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(71) Applicant: **Yazaki Energy System Corporation**
Minato-ku
Tokyo 108-0075 (JP)

(72) Inventor: **NAKAMURA, Takuju**
Hamamatsu-shi, Shizuoka 435-0015 (JP)

(74) Representative: **Grünecker Patent- und Rechtsanwälte**
PartG mbB
Leopoldstraße 4
80802 München (DE)

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(54) **BUILDING**

(57) This building comprises: a higher level (H2) having a floor part (F2); an immediately-below level (H1) located immediately below the floor part; a pillar (P) provided on the floor part; an outer wall (OW) attached to the pillar, and having one surface facing an external space and another surface facing an interior space; and an air-conditioning panel adopted in at least a part of the

outer wall, and which exhibits an air-conditioning effect in the interior space. The floor part (F2) has a gap (S) within the thickness range of the pillar between the floor part and the outer wall, and is configured to allow air circulation between the immediately-below level and the higher level through the gap.

FIG. 3

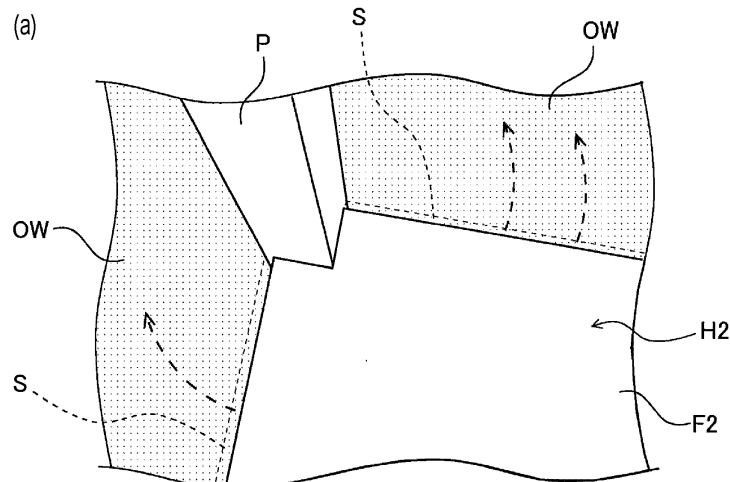
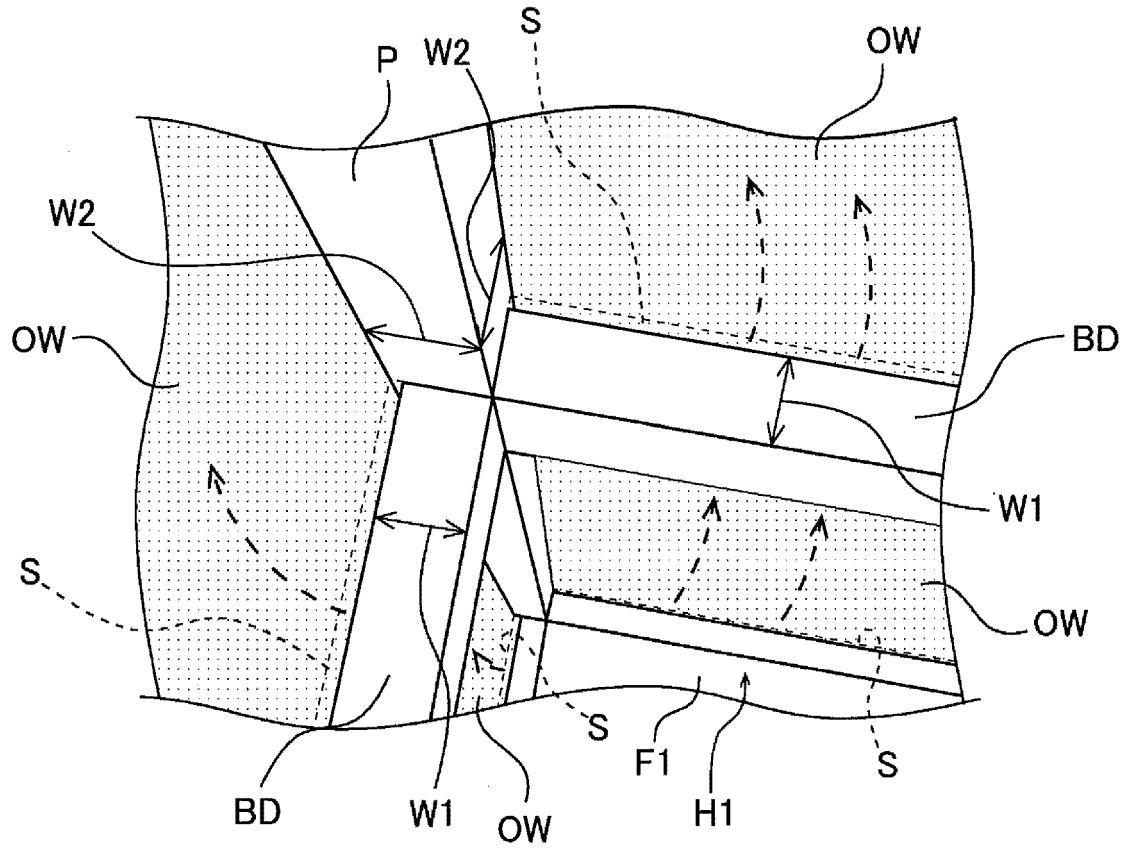


