

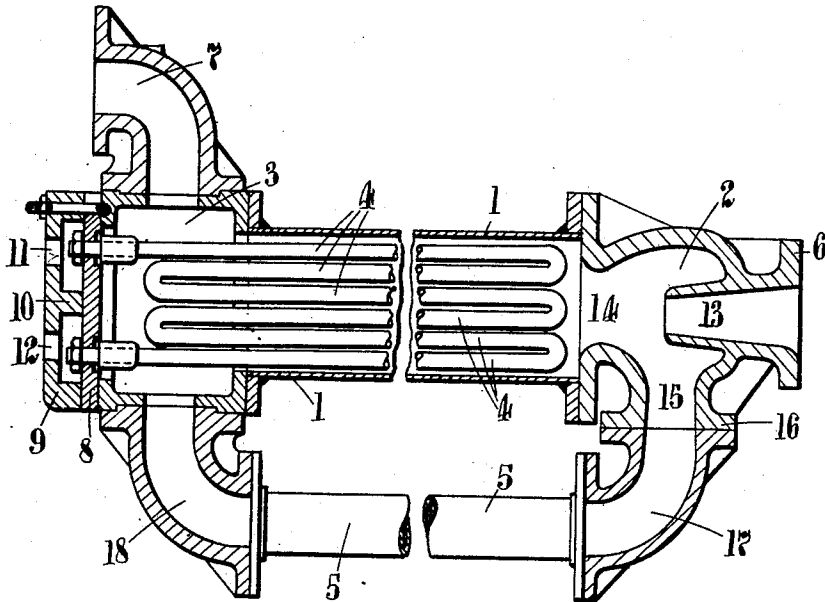
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BOILER FEEDWATER HEATER

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BOILER-FEED-WATER HEATER

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This invention relates to the type of boiler feedwater heater embodying steam-heating tubes or coils or equivalent with which the feedwater contacts.

5 We provide a heater of this type, having at least one auxiliary conduit in circuit with the main body or casing of the heater, and means whereby the feedwater entering said body or casing from the feed main is utilized to set up
10 a return flow through said conduit (hereinafter termed the return pipe). The arrangement ensures a repeated circulation or multi-flow of the feedwater in the heater and a consequential increase in heating efficiency, without structural complication, the apparatus
15 being substantially as simple in construction as a uni-flow heater.

Said means may take the form of an inlet box having two, preferably aligned, nozzles
20 through which the feedwater enters the body of the heater from the feed main and between which the return pipe opens into the inlet box, these nozzles both tapering inwards in the direction of flow.

25 Preferably the body of the heater consists of a tube to one flanged end of which is attached an inlet box having nozzles as aforesaid, and to the other flanged end of which is attached an outlet box provided with a removable door or closure supporting bent
30 steam-heating tubes that extend into the body. The return pipe for the feedwater is arranged below the body and jointed at its ends to tubular elbows extending from said
35 inlet and outlet boxes.

If desired, a by-pass around the heater may be provided so that the heating tubes may be withdrawn, for cleaning or other purposes, without stopping the pumps.

40 By way of example, one constructional form of feedwater heater embodying the before mentioned and other features of our invention is illustrated, in longitudinal section, on the accompanying drawing to which
45 reference will now be made.

The heater comprises a horizontally arranged body 1, a feedwater inlet box 2, a feedwater outlet box 3, steam-heating coils 4 located in the body, and a return-flow pipe 5.
50 Conveniently, the body is formed from a steel

or copper tube and is say six or eight inches in diameter and about six feet long, but it may be made of cast iron or other suitable metal or material. It is flanged at the ends to receive the metal inlet and outlet boxes 2 and 3, which have connections 6 and 7 to
55 joint into the main line of feed pipes on the delivery side of the feed pumps (not shown). The feed outlet connection 7 is shown arranged above the heater body.

A door or closure 8 removably fitted to the outlet box 3 in direct line with the body 1 of the heater, supports the heating coils 4 each of which is formed of a tube bent upon
60 itself as many times as possible while allowing it to pass freely into the heater body and have both its ends jointed, as shown, to the door. The number of coils 4 varies according to the degree of heat required. For
65 instance, there may be five coils disposed side by side, the two outer coils each having four limbs while the remainder each have six limbs.

Fitted over the door or closure 8 is a steam distributing chest 9 having a partition 10 to
75 separate one end of each heating tube 4 from its other end and thereby provide a steam inlet 11 and a steam outlet 12 to and from the tubes.

In the inlet box 2 through which the feedwater enters the heater there is formed a nozzle 13 tapering down from the diameter of the feed pipe (not shown) to an inch or so less, and aligned with this nozzle is a second
80 nozzle 14 having its large end open towards the first. A branch 15 formed integral with the inlet box extends between the two nozzles and is flanged, at 16, to receive one flanged end of a tubular elbow 17; a similar tubular elbow 18 extends from the outlet box 3 at
85 the other end of the heater, and the return pipe 5 is connected between these elbows.

