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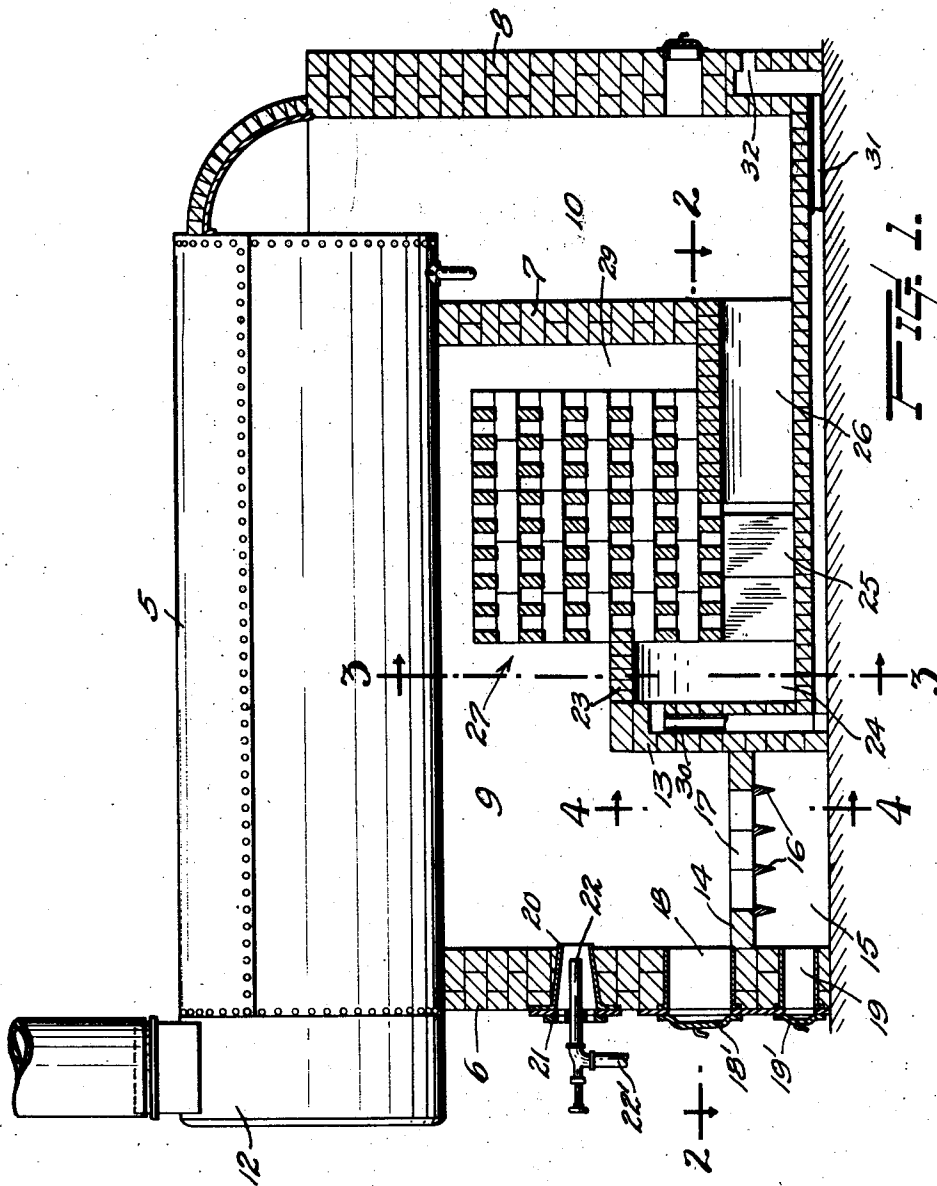
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STEAM BOILER FURNACE

