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(54) **A RADIATOR WITH INTEGRATED ISOLATION VALVES**

RADIATOR MIT INTEGRIERTEN ABSPERRVENTILEN

RADIATEUR AVEC DES SOUPAPES D'ARRÊT INTEGRÉES

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## Description

### BACKGROUND

#### Technical Field

[0001] The present invention relates to an improved radiator for use in a building's heating system.

#### Description of Related Art

[0002] A conventional hot water radiator, for use in a building, generally comprises a sealed hollow metal panel structure. Hot water from a supply pipe of a building's heating system enters the radiator through an inlet and passes through the radiator. Heat from the water is transferred to the surroundings firstly by convection to the walls of the radiator, followed by conduction through the radiator walls and finally by radiation from the walls to the cooler surroundings. The air near the radiator is then heated, and produces a convection current in the room which draws colder air in the room towards the radiator, which is then subsequently heated.

[0003] This transfer of heat causes water in the radiator to cool. As a result, the density of this water increases, causing the water to sink to the bottom of the radiator, where it is forced through an outlet of the radiator into a return pipe and back into the heating system.

[0004] Radiators are conventionally connected to the supply and return pipes of a heating system via control valves provided on the pipes. If it is necessary to move a radiator, for example to decorate behind the radiator or to repair or replace it, then it is necessary to shut off the control valves, so as to isolate the radiator from the heating system.

[0005] The radiator is then detached from the supply and return pipes. At this point, water within the radiator, along with rust and sludge which may have built up, will tend to spill out of the inlet and outlet of the radiator onto the floor and surrounding area. It is therefore necessary to position a receptacle underneath the inlet to catch this in order to avoid damage to the floor or nearby decorations/appliances.

[0006] When the radiator is reconnected, it is full of air and so bleeding of air within the radiator is necessary.

[0007] Due to the above problems, removing a radiator and reinstalling it is a time consuming and cumbersome process. As a result, when a new building is being decorated, it is necessary from a practical point of view to wait to install any radiators until the decoration of the building is completed. As a result of this it is necessary, during construction of a new building, for a plumber to complete his work in two stages. The plumber first has to fix and install a boiler and copper feed pipes around the building. The plumber must then wait until decoration of the building has been completed before installing the radiators. This adds expense for the property developer and is inconvenient for the plumber and other profession-

als who have to work in a cold building. A cold building specifically creates a problem for plasterers, whose speed of work is dependent on how fast plaster dries.

[0008] Also, conventional central heating radiators are typically made of mild steel which corrodes when exposed to water.

[0009] A problem with such radiators is that water within the radiator corrodes the metal, resulting in a build up of rust and sludge within the radiator over time. This build up decreases the efficiency of heat transfer from the radiator and can travel through the return pipe of a heating system to other parts of the system. If this build up enters components of the heating system, such as a circulation pump, then this can decrease the life of the components.

[0010] Since conventional radiators are made of steel, they are heavy and therefore difficult to lift and transport. This is especially the case when a radiator is full of water, which adds to the weight of the radiator.

[0011] Due to this problem, it is necessary for radiators to be installed prior to being filled with water. Once a radiator is installed, control valves provided on supply and return pipes of a heating system are opened, allowing water to flow into the radiator from the heating system. However, by doing this, a large amount of air is trapped within the radiator, as the radiator fills with water, and therefore bleeding of this air from the radiator is necessary.

[0012] GB2385909 discloses a radiator comprising two shut off valves at either end connecting to the outlet and inlet pipes so that when closed, the radiator can be removed without water spillage.

[0013] It is the object of embodiments of the present invention to overcome, or at least reduce, the problems discussed above.

### SUMMARY OF THE INVENTION

[0014] According to the invention there is provided a radiator for a building heating system, according to claim 1.

[0015] The radiator inlet is preferably connectable to a supply pipe, of the building heating system, which provides a supply of heated fluid.

[0016] The radiator outlet is preferably connectable to a return pipe, of the building heating system, which returns fluid to the heating system.

[0017] Preferably, when in the second state, the first and second control means prevent fluid flow in either direction through the radiator inlet and outlet respectively.

[0018] The radiator may have the shape of a conventional panel radiator having first and second side ends, a top face, a bottom face, a front face and a rear face.

[0019] The front and rear face of the radiator may be of a generally rectangular shape and may extend parallel to each other in a length direction. The front and rear faces may be generally rectangular, ribbed surfaces. The space between the front and rear surfaces preferably defines a number of internal channels within the radiator,

distributed across the length of the radiator. The channels are preferably spaced apart in the length direction, extend substantially from the top to the bottom of the radiator and are substantially parallel to each other.

**[0020]** Once the radiator has been isolated from the heating system, for example by closing control valves provided on the supply and return pipes of the heating system, the first and second control means may be closed. The fluid within the radiator is then completely sealed within the radiator. As a result, the radiator may be disconnected from the supply and return pipes without danger of spilling of fluid, rust and sludge from the radiator onto the floor.

**[0021]** The radiator can then be removed to a convenient location for draining, cleaning and refilling, with minimal bleeding of air on reinstallation of the radiator. Alternatively, the radiator can simply be reinstalled without any draining, refilling or bleeding of air, for example following decoration of a wall that the radiator was mounted on.

**[0022]** The radiator comprises inlet and outlet channels which extend, respectively, from the inlet and outlet into the body of the radiator. The first and second control means are arranged to control flow of fluid through the inlet and outlet channels.

**[0023]** The valves are disposed in the inlet and outlet channels. Each comprises a valve body and a valve member operable to control the flow of fluid through the valve body. The valve body may be formed by the body of the radiator.

**[0024]** A first bore extends from the front face to the rear face of the radiator, intersecting the inlet channel, and terminates as apertures on the front and rear faces of the radiator respectively.

**[0025]** A first valve member is housed within the first bore. The first valve member comprises a generally cylindrical body. An aperture, which may be of substantially circular cross section, extends throughout the first valve member in a direction substantially perpendicular to the longitudinal axis of the valve member. The aperture in the first valve member is of substantially similar diameter to that of the inlet channel.

**[0026]** The first valve member is rotatable within the first bore. As the first valve member is rotated, the degree of alignment of the aperture in the first valve member with the inlet channel is varied. The first valve member may be rotated to a first position such that the aperture in the first valve member is aligned with the inlet channel. In this case, fluid may flow from the supply pipe of the heating system, through the first valve member and into the radiator.

