



(43) International Publication Date
7 April 2011 (07.04.2011)

(10) International Publication Number
WO 2011/038943 A1

(51) International Patent Classification:
F24D 3/10 (2006.01)

(21) International Application Number:
PCT/EP2010/052566

(22) International Filing Date:
1 March 2010 (01.03.2010)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
TV2009A000188 29 September 2009 (29.09.2009) IT

(71) Applicant (for all designated States except US): **TREZETA S.R.L.** [IT/IT]; Via Giosue' Carducci, 1/B, I-33077 Sacile (IT).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **ZAIA, Franco** [IT/IT]; Via Antonio Canova, 18, I-33077 Sacile (IT).
ZAIA, Silvia [IT/IT]; Via Roma, 23, I-31016 Cordignano (IT).

(74) Agents: **MODIANO, Micaela** et al.; Modiano & Partners, Via Meravigli, 16, I-20123 Milano (IT).

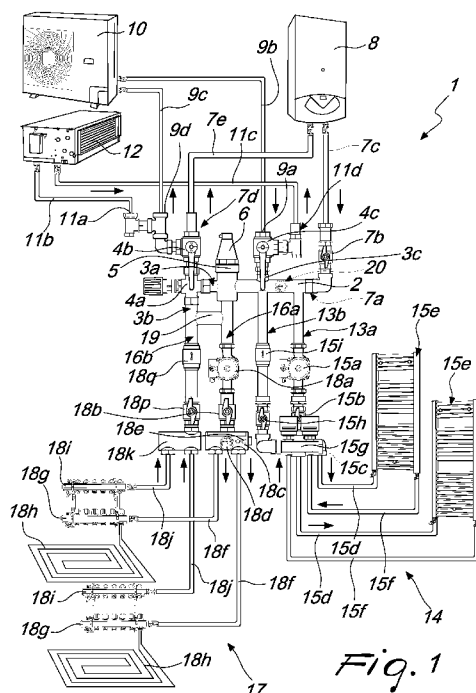
(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

- with international search report (Art. 21(3))
- with amended claims (Art. 19(1))

(54) Title: DISTRIBUTION MODULE, PARTICULARLY FOR DISTRIBUTING HEATING OR COOLING WATER



(57) Abstract: A distribution module (1) particularly adapted to distributing heating or cooling water constituted by a monoblock unit (2) that has couplings (3a, 5, 3b) for a first three-way valve (4a), for a deaerator (6), for three first inlets and three first outlets, some being controlled by a second (4a) and a third (4b) three-way valve for a boiler (8), for a refrigeration system (10) and for a dehumidifier (12), two second inlets (16b, 13b) and two second outlets (16a, 13a) for a water circulation system (14, 17) at high and low temperature; a bypass duct (19) being also present, that is interposed between the second inlet (16b) and the second outlet (16a) for the low-temperature system (17), downstream of the first three-way valve (4a) and the deaerator (6), and an adjustment valve (20) that is associated to a duct that is interposed between the second inlet (13b) and the second outlet (13a) of the high-temperature system (14) and the first boiler inlet and the first inlet (9a) of said refrigeration system (10).

DISTRIBUTION MODULE, PARTICULARLY FOR DISTRIBUTING HEATING OR COOLING WATER

Technical field

The present invention relates to a distribution module particularly adapted to be used for the distribution of heating or cooling water.

Background Art

Today, the heating or cooling of all or part of a building is usually done with water that is respectively brought to high or low temperature by means of a heat generator, such as a boiler, or with a refrigeration system.

10 Normally, the water is made to circulate within a distribution circuit towards one or more heat exchangers of the water-air type, including for example radiators, radiating panels or convective ventilation systems.

Today, the distribution of water to the heat exchangers is usually controlled by means of known electronic devices that are adapted to act on
15 water circulation and on the adjustment of the boiler as a function of environmental measurements taken, for example, by means of a thermostat.

However, modern building industry suffers the drawback of creating technical areas that are dedicated to the accommodation of the pipes and the electronic devices and, above all, the adjustment and control means that are
20 controlled by such devices, including for example pumps, calibration valves, mixing and/or distribution valves, zone and/or thermostatic valves, diverters and three-way valves.

Each specific building has the problem of having to identify such technical areas each time, as each building has specific thermal needs as a
25 function of the predetermined areas that must be brought to a different temperature or other characteristics that require particular technical choices.

Accordingly, the person responsible for installing the system is required to be very experienced, as well as willing, in terms of dedicating time and resources in order to assemble each specific system, which affects
30 the total cost of such system.

In any case, the problem remains of having non homogenous thermal solutions between two distinct thermal systems and a consequent low or different efficiency or guarantee of results between them.

This is aggravated by the fact that often the presence of different types
5 of professionals is required, since often the installer of the hydraulic components does not have the specialization necessary to carry out also the electrical part of the system.

The consequences relating to the problems and drawbacks described above are that sometimes the thermal systems that are installed do not
10 operate optimally, which results in high consumption rates and an elevated risk of having anomalies and breakage within the system, and the consequential dissatisfaction of the user.

The demand for a mixed thermal system, both at high temperature, with radiators, and at low temperature, with radiating panels in the floor or
15 wall creates other problems, due to the mixing modules used.

One drawback found in the usual mixing modules commercially available is that they are composed of many parts, fittings and curves that, during its assembly, can cause water leakage or can be arranged erroneously and cause head losses.

20 Another drawback of mixing modules of the known type is constituted by the presence of air in the heating circuit that must be taken out by acting on each single radiator or exchanger; such problems are aggravated when using underfloor systems.

Another drawback of mixing modules of the known type is due to the
25 fact that during the summer cooling operation, the cooling water within the circuit passes through the calibration valve or diverter, generating head losses and thus a higher dissipation of power in the circulator.

