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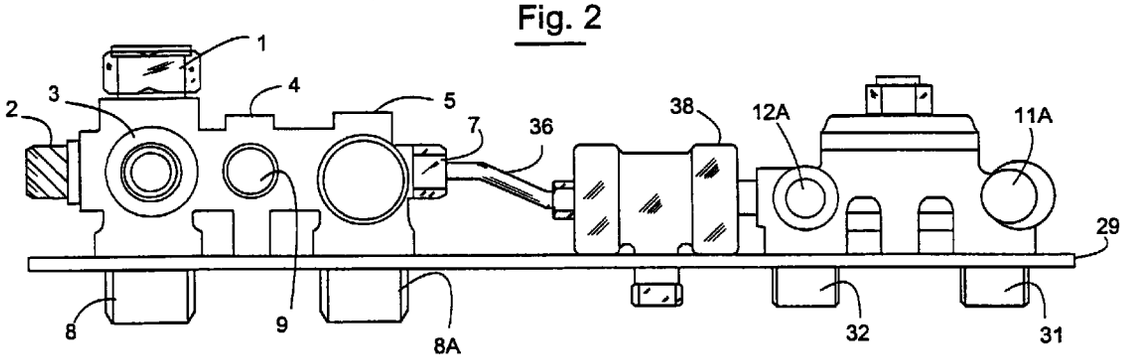
(54) An improved valve assembly for plants providing both heating and domestic hot water

(57) A valve assembly for a combined plants adapted for providing both heating and sanitary hot water comprising a gas-fired boiler (1) and a main gas/water heat exchanger (20) of the type including an inner circuit (22) and an outer circuit (21).

The valve assembly provides for a heating sub-group comprising a first section with a connection (1) for a pump (P) and a connection (8) for the return pipe from the room heating plant (R), and a second section comprising a connection (5A) to the outer circuit (21) of the heat exchanger (20) and incorporating a check valve (5), and a delivery connection (8A) to the heating plant (R). The two sections are connected by an automatic by-pass valve (30).

The second or sanitary water distribution sub-group, comprises two connections (31, 32) to the drinkable water pipes, and two connections (11A, 12A) to the inner circuit (22) of the heat exchanger (20), a depression device (11) being provided in proximity of one (11A) of the connections to the heat exchanger (20), and a thermostatic device (12) for mixing the sanitary water being provided in proximity of the other connection (12A).

Fig. 2



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Description

The present invention concerns a valve assembly adapted for being used in combined plants for providing both heating and sanitary hot water, i.e. residential plants wherein the same heat source, particularly a wall gas-fired boiler, is used for heating both the water for the heat radiating elements (radiators) for heating the rooms, and the sanitary or domestic hot water for various purposes.

These plants use the so called "bithermal" or double action heat exchanger, comprising a single body for heating both the water in the primary or heating circuit and the sanitary water.

In these plants the hydraulic arrangement is presently made up by a number of components that are assembled together by means of several pipes and connections. This requires a large amount of labour, a high cost of the plant and a considerable availability of space.

The object of the present invention is to overcome the above mentioned shortcomings and limitations and more precisely to provide a valve assembly or group for realizing plants of the above mentioned type, which is formed by two very compact sub-groups, while at the same time providing all the functions requested in these type of plants, both in view of the existing regulations and of technical reasons. Such assembly is further flexible and easily connectible to the other components of the plant, and has quite limited costs, both for its construction and installation.

According to the invention, such objects are achieved through a valve assembly for combined plants adapted for providing both heating and sanitary hot water and comprising a gas-fired boiler, a main gas/water of the double action type including an inner circuit and an outer circuit, at least one radiator and a pump for circulating the heating water, said valve assembly comprising two sub-groups or valve units mounted on the same support plate, characterized in that

the first heating sub-group comprises two sections, communicating through an automatic by-pass valve, the first section comprising a connection for said pump and a connection for the return pipe from the heating plant; the second section comprising a connection connected to the outer circuit of the heat exchanger and incorporating a check valve, and a delivery connection to the heating plant, and in that

the second sanitary water distribution sub-group, comprises a connection for the inlet of drinkable water, an outlet connection of the drinkable water and two connections for the inner circuit of the double action heat exchanger, in proximity of one of said connections for the heat exchanger there being provided a depression device, whereas in proximity of the other connection there being provided a thermostatic device for tempering the sanitary water.