During the operation of the heater the feedwater therein for the time being is heated by contact with the tubes 4 through which exhaust or live steam is passed. Naturally the
95 hottest part of this water rises to the top of the casing 1 whereas the coldest water gravitates to the bottom of said casing and to the return pipe 5. Now, as each fresh quantity
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of feedwater is admitted to the heater through the inlet box 2 and under the action of the feed pump, some of the hottest water is displaced from the upper part of the casing 1 through the feed outlet connection 7 towards the boiler. At the same time some of the coldest water at the bottom of the heater is, by reason of the nozzles 13:14, drawn back through the return pipe 5 and again passed through the heater. In passing through the nozzle 13 the feedwater entering the heater from the main has its velocity increased, and in passing through the second nozzle 14 it induces a return flow through the pipe 5 of some of the water (the coldest) already in the apparatus. Thus, the heater operates as an efficient multi-flow heater, only the very hottest water at the top passing to the outlet 7 at each stroke of the feed pump. The ratio capacity of the heater to the pump governs the number of flows.

As the steam-heating tubes 4 are solely attached to the door 8 they can be removed as a unit with the latter, thus facilitating the work of cleaning the tubes and the interior of the heater body 1. Expansion or contraction of the tubes due to change of temperature is taken up by the bends and leaky joints are thus avoided.

Although one embodiment of the invention has been herein described, it is obvious that modifications may be made. For example, the nozzles 13:14 instead of being cast integral with the inlet box 2 may be separate therefrom and removably fitted in position.

If desired, the connection 7 may be equipped with a thermometer and/or an air extraction cock. Moreover, the return-flow conduit may be formed integral with the main heater casing.

We claim:—

1. In a boiler feedwater heater, the combination of a casing forming a main conduit for the passage of the feedwater to the boiler, means for heating the feedwater in the casing, at least one auxiliary conduit in circuit with the casing, and means whereby the feedwater admitted to the casing is utilized to set up a return flow through the auxiliary conduit.

2. In a boiler feedwater heater, the combination of a casing forming a main conduit for the passage of the feedwater to the boiler, means in the casing for heating the feedwater, spaced nozzles constituting the inlet to the casing, and a return flow conduit leading from the delivery end of the casing to the space between the nozzles, whereby a multi-flow of the feedwater in the heater will be obtained.

3. A boiler feedwater heater comprising a tubular casing forming a main conduit for the passage of feedwater to the boiler, an inlet box at one end of the casing, nozzles in

the inlet box, an outlet box at the other end of the casing, steam-heating coils extending into the casing, and a return flow conduit connected between the inlet and outlet boxes.

4. A boiler feedwater heater comprising a tubular casing, an inlet box at one end of the casing, nozzles in the inlet box, an outlet box at the other end of the casing, a removable door fitted to the outlet box, coiled steam-heating tubes carried by the door and projecting into the casing, and at least one return flow conduit connected between the inlet and outlet boxes.

5. A boiler feedwater heater comprising a tubular casing, an inlet box at one end of the casing, nozzles in the inlet box, an outlet box at the other end of the casing, steam-heating coils extending into the casing, tubular elbows on the inlet and outlet boxes, and a pipe connecting the tubular elbows.

6. A boiler feedwater heater comprising a tubular casing, an inlet box at one end of the casing, nozzles in the inlet box, an outlet box at the other end of the casing, a removable door fitted to the outlet box, coiled steam-heating tubes carried by the door and projecting into the casing, tubular elbows on the inlet and outlet boxes, and a pipe connecting the tubular elbows.

7. A boiler feedwater heater comprising a tubular casing, an inlet box at one end of the casing, nozzles in the inlet box, an outlet box at the other end of the casing, steam-heating coils extending into the casing through the outlet box, a steam-distributing chest for the coils fitted to the outlet box, and a return flow conduit connected between the inlet and outlet boxes.

8. A boiler feedwater heater comprising a tubular casing, an inlet box at one end of the casing, nozzles in the inlet box, an outlet box at the other end of the casing, a removable door fitted to the outlet box, coiled steam-heating tubes carried by the door and projecting into the casing, a steam-distributing chest for the coils fitted over the door, and at least one return flow conduit connected between the inlet and outlet boxes.

9. A boiler feedwater heater comprising a tubular casing, an inlet box at one end of the casing, nozzles in the inlet box, an outlet box at the other end of the casing, steam-heating coils extending into the casing through the outlet box, a steam-distributing chest for the coils fitted to the outlet box, a tubular elbow on the inlet box, a tubular elbow on the outlet box, and a pipe connecting the tubular elbows, said elbows and said pipe forming a passage between the inlet and outlet boxes.

10. A boiler feedwater heater comprising a tubular casing, an inlet box at one end of the casing, spaced nozzles in the inlet box, an outlet box at the other end of the casing, a removable door fitted to the outlet box, coiled steam-heating tubes carried by the door and

projecting into the casing, a steam-distributing chest for the coils fitted over the door, a tubular elbow on the inlet box communicating with the latter between the spaced nozzles, a
5 tubular elbow on the outlet box, and a pipe connecting the tubular elbows.

In testimony whereof we affix our signatures.

JAMES NEWBY WYNDHAM.

10 STEPHEN LEYSHON WYNDHAM.

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