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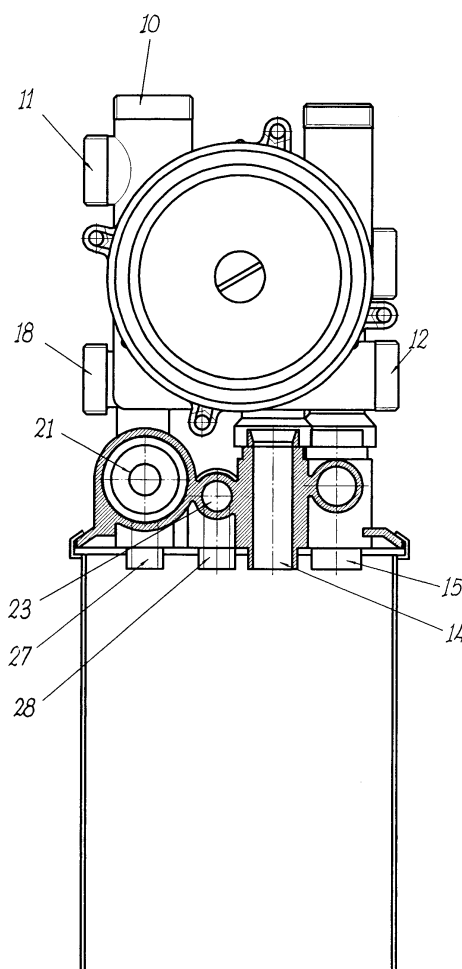
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(54) **Modular hydraulic assembly**

(57) The invention concerns a modular hydraulic assembly comprising a combination of at least two modules chosen among a pump module (A), a flow switch-deaeration device module (B), a three way valve module (C), and a sanitary module (D), said modules being provided with union and/or orienteering means to allow their coupling each other in function of the kind of boiler, and means for the connection with the hydraulic plants.

FIG. 2



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Description

[0001] The present invention relates to a modular hydraulic assembly.

[0002] More specifically, the invention concerns a solution allowing to realise in any situation the hydraulic assembly most suitable for the specific boiler.

[0003] As it is well known, it is necessary to realise a specific hydraulic assembly for any water boiler.

[0004] Obviously, the above need involves remarkable problems for the realisation and the installation of the boiler.

[0005] Main object of the present invention is that of providing a solution allowing to realise before hand a hydraulic assembly suitable for any specific needing.

[0006] Further object of the present invention is that of providing a hydraulic assembly suitable for any boiler and thermal assembly employing water as thermal carrier fluid for heating and sanitary water preparation purposes.

[0007] Still another object of the present invention is that of providing a hydraulic assembly comprised of modules that can be composed in such a way to allow to realise different geometrical configurations in function of contingent factors such as accessibility for mounting and disassembling of the inner elements of the group (assembling and maintenance) accessibility for hydraulic and electric coupling with other elements out of the hydraulic assembly, etc.

[0008] By the solution suggested according to the present invention, thanks to the various possible configurations of the modules and sub-modules of the hydraulic assembly, the same group can be mounted in any water boiler, such as wall or floor boilers, heating or mixed boilers, i.e. with instantaneous, semi-accumulation or accumulation sanitary heat water production, boilers for high temperature heating plants (radiators and fan-carriers, etc.) or for low temperature heating plants (floor, ceiling or wall radiant panels, etc.) boilers with atmospheric burners with a natural draught, atmospheric burners with a forced, fanned or premixed draught, employing solid, liquid or gaseous combustible, boilers having main exchangers of any shape and material, working or not in a vapour condensation regime of fumes, etc.

[0009] It is therefore specific object of the present invention a modular hydraulic assembly comprising a combination of at least two modules chosen among a pump module, a flow switch-deaeration device module, a three way valve module, and a sanitary module, said modules being provided with union and/or orienteering means to allow their coupling each other in function of the kind of boiler, and means for the connection with the hydraulic plants.

[0010] Preferably, according to the invention, said hydraulic group can comprise further functional modules provided with union and/or orienteering means and/or means for connection with the hydraulic plants.

[0011] According to the invention, said pump module can provide a motor, a turbine, a scroll, provided with outlet union to send water to a main exchanger and a union for the connection with said flow switch - deaeration device module.

