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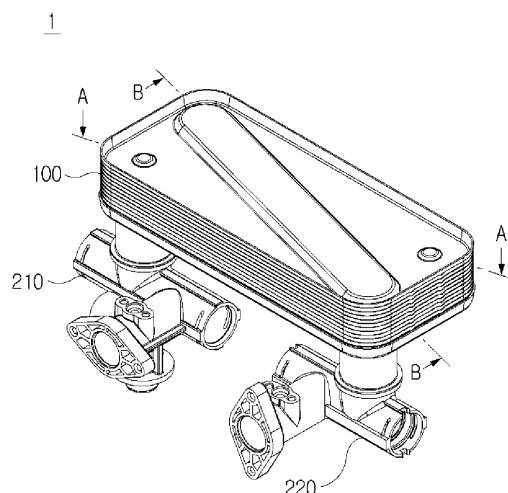
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(54) **HOT-WATER HEAT EXCHANGER**

(57) The present invention is directed to providing a hot water heat exchanger which has a simple piping structure and minimizes a flow passage length therein, thereby minimizing flow resistance. To this end, the hot water heat exchanger is characterized in that the first adaptor and the second adaptor are connected to the partition configured to define one side surface of the heat exchanging part, a first heating water circulation passage through which the heating water introduced from the inlet port of the first adaptor flows is formed at the space between the partition and the partition adjacent thereto, a first direct water circulation passage through which the

direct water introduced from the inlet port of the second adaptor flows is formed at the space between the partition configured to define the other side surface of the heat exchanging part and the partition adjacent thereto, and a plurality of second heating water circulation passages through which the heating water passing through the first heating water circulation passage flows, and a plurality of second direct water circulation passages through which the direct water passing through the first direct water circulation passage flows are alternately formed between the first heating water circulation passage and the first direct water circulation passage.

FIG. 2



Description

Technical Field

5 **[0001]** The present invention relates to a hot water heat exchanger, and more particularly, to a hot water heat exchanger which supplies hot water through heat exchange between direct water and heating water heated in a main heat exchanger of a boiler.

Background Art

10 **[0002]** FIG. 1 is a block diagram schematically illustrating a general instantaneous boiler for heating and hot water supply.

15 **[0003]** In a heating mode, a circulation pump 10 is operated and heating water is transferred. The heating water is heated in a main heat exchanger 20 by combustion heat of a burner 21, and then transferred to a place to be heated through a three-way valve 30, whereby the heating is achieved. The heating water of which a temperature is lowered by the heat exchange in the place to be heated is transferred to the main heat exchanger 20 through an expansion tank 50 and the circulation pump 10 and then reheated. A reference numeral 22 which is not described is an air blower.

20 **[0004]** In a hot water mode, a passage connected from the three-way valve 30 to the place to be heated is blocked, and a passage connected to a hot water heat exchanger 40 is opened so that the heating water heated in the main heat exchanger 20 is transferred to the hot water heat exchanger 40. In the hot water heat exchanger 40, heat exchange between direct water and heating water is performed, and thus heated hot water is supplied to a place requiring the hot water.

25 **[0005]** Like this, the hot water heat exchanger 40 is connected with a pipe 41 through which the heating water is introduced, a pipe 42 through which the heating water is discharged, a pipe 43 through which the direct water is introduced, and a pipe 44 through which the hot water is discharged. To simplify a structure of these pipes 41, 42, 43 and 44, there has been proposed a hot water heat exchanger which is disclosed in Korean Patent No. 10-1002382 filed and registered by the applicant.

30 **[0006]** The hot water heat exchanger disclosed in Korean Patent No. 10-1002382 includes a heat exchanging part in which a plurality of partitions are arranged to overlap, and the heating water and the direct water flow through spaces among the partitions, and thus the heat exchange is performed therebetween, a first adaptor in which an inlet port through which the heating water is introduced and an outlet port through which the heating water heat-exchanged in the heat exchanging part is discharged are integrally formed and coupled to the heat exchanging part, and a second adaptor in which an inlet port through which the direct water is introduced and an outlet port through which hot water heated by the heat exchange with the heating water in the heat exchanging part is discharged are integrally formed and coupled to the heat exchanging part.

35 **[0007]** In the heat exchanging part, passages of the heating water and the direct water are defined by a space between adjacent partitions. These passages have longer lengths and smaller cross-sectional areas than those in a general hot water heat exchanger, and thus flow resistance in the heat exchanging part becomes much larger.

40 Disclosure

Technical Problem

45 **[0008]** The present invention is directed to providing a hot water heat exchanger which has a simple piping structure and minimizes a flow passage length therein, thereby minimizing flow resistance.

Technical Solution

50 **[0009]** One aspect of the present invention provides a hot water heat exchanger including a heat exchanging part (100) in which a plurality of partitions (101 to 113) are arranged to overlap, and heating water supplied from a main heat exchanger and direct water alternately flow through spaces (131, 132, 133 and 134) among the partitions, and thus heat exchange is achieved therebetween, a first adaptor (210) in which an inlet port (211) through which the heating water is introduced and an outlet port (212) through which the heating water heat-exchanged in the heat exchanging part (100) is discharged are integrally formed and coupled to the heat exchanging part (100), and a second adaptor (220) in which an inlet port (221) through which the direct water is introduced and an outlet port (222) through which hot water heat-exchanged with the heating water and thus heated in the heat exchanging part (100) is discharged are integrally formed and coupled to the heat exchanging part (100), wherein the first adaptor (210) and the second adaptor (220) are connected to the partition (101) configured to define one side surface of the heat exchanging part (100), a first heating water

circulation passage (131) through which the heating water introduced from the inlet port (211) of the first adaptor (210) flows is formed at the space between the partition (101) and the partition (102) adjacent thereto, a first direct water circulation passage (133) through which the direct water introduced from the inlet port (221) of the second adaptor (220) flows is formed at the space between the partition (113) configured to define the other side surface of the heat exchanging part (100) and the partition (112) adjacent thereto, and a plurality of second heating water circulation passages (132) through which the heating water passing through the first heating water circulation passage (131) flows, and a plurality of second direct water circulation passages (134) through which the direct water passing through the first direct water circulation passage (133) flows are alternately formed between the first heating water circulation passage (131) and the first direct water circulation passage (133).

