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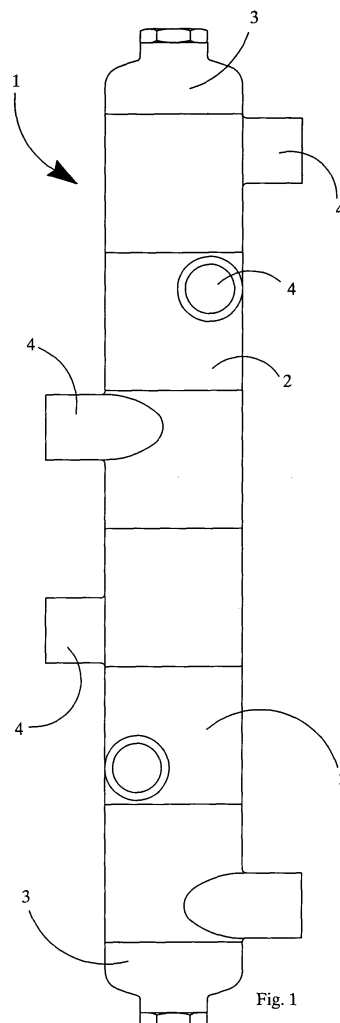
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(54) **Modular housing with multiple inlets and outlets for primary and / or secondary circuits in heating and cooling plants**

(57) In comparison with the known solutions, the housing according to the present invention is very advantageous because it is modular and is provided with centred or offset connections, threaded groove-and-tongue joints, flanged connections or other kind of connections of various sizes and shapes while previously, components with soldered or fused connections were used, which were fixed in the sense of direction and had a predetermined number of inlets and outlets. Basically, the housing (1) includes a plurality of modular elements (2) which are placed between two bottom elements or bottoms (3). The shape of each modular elements is substantially cylindric. The modular elements (2) project from the body of pipe-fittings or connections (4). The arrangement of the said connections (4) is orthogonal to the housing axis and tangential to the housing circumference so as to allow the inner flow of the liquid to form inner whirl flows. These inner flows permit a better mixing with a better stratification and separation of the microbubbles.



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## Description

**[0001]** The present invention proposes a thermo-hydraulic component called modular housing with multiple inlets and outlets and is to be utilized in primary and secondary circuits of liquid and/or gaseous fluids in heating and cooling plants.

**[0002]** The housing in question according to the present invention can be utilized in practice as hydraulic capacity compensator, head stabilizer of various primary and secondary circuits, air separator and impurity separator. In certain conditions, the present housing can be utilized as gas remover.

**[0003]** In comparison with the known solutions, the housing according to the present invention is very advantageous because it is modular and is provided with centred or offset connections, threaded groove-and-tongue joints, flanged connections or other kind of connections of various sizes and shapes while previously, components with soldered or fused connections were used, which components were fixed in the sense of direction and had a predetermined number of inlets and outlets.

**[0004]** As is known, the market offers several devices and components falling under the field of thermo-hydraulics. The said devices and components permit the junction and derivation of the pipes in heating plants.

**[0005]** Prior art discloses the conventional solutions of the connecting components through which it is possible to derive the inlet pipes for the primary circuits as well as the out pipes for the secondary circuits.

**[0006]** Basically, the said solutions consist of connections which are provided with fixed inlet and outlet intakes with soldered or fused connections.

**[0007]** The known models of derivation show a first drawback due to the fact that the points of derivation are soldered or fused and therefore, they are fixed and can not be directed according to a specific direction and show a predetermined number of inlets and outlets.

**[0008]** Another drawback of the known systems of derivation is due to the fact that the compensators offered by the market are not equipped with inner components for the gas removal while the existing gas removers are monobloc and are provided with in-line, centred connections on the same plane.

**[0009]** The aim of the present invention is to conceive and carry out a housing which removes the said drawbacks through a housing to be utilized in the heating and cooling plants or other kind of plants, which housing shows the following features:

1) It is a hydraulic capacity compensator, head stabilizer of various primary and secondary circuits of liquid and/or gaseous fluids, air separator and impurity separator. In certain conditions, the present housing can be utilized as a gas remover.

2) It is modular because it can be adapted to the plant.

