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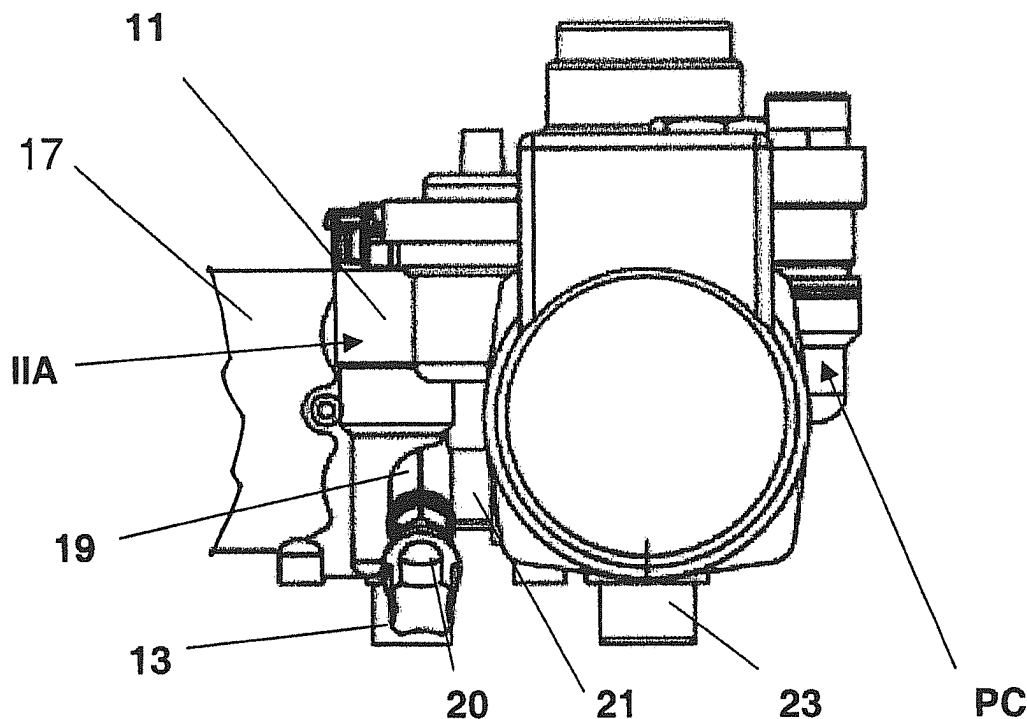
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(54) **Hydraulic return group for wall boiler**

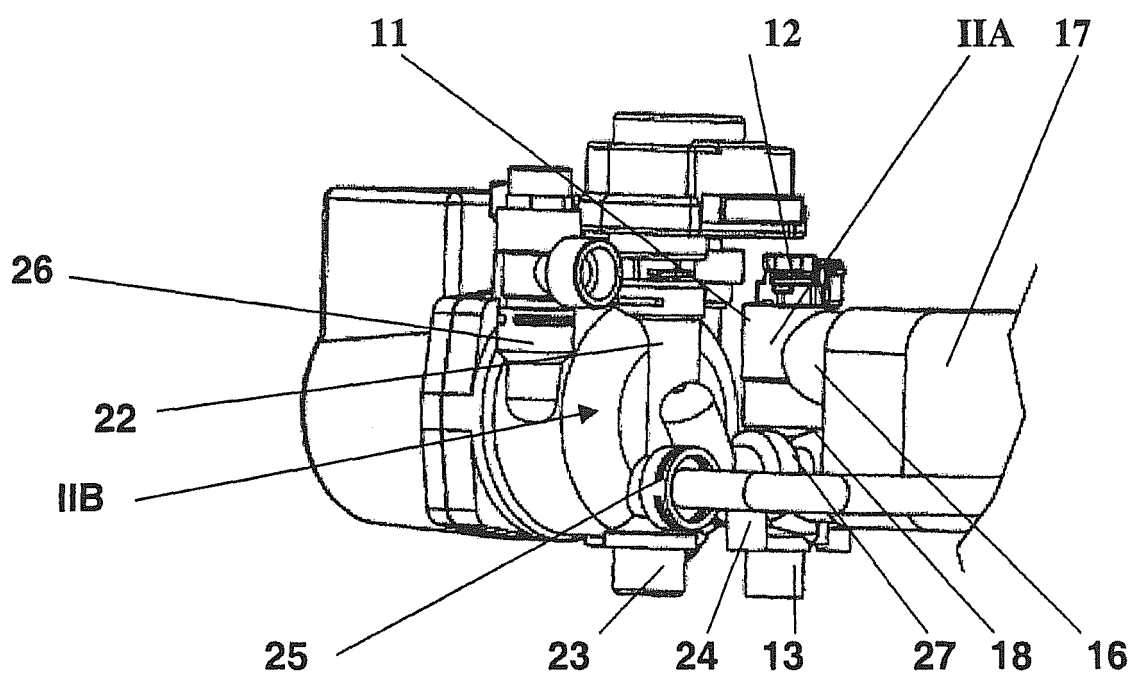
(57) The invention concerns a return subgroup for a system adapted to supply both heating and sanitary water, as well as a hydraulic group incorporating such subgroup. The return subgroup includes a metal unit (IIA) and a unit of a composite material (IIB) formed by the