FIG. 3

(b)



Description

TECHNICAL FIELD

[0001] The present invention relates to a building.

BACKGROUND ART

[0002] In the related art, vacuum insulation panels are often used on outer walls of a building to keep the interiors of the building comfortable. Furthermore, in recent years, air conditioning panels have also been suggested, in which the panels themselves provide the air conditioning function, such as heat pipe panels that allow heat transmission from one surface to the other surface while blocking the heat transmission from the other surface to the one surface, and refrigerator panels in which an absorption or adsorption refrigerator is formed into a panel shape (for example, see Patent Literatures 1 and 2).

CITATION LIST

PATENT LITERATURE

[0003]

Patent Literature 1: JPS60-042529A

Patent Literature 2: JP2008-134043A

SUMMARY OF INVENTION

TECHNICAL PROBLEM

[0004] Here, for a building using air-conditioning panels on its outer walls, it is preferable to spread comfortable air obtained by the air-conditioning panels throughout the building. However, in a general building with a plurality of floors, each floor blocks upward and downward streams, making it difficult to spread comfortable air throughout the building. Therefore, an atrium may be provided so as to ensure upward and downward streams, but this can greatly reduce the floor area on the upper floors, which is not preferable.

[0005] The present invention has been made to solve the problems described above, and accordingly, an object is to provide a building that can ensure upward and downward streams without greatly reducing the floor area of the upper floors.

SOLUTION TO PROBLEM

[0006] A building according to the present invention includes:

an upper floor having a floor part,
a directly lower floor located directly below the floor part,
a pillar provided on the floor part,

an outer wall attached to the pillar and having one side facing an exterior space and the other side facing an interior space, and
an air-conditioning panel adopted for at least a part of the outer wall and providing an air-conditioning effect to the interior space,
in which the floor part has a gap between the floor part and the outer wall, in which the gap is within a thickness range of the pillar, and the floor part is configured to allow air circulation between the directly lower floor and the upper floor through the gap.

[0007] It is to be noted that the floor part is not limited to the one that actually functions as a floor on which people walk or sleep, but refers to a lower structure in the floor.

ADVANTAGEOUS EFFECTS OF INVENTION

[0008] According to the present invention, the building capable of ensuring upward and downward streams without reducing the floor area of an upper floor significantly can be provided.

BRIEF DESCRIPTION OF DRAWINGS

[0009]

[FIG. 1] FIG. 1 is a perspective view of an example of a building according to an embodiment of the present invention.

[FIG. 2] FIG. 2 is a perspective view of a structure when a wall part is removed from the building according to the present embodiment.

[FIG. 3] FIG. 3 shows partially enlarged views of FIG. 1, in which (a) is a partially enlarged view of a second floor, and (b) is a partially enlarged view showing a state that the floor part of the second floor is removed.

[FIG. 4] FIG. 4 shows partially enlarged views according to a modification, in which (a) is a partially enlarged view of the second floor, and (b) is a partially enlarged view showing a state that the floor part of the second floor is removed.

[FIG. 5] FIG. 5 is another partially enlarged view of the second floor.

[FIG. 6] FIG. 6 is a perspective view of a state that a roll screen shown in FIG. 5 is stretched.

