

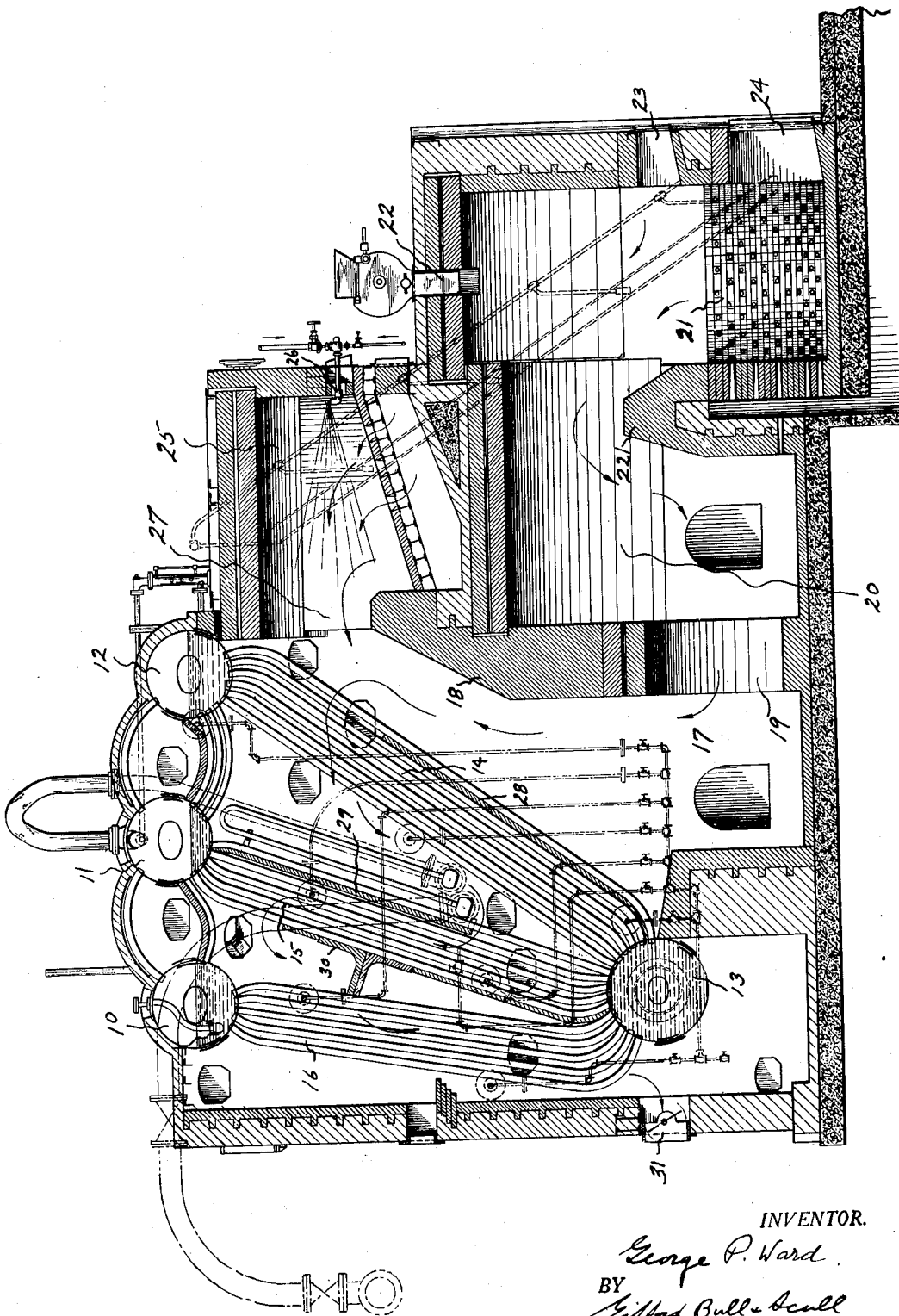
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FURNACE

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FURNACE.

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My present invention relates to a furnace associated with a steam boiler and provided with separate fire boxes in which solid fuel and fluid fuel may be burned, respectively.

One of the objects of my invention is to provide a compact arrangement in which either fuel may be used separately or both in combination with efficient results. Another object of my invention is to provide an arrangement in which the two fire boxes may be combined in a compact manner and so that the operation of either one will not be interfered with by the presence of the other. With these and other objects in view, my invention consists in the arrangements and constructions hereinafter described and more specifically pointed out in the appended claims.

In the drawings I have illustrated one embodiment of my invention in a furnace connected to a Stirling boiler of a known type, with the fire boxes arranged to burn bagasse and oil, respectively.

The boiler has three upper steam and water drums 10, 11 and 12 and a mud drum 13 connected by vertically inclined banks of water tubes 14, 15 and 16, the boiler being placed in a setting over a combustion chamber 17.

A wall 18 replaces the usual front furnace wall for such a boiler and through it is a gas inlet 19 connecting with a combustion chamber or gas passage 20 separated from the bagasse fire box proper 21 by a bridge wall 221. The bagasse may be supplied through an opening 22 in the roof of the fire box and access openings 23 and 24 are provided through which the fire may be reached by the operator of the furnace.

Above the gas passage 20 and located so as not to interfere with the bagasse feed, opening 22 is a fluid fuel fire box or combustion chamber 25 provided with an oil burner 26 at its front end and having a connection through the opening 27 with the combustion chamber 17.

