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

(11) EP 1 408 292 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
14.04.2004 Bulletin 2004/16

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

(21) Application number: **03078069.6**

(22) Date of filing: **02.10.2003**

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

(30) Priority: **07.10.2002 NL 1021594**

(71) Applicant: **NEFIT BUDERUS B.V.**
7418 BB Deventer (NL)

(72) Inventors:
- **Maas, Aschwin Hendrikus Johannes**
  7586 AB Overdinkel (NL)
- **Gorkink, Johan**
  7383 AB Voorst (NL)
- **Jacobs, Gerdewan Gerardus Wilhelmus**
  7422 LE Deventer (NL)
- **De Bruin, Robbert Cornelis**
  7451 VA Holten (NL)

(74) Representative: **Brookhuis, Hendrik Jan Arnold**
Exter Polak & Charlouis B.V.
P.O. Box 3241
2280 GE Rijswijk (NL)

(54) Heating device

(57) A heating device for a central heating system having a primary circuit. The heating device comprises a primary heat exchanger for heating central heating water, and also comprises a hydraulic block which is provided with connections for a feed line and a return line of the primary heat exchanger, and which is provided with connections for coupling the heating device to a feed line and a return line of the central heating system. The hydraulic block comprises a first module, which is provided with passages for transporting central heating water from or to the primary heat exchanger to the feed line or from the return line of the central heating system. The heating device may furthermore comprise a secondary circuit having a secondary heat exchanger for heating tap water by means of central heating water which has been heated by the primary heat exchanger. The secondary heat exchanger is connected to branches of the first circuit, one of the branches being provided with a valve. The hydraulic block comprises a second module, which is provided with passages which are connected to the secondary heat exchanger and are provided with connections for a tap water outlet line and a tap water inlet line, respectively.

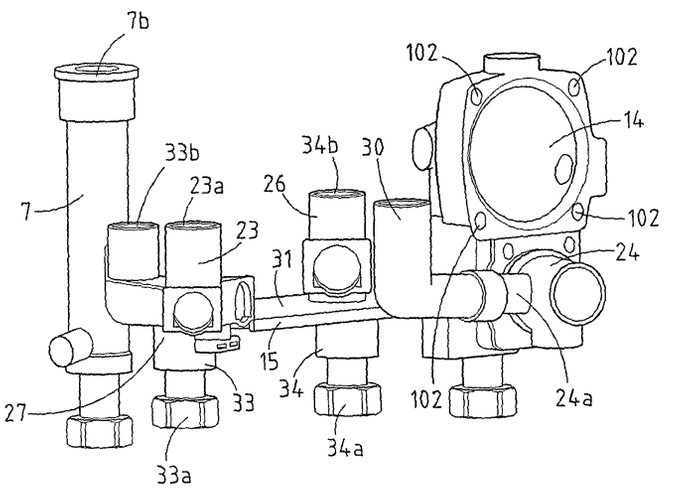

FIG. 5.

EP 1 408 292 A1

Description

[0001] The invention relates to a heating device for a central heating system having a primary circuit, which heating device forms part of the primary circuit and comprises a primary heat exchanger, for example equipped with a burner, for heating central heating water, and also comprises a hydraulic block, which is provided with connections for a feed line and a return line of the primary heat exchanger, by means of which the hydraulic block is coupled to the primary heat exchanger, and which is provided with connections for coupling the heating device to a feed line and a return line of the central heating system.

[0002] A heating device of this type is known, for example, from EP 0 652 408, on which the preamble of claim 1 is based. The known heating device is suitable for use in a heating system comprising a primary circuit for central heating combined with a secondary circuit for heating tap water. The primary circuit comprises a primary heat exchanger and radiators which are coupled to one another by means of the hydraulic block. The secondary circuit comprises a secondary heat exchanger for heating the tap water with the aid of central heating water from the primary circuit. The secondary circuit is coupled to the primary circuit by means of the hydraulic block.

[0003] A heating device which is known from DE 199 12 284 likewise has a hydraulic block which is suitable for use in a heating system comprising a primary circuit for central heating combined with a secondary circuit for heating tap water. The known hydraulic block comprises at least two parts. One part in each case bears two connection lines for one side of the secondary heat exchanger, while the other part bears two connection lines for the other side of the secondary heat exchanger. The division of the hydraulic block into two parts which is proposed in this publication makes it possible to permit thermal expansion in the secondary heat exchanger.

[0004] DE 100 44 873 shows yet another heating device having a hydraulic block which is suitable for use in a heating system comprising a primary circuit for central heating combined with a secondary circuit for heating tap water. The hydraulic block has a first grouping where the return line from the central heating and the feed line for cold tap water are coupled and to which two of the four connections for the secondary heat exchanger are fitted. Furthermore, the hydraulic block has a second grouping, to which the feed line for the central heating and the line for warm tap water are coupled and to which the other two of the four connections for the secondary heat exchanger are fitted.

[0005] In practice, a manufacturer of heating devices will construct a certain number of types of heating devices, to allow him to supply various designs of devices. The known heating device described above is constructed specifically for what is known as a combination system having a primary circuit combined with a secondary circuit, but there are also, for example, other designs, for example for a central heating system having only a primary circuit or for a system having an external boiler.

[0006] When constructing different types of heating devices, the known construction of the devices leads to inefficiency and therefore increases costs. It is an object of the invention to allow more efficient production.

[0007] The invention aims to achieve this by means of a heating device in accordance with the preamble of claim 1 in which the hydraulic block comprises a first module, which is provided with a first passage and with a second passage for transporting central heating water from or to the primary heat exchanger to the feed line or from the return line of the central heating system, which can be connected to the first and second passages by means of connections, and in which the first module at the second passage forms a valve connection for a valve by which the second passage can be closed off when a secondary circuit is connected to the primary circuit, which valve connection is sealed by a sealing member which can be removed for the fitting of a valve which is to be fitted, and in which the first passage is provided with at least one branch connection for transporting central heating water, when a secondary circuit is connected to the primary circuit, from or to the first passage to or from the secondary circuit.

[0008] The first module comprising the connections which are required for a simple basic system, in which the first module is designed to couple the heating device to lines of the central heating system. The first module can function independently, even without another module being coupled to it.

[0009] In a further embodiment of the invention, the heating device also comprises a secondary circuit having a secondary heat exchanger for heating tap water by means of central heating water which has been heated by the primary heat exchanger, the branch connection of the first passage being connected to the secondary heat exchanger in order to transport central heating water from or to the first passage to or from the secondary heat exchanger, wherein a valve is arranged at the valve connection of the first module, and the hydraulic block comprises a second module, which second module is provided with a third passage and a fourth passage, which are connected to the secondary heat exchanger and are provided with connections for a tap water outlet line and a tap water inlet line, respectively, for transporting tap water from a tap water inlet line to the secondary heat exchanger and from the secondary heat exchanger to a tap water outlet line, and wherein there is a fifth passage between the valve and the secondary heat exchanger for transporting central heating water from the secondary heat exchanger to the second passage.

[0010] The second module is suitable for coupling the primary circuit to a secondary circuit, in particular a heating system for tap water which makes use of a secondary heat exchanger which is present in the device and

in which tap water is heated by central heating water. As a result of the second module being fitted in the heating device, it is easy for the manufacturer to add standard components to a heating device for a basic central heating system with a primary heat exchanger to form a combination system with a secondary heat exchanger present in the device.

[0011] The fifth passage may, for example, be a separate passage which is coupled to the valve and the secondary heat exchanger. However, it is preferable for the fifth passage to be fixed to the second module.

[0012] An alternative embodiment of the invention is characterized in that the heating device can be connected to an external part of a secondary circuit, which is provided with an external secondary heat exchanger for heating tap water by means of central heating water, a valve being arranged at the valve connection of the first module, the hydraulic block also comprising a third module, which third module is provided with a sixth passage, which is coupled to the branch connection of the first passage and is provided with a connection for a line for transporting central heating water from or to the secondary heat exchanger and a seventh passage, which is coupled to the valve and is provided with a connection for a line for transporting central heating water from or to the secondary heat exchanger to or from the second passage.

