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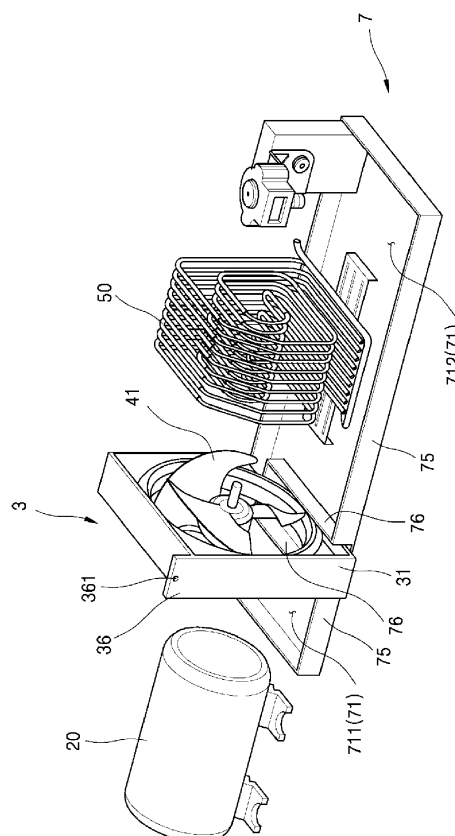
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(54) **ASSEMBLY SET INCLUDING DRIP TRAY FOR A COMPACT MACHINE COMPARTMENT AND REFRIGERATOR USING A DRIP TRAY**

(57) An assembly set including a drip tray (7) and a fan assembly (3) is provided. The assembly set is configured to be provided in a machine compartment (10) of a refrigerator. The fan assembly (3) includes a fan (41) configured to generate air flow by rotation thereof and a frame (30) configured to support the fan (41). The drip tray (7) includes a fan assembly mounting space (73) in which at least a portion of the fan assembly (3) is mounted and an opening (78) laterally and outwardly open to communicate with the fan assembly mounting space (73). The fan assembly (3) is configured to be at least partially inserted into or withdrawn out of the fan assembly mounting space (73) through the opening (78).

FIG. 6



Description

BACKGROUND

1. Field

[0001] The present disclosure relates to an assembly set comprising a drip tray and a fan assembly, it further refers to refrigerator having a compact machine compartment.

2. Background

[0002] A machine compartment may be provided in a rear lower portion of a refrigerator. The machine compartment may accommodate a compressor and a condenser that generate heat in a refrigerating cycle of the refrigerator. A drip tray configured to receive defrosted water as generated in an evaporator used to cool a cabinet of the refrigerator may be provided in the machine compartment.

[0003] The defrosted water stored in the drip tray may be evaporated by the heat released from the compressor and condenser of the machine compartment. The drip tray may have a flat and wide shape to widen a surface area in contact with the atmosphere. The machine compartment may include a fan which generates an air flow through the compressor and the condenser. The air flow may be used to evaporate the water contained in the drip tray.

[0004] As shown in FIG. 1, a drip tray 8 may have a form of a tray having a rectangular broad bottom member 87 and an outer wall 85 having a small vertical dimension and extending upwardly from an edge of the bottom member. The defrosted water may be received in a space defined by the bottom member and the outer wall.

[0005] Referring to FIG. 1 and FIG. 2, defrosted water W may be stored in the drip tray 8. Thus, a fan assembly 9 may be provided above the bottom member 87 of the drip tray 8. In this connection, the fan assembly 9 may be placed on a fan assembly support 89 provided inside the drip tray 8 and may be fixed to the fan assembly support 89 by a fastener such as a screw b. Further, a lower end of the fan assembly 9 may be interposed between two outer walls 85 of the tray drip 8.

[0006] A height h of the machine compartment housing the drip tray 8 and the fan assembly 9 may be determined by a distance between a bottom boundary 13 extending horizontally from the bottom member 87 of the tray drip 8 and a top boundary 14 extending horizontally from a top of the fan assembly 9. That is, the height h of the machine compartment according to FIGs. 1 and 2 may be equal to a sum of a height of the fan assembly support 89 and a height of the fan assembly 9.

[0007] Furthermore, a depth d of the machine compartment according to FIGs. 1 and 2 may be determined by a distance between the two parallel and spaced outer walls 85 of the drip tray 8 defining a space receiving the

lower end of the fan assembly 9. According to the combined structure of the drip tray 8 and the fan assembly 9 in FIGs. 1 and 2, reducing the height h and depth d of the machine compartment should result from the reduction of the size of the fan assembly 9. However, when the size of the fan assembly 9 is reduced, there may be a problem that a fan flow rate is reduced correspondingly.

[0008] The object is therefore to provide a drip tray for a refrigerator allowing the fan assembly to be assembled into a machine compartment or installation space of the refrigerator to have a reduced installation height and more efficient space utilization of the machine compartment or installation space to further increase the storing space of the refrigerator without increasing outside dimensions. Furthermore, the efficiency of the fan with respect to the amount of water stored in the drip tray should be increased.

[0009] Another object is to provide a drip tray and fan assembly which may be easily placed inside a compact machine compartment.

[0010] The object is solved by the features of the independent claims. Preferred embodiments are given in the dependent claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] Embodiments will be described in detail with reference to the following drawings in which like reference numerals refer to like elements, and wherein:

FIG. 1 is a perspective view of a drip tray used in a related refrigerator machine compartment;

FIG. 2 is a cross-sectional side view of a coupled state between a drip tray and a fan assembly housed in the related machine compartment;

FIG. 3 is a perspective view of an embodiment of a drip tray used in a refrigerator machine compartment;

FIG. 4 is a side view of an embodiment of a fan assembly used in a refrigerator machine compartment; FIG. 5 is a side cross-sectional view of a coupled state between the drip tray of FIG. 3 and the fan assembly of FIG. 4;

FIG. 6 is an external perspective view of an arrangement of a compressor, a drip tray, a fan assembly, and a heat-exchanger in a machine compartment; FIG. 7 shows internal perspective and enlarged views of a coupled state between the drip tray and the fan assembly;

FIG. 8 is a perspective view of an arrangement of the compressor, drip tray, fan assembly, and heat-exchanger of FIG. 6 in the machine compartment; FIG. 9 is a perspective view of another embodiment of a drip tray used in a refrigerator machine compartment;

FIG. 10 is a side view of an embodiment of a fan assembly used in a refrigerator machine compartment; and

FIG. 11 is a cross-sectional side view of a coupled state between the fan assembly of FIG. 10 and the drip tray of FIG. 9.

DETAILED DESCRIPTION

[0012] The above objects, features and advantages will become apparent from the detailed description with reference to the accompanying drawings. Embodiments are described in sufficient detail to enable those skilled in the art in the art to easily practice the technical idea of the present disclosure. Detailed descriptions of well-known functions or configurations may be omitted in order not to unnecessarily obscure the gist of the present disclosure. Hereinafter, embodiments of the present disclosure will be described in detail with reference to the accompanying drawings. Throughout the drawings, like reference numerals refer to like elements.

[Tray drip]

[0013] An embodiment of a drip tray provided in a machine compartment may include, as shown in FIG. 3, a bottom member or panel 77 formed of a plate having a substantially rectangular shape, and an outer or first wall 75 that extends upward from an edge of the bottom panel 77. The bottom panel 77 may be made of metal or plastic.

[0014] The bottom panel 77 may have a rectangular shape including short sides and long sides. Along a predetermined length at the long side edge of the bottom panel 77, an opening 78 at which the outer wall is not formed may be defined. That is, the outer wall may extend upward from the edge of the bottom panel 77 along a periphery of the bottom panel 77 except for the opening 78 region.

[0015] Further, the drip tray 7 may include an inner or second wall 76 that extends from both ends of the opening 78 of the bottom panel 77. The inner wall 76 may extend in a perpendicular manner to the long side of the bottom panel 77 and may extend along the bottom panel 77. That is, the inner wall 76 may extend inward from the long side of the bottom panel 77. The direction in which the inner wall 76 extends inward from the long side of the bottom panel 77 may be parallel to the extending direction of the short side of the bottom panel 77.

[0016] The inner wall 76 may extend upward from the bottom panel 77. The inner wall 76 may be connected to the outer wall 75 at the opening 78. The inner wall 76 may have a "⊂" shape (U-shape). That is, an opposite portion to the opening 78 may be closed. The inner wall 76 may include a first inner wall and a second inner wall, and both may extend in a direction parallel to the short side of the bottom panel 77, and a third inner wall that connects distal ends of the first and second inner walls to each other. That is, the proximal ends of the first inner wall and the second inner wall may be connected to the outer wall 75 of the bottom panel 77, while the distal ends of the first inner wall and the second inner wall may be

interconnected via the third inner wall.

[0017] The first inner wall and the second inner wall may extend parallel to each other and may be parallel to the short side of the bottom panel 77. The third inner wall may be shorter than each of the first and second inner walls. The third inner wall may be parallel to the long side of the bottom panel 77.

[0018] According to an embodiment, the drip tray 7 may include outer walls that define two short sides and one long side of the rectangular shaped bottom panel 77, and an outer wall that defines the other long side except for the opening 78. That is, the outer wall 75 may define all the edges of the bottom panel 77 except for the opening 78.

[0019] Further, the inner wall 76 may be connected to the outer wall 75 and may extend inward from an edge of the bottom panel 77. Accordingly, the outer wall 75 and the inner wall 76 of the drip tray 7 may form a closed loop.

[0020] A space defined by the bottom panel 77 and the closed loop formed by the outer wall 75 and the inner wall 76 may define a defrosted water storage space (or water storage space) 71. The water storage space 71 for defrosted water may be divided into two spaces. The two spaces are divided by the inner wall 76, in particular by the inner wall 76 protruding from the edge of the bottom panel 77 to the inside of the area of the bottom panel 77. A first storage space 711 may be defined to one side of the inner wall 76 along the longitudinal direction of the long side of the bottom panel 77, while a second storage space 712 may be defined to the other side of the inner wall 76 along the longitudinal direction of the long side of the bottom panel 77.

[0021] The second storage space 712 may occupy a wider area than the first storage space 711. In the second storage space, a heat-exchanger condenser to be described later may be provided.

[0022] The first storage space 711 and the second storage space 712 may communicate with each other through a communication space 713. The communication space 713 may be defined between the third inner wall and the outer wall. Since the defrosted water is a liquid, the defrosted water contained in the first storage space 711 and the defrosted water contained in the second storage space 712 may communicate with each other through the communication space 713 and may have the same water level.

