



(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
15.03.2017 Bulletin 2017/11

(51) Int Cl.:
F24F 5/00 (2006.01)

(21) Application number: **15822900.5**

(86) International application number:
PCT/JP2015/070171

(22) Date of filing: **14.07.2015**

(87) International publication number:
WO 2017/009951 (19.01.2017 Gazette 2017/03)

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
MA

(71) Applicant: **Eco Factory Co. Ltd.**
Kumamoto 862-0950 (JP)

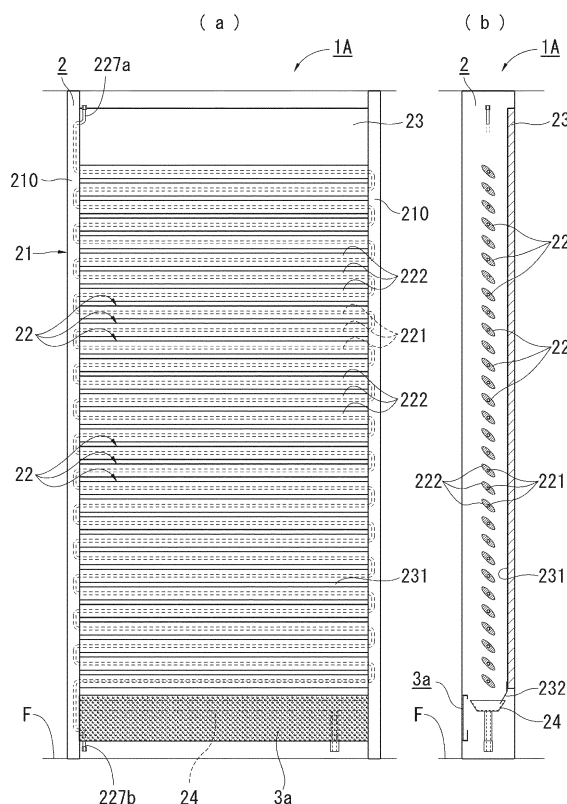
(72) Inventor: **MURAKAMI Takanobu**
Kumamoto-shi
Kumamoto 862-0950 (JP)

(74) Representative: **Isarpatent**
Patent- und Rechtsanwälte Behnisch Barth
Charles
Hassa Peckmann & Partner mbB
Postfach 44 01 51
80750 München (DE)

(54) **AIR CONDITIONER AND AIR CONDITIONING SYSTEM**

(57) An air conditioning device 1A includes a support frame 21, a heat generating portion 22 having flow pipes for a flowable heating medium which are respectively laterally laid at an interval in an up-and-down direction across an intermediate region of the support frame and outer shell bodies covering the flow pipes, each showing a flat shape or elliptical shape as an outer shape of a cross-section of a peripheral wall, having a structure capable of dissipating to the outside heat transmitted from the flow pipe, and attached so that long axis directions perpendicular to a longitudinal direction are inclined in the same direction, a reflector 23 having a reflecting surface that reflects radiant heat from the heat generating portion and is not permeable to water, and disposed on the back side of the air conditioning device 1A and a gutter-shaped receiving portion 24 disposed under the reflector.

[Fig. 1]



Description

Technical Field

[0001] The present invention relates to an air conditioning device and an air conditioning system. Specifically, the present invention relates to an air conditioning device and an air conditioning system configured so as to prevent staining the periphery of an installation site of the air conditioning device with water condensed as dew on a heat generating portion.

Background Art

[0002] Conventionally, an air conditioning device using radiant heat of a heat exchanger has been used in order to eliminate a draft sensation that is produced in a blow type air conditioning device and with which a person in the surrounding area feels uncomfortable. As such an air conditioning device, for example, one for which a plurality of heat exchangers are laterally laid and disposed in a vertically aligned manner has been proposed, as in an air conditioning device described in Patent Document 1.

[0003] The air conditioning device 9 described in Patent Document 1 shown in Fig. 12 is a device which makes a heating medium flow through the inside of a flow path member to perform heating or cooling of the outside of the flow path member by heat exchange with the heating medium, in which heat exchangers 90 for which an inner core member is housed in the inside of the flow path member and a flow channel through which the heating medium is made to flow is formed by a surface of the inner core member and an inner surface of the flow path member are arranged side by side vertically, horizontally, or in a direction other than the vertical and horizontal directions, so as to circulate the heating medium through the heat exchangers 90.

[0004] The air conditioning device 9, by having the configuration described above, can eliminate during operation a draft sensation with which a person in the surrounding area feels uncomfortable and also achieves a quick rise in temperature of a surface of the flow path member that is a heat exchanging portion, and is therefore highly convenient.

Prior Art Document

Patent Document

[0005] Patent Document 1: WO2009/130764

SUMMARY OF THE INVENTION

Problem(s) to be Solved by the Invention

[0006] On the other hand, because the air conditioning device 9 described in Patent Document 1 has its heat exchangers 90 in round bar shapes and vertically dis-

posed, during a cooling operation, dew condensation water produced on the heat exchangers 90 have sometimes dipped onto a front side or back side of the air conditioning device 9 to stain the periphery of a site where the air conditioning device 9 has been installed.

[0007] Also, as shown in Fig. 13, when a reflector 91 is disposed at the back side of the air conditioning device 9 in order to improve heat radiation efficiency, an indoor heat convection occurs, and air may enter into a clearance gap between the reflector 91 and the heat exchangers 90 to flow in a direction opposite to the reflector 96 from between the heat exchangers 90. At this time, droplets of dew condensation water produced on the heat exchangers 90 may be carried on the convective air to splatter onto the front side of the air conditioning device 9 and stain the surroundings. Such stains due to dew condensation water present a poor appearance and also cause mold and the like, and are thus not preferable from a hygienic point of view.

[0008] The present invention has been made in view of the above points, and an object thereof is to provide an air conditioning device and an air conditioning system configured so as to prevent the periphery of an installation site from being stained by dripping, splattering, etc., of water having condensed on a heat generating portion.

Means for Solving the Problem(s)

[0009] In order to achieve the above object, an air conditioning device of the present invention includes a support frame having support portions provided to stand on an installation surface and disposed at an interval in a horizontal direction, a heat generating portion having, in a region between the support portions of the support frame, flow pipes which are respectively laterally laid thereacross at an interval in an up-and-down direction and inside of which a flowable heating medium can flow through and outer shell bodies covering the respective flow pipes, each showing a flat shape or elliptical shape as an outer shape of a cross-section, having a structure capable of dissipating to the outside heat transmitted from the flow pipe, and attached so that long axis directions perpendicular to a longitudinal direction are inclined in the same direction, a reflector having a reflecting surface that reflects radiant heat from the heat generating portion and is not permeable to water, and disposed so that an end edge portion at a lower side in the long axis direction of the outer shell body and the reflecting surface are opposed at an interval, and a gutter-shaped receiving portion disposed below the heat generating portion and under the reflector, and opened at an upper part.

[0010] Here, the support frame, in the region between the support portions, supports the heat generating portion in a manner laterally laid in the horizontal direction, and supports the outer shell bodies of the heat generating portion at an interval in the up-and-down direction.

[0011] When the flowable heating medium flows through the flow pipe housed inside the heat generating

portion, heat is transmitted to the outer shell body having a structure capable of dissipating to the outside heat transmitted from the flow pipe, and the heat generating portion radiates radiant heat to its surroundings. Also, the outer shell body covering the flow pipe prevents the flow pipe from being deformed or damaged by an outside pressure or impact and makes the surface area larger than when the heat generating part is a simple tubular body to improve the heat exchange efficiency.

[0012] Also, as a result of the heat generating portion being disposed in the horizontal direction and having the outer shell bodies being a constituent of the heat generating portion each showing a flat shape or elliptical shape as an outer shape of a cross-section (the term "cross-section" is used with a meaning of a section in a direction perpendicular to the longitudinal direction of the heat generating portion. The same applies in the following.) and being attached so that the long axis directions perpendicular to the longitudinal direction are inclined in the same direction, dew condensation water produced on the surface of the heat generating portion flows down only to the reflector side which is the direction of inclination.

[0013] The reflector reflects radiant heat radiated to the reflector side of the heat generating portion to emit the radiant heat to the outside of the air conditioning device through the clearance gap in the heat generating portion. Also, if dew condensation water from the heat generating portion adheres to the reflector, the adhered dew condensation water runs down the plate surface to flow down onto the receiving portion located below.

[0014] The gap between the end edge portion at the lower side in the long axis direction of the outer shell body of the outer shell body of the heat generating portion and the reflecting surface serves as a flow path when air heated or cooled by the heat generating portion rises or falls.

[0015] The receiving portion receives dew condensation water that has run down the heat generating portion to drip or dew condensation water that has run down the reflector to drip. Additionally, the receiving portion prevents cold air convecting from an up to down direction during cooling from directly contacting the installation surface to prevent dew condensation, and changes the direction of convection to guide the cold air so as to flow to the outside of the device.

[0016] The heat generating portion, the reflector, and the receiving portion, in conjunction with one another, receive the dew condensation water produced on the heat generating portion so as not to leak.

[0017] With the air conditioning device including the support frame, the heat generating portion, the reflector, and the receiving portion, during operation, a person in the surrounding area never feels an uncomfortable draft sensation, and air heated or cooled by the heat generating portion directly warms or cools a space in front of the reflector, and can efficiently warm and cool the installation space because convection occurs in the installation space.

[0018] When the outer shell body has a pair of shell members having the same shape as each other and is structured so that, in each one shell member, a fitting portion in which an abutting portion formed with a concave face to be joined so as to be closely fitted to an outer surface of the flow pipe, a projecting piece portion to be fitted by being inserted into a recess portion formed in the other shell member, and a recess portion into which a projecting piece portion formed in the other shell member is fitted by insertion are formed is provided to fit the shell members together, because of being a simple structure formed by only fitting the projecting piece portions and the recess portions provided therefor in the fitting portions, no special tool or special technique is required for an assembling operation to the flow pipe, which thus enables quick assembly.

[0019] Also, because the shell members are identical components, needless expense in component procurement can be eliminated to resultingly achieve a reduction in manufacturing costs. Additionally, the concave face portions formed in the fitting portions of the shell members, in a state of fitting together with the flow pipe sandwiched, make the outer shell body and the flow pipe be closely fitted and keep these so as to be immovable, and receive heat from the flow pipe to conduct the heat to the surface side of the outer shell body. Further, the outer shell body, by adjusting its close-fitting property with the flow pipe without fixedly mounting on the support frame, can turn around the flow pipe to set the angle in its transverse direction to a required angle and can thereby also adjust the radiation efficiency.

[0020] When the flowable heating medium is warm water or cold water, handling is easier than when the flowable heating medium is oil or a chemical, and there is less environmental burden at disposal.

[0021] When the flowable heating medium is a refrigerant, adopting one having a better heat exchange efficiency and rust preventing property as compared with those of water allows enhancing the performance of the air conditioning device such as a rise in temperature and maintenance properties. Also, in this case, a refrigerant exclusively for the air conditioning device may be used, or a refrigerant that is in common with a refrigerant circuit of an air conditioner to be described later may be used.

[0022] When the air conditioning device includes a panel body attached to a region of the support frame to be on an opposite side of the reflector with the heat generating portion therebetween, and provided with a clearance for ventilation in a ceiling direction or with respect to the installation surface, the panel body serves a role of a protective cover to protect the heat generating portion or a mechanical portion such as a branching portion of the flow pipe, and also has a role of a screen. Further, by the panel body, the heat generating portion is sandwiched with the reflector to produce a chimney effect, and warm air or cold air is emitted from the clearance for ventilation to promote the convection of air, so that the heating efficiency or cooling efficiency is improved.

[0023] When at least a part of the panel body that covers the heat generating portion has a structure through which radiant heat generated by the heat generating portion can pass, the panel body serves a role of a protective cover of the heat generating portion, and the radiant heat that has passed the panel body can directly warm or cool a user and the ambient air.