[0013] The third module is suitable for coupling the primary circuit to a secondary circuit, in particular a heating system for tap water which makes use of a secondary heat exchanger, such as for example an external boiler, which is positioned outside the heating device.

[0014] It is particularly expedient to carry out a method for producing one or more heating devices according to claim 1 and one or more heating devices according to claim 2 in which during production of the heating device according to claim 1:

- the primary heat exchanger is fitted,
- the first module is fitted into the device, and
- the feed line and the return line of the primary heat exchanger are connected to the first passage and the second passage, and in which during the production of the heating device according to claim 2:

- the primary heat exchanger is fitted,
- the first module is fitted into the device,
- a valve is fitted to the valve connection of the first module,
- the second module is fitted into the device, the fifth passage of the second module is coupled to the three-way valve,
- the secondary heat exchanger is fitted into the device, a central heating water inlet line and a central heating water outlet line of the secondary heat exchanger being connected to the branch connection of the first passage and the fifth passage of the second module, and a tap water inlet line and a tap water outlet line of the secondary heat exchanger being connected to the third and fourth passages of the second module, and
- the feed line and the return line of the primary heat exchanger being connected to the first and second passages of the first module.

[0015] In a further method, it is also possible to produce one or more heating device according to claim 10, in which case:

- the primary heat exchanger is fitted,
- the first module is fitted into the device,
- a valve is fitted to the valve connection of the first module,
- the third module is fitted into the device, the sixth passage of the third module being connected to the branch connection of the first passage and the seventh passage of the third module being coupled to the valve, and
- the feed line and the return line of the primary heat exchanger being connected to the first and second passages of the first module.

[0016] It will be clear from the above that different types of heating devices can be constructed in a simple way from one basic system, on account of the fact that the hydraulic block can be composed of various standard modules. The methods used to construct the different types of device are described in claims 30 and 31.

[0017] The invention will be explained in more detail below with reference to the drawing, in which:

Fig. 1 diagrammatically depicts a first embodiment of a heating device according to the invention,
Fig. 2 shows a perspective view of a first module of a hydraulic block of a heating device as shown in Fig. 1,
Fig. 3 diagrammatically depicts a second embodiment of a heating device according to the invention,
Fig. 4 shows a perspective view of a second module of a hydraulic block of a heating device as shown in Fig. 3,
Fig. 5 shows a perspective view of the hydraulic block having the second module shown in Fig. 4 in the mounted position on the first module shown in Fig. 2,
Fig. 6 diagrammatically depicts a third embodiment of a heating device according to the invention,
Fig. 7 shows a perspective view of a third module of a hydraulic block of a heating device as shown in Fig. 6,
Fig. 8 shows a perspective view of the hydraulic block having the third module shown in Fig. 7 in the mounted state on the first module shown in Fig. 2,
Fig. 9 shows a perspective view of a hydraulic block, having a plate-type heat exchanger, mounted in the heating device shown in Fig. 3,

Fig. 10 shows a perspective view of a hydraulic block, having a boiler, mounted in the heating device shown in Fig. 3,

Fig. 11 shows a perspective view of a hydraulic block mounted in the heating device shown in Fig. 6,

Fig. 12 shows a perspective view of the mounting of a coupling piece in a connection of a module,

Fig. 13 shows a perspective view of the mounting of the connection with coupling piece on a frame of the heating device, and

Fig. 14 shows a perspective view of the connection with coupling piece in the mounted state on the frame of the heating device.

[0018] Fig. 1 shows a heating device 1 for a central heating system comprising a primary heating circuit provided with a primary heat exchanger 2. The primary heat exchanger 2 may, for example, be equipped with a burner for heating central heating water. The heating device 1 also includes a hydraulic block 3 which is coupled to the primary heat exchanger 2 via a feed line 4 and a return line 5 of the primary heat exchanger. The hydraulic block 3 is provided with connections 6 and 7 for coupling the heating device to the central heating system.

[0019] Fig. 2 shows the hydraulic block 3 illustrated in Fig. 1, which in this simple example is formed by a first module 10. The first module 10 is provided with a first passage 11 for transporting central heating water from the primary heat exchanger 2 connected to connection 7b to a feed line for the central heating system which is connected to connection 7. The connection 7 is provided with a metal coupling piece 7a, preferably made from stainless steel or brass. The first module 10 is also provided with a second passage 12 for transporting central heating water to the primary heat exchanger 2, which is connected to connection 6b, from a return line from the central heating system, which is connected to connection 6. The connection 6 is provided with a metal coupling piece 6a, preferably made from stainless steel or brass. The first passage 11 is provided with at least one branch connection in the form of a branch passage 23 for transporting central heating water from the first passage 11 to a secondary circuit, which is not connected in this example. The first passage 11 and the second passage 12 of the first module are connected to one another by a bridge part 15 which imparts mechanical strength to the first module 10. In the example shown, this bridge part 15 is made from a single piece. Another possible option is for the bridge part 15 to be made from a number of pieces which can be connected to one another. By way of example, in terms of manufacturing technology it may be expedient for the first passage 11 to be provided with a first section of the bridge part 15 and for the second passage 12 to be provided with a second section of the bridge part 15, in which case the first and second sections of the bridge part 15 can be connected to one another by means of, for example, a quick-fit connection.

[0020] A valve connection 13 is present at the second passage 12. The valve connection 13 is provided with a sealing member (not shown), which can be removed for installation of a valve. In the case of the device design shown in Fig. 1, there is no need for a valve to be connected, so that the connection can remain closed. The sealing wall of the valve connection can be screwed securely onto the flange 13a of valve connection 13 on the first module 10 by means of a flange.

[0021] Fig. 3 shows a heating device 21 for a combination system. The heating device 21 comprises a part of a primary heating circuit which is provided with the primary heat exchanger 2 and a secondary heating circuit which is provided with a secondary heat exchanger 22 for heating tap water by means of central heating water. In the heating device 21, the same first module 10 is fitted as in the heating device 1 shown in Fig. 1. The first passage 11 of the first module 10 is provided with the branch passage 23 having a connection 23a for transporting central heating water from the first passage 11 to the secondary heat exchanger 22. The hydraulic block comprises a second module 25. The second module 25 is provided with a third passage 27 and a fourth passage 26, in which connections for a tap water outlet line and a tap water inlet line, respectively, can be arranged. The fourth passage 26 is used to transport tap water from a tap water inlet line 28 to the secondary heat exchanger 22, which is connected to connection 34b. The third passage 27 is used to transport tap water from the secondary heat exchanger 22, which is connected to the connection 33b, to a tap water outlet line 29. The third and fourth passages 27 and 26, respectively, are also provided with connections 33 and 34, respectively, (cf. Figs. 4 and 5). The connection 33 is provided with a metal coupling piece 33a, preferably made from stainless steel or brass, and the connection 34 is provided with a metal coupling piece 34a, preferably made from stainless steel or brass.

[0022] A housing part 24 of a three-way valve is fitted to the valve connection 13 of the first module 10, as can be seen from Fig. 5. The valve connection 13 in this example comprises a branch in the second passage 4. The three-way valve is fitted into the second passage 4 at this branch in such a manner when the three-way valve closes off the second passage 4, the branch is placed in open communication with the second passage 4.

[0023] The second module 25 is also provided with a fifth passage 30, which is coupled to a branch passage 24a of the three-way valve for transporting water from the secondary heat exchanger 22 via the branch passage 24a to the second passage 4 when the three-way valve closes off the second passage 4.

