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(54) **Hydraulic valve assembly for wall-mounted boilers**

(57) A hydraulic valve assembly (13*) for wall-mounted boilers (11), wherein a secondary heat exchanger (20) represents an assemblage plate, mounted on which are, by means of fast-coupling mechanical devices ((SHR1), (SHR2)):
- a first, central, sub-assembly (STG1) basically comprising a pump (26);
- a second, lateral, sub-assembly (STG2) comprising some elements belonging to a secondary circuit (C2) for the distribution of sanitary water; and
- a third, lateral, sub-assembly (STG3) comprising some elements belonging to a primary circuit (C1) for distribution of heating water in premises.

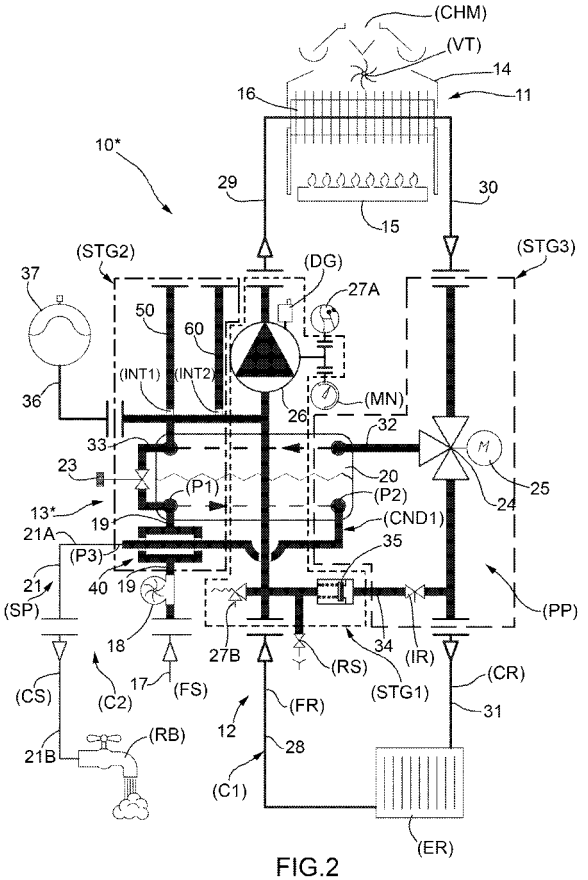

FIG.2

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Description

[0001] The present invention relates to a multifunction hydraulic assembly for combined wall-mounted boilers.

[0002] As is known, hydraulic assemblies for combined wall-mounted boilers developed in the last few years have integrated, within increasingly compact overall dimensions, all the hydraulic functions of the boiler.

[0003] In this perspective, the secondary heat exchanger with braze-welded plates for the production of sanitary hot water has asserted itself on the market, totally replacing the barrel heat exchanger thanks to its characteristics of smaller overall dimensions and lower production cost.

[0004] The continuous research aimed at knocking down production costs of wall-mounted boilers (configuring them increasingly as electrical household appliances for use in apartments) has introduced the use of composite materials (technopolymers) as a replacement for the parts made of brass that were widely used previously.

[0005] However, the arrangements of the various components in hydraulic assemblies currently on the market present certain drawbacks.

[0006] In particular, the current configurations adopted in hydraulic assemblies present arrangements of the functional elements that are non-rational, and hence do not enable a significant reduction of the overall dimensions with a consequent reduction of costs.

[0007] To provide a framework of the problem, it has appeared useful to show in Figure 1 a system of a traditional type that uses a hydraulic valve assembly of a known type.

[0008] In Figure 1, designated as a whole by 10 is a combined autonomous system for heating premises and producing hot water.

[0009] The system 10 is of a known type and consequently belongs to the prior art.

[0010] The system 10 comprises a wall-mounted boiler 11, a hydraulic network 12, which connects the wall-mounted boiler 11 hydraulically with the water-using devices, and a hydraulic valve assembly 13, which has the purpose of adjusting the flowrates of water from/to the wall-mounted boiler 11.

[0011] The system 10 is completed by at least one tap (RB) for delivery of sanitary hot water and by at least one heating element (ER) for heating premises both connected up to the hydraulic network 12.

[0012] As shown once again in Figure 1, the gas-fired wall-mounted boiler 11 comprises a casing 14 (normally made of sheet metal), housed inside which are a atmospheric gas burner 15, a main heat exchanger 16, and a flue (CHM) for evacuation of the fumes produced by combustion of the gas. The flue (CHM) is provided with a fan (VT).

[0013] The hydraulic valve assembly 13 comprises, in turn, an inlet pipe 17 for the sanitary cold water (FS) coming from a water mains supply (not shown).

[0014] The inlet pipe 17 envisages a flowmeter 18 for intake of the sanitary cold water (FS), which is set in a coupling 19 for connection with a secondary heat exchanger 20; in addition, the heat exchanger 20 is advantageously, though not necessarily, of the plate type.

[0015] Departing from the heat exchanger 20 is a pipe 21 for outlet for the sanitary hot water (CS) sent to the tap (RB).

[0016] The coupling 19 is provided with a deviation pipe 22, which envisages, in turn, a tap 23 for filling a primary circuit (C1), which, as will be seen, has the purpose of supplying the aforesaid heating element (ER) with hot water.

[0017] As emerges from Figure 1, whereas the water circulating in the main heat exchanger 16 is heated directly by the heat produced by the atmospheric gas burner 15, in the secondary heat exchanger 20 a heat exchange occurs between the hot water coming from the first heat exchanger 16 and the sanitary cold water (FS) coming from the water mains and in particular from the coupling 19.

[0018] In a traditional way, the hydraulic valve assembly 13 further comprises a three-way valve 24 driven by a motor 25 and a pump 26 for recirculation into the main circuit (C1).

[0019] As is known, the three-way valve 24 is used for activating a secondary circuit (C2) (for the sanitary water), which comprises the secondary heat exchanger 20. Said secondary circuit (C2) is activated in the presence of a request for sanitary hot water by a user.

[0020] Installed alongside the pump 26 is a pressure switch 27A of the primary circuit (C1); the pressure switch 27A guarantees the minimum operating pressure of the wall-mounted boiler 11. Located in the vicinity of the pump 26 an also a safety valve 27B of the primary circuit (C1), a degassing air valve (DG) of the central body of the pump 26, and a pipe tap for a manometer (MN).

[0021] It is possible to break down the primary circuit (C1) into the following pipes:

- return pipe 28 for return of the cold water for heating (FR) from the heating element (ER);
- delivery pipe 29 for delivery of the cold water for heating (FR) to the main heat exchanger 15;
- return pipe 30 for return of the hot water for heating (CR) from the main heat exchanger 16;
- delivery pipe 31 of the heating system for delivery of the hot water for heating (CR) to the heating element (ER);
- delivery pipe 32 for delivery of the hot water for heating (CR) to the secondary heat exchanger 20;
- return pipe 33 for return of the hot water for heating (CR) from the secondary heat exchanger 20 to the delivery pipe 29 for delivery to the main heat exchanger 16; it is evident that in the return pipe 33 the hot water for heating (CR) has a temperature lower than that of the hot water for heating (CR) in the delivery pipe 32; in addition, the return pipe 33 is provided with a tap (RS) for discharge of the primary

circuit for supply of the boiler 11;

- by-pass pipe 34 of the return pipe 28, of the delivery pipe 31, and of the heating element (ER); said by-pass pipe 34 is used in the case where the slam-shut valves (not illustrated) present in the pipes 28, 31 and in a position corresponding to the heating element (ER) have been activated; in addition, the by-pass pipe 34 is provided with a corresponding precalibrated by-pass valve 35 and a pipe 36 for connection with an expansion vessel 37; the presence of said by-pass pipe 34 prevents onset of undesirable overheating of the main heat exchanger 16 during any possible block in circulation of the water.

[0022] However, the hydraulic valve assembly 13 illustrated in Figure 1 is not compact, and the elements that make it up are arranged in a non-rational way and in such a way that installation by specialized operators is not intuitive and immediate. In addition, the hydraulic valve assembly 13 shown in Figure 1 envisages the use of a plurality of connection elements between the various components, all this at the expense of compactness, reliability and cost of the hydraulic valve assembly 13 itself.

[0023] Consequently, the main aim of the present invention is to provide a hydraulic valve assembly for wall-mounted boilers that is extremely compact and the constitutive elements of which are arranged in a rational way.