3) It has the possibility of having one or more inlets for the primary circuits and/or one or more outlets for the secondary circuits.

4) It can be positioned in such a way that the connections of the primary and secondary circuits can be arranged on the same line, at an angle or in the most various directions because the modules may rotate about the body axis.

5) Contrary to the known solutions, the connections are tangent to the circumference and are offset to the body axis, which generates inner whirls which mix the fluids and permit to obtain a better stratification and separation of the microbubbles.

**[0010]** Further features and details of the present invention will be better understood from the following specification given as a non-limiting example on the hand of the accompanying drawings wherein:

Fig. 1 is a schematic front view of a housing according to the invention on the whole, provided with some modular elements;

Fig. 2 is a schematic view of the same housing of Fig. 1, the direction of the pipes being different;

Fig. 3 is a schematic view of a housing according to the invention with a greater number of components;

Fig. 4 is a schematic view of the housing according to the present invention showing a component type and arrangement different from the previous ones;

Fig. 5 shows a further possibility of arrangement of the modular components;

Fig. 6 is a schematic sectional view of two assembled housing components;

Fig. 7 is a schematic sectional view of one of the housing components;

Fig. 8 is a schematic sectional view of the housing bottom;

Figs. 9-13 are schematic sectional views of the housing and the components thereof showing various arrangements.

**[0011]** With reference to the accompanying drawings, number 1 denotes a housing on the whole according to the present invention. The housing 1 is modular, is provided with multiple inlets and outlets and is utilized in primary and/or secondary circuits of liquid and/or gaseous fluids in heating and cooling plants.

**[0012]** Basically, the housing 1 includes a plurality of modular elements 2 which are placed between two bottom elements or bottoms 3. The bottoms 3 are placed at the two respective ends of the housing and act as connections elements for the main pipes in which the housing is inserted.

**[0013]** The main feature of the present invention is that the housing is obtained through the union of the said modular elements which are arranged consecutively and are united through a groove-and-tongue joint with

packing or threading or other more suitable system.

[0014] Basically, the shape of each modular element 2 is cylindric.

[0015] The modular elements 2 project from the body of pipe-fittings or connections 4.

[0016] The arrangement of the said connections 4 is orthogonal to the housing axis and tangential to the housing circumference so as to allow the inner flow of liquid to form inner whirl flows. These inner whirl flows permit a mixing with a better stratification and separation of the microbubbles.

[0017] In addition, the particular structure of the housing permits to have the inlet and outlet on the same line or at an angle or in the most various directions because the modules may rotate about the body axis. The connections 4 are tangential to the housing circumference but they may be also offset to the body axis and the inlet may be higher than the outlet or viceversa.

[0018] The housing acts as a gas remover because its structure permits the formation of inner whirls with a longer period of decantation. In this way, the housing according to the present invention permits to obtain a better stratification and separation of the microbubbles than the conventional models.

[0019] The so-described housing may be provided with centred or offset connections, threaded groove-and-tongue joints, flanged connections or other kind of connections of various sizes and shapes.

[0020] The drawings show some embodiments of the so-described housing but many other embodiments may be provided, there being numberless possibilities as concerns the sense of direction of the connections for the different types of liquid and/or gas plants in which the housing in question is inserted.

[0021] As can be seen and as previously discussed, the structure of the described housing permits an utilization of the housing as hydraulic capacity compensator, head stabilizer of various primary and secondary circuits of liquid and/or gaseous fluids, air separator and impurity separator. In certain conditions, the present housing can be utilized as a gas remover.

[0022] Moreover, the present housing is modular because it can be adapted to the various plants and uses since it offers the possibility of adding, removing and changing the sense of direction of its components.

[0023] It is also possible to provide one or more inlets for the primary circuits and/or one or more outlets for the secondary circuits, as well represented in Fig. 6.

[0024] The housing can be positioned in such a way as to have the connections of the primary and secondary circuits on the same line or at an angle or in the most various directions since the modules may be rotated in respect to the body axis.

[0025] It is also to be noted that contrary to the known solutions, the connections are tangential to the circumference and offset to the body axis, which generates inner whirls which permit a better mixing of the fluids with a better stratification and separation of the microbub-

bles.