[0024] When an advertisement, a sign, a picture, or a photo is displayed on a surface of the panel body, the panel body can be used as an advertisement panel or a signboard. That is, because the air conditioning device also has significant presence as it is in a largely exposed form in the indoor space in which the same is installed, when an advertisement is displayed thereon, it can be made to have a function of a more effective advertisement, and when an artistic image or the like is displayed thereon, various effects, such as the creation of a space with an atmosphere of splendor or a space that is relaxing to a person in the surrounding area, can be produced in the indoor space by the artistic image.

[0025] When one or a plurality of types of processing or coating selected from among knurling, alumite processing, heat dissipation coating, far infrared ray emission coating, and coating having a deodorizing function, an antibacterial function, or a volatile organic compound adsorption-decomposition function are applied to a surface of the outer shell body, applying these types of processing or the like allows providing various functions for the heat generating portion.

[0026] In greater detail, by applying knurling, an alumite processing, or a heat dissipation coating, the heat generating portion is improved in heat dissipation and the heat exchange at the heat generating portion is performed more efficiently, and if a far infrared ray emission coating is applied, the far infrared rays emitted from the heat generating portion, together with the radiant heat, cause indoor temperature adjustment to be performed efficiently. Further, by applying a coating having a deodorizing function, an antibacterial function, or a volatile organic compound adsorption-decomposition function, the maintenance of the air conditioning device is made simpler and comfortable use can be realized by these functions.

[0027] In order to achieve the above object, an air conditioning system of the present invention includes an air conditioning device including a support frame having support portions provided to stand on an installation surface and disposed at an interval in a horizontal direction, a heat generating portion having, in a region between the support portions of the support frame, flow pipes which are respectively laterally laid thereacross at an interval in an up-and-down direction and inside of which a flowable heating medium can flow through and outer shell bodies covering the respective flow pipes, each showing a flat shape or elliptical shape as an outer shape of a cross-section, having a structure capable of dissipating to the outside heat transmitted from the flow pipe, and attached so that long axis directions perpendicular to a

longitudinal direction are inclined in the same direction, a reflector formed with a reflecting surface that reflects radiant heat from the heat generating portion and is not permeable to water, and disposed so that an end edge portion at a lower side in the long axis direction of the outer shell body and the reflecting surface are opposed at an interval, and a gutter-shaped receiving portion disposed below the heat generating portion and under the reflector, and opened at an upper part, and an air conditioner to be operated in combination with the air conditioning device, including a refrigerant circuit in which a compressor, an expansion valve, a flow path switching valve, an indoor side heat exchanger, and an outdoor side heat exchanger are connected by piping to circulate a refrigerant to perform a refrigeration cycle, said air conditioning device being incorporated in said refrigerant circuit, and supplying air that has undergone heat exchange with the refrigerant by the indoor side heat exchanger to an indoor space by a fan.

[0028] Here, the support frame, in the region between the support portions, supports the heat generating portion in a manner laterally laid in the horizontal direction, and supports the outer shell bodies of the heat generating portion at an interval in the up-and-down direction.

[0029] When the flowable heating medium flows through the flow pipe housed inside the heat generating portion, heat is transmitted to the outer shell body having a structure capable of dissipating to the outside heat transmitted from the flow pipe, and the heat generating portion radiates radiant heat to its surroundings. Also, the outer shell body covering the flow pipe prevents the flow pipe from being deformed or damaged by an outside pressure or impact and makes the surface area larger than when the heat generating part is a simple tubular body to improve the heat exchange efficiency.

[0030] Also, as a result of the heat generating portion being disposed in the horizontal direction and having the outer shell bodies being a constituent of the heat generating portion each showing a flat shape or elliptical shape as an outer shape of a cross-section (the term "cross-section" is used with a meaning of a section in a direction perpendicular to the longitudinal direction of the heat generating portion. The same applies in the following.) and being attached so that the long axis directions perpendicular to the longitudinal direction are inclined in the same direction, dew condensation water produced on the surface of the heat generating portion flows down only to the reflector side which is the direction of inclination.

[0031] The reflector reflects radiant heat radiated to the reflector side of the heat generating portion to emit the radiant heat to the outside of the air conditioning device through the clearance gap in the heat generating portion. Also, if dew condensation water from the heat generating portion adheres to the reflector, the adhered dew condensation water runs down the plate surface to flow down onto the receiving portion located below.

[0032] The gap between the end edge portion at the

lower side in the long axis direction of the outer shell body of the outer shell body of the heat generating portion and the reflecting surface serves as a flow path when air heated or cooled by the heat generating portion rises or falls.

[0033] The receiving portion receives dew condensation water that has run down the heat generating portion to drip or dew condensation water that has run down the reflector to drip. Additionally, the receiving portion prevents cold air convecting from an up to down direction during cooling from directly contacting the installation surface to prevent dew condensation, and changes the direction of convection to guide the cold air so as to flow to the outside of the device.

[0034] The heat generating portion, the reflector, and the receiving portion, in conjunction with one another, receive the dew condensation water produced on the heat generating portion so as not to leak.

[0035] With the air conditioning device including the support frame, the heat generating portion, the reflector, and the receiving portion, during operation, a person in the surrounding area never feels an uncomfortable draft sensation, and air heated or cooled by the heat generating portion directly warms or cools a space in front of the reflector, and can efficiently warm and cool the installation space because convection occurs in the installation space.

[0036] Also, the air conditioner, as a result of being one including a refrigerant circuit in which a compressor, an expansion valve, a flow path switching valve, an indoor side heat exchanger, and an outdoor side heat exchanger are connected by piping to circulate a refrigerant to perform a refrigeration cycle and supplying air that has undergone heat exchange with the refrigerant by the indoor side heat exchanger to an indoor space by a fan, can perform air conditioning of the interior of the installation space by forced convection due to blown air.

[0037] Additionally, as a result of the air conditioning device being incorporated in the refrigerant circuit of the air conditioner, because a refrigerant is supplied from the air conditioner side, equipment such as a compressor becomes no longer necessary for the air conditioning device, and it also becomes possible to perform control coupled with the air conditioner.

[0038] For example, the air conditioner has an advantage of being able to make the interior of the space quickly reach a target temperature by forced convection due to blown air from the fan, but on the other hand has a disadvantage in that blown air from the fan provides an uncomfortable sensation (draft sensation) to the human body, and the radiation type air conditioning device has an advantage of not providing such a draft sensation to a person in the surrounding area, but has a disadvantage in that it takes a long time to make the interior of the space reach a target temperature as compared with the air conditioner.

[0039] To cope therewith, by operating the air conditioning device and the air conditioner in combination, for example, mainly operating the air conditioner at first en-

abling approaching a target temperature in a short time, and thereafter, mainly operating the air conditioning device enables maintaining the temperature of the interior of the space, so that the fan operating time of the indoor heat exchanger can be held short to perform air conditioning that does not provide an uncomfortable draft sensation to the human body.

[0040] Also, when the air conditioner and the air conditioning device are simultaneously operated, radiant heat from the air conditioning device acts directly on the body sensation of a person that is present in the nearby surrounding area, while the air conditioner performs air conditioning of the entirety, and therefore, the time until comfort is provided for the person in the surrounding area can become shorter than when either the air conditioner or air conditioning device is operated alone. Further, convecting the radiant heat from the air conditioning device and blown air from the fan allows quickly making the temperature of the interior of the space uniform.

[0041] By the air conditioning system of the present invention, in which the air conditioner that blows air by the fan and the radiation type air conditioning device thus complement each other in their disadvantages by combining their respective advantages, the temperature control of cooling and heating can therefore be performed efficiently and effectively. Effect(s) of the Invention

[0042] The air conditioning device according to the present invention can prevent staining the periphery of an installation site of the air conditioning device with water condensed as dew on the heat generating portion.

[0043] The air conditioning system according to the present invention can prevent staining the periphery of an installation site of the air conditioning device with water condensed as dew on the heat generating portion.

BRIEF DESCRIPTION OF THE DRAWINGS

[0044]

Fig. 1(a) is an explanatory front view and Fig. 1(b) is an explanatory longitudinal sectional view, showing an air conditioning device of a first embodiment of the present invention.

Fig. 2 is an explanatory longitudinal sectional view showing a structure of a heat generating portion of the air conditioning device shown in Fig. 1.

Fig. 3 is an enlarged explanatory view in which a middle portion of Fig. 1(b) is partially omitted.

Fig. 4 is an enlarged explanatory view in which a middle portion of Fig. 1(b) is partially omitted and the flow of air during a cooling operation is shown by arrows.

Fig. 5 is an enlarged explanatory view in which a middle portion of Fig. 1(b) is partially omitted and the flow of dew condensation water during a cooling operation is shown.

Fig. 6 is an explanatory view in which the flow of air during a heating operation in the air conditioning de-

vice shown in Fig. 1 is shown by arrows.

Fig. 7 is a front view showing a second embodiment of an air conditioning device of the present invention. Fig. 8 is an explanatory front view showing a third embodiment of an air conditioning device of the present invention.

Fig. 9 is an explanatory front view showing a fourth embodiment of an air conditioning device of the present invention.

Fig. 10 is a schematic explanatory view of an air conditioning system for which an air conditioner is combined with the air conditioning device shown in Fig. 1, showing a fifth embodiment of the present invention.

Fig. 11 includes refrigerant circuit diagrams of the air conditioning system shown in Fig. 10.

Fig. 12 is a perspective view showing a conventional air conditioning device.

Fig. 13 is an explanatory view showing the flow of dew condensation water in the case of a structure where a reflector is disposed for the conventional air conditioning device.

MODES FOR CARRYING OUT THE INVENTION

[0045] Embodiments of the present invention will be described in greater detail with reference to Fig. 1 to Fig. 9. In addition, symbols in the respective figures are used to the extent so as to reduce complication and facilitate understanding. In addition, a term "front side" to be described later is used with a meaning equal to a "region to be on an opposite side of a reflector with a heat generating portion therebetween."

[First Embodiment]

[0046] An air conditioning device 1A has a support frame 21, a heat generating portion 22 attached to the support frame 21, a reflector 23 for reflecting radiant heat from the heat generating portion 22, a gutter-shaped receiving portion 24, and a panel body 3a, and the respective portions will be described in the following.

[0047] Fig. 1(a) is referred to. The support frame 21 has support portions 210 provided to stand on an installation surface F (if indoors, a floor surface or the like) of the air conditioning device 1A and disposed at an interval in the horizontal direction. The respective support portions 210 store inside connecting parts located at both ends of a flow pipe 221 to be described later in a manner not visible from the outside (refer to Fig. 1(a)). Also, in an upper side of a region between the respective support portions 210, a reinforcing member 211 is provided in a manner laterally laid thereacross.

[0048] The heat generating portion 22 is disposed in the region between the support portions 210 of the support frames 21, and constituted by the flow pipe 221 through the inside of which a flowable heating medium can flow and an outer shell body 222 covering the flow-

pipe 221 and having a structure capable of dissipating to the outside heat transmitted from the flow pipe 221.

[0049] The flow pipe 221 is, in a manner connecting at both end sides, meandering in an up-and-down direction so as to run as a whole along an identical vertical plane, and has a structure in which outer shell bodies 222 are respectively mounted on respective horizontal parts arranged at regular intervals. Moreover, the respective outer shell bodies 222 are attached in a manner such that long axis directions of their cross-sections are similarly downwardly inclined toward the reflector 23 (refer to Fig. 1(b)).

[0050] In greater detail, the outer shell body 222 has a pair of shell members 223a and 223b having the same shape as each other, and is structured so that, in each one shell member 223a, 223b, a fitting portion in which an abutting portion 226a, 226b formed with a concave face to be joined so as to be closely fitted to an outer surface of the flow pipe 221, a projecting piece portion 225a (225b) to be fitted by being inserted into a recess portion 224b (224a) formed in the other shell member 223b (223a), and a recess portion 224a (224b) to which a projecting piece portion 225b (225a) formed in the other shell member 223b (223a) is fitted by insertion are formed is provided, and the outer shape of a cross-section becomes a slightly flat, substantially elliptical shape by fitting together the shell members 223a and 223b (refer to Fig. 2).

