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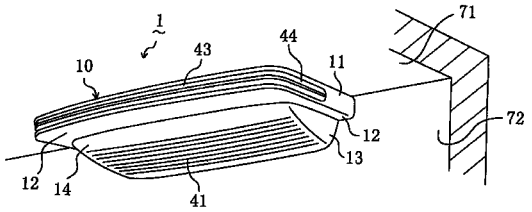
(54) INDOOR UNIT FOR AIR-CONDITIONERS AND STRUCTURE FOR INSTALLING THE SAME

(57) A casing (**10**) is composed of a main body section (**11**) having a flattened, approximately rectangular parallelepipedic shape and a protuberant section (**13**) extending continuously from a bottom portion of the main body section (**11**). A front face of the protuberant section (**13**) is formed into an inclined face (**14**) which inclines downwardly in a front to back direction of the casing (**10**). An air intake opening (**41**) is formed in the inclined face (**41**) of the protuberant section (**13**). An air forward-exhaust opening (**43**) is formed in a front face of the main body section (**11**). An air lateral-exhaust opening (**44**) is formed in each of lateral faces of the main body section (**10**). Within the casing (**10**), a centrifugal fan for drawing room air from below and for emitting it in lateral direction and a heat exchanger for generating conditioned air are disposed in an air passage providing communication from the air intake opening (**41**) to each of the air exhaust openings (**43**, **44**).

Fig. 1



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Description

TECHNICAL FIELD

[0001] This invention relates to an indoor unit for an air conditioner and its mounting mechanism.

BACKGROUND ART

[0002] In a typical air conditioner indoor unit, an indoor heat exchanger, a fan, and other components are housed within an indoor unit casing having an air intake opening and an air exhaust opening. The indoor unit draws room air into the air intake opening. In the indoor heat exchanger, the drawn room air is subjected to heat exchange with a refrigerant in a refrigerating circuit to generate conditioned air. Thereafter, the indoor unit expels currents of conditioned air through the air exhaust opening to air condition a room space.

[0003] Such a type of air conditioner indoor unit includes a wall-mounted one, an example of which is disclosed in Japanese Granted Patent Gazette No. S59-25927. This wall-mounted type indoor unit, which has a centrifugal fan, is installed by attaching its casing to a side wall of a room. The indoor unit is constructed such that it sucks room air through an air intake opening formed in a front face of the casing and expels a current of conditioned air from an air exhaust opening formed in a lower portion of the casing. The centrifugal fan is disposed within the casing, with its rotation shaft extending in a horizontal direction.

[0004] Japanese Granted Patent Gazette No. S63-15494 discloses an air conditioner indoor unit of a ceiling suspended type. In this indoor unit, a centrifugal fan is disposed within a casing with its rotation shaft extending in a perpendicular direction, together with a heat exchanger formed into a shape similar to a Japanese katakana letter of *ko* (like a bracket of]) and located on the sides of a front face and both lateral faces of the centrifugal fan. The indoor unit is constructed such that it sucks room air from a lower face of the casing having a rectangular parallelepipedic shape and expels currents of conditioned air from the front face and as well as from both the lateral faces of the casing.

PROBLEMS THAT THE INVENTION INTENDS TO SOLVE

[0005] However, air conditioner indoor units of the conventional wall-mounted type described above have the problem that since conditioned air is expelled towards the front from an air exhaust opening formed in a lower portion of a casing, it is impossible to achieve a uniform supply of conditioned air into a room space.

[0006] That is to say, the aforesaid conventional indoor unit is designed to expel conditioned air towards the front only, so that it is impossible for this indoor unit to expel conditioned air sideways. Accordingly, conditioned air will not be supplied to every space of a room, thereby resulting in being incapable of providing uniform cooling or heating to the room. This accordingly produces some problems, one of which is that room temperature varies from one room space to another. Therefore, satisfactory comfortability cannot be obtained.

[0007] Generally, pieces of furniture and display shelves are arranged along a side wall of the room. Accordingly, when an indoor unit of the above-described type is mounted on a side wall, a display shelve or the like cannot be arranged along the side wall carrying thereon the indoor unit. Installation of an indoor unit on a side wall produces the problem that it is impossible to make good use of room space.

[0008] On the other hand, for the case of ceiling-suspended type indoor units described above, conditioned air is expelled forwardly and laterally in three different directions. However, the casing is formed into a simple rectangular parallelepipedic shape, therefore being great in size in a longitudinal direction. This represents the problem when installing such a type of indoor unit in the vicinity of a wall. In such a case, the indoor unit projects much from the wall, thereby causing sort of oppressing discomfort to the viewer, i.e., a person present in the room.

[0009] Bearing in mind the above-described problems with the prior art techniques, the present invention was made. Accordingly, an object of the present invention is to provide an improved air conditioner indoor unit capable of expelling currents of conditioned air more uniformly into a room than conventional ones, capable of achieving good use of room space, and capable of diminishing sort of oppressing discomfort that a person present in the room may feel.

DISCLOSURE OF THE INVENTION

[0010] In the present invention, conditioned air can be expelled forwardly and laterally in three different directions (i.e., in a forward direction and in both of lateral directions), a casing (**10**, **110**) is formed into a flattened shape, and an inclined face (**14**, **114**) which inclines downwardly in a front to back direction of the casing (**10**, **110**) is provided at a lower portion of the casing (**10**, **110**) in order that the casing (**10**, **110**) has a smaller thickness on the front side than on the rear side.

[0011] More specifically, a first problem-solving means of the invention is directed to an indoor unit for an air conditioner for drawing air within a room into a casing (**10**, **110**) and for expelling conditioned air to the room, wherein the casing (**10**, **110**) is composed of a main body section (**11**, **111**) having a flattened, approximately rectangular parallelepipedic shape and a protuberant section (**13**, **113**) extending continuously from a bottom portion of the main body section (**11**, **111**), wherein the protuberant section (**13**, **113**) has a front face formed into an inclined face (**14**, **114**), the inclined face (**14**,

114) inclining downwardly in a front to rear direction, wherein (a) an air intake opening (**41**, **141**) is formed in the inclined face (**14**, **114**) of the protuberant section (**13**, **113**), (b) an air forward-exhaust opening (**43**, **143**) is formed in a front face of the main body section (**11**, **111**), and (c) an air lateral-exhaust opening (**44**, **144**) is formed in each of lateral faces of the main body section (**11**), wherein an air passage (**45**, **145**) is formed in the casing (**10**, **110**), establishing communication from the air intake opening (**41**, **141**) to each exhaust opening (**43**, **44**, **143**, **144**), and wherein a fan (**20R**, **20L**, **120R**, **120L**) and a heat exchanger (**30**, **130**) for generating conditioned air from room air are disposed in the air passage (**45**, **145**).

[0012] A second problem-solving means of the invention is directed to the air conditioner indoor unit of the first problem-solving means, wherein the casing (**10**, **110**) is mountably constructed to a side wall (**72**) through a wall mounting means (**170**).

[0013] A third problem-solving means of the invention is directed to the air conditioner indoor unit of the first problem-solving means, wherein the casing (**10**, **110**) is mountably constructed to a ceiling (**71**) through a suspending means (**170**).

[0014] A fourth problem-solving means of the invention is directed to the air conditioner indoor unit of the first problem-solving means, wherein the protuberant section (**13**, **113**) of the casing (**10**, **110**) bulges out downwardly from inside a forward edge and both lateral edges of the main body section (**11**, **111**), and wherein a forward edge portion and both lateral edge portions of the main body section (**11**, **111**) together form a projecting edge portion (**12**, **112**), the projecting edge portion (**12**, **112**) extending forwardly and laterally to project beyond a front end and both lateral ends of the protuberant section (**13**, **113**).

[0015] A fifth problem-solving means of the invention is directed to the air conditioner indoor unit of the fourth problem-solving means, wherein a front face and both lateral faces of the projecting edge portion (**12**) each comprise an approximately vertical face.

[0016] A sixth problem-solving means of the invention is directed to the air conditioner indoor unit of the fourth problem-solving means, wherein the projecting edge portion (**112**) comprises a curved face which projects outwardly of the casing (**110**).

[0017] A seventh problem-solving means of the invention is directed to the air conditioner indoor unit of the first problem-solving means, wherein the fan (**20R**, **20L**, **120R**, **120L**) is implemented by a centrifugal fan for drawing room air from below and for emitting the drawn room air in lateral directions, the centrifugal fan (**20R**, **20L**, **120R**, **120L**) being disposed with its rotation shaft extended vertically.

[0018] An eighth problem-solving means of the invention is directed to the air conditioner indoor unit of the seventh problem-solving means, wherein within the main body section (**11**, **111**) of the casing (**10**, **110**), a plurality of the centrifugal fans (**20R**, **20L**, **120R**, **120L**) are arranged in a parallel relationship with respect to each other in a crosswise direction of the main body section (**11**, **111**).

[0019] A ninth problem-solving means of the invention is directed to the air conditioner indoor unit of the eighth problem-solving means, wherein the heat exchanger (**30**) is disposed under the centrifugal fan (**20R**, **20L**).

[0020] A tenth problem-solving means of the invention is directed to the air conditioner indoor unit of the ninth problem-solving means, wherein the heat exchanger (**30**) is housed within the protuberant section (**13**) of the casing (**10**).

[0021] An eleventh problem-solving means of the invention is directed to the air conditioner indoor unit of the ninth problem-solving means, wherein a baffling member (**60**) is provided within the casing (**10**), the baffling member (**60**) having guide faces (**61**, **62**) formed correspondingly to the centrifugal fan (**20R**, **20L**) so that air emitted by the centrifugal fan (**20R**, **20L**) is directed to the air forward-and lateral-exhaust openings (**43**) and (**44**).

[0022] A twelfth problem-solving means of the invention is directed to the air conditioner indoor unit of the first problem-solving means, wherein each of the two air lateral-exhaust openings (**44**) is formed closably, and wherein the casing (**10**) is settable either to a three-way exhaust mode in which all of the air forward-exhaust opening (**43**) and the two air lateral-exhaust openings (**44**) are opened, to a two-way exhaust mode in which one of the two air lateral-exhaust openings (**44**) is closed while the other of the two air lateral-exhaust openings (**44**) and the air forward-exhaust opening (**43**) are opened, or to a one-way exhaust mode in which both of the two air lateral-exhaust openings (**44**) are closed while the air forward-exhaust opening (**43**) is opened.

[0023] A thirteenth problem-solving means of the invention is directed to the air conditioner indoor unit of the twelfth problem-solving means, wherein an air current changing means (**52**) is disposed within the casing (**10**) so that:

when the casing (**10**) is set to the three-way exhaust mode, air emitted by the centrifugal fan (**20R**, **20L**) is flow divided, by the air current changing means (**52**), into a current of air traveling towards the air forward-exhaust opening (**43**) and currents of air traveling towards the two air lateral-exhaust openings (**44**), and

when the casing (**10**) is set to the two-way exhaust mode. a current of air, emitted by the centrifugal fan (**20R**, **20L**) and traveling towards a closed one of the two air lateral-exhaust openings (**44**), is directed, by the air current changing means (**52**), to the air forward-exhaust opening (**43**), and when the casing (**10**) is set to the one-way exhaust mode, currents of air, emitted by the centrifugal fan (**20R**,

20L) and traveling towards the two air lateral-exhaust openings (**44**) in a closed state, are directed, by the air current changing means (**52**), to the air forward-exhaust opening (**43**).

[0024] A fourteenth problem-solving means of the invention is directed to the air conditioner indoor unit of any one of the first to eighth problem-solving means, wherein the heat exchanger (**130**) is housed within the main body section (**111**) of the casing (**110**) and wherein the heat exchanger (**130**) includes a front heat exchanging section (**131**) disposed along the air forward-exhaust opening (**143**) and a lateral heat exchanging section (**132**) disposed along each of the air lateral-exhaust openings (**144**).

[0025] A fifteenth problem-solving means of the invention is directed to the air conditioner indoor unit of the fourteenth problem-solving means, wherein an air conditioning component (**160**) is housed in a void space within the protuberant section (**113**).

[0026] A sixteenth problem-solving means of the invention is directed to the air conditioner indoor unit of the fifteenth problem-solving means, wherein the air conditioning component (**160**) is at least either one of a high-efficiency air filter and a deodorizier.

[0027] A seventeenth problem-solving means of the invention is directed to the air conditioner indoor unit of the first problem-solving means, wherein on an internal rear side of the casing (**110**), air conditioning components (**162a**, **162b**) are housed in a void space defined between a rear face (**110b**) and the fan (**120R**, **120L**).

[0028] An eighteenth problem-solving means of the invention is directed to the air conditioner indoor unit of the seventeenth problem-solving means, wherein the air conditioning components (**162a**, **162b**) are a refrigerant line and a drain line, respectively.

[0029] A nineteenth problem-solving means of the invention is directed to the air conditioner indoor unit of the first problem-solving means, wherein the heat exchanger (**130**) includes a front heat exchanging section (**131**) disposed along the air forward-exhaust opening (**143**) and a lateral heat exchanging section (**132**) disposed along each of the air lateral-exhaust openings (**144**), wherein the fan (**120R, 120L**) is disposed between a rear face (**110b**) of the casing (**110**) and the front and lateral heat exchanging sections (**131**, **132**) of the heat exchanger (**130**), and wherein an air conditioning component (**161**) is disposed in a void space (**S1**) defined between the rear face (**110b**) of the casing (**110**), the fan (**120R**, **120L**), and the lateral heat exchanging section (**132**).

[0030] A twentieth problem-solving means of the invention is directed to the air conditioner indoor unit of the first problem-solving means, wherein the heat exchanger (**130**) includes a front heat exchanging section (**131**) disposed along the air forward-exhaust opening (**143**) and a lateral heat exchanging section (**132**) disposed along the air lateral-exhaust opening (**144**), wherein a plurality of the fans (**120R**, **120L**) are arranged in a parallel relationship with respect to each other between a rear face (**110b**) of the casing (**110**) and the front and lateral heat exchanging sections (**131**, **132**) of the heat exchanger (**130**), and wherein an air conditioning component (**161**) is disposed in a void space (**S2**) defined between each of the fans (**120R**, **120L**) and the front heat exchanging section (**131**).

[0031] A twenty-first problem-solving means of the invention is directed to the air conditioner indoor unit of the first problem-solving means, wherein the heat exchanger (**130**) includes a front heat exchanging section (**131**) disposed along the air forward-exhaust opening (**143**) and a lateral heat exchanging section (**132**) disposed along each of the air lateral-exhaust openings (**144**), wherein a plurality of the fans (**120R**, **120L**) are arranged in a parallel relationship with respect to each other between a rear face (**110b**) of the casing (**110**) and the front and lateral heat exchanging sections (**131**, **132**) of the heat exchanger (**130**), and wherein an air conditioning component (**161**) is disposed in a void space (**S3**) defined between a rear face (**110b**) of the casing (**110**) and each of the fans (**120R**, **120L**).

[0032] A twenty-second problem-solving means of the invention is directed to the air conditioner indoor unit of the first problem-solving means, wherein the heat exchanger (**130**) includes a front heat exchanging section (**131**) disposed along the air forward-exhaust opening (**143**) and a lateral heat exchanging section (**132**) disposed along each of the air lateral-exhaust openings (**144**), wherein a plurality of the fans (**120R**, **120L**) are arranged in a parallel relationship with respect to each other between a rear face (**110b**) of the casing (**110**) and the front and lateral heat exchanging sections (**131**, **132**) of the heat exchanger (**130**), and wherein an air conditioning component (**161**) is disposed in a void space (**S4**) defined between each fan (**120R**, **120L**).

[0033] A twenty-third problem-solving means of the invention is directed to the air conditioner indoor unit of any of the nineteenth to twenty-second problem-solving means, wherein the air conditioning component (**161**) is a switch box.

[0034] A twenty-fourth problem-solving means of the invention is directed to the air conditioner indoor unit of any one of the nineteenth to twenty-second problem-solving means, wherein the air conditioning component (**161**) is a drain pump.

[0035] A twenty-fifth problem-solving means of the invention is directed to the air conditioner indoor unit of the first problem-solving means, wherein the inclined face (**114**) of the protuberant section (**113**) is formed in such a manner as to incline at a smaller degree of inclination on the rear side than on the front side of the casing (**110**), wherein a plurality of slits (**141a**) are arranged in a parallel relationship with respect to one another in a longitudinal direction in the air intake opening (**141**), extending from side to side of the casing (**110**), and wherein the plurality of slits (**141a**) are formed in such a

manner as to have a greater width on the rear side than on the front side of the casing (**110**).

[0036] A twenty-sixth problem-solving means of the invention is directed to the air conditioner indoor unit of the seventh problem-solving means, wherein the centrifugal fan (**120R**, **120L**) is disposed at a specific distance away from an internal top face of the casing (**110**) so that a current of air can flow between the fan (**120R**, **120L**) and the internal top face of the casing (**110**), and wherein a motor (**125**) for the fan (**120R**, **120L**) is disposed between the fan (**120R**, **120L**) and the casing (**110**).

[0037] A twenty-seventh problem-solving means of the invention is directed to the air conditioner indoor unit of the first problem-solving means, wherein a lateral plate (**110e**) of the casing (**110**) is detachably constructed, and wherein a constituent member (**51**) of the air lateral-exhaust opening (**144**) is incorporated into the lateral plate (**110e**).

[0038] A twenty-eighth problem-solving means of the invention is directed to an indoor unit mounting mechanism comprising an air conditioner indoor unit (**2**) of claim 1 and a mounting fitting (**170**) for installing the indoor unit (**2**) in a room, wherein the mounting fitting (**170**) is formed in one piece composed of a longitudinal plate member (**171**) along a rear face (**110b**) of the indoor unit (**2**) and a lateral plate member (**172**) extending forwardly from the longitudinal plate member (**171**), and wherein the longitudinal plate member (**171**) has a first hooking means (**173**) which becomes engaged with a lower portion (**110f**) on a rear side of the indoor unit (**2**) and wherein the lateral plate member (**172**) has a second hooking means (**174**) which becomes engaged with a portion (**110g**) located in front of the rear-side lower portion (**110f**).

[0039] A twenty-ninth problem-solving means of the invention is directed to the indoor unit mounting mechanism of the twenty-eighth problem-solving means, wherein the mounting fitting (**170**) and the indoor unit (**2**) are constructed so that a top face (**110a**) of the indoor unit (**2**) and the lateral plate member (**172)** become engaged with each other in an approximately parallel manner, and wherein an engaging position of the indoor unit (**2**) with the mounting fitting (**170**) is determined such that a clearance available for controlling the position of the indoor unit (**2**) is defined between the lateral plate member (**172**) of the mounting fitting (**170**) and the top face (**110a)** of the indoor unit (**2**).

[0040] A thirtieth problem-solving means of the invention is directed to the indoor unit mounting mechanism of the twenty-eighth problem-solving means, wherein a mounting hole (**H3**) for a side wall (**72**) of the room is formed in the longitudinal plate member (**171**), and wherein a mounting hole (**H1**) for each bolt (**90**, **95**) for fastening the indoor unit (**2**) is formed in the lateral plate member (**172**).

[0041] A thirty-first problem-solving means of the invention is directed to the indoor unit mounting mechanism of the thirtieth problem-solving means, wherein the mounting hole (**H1**) of the lateral plate member (**172**) is formed at a corresponding position to the suspending bolt (**95**) in a ceiling (**71**) for fastening the indoor unit (**2**).

[0042] Finally, a thirty-second problem-solving means of the invention is directed to the indoor unit mounting mechanism of the twenty-eighth problem-solving means, wherein the first hooking means (**173**) is a first hook (**173**) which is provided at a lower end portion of the longitudinal plate member (**171**) so as to become engaged with the rear-side lower portion (**110f**) of the indoor unit (**2**), wherein the second hooking means (**174**) is a second hook (**174**) which is provided at each of right- and left-hand side lateral edge portions of the lateral plate member (**172**) so as to become engaged with the lateral edge portion (**110g**) of the indoor unit (**2**), and wherein the second hook (**174**) is formed of an elastic material and wherein the second hook (**174**) includes a base portion (**174a**) which is constructed so as to lie along the lateral edge portion (**110g**) and a leading end hooking portion (**174b**) formed by bending a lower end portion of the base portion (**174a**) more inwardly than the lateral edge portion (**110g**) of the indoor unit (**2**).

OPERATION

[0043] In the first problem-solving means of the invention, when the centrifugal fan (**20R**, **20L**, **120R**, **120L**) is started, room air is drawn into the casing (**10**, **110**) through the air intake opening (**41**, **141)** formed in the inclined face (**14**, **114)** of the protuberant section (**13**, **113**). The drawn room air is cooled or heated in the heat exchanger (**30**, **130**) to change to conditioned air. The conditioned air flows through the air passage (**45**, **145**) and is expelled into the room from the air exhaust opening (**43**, **44**, **143**, **144**). More specifically, the air forward-exhaust opening (**43**, **143**) expels a current of conditioned air forwardly of the indoor unit (**1**, **2**), while on the contrary the air lateral-exhaust opening (**44**, **144**) expels a current of conditioned air laterally of the indoor unit (**1**, **2**). In other words, currents of conditioned air are expelled forwardly and laterally of the indoor unit (**1**, **2**) in three different directions, i.e., in a forward direction and in both lateral directions.

