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(54) **FLUID HEATING HEATER**

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(57) **ABSTRACT**

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Jan. 23, 2025 (KR) ..... 10-2025-0010553

A fluid heating heater according to one embodiment of the present invention may include a main body in which a flow path through which a fluid flows in and is heated is formed, an inlet that is disposed on one side of the main body and through which the fluid flows in, an outlet that is disposed on the other side of the main body and through which the fluid flows out, and a plurality of flow path protrusions that are provided inside the main body to protrude and are isotropically disposed between the inlet and the outlet.

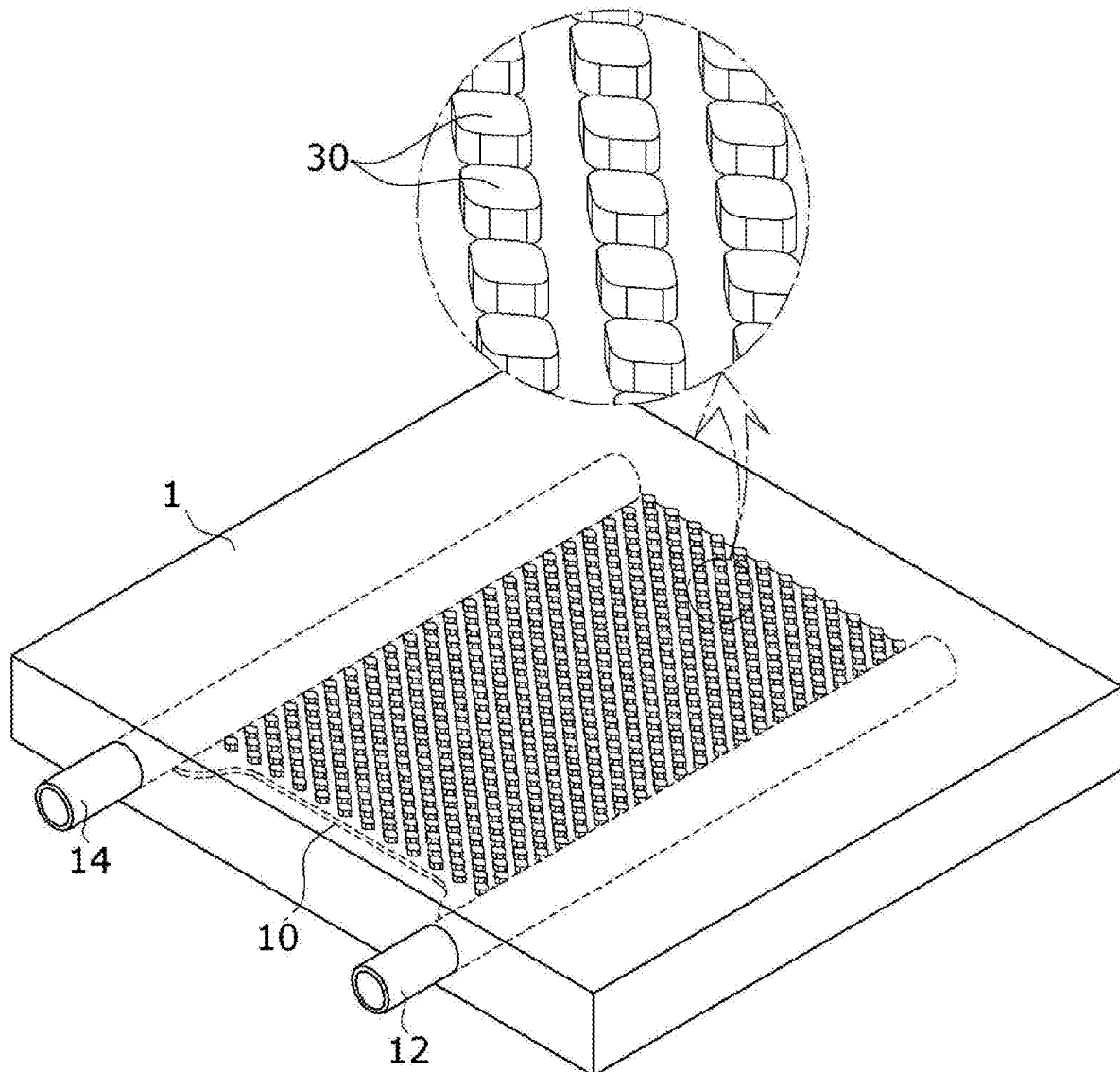


FIG. 1