[0026] As an advantage, it is possible to insert further gas removing elements in the inside of the housing. These elements may be wire nets or other wide-mesh or close-mesh elements.

[0027] A technician of the present field can modify and change the so-described housing so as to obtain solutions that are to be considered as included in the scope of protection of the present invention as further defined in the following claims.

## Claims

1. Modular housing with multiple inlets and outlets for primary and/or secondary circuits of liquid and/or gaseous fluids in heating and cooling plants, **characterized in that** it includes a plurality of modular elements (2) which are placed between two bottom elements or bottoms (3) which are placed at the two respective ends of the housing (1) and act as connecting elements for the main pipes in which the housing (1) is inserted.
2. Modular housing with multiple inlets and outlets as claimed in the foregoing claim, **characterized in that** it is obtained through the union of the said modular elements (2) which are arranged consecutively and are united through a groove-and-tongue joint with packing or threading or other more suitable system.
3. Modular housing with multiple inlets and outlets as claimed in the foregoing claims, **characterized in that** the shape of the modular elements (2) is essentially cylindric and the modular elements (2) project from the body of pipe-fittings or connections (4), the arrangement of the said connections (4) being orthogonal to the housing axis and tangential to the housing circumference so as to allow the inner flow of liquid to form inner whirl flows permitting a mixing with a better stratification and separation of the microbubbles.
4. Modular housing with multiple inlets and outlets as claimed in the foregoing claims, **characterized in that** the particular structure of the housing (1) permits to have the inlet and outlet on the same line or at an angle or in the most various directions because the modules (2) may rotate round the body axis and the connections (4) are tangential to the housing circumference but they may be also offset to the body axis and the inlet may be higher than the outlet or viceversa.
5. Modular housing with multiple inlets and outlets as claimed in the foregoing claims, **characterized in that** it is modular because it is adapted to the vari-

ous plants and uses since it offers the possibility of adding, removing and changing the sense of direction of its components.

6. Modular housing with multiple inlets and outlets as claimed in the foregoing claims, **characterized in that** it is also possible to provide one or more inlets for the primary circuits and/or one or more outlets for the secondary circuits.