Additional advantageous features are disclosed in the dependent claims.

The connections or coupling joints of the assembly according to the invention can be either horizontal or vertical. According to an embodiment of the invention, for filling the heating plant there is provided a communication device with or without a so called disconnector (that is formed either as a simple connecting tube or via a disconnecting device). Preferably both the sub-groups are formed as integral or single blocks.

The invention will now be described with reference to the attached drawings illustrating preferred but non-limiting embodiments thereof, in which:

Fig. 1 schematically illustrates the construction of the valve assembly according to the present invention;

Fig. 2 is a top view of the valve assembly according to the invention; and

Fig. 3 is a front view of the valve assembly of Fig. 2.

Fig. 1 is a diagram illustrating the construction of the valve assembly according to the invention connected to a heating plant also supplying domestic hot water, i. e. a plant capable of heating water that circulates in a closed circuit including heat radiating elements, and of supplying upon request domestic hot water for various uses, which plant employs the same heat source, more particularly a gas-fired boiler. A preferred particular embodiment of the valve assembly and of the components thereof is shown in Figures 2 and 3.

The valve assembly according to the invention comprises two sub-groups or valve units that are preferably mounted on the same support plate 29 even when the components are not to be connected to each other (Figures 2 and 3).

The first sub-group, also named heating sub-group, is formed by two sections, with a first section comprising a connection 1 connected to a pump P and through this latter to a heat exchanger 20, and a connection 5A also connected to the heat exchanger 20 and incorporating a check valve. In the present description the term connection is used to mean a portion of a coupling joint, such as a flanged member comprising a coupling nut or a threaded spigot.

The second section of the first sub-group comprises a delivery connection 8A to be coupled with the heating plant, schematically represented by one element R, and a connection 8 for the return from such heating plant.

The section including connections 1 and 8 communicates with the section including connections 5A and 8A through an automatic by-pass valve 30 housed in a connecting portion between the two sections and comprising a pan urged by a spring into a closing position which hydraulically separates the two sections. A valve of this type is disclosed for example in the Italian Utility Model Application No. MI92 U 000 577 filed on June 25, 1992 and its construction and purposes are therefore not further illustrated.

In the above mentioned connecting portion between the two sections there are further provided two additional connections, namely a connection 9 for a safety valve

(not shown) and a connection 4 to an water gauge (not shown) controlling the pressure in the primary circuit.

Finally, in the section including the connections 1, 8 there is provided a connection 3 for the draining water from the primary or heating circuit, whereas a connection 6 for a pressure difference device (if any and not shown in the drawings) is provided in the section including the connections 5A, 8A.

The second sub-group or sanitary water distribution sub-group, comprises a connection 31 for the inlet of drinkable (tap) water connected to the waterworks, and an outlet connection 32 of the drinkable water connected to the domestic sanitary water circuit, that is to the various taps (not shown) of this latter. The sanitary water distribution sub-group further comprises two connections 11A and 12A for the connection to the inner circuit 22 of the heat exchanger 20. In the sanitary water distribution sub-group, in proximity of the inlet connection 31 there is fitted a device 16 for manual adjusting the flow rate, equipped with a filter 16A and a connection 10 for draining water from the sanitary circuit.

In proximity of the connection 11A there is fitted a depression device 11, in case equipped with a so called Mannesmann regulator for automatically regulating the water flow. A device of this type is disclosed for example in the Italian Patent Application No. MI92 A 000 575 filed on March 3, 1992 and its construction and purposes are therefore not further illustrated.

Near the connection 12A there is fitted a thermostatic device 12 for tempering the sanitary water when this latter reaches a high temperature. Devices 11 and 12 are connected to each other by a duct 33. Between the duct 33 and the connection 31 there is fitted a differential pressure flow valve 13 to which a double microswitch 14 is associated. A signal SP from one of the microswitches actuates the pump P, whereas the other signal SVG the microswitches controls the gas erogating valve (not shown).

Finally, in accordance with an alternate embodiment, a faucet 15 is provided for supplying water to the heating plant, which is connected either through a tiny tube 36 or a disconnector 38 to the second section of the first sub-group, as shown in Figures 1 to 3.

This device is requested by the regulations under some circumstances, and serves to keep separated the sanitary water in the primary (or heating) circuit from the water in the sanitary circuit.

