(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 976 989 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
02.02.2000 Bulletin 2000/05

(51) Int. Cl.[7]: **F24H 9/14**

(21) Application number: **98123350.5**

(22) Date of filing: **08.12.1998**

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **29.07.1998 IT MI980531 U**

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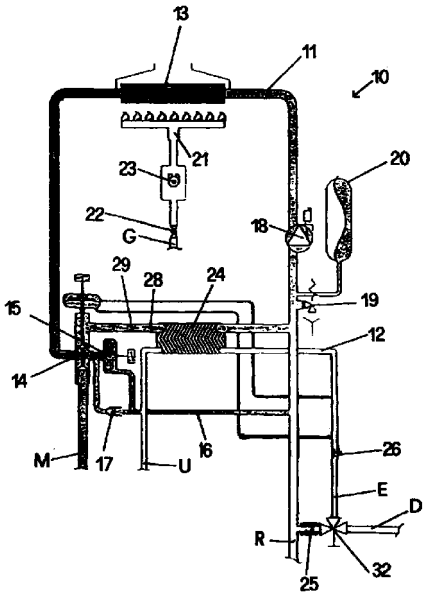
(54) Water circuit of a combined service wall-mounted gas-fired boiler

(57) The water circuit (10) for a combined service wall-mounted gas-fired boiler includes a primary circuit (11) in which the hot water for room heating is circulated and a secondary circuit (12) in which hot water for domestic use is circulated. In order to fill with water the primary circuit (11) of the boiler and the room heating units connected thereto through pipes (M,R) a three-way valve (32) is provided. This valve (32) is arranged so as to connect the primary circuit (11) or the secondary circuit (12) to the water mains (D) or to disconnect both therefrom. When the filling with water of the primary circuit (11) and the room heating units is required, the three-way valve (32) connects the primary circuit (11) to the water mains (D), while during the normal operation of the boiler the three-way valve (32) connects the secondary circuit (12) to the water mains (D).

FIG. 2



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Description

[0001] The present invention generally relates to gas-fired heating apparatus and, more particularly, an improvement to the water circuit of a wall-mounted gas-fired boiler for combined room heating and domestic hot water service.

[0002] As known, the water circuit of wall-mounted gas-fired boilers for combined service generally comprises a primary circuit connected to the room heating units in which hot water for room heating is circulated and a secondary circuit for the production of hot water for domestic use.

[0003] The secondary circuit is usually connected to a water supply pipe which is branched off from the water mains.

[0004] Before putting the boiler into operation, the water circuit and the room heating units connected thereto through pipes must be filled with water in order to test the boiler and to permit it to be operated.

[0005] For this purpose, the water circuit is generally provided with water filling means.

[0006] In a conventional boiler, the water filling means is generally formed of a pipe branched off from the secondary circuit and connected to the primary circuit of the boiler. A manually operated ON-OFF valve is provided in this pipe which when in open position permits the primary circuit to be filled with water and when in closed position disconnects the primary circuit from the secondary circuit.

[0007] The provision of this pipe with ON-OFF valve makes the water circuit rather complex also for the difficult accessibility of the ON-OFF valve.

[0008] Therefore, the present invention is aimed at providing a wall-mounted gas-fired boiler for combined service in which the water circuit comprises water filling means capable of offering better accessibility and less maintenance with lower costs than those of conventional water filling means which are known in the art.

[0009] More in particular, the water circuit of the wall-mounted gas-fired boiler for combined service includes a primary circuit in which the hot water for room heating is circulated and a secondary circuit in which hot water for domestic use is circulated and is characterized in that it comprises a three-way valve arranged so as to connect the primary circuit or the secondary circuit to the water mains or to disconnect both therefrom.

[0010] According to a feature of the present invention, the three-way valve in its first position disconnects the primary circuit and the secondary circuit from the water mains, in its second position connects the room heating primary circuit to the water mains in order to permit it to be filled with water and in its third position connects the secondary circuit to the water mains.

[0011] Of course, during boiler operation, the three-way valve is set in its third position, i.e. with the secondary circuit connected to the water mains.