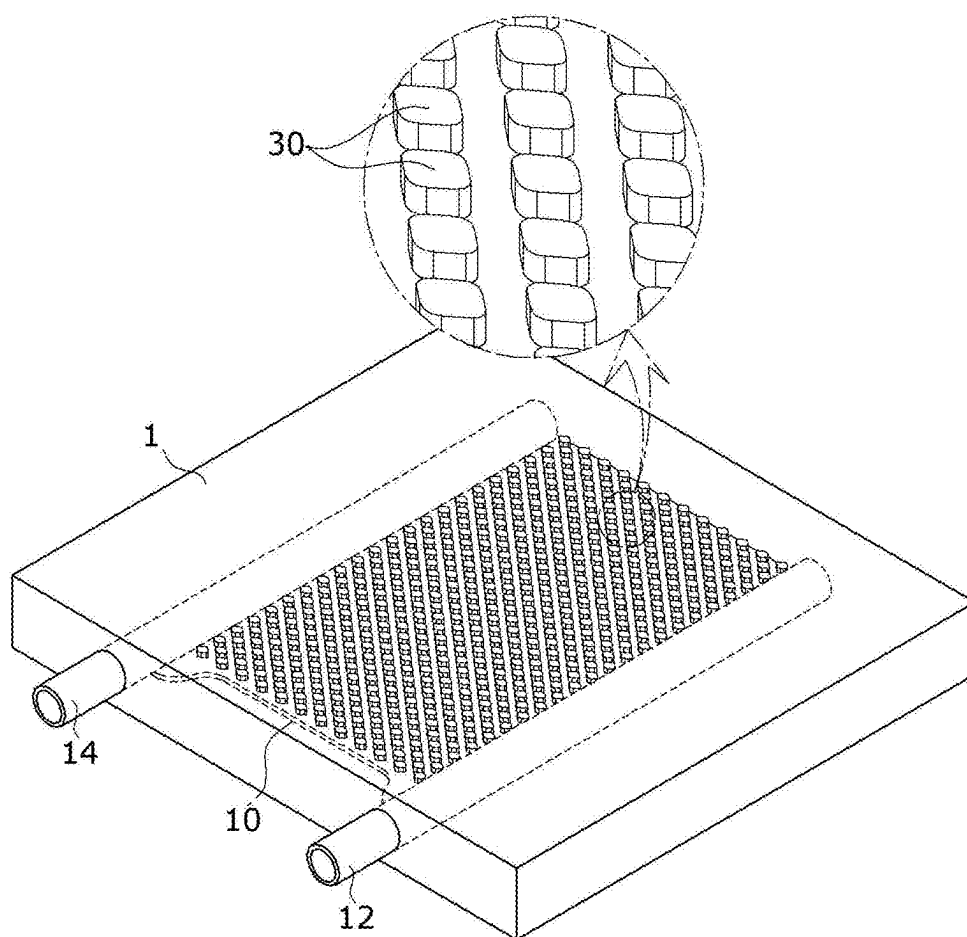


FIG. 2

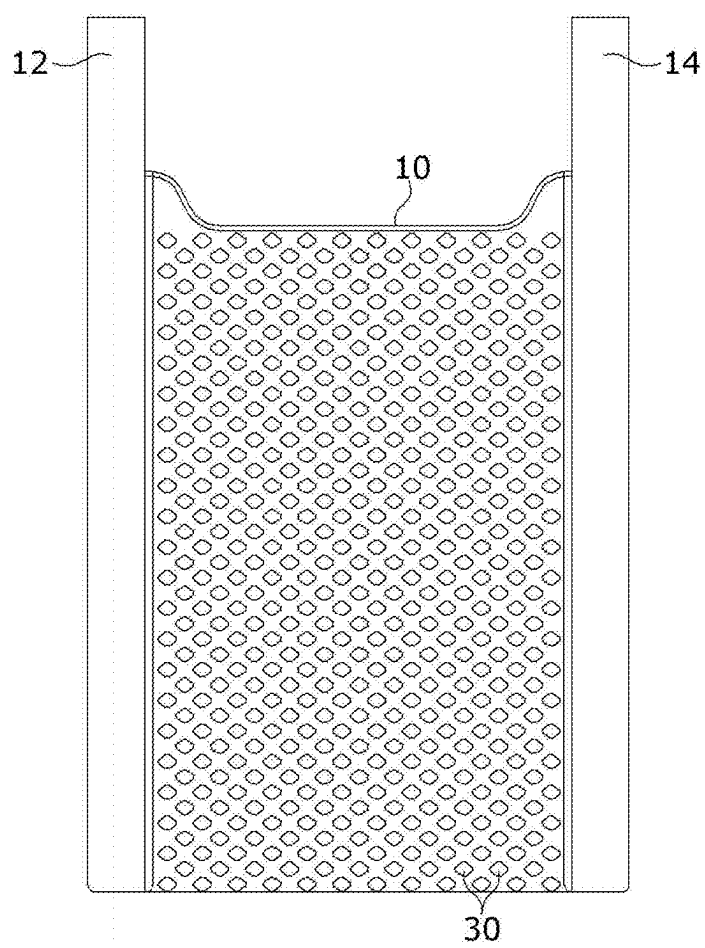


FIG. 3

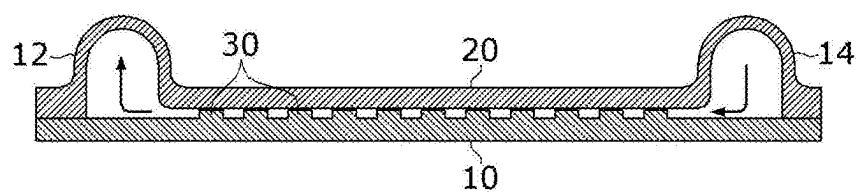


FIG. 4

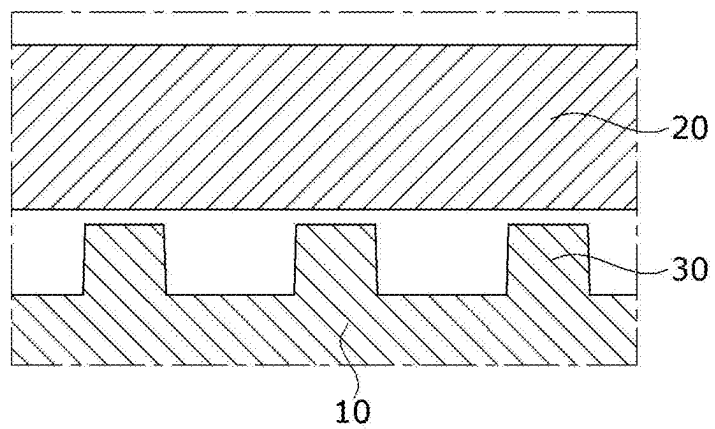


FIG. 5

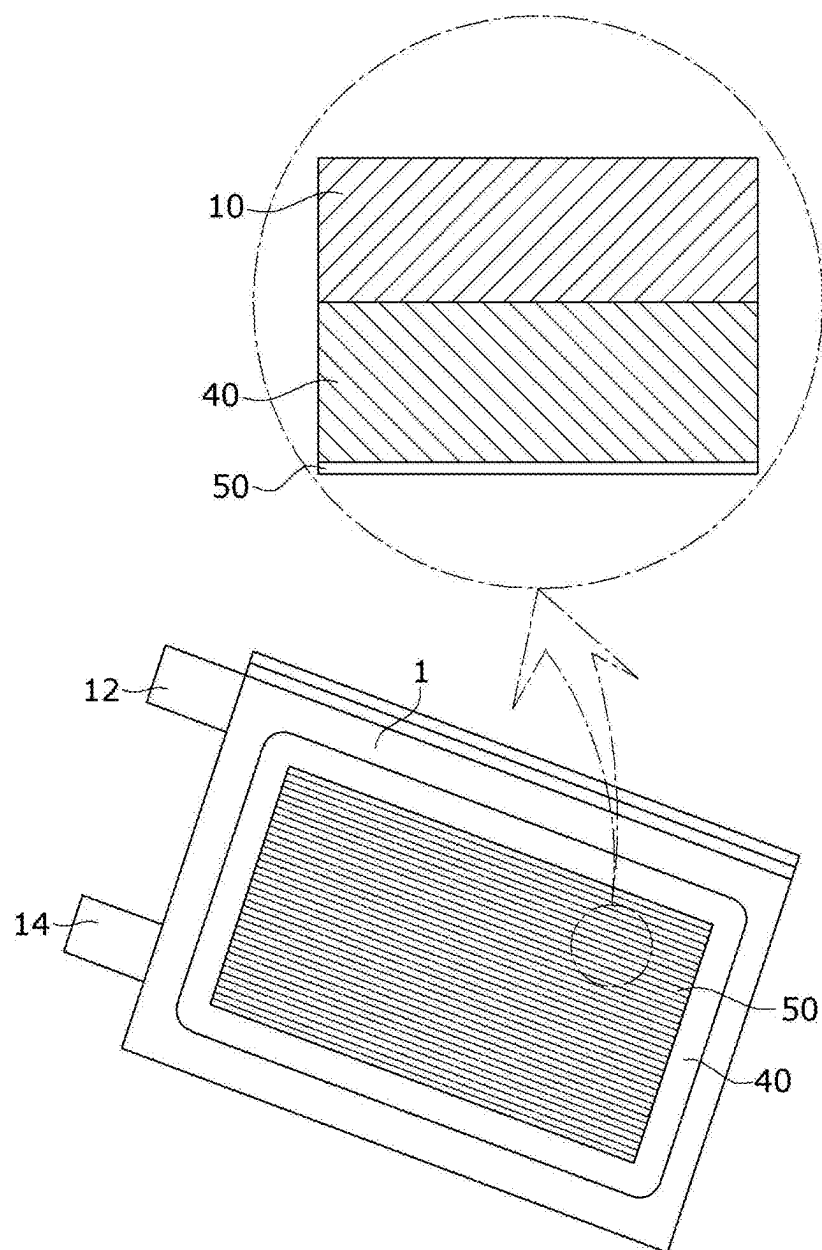


FIG. 6

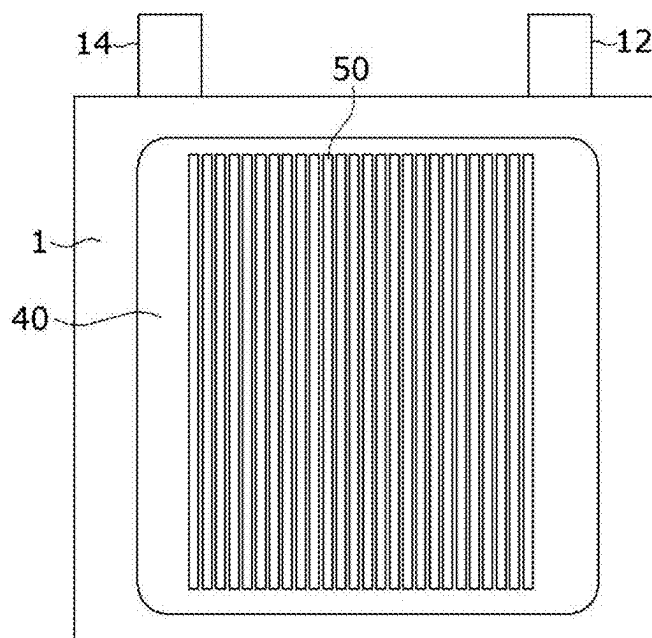


FIG. 7

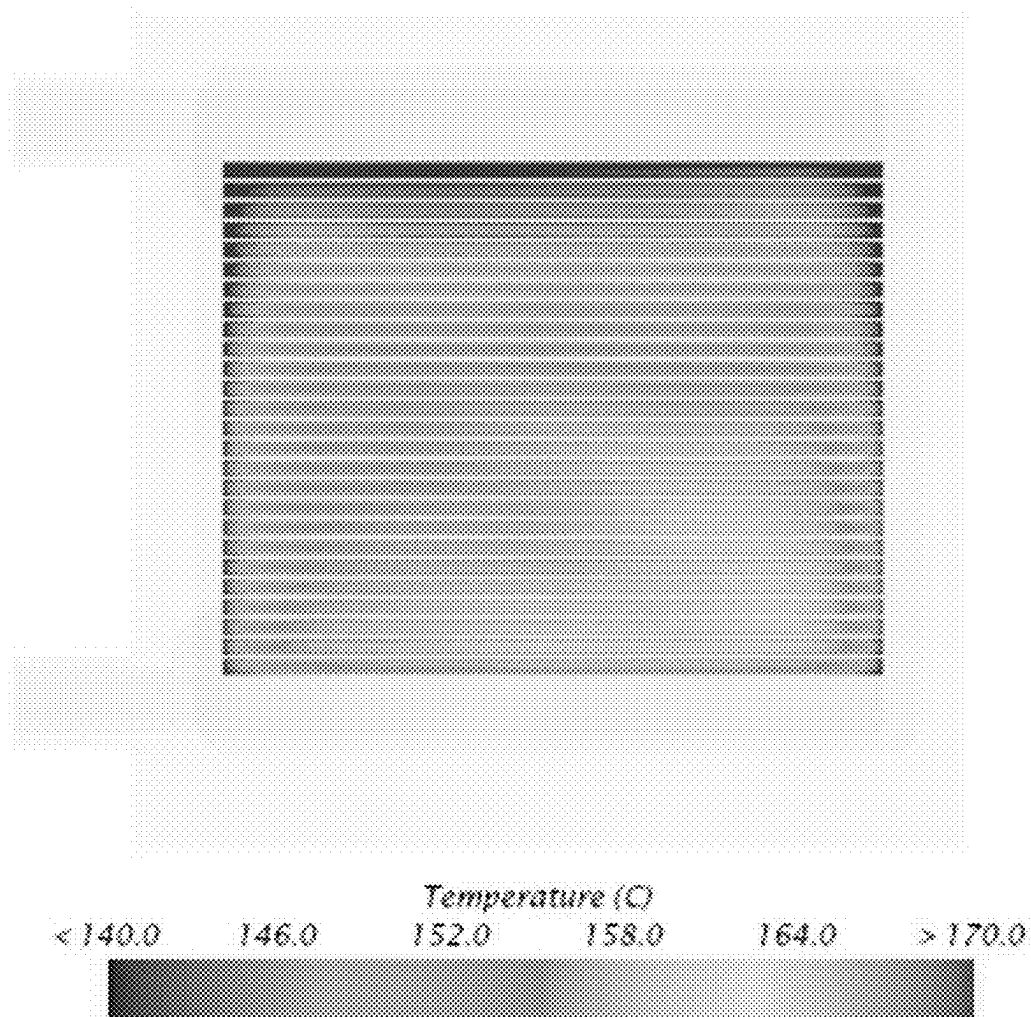


FIG. 8

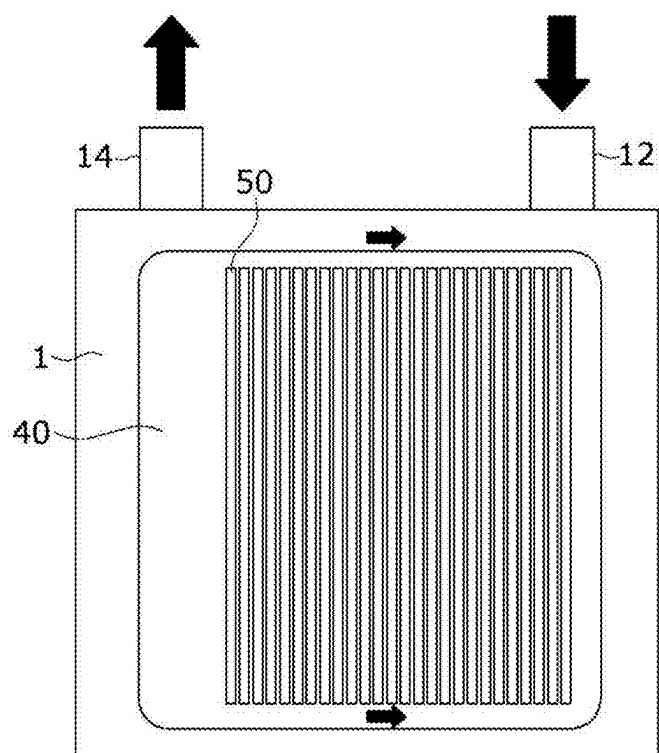


FIG. 9

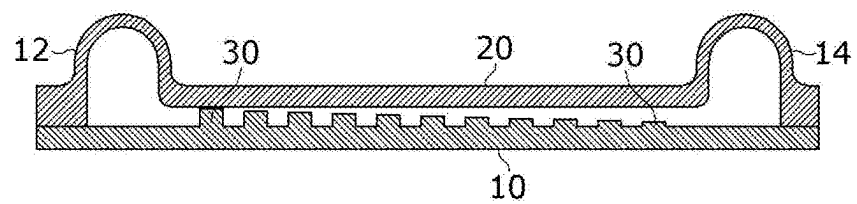
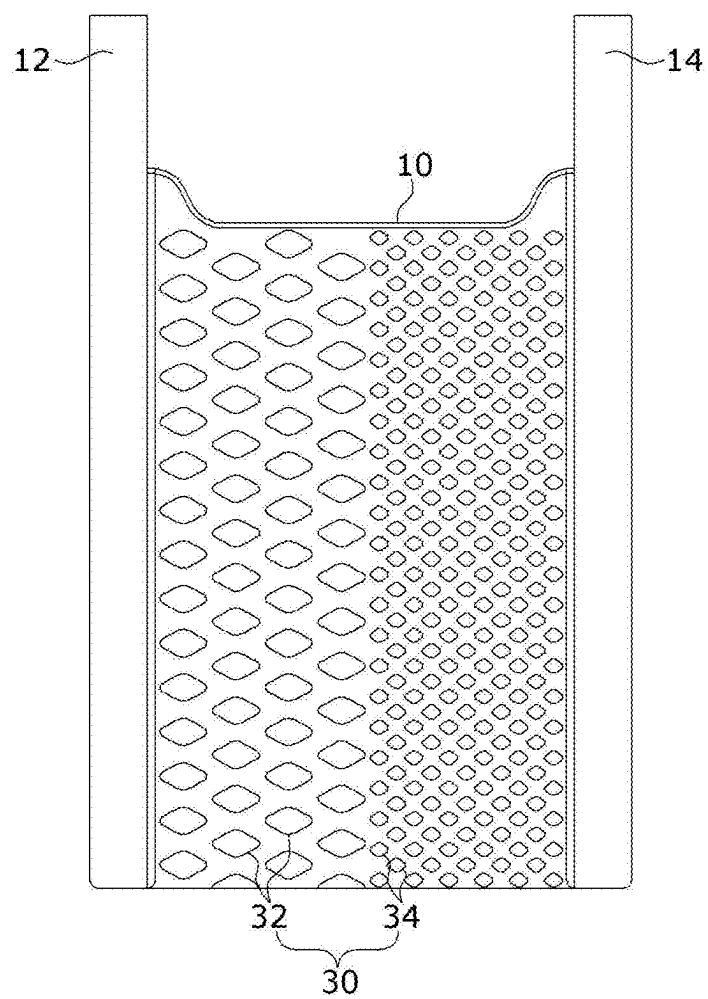




FIG. 10



## FLUID HEATING HEATER

### CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims priority to and the benefit of Korean Patent Application No. 10-2024-0019525, filed on Feb. 8, 2024, and Korean Patent Application No. 10-2025-0010553, filed on Jan. 23, 2025, the disclosure of both are incorporated herein by reference in their entirety.