body (PC) of the system circulating pump, which incorporates the routing three-way valve (22). The metal unit (IIA) houses a flow detector (12) of the sanitary water for controlling the three-way valve (22), a connection (13) to the sanitary water circuit and two connections (16, 18) to the water-water heat exchanger (17).



**Fig. 1**

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**Fig. 3**

## Description

**[0001]** The present invention relates to residential mixed systems adapted to supply both heating and sanitary water, i.e. systems in which the hot water from one or different supplies is used both for heating dwellings through radiator elements (heaters) and for producing sanitary warm water for several uses. The primary hot water can be supplied either by a local gas burner, or by a centralized plant or by a station of a district heating system.

**[0002]** As disclosed in Italian patent No. 1 254 266 (corresponding to EP 568122B1) a hydraulic group of this kind comprises a delivery subgroup and a return subgroup connected to a water/water heat exchanger of the type comprising a plurality of plates brazed together.

**[0003]** Fig. 1 of the above mentioned patent illustrates a hydraulic diagram of a group to which the present invention could be applied. As disclosed in patent No. 1 254 266, the delivery subgroup is formed as a metal block, typically of brass, housing a three-way valve, a connection to the main heat exchanger, a connection to the radiator system, an outlet connection for the sanitary water, two connections to the water/water heat exchanger, as well as seats or recesses for a pressure switch and a bypass valve with associated outlet connections.

**[0004]** The return subgroup is formed as a metal block, typically of brass, housing a water flow detector that actuates the three-way valve (in the above mentioned patent a pressure drop device, and more recently a flow transducer or meter), a connection to the radiator system, an inlet connection to the sanitary water, an outlet connection to the pump, and the other two connections to the water/water heat exchanger. In some embodiments, the pump can be embedded in the second subgroup made of plastic material or anyhow secured to the second metal subgroup.

**[0005]** In respect of the functions of the components and the operation of the group, reference is made to the description of the above mentioned patent.

**[0006]** The construction with two subgroups disclosed in the above mentioned patent proved to be satisfactory and is still used, nevertheless it would be desirable to reduce the weight, and therefore the cost, of the metal material (brass) of which the subgroups are formed, without at the same time jeopardizing or limiting the functions that are typical of the traditional hydraulic circuits.

**[0007]** It is further to be pointed out that any constructional improvement affecting only a part of the group, such as for example the return subgroup, might result in being incompatible with the remainder of the group, to the point of requiring the replacement of the whole group. This prevents from making improvements to groups that are not installed, but are in kept in stock for replacement and servicing purposes, although these groups would otherwise take advantage of constructional improvements. This situation further hinders a partial replacement with up-to-date improved components in already

installed groups.

**[0008]** It is an object of the present invention to realize a return subgroup of the above type providing for a consistent weight reduction of the metal material, and therefore a cost reduction, without impairment or limitations of the functions that are typical of the traditional hydraulic circuits.

