United States Patent

Ostbo

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[54] RETURN FLOW BOILER

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[52] **U.S. Cl.**.....**122/182 R**

[51] **Int. Cl.**.....**F22b 7/12**

[58] **Field of Search**.....122/182, 185

[56] **References Cited**

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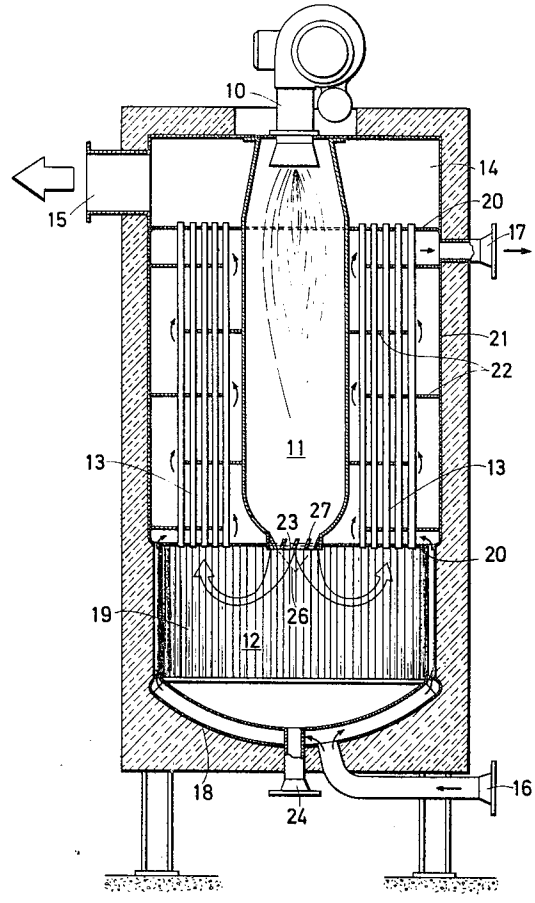
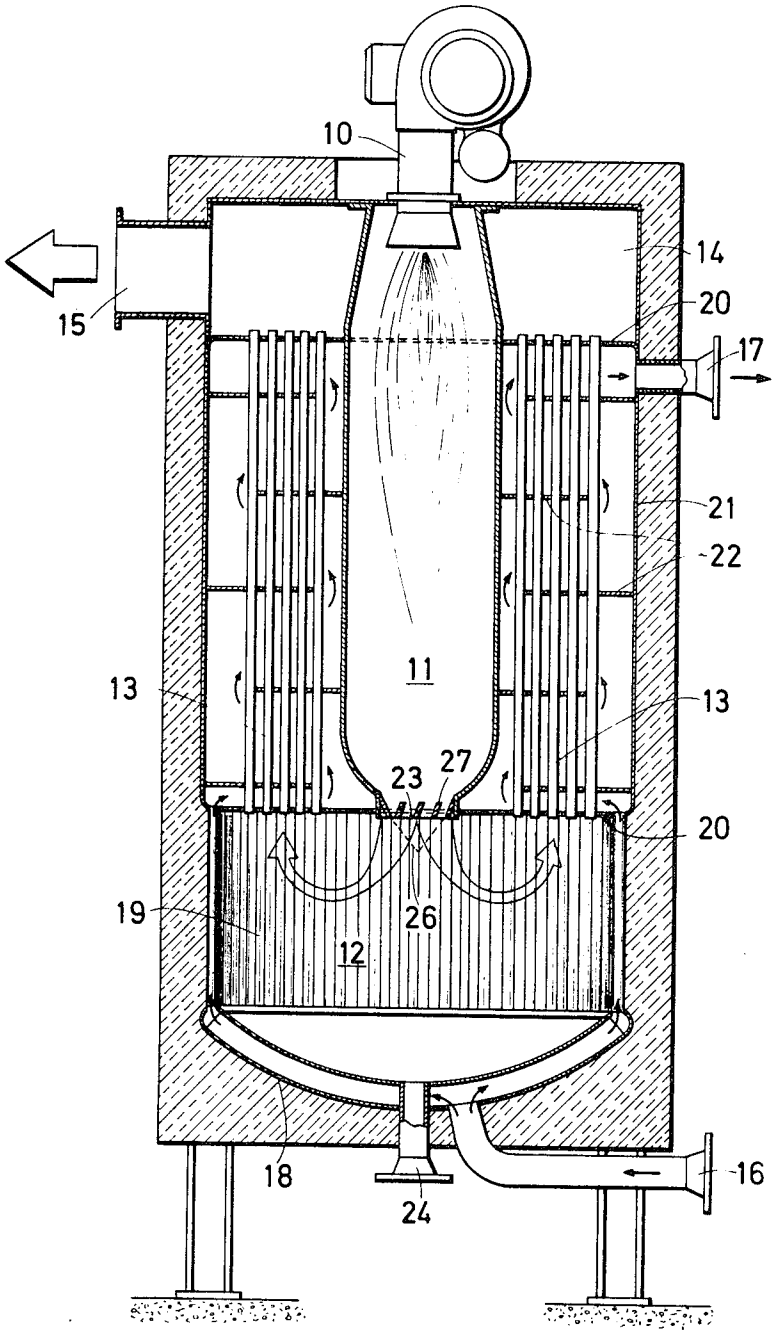
[57] **ABSTRACT**