[0024] The present invention will now be described with reference to the annexed drawings, which illustrate non-limiting examples of embodiment thereof, it being pointed out that, given the particular complexity of the drawings and the large number of items, not all the elements have been numbered. In the drawings:

- Figure 2 represents an overall scheme of a first embodiment of a combined system for heating and production of hot water according to the present invention;
- Figure 3 represents an overall scheme of a second embodiment of a combined system for heating and production of hot water according to the present invention;
- Figure 4 represents a three-dimensional perspective view of a hydraulic valve assembly used in the first embodiment of the combined system shown in Figure 2;
- Figure 5 shows an exploded view of the hydraulic valve assembly of Figure 4;
- Figure 6 represents a first three-dimensional perspective view of the hydraulic valve of Figure 4 without the heat exchanger;
- Figure 7 shows a second three-dimensional perspective view of the hydraulic valve assembly of Figure 4 without the heat exchanger;
- Figure 8 represents a longitudinal cross section of the hydraulic valve assembly of Figure 7;
- Figure 9 is a schematic illustration of a hydraulic scheme corresponding to crossed connections used both for the primary circuit for heating premises and for the secondary circuit for the production of hot water;
- Figure 10 is an exploded view comprising a plate heat exchanger associated to which is a header that implements the hydraulic scheme of Figure 9; and
- Figure 11 shows an assembly resulting from the assemblage of the plate heat exchanger and of the header illustrated in Figure 10.

[0025] Shown in Figure 2 is a system 10* provided with a newly devised hydraulic valve assembly 13*.

[0026] In the system 10* and in particular in the hydraulic valve assembly 13* of Figure 2 the same reference numbers have been used to designate the same elements illustrated in the system 10 shown in Figure 1 and belonging to the prior art.

[0027] The hydraulic valve assembly 13* further comprises a shut-off tap (IR) set in the by-pass pipe 34.

[0028] As shown in Figure 2, in the hydraulic valve assembly 13* forming the subject of the present invention, the pump 26 has been set centrally with respect to the secondary heat exchanger 20.

[0029] The three-way valve 24 and the corresponding motor 25 are located on a first side (PP) (in this case on the right of the pump 26) with respect to the secondary heat exchanger 20 and to the pump 26.

[0030] In addition, once again located on the first side (PP) is the delivery pipe 31 of the heating system of the hot water for heating (CR), whilst positioned aligned to the pump 26 itself is the return pipe 28 of the primary circuit (C1).

[0031] Located on a second side (SP) (opposite to the first side (PP) with respect to the secondary heat exchanger 20 and to the pump 26) are the inlet pipe 17 for the sanitary cold water (FS) and the pipe 21 for outlet for the sanitary hot water (CS) to the tap (RB).

[0032] As may be noted from Figure 2, the inlets and the outlets of the heating water (FR), (CR) and of the sanitary water (FS), (CS), are divided, respectively, into two distinct groups that do not cross over one another, and are not intertwined.

[0033] In order for the sanitary hot water (CS) to be on the left with respect to the sanitary cold water (FS), the sanitary water coming from a point (P1) (where the coupling 19 ends) flows into the heat exchanger 20 towards a point (P2), starting from which is the pipe 21 for supply of the tap (RB). In particular, the sanitary water flows towards a point (P3) that is located on the same side as the point (P1).

[0034] In this way, a second vertical portion 21B of the pipe 21 comes to be located to the left of the inlet pipe 17 for the sanitary cold water (FS), thus respecting the conventions adopted in the sector of hydraulic systems, which require the pipe for the sanitary hot water (possibly equipped with a tap) to be to the left of the pipe for delivery of the sanitary cold water.

[0035] Using a different terminology, we can say that

the hydraulic valve assembly 13* envisages:

- a first, central, sub-assembly (STG1) comprising, in turn, the pump (26), at least one portion of the pipe (28), and at least one portion of the pipe (29);
- a second, lateral, sub-assembly (STG2), set on a first side with respect to the first sub-assembly (STG1), comprising, in turn, an inlet 19 for sanitary cold water, an outlet 21 for sanitary hot water, a return pipe 33 for return of the hot water for heating (CR) from the secondary heat exchanger 20, and a device (40) for crossing of the sanitary waters (see hereinafter); and
- a third sub-assembly (STG3), set on a second side with respect to the first sub-assembly (STG1), comprising the three-way valve (24) with the corresponding motor (25), at least one portion of the outlet pipe (21A) for the sanitary hot water (CS), the delivery pipe (32) for delivery of the hot water for heating (CR) to the secondary heat exchanger (20), at least one portion of the pipe (30), and at least one portion of the pipe (31).

[0036] The three sub-assemblies (STG1), (STG2), (STG3) comprise fast-coupling hydraulic means for connection to one another and to the rest of the hydraulic network. In addition, the sub-assemblies (STG2), (STG3) envisage fast-coupling mechanical means for connection to the secondary heat exchanger 20 (see hereinafter).

[0037] Since the three sub-assemblies (STG1), (STG2), (STG3) are made of composite material, they can each be formed in a single enbloc assembly, i.e., with a single moulding operation.

[0038] According to a further arrangement, all three sub-assemblies (STG1), (STG2), (STG3) can be produced together in a single enbloc assembly, i.e., with a single moulding operation.

[0039] In addition to what has been mentioned previously, it may be stated that the secondary heat exchanger 20 represents a plate for assemblage of the three sub-assemblies (STG1), (STG2), (STG3).

[0040] In effect, as is shown in greater detail in Figures 4, 5, and 6, the three sub-assemblies (STG1), (STG2), (STG3) are fixed to the secondary heat exchanger 20 by means of just two screws (SHR1) and (SHR2). Each screw (SHR1), (SHR2) is first inserted into a corresponding hole (HL1), (HL2) made, respectively, in the second, lateral, sub-assembly (STH2) and in the third, lateral, sub-assembly (STG3) (Figure 6). Finally, each screw (SHR1), (SHR2) is screwed in a respective threaded seat (SD1), (SD2), which is located on the secondary heat exchanger 20 (Figure 5).

[0041] As shown in greater detail in Figure 6, the two lateral hydraulic sub-assemblies (STG2) and (STG3) each envisage a respective pair of headers (CLT1), (CLT2), (CLT3), (CLT4), which are designed to be connected to similar headers (not shown in Figure 6) present on the secondary heat exchanger 20.

[0042] Moreover provided in the hydraulic valve assembly 13* is the aforesaid device 40 for crossing of the sanitary waters at inlet to and outlet from the secondary heat exchanger 20.

[0043] In this connection, it should be noted that the crossing device 40, from the thermal standpoint, is "zero balance" in the sense that the amount of heat yielded by the sanitary hot water is substantially equal to the amount of heat received by the same sanitary cold water at inlet. In addition, in the device 40 there is no mixing between the sanitary cold water and the sanitary hot water.

[0044] One of the advantages of the hydraulic valve assembly 13* forming the subject of the present invention consists in having defined a new arrangement of the system connections on the bottom closing plate of the casing 14 of the boiler 11 in order to compact further the overall dimensions of the hydraulic valve assembly 13* and consequently reduce the total number of components, with a consequent marked reduction in production costs.

[0045] To do this, in the present invention interventions have been made, delimiting a space surrounding the secondary plate heat exchanger and positioning all the components for operation and control in a compact way.

[0046] The compacting has led to a superposition with crossing of the connections for the sanitary-water circuit of the plate heat exchanger between the inlet for the sanitary cold water and the outlet for the sanitary hot water.

[0047] Interestingly, this compacting is moreover suited to an enbloc construction of the main assemblies obtained in a single body of composite material, where by "composite material" is meant a thermoplastic material, also referred to as "technopolymer", which guarantees a good resistance to high operating temperatures, allied to a low permeability of water absorption (hydrolysis).

[0048] Sticking, instead, to the design choice that envisages three sub-assemblies (STG1), (STG2), (STG3), it is possible to envisage the construction of the hydraulic valve assembly 13* in two "specular" configurations with the same dimensions and both having as central assembly the first sub-assembly (STG1).

[0049] Hence it is possible to envisage two "specular" configurations:

(1) a first configuration with the second sub-assembly (STG2) to the left of the first, central, sub-assembly (STG1), whilst the third sub-assembly (STG3) is positioned to the right of the first, central, sub-assembly (STG1);

(2) a second configuration with the second sub-assembly (STG2) to the right of the first, central, sub-assembly (STG1), whilst the third sub-assembly (STG3) is positioned to the left of the first, central, sub-assembly (STG1).

[0050] In addition, as shown in particular in Figure 7, the volute (VLT) of the pump 26, with corresponding intake header (CLTA) and delivery header (CLTM), a supplementary attachment (ATT) of the three-way valve 24

(useful in the case where it is desired to displace the three-way valve), a tap (PRS) for the manometer (MN) (not shown in Figure 7) are integrated in the first, central, sub-assembly (STG1). In Figure 6, it has been shown how the two lateral sub-assemblies (STG2), (STG3) grip between them the first sub-assembly (STG1) comprising the volute (VLT) of the pump 26 and the corresponding elements seen previously connected thereto.

[0051] As mentioned previously and as is shown in greater detail in Figure 8, the hydraulic assembly 13* also envisages a device 40 for crossing of the sanitary waters at inlet to and outlet from the heat exchanger 20.

[0052] Once again in Figure 8 it may be seen that the two sub-assemblies (STG2) and (STG3) are hydraulically connected to one another by a first, bottom, pipe (CND1) and, via the first sub-assembly (STG1), by a second, top, pipe (CND2).