Preferably, the front bank of tubes 14 which constitutes the rear of the combustion chamber 17 is provided with a baffle 28 extending upwardly from the mud drum 13 and terminating short of the drum 12. This baffle 28 may be located in front of the entire bank, but preferably I locate it behind one or more rows of tubes of this front bank. At the rear of the bank 14 is a baffle 29 extending downward along the tubes of the bank 15 from

the drum 11 and terminating short of the drum 13. Another baffle 30 extends upward from the drum 13 toward the drum 11 at the rear of the bank 15. A gas outlet 31 is provided at the lower rear part of the setting.

In operation, bagasse is charged into the fire box 21 and burned, the heated gases therefrom passing through the gas passage 20 where they are more thoroughly combined and burned, and from thence pass through the opening 19 into the lower part of the combustion chamber 17. For some purposes, and at some stages of the operation, the heat derived from this burned bagasse will be sufficient. In the event that the supply of bagasse is insufficient for steaming purposes or does not give the amount of heat desired, then the burner 26 may be brought into action, access to the burner being had without interfering with the bagasse supply through the opening 22. The hot gases from the oil burned in the fire box 25 will pass through the opening 27 into the upper part of the combustion chamber 17. It will be understood that, if desired, the bagasse furnace alone or the oil burner alone may be in operation.

By the arrangement which I have shown it will be clear that both of these fire boxes may be located in front of the boiler, so that the gases from each of them may enter the combustion chamber thereof and pass to the boiler tubes in an efficient manner. The boiler tubes are preferably screened from the direct radiant heat of the solid fuel furnace by the wall 18 and the bridge wall 221 while the boiler tubes are directly exposed to the radiant heat of the fluid fuel furnace. This arrangement also is obviously a compact one and one in which either fire box may be operated alone without difficulty because of the presence of the other. Moreover, the means for feeding the solid fuel and for feeding the liquid fuel are preferably adjacently located as illustrated, so that both may conveniently be under the control of a single operator.

Preferably, I use the form of baffling illustrated rather than the usual form, in which there would be no baffle located in front of the tubes of the bank 14. With this latter construction, the gases from the oil burner may pass over the top of such a baffle without contacting with the tubes in the first bank, so that the heat therefrom would be absorbed only by the tubes in the middle and last bank. By

providing the baffle arrangement which I have illustrated, it will be seen that the gases from both the bagasse and the oil follow substantially the same path and contact with all
 5 of the tubes of the boiler. This last would be completely true if the baffle 28 were placed in front of all of the tubes in the bank 14. I prefer to place it behind one or more rows, however, so that the baffle will be protected
 10 from the direct heat of the gases from the bagasse fire box.

It will be understood that the arrangement which I have shown is merely illustrative, and that my invention may be widely varied
 15 in its application. While I have shown a boiler of the Stirling type, it will be understood that my furnace may be used with a boiler of other types, particularly with such as have vertical or nearly vertical water tubes.

20 It will also be understood that while I have shown a bagasse burner, any other form of solid fuel fire box could be substituted therefor, and that similarly, while I have shown an oil burner in my fluid fuel fire box, any other
 25 form of fluid fuel may be used, such as gas or the like. In the appended claims, when I refer to solid fuel, it will be understood that I include therein all forms of fuel to be burned on a grate or its equivalent, and that
 30 by fluid fuel, I mean any form of gaseous or liquid fuel or pulverized fuel which may be blown into the fire box.

I claim:—

1. In combination, a steam boiler comprising
 35 vertically extending tubes with a baffle located near the front thereof and extending substantially parallel thereto, a furnace adapted to burn fuel of low heat value, a passage adapted to lead the gases from said
 40 furnace to the upper ends of said tubes, a fluid fuel furnace located above said first-mentioned furnace and constructed and arranged to deliver heated gases against and among the
 45 upper ends of the front tubes, boiler tubes being subjected to the direct radiant heat of said fluid fuel furnace, and means for directing the heated gases over the succeeding tubes of said boiler, both of said furnaces being located at
 50 one side of said boiler.

2. In combination, a steam boiler comprising
 vertically extending tubes with a baffle located near the front thereof and extending

substantially parallel thereto, a furnace adapted to burn fuel of low heat value, a pas-
 55 sage adapted to lead the gases from said furnace to the upper ends of said tubes with change in direction during their passage from the furnace to the boiler, a fluid fuel furnace located above said first-mentioned furnace
 60 and constructed and arranged to deliver heated gases against and among the upper ends of the front tubes, boiler tubes being subjected to the direct radiant heat of said fluid fuel furnace, and means for directing the heated
 65 gases over the succeeding tubes of said boiler, both of said furnaces being located at one side of said boiler.

3. In combination, a steam boiler comprising
 70 vertically extending tubes with a baffle located near the front thereof and extending substantially parallel thereto, a furnace adapted to burn fuel of low heat value, a passage adapted to lead the gases from said furnace to the upper ends of said tubes, the parts
 75 being constructed and arranged to screen said furnace from the boiler tubes a fluid fuel furnace located above said first-mentioned furnace and constructed and arranged to deliver heated gases against and among the up-
 80 per ends of the front tubes, boiler tubes being subjected to the direct radiant heat of said fluid fuel furnace, and means for directing the heated gases over the succeeding tubes of said boiler, both of said furnaces being located at
 85 one side of said boiler.

4. In combination, a steam boiler comprising
 90 vertically extending tubes with a baffle located near the front thereof and extending substantially parallel thereto, a furnace adapted to burn fuel of low heat value, a passage adapted to lead the gases from said furnace to the upper ends of said tubes, a fluid
 95 fuel furnace located above said first-mentioned furnace and constructed and arranged to deliver heated gases against and among the upper ends of the front tubes, boiler tubes being subjected to the direct radiant heat of
 100 said fluid fuel furnace, and means for directing the heated gases over the succeeding tubes of said boiler, both of said furnaces being located at one side of said boiler and constituting a front therefor.

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