It is a further object of the invention to realize a return subgroup with improved characteristics of compactness and low cost, while maintaining high levels of reliability. Another object of the invention is to retain the interchangeability of the hydraulic subgroup of the present invention with those already present in the market, whereby the replacement of these latter becomes economically advantageous and does not require modifications to other parts of the hydraulic system.

**[0009]** The invention further relates to a hydraulic group for a system providing for both heating and sanitary water and equipped with a return subgroup of the above mentioned type.

**[0010]** According to the invention, these objects are achieved through a return subgroup for hydraulic groups as claimed in claim 1 and a hydraulic group as claimed in claim 11. Further advantageous characteristics are recited in the dependent claims.

**[0011]** The invention will now be disclosed with reference to the attached drawings illustrating preferred but not limiting embodiments of the invention, in which:

Fig. 1 is a front view of a return subgroup according to the invention connected to a heat exchanger which is only partially shown;

Fig. 2 is a top view of the return subgroup according to the invention;

Fig. 3 is a perspective side back view of the return subgroup according to the invention; and

Fig. 4 is a back view of the return subgroup according to the invention.

**[0012]** Throughout all the Figures the same numerical references have been used for indicating equal or functionally equivalent parts.

**[0013]** With reference to the Figures, in which the return (sub)group according to the invention is shown as being connected to a water/water heat exchanger 17 only partially represented, such return subgroup comprises two parts, respectively a portion or unit IIA and a portion or unit IIB. Unit IIA is made of brass and is preferably a "light weight" unit, i.e. formed with a small amount of metal material, whereas unit or portion IIB is made of a composite material based on polyamide, i.e. comprising a polymeric base material and at least one filler. A preferred material is for instance the one known as PA 6.6 GF30s comprising Polyammyde PA 6.6 filled with a 30% of glass fibers (Glass Fibers GF30). Unit or portion IIB is more massive and is formed inside the pump body, or in other words the pump body PC is formed in such way as to incorporate the other group functions such as the three-

way valve, the drain tap, the connection to the safety valve, etc. that will be illustrated later on. The metal material from which unit IIA is formed is preferably brass (UNI EN 12165 CW617N).

**[0014]** More precisely, the brass subgroup IIA is formed as a cylindrical body 11 housing a flow detector 12 of the sanitary water and providing at the opposite end for a connection 13 to the circuit of the sanitary water. The flow detector 12 can be either a transducer supplying an output electric signal representative of the flow/no-flow condition, or a device metering the water flow.

**[0015]** On the cylindrical body 11 there are further formed two transverse portions 16 and 18 for connecting the water-water heat exchanger to the subgroup, and a tilted portion 19 housing the tap 20 for filling the primary circuit, and also a connection 21 for the connection of the subgroup to unit IIB.

**[0016]** Portion IIB is substantially made up by the pump body PC and incorporates a three-way routing valve 22 (integrated in the pump body PC), and in accordance with an advantageous embodiment of the invention, this valve extends vertically.

**[0017]** In the lower part of the pump body PC there is formed a return connection 23 for the primary circuit.

**[0018]** In the portion IIB there are further formed a drain tap 24 for emptying the plant, a connection 25 (if required) to an external bypass pipe, a connection 26 to a safety valve and a connection 27 for connecting the portion IIB to the above illustrated brass group IIA.

**[0019]** The advantage of a vertical construction of the routing three-way valve 22 is that of enabling the construction of the inner functional parts of the routing three-way valve as a single component assembled so as to be completely removable (like a sort of "cartridge"). This way the worn parts can be replaced without disassembling the pump or other parts of the plant, and moreover the standard connections are maintained for the actual linear actuators.

**[0020]** The group according to the invention accomplishes the return subgroup functions partly in the light-weight brass portion or unit IIA (transducer and filling), and partly in the pump body, thus providing for a consistent reduction of the metal material (brass) while nevertheless maintaining all the functional features of a traditional return group. Anyhow the metal (brass) is present in all those parts mostly subjected to water hammers (particularly in the sanitary circuit) where traditionally the composite materials (plastics) would not assure an absolute reliability. Also in this case the distance between the axes of the sanitary and primary return connections 13 and 23 is maintained (65 mms).