**[0027]** The first valve member may be rotated to a second position such that the channel in the first valve member is not aligned with the inlet channel. In this case, fluid cannot flow through the first valve member into the internal chambers of the radiator from the supply pipe of the heating system.

**[0028]** The first valve member is provided with a rota-

tion means arranged to allow a user to rotate the first valve member. The rotation means comprises at least one protrusion provided on an end face of the first valve member.

**[0029]** The first valve member is provided with a sealing means for forming a seal between the first valve member and radiator body in which it is installed. The sealing means is an O-ring extending around the circumference of the valve member. Preferably the sealing means is a pair of spaced apart O-rings, each extending around the circumference of the valve member, one at each end of the valve member. The O-rings may be disposed in channels extending around the circumference of the valve member. The sealing means seeks to prevent fluid escaping from the radiator at the interface between the valve member and the radiator body in which it is installed.

**[0030]** A portion of the first valve member, towards a first end of the valve member, protrudes in the radial direction to form a lip. The lip is arranged such that when the valve member is inserted into the first bore, the lip abuts against an outer face of the radiator, limiting the extent to which the valve member may pass into the bore.

**[0031]** The valve member is provided, towards a second end, with a groove extending around the circumference of the valve member.

**[0032]** When the valve member is inserted into the first bore, the second end of the valve member protrudes beyond a rear face of the radiator. A generally resilient circular clip is housed within the groove. The clip may be arranged such that it abuts against the rear face of the radiator, when the valve member is housed within the bore. The clamping action of the clip and lip preferably acts to retain the valve member within the bore.

**[0033]** A washer may be provided between the clip and the rear face of the radiator. The washer reduces the wear of the clip on the rear face of the radiator.

**[0034]** The radiator is provided with a second bore which extends from the front face to the rear face of the radiator, intersects with the outlet channel, and terminates as apertures provided on the front and rear faces of the radiator respectively.

**[0035]** A second valve member is housed within the second bore. The second valve member is of the same description as the first valve member.

**[0036]** The second valve member is preferably rotatable within the second bore. As the second valve member is rotated, the degree of alignment of the channel in the second valve member with the outlet channel is varied. The second valve member may be rotated to a first position such that the channel in the second valve member is aligned with the outlet channel. In this case, fluid may flow from the internal channels of the radiator, through the second valve member and into the return pipe of the heating system.

**[0037]** The second valve member may be rotated to a second position such that the channel in the second valve member is not aligned with the outlet channel. In this case, fluid cannot flow from the internal channels of the

radiator, through the second valve member and into the return pipe of the heating system.

**[0038]** The fluid is preferably water but may be steam or any other suitable fluid.

**[0039]** The radiator may be substantially moulded from a material.

**[0040]** The radiator may be moulded substantially from a plastics material. Preferably the radiator is substantially moulded from a thermally conductive plastics material.

**[0041]** Alternatively, the radiator may be substantially moulded from a lightweight, injection mouldable material, which does not corrode in the presence of water. The material may be an injection mouldable metal alloy, such as that sold under the trademark Xyloy M950 by Cool Polymers, Inc.

**[0042]** Since such materials do not corrode in the presence of water, rust is not produced within the radiator. As a result, the efficiency of heat transfer from the radiator is maintained and the performance and lifetime of other heating system components is not compromised.

**[0043]** A radiator made substantially of a thermally conductive plastics material or another corrosion resistant lightweight, injection mouldable metal provides a radiator which is lighter in weight than a conventional steel radiator, allowing it to be easily lifted and transported, while retaining its function of transferring heat to its surroundings from heated fluid within the radiator.

**[0044]** Preferably the thermal conductivity of the material is greater than 0.2 W/mK. More preferably the thermal conductivity of the material is greater than 1 W/mK. Still more preferably the thermal conductivity of the material is greater than 20 W/mK.

**[0045]** The internal channels of the radiator may be a series of discreet adjacent fluid conduits of substantially circular cross section. At the top and bottom of the conduits the conduits may communicate with a laterally extending channel.

**[0046]** The radiator may be injection moulded or vacuum formed. The radiator may be formed as a single unitary piece. Alternatively the radiator may be formed in two separate pieces which are then joined together, for example by welding.

**[0047]** The use of a structure having discrete internal conduits increases the structural integrity of the radiator as compared to conventional radiators. The structure can therefore usefully compensate for the inherent reduced strength of such materials over conventional metals.

**[0048]** Although the internal structure of the radiator is different from that of conventional radiators, the external appearance of the radiator is the same. Therefore the radiator can be lighter in weight and stronger than corresponding conventional metal radiators while maintaining a conventional appearance.

**[0049]** According to another aspect of the invention there is provided a radiator substantially moulded from a material.

**[0050]** The radiator may be moulded substantially from a plastics material. Preferably the radiator is substantially

moulded from a thermally conductive plastics material.

**[0051]** Alternatively, the radiator may be substantially moulded from a lightweight, injection mouldable material, which does not corrode in the presence of water. The material may be an injection mouldable metal alloy, such as that sold under the trademark Xyloy M950 by Cool Polymers, Inc.

**[0052]** Since such materials do not corrode in the presence of water, rust is not produced within the radiator. As a result, the efficiency of heat transfer from the radiator is maintained and the performance and lifetime of other heating system components is not compromised.

**[0053]** A radiator made substantially of a thermally conductive plastics material or another corrosion resistant lightweight, injection mouldable metal provides a radiator which is lighter in weight than a conventional steel radiator, allowing it to be easily lifted and transported, while retaining its function of transferring heat to its surroundings from heated fluid within the radiator.

**[0054]** Preferably the thermal conductivity of the material is greater than 0.2 W/mK. More preferably the thermal conductivity of the material is greater than 1 W/mK. Still more preferably the thermal conductivity of the material is greater than 20 W/mK.

**[0055]** The radiator preferably has the shape of a conventional panel radiator, having first and second side ends, a top face, a bottom face, a front face and a rear face.

**[0056]** The front and rear face of the radiator may be of a generally rectangular shape and may extend parallel to each other in a length direction. The front and rear faces may be generally rectangular, ribbed surfaces. The space between the front and rear surfaces preferably defines a number of internal channels within the radiator, distributed across the length of the radiator. The channels are preferably spaced apart in the length direction, extend between the top and bottom of the radiator and are substantially parallel to each other.