[0053] Housed in the first pipe (CND1) is a first horizontal portion 21A of the pipe 21 for outlet of the sanitary hot water. The first pipe (CND1) and the horizontal portion 21A are coaxial. In addition, the horizontal portion 21A has a diameter smaller than that of the first pipe (CND1). Obtained by plastic deformation on the first portion 21A are two flanges (FLG1) and (FLG2) shaped like an annulus, equipped with respective O-rings. The sanitary hot water (CS) flows in the horizontal portion 21A and heats the sanitary cold water (FS) that enters the inlet pipe 17 and flows around the horizontal portion 21A itself before entering the secondary heat exchanger 20.

[0054] Crossing between the coupling 19 and the pipe (CND1) defines the crossing device 40.

[0055] As shown once again in Figure 8 the second, top, pipe (CND2) traverses, in use, the volute (VLT) of the pump 26 and has the purpose of rendering the volute (VLT) itself fixed with respect to the body of the secondary heat exchanger 20. For this purpose, the second, top, pipe (CND2) can be broken down into a number of pieces that can be connected to one another, at least one of which is inserted in the volute (VLT) itself.

[0056] The hydraulic assembly 13* is also provided with a delivery pipe 50 for delivery to a micro-accumulation tank (MCR) (Figure 3) and a return pipe 60 for return of the hot water contained in the micro-accumulation tank (MCR) to the primary circuit (C1).

[0057] In the embodiment illustrated in Figure 2, given that they do not envisage any micro-accumulation tank, the pipes 50, 60 have been deliberately disconnected from the rest of the system, each envisaging a respective interruption (INT1), (INT2).

[0058] Said two interruptions (INT1), (INT2) are provided at the moment of production of the second sub-assembly (STG2).

[0059] Instead, in the model with micro-accumulation tank (MCR) illustrated in Figure 3, a plug (TPT) is provided in the pipe 36, which disconnects the cold water entering the micro-accumulation tank (MCR) from the hot water that flows out.

[0060] As is known, the micro-accumulation tank (MCR) is a 4-litre or 5-litre tank, kept pre-heated by an electrical resistor (RE) (Figure 3), which enables the instantaneous boiler 11 to reduce drastically the time for waiting for the production of hot water at 50°C when said boiler 11 starts cold. It basically functions as thermal flywheel in the initial step of intake of the sanitary hot water.

[0061] In fact, when a user opens the tap (RB), the pump 26 goes into operation and recalls hot water at 70-80°C (from the pipe 60) present in the micro-accumulation tank (MCR), said hot water being sent to the primary heat exchanger 16 through the pipe 29 so as to bring the hot water of the primary circuit (C1) rapidly into steady-state conditions and, evidently indirectly, heat also up the sanitary water fast by means of the secondary heat exchanger 20.

[0062] In addition, the delivery pipe 50 and the return pipe 60 of the micro-accumulation tank (MCR) are provided, respectively, with an attachment (IAF) for the cold water and an attachment (UAC) for hot water for immediate needs.

[0063] A peculiarity of the present invention lies in that the two attachments (IAF) and (UAC) are integrated in the second sub-assembly (STG2), hence enabling elimination of inconvenient coupling pipes used in known existing embodiments.

[0064] The same solution adopted for the sanitary water can be used for the heating water as shown in Figures 9, 10, and 11.

[0065] In this case, it is possible to conceive a device 40* for crossing of the delivery and return waters of the primary circuit (C1), which enter and exit from the secondary heat exchanger 20.

[0066] Each device 40 and 40* for crossing of the water entering/leaving the secondary heat exchanger 20 enables the connections of the heat exchanger to be rendered reversible, using at will, on the right or on the left, the coupling headers.

[0067] Figures 9, 10, and 11 show a particular arrangement, which envisages the use of a header (CLT), integrated in which are two water-crossing devices 40, 40*.

[0068] In particular, in the embodiment illustrated in Figures 9, 10, and 11, the two water-crossing devices 40, 40* are both on the same side, even though it is possible to provide headers (not shown), in which the two crossing devices 40, 40* are set at the vertices of a diagonal of the heat exchanger 20.

[0069] The main advantage of the hydraulic valve assembly forming the subject of the present invention consists in providing rational arrangements of the functional elements, with a significant reduction of the overall dimensions and a consequent significant cut in production costs.

Claims

1. A hydraulic valve assembly (13*) for wall-mounted boilers (11);

the hydraulic valve assembly (13*) comprising:

- a primary circuit (C1) for distribution of heating water in premises; said primary circuit (C1) being provided with pumping means (26);
- a secondary circuit (C2) for distribution of sanitary water; said secondary circuit (C2) envisaging a secondary heat exchanger (20) for heating the sanitary water; and
- a three-way valve (24) controlled by actuation means (25); hydraulic valve assembly (13*) wherein said secondary heat exchanger (20) represents an assemblage plate, mounted on which, by means of fast-coupling mechanical means ((SHR1), (SHR2)) are:
- a first, central, sub-assembly (STG1) basically comprising at least one portion of said means (26) for pumping the water into the primary circuit (C1) for distribution of heating water in premises;
- a second, lateral, sub-assembly (STG2) basically comprising at least some elements belonging to said secondary circuit (C2) for distribution of sanitary water; and
- a third, lateral, sub-assembly (STG3) basically comprising at least some elements belonging to said primary circuit (C1) for distribution of heating water in premises;

the hydraulic valve assembly (13*) being **characterized in that** said second, lateral, sub-assembly (STG2) further comprises at least one device (40) for crossing of the sanitary waters.

2. The hydraulic valve assembly (13*) as claimed in Claim 1, **characterized in that** said device (40) for crossing of the sanitary waters comprises a first pipe (CND1), housed in which is a first horizontal portion (21A) of a pipe (21) for outlet of the sanitary hot water; said first pipe (CND1) and said horizontal portion (21A) being coaxial, and the horizontal portion (21A) moreover having a diameter smaller than that of the first pipe (CND1).

3. The hydraulic valve assembly (13*) as claimed in Claim 2, **characterized in that** obtained by plastic deformation on the horizontal portion (21A) are two flanges (FLG1) and (FLG2) shaped like an annulus, equipped with respective O-rings, in such a way that the sanitary hot water (CS) that flows in the horizontal portion (21A) heats the sanitary cold water (FS) that enters the inlet pipe (17) and flows around the portion (21A) itself.

4. The hydraulic valve assembly (13*), as claimed in any one of the preceding claims, **characterized in that** the three sub-assemblies (STG1, STG2, STG3) envisage fast-coupling hydraulic means for connection to one another and to the rest of the hydraulic network.

5. The hydraulic valve assembly (13*) as claimed in any one of the preceding claims, **characterized in that** it envisages:

- a first, central, sub-assembly (STG1) comprising pumping means (26), at least one portion of a pipe (28) for return of the cold water for heating (FR), and at least one portion of a pipe (29) for delivery to said main heat exchanger (16);
- a second, lateral, sub-assembly (STG2), set on a first side with respect to said first sub-assembly (STG1), comprising an inlet (19) for the sanitary cold water, an outlet (21) for the sanitary hot water, and a return pipe (33) for return of the hot water for heating (CR) from the secondary heat exchanger (20); and
- a third, lateral, sub-assembly (STG3), set on a second side with respect to said first sub-assembly (STG1), comprising a three-way valve (24) with a corresponding drive motor (25), at least one portion (21A) of an outlet pipe (21) for the sanitary hot water (CS), a delivery pipe (32) for delivery of the hot water for heating (CR) to the secondary heat exchanger (20), at least one portion of a return pipe (30) for return from the main heat exchanger (16) for the hot water for heating, and at least one portion of a delivery pipe (31) of the heating system for delivery of the hot water for heating (CR) to the heating element (ER).

6. The hydraulic valve assembly (13*) as claimed in any one of the preceding claims, **characterized in that** it envisages two specular configurations:

(1) a first configuration with the second sub-assembly (STG2) to the left of the first, central, sub-assembly (STG1), whilst the third sub-assembly (STG3) is positioned to the right of the first, central, sub-assembly (STG1); and
(2) a second configuration with the second sub-assembly (STG2) to the right of the first, central, sub-assembly (STG1), whilst the third sub-assembly (STG3) is positioned to the left of the first, central, sub-assembly (STG1).

7. The hydraulic valve assembly (13*) as claimed in Claim 1, **characterized in that** integrated in the first, central, sub-assembly (STG1) are:

- a volute (VLT) of the pumping means (26) with corresponding intake header (CLTA) and delivery header (CLTM);
- a supplementary attachment (ATT) of the three-way valve (24); and
- a tap for a manometer (MN).

8. The hydraulic valve assembly (13*), as claimed in any one of the preceding claims; the hydraulic valve assembly (13*) being **characterized in that** the pumping means (26) are set in a position corresponding to said secondary heat exchanger (20) and **in that** the main circuit (C1) is located in a position corresponding on a first side (PP) with respect to said secondary heat exchanger (20), whilst both an inlet pipe (17) for the sanitary cold water (FS) and an outlet pipe (21B) for the sanitary hot water (CS) are located on a second side (SP) opposite to said first side (PP) with respect to said secondary heat exchanger (20).