Another drawback consists of a lack of insulation between the mixing modules and the environment: condensation can form when cooling during
30 summer use, making the region contiguous to the mixing module wet, while

during the winter heat dissipation occurs.

FR-A-2733822 is also known which discloses a distribution module for the installation within a thermal station with a radiating panel and radiators, in which the water that leaves a boiler is divided between two parallel paths that respectively feed a high temperature circuit and a low temperature circuit.

EP-A-0806612 is also known which discloses the installation of a heating system that has a mixing point in which the hot water, coming from a boiler, is mixed with the return water from a low temperature circuit so that it feeds a running water store.

EP 1304528 is also known in which a distribution module is illustrated, particularly for distributing heating or cooling water, and comprises a containment compartment for a plurality of conductors that are adapted to connect at least one first high temperature circuit and one second low temperature circuit that are mutually interconnected preferably by means of at least one mixing valve and one calibration valve, such compartment further comprising a first duct for the entry of hot water coming from an external heat generator, such as a boiler, and a second return duct in such heat generator for the water that has circulated in at least one of such first and second circuits.

In such module the first duct is controlled by a third duct for connection to such adjustment valve that is constituted by a mixing valve, such as for example a three-way valve, the third duct connecting the first high temperature circuit and the second low temperature circuit by means of:

(i) a fourth duct arranged downstream to the calibration valve and that allows for the outflow of water from the first high temperature circuit towards a first confluence located along the duct; and

(ii) a feeding duct of the second low temperature circuit that is connected to the third duct that is downstream to the first confluence and upstream to the adjustment valve.

This known solution has some drawbacks: the distribution modules have in fact a complex construction and are subject to head losses.

More precisely, the first manifold that is arranged about horizontally is particularly complex because many ducts, including the eighth duct, the fourth duct and the first duct must be made to pass diametrically and internally to such first manifold.

Further, when the known mixing module is used for cooling during the summer, it is necessary to use a further manifold that thus increases the structural complexity of the distribution module.

Another drawback that is attributed to such known distribution module is that it is composed of many components including curves, fittings, pipe stubs and three-way joints that increase the overall fluid head losses and the possibility of any water leakage at the joints or any errors during its assembly, which increases its cost due to the necessity of many materials and the cost of assembly and maintenance.

For such known mixing module it is also necessary to manually purge the heating circuits, an operation which cannot be done by the final user if it is an underfloor system.

Also, given the structural complexity of the known distribution module, there is great difficulty in obtaining thermal insulation with respect to the environment in which it is placed, which thus causes, during the summer, condensation on the cold ducts and the consequent dripping on the area underneath such module.

Vice versa, during the winter, thermal dissipation of the environment occurs.

Disclosure of the Invention

The aim of the present invention is to solve the above-mentioned technical problems, eliminating the drawbacks of the background art, by providing an invention that allows to provide simply and quickly a thermal system in a building or in a part thereof.

Within this aim, an object of the invention is to provide a device that can be installed even by non-specialized personnel.

Another object of the invention is to provide a module that is structurally simple and compact and that can be used for heating-cooling
5 systems both at low and high temperature.

Another object of the invention is to provide a device that allows to have a unified and simultaneous management of more circuits both at high temperature (for example radiators) and low temperature (such as floor or wall radiating panels), as well as being able to quickly and simply modify,
10 even by the final user, the same system in order to obtain summer cooling.

Another object of the invention is to lower both the manufacturing costs and also the cost of installation and management of the system by limiting the use of curves, couplings and variations in diameter.

Another object of the invention is to allow for the air in the system to
15 be removed quickly and simply even from the portion under the floor.

Another object of the invention is to optimize temperature control, which automatically guarantees that the conditions for the user's well-being are maintained.

Another object of the invention is to provide a device that, in addition
20 to having a simple structure, has low manufacturing and maintenance costs.

This aim and these and other objects that will become better apparent hereinafter are achieved by a distribution module, particularly for distributing heating or cooling water, characterized in that it is constituted by a monoblock unit provided with couplings for a first three-way valve, for a
25 deaerator, for three first inlets and three first outlets, some of which are controlled by second and third three-way valves for a boiler, for a refrigeration system and for a dehumidifier, two second inlets and two second outlets for a system for circulating water at high and low temperature, said monoblock unit having a bypass duct which is interposed
30 between the second inlet and the second outlet for said low-temperature

system downstream of the first three-way valve and of the deaerator, and an adjustment valve or diverter which is associated with a duct that is interposed between the second inlet and the second outlet of said high-temperature system and the first inlet of said boiler and said refrigeration
5 system.

Brief description of the drawings

Further characteristics and advantages of the invention will become better apparent from the following detailed description of a particular embodiment thereof, illustrated by way of a non-limitative example in the
10 accompanying drawings, wherein:

Figure 1 is a schematic view of a device according to the invention that is applied to a heating system at high and low temperature and a cooling system in the winter configuration;

Figure 2 is a schematic view of the device that is applied to a heating
15 system at high and low temperature and a cooling system in the summer configuration;

Figure 3 is a plan view of the monoblock unit;

Figure 4 is a plan view of the distribution module placed within a containment box.

20 Ways of carrying out the invention

With reference to Figure 1, the reference numeral 1 designates a distribution module, particularly suitable for distributing heating or cooling water in a building or in a part thereof.

The distribution module 1 comprises a monoblock unit, generally
25 designated by the reference numeral 2, which is provided with a first and a second coupling 3a, 3b for a first three-way valve 4a that is connected to a second three-way valve 4b.

The monoblock unit 2 is provided with a third coupling 3c, for a third three-way valve 4c, a fourth coupling 5 for a deaerator 6 and a first boiler
30 inlet 7a that is connected to a boiler 8 by way of a first flow control valve 7b

and a boiler delivery duct 7c.

A boiler return duct 7e is connected to a first boiler outlet 7d that is provided in the second three-way valve 4b.