**[0057]** The internal channels of the radiator may be a series of discreet adjacent fluid conduits of substantially circular cross section. At the top and bottom of the conduits the conduits may communicate with a laterally extending channel.

**[0058]** The radiator may be injection moulded or vacuum formed. The radiator may be formed as a single unitary piece. Alternatively the radiator may be formed in two separate pieces which are then joined together, for example by welding.

**[0059]** The use of a structure having discrete internal conduits increases the structural integrity of the radiator as compared to conventional radiators. The structure can therefore usefully compensate for the inherent reduced strength of such materials over conventional metals.

**[0060]** Although the internal structure of the radiator is different from that of conventional radiators, the external appearance of the radiator is the same. Therefore the radiator can be lighter in weight and stronger than corresponding conventional metal radiators while maintain-

ing a conventional appearance.

**[0061]** All of the features described herein may be combined with any of the above aspects, in any combination.

**[0062]** The terms inlet and outlet have been used for convenience. The direction of fluid flow through the radiator may be reversed so that the inlet and outlet become the outlet and inlet respectively.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0063]** For a better understanding of the invention, and to show how embodiments of the same may be carried into effect, reference will now be made, by way of example, to the accompanying diagrammatic drawings in which:

**Figure 1** shows a perspective view of a radiator according to the invention;

**Figure 2** shows an enlarged exploded view of the radiator of figure 1 in the region of an inlet of the radiator.

**Figure 3** shows a side view of a valve member.

**Figure 4** shows an end view of the valve member shown in figure 3;

**Figure 5** shows a top view of the valve member shown in figures 3 and 4; and

**Figure 6** shows an end view of the valves shown in figures 3, 4 and 5.

**Figure 7** shows a front view of the radiator shown in Figure 1.

**Figure 8** shows a cross sectional view taken along the line 30 of Figure 7.

## DETAILED DESCRIPTION OF THE EXAMPLE EMBODIMENTS

**[0064]** In the drawings like reference numerals are used throughout to identify like features. The terms top, bottom, side and like terms are used for convenience and refer to the apparatus as shown in the drawings, but should not be taken as otherwise limiting.

**[0065]** Referring to Figures 1 to 8 there is shown a radiator 1 for a building heating system. The radiator 1 has the shape of a conventional panel radiator having first and second side ends 2, 3, a top face 4, a bottom face 5, a front face 6 and a rear face (not shown). The radiator 1 is provided with an inlet 7 and an outlet 8.

**[0066]** The front face 6 and rear face of the radiator 1 are of a generally rectangular shape, spaced apart and extend parallel to each other. The front face 6 and rear face are generally rectangular, ribbed surfaces. The

space between the front face 6 and the rear face defines a number of internal channels 9 within the radiator 1, distributed across the length of the radiator 1. The channels 9 are spaced apart in the length direction, extend between the top 4 and bottom 5 of the radiator 1 and are substantially parallel to each other. The channels 9 may be open on either side such that water may flow between the channels 9 or they may be discretely formed, as shown in Figure 8. At the top and bottom of the channels, the channels communicate with a laterally extending channel.

**[0067]** The radiator 1 comprises an inlet channel 10 and an outlet channel 31, which extend, respectively, from the inlet 7 and outlet 8 into the body of the radiator 1. The inlet 7 is connected to a supply pipe 11 of the heating system. The outlet 8 is connected to a return pipe 12 of the heating system.

**[0068]** A first lower corner 13 of the radiator 1 is provided with a first bore 14 which extends from the front face 6 to the rear face of the radiator 1, intersects the inlet channel 10, and terminates as apertures provided on the front 6 and rear faces of the radiator 1 respectively.

**[0069]** A first valve 25 comprises a first valve member 15, and the radiator body. The first valve member 15 is housed within the first bore 14. The first valve member 15 comprises a generally cylindrical body. An aperture 16 of substantially circular cross section extends throughout the first valve member 15 in a direction substantially perpendicular to the longitudinal axis of the valve member 15. The aperture 16 in the first valve member 15 is of substantially similar diameter to that of the inlet channel 10.

**[0070]** The first valve member 15 is rotatable within the first bore 14. As the first valve member 15 is rotated, the degree of alignment of the aperture 16 in the first valve member 15 with the inlet channel 10 is varied. The first valve member 15 may be rotated to a first position such that the aperture 16 in the first valve member 15 is aligned with the inlet channel 10. In this case, water may flow from the supply pipe 11 of the heating system, through the first valve member 15 and into the internal chambers 9 of the radiator 1.

**[0071]** The first valve member 15 may be rotated to a second position such that the aperture 16 in the first valve member 15 is not aligned with the inlet channel 10. In this case, water cannot flow through the first valve member 15 into the radiator 1 from the supply pipe 11 of the heating system.

**[0072]** The first valve member 15 is provided with a pair of protrusions 17 on an end face of the valve member 15. The protrusions 17 provide a means of manually rotating the valve member 15.

**[0073]** The first valve member 15 is provided with a sealing means comprising a pair of spaced apart O-rings 18, each disposed in channels extending around the circumference of the valve member 15. The O-rings 18 seek to prevent fluid escaping from the radiator 1 at the interface between the valve member 15 and the radiator body in

which it is installed.

**[0074]** A portion of the first valve member 15, towards a first end of the valve member 15, protrudes in the radial direction to form a lip 19. The lip 19 is arranged such that when the valve member 15 is inserted into the first bore 14, the lip 19 abuts against the front outer face 6 of the radiator 1, limiting the extent to which the valve member 15 may pass into the bore 14.

**[0075]** The valve member 15 is provided, towards a second end, with a groove 40 extending around the circumference of the valve member 15.

**[0076]** When the valve member 15 is housed within the bore 14, the second end of the valve member 15 protrudes beyond the rear face of the radiator 1. A generally resilient circular clip (circlip) 20 is housed within the groove 40. The clip 20 is arranged such that it abuts against the rear face of the radiator 1, when the valve member 15 is housed within the bore 14. The clamping action of the clip 20 and lip 19 acts to retain the valve member 15 within the bore 14.

**[0077]** A washer 21 is provided between the clip 20 and the rear face of the radiator 1. The washer 21 reduces the wear of the clip 20 on the rear face of the radiator 1.