Filed July 26, 1927

2 Sheets-Sheet 1



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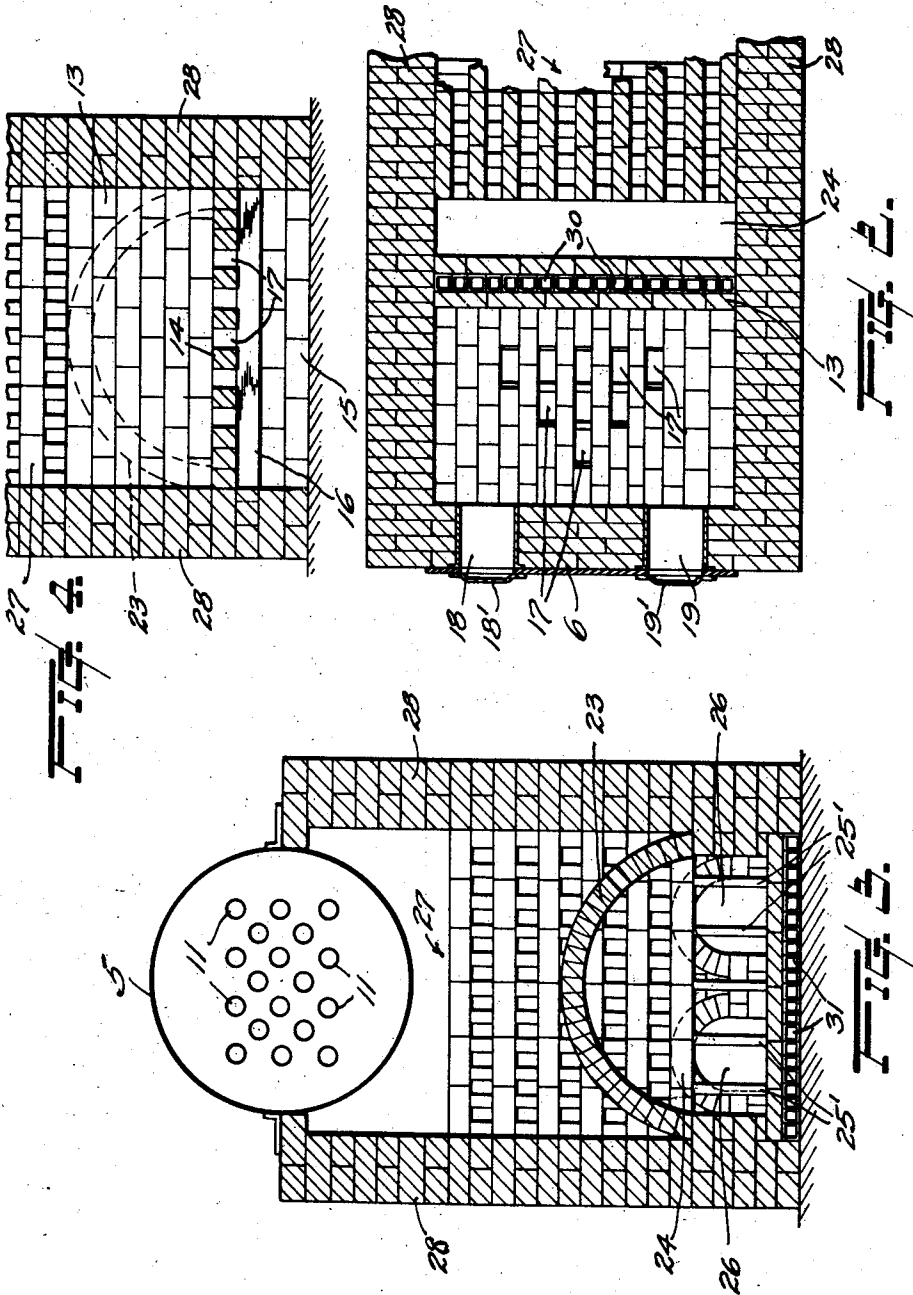
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE.

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STEAM-BOILER FURNACE.

Application filed July 26, 1927. Serial No. 208,433.

This invention relates to furnaces for steam boilers, and its object, generally, is the provision of an improved furnace of this character which is peculiarly adapted to the use of liquid or gaseous fuel.

Another object of the invention is the provision of a furnace equipped with devices whereby the combustion of the fuel is substantially completed within the furnace.

More specific objects and advantages of the invention will appear in the following description.

The invention consists in the novel construction, adaptation and combination of devices hereinafter described and claimed.

In the accompanying drawings,—

Figure 1 is a longitudinal vertical sectional view of a boiler setting embodying my improved furnace applied to a steam boiler which is shown in side elevation; and Figs. 2, 3 and 4 are sectional views taken on lines 2—2, 3—3 and 4—4 of Fig. 1.

In said drawings the reference numeral 5 represents a horizontal tubular boiler which is shown supported upon the front wall 6 and a baffle wall 7 positioned near the rear wall 8 of the furnace. The spaces 9 and 10 to the front and rear, respectively, of the baffle wall 7 constitute combustion chambers, of which the rear chamber 10 communicates from near its top with the rear ends of the boiler tubes 11 (Fig. 3) whose front ends communicate with a stack or chimney connection 12.

Intermediate its length the forward combustion chamber 9 is provided with a bridge wall 13, and in front thereof is a floor 14 separating the furnace proper from an air receiving chamber 15. The floor 14 is composed of brick, or an equivalent, shown as laid upon supporting bars 16, and is provided with air passages 17.