[0012] Further, said pump module can rotate about the axis of the motor in order to individuate the assembling position suitable for the specific needing of the boiler.

[0013] Furthermore, according to the invention, said flow switch - deaeration device module can provide a body comprising a chamber for the separation of air/gas bubbles from water, said chamber having in its upper portion an automatic valve for air/gas vent; being further provided hydraulic unions for the connection with the expansion tank, with the safety valve, with the pump module, with the three way valve module and with other eventual components, said module being spatially placed in a position established before hand with automatic vent provided in the upper part of the same.

[0014] Further, said flow switch - deaeration device module can provide a safety flow switch to guarantee the presence and the circulation of the primary water.

[0015] Always according to the invention, said three way valve module can provide a body, a switching valve and a primary probe holder sump.

[0016] Furthermore, according to the invention, in said three way valve module there can be provided possible seats for other thermostats and temperature, pressure and flow rate sensors, possible primary water interception valves, a possible by-pass valve, a hydraulic union for the return of the water from the primary exchanger, outlet and return hydraulic unions for the heating system, inlet and outlet hydraulic unions for the boiler primary circuit, a primary union for filling the primary circuit, unions for connection with flow switch - deaeration device and sanitary modules, hydraulic unions for the connection with the discharge valve, and with other possible components.

[0017] Still according to the invention, said sanitary module can comprise a body, a sanitary union for filling the primary circuit, a sanitary precedence flow switch, the sanitary water - water exchanger or boiler, a limiting - stabilising valve for the sanitary water flow rate, and possible other seats for thermostats and temperature, pressure and flow rate sensors.

[0018] Further, in said sanitary module there can be provided hydraulic unions for the connection with sanitary cold water and sanitary hot water, a sanitary probe holder sump, a boiler sanitary inlet, a boiler sanitary outlet, unions for the connection with the three way valve module, other hydraulic unions for the connection with other possible outer elements such as boilers, tanks, safety valve against overpressure, sanitary expansion tank, sanitary water interception valve, etc.

[0019] The present invention will be now described, for illustrative but not limitative purposes, according to its preferred embodiments, with particular reference to

the figures of the enclosed drawings, wherein:

figure 1 is a lateral view, partially broken away, of a hydraulic assembly according to the invention;
figure 2 is a front view of the hydraulic group of figure 1;
figure 3 is a top view of the hydraulic group of figure 1; and
figure 4 shows a scheme of the hydraulic group of figure 1.

[0020] Observing now all the four figures of the enclosed drawings, it is shown an embodiment of a hydraulic assembly according to the invention, wherein a certain combination of modular components is provided. However, it must be taken into account that such combination must not be used to limit the scope of the invention, since in the different hydraulic assemblies that can be realised for the different kind of boilers all or some of the functional elements of the shown solution can be provided, as well as other functional elements.

[0021] Particularly, in the embodiment of the figures, it is provided a pump module A, providing a motor 1, a turbine 2, a scroll 3, provided with an outlet union 4 to deliver water to a primary exchanger 29 and with a union for the connection with the flow switch - deaeration device module B.

[0022] Said module A can rotate about axis of the motor 1 in order to individuate the assembly position suitable to the needing of the specific boiler.

[0023] The flow switch - deaeration device module B provides a body comprising a chamber 6 for the separation of air/gas bubbles from water, provided above with a air/gas automatic vent valve 7.

[0024] Furthermore, hydraulic unions are provided for the connection with the expansion tank 16, with the safety valve 17, with module A, with module C and with other possible components of the modular hydraulic group according to the invention.

[0025] Module B further provides a safety flow switch 5 to guarantee the presence and the circulation of primary water.

[0026] During the assembling of the assembly according to the invention, module B has a not variable position established before hand providing the automatic vent 7 compulsorily provided on the upper part (see figure 1).

[0027] Third module C is the three way valve module providing a body 8, with a switching valve 9, a primary probe holder sump and possible seats for other thermostats and temperature, pressure and flow rate sensors.

[0028] Furthermore, it is possible to provide primary water interception valves, a hydraulic union 11 for the return of the water from the primary exchanger 29, outlet 12 and return 13 hydraulic unions for the heating system, inlet 14 and outlet 15 hydraulic unions for the boiler primary circuit 20, unions for connection with B and D modules, hydraulic unions 18 for the connection with the

discharge valve, and with other possible components not shown in the figures.