[0051] In addition, to a surface of the outer shell body 222, knurling and an alumite processing that form longitudinally extending concavities and convexities are applied, and thereby, corrosion resistance is improved, and the surface area is increased to improve the efficiency in heat exchange.

[0052] In the present embodiment, an inclination angle when attaching the outer shell body 222 suffices to be in a range of 1 to 89° where the angle at which the long axis of an elliptical sectional shape of the outer shell body 222 becomes horizontal is provided as 0°, and further, it is preferably in a range of 35° to 70°. This is because, if in this inclination angle range, a radiation flux to be generated from the side to be a lower surface side of the outer shell body 222 is likely to head towards the front side and to a front-side floor surface of the air conditioning device 1A. Also, the outer shell body 222 may be fixedly mounted by a screw or the like on the support frame 21 so as to keep a predetermined inclination angle, or the outer shell body 222 may be rotatably attached so as to allow a person in the surrounding area to appropriately set an inclination angle.

[0053] In the present embodiment, on the surface of the outer shell body 222 is applied knurling and an alumite processing, but the processing is not limited thereto. When, for example, one or a plurality of types of processing or coating selected from among other types of coating including heat dissipation coating, far infrared ray emission coating, and coating having a deodorizing function, an antibacterial function, or a volatile organic compound

adsorption-decomposition function are applied, applying these types of processing or the like allows providing various functions for the heat generating portion.

[0054] In the present embodiment, the flow pipe 221 is a meandering pipe as described above, but is not limited thereto, and may have, for example, a ladder-shaped configuration in which the flow pipe has a pair of vertical parts extending in the up-and-down direction and a plurality of horizontal parts laid between the respective vertical parts. Also, the flow pipe 221 includes at an upper end a connecting portion 227a to be connected to an inlet pipe of the flowable heating medium and includes at a lower end a connecting portion 227b to be connected to a return pipe of the flowable heating medium, but is not limited thereto, and for example, the connecting portions to the inlet pipe/return pipe may be provided in a side direction of the air conditioning device 1A, and three or more connecting portions to the inlet pipe/return pipe may be provided. Also, the connecting portions to the inlet pipe/return pipe may be both provided toward the upper end or lower end of the air conditioning device 1A.

[0055] The reflector 23 is formed of a heat insulating material, and has a reflecting surface 231 that is not permeable to water, and the reflecting surface 231 is disposed so as to be opposed at an interval to an end edge portion at a lower side in the long axis direction of the outer shell body 222. To a lower end of the reflector 23, a guide plate 232 bent at an obtuse angle to the side of the heat generating portion 22 is attached. A front end of the guide plate 232 is structured to be located in the inside of a receiving portion 24 to be described later (refer to Fig. 1(b)).

[0056] The receiving portion 24 is located below the lowermost outer shell body 222 among the outer shell bodies 222 of the heat generating portion 22 and under the reflector 23 (more specifically, under the guide plate 232 attached to the reflector 23), and has a structure opened at an upper part so as to be able to receive dew condensation water that has run down the guide plate 232 to drip or has dripped directly from the heat generating portion 22.

[0057] The panel body 3a is formed of a perforated metal, and attached to below the front side of the air conditioning device 1A. The panel body 3a provides a covering for the receiving portion 24, a piping portion (not shown), etc., so as to serve as a screen when viewed from the front direction. Also, the panel body 3a is attached so that a clearance for ventilation is formed with the installation surface F.

[0058] Also, in the present embodiment, the panel body is attached to below the front side of the air conditioning device, but is not limited thereto, and there may be a form in which the panel body is attached to above the front side of the air conditioning device when a piping portion (not shown) or the like is provided in an upper portion.

[0059] Examples of the flowable heating medium that flows through the flow pipe 221 include warm (hot) water,

steam, cold water, liquid phase refrigerants, gas-liquid two phase refrigerants, and gas phase refrigerants of hydrochlorofluorocarbon, hydrofluorocarbon, etc., but the flowable heating medium is not limited thereto, and other publicly known heating media may be adopted.

[0060] Also, a modification example of the heat generating portion may be in such a form that, of the surface of the outer shell body, a processing such as a water-repelling processing or a guide groove along which dew condensation water is likely to flow down is applied to a region facing the reflector side, and a processing to enhance a heat dissipation effect such as knurling is applied to a region to be on an opposite side of the reflector. In this case, dew condensation water produced on that heat generating portion or dew condensation water that has dripped from the outer shell body located at an upper height is likely to flow down to the reflector side, and is unlikely to head for the front side of the air conditioning device 1A. In addition, a measure against dew condensation water by applying a hydrophilization processing such as blasting to a surface of the region facing the reflector side is also not excluded.

[0061] On the other hand, because knurling etc., is applied to a side, of the surface of the outer shell body, facing the front of the air conditioning device 1A, the efficiency of heat dissipation to a person or space located on the front side is excellent.

[0062] Actions of the air conditioning device 1A according to the present invention will be described with reference to Fig. 1 to Fig. 6, and particularly, to Fig. 4 to Fig. 6.

[0063] When the flowable heating medium flows through the flow pipe 221 of the heat generating portion 22, heat of the flowable heating medium is transmitted to the outer shell body 222 to dissipate the heat to the outside. The outer shell body 222 prevents the flow pipe 221 from being deformed or damaged by an outside pressure or impact and makes the surface area larger than when the heat generating part is simply the flow pipe 221 to improve the heat exchange efficiency. The reflector 23 reflects radiant heat radiated to the side of the reflector 23 of the heat generating portion 22 to emit the radiant heat to the front direction side of the air conditioning device 1A through the clearance gaps formed in the heat generating portion 22.

[0064] Also, as a result of the outer shell body 222 of the heat generating portion 22 being, as described above, attached in an inclined manner, dew condensation water T produced on the surface of the outer shell body 222 of the heat generating portion 22 flows down only to the side of the reflector 23. The dew condensation water T produced from the heat generating portion 22 and adhered to the reflector 23 runs down the plate surface to flow down onto the receiving portion 24 located below (refer to Fig. 5).

[0065] Also, as described above, as a result of the heat generating portion 22 being attached in an inclined manner, because radiant heat generated from a part to be at the lower surface side of the outer shell body 222 of the

heat generating portion 22 is directly radiated towards the front direction of the air conditioning device 1A and to the floor direction, a person present on the front side of the air conditioning device 1A can directly feel either cool or warm radiant heat.

[0066] As shown in Fig. 4 or Fig. 6, during a cooling or heating operation, a mainstream of air to rise or fall along the reflector 23 occurs, and air passing through the clearance gaps of the outer shell bodies 222 of the respective heat generating portions 22 flows to join the mainstream of air or flows separately therefrom, and at the time of the joint flow or separate flow, the inclined outer shell bodies 222 guide air so as to easily flow to increase the flow speed of air passing through the clearance gaps. Further, during heating, radiant heat generated by the part to be at the lower surface side of the outer shell body 222 warms the floor surface present in its radiation flux direction to enhance an upward convection effect of indoor air thereby caused.

[0067] Because the outer shell body 222 has the structure described above and is simply formed by only fitting the projecting piece portions 225a and 225b and the recess portions 224a and 224b provided therefor in the fitting portions, no special tool or special technique is required for an assembling operation to the flow pipe 221, which thus enables quick assembly.

[0068] Also, because the shell members 223a and 223b are identical components, needless expense in component procurement can be eliminated to achieve a reduction in manufacturing costs. Additionally, in a state of being fitted together with the flow pipe 221 sandwiched by the abutting portions 226a and 226b formed in the fitting portions of the shell members 223a and 223b, the outer shell body 222 and the flow pipe 221 are closely fitted and kept so as to be immovable.

[0069] In the present embodiment, the outer shell body 222 is fixedly mounted on the support frame 21 using a securing means such as a screw to be kept at a predetermined mounting angle, but is not limited thereto, and for example, by adjusting its close-fitting property with the flow pipe 221 without fixedly mounting on the support frame 21, the outer shell body 222 may be configured so as to be able to turn around the flow pipe 221 to set the angle in its transverse direction to a required angle and thereby be able to adjust the radiation efficiency.

[0070] During a cooling operation shown in Fig. 4 and Fig. 5, the air in an installation space convects from up to down as shown by the arrows. Also, due to guidance by the inclined surfaces of the outer shell bodies 222 of the heat generating portion 22, the clearance gaps formed in the heat generating portion 22 also serve as flow paths of air, and air passing through the clearance gaps formed in the heat generating portion 22 flows to join air that falls along the reflector 23 through the gap between the heat generating portion 22 and the reflector 23. At this time, dew condensation water T produced on the heat generating portion 22, even if dripping onto the outer shell body 222 located at a lower height, does not

splatter onto the front side of the air conditioning device 1A because the outer shell body 222 is inclined to the side of the reflector 23 as described above.

[0071] When the dripped dew condensation water T adheres to the reflector 23 due to contact with the lower outer shell body 222 to splatter or the like (refer to the enlarged view of Fig. 5), the adhered dew condensation water T runs down the plate surface to flow down onto the receiving portion 24 located below. The heat generating portion 22, the reflector 23 including the guide plate 232, and the receiving portion 24, in conjunction with one another, thus receive the dew condensation water T produced on the heat generating portion 22 so as not to leak.

[0072] Additionally, the receiving portion 24 prevents cold air convecting from an up to down direction during cooling from directly contacting the installation surface F, and changes the direction of convection to guide the cold air so as to flow to the outside of the device.

[0073] During a heating operation shown in Fig. 6, the air in an installation space convects from down to up as shown by the arrows. In addition, during the heating operation, because no dew condensation water T is produced on the heat generating portion 22, even if air flows to the front side of the air conditioning device 1A from the clearance gaps formed in the heat generating portion 22, contamination with dew condensation water T does not occur.

[0074] The air conditioning device 1A can thus prevent staining the periphery of a site where the air conditioning device 1A has been installed with dew condensation water T produced on the heat generating portion 22. Also, with the air conditioning device 1A, during operation, because the flow of air that is generated in the space of an installation region is by natural convection due to a difference in temperature of the interior of the space, not by blown air due to forced convection as in a conventional air conditioning device (air conditioner), a person in the surrounding area never feels an uncomfortable draft sensation, and air heated or cooled by the heat generating portion 22 directly warms or cools a space in front of the reflector 23, and can efficiently warm and cool the installation space because convection occurs in the installation space.

[Second Embodiment]

[0075] An air conditioning device 1B shown in Fig. 7 is in a form for which panel bodies 3b and 3c to cover the heat generating portion 22 are further provided at the front side of the air conditioning device 1A. In addition, because structural parts other than the panel bodies 3b and 3c are the same as in the air conditioning device 1A, common structural parts will be denoted by the same symbols as in the air conditioning device 1A, and description thereof will be omitted.

[0076] The panel bodies 3b and 3c are formed of perforated metals, and attached so as to cover the heat gen-

erating portion 22 to be not visible from an upper to a middle portion of the front side of the air conditioning device 1B. Also, the panel body 3c is attached so that a clearance for ventilation is formed with a ceiling surface.

[0077] Because the panel bodies 3b and 3c serve a role of a protective cover of the heat generating portion 22 and have a structure through which radiant heat generated by the heat generating portion 22 can pass, the radiant heat that has passed therethrough can directly warm or cool a person in the surrounding area and the ambient air.

[0078] Also, as shown in Fig. 7, on a surface of the panel bodies 3b and 3c, an advertisement is displayed, and the panel body part can thus be used as an advertisement panel or a signboard. That is, because the air conditioning device 1B also has significant presence as it is in a largely exposed form in the indoor space in which it is installed, when an advertisement is displayed thereon, it can be made to have a function of a more effective advertisement, and when an artistic image or the like is displayed thereon, various effects, such as the creation of a space with an atmosphere of splendor or a space that is relaxing to a person in the surrounding area, can be produced in the indoor space by the artistic image.