### BACKGROUND

#### Field of the Invention

[0002] The present invention relates to a fluid heating heater, and more specifically, to a fluid heating heater for heating a fluid such as a coolant circulating inside a vehicle.

#### Discussion of Related Art

[0003] Under the trend of development of environmentally friendly industries and development of energy sources that replace fossil raw materials, areas that have recently attracted the most attention in the automobile industry are electric vehicles, hybrid vehicles, and fuel cell vehicles. However, unlike vehicles that use conventional petroleum-fueled engines as an energy source, in the electric vehicles, hybrid vehicles, and fuel cell vehicles, it is difficult or impossible to apply a heating system using a coolant.

[0004] That is, in the case of vehicles that use a conventional petroleum-based engine as a power source, a lot of heat is generated from the engine, a coolant circulation system for cooling the engine is provided, and the heat absorbed by the coolant from the engine is used to heat the interior. However, since the electric vehicles, hybrid vehicles, and fuel cell vehicles do not generate as much heat as the engine, there are limitations to using these conventional heating methods.

[0005] Accordingly, various studies are being conducted on adding heat pumps to the air conditioning systems of the electric vehicles, hybrid cars, and fuel cell vehicles to be used as a heat source, providing separate heat sources such as electric heaters, and so on. Among these, the electric heater is currently widely used because the electric heater may more easily heat a coolant without significantly affecting the air conditioning system.