[0029] Finally, in the enclosed figures, it is shown a sanitary module D providing a body 19, a sanitary union 20 for filling the primary circuit, a sanitary precedence flow switch 21, the sanitary water - water exchanger 22, or boiler, a limiting - stabilising valve 23 for the sanitary water flow rate, and possible other seats for thermostats and temperature, pressure and flow rate sensors.

[0030] Further, in said sanitary module D there can be provided hydraulic unions for the connection with sanitary cold water 24 and sanitary hot water 25, a sanitary probe holder sump 26, a boiler sanitary inlet 27, a boiler sanitary outlet 28, unions for the connection with the C module, and other hydraulic unions for the connection with other possible outer elements such as boilers, tanks, safety valve against overpressure, sanitary expansion tank, sanitary water interception valve, etc.

[0031] By the hydraulic assembly according to the invention, it is possible to eliminate many connection tubes between the functional elements of the boilers, saving material and assembling time.

[0032] It is further obtained a remarkable reduction of hydraulic charge losses in view of the limited extension of the hydraulic circuit, as well as the unification into a single body of many bodies of the single functional elements, saving the material and with reduced assembling time.

[0033] Another advantage obtained by the hydraulic assembly according to the invention is the reduction of the number of hermetic hydraulic connection to be realised, thus reducing the number of unions, gaskets, and the time necessary for assembling and testing.

[0034] Further, the assembly has reduced sizes and is more compact, so that handling and storing costs are reduced, a lower noise of the water flow is obtained, as well as a reduction of the probability of start of the mechanical resonance vibrations, a lower heat dispersion for the reduction of the whole outer surface, and a lower complexity of the eventual insulation of the hydraulic assembly to limit heat dispersion.

[0035] Finally, the unification in the hydraulic assembly of main part of the hydraulic circuit for many different kind of boilers allows to: obtain economy, unify the maintenance intervention on similar problems, a lower variety of spare parts necessary to maintain different boiler models.

[0036] The present invention has been described for illustrative but not limitative purposes, according to its preferred embodiments, but it is to be understood that modifications and/or changes can be introduced by those skilled in the art without departing from the relevant scope as defined in the enclosed claims.

Claims

1. Modular hydraulic assembly characterised in that it

comprises a combination of at least two modules chosen among a pump module, a flow switch-deaeration device module, a three way valve module, and a sanitary module, said modules being provided with union and/or orienteering means to allow their coupling each other in function of the kind of boiler, and means for the connection with the hydraulic plants.

2. Modular hydraulic assembly according to claim 1, characterised in that said hydraulic group comprises further functional modules provided with union and/or orienteering means and/or means for connection with the hydraulic plants. 10
3. Modular hydraulic assembly according to claim 1 or 2, characterised in that said pump module provides a motor, a turbine, a scroll, provided with outlet union to send water to a main exchanger and a union for the connection with said flow switch - deaeration device module. 15
4. Modular hydraulic assembly according to claim 3, characterised in that said pump module rotates about the axis of the motor in order to individuate the assembling position suitable for the specific need of the boiler. 20
5. Modular hydraulic assembly according to one of the preceding claims, characterised in that said flow switch - deaeration device module provides a body comprising a chamber for the separation of air/gas bubbles from water, said chamber having in its upper portion an automatic valve for air/gas vent; being further provided hydraulic unions for the connection with the expansion tank, with the safety valve, with the pump module, with the three way valve module and with other eventual components, said module being spatially placed in a position established before hand with automatic vent provided in the upper part of the same. 25 30 35 40
6. Modular hydraulic assembly according to claim 5, characterised in that said flow switch - deaeration device module provides a safety flow switch to guarantee the presence and the circulation of the primary water. 45
7. Modular hydraulic assembly according to one of the preceding claims, characterised in that said three way valve module provides a body, a switching valve and a primary probe holder sump. 50
8. Modular hydraulic assembly according to claim 7, characterised in that in said three way valve module there are provided possible seats for other thermostats and temperature, pressure and flow rate sensors, possible primary water interception valves, a

possible by-pass valve, a hydraulic union for the return of the water from the primary exchanger, outlet and return hydraulic unions for the heating system, inlet and outlet hydraulic unions for the boiler primary circuit, a primary union for filling the primary circuit, unions for connection with flow switch - deaeration device and sanitary modules, hydraulic unions for the connection with the discharge valve, and with other possible components.