The third three-way valve 4c has a first refrigeration inlet 9a which is
5 connected, by means of a refrigeration delivery duct 9b, to a refrigeration system 10.

This refrigeration system is connected, by means of a refrigeration return duct 9c, to a first refrigeration outlet 9d, which is provided in the second three-way valve 4b and is separate from the first boiler outlet 7d.

10 The first refrigeration outlet 9d is shared with a first dehumidifier inlet 11a, which in turn is connected to a dehumidifier delivery duct 11b connected to a dehumidifier 12 which is to be connected to the second three-way valve 4c by means of a dehumidifier inlet duct 11c which is connected to a first dehumidifier outlet 11d that is present in the third three-way valve
15 4c and is separate from the first refrigeration inlet 9a.

The monoblock unit 2 is provided with a second high-temperature outlet 13a and a second high-temperature inlet 13b for connection to a high-temperature system 14.

The high-temperature system 14 comprises a first circulation unit 15a,
20 which is connected to the second high-temperature outlet 13a, which is arranged in series to a second flow control valve 15b and with a first manifold 15c.

The first manifold 15c is connected, by means of second delivery ducts 15d to one or more high-temperature exchangers 15e.

25 Third return ducts 15f connect the high-temperature exchangers 15e to a second manifold 15g that is arranged in series to a third flow control valve 15h and a first check valve 15i.

This check valve is connected to the second high-temperature inlet 13b and allows the flow to move in the direction of the monoblock unit 2.

30 The monoblock unit 2 comprises a second low-temperature outlet 16a

and a second low-temperature inlet 16b for a low-temperature system 17.

The low-temperature system 17 comprises in series, starting from the second low-temperature outlet 16a, a second circulation unit 18a that is followed by a fourth flow control valve 18b and by a third manifold 18c.

5 This third manifold comprises a thermometer 18d and a temperature probe 18e which interacts with the first three-way valve 4a.

Third ducts 18f are present for connection between the third manifold 18c and fourth manifolds 18g for feeding one or more underfloor systems 18h.

10 Fifth manifolds 18i, for the return of the water from the underfloor systems 18h, are connected, by means of fourth ducts 18j, to a sixth manifold 18k which in turn is connected to the second low-temperature inlet 16b with the interposition of a fifth flow control valve 18p and of a second check valve 18q.

15 The second check valve 18q is connected directly to the second low-temperature inlet 16b and allows the flow to move in the direction of the monoblock unit 2.

This monoblock unit is provided with a by-pass duct 19 that is interposed between the second low-temperature inlet 16b and the second
20 low-temperature outlet 16a, the bypass duct 19 being arranged downstream of the first three-way valve 4a and downstream of the deaerator 6.

The monoblock unit 2 comprises an adjustment valve or diverter 20 which is interposed between the second high-temperature outlet 13a and the first boiler inlet 7a and between the second high-temperature inlet 13b and
25 the third coupling 3c.

A containment box 21 can accommodate the distribution module 1, insulation being provided inside it which can be constituted by two or more suitably contoured shells which can be arranged so as to wrap around the various components enclosed in the containment box 21.

30 Such box has small dimensions, on account of the dimensions of the

monoblock unit, and thus allows for an optimal insulation in a small space, as those that can be available in the housing units.

Two configurations can be distinguished in operation, i.e. a winter configuration, which is shown schematically in Figure 1, and a summer configuration, which is shown schematically in Figure 2, and are determined by the simultaneous rotation of the handles of the second and third three-way valves 4b and 4c that conveniently modify the paths of the water flow.

During winter use the hot water that comes from the boiler 8 through the boiler delivery duct 7c and through the first flow control valve 7b, enters the monoblock unit 2 through the first boiler inlet 7a.

The water flow thus arrives at the fork between the duct that accommodates the adjustment valve 20 and the duct that leads to the second high-temperature outlet 13a; the flow is divided between the two ducts as a function of the opening of the adjustment valve 20: the more it is open, the more water can flow through the duct that accommodates the adjustment valve 20.

Vice versa, the more the adjustment valve 20 is closed, the more water is able to flow through the duct that leads to the second high-temperature outlet 13a, and thus in the first manifold 15a and in the high-temperature system 14.

The third three-way valve 4c prevents, in the current configuration, the flow of hot water from reaching the refrigeration system 10 or the dehumidifier 12, that at the same time are mutually connected so that the dehumidifier 12 can operate with the refrigerated water generated by the refrigeration system 10.

At the confluence between the second high-temperature inlet 13b and the duct that leads to the adjustment valve 20 the entire volume of water flow that has been processed by the boiler 8 is present again and is brought entirely to the deaerator 6, where it is subdivided into two smaller volumes of water flow of which one is brought towards the second low-temperature

outlet 16a, and the other, through the first coupling 3a, is brought to the first three-way valve 4a.

The first three-way valve 4a, which is connected to the duct that leads to the second coupling 3b, chokes the flow of water between the second
5 coupling 3b and the second three-way valve 4b as a function of the temperature read by the temperature probe 18e: in this way it is possible to have the desired amount of water passing through the second low-temperature outlet 16a that is arranged upstream of the bypass duct 19.

This volume of water flow mixes in the bypass duct 19 with the
10 volume of water returning from the low-temperature system 17 and is introduced, by means of the second circulation unit 18a, into the low-temperature system 17; it is thus possible to control the temperature of the low-temperature system 17.

The second three-way valve 4b allows the entire volume of heating
15 water to return to the boiler 8 through the boiler return duct 7e. The refrigeration return duct 9c and the dehumidifier delivery duct 11b, which are mutually connected and are affected by the flow of refrigerated water, are separate from the water flow returning from the boiler thanks to the winter disposition of the second three-way valve 4b (after a 90° clockwise
20 rotation of the relevant knob).