[0079] Additionally, the panel bodies 3b and 3c sandwich the heat generating portion 22 with the reflector 23 to produce a chimney effect, and warm air or cold air is emitted from the clearance for ventilation to promote the convection of air, so that the heating efficiency or cooling efficiency is improved. Also, because the panel bodies 3b and 3c have a large number of pores that penetrate through the inner and outer surfaces and through which radiant heat can pass, when air flows at a high speed into the clearance gaps formed in the heat generating portion 22 along the outer shell bodies 222 of the heat generating portion 22, the pressure inside the gaps decreases (based on Bernoulli's principle), and air is taken into the gaps from the pores formed in the panel bodies 3b and 3c to increase the flow rate of air passing through a region at the inner side of the panel bodies 3b and 3c and further promote the convection of indoor air.

[0080] Further, by attaching the panel bodies 3b and 3c, an arrangement of incorporating the heat generating portion 22 is provided, in which direct touching of the heat generating portion 22 by hand is prevented. Therefore, even though the heat generating portion 22 may become high in temperature during heating by the gas phase refrigerant, etc., the arrangement is safe for a person in the surrounding area because the person in the surrounding area cannot touch the heat generating portion 22 inadvertently.

[0081] Also, in the present embodiment, the structure of the panel bodies 3a, 3b, and 3c is not particularly limited as long as radiant heat and air can pass through, and for example, it may be like a fine mesh, or may be a structure or the like for which a plurality of thin slits are provided in a plate. Also, the shape of the pores or slits is not particularly limited, and may, for example, be cir-

cular, elliptical, or any of various polygonal shapes, etc. The pores and slits may be connected to each other as penetrating holes, or may be formed separately without being connected. Further, although the size of each pore or slit is not particularly limited, it is preferably of a size through which, for example, a finger cannot pass so that a person in the surrounding area cannot inadvertently or intentionally contact the heat generating portion.

10 [Third Embodiment]

[0082] An air conditioning device 1C shown in Fig. 8 is in a form for which the flow pipe 221 of the air conditioning device 1A is changed in structure. In addition, because the air conditioning device 1C is the same as the air conditioning device 1A except for the structural part of a flow pipe, common structural parts will be denoted by the same symbols as in the air conditioning device 1A, and description thereof will be omitted.

20 **[0083]** The flow pipe 221a is, in a manner connecting at both end sides, meandering in an up-and-down direction so as to run as a whole along an identical vertical plane, and specifically, has a structure in which, unlike the flow pipe 221, it branches off from a first vertical part into a plurality of (in the present embodiment, six) laterally laid parts, and the respective laterally laid parts connect to a second vertical part located at a required interval with the first vertical part to again join into one, and such structures are provided continuously in the up-and-down direction (refer to Fig. 8). In addition, the flow of a flowable heating medium is shown by the arrows, but is not limited thereto, and for example, as in a fifth embodiment to be described later, the flow of a flowable heating medium is reversed by operation switching in some cases.

35 **[0084]** According to the air conditioning device 1C using the flowpipe 221a, as compared with when it is a simple meandering pipe, the flowable heating medium flowing through the flow pipe 221a is lowered in resistance value, and a load to be applied to a compressor or pump for sending out the flowable heating medium can thereby be reduced.

[Fourth Embodiment]

45 **[0085]** An air conditioning device 1D shown in Fig. 9 is in a form for which the air conditioning device 1A is reduced in height. In addition, because the air conditioning device 1D is substantially the same as the air conditioning device 1A, common structural parts will be denoted by the same symbols as in the air conditioning device 1A, and description thereof will be omitted. In addition, in the present embodiment, because an upper portion of the air conditioning device 1D and the ceiling are separated in distance, a structure is provided in which a flowable heating medium flows in from the direction of "IN" described below the air conditioning device 1D and the flowable heating medium returns to the direction of "OUT."

[0086] As can be understood by contrast with the person (symbol omitted) described in Fig. 9, the air conditioning device 1D is provided at a height on the order of one meter, and the air conditioning device 1D, if in such a short form, can be disposed like a partition that partitions a public space or can be disposed along a wall under a window disposed at a predetermined height, and regardless of the natural disposition, it can warm or cool a person in the periphery or a peripheral space by radiant heat.

[Fifth Embodiment]

[0087] In a fifth embodiment of the present invention shown in Fig. 10 and Fig. 11, an air conditioning system S is constituted by one outdoor machine 40 and two indoor machines connected in series to the outdoor machine 1. One of the two indoor machines is a general convective indoor machine 41, and the other is an air conditioning device 1A. The convective indoor machine 41 and the air conditioning device 1A are installed in a room or the like having an air conditioning target space, and have a function of cooling or heating the air conditioning target space.

[0088] In addition, the outdoor machine 40 and the convective indoor machine 41 described above and a refrigerant piping 42, a compressor 43, an outdoor side heat exchanger 44, an expansion valve 45, an indoor side heat exchanger 46, and a four-way switching valve 47 to be described later are equipment to constitute a so-called blow type air conditioner, and in the following, are sometimes collectively called simply an "air conditioner" when describing actions. Also, regarding the air conditioning device 1A to be used in the present embodiment, because the structure and actions thereof are as described before, description thereof will be omitted.

[0089] The convective indoor machine 41 and the air conditioning device 1A are communicatively connected by the refrigerant piping 42. Accordingly, the convective indoor machine 41 and the air conditioning device 1A form a part of a refrigerant circuit, and a cooling operation or heating operation can be performed by circulating a refrigerant in the refrigerant circuit. Note that, although the air conditioning system S is constituted by one outdoor machine, one convective indoor machine 41, and one air conditioning device 1A in Fig. 10 and Fig. 11, the number of each of the machines is not limited to the number shown in the figures.

[0090] As shown in Fig. 10 and Fig. 11, the outdoor machine 40 has a publicly known structure having the compressor 43, the outdoor side heat exchanger 44, and the expansion valve 45. Also, the convective indoor machine 41 has a publicly known structure including the indoor side heat exchanger 46 and a blowing fan (not shown) that blows air to the indoor side heat exchanger 46.

[0091] The indoor side heat exchanger 46 serves as a vaporizer during a cooling operation and as a condenser

(radiator) during a heating operation, performs heat exchange between air supplied from a blower such as a fan (not shown) and the refrigerant, and generates heating air or cooling air to be supplied to the air conditioning target space. The equipment described above is connected via the refrigerant piping 42, and constitutes a part of a refrigeration cycle (refrigerant circuit) of the air conditioning system S.

[0092] Referring to Fig. 10 and Fig. 11, the flow of a refrigerant during each operation of the air conditioning system S will be described.

(During cooling operation: Fig. 11(a))

[0093] When a cooling operation is carried out by the air conditioning system S, the four-way switching valve 47 is switched so that a refrigerant discharged from the compressor 43 flows into the outdoor side heat exchanger 44, and the compressor 43 is driven.

[0094] A refrigerant sucked into the compressor 43 is brought into a state of high-pressure and high-temperature gas in the compressor 43, and the gas is discharged therefrom, and flows into the outdoor side heat exchanger 44 via the four-way switching valve 47. The refrigerant which has flowed in the outdoor side heat exchanger 44 is cooled while dissipating heat to air supplied from the blower (not shown), and becomes a low-pressure and high-temperature liquid refrigerant to flow out from the outdoor side heat exchanger 44.

[0095] The liquid refrigerant which has flowed out from the outdoor side heat exchanger 44 flows into the convective indoor machine 41 through the expansion valve 45. The refrigerant which has flowed in the convective indoor machine 41 becomes a two-phase refrigerant. The low-pressure two-phase refrigerant flows into the indoor side heat exchanger 46, and vaporizes by absorbing heat from air supplied from the blower (not shown) to become gas. At this time, cooling air is supplied to the air conditioning target space such as an indoor space to realize a cooling operation of the air conditioning target space.

[0096] The two-phase refrigerant which has flowed out from the indoor side heat exchanger 46 flows out from the convective indoor machine 41, flows into the air conditioning device 1A, and passes through the heat generating portion 22. At this time, a heat absorption action with the atmosphere and cooling of the atmosphere, that is air, of the air conditioning target space such as an indoor space is performed to realize cooling of the air conditioning target space.

[0097] The refrigerant which has flowed out from the air conditioning device 1A flows into the outdoor machine 40, passes through the four-way switching valve 47 of the outdoor machine 40, and is sucked into the compressor 43 again.

[0098] The cooling operation is performed by repeating the above refrigerant cycle.

(During heating operation: Fig. 11(b))

[0099] When a heating operation is carried out by the air conditioning system S, the four-way switching valve 47 is switched so that a refrigerant discharged from the compressor 43 flows into the indoor side heat exchanger 46, and the compressor 43 is driven. A refrigerant sucked into the compressor 43 is brought into a state of high-pressure and high-temperature gas in the compressor 43, and the gas is discharged therefrom, and flows into the air conditioning device 1A via the four-way switching valve 47.

[0100] The refrigerant which has flowed in the air conditioning device 1A emits radiant heat from the heat generating portion 22 to warm the atmosphere of the air conditioning target space such as an indoor space. The refrigerant which has flowed out from the air conditioning device 1A flows into the indoor side heat exchanger 46 of the convective indoor machine 41. The refrigerant which has flowed in the indoor side heat exchanger 46 is cooled while dissipating heat to air supplied from the blower (not shown) and becomes a liquid refrigerant. At this time, heating air is supplied to the air conditioning target space such as an indoor space to realize a heating operation of the air conditioning target space.

[0101] The liquid refrigerant which has flowed out from the indoor side heat exchanger 46 is decompressed by the expansion valve 45 and becomes a low-pressure two-phase refrigerant. The low-pressure two-phase refrigerant flows into the outdoor side heat exchanger 44 of the outdoor machine 40. The low-pressure two-phase refrigerant which has flowed in the outdoor side heat exchanger 44 vaporizes by absorbing heat from air supplied from the blower (not shown) to become gas. The low-pressure gas refrigerant flows out from the outdoor side heat exchanger 44, passes through the four-way switching valve 47, and is sucked into the compressor 43 again.

[0102] The heating operation is performed by repeating the above refrigerant cycle.

[0103] In the air conditioning system S, the air conditioner (convective indoor machine 41) and the air conditioning device 1A can thus complement each other in their disadvantages by combining their respective advantages, so that the temperature control of cooling and heating can be performed efficiently and effectively.

[0104] Also, during heating, the air in the vicinity of the heat generating portion 22 is heated by conductive heat and radiant heat and a flow of air rising from a down to up direction is generated along the reflector 23 through the gap between the reflector 23 and the heat generating portion 22, and the air from below is heated by the heat generating portion 22 as it rises, and the flow described above is thus sustained.

[0105] The heated air that has risen and reached the ceiling has been increased in flow speed, and flows along the ceiling surface to reach a position that is considerably separated from the air conditioning device 1A. Also, in conjunction with this movement, the air undergoes heat

exchange with the indoor air, is thereby cooled, and descends to move toward the installation surface, and the air again makes entry from a lower portion of the air conditioning device 1A and rises upon being heated by the heat generating portion 22. The indoor air is thus circulated and convected around the entire indoor space while being heated by the heat generating portion 22.

[0106] Additionally, radiant heat radiated from the heat generating portion 22 is emitted to the indoor space from the front side of the air conditioning device 1A, and a part of the radiant heat reflected by the reflector 23 passes through the clearance gaps formed in the heat generating portion 22 and is emitted to the indoor space to be propagated to a person in the surrounding area, and therefore, the person in the surrounding area can feel warmth directly. In addition, the radiant heat is used effectively for warming the walls, ceiling, installation surface F, etc., and the indoor air is indirectly warmed by the warmed walls, ceiling, installation surface F, etc.

