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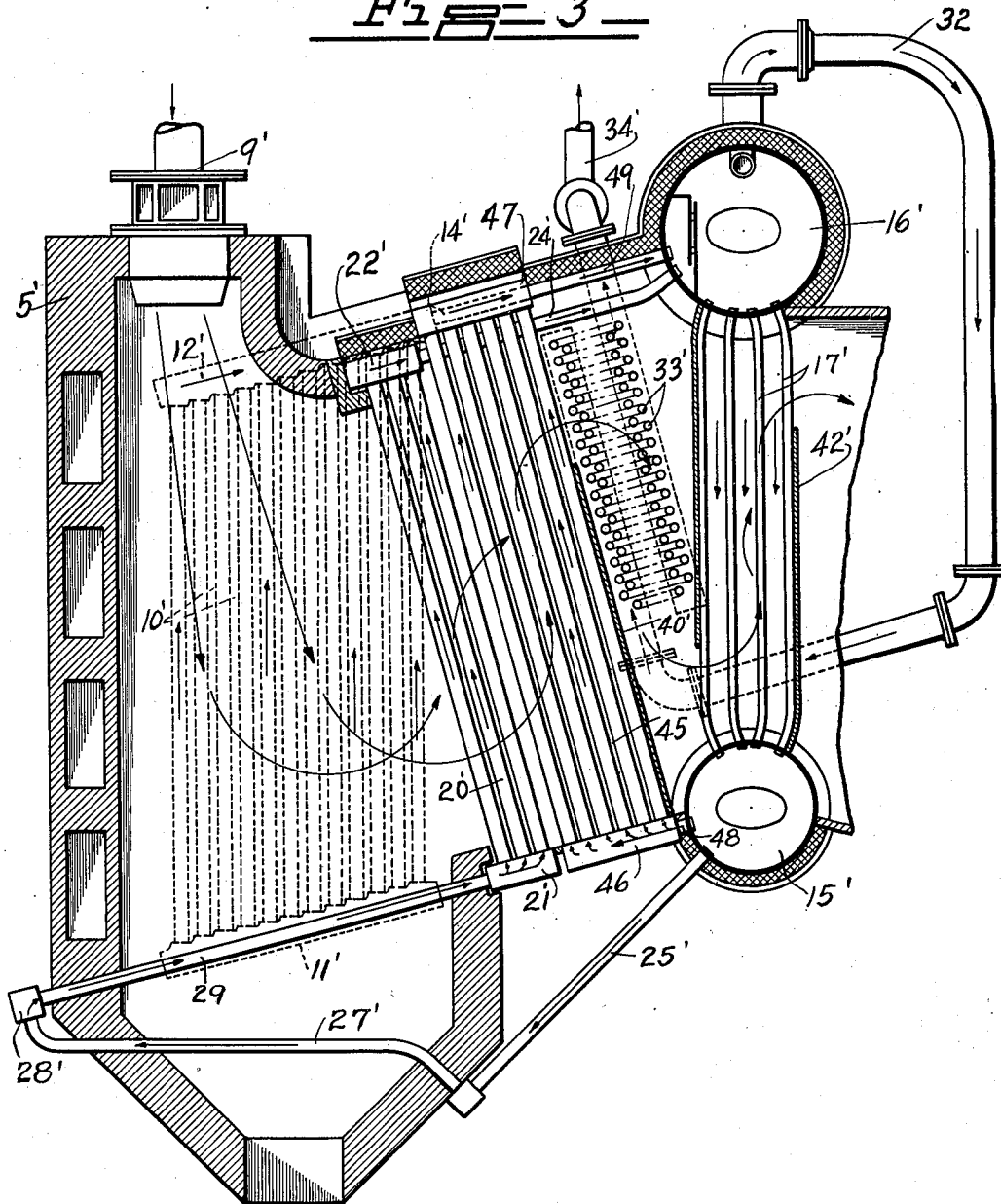
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STEAM GENERATOR

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2 Sheets-Sheet 2

FIG-3



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STEAM GENERATOR

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This invention relates to a steam boiler that is made in sections, and will be understood from the description in connection with the accompanying drawings, in which Fig. 1 is a vertical section through an illustrative embodiment of the invention; Fig. 2 is a section along the line 2—2 of Fig. 1, and Fig. 3 is a vertical section through a modification.

The steam generator or boiler comprises a furnace having two side walls and a front wall enclosed at the top and formed with an ash outlet at the bottom. The rear wall of the furnace has rows of steeply inclined tubes extending thereacross. The side walls of the furnace are each formed by a row of tubes on which brick work or tile is superposed in such a manner that the tubes are completely covered by a thin layer of brick work or tile. The side wall tubes are expanded into headers which connect with a drum or drums of the boiler.