[0012] The features and advantages of the present invention will be clearly understood from the following detailed description together with the accompanying drawings, wherein:

Fig. 1 diagrammatically shows a conventional water circuit of a wall-mounted gas-fired boiler for combined service,

Fig. 2 diagrammatically shows the wall-mounted gas-fired boiler for combined service according to the present invention,

Fig. 3 is a front elevation view of the fittings assembly of the boiler illustrated in Figure 2, and

Fig. 4 is a perspective view of the three-way valve used in the water circuit of the wall-mounted gas-fired boiler for combined service illustrated in Figure 2.

[0013] For the sake of semplicity, in the following description all the parts corresponding in form and/or function are designated by the same reference numerals.

[0014] In Figure 1 there is generally indicated by 10 the water circuit of a combined service wall-mounted gas-fired boiler according to a well-known configuration.

[0015] The water circuit of the boiler comprises a primary circuit 11 in which hot water for room heating is circulated and a secondary circuit 12 in which hot water for domestic use is circulated.

[0016] The primary circuit 11 comprises a primary heat exchanger 13, a differential pressure operated three-way change-over valve 14, a pressure-surge reducing valve 15, a by-pass pipe 16 with its relevant by-pass valve 17, a circulation pump 18 provided with an air separator, a spring-loaded safety valve 19 which is set at the maximum overpressure of the primary circuit, an expansion tank 20, a water supply pipe M and a water return pipe R for the room heating units, for example radiators.

[0017] Located under the primary heat exchanger 13 are a gas burner 21 connected to a gas supply pipe 20 through an ON-OFF valve 22 and a modulating valve 23.

[0018] The secondary circuit 12 comprises a secondary heat exchanger 24, a domestic water flow limiter 26, a domestic water inlet pipe E and outlet pipe U. The domestic water inlet pipe E is connected to the water mains D through an ON-OFF valve 27.

[0019] The domestic water is prepared in the secondary heat exchanger 24. When the user demands domestic hot water, the hot water which has been heated in the primary heat exchanger 13 is diverted by the three-way change-over valve 14 into a pipe 28 connected to the secondary heat exchanger 24 so as to flow therethrough and heat the domestic water. Then the hot water returns to the primary circuit 11 on the

suction side of the circulation pump 18 and upstream the expansion tank 20. A check valve 29 is suitably provided in the pipe 28.

[0020] In Fig. 1 there is also shown the water filling means for filling the primary circuit 11 and the room heating units connected thereto through the pipes M,R. The water filling means comprises a pipe 30 which is branched off from the secondary circuit 12 and is connected to the primary circuit 11. A check valve 25 and a manually operable ON-OFF valve 31 are provided in the pipe 30. The ON-OFF valve 31 in open position permits the primary circuit 11 to be filled with water and in closed position disconnects the primary circuit 11 from the secondary circuit 12.

[0021] Referring now to Fig. 2, there is shown the water circuit of the combined service wall-mounted gas-fired boiler according to the present invention. As can be seen, the water circuit is different from that shown in Figure 1 in that the water filling means of the primary circuit 11 comprises only a three-way valve 32. The three-way valve 32 is connected to the water mains D, to the domestic water inlet pipe E and to the water return pipe R from the room heating units. The check valve 25 is located between the three-way valve 32 and the return pipe R. The valve member of the three-way valve 32 can take three operative positions, namely: a first position in which it disconnects both the primary circuit 11 and the secondary circuit 12 from the water mains D, a second position in which it connects the primary circuit 11 only to the water mains D and a third position in which it connects the secondary circuit 12 only to the water mains D.

[0022] As can be seen in Fig. 3 of the drawings, the three-way valve 32 is arranged on a connection plate P of the boiler support frame T. The connection plate P usually serves as a lower transverse member of the boiler support frame T of the kind described herein and it embodies the various fittings of the water circuit.

[0023] Apart from the three-way valve 32, the supply and return pipe fittings 33, 34 for circulating the room heating water, the domestic water outlet fitting 35 and the gas inlet fitting 36 are mounted onto the connection plate P.

[0024] The three-way valve 32 is connected to the heating water return fitting by means of a connection pipe 37.