[0024] The third and fourth passages 27, 26 of the second module 25 are connected to one another by a bridge part 31 as shown in Fig. 4. This bridge part 31 provides mechanical strength to the second module 25. This bridge part can also be designed in a number of pieces, in accordance with what has already been de-

scribed above in connection with the bridge part 15 of the first module 10.

[0025] As shown in the example presented in Fig. 5, the second module 25 is fitted to the first module 10. The bridge part 31 of the second module 25, in the mounted state, rests on the bridge part 15 of the first module 10, as can be seen in Fig. 5. The space available in heating devices is limited. Consequently, it is desirable for the components which are incorporated in the device to be of compact design. For this reason, it is expedient for the hydraulic block to be of compact design. This is achieved by virtue of the second module 25 being fitted directly to the first module 10, with the hydraulic block assembled from the modules 10 and 25 having a sufficient mechanical stability.

[0026] The first module 10 and the second module 25 are connected to one another, for example, by means of a click-fit connection, since this allows rapid and simple mounting.

[0027] Figs. 9 and 10 show the hydraulic block from Fig. 5 to which a valve having a valve housing 100 has been connected. Furthermore, a circulation pump 101 has been fitted. The pump connection 14 is provided, for example, with holes 102 (cf. Fig. 5), into or through which bolts can be fitted in order to secure the pump 101 to the first module 10. A bypass line 44 is arranged between the first passage 11 and the second passage 12.

[0028] As can be seen from Fig. 9, a plate-type heat exchanger 103 can be fitted as internal secondary heat exchanger 22. As can be seen from Fig. 10, a boiler 104 can be fitted as internal secondary heat exchanger 22. In the examples shown in Figs. 9 and 10, the secondary heat exchanger 22 is supported by the hydraulic block.

[0029] Fig. 6 diagrammatically depicts a heating device 41 which can be connected to an external secondary heating circuit. In the example shown, this external secondary heating circuit is designed as a boiler 42 which is provided with an external secondary heat exchanger in the form of a heating coil 43 for heating tap water by means of central heating water.

[0030] The hydraulic block 3 comprises a first module 10 and a third module 45, which is fitted to the first module 10, as can also be seen from Fig. 8. The third module 45 comprises a first part 45a (cf. Fig. 7), which is provided with a sixth passage 46 which is coupled, by means of a connection 46a, to a branch 11a in the first passage 11 and is provided with a connection 48 having a metal coupling piece 48a, preferably made from stainless steel or brass, for connecting a line 50 for transporting water to the secondary heat exchanger 43 (cf. also Fig. 11). The third module 45 also comprises a second part 45b (cf. Fig. 7) , which is fitted to the first module 10 separately from the first part 45a. The second part 45b comprises a seventh passage 47, which is coupled, by means of connection 47a, to the branch passage 24a of the housing part 24 of the three-way valve and is provided with a connection 49 for a line 51 for transporting central heating water from the secondary heat exchanger 43 to the second passage 12 (cf. also Fig. 11). The connection 49 has a metal coupling piece 49a, preferably made from stainless steel or brass. The parts 45a and 45b of the third module 45 can be connected to the first module 10 by means of a quick-fit connection.

[0031] The hydraulic block, in particular the first module 10, can preferably be connected to a frame of the heating device 1, 21, 41, so that the hydraulic block is provided with further mechanical stability and the hydraulic block together with the components which have been fitted to it is supported by the frame. A click-fit connection or a clamping connection, as shown in Figs. 12-14, is preferably used to connect the first module 10 to the frame, since this allows fast and simple mounting of the hydraulic block in the heating device 1, 21, 41.

[0032] Fig. 12 shows how a stainless steel or brass coupling piece 70 is fitted into a connection 80 of a line. The coupling piece 70 has a first part 71 which is fitted into the connection 80, as indicated by arrow 90. Furthermore, the coupling piece 70 has a second part 72 which is provided with a union nut 73 and is designed to be coupled to lines of the central heating system or of the tap water system. A clamping plate 74, the function of which will become clear below, is present between the first part 71 and the second part 72. At the outermost end, the connection 80 has a flange 81 and a circumferential rib 82 at an axial distance therefrom. When the first part 71 of the coupling piece 70 has been fitted into the connection 80, the clamping plate 74 bears against the flange 81, as can be seen from Fig. 13.

[0033] The connection 80 and the inserted coupling piece 70 can then be pushed into a cutout 94 in a frame part 95 of the heating device 1, 21, 41, as indicated by arrow 91. The frame part 95 is in this example designed as a flat plate. The clamping plate 74 then bears against the edge regions of the cutout 94 on the frame part 95 (cf. Fig. 14). Next to the cutout 94, hook members 96 are positioned on either side, substantially perpendicular to the frame part 95. In the mounted state, these hook members 96 engage on the space between the flange 81 and the rib 82, as can be seen clearly from Fig. 14. The coupling piece 70 and the module connected to it is in this way fixed in the direction perpendicular to the frame part 95 by the edge regions of the cutout 94 and the hook members 96. Furthermore, the hook members 96 ensure that the clamping plate 74 of the coupling piece 70 and the flange 81 of the connection 80 remain fixed to one another and therefore the coupling piece 70 cannot be removed from the connection 80 when the entire assembly is fitted to the frame part 95. This is advantageous since no additional locking clips are required for providing the locking action between the connection 80 and the coupling piece, meaning that fewer components and therefore also fewer assembly operations are required. Also, the hook members 96 ensure a locking action against displacement in the direction perpendicular to the direction of introduction indicated

by arrow 91.

[0034] The clamping plate 74 also comprises a projection 74a on the side 74b which faces the frame part 95 during mounting. Two obliquely raised lips 97 are arranged on the frame part 95 at a distance from the front edge 94a of the cutout 94. In the mounted state, the projection 74a is clamped between the frame part 95 and the lips 97, as shown in Fig. 14. As a result, the coupling piece 70 is securely clamped to the frame part 95, and the module connected to it is locked against rotation.

[0035] The connection shown between the coupling piece/module and the frame results in a robust connection, with the result that the hydraulic block with the components fitted to it can be supported by the frame.

[0036] In a further embodiment, it is also possible for the second module 25 or the third module 45 to be connected to the frame in the manner described above, so that additional strength and stability are obtained. In this context, it should be noted that the connections 33 and 34 of the second module 25 are preferably located at the same position as the connections 48 and 49 of the third module 45, so that the same pattern of cutouts 94 can be used in the frame for each design of device.

[0037] The modules 10, 25, 45 of the hydraulic block are preferably made from plastic. They can be produced in particular by injection moulding. In one expedient embodiment, at least the connections on the first module which are not required for a specific version of the heating device are provided with sealing walls produced during the injection moulding, which sealing walls can be broken out or cut out as desired during the mounting of components. This results in a first module which, for example, can be used for a simple central heating system.

[0038] If, by way of example, a more extensive system is desired, this can be obtained by opening up a number of connections which were initially closed, for example by cutting open these connections, and then connecting the desired components. For example, the valve connection 13 may be closed off in the manner described here. If a valve is to fitted, the connection can, for example, be opened by cutting away the sealing wall. Other examples of components which can be connected to the first module include: an expansion vessel, a filling and drain tap, an overflow valve, a bypass valve, sensors and thermostats, a flow switch, a bleed device and a quick-fill device. By way of example, it is also possible for a connection for an expansion vessel, a connection for a filling and drain tap, means for fitting sensors and thermostats, means for fitting a flow switch, means for fitting a quick-fill device, to be fitted to the second module. The list of components mentioned here is intended to be purely indicative and should not be considered limiting in any way.

[0039] Perhaps superfluously, it should also be noted that the modules are not provided with unnecessary functionalities. What this means is that, for example, there are no means on the first module for the connection of components which are only required in a heating device in which the second or third module is also fitted. For example, therefore, there is no connection on the first module for a temperature sensor which is only required in a combination system, but this connection is present on the second module.