Advantageous Effects

[0010] According to the present invention, since the heating water introduced through the first adaptor is introduced into the first heating water circulation passage formed at one side of the heat exchanging part, and the direct water introduced through the second adaptor is introduced into the first direct water circulation passage formed at the other side of the heat exchanging part, the flow passages of the heating water and the direct water, which are formed in the heat exchanging part, may be shortened.

[0011] Further, since the heating water passing portion having the expanded flow cross-sectional area is formed at the partition disposed at one side of the heat exchanging part, and the direct water passing portion having the expanded flow cross-sectional area is formed at the partition disposed at the other side of the heat exchanging part, the flow resistance may be reduced.

Description of Drawings

[0012]

FIG. 1 is a block diagram schematically illustrating a general instantaneous boiler for heating and hot water supply.

FIG. 2 is a perspective view of a hot water heat exchanger according to the present invention.

FIG. 3 is an exploded perspective view of the hot water heat exchanger of FIG. 2.

FIG. 4 is a schematic cross-sectional view taken along a line A-A of a heat exchanging part of the hot water heat exchanger of FIG. 2.

FIG. 5 is a schematic cross-sectional view taken along a line B-B of the heat exchanging part of the hot water heat exchanger of FIG. 2.

FIG. 6 is a cross-sectional view illustrating a state in which a first connection member and a second connection member are coupled to a first adaptor according to the present invention.

FIG. 7 is a cross-sectional view illustrating a state in which a third connection member and a fourth connection member are coupled to a second adaptor according to the present invention.

FIG. 8 is a cross-sectional view respectively illustrating a passage of heating water and a passage of hot water in a state in which the first and second adaptors are coupled to the heat exchanging part according to the present invention.

Description of Main Elements

1:	hot water heat exchanger	100:	heat exchanging part
101 to 113:	partition		
101a to 111a, 102b to 111b:	heating water passing hole		
101c to 112c, 103d to 112d:	direct water passing hole		
131:	first heating water circulation passage		
132:	second heating water circulation passage		
133:	first direct water circulation passage		
134:	second direct water circulation passage		
210:	first adaptor	211:	inlet port
212:	outlet port	213:	external connection port
214:	internal connection port	216:	feed water valve connection port
217:	returning heating water connection port		
220:	second adaptor		

(continued)

221:	inlet port	222:	outlet port
223:	internal connection port	224:	external connection port
226:	feed water valve connection port		
231:	first connection member		
232:	second connection member	241:	third connection member
242:	fourth connection member	300:	feed water valve

Modes of the Invention

[0013] Hereinafter, the configurations and operations of exemplary embodiments of the present invention will be described in detail with reference to the accompanying drawings.

[0014] FIG. 2 is a perspective view of a hot water heat exchanger according to the present invention.

[0015] A hot water heat exchanger 1 according to the present invention includes a heat exchanging part 100 in which a plurality of partitions are arranged to overlap, and heating water and direct water flow through spaces among the partitions, and thus heat exchange is achieved therebetween, and a first adaptor 210 and a second adaptor 220 coupled to the heat exchanging part 100 to connect the heat exchanging part 100 and pipes 41, 42, 43 and 44 (FIG. 1) of a heating line and a hot water line.

[0016] FIG. 3 is an exploded perspective view of the hot water heat exchanger of FIG. 2, FIG. 4 is a schematic cross-sectional view taken along a line A-A of a heat exchanging part of the hot water heat exchanger of FIG. 2, and FIG. 5 is a schematic cross-sectional view taken along a line B-B of the heat exchanging part of the hot water heat exchanger of FIG. 2.

[0017] As an example, the heat exchanging part 100 is configured with a structure in which thirteen partitions 101 to 113 overlap. The partitions 101 to 113 serve as heat transfer surfaces on which the heat exchange between the heating water and the direct water is performed, and have a stacking structure in which edge portions of thin plates are bent and the edge portions of the adjacent partitions 101 to 113 are welded and coupled to each other.

[0018] The partitions 101 to 113 have concavo-convex portions to increase a heat transfer area. The concavo-convex portions are omitted in FIGS. 4 and 5.

[0019] The partitions 101 to 113 define heating water passing holes 101a to 112a and 102b to 111b and direct water passing holes 101c to 112c and 103d to 112d through which the heating water and the direct water may flow in the heat exchanging part 100 without being mixed.

[0020] The heating water passing holes 101a to 112a and 102b to 111b and the direct water passing holes 101c to 112c and 103d to 112d may be defined by protruding and also bending flat portions of the partitions 101 to 113 to form flanges, and thus the partitions may be coupled so that the heating water passing holes and the direct water passing holes of the adjacent partitions are respectively in communication with each other. As illustrated in FIGS. 4 and 5, the flange shapes protruding around the heating water passing holes and the direct water passing holes may be formed on the adjacent partitions. Otherwise, only the holes may be formed in one partition, and the flanges may be formed on another adjacent partition by protruding the holes.

[0021] The heating water passing holes 101a to 112a and 102b to 111b connected as described above form a passage through which the heating water flows, and the direct water passing holes 101c to 112c and 103d to 112d form a passage through which the direct water flows.

[0022] As illustrated in FIGS. 4 and 5, the space formed among the partitions 101 to 113 defines heating water circulation passages 131 and 132 and direct water circulation passages 133 and 134. The heating water introduced into the heat exchanging part 100 through the first adaptor 210 passes, in turn, through the first heating water circulation passage 131 and the second heating water circulation passage 132, and is heat-exchanged with the direct water passing through the first direct water circulation passage 133 and the second direct water circulation passage 134, and then discharged to a heating water returning side through the first adaptor 210. Further, the direct water introduced into the heat exchanging part 100 through the second adaptor 220 passes, in turn, through the first direct water circulation passage 133 and the second direct water circulation passage 134, and is heat-exchanged with the heating water passing through the first heating water circulation passage 131 and the second heating water circulation passage 132, and then supplied to a place requiring hot water through the second adaptor 220.