[0023] On the bottom panel 77, a space excluding the defrosted water storage space 71 defined by the first storage space 711, the second storage space 712, and the communication space 713 may define a fan assembly accommodation space (or fan assembly mounting space) 73 into which the defrosted water does not invade. The fan assembly accommodation space 73 may have a form of an elongated rectangular shape. The space 73 may be defined by the inner wall 76 defining two long sides and one short side. The other short side of the space 73 may be defined by the opening 78.

[0024] The fan assembly accommodation space 73 may not accommodate defrosted water therein. Thus, in the location of the fan assembly accommodation space 73, a portion or all of the bottom panel 77 may be removed. When a portion or all of the bottom panel 77 is removed in this manner, the water w may drain immediately therefrom even when the defrosted water w penetrates into the fan assembly accommodation space 73. This may reduce a risk that water will penetrate into the motor 42 of the fan assembly 3, which will be described later, provided in the fan assembly accommodation space 73.

[0025] The fan assembly accommodation space 73 may have one short side that defines the opening 78. Thus, although the bottom panel 77 is not removed in that region, the water drain may be realized. Therefore, for drainage, the portion or all of the bottom panel 77 may not be removed intentionally.

[0026] However, when, in the region of the fan assembly accommodation space 73, the bottom panel 77 is not removed, an overall stiffness of the drip tray 7 may increase. On the other hand, when, in the region of the fan assembly accommodation space 73, the bottom panel 77 is removed, the fan assembly 3 as described later may be accommodated more deeply within the machine compartment, thereby reducing the entire height of the machine compartment.

[0027] The absence or presence of the bottom panel 77 on the fan assembly accommodation space 73 may be determined by a method of manufacturing the drip tray 7. For example, when the drip tray 7 is manufactured by bending a metal plate, the inner wall 76 may be formed by bending a bottom plate upwards in the region of the fan assembly accommodation space 73. In this case, the bottom panel 77 may be removed. The material and manufacturing method of the drip tray 7 may be variously selected so that defrosted water stored in the defrosted water storage space 71 may not leak.

[0028] In the fan assembly accommodation space 73, the fan assembly 3 may be fixedly received. To this end, the inner wall 76 may include a first retainer or hook 79 which may be fastened to the fan assembly 3 and fix the fan assembly 3. The first retainer 79 may include a cantilever extension that extends horizontally from the inner wall toward the fan assembly accommodation space, and a hook structure formed at distal end of the cantilever extension. The first retainer 79 may extend from the third inner wall surface, however, the disclosure is not limited thereto.

[Fan assembly]

[0029] Hereinafter, the fan assembly 3 provided in the fan assembly accommodation space 73 of the drip tray 7 is described.

[0030] The fan assembly 3 may include a fan 41, a motor 42 that generates power to rotate the fan 41, and a frame 30 that supports the motor and the fan.

[0031] The frame 30 may include a square outer frame 31 and a circular inner frame 32 provided inside the outer frame 31. Between the outer frame 31 and the inner frame 32, a blocking plate 33 that closes a space between the outer frame and the inner frame may be provided.

[0032] The outer frame 31 may define an outer face of the fan assembly 3 and may be a rigid structure that supports the fan assembly 3 as a whole. The outer frame 31 may have a width wide enough to secure the rigidity to support the fan assembly 3 as a whole and to stably support the fan assembly 3.

[0033] The inner circumferential face of the inner frame 32 may have a curved surface that guides air flow from the fan 41. The fan 41 may be provided within a fan air flow cross-section defined by the inner circumferential face of the inner frame 32. The fan 41 may be directly coupled to a rotation shaft of the motor 42 and may rotate together with the rotation shaft of the motor.

[0034] The motor 42 may be located at the center of the fan air flow cross-section. The frame 30 may include support arms 38 which may radially extend from the center of the fan air flow cross-section and which may be thinly formed so as not to interfere with fan air flow. The support arms 38 may support a motor fixing portion 39 that fixes the motor 42.

[0035] Referring to FIG. 4, at the inner lower position of the fan assembly 3, a cutout 34 may be formed by partially cutting the frame 30. The cutout 34 may be formed by cutting a portion of the outer frame 31 and a portion of the blocking plate 33. The cut-out 34 may have a shape approximately corresponding to a cross-section shape of the communication space 713 of the drip tray 7.

[0036] Referring to FIGS. 3 and 5, the first retainer 79 may include an extension that extends laterally outward toward the fan assembly accommodation space 73 from the upper end of the inner wall 73 and a hook that protrudes upward from the distal end of the extension. Correspondingly, in an inner face portion of the cutout 34, a second retainer 35 may be defined. The second retainer 35 may be engaged with the first retainer 79 provided in the fan assembly accommodation space 73 of the drip tray 7 described above. Referring to FIG. 4, the second retainer or notch 35 may have a stopper onto which the hook may be hooked.

[0037] In one embodiment, a fixing support 36 may extend upward from the top portion of the frame 30. A through-hole 361 may be defined in the fixing support 36. The through-hole 361 may be a hole through which a screw or bolt passes. Thus, the fan assembly 3 may be fixed to the machine compartment.

[Machine compartment]

[0038] Referring to FIGS. 3 to 8, a combined structure between the drip tray 7 and the fan assembly 3 according to the first embodiment will be described.

[0039] Upper and lower ends and a front end of the machine compartment 10 may be closed, while a rear

end of the machine compartment 10 may be opened. Thus, the machine compartment 10 may have a rectangular parallelepiped structure in which air channels are formed through which the air may circulate. That is, the machine compartment may have an elongate and flat rectangular parallelepiped shape.

[0040] The drip tray 7 may be provided on the bottom of the machine compartment 10. The long side of the drip tray 7 may be parallel to the longitudinal direction. Furthermore, the opening 78 of the drip tray 7 may face out of the machine compartment 10 in a rearward direction.

[0041] A compressor 20 may be provided on a first or left side of the drip tray 7. The compressor 20 may be provided on the bottom of the machine compartment 10 away from or outside of the drip tray 7. Furthermore, the first storage space 711 of the drip tray 7 may be arranged closer to the compressor 20. The compressor 20 may be provided above the first storage space 711 of the drip tray 7.

[0042] A heat-exchanger condenser 50 may be provided in the second storage space 712 of the drip tray 7. Within the machine compartment 10, the fan assembly accommodation space 73 may be arranged between the compressor 20 and the heat-exchanger 50. That is, the heat exchanger 50 may be arranged on the air discharge side of the fan assembly 3, while the compressor 20 may be provided on the air suction side of the fan assembly 3.

[0043] The fan assembly 3 may be inserted into the machine compartment 10 from a rear of the machine compartment 10, thereby placing the fan assembly 3 in the fan assembly accommodation space 73. The fan assembly 3 may be guided in the length direction along the first and second inner walls of the fan assembly accommodation space 73.

[0044] When the fan assembly 3 is inserted up to an insertion depth, the hook, which may be the first retainer 79 of the drip tray 7 may be hooked onto the stopper which may be the second retainer 35 of the fan assembly 3. The hook may have an upper inclined surface facing out of the machine compartment 10. The inner face of the hook may be vertical. Therefore, during the insertion of the fan assembly 3, the first retainer may be elastically deformed. When the fan assembly 3 is completely inserted, the first retainer may be resiliently restored and may be engaged with the second retainer as shown in FIG. 7. Once the stopper and the hook are fastened to each other, the hook may not easily escape from the stopper.

[0045] A width of the first retainer 79 may be greater than a thickness of the blocking plate 33 of the fan assembly 3. Therefore, when the fan assembly 3 is to be separated and removed, a portion of the first retainer 79 exposed toward a side face of the blocking plate 33 of the fan assembly may be pushed downward as shown in FIG. 7 and the fan assembly 3 may be taken out of the machine compartment. After inserting the fan assembly 3 into the machine compartment, a fastener such as a screw may be inserted through the through-hole 361 of the fixing support 36 to further secure the fan assembly

3 to the machine compartment.

[0046] Referring to FIG. 5 and FIG. 7, when the drip tray 7 and fan assembly 3 are placed in machine compartment 10, an inner portion of the outer frame 31 of the fan assembly 3 which is disposed inside the machine compartment 10 may be aligned with an inner portion of the outer wall 75 of the drip tray 7 which may be provided inside the machine compartment 10. Thus, an inner boundary 12 of the machine compartment 10 may be aligned with the inner portion of the outer wall 75 of the drip tray 7 and the inner portion of the outer frame 31 of the fan assembly 3.

[0047] Further Referring to FIG. 5, FIG. 6, and FIG. 8, when the drip tray 7 and fan assembly 3 are placed in machine compartment 10, an outer portion of the outer frame 31 of the fan assembly 3 may be provided further forward with an outer portion of the outer wall 75 of the drip tray 7. An outer boundary 11 of the machine compartment 10 may be arranged between the outer portion of the outer wall 75 of the drip tray 7 and the outer portion of the outer frame 31 of the fan assembly 3. That is, the outer boundary 11 of the machine compartment 10 may be provided outside of the outer portion of the outer wall 75 of the drip tray 7, while the outer boundary 11 may be arranged inside of the outer portion of the outer frame 31 of the fan assembly 3.

[0048] Thus, the depth d of the machine compartment may correspond to the length of the short side of the drip tray 7. The fan assembly 3 may be longer than the short side length of the drip tray 7.

[0049] In one embodiment, referring to Figures 5 and 8, a bottom boundary 13 of the machine compartment may be aligned with the lower face of the bottom panel 77 of the drip tray 7. Furthermore, a top boundary 14 of the machine compartment may be aligned with the upper end of the outer frame 31 of the fan assembly 3. Thus, the height h of the machine compartment may be determined as the distance between the bottom face of bottom panel 77 of drip tray 7 and the top face of outer frame 31 of fan assembly 3.

[0050] The fan assembly accommodation space 73 into which defrosted water does not leak may be defined within or inside the region of the defrosted water storage space 71. So, the fan assembly accommodation space 73 is surrounded at three sides by the water storage space 71. Thus, unlike the related art, the lower end of the outer frame 31 of the fan assembly 3 may be in contact with the bottom panel 77 of the drip tray 7. Further, when, in the region of the fan assembly accommodation space 73, the bottom panel 77 is removed, the lower end of the outer frame 31 of the fan assembly 3 may be in contact with the bottom of the machine compartment 10. Thus, according to the present disclosure, the height h of the machine compartment may be determined solely by the height of the fan assembly 3.