It is thus possible to operate the dehumidifier 12 together with the refrigeration system 11 and with the boiler 8, during the seasons in which it is necessary to use both the heating and the dehumidifier.

The maneuver to change the system from summer to winter setting
25 and vice versa requires the simple simultaneous 90° clockwise rotation of the knobs of the valves 4b and 4c.

In the case of summer operation as illustrated in Figure 2, the configuration of the three-way valves 4b and 4c is different: the boiler return duct 7e has been excluded from the second three-way valve 4b, and
30 consequently no amount of water flow passes through the boiler 8.

Regarding the summer configuration the operation is as follows.

The flow of water refrigerated by the refrigeration system 10 enters the monoblock unit 2 through the first refrigeration inlet 9a of the third three-way valve 4c and a part of the water flow feeds the dehumidifier 12
5 through the dehumidifier inlet duct 11c.

The water flow entering the monoblock unit 2 cannot enter the duct that is relative to the second high-temperature inlet 13b for the presence of the first check valve 15i and cannot enter the duct that is relative to the second high-temperature outlet 13a for the presence of head losses of the
10 low-temperature system 17.

The entire volume of refrigerated water will therefore go to the deaerator 6 and subsequently the first three-way valve 4b will manage the temperature of the low-temperature circuit 17 in the same way as the winter configuration.

15 The path of the refrigerated water reaches the first three-way valve 4a without passing the adjustment valve 20 and therefore is without head losses.

The water flow leaving the first three-way valve 4a and returning from the dehumidifier 12 through the dehumidifier delivery duct 11b returns to
20 the refrigeration system through the second three-way valve 4b and through the refrigeration return duct 9c.

In practice, it has been found that the invention achieves the aim and objects described above, a distribution module being provided which is particularly adapted to being used for the distribution of heating or cooling
25 water, such module being constituted by a monoblock unit that is without water leakage and with low head losses, and being coupled with the other components of the system.

Naturally, the materials employed, as well as the dimensions constituting the single components of the invention, may be more pertinent
30 according to specific requirements.

The different means for performing certain different functions certainly do not need to coexist only in the illustrated embodiment, but may be present per se in many embodiments that are not illustrated.

The characteristics indicated as advantageous, convenient or the like
5 may also be omitted or replaced with other equivalent characteristics.

The disclosures in Italian Patent Application No. TV2009A000188 from which this application claims priority are incorporated herein by reference.

Where technical features mentioned in any claim are followed by
10 reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

CLAIMS

1. A distribution module (1), particularly for distributing heating or cooling water, characterized in that it is constituted by a monoblock unit (2) provided with couplings (3a, 3b) for a first three-way valve (4a), for a
5 deaerator (6), for three first inlets and three first outlets, some of which are controlled by second (4b) and third (4c) three-way valves for a boiler (8), for a refrigeration system (10) and for a dehumidifier (12), two second inlets and two second outlets for a system for circulating water at high and low temperature (14, 17), said monoblock unit (2) having a bypass duct (19)
10 which is interposed between the second inlet and the second outlet for said low-temperature system (17) downstream of the first three-way valve (4a) and of the deaerator (6), and an adjustment valve or diverter which is associated with a duct that is interposed between the second inlet and the second outlet of said high-temperature system (14) and the first inlet of said
15 boiler and said refrigeration system.

2. The module according to claim 1, characterized in that said monoblock unit is provided with a first coupling and with a second coupling (3a, 3b) for said first three-way valve (4a) connected to said second three-way valve (4b), with a third coupling (3c) for said third three-way valve
20 (4c), with a fourth coupling (5) for said deaerator (6), and with a first boiler inlet (7a), which is connected to said boiler (8) by means of a first flow control valve (7b) and a boiler delivery duct (7c).

3. The module according to claims 1 and 2, characterized in that it comprises a boiler return duct (7e), which is connected to a first boiler outlet
25 (7d) provided in said second three-way valve (4b).

4. The module according to claims 1 and 3, characterized in that said third three-way valve (4c) has a first refrigeration inlet (9a) which is connected, by means of a refrigeration delivery duct (9b), to a refrigeration system (10), which in turn is connected, by means of a refrigeration return
30 duct (9c), to a first refrigeration outlet (9d), which is provided in said second

three-way valve (4b) and is separate from said first boiler outlet (7d).

5 5. The module according to claims 1 and 4, characterized in that said first refrigeration outlet (9d) is shared with a first dehumidifier inlet (11a), which in turn is connected to a dehumidifier delivery duct (11b) connected to a dehumidifier (12), which is to be connected to said second three-way valve (4b) by means of a dehumidifier inlet duct (11c), which in turn is connected to a first dehumidifier outlet (11d) that is present in said third three-way valve (4c) and is distinct with respect to said first refrigeration inlet (9a).

10 6. The module according to claims 1 and 5, characterized in that said monoblock unit (2) has a second high-temperature outlet (13a) and a second high-temperature inlet (13b) for connection to a high-temperature system (14), said high-temperature system (14) comprising a first circulation unit (15a), which is connected to said second high-temperature outlet (13a),
15 which is arranged in series to a second flow control valve (15b), and to a first manifold (15c), said first manifold (15c) being connected, by means of second delivery ducts (15d), to one or more high-temperature exchangers (15e).

20 7. The module according to claims 1 and 6, characterized in that it comprises third return ducts (15f), which connect said high-temperature exchangers (15e) to a second manifold (15g) arranged in series to a third flow control valve (15h) and to a first check valve (15i), the latter being connected to said second high-temperature inlet (13b) and allowing the flow to move in the direction of said monoblock unit (2).

25 8. The module according to claims 1 and 7, characterized in that said monoblock unit (2) comprises a second low-temperature outlet (16a) and a second low-temperature inlet (16b) for a low-temperature system (17), the latter comprising in series, starting from said second low-temperature outlet (16a), a second circulation unit (18a), followed by a fourth flow control
30 valve (18b) and a third manifold (18c), which comprises a thermometer

(18d) and a temperature probe (18e) which interacts with said first three-way valve (4a).