DESCRIPTION OF EMBODIMENTS

[0010] Hereinafter, the present invention will be described according to preferred embodiments. The present invention is not limited to the embodiments described below, and can be appropriately modified within a scope that does not depart from the spirit of the present invention. Moreover, in the embodiments shown below, the illustrations and explanations of certain configura-

tions may be omitted, but it is apparent that publicly known or well-known techniques are appropriately applied to the details of the omitted techniques as long as no contradiction occurs with the contents described below.

[0011] FIG. 1 is a perspective view of an example of a building according to an embodiment of the present invention. A building 1 according to the example shown in FIG. 1 includes a plurality of floors and includes a wall part 10 and a roof part 20. The wall part 10 includes a window part W and an outer wall OW. A window glass or the like is attached to the window part W. The window part W may be of a slide opening/closing type, a depth opening/closing type, or a fixed type that is fixed and cannot be opened or closed. In addition, the window part W may be provided with outer wall penetrating elements such as a ventilation port, an exhaust port, a lead-in for a power line, a telephone line, and the like, and an antenna wiring.

[0012] The outer wall OW is directly or indirectly attached to a pillar (see symbol P in FIGS. 3 and 4), and one side faces the exterior space. In the present embodiment, the outer wall OW employs so-called air-conditioning panels AP. The air-conditioning panel AP provides an air-conditioning effect on the indoor side that is the other side, and includes a heat pipe panel or a refrigerator panel, for example.

[0013] The heat pipe panel is a panel that allows heat transmission from one surface side to the other surface side and prevents the heat transmission from the other surface side to the one surface side. This heat pipe panel is a panel that has a working fluid therein and allows heat transmission from one surface side to the other surface side as the working fluid evaporates on one surface side and takes heat, and the vapor generated by the evaporation reaches the other surface side and dissipates the heat of condensation from the other surface side. This heat pipe panel has an inclined structure therein and has a structure in which the working fluid condensed on the other surface side returns to the one surface side by its own weight. In addition, the heat pipe panel has a heat insulation layer having a vacuum or the like therein, prevents heat transmission from the other surface side to the one surface side, and has high heat insulation performance.

[0014] The refrigerator panel is a panel that provides a refrigerating function by absorption or adsorption, and includes, in a plate shape, a regenerator, a condenser, an evaporator, and an absorber which form an absorption refrigeration cycle, or an adsorber, a condenser, and an evaporator which form an adsorption refrigeration cycle. The refrigerator panel also includes a vacuum insulation part (heat insulation layer) and the like, and has high insulation performance.

[0015] It is desirable that the opposite surface side of the outer wall OW, that is, the indoor side is not formed with the interior decoration such as gypsum board or plywood and directly exposed to the indoor air. While it will

be described below that the air-conditioning panel AP is adopted in all of the outer wall OW except for the triangular or trapezoidal upper portion U, embodiments are not limited thereto, and the air-conditioning panel AP may be adopted only in a part of the outer wall OW except for the upper U. In addition, the air-conditioning panel AP is not limited to the heat pipe panel and the refrigerator panel, but may be any other type of panel as long as it provides an air-conditioning effect on the indoor side, such as a panel that is simply supplied with electric power and provides a cooling effect with electric power.

[0016] FIG. 2 is a perspective view of the structure when the wall part 10 is removed from the building 1 according to the present embodiment. As shown in FIG. 2, the building 1 according to the present embodiment includes four floors, that is, a first floor H1 and a second floor H2 serving as living room spaces, an underfloor floor UF, and an attic BH.

[0017] The first floor H1 is a so-called first floor. The underfloor floor UF is provided below a floor part F1 of the first floor H1. The underfloor floor UF is a floor of which a bottom surface is the foundation of the building 1. The second floor H2 is a so-called second floor. In the present embodiment, the second floor H2 includes a so-called skip floor, that is, a structure in which underfloor surfaces of a plurality of heights are provided in one floor, and includes a step ST with a gap provided between floor parts F2. The attic BH is provided above a ceiling part C of the second floor H2. The ceiling part C is indicated by a dashed line in FIG. 2 and corresponds to the floor part of the attic BH. Hereinafter, the floor part of the attic BH is also denoted by a reference sign C. The attic BH, also called a loft, is a floor surrounded by the ceiling part C of the second floor H2 and the roof part 20 shown in FIG. 1. The second floor H2 may have no ceiling part C and may be a space integrated with the attic BH.