[0023] A heating water passing portion 101e is provided at the partition 101, to which the adaptors 210 and 220 are coupled, to protrude toward an outside of the heat exchanging part 100 and also to diagonally cross the partition 101. A space formed between the first partition 101 having the heating water passing portion 101e and another adjacent partition 102 defines the first heating water circulation passage 131. The concavo-convex portions are formed on the adjacent partition 102. In this case, since the remaining flat portion of the partition 101 other than the heating water

passing portion 101e may be in contact with or close to the concavo-convex portions formed at the adjacent partition 102, flow resistance may be increased when the heating water passes through this area. In the present invention, since the heating water passing portion 101e is formed to protrude to the outside, and the heating water passing hole 101a through which the heating water is introduced is formed at one end of the heating water passing portion 101e, the heating water may be led to the heating water passing portion 101e having the expanded passage, and thus the flow resistance is reduced when the heating water passes.

[0024] Meanwhile, a direct water passing portion 113e is provided at another partition 113, which is disposed at the other side of the heat exchanging part 100 to be opposite to the first partition 101, to protrude toward the outside of the heat exchanging part 100 and also to diagonally cross the other partition 113. A space formed between the partition 113 having the direct water passing portion 113e and another partition 112 adjacent thereto defines the first direct water circulation passage 133. Since the passage is expanded due to the direct water passing portion 113e, the flow resistance is reduced when the direct water passes through the first direct water circulation passage 133.

[0025] FIG. 6 is a cross-sectional view illustrating a state in which a first connection member and a second connection member are coupled to a first adaptor according to the present invention, and FIG. 7 is a cross-sectional view illustrating a state in which a third connection member and a fourth connection member are coupled to a second adaptor according to the present invention.

[0026] A coupling structure between the heat exchanging part 100 and the first adaptor 210 will be described with reference to FIG. 6.

[0027] An end of a first connection member 231 is inserted and coupled into the heating water passing hole 101a formed in the first partition 101. The first connection member 231 has a cylindrical body, and an upper end of the body is bent, and the bent portion is inserted into and welded to the heating water passing hole 101a.

[0028] A second connection member 232 is inserted into the first connection member 231. The second connection member 232 has a body which partly protrudes to an upper side of the first connection member 231, and an upper end of the protruding portion is inserted and coupled into the heating water passing holes 102b and 103b of the second and third partitions 102 and 103.

[0029] An inner circumferential surface of the first connection member 231 and an outer circumferential surface of the second connection member 232 are spaced apart from each other, and the heating water introduced through an inlet port 211 passes through a space 231a formed therebetween.

[0030] The first adaptor 210 connects a heating water pipe and the heat exchanging part 100 so that the heating water is introduced or discharged therethrough. The inlet port 211, an outlet port 212 and connection ports 213 and 214 are integrally formed by an injection molding process.

[0031] The inlet port 211 is connected with the pipe 41 of the heating line in FIG. 1 so that the heating water is introduced therethrough, and the outlet port 212 is connected with the pipe 42 of the heating line in FIG. 1 so that the heating water passing through the heat exchanging part 100 is discharged through the outlet port 212.

[0032] The connection ports 213 and 214 include an external connection port 213 inserted and coupled into a lower end of the first connection member 231, and an internal connection port 214 inserted and coupled into a lower end of the second connection member 232. The internal connection port 214 is concentrically disposed in the external connection port 213.

[0033] The heating water introduced through the inlet port 211 passes through a space 215 between the external connection port 213 and the internal connection port 214, and is discharged through a space 231a between the first connection member 231 and the second connection member 232, and then introduced into the first heating water circulation passage 131.

[0034] The heating water circulated in the heat exchanging part 100 passes through internal spaces of the second connection member 232 and the internal connection port 214 and then is discharged through the outlet port 212.

[0035] An O-ring configured to maintain airtightness may be inserted into a coupling portion between the first connection member 231 and the external connection port 213 and a coupling portion between the second connection member 232 and the internal connection port 214.

[0036] In a state in which the external connection port 213 and the internal connection port 214 are inserted into the lower ends of the first and second connection members 231 and 232 through the O-ring, if the external connection port 213 and a protruding outer circumferential surface of the first connection member 231 are fixed to each other by a clamp or the like, the first adaptor 210 may be removable.

[0037] In this case, since the upper end of the first connection member 231 is welded around the heating water passing hole 101c of the partition 101, and the upper end of the second connection member 232 is welded around the heating water passing holes 102b and 103b of the partitions 102 and 103, only the first adaptor 210 may be separated from the first and second connection members 231 and 232.

[0038] Meanwhile, a feed water valve connection port 216 (referring to FIG. 8) connected with a feed water valve 300 (referring to FIG. 8) configured to replenish the heating water into the heating water pipe of a boiler may be formed at the first adaptor 210. The feed water valve 300 serves to additionally supply the heating water when the heating line

lacks the heating water. Since the feed water valve 300 is connected to the feed water valve connection port 216 which is integrally formed at the first adaptor 210, the piping structure may be simplified.

[0039] Further, a returning heating water connection port 217 (referring to FIG. 8) may be provided at the first adaptor 210. The returning heating water connection port 217 is connected to the heating water pipe side in which the returning heating water flows. The returning heating water introduced through the returning heating water connection port 217 is supplied to a circulation pump 10 through the outlet port 212.

[0040] A coupling structure between the heat exchanging part 100 and the second adaptor 220 will be described with reference to FIG. 7.

[0041] A third connection member 241 is inserted and coupled into the direct water passing holes 101c and 102c formed in the first and second partitions 101 and 102. The third connection member 241 has a cylindrical body, and an upper end of the body is bent, and the bent portion is inserted into and welded to the direct water passing holes 101c and 102c.

[0042] A fourth connection member 242 is inserted into the third connection member 241. The fourth connection member 242 has a body which partly protrudes to an upper side of the third connection member 241, and an upper end of the protruding portion is coupled around the direct water passing holes 111c and 112c of the partitions 111 and 112 disposed at an upper side of the heat exchanging part 100.

[0043] An inner circumferential surface of the third connection member 241 and an outer circumferential surface of the fourth connection member 242 are spaced apart from each other, such that a space 241a formed therebetween is in communication with the outlet port 222.

[0044] The second adaptor 220 connects the direct water/hot water pipe 43 or 44 and the heat exchanging part 100 so that the direct water/hot water is introduced or discharged therethrough. An inlet port 221, an outlet port 222 and connection ports 223 and 224 are integrally formed by an injection molding process.