9. The module according to claims 1 and 8, characterized in that it comprises third ducts (18f), for connection between said third manifold (18c), and fourth manifolds (18g), for feeding one or more underfloor systems (18h), and fifth manifolds (18i), for return of the water from said underfloor systems (18h), which are connected, by way of fourth ducts (18j), to a sixth manifold (18k), which in turn is connected to said second low-temperature inlet (16b) with the interposition of a fifth flow control valve (18p) and of a second check valve (18q) which is connected directly to said second low-temperature inlet (16b) so as to allow the flow to move in the direction of said monoblock unit (2).

10. The module according to claims 1 and 9, characterized in that said monoblock unit (2) has a bypass duct (19), which is interposed between said second low-temperature inlet (16b) and said second low-temperature outlet (16a), said bypass duct (19) being arranged downstream of said first three-way valve (4a) and downstream of said deaerator (6).

11. The module according to claims 1 and 10, characterized in that said monoblock unit (2) comprises an adjustment valve or diverter (20), which is interposed between said second high-temperature outlet (13a) and said first boiler inlet (7a) and between said second high-temperature inlet (13b) and said third coupling (3c).

12. The module according to claims 1 and 11, characterized in that it comprises a containment box (21), which is adapted to accommodate said distribution module (1), insulation being provided inside it which is constituted by two or more suitably contoured shells which can be arranged so as to wrap around the various components enclosed in said containment box (21).

13. The module according to claims 1 and 12, characterized in that said second and third three-way valves (4b, 4c) have handles whose rotation

presets said system according to a winter or summer configuration.

1. A distribution module (1) for distributing heating or cooling water, comprising:

three first inlets (7a, 9a, 11a) and three first outlets (7d, 9d, 11d) respectively for connection to a boiler (8), a refrigeration system (10), and a dehumidifier (12);

a first three-way valve (4a) and a second three-way valve (4b), said second three-way valve (4b) being connected: to said first three-way valve (4a); to the first outlets (7d, 9d) for the boiler (8) and the refrigeration system (10); and to the first inlet (11a) for said dehumidifier (12);

a third three-way valve (4c) connected to the first inlet (9a) for the refrigeration system (10) and to the first outlet (11d) for said dehumidifier (12);

a monoblock unit (2), said monoblock unit (2) comprising: a first coupling (3a) and a second coupling (3b) connected to said first three-way valve (4a); a third coupling (3c) connected to said third three-way valve (4c); a fourth coupling (5) connected to a deaerator (6); the first inlet (7a) for the boiler; two second inlets (13b, 16b) and two second outlets (13a, 16a) for a system for circulating water at high and low temperature (14, 17); a bypass duct (19) which is interposed between the second inlet (16b) and the second outlet (16b) for said low-temperature system (17) downstream of the first three-way valve (4a) and of the deaerator (6);, and an adjustment valve or diverter (20) which is associated with a duct that is interposed between the second inlet (13b) and the second outlet (13a) of said high-temperature system (14) and the first inlet (7a) for said boiler and said third coupling (3c).

2. The module according to claim 1, characterized in that said first boiler inlet (7a) is connected to a first flow control valve (7b) and a boiler delivery duct (7c).

3. The module according to claim 2, characterized in that it comprises a boiler return duct (7e), which is connected to said first boiler outlet (7d) provided in said second three-way valve (4b).

4. The module according to claim 3, characterized in that it further comprises: a refrigeration delivery duct (9b) connected to said first refrigeration inlet (9a); and a refrigeration return duct (9c) connected to said first refrigeration outlet (9d) separately from said first boiler outlet (7d).

5. The module according to claim 4, characterized in that said first refrigeration outlet (9d) is shared with said first dehumidifier inlet (11a), which in turn is connected to a dehumidifier delivery duct (11b) for said dehumidifier (12), the module (1) further comprising a dehumidifier inlet duct (11c) connected to said first dehumidifier outlet (11d) that is present in said third three-way valve (4c) and is distinct with respect to said first refrigeration inlet (9a).

6. The module according to claim 5, further comprising a first circulation unit (15a), which is connected to said second high-temperature outlet (13a), which is arranged in series to a second flow control valve (15b), and to a first manifold (15c), said first manifold (15c) being connected to second delivery ducts (15d), for connection to one or more high-temperature exchangers (15e).

7. The module according to claim 6, characterized in that it comprises third return ducts (15f) for connection with said high-temperature exchangers (15e) by means of a second manifold (15g) arranged in series to a third flow control valve (15h) and to a first check valve (15i), the latter being connected to said second high-temperature inlet (13b) and allowing the flow to move in the direction of said monoblock unit (2).

8. The module according to claim 7, characterized in that it further comprises, in series, starting from said second low-temperature outlet (16a), a second circulation unit (18a), followed by a fourth flow control valve (18b) and a third manifold (18c), which comprises a thermometer (18d) and a temperature probe (18e) which interacts with said first three-way valve (4a).

9. The module according to claim 8, characterized in that it comprises third ducts (18f), for connection between said third manifold (18c), and fourth manifolds (18g), for feeding one or more underfloor systems (18h), and fifth manifolds (18i),

for return of the water from said underfloor systems (18h) by way of fourth ducts (18j), to a sixth manifold (18k), which in turn is connected to said second low-temperature inlet (16b) with the interposition of a fifth flow control valve (18p) and of a second check valve (18q) which is connected directly to said second low-temperature inlet (16b) so as to allow the flow to move in the direction of said monoblock unit (2).

10. The module according to claim 9, characterized in that it comprises a containment box (21), which is adapted to accommodate said distribution module (1), insulation being provided inside it which is constituted by two or more suitably contoured shells which can be arranged so as to wrap around the various components enclosed in said containment box (21).