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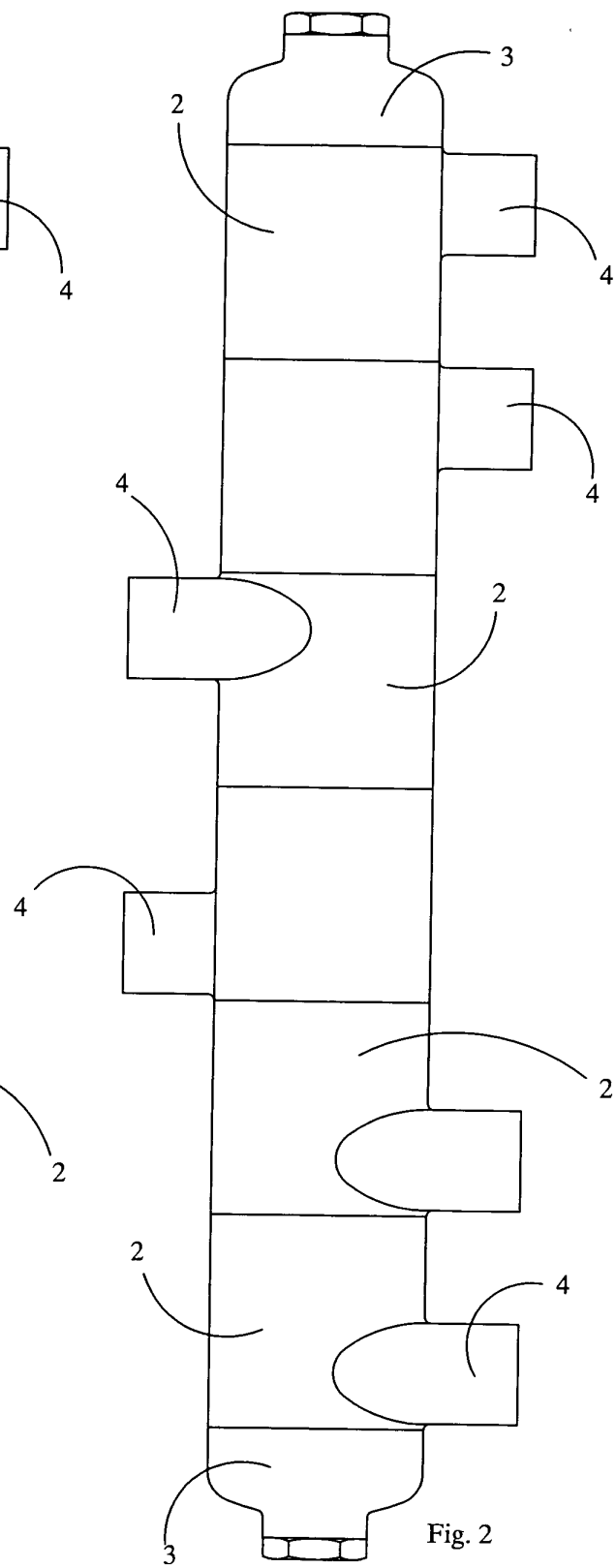
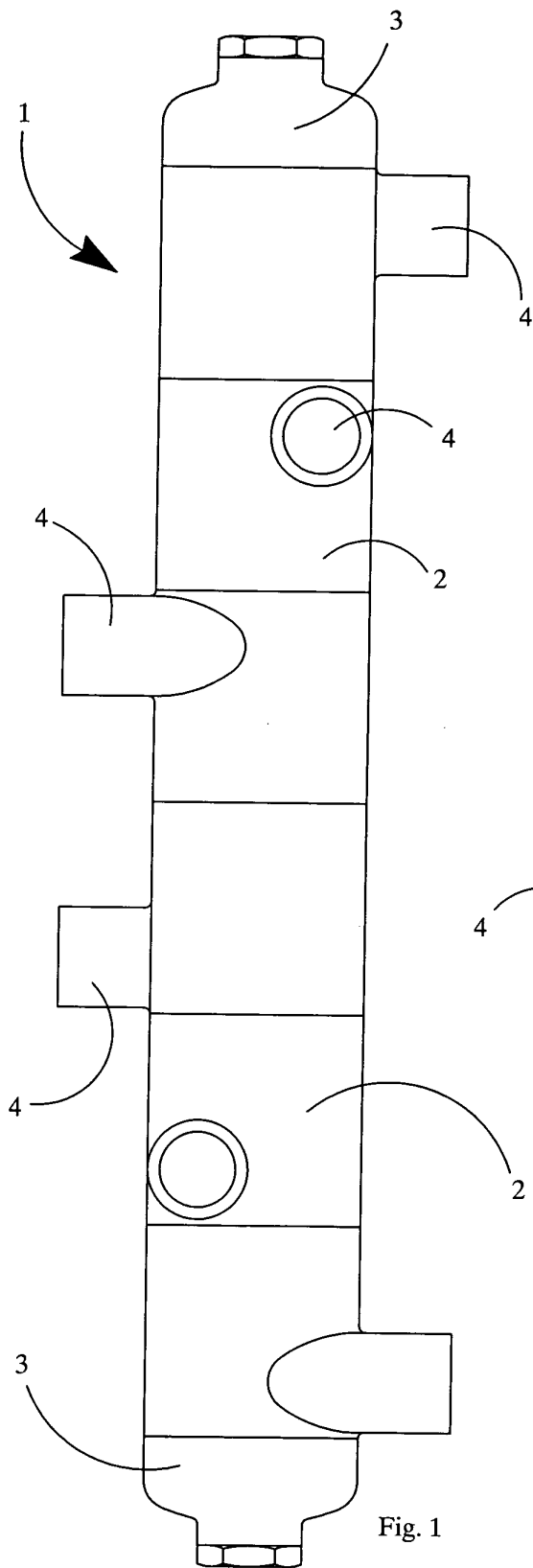