For the purpose of preheating the water that is fed to the tubes at the rear of the furnace, which tubes are subjected to radiation, and in order to equalize the amount of work done throughout the water tube bank and also for the purpose of eliminating scaling of the rear or radiant heat tubes, the heating surface is extended over the lower part of the furnace, the water from the lower drum being preheated in its passage across the furnace and back to the first row of radiant tubes. The tubes at the rear of the furnace may be divided into two banks, the bank of tubes near the furnace proper being supplied with water that is preheated in its passage through the lower furnace tubes and connections to the steam and water drums are provided so that there will be a non-restricted circulation of water through these tubes. The other bank of tubes at the rear of the furnace may be supplied with water by connections entirely separate from those supplying the first bank.

In the drawings reference character 5 indicates the front wall and 6 the side walls of the furnace, and 7 indicates air passages that may be used for cooling purposes. The upper portion or top 8 of the furnace is provided with fuel burners 9 in the well known

manner, so that the flames are directed as indicated by the arrows. The side walls 6 are built up around the row of tubes 10, so as to enclose the same with a layer of brick or tile. Each row of tubes 10 is connected to a lower header 11 and an upper header 12, and these headers are connected by tubes 13 and 14 to the lower drum 15 and the upper drum 16 of the boiler, respectively. Rows of vertically disposed tubes 17 connect the drums 15 and 16. Rows of banks of steeply inclined tubes 20 at the rear of the furnace are connected at their lower and upper ends to the headers 21 and 22, that are connected by the connections or nipples 23 and 24, respectively, to the drums 15 and 16. One or more tubes 25 connect the lower drum 15 to the horizontal header 26, that may be provided with a valved drain pipe, extending along one side of the lower part of the furnace. A row of tubes 27 extends from the header 26 to the horizontal header 28 along the other side of the furnace, and a row of slag screen tubes 29 extends from the header 28 across the lower portion of the furnace to the headers 21.

A pipe 32 extends from the steam space of the drum 16 to the superheater 33 that is located between the banks 17 and 20 of tubes and a pipe 34 leads from the superheater to the steam main.

An economizer 35 is located at the rear of the bank of tubes 17. This economizer comprises tubes that are connected to lower and upper headers 36 and 37. A feed water pipe 38 leads to a lower header 36 and a valved pipe 39 leads from the upper header 37 to the steam and water drum 16. Baffles 40, 41, 42 and 43 are provided as indicated to direct the passage of the hot products of combustion across the tubes.

It will be obvious from the description that there is a local circulation of water through the side wall tubes and an independent local circulation of water through the bank of tubes 20.

In the modification shown in Fig. 3 parts similar to those already described in connection with Figs. 1 and 2 are designated by the same reference characters with primes, and

it is not thought necessary to describe them again.

In this modification, a second bank of tubes 45 is provided at the rear of the furnace behind the bank of tubes 20' and are connected to lower headers 46 and upper headers 47, which are in turn connected to the drums 15' and 16' by means of the nipples 48 and 49, respectively. The circulation of water through this bank of tubes is entirely independent of the circulation of the water through the bank 20' or the banks 10' along the side walls of the furnace.

In both forms shown the connections exemplified by the nipples 23 and 24 extend forwardly from the two drums. Some of these connections terminate in the headers 21 and 22, and others in the headers 11 and 12. In turn, some of the headers 21 in effect extend forwardly in the form of the slag screen tubes 29 which are connected at their forward end to the drum 15. In each case the headers, connections and tubes referred to are in line with each other, and in the embodiment of Figs. 1 and 2 there is an actual physical connection between these different elements, whereby the flow may take place therethrough.

I claim:

1. In combination, a furnace having side walls, vertically extending tubes in said side walls, a bank of vertically extending tubes disposed at the rear of said furnace, horizontal upper and lower drums disposed rearwardly of said bank and connected by a second bank of tubes, connections extending forwardly from each of said upper and lower drums, headers for said first mentioned bank of tubes and for said wall tubes, said headers forming extensions of some of said connections, and slag screen tubes extending across the bottom of the furnace and forming extensions of some of the headers at the lower end of said first mentioned bank.

2. In combination, a furnace having side walls, vertically extending tubes in said side walls, a bank of vertically extending tubes disposed at the rear of said furnace, horizontal upper and lower drums disposed rearwardly of said bank and connected by a second bank of tubes, connections extending forwardly from each of said upper and lower drums, headers for said first mentioned bank of tubes and for said wall tubes, said headers forming extensions of some of said connections, slag screen tubes extending across the bottom of the furnace and forming extensions of some of the headers at the lower end of said first mentioned bank, and a connection from said lower drum to the front ends of said screen tubes.

3. In combination, a furnace, a bank of vertically extending tubes disposed at the rear of said furnace, horizontal upper and lower drums disposed rearwardly of said

bank and connected by a second bank of tubes, connections extending forwardly from each of said upper and lower drums, headers for said first mentioned bank of tubes, said headers forming extensions of said connections, and slag screen tubes extending across the bottom of the furnace and forming extensions of headers at the lower end of said first mentioned bank of tubes.

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