[0040] It will be clear that if it is desired to fit a second module, by way of example the branch 23 of the first passage 11, like the components mentioned above, can also be connected to a connection which was originally closed and has to be broken or cut open for use.

[0041] Since plastic is used instead of brass to produce the hydraulic block, weight is saved. If is expedient for the devices to be of lightweight design, in particular when dealing with types of devices which can be mounted on a wall.

Claims

1. Heating device for a central heating system having a primary circuit, which heating device forms part of the primary circuit and comprises a primary heat exchanger, for example equipped with a burner, for heating central heating water, and also comprises a hydraulic block, which is provided with connections for a feed line and a return line of the primary heat exchanger, by means of which the hydraulic block is coupled to the primary heat exchanger, and which is provided with connections for coupling the heating device to a feed line and a return line of the central heating system, **characterized in that** the hydraulic block comprises a first module, which is provided with a first passage and with a second passage for transporting central heating water from or to the primary heat exchanger to the feed line or from the return line of the central heating system, which can be connected to the first and second passages by means of connections, and **in that** the first module at the second passage forms a valve connection for a valve by which the second passage can be closed off when a secondary circuit is connected to the primary circuit, which valve connection is sealed by a sealing member which can be removed for the fitting of a valve which is to be fitted, and **in that** the first passage is provided with at least one branch connection for transporting central heating water, when a secondary circuit is connected to the primary circuit, from or to the first passage to or from the secondary circuit.

2. Heating device according to claim 1, **characterized in that** the heating device also comprises a secondary circuit having a secondary heat exchanger for heating tap water by means of central heating water which has been heated by the primary heat exchanger, the branch connection of the first passage being connected to the secondary heat exchanger in order to transport central heating water from or

to the first passage to or from the secondary heat exchanger, **in that** a valve is arranged at the valve connection of the first module, **in that** the hydraulic block comprises a second module, which second module is provided with a third passage and a fourth passage, which are connected to the secondary heat exchanger and are provided with connections for a tap water outlet line and a tap water inlet line, respectively, for transporting tap water from a tap water inlet line to the secondary heat exchanger and from the secondary heat exchanger to a tap water outlet line, and **in that** there is a fifth passage between the valve and the secondary heat exchanger for transporting central heating water from the secondary heat exchanger to the second passage.

3. Heating device according to claim 2, **characterized in that** the fifth passage is arranged fixed to the second module.

4. Heating device according to one of claims 1-3, **characterized in that** the first passage and the second passage of the first module are mechanically connected by a bridge part.

5. Heating device according to claim 4, **characterized in that** the bridge part of the first module comprises two or more parts which can be connected to one another.

6. Heating device according to one or more of claims 2-5, **characterized in that** the third and fourth passages of the second module are mechanically connected by a bridge part.

7. Heating device according to claim 6, **characterized in that** the bridge part of the second module comprises two or more parts which can be connected to one another.

8. Heating device according to one or more of claims 2-7, **characterized in that** the second module is fitted to the first module.

9. Heating device according to claim 8, **characterized in that** the bridge part of the second module, in the fitted position, bears against the bridge part of the first module.

10. Heating device according to claim 1, **characterized in that** the heating device can be connected to an external part of a secondary circuit, which is provided with an external secondary heat exchanger for heating tap water by means of central heating water, a valve being arranged at the valve connection of the first module, the hydraulic block also comprising a third module, which third module is provided with a sixth passage, which is coupled to the branch connection of the first passage and is provided with a connection for a line for transporting central heating water from or to the secondary heat exchanger and a seventh passage, which is coupled to the valve and is provided with a connection for a line for transporting central heating water from or to the secondary heat exchanger to or from the second passage.

11. Heating device according to claim 10, **characterized in that** the third module is fitted to the first module.

12. Heating device according to claim 10 or 11, **characterized in that** the third module comprises two parts which can be fitted to the first module separately from one another and respectively include the sixth passage and the seventh passage.

13. Heating device according to one or more of the preceding claims, **characterized in that** the hydraulic block, in particular the first module, is connected to a frame of the heating device, preferably by a clamping or click-fit connection.

14. Heating device according to claim 13, **characterized in that** the second module or the third module is connected to the frame of the heating device, and in the case in which the second module is fitted, the connections of the second module for the tap water inlet line and the tap water outlet line are located at the same location as the connections for the lines for transporting central heating water to and from the external heat exchanger when the third module is fitted.

15. Heating device according to claim 2, **characterized in that** the hydraulic block supports the secondary heat exchanger.

16. Heating device according to claim 1, **characterized in that** the first module is also provided with a pump connection for a circulation pump.

17. Heating device according to one or more of the preceding claims, **characterized in that** the valve connection comprises a branch in the second passage, at which branch a valve can be arranged in the second passage in such a manner that when the valve closes off the second passage, it brings the branch into open communication with the second passage.

18. Heating device according to one or more of the preceding claims, **characterized in that** the first module is also provided with:

- a connection for an expansion vessel, and/or

- a connection for a filling and drain tap, and/or
- means for fitting an overflow valve, and/or
- means for fitting a bypass valve, and/or
- means for fitting sensors and thermostats, and/or
- means for fitting a flow switch, and/or
- means for fitting a bleed device, and/or
- means for fitting a quick-fill device.

19. Heating device according to claim 2, **characterized in that** the second module is also provided with:

- a connection for an expansion vessel, and/or
- a connection for a filling and drain tap, and/or
- means for fitting sensors and thermostats, and/or
- means for fitting a flow switch, and/or
- means for fitting a quick-fill device.

20. Heating device according to one or more of the preceding claims, **characterized in that** one or more of the modules are made from plastic, preferably by injection moulding.

21. Heating device according to claim 20, **characterized in that** the sealing member of the valve connection is a sealing wall which is formed during the injection moulding, which sealing wall can be removed when the valve is being fitted.

22. Heating device according to one or more of claims 1-20, **characterized in that** the sealing member of the valve connection is a sealing plate which is releasably fixed to the first module.

23. Heating device according to claim 20, **characterized in that** one or more connections of a module are provided with a sealing wall which is formed during the injection moulding, which sealing wall can be removed if desired.

24. Heating device according to one or more of the preceding claims, **characterized in that** at least some of the connections are suitable for receiving coupling pieces for coupling the hydraulic block to lines of the central heating system.

25. Heating device according to claim 24 where the latter is dependent on claim 13 or 14, **characterized in that** common hook means are arranged on the frame for connecting the hydraulic block to the frame and for locking the coupling pieces in the connections.

26. Hydraulic block for use in a heating device according to one or more of the preceding claims.

27. Hydraulic block for use in a heating device, which hydraulic block is provided with connections for coupling a heating device to other devices in a heating system, **characterized in that** the hydraulic block is made from plastic, preferably by injection moulding, at least some of the connections being provided with sealing walls which are formed during the injection moulding, which sealing walls can if desired be removed during fitting.

28. Hydraulic block according to claim 27, **characterized in that** some of the connections are suitable for receiving coupling pieces for coupling the hydraulic block to the lines of the heating system.

29. Coupling piece for use with a hydraulic block according to one of claims 26-28.

30. Coupling piece according to claim 29, **characterized in that** the coupling piece is made from metal.

31. Method for producing one or more heating devices according to claim 1 and one or more heating devices according to claim 2,
in which during the production of the heating device according to claim 1:

- the primary heat exchanger is fitted,
- the first module is fitted into the device, and
- the feed line and the return line of the primary heat exchanger are connected to the first passage and the second passage,

and
in which during the production of the heating device according to claim 2:

- the primary heat exchanger is fitted,
- the first module is fitted into the device,
- a valve is fitted to the valve connection of the first module,
- the second module is fitted into the device,
- the fifth passage is coupled to the valve,
- the secondary heat exchanger is fitted into the device, a central heating water inlet line and a central heating water outlet line of the secondary heat exchanger being connected to the branch connection of the first passage of the first module and the fifth passage, and a tap water inlet line and a tap water outlet line of the secondary heat exchanger being connected to the third and fourth passages of the second module, and
- the feed line and the return line of the primary heat exchanger being connected to the first and second passages of the first module.