9. The hydraulic valve assembly (13*), as claimed in any one of the preceding claims, **characterized in that** it is also provided with a delivery pipe (50) for delivery to a micro-accumulation tank (MCR) and a return pipe (60) for return of the hot water contained in the micro-accumulation tank (MCR) to the primary circuit (C1).

10. The hydraulic valve assembly (13*), as claimed in Claim 9, **characterized in that** the pipes (50, 60), if they do not envisage any micro-accumulation tank (MCR), are deliberately disconnected from the rest of the system, each envisaging a respective interruption (INT1), (INT2).

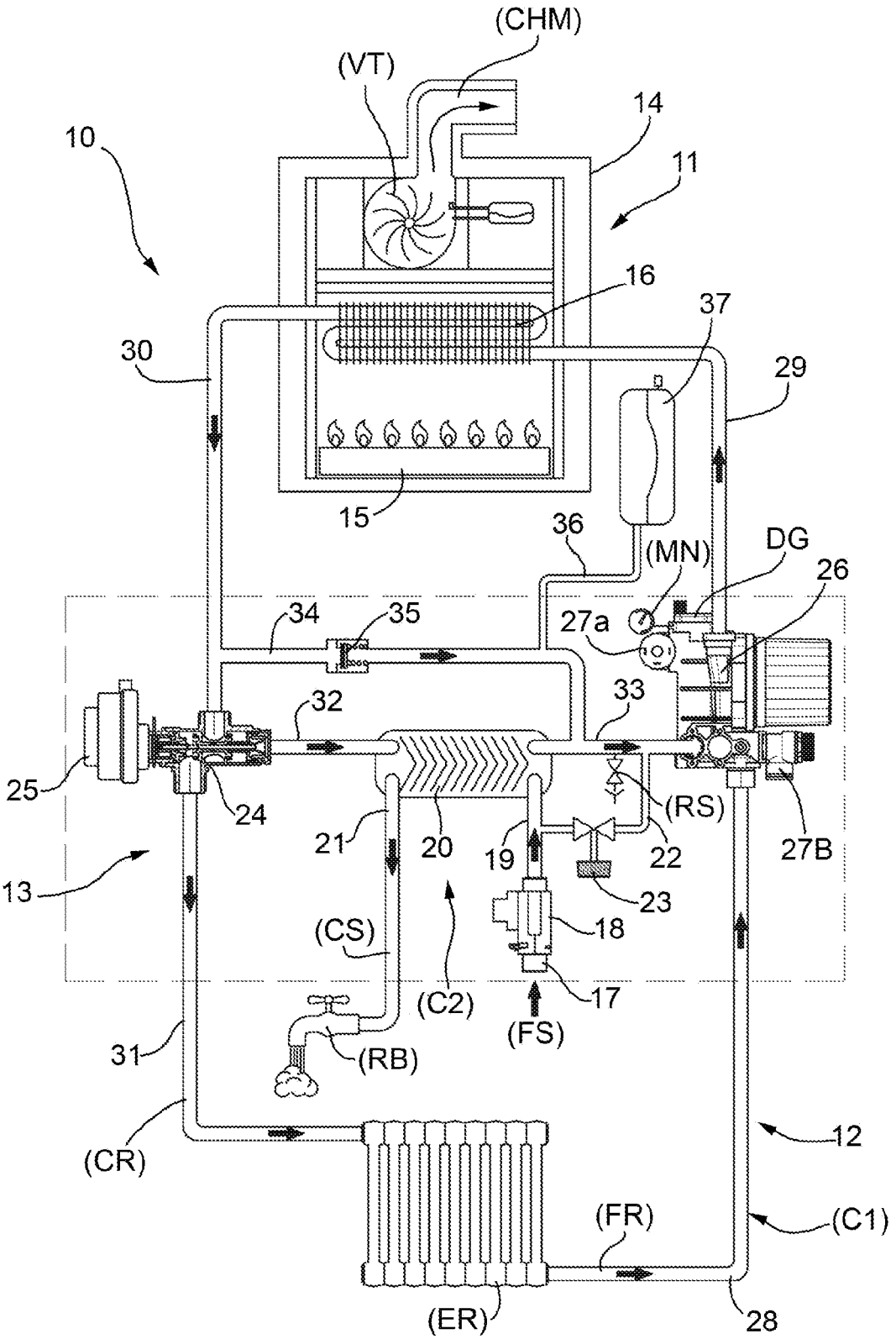
11. The hydraulic valve assembly (13*), as claimed in Claim 9, **characterized in that** it comprises, if the presence of a micro-accumulation tank (MCR) is in effect envisaged, a plug (TPT) in a pipe (36) that disconnects the cold water entering the micro-accumulation tank (MCR) from the hot water flowing out.

12. The hydraulic valve assembly (13*), as claimed in Claim 11, **characterized in that** the pipes (50, 60) envisage two attachments (IAF) and (UAF) integrated in the second sub-assembly (STG2).

13. The hydraulic valve assembly (13*), as claimed in Claim 1, **characterized in that** it moreover envisages a device for crossing (40*) of the delivery and return waters of the primary circuit (C1) that enter and exit from the secondary heat exchanger (20).

14. The hydraulic valve assembly (13*), as claimed in Claim 13, **characterized in that** it envisages that the two water-crossing devices (40, 40*) are set both on the same side; or else, alternatively, the two crossing devices (40, 40*) are set on a diagonal of the heat exchanger 20.

15. The hydraulic valve assembly (13*), as claimed in any one of the preceding claims, **characterized in that** the three sub-assemblies (STG1), (STG2), (STG3) are each made of an enbloc assembly, i.e., with a single moulding operation, or else **in that** all three sub-assemblies (STG1), (STG2), (STG3) are formed together in a single enbloc assembly, i.e., with a single moulding operation.



PRIOR ART

FIG.1

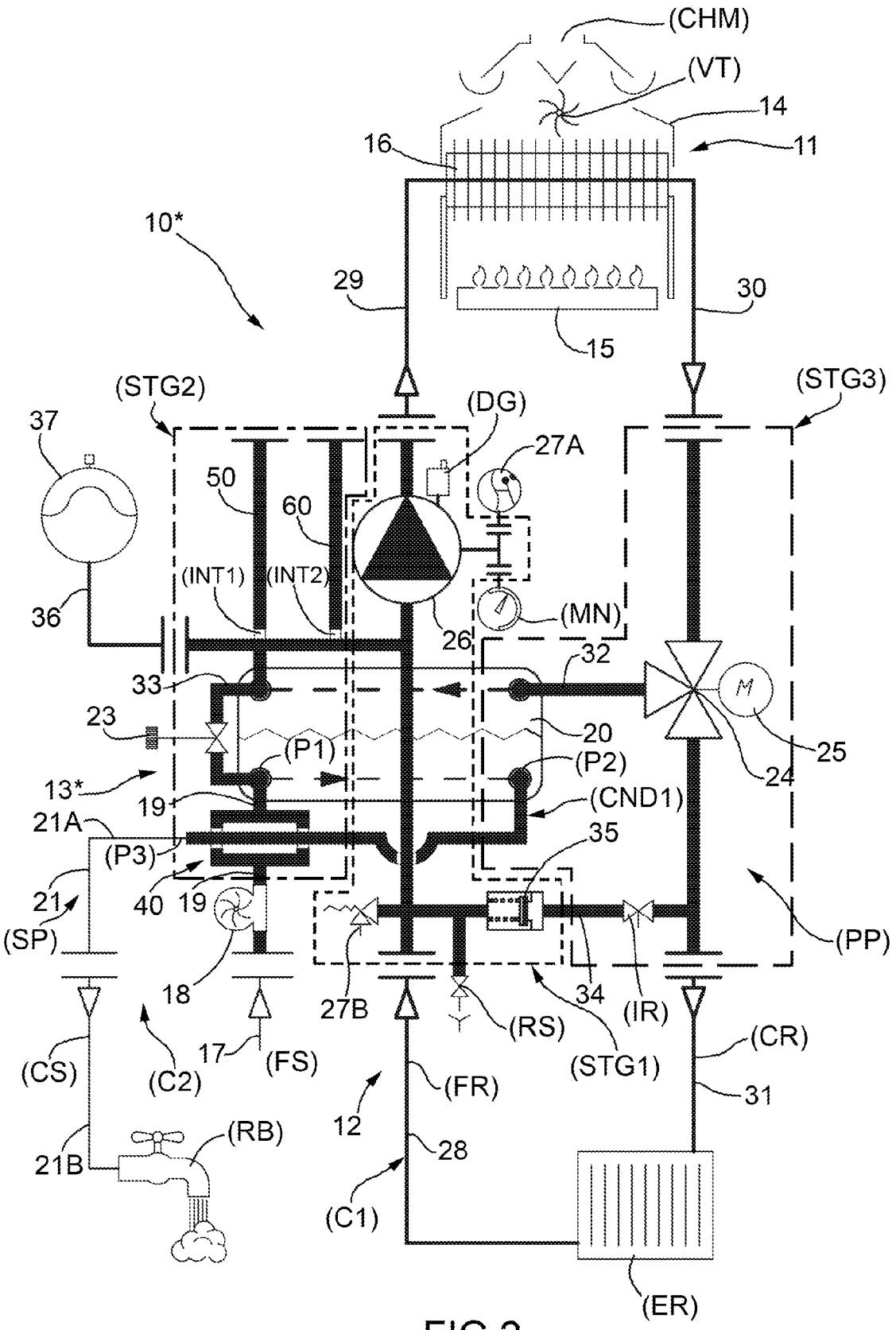

(CHM)
(VT)
14
11
16
10*
29
30
15
(STG2)
(STG3)
(DG)
37
27A
50
60
(INT1)
(INT2)
(MN)
36
26
32
33
M
23
20
25
(P1)
(P2)
24
13*
19
(CND1)
21A
35
(P3)
21
40
19
(SP)
(PP)
18
27B
34
(IR)
(RS)
(CR)
17
(FS)
(STG1)
(CS)
(C2)
(FR)
31
12
(RB)
28
21B
(C1)
(ER)