[0044] In the indoor unit (**1**, **2**), the protuberant section (**13**, **113**) arranged at the bottom of the flatted main body section (**11**, **111**) has the inclined face (**14**, **114**) which inclines downwardly in a front to back direction with respect to the casing (**10**, **110**). Accordingly, the thickness of the casing (**10**, **110**) at the front face side is smaller than at the rear face side, thereby providing the advantage that when installed in a room, the amount of overhang of a lower end portion of the casing front face can be reduced.

[0045] In the second problem-solving means of the invention, the casing (**10**, **110**) is mounted onto the side wall (**72**) through the wall mounting means (**170**). On

the other hand, in the third problem-solving means of the invention, the casing (**10**, **110**) is mounted to the ceiling (**71**) through the suspending means (**170**).

[0046] In the forth problem-solving means of the invention, a forward edge portion and both lateral edge portions of the main body section (**11**, **111**) of the casing (**10**, **110**) together form the projecting edge portion (**12**, **112**). The projecting edge portion (**12**, **12**) extends forwardly and laterally, projecting beyond a front end and both lateral ends of the protuberant section (**13**, **113**). The air intake opening (**41**, **141**) is formed in the inclined face (**14**, **114**) of the protuberant section (**13**, **113**). The air forward-exhaust opening (**43**, **143**) is formed in a front face of the main body section (**11**, **111**) and the air lateral-exhaust opening (**44**, **144**) is formed in each of lateral faces of the main body section (**11**, **111**), as a result of which the air exhaust opening (**43**, **44**, **143**, **143**) is positioned at a specified distance away from the air intake opening (**41**, **141**).

[0047] Further, an arrangement may be made, in which a front face and both lateral faces of the projecting edge portion (**12**) of the main body section (**11**) of the casing (**10**) each comprise an approximately vertical face, as in the fifth problem-solving means of the invention. Alternatively, another arrangement may be made, in which the projecting edge portion (**12**) comprises a curved face projecting outwardly of the casing (**110**), as in the sixth problem-solving means of the invention.

[0048] In the seventh problem-solving means of the invention, the centrifugal fan (**20R**, **20L**, **120R**, **120L**) is arranged with its rotation shaft directed in a vertical direction. Such arrangement makes it possible to vertically narrow a space necessary for the placement of the centrifugal fan (**20R**, **20L**, **120R**, **120L**). Therefore, the casing (**10**) can be formed into a shortened, flattened shape in a vertical direction.

[0049] In the eighth problem-solving means of the invention, a plurality of the centrifugal fans (**20R**, **20L**, **120R**, **120L**) are provided within the main body section (**11, 111**), being arranged parallel with respect to each another in a crosswise direction of the main body section (**11**, **111**). Accordingly, it becomes possible to deliver sufficient amounts of air towards the air lateral-exhaust opening (**14**, **144**).

[0050] In each of the ninth and tenth problem-solving means of the invention, room air, drawn through the air intake opening (**41**, **141**), passes through the heat exchanger (**30**) where the room air is changed to conditioned air. The conditioned air is drawn into the centrifugal fan (**20R**, **20L**). Then, the conditioned air is expelled into a room space.

[0051] In the eleventh problem-solving means of the invention, air, emitted from the centrifugal fan (**20R**, **20L**) towards the air forward- and lateral-exhaust openings (**43**) and (**44**), flows through these openings (**43**, **44**) and is expelled indoors. On the other hand, air, emitted from the centrifugal fan (**20R**, **20L**) in a direction opposite to each air exhaust opening (**43**, **44**), flows along the guide faces (**61**, **62**) formed in the baffling member (**60**) and is directed to the air forward- and lateral-exhaust openings (**43**) and (**44**). Accordingly, by virtue of the centrifugal fan (**20R**, **20L**), conditioned air will be expelled forwardly and laterally of the casing (**10**) in three different directions.

[0052] In the twelfth problem-solving means of the invention, each air lateral-exhaust opening (**44**) is constructed closably, and the casing (**10**) is constructed such that it is settable to a three-way exhaust mode, to a two-way exhaust mode, or to a one-way exhaust mode. Accordingly, the direction, in which conditioned air is to be expelled, can be set according to the installation state of the indoor unit (**1**) and according to the purpose of a room where the indoor unit (**1**) is installed.

[0053] In the thirteenth problem-solving means of the invention, when the casing is set to the three-way exhaust mode in which both the air lateral-exhaust openings (**44**) are opened, air, emitted by the centrifugal fan (**20R, 20L**), is flow divided by the air current changing means (**52**) into a current of air to the air forward-exhaust opening (**43**) and currents of air to both the air lateral-exhaust openings (**44**). On the other hand, when one or both of the air lateral-exhaust openings (**44**) are closed, i.e., when the casing is set either to the two-way exhaust mode or to the one-way exhaust mode, air, emitted from the centrifugal fan (**20R**, **20L**) and flowing to a closed one of the air lateral-exhaust openings (**44**) or to both of them in the closed state, is directed by the air current changing means (**52**) in the direction of the air forward-exhaust opening (**43**).

[0054] In the fourteenth problem-solving means of the invention, in the main body section (**111**) of the casing (**110**) the heat exchanger (**130**) includes the front heat exchanging section (**131**) along the air forward-exhaust Opening (**43**) and the lateral heat exchanging section (**132**) along the air lateral-exhaust opening (**44**). As a result of such arrangement, after room air is drawn into the fans (**120R**, **120L**) through the air intake opening (**141**), the room air, when expelled forwardly and laterally, passes through the heat exchanger (**130**) to change into conditioned air and thereafter is expelled indoors through each air exhaust opening (**143**, **144**).

[0055] As described above, the heat exchanger (**130**) is housed within the main body section (**111**) of the casing (**110**), and there is produced a void space in the protuberant section (**113**). In the fifteenth problem-solving means of the invention, an air conditioning component (**160**) is housed in such a void space. In the sixteenth problem-solving means of the invention, the air conditioning component (**160**) is either one of a high-efficiency air filter and a deodorizer.

[0056] In the seventeenth problem-solving means of the invention, air conditioning components (**162a**, **162b**) are housed in a void space defined between the rear face (**110b**) of the casing (**110**) and the fan (**120R**, **120L**). In the eighteenth problem-solving means of the invention, the air conditioning components (**162a**, **162b**)

are a refrigerant line and a drain line, respectively. This makes good use of a void space on the side of the rear face (**110a**) of the casing (**110**).

[0057] Further, it is arranged such that the air conditioning component (**161**) is disposed (a) in the void space (**S1**) defined between the rear face (**110b**) of the casing (**110**), the fans (**120R**, **120L**), and the lateral heat exchanging section (**132**), (b) in the void space (**S2**) surrounded by each fan (**120R**, **120L**) and the front heat exchanging section (**131**), (c) in the void space (**S3**) surrounded by the rear face (**110b**) of the casing (**110**) and each fan (**120R**, **120L**), and (d) in the void space (**S4**) defined between each fan (**120R**, **120L**), in the nineteenth to the twenty-second problem-solving means, respectively. In the twenty-third and twenty-fourth problem-solving means of the invention, air conditioning components (**161**) are a switch box and a drain pump, thereby making good utilization of these void spaces (**S1-S4**).

[0058] In the twenty-fifth problem-solving means of the invention, the slits (**141a**) are formed in the air intake opening (**141**). More specifically, the slits (**141a**) are formed in the inclined face (**140**) of the protuberant section (**113**) such that slits (**141a**) at the rear side of the inclined face (**140**) where the degree of inclination of the inclined face (**140**) is gentler have a greater width than slits (**141a**) at the front side. Generally, the indoor unit (**2**) is viewed in an obliquely upward direction from a center side area of a room by a person present in the room. Accordingly, to such a viewer, all the slits (**141a**) seem to have almost the same width. However, the slits (**141a**) are actually formed to have a greater width on the rear side of the casing (**110**), thereby making it possible to provide reduction in the suction resistance of air.

[0059] In the twenty-sixth problem-solving means of the invention, air, expelled from the centrifugal fan (**120R**, **120L**), flows passing between an internal top face of the casing (**110**) and the centrifugal fan (**120R**, **120L**). The motor (**125**) for the centrifugal fan (**120R**, **120L**) is disposed between the centrifugal fan (**120R**, **120L**) and the casing (**110**), as a result of which arrangement air will flow around the periphery of the motor (**125**).

[0060] In the twenty-seventh problem-solving means of the invention, the lateral plate (**110e**) of the casing (**110**) is constructed detachably with respect to the other casing constituent members (**110a**, **110b**, **110c**, **110d**). Furthermore, it is designed such that the constituent member (**151**) of the air lateral-exhaust opening (**144**) is incorporated into the lateral plate (**110e**), because of which it becomes possible to pre-adjust the position of the constituent member (**151**) to the lateral plate (**110e**).

[0061] In the twenty-eighth problem-solving means of the invention, firstly, the mounting fitting (**170**) is attached either to the side wall (**72**) or in the ceiling (**71**) of the room. Secondly, the lower portion (**110f**) on the side of the rear face (**110b**) of the indoor unit (**2**) is engaged with the first hooking means (**173**) and the portion (**110g**) in front of the lower portion (**110f**) is engaged with the second hooking means (**174**), whereby the indoor unit (**2**) is mounted to the mounting fitting (**170**).

[0062] In the twenty-ninth problem-solving means of the invention, when mounting the indoor unit (**2**) to the mounting fitting (**170**), there is created a predetermined clearance between the lateral plate member (**172**) of the mounting fitting (**170**) and the top face (**110a**) of the indoor unit (**2**). Accordingly, when firmly fastening the indoor unit (**2**) to the lateral plate member (**172**) in a later mounting step, it is possible to perform fine adjustment of the inclination of the indoor unit (**2**).

[0063] In the thirtieth problem-solving means of the present invention, after the mounting fitting (**170**) is attached to the side wall (**72**) of the room by means of the mounting hole (**H3**) formed in the longitudinal plate member (**171**), the indoor unit (**2**) is attached to the mounting fitting (**170**), as in the twenty-eighth problem-solving means. Thereafter, the bolts (**90**, **95**) are used to firmly fasten the indoor unit (**2**) to the lateral plate member (**172**) of the mounting fitting (**170**). In other words, in such a case each hooking means (**173, 174**) is used to function as a temporal fastening mechanism for temporarily tacking the indoor unit (**2**) to the mounting fitting (**170**).

[0064] In the thirty-first problem-solving means of the invention, it is possible to firmly fix the mounting fitting (**170**) to the suspending bolt (**95**) of the ceiling (**71**). Thereafter, the indoor unit (**2**) is temporarily fastened to the mounting fitting (**170**) and then is firmly fastened thereto, as in the thirtieth problem-solving means.

[0065] In the thirty-second problem-solving means of the invention, the lower portion (**110f**) on the side of the rear face (**110b**) of the indoor unit (**2**) is hooked on the first hook (**173**), and the indoor unit (**2**) is lifted at its front side so that the lateral edge portion (**110g**) of the indoor unit (**2**) comes to hook on the leading end fastening portion (**174b**) of the second hook (**174**). At that time, when the lateral edge portion (**110g**) of the indoor unit (**2**) makes its way against the second hook (**174**), the second hook (**174**) is forcefully spread out to undergo elastic deformation. Thereafter, when the lateral edge portion (**110g**) has passed through the leading end fastening portion (**174b**), the second hook (**174**) returns to its original shape to engage with the lateral edge portion (**110g**).

EFFECTS OF THE INVENTION

[0066] In the first problem-solving means of the invention, the air forward-exhaust opening (**43**, **143**) is able to expel a current of conditioned air forwardly of the casing (**10**, **110**). On the other hand, the air lateral-exhaust opening (**44**, **144**) is able to expel a current of conditioned air laterally of the casing (**10**, **110**). In other words, the indoor unit (**1**, **2**) has the ability to expel conditioned air forwardly and laterally in three different

directions. Accordingly, conditioned air will be supplied to every space of a room, thereby providing uniform cooling or heating to the room. Uniformization of the room temperature is tried in an effort to provide an improved comfort to persons present in the room.

[0067] Further, room air is drawn into the air intake opening (**41**, **141**) formed in the inclined face (**14**, **114**) of the protuberant section (**13**, **113**) on the bottom side of the casing (**10**, **110**), and conditioned air is expelled forwardly and laterally of the casing (**10**, **110**). Because of this, at the time of installation of the casing (**10**, **110**), it is possible to carry out the installation with the top face of the casing (**10**, **110**) in close proximity to the ceiling (**71**) of the room (**70**). In other words, it is possible to install the indoor unit (**1**, **2**) at a corner area formed between the side wall (**72**) and the ceiling (**71**). As a result, even with the indoor unit (**1**, **2**) installed, it is possible to arrange furniture such as shelves along the side wall (**72**), thereby making good utilization of room space.

[0068] Further, the casing (**10**, **110**) of the indoor unit (**1**, **2**) is formed into a vertically flattened shape and in addition is formed to become thinner in thickness at the front side than at the rear side, therefore reducing sort of oppressing discomfort that persons present in the room may feel.

[0069] In the second problem-solving means of the invention, it is possible to construct the indoor unit (**1**, **2**) of a wall-mounted type to expel currents of conditioned air forwardly and laterally in three different directions. In other words, in the wall-mounted type indoor unit (**1, 2**) which can be installed generally in an easier way in comparison with the indoor unit (**1**, **2**) of a ceiling-embedded or ceiling-suspended type, it is possible to expel conditioned air in three different directions.

[0070] In the third problem-solving means of the invention, it is constructed that conditioned air can be expelled forwardly and laterally in three different directions, with the indoor unit (**1, 2**) of a ceiling-suspended type installed at a corner between the ceiling (**71**) and the side wall (**72**). Because of this, the indoor unit (**1**, **2**) can be installed even in the vicinity of a wall face such as a room partition not strong enough to carry the indoor unit (**1**, **2**), thereby providing a wider installation area range.

[0071] In the fourth problem-solving means of the invention, the air intake opening (**41**, **141**) for the drawing of room air is formed at a specific distance away from the air forward-and lateral-exhaust openings (**43**, **143** and **44**, **144**) for the blowing-out of conditioned air. Such arrangement makes it possible to prevent the occurrence of so-called air short-circuiting, i.e., an undesirable state in which conditioned air once expelled through the air exhaust openings (**43**, **44**, **143, 144**) are again drawn into the air intake opening (**41**, **141**). This ensures that room air-conditioning is carried out satisfactory.

[0072] Further, an arrangement may be made, in which a front face and both lateral faces of the projecting edge portion (**12**, **112**) of the main body section (**11**, **111**) of the casing (**10**, **11**) each comprise an approximately vertical face, as in the fifth problem-solving means. Alternatively, another arrangement may be made, in which the projecting edge portion (**12**, **112**) comprises a curved face projecting outwardly of the casing (**110**), as in the sixth problem-solving means. As a result of such arrangement, the casing (**10**, **110**) can be design-processed in various ways. Particularly, if the projecting edge portion (**112**) is formed of a curved face, this will enhance the integration of itself with the inclined face (**114**) of the protuberant section (**113**). This further reduces the degree of sort of oppressing discomfort that persons present in the room may feel when the indoor unit is installed.

[0073] In the seventh problem-solving means of the invention, the casing (**10**) can be formed into a vertically flattened shape. This contributes to making the indoor unit (**1**) look smaller in size, with the indoor unit (**1**) installed to the side wall (**72**). In the eighth problem-solving means of the invention, a

[0074] plurality of the centrifugal fans (**20R**, **20L**, **120R**, **120L**) are arranged parallel with respect to each other in a crosswise direction of the main body section (**11**, **111**) of the casing (**10**, **110**), whereby air can sufficiently be delivered to the air lateral-exhaust opening (**44**, **144**). This accordingly provides a more uniformly air-conditioned room space.

[0075] In the ninth and tenth problem-solving means of the invention, the heat exchanger (**30**) is disposed under the centrifugal fan (**20R**, **20L**), and particularly in the tenth problem-solving means, the heat exchanger (**30**) is disposed within the protuberant section (**13**). Such arrangement makes it possible to downsize the main body section (**11**) of the casing (**10**).

[0076] In the eleventh problem-solving means of the invention, air, emitted by the centrifugal fan (**20R**, **20L**), is directed by the baffling member (**60**) towards each air exhaust opening (**43, 44**). This ensures a steady supply of conditioned air in three different directions, i.e., in forward and lateral directions of the indoor unit (**1**). As a result, currents of conditioned air can be supplied throughout the room, thereby providing an improved comfort to persons present in the room.

[0077] In the twelfth problem-solving means of the invention, the direction, in which a current of conditioned air is to be expelled, can be set according to the installation state of the indoor unit (**1**) and according to the purpose of the room (**70**) where the indoor unit (**1**) is installed, in other words, it is possible to carry out so-called zoning. More specifically, when the indoor unit (**1**) is installed in the room (**70**) of a rectangular shape, the casing (**10**) is set to the three-way exhaust mode. On the other hand, when the indoor unit (**1**) is installed in the room (**70**) of an oblong shape, the casing (**10**) is set to the one-way exhaust mode. Because of such arrangement, conditioned air will be supplied through-

out the room.

[0078] On the other hand, depending on the purpose of the room (**70**) where the indoor unit (**1**) is installed, it becomes necessary to deliver currents of conditioned air in only particular directions in the room. In such a case, one of the air lateral-exhaust openings (**44**) is placed in the closed state so that the casing is set to the two-way exhaust mode. In this way, the aforesaid requirement can be met.

[0079] In the thirteenth problem-solving means of the invention, at the time of setting the casing (**10**) in the three-way exhaust mode, air emitted by the centrifugal fan (**20R, 20L**) can be flow divided by the air current changing means (**52**) into a current of air flowing to the air forward-exhaust opening (**43**) and currents of air flowing to each air lateral-exhaust opening (**44**). This causes each air exhaust opening (**43, 44**) to uniformly expel conditioned air, thereby ensuring that conditioned air is supplied throughout the room. As a result, indoor temperature is uniformized to provide an improved comfort to persons present in the room.

[0080] On the other hand, at the time of setting the casing (**10**) either in the two-way exhaust mode or in the one-way exhaust mode, currents of air, emitted by the centrifugal fan (**20R**, **20L**) and flowing towards a closed one of the air lateral-exhaust openings (**44**) or both in the closed state, can be directed to the air forward-exhaust opening (**43**). This results in ensuring that conditioned air generated is expelled through the air exhaust opening (**43**, **44**) in the opened state.

[0081] In the fourteenth problem-solving means of the invention, the heat exchanger (**30**) is housed in the main body section (**111**) of the casing (**110**), thereby making it possible to reduce the protuberant section (**113**) in size.

[0082] In the fifteenth problem-solving means of the invention, the air conditioning component (**160**) is housed in a void space created in the protuberant section (**113**), thereby making it possible to make good utilization of spaces in the casing (**110**).

[0083] In the sixteenth problem-solving means of the invention, the air conditioning component (**160**) is either one of a high-efficiency air filter and a deodorizer. Accordingly, without having to increase the size of the casing (**110**) of the air conditioner indoor unit (**2**), it is possible to provide an additional function as deodorizing or detoxifying odorous and harmful substances.

[0084] In the seventeenth to twenty-fourth problem-solving means of the invention, the in-casing placement of air conditioning components of the first problem-solving means is improved thereby to make it possible to reduce the size of casing. On the other hand, for example, Japanese Granted Patent Gazette No. S63-15494 discloses a structure in which a centrifugal fan is disposed in a casing having a rectangular, vertically flattened, rectangular parallelepipedic shape, with its rotation shaft perpendicularly extended, and currents of conditioned air are expelled in three different directions through air exhaust openings formed in a front face and both of lateral faces of the casing. In this prior art example, a heat exchanger, having a shape similar to a Japanese katakana letter of *ko* (like a bracket of]) when viewed from the top, is disposed on the sides of a front face and both lateral faces of the fan, and room air is sequentially passed through the fan and then through the heat exchanger to generate conditioned air. Thereafter, the conditioned air is expelled into the room.

[0085] Such a type of air conditioner indoor unit which expels conditioned air in three different directions from the front face and both the lateral faces of the casing, however, has the problem that a void space created between a rear face of the casing and the fan is likely to become dead space, which is a bar to downsizing the indoor unit casing.

[0086] Further, a structure may be considered, in which a plurality of fans are arranged within a casing of an air conditioner indoor unit of the type describe above. However, in such a case, when the space between each fan is made narrow, a flow of expelled air is likely to be disturbed between fans even if a partition plate is provided therebetween. Accordingly, it is required to arrange each fan at some degree of intervals, which results in producing a dead space between fans. This therefore produces a bar to downsizing the indoor unit casing.

[0087] To cope with such a problem, in the seventeenth to twenty-fourth problem-solving means of the invention, dead space, which is created around the periphery of fans of an air conditioner indoor unit having air forward- and lateral-exhaust openings, is reduced, whereby the entire equipment can be reduced in size.

[0088] More specifically, in the seventeenth and eighteenth problem-solving means of the invention, a void space defined between the rear face (**110b**) of the casing (**110**) and the fan (**120R**, **120L**) is utilized in an effective manner for the downsizing of the casing (**110**). If the refrigerant line (**162a**) and the drain line (**162b**) are disposed in such a void space, this improves the degree of freedom in installation of the indoor unit since the connecting of external piping with the indoor unit can be established at a lateral face portion of the casing (**110**).