[0051] Thus, the height h of the machine compartment 10 may correspond only to the height of the fan assembly 3, which may be smaller than a height of a fan assembly

in the related art. Further, the depth *d* of the machine compartment 10 may be equal to or smaller than the depth of the fan assembly. That is, the area of the fan assembly 3 may be increased while reducing the volume of the machine compartment. Thus, heat exchange efficiency and defrosted water removal efficiency may be increased. Thus, the storage capacity of the refrigerator may be further increased.

[0052] In particular, while the machine compartment 10 maintains a contour frame thereof and the drip tray 7 is provided in the machine compartment 10, the fan assembly 3 may be inserted into the machine compartment 10 in a sliding manner. Thus, the assembly of the machine compartment 10 may be very simple while reducing the height *h* of the machine compartment 10 to substantially the same height as the height of the fan assembly 3.

[Tray drip - variant embodiment]

[0053] Hereinafter, a variant of a drip tray is illustrated. In a following example of a modified drip tray, the overlapping contents between the variant embodiment and the first embodiment will not be described in detail.

[0054] The variant embodiment of the drip tray 7 provided within a machine compartment 10 may include a bottom member or panel 77 in the form of a substantially rectangular plate, and an outer wall 75 that extends upward from the edge of the bottom panel 77, as shown in FIG. 9.

[0055] The bottom panel 77 may have a rectangular shape including short sides and long sides. In the variant embodiment, the outer wall 75 may be formed in an outer closed loop shape defining the entire edge of the bottom panel 77. Further, in the drip tray 7 of the variant embodiment, the inner wall 76 may form an inner closed loop in the space defined by the outer wall 75 of the bottom panel 77, thereby defining a fan assembly accommodation space 73.

[0056] The fan assembly accommodation space 73 may have an elongated rectangular shape. The extending direction of the long side of the bottom panel 77 and the extending direction of the long side of the fan assembly accommodation space 73 may be perpendicular to each other. That is, the fan assembly accommodation space 73 may have a longitudinal direction perpendicular to the longitudinal direction of the drip tray 7.

[0057] The inner wall 76 may extend upward from the bottom panel 77. The inner closed loop may be formed by only the inner wall 76. The inner wall 76 may include first inner and second inner walls that extend in a direction parallel to the short side of the bottom panel 77, and third and fourth inner walls that connect distal and proximal ends of the first and second inner walls, respectively.

[0058] Each of the third and fourth inner walls may be parallel to the long side of the bottom panel 77. Each of the first and second inner walls may be longer than each of the third and fourth inner walls.

[0059] According to another embodiment, the drip tray

7 may have an outer wall 75 that defines both the two short sides and two long sides of the rectangular bottom panel 77. Furthermore, the inner wall 76 that defines the fan assembly accommodation space 73 in a rectangular shape may be formed in the space defined by the outer wall 75 of the bottom panel 77.

[0060] In the variant embodiment, the defrosted water storage space 71 may be provided inside the closed loop defined by the outer wall 75. The defrosted water storage space 71 may be defined out of the inner closed loop formed by the inner wall 76.

[0061] The defrosted water storage space 71 may be divided into two spaces by the fan assembly accommodation space 73. A first storage space 711 may be defined on a first side of the fan assembly accommodation space 73 along the longitudinal direction of the long side of the bottom panel 77, while a second storage space 712 may be defined on a second side of the fan assembly accommodation space 73 opposite the first side along the longitudinal direction of the long side of the bottom panel 77. The second storage space 712 may occupy a larger area than the first storage space 711.

[0062] The first storage space 711 and the second storage space 712 may communicate with each other through one or more communication spaces 713. Each communication space 713 may be defined between each of the third and fourth inner wall and the outer wall 76. Since the defrosted water may be a liquid, the defrost water contained in the first storage space 711 and the defrosted water contained in the second storage space 712 may communicate with each other through the communication space 713 and may have the same water level.

[0063] The communication space 713 may be defined between the long side of the outer wall 75 and the short side of the inner wall 76 of the fan assembly accommodation space 73. The communication space 713 may be provided at a first end in the longitudinal direction of the fan assembly accommodation space 73. The communication spaces 713 may also be provided respectively at both ends in the longitudinal direction of the fan assembly accommodation space 73.

[0064] The fan assembly accommodation space 73 may not accommodate defrosted water therein. Thus, in the location of the fan assembly accommodation space 73, a portion or all of the bottom panel 77 may be removed. When a portion or all of the bottom panel 77 is removed in this manner, the water *w* may drain immediately therefrom even when the defrosted water *w* penetrates into the fan assembly accommodation space 73. Thus, a risk that water will penetrate into the motor 42 of the fan assembly 3 as disposed in the fan assembly accommodation space 73 may be reduced.

[Fan assembly - variant embodiment]

[0065] Hereinafter, a fan assembly 3 provided within the fan assembly accommodation space 73 of the drip

tray 7 according to a variant embodiment is illustrated. In the following modified fan assembly, the detailed descriptions of overlapping components between the variant embodiment and the first embodiment will be omitted as these components can be easily combined with each other.

[0066] Referring to FIG. 10, at both opposite or inner and outer lower positions of the fan assembly 3, inner and outer cutouts 34 defined by partially cutting the frame 30 may be formed respectively. The inner and outer cutouts 34 may be formed by cutting portions of the outer frame 31 and portions of the blocking plate 33. Each of the inner and outer cut-outs 34 may have a shape approximately corresponding to a cross-section shape of the communication space 713 of the drip tray 7. It may be possible to realize a compact machine compartment by reducing both the height h and the depth d of the machine compartment.

[0067] The embodiments are designed to solve the above problem. A purpose of the embodiments is to provide a drip tray and fan assembly having a structure capable of reducing a volume of a machine compartment of a refrigerator without reducing the size of the fan assembly 9, and to provide a refrigerator including a machine compartment containing a drip tray and fan assembly. Another purpose of the embodiments is to provide a drip tray and fan assembly which may be easily placed inside a compact machine compartment, and to provide a refrigerator including the machine compartment containing a drip tray and fan assembly.

[0068] In the following preferred features of the disclosure will be provided, which could be combined selectively for a solution of the above mentioned object without the necessity to implement all of them.

[0069] A drip tray 7 may include a defrosted water storage space 71 defined by a bottom member 77 and an outer wall 75 extending upwardly from the bottom member 77. The drip tray 7 may have a fan assembly accommodation space 73 defined therein in which a fan assembly 3 is disposed. At least a portion of the fan assembly accommodation space 73 may be defined by an inner wall 76 extending upwardly from the bottom panel 77. The fan assembly accommodation space 73 may be blocked via the inner wall 76 from the defrosted water storage space 71 such that defrosted water is absent in the fan assembly accommodation space 73.

[0070] The fan assembly accommodation space 73 may extend in an elongate manner to be perpendicular to a longitudinal direction of an elongate drip tray 7. The fan assembly accommodation space 73 may divide the defrosted water storage space 71 into a first storage space 711 and a second storage space 712. A communication space 713 for communicating the first storage space 711 and the second storage space with each other may be defined between the fan assembly accommodation space and the outer wall.

[0071] The communication space may be disposed adjacent to at least one of both opposite longitudinal ends

of the fan assembly accommodation space. The fan assembly accommodation space may communicate with an opening defined in a portion of the outer wall. The outer wall 75 and the inner wall 76 may be connected to each other to define a first closed loop, wherein the defrosted water storage space may be defined in the first closed loop.

[0072] The outer wall 75 may define a second closed loop. The inner wall 76 may define a third closed loop disposed within the second closed loop. The defrosted water storage space may be defined between the second closed loop and the third closed loop. The inner wall 76 may include a first retainer 79. The first retainer 79 may be fastened to the fan assembly 3 to retain the fan assembly 3 in the fan assembly accommodation space 73. The bottom member 77 may be at least partially or entirely removed in the fan assembly accommodation space 73.

[0073] A machine compartment for a refrigerator may include a drip tray 7, a fan assembly 3 received in a fan assembly accommodation space 73, and a machine compartment 10 for receiving therein the fan assembly and drip tray 7.

[0074] The frame 30 may include: an outer frame 31 defining an outer face of the fan assembly; an inner frame 32 provided inside the outer frame and defining an inner face of the fan assembly; a blocking plate 33 for blocking a space interposed between the outer frame 31 and the inner frame 32 and for connecting the outer frame and the inner frame; and a fan 41 rotatably received inside the inner frame 32. The frame 30 may have a cutout 34, wherein the cut-out 34 may be a portion of the frame which is overlapped with the defrosted water storage space 71 beyond the inner wall when the fan assembly 3 is disposed in the fan assembly accommodation space 73.

[0075] The cut-out 34 may include a cut-out of a part of the outer frame 31 and a cut-out of a part of the blocking plate 33. The outer frame may have a substantially square shape, and the inner frame may have a substantially circular shape. The cut-out 34 may include at least a cut-out in a bottom corner of the outer frame. The cut-out 34 may have a second retainer 35 engaged with a first retainer 79 provided on the inner wall 76.

[0076] The first retainer 79 may include a cantilevered extension extending in a horizontal direction and a hook provided at a distal end of the extension. The second retainer 35 may include a stopper hooked onto the hook.

[0077] An inner end of the outer frame 31 of the fan assembly 3 may be disposed on the outer wall 75 of the drip tray 7 located inside the machine compartment.

[0078] An outer end of the outer frame 31 of the fan assembly 3 may be positioned more outwardly than an outer boundary 11 of the machine compartment 10. A bottom of the outer frame 31 of the fan assembly 3 may contact the bottom member in the fan assembly accommodation space 73.

[0079] The machine compartment may further com-

prise a heat-exchanger 50 provided on an air discharge side from the fan assembly 3. The heat exchanger 50 may be disposed above the defrosted water storage space 71. The machine compartment may further comprise a compressor 20 provided on an air suction side from the fan assembly 3. The compressor 20 may be received in the machine compartment 10 from outside of the defrosted water storage space 71.

[0080] An assembly set may include a drip tray 7 and a fan assembly 3, wherein the assembly set is disposed in a machine compartment 10 for a refrigerator. The fan assembly 3 may include: a fan 41 for generating fan air flow by rotation thereof; and a frame 30 for supporting the fan 41. The drip tray 7 may include a fan assembly accommodation space 73 for receiving the fan assembly 3 therein; and an opening 78 laterally and outwardly open to communicate with the fan assembly accommodation space 73. The fan assembly 3 may be inserted into or withdrawn out of the fan assembly accommodation space 73 through the opening 48.