9. Modular hydraulic assembly according to one of the preceding claims, characterised in that said sanitary module comprises a body, a sanitary union for filling the primary circuit, a sanitary precedence flow switch, the sanitary water - water exchanger or boiler, a limiting - stabilising valve for the sanitary water flow rate, and possible other seats for thermostats and temperature, pressure and flow rate sensors.
10. Modular hydraulic assembly according to claim 9, characterised in that in said sanitary module there are provided hydraulic unions for the connection with sanitary cold water and sanitary hot water, a sanitary probe holder sump, a boiler sanitary inlet, a boiler sanitary outlet, unions for the connection with the three way valve module, other hydraulic unions for the connection with other possible outer elements such as boilers, tanks, safety valve against overpressure, sanitary expansion tank, sanitary water interception valve, etc.
11. Modular hydraulic assembly according each one of the preceding claims, substantially as illustrated and described.

FIG. 1

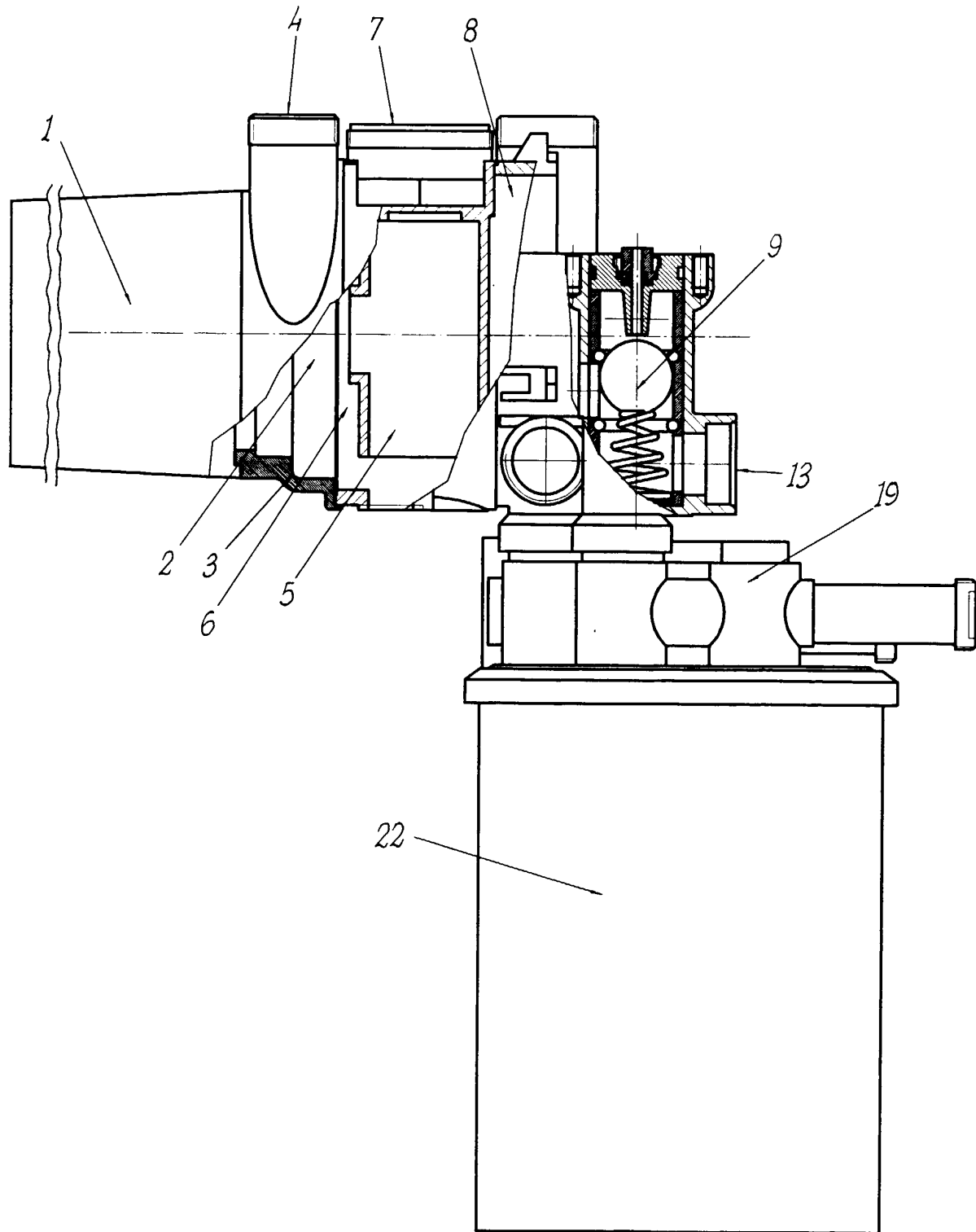
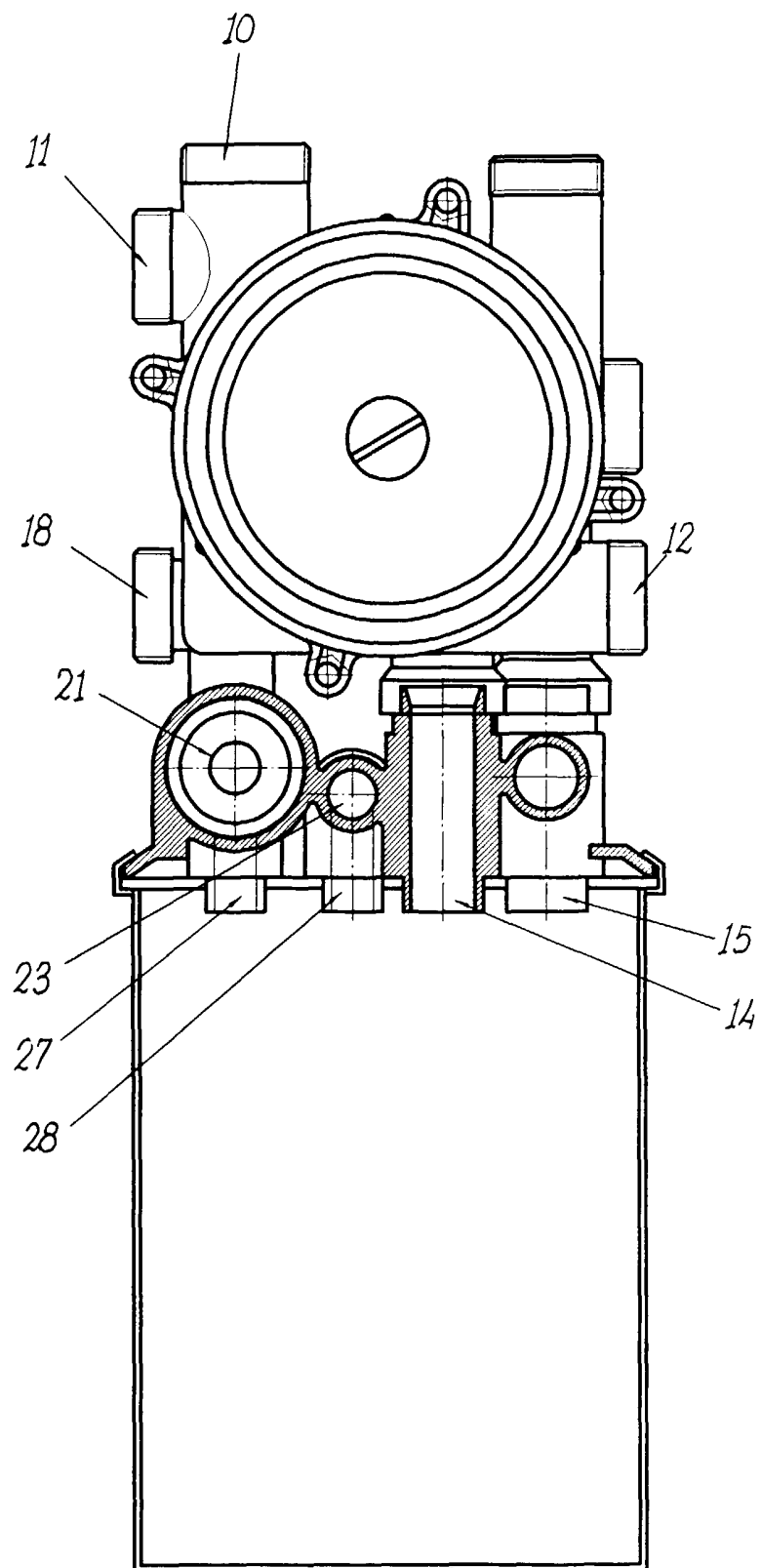