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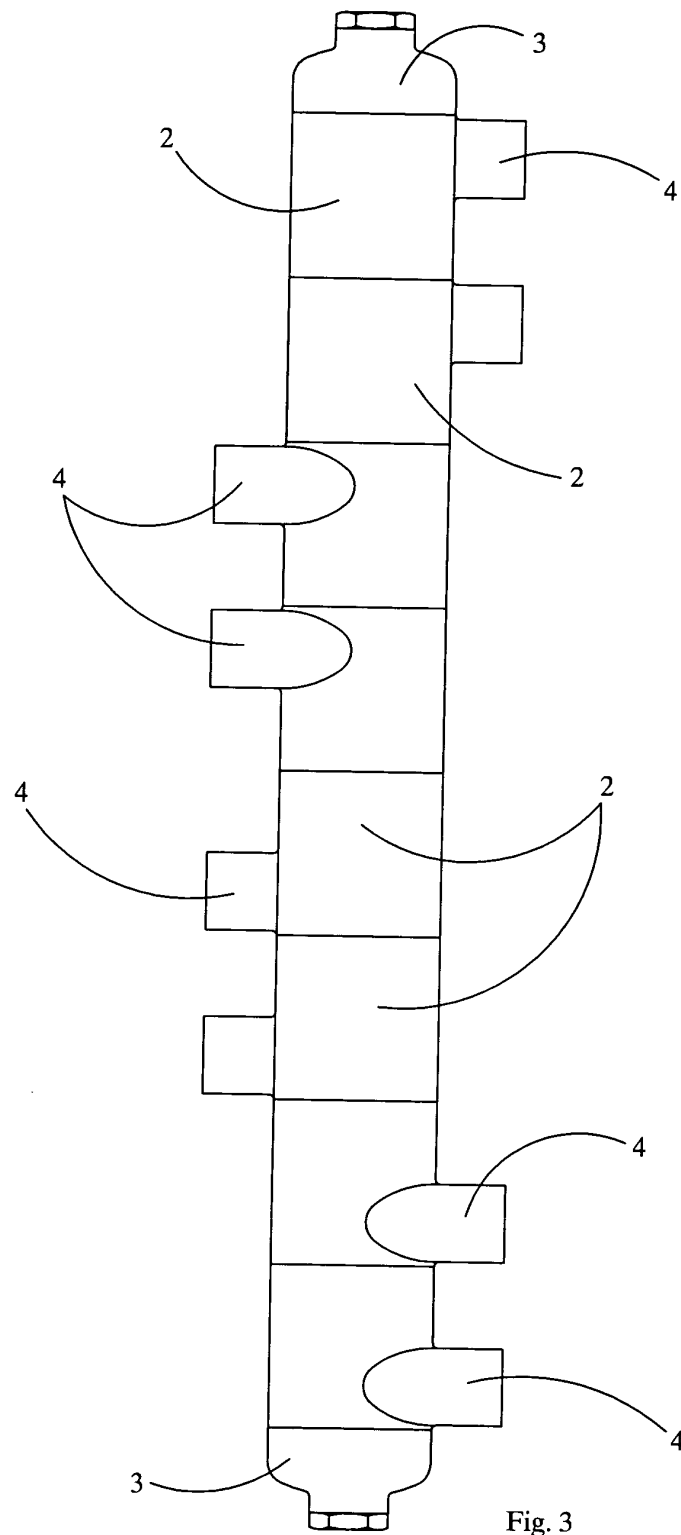