[0045] The inlet port 221 is connected with the pipe 43 of FIG. 1 so that the direct water is introduced therethrough, and the outlet port 222 is connected with the pipe 44 of FIG. 1 so that the heating water heated while passing through the heat exchanging part 100 is discharged therethrough.

[0046] The connection ports 223 and 224 include an external connection port 224 inserted and coupled into a lower end of the third connection member 241, and an internal connection port 223 inserted and coupled into a lower end of the fourth connection member 242. The internal connection port 223 is concentrically disposed in the external connection port 224.

[0047] The direct water introduced through the inlet port 221 is introduced into the first direct water circulation passage 133 through inner spaces of the internal connection port 223 and the fourth connection member 242.

[0048] The direct water circulated in the heat exchanging part 100 through the first direct water circulation passage 133 passes, in turn, through a space 241a formed between the third connection member 241 and the fourth connection member 242 and a space 225 formed between the external connection port 224 and the internal connection port 223 and in communication with the space 241a, and then is discharged through the outlet port 222.

[0049] An O-ring configured to maintain airtightness may be inserted into a coupling portion between the third connection member 241 and the external connection port 224 and a coupling portion between the fourth connection member 242 and the internal connection port 223.

[0050] In a state in which the external connection port 224 and the internal connection port 223 are inserted into the lower ends of the third and fourth connection members 241 and 242 through the O-ring, if the external connection port 224 and a protruding outer circumferential surface of the third connection member 241 are fixed to each other by a clamp or the like, the second adaptor 220 may be removable.

[0051] In this case, since the upper end of the third connection member 241 is welded around the passing holes 101c and 102c of the partitions 101 and 102, and the upper end of the fourth connection member 242 is welded around the passing holes 111c and 112c of the partitions 111 and 112, only the second adaptor 220 may be separated from the third and fourth connection members 241 and 242.

[0052] As described above, since the inlet ports 211 and 221, the outlet ports 212 and 222 and the connection ports 213, 214, 223 and 224 are integrally formed at the first and second adaptors 210 and 220 of the present invention, the piping structure may be simplified.

[0053] A feed water valve connection port 226 (referring to FIG. 8) connected with the feed water valve 300 may be provided at the second adaptor 220.

[0054] FIG. 8 is a cross-sectional view respectively illustrating a passage of heating water and a passage of hot water in a state in which the first and second adaptors are coupled to the heat exchanging part according to the present invention.

[0055] The first and second adaptors 210 and 220 configured to connect the heating water pipe and the hot water pipe are coupled to the heat exchanging part 100, and the first adaptor 210 and the heat exchanging part 100 are coupled to each other through the first connection member 231 and the second connection member 232.

[0056] When the three-way valve 30 is switched into a hot water mode, the heating water heated in the main heat exchanger 20 does not flow to a place to be heated, but is supplied to the hot water heat exchanger 1 and introduced

into the inlet port 211 of the first adaptor 210.

[0057] The heating water introduced from the inlet port 211 of the first adaptor 210 passes, in turn, through the space 215 between the external connection port 213 and the internal connection port 214 of the first adaptor 210 and the space 231a between the first connection member 231 and the second connection member 232 and then introduced into the first heating water circulation passage 131 formed between the first partition 101 and the adjacent partition 102.

[0058] Since the upper end of the second connection member 232 is coupled so that the heating water is not introduced into the heating water passing holes 102b and 103b of the partitions 102 and 103, the heating water introduced into the first heating water circulation passage 131 horizontally flows along the first heating water circulation passage 131, and then is introduced into the upper heating water circulation passage through other heating water passing holes 102a and 103a which are diagonally formed with respect to the heating water passing holes 102b and 103b.

[0059] Since the heating water passing portion 101e having the expanded flow cross-sectional area is formed at the partition 101 defining the first heating water circulation passage 131, the flow resistance is not greatly applied to the heating water passing through the first heating water circulation passage 131.

[0060] The heating water passing through the heating water passing holes 102a and 103a passes, in turn, through the heating water passing holes 104a to 111a of another partition formed immediately thereabove, and then horizontally flows through a plurality of second heating water circulation passages 132 formed above the first heating water circulation passage 131 in a direction opposite to the flow direction in the first heating water circulation passage 131.

[0061] The heating water heat-exchanged with the direct water passing through the direct water circulation passages 133 and 134 while passing through the second heating water circulation passage 132 passes, in turn, through the heating water passing holes 111b to 104b formed in a diagonally horizontal direction of the heating water passing holes 104a to 111a, and then is discharged to the expansion tank 50 through the outlet port 212 in a state in which a temperature thereof is lowered while being introduced into the second connection member 232 and passing through the internal connection port 214 of the first adaptor 210.

[0062] At the same time, the direct water is introduced into the inlet port 221 of the second adaptor 220. The direct water introduced into the inlet port 221 passes through the inner sides of the internal connection port 223 and the fourth connection member 242, and then is introduced into the first direct water circulation passage 133 formed at an opposite side of the heat exchanging part 100 to which the adaptors 210 and 220 are coupled.

[0063] The direct water introduced into the first direct water circulation passage 133 flows horizontally and then is introduced into the lower direct water circulation passage through the direct water passing holes 111d and 112d formed in the partitions 111 and 112.

[0064] Since the direct water passing portion 113e having the expanded flow cross-sectional area is formed at the partition 113 defining the first direct water circulation passage 133, the flow resistance is not greatly applied to the direct water passing through the first direct water circulation passage 133.

[0065] The direct water passing through the passing holes 111d and 112d passes, in turn, through the direct water passing holes 110d to 103d of another partition formed immediately therebelow, and then horizontally flows through a plurality of second direct water circulation passages 134 formed below the first direct water circulation passage 133 in a direction opposite to the flow direction in the first direct water circulation passage 133.

[0066] The direct water heat-exchanged with the heating water passing through the heating water circulation passages 131 and 132 while passing through the second direct water circulation passage 134 passes, in turn, through the direct water passing holes 110c to 103c formed in a diagonally horizontal direction of the direct water passing holes 110d to 103d, and then is discharged to the place requiring hot water through the outlet port 222 in a state of being changed into the hot water while being introduced into the space 241a between the third connection member 241 and the fourth connection member 242 and passing through the space 225 between the internal connection port 223 and the external connection port 224.