[0006] The existing fluid heating heater includes a plurality of parallel fluid flow paths. In this way, when the fluid flow paths are configured as parallel flow paths, the size is determined by the number of channels in the parallel flow paths, so that the degree of design freedom is not high and each parallel flow path has a structure of two or more hairpins, and thus there is a problem that a large differential pressure occurs. In particular, there is a problem that a larger differential pressure occurs in a low flow region with high viscosity.

### SUMMARY OF THE INVENTION

[0007] One embodiment of the present invention is directed to providing a fluid heating heater capable of preventing occurrence of differential pressure and increasing the degree of design freedom compared to parallel-disposed flow paths by forming its flow paths on a main plate in series rather than in parallel.

[0008] One embodiment of the present invention is also directed to providing a fluid heating heater capable of interchangeably using an inlet and an outlet without being restricted by a direction of the inlet and the outlet by alternately disposing a plurality of flow path protrusions in each column and row on a main plate to form an isotropic flow path between the inlet and the outlet.

[0009] One embodiment of the present invention is also directed to providing a fluid heating heater capable of making a temperature distribution of a fluid flow path uniform overall by changing the position of a heating element mounted on a main plate and the height of a flow path protrusion to match inlet and outlet sides.

[0010] Problems to be solved by the present invention are not limited to those mentioned above, and other problems not mentioned will be clearly understood by those skilled in the art from the following description.

[0011] According to an aspect of the present invention, there is provided a fluid heating heater including a main body in which a flow path through which a fluid flows in and is heated is formed, an inlet that is disposed on one side of the main body and through which the fluid flows in, an outlet that is disposed on the other side of the main body and through which the fluid flows out, and a plurality of flow path protrusions that are provided inside the main body to protrude and are isotropically disposed between the inlet and the outlet.

[0012] The main body may include a main plate including the flow path protrusions on a surface thereof and a cover coupled to cover an upper portion of the main plate.

[0013] The inlet and the outlet may be symmetrically disposed on both sides centered on the main plate.

[0014] An upper end of the flow path protrusion may be formed to be spaced apart from the cover.

[0015] The flow path protrusions may be disposed in a plurality of columns and rows on the main plate.

[0016] The flow path protrusions disposed in the same column and row among the flow path protrusions may be disposed at a constant interval.

[0017] The flow path protrusion may be disposed between the flow path protrusions disposed in a next adjacent row or column.

[0018] The flow path protrusion may be formed to have a rhombus-shaped cross-section.

[0019] The flow path protrusion may be disposed so that a rhombus-shaped diagonal line lies in a flow direction of the fluid on the main plate.

[0020] The flow path protrusion may be formed to have an elliptical cross-section.

[0021] The flow path protrusion may be formed so that a height thereof increases toward the outlet from the inlet.

[0022] A height thereof may increase in some sections toward the outlet from the inlet.

[0023] A heating element may be mounted on a lower surface of the main plate to transfer heat to the main plate.

[0024] The heating element may be disposed closer to the inlet than the outlet with respect to the flow direction of the fluid.

[0025] According to another aspect of the present invention, there is provided a fluid heating heater including a main plate in which a flow path through which a fluid flows in and is heated is formed, an inlet that is disposed on one side of the main plate and through which the fluid flows in, an outlet that is disposed on the other side of the main plate and

through which the fluid flows out, and a flow path protrusion that is provided inside the main plate to protrude and is disposed between the inlet and the outlet so that a surface area thereof increases toward the outlet from the inlet. The flow path protrusion may be formed so that a size thereof decreases toward the outlet from the inlet. The flow path protrusions may be disposed so that the number thereof increases toward the outlet from the inlet. The flow path protrusions may be disposed so that an interval therebetween becomes narrower toward the outlet from the inlet. The flow path protrusion may include a first flow path protrusion disposed between the inlet and a central portion of the inlet and the outlet and a second flow path protrusion disposed between the central portion and the outlet, and the first flow path protrusion may be formed to have a larger size than the second flow path protrusion. The first flow path protrusions may be disposed to have a narrower interval than the second flow path protrusions.

#### BRIEF DESCRIPTION OF THE DRAWINGS

[0026] The above and other objects, features and advantages of the present invention will become more apparent to those of ordinary skill in the art by describing exemplary embodiments thereof in detail with reference to the accompanying drawings, in which:

[0027] FIG. 1 is a perspective view illustrating a fluid heating heater according to one embodiment of the present invention;

[0028] FIG. 2 is a plan view illustrating the fluid heating heater according to one embodiment of the present invention;

[0029] FIG. 3 is a cross-sectional view illustrating the fluid heating heater according to one embodiment of the present invention;

[0030] FIG. 4 is a cross-sectional view illustrating a flow path of the fluid heating heater according to one embodiment of the present invention;

[0031] FIG. 5 is a perspective view illustrating a bottom surface of the fluid heating heater according to one embodiment of the present invention;

[0032] FIG. 6 is a bottom view illustrating an existing fluid heating heater;

[0033] FIG. 7 is a view illustrating that a temperature deviation occurs in a heating element illustrated in FIG. 6;

[0034] FIG. 8 is a bottom view illustrating a fluid heating heater according to one embodiment of the present invention;

[0035] FIG. 9 is a cross-sectional view illustrating a fluid heating heater according to another embodiment of the present invention; and

[0036] FIG. 10 is a plan view illustrating a fluid heating heater according to still another embodiment of the present invention.

#### DETAILED DESCRIPTION OF EXEMPLARY EMBODIMENTS

[0037] Since the present invention may be variously modified and embodied, particular embodiments thereof will be illustrated in the drawings and described in detail. However, this is not intended to limit the present invention to the specific embodiments, and it should be understood to include all modifications, equivalents, and substitutes included in the spirit and scope of the present invention. In

describing the present invention, when it is determined that the detailed description of the related known technology may obscure the subject matter of the present invention, the detailed description thereof will be omitted.

[0038] Terms “first,” “second,” etc., may be used herein to describe various elements, but the elements should not be limited by the terms. These terms are only used to distinguish one element from another element.