Fig. 3

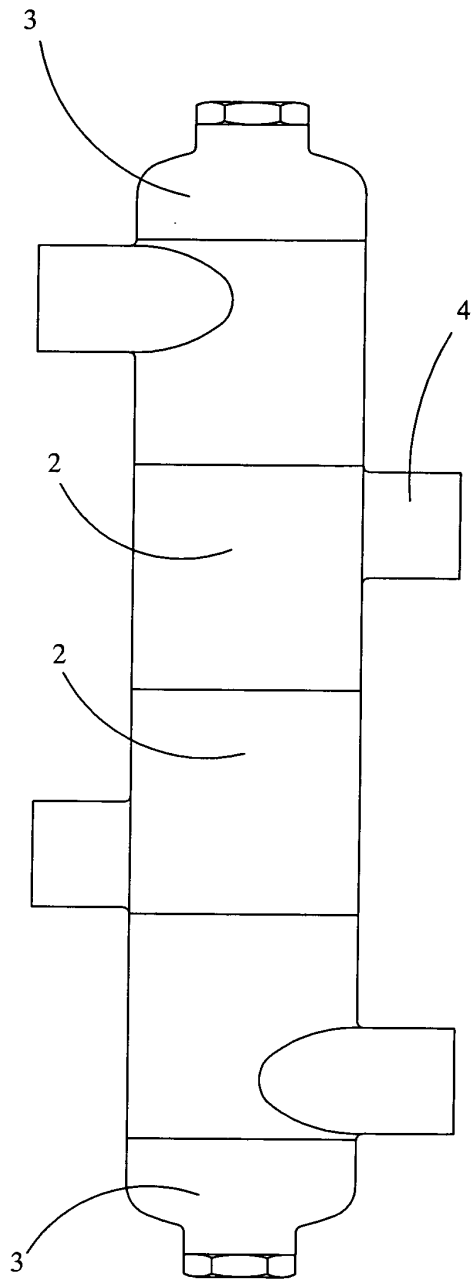


Fig. 4

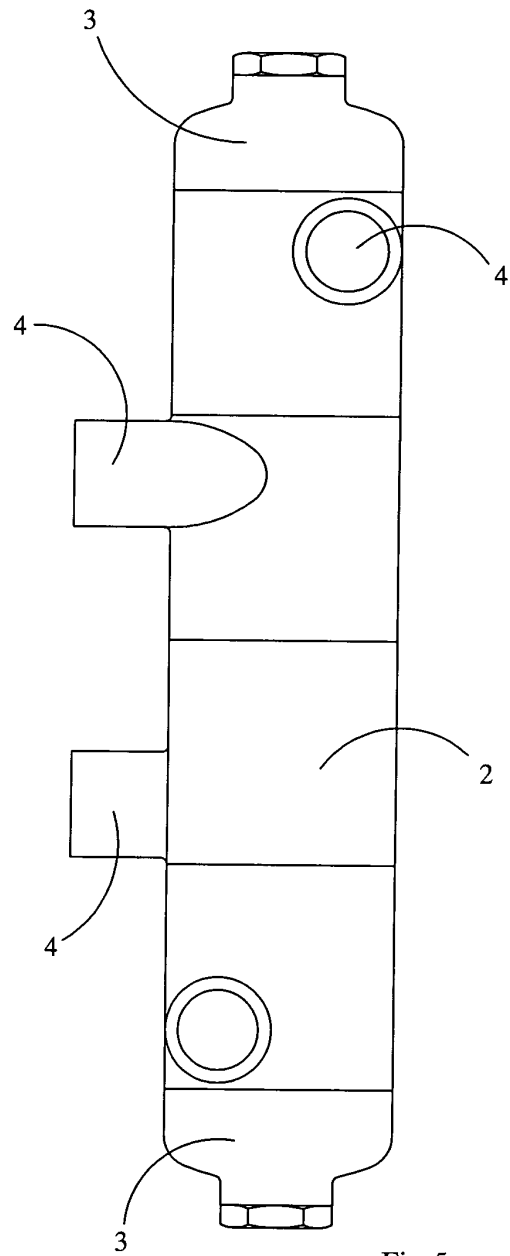


Fig. 5

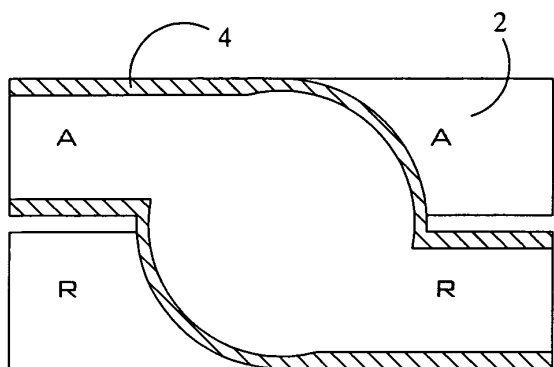


Fig. 6