[0089] Any air conditioning components including the refrigerant line (**162a**) and the drain line (**162b**) are not disposed between the front or lateral face of the casing (**110**) and the fan (**20R**, **20L**), the reason for which is that, if such air conditioning components were disposed, they would become obstacles, preventing currents of conditioned air from passing through the air forward- and lateral-exhaust openings (**143**,**144**).

[0090] Further, in the nineteenth to twenty-fourth problem-solving means of the invention, the downsizing of the casing (**110**) is tried by making good utilization of (a) the void space (**S1**) defined between the rear face (**110b**) of the casing (**110**), the fan (**120R**, **120L**), and the lateral heat exchanging section (**132**), (b) the void space (**S2**) surrounded by each fan (**120R**, **120L**) and

the front heat exchanging section (**131**), (c) the void space (**S3**) surrounded by the rear face (**110b**) of the casing (**110**) and each fan (**120R**, **120L**), and (d) the void space (**S4**) defined between each fan (**120R**, **120L**).

[0091] In the twenty-fifth problem-solving means of the invention, it is arranged such that of the slits (**141a**), slits (**141a**), which are formed on the rear side of the casing (**110**) thereby to give to a person present in the room a limited view of the inside of the indoor unit (**2**) therethrough, have a greater width than ones formed on the front side. In addition, it is arranged such that the degree of inclination of the inclined face of the protuberant section (**113**) at the rear side of the casing (**110**) is smaller than at the front side thereof. This provides to the viewer such an impression that all the slits (**141a**) have almost the same width, and it is possible to prevent the suction resistance of air from increasing.

[0092] In the twenty-sixth problem-solving means of the invention, air produced by the centrifugal fan (**120R**, **120L**) flows around the periphery the motor (**125**) for the centrifugal fan (**120R**, **120L**). It is possible to cool the motor (**125**) with room air, thereby ensuring the steady operation of the motor (**125**).

[0093] In the twenty-seventh problem-solving means of the invention, it is possible to perform pre-adjustment of the position of the constituent member (**151**) of the air lateral-exhaust opening (**144**) with respect to the lateral plate (**110e**) of the casing (**110**), as a result of which it becomes possible to facilitate incorporation of the lateral plate (**110e**) into the other casing constituent members (**110a**, **110b**, **110c**, **110d**).

[0094] In the twenty-eighth to the thirty-second problem-solving means of the invention, improvements in a mounting mechanism for the indoor unit of the first problem-solving means are made. A typical air conditioner of a wall-mounted type (one such example is shown in Japanese Granted Patent Gazette No. S59-25927) has a structure in which a mounting plate having a hook at its upper portion is firmly attached to a room side wall and the air conditioner is hooked on the hook of the mounting plate. In addition, Japanese Granted Patent Gazette No. S63-15494 shows a ceiling-suspended air conditioner which is generally constructed such that it is fixed to a ceiling of the room by a suspending bolt embedded into the ceiling. More concretely, with a suspending bolt inserted into a mounting hole formed in an air conditioner casing, a plurality of nuts screwed on the suspending bolt are further tightened from above and below the casing, whereby the casing can be attached firmly to the ceiling.

[0095] However, for the case of wall-mounted type air conditioners, if the casing has a greater front-to-rear depth, a structure, in which only a rear face of the casing is fixed to a wall by means of a mounting plate, is problematic in terms of strength. Further, when a fixing mechanism as employed for conventional ceiling-suspended type air conditioners is used, there is produced a problem in workability. In other words, a plurality of installation workmen are required for the mounting of an air conditioner, e.g., one for supporting the air conditioner with suspending bolts placed into corresponding mounting holes and the other for screwing nuts onto the suspending bolts.

[0096] To cope with the above-described problem, in the twenty-eighth to thirty-second problem-solving means of the invention, there are provided improved mounting mechanisms for wall-mounted type air conditioners which are enhanced in mounting strength and which are applicable to ceiling-suspended type air conditioners, thereby providing improvement in workability.

[0097] More concretely, in the twenty-eighth problem-solving means of the invention, the first hooking means (**173**) and second hooking means (**174**) of the mounting fitting (**170**) attached to the side wall (**72**) or to the ceiling (**71**) of the room (**70**) are engaged with the lower portion (**110f**) on the side of the rear face of the indoor unit (**2**) and the portion (**110g**) located in front of the portion (**110f**), for the installation of the indoor unit (**2**) in the room. This facilitates the mounting of the indoor unit (**2**). Even the indoor unit (**2**) having a greater front-to-rear depth can firmly be mounted to the side wall (**72**) or to the ceiling (**71**).

[0098] In the twenty-ninth problem-solving means of the invention, it is possible to horizontally hold the indoor unit (**2**) having a great front-to-back depth which is therefore likely to bend forwardly in an installed state. Additionally, even when the ceiling (**71**) or the side wall (**72**) inclines, it is possible to adjust the inclination of the indoor unit (**2**) to the inclination of the ceiling (**71**) or the side wall (**72**).

[0099] In the thirtieth problem-solving means of the invention, after the longitudinal plate member (**171**) of the mounting fitting (**170**) is firmly attached to the side wall (**72**) of the room (**70**), the indoor unit (**2**) is temporarily tacked to the mounting fitting (**170**). Then, the indoor unit (**2**) is firmly fastened to the lateral plate member (**172**). The degree of mounting strength is further enhanced.

[0100] In the thirty-first problem-solving means of the invention, after the mounting fitting (**170**) is attached to the suspending bolt (**95**) of the ceiling (**71**), it is possible to temporarily fasten the indoor unit (**2**) to the mounting fitting (**170**) and thereafter to firmly fix the indoor unit (**2**) to the mounting fitting (**170**). In the way described above, the mounting fitting (**170**) is applicable to the indoor unit (**2**) of a ceiling-suspended type. In addition, no extra workman is required to support the indoor unit (**2**) when another workman screws nuts on the suspending bolt (**95**), thereby providing improvement in workability. Further, the indoor unit (**2**) can be mounted to any one of the side wall (**72**) and the ceiling (**71**) of the room (**70**), thereby providing an improved degree of freedom in installation.

[0101] Finally, in the thirty-second problem-solving means of the invention, what is to be done for the

attachment of the indoor unit (**2**) to the mounting fitting (**170**) is just lifting the indoor unit (**2**) at its front side after the lower portion (**110f)** on the side of the rear face (**110b**) of the indoor unit (**2**) is hooked on the first hook (**173**), thereby facilitating the mounting of the indoor unit (**2**) onto the mounting fitting (**170**).

BRIEF DESCRIPTION OF DRAWINGS

[0102]

Figure **1** is a perspective view of an indoor unit for an air conditioner according to a first embodiment of the invention.

Figure **2** is a schematic side view in cross section of the indoor unit according to the first embodiment.

Figure **3** is a schematic plan view in cross section of the indoor unit according to the first embodiment.

Figure **4** is a descriptive diagram illustrating the blowout direction of conditioned air when the indoor unit of the first embodiment is set to a three-way exhaust mode.

Figure **5** is a schematic plan view in cross section of the indoor unit of the first embodiment in a two-way exhaust mode.

Figure **6** is a descriptive diagram illustrating the blowout direction of conditioned air when the indoor unit of the first embodiment is set to a two-way exhaust mode.

Figure **7** is a schematic plan view in cross section of the indoor unit of the first embodiment in a one-way exhaust mode.

Figure **8** is a descriptive diagram illustrating the direction of conditioned air when the indoor unit of the first embodiment is set to a one-way exhaust mode.

Figure **9** is an exploded perspective view of an indoor unit for an air conditioner according to a second embodiment of the invention.

Figure **10** is a schematic side view in cross section of the indoor unit of the second embodiment.

Figure **11** is a plan view illustrating a layout of internal components of the indoor unit of the second embodiment.

Figure **12** is a front view illustrating a layout of internal components of the indoor unit of the second embodiment.

Figure **13** is a side view illustrating a layout of internal components of the indoor unit of the second embodiment.

Figure **14** is an enlarged sectional view of an air intake grille of the indoor unit of the second embodiment.

Figure **15** is an exploded perspective view of a mounting mechanism of the indoor unit of the second embodiment.

Figure **16** is a side view in cross section illustrating a manner of mounting the indoor unit of the second embodiment on a side wall of a room.

Figure **17** is a side view in cross section of a longitudinal plate member of a mounting fitting used in a mounting mechanism of the indoor unit of the second embodiment.

Figure **18** is an enlarged view partially illustrating a state of mounting the indoor unit of the second embodiment to a mounting fitting.

Figure **19** is an enlarged view partially illustrating a state of how the indoor unit is mounted to a mounting fitting.

Figure **20** is a side view in cross section illustrating a state of mounting the indoor unit of the second embodiment to a ceiling portion of a room.

BEST MODE FOR CARRYING OUT THE INVENTION

[0103] Hereinafter, preferred embodiments of the invention will be described in detail by making reference to the accompanying drawings.

EMBODIMENT 1

[0104] A first embodiment of the invention is shown in Figures **1-8**. As shown in Figure **1**, an indoor unit (**1**) for an air conditioner according to the first embodiment of the invention is mounted at a corner area formed by a ceiling (**71**) and a side wall (**72**) of a room (**70**). The indoor unit (**1**) is formed to a wall-mounted type, and although not shown in the figure, a casing (**10**) is fixedly attached to the side wall (**72**) through a mounting metal fitting (i.e., a wall mounting means).

[0105] The casing (**10**) is composed of a main body section (**11**) having a flattened, rectangular-parallelepipedic shape and a protuberant section (**13**) bulging out downwardly from a bottom face of the main body section (**11**).

[0106] When installed, the main body section (**11**) of the casing (**10**) lies along the ceiling (**71**) of the room (**70**), and the main body section (**11**) is formed thinner in thickness in a vertical direction in order to reduce its projection amount from the ceiling (**71**).

[0107] As shown in Figures **1** and **2**, the protuberant section (**13**) of the casing (**10**) is formed in such a way as to project downwardly little by little from front to rear, in a bottom face (**12**) of the main body section (**11**). In other words, in its installed state, the protuberant section (**13**) is formed into a shape gradually projecting towards the side wall (**72**) of the room (**70**).

[0108] More specifically, the protuberant section (**13**) has a front face formed into an inclined face (**14**). More specifically, the inclined face (**14**) inclines downwardly in a gentle manner from its front side continuously extending from the main body section (**11**) to the rear side. On the other hand, the protuberant section (**13**) has a rear face formed into a vertically rising face (**17**) along the side wall (**72**) of the room (**70**) and continuously extending to a rear face of the main body section (**11**). Addi-

tionally, both of lateral faces of the protuberant section (**13**) are formed into vertical faces, continuously extending to corresponding lateral portions of the lower face of the main body section (**11**).

[0109] Further, the inclined surface (**14**) of the protuberant section (**13**) has a front side somewhat behind the forward edge of the main body section (**11**). Additionally, both lateral sides of the protuberant section (**13**) are located more inwardly than both lateral ends of the main body section (**11**). Further, formed at a front portion and both lateral portions is a projecting edge portion (**12**) projecting from the protuberant section (**13**). This projecting edge portion (**12**) has front and lateral faces which are almost vertical.

[0110] Formed in the casing (**10**) are an air intake opening (**41**) through which room air is drawn into the casing (**10**) and air exhaust openings (**43, 44**) through which currents of conditioned air are expelled into the room. The air intake opening (**41**) is formed and positioned in the inclined face (**14**) of the protuberant section (**13**) of the casing (**10**). On the other hand, the air exhaust openings (**43**, **44**) are formed over from the front face to the lateral faces of the main body section (**11**) of the casing (**10**). Of the air exhaust openings (**43**, **44**), the air forward-exhaust opening (**43**) is formed so as to open at the front face of the main body section (**11**), while on the contrary the air lateral-exhaust openings (**44**) are formed so as to open at the lateral faces of the main body section (**11**), respectively. As described above, the projecting edge portion (**12**) is formed in the main body section (**11**) of the casing (**10**), so that the air intake opening (**41**) is located at a specific distance away from each of the air exhaust openings (**43**, **44**).

[0111] As can be seen from Figures **5** and **7**, there are provided lids (**16)** to the air lateral-exhaust openings (**43**, **44**) in a mountable manner so that the air lateral-exhaust openings (**43**, **44**) can be closed. Accordingly, the casing (**10**) is settable either to a three-way exhaust mode in which the air forward-exhaust opening (**43**) and both the air lateral-exhaust openings (**43, 44**) are all in the opened state, to a two-way exhaust mode in which one of the air lateral-exhaust openings (**44)** is in the closed state while the other air lateral-exhaust opening (**44**) and the air forward-exhaust opening (**43**) are in the opened state, or to a one-way exhaust mode in which both the air lateral-exhaust openings (**44**) are in the closed state while the air forward-exhaust opening (**43**) is in the opened state.

[0112] Within the casing (**10**), a flow-through opening (**18**) is opened in a bottom face portion of the main body section (**11**), forming an air passage (**45**) which provides communication from the air intake opening (**41**) to each of the air exhaust openings (**43**, **44**).

[0113] As shown in Figure **2**, disposed in the air passage (**45**) are a heat exchanger (**30**) and two fans (**20R**, **20L**).

[0114] The heat exchanger (**30**) is disposed within the protuberant section (**13**) of the casing (**10**). The heat exchanger (**30**) is made up of a front heat exchanging section (**31**) and a rear heat exchanging section (**32**). The front heat exchanging section (**31**) is located at a front area of the protuberant section (**13**), being formed in a forward-bent position. On the other hand, the rear heat exchanging section (**32**) is located at a rear area of the protuberant section (**13**), being formed in a backward-bent position. Accordingly, the heat exchanger (**30**) is formed into a V-shape when viewed from the side. Additionally, although not shown in the figure, the front and rear heat exchanging sections (**31**, **32**) are implemented by so-called cross fin heat exchangers. In other words, each of the front and rear heat exchanging sections (**31**, **32**) is formed by many plate-like fins arranged parallel with one another and a heat-transfer pipe disposed in such a way as to pass through the fins.

[0115] In each fan (**20R**, **20L**), a blade (**23**) is held between a shroud (**21**) and a hub (**22**). Each fan (**20R**, **20L**) is a type of centrifugal fan, i.e., a so-called radial fan. Further, a fan motor (**26**) has a drive shaft (**26**) extending in a vertical direction. This drive shaft (**26**) is fixedly inserted into the hub (**22**) of each fan (**20R**, **20L**).

[0116] Opened in the middle of the shroud (**21**) is a suction port (**24**) which is located at the flow-through opening (**18**) of the main body section (**11**) of the casing (**10**). Each fan (**20R**, **20L**) is formed as follows. That is, each fan (**20R**, **20L**) is driven by the fan motor (**25**) to rotate, so that air is drawn through the suction port (**24**) and the drawn air is discharged towards the side of each fan (**20R**, **20L**).

[0117] Additionally, the fan motor (**25**) for the fans (**20R**, **20L**) is attached to a top plate (**15**) of the main body section (**11**) of the casing (**10**) from the side of a lower face of the top plate (**15**). In a bottom face portion of the main body section (**11**) under the fans (**20R**, **20L**), a bell mouth (**27**) for guiding the room air, which has flowed into the air passage (**45**) from the air intake opening (**41**), toward the fans (**20R**, **20L**) is formed in an edge portion of the flow-through opening (**18**).

[0118] As shown in Figure **3**, in the main body section (**11**) of the casing (**10**), the fans (**20R**, **20L**) are disposed in parallel with each other, with a specific interval held therebetween in a crosswise direction of the main body section (**11**). In other words, the casing (**10**) is provided with the right-hand side fan (**20R**) which is located on the right-hand side when viewed from the front and the left-hand side fan (**20L**) which is located on the left-hand side when viewed from the front. Further, both the fans are constructed so as to rotate in directions as indicated by solid-line arrows. That is to say, when viewed from above the casing (**10**), the right-hand side fan (**20R**) is constructed so as to rotate counterclockwise, while the left-hand side fan (**20L**) is constructed so as to rotate clockwise.

[0119] The main body section (**11**) of the casing (**10**) is provided with a baffling member (**60**) formed into a specific shape. By virtue of the baffling member (**60**), the air passage (**45**) in the main body section (**11**) of the

casing (**10**) is divided into two parts, namely a right-hand side air passage (**45R**) located on the right-hand side when viewed from the front of the casing (**10**) and a left-hand side air passage (**45L**) located on the left-hand side when viewed from the front of the casing (**10**). The right-hand side air passage (**45R**) is constructed as follows. That is, the right-hand side air passage (**45R**) has therein the right-hand side fan (**20R**) and is in communication with the right half of the air forward-exhaust opening (**43**) as well as in communication with the right-hand side air lateral-exhaust opening (**44**). On the other hand, the left-hand side air passage (**45L**) is constructed as follows. That is, the left-hand side air passage (**45L**) has therein the left-hand side fan (**20L**) and is in communication with the left half of the air forward-exhaust opening (**43**) as well as in communication with the left-hand side air lateral-exhaust opening (**44**).

[0120] With respect to the right- and left-hand side fans (**20R**, **20L**), the baffling member (**60**) has a pair of first guide surfaces (**61**) and a pair of second guide surfaces (**62**) continuously extending from the their corresponding first guide surfaces (**61**).

[0121] Passing on the side of each fan (**20R**, **20L**) from a front middle portion of the main body section (**11**) of the casing (**10**), each first guide surface (**61**) extends laterally of the main body section (**11**) so as to be formed along a side surface of each fan (**20R**, **20L**). Further, when viewed from above the casing (**10**), the first guide surface (**61**) is formed into a scroll form, so that the clearance between the first guide surface(**61**) and the side surface of each fan (**20R**, **20L**) gradually expands along the direction in which each fan (**20R**, **20L**) rotates.

[0122] The first guide surface (**61**) is formed such that air flowing towards the rear face of the casing (**10**) from each fan (**20R**, **20L**) is directed to the air forward-exhaust opening (**43**).

[0123] The second guide surface (**62**) is formed over from one end of the first guide surface (**61**) on the side of the main body section (**11**) of the casing (**10**) to the side surface of the main body section (**11**). The second guide surface (**62**) has a concave surface portion of a given shape and a convex surface portion of a given shape, so that air flowing towards the lateral rear face of the casing (**10**) is guided to each air lateral-exhaust opening (**44**).

[0124] Horizontal flaps (**51**) are provided and located at the air forward- and lateral-exhaust openings (**43**, **44**) in the casing (**10**). The horizontal flap (**51**) is constructed rotatably around a horizontal shaft, so that the blowout direction of conditioned air expelled from the air exhaust openings (**43**, **44**) can be changed.

[0125] Provided within the main body section (**11**) of the casing (**10**) are a pair of flow-arranging flaps (**52**) which are located at both lateral portions on the side of the front face. The flow-arranging flap (**52**) is constructed rotatably around a vertical shaft. The flow-arranging flap (**52**) constitutes an air current changing means. More specifically, when the casing (**10**) is set in a three-way exhaust mode, a flow of air emitted from each fan (**20R**, **20L**) is flow divided by the flow-arranging flap (**52**) to a current of air to the air forward-exhaust opening (**43**) and currents of air to both the air lateral-exhaust openings (**44**). On the other hand, when the casing (**10**) is set either in a two-way exhaust mode or in a one-way exhaust mode, air, emitted from each fan (**20R**, **20L**) and flowing towards a closed one of the air lateral-exhaust openings (**44**) or towards both of them in the closed state, is directed to the air forward-exhaust opening (**43**).

[0126] More specifically, the flow-arranging flap (**52**) is formed into a cant shape of almost a triangular shape when viewed from the top. The flow-arranging flap (**52**) has an internal guide surface (**53**) formed into a somewhat concavely curved surface, an external guide surface (**54**) formed into a somewhat convexly curved surface, and a bottom guide surface (**55**) formed into an almost flattened surface. The flow-arranging flap (**52**) is pin-supported at the angle of the internal guide surface (**53**) and the bottom guide surface (**55**), whereby an apex (**56**), at which the internal guide surface (**53**) and the external guide surface (**54**) are continuous with each other, can be rotated inwardly and outwardly.

[0127] In other words, when the apex (**56**) of the flow-arranging flap (**52**) is positioned outside, currents of air emitted from the fans (**20R, 20L**) are directed to the air lateral-exhaust openings (**44**), as shown by arrow (**X**) of Figure **3**. On the other hand, when the apex (**56**) is positioned inside, currents of air emitted from the fans (**20R**, **20L**) are directed to the air forward-exhaust opening (**43**), as shown by arrow (**Y**).

RUNNING OPERATION

[0128] The air conditioning operation of the indoor unit (**1**) will be described below.

[0129] In the first place, each fan (**20R**, **20L**) is driven by the fan motor (**25**), so that room air is drawn into the casing (**10**) through the air intake opening (**41**). In the casing (**10**), the drawn room air flows through the air passage (**45**), thereafter passing through the heat exchanger (**30**).

[0130] A refrigerant of a refrigerating circuit flows in the heat exchanger (**30**), which is not shown in the figure. In a cooling running mode, the refrigerant exchanges heat with room air to evaporate, thereby cooling the room air to generate low-temperature conditioned air. On the other hand, in a heating running mode, a refrigerant exchanges heat with room temperature to condense, thereby heating the room air to generate high-temperature conditioned air.