**[0078]** A second lower corner 22 of the radiator 1 is provided with a second bore 32 which extends from the front face 6 to the rear face of the radiator 1, intersects with the outlet channel, and terminates as apertures provided on the front 6 and rear faces of the radiator 1 respectively.

**[0079]** A second valve 26 comprises a second valve member (not shown), and the radiator body. The second valve member 23 is housed within the second bore. The second valve member 23 is of a same description as the first valve member 15.

**[0080]** The second valve member 23 is preferably rotatable within the second bore. As the second valve member 23 is rotated, the degree of alignment of the channel in the second valve member with the outlet channel is varied. The second valve member 23 is rotated to a first position such that the channel in the second valve member 23 is aligned with the outlet channel. In this case, water may flow from the internal channels 9 of the radiator 1, through the second valve member 23 and into the return pipe 12 of the heating system.

**[0081]** The second valve member 23 may be rotated to a second position such that the channel in the second valve member 23 is not aligned with the outlet channel. In this case, water cannot flow from the internal channels 9 of the radiator 1, through the second valve member 23 and into the return pipe 12 of the heating system.

**[0082]** The second valve member 23 is provided with a sealing means, a clip and a washer in the same manner as the first valve.

**[0083]** When the first and second valves are closed, any water within the radiator 1 is then completely sealed within the radiator 1. As a result, the radiator 1 may be disconnected from a heating system, once the radiator 1 has been isolated from the heating system by closing

control valves provided on the supply and return pipes 11, 12 of the heating system, without the danger of spilling water, or any rust or sludge which may have accumulated in the radiator 1, from the radiator 1 onto the surroundings.

**[0084]** The radiator 1 can then be removed to a convenient location for draining, cleaning and refilling, with minimal bleeding of air on reinstallation of the radiator 1. Alternatively, the radiator 1 can simply be reinstalled without any draining, refilling or bleeding of air, for example following decoration of a wall that the radiator 1 was mounted on.

**[0085]** Since the first and second valves are provided at positions proximal to the inlet 7 and outlet of the radiator 1 respectively, the amount of water that may become trapped when the control valves and first and second valve members are closed, between the control valves on the supply and return pipes 11, 12 of the heating system and the first and second valve members respectively is very small. The amount of water that may spill from the radiator 1 when it is uninstalled is therefore negligible.

**[0086]** The radiator 1 may be moulded from a thermally conductive plastics material. Plastics materials do not corrode when exposed to water, therefore rust is not produced within such a radiator. As a result, the efficiency of heat transfer from the radiator is maintained and the performance and lifetime of other components of the heating system is not compromised.

**[0087]** Alternatively the radiator 1 may be moulded from an injection mouldable metal or alloy, such as that sold under the trademark Xyloy M950.

**[0088]** The radiator 1 may be injection moulded or vacuum formed. The radiator 1 may be formed in two separate pieces which are then joined together, for example by welding.

**[0089]** A radiator made substantially of said materials is lighter in weight than a corresponding conventional metallic radiator, e.g. a corresponding steel radiator. This light weight allows the radiator to be easily lifted and transported while it is full of water. As previously explained, the valves 25, 26 allow the radiator 1 to retain the water inside it once the radiator 1 has been disconnected from the heating system. This is beneficial since it allows the radiator 1 to be disconnected from the heating system, removed and reinstalled again without having to drain the radiator 1.

**[0090]** As shown in Figure 8, the internal channels of the radiator 1 may be a series of discreet adjacent fluid conduits 9 of substantially circular cross section. At the top and bottom of the conduits 9, the conduits 9 communicate with a laterally extending channel (not shown).

**[0091]** The use of a structure having separate internal conduits 9 increases the structural integrity of the radiator 1 as compared to conventional radiators. The structure can therefore usefully compensate for the inherent reduced strength of plastics materials over metals.

**[0092]** Although the internal structure of the radiator 1 is different from that of conventional radiators, the exter-

nal appearance of the radiator 1 is the same. Therefore the radiator 1 is lighter in weight and stronger than conventional radiators while maintaining a conventional appearance.

**[0093]** It is of course to be understood that the invention is not limited to the details of the above embodiments, which are by way of example only. Many variations are possible without departing from the invention, defined by the claims.

## Claims

1. A radiator (1) for a building heating system, said radiator (1) comprising an inlet (7) and an outlet (8), wherein the radiator (1) comprises a first control means (25) which is operable between a first state, in which fluid can flow through the inlet (7) and a second state, in which fluid cannot flow out of the radiator (1) through the inlet (7), and a second control means (26) which is operable between a first state, in which fluid can flow through the outlet (8), and a second state in which fluid cannot flow out of the radiator (1) through the outlet (8), and the radiator (1) comprising inlet and outlet channels (10, 31) which extend, respectively, from the inlet (7) and outlet (8) into the body of the radiator (1) and wherein the first and second control means (25, 26) are arranged to control flow of fluid through the inlet and outlet channels (10, 31) wherein the first and second control means (25, 26) are valves, wherein each valve comprises a valve body and a valve member (15, 23) operable to control the flow of fluid through the valve body;  
**characterised in that**  
the valve members are housed in respective bores (14) which extend from a front face (6) to a rear face of the radiator (1), intersect the inlet and outlet channels (10, 31) respectively, and terminate as apertures provided on the front and rear faces of the radiator (1) wherein the radiator (1) is substantially moulded from a material.
2. The radiator (1) according to claim 1 wherein, in the second state, the first and second control means (25, 26) prevent fluid flow in either direction through the radiator (1) inlet (7) and outlet (8) respectively.
3. The radiator (1) according to any preceding claim wherein the control means are disposed within the body of the radiator (1).
4. The radiator (1) according to any preceding claim wherein the control means are disposed in the inlet and outlet channels (10, 31).
5. The radiator (1) according to any preceding claim wherein each valve body is formed by the body of

the radiator (1).

6. The radiator (1) according to any preceding claim wherein an aperture (16) of circular cross section extends throughout each valve member in a direction substantially perpendicular to the longitudinal axis of the respective valve member.
7. The radiator (1) according to claim 6 wherein as each valve member is rotated, the degree of alignment of the aperture (16) in the valve member with the inlet and outlet channels (10, 31) respectively is varied.
8. The radiator (1) according to any preceding claim wherein each valve member (15, 23) is provided with a rotation means (17) arranged to allow a user to rotate the valve member.
9. The radiator (1) according to any preceding claim, wherein the radiator (1) is substantially moulded from a plastics material.
10. The radiator (1) according to any preceding claim, wherein the radiator (1) is substantially moulded from a lightweight injection mouldable material.