11. The module according to the preceding claims, characterized in that said second and third three-way valves (4b, 4c) have handles whose rotation presets said system according to a winter or summer configuration.

12. A system for heating at high and low temperatures and for cooling, comprising:

the module (1) according to claim 10;

a boiler (8) interconnected between said boiler delivery duct (7c) and said boiler return duct (7e);

a refrigeration system (10) interconnected between said refrigeration delivery duct (9b) and said refrigeration return duct (9c);

a dehumidifier (12) interconnected between said first dehumidifier inlet (11a) and said dehumidifier inlet duct (11c);

one or more high-temperature exchangers (15e) interconnected between said second delivery ducts (15d) and said third return ducts (15f); and

one or more underfloor systems (18h) interconnected between said third ducts (18f) and said fourth ducts (18j).

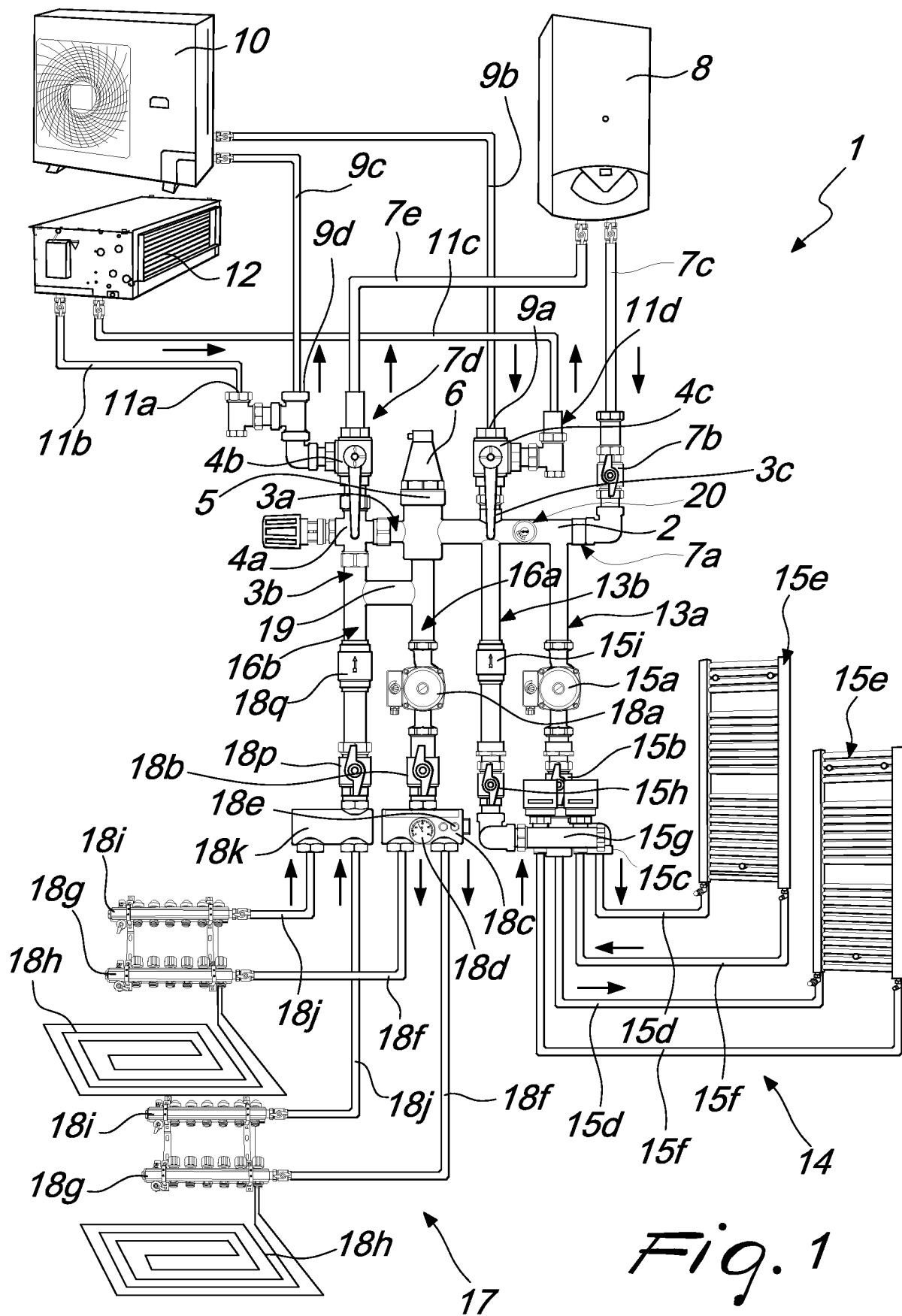


Fig. 1

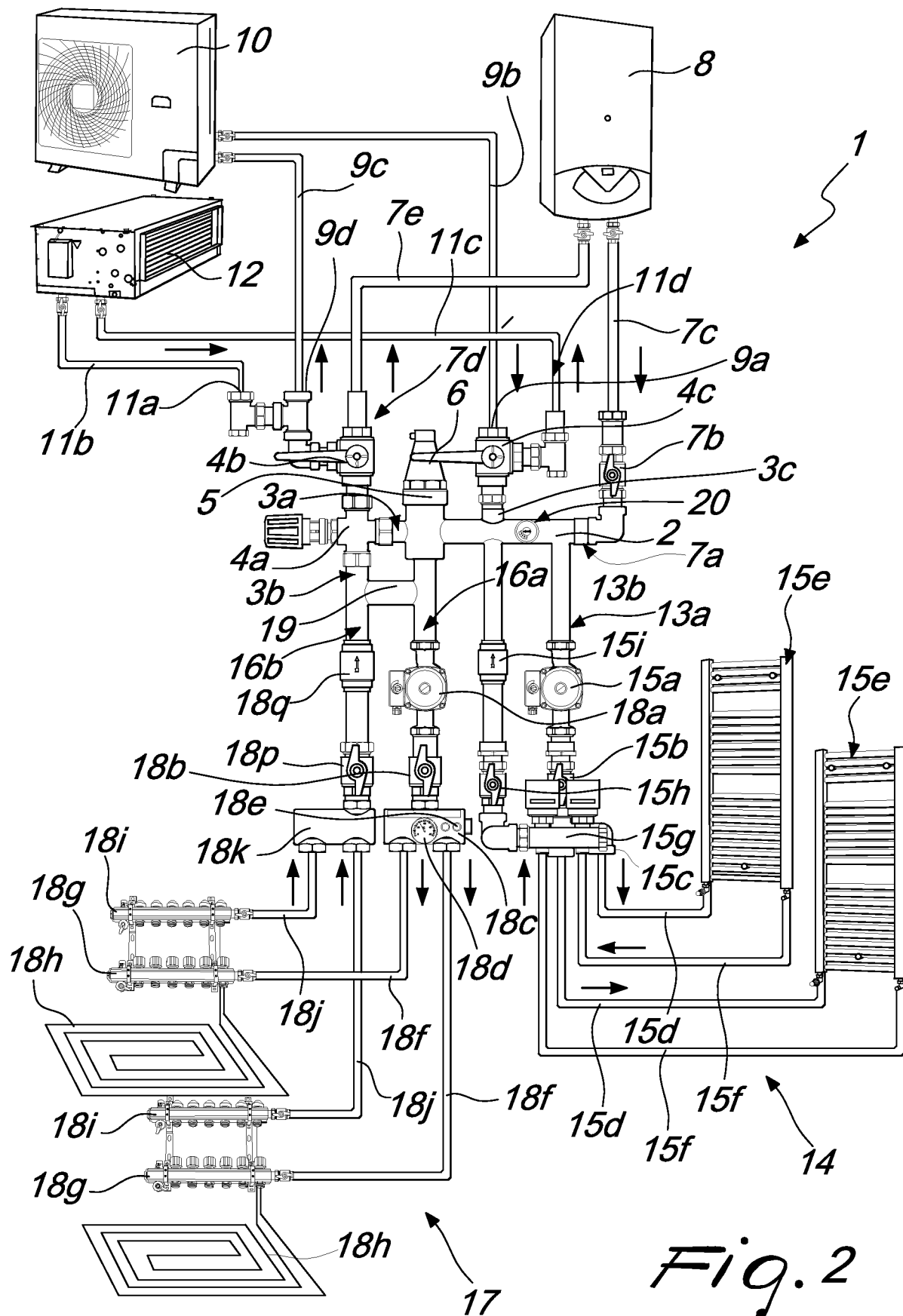


Fig. 2

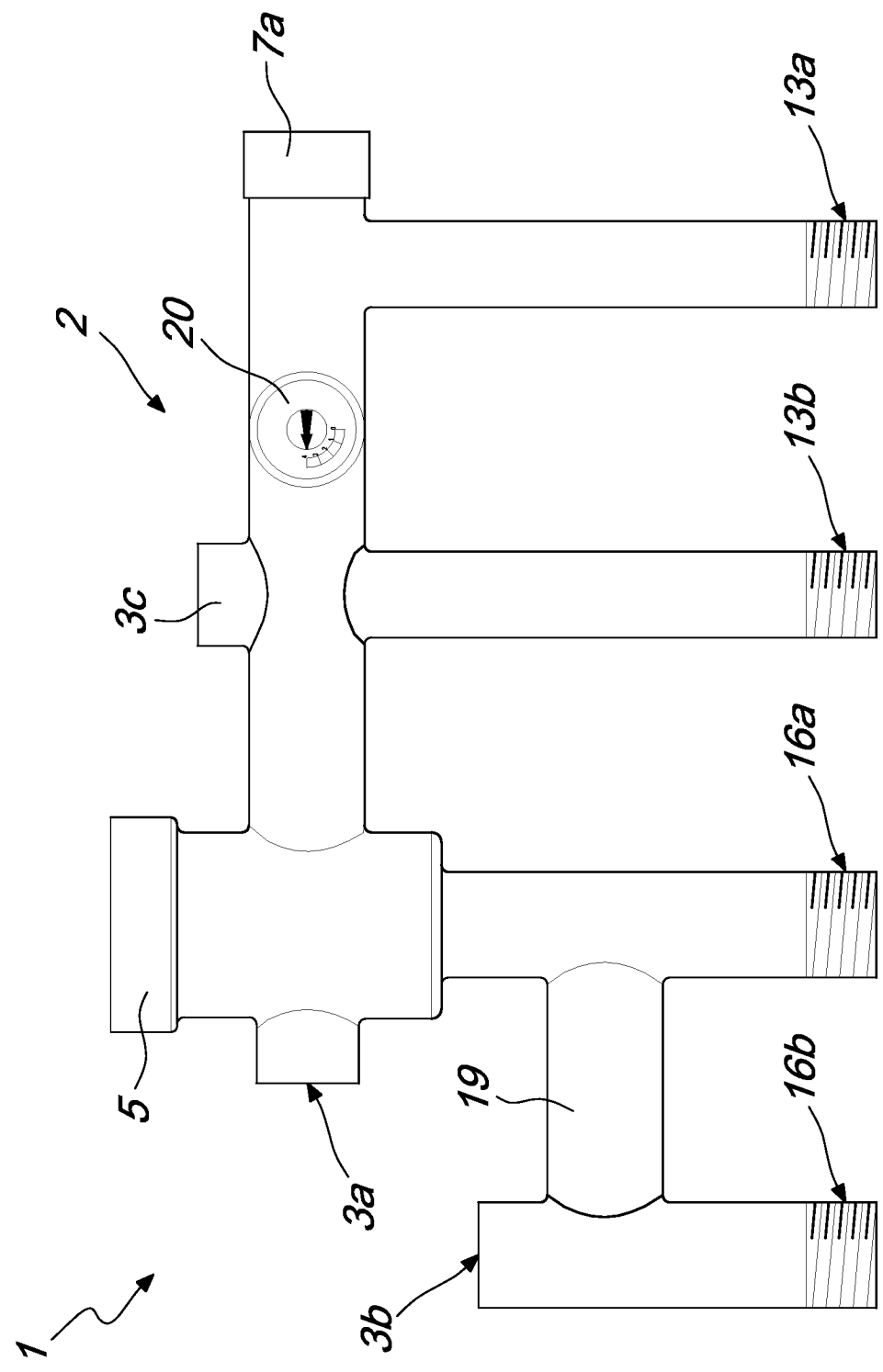
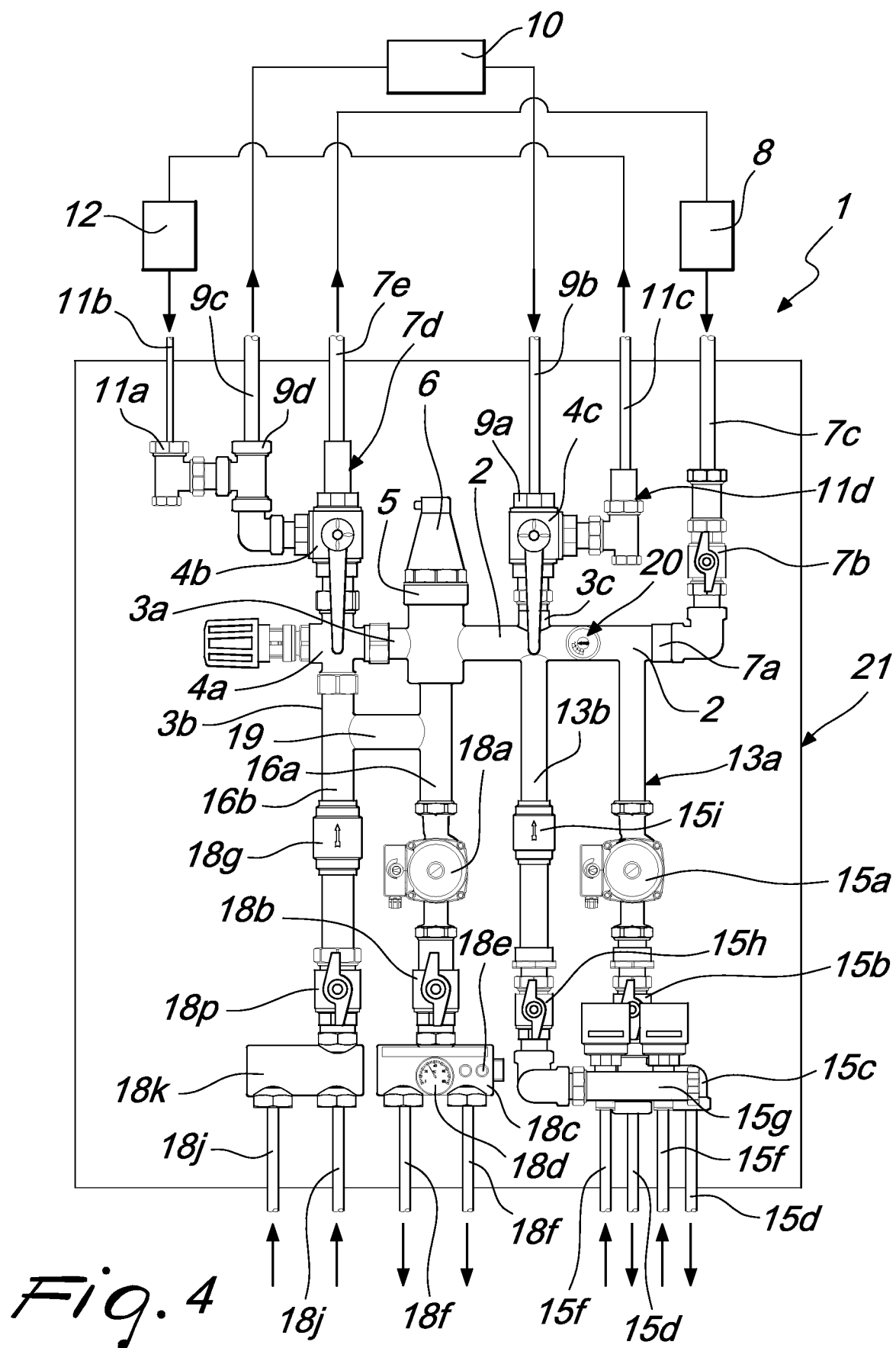


Fig. 3



INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2010/052566

A. CLASSIFICATION OF SUBJECT MATTER
INV. F24D3/10
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
F24D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	FR 2 740 863 A1 (AXTERM [FR]) 9 May 1997 (1997-05-09) * abstract; figures 1-5 pages 3-4	1-13
X	WO 2004/070280 A1 (I V A R S R L [IT]; BERTOLOTTI UMBERTO [IT]) 19 August 2004 (2004-08-19) * abstract; figures 1-10 pages 5-13	1-13

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

26 October 2010

Date of mailing of the international search report

04/11/2010

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
Fax: (+31-70) 340-3016

Authorized officer

Blot, Pierre-Edouard

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2010/052566

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
FR 2740863	A1	09-05-1997	NONE	
WO 2004070280	A1	19-08-2004	AU 2003215889 A1	30-08-2004
			CN 1738994 A	22-02-2006
			EP 1590607 A1	02-11-2005