[0039] The terms used in the present application are merely provided to describe specific embodiments, and are not intended to limit the present invention. The singular forms are intended to include the plural forms as well, unless the context clearly indicates otherwise. In the present application, it will be understood that terms “include,” “have,” or the like are intended to specify the presence of features, integers, steps, operations, elements, components, and/or combinations thereof stated in the specification, but do not preclude the possibility of the presence or addition of one or more other features, integers, steps, operations, elements, components, or combinations thereof in advance.

[0040] In addition, throughout the specification, when “connected” is used, this does not only mean two or more components are directly connected, but means that two or more components are indirectly connected through another component, that the components are not only physically connected, but also electrically connected, or that the components are integrated although the components are referred to as different names depending on a location or a function.

[0041] Hereinafter, one embodiment of a fluid heating heater according to the present invention will be described in detail with reference to the accompanying drawings, and in giving description with reference to the accompanying drawings, identical or corresponding components will be assigned the same numbers and overlapping descriptions thereof will be omitted.

[0042] FIG. 1 is a perspective view illustrating a fluid heating heater according to one embodiment of the present invention, FIG. 2 is a plan view illustrating the fluid heating heater according to one embodiment of the present invention, FIG. 3 is a cross-sectional view illustrating the fluid heating heater according to one embodiment of the present invention, FIG. 4 is a cross-sectional view illustrating a flow path of the fluid heating heater according to one embodiment of the present invention, and FIG. 5 is a perspective view illustrating a bottom surface of the fluid heating heater according to one embodiment of the present invention.

[0043] According to the above drawings, the fluid heating heater according to one embodiment of the present invention may include a main body 1 in which a flow path through which a fluid flows in and is heated is formed, an inlet 12 that is disposed on one side of the main body 1 and through which the fluid flows in, an outlet 14 that is disposed on the other side of the main body 1 and through which the fluid flows out, and a plurality of flow path protrusions 30 that are provided inside the main body 1 to protrude and are isotropically disposed between the inlet 12 and the outlet 14.

[0044] The main body 1 forms an overall appearance of the fluid heating heater, and the main body 1 may be made in a roughly flat rectangular shape. The main body 1 may include a main plate 10 including the flow path protrusions 30 on a surface thereof, and a cover 20 coupled to cover an upper portion of the main plate 10.

[0045] The inlet 12 through which fluid flows in and the outlet 14 through which fluid flows out may be formed on

both sides of the main plate 10. The inlet 12 and the outlet 14 are made in a pipe shape so that a fluid may flow therein. In the present embodiment, the inlet 12 and the outlet 14 may extend parallel to each other along both side surfaces of the main plate 10. In addition, portions where the inlet 12 and the outlet 14 come into contact with both side surfaces of the main plate 10 communicate with each other, so that the fluid may flow in and out through the inlet 12 and the outlet 14.

[0046] Meanwhile, the fluid flowing into the fluid heating heater may be a coolant as one example. Of course, the fluid is not limited to the coolant and other types of fluids may be used.

[0047] The main plate 10 is a portion where heating actually takes place while the fluid flows. The main plate 10 may be made in a roughly flat hexahedral shape. In one embodiment, the main plate 10 may be formed so that both side surfaces thereof are parallel to each other, and may be formed so that its width becomes narrower as it is further away from portions adjacent to the inlet 12 and the outlet 14.

[0048] In the present embodiment, the inlet 12 and the outlet 14 may be symmetrically disposed on both sides centered on the main plate 10. In addition, as described above, since the inlet 12 and the outlet 14 are disposed to be parallel to each other, the fluid flowing therebetween may flow in a direction perpendicular to the inlet 12 and the outlet 14. In addition, in FIG. 2, the inlet 12 is shown as being disposed on the right side of the main plate 10 and the outlet 14 is shown as being disposed on the left side of the main plate 10, but this is only one example and the inlet 12 may be disposed on the left side of the main plate 10 and the outlet 14 may be disposed on the right side of the main plate 10.

[0049] A plurality of flow path protrusions 30 may be provided to protrude on the surface of the main plate 10. As one example, the flow path protrusions 30 may be disposed to have isotropy on the surface of the main plate 10. Here, isotropy means that the flow path protrusions 30 allow the fluid to flow in any direction between the inlet 12 and the outlet 14 regardless of the direction of the inlet 12 and the outlet 14. For example, in FIG. 2, the fluid flowing into the inlet 12 may be converted into a vertical direction and flow between the flow path protrusions 30 and flow out through the outlet 14, and when the outlet 14 acts as a fluid inflow point, the fluid may flow into the outlet 14 and flow out through the inlet 12.

[0050] In addition, in the present embodiment, since the fluid flow paths are formed in series rather than in parallel on the main plate 10, there is an advantage in that no differential pressure occurs and the degree of design freedom is increased compared to flow paths disposed in parallel.

[0051] The flow path protrusions 30 may be disposed in a plurality of columns and rows on the surface of the main plate 10. In addition, the fluid flow path may be formed substantially along a line flowing between the flow path protrusions 30. As described above, the flow path protrusions 30 are disposed in the plurality of columns and rows, and among the flow path protrusions 30, the flow path protrusions 30 disposed in the same column and row may be disposed to have a constant interval. When the flow path protrusions 30 are disposed in this way, the fluid flow path formed between the inlet 12 and the outlet 14 may have isotropy.

[0052] In addition, the flow path protrusion 30 may be disposed between flow path protrusions 30 disposed in a next adjacent row or column. For example, when the flow path protrusions 30 disposed in a first row are disposed at a constant interval, the flow path protrusions 30 disposed in a second row may not be disposed at the same position as in the first row, but may be disposed between the flow path protrusions 30 disposed in the first row. As one embodiment, each of the flow path protrusions 30 disposed in the second row may be disposed in a center between the flow path protrusions 30 disposed in the first row.

[0053] As one embodiment, the flow path protrusions 30 disposed in a third row may be disposed in a position parallel to the flow path protrusions 30 disposed in the first row in a column direction. That is, since the flow path protrusions 30 disposed in the third row are disposed in the centers between the flow path protrusions 30 disposed in the second row, the flow path protrusions 30 disposed in the third row may be disposed in the position parallel to the first row in the column direction. In this way, the flow path protrusions 30 may be alternately disposed in each row.

[0054] The above description is given using the example of the flow path protrusions 30 disposed along the rows, and may be equally applied to the flow path protrusions 30 disposed along the columns. As one embodiment, the flow path protrusions 30 may be alternately disposed in each column. Ultimately, when the flow path protrusions 30 are disposed in this way, since isotropic flow paths may be formed between the inlet 12 and the outlet 14, the inlet 12 and the outlet 14 may be interchangeably used without being restricted by the direction of the inlet 12 and the outlet 14.