[0067] In this case, the fourth connection member 242 is inserted into the direct water passing holes 110c to 103c, and the direct water flows through an interval between an outer circumferential surface of the fourth connection member 242 and the direct water passing holes 110c to 103c.

[0068] In the present invention, as described above, since one first heating water circulation passage 131, the plurality of second direct water circulation passages 134, the plurality of second heating water circulation passages 132 and one first direct water circulation passage 133 are stacked in turn, the flow passages of the heating water and the direct water flowing in the heat exchanging part 100 are short, and thus the flow resistance is reduced.

[0069] That is, since the first heating water circulation passage 131 serving as the first space in the heat exchanging part 100 in which the heating water is introduced, and the first direct water circulation passage 133 serving as the first space in the heat exchanging part 100 in which the direct water is introduced are respectively formed at one side and the other side of the heat changing part 100, the flow passages of the heating water and the direct water may be shortened.

[0070] Meanwhile, when the three-way valve 30 is switched into a heating mode, the heating water supplied to the place to be heated performs the heat exchanging process and then is returned to the circulation pump 10. In the present invention, the returning heating water returned to the circulation pump 10 is introduced into the returning heating water

connection port 217 of the first adaptor 210, and then returned to the circulation pump 10 through the outlet port 212 and the expansion tank 50.

[0071] If the heating line lacks the heating water, the feed water valve 300 is opened to replenish the heating water. The feed water valve 300 is installed between the feed water valve connection port 216 of the first adaptor 210 and the feed water valve connection port 226 of the second adaptor 220. Therefore, if the feed water valve 300 is opened, some of the hot water in the second adaptor 220 passes, in turn, through the feed water valve connection port 226, the feed water valve connection port 216 of the first adaptor 210 and the outlet port 212, and then is supplied to the heating water pipe disposed at the returning water side.

Claims

1. A hot water heat exchanger comprising:

a heat exchanging part (100) in which a plurality of partitions (101 to 113) are arranged to overlap, and heating water and direct water supplied from a main heat exchanger alternately flow through spaces (131, 132, 133 and 134) among the partitions, and thus heat exchange is achieved therebetween, a first adaptor (210) in which an inlet port (211) through which the heating water is introduced and an outlet port (212) through which the heating water heat-exchanged in the heat exchanging part (100) is discharged are integrally formed and coupled to the heat exchanging part (100), and a second adaptor (220) in which an inlet port (221) through which the direct water is introduced and an outlet port (222) through which hot water heat-exchanged with the heating water and thus heated in the heat exchanging part (100) is discharged are integrally formed and coupled to the heat exchanging part (100), wherein the first adaptor (210) and the second adaptor (220) are connected to the partition (101) configured to define one side surface of the heat exchanging part (100), a first heating water circulation passage (131) through which the heating water introduced from the inlet port (211) of the first adaptor (210) flows is formed at the space between the partition (101) and the partition (102) adjacent thereto, a first direct water circulation passage (133) through which the direct water introduced from the inlet port (221) of the second adaptor (220) flows is formed at the space between the partition (113) configured to define the other side surface of the heat exchanging part (100) and the partition (112) adjacent thereto, and a plurality of second heating water circulation passages (132) through which the heating water passing through the first heating water circulation passage (131) flows, and a plurality of second direct water circulation passages (134) through which the direct water passing through the first direct water circulation passage (133) flows are alternately formed between the first heating water circulation passage (131) and the first direct water circulation passage (133).

2. The hot water heat exchanger of claim 1, wherein a heating water passing portion (101e) is formed at the partition (101) configured to define the one side surface of the heat exchanging part (100) to protrude toward an outer side of the heat exchanging part (100) and also to diagonally cross the partition (101), and thus a flow cross-sectional area of the first heating water circulation passage (131) is expanded.

3. The hot water heat exchanger of claim 2, wherein a direct water passing portion (113e) is formed at the partition (113) configured to define the other side surface of the heat exchanging part (100) to protrude toward the outer side of the heat exchanging part (100) and also to diagonally cross the other partition (113), and thus a flow cross-sectional area of the first direct water circulation passage (133) is expanded.

4. The hot water heat exchanger of claim 2 or 3, wherein an external connection port (213) connected to the passing hole (101a) formed at one side of the partition (101), and an internal connection port (214) inserted into the external connection port (213) to be concentric with the external connection port (213) and connected to the heating water passing holes (102b and 103b) of the partitions (102 and 103) adjacent to the partition (101) are integrally formed at the first adaptor (210), the heating water introduced into the inlet port (211) is introduced into the first heating water circulation passage (131) through the space (215) between the external connection port (213) and the internal connection port (214), an external connection port (224) connected to the direct water passing hole (101c and 102c) formed at the other side of the partition (101), and an internal connection port (223) inserted into the external connection port (224) to be concentric with the external connection port (224) and connected to the direct water passing holes (111c and 112c) of the partitions (111 and 112) adjacent to the partition (113) are integrally formed at the second adaptor 220, and

the direct water introduced into the inlet port (221) is introduced into the first direct water circulation passage (133) through the space (225) between the external connection port (224) and the internal connection port (223).

5. The hot water heat exchanger of claim 4, wherein the external connection port (213) of the first adaptor (210) and the heating water passing hole (101a) are connected through a first connection member (231),
the internal connection port (214) of the first adaptor (210) and the heating water passing holes (102b and 103b) are connected through a second connection member (232) of which an end further protrudes toward an outer side of the first connection member 231 to define a space (231a), through which the heating water flows, between the first connection member (231) and the second connection member (232),
the external connection port (224) of the second adaptor (220) and the direct water passing holes (101c and 102c) are connected through a third connection member (241), and
the internal connection port (223) of the second adaptor (220) and the direct water passing holes (111c and 112c) are connected through a fourth connection member (242) of which an end further protrudes toward an outer side of the third connection member 241 to define a space (241a), through which the direct water flows, between the third connection member (241) and the fourth connection member (242).
6. The hot water heat exchanger of claim 5, wherein an upper end of the first connection member 231 is welded around the direct water passing hole (101c) of the partition (101), and an upper end of the second connection member 232 is welded around the heating water passing holes (102b and 103b) of the partitions (102 and 103),
an upper end of the third connection member 241 is welded around the direct water passing holes (101c and 102c) of the partitions (101 and 102), and an upper end of the fourth connection member 242 is welded around the direct water passing holes (111c and 112c) of the partitions (111 and 112),
an upper end of the external connection port (213) of the first adaptor (210) is inserted into a lower end of the first connection member (231) and an upper end of the internal connection port (214) of the first adaptor (210) is inserted into a lower end of the second connection member (232), such that airtightness is maintained by an O-ring, and
an upper end of the external connection port (224) of the second adaptor (220) is inserted into a lower end of the third connection member (241) and an upper end of the internal connection port (223) of the second adaptor (220) is inserted into a lower end of the fourth connection member (242), such that airtightness is maintained by an O-ring.