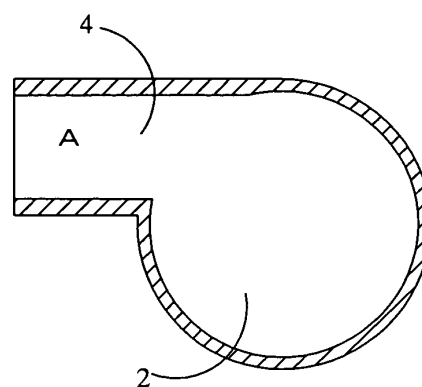


Fig. 7

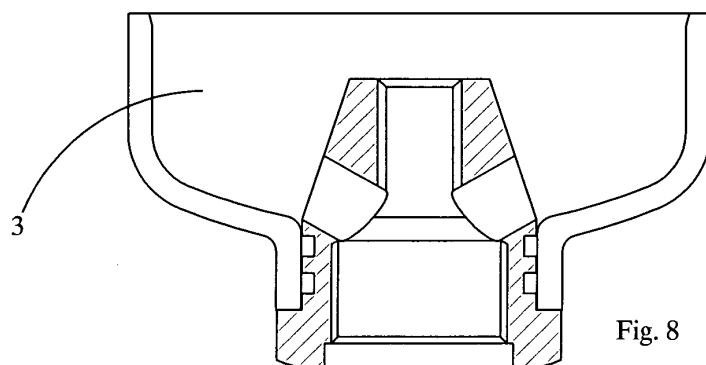


Fig. 8

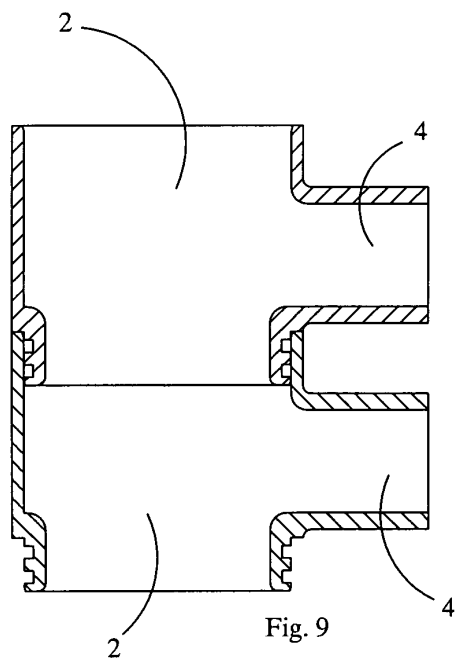


Fig. 9

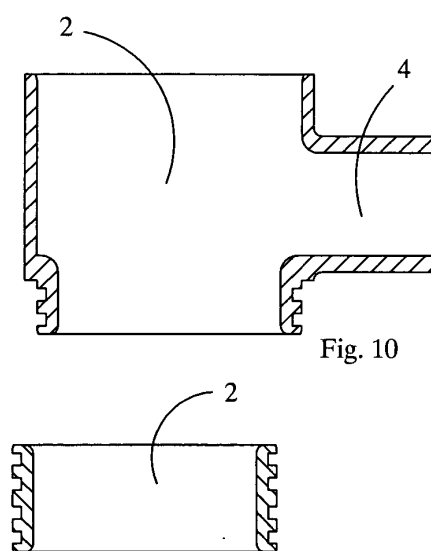