[0131] Conditioned air generated in the heat exchanger (**30**) flows in the air passage (**45**), passes through the bell mouth (**27**), and flows into each fan (**20R**, **20L**). The conditioned air passes through the inside of each fan (**20R**, **20L**) from the suction port (**24**),

thereafter flowing laterally of each fan (**20R**, **20L**).

[0132] The casing (**10**) is set either to a three-way exhaust mode, to a two-way exhaust mode, or to a one-way exhaust mode. Conditioned air emitted from each fan (**20R**, **20L**) flows into the air exhaust openings (**43**, **44**) in the opened state and is expelled into the room, at which time conditioned air, emitted from each fan (**20R**, **20L**) towards the rear face of the casing (**10**), flows along the guide surface (**61**) of the baffling member (**60**) and is directed to the air forward-exhaust opening (**43**). Further, because there is provided a specific distance between the air intake opening (**41**) and each air exhaust opening (**43**, **44**), this prevents so-called air short circuiting from occurring. In other words, conditioned air expelled from each air exhaust opening (**43**, **44**) will not flow directly into the air intake opening (**41**). The flow of conditioned air in each exhaust mode will be described below.

THREE-WAY EXHAUST MODE

[0133] When the casing (**10**) is set in a three-way exhaust mode, all of the air forward-exhaust opening (**43**) and both of the air lateral-exhaust openings (**44**) are placed in the opened state, as illustrated in Figure **3**. Further, both of the flow-arranging flaps (**52**) arranged on the right- and left-hand sides are set such that their respective apexes (**56**) are positioned outside.

[0134] In such a state, currents of conditioned air, emitted from each fan (**20R**, **20L**), are expelled into the room from the air forward-exhaust opening (**43**) as well as from both of the air lateral-exhaust openings (**44**), at which time conditioned air is expelled at an angel to the front along the internal guide surface (**53**) of each of the flow-arranging flaps (**52**) while also being expelled laterally by the external guide surface (**54**) from the bottom guide surface (**55**). Accordingly, currents of conditioned air are expelled from the air forward- and lateral-exhaust openings (**43**, **44**) at almost the uniform wind velocity.

[0135] That is to say, as shown in Figure **4**, conditioned air is expelled in three different directions, namely in a forward direction of the casing (**10**) and in both of lateral directions of the casing (**10**). As a result of such arrangement, even when the indoor unit (**1**) is installed in the room (**70**) which is rectangular, currents of conditioned air can be supplied everywhere in the room.

TWO-WAY EXHAUST MODE

[0136] When the casing (**10**) is set in a two-way exhaust mode, a closing lid (**16**) is attached to, for example, the air lateral-exhaust opening (**44**) positioned on the left-hand side when viewed from the front, as shown in Figure **5**. The left-hand side air lateral-exhaust opening (**44**) is closed by the lid (**16**). The air forward-exhaust opening (**43**) and the right-hand side air lateral-exhaust opening (**44**) are in the opened state.

[0137] Additionally, the flow-arranging flap (**52**) positioned on the right-hand side is set such that its corresponding apex (**56**) is positioned outside, whereas the flow-arranging flap (**52**) positioned on the left-hand side is set such that its corresponding apex (**56**) is positioned inside.

[0138] In such a state, conditioned air emitted from the right-hand side fan (**20R**) is flow divided by the right-hand side flow-arranging flap (**52**), as in the three-way exhaust mode, whereby conditioned air thus flow divided can be expelled through the air forward-exhaust opening (**43**) and through the right-hand side air lateral-exhaust opening (**44**), respectively, at almost the uniform wind velocity. On the other hand, conditioned air emitted from the left-hand side fan (**20L**) is directed by the closing lid (**16**) and the left-hand side flow-arranging flap (**52**) towards the air forward-exhaust opening (**43**), and is expelled into the room.

[0139] That is to say, as shown in Figure **6**, conditioned air is supplied, only to a desired space. In some cases, it is required that conditioned air be expelled indoors in specific directions, depending upon the purpose of the room (**70**) in which the indoor unit (**1**) is installed. In such a case, by setting the casing (**10**) in a two-way exhaust mode, it becomes possible to cope with such a requirement.

[0140] In the description made above, the air lateral-exhaust opening (**44**), positioned on the left-hand side when viewed from the front of the casing (**10**), is placed in the closed state. However, an arrangement may be made in which the right-hand side air lateral-exhaust opening (**44**) is placed in the closed state and conditioned air is expelled through the air forward-exhaust opening (**43**) as well as through the left-hand side air lateral-exhaust opening (**44**).

ONE-WAY EXHAUST MODE

[0141] Then the casing (**10**) is set in a one-way exhaust mode, the closing lid (**16**) is attached to each of the air lateral-exhaust openings (**44**), as shown in Figure **7**. This places both the air lateral-exhaust openings (**44**) in the closed state, while on the contrary the air forward-exhaust opening (**43**) is in the opened state. Both the right- and left-hand flow-arranging flaps (**52**) are set such that their respective apexes (**56**) are positioned inside.

[0142] In such a state, currents of conditioned air produced by each fan (**20R**, **20L**) are expelled into the room, only from the air forward-exhaust opening (**43**), at which time conditioned air is directed by the closing lids (**16**) and the external guide surfaces (**54**) of the flow-arranging flaps (**52**) towards the air forward-exhaust opening (**43**) to be expelled therefrom into the room.

[0143] In other words, conditioned air generated is expelled, only forwardly of the casing (**10**), so that even when the indoor unit (**1**) is installed in the room (**70**) of an oblong shape, conditioned air reaches a space at

distant from the indoor unit (**1**), whereby conditioned air can be supplied throughout the room.

EFFECTS OF THE FIRST EMBODIMENTS

[0144] As described above, according to the first embodiment of the invention, each fan (**20R**, **20L**) is provided within the casing (**10**), with its rotation shaft extending in vertical direction, thereby making it possible to form the casing (**10**) of the indoor unit (**1**) into a vertically flattened shape. Furthermore, the protuberant section (**13**) is formed such that it gradually projects downwardly from its front to rear end. As a result of such arrangement, the casing (**10**) is thinner in thickness at the front end side than at the rear end side, thereby making the indoor unit (**1**) look visually smaller than its actual size when mounted on the side wall (**72**).

[0145] Further, it is designed such that room air is drawn in through the air intake opening (**41**) at the bottom of the casing (**10**) and currents of conditioned air are expelled forwardly and laterally of the casing (**10**). As a result of such arrangement, when mounting the casing (**10**) onto the side wall (**72**), it becomes possible to install the casing (**10**) on the wall, with its upper face in close proximity to the ceiling (**71**) of the room (**70**). In other words, the indoor unit (**1**) can be installed at a corner area of the side wall (**72**) and the ceiling (**71**). As a result, even with the indoor unit (**1**) installed on the side wall (**72**), furniture such as display shelves can be laid out along the side wall (**72**), thereby making good use of room space.

[0146] In addition to the above, the blowout direction of conditioned air can be set according to the installation state of the indoor unit (**1**) and according to the purpose of the room (**70**). In other words, it is possible to set the casing (**10**) either in a three-way exhaust mode or in a one-way exhaust mode according to the shape of the room (**70**) in which the indoor unit (**1**) is installed, as described above. Because of such arrangement, it becomes possible to supply conditioned air throughout the room thereby to uniformly cool or heat the room. As a result, the room temperature is conditioned uniformly, thereby providing an improved comfort to persons present in the room.

[0147] On the other hand, depending upon the purpose of the room (**70**) in which the indoor unit (**1**) is installed, the requirement that conditioned air is to be expelled indoors in only specific directions will result. In such a case, by setting the casing (**10**) in a two-way exhaust mode, such a requirement can be met.

[0148] Further, by virtue of the baffling member (**60**), air produced by each fan (**20R**, **20L**) can be directed to the air forward-exhaust opening (**43**). Furthermore, when the casing (**10**) is set either in a three-way exhaust mode, in a two-way exhaust mode, or in a one-way exhaust mode, conditioned air can be directed by the flow-arranging flaps (**52**) to the air exhaust openings (**43**, **44**) whichever are placed in the opened state in each exhaust mode. This results in ensuring that conditioned air produced is expelled from the air exhaust openings (**43**, **44**) in the opened state, thereby further ensuring that the interior of the room is air-conditioned satisfactory.

[0149] Further, the air intake opening (**41**) for the suction of room air is formed at a specific distance away from the air exhaust openings (**43**, **44**) for the supplying of conditioned air. This results in preventing the air intake opening (**41**) from sucking a current of conditioned air that has been expelled through the air exhaust openings (**43**, **44**), which is known in the art as air short circuiting, thereby ensuring that the room is air-conditioned satisfactory.

EMBODIMENT 2

[0150] Referring now to Figures **9-20**, a second embodiment of the invention will be described in detail.

[0151] As in the first embodiment previously described, a casing (**110**) of an indoor unit (**2**) of the second embodiment includes a flattened, approximately rectangular parallelepipedic main body section (**111**) and a protuberant section (**113**) which is formed so as to downwardly bulge out from the main body section (**111**). However, the casing (**110**) of the indoor unit (**2**) of the present embodiment is, as a whole, more rounded than the casing (**10**) of the indoor unit (**1**) of the first embodiment.

[0152] Further, a forward edge portion and both of lateral edge portions of the main body section (**111**) of the casing (**110**) are formed into a projecting edge portion (**112**) which outwardly projects beyond the front end and both of the lateral ends of the protuberant section (**113**). This projecting edge portion (**112**) is composed of a combination of curved faces. This results in providing an effect of further reducing the impression that the projecting edge portion (**112**) projects outwardly of the casing (**110**) from the front end and both the lateral ends of the protuberant section (**113**), in comparison with the first embodiment.

[0153] As in the first embodiment, the protuberant section (**113**) bulges out downwardly from inside the forward edge and both the lateral edges of the main body section (**111**). From its front face, a lower face of the protuberant section (**113**) is inclined downwardly from the front to the rear of the casing (**110**), thereby forming an inclined surface (**114**) which gradually decreases in the degree of inclination as it extends towards the rear of the casing (**110**). Additionally, in the present embodiment, the projecting edge portion (**112**) is composed of a combination of curved faces, so that the connecting of the projecting edge portion (**112**) and the protuberant section (**113**) is made in a smoother manner than in the first embodiment. This provides a design capable of deemphasizing the thickness of the casing (**110**) on the front side.

[0154] Formed in the inclined face (**114**) of the protu-

berant section (**113**) is an air intake opening (**141**) for drawing in room air from below. This air intake opening (**141**) is provided with a suction grille (**142**). As depicted in detail by Figure **14**, in the suction grille (**142**) a plurality of slits (**141a**) are arranged parallel to one another in a front-to-back direction, extending laterally of the casing (**110**). The slits (**141a**) are formed such that slits (**141a**) located on the rear side of the casing (**110**) has a greater width than slits (**141a**) located on the front side. More specifically, the slits (**141a**) are arranged at pitches P1-P6, respectively, wherein P1 < P2 < P3 < P4 < P5 < P6. The width of the slits (**141a**) increases with the pitch. Two rows of slits (**141a**) at the pitch P1 are formed. For each of the pitches P2-P5, six rows of slits (**141a**) are formed. Five rows of slits (**141a**) at the pitch P6 are formed.

[0155] Formed at a front face of the main body section (**111**) of the casing (**110**) is an air forward-exhaust opening (**143**) for expelling a current of conditioned air forwardly of the casing (**110**). On the other hand, formed in both lateral faces of the main body section (**111**) are air lateral-exhaust openings (**144**) for expelling currents of conditioned air laterally of the casing (**110**).

[0156] On the other hand, as shown in an exploded perspective view of Figure **9**, the casing (**110**) comprises a top plate (**110a**), a back plate (**110b**), front plates (**110c**, **110d**), and right- and left-hand side lateral plates (**110e**). The top plate (**110a**), the back plate (**110b**), and the front plates (**110c**, **110d**) are integrally formed together to one piece. The lateral plates (**110e**) are constructed detachably to the top plate (**110a**), to the back plate (**110b**), and to the front plates (**110c**, **110d**).

[0157] Arranged in the air forward-exhaust opening (**143**) which is formed between the front plates (**110c**, **110d**) is a horizontal flap (**151**). The horizontal flap (**151**) is held by stays (**151a**) in a manner capable of controlling the blowout angle of conditioned air from the air forward-exhaust opening (**143**). The stays (**151a**) are provided with respective swing units (**151b**) for changing the angle of the horizontal flap (**151**). Further, the horizontal flap (**151**) and an adjustment mechanism for controlling the angle of the horizontal flap (**151**), not shown, are incorporated into each lateral plate (**110e**), so that the blowout direction of conditioned air can be adjusted manually at the side of each of the air lateral-exhaust openings (**144**).

[0158] An air passage (**145**) is formed within the casing (**110**), communicating from the air intake opening (**141**) to each of the air exhaust openings (**143**, **144**). Disposed in the air passage (**145**) are centrifugal fans (**120R**, **120L**) for drawing in room air from below and expelling the room air laterally, and a heat exchanger (**130**) for generating conditioned air from room air. Arranged underneath the centrifugal fans (**120R**, **120L**) and in close proximity to the air intake opening (**141**) is an air filter (**165**).

[0159] In the present embodiment, the number of centrifugal fans (**120R**, **120L**) is two. These centrifugal fans (**120R**, **120L**) are disposed in a parallel relationship with respect to each other in the main body section (**111**) of the casing (**110**) in a crosswise direction, with their respective rotation shafts extending in a vertical direction. Each of the centrifugal fans (**120R**, **120L**) is implemented by a turbofan. Arranged above the centrifugal fans (**120R**, **120L**) is a fan motor (**125**) serving as a drive source for the centrifugal fans (**120R**, **120L**). On the other hand, arranged underneath the centrifugal fans (**120R**, **120L**) is a bell mouth (**127**) for guiding room air from the air intake opening (**141**) to the centrifugal fans (**120R**, **120L**). These two centrifugal fans (**120R**, **120L**) each are constructed so as to rotate clockwise when viewed from the top. Disposed between the centrifugal fans (**120R, 120L**) is a partitioning plate (**164**) for preventing air emitted by one of the centrifugal fans (**120R**, **120L**) from interfering against air emitted by the other of the centrifugal fans (**120R**, **120L**) (see Figures **11** and **12**).

[0160] Further, the centrifugal fans (**120R**, **120L**) are disposed at a given distance away from an internal face of the top plate (**110a**) of the casing (**110**) so as to allow a current of air to flow between the centrifugal fans (**120R**, **120L**) and the internal face of the top plate (**110a**). Furthermore, the fan motor (**125**) for the centrifugal fans (**120R**, **120L**) is placed between the centrifugal fans (**120R**, **120L**) and the top plate (**110a**) of the casing (**110**), so that the fan motor (**125**) can be cooled with air produced by the centrifugal fans (**120R**, **120L**).

[0161] Unlike the first embodiment, the heat exchanger (**130**) is housed within the main body section (**111**) of the casing (**110**). The heat exchanger (**130**) is formed into a shape similar to a Japanese katakana letter of *ko* (like a bracket of]), when viewed from the top, by a front heat exchanger section (**131**) located on the front side of the main body section (**111**) of the casing (**110**) and lateral heat exchanger sections (**132**) located on both the lateral sides of the main body section (**111**) of the casing (**110**). Currents of room air, emitted by the fans (**120R**, **120L**), will exchange heat with a refrigerant in the heat exchanger (**130**), thereby being supplied through the air exhaust openings (**143**, **144**) into the room in the form of conditioned air.

[0162] In the present embodiment, the front heat exchanger section (**131**) and the lateral heat exchanger sections (**132**) are integrally formed together to one piece, wherein the heat exchanger (**130**) is formed into a shape similar to a Japanese katakana letter of *ko* (like a bracket of]) when viewed from the top. However, an arrangement may be made, in which the front heat exchanger section (**131**) and the lateral heat exchanger sections (**132**) are formed by respective separate bodies and are arranged separately from each other. Further, the fans (**120R**, **120L**) are disposed in a parallel relationship with respect to each other in a space surrounded by the front and lateral heat exchanger sections (**131**, **132**) of the heat exchanger (**130**) and the

back plate (**110b**) of the casing (**110**).

[0163] Provided on the side of an upper face of the heat exchanger (**130**) is a heat insulating material (**135**) formed into a shape similar to a Japanese katakana letter of *ko* (like a bracket of]) when viewed from the top, like the heat exchanger (**130**). Further, provided on the side of a lower face of the heat exchanger (**130)** is a drain pan (**136**) made of heat insulating material formed into, likewise, a shape similar to a Japanese katakana letter of *ko* (like a bracket of]) when viewed from the top. The heat insulating material (**135**) and the drain pan (**136**) are formed of, for example, expanded polystyrene.

[0164] Figures **11-13** are layout diagrams each showing a positional relationship between components in the casing (**110**), wherein only their external shapes including an external shape of the casing (**110**) are shown in a simplified manner. In the present embodiment, the heat exchanger (**130**) is disposed within the main body section (**111**) of the casing (**110**), which creates a void space within the protuberant section (**113**) of the casing (**110**). In the present embodiment, such a void space is utilized as a space for housing an optional air conditioning component (**160**). For example, the void space is designed so as to house therein either one of a high-efficiency air filter and a deodorizer. As high-efficiency filter, a so-called HEPA filter or an electrostatic filter is applicable. As deodorizer, a photodeodorizing unit is applicable which employs a photocatalyst capable of deodorizing odorous substances.

[0165] Further, a switch box (**161**) is disposed in a void space (**S4**) defined between the centrifugal fans (**120R**, **120L**) located on the right- and left-hand sides, respectively. An arrangement may be made, in which a drain pump is disposed in the void space (**S4**) in place of the switch box (**161**). Further, a space (**162**) used for piping arrangement is provided between the centrifugal fans (**120R**, **120L**) and the back plate (**110b**) of the casing (**110**), running along the back plate (**110b**). Both a refrigerant line (**162a**) and a drain line (**162b**) are laid out along the back plate (**110b**), in the piping space (**162**). Figure 9 shows a line cover (**163**).

[0166] On the other hand, the casing (**110**) of the indoor unit (**2**) of the present embodiment is constructed such that it can be mounted onto the ceiling (**71**) or to the side wall (**72**) of the room (**70**) through a mounting fitting (**170**). The mounting fitting (**170**) is constructed capable of fixedly mounting the indoor unit (**2**) to the ceiling (**71**) or to the side wall (**72**). In other words, the mounting fitting (**170**) constitutes a wall-mounting means for mounting the casing (**110**) onto the side wall (**72**) when fixedly mounting the indoor unit (**2**) onto the side wall (**72**). Furthermore, the mounting fitting (**170**) constitutes a suspending means for mounting the casing (**110**) to the ceiling (**71**) when fixedly mounting the indoor unit (**2**) to the ceiling (**71**).

[0167] More specifically, the mounting fitting (**170**) is an integrated member of a longitudinal plate member (**171**) running along the back plate (**110b**) of the casing (**110**) and a lateral plate member (**172**) extending to the front from the longitudinal plate member (**171**). The lateral plate member (**172**) is constructed so as to extend in parallel with the top plate (**110a**) of the casing (**110**), and the mounting fitting (**170**) is formed by the longitudinal plate member (**171**) and the lateral plate member (**172**) into an L-shape when viewed from the side. In the present embodiment, the lateral plate member (**172**) is made up of two cross-sectionally L-shaped arms located at the right- and left-hand sides of the casing (**110**), respectively.

[0168] As shown in detail in Figure **15**, mounting holes (**H1**, **H2**), through which mounting bolts are passed, are formed in the arm (**172**) and in the top plate (**110a**) of the indoor unit (**2**), respectively. The mounting holes (**H1**) formed in the mounting fitting (**170**) are elliptic holes. On the other hand, of the mounting holes (**H2**) of the casing (**110**), front mounting holes (**H2**) are elliptic holes, while on the contrary rear mounting holes (**H2**) are slit-like holes. As a result of such arrangement, the installation position of the casing (**110**) can be adjusted longitudinally with respect to the mounting fitting (**170**).

[0169] Further, mounting holes (**H3**), through which bolts or the like are passed for fixedly attaching the mounting fitting (**170**) to the side wall (**72**), are formed in the longitudinal plate member (**171**) of the mounting fitting (**170**). As shown in Figure **17**, many mounting holes (**H3**) are formed in the longitudinal plate member (**171**), whereby the mounting fitting (**170**) can fixedly be attached to the wall at any position.

[0170] The mounting fitting (**170**) is provided with an engagement mechanism which engages with the casing (**110**) of the indoor unit (**2**). The engagement mechanism is composed of a first hook (**173**) and a second hook (**174**). The first hook (**173**) is formed in the longitudinal plate member (**171**) so as to engage with a lower portion (**110f**) of the back plate (**110b**) of the casing (**110**). On the other hand, the second hook (**174**) is formed in the arm (**172**) so as to engage with a lateral edge portion (**110g**) of the top plate (**110a**) of the casing (**110**). More specifically, the second hook (**174**) is designed to engage with the lateral edge portion (**110g**) of the top plate (**110a**) positioned in front of the lower portion (**110f**) of the back plate (**110b**). To sum up, whereas the first hook (**173**) constitutes a first hooking means, the second hook (**174**) constitutes a second hooking means.