In return flow boilers the gases flowing along the wall of the flue tube will be cooled, whereby the combustion in the marginal portions of the flame will be considerably less complete than in the core thereof, which will have undesirable consequences when the flame emerges into the return chamber. In order to bring about a complete combustion also of the marginal portions of the flame the outlet of the flue tube is considerably restricted as compared to the main part of the tube, whereby the portions of the flame having flown along the wall of the flue tube will be forced into the core of the flame, when this emerges into the return chamber.

1 Claims, 1 Drawing Figure

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RETURN FLOW BOILER

BACKGROUND OF THE INVENTION

It is difficult to bring about a complete combustion of fuel oil in a boiler furnace. This incomplete combustion causes contamination of the heat exchanger surfaces in the boiler and also sanitary inconveniences due to partly burnt particles following the gases into the atmosphere.

SUMMARY OF THE INVENTION

The present invention refers to a return flow boiler having a flue tube connected centrally to one sidewall of a return chamber and is surrounded by a number of fire tubes running backwards therefrom, parallel to the flue tube, which is designed with a specific object to aid the complete combustion of the fuel oil. The invention is characterized by that the outlet of the flue tube into the return chamber is noticeably smaller than the cross section of the main part of the flue tube, in such a manner that the marginal portions of the flame within the flue tube will be forced into the core of the flame, when the latter passes out into the return chamber.

BRIEF DESCRIPTION OF THE DRAWING

One embodiment of the invention is shown on the accompanying drawing, which is a section through a vertical hot water boiler.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The boiler comprises a vertical, cylindrical shell to the upper part of which an oil burner **10** is fitted. The burner is directed into a flue tube **11**, which is arranged centrally within the shell, and is connected to one sidewall of a return chamber **12**. A number of fire tubes **13** extend from this chamber backwards, parallel to the flue tube and open into a collecting chamber **14**, which is connected to an outlet **15** for the combustion gases. The water enters at **16** and leaves the boiler at **17**.

The return chamber **12** has a cup-shaped lower end wall **18** designed as a water chamber, to the perimeter of which a circular row of closely arranged water tubes, preferably provided with fins is arranged the tubes, or fins respectively, being interconnected to form a gastight sidewall in the return chamber, said sidewall being subjected to radiation from a flame entering the chamber.

The fire tubes **13** are fitted into two end plates **20**, which together with the cylindrical shell **21** enclose a convection part. The water flowing within the latter is guided by baffles **22** arranged in a suitable manner. The water tubes **19** are connected to the lower end plate **20** outside the fire tubes **13**. The latter are mounted symmetrically around the flue tube and the temperature will be mainly uniform within this part of the boiler.

The flame passes from the flue tube out into the return chamber through an outlet **23**, the cross section of which is noticeably smaller than the cross section of the main portion of the flue tube. In this manner the marginal portions of the flame, which have been in contact with the cooled wall of the flue tube and therefore have a lower temperature than the rest of the flame, are forced into the core of the flame, whereby an efficient combustion of the particles entrained in the marginal portions of the flame is efficiently obtained. The resulting gases are symmetrically distributed in the return chamber and flow through the fire tubes towards the outlet **15**. The outlet **23** of the flue tube is cylindrical over a short distance. The portion between the cylindrical main part of the flue tube and the outlet portion is basically a truncated cone having its apex **26** located just outside the outlet, the wall of the transient portion is slightly curved to ensure a smooth flow. A number of guide vanes **27** may be fitted in the cylindrical portions to impart a swirling motion to the flame entering the return chamber, whereby particles of ash and other contaminations are separated by centrifugal action. Such particles are collected at the bottom of the return chamber and may be removed through a cleaning opening **24**.

If circulation pumps are used the flow of water within the boiler may be reversed. The boiler may be arranged with its longitudinal axis horizontal and by the fitting of a steam drum the boiler may be used as a common steam boiler.

What I claim is:

1. A return flow boiler having a flue tube connected centrally to one sidewall of a return chamber and being surrounded by a number of fire tubes running backwards therefrom and parallel to the flue tube, a fuel burner being fitted at the end of the flue tube remote from the return chamber and being arranged to direct flame axially into said fire tube, in which the main part of the flue tube is cylindrical and presents a smooth, water-cooled, wall towards the flame, and the outlet of the flue tube is cylindrical over a short distance and noticeably smaller than the cross section of the main part of the flue tube, the transient part between said cylindrical portions being shaped as a truncated cone having its apex just outside the outlet from the flue tube and likewise presenting a smooth, water-cooled wall towards the flame, whereby the marginal portions of the flame within the flue tube will be forced into the core of the flame, when the latter passes out into the return chamber.

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