FIG.2

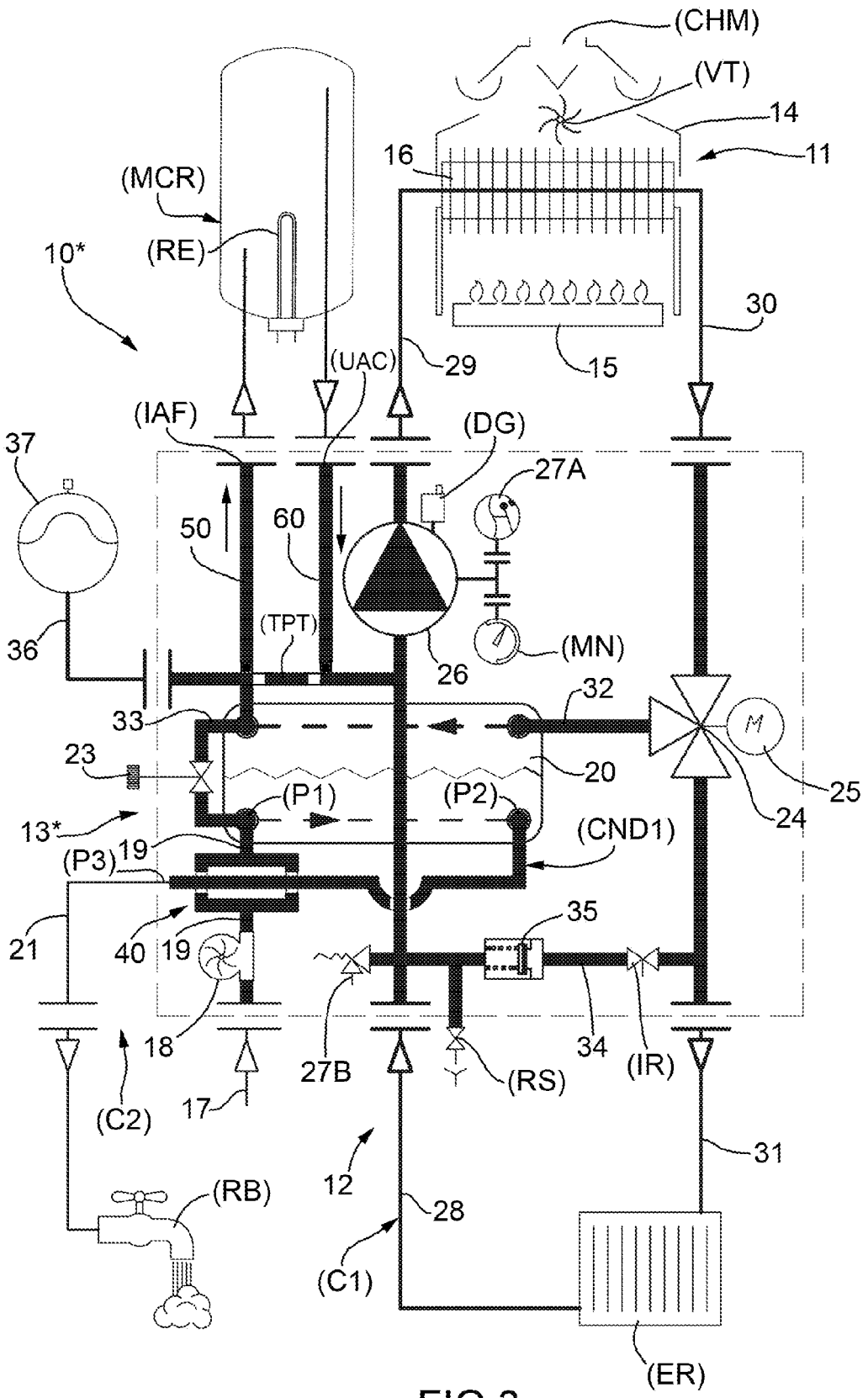

(CHM)
(VT)
14
11
16
(MCR)
(RE)
10*
30
15
29
(UAC)
(IAF)
(DG)
37
27A
50
60
(TPT)
(MN)
36
26
32
33
M
23
20
25
(P1)
(P2)
24
13*
(CND1)
(P3)
19
35
21
40
19
18
27B
(RS)
34
(IR)
(C2)
17
31
12
(RB)
28
(C1)
(ER)