[0081] The fan assembly 3 may include a second retainer 35 engaged with the drip tray 7. The drip tray 7 may include a first retainer 79 engaged with the second retainer 35. One of the first retainer 79 and the second retainer 35 may include a cantilevered extension extending in a horizontal direction and a hook provided at a distal end of the extension. The other of the first retainer 79 and the second retainer 35 may include a stopper hooked onto the hook.

[0082] The drip tray 7 may include an inner wall surrounding the fan assembly accommodation space. The inner wall may guide insertion of the frame of the fan assembly laterally into the fan assembly accommodation space. The inner wall may support the fan assembly when the fan assembly is received in the space.

[0083] A width of the extension may be greater than a width of the stopper, such that the hook may be separated from the stopper as the extension is deformed by pressing a portion of the extension exposed through an open face of the stopper. The drip tray may include a bottom member 77, and an outer wall 75 extending upwardly from the bottom member 77. The opening 78 may be at the outer wall 75.

[0084] The drip tray may include an inner wall 76 connected to the outer wall 75 at the opening and extending upwardly from the bottom member 77. The inner wall 76 may be formed substantially in a "⊃" shape, wherein a portion of the shape opposite to the opening 78 is closed. The connection of the outer wall 75 and the inner wall 76 may define a closed loop. The bottom member 77, the outer wall 75 and the inner wall 76 may define the defrosted water storage space 71.

[0085] A space surrounded by the inner wall 76 and the opening 78 may define the fan assembly accommodation space 73. The bottom member 77 may be at least partially or entirely removed in the fan assembly accommodation space 73.

[0086] The fan assembly accommodation space 73

may divide the defrosted water storage space 71 into a first storage space 711 and a second storage space 712. A communication space 713 for communicating the first storage space 711 and the second storage space 712 with each other may be defined between the fan assembly accommodation space 73 and the outer wall 75, wherein the communication space 713 is disposed opposite to the opening 78.

[0087] The second storage space 712 may occupy a wider area than the first storage space 711. A heat-exchanger 50 may be disposed above the second storage space 712. The frame 30 may include: an outer frame 31 defining an outer face of the fan assembly; an inner frame 32 provided inside the outer frame and defining an inner face of the fan assembly; and a blocking plate 33 for blocking a space interposed between the outer frame 31 and the inner frame 32 and for connecting the outer frame and the inner frame.

[0088] The frame may have a cut-out 34, wherein the cut-out 34 is defined beyond the fan assembly accommodation space 73 when the fan assembly 3 is disposed in the fan assembly accommodation space 73. The cut-out 34 may be a cut out portion of the frame overlapped with the communication space 713 of the defrosted water storage space 71. The frame 30 may have a substantially square shape, while the cut-out 34 may include a cut-out defined in a lower corner of the frame 30.

[0089] A machine compartment for a refrigerator may include: an assembly set including a drip tray 7 and a fan assembly 3, and a machine compartment 10 for receiving therein the assembly set. A fixing support 36 may extend upwardly from a top of the frame 30. The fixing support 36 may be fixed to the machine compartment 10 while being disposed outside the machine compartment 10. A refrigerator may have the machine compartment for the refrigerator as defined above.

[0090] A drip tray 7 may include a bottom panel 77 and a plurality of first and second walls 75, 76 that extend upward from the bottom panel 77. Each of the plurality of first and second walls 75, 76 may have an inner surface and an outer surface. The bottom panel 77, the inner surfaces of the plurality of first walls 75, and the outer surfaces of the plurality of second walls 76 may define a water storage space 71 to receive water which has defrosted in the refrigerator. The inner surfaces of the plurality of second walls 76 may define a fan assembly mounting space 73 in which at least a portion of a fan assembly 3 is mounted. The drip tray 7 is configured to be placed in a machine compartment 10 of the refrigerator.

[0091] A length of the drip tray 7 in a first direction may be longer than a width of the drip tray 7 in a second direction perpendicular to the first direction. A length of the fan assembly mounting space 73 in the second direction may be longer than a width of the fan assembly mounting space 73 in the first direction. The fan assembly mounting space 73 may divide, in the second direction, the water storage space into a first storage space 711 and a second

storage space 712. A communication space 713 that allows the first storage space 711 and the second storage space 712 to communicate with each other may be defined between the fan assembly mounting space 73 and one of the plurality of first walls 75 in the second direction.

[0092] The communication space 713 may be adjacent to at least one end of the fan assembly mounting space 73 in the second direction.

[0093] The fan assembly mounting space 73 may include an opening 78 defined by at least one of the plurality of first walls 75. The plurality of first and second walls 75, 76 may be connected to each other to define a closed loop. The water storage space 71 may be defined within the closed loop.

[0094] The plurality of first walls 75 may define a first closed loop. The plurality of second walls 76 may define a second closed loop located within the first closed loop. The water storage space 71 may be defined between the first closed loop and the second closed loop.

[0095] A first hook 79 may protrude from one of the plurality of second walls 76, and the first hook 79 may be configured to be fastened to the fan assembly 3 to hold the fan assembly 3 in the fan assembly mounting space 73.

[0096] A thickness of the bottom panel 77 for the water storage space 71 may be greater than a thickness of the bottom panel for the fan assembly mounting space 73. The bottom panel 77 may be provided only at the water storage space 71.

[0097] An assembly set may include a drip tray 7 and a fan assembly 3. The assembly set may be provided in a machine compartment 10 of a refrigerator. The fan assembly 3 may include a fan 41 configured to generate air flow by rotation thereof and a frame 30 configured to support the fan 41. The drip tray 7 may include a bottom panel 77, a plurality of first and second walls 75, 76 that extend upward from the bottom panel 77, each of the plurality of first and second walls 75, 76 having an inner surface and an outer surface, a water storage space 71 defined by the bottom panel 77, the inner surfaces of the plurality of first walls 75, and the outer surfaces of the plurality of second walls 76, and a fan assembly mounting space 73 defined by the inner surfaces of the plurality of second walls 76 and configured to at least partially receive the fan assembly 3 therein.

[0098] The fan assembly mounting space 73 may be blocked from the defrosted water storage space 71 via the plurality of second walls 76 such that defrosted water does not flow into the fan assembly mounting space 73.

[0099] The fan assembly mounting space 73 may include an opening 78 defined by at least one of the plurality of first walls 75. The fan assembly 3 may be configured to be at least partially inserted into or withdrawn out of the fan assembly mounting space 73 through the opening 78.

[0100] The drip tray 7 may include a first retainer 79 and the fan assembly 3 may include a second retainer 35 configured to engage with the first retainer 79.

[0101] One of the first retainer 79 and the second retainer 35 may include a cantilevered extension tab that extends in a horizontal direction and a hook provided at a distal end of the extension tab and the other of the first retainer 79 and the second retainer 35 may include a notch configured to be hooked onto the hook.

[0102] Preferably, a width of the extension tab is greater than a width of the notch, such that a portion of the extension tab is exposed adjacent to the notch and is configured to be pressed in order to be separated from the notch.

[0103] The plurality of second walls 76 may be configured to guide insertion of the frame 30 of the fan assembly 3 into the fan assembly mounting space 73, and the plurality of second walls 76 may support the fan assembly 3 when the fan assembly 3 is received in the fan assembly mounting space 73.

[0104] A drip tray 7 and a fan assembly 3 may be assembled with each other in the machine compartment 10. The fan assembly 3 may include a fan 41 configured to generate air flow by rotation thereof and a frame 30 that supports the fan 41.

[0105] The drip tray 7 may include a bottom panel 77, a plurality of first and second walls 75, 76 that extends upward from the bottom panel 77, each of the plurality of first and second walls 75, 76 having inner and outer surfaces, a water storage space 71 defined by the bottom panel 77, the inner surfaces of the plurality of first walls 75, and the outer surfaces of the plurality of second walls 76 and a fan assembly mounting space 73 defined by the inner surfaces of the plurality of second walls 76 and configured to receive the fan assembly 3 therein.

[0106] The frame may include an outer frame 31 that defines an outer face of the fan assembly 3, an inner frame 32 provided inside the outer frame 31 that defines an inner face of the fan assembly 3 and a blocking plate 33 that connects the outer frame 31 and the inner frame 32.

[0107] The fan 41 may be rotatably received inside the inner frame 32. The frame 30 may include a cut-out 34 which overlaps a portion of the water storage space 73 and the plurality of second walls 76 when the fan assembly 3 is arranged in the fan assembly mounting space 73. The cut-out 34 may include a cut-out of the outer frame 31 and a cut-out of the blocking plate 33.

[0108] The outer frame 31 may have a substantially square shape, the inner frame 32 may have a substantially circular shape, and the cut-out 34 may include at least a cut-out in a bottom corner of the outer frame 31.

[0109] A bottom of the outer frame 31 of the fan assembly 3 may contact the bottom panel 77 in the fan assembly mounting space 73.

[0110] The machine compartment may further include a heat-exchanger 50 provided on an air discharge side of the fan assembly 3. The heat exchanger 50 may be provided in the water storage space 71.

[0111] A volume of the machine compartment may be reduced without reducing the size of the fan assembly.

As a result, cooling of the compressor and heat exchange efficiency of the heat exchanger (condenser) may be enhanced, and, further, a storage space for the refrigerator may be further secured.

[0112] The object is solved by a refrigerator having a machine compartment including a drip tray and a fan assembly as described above.

[0113] Further, although the machine compartment is compact and thus a space for assembly of components is reduced, the drip tray and fan assembly may be conveniently assembled in the machine compartment. The specific effects of the embodiments as well as effects as described above will be described with reference to specific examples for carrying out the embodiments.

[0114] The detailed advantageous effects according to the present disclosure as well as the aforementioned effect have described above with regard to the embodiments of the present disclosure. The present disclosure described above may be variously substituted, altered, and modified by those skilled in the art to which the present disclosure pertains without departing from the scope and spirit of the present disclosure. Therefore, the present disclosure is not limited to the above-mentioned exemplary embodiments and the accompanying drawings.

[0115] It will be understood that when an element or layer is referred to as being "on" another element or layer, the element or layer can be directly on another element or layer or intervening elements or layers. In contrast, when an element is referred to as being "directly on" another element or layer, there are no intervening elements or layers present. As used herein, the term "and/or" includes any and all combinations of one or more of the associated listed items.

[0116] It will be understood that, although the terms first, second, third, etc., may be used herein to describe various elements, components, regions, layers and/or sections, these elements, components, regions, layers and/or sections should not be limited by these terms. These terms are only used to distinguish one element, component, region, layer or section from another region, layer or section. Thus, a first element, component, region, layer or section could be termed a second element, component, region, layer or section without departing from the teachings of the present invention.