FIG. 2



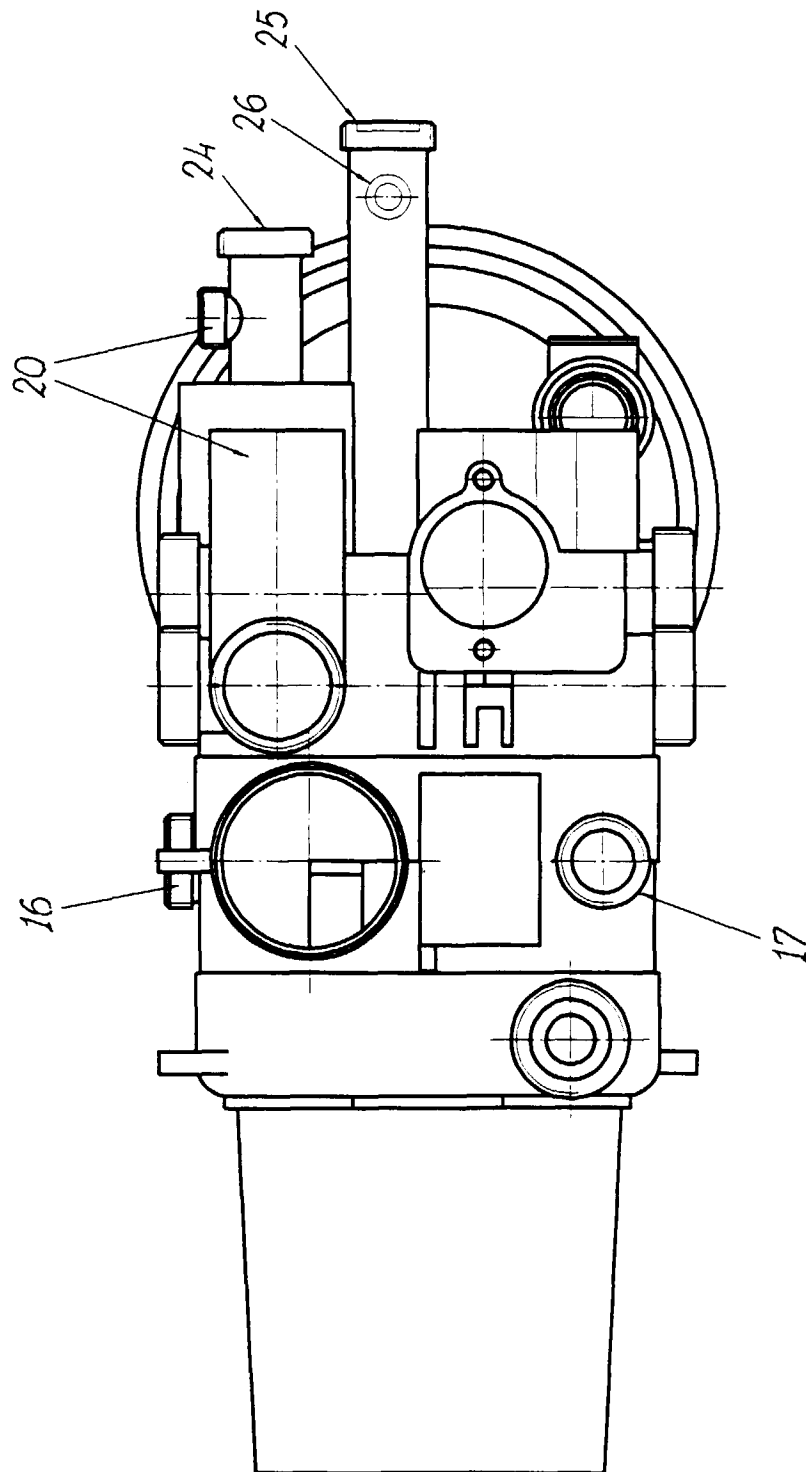