[0171] The first hook (**173**) is provided at a lower end portion of the longitudinal plate member (**171**). On the other hand, the second hook (**174**) is provided at one end portion of each arm (**172**). The second hook (**174**) comprises elastic material. Further, the second hook (**174**) includes, at each side, a base portion (**174a**) lying along the top plate (**110a**) of the casing (**110**) of the indoor unit (**2**) and a leading end engaging portion (**174b**) bent inwardly at a sharp angle from the lower end of the base portion (**174a**).

[0172] On the other hand, the indoor unit (**2**) has a first engaging portion which engages with the first hook (**173**) and a second engaging portion which engages with the second hook (**174**). More specifically, the first engaging portion is formed by the lower portion (**110f**) of the back plate (**110b**) of the casing (**110**) and engages with the first hook (**173**). On the other hand, the second engaging portion is formed by the lateral edge portion (**110g**) of the top plate (**110a**) of the casing (**110**) and engages with the leading end engaging portion (**174b**) of the second hook (**174**).

[0173] Next, the operation of mounting the indoor unit (**2**) will be described below.

[0174] The indoor unit (**2**) is mounted onto the side wall (**72**) of the room (**70**) with the mounting fitting (**170**) in the following way.

[0175] Firstly, a bolt (**90**) for the mounting of the indoor unit (**2**) is slid, from up to down, into the mounting hole (**H2**) formed in the arm (**172**) of the mounting fitting (**170**). Then, the bolt (**90**) is firmly fastened to the arm (**172**) of the mounting fitting (**170**) with a nut (**91**) (see Figure **18**). Thereafter, the mounting fitting (**170**) is fixedly attached to the wall by the passing of nails and bolts through the mounting holes (**H3**) formed in the longitudinal plate member (**171**).

[0176] Secondly, as shown in Figure **16**, the lower portion (**110f**) of the back plate (**110b**) of the casing (**110**) is hooked on the first hook (**173**) of the mounting fitting (**170**). Then, the indoor unit (**2**) is lifted upwardly at its front side portion, with the engaging part of the lower portion (**110f**) and the first hook (**173**) as a supporting point, so that the lateral edge portion (**110g**) of the top plate (**110a**) is hooked on the second hook (**174**). When the lateral edge portion (**110g**) of the top plate (**110a**) moves up beyond the leading end engaging portion (**174b**) therefore to forcefully spread out the leading end engaging portion (**174b**) of the second hook (**174**), the lateral edge portion (**110g**) becomes engaged with the second hook (**174**) (see Figure **19**).

[0177] In the way described above, when the indoor unit (**2**) is engaged with the mounting fitting (**170**), the mounting bolt (**90**) passes through the mounting hole (**H2**) formed in the top plate (**110a**) of the casing (**110**). The nut (**92**) is then screwed on the mounting bolt (**90**) from below, thereby fixedly fastening the indoor unit (**2**) to the mounting fitting (**170**). In other words, in this case, the engagement mechanisms is used to temporarily fasten or tack the indoor unit (**2**) to the mounting fitting (**170**). Figure **18** illustrates a state in which the indoor unit (**2**) is locked by a double nut (**92**). After the indoor unit (**2**) is fixedly fastened to the mounting fitting (**170**) in the way described above, what is left to complete the mounting of the indoor unit (**2**) is attaching the lateral plates (**110e**) to the casing (**110**).

[0178] In the present embodiment, when the indoor unit (**2**) is temporarily tacked to the mounting fitting (**170**), an engaging position where the indoor unit (**2**) is engaged with the mounting fitting (**170**) is determined such that there is created some clearance of around 5 mm between the arm (**172**) of the mounting fitting (**170**) and the top plate (**110a**) of the casing (**110**). Such a clearance is provided in order to adjust the position of the indoor unit (**2**). The indoor unit (**2**) has a greater depth for its height, as result of which the indoor unit (**2**), when installed, tends to take a forward-bent position. Such a forward-bent position can be prevented by changing a way of screwing the nuts (**91**, **92**) on the bolts (**90**) at the front and rear sides of the casing (**110**). In other words, when the indoor unit (**2**) bends forwardly, then the front side is tightened with a clearance left at the rear side so that the indoor unit (**2**) is held horizontally.

[0179] Referring now to Figure **20**, there is shown the indoor unit (**2**) which is fixedly fastened to the room ceiling (**71**) by means of the mounting fitting (**170**). In this case, the mounting hole (**H2**) of the top plate (**110a**) of the casing (**110**) and the mounting hole (**H1**) of the arm (**172**) of the mounting fitting (**170**) are formed at corresponding positions to the ceiling-suspending bolt (**95**) for fixedly fastening the indoor unit (**2**) to the ceiling.

[0180] In such a case, the mounting fitting (**170**) is held between lower and upper nuts (**96**) screwed on the bolt (**95**) of the ceiling (**71**), so that the mounting fitting (**170**) is fixedly fastened to the suspending bolt (**95**). Mounting operations after the mounting fitting (**170**) is fixedly secured to the suspending bolt (**95**) are the same as ones performed on the side wall (**72**). In other words, the lower portion (**110f**) of the back plate (**110b**) of the casing (**110**) is hooked on the first hook (**173**). Then, the indoor unit (**2**) is lifted upwardly at its front end portion, with an engaging part of the lower portion (**110f**) and the first hook (**173**) used as a supporting point, so as to temporarily fasten the indoor unit (**2**) to the mounting fitting (**170**). Subsequently, a nut (**97**) is screwed up on the suspending bolt (**95**) projecting downwardly from the top plate (**110a**). Further, the lateral plates (**110e**) are attached to the casing (**110**) to complete the mounting of the indoor unit (**2**).

EFFECTS OF THE SECOND EMBODIMENT

[0181] As described above, in the present embodiment, an exterior face of the projecting edge portion (**112**) is formed into a curved shape, thereby providing a design capable of de-emphasizing the front-side thickness of the casing (**110**). This results in further reducing sort of oppressing discomfort that a person present in the room may feel, in comparison with the first embodiment.

[0182] Further, the heat exchanger (**130**), formed into a shape similar to a Japanese katakana letter of *ko* (like a bracket of]), is housed within the main body section (**111**) of the casing (**110**), thereby making it possible to dispose the air conditioning component (**160**), such as a high-efficiency air filter or a deodorizer, within the protuberant section (**113**). As a result of such arrangement,

the space within the casing (**110**) will be used without waste. It becomes possible to reduce in size the casing (**110**), thereby reducing sort of oppressing discomfort that a person present in the room may feel.

[0183] Further, the two centrifugal fans (**120R, 120L**) are disposed in the casing (**110**), and the switch box (**161**) and the drain pump are arranged in a space defined between the fans (**120R**, **120L**). This results in making good use of space defined between the centrifugal fans (**120R**, **120L**) without waste. Space within the casing (**110**) is used effectively. This also contributes to downsizing the casing (**110**).

[0184] Further, the refrigerant line (**162a**) and the drain line (**162b**) are arranged so as to pass between the back plate (**110b**) of the casing (**110**) and the centrifugal fans (**120R, 120L**), which makes it possible to make good use of space defined on the rear side of the centrifugal fans (**120R**, **120L**). This also contributes to the downsizing of the casing (**110**). Further, the placement of the refrigerant line (**162a**) and the drain line (**162b**) in such a location makes it possible to establish connection of external piping with the indoor unit at a side face portion of the casing (**110**), therefore increasing the degree of freedom in the mounting of the indoor unit (**2**).

[0185] Further, the indoor unit (**2**) is installed at a corner of the room between the side wall (**72**) and the ceiling (**71**), so that a person present in the room catches sight of the indoor unit (**2**) generally from a direction of the arrow A of Figure **14**. Additionally, the slits (**141a**) together constituting the air intake opening (**141**) are formed in the inclined surface (**114**) which becomes gentler in inclination degree and wider in width as they extend towards the rear side. This provides to a person present in the room the impression that all the slits (**141a**) appear to have the same width. Furthermore, the width of slits (**141a**) located at the rear side is actually greater than that of slits (**141a**) located at the front side, thereby preventing the resistance of suction of air into the casing (**110**) from increasing.

[0186] Further, it is arranged such that the fan motor (**125**) is cooled by air produced and emitted by the centrifugal fans (**120R**, **120L**). The reliability of the centrifugal fans (**120R**, **120L**) will be improved.

[0187] Additionally, the lateral plates (**110e**) of the casing (**110**) are constructed detachably from the top plate (**110a**), the front plates (**110c**, **110d**), and the back plate (**110b**). Each lateral plate (**110e**) is provided with constituent components of the air lateral-exhaust opening (**144**), i.e., the horizontal flap (**151**) and the swing mechanism. If an arrangement is employed in which these constituent components of the air lateral-exhaust opening (**144**) are mounted on the side of the top plate (**110a**), the front plates (**110c**, **110d**), or the back plate (**110b**), this may result in causing damage to the constituent components of the air lateral-exhaust opening (**144)** when mounting the lateral plates (**110e**) onto the top plate (**110a**), the front plates (**110c**, **110d**), and the back plate (**110b**). However, in the present embodiment, the danger of causing damage to the constituent components of the air lateral-exhaust opening (**144**) is eliminated. Further, it is possible to perform pre-adjustment of the position of the structural components of the air lateral-exhaust opening (**144**) with respect to the lateral plate (**110e**), thereby facilitating the assembly of the casing (**110**).

[0188] In addition to the above advantages, according to the mounting mechanism of the present embodiment, the indoor unit (**2**) can be mounted to the ceiling (**71**) or to the side wall (**72**). Particularly, since the indoor unit (**2**) can be ceiling-suspended, it is possible to mount the indoor unit (**2**) at a corner between an exterior wall face and the room, even in the vicinity of a partition wall not strong enough to carry the indoor unit (**2**). This therefore provides a wider mounting range of the indoor unit (**2**).

[0189] Further, when the indoor unit (**2**) is firmly attached to the side wall (**72**) of the room, it is possible to firmly fasten the top plate (**110a**) of the casing (**110**) to the mounting fitting (**170**). This results in providing sufficient installation strength, even for the mounting of an indoor with a greater depth.

[0190] In any case, fixed to the side wall (**72**) or to the ceiling (**71**), the indoor unit (**2**) can be firmly fastened to the mounting fitting (**170**) after the temporal tacking of the unit (**2**) to the fitting (**170**). This eliminates conventionally required labor, i.e.. the need for an extra installation workman to support the indoor unit (**2**) when another workman is screwing the nuts (**92**, **97**) on the bolts. This provides an improved workability.

[0191] Further, it is arranged such that there is created a clearance between the arm (**172**) and the top plate (**110a**) of the casing (**110**) when the indoor unit (**2**) is engaged with the mounting fitting (**170**). Such arrangement prevents the casing (**110**) from tending to take a forward-bent position. In addition, in cases where the ceiling (**71**) or the side wall (**72**) inclines, it is possible to adjust a clearance between the casing (**110**) and the ceiling (**71**).

VARIATION EXAMPLES OF THE SECOND EMBODIMENT

[0192] In the second embodiment described above, the switch box (**161**), as an air conditioning component, is disposed in the void space (**S4**) defined between the fans (**120R**, **120L**), as shown in Figure **11**. An arrangement may be made, in which the air conditioning component (**161**) is disposed in a void space (**S1**) surrounded by the back plate (**110b**) of the casing (**110**), the fans (**120R**, **120L**). and the lateral heat exchanger section (**132**). In such a placement arrangement, the provision of one centrifugal fan will suffice.

[0193] Further, an arrangement may be made, in which the air conditioning component (**161**) is disposed in a void space (**S2**) surrounded by each centrifugal fan (**120R**, **120L**) and the front heat exchanging section

(**131**). Another arrangement may be made, in which the air conditioning component (**161**) is disposed in a void space (**S3**) defined between by the back plate (**110b**) of the casing (**110**) and each centrifugal fan (**120R**, **120L**).

[0194] Additionally, it is to be noted that air conditioner components, capable of being disposed between the centrifugal fans (**120R**, **120L**) and the back plate (**110b**) of the casing (**110**) or between the two centrifugal fans (**120R**, **120L**), are not limited to the above-described ones such as the switch box (**161**), the drain pump, the refrigerant line (**162a**), and the drain line (**162b**). In other words, any air conditioner components can be selected and disposed in the void space (**S1**).

[0195] When, as in the second embodiment, the centrifugal fans (**120R**, **120L**) are disposed within the casing (**110**) of the indoor unit (**2**) having the air forward-exhaust opening (**143**) and the air lateral-exhaust openings (**144**), corner areas of the casing (**110**) are likely to become dead spaces, regardless of the number of centrifugal fans (**120R**, **120L**) employed. Accordingly, dead space can be used effectively if air conditioner components are disposed at such corner areas. This contributes to further reducing in size the casing (**110**).

[0196] Additionally, in the second embodiment, the mounting fitting (**170**) is constructed to function not only as a wall mounting means but also as a suspending means. However, a wall-mounting means and a suspending means may be formed by separate components. Further, when suspending the indoor unit (**2**) from the ceiling (**71**), the casing (**10**) can be fixed directly to the suspending bolts (i.e., the suspending means).

[0197] Further, in the second embodiment, it is designed such that the lower portion (**110f**) of the back plate (**110b**) of the casing (**110**), i.e., the first engaging portion, is hooked on the first hook (**173**). Alternatively, an arrangement may be made, in which a hole is formed in a lower portion of the back plate (**110b**) of the casing (**110**) and the first hook (**173**) is hooked in the hole.

[0198] Further, in the second embodiment, it is designed such that the lateral edge portion (**110g**) of the top plate (**110a**) of the casing (**110**) is hooked on the second hook (**174**). Instead of the hooking of the top plate (**110a**) of the casing (**110**) on the second hook (**174**), a portion therebelow may be hooked on the second hook (**174**). In other words, it is sufficient that a portion in front of the first engaging portion (**110f**) of the casing (**110**) is hooked on the second hook (**174**).

[0199] Further, in the second embodiment, the lateral plate member (**172**) is implemented in the form of two separate arms on the right- and left-hand sides, each having an L-shaped cross section. However, for example, it is sufficient that the shape of the lateral plate member (**172**) is determined according to the shape of the casing (**110**). An arrangement may be made, in which the lateral plate member (**172**) is not separated into individual arms.

[0200] Still further, it is possible that the mounting fitting (**170**) is dedicated to serving as a wall-mounting means. In such a case, it is possible to employ other fixing means other than the bolt (**90**).

[0201] Further, the mounting fitting (**170**) may be fixed to the side wall (**72**) of the room (**70**) by any appropriate fixing means other than bolts.

[0202] Still further, in the second embodiment, the first hook (**173**) serving as the first hooking means and the second hook (**174**) serving as the second hooking means are used as mechanisms for temporary fastening the indoor unit (**2**) to the mounting fitting (**170**). However, depending upon the case, it is possible to firmly fix the indoor unit (**2**) to, for example, a side wall area of the room with only these first and second hooks (**173**, **174**), without using any other fixing means such as the bolt (**90**).

OTHER EMBODIMENTS

[0203] In each embodiment of the invention that has been described above, the number of fans provided are two, i.e., the fans (**20R**, **20L**) in the first embodiment and the tans (**120R**, **120L**) in the second embodiment. However, depending on the air conditioning power of each indoor unit (**1**, **2**), the number of fans may be one, three or more. In the present invention, centrifugal fans are employed, but which should not be considered to be restrictive. Other types of fans may be employed.

[0204] Further, in each of the embodiments of the invention, the casing (**10**, **110**) is composed of the main body section (**11**, **111**) and the protuberant section (**13**, **113**) and the front and lateral edge portions of the main body section (**11**, **111**) are formed into the projecting edge portion (**12**, **112**). However. the projecting edge portion (**12**, **112**) is not necessarily formed.

INDUSTRIAL APPLICABILITY

[0205] As described above, the present invention provides improved air conditioner indoor units useful as air conditioning apparatus, particularly applicable as a wall-mounted type indoor unit.

Claims

1. An indoor unit for an air conditioner for drawing air within a room into a casing (**10**, **110**) and for expelling conditioned air to the room,

   wherein said casing (**10**, **110**) is composed of a main body section (**11**, **111**) having a flattened, approximately rectangular parallelepipedic shape and a protuberant section (**13**, **113**) extending continuously from a bottom portion of said main body section (**11**, **111**),
   wherein said protuberant section (**13**, **113**) has a front face formed into an inclined face (**14**, **114**), said inclined face (**14, 114**) inclining

downwardly in a front to rear direction,

wherein (a) an air intake opening (**41**, **141**) is formed in said inclined face (**14**, **114**) of said protuberant section (**13**, **113)**, (b) an air forward-exhaust opening (**43**, **143**) is formed in a front face of said main body section (**11**, **111**), and (c) an air lateral-exhaust opening (**44**, **144)** is formed in each of lateral faces of said main body section (**11**),

wherein an air passage (**45**, **145**) is formed in said casing (**10**, **110**), establishing communication from said air intake opening (**41**, **141**) to each said exhaust opening (**43**, **44**, **143, 144**), and

wherein a fan (**20R**, **20L, 120R**, **120L**) and a heat exchanger (**30**, **130**) for generating conditioned air from room air are disposed in said air passage (**45**, **145**).

2. The air conditioner indoor unit as in claim 1, wherein said casing (**10**, **110**) is mountably constructed to a side wall (**72**) through a wall mounting means (**170**).

3. The air conditioner indoor unit as in claim 1, wherein said casing (**10**, **110**) is mountably constructed to a ceiling (**71**) through a suspending means (**170**).

4. The air conditioner indoor unit as in claim 1,

wherein said protuberant section (**13**, **113**) of said casing (**10**, **110**) bulges out downwardly from inside a forward edge and both lateral edges of said main body section (**11**, **111**), and wherein a forward edge portion and both lateral edge portions of said main body section (**11**, **111**) together form a projecting edge portion (**12**, **112**), said projecting edge portion (**12**, **112**) extending forwardly and laterally to project beyond a front end and both lateral ends of said protuberant section (**13**, **113**).

5. The air conditioner indoor unit as in claim 4, wherein a front face and both lateral faces of said projecting edge portion (**12**) each comprise an approximately vertical face.

6. The air conditioner indoor unit as in claim 4, wherein said projecting edge portion (**112**) comprises a curved face which projects outwardly of said casing (**110**).

7. The air conditioner indoor unit as in claim 1, wherein said fan (**20R**, **20L**, **120R**, **120L**) is implemented by a centrifugal fan for drawing room air from below and for emitting said drawn room air in lateral directions, said centrifugal fan (**20R**, **20L**, **120R**, **120L**) being disposed with its rotation shaft extended vertically.

8. The air conditioner indoor unit as in claim 7, wherein within said main body section (**11**, **111**) of said casing (**10**, **110**), a plurality of said centrifugal fans (**20R**, **20L**, **120R**, **120L**) are arranged in a parallel relationship with respect to each other in a crosswise direction of said main body section (**11, 111**).

9. The air conditioner indoor unit as in claim 7 or claim 8, wherein said heat exchanger (**30**) is disposed under said centrifugal fan (**20R**, **20L**).

10. The air conditioner indoor unit as in claim 9, wherein said heat exchanger (**30**) is housed within said protuberant section (**13**) of said casing (**10**).

11. The air conditioner indoor unit as in claim 9, wherein a baffling member (**60**) is provided within said casing (**10**), said baffling member (**60**) having guide faces (**61**, **62**) formed correspondingly to said centrifugal fan (**20R**, **20L**) so that air emitted by said centrifugal fan (**20R**, **20L**) is directed to said air forward- and lateral-exhaust openings (**43**) and (**44**).

12. The air conditioner indoor unit as in claim 1,

wherein each of said two air lateral-exhaust openings (**44**) is formed closably, and

wherein said casing (**10**) is settable either to a three-way exhaust mode in which all of said air forward-exhaust opening (**43**) and said two air lateral-exhaust openings (**44**) are opened, to a two-way exhaust mode in which one of said two air lateral-exhaust openings (**44**) is closed while the other of said two air lateral-exhaust openings (**44**) and said air forward-exhaust opening (**43**) are opened, or to a one-way exhaust mode in which both of said two air lateral-exhaust openings (**44**) are closed while said air forward-exhaust opening (**43**) is opened.

13. The air conditioner indoor unit as in claim 12, wherein an air current changing means (**52**) is disposed within said casing (**10**) so that:

when said casing (**10**) is set to said three-way exhaust mode, air emitted by said centrifugal fan (**20R**, **20L**) is flow divided, by said air current changing means (**52**), into a current of air traveling towards said air forward-exhaust opening (**43**) and currents of air traveling towards said two air lateral-exhaust openings (**44**), and

when said casing (**10**) is set to said two-way

exhaust mode, a current of air, emitted by said centrifugal fan (**20R**, **20L**) and traveling towards a closed one of said two air lateral-exhaust openings (**44**), is directed, by said air current changing means (**52**), to said air forward-exhaust opening (**43**), and when said casing (**10**) is set to said one-way exhaust mode, currents of air, emitted by said centrifugal fan (**20R**, **20L**) and traveling towards said two air lateral-exhaust openings (**44**) in a closed state, are directed, by said air current changing means (**52**), to said air forward-exhaust opening (**43**).

14. The air conditioner indoor unit as in one of claims 1-8, wherein said heat exchanger (**130**) is housed within said main body section (**111**) of said casing (**110**) and wherein said heat exchanger (**130**) includes a front heat exchanging section (**131**) disposed along said air forward-exhaust opening (**143**) and a lateral heat exchanging section (**132**) disposed along each of said air lateral-exhaust openings (**144**).