[0107] Thus, while the air conditioning device 1A repeats the reflection and emission of the radiant heat, the entire indoor space is satisfactorily heated by the radiant heat together with the heat moving due to the convection of air, and the air conditioning can thus be performed effectively, and which therefore enables the blowing amount of the fan of the indoor side heat exchanger 46 of the air conditioner to be lessened or the fan to be stopped, and consequently, the draft sensation felt by the person in the surrounding area due to the blown air from the fan can be suppressed or eliminated.

[0108] In addition, during the cooling described above, unlike when performing heating, air is cooled by the heat generating portion 22 and the flow of air along the heat generating portion 22 and the reflector 23 thus becomes from the up to down direction and the flow of the cooled air is substantially opposite in direction to that in the case of heating, but the ability to perform effective air conditioning of the entire indoor space, the ability to suppress the draft sensation that the person in the surrounding area feels due to the blown air from the fan, etc., are the same as those in the case of heating.

[0109] Further, as a result of the air conditioning device 1A being incorporated in the refrigerant circuit of the air conditioner, because a refrigerant is supplied from the air conditioner side, equipment such as a compressor becomes no longer necessary for the air conditioning device 1A, and it also becomes possible to perform control coupled with the air conditioner.

[0110] In the present specification and claims, the term "radiant" may be replaced by "radiation." Also, the term "chimney effect" in the present specification is used with a meaning including the effect of increasing the flow speed of air inside the gap by covering a part of the sides of the heat generating portion or by forming the entirety of the sides of the heat generating portion into a tubular shape to cover the same.

[0111] Note that the terms and expressions used in the present specification and claims are merely descriptive,

and not restrictive by any means, and not intended to exclude terms and expressions equivalent to the features and portions thereof described in the present specification and claims. Also, as a matter of course, various modifications are possible within the scope of the technical ideas of the present invention. Description of the Symbols

1A, 1B, 1C, 1D: air conditioning device, S: air conditioning system,
21: support frame, 210: support portion, 22: heat generating portion, 221, 221a: flowpipe, 222: outer shell body, 223a, 223b: shell member, 224a, 224b: recess portion, 225a, 225b: projecting piece portion, 226a, 226b: abutting portion, 227a, 227b: connecting portion, 23: reflector, 231: reflecting surface, 232: guide plate, 24: receiving portion
3a, 3b, 3c: panel body,
40: outdoor machine, 41: convective indoor machine, 42: refrigerant piping, 43: compressor, 44: outdoor side heat exchanger, 45: expansion valve, 46: indoor side heat exchanger,
47: four-way switching valve,
F: mounting surface, T: dew condensation water
9: air conditioning device, 90: heat exchanger, 91: reflector

Claims

1. An air conditioning device comprising:
 - a support frame having support portions provided to stand on an installation surface and disposed at an interval in a horizontal direction;
 - a heat generating portion having, in a region between the support portions of the support frame, flow pipes which are respectively laterally laid thereacross at an interval in an up-and-down direction and inside of which a flowable heating medium can flow through and outer shell bodies covering the respective flow pipes, each showing a flat shape or elliptical shape as an outer shape of a cross-section, having a structure capable of dissipating to the outside heat transmitted from the flow pipe, and attached so that long axis directions perpendicular to a longitudinal direction are inclined in the same direction;
 - a reflector having a reflecting surface that reflects radiant heat from the heat generating portion and is not permeable to water, and disposed so that an end edge portion at a lower side in the long axis direction of the outer shell body and the reflecting surface are opposed at an interval; and
 - a gutter-shaped receiving portion disposed below the heat generating portion and under the reflector, and opened at an upper part.
2. The air conditioning device according to claim 1, wherein the outer shell body has a pair of shell members having the same shape as each other, and is structured so that, in each one shell member, a fitting portion in which an abutting portion formed with a concave face to be joined so as to be closely fitted to an outer surface of the flow pipe, a projecting piece portion to be fitted by being inserted into a recess portion formed in the other shell member, and a recess portion into which a projecting piece portion formed in the other shell member is fitted by insertion are formed is provided to fit the shell members together.
3. The air conditioning device according to claim 1 or claim 2, wherein the flowable heating medium is warm water or cold water.
4. The air conditioning device according to claim 1 or claim 2, wherein the flowable heating medium is a refrigerant.
5. The air conditioning device according to claim 1, claim 2, claim 3, or claim 4, comprising a panel body attached to a region of the support frame to be on an opposite side of the reflector with the heat generating portion therebetween, and provided with a clearance for ventilation in a ceiling direction or with respect to the installation surface.
6. The air conditioning device according to claim 5, wherein at least a part of the panel body that covers the heat generating portion has a structure through which radiant heat generated by the heat generating portion can pass.
7. The air conditioning device according to claim 5 or claim 6, wherein an advertisement, a sign, a picture, or a photo is displayed on a surface of the panel body.
8. The air conditioning device according to claim 1, claim 2, claim 3, claim 4, claim 5, claim 6, or claim 7, wherein one or a plurality of types of processing or coating selected from among knurling, alumite processing, heat dissipation coating, far infrared ray emission coating, and coating having a deodorizing function, an antibacterial function, or a volatile organic compound adsorption-decomposition function are applied to a surface of the outer shell body.
9. An air conditioning system comprising:
 - an air conditioning device including a support frame having support portions provided to stand on an installation surface and disposed at an interval in a horizontal direction, a heat generating portion having, in a region between the support portions of the support frame, flow pipes

which are respectively laterally laid thereacross
at an interval in an up-and-down direction and
inside of which a flowable heating medium can
flow through and outer shell bodies covering the
respective flow pipes, each showing a flat shape 5
or elliptical shape as an outer shape of a cross-
section, having a structure capable of dissipat-
ing to the outside heat transmitted from the flow
pipe, and attached so that long axis directions 10
perpendicular to a longitudinal direction are in-
clined in the same direction, a reflector formed
with a reflecting surface that reflects radiant heat
from the heat generating portion and is not per-
meable to water, and disposed so that an end 15
edge portion at a lower side in the long axis di-
rection of the outer shell body and the reflecting
surface are opposed at an interval, and a gutter-
shaped receiving portion disposed below the
heat generating portion and under the reflector, 20
and opened at an upper part; and
an air conditioner to be operated in combination
with the air conditioning device, including a re-
frigerant circuit in which a compressor, an ex-
pansion valve, a flow path switching valve, an 25
indoor side heat exchanger, and an outdoor side
heat exchanger are connected by piping to cir-
culate a refrigerant to perform a refrigeration cy-
cle, said air conditioning device being incorpo-
rated in said refrigerant circuit, and supplying air 30
that has undergone heat exchange with the re-
frigerant by the indoor side heat exchanger to
an indoor space by a fan.

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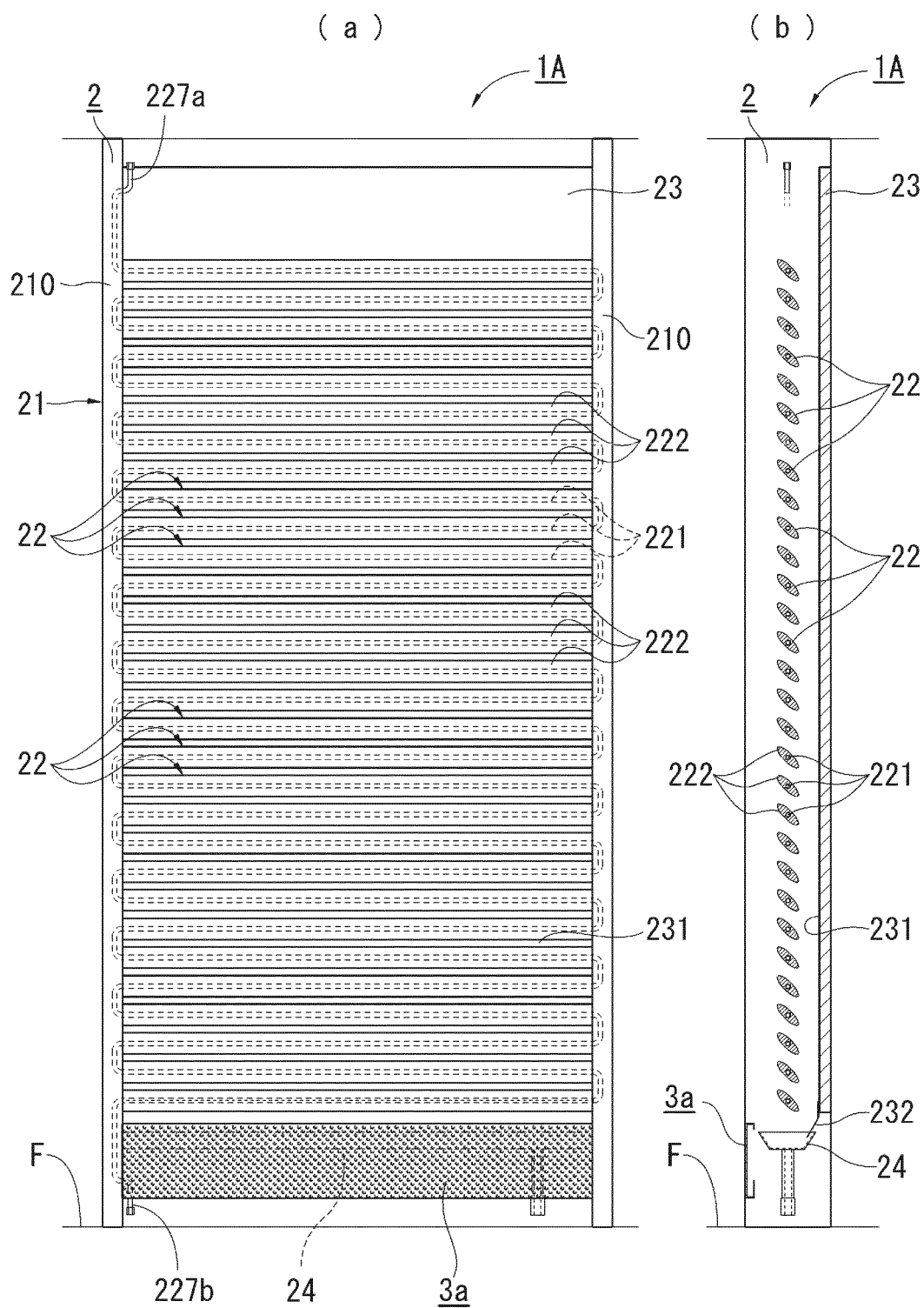
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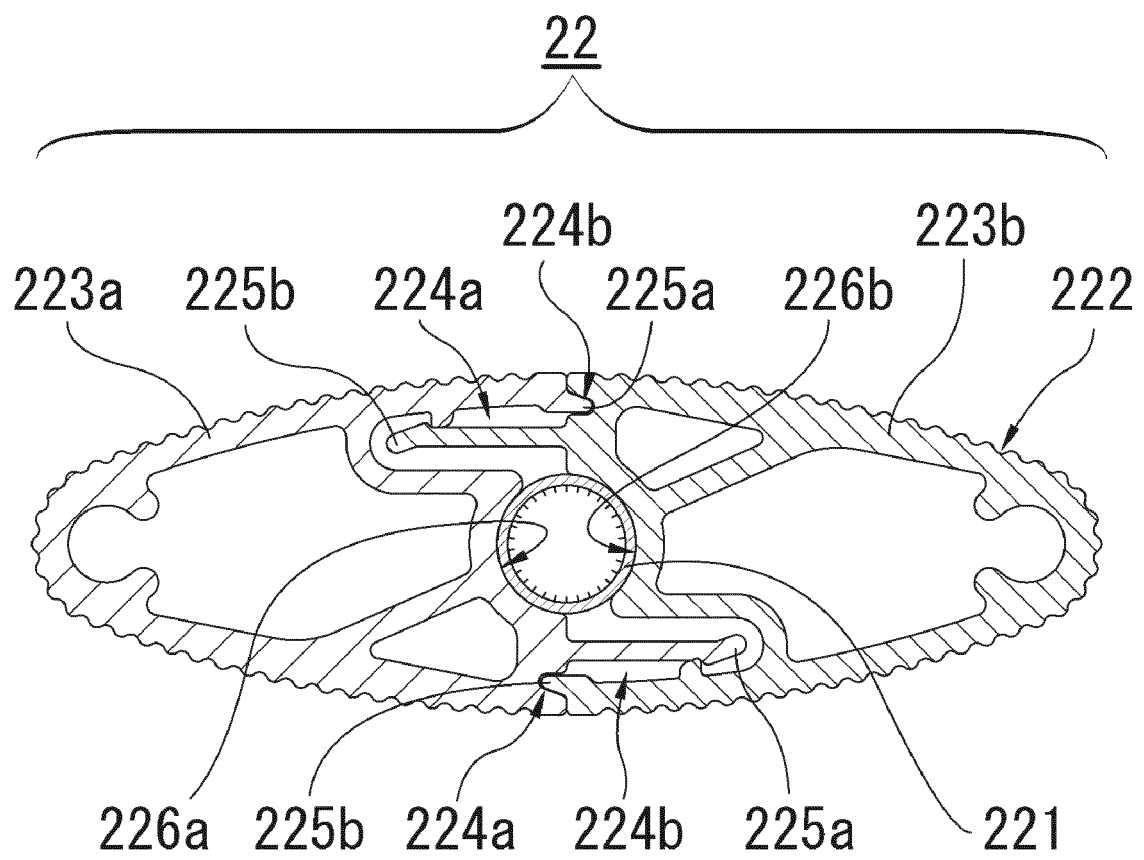
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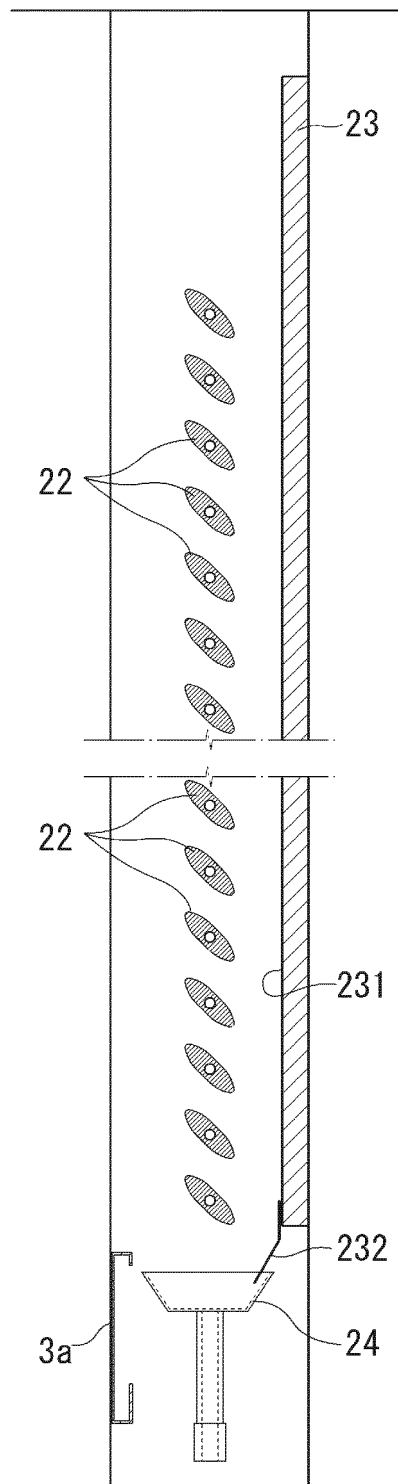
[Fig. 1]