**[0021]** By maintaining the same spacing between the delivery and the return connections the hydraulic circuit according to the invention is completely interchangeable with the existing ones and allows their advantageous replacement without modifying the parts made of metal plates of the existing boilers.

**[0022]** Although the invention has been illustrated with

reference to preferred embodiments, it is susceptible in general of other applications and modifications that fall within its scope as will be evident to the skilled of the art.

## Claims

1. A return subgroup for a system adapted to supply both heating and sanitary water, said system including:

- a delivery subgroup and a return subgroup both connected to a water/water plate heat exchanger (17), said heat exchanger being connectable under control of a three-way valve (22) to the heating water circuit for receiving hot water from a supply, and
- a pump for circulating said heating water,

said return subgroup being **characterized in that** it comprises:

a metal unit (IIA) that houses:

- a flow detector (12) of the sanitary water for controlling said three-way valve (22),
- a connection (13) to the sanitary water circuit,
- two connections (16, 18) to said water-water heat exchanger (17), and

a unit (IIB) of a composite material made up by the body (PC) of said pump and incorporating said three-way routing valve (22).

2. A return subgroup as claimed in claim 1, **characterized in that** said composite material unit (IIB) further incorporates a connection (25) for an external bypass pipe.
3. A return subgroup as claimed in claim 1 or 2, **characterized in that** said three-way valve (22) has a vertical extending construction.
4. A return subgroup as claimed in the preceding claims, **characterized in that** said metal is brass.
5. A return subgroup as claimed in the preceding claims, **characterized in that** said composite material is a polyamide filled with glass fibers.
6. A return subgroup as claimed in the preceding claims, **characterized in that** said metal unit (IIA) additionally houses a tap for filling the primary circuit (20).
7. A return subgroup as claimed in the preceding claims, **characterized in that** said composite ma-

terial unit (IIB) further incorporates a tap (24) for emptying out the plant water.

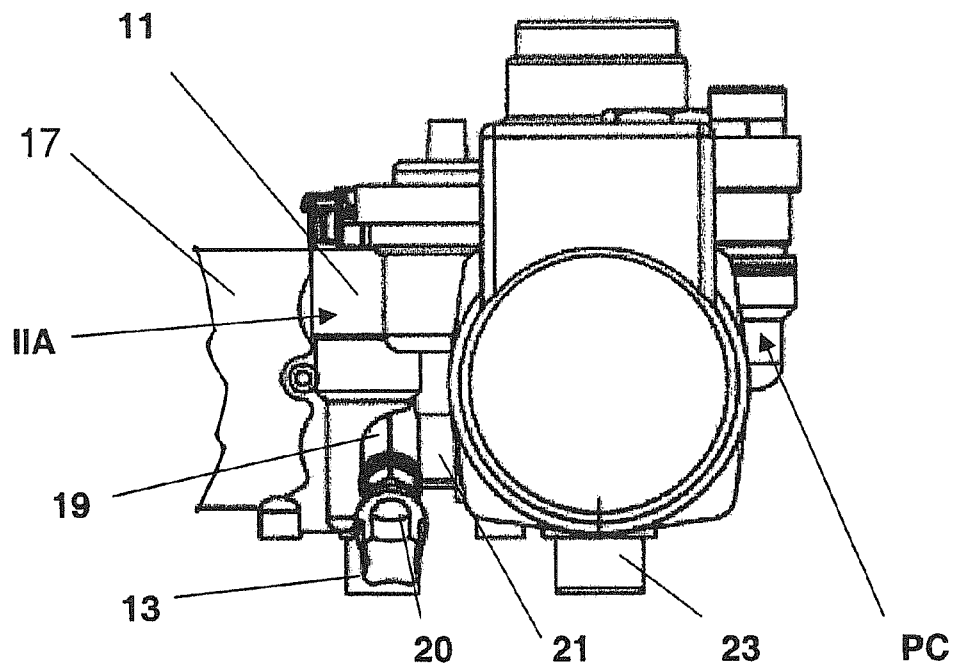
8. A return subgroup as claimed in the preceding claims, **characterized in that** said flow detector (12) in said metal unit (IIA) is a transducer adapted to supply an output electric signal. 5
9. A return subgroup as claimed in the preceding claims, **characterized in that** said flow detector (12) in said metal unit (IIA) is a flow meter. 10
10. A return subgroup as claimed in the preceding claims, **characterized in that** said unit (IIB) of a composite material incorporates a connection (26) for a safety valve. 15
11. A hydraulic group for a system adapted to supply both heating and sanitary water and comprising a supply of hot water and a pump for circulating said heating water, said group comprising a delivery subgroup and a return subgroup both connected to a water/water plate heat exchanger (17) being connectable under control of a three-way valve (22) to the heating water circuit, said hydraulic group being **characterized by** comprising a return subgroup according to any of the preceding claims. 20 25
12. A hydraulic group as claimed in claim 11, **characterized in that** said hot water supply comprises a main gas/water heat exchanger provided in the gas boiler. 30
13. A hydraulic group as claimed in claim 11, **characterized in that** said hot water is supplied from a centralized plant or from a station of a district heating system. 35