15. The air conditioner indoor unit as in claim 14, wherein an air conditioning component (**160**) is housed in a void space within said protuberant section (**113**).

16. The air conditioner indoor unit as in claim 15, wherein said air conditioning component (**160**) is at least either one of a high-efficiency air filter and a deodorizier.

17. The air conditioner indoor unit as in claim 1, wherein on an internal rear side of said casing (**110**), air conditioning components (**162a**, **162b**) are housed in a void space defined between a rear face (**110b**) and said fan (**120R**, **120L**).

18. The air conditioner indoor unit as in claim 17, wherein said air conditioning components (**162a**, **162b**) are a refrigerant line and a drain line, respectively.

19. The air conditioner indoor unit as in claim 1,

wherein said heat exchanger (**130**) includes a front heat exchanging section (**131**) disposed along said air forward-exhaust opening (**143**) and a lateral heat exchanging section (**132**) disposed along each of said air lateral-exhaust openings (**144**),

wherein said fan (**120R**, **120L**) is disposed between a rear face (**110b**) of said casing (**110**) and said front and lateral heat exchanging sections (**131**, **132**) of said heat exchanger (**130**), and

wherein an air conditioning component (**161**) is disposed in a void space (**S1**) defined between said rear face (**110b**) of said casing (**110**), said fan (**120R**, **120L**), and said lateral heat exchanging section (**132**).

20. The air conditioner indoor unit as in claim 1,

wherein said heat exchanger (**130**) includes a front heat exchanging section (**131**) disposed along said air forward-exhaust opening (**143**) and a lateral heat exchanging section (**132**) disposed along said air lateral-exhaust opening (**144**),

wherein a plurality of said fans (**120R, 120L**) are arranged in a parallel relationship with respect to each other between a rear face (**110b**) of said casing (**110**) and said front and lateral heat exchanging sections (**131**, **132**) of said heat exchanger (**130**), and

wherein an air conditioning component (**161**) is disposed in a void space (**S2**) defined between each of said fans (**120R**, **120L**) and said front heat exchanging section (**131**).

21. The air conditioner indoor unit as in claim 1,

wherein said heat exchanger (**130**) includes a front heat exchanging section (**131**) disposed along said air forward-exhaust opening (**143**) and a lateral heat exchanging section (**132**) disposed along each of said air lateral-exhaust openings (**144**),

wherein a plurality of said fans (**120R**, **120L**) are arranged in a parallel relationship with respect to each other between a rear face (**110b**) of said casing (**110**) and said front and lateral heat exchanging sections (**131**, **132**) of said heat exchanger (**130**), and

wherein an air conditioning component (**161**) is disposed in a void space (**S3**) defined between a rear face (**110b**) of said casing (**110**) and each of said fans (**120R**, **120L**).

22. The air conditioner indoor unit as in claim 1,

wherein said heat exchanger (**130**) includes a front heat exchanging section (**131**) disposed along said air forward-exhaust opening (**143**) and a lateral heat exchanging section (**132**) disposed along each of said air lateral-exhaust openings (**144**),

wherein a plurality of said fans (**120R, 120L**) are arranged in a parallel relationship with respect to each other between a rear face (**110b**) of said casing (**110**) and said front and

lateral heat exchanging sections (**131**, **132**) of said heat exchanger (**130**), and

wherein an air conditioning component (**161**) is disposed in a void space (**S4**) defined between each said fan (**120R**, **120L**).

23. The air conditioner indoor unit as in one of claims 19-22, wherein said air conditioning component (**161**) is a switch box.

24. The air conditioner indoor unit as in one of claims 19-22, wherein said air conditioning component (**161**) is a drain pump.

25. The air conditioner indoor unit as in claim 1,

wherein said inclined face (**114**) of said protuberant section (**113**) is formed in such a manner as to incline at a smaller degree of inclination on the rear side than on the front side of said casing (**110**),

wherein a plurality of slits (**141a**) are arranged in a parallel relationship with respect to one another in a longitudinal direction in said air intake opening (**141**), extending from side to side of the casing (**110**), and

wherein said plurality of slits (**141a**) are formed in such a manner as to have a greater width on the rear side than on the front side of said casing (**110**).

26. The air conditioner indoor unit as in claim 7,

wherein said centrifugal fan (**120R**, **120L**) is disposed at a specific distance away from an internal top face of the casing (**110**) so that a current of air can flow between said fan (**120R**, **120L**) and said internal top face of said casing (**110**), and

wherein a motor (**125**) for said fan (**120R**, **120L**) is disposed between said fan (**120R**, **120L**) and said casing (**110**).

27. The air conditioner indoor unit as in claim 1,

wherein a lateral plate (**110e**) of said casing (**110**) is detachably constructed, and

wherein a constituent member (**51**) of said air lateral-exhaust opening (**144**) is incorporated into said lateral plate (**110e**).

28. An indoor unit mounting mechanism comprising an air conditioner indoor unit (**2**) of claim 1 and a mounting fitting (**170**) for installing said indoor unit (**2**) in a room,

wherein said mounting fitting (**170**) is formed in one piece composed of a longitudinal plate member (**171**) along a rear face (**110b**) of said indoor unit (**2**) and a lateral plate member (**172**) extending forwardly from said longitudinal plate member (**171**), and

wherein said longitudinal plate member (**171**) has a first hooking means (**173**) which becomes engaged with a lower portion (**110f**) on a rear side of said indoor unit (**2**) and wherein said lateral plate member (**172**) has a second hooking means (**174**) which becomes engaged with a portion (**110g**) located in front of said rear-side lower portion (**110f**).

29. The air conditioner indoor unit mounting mechanism as in claim 28,

wherein said mounting fitting (**170**) and said indoor unit (**2**) are constructed so that a top face (**110a**) of said indoor unit (**2**) and said lateral plate member (**172**) become engaged with each other in an approximately parallel manner, and

wherein an engaging position of said indoor unit (**2**) with said mounting fitting (**170**) is determined such that a clearance available for controlling the position of said indoor unit (**2**) is defined between said lateral plate member (**172**) of said mounting fitting (**170**) and said top face (**110a**) of said indoor unit (**2**).

30. The air conditioner indoor unit mounting mechanism as in claim 28,

wherein a mounting hole (**H3**) for a side wall (**72**) of said room is formed in said longitudinal plate member (**171**), and

wherein a mounting hole (**H1**) for each bolt (**90**, **95**) for fastening said indoor unit (**2**) is formed in said lateral plate member (**172**).

31. The air conditioner indoor unit mounting mechanism as in claim 30, wherein said mounting hole (**H1**) of said lateral plate member (**172**) is formed at a corresponding position to said suspending bolt (**95)** in a ceiling (**71**) for fastening said indoor unit (**2**).

32. The air conditioner indoor unit mounting mechanism as in claim 28,

wherein said first hooking means (**173**) is a first hook (**173**) which is provided at a lower end portion of said longitudinal plate member (**171**) so as to become engaged with said rear-side lower portion (**110f**) of said indoor unit (**2**),

wherein said second hooking means (**174**) is a second hook (**174**) which is provided at each of right- and left-hand side lateral edge portions of

said lateral plate member (**172**) so as to become engaged with said lateral edge portion (**110g**) of said indoor unit (**2**), and

wherein said second hook (**174**) is formed of an elastic material and wherein said second hook (**174**) includes a base portion (**174a**) which is constructed so as to lie along said lateral edge portion (**110g**) and a leading end hooking portion (**174b**) formed by bending a lower end portion of said base portion (**174a**) more inwardly than said lateral edge portion (**110g)** of said indoor unit (**2**).