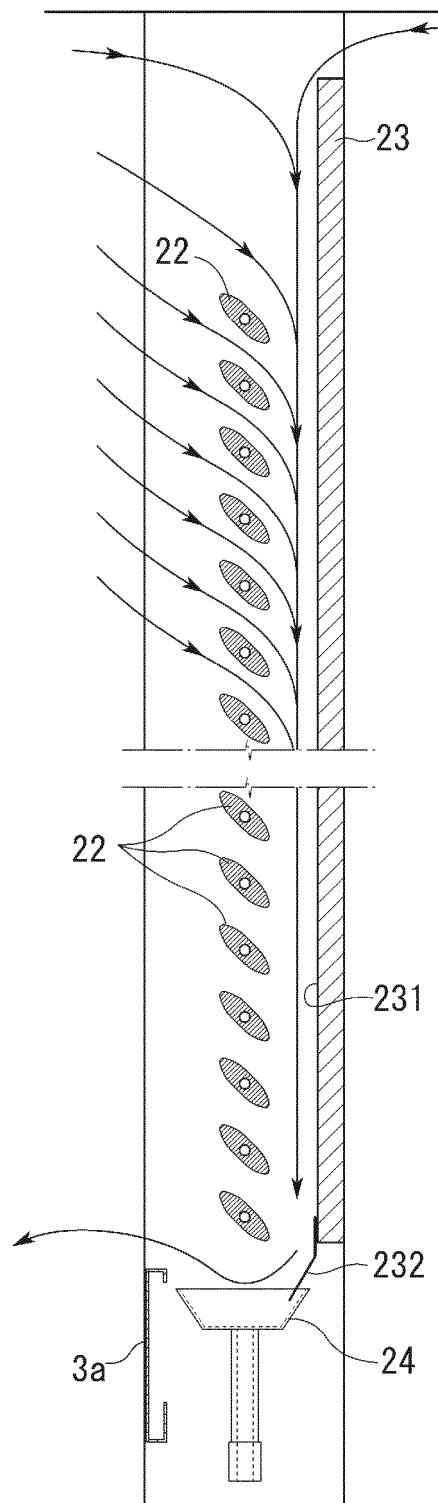
[Fig. 2]



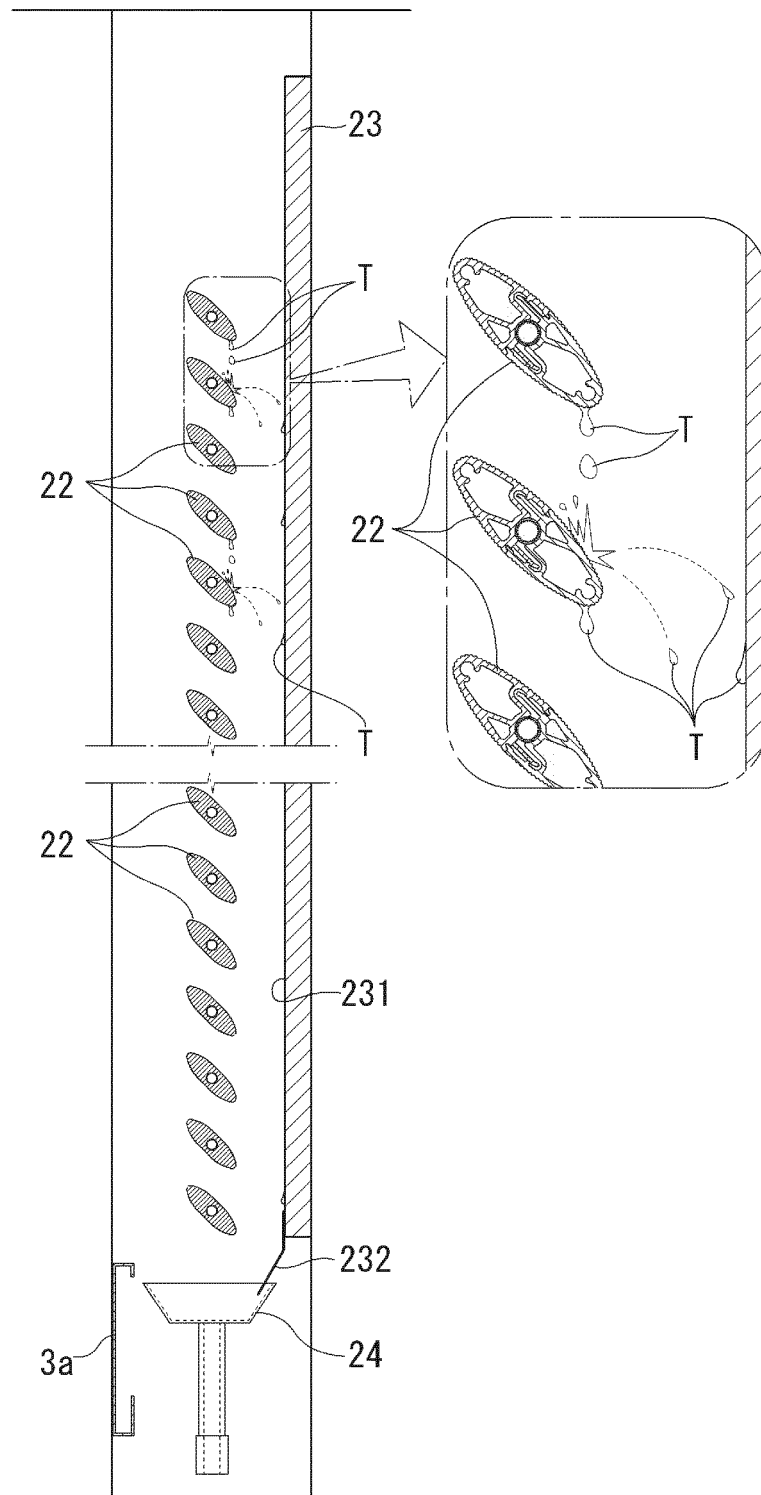
[Fig. 3]



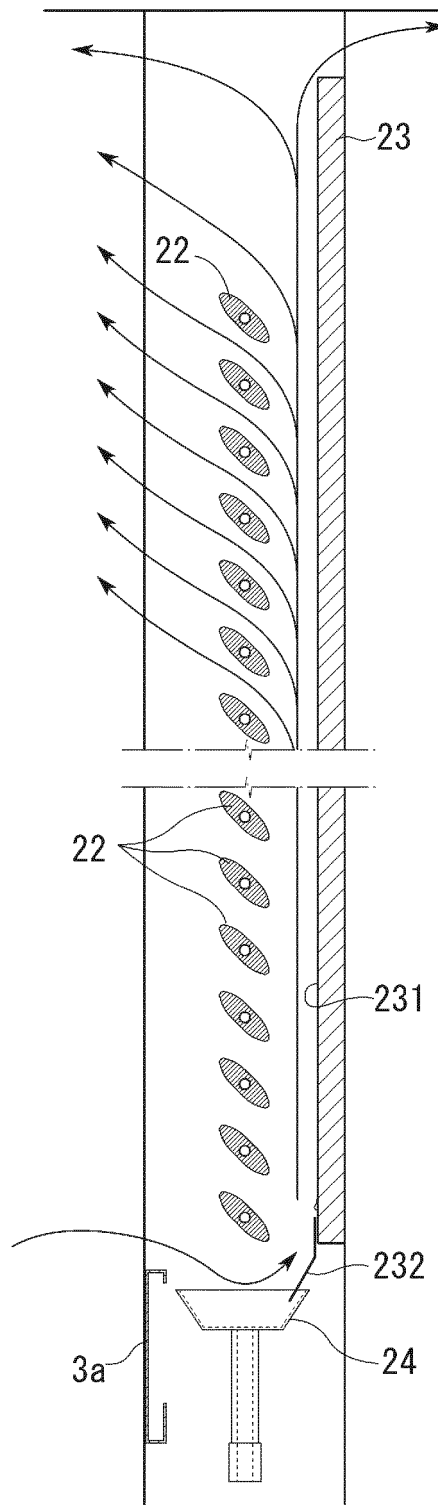
[Fig. 4]