## Patentansprüche

1. Radiator (1) für ein Gebäudeheizungssystem, wobei der Radiator (1) einen Einlass (7) und einen Auslass (8) aufweist, wobei der Radiator (1) ein erstes Regelmittel (25), das zwischen einem ersten Zustand, in dem Fluid durch den Einlass (7) strömen kann, und einem zweiten Zustand betreibbar ist, in dem Fluid nicht aus dem Radiator (1) durch den Einlass (7) strömen kann, und ein zweites Regelmittel (26) aufweist, das zwischen einem ersten Zustand, in dem Fluid durch den Auslass (8) strömen kann, und einem zweiten Zustand betreibbar ist, in dem Fluid nicht aus dem Radiator (1) durch den Auslass (8) strömen kann, und wobei der Radiator (1) Einlass- und Auslasskanäle (10, 31) aufweist, die aus dem Einlass (7) bzw. Auslass (8) in den Körper des Radiators (1) verlaufen, und wobei das erste und zweite Regelmittel (25, 26) zum Regeln von Fluidstrom durch die Einlass- und Auslasskanäle (10, 31) angeordnet sind, wobei das erste und zweite Regelmittel (25, 26) Ventile sind, wobei jedes Ventil einen Ventilkörper und ein Ventiltglied (15, 23) aufweist, die zum Regeln von Fluidstrom durch den Ventilkörper betreibbar sind;  
**dadurch gekennzeichnet, dass**  
die Ventiltglieder in jeweiligen Bohrungen (14) aufgenommen sind, die von einer Vorderseite (6) zu einer Rückseite des Radiators (1) verlaufen, die Einlass- bzw. Auslasskanäle (10, 31) schneiden und als Öffnungen enden, welche auf der Vorder- und Rück-

seite des Radiators (1) vorgesehen sind, wobei der Radiator (1) im Wesentlichen aus einem Material geformt ist.

2. Radiator (1) nach Anspruch 1, wobei das erste und zweite Regelmittel (25, 26) im zweiten Zustand Fluidstrom in beiden Richtungen durch den Einlass (7) bzw. Auslass (8) des Radiators (1) verhindern. 5
3. Radiator (1) nach einem der vorhergehenden Ansprüche, wobei die Regelmittel innerhalb des Körpers des Radiators (1) angeordnet sind. 10
4. Radiator (1) nach einem der vorhergehenden Ansprüche, wobei die Regelmittel in den Einlass- und Auslasskanälen (10, 31) angeordnet sind. 15
5. Radiator (1) nach einem der vorhergehenden Ansprüche, wobei jeder Ventilkörper durch den Körper des Radiators (1) ausgebildet ist. 20
6. Radiator (1) nach einem der vorhergehenden Ansprüche, wobei eine Öffnung (16) mit kreisförmigem Querschnitt durchgehend durch jedes Ventilglied in einer Richtung verläuft, die im Wesentlichen senkrecht zur Längsachse des jeweiligen Ventilglieds steht. 25
7. Radiator (1) nach Anspruch 6, wobei, wenn jedes Ventilglied gedreht ist, der Grad der Ausrichtung der Öffnung (16) in dem Ventilglied an den Einlass- bzw. Auslasskanälen (10, 31) verändert ist. 30
8. Radiator (1) nach einem der vorhergehenden Ansprüche, wobei jedes Ventilglied (15, 23) mit Drehmitteln (17) versehen ist, die angeordnet sind, um es einem Benutzer zu ermöglichen, das Ventilglied zu drehen. 35
9. Radiator (1) nach einem der vorhergehenden Ansprüche, wobei der Radiator (1) im Wesentlichen aus einem Kunststoffmaterial geformt ist. 40
10. Radiator (1) nach einem der vorhergehenden Ansprüche, wobei der Radiator (1) im Wesentlichen aus einem leichten spritzgussfähigen Material geformt ist. 45

## Revendications

1. Radiateur (1) pour un système de chauffage de bâtiment, ledit radiateur (1) comprenant une entrée (7) et une sortie (8), le radiateur (1) comprenant un premier moyen de commande (25) qui peut fonctionner entre un premier état dans lequel du fluide peut s'écouler à travers l'entrée (7) et un deuxième état dans lequel du fluide ne peut pas s'écouler hors du 55

radiateur (1) à travers l'entrée (7), et un deuxième moyen de commande (26) qui peut fonctionner entre un premier état dans lequel du fluide peut s'écouler à travers la sortie (8) et un deuxième état dans lequel du fluide ne peut pas s'écouler hors du radiateur (1) à travers la sortie (8), et le radiateur (1) comprenant des canaux d'entrée et de sortie (10, 31) qui s'étendent, respectivement, depuis l'entrée (7) et la sortie (8) dans le corps du radiateur (1) et les premier et deuxième moyens de commande (25, 26) étant agencés de manière à commander l'écoulement de fluide à travers les canaux d'entrée et de sortie (10, 31), les premier et deuxième moyens de commande (25, 26) étant des soupapes, chaque soupape comprenant un corps de soupape et un organe de soupape (15, 23) capable de commander l'écoulement de fluide à travers le corps de soupape ;

### caractérisé en ce que

les organes de soupape sont logés dans des alésages respectifs (14) qui s'étendent depuis une face avant (6) jusqu'à une face arrière du radiateur (1), coupent les canaux d'entrée et de sortie (10, 31) respectivement, et se terminent sous forme d'ouvertures prévues sur les faces avant et arrière du radiateur (1), le radiateur (1) étant substantiellement moulé en un matériau.