Fig. 1

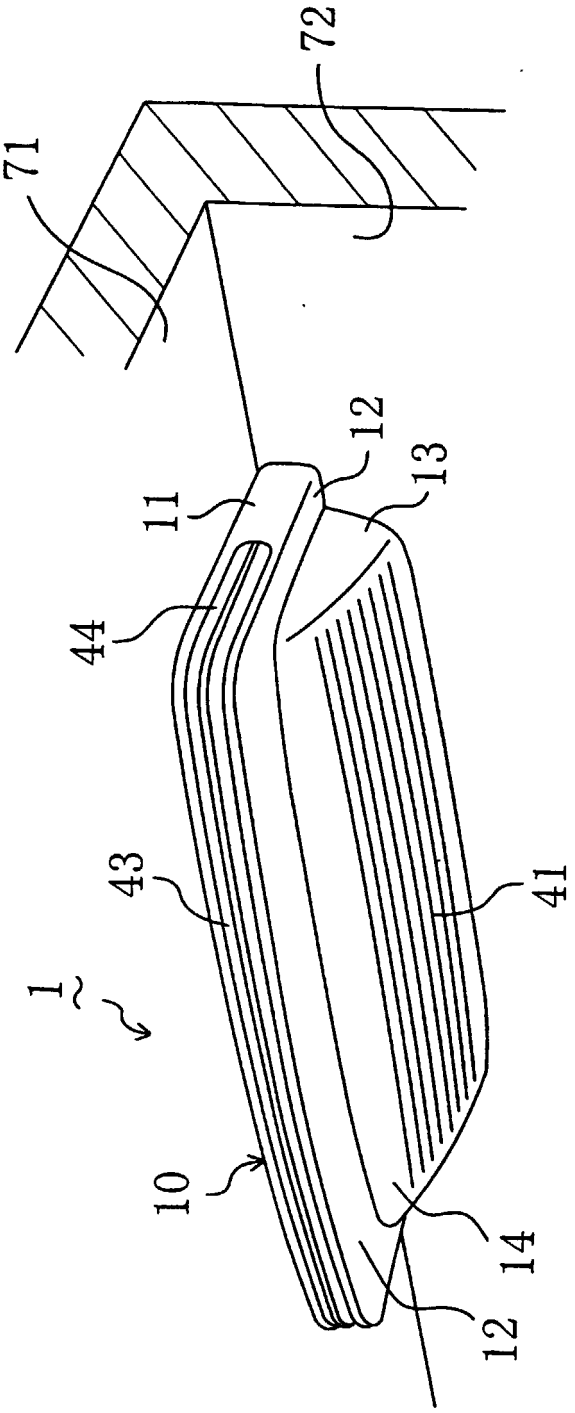


Fig. 2

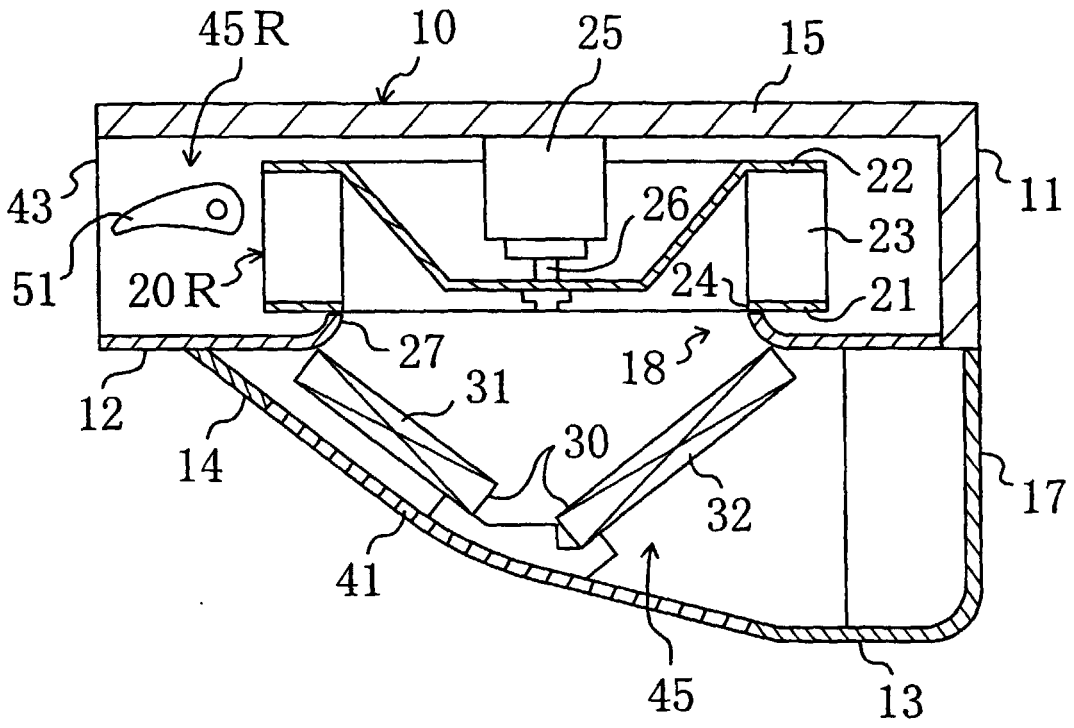

1
45R
10
25
15
43
51
20R
22
11
26
23
24
21
27
18
12
31
14
30
32
17
41
45
13

Fig. 3

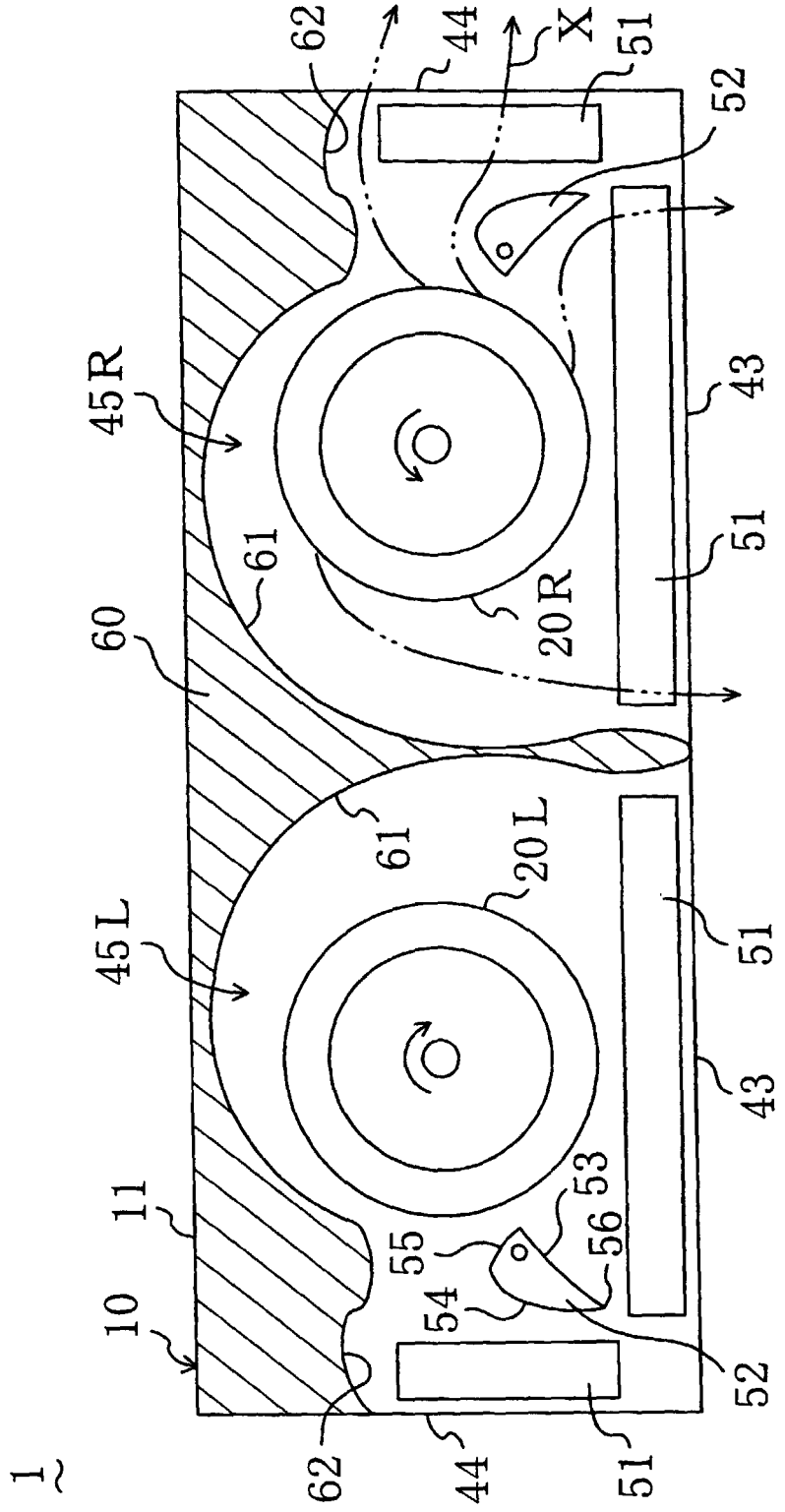


Fig. 4

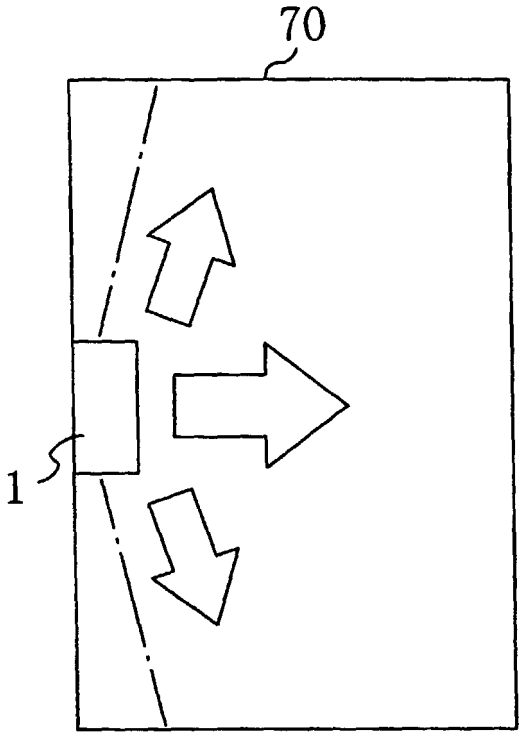


Fig. 5

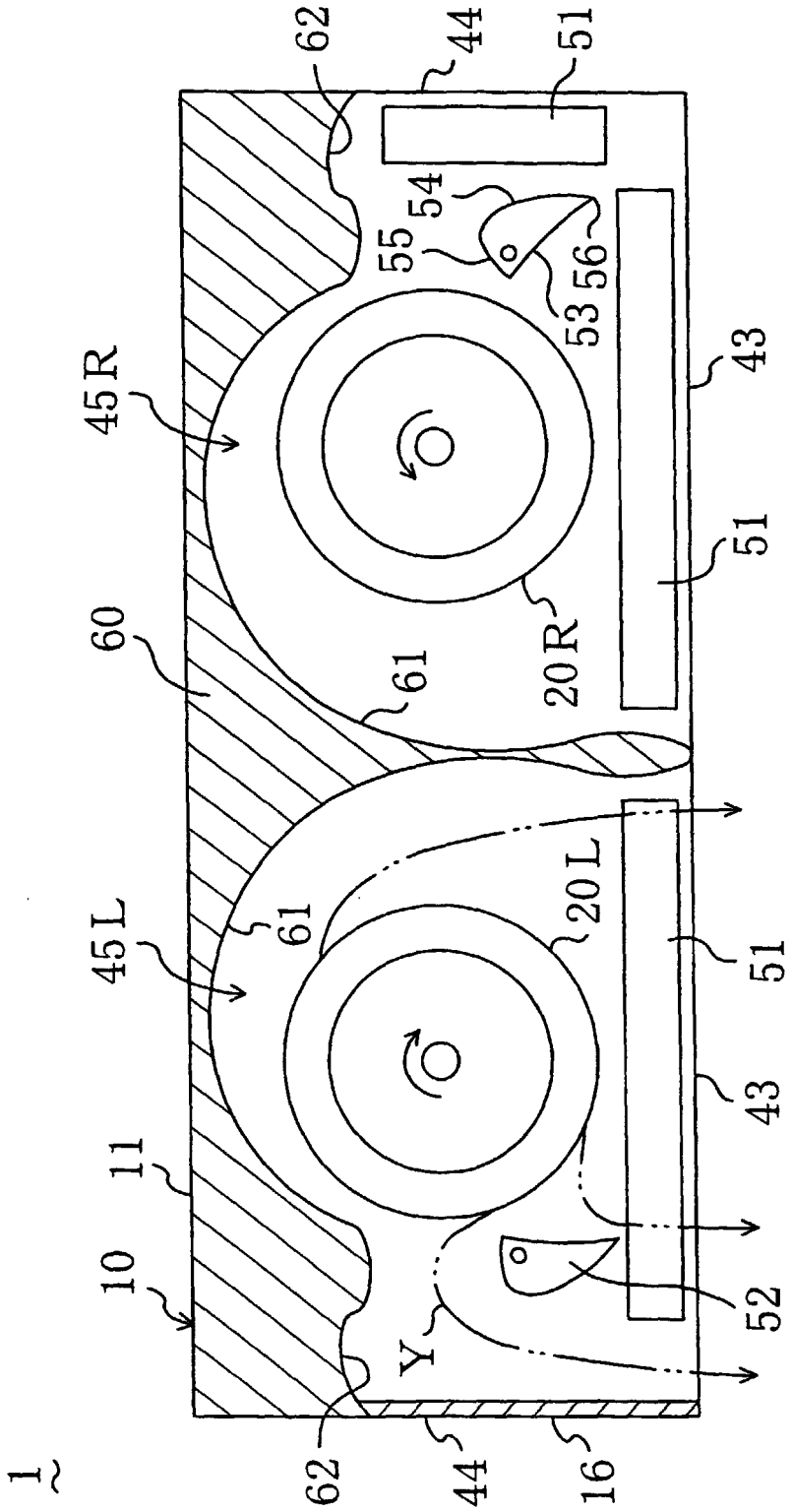

1
62
44
51
54
55
53
56
43
45R
51
60
61
20R
45L
61
20L
51
43
11
10
52
Y
62
44
16

Fig. 6

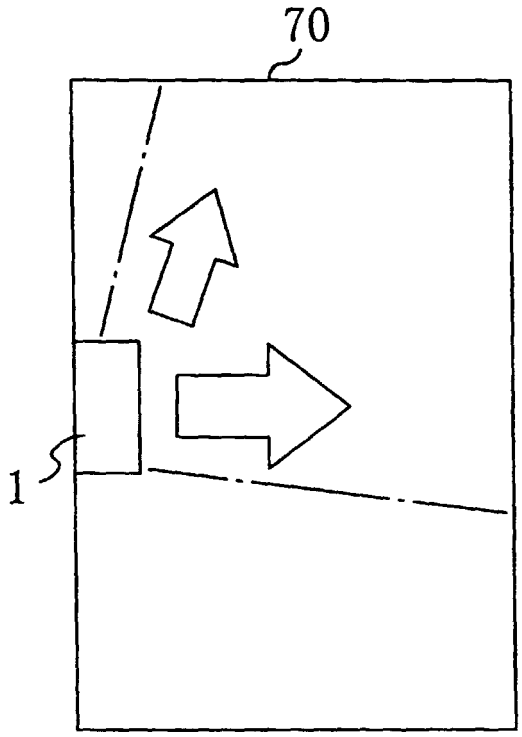


Fig. 7

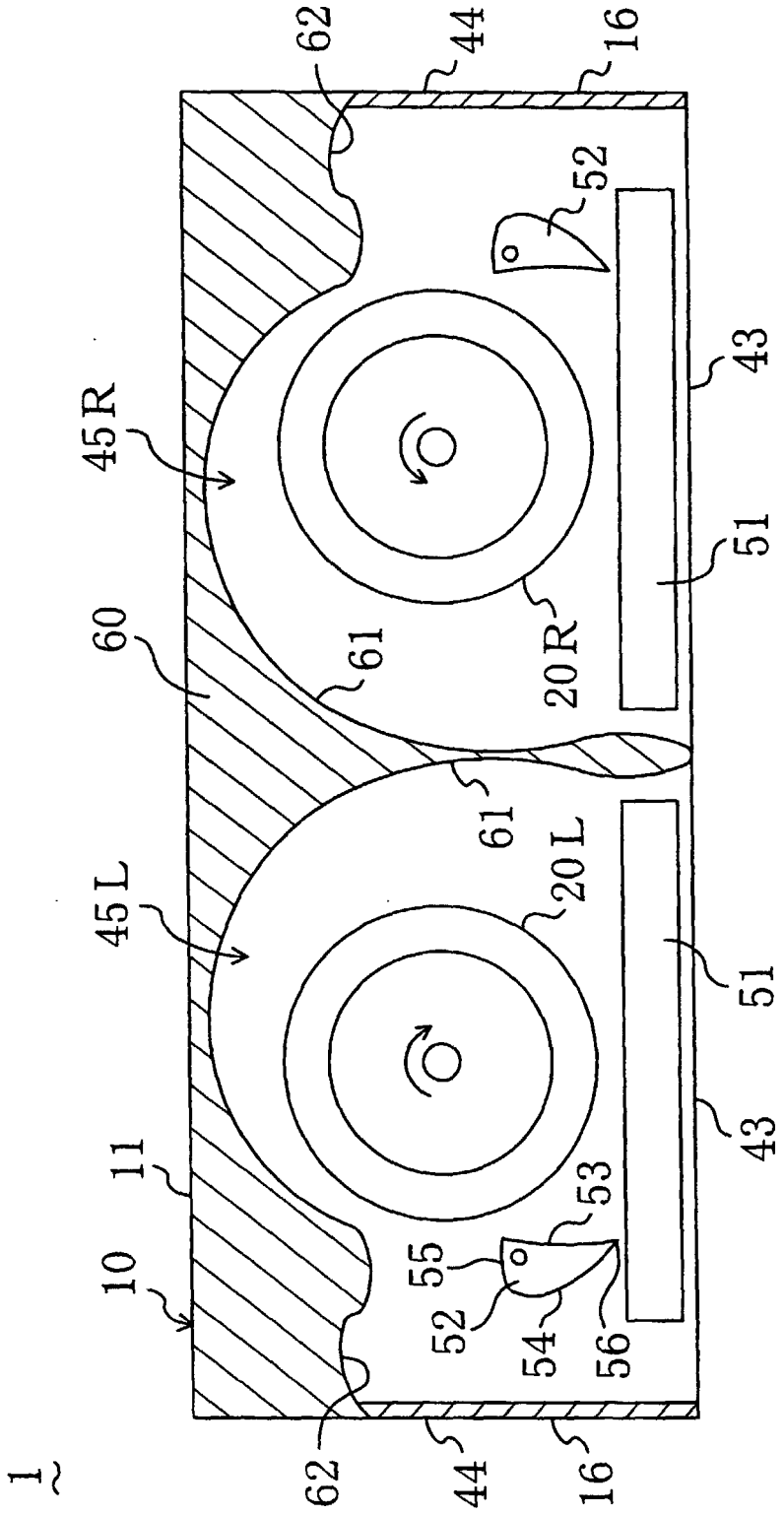

1
62
44
16
52
43
45R
51
60
61
20R
61
20L
45L
51
11
43
53
10
55
52
54
56
62
44
16

Fig. 8

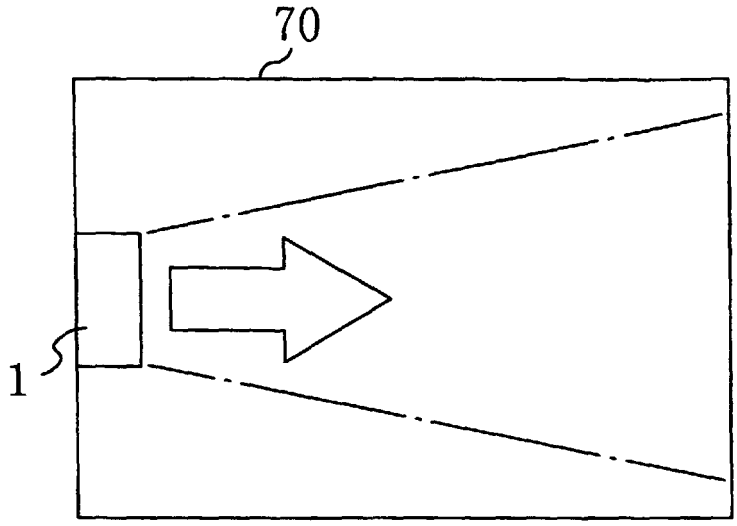


Fig. 9

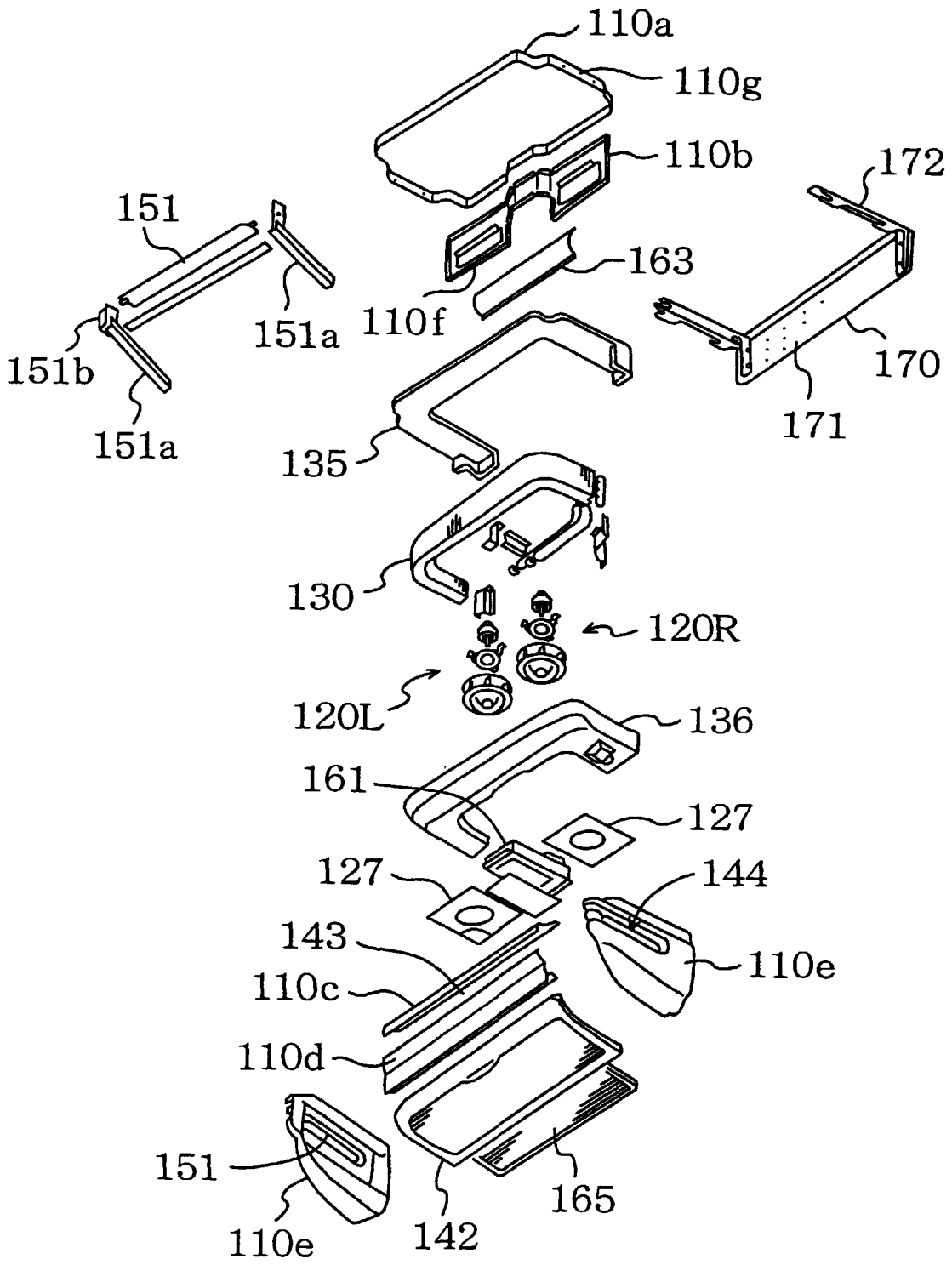

110a
110g
110b
172
151
163
151a
110f
151b
170
171
151a
135
130
120R
120L
136
161
127
127
144
143
110e
110c
110d
151
165
110e
142

Fig. 10

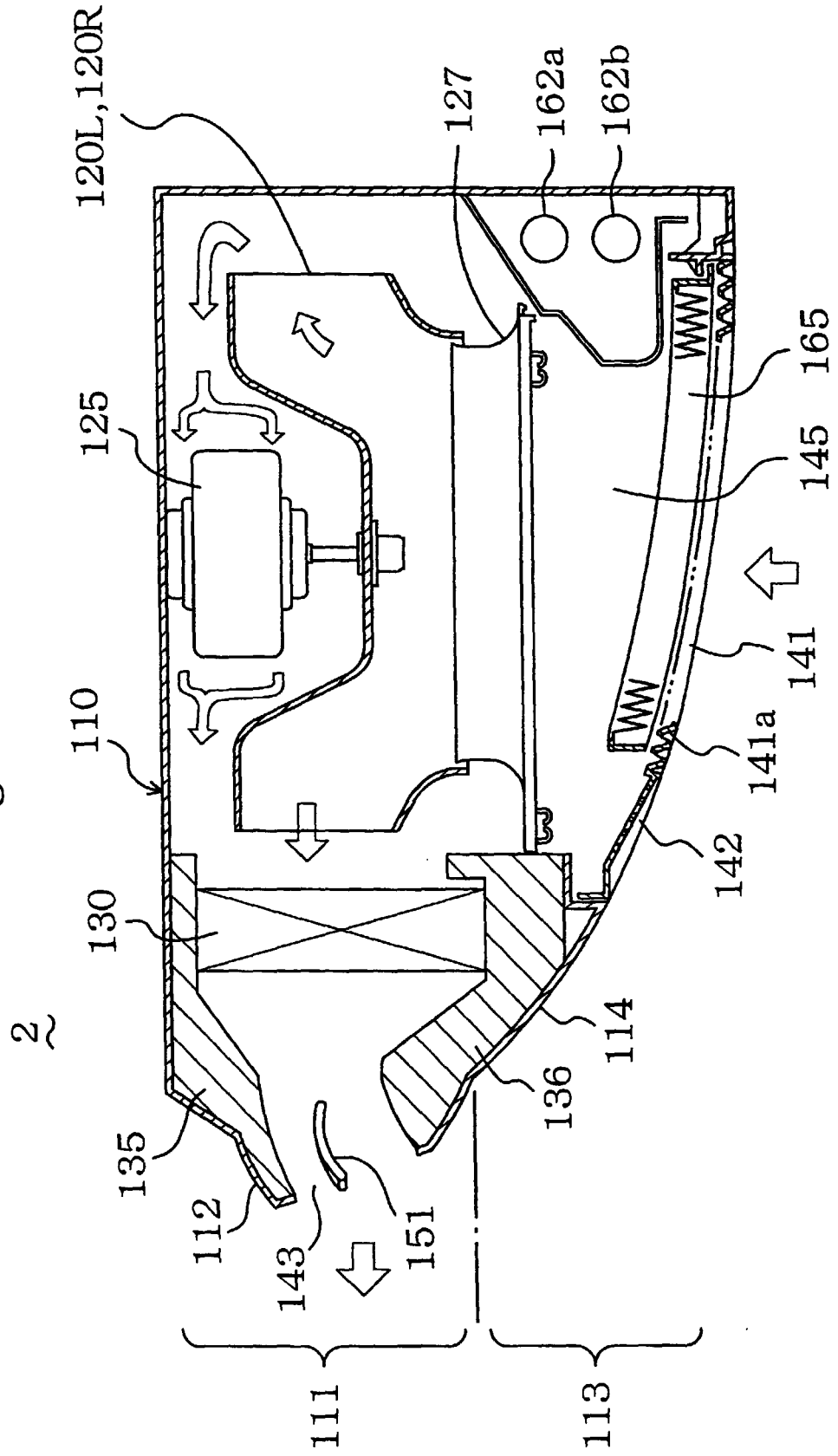

2
120L,120R
127
162a
162b
165
125
145
110
141
141a
142
130
114
136
135
112
143
151
111
113