[0018] Here, the underfloor floor UF and the attic BH basically do not have an inner wall, or if an inner wall is present, it is preferable that an opening be formed to form one space. In addition, it is preferable that the first floor H1 and the second floor H2 do not have inner walls. However, if the inner wall is present, it is preferable that a corridor be provided between the outer walls OW facing each other (see Fig. 1) such that a horizontal flow can be generated, or that an openable sliding door or the like be provided so that the spaces are communicated by the residents.

[0019] FIG. 3 is a partially enlarged view of FIG. 1, in which (a) is a partially enlarged view of the second floor H2, and (b) is a partially enlarged view showing a state that the floor part F2 of the second floor H2 is removed. As shown in FIG. 3(a), the floor part F2 of the second floor H2 has a gap S with respect to the outer wall OW, in which the gap S is within a thickness range of the pillar P (less than the pillar width). Therefore, in the building 1 according to the present embodiment, air can be circulated through the gap S between directly higher floor (that is, the second floor H2) and directly lower floor (that is,

the first floor H1) of the floor part F2.

[0020] Specifically, as shown in FIG. 3(b), a beam width W1 of a girth part BD is made narrower than a pillar width W2, and the narrowed portion defines the gap S from the outer wall OW. Accordingly, it is not necessary to add a new structure to provide the gap S, and the gap S can be formed by adjusting the size of the beam width W1 of the girth part BD and the size of the floor part F2. The girth part BD is a concept that includes not only the so-called girth that divides each floor, but also the sill provided on the foundation of the first floor H1.

[0021] In addition, as shown in FIG. 3(b), for the first floor H1, it is also preferable to narrow the beam width of the sill to form a gap S between the outer wall OW and the floor part F1. For the first floor H1, it is necessary to take appropriate measures such as providing a gap between the sill placed on the foundation and the foundation such that the air can circulate through the gap S to the underfloor floor UF, or providing a sealing member to prevent a gap from occurring between the outer wall OW and the foundation.

[0022] Furthermore, although not illustrated, it is preferable to form the gap S in the same manner in the attic BH when the ceiling part C of the second floor H2 is provided. That is, it is preferable that the gap S be provided in all of the upper floors H1, H2, and BH except for the lowest floor, that is, the underfloor floor UF, which is the lowest floor of a plurality of floors (four floors). It is to be noted that the gap S may be provided in at least one of the upper floors H1, H2, and BH.

[0023] FIG. 4 shows partially enlarged views according to a modification, in which (a) is a partially enlarged view of the second floor H2, and (b) is a partially enlarged view showing a state that the floor part F2 of the second floor H2 is removed. The gap S is not limited to being formed by narrowing the beam width W1 of the girth part BD. For example, the building 1 (see FIG. 1) has a furring strip BE attached to the outside of the pillar P, as shown in FIG. 4(a). In addition, the outer wall OW is attached to the furring strip BE, and is attached to the pillar P via the furring strip BE. Therefore, the gap S corresponding to the thickness of the furring strip BE is formed between the furring strip BE and the outer wall OW. As a result, it is not necessary to narrow the beam width W1 (see FIG. 3) of the girth part BD in order to provide the gap S, and it is possible to prevent a situation in which strength is compromised due to narrowing of the girth part BD.

[0024] In addition, as shown in FIG. 4(b), the gap S may also be formed using a furring strip BE for the first floor H1 according to a modification. In this case, as described with reference to FIG. 3(b), it is needless to say that appropriate measures such as gaps and sealing members are provided. In addition, although not shown, the gap S may also be formed using a furring strip BE for the attic BH as well. Furthermore, the gap S shown in FIG. 4 may be provided in any one of the upper floors H1, H2, and BH, although it is preferable that the gap S is provided in all of the upper floors H1, H2, and BH.

Further, as shown in FIG. 4(b), the furring strip BE may be a horizontal member or a vertical member joined to the pillar P so as to increase the thickness of the pillar P.

[0025] In addition, the gap S shown in FIG. 3 may be adopted for the outer wall OW facing a certain direction in the building 1, and the gap S shown in FIG. 4 may be adopted for the outer wall OW facing another direction. In other words, both the gap S shown in FIG. 3 and the gap S shown in FIG. 4 may be adopted in one building 1.