[0117] Spatially relative terms, such as "lower", "upper" and the like, may be used herein for ease of description to describe the relationship of one element or feature to another element(s) or feature(s) as illustrated in the figures. It will be understood that the spatially relative terms are intended to encompass different orientations of the device in use or operation, in addition to the orientation depicted in the figures. For example, if the device in the figures is turned over, elements described as "lower" relative to other elements or features would then be oriented "upper" relative the other elements or features. Thus, the exemplary term "lower" can encompass both an orientation of above and below. The device may be otherwise

oriented (rotated 90 degrees or at other orientations) and the spatially relative descriptors used herein interpreted accordingly.

[0118] The terminology used herein is for the purpose of describing particular embodiments only and is not intended to be limiting of the invention. As used herein, the singular forms "a", "an" and "the" are intended to include the plural forms as well, unless the context clearly indicates otherwise. It will be further understood that the terms "comprises" and/or "comprising," when used in this specification, specify the presence of stated features, integers, steps, operations, elements, and/or components, but do not preclude the presence or addition of one or more other features, integers, steps, operations, elements, components, and/or groups thereof.

[0119] Embodiments of the disclosure are described herein with reference to cross-section illustrations that are schematic illustrations of idealized embodiments (and intermediate structures) of the disclosure. As such, variations from the shapes of the illustrations as a result, for example, of manufacturing techniques and/or tolerances, are to be expected. Thus, embodiments of the disclosure should not be construed as limited to the particular shapes of regions illustrated herein but are to include deviations in shapes that result, for example, from manufacturing.

[0120] Unless otherwise defined, all terms (including technical and scientific terms) used herein have the same meaning as commonly understood by one of ordinary skill in the art to which this invention belongs. It will be further understood that terms, such as those defined in commonly used dictionaries, should be interpreted as having a meaning that is consistent with their meaning in the context of the relevant art and will not be interpreted in an idealized or overly formal sense unless expressly so defined herein.

[0121] Any reference in this specification to "one embodiment," "an embodiment," "example embodiment," etc., means that a particular feature, structure, or characteristic described in connection with the embodiment is included in at least one embodiment of the invention. The appearances of such phrases in various places in the specification are not necessarily all referring to the same embodiment. Further, when a particular feature, structure, or characteristic is described in connection with any embodiment, it is submitted that it is within the purview of one skilled in the art to effect such feature, structure, or characteristic in connection with other ones of the embodiments.

[0122] Although embodiments have been described with reference to a number of illustrative embodiments thereof, it should be understood that numerous other modifications and embodiments can be devised by those skilled in the art that will fall within the scope of the principles of this disclosure. More particularly, various variations and modifications are possible in the component parts and/or arrangements of the subject combination arrangement within the scope of the disclosure, the draw-

ings and the appended claims. In addition to variations and modifications in the component parts and/or arrangements, alternative uses will also be apparent to those skilled in the art.

Claims

1. An assembly set including a drip tray (7) and a fan assembly (3), wherein the assembly set is configured to be provided in a machine compartment (10) of a refrigerator, wherein the fan assembly (3) includes:

a fan (41) configured to generate air flow by rotation thereof; and
a frame (30) configured to support the fan (41);

wherein the drip tray (7) includes:

a fan assembly mounting space (73) in which at least a portion of the fan assembly (3) is mounted; and
an opening (78) laterally and outwardly open to communicate with the fan assembly mounting space (73);

wherein the fan assembly (3) is configured to be at least partially inserted into or withdrawn out of the fan assembly mounting space (73) through the opening (78).

2. The assembly set of claim 1, wherein the drip tray (7) includes a first retainer (79) and the fan assembly (3) includes a second retainer (35) configured to engage with the first retainer (79).
3. The assembly set of claim 2, wherein one of the first retainer (79) and the second retainer (35) includes a cantilevered extension tab that extends in a horizontal direction and a hook provided at a distal end of the extension tab, and wherein the other of the first retainer (79) and the second retainer (35) includes a notch configured to be hooked onto the hook.
4. The assembly set of any one of the claims 1, 2 or 3, wherein the drip tray (7) includes an inner wall (76) surrounding the fan assembly mounting space (73), wherein the inner wall (76) guides insertion of the frame of the fan assembly (3) laterally into the fan assembly mounting space (73) and supports the fan assembly (3) when the fan assembly (3) is received in the fan assembly mounting space (73).
5. The assembly set of any one of claim 3 or 4, wherein a width of the extension tab is greater than a width of the notch, such that a portion of the extension tab

is exposed adjacent to the notch and is configured to be pressed in order to be separated from the notch.

6. The assembly set of any one of preceding claims, wherein the drip tray (7) includes:

a bottom panel (77); and
an outer wall (75) extending upwardly from an edge of the bottom panel (77);

wherein the opening (78) is defined in the outer wall (75).

7. The assembly set of claim 6, wherein the inner wall (76) is connected to the outer wall (75) at the opening (78) and extends upward from the bottom panel (77), wherein the inner wall (76) extends inward from the opening (78) and has a substantially U-shape, wherein the outer wall (75) and the inner wall (76) are connected to each other to define a closed loop, and wherein a space defined by the bottom panel (77) and the closed loop formed by the outer wall (75) and the inner wall (76) defines a defrosted water storage space (71).
8. The assembly set of any one of the claims 4-7, wherein the fan assembly mounting space (73) is defined as a space surrounded by the inner wall (76) and the opening (78).
9. The assembly set of claim 7 or 8, wherein the bottom panel (77) is provided at the water storage space (71) and/or the bottom panel (77) is only partially provided or fully not provided at the fan assembly mounting space (73).
10. The assembly set of any one of claims 7 to 9, wherein the fan assembly mounting space (73) divides the water storage space (71) into a first storage space (711) and a second storage space (712), wherein at least one communication space (713) is provided that allows the first storage space (711) and the second storage space (712) to communicate with each other, the communication space (713) is defined between the fan assembly mounting space (73) and the outer wall (75), wherein at least one communication space (713) is disposed opposite to the opening (78).
11. The assembly set of claim 10, wherein an area of the second storage space (712) is larger than that of the first storage space (711), and a heat-exchanger (50) is disposed at the second storage space (712).
12. The assembly set of any one of preceding claims, wherein the frame (30) includes:

an outer frame (31) that defines an outer face of the fan assembly (3);
an inner frame (32) provided inside the outer frame (31) that defines an inner face of the fan assembly (3); and
a blocking plate (33) that connects the outer frame (31) and the inner frame (32).

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13. The assembly set of any one of preceding claims, wherein the frame (30) includes at least one cut-out (34), and wherein the at least one cut-out (34) overlaps a portion of the water storage space (73) and the inner wall (76) when the fan assembly (3) is arranged in the fan assembly mounting space (73).

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14. The assembly set of claim 13, wherein the cut-out (34) includes at least a cut-out in a bottom corner of frame (30).

15. A machine compartment (10) of a refrigerator provided with the assembly set of any one of preceding claims, wherein a fixing support (36) extends upward from a top of the frame (30), and the fixing support (36) is fixed to the machine compartment (10) while being disposed outside the machine compartment (10).