[0055] As one embodiment, the flow path protrusion 30 may be formed to have a rhombus-shaped cross-section. Of course, in the present embodiment, the reason why the flow path protrusions 30 have a rhombus-shaped cross-section is to allow the fluid flowing between the flow path protrusions 30 to move more smoothly along the flow path. To this end, the flow path protrusion 30 may be disposed so that a diagonal line in the rhombus shape lies along a fluid flow on the main plate 10. That is, referring to FIG. 2, the flow path protrusion 30 may be disposed so that a longer diagonal line of the two diagonal lines lies along a flow direction of the fluid. When the flow path protrusion 30 is disposed in this way, since the fluid moves along an inclined side surface of the flow path protrusion 30 as the fluid moves to the left or right on the drawing, the flow may be smooth.

[0056] Of course, in the above, the formation of the shape of the flow path protrusion 30 in the rhombus cross-section shape is only one example, and the flow path protrusion 30 may employ any cross-section when the cross-section may allow the fluid to smoothly move. For example, the flow path protrusion 30 may be formed to have an elliptical cross-section to allow the fluid to smoothly move.

[0057] Referring to FIGS. 3 and 4, the fluid may flow into the inlet 12, change its direction into a vertical direction, and then flow toward the main plate 10. In addition, the fluid may be heated while flowing between the flow path protrusions 30 protruding on the main plate 10, and then flow into the outlet 14 to be discharged to the outside.

[0058] The flow path protrusion 30 may be formed so that its upper end is spaced apart from the cover 20. The flow path protrusion 30 protrudes upward from the surface of the main plate 10, and is formed so that the upper end does not come into contact with a ceiling surface and has a prede-

terminated gap. In this case, the gap may be, for example, 4 mm or less, but is not limited thereto. In this way, when the upper end of the flow path protrusion 30 forms a gap with the cover 20, the fluid flow cross-sectional area becomes smaller, so that the fluid speed in a corresponding section may increase.

[0059] Referring to FIG. 5, a heating element 50 is disposed on one surface, that is, a lower surface, of the main plate 10. The heating element 50 is mounted on a portion of one surface of the main plate 10 in which the fluid flow path is formed to serve to heat the fluid by applying heat toward the flow path. As one embodiment, the heating element 50 may be in the form of a film to be mounted on one surface of the main plate 10. In addition, an insulating layer 40 is disposed between the heating element 50 and the main plate 10.

[0060] FIG. 6 is a bottom view illustrating an existing fluid heating heater, and FIG. 7 is a view illustrating that a temperature deviation occurs in a heating element illustrated in FIG. 6.

[0061] FIG. 6 illustrates the existing fluid heating heater in which a heating element 50 is mounted at the center of a lower surface of a main plate 10. When a fluid is heated with the heating element 50 positioned in the center in this way, a temperature deviation occurs as illustrated in FIG. 7. That is, a phenomenon in which the temperature is low near an inlet 12 through which the fluid flows in and the temperature increases toward the outlet 14 occurs.

[0062] FIG. 8 is a bottom view illustrating a fluid heating heater according to one embodiment of the present invention.

[0063] Referring to FIG. 8, in the present embodiment, in order to solve the problem examined in FIGS. 6 and 7, a heating element 50 is disposed close to an inlet 12. That is, by moving and disposing the heating element 50 toward a side of the inlet 12 from a side of an outlet 14 as a whole, the fluid temperature at the side of the inlet 12 may be further increased. In this way, when the heating element 50 is eccentrically disposed, since the fluid may be further heated through the heating element 50 at the side of the existing inlet 12, the fluid temperature at the side of the inlet 12 relatively increases. Then, as a result, the overall temperature distribution of the fluid flow path may be uniform.

[0064] FIG. 9 is a cross-sectional view illustrating a fluid heating heater according to another embodiment of the present invention.

[0065] Referring to FIG. 9, as one example, a flow path protrusion 30 may be formed so that its height increases toward an outlet 14 from an inlet 12. That is, the flow path protrusion 30 disposed at a side of the outlet 14 has the highest height and the height decreases in a step-like shape toward the inlet 12, so that the flow path protrusion 30 disposed at a side of the inlet 12 may have the lowest height. For reference, in the present embodiment, the heating element 50 may be disposed as in FIG. 8 or may be disposed in the center as in FIG. 6.

[0066] As seen in FIGS. 6 and 7, since the temperature at the side of the inlet 12 is higher than the temperature at the side of the outlet 14 in the existing flow heating heater, so to make it uniform, in order to make the temperature difference uniform, the flow path protrusions 30 are made to have different heights in a step form as described above. In this way, when the height of the flow path protrusion 30 increases toward the outlet 14, since the heat dissipation area

at the side of the outlet 14 increases, it is possible to improve the heat dissipation performance and make the overall temperature distribution of the fluid flow path uniform.

[0067] Meanwhile, in the present embodiment, the height of the flow path protrusion 30 has been described as increasing toward the side of the outlet 14 from the side of the inlet 12 as a whole, but the present embodiment is not limited thereto. For example, the flow path protrusion 30 may be formed so that its height is different only in some sections. That is, the height of the flow path protrusion 30 may increase only in some sections centered on the side of the inlet 12, or the height may decrease only in some sections centered on the side of the outlet 14.

[0068] FIG. 10 is a plan view illustrating a fluid heating heater according to still another embodiment of the present invention.

[0069] With reference to FIG. 10, a fluid heating heater according to the still another embodiment of the present invention may include a main body 1 in which a flow path through which a fluid flows in and is heated is formed, an inlet 12 that is disposed on one side of the main body 1 and through which the fluid flows in, an outlet 14 that is disposed on the other side of the main body 1 and through which the fluid flows out, and flow path protrusions 30 that are provided inside the main body 1 to protrude and are disposed between the inlet 12 and the outlet 14 so that a surface area thereof increases toward the outlet 14 from the inlet 12.

[0070] The flow path protrusions 30 may be disposed in a plurality of columns and rows on the surface of a main plate 10. In addition, the fluid flow path may be formed substantially along a line flowing between the flow path protrusions 30. In this case, unlike the above-described embodiments, the flow path protrusions 30 may be disposed so that a surface area increases toward the outlet 14 from the inlet 12, and this may be implemented by various embodiments.