FIG. 1

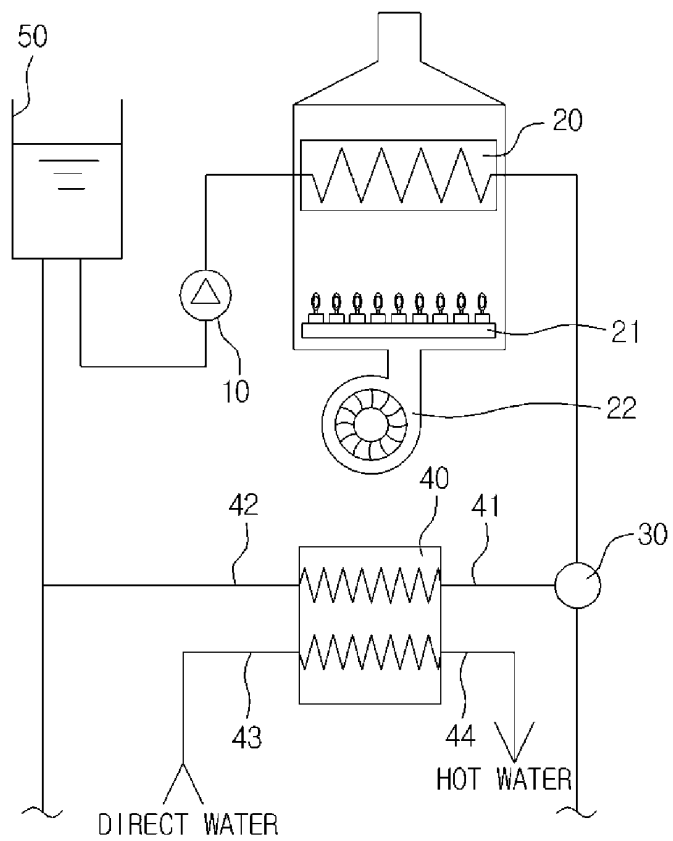


FIG. 2

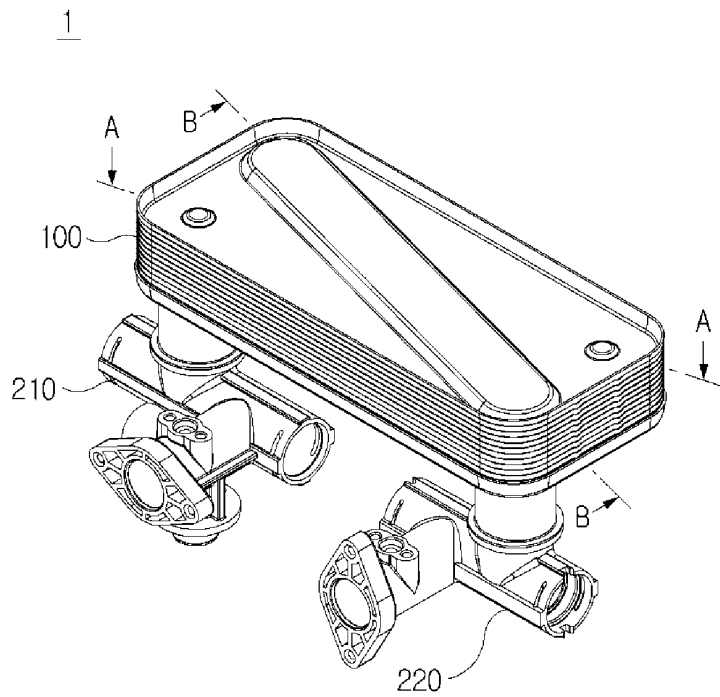


FIG. 3

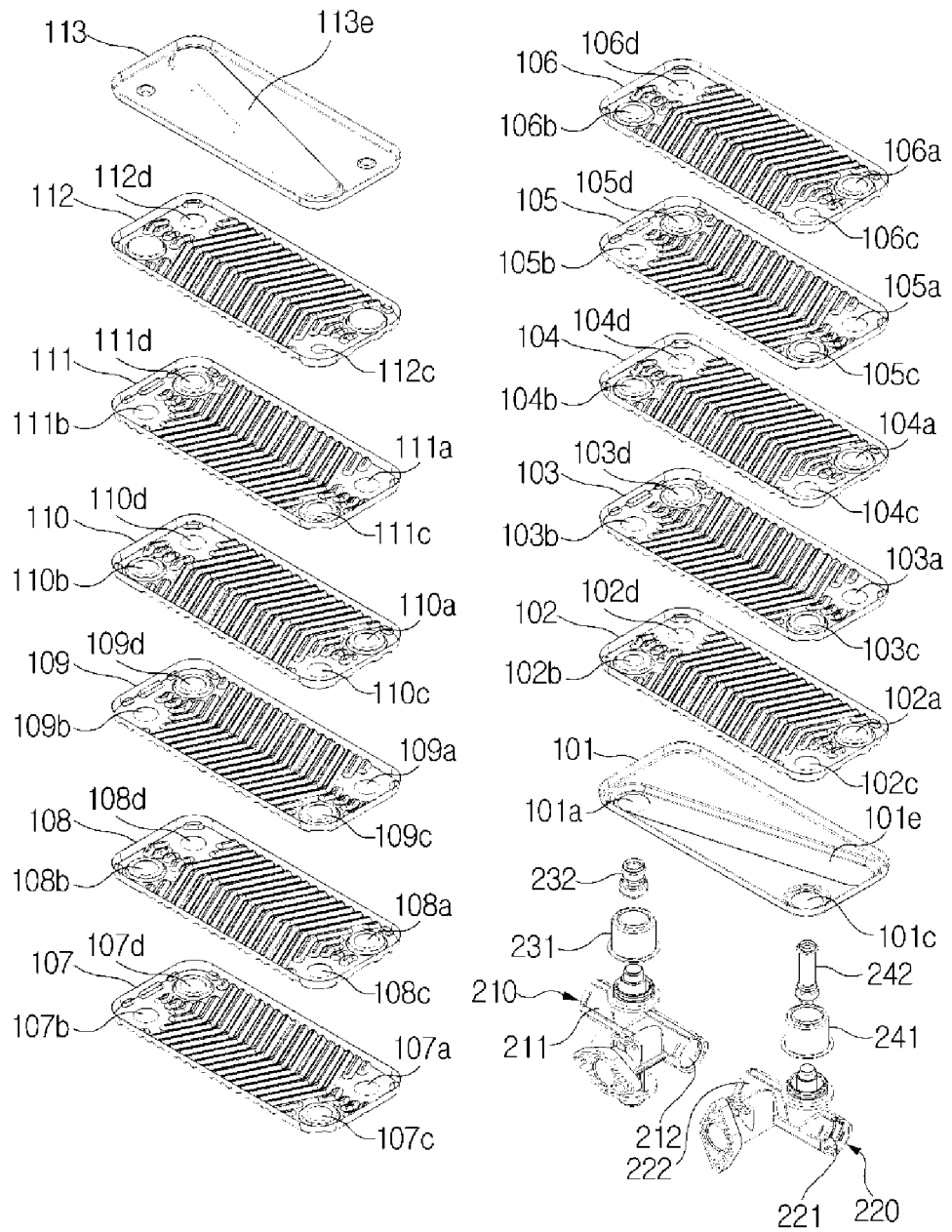


FIG. 4

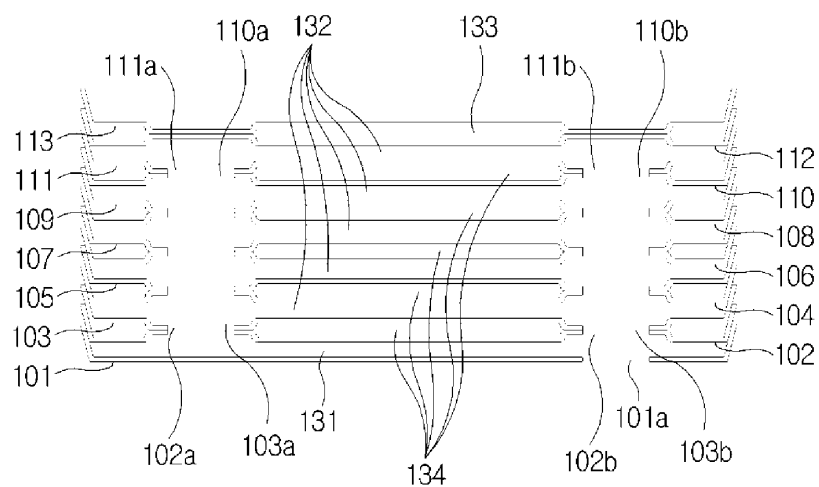


FIG. 5

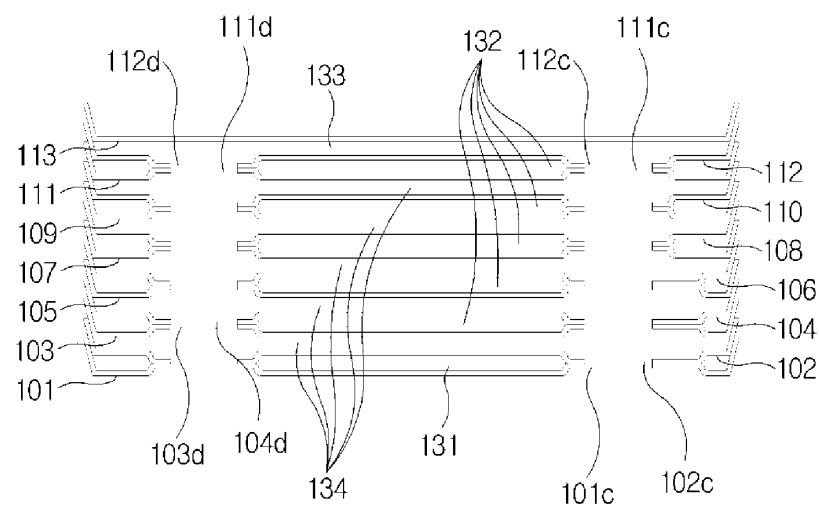


FIG. 6

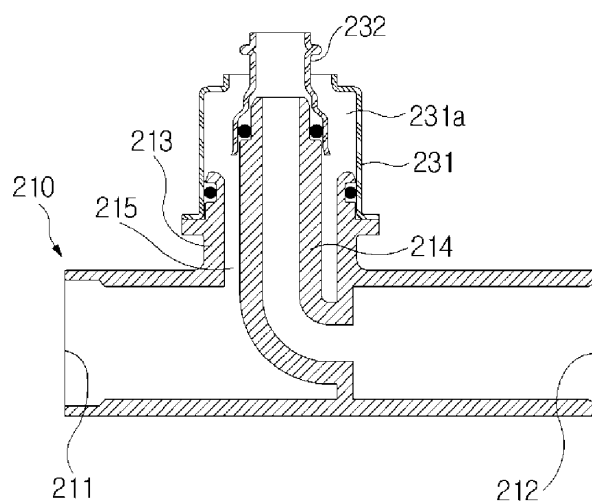


FIG. 7

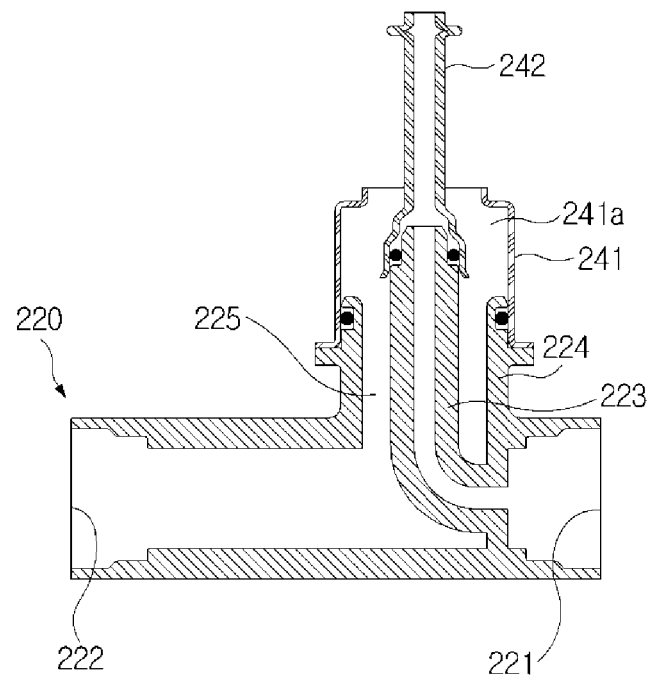
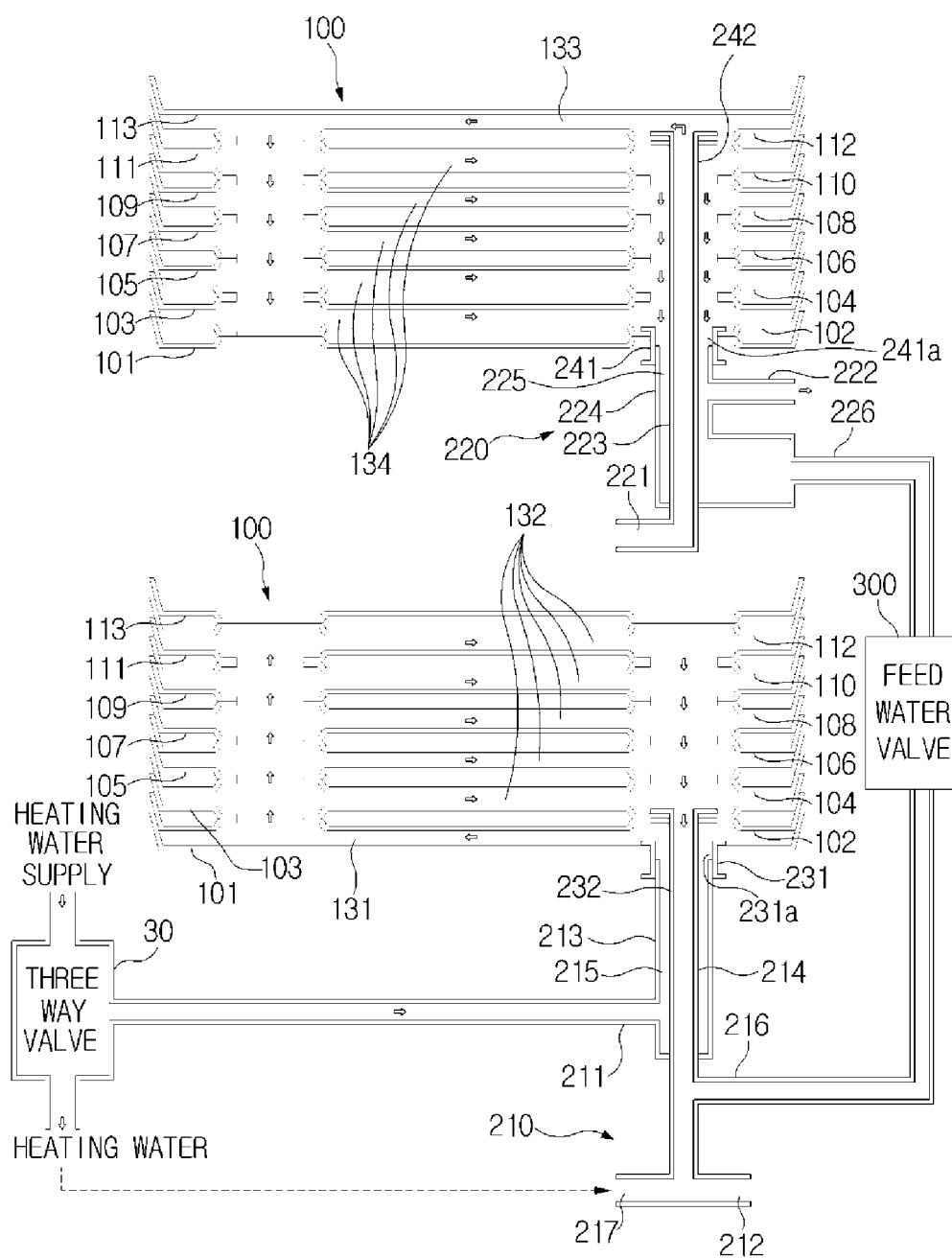


FIG. 8



INTERNATIONAL SEARCH REPORT

International application No.

PCT/KR2012/009559

A. CLASSIFICATION OF SUBJECT MATTER

F24D 3/00(2006.01)i, F28D 9/02(2006.01)i, F24D 9/00(2006.01)i, F28F 3/08(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

F24D 3/00; F24H 1/00; F28F 3/08; F24D 3/10; F28F 3/02; F28F 3/04; F24H 1/10; F28D 1/03