Fig. 11

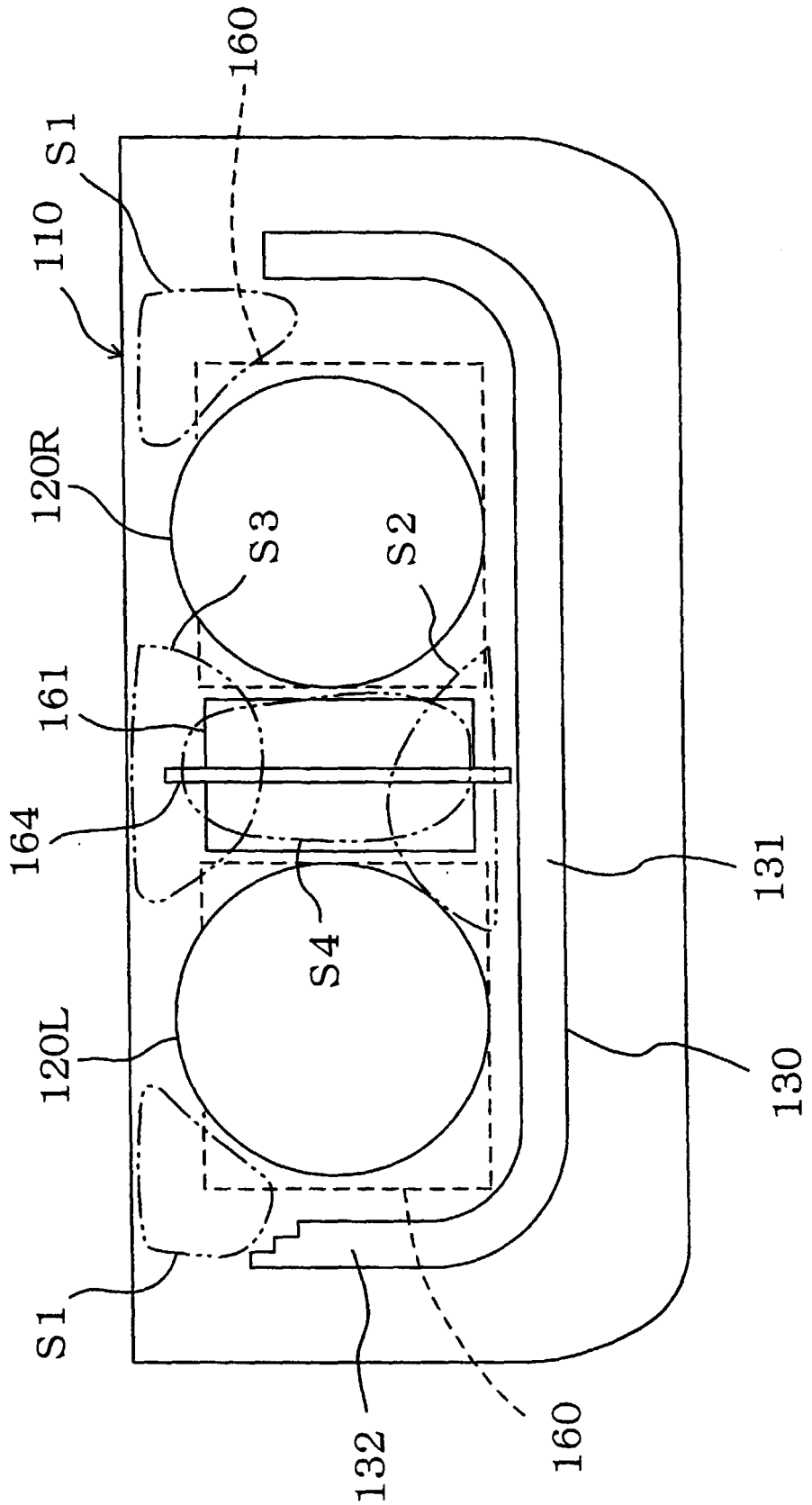


Fig. 12

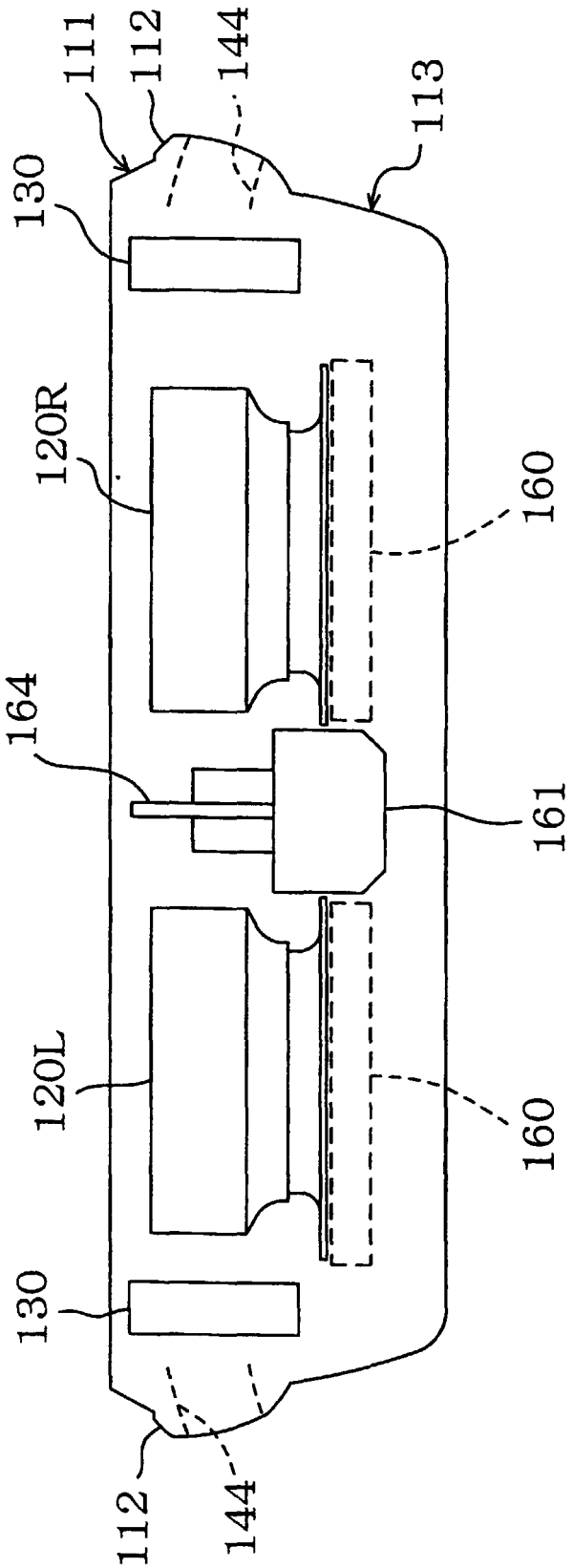


Fig. 13

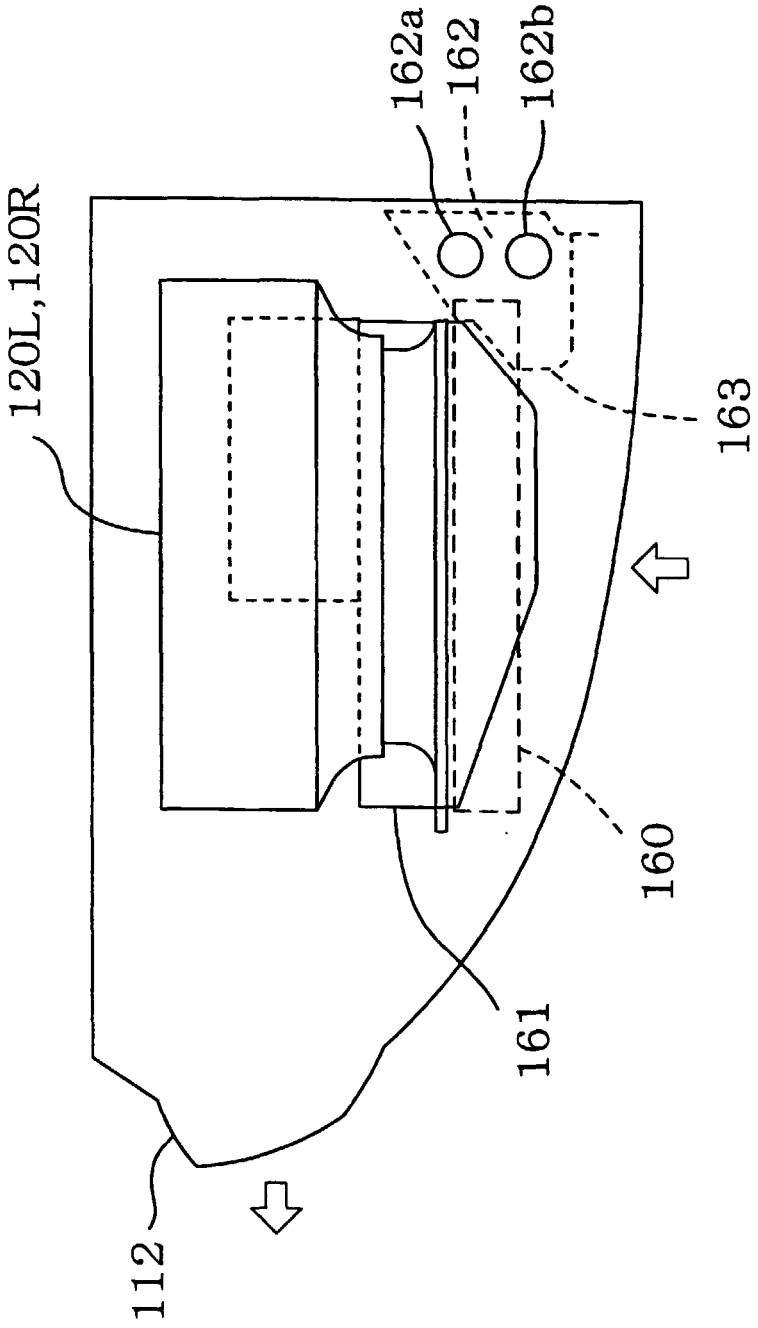


Fig. 14

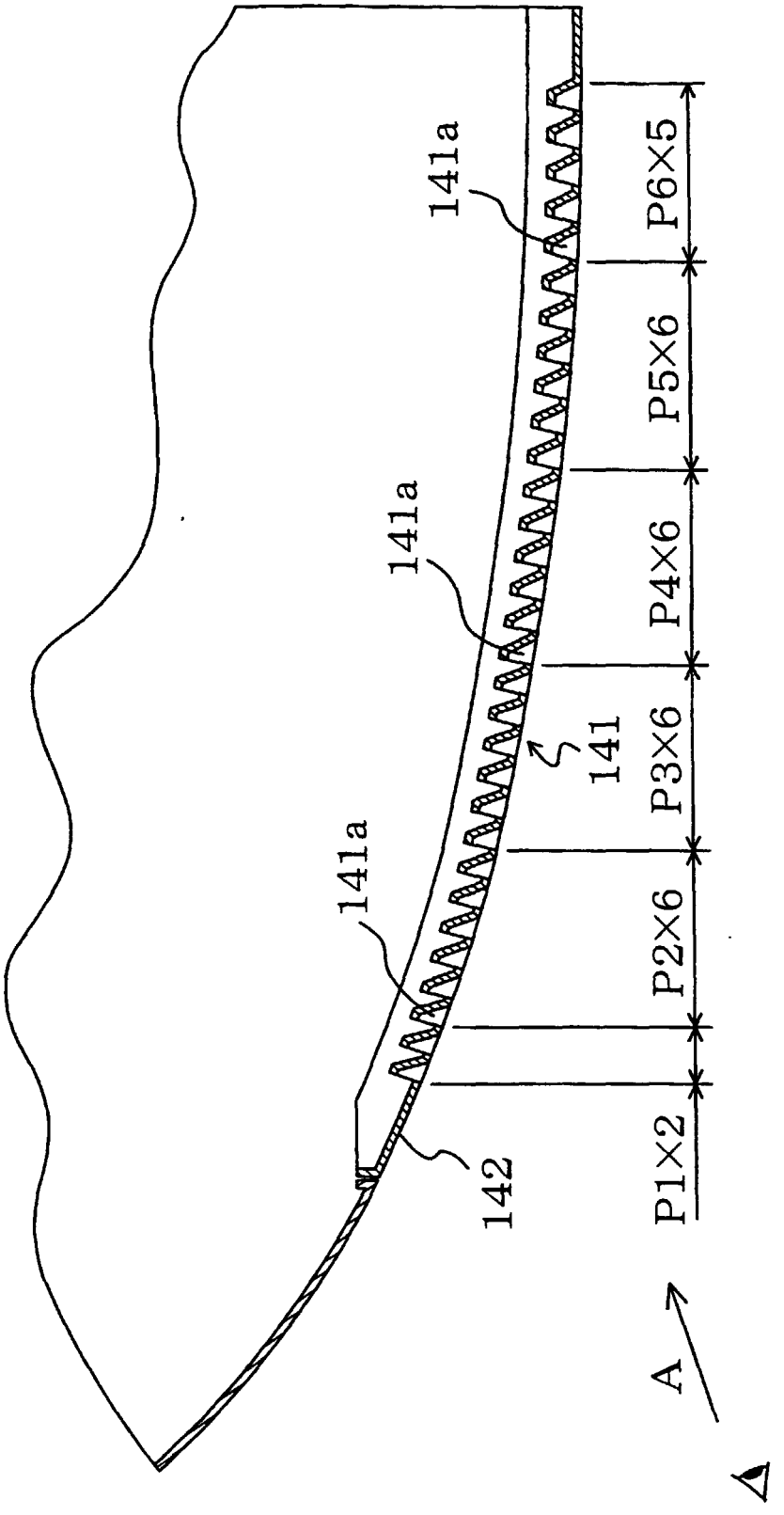


Fig. 15

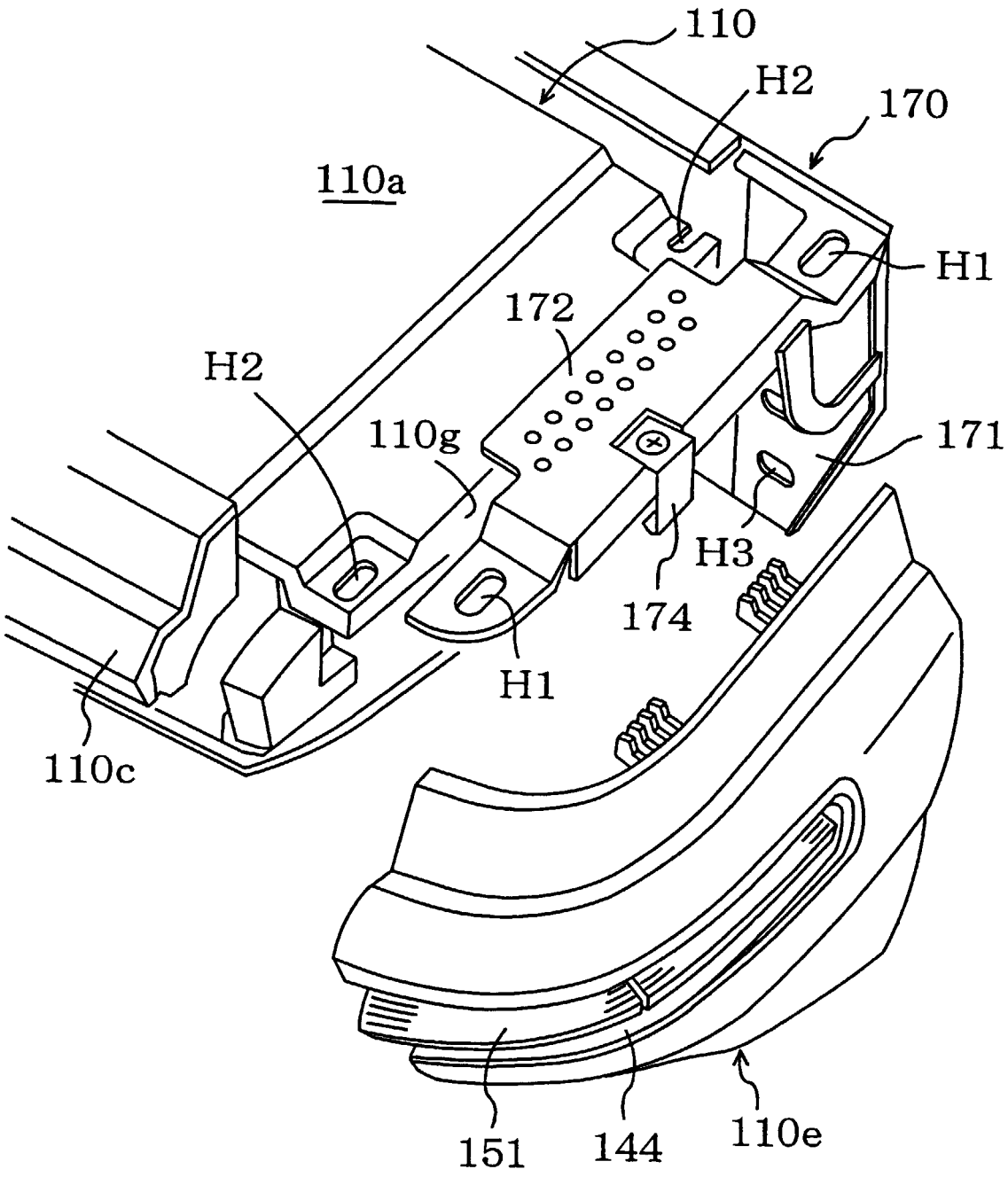


Fig. 16

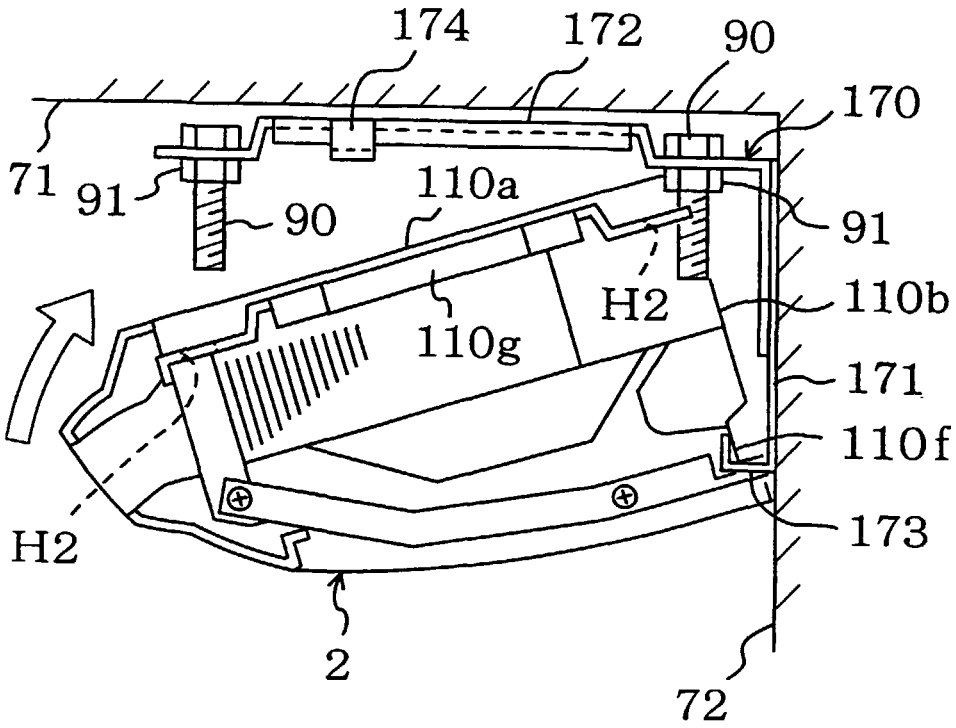

174
172
90
170
71
91
90
110a
91
H2
110b
110g
171
110f
H2
173
2
72

Fig. 17

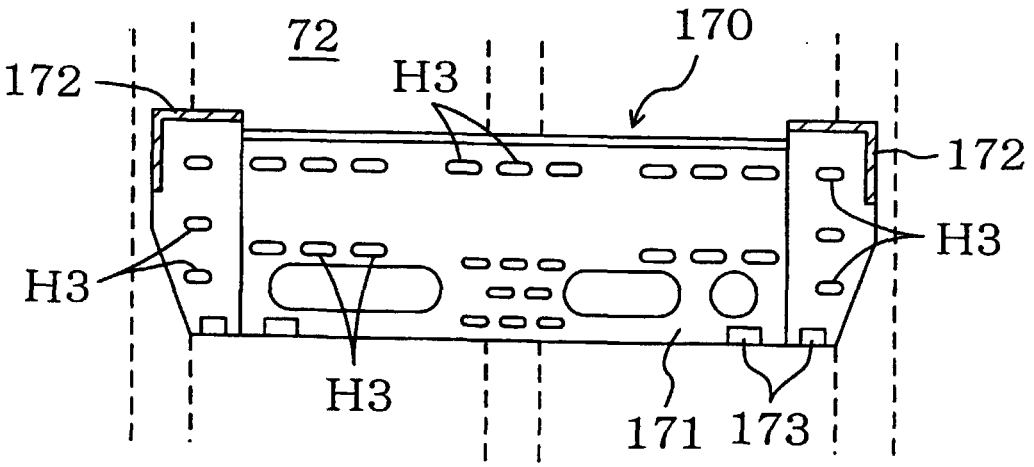

72
170
172
H3
172
H3
H3
H3
171
173

Fig. 18

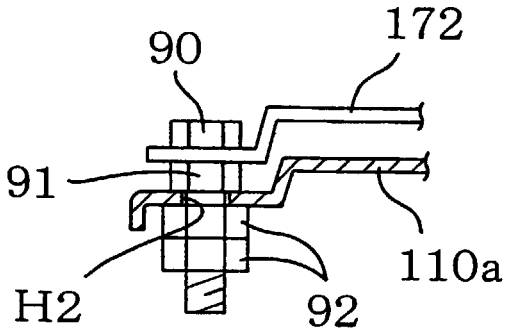


Fig. 19

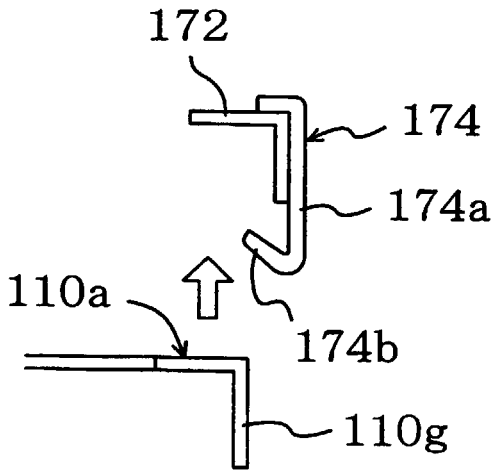
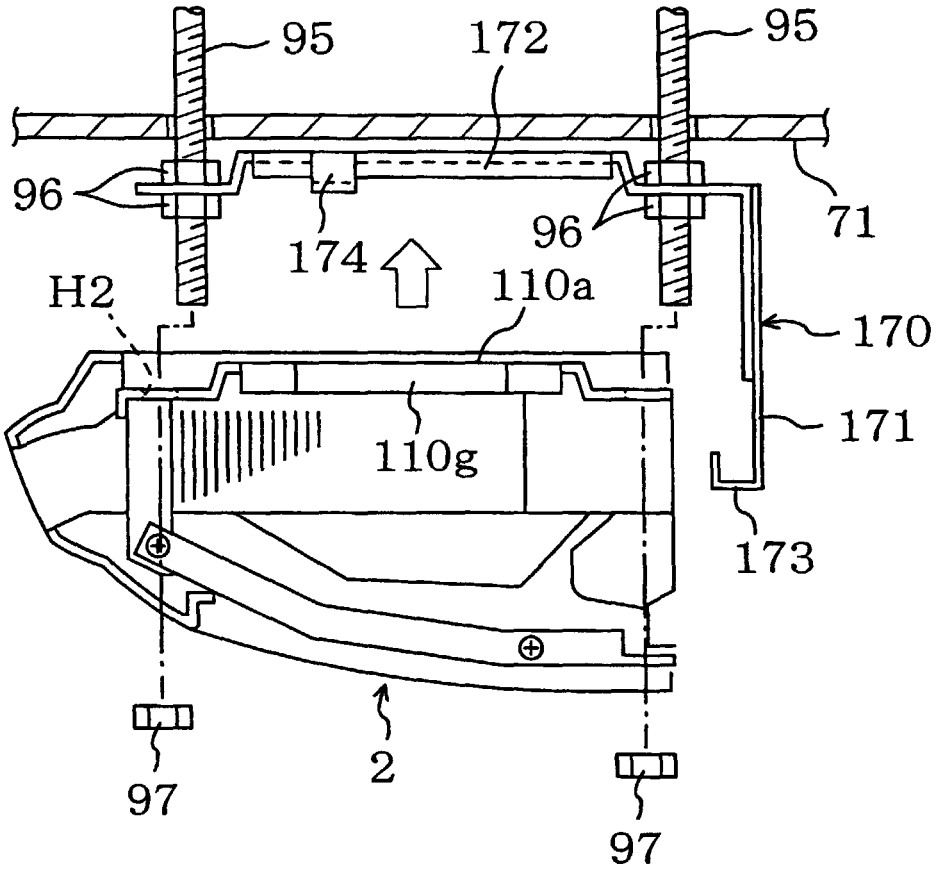


Fig. 20



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP99/00914

A. CLASSIFICATION OF SUBJECT MATTER
Int.Cl[6] F24F1/00

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)
Int.Cl[6] F24F1/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Jitsuyo Shinan Koho 1926-1999 Toroku Jitsuyo Shinan Koho 1994-1999
Kokai Jitsuyo Shinan Koho 1971-1999

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, 4-120534, U (Toshiba Corp.), 28 October, 1992 (28. 10. 92) (Family: none)	1-28
Y	JP, 62-84232, A (Matsushita Refrigeration Co.), 17 April, 1987 (17. 04. 87) (Family: none)	1-28
Y	JP, 5-99454, A (Hitachi,Ltd.), 20 April, 1993 (20. 04. 93) (Family: none)	1-28
Y	JP, 55-100916, U (Daikin Industries,Ltd.), 14 July, 1980 (14. 07. 80) (Family: none)	2
Y	JP, 56-14914, U (Hitachi,Ltd.), 9 February, 1981 (09. 02. 81) (Family: none)	2, 3, 28
Y	JP, 61-151127, U (Nishida Tekkou K.K.), 18 September, 1986 (18. 09. 86) (Family: none)	8
Y	JP, 6-137578, A (Mitsubishi Electric Corp.), 17 May, 1994 (17. 05. 94) (Family: none)	11

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Date of the actual completion of the international search	Date of mailing of the international search report
26 March, 1999 (26. 03. 99)	13 April, 1999 (13. 04. 99)
Name and mailing address of the ISA/ Japanese Patent Office	Authorized officer
Facsimile No.	Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP99/00914

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, 58-20124, U (Tokyo Shibaura Electric Co., Ltd.), 7 February, 1983 (07. 02. 83) (Family: none)	12, 13
Y	JP, 1-112340, U (Daikin Industries,Ltd.), 28 July, 1989 (28. 07. 89) (Family: none)	23
A	JP, 62-179516, U (Daikin Industries,Ltd.), 14 November, 1987 (14. 11. 87) (Family: none)	29-32
A	JP, 6-123442, A (Hitachi,Ltd.), 6 May, 1994 (06. 05. 94) (Family: none)	29-32

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