[0071] As one embodiment, the flow path protrusions 30 may be disposed so that the number thereof increases toward the outlet 14 from the inlet 12. Since as the number of flow path protrusions 30 increases in this way, the total surface area of the flow path protrusions 30 increases, the fluid comes into contact with surfaces of the flow path protrusions 30 more as the fluid flows downstream. Since the fluid temperature at the inlet 12 is higher than the fluid temperature at the outlet 14, the temperature of the heating element 50 (see FIG. 5) may be uniformized and the differential pressure may be reduced. Meanwhile, the flow path protrusions 30 may have the same size or may have different sizes.

[0072] As one embodiment, the flow path protrusions 30 may be disposed so that the size thereof decreases toward the outlet 14 from the inlet 12. When the sizes of the flow path protrusions 30 decrease in this way, since the total surface area of the flow path protrusions 30 increases, the fluid may come into contact with the surface of the flow path protrusions 30 more as the fluid flows downstream.

[0073] As one embodiment, the flow path protrusions 30 may be disposed so that an interval between the flow path protrusions 30 becomes narrower toward the outlet 14 from the inlet 12. When the interval of the flow path protrusions 30 becomes narrower in this way, since the total surface area of the flow path protrusions 30 increases, the fluid may come into contact with the surface of the flow path protrusions 30 more as the fluid flows downstream.

[0074] As one embodiment, the flow path protrusion 30 may include a first flow path protrusion 32 disposed between

the inlet 12 and a central portion centered on the central portion of the inlet 12 and the outlet 14 and a second flow path protrusion 34 disposed between the central portion and the outlet 14, and the first flow path protrusion 32 may be formed to have a larger size than the second flow path protrusion 34.

[0075] As one embodiment, the first flow path protrusion 32 may be disposed to have a narrower interval than the second flow path protrusion 34.

[0076] Meanwhile, in the present embodiment, the flow path protrusions 30 are described as being disposed with the first flow path protrusion 32 and the second flow path protrusion 34, but the present embodiment is not limited thereto, and the flow path protrusions 30 may be disposed with three or more different sizes, shapes, and numbers between the inlet 12 and the outlet 14.

[0077] According to one embodiment of the present invention, since fluid flow paths are formed on a main plate in series rather than in parallel, it is possible to prevent occurrence of differential pressure and increase the degree of design freedom compared to flow paths disposed in parallel.

[0078] In addition, according to one embodiment of the present invention, since a plurality of flow path protrusions are alternately disposed in each column and row on a main plate, by forming an isotropic flow path between an inlet and an outlet, it is possible to interchangeably use the inlet and the outlet without being restricted by a direction of the inlet and the outlet.

[0079] In addition, according to one embodiment of the present invention, by changing the position of a heating element mounted on a main plate and the height of a flow path protrusion to match inlet and outlet sides, it is possible to make a temperature distribution of a fluid flow path uniform overall.

[0080] Although the specific embodiments of the present invention have been described above, it is understood that one ordinary skilled in the art can make various changes and modifications to the present invention without departing from the spirit and scope of the present invention as hereinafter claimed.

What is claimed:

1. A fluid heating heater comprising:
  - a main body in which a flow path through which a fluid flows in and is heated is formed;
  - an inlet that is disposed on one side of the main body and through which the fluid flows in;
  - an outlet that is disposed on the other side of the main body and through which the fluid flows out; and
  - a plurality of flow path protrusions that are provided inside the main body to protrude and are isotropically disposed between the inlet and the outlet.
2. The fluid heating heater of claim 1, wherein the main body includes:
  - a main plate including the flow path protrusions on a surface thereof; and
  - a cover coupled to cover an upper portion of the main plate.
3. The fluid heating heater of claim 2, wherein the inlet and the outlet are symmetrically disposed on both sides centered on the main plate.
4. The fluid heating heater of claim 2, wherein an upper end of the flow path protrusion is formed to be spaced apart from the cover.

5. The fluid heating heater of claim 2, wherein the flow path protrusions are disposed in a plurality of columns and rows on the main plate.

6. The fluid heating heater of claim 5, wherein the flow path protrusions disposed in the same column and row among the flow path protrusions are disposed at a constant interval.

7. The fluid heating heater of claim 5, wherein the flow path protrusion is disposed between the flow path protrusions disposed in a next adjacent row or column.

8. The fluid heating heater of claim 2, wherein the flow path protrusion is formed to have a rhombus-shaped cross-section.

9. The fluid heating heater of claim 8, wherein the flow path protrusion is disposed so that a rhombus-shaped diagonal line lies in a flow direction of the fluid on the main plate.

10. The fluid heating heater of claim 2, wherein the flow path protrusion is formed to have an elliptical cross-section.

11. The fluid heating heater of claim 2, wherein the flow path protrusion is formed so that a height thereof increases toward the outlet from the inlet.

12. The fluid heating heater of claim 2, wherein a height thereof increases in some sections toward the outlet from the inlet.

13. The fluid heating heater of claim 2, wherein a heating element is mounted on a lower surface of the main plate to transfer heat to the main plate.

14. The fluid heating heater of claim 13, wherein the heating element is disposed closer to the inlet than the outlet with respect to a flow direction of the fluid.

15. A fluid heating heater comprising:

- a main plate in which a flow path through which a fluid flows in and is heated is formed;
- an inlet that is disposed on one side of the main plate and through which the fluid flows in;
- an outlet that is disposed on the other side of the main plate and through which the fluid flows out; and
- a flow path protrusion that is provided inside the main plate to protrude and is disposed between the inlet and the outlet so that a surface area thereof increases toward the outlet from the inlet.

16. The fluid heating heater of claim 15, wherein the flow path protrusion is formed so that a size thereof decreases toward the outlet from the inlet.

17. The fluid heating heater of claim 15, wherein the flow path protrusions are disposed so that the number thereof increases toward the outlet from the inlet.

18. The fluid heating heater of claim 15, wherein the flow path protrusions are disposed so that an interval therebetween becomes narrower toward the outlet from the inlet.

19. The fluid heating heater of claim 15, wherein the flow path protrusion includes:

- a first flow path protrusion disposed between the inlet and a central portion of the inlet and the outlet; and
  - a second flow path protrusion disposed between the central portion and the outlet, and
- the first flow path protrusion is formed to have a larger size than the second flow path protrusion.

20. The fluid heating heater of claim 19, wherein the first flow path protrusions are disposed to have a narrower interval than the second flow path protrusions.

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