[0026] FIG. 5 is another partially enlarged view of the second floor H2. As shown in FIG. 5, the building 1 (see FIG. 1) may be provided with an atrium AT that vertically extends through, among the plurality of floors, two or more floors including at least a floor with the gap S (see FIGS. 3 and 4). Unlike the gap S described above, the atrium AT has a size equal to or greater than the thickness of the pillar P (see FIGS. 3 and 4). Furthermore, in the present embodiment, a ceiling fan (pressure difference generating means) SF is provided in the atrium AT.

[0027] The ceiling fan SF is provided with horizontal blades, and the blades are rotated to generate a pressure difference between an upper side (one side) and a lower side (the other side) of the blades. The building 1 according to the present embodiment can generate upward and downward streams in the atrium AT by rotating the ceiling fan SF in the atrium AT. Furthermore, in conjunction with the generation of upward and downward streams in the atrium AT, it is also possible to generate upward and downward streams using the gap S, thereby achieving smooth air circulation in the building 1.

[0028] Further, although not shown, the atrium AT shown in FIG. 5 vertically extends through the ceiling part C (see FIG. 2) of the second floor H2 and up to the attic BH (see FIG. 2). That is, the atrium AT shown in FIG. 5 vertically extends through three floors. In the atrium AT, a first direction faces the outer wall OW (see FIG. 1, and the like) on the second floor H2, and a handrail HR is provided in a second direction opposite to the first direction. Furthermore, the atrium AT is provided with spandrel walls SW in a third direction and a fourth direction that intersect the first direction and the second direction at right angles.

[0029] Since the atrium AT has the configuration described above, the second floor H2 (middle floor) except for the attic BH and the first floor H1 (the uppermost and lowermost floors) of the three floors vertically extend through by the atrium AT have a space portion SP facing the atrium AT and the second floor H2. In other words, the space portion SP is a common part of the space in the second floor H2 and the space in the atrium AT.

[0030] Furthermore, in the present embodiment, a plurality of roll screens (shielding means) RS that can be extended upward are provided. Specifically, a first roll screen RS1 is provided on the floor part F2 in the second direction in which the handrail HR is provided. In addition, in the third and fourth directions in which the spandrel wall SW is provided, there are second and third roll screens RS2 and RS3 provided above the spandrel wall

SW. Plate-shaped handrails HRB are provided above the second and third roll screens RS2 and RS3 respectively, hiding the second and third roll screens RS2 and RS3.

[0031] FIG. 6 is a perspective view of a state that the roll screen RS shown in FIG. 5 is stretched. As shown in FIG. 6, the first to third roll screens RS1 to RS3 can be extended to the vicinity of the ceiling part C (see FIG. 2) of the second floor H2. Upon stretching in this manner, the space portion SP (see FIG. 5) facing the atrium AT and the second floor H2 is closed. In other words, the first to third roll screens RS1 to RS3 are each stretched to the vicinity of the ceiling part C (see FIG. 2) of the second floor H2, thereby separating the space portion SP from the space in the second floor H2. By closing the space portion SP in this manner, the atrium AT directly connects the first floor H1 and the attic BH. As a result, the upward and downward streams pass through without blowing into the second floor H2.

[0032] It is to be noted that the first to third roll screens RS1 to RS3 are not limited to being extended to the ceiling part C of the second floor H2, and can be stopped half-way. Therefore, the space portion SP can be partially closed and the remaining part can be left open, and the upward and downward streams distribution and the air collection height on the second floor H2 can be arbitrarily determined.

[0033] Next, the operation of the building 1 according to the present embodiment will be described. First, as shown in FIGS. 3 and 4, the building 1 shown in FIG. 1 has the gap S from the outer wall OW. Accordingly, the air of the outer wall OW that is air-conditioned by the air-conditioning panel AP moves through the gaps S in a plurality of floors as upward and downward streams.

[0034] In particular, when the atrium AT has means such as a ceiling fan SF for generating a pressure difference, the ceiling fan SF can generate the upward and downward stream in the atrium AT, thereby generating upward and downward stream through the gap S. For example, if a downward flow is generated in the atrium AT, an upward flow in the opposite direction can be generated in the gap S accordingly.

[0035] In particular, in the present embodiment, the building 1 includes four floors, and the gap S is also provided in the floor part C of the attic BH and the floor part F1 of the first floor H1. Accordingly, the attic BH and the underfloor floor UF are generally available, and the attic BH and the underfloor floor UF have no or few inner walls and are not equipped with furniture, and the like, and can thus suitably allow generation of a horizontal flow. Here, when circulating air in the building 1, it is necessary to generate not only upward and downward flows but also the horizontal flow. Therefore, by using the attic BH and the underfloor floor UF, it is possible to preferably perform air circulation.