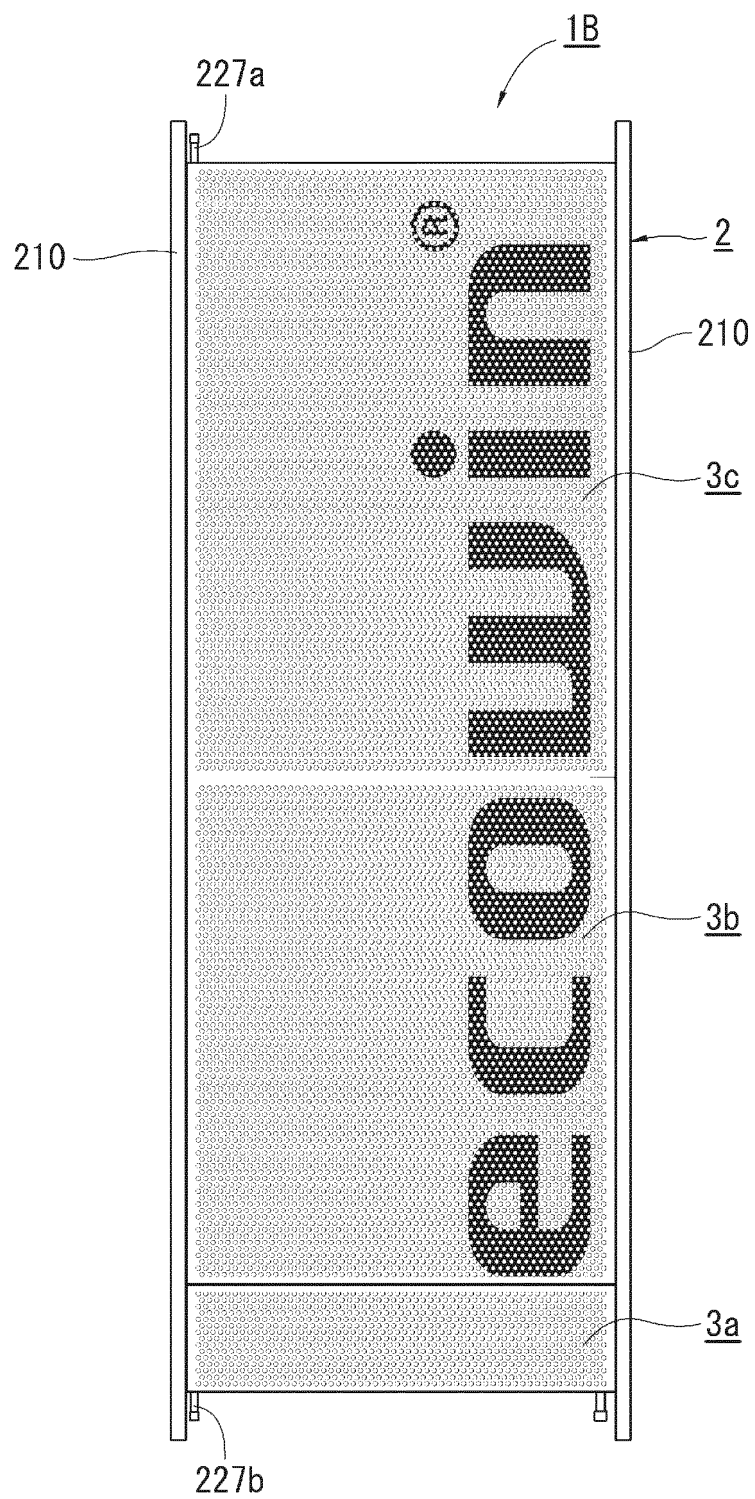
[Fig. 5]



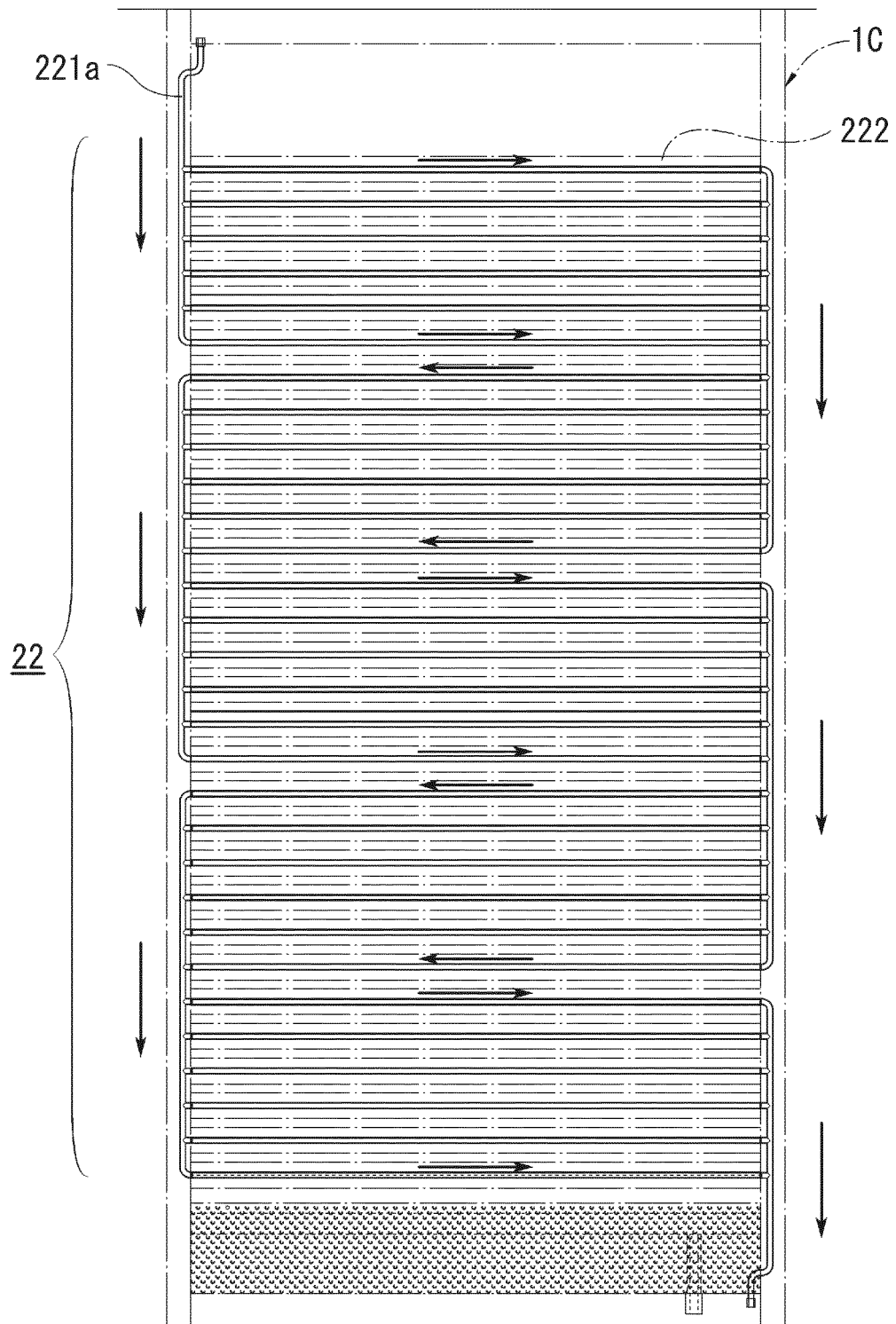
[Fig. 6]

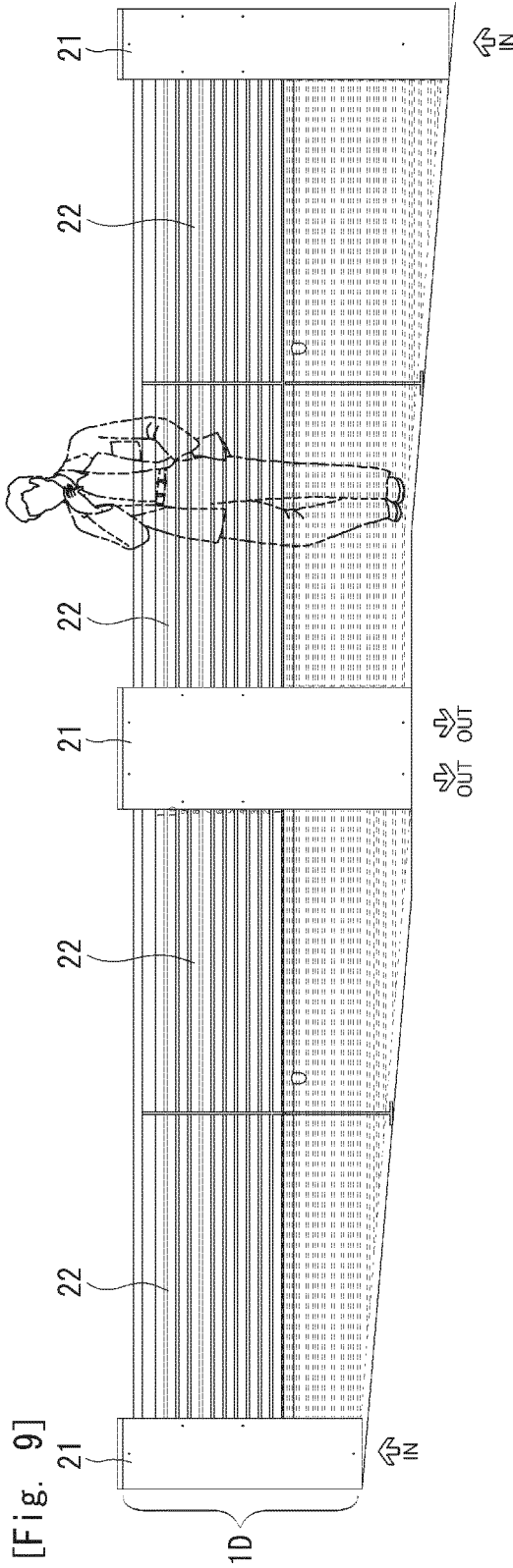


[Fig. 7]

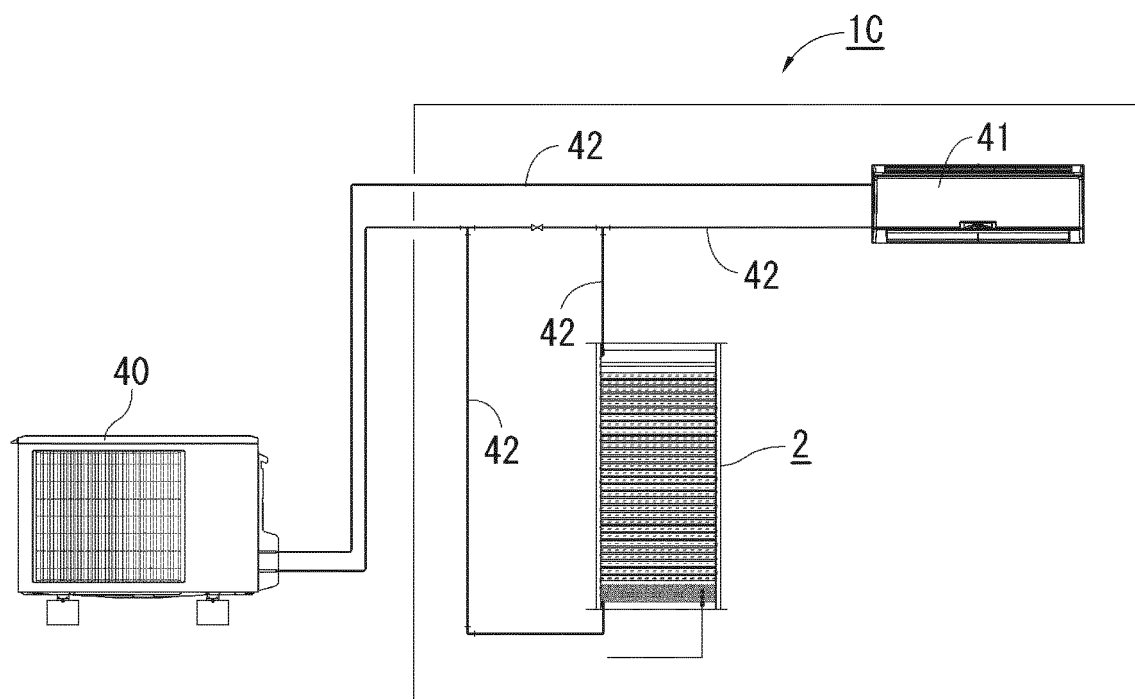


[Fig. 8]