FIG. 3

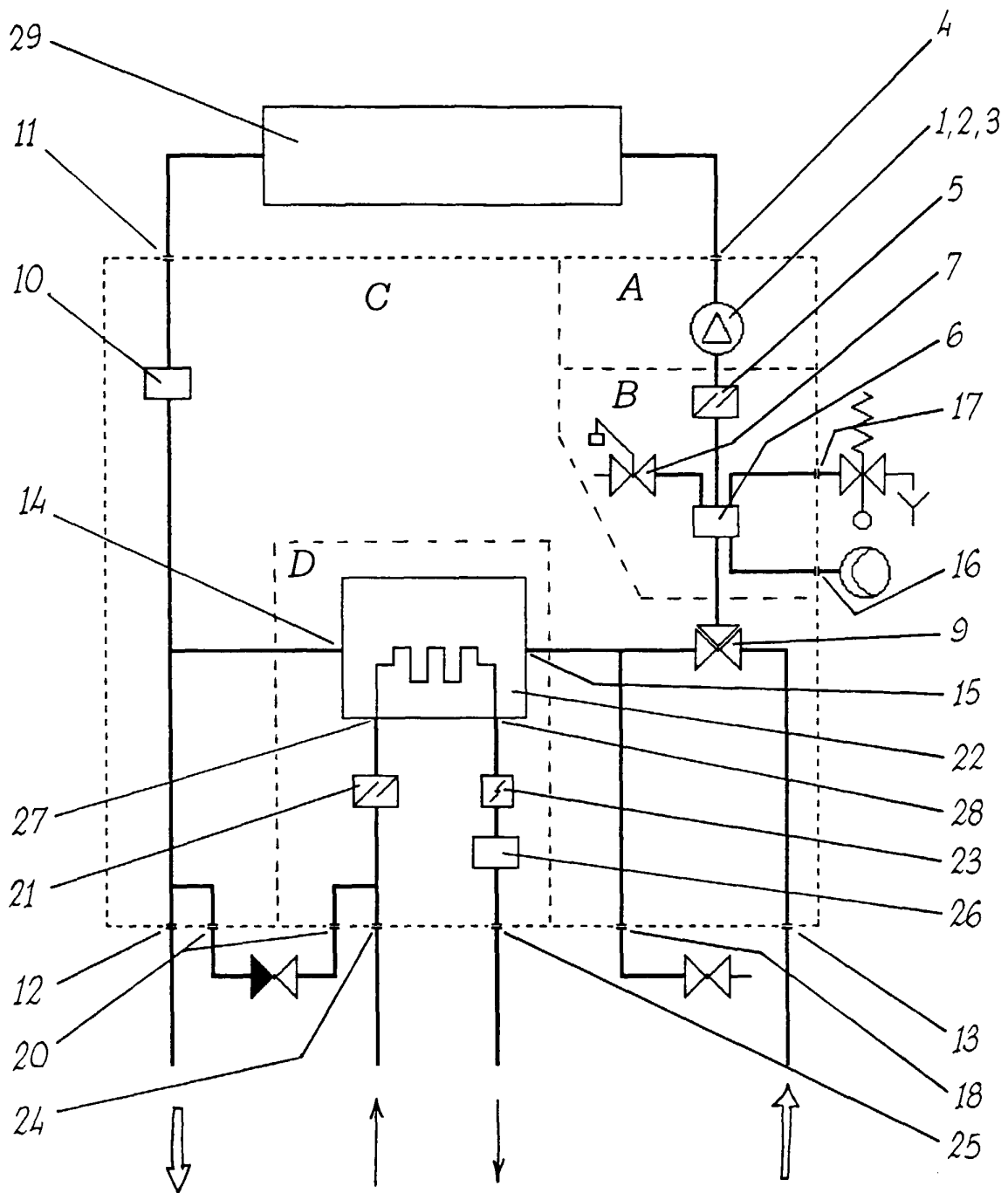


FIG. 4