2. Radiateur (1) selon la revendication 1, dans lequel, dans le deuxième état, les premier et deuxième moyens de commande (25, 26) empêchent l'écoulement de fluide dans l'une ou l'autre direction à travers l'entrée (7) et la sortie (8) respectives du radiateur (1).
3. Radiateur (1) selon l'une quelconque des revendications précédentes, dans lequel les moyens de commande sont disposés à l'intérieur du corps du radiateur (1).
4. Radiateur (1) selon l'une quelconque des revendications précédentes, dans lequel les moyens de commande sont disposés dans les canaux d'entrée et de sortie (10, 31).
5. Radiateur (1) selon l'une quelconque des revendications précédentes, dans lequel chaque corps de soupape est formé par le corps du radiateur (1).
6. Radiateur (1) selon l'une quelconque des revendications précédentes, dans lequel une ouverture (16) de section transversale circulaire s'étend à travers chaque organe de soupape dans une direction substantiellement perpendiculaire à l'axe longitudinal de l'organe de soupape respectif.
7. Radiateur (1) selon la revendication 6, dans lequel, à mesure que chaque organe de soupape est tourné, le degré d'alignement de l'ouverture (16) dans l'or-

gane de soupape avec les canaux d'entrée et de sortie (10, 31), respectivement, est varié.

8. Radiateur (1) selon l'une quelconque des revendications précédentes, dans lequel chaque organe de soupape (15, 23) est pourvu d'un moyen de rotation (17) prévu pour permettre à un utilisateur de faire tourner l'organe de soupape. 5
9. Radiateur (1) selon l'une quelconque des revendications précédentes, dans lequel le radiateur (1) est substantiellement moulé à partir d'un matériau plastique. 10
10. Radiateur (1) selon l'une quelconque des revendications précédentes, dans lequel le radiateur (1) est substantiellement moulé à partir d'un matériau léger moulable par injection. 15

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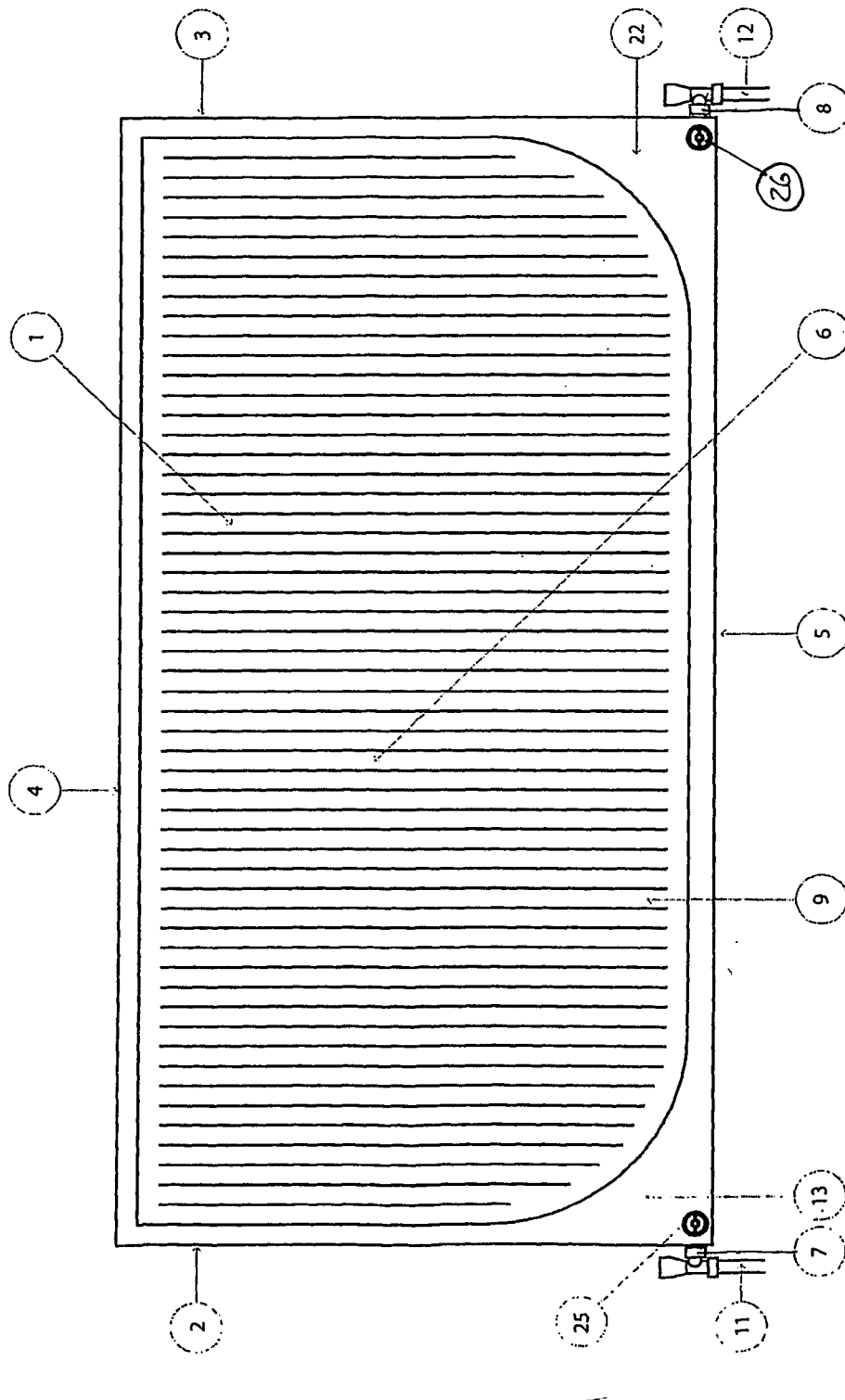