32. Method according to claim 31, in which, furthermore, one or more heating devices according to

claim 10 are produced, wherein

- the primary heat exchanger is fitted,
- the first module is fitted into the device,
- a valve is fitted to the valve connection of the first module,
- the third module is fitted into the device, the sixth passage of the third module being connected to the branch connection of the first passage and the seventh passage of the third module being coupled to the valve, and
- the feed line and the return line of the primary heat exchanger being connected to the first and second passages of the first module.

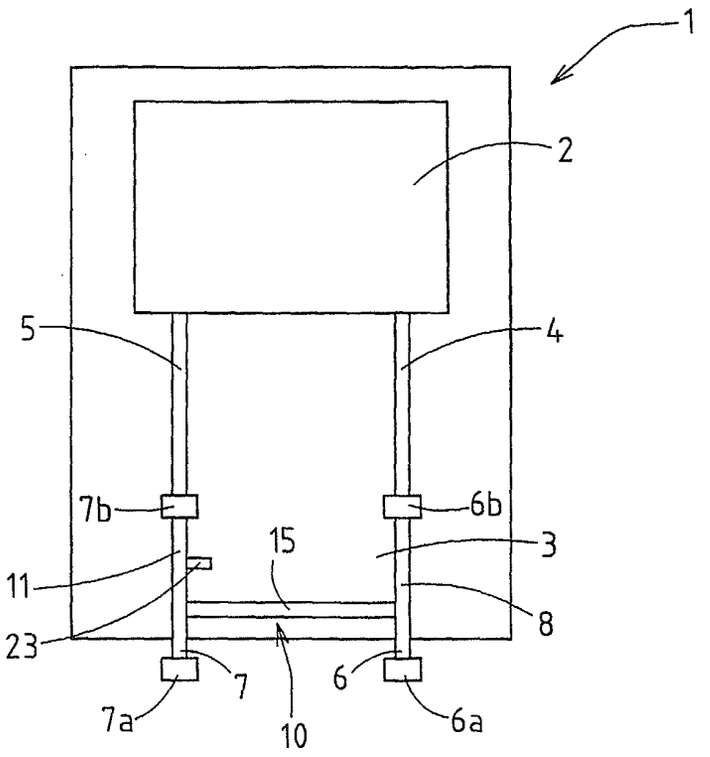
1
2
5
4
7b
6b
15
3
11
8
23
7
6
7a
10
6a

FIG. 1.

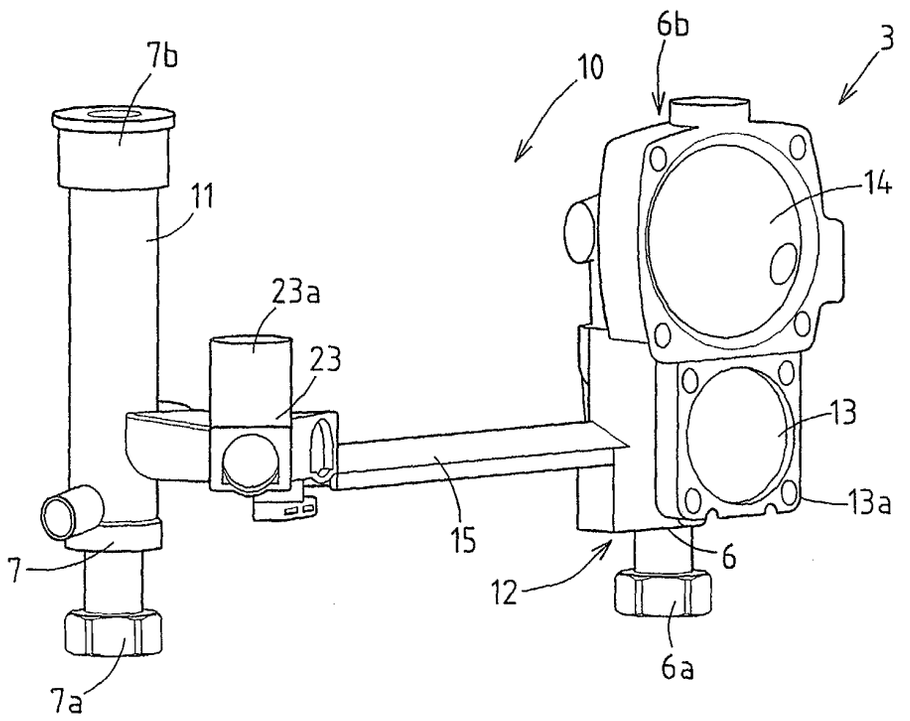
7b
6b
3
10
11
14
23a
23
13
13a
15
6
7
12
7a
6a

FIG. 2.

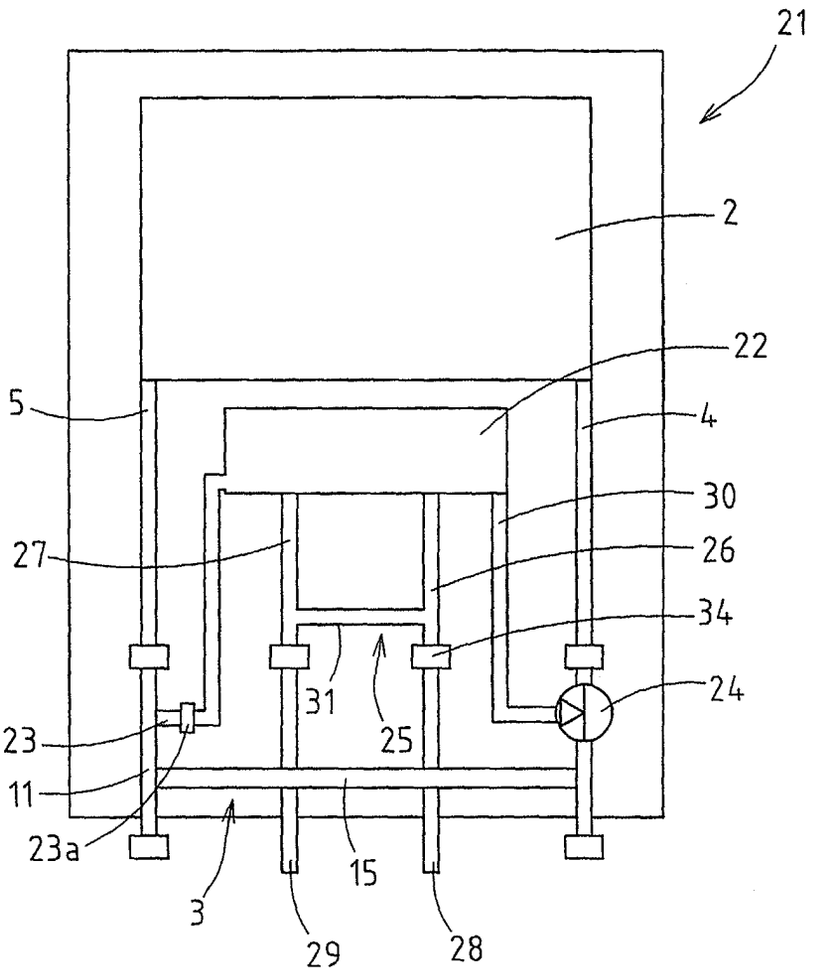

FIG. 3.

