be unnecessary.

It will be understood that, when in the foregoing description, I have used the expression "fluid fuel", I mean to include in such expression, any fuel which can be forced through a small opening, such as gas, oil, or powdered coal.

It will be understood that the arrangement which I have shown is merely illustrative and that the embodiment of my invention may be widely varied.

I claim:

1. In a furnace, a solid-fuel feeding apparatus for moving fuel into the furnace, means to deliver fuel to said apparatus, means to apply flame to the solid fuel in proximity to its point of delivery to said apparatus, and means to supply combustion air to the furnace chamber above the solid fuel.

2. In a furnace, a solid-fuel feeding apparatus for moving fuel into the furnace, means to deliver fuel to said apparatus, means to supply flame to the solid fuel in proximity to its point of delivery to said apparatus, said means including a fluid-fuel supply adjacent said point, and means independent of said fluid-fuel supply to supply combustion air to the fluid fuel above the grate.

3. In a furnace, a solid-fuel feeding apparatus for moving fuel into the furnace, means to deliver fuel to said apparatus, means to apply flame to the solid fuel in proximity to its point of delivery to said apparatus, said means including a fluid-fuel supply adjacent said point and means to supply combustion air to the fluid fuel, and means independent of said fluid-fuel supply

to supply combustion air to the furnace chamber above the solid fuel.

4. In a furnace, a solid-fuel feeding apparatus for moving fuel into the furnace, a hopper to deliver fuel to said apparatus, a fluid-fuel supply having its opening adjacent the outlet of the hopper and directed at the solid fuel passing from the hopper to said apparatus, and means independent of said fluid-fuel supply to supply combustion air to the furnace chamber above the solid fuel.

5. In a furnace, a solid-fuel feeding apparatus for moving fuel into the furnace, a hopper to deliver fuel to said apparatus, a fluid-fuel supply having its opening adjacent the outlet of the hopper and directed at the solid fuel passing from the hopper to said apparatus, and means independent of said fluid-fuel supply to supply combustion air to the fluid-fuel above the grate.

6. In a furnace, a solid-fuel feeding apparatus for moving fuel into the furnace, a hopper to deliver fuel to said apparatus, a small combustion chamber adjacent the mouth of the hopper on the side away from the direction of the travel of fuel on said apparatus, said small combustion chamber having one side open to the fuel flowing from said hopper, a fluid-fuel supply and a combustion air supply independent of said fluid-fuel supply for said small combustion chamber, and means to supply combustion air to the main furnace chamber above the solid fuel.

7. In a furnace, a chain grate stoker, a hopper above the grate at one end thereof and open at the bottom to supply solid fuel to the grate, a fluid-fuel pipe extending across the grate in front of the hopper and having openings toward the fuel flowing from the hopper to the grate, a small combustion chamber having its walls substantially surrounding said fluid-fuel pipe, with an opening in said small combustion chamber toward and adjacent the hopper outlet, means independent of the fluid-fuel supply to supply combustion air to said small chamber, and means to supply combustion air to the furnace chamber above the grate and adjacent the point of entrance of the solid fuel into the furnace chamber.

8. In a furnace, a chain grate stoker, means to deliver solid fuel thereto, means for introducing a mixture of fluid-fuel and air into the solid fuel as it approaches the furnace, and means for introducing a supplemental air supply into the furnace above the grate at the end to which the solid fuel is fed.

9. In a furnace, a chain grate stoker, means to deliver solid fuel thereto, means for introducing a mixture of fluid-fuel and air into the solid fuel as it approaches the furnace, means for introducing a supplemental air supply into the furnace above the grate at the end to which the solid fuel is fed, and means for passing air through the chain grate.

10. In a furnace, a chain grate stoker, means to deliver solid fuel thereto, means for introducing a mixture of fluid-fuel and air into the front of the fuel bed as it approaches the furnace, and means for introducing a supplemental air supply into the furnace above the grate at the end to which the solid fuel is fed.

11. In a furnace, a chain grate, a hopper to

deliver solid-fuel to the upper run of the grate to form a bed thereon, a small combustion chamber having an outlet adjacent the outlet of the hopper and extending transversely of the grate, means to discharge fluid-fuel into said chamber, and an air chamber extending transversely of said grate and disposed adjacent said combustion chamber, said chambers being constructed and arranged for the discharge of air from the air-chamber to the combustion chamber in a direction lengthwise of the grate and substantially throughout the width of the grate.

12. In a furnace, a chain grate, a hopper to deliver solid fuel to the upper run of the grate to form a bed thereon, a small combustion chamber having an outlet adjacent the outlet of the hopper and extending transversely of the grate, with said outlet directed toward the bed of fuel, and an air chamber extending transversely of the grate and disposed along said combustion chamber, said chambers being connected substantially throughout their length so that air may be supplied from the air chamber to substantially all parts of the combustion chamber.

13. In a furnace, a solid fuel-feeding apparatus for moving fuel into the combustion chamber of said furnace, means to deliver fuel to said apparatus, means to apply heat independent of that generated by combustion of said solid fuel to the solid fuel in proximity to its point of delivery to said apparatus and in advance of its delivery to said combustion chamber, and means to supply combustion air to the combustion chamber above the solid fuel.

14. In a furnace, a chain grate stoker for moving fuel into the combustion chamber of said furnace, means to deliver fuel to said stoker, means to apply heat independent of that generated by combustion of said solid fuel to the solid fuel in proximity to its point of delivery to said stoker and in advance of its delivery to said chamber, and means to supply combustion air to the combustion chamber above the solid fuel.

15. In a furnace, a solid fuel-feeding apparatus for moving fuel into the combustion chamber of said furnace, means to deliver fuel to said apparatus, means to apply sufficient heat independent of that generated by combustion of said solid fuel to the solid fuel in proximity to its point of delivery to said apparatus and in advance of its delivery to said combustion chamber to distil volatile products from said fuel, and means to supply combustion air to the combustion chamber above the solid fuel.

16. In a furnace, a solid fuel-feeding apparatus for moving fuel into the combustion chamber of said furnace, means to deliver fuel to said apparatus, means to apply sufficient heat independent of that generated by combustion of said solid fuel to the solid fuel in proximity to its point of delivery to said apparatus and in advance of its delivery to said combustion chamber to distil volatile products from said fuel and deliver said volatile products to said combustion chamber above the solid fuel, and means to supply combustion air to the combustion chamber above the solid fuel.

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