FIG.1

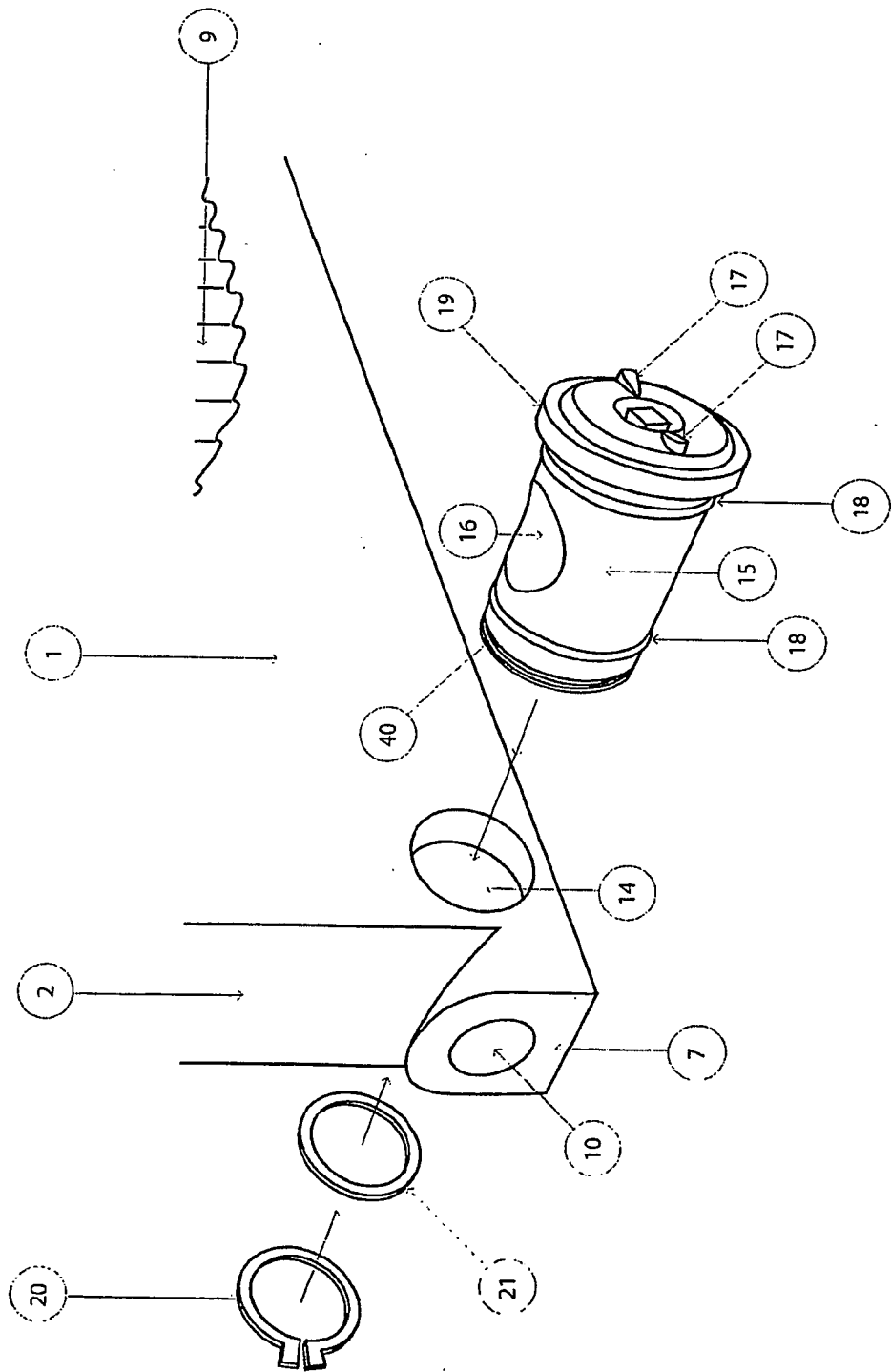


FIG. 2

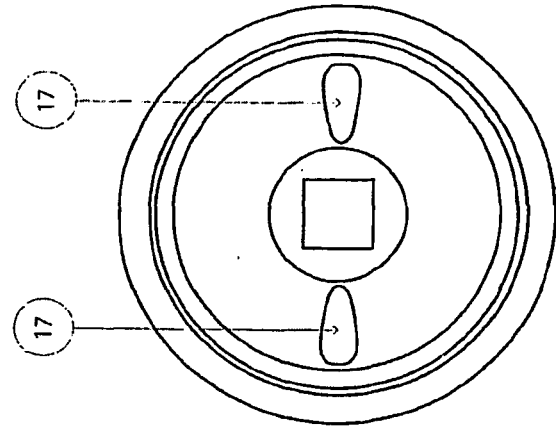


FIG. 4

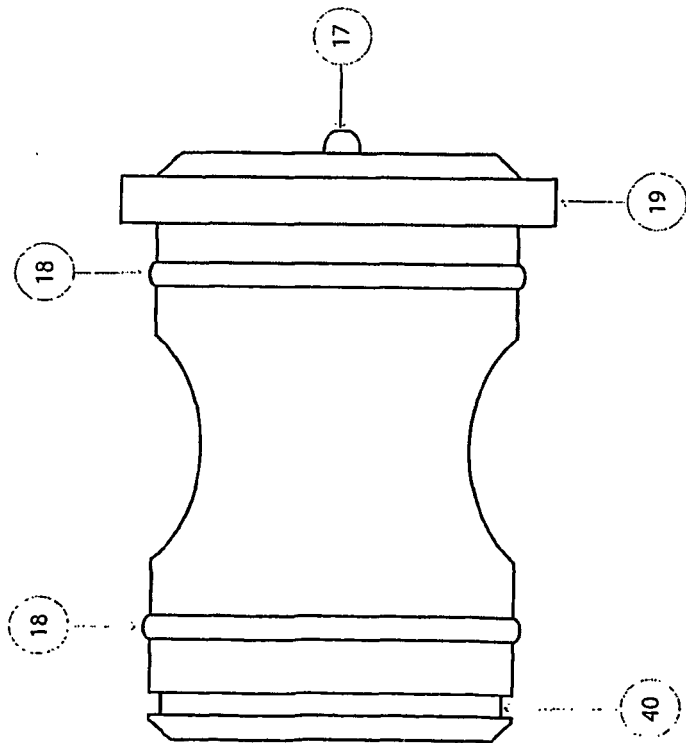


FIG. 3

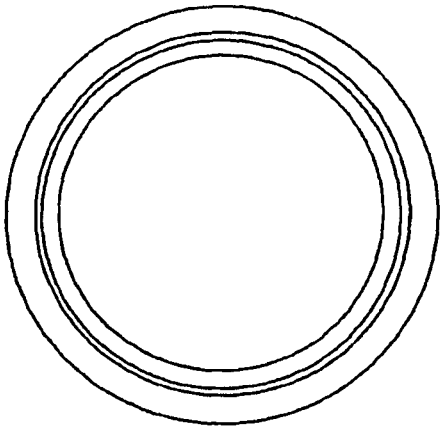


FIG. 6

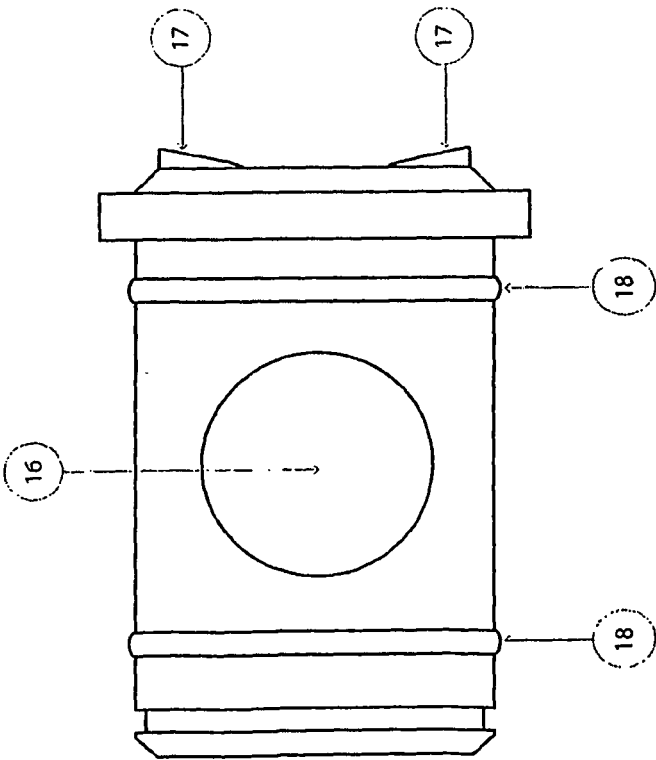


FIG. 5