[0025] Fig. 4 is a perspective view of the three-way valve 32. There can be seen the attachments 32D,32E,32R for connection to the water mains D, to the domestic water inlet pipe E and to the water return pipe R from the room heating units, respectively. A valve control lever L is provided for operating the three-way valve 32.

[0026] The advantage of using a three-way valve 32 as a water filling means for filling the boiler water circuit instead of the well-known water filling means can be clearly understood by comparing the water circuits shown in Figures 1 and 2. As a matter of fact, it can be noted that the water circuit of the invention has a smaller number of components since the three-way valve 32 undertakes the functions of the ON-OFF valves 27,31 and the pipe 30 that connects the primary circuit 11 to the secondary circuit 12 of the boiler so that these components become unnecessary. Therefore, the water circuit of the boiler according to the present invention has a more rational configuration and is less expensive to manufacture. Further, also filling operations of the water circuit are more simple to perform because the operator has to maneuver one valve only.

Claims

1. A water circuit (10) for a wall-mounted gas-fired boiler for combined service including a primary circuit (11) in which the hot water for room heating is circulated and a secondary circuit (12) in which hot water for domestic use is circulated, characterized in that it comprises a three-way valve (32) arranged so as to connect the primary circuit (11) or the secondary circuit (12) to the water mains (D) or to disconnect both therefrom.

2. Water circuit according to claim 1, characterized in that the three-way valve (32) in its first operative position disconnects both the primary circuit (11) and the secondary circuit (12) from the water mains (D), in its second operative position connects the primary circuit (11) only to the water mains (D) and in its third operative position connects the secondary circuit (12) only to the water mains (D) for the purpose of preparing the domestic hot water when requested by the user.

3. Water circuit according to claim 2, characterized in that during boiler operation the three-way valve (32) is set in its third operative position, i.e. with the secondary circuit (12) connected to the water mains (D).

FIG. 1

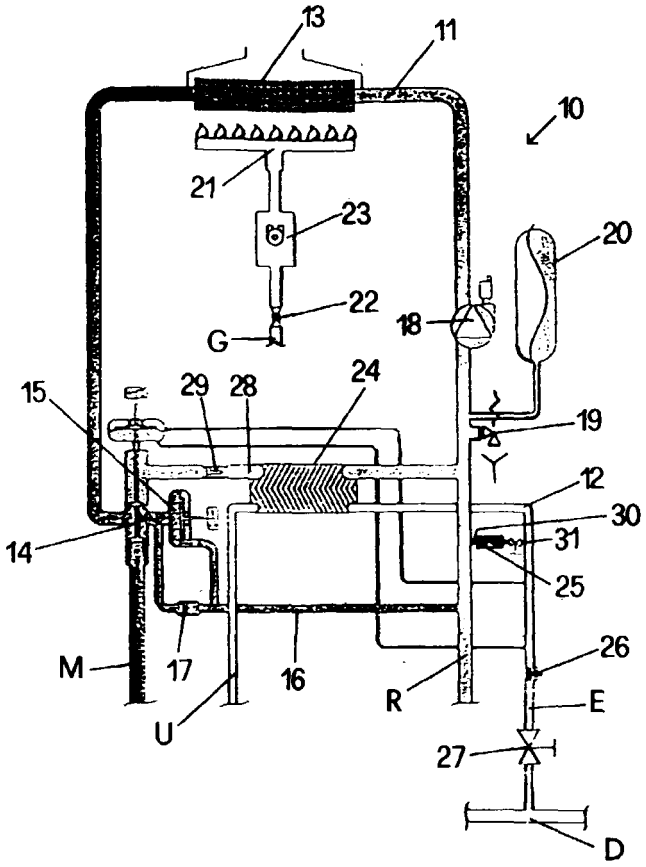
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FIG. 2