Above and below the elevation of said floor, the front wall 6 is formed to provide openings 18 and 19, respectively, and are provided with doors 18^a and 19^a. A third opening is provided above the opening 18 in the wall 6 by the provision therein of a tube 20 having an air controlling damper 21 at its outer end. 22 represents a nozzle extending axially into the tube 20 and through which fuel is delivered into the furnace from a pipe 22^a leading from a source of fuel supply, not shown.

23 represents an arch forming the roof of a compartment 24 whose front wall is pro-

vided by the bridge wall 13. The compartment 24 communicates from its lower portion through ways 25, afforded by longitudinally disposed tiling 25^a (Fig. 3), with tunnels 26 which open into the lower portion of the rear combustion chamber 10.

27 represents a cribriform construction extending between the side walls 28 of the furnace and from a relatively short distance below the boiler 5 to the top of said tunnels 26 and above the ways 25. The structure 27, moreover, extends from the compartment wall 23 to within a short distance of the baffle wall 7 so as to afford a space 29 directly in front thereof.

The cribriform structure 27 above referred to is composed of alternate layers of longitudinally and transversely arranged brick, the brick of each layer being spaced to provide parallel aligned channels which communicate with the channels rectangular thereto of the courses next above and below the same.

The longitudinal channels of the structure 27 which are above the arch wall 23 afford communication between the combustion space at the front of the furnace with the space 29, and similarly communication is had through the lower longitudinal chambers between such space 29 and the upper portion of the compartment 24 and also through the medium of the ways 25 with the front ends of said tunnels. Primary air for combustion purposes is admitted through the tube 20 and receiving chamber 15, and secondary combustion air is admitted rearwardly into the upper portion of the compartment 24 by air conduits 30 (Figs. 1 and 2) extending upwardly through the bridge wall 13 from supply conduits as 31 and 32 provided in the furnace walls from outside atmosphere.

The purpose of thus embedding the conduits in the furnace walls is to heat the secondary air prior to its admission into the furnace.

In action the fuel accompanied by air is injected in an inflammable condition from the burner (22—20) into the front portion of the furnace. The primary combustion which occurs above the floor 14 is promoted by the admission of a regulated quantity of air through floor openings 17 from the chamber 15. The burning fuel, in the form of flames or otherwise, is passed over the cellular structure 27 and through the channels thereof into the chamber 29 in front of the baffle wall 7, whence it is caused to pass forwardly

and downwardly through the channels of the structure 27 into the tunnels 26 either directly through the ways 25, or through the latter and the compartment 24. From said tunnels the flames and unconsumed gases reach the chamber 10, wherein the combustion is completed. With the exception of such portion of the boiler 5 as is exposed within the furnace, the surfaces with which the combustible gases and flames come into contact are of brick, or an equivalent, which under normal conditions are maintained at a temperature above that requisite for the combustion of the fuel. The flow of the combustion products through the furnace is reversed first by the baffle wall 7 and then by the bridge wall 13, and in thus traveling to the tunnels all of the fuel gases must pass one or more times through the channels of the hot cribriform structure, being divided therein into numerous currents.

The arrangement of the ducts, etc., for the admission of air for combustion, is such that the air enters the furnace in a preheated state.

The invention will, it is thought, be understood from the foregoing description.

What I claim is:—

1. In a steam-boiler furnace, in combination, a baffle wall dividing the furnace to provide a front combustion chamber and a rear combustion chamber, a bridge wall in said front chamber, a compartment at the rear of the bridge wall, said compartment having a roof separating the compartment from direct communication with the space there-

above in said front chamber, a passage extending from said compartment through the baffle wall to said rear chamber, and a cribriform structure provided in said front chamber above said passage, said structure being located in the path of combustion gases travelling from said front chamber into said compartment and thence through said passage to the rear combustion chamber.

2. In a steam-boiler furnace the combination as defined in claim 1 wherein the bridge wall is provided with an air-passage with a rearwardly directed opening into said compartment.

3. In a steam-boiler furnace, in combination, a furnace provided with front and rear combustion chambers separated by a baffle wall and communicating with each other through openings provided in the lower portion of said wall, a bridge wall provided in the front combustion chamber, said bridge wall constituting the front wall of a compartment having communication from its lower portion with the openings of the baffle wall, a fuel burner extending into the front portion of the front combustion chamber, means provided to the rear of the bridge wall for conducting gases from the burner in a plurality of streams to said wall openings directly and also through the medium of the compartment, and air-passages extending into said bridge wall and opening into said compartment.

Signed at Seattle, Washington, this 29th day of June, 1927.

ALEXANDER McVAY.