FIG.3

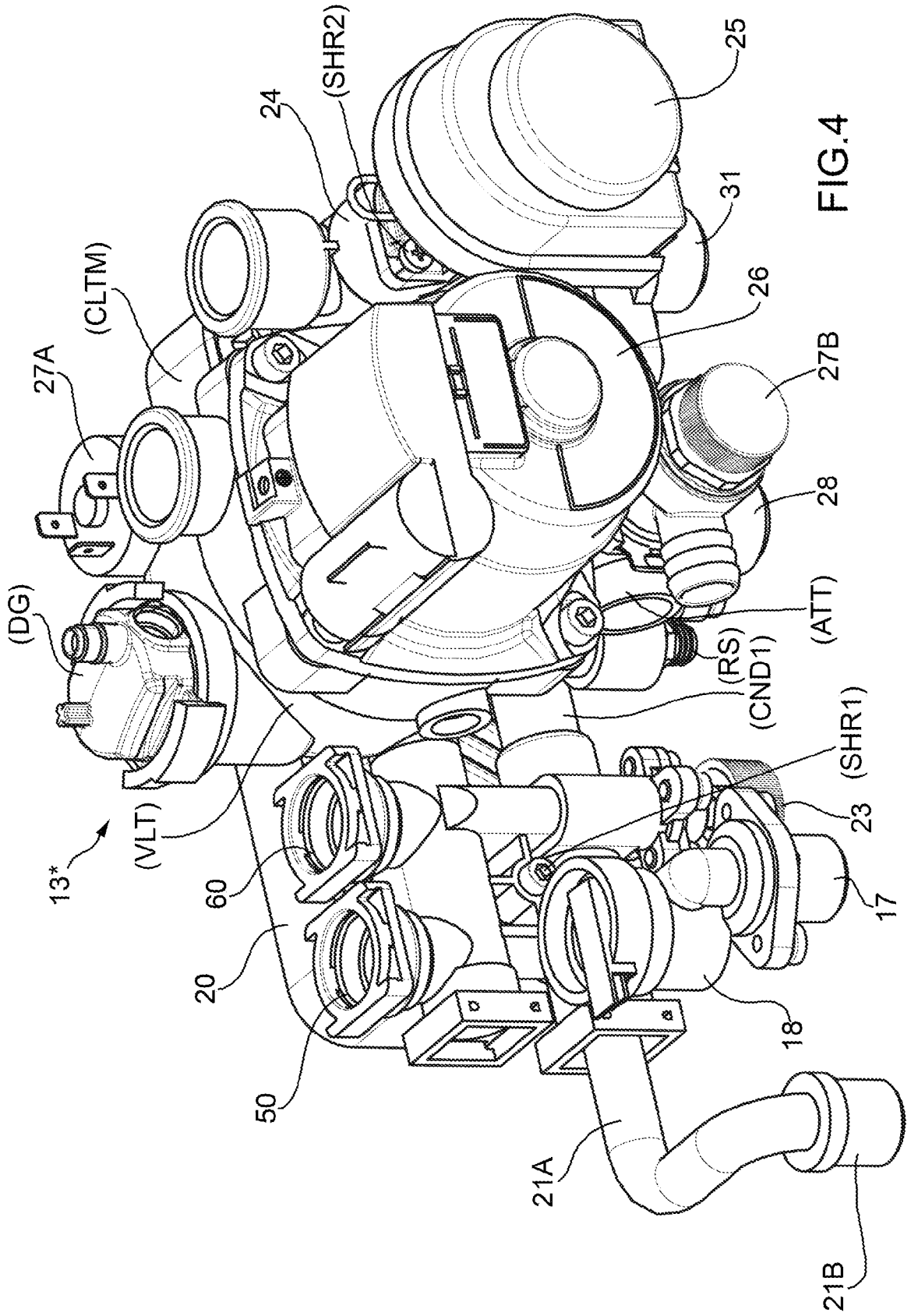

25
(SHR2)
24
31
(CLTM)
26
27A
27B
28
(DG)
(ATT)
(RS)
(CND1)
(SHR1)
23
(VLT)
13*
60
17
20
18
50
21A
21B

FIG.4

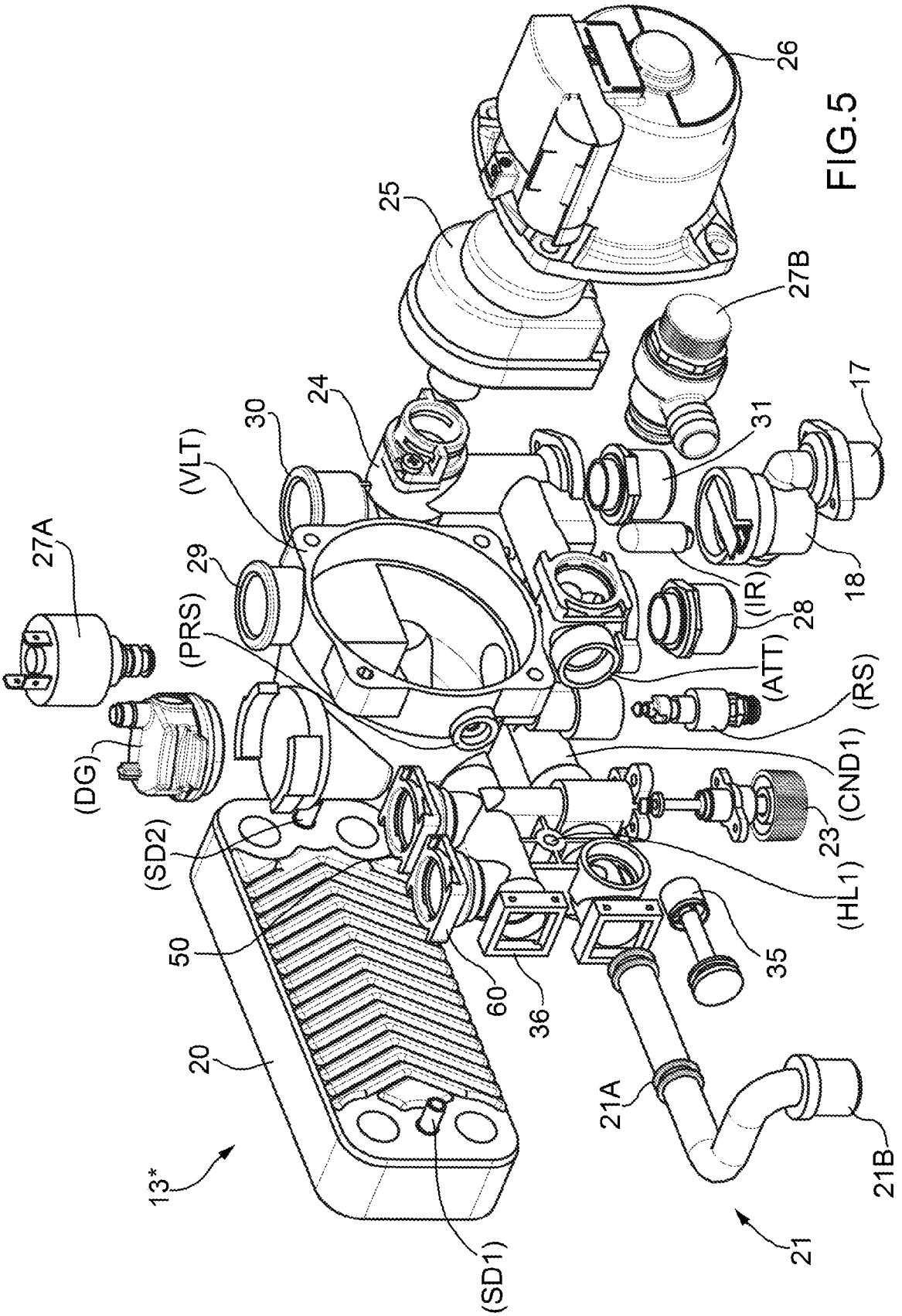

26
25
27B
17
31
24
30
(VLT)
27A
29
(PRS)
18
(IR)
28
(ATT)
(RS)
(DG)
(CND1)
23
(SD2)
(HL1)
50
35
60
36
20
21A
21B
13*
21
(SD1)

FIG.5

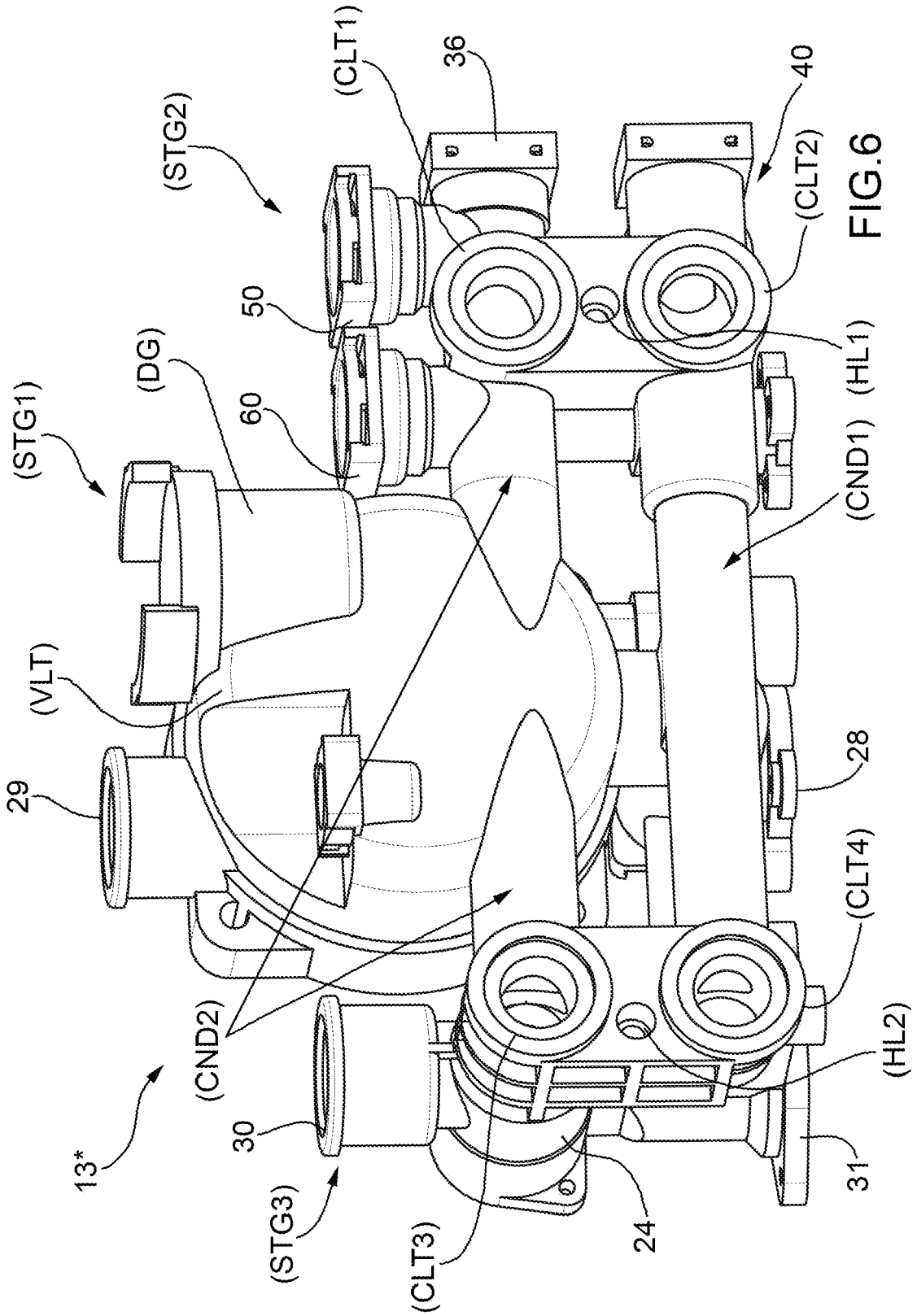

(CLT1)
36
40
(STG2)
(CLT2)
50
(HL1)
(DG)
60
(STG1)
(CND1)
(VLT)
28
29
(CLT4)
(CND2)
(HL2)
30
31
13*
(STG3)
24
(CLT3)