Although the invention has been illustrated with reference to preferred embodiments, in general the invention is capable of other applications and modifications that are to be considered within the scope of the invention, as it will be clear to the skilled in the art.

Claims

1. A valve assembly for combined plants adapted for providing both heating and sanitary hot water and comprising a gas-fired boiler, a main gas/water of the double action type including an inner circuit (22) and an outer circuit (21), at least one radiator (R) and a pump (P) for circulating the heating water, said valve assembly comprising two sub-groups or valve units mounted on the same support plate (29), characterized in that

   the first heating sub-group comprises two sections, communicating through an automatic bypass valve (30), the first section comprising a connection (1) for said pump (P) and a connection (8) for the return pipe from the heating plant (R); the second section comprising a connection (5A) connected to the outer circuit (21) of the heat exchanger (20) and incorporating a check valve (5), and a delivery connection (8A) to the heating plant (R), and in that

   the second sanitary water distribution subgroup, comprises a connection (31) for the inlet of drinkable water, an outlet connection (32) of the drinkable water and two connections (11A, 12A) for the inner circuit (22) of the double action heat exchanger (20), in proximity of one (11A) of said connections for the heat exchanger (20) there being provided a depression device (11), whereas in proximity of the other (12A) connection there being provided a thermostatic device (12) for tempering the sanitary water.

2. A valve assembly as claimed in claim 1, characterized in that said first section further comprises a connection (2) for an expansion tank.

3. A valve assembly as claimed in claim 1 or 2, characterized in that said second section further comprises a connection (3) for draining water from the primary (heating) circuit, and a connection (4) for a water gauge controlling the pressure in the primary circuit.

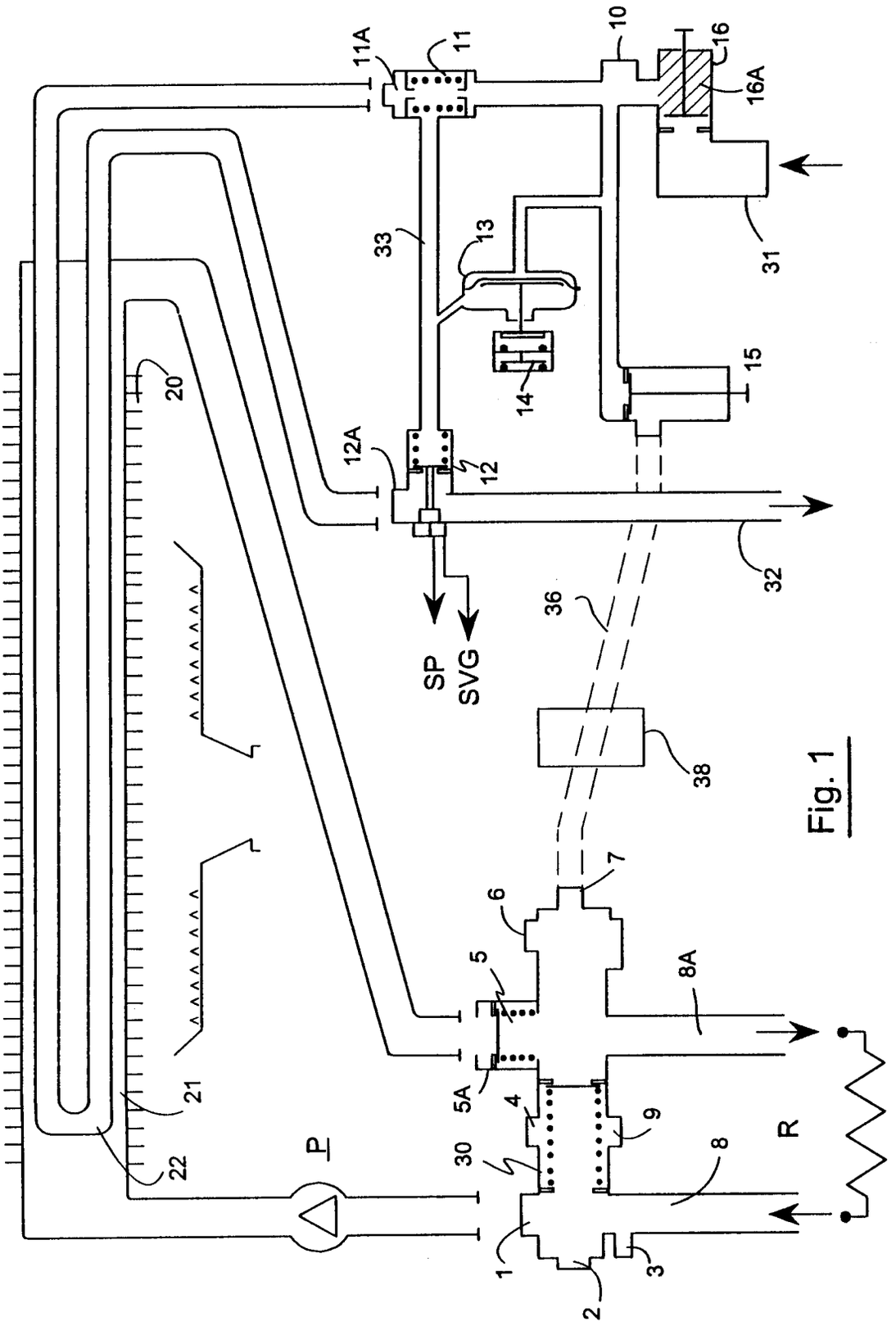
4. A valve assembly as claimed in claim 1, 2 or 3, characterized in that said second section further comprises a connection (9) for a safety valve, and a connection (6) for a pressure difference device.