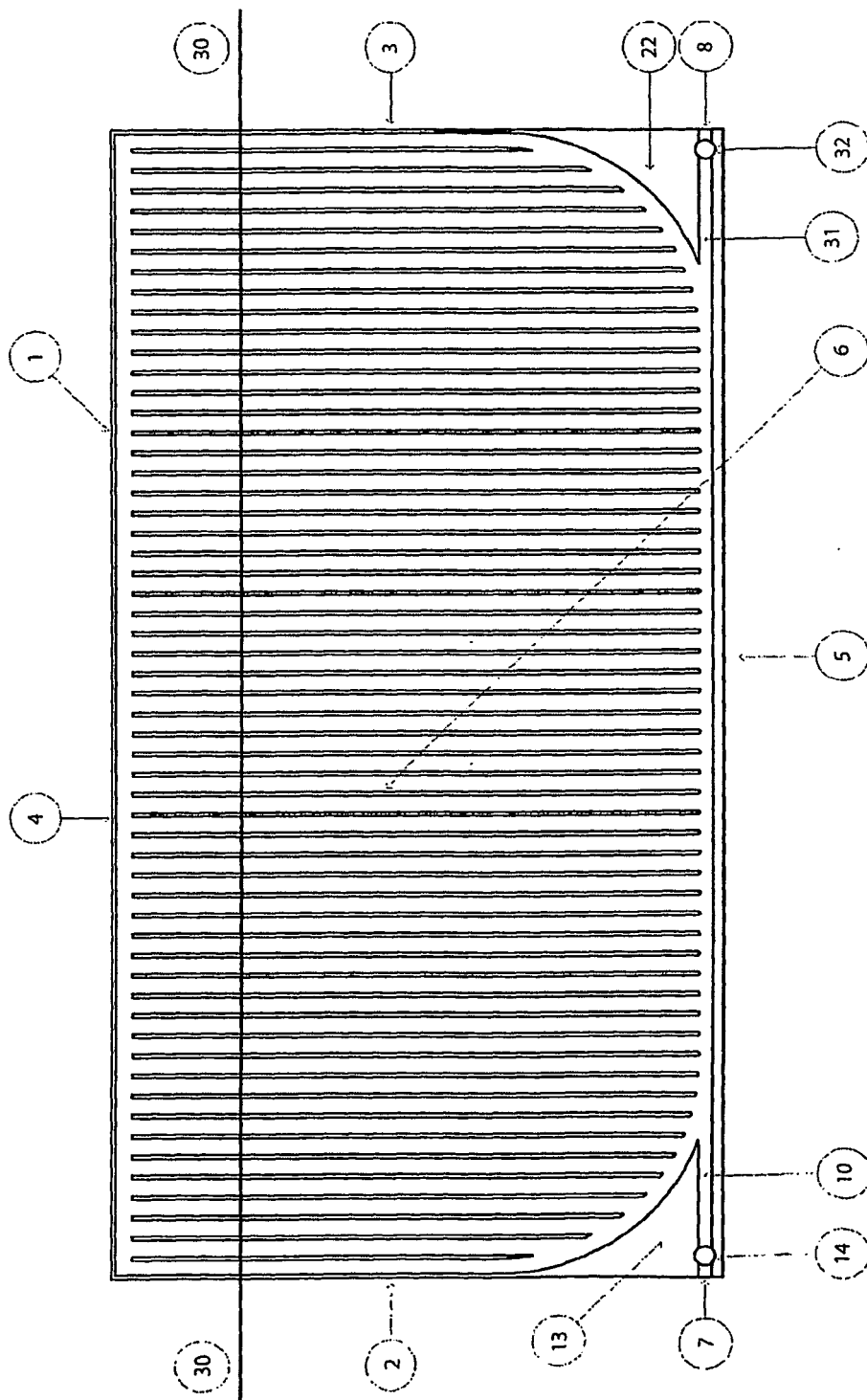


FIG. 7

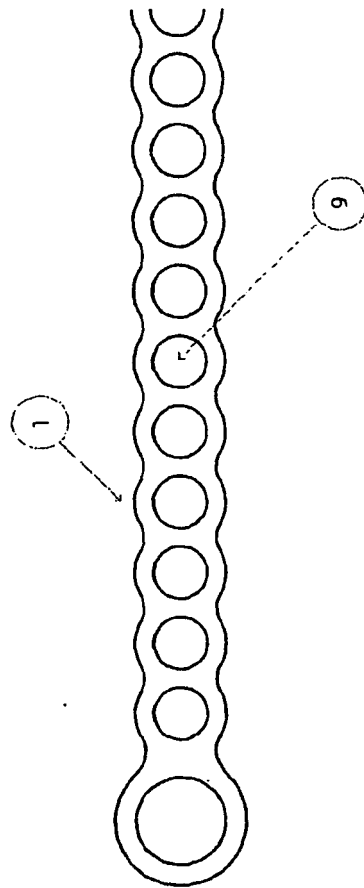


FIG. 8

**REFERENCES CITED IN THE DESCRIPTION**

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**Patent documents cited in the description**

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