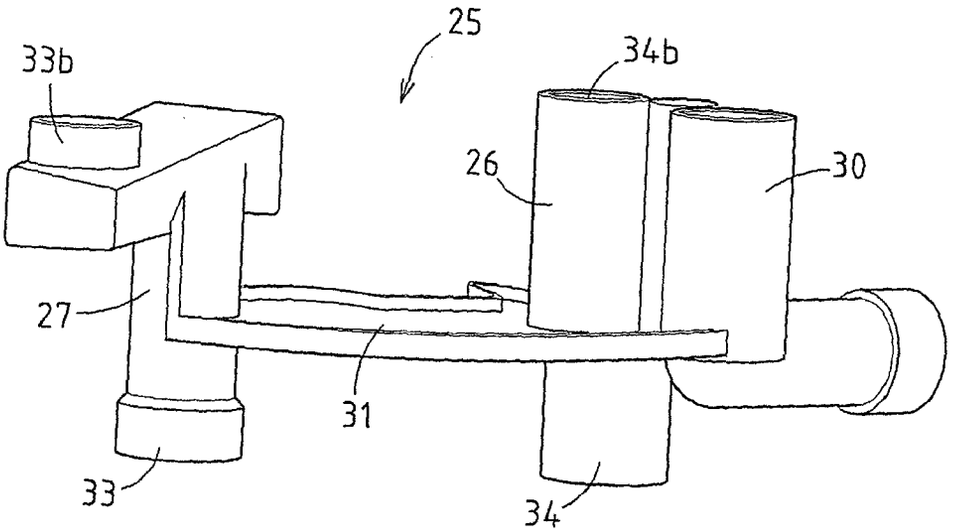
25
33b
34b
26
30
27
31
33
34

FIG. 4.

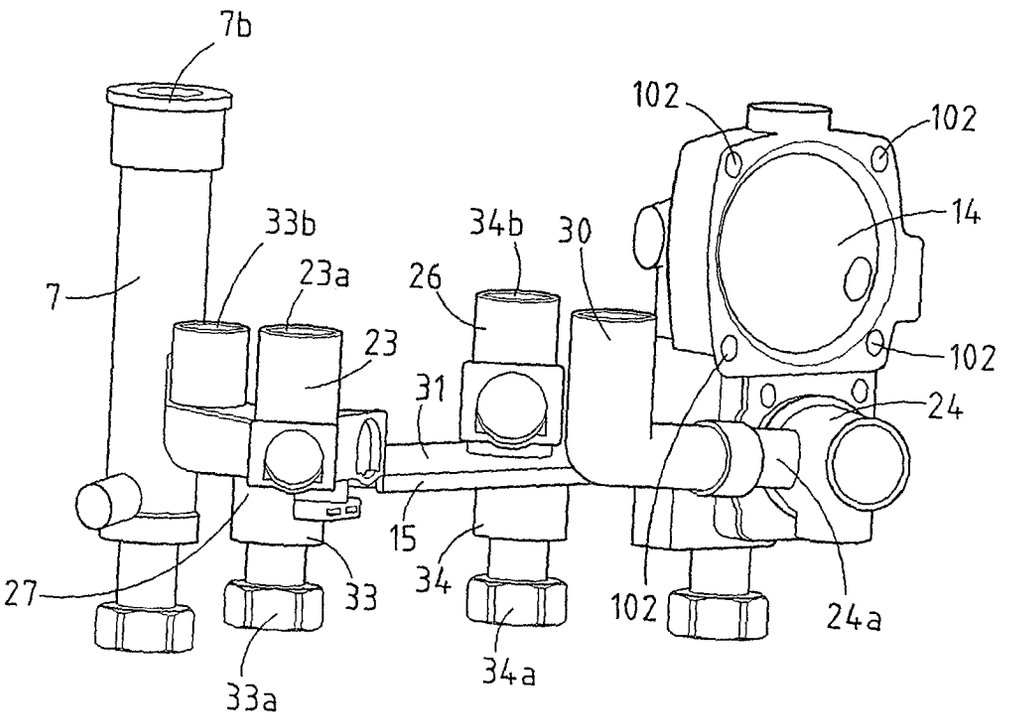
7b
102
102
14
33b
34b
30
23a
26
7
23
31
102
24
15
34
27
33
102
24a
34a
33a

FIG. 5.

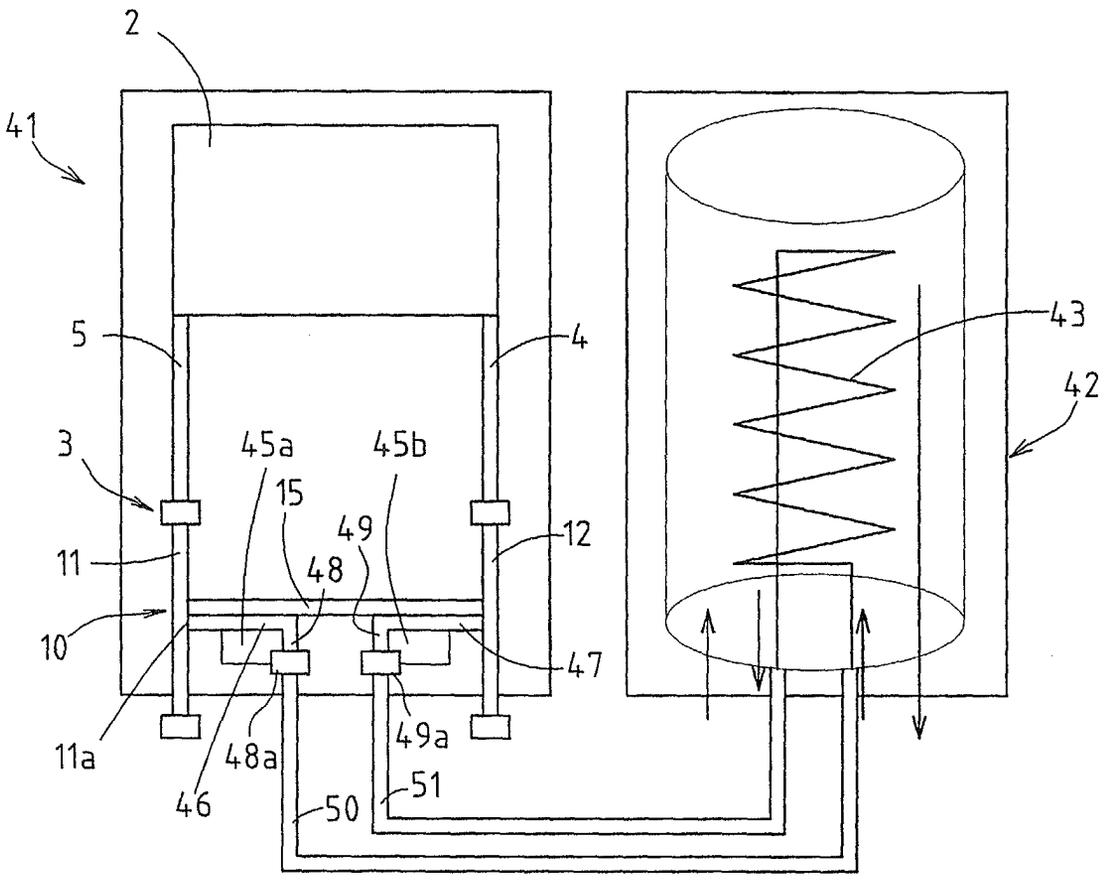

FIG. 6.