5. A valve assembly as claimed in the preceeding claims, characterized in that in said second subgroup devices (11, 12) are connected to each other by a duct (33) and in that between said duct (33) and the connection (31) there is fitted a differential pressure flow valve (13) to which a double microswitch 14 is associated.

6. A valve assembly as claimed in the preceding claims, characterized in that said second sub-group provides, in proximity of the inlet connection (31), a device (16) for manual adjusting the flow rate, equipped with a filter (16A), and a connection (10) for draining water from the sanitary plant.

7. A valve assembly as claimed in the preceding claims, characterized in that said pressure difference device (11) houses a flow regulator (80) of the so called Mannesmann valve type.

8. A valve assembly as claimed in the preceding claims, characterized in that it provides a faucet (15) for supplying water to the heating plant, which is connected (36) between the connection (10) for draining the sanitary plant and the second section of the first sub-group.


11A
11
10
16
16A
33
13
31
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14
15
12A
12
SP
SVG
36
32
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Fig. 1

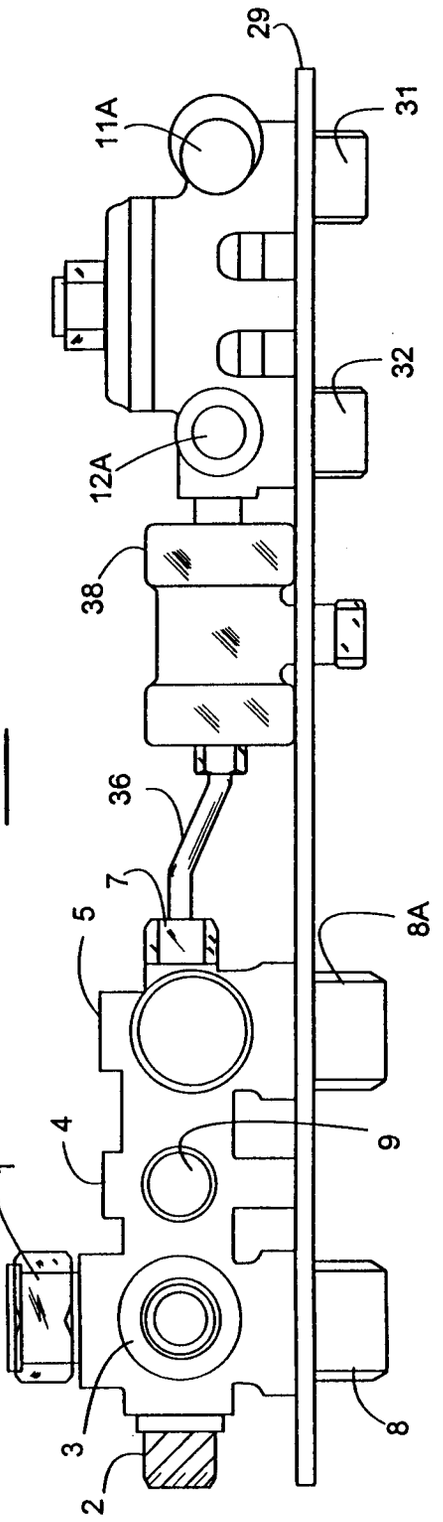

Fig. 2

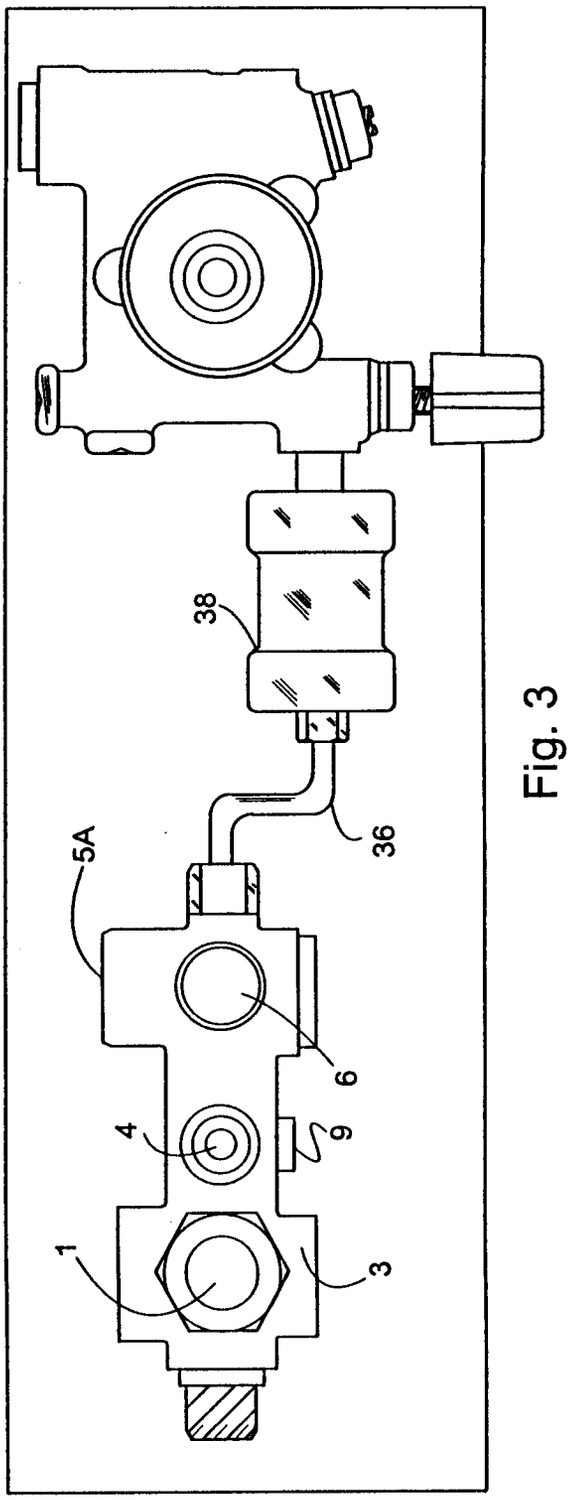

Fig. 3

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EUROPEAN SEARCH REPORT

Application Number EP 95108514.1

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 6)
Y	EP - A - 0 568 122 (FUGAS S.R.L.) * Totality * --	1,2	F 24 D 19/10 F 24 H 9/20
Y	BRENNWERTGERÄTE TECHNIK--VORSCHRIFTEN-ERFAHRUNGEN Nr. 11 der ASUE-Schriftenreihe, February 1989 H.U. GLAUSER "Brennwert--Umlaufwasserheizer für zentrale und dezentrale Heizsysteme", pages 70-73 * Pictures 4,5 * --	1,2	
A	DE - A - 4 027 206 (GOLDSTAR CO., LTD.) * Totality * --	1	
A	DE - A - 4 034 917 (JOH. VAILLANT GMBH & CO.) * Totality * ----	1	TECHNICAL FIELDS SEARCHED (Int. Cl. 6) F 24 D 19/00 F 24 H 9/00

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
VIENNA	09-10-1995	ENDLER

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
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E : earlier patent document, but published on, or after the filing date
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& : member of the same patent family, corresponding document

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