Fig. 10

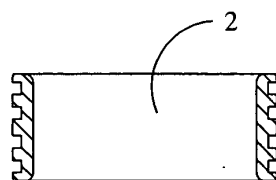


Fig. 11



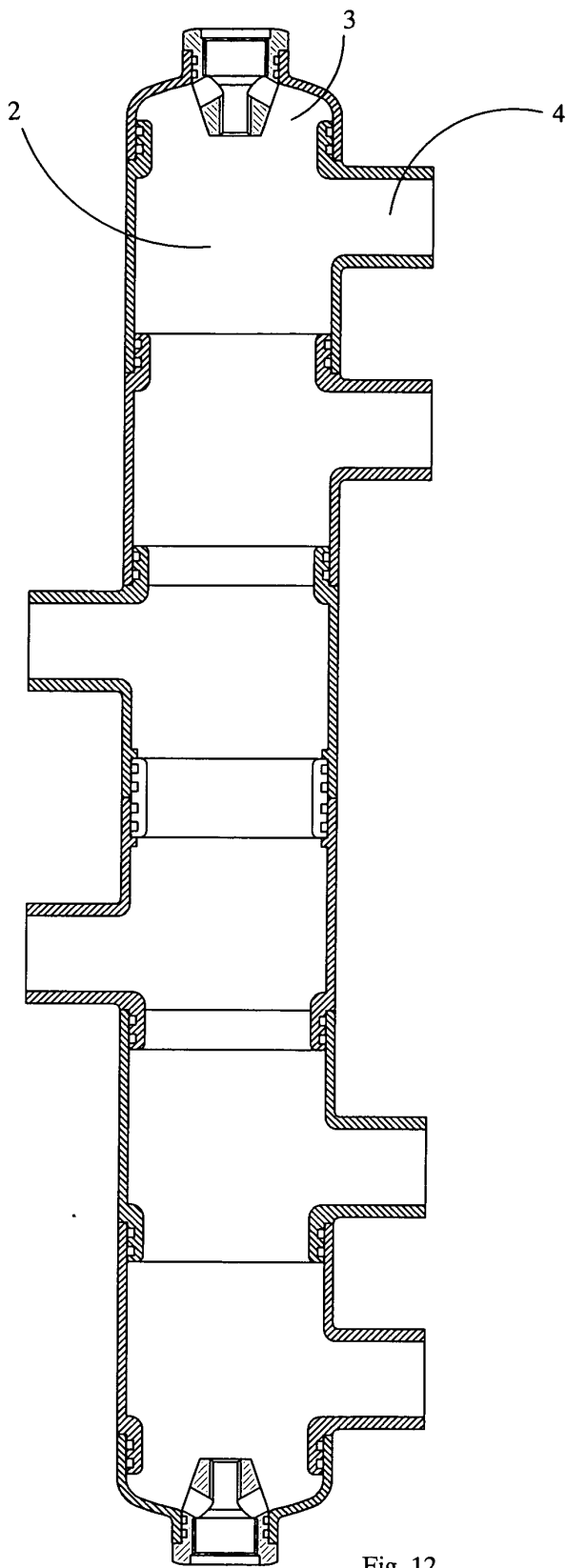


Fig. 12

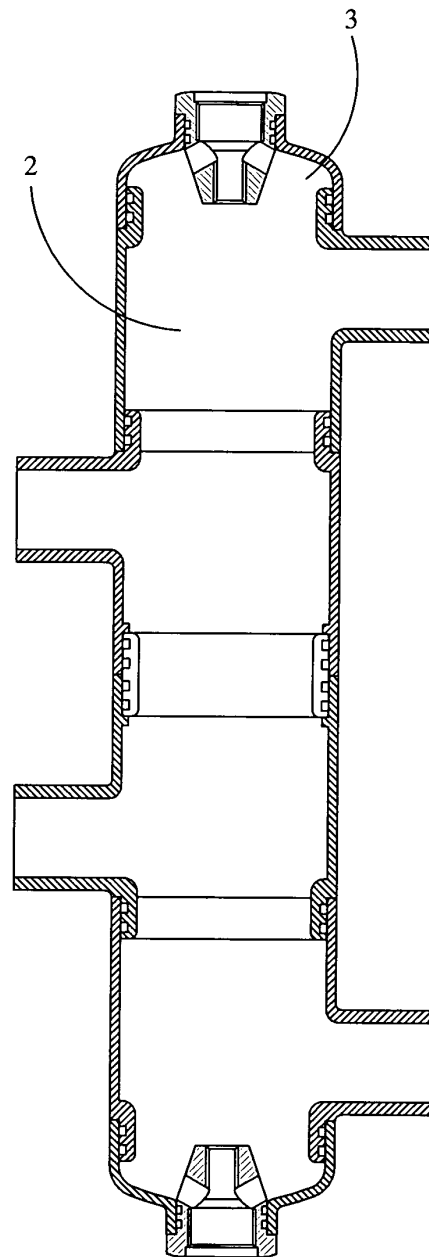


Fig. 13