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FIG. 1

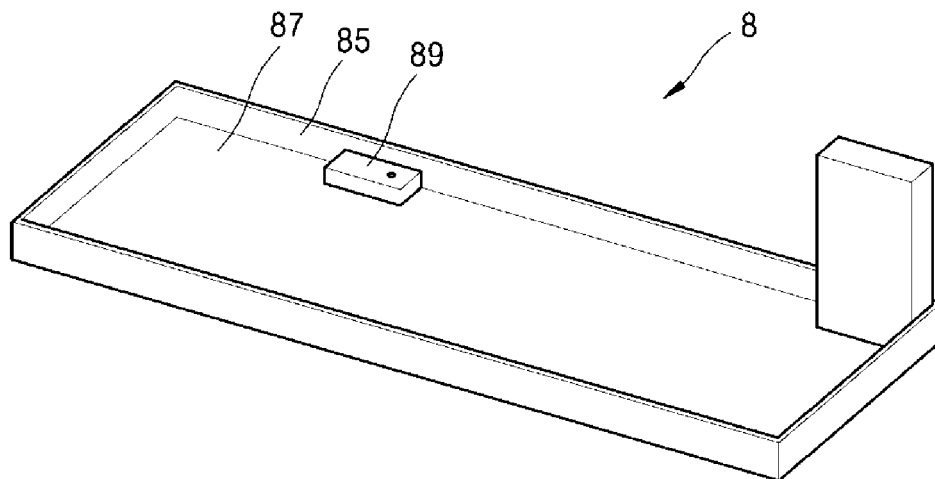


FIG. 2

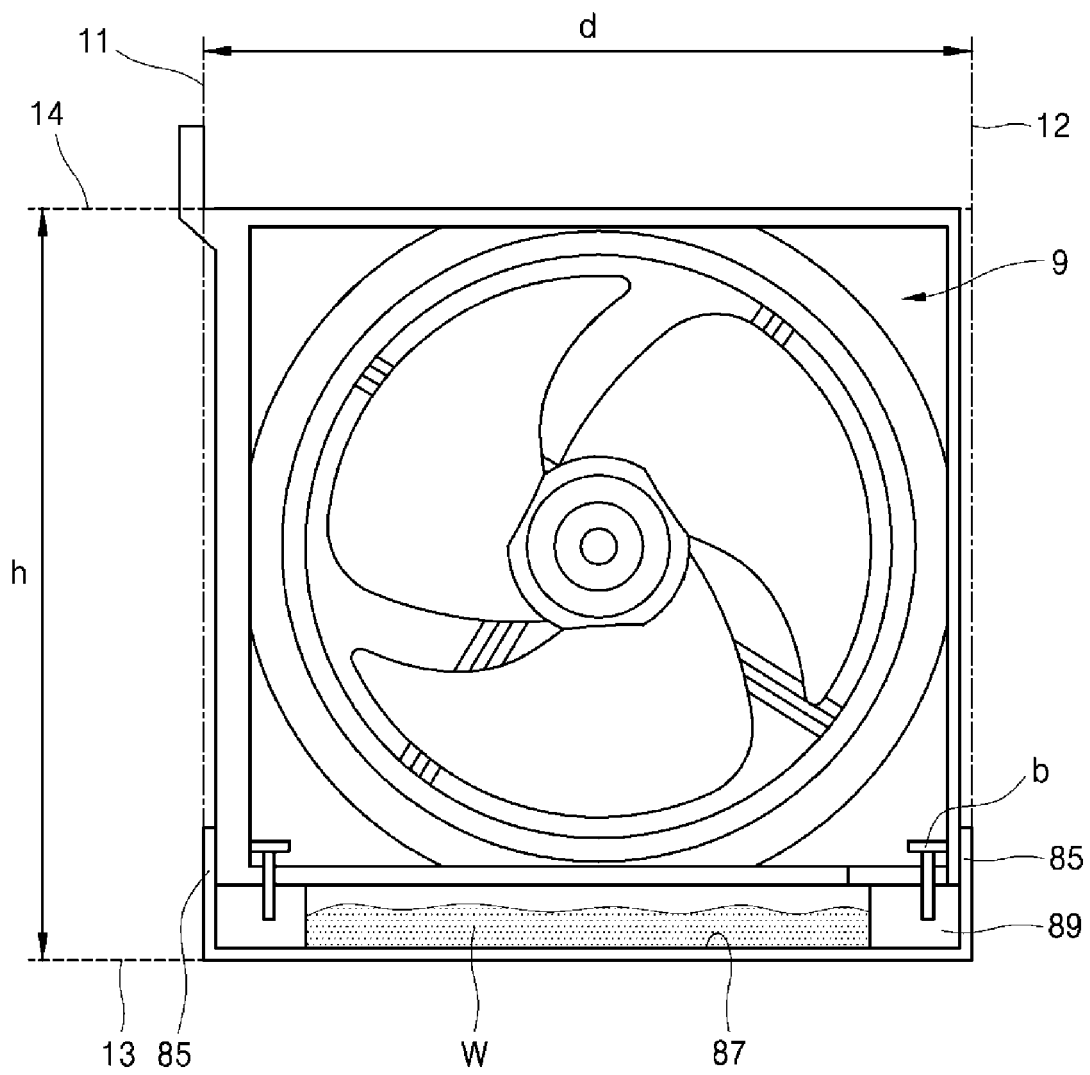


FIG. 3

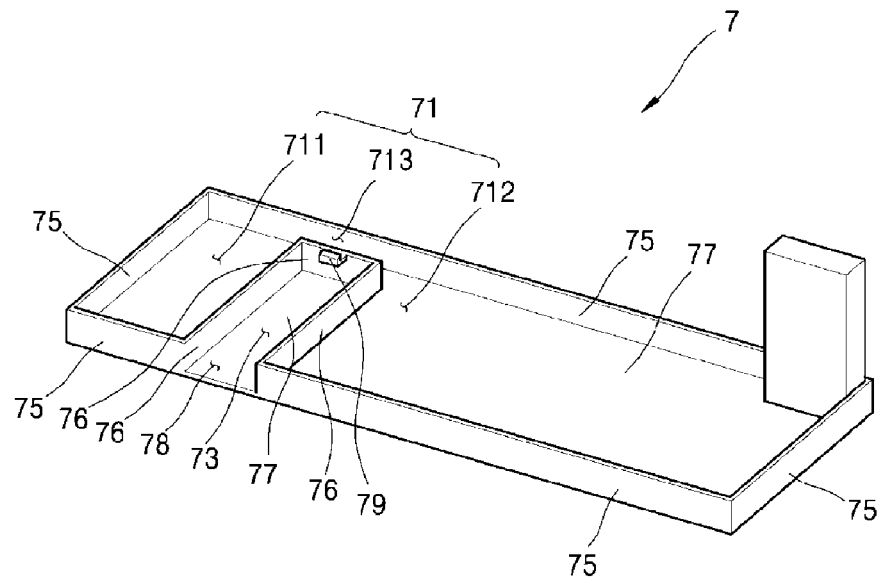


FIG. 4

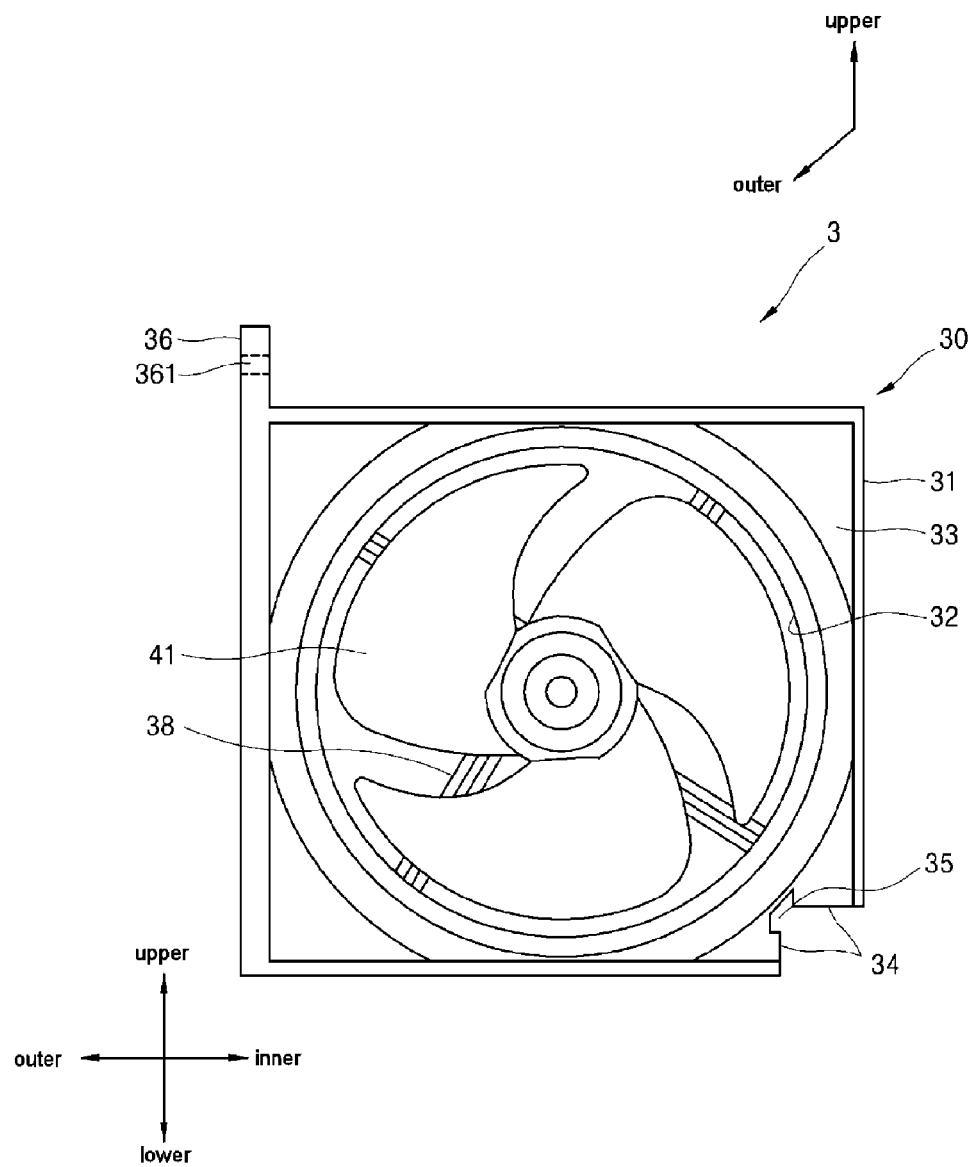


FIG. 5

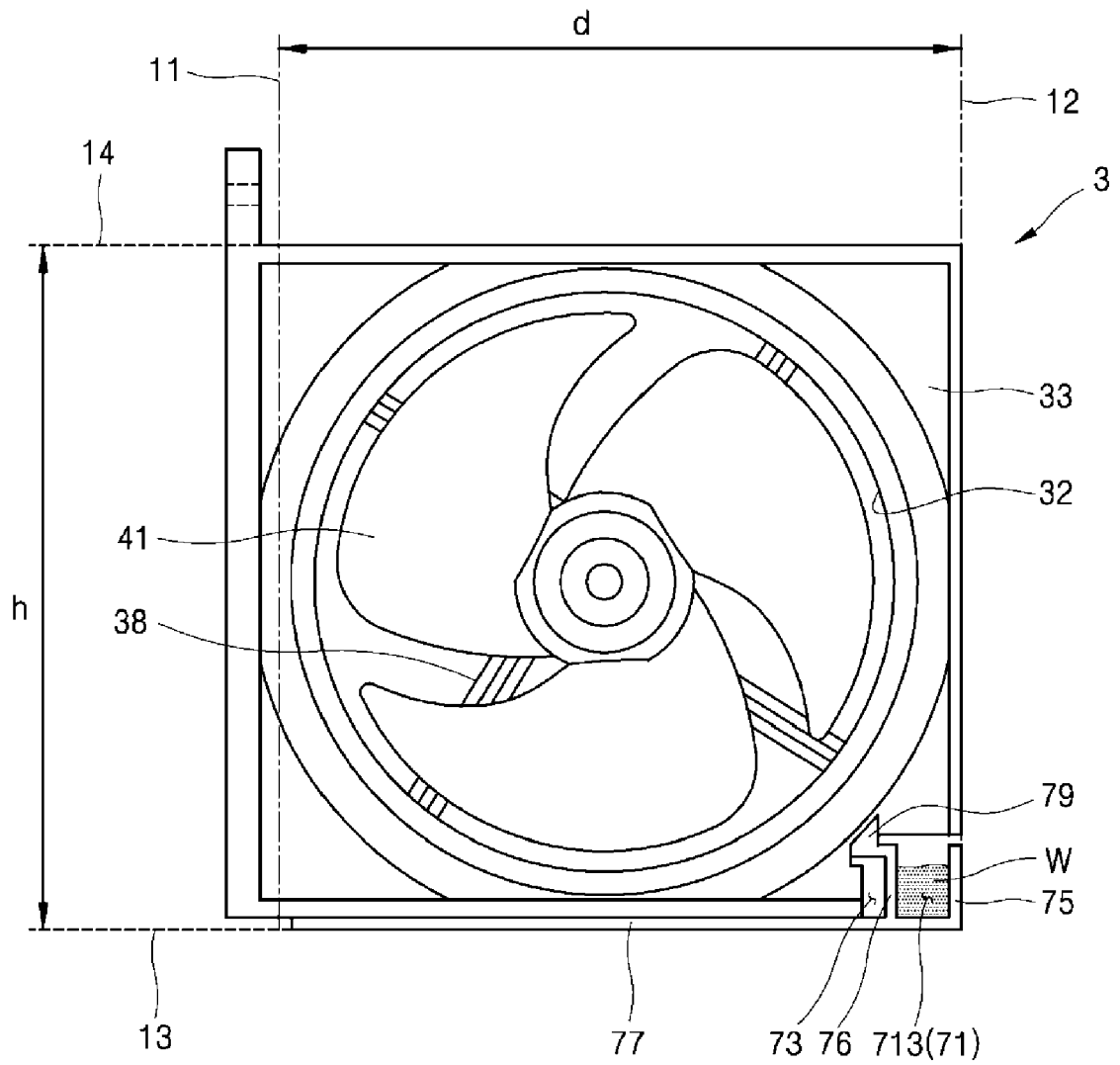


FIG. 6

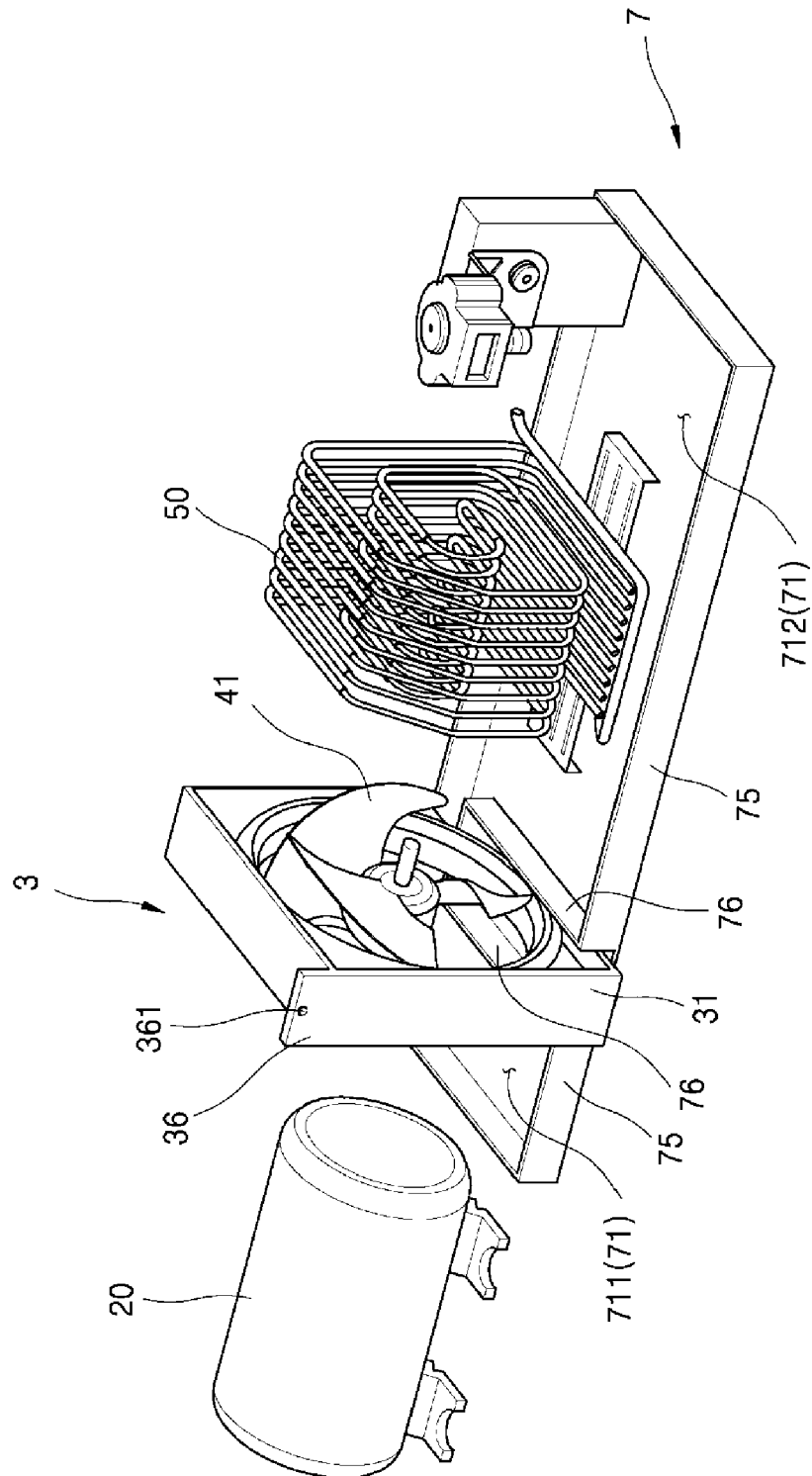


FIG. 7

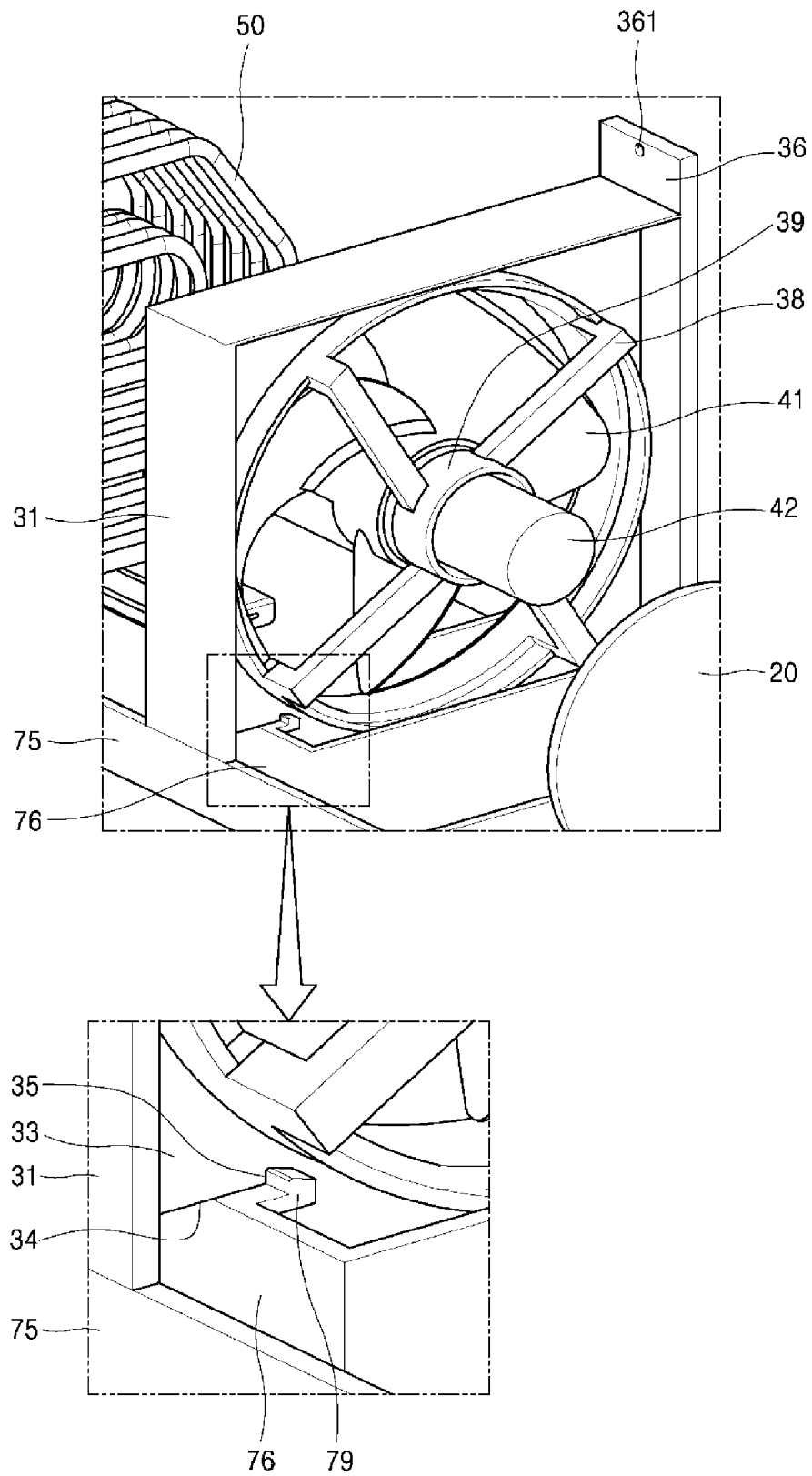


FIG. 8

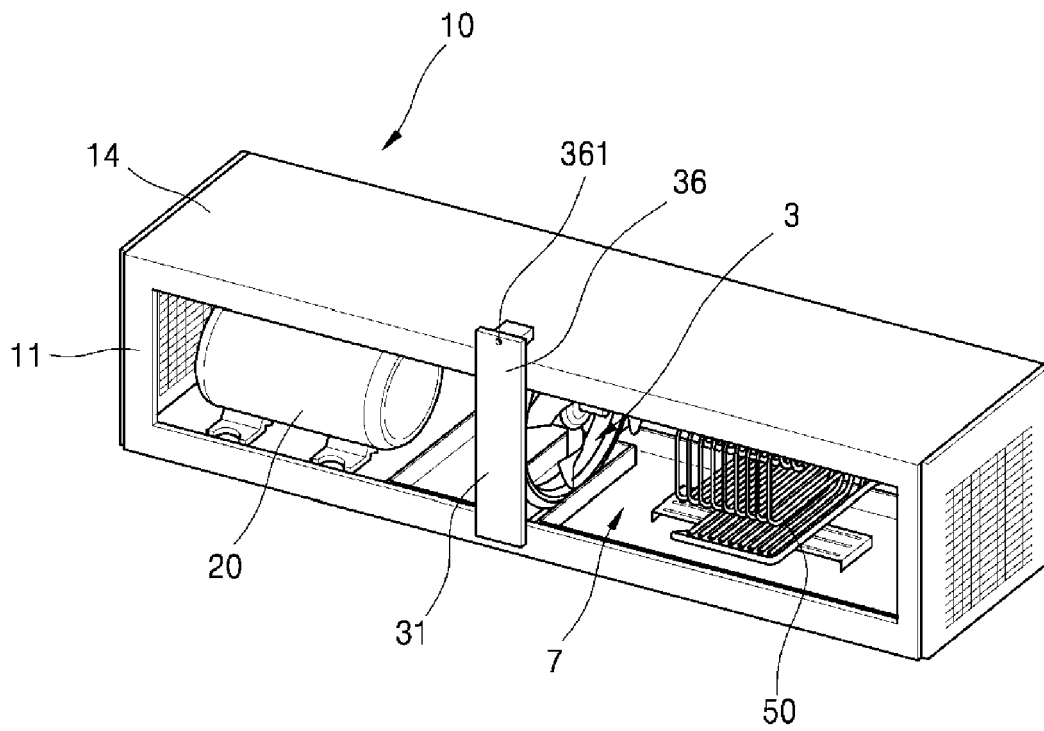


FIG. 9

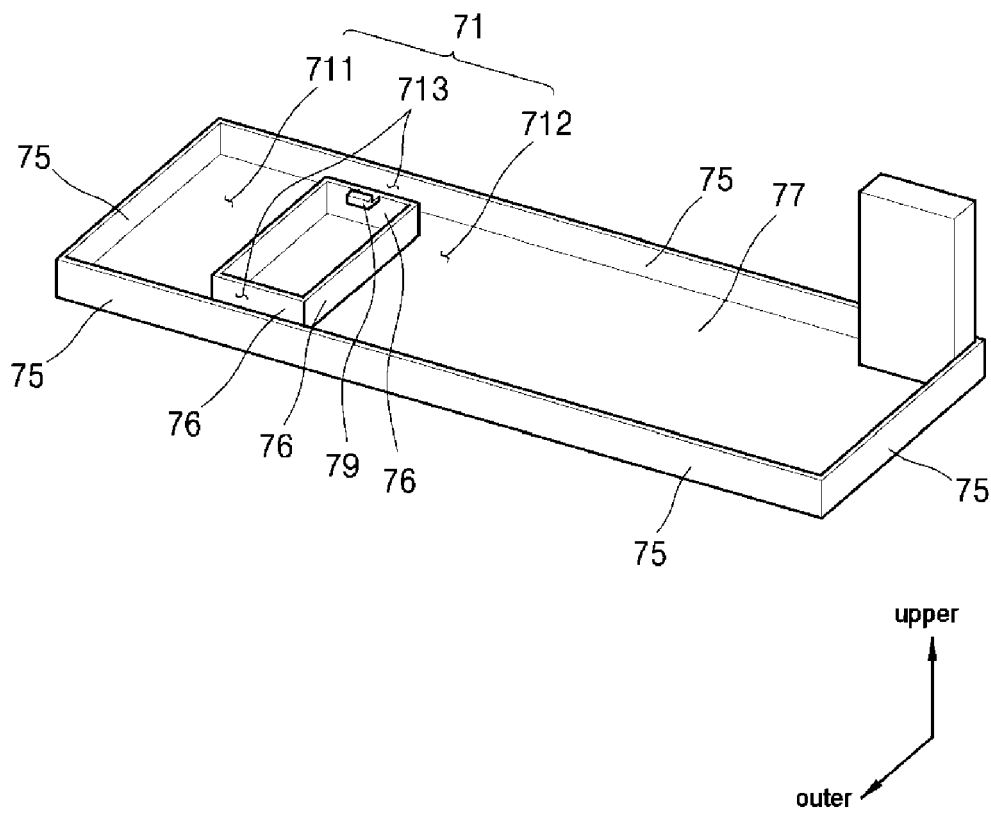


FIG. 10

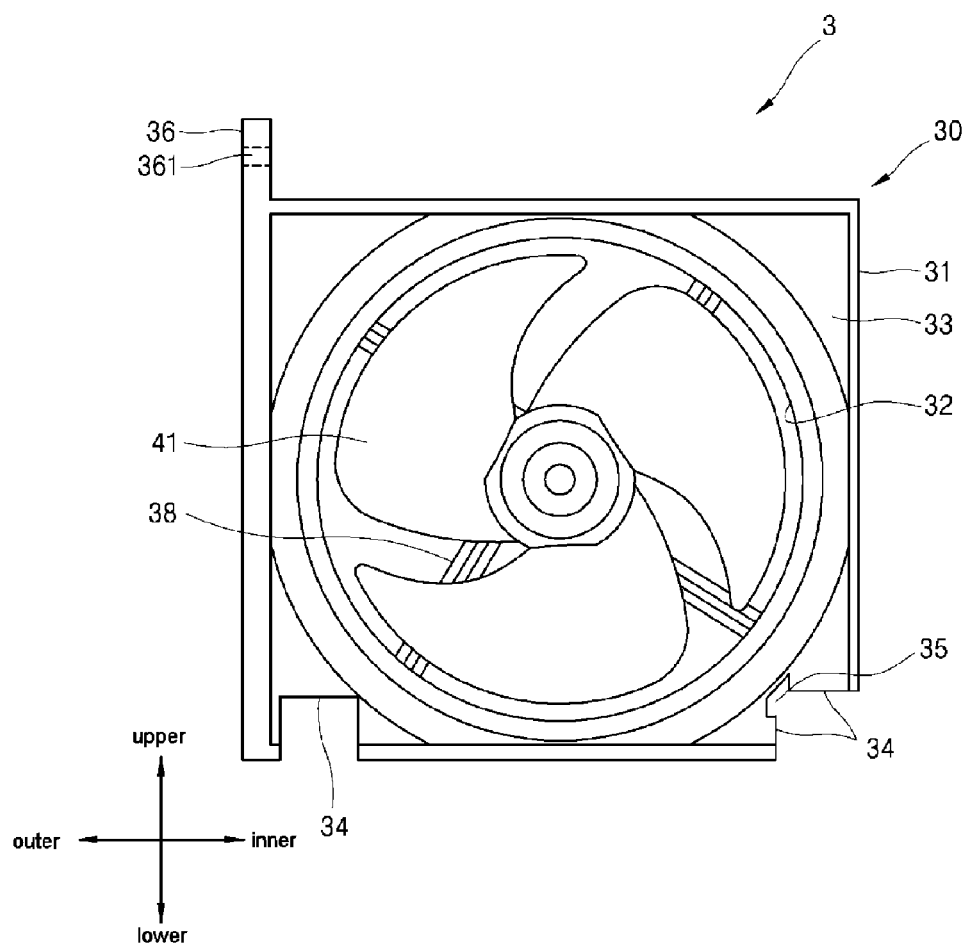
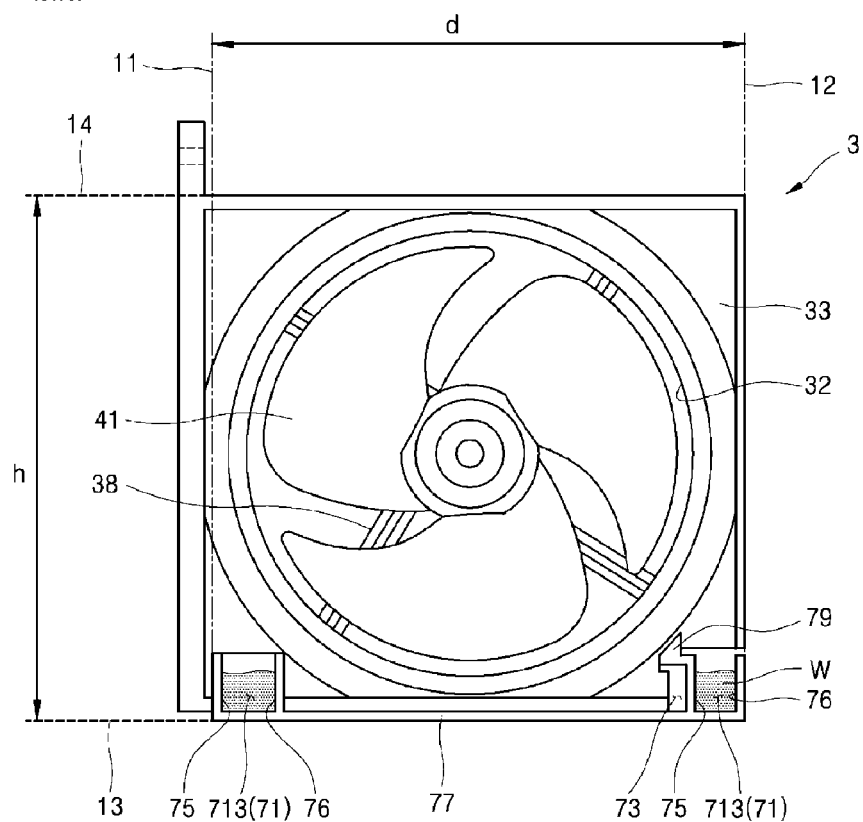


FIG. 11





EUROPEAN SEARCH REPORT

Application Number
EP 18 20 1980