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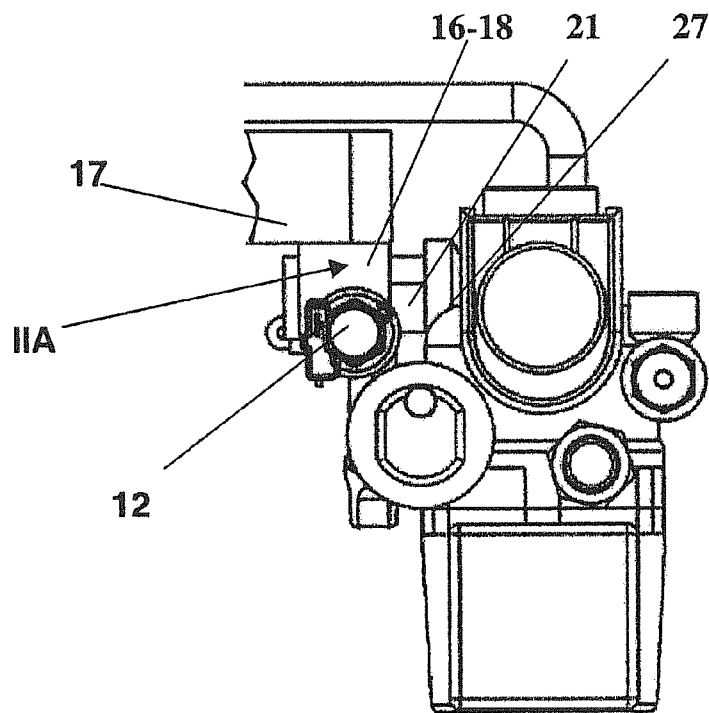
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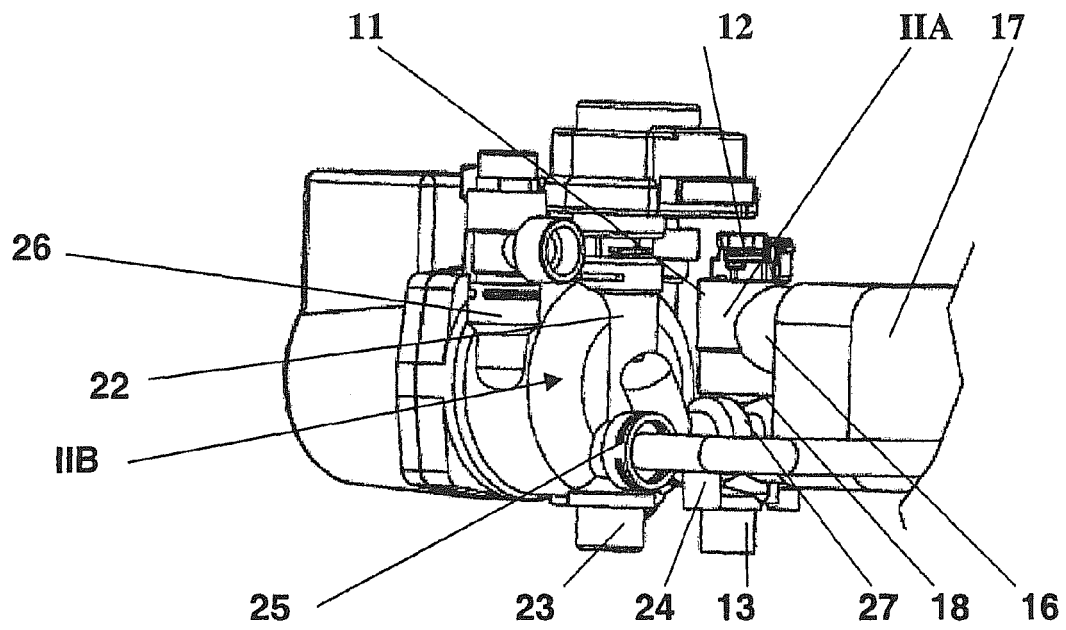
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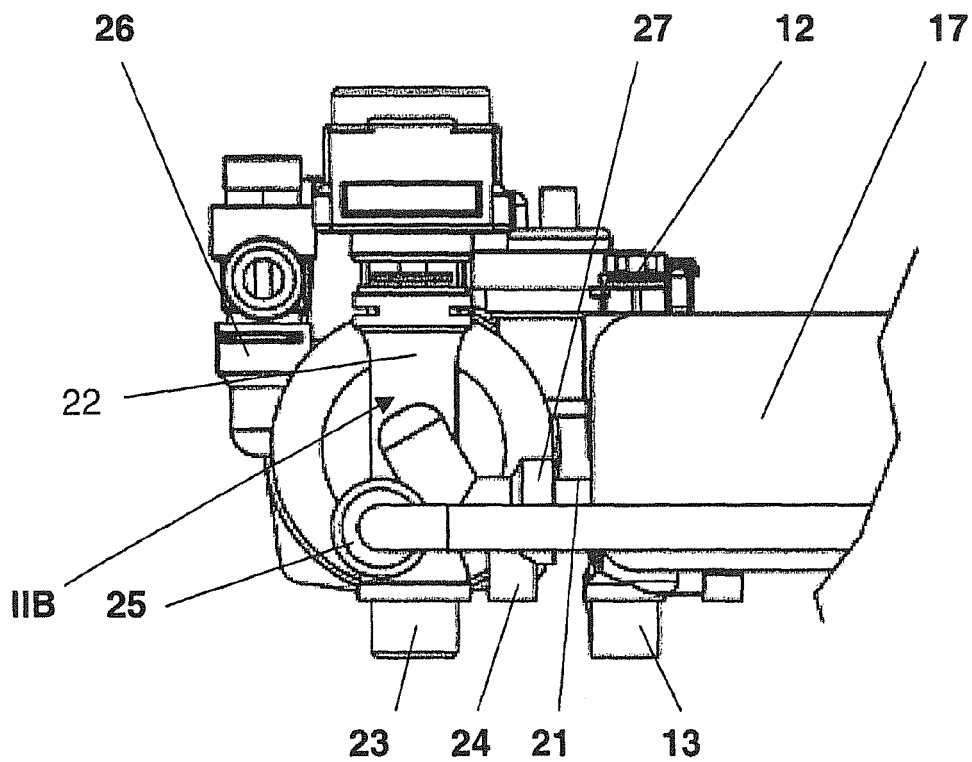
**Fig. 1**



**Fig. 2**



**Fig. 3**



**Fig. 4**



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Application Number  
EP 07 10 6133

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Place of search Munich		Date of completion of the search 26 July 2007	Examiner GARCIA MONCAYO, O
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# EUROPEAN SEARCH REPORT

Application Number  
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Place of search Munich		Date of completion of the search 26 July 2007	Examiner GARCIA MONCAYO, O
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