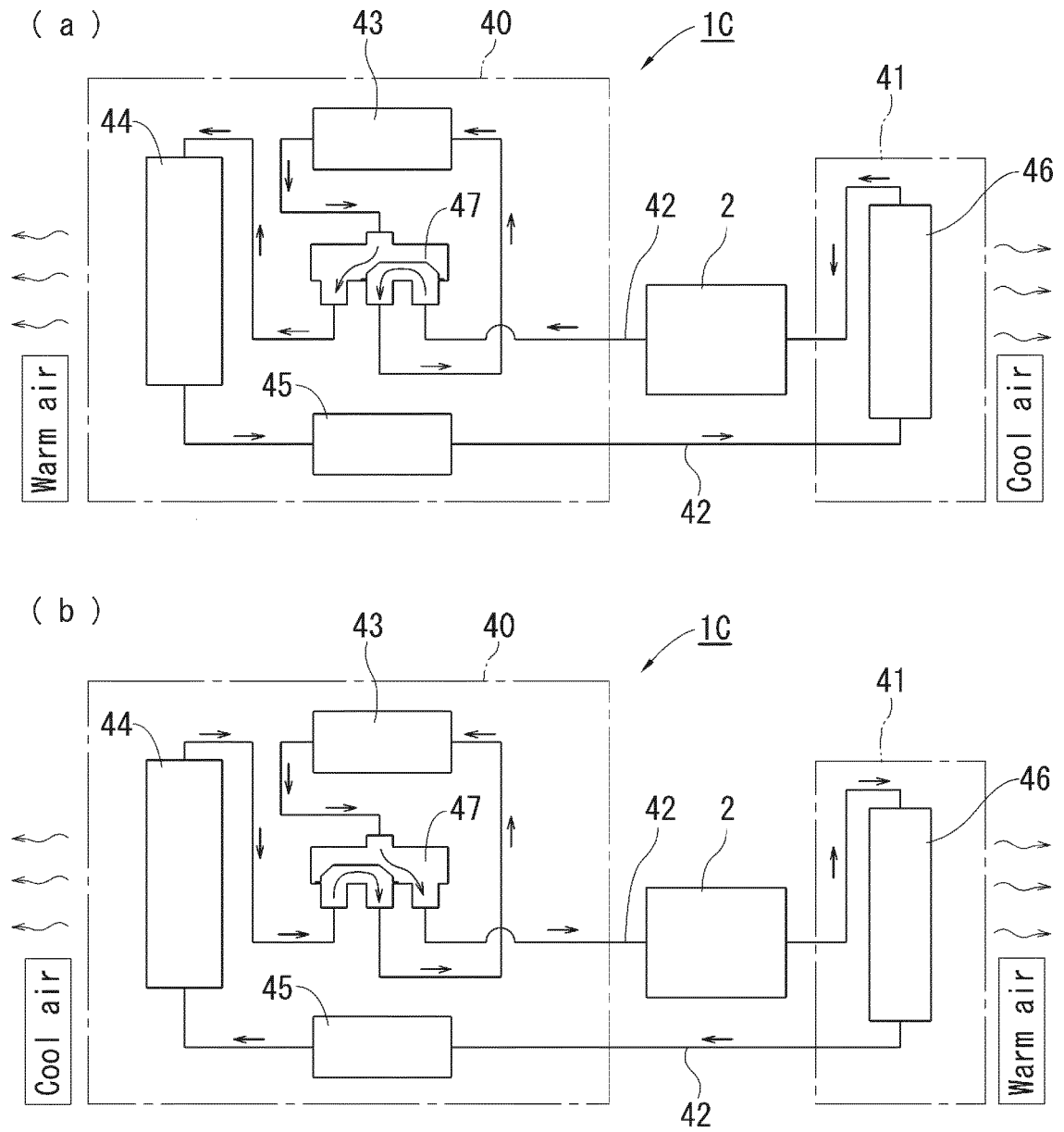




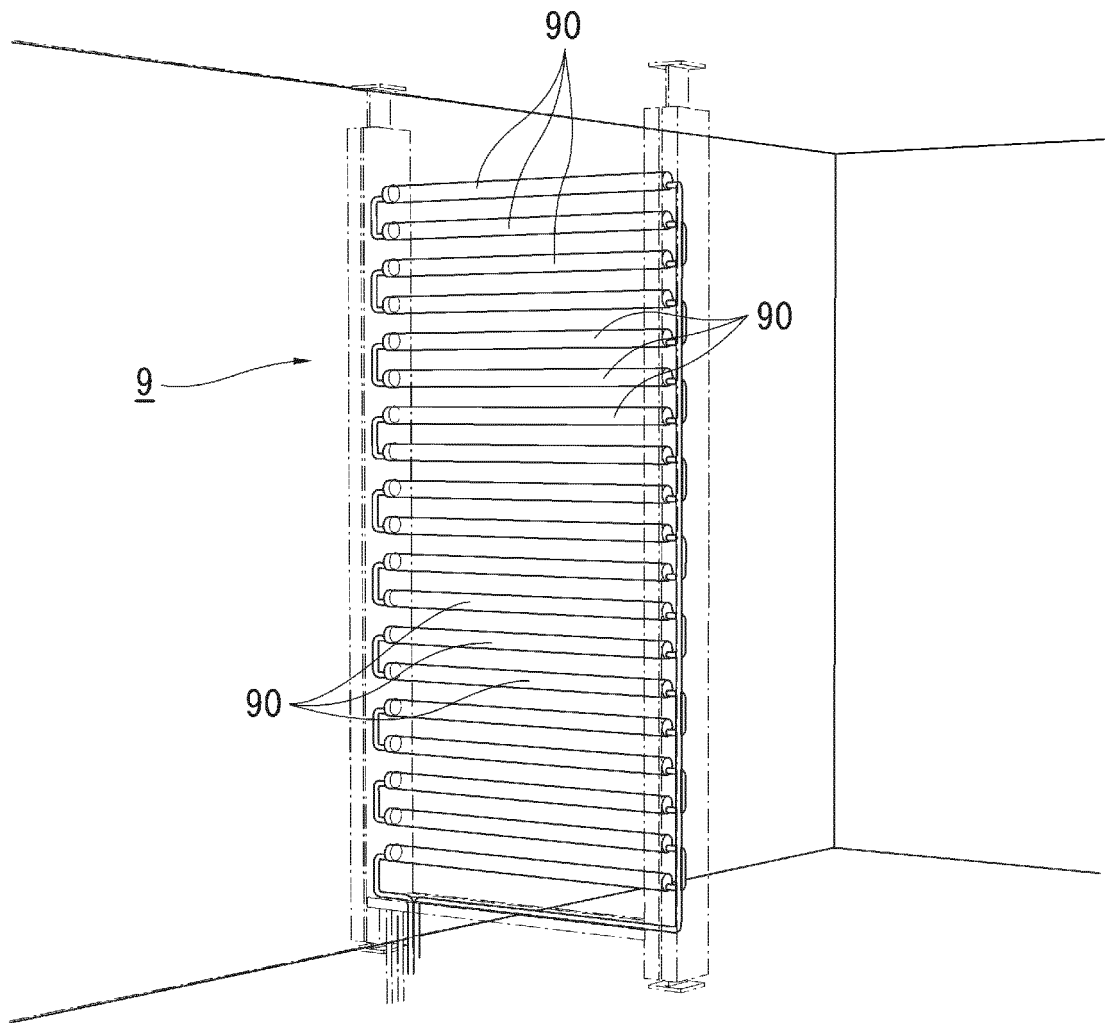
[Fig. 10]



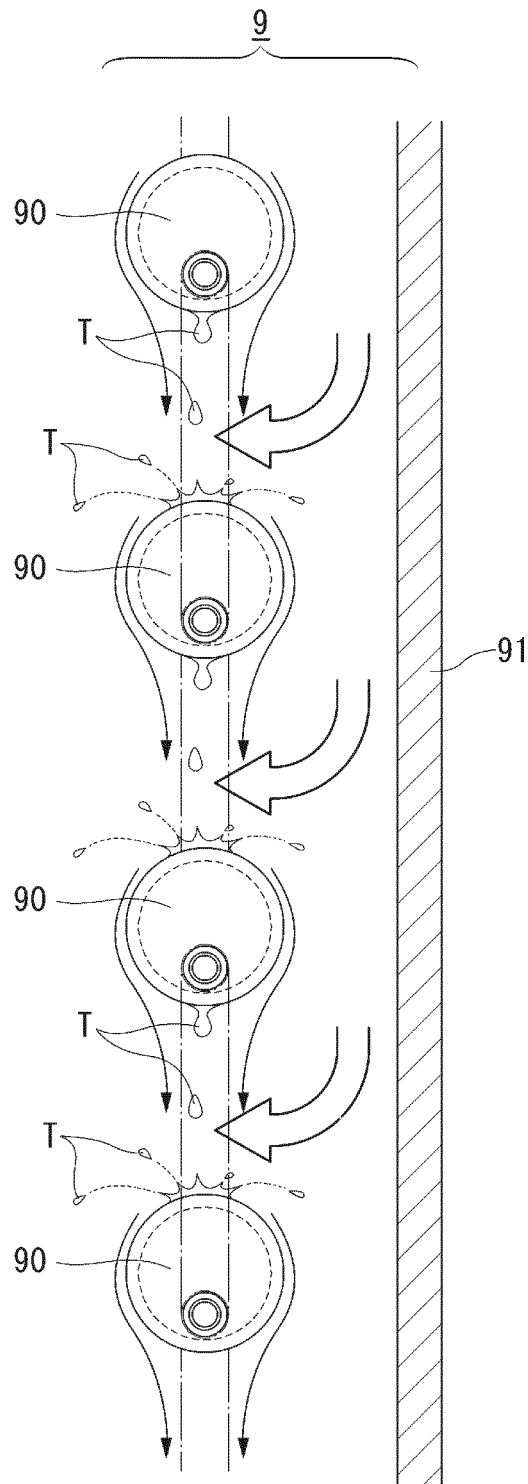
[Fig. 11]



[Fig. 12]



[Fig. 13]



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2015/070171

A. CLASSIFICATION OF SUBJECT MATTER

F24F5/00(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)

F24F5/00

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

Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2015

Kokai Jitsuyo Shinan Koho 1971-2015 Toroku Jitsuyo Shinan Koho 1994-2015

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 2015-25627 A (Ecofactory Co., Ltd.), 05 February 2015 (05.02.2015), paragraphs [0075] to [0163]; fig. 1 to 17 & JP 5544580 B & WO 2015/011844 A & EP 2868986 A1 paragraphs [0075] to [0163] & CA 2843925 A & CN 104487774 A & KR 10-2015-0035468 A & TW 201504584 A	1-9
Y	Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 45013/1989(Laid-open No. 137622/1990) (Mitsubishi Heavy Industries, Ltd.), 16 November 1990 (16.11.1990), page 5, line 8 to page 7, line 20; fig. 1 to 3 (Family: none)	1-9

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

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
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10 November 2015 (10.11.15)Date of mailing of the international search report
17 November 2015 (17.11.15)Name and mailing address of the ISA/
Japan Patent Office
3-4-3, Kasumigaseki, Chiyoda-ku,
Tokyo 100-8915, Japan

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 4-369331 A (Katsura Seiki Manufacturing Co., Ltd.), 22 December 1992 (22.12.1992), claim 1; fig. 1 to 2 (Family: none)	1-9

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Patent documents cited in the description

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