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	CN 201 262 505 Y (HISENSE KELON ELEC HOLDINGS CO [CN]) 24 June 2009 (2009-06-24) * figures *	1,2, 6-10,12	INV. F25D21/14 F25D23/00
X	JP 4 555142 B2 (HOSHIZAKI ELECTRIC CO LTD) 29 September 2010 (2010-09-29) * figures 9-11 *	1,2,4, 8-12	
X	KR 101 564 099 B1 (LG ELECTRONICS INC [KR]) 29 October 2015 (2015-10-29) * figures 2,3 *	1,2,6, 12-14 3,5	
X	JP 2001 133129 A (HOSHIZAKI ELECTRIC CO LTD) 18 May 2001 (2001-05-18) * figure 1 *	1,2,4,6, 8,9,13	
X	US 4 490 990 A (CHASTINE GARY L [US] ET AL) 1 January 1985 (1985-01-01) * figures 3,4 *	1,2,6, 12,15	
Y	WO 2007/012157 A1 (SPRINGER CARRIER LTDA [BR]; MORAES LUCIANO DA LUZ [BR]) 1 February 2007 (2007-02-01) * figure 7 *	3,5	TECHNICAL FIELDS SEARCHED (IPC) F25D
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 6 March 2019	Examiner Canköy, Necdet
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

EPO FORM 1503 03/82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 18 20 1980

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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06-03-2019

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
CN 201262505 Y	24-06-2009	NONE	
JP 4555142 B2	29-09-2010	JP 4555142 B2	29-09-2010
		JP 2006308140 A	09-11-2006
KR 101564099 B1	29-10-2015	NONE	
JP 2001133129 A	18-05-2001	NONE	
US 4490990 A	01-01-1985	CA 1233332 A	01-03-1988
		US 4490990 A	01-01-1985
WO 2007012157 A1	01-02-2007	BR P10520442 A2	13-06-2009
		CN 101268315 A	17-09-2008
		EP 1910755 A1	16-04-2008
		KR 20080017478 A	26-02-2008
		WO 2007012157 A1	01-02-2007