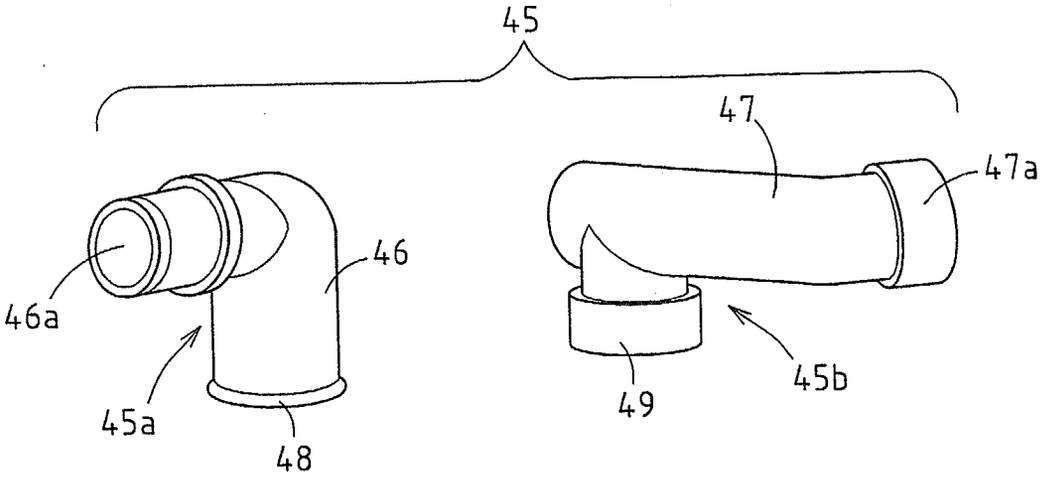
45
47
47a
46
46a
45a
48
49
45b

FIG. 7.

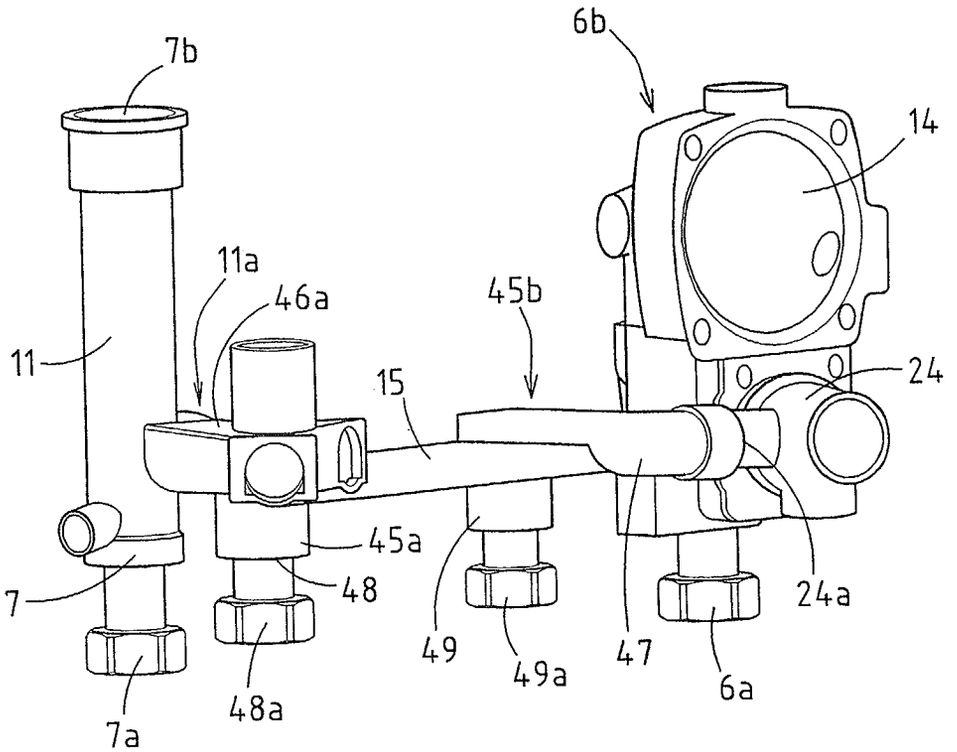
6b
7b
14
11a
46a
45b
11
15
24
45a
48
7
24a
49
49a
47
6a
48a
7a

FIG. 8.

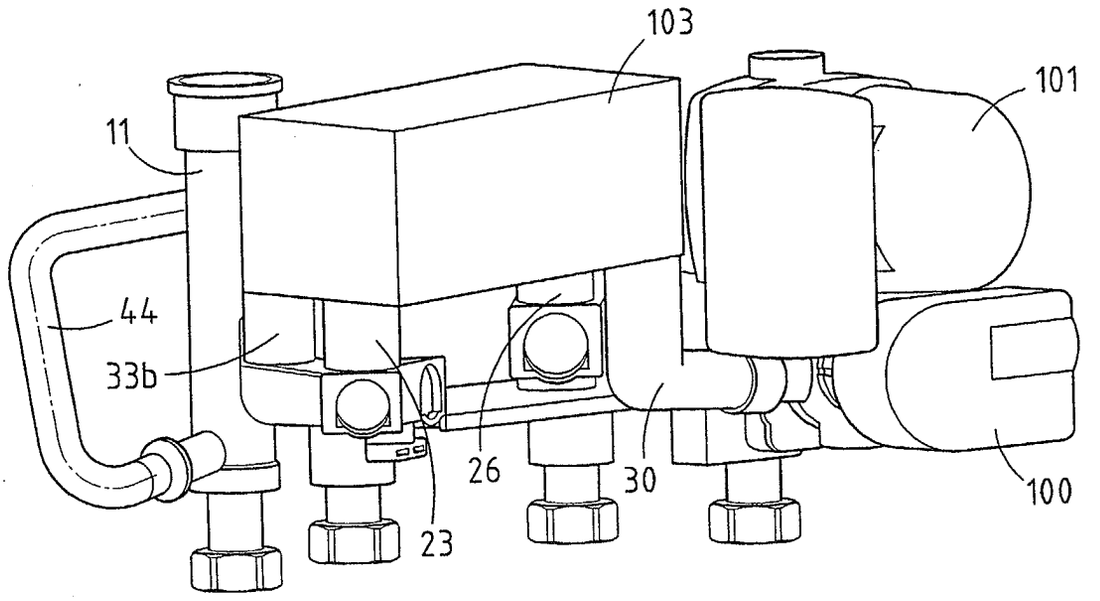

FIG. 9.

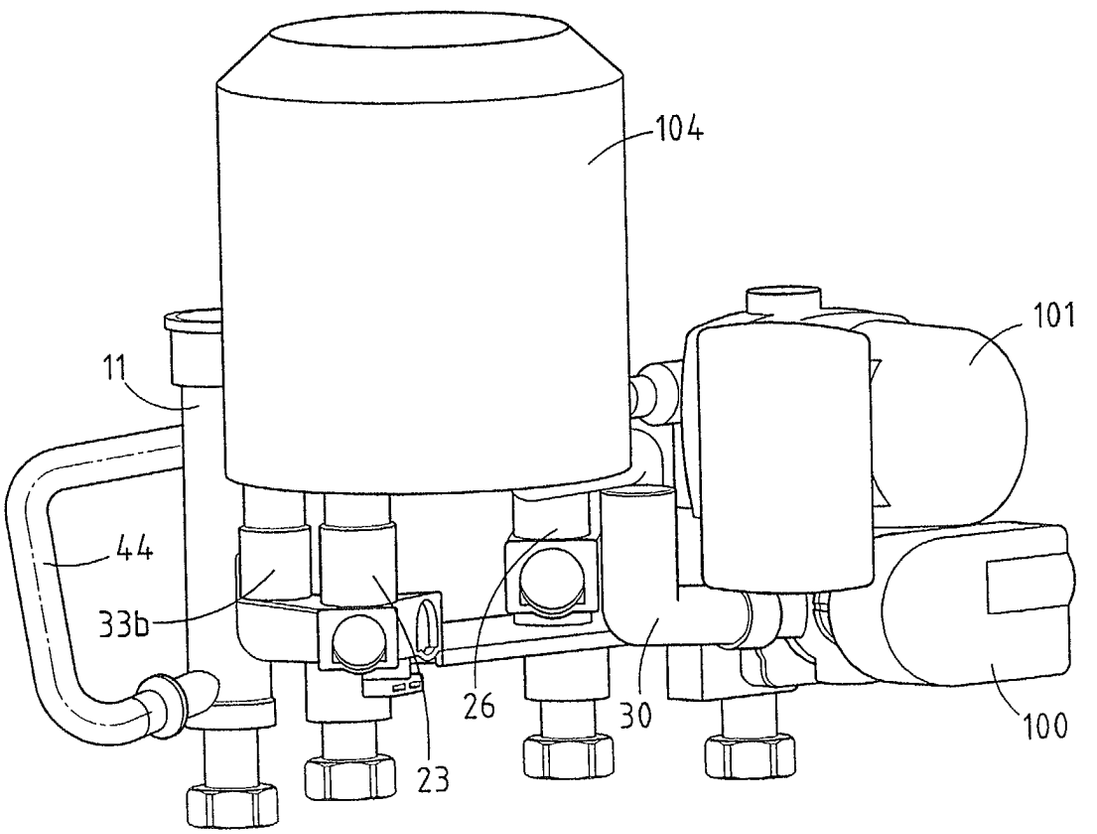

FIG. 10.