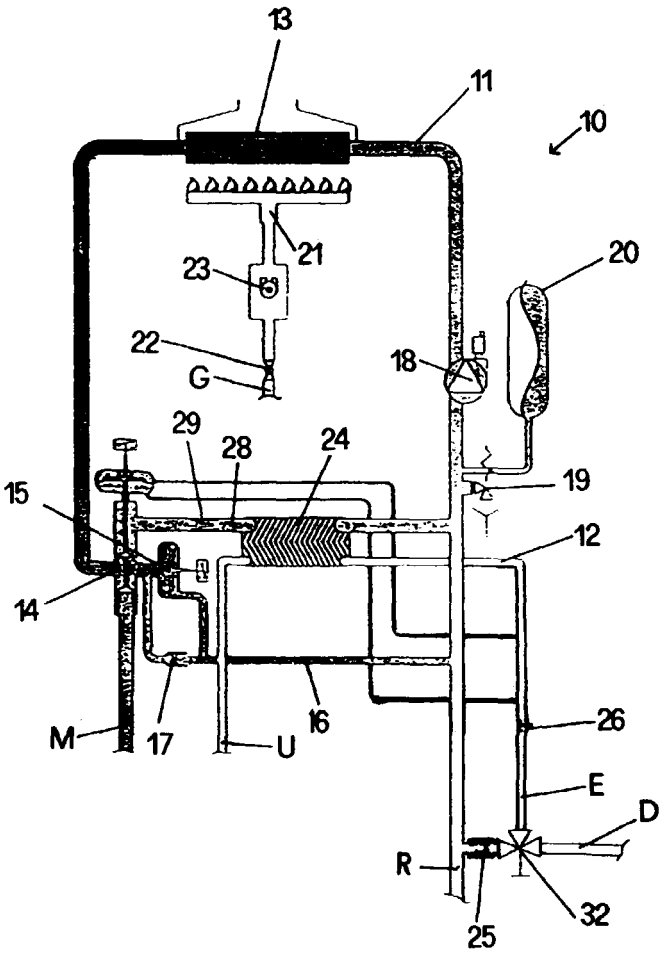
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FIG. 3

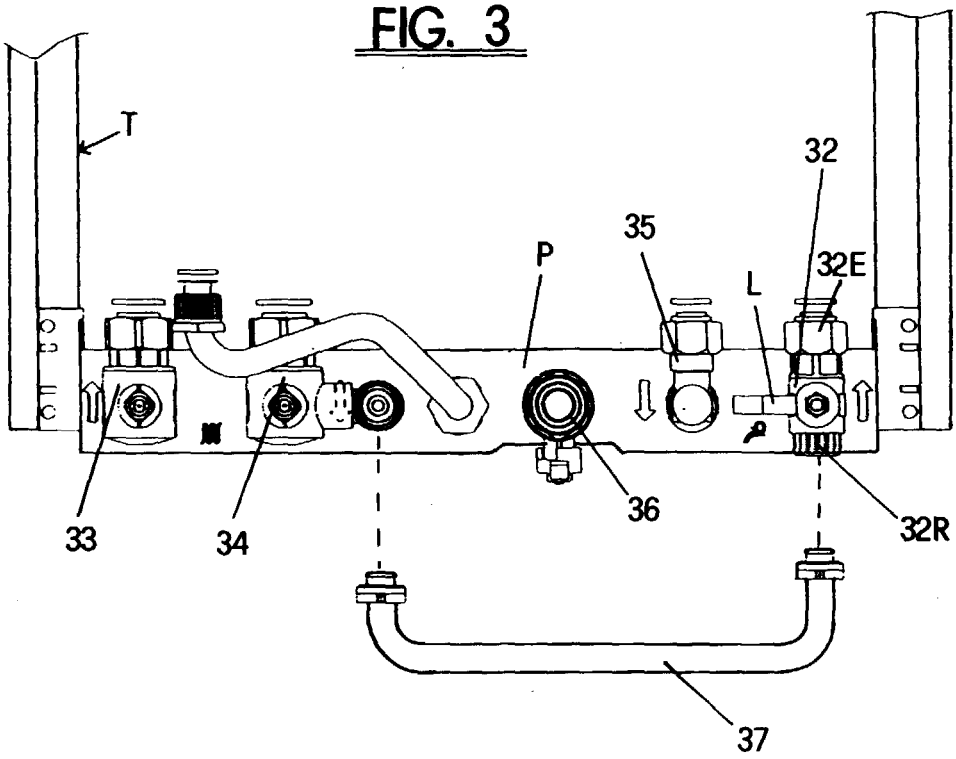

FIG. 4