FIG.6

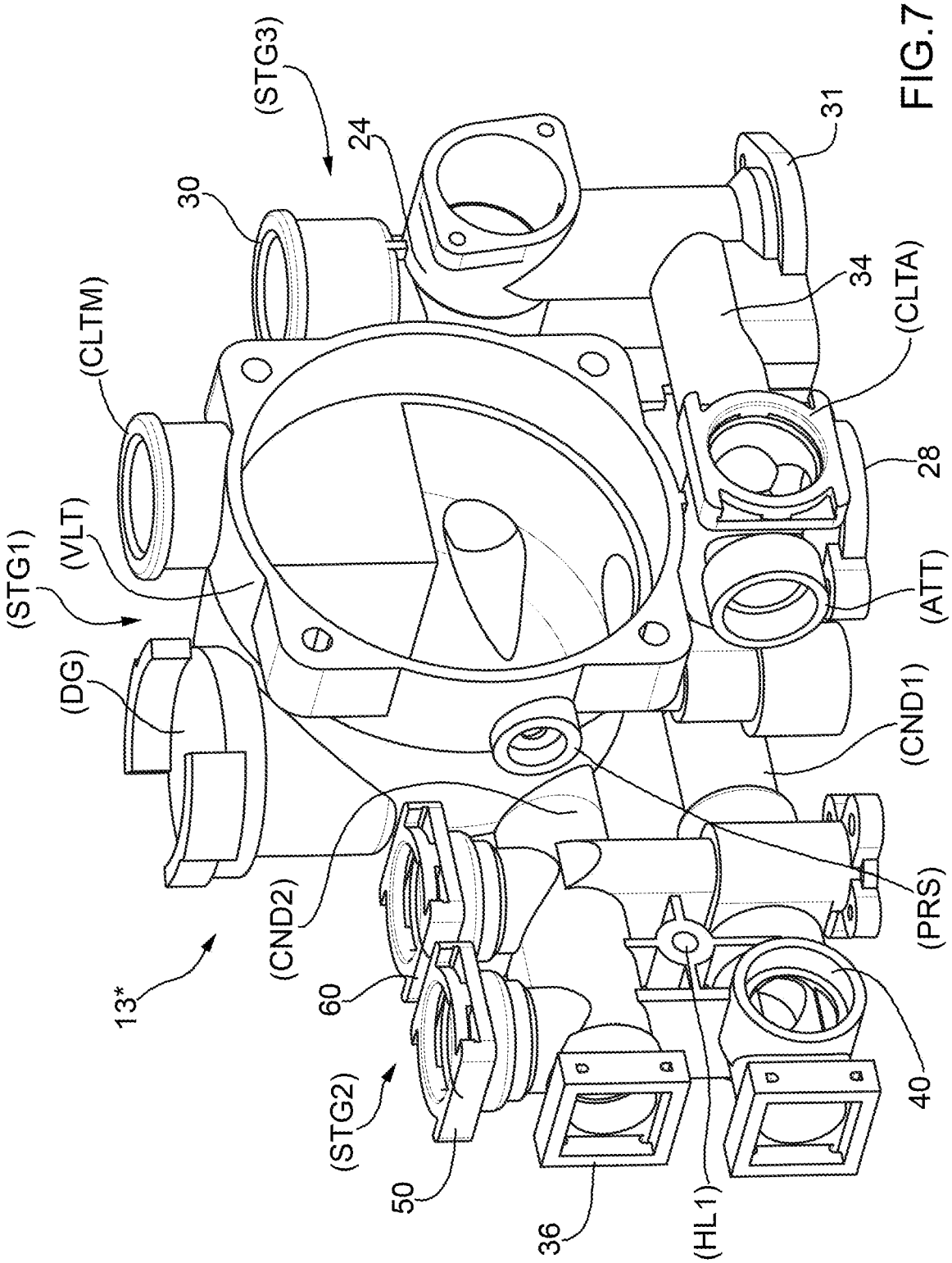

(STG3)
24
31
30
34
(CLTM)
(CLTA)
28
(VLT)
(STG1)
(ATT)
(DG)
(CND1)
(CND2)
(PRS)
13*
60
40
(STG2)
50
36
(HL1)