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean Utility models and applications for Utility models: IPC as above

Japanese Utility models and applications for Utility models: IPC as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS (KIPO internal) & Keywords: hot water supply, heat exchanger, adapter, heating water circulation path, tankless circulation path

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	KR 10-2010-0007546 A (KYUNG DONG NAVIEN CO., LTD.) 22 January 2010 See paragraphs 16-51 and figures 1-11	1 2-6
A	JP 2005-326074 A (HISAKA WORKS LTD) 24 November 2005 See paragraphs 20-42 and figures 1-9	1-6
A	KR 10-0645734 B1 (KYUNG DONG NAVIEN CO., LTD.) 15 November 2006 See claims 1-4 and figures 1-4	1-6
A	JP 11-257877 A (NIPPON CLIMATE SYSTEMS CORP) 24 September 1999 See paragraphs 13-35 and figures 1-8	1-6

☐ Further documents are listed in the continuation of Box C.
 ☒ See patent family annex.

* Special categories of cited documents:

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

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Date of the actual completion of the international search

24 JANUARY 2013 (24.01.2013)

Date of mailing of the international search report

25 JANUARY 2013 (25.01.2013)

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/KR2012/009559

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		JP 2941768 B2	30.08.1999

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Patent documents cited in the description

- KR 101002382 [0005] [0006]