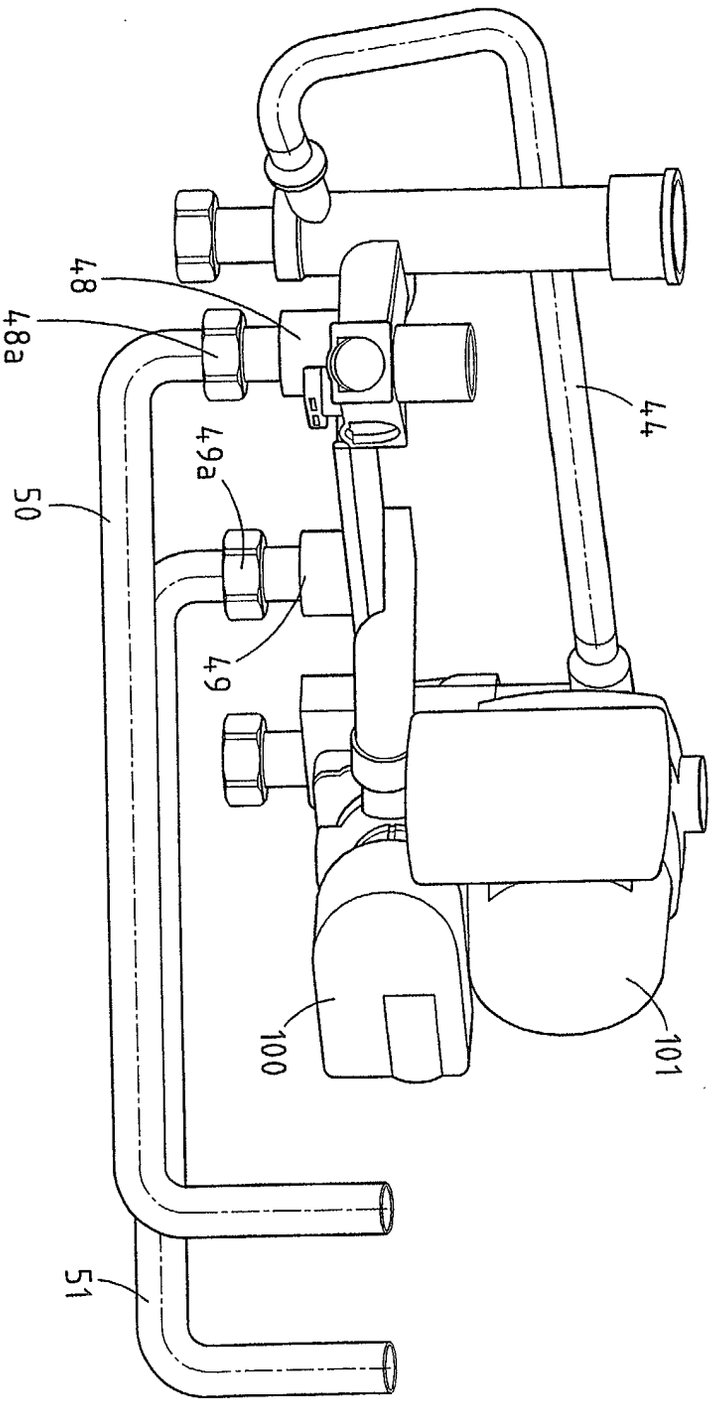

FIG. 11.

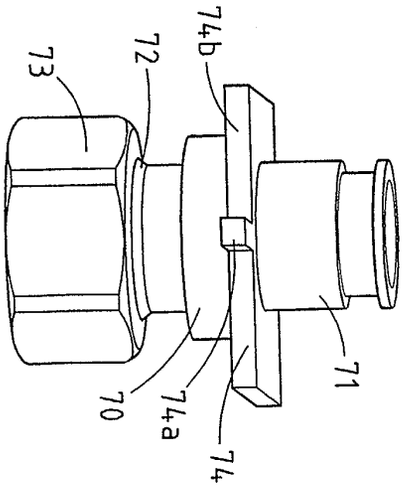

FIG. 12.

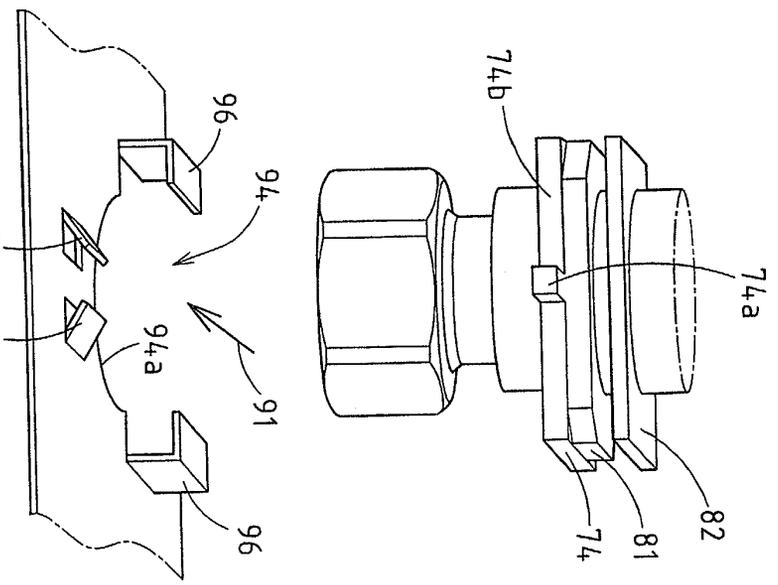

FIG. 13.

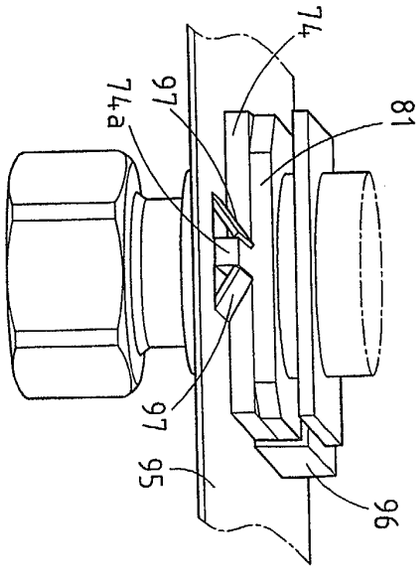

FIG. 14.

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 03 07 8069

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.7)
A,D	DE 199 12 284 A (GRUNDFOS A S BJERRINGBRO) 28 September 2000 (2000-09-28) * figures *	1,26,27, 29,31	F24H9/14
A,D	DE 100 44 873 A (VIESSMANN WERKE KG) 4 April 2002 (2002-04-04) * figures *	1,26,27, 29,31	

TECHNICAL FIELDS SEARCHED (Int.Cl.7)

F24H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	30 January 2004	Van Gestel, H

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
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 03 07 8069

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

30-01-2004

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 19912284 A	28-09-2000	DE 19912284 A1	28-09-2000
DE 10044873 A	04-04-2002	DE 10044873 A1	04-04-2002

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82