FIG.7

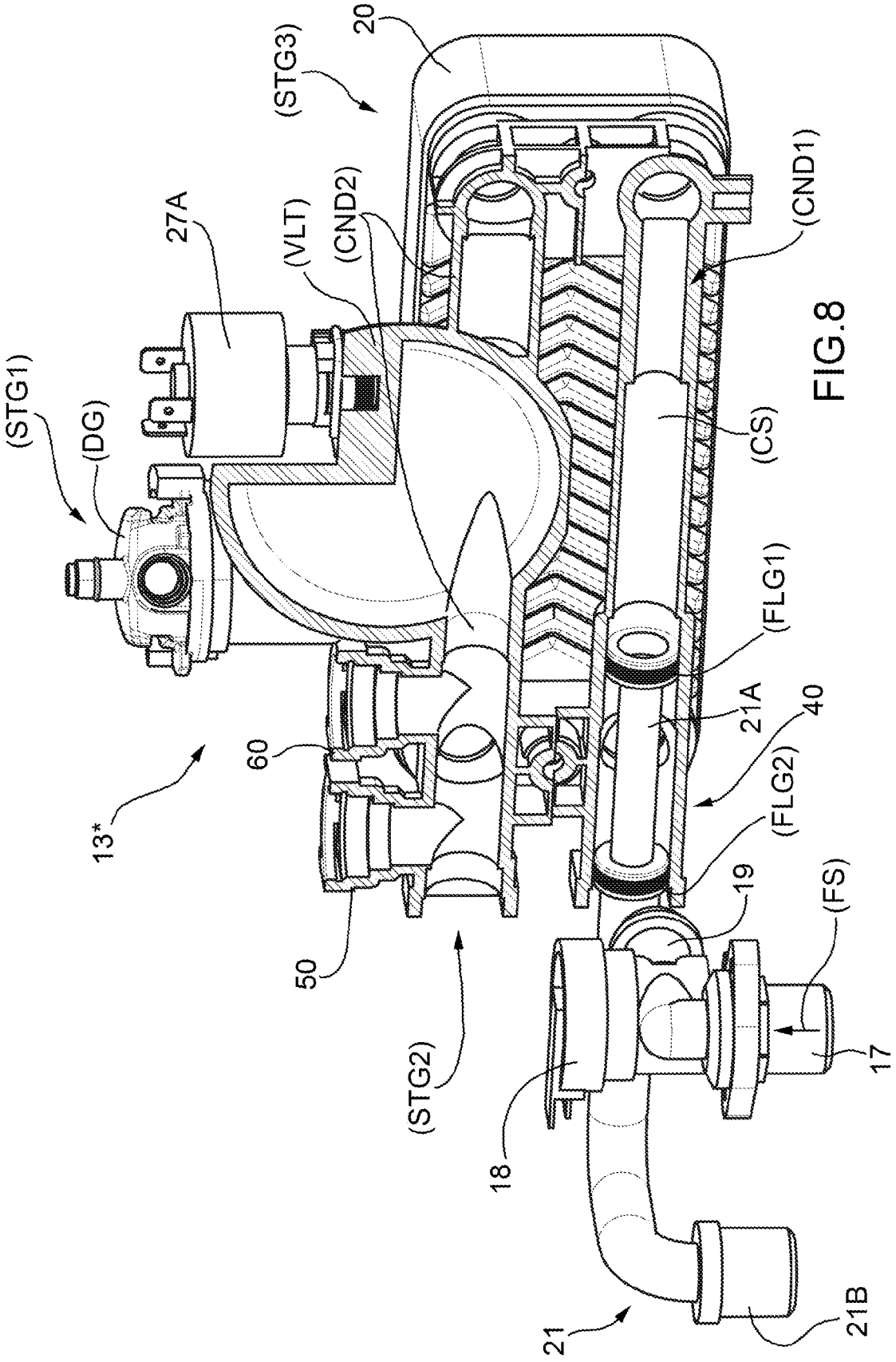

20
(STG3)
27A
(VLT)
(CND2)
(CND1)
(STG1)
(DG)
(CS)
(FLG1)
21A
40
60
13*
(FLG2)
19
(FS)
50
(STG2)
17
18
21
21B

FIG.8

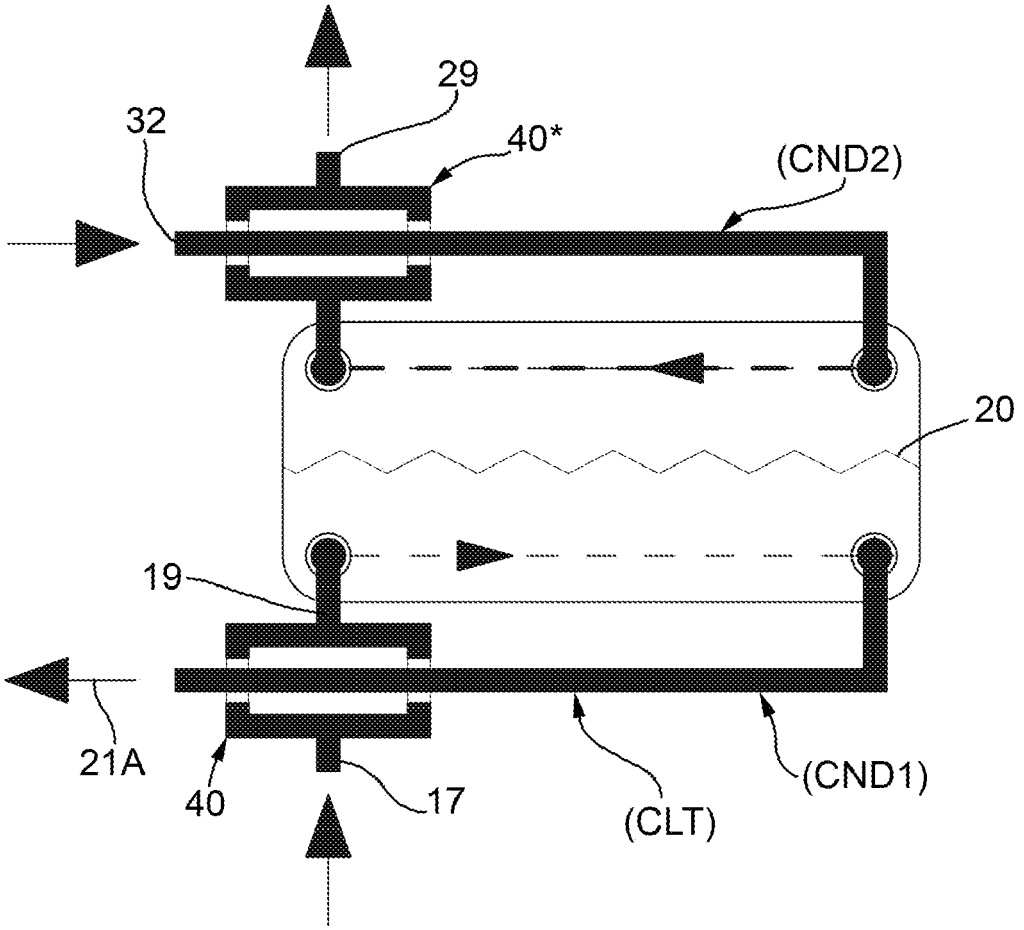


FIG.9

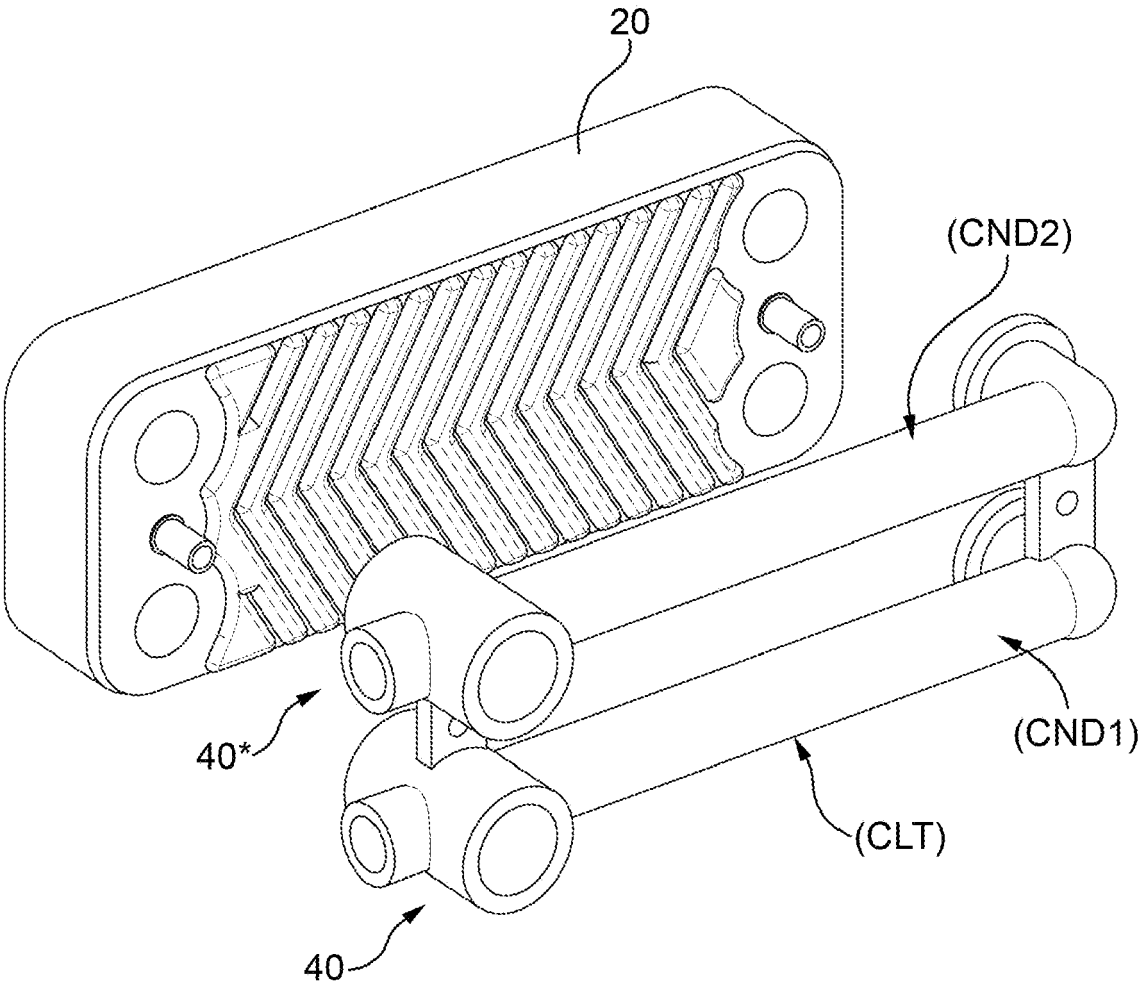


FIG.10

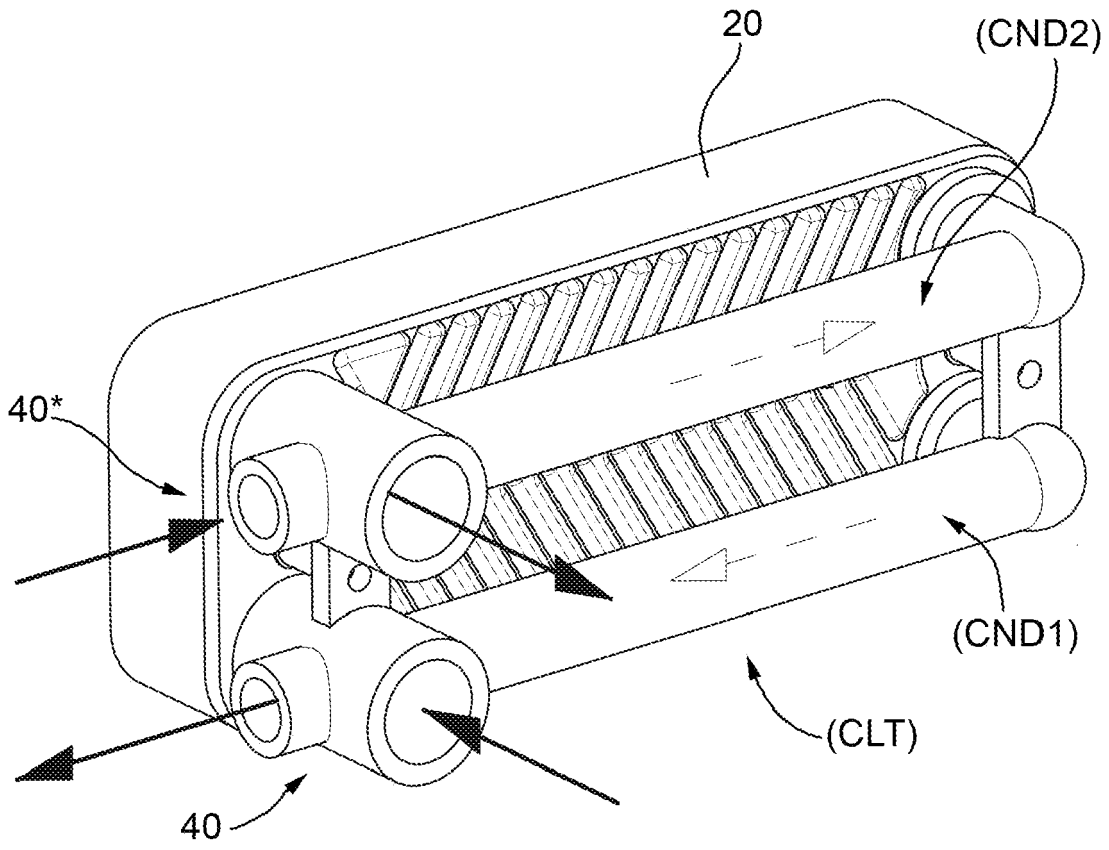


FIG.11