[0036] As described above, according to the building 1 according to the present embodiment, at least one of the floor parts F1, F2, and C of the upper floors H1, H2,

and BH has the gap S with respect to the outer wall OW, which is within the thickness range of the pillar P, and the gap S enables air circulation between the directly lower floor and directly higher floor among the floor parts F1, F2, and C. Therefore, according to the building 1, it is possible to ensure the upward and downward streams through the gap S without providing the atrium AT having a size equal to or greater than a predetermined size. Therefore, it is possible to ensure the upward and downward streams without significantly reducing the floor area of the upper floors.

[0037] In addition, the building 1 has the girth part BD with the beam width W1 narrower than that of the pillar P, and the gap S is formed between the girth part BD and the outer wall OW. Therefore, it is not necessary to add a new structure to provide the gap S, and by adjusting the beam width W1 of the girth part BD, it is possible to ensure the upward and downward streams without significantly reducing the floor area of the upper floor.

[0038] In addition, since the gap S is formed by attaching the outer wall OW to the pillar P via the furring strip BE, the gap S can be formed by using the furring strip BE without working on the pillar P, the girth part BD, and the like, and the strength or the like of the building 1 can be hardly affected and the upward and downward streams can be ensured.

[0039] In addition, the air-conditioning panel AP has a heat insulation layer that insulates the interior of the room from the exterior space, and has no interior material on the indoor side of the gap S, so that the indoor surface facing the interior space is directly exposed to the interior air. Accordingly, the room air can be directly air-conditioned on the indoor surface, and the room air can be preferably circulated through the gap S.

[0040] In addition, since the building 1 has the ceiling fan SF and the atrium AT vertically extends through the floors including the floor provided with the gap S, the atrium AT can be used to generate upward and downward streams, and it is thus possible to facilitate the upward and downward streams using the gap S. Therefore, it is possible to contribute to smooth air circulation. The atrium AT may be considered as a component that reduces the floor area of the upper floors, but since the structure corresponding to the atrium AT can be skipped by the amount of the gap S, the floor area of the upper floors is not greatly reduced.

[0041] In addition, the building 1 includes the roll screen RS on the second floor H2 of the atrium AT for closing the space portion SP facing the atrium AT and the second floor H2. Accordingly, when shielded by the roll screen RS, the upward and downward streams can be generated in such a form that the streams pass through the second floor H2, and when not shielded by the roll screen RS, upward and downward streams can be generated without passing through the second floor H2. Therefore, it is possible to select a floor for the upward and downward stream air circulation.

[0042] In addition, according to the building 1, the di-

rectly higher floor of the gap S is the attic BH, and since the attic BH where no walls or furniture are normally installed can be used, this can contribute to suitably generating the horizontal flow that is as essential as the upward and downward streams.

[0043] In addition, the directly lower floor of the gap S is the underfloor floor UF, and since the underfloor floor UF is usually not provided with inner walls, furniture, and the like, it is possible to contribute to suitably generating a horizontal flow in addition to the upward and downward streams. Further, even when the underfloor floor UF is blocked by the foundation, providing an opening in a part of the foundation can contribute to the favorable generation of horizontal flow.

[0044] As described above, while the present invention has been described based on certain embodiments, the present invention is not limited to the embodiments described above, and modifications may be performed without departing from the spirit of the present invention, and well-known or publicly known techniques may be combined.

[0045] For example, in the embodiment described above, the atrium AT faces the outer wall OW in the first direction, but embodiments are not limited thereto, and may not face the outer wall OW in any of the first to fourth directions. In addition, when there are pillars P having different thicknesses in the building 1, the gap S may be within the thickness range of the thickest pillar P. Furthermore, in the embodiment described above, the pillar P extends from the directly lower floor H1 to the upper floor H2 through the floor part F2, but the pillar P only needs to be provided on the floor part, and does not necessarily have to pass through from the directly lower floor H1 to the upper floor H2.

[0046] Furthermore, the means for shielding the space portion SP is not limited to the roll screen RS, and may be another object such as a slidable wall. Furthermore, the means for generating a pressure difference is not limited to the propeller type like the ceiling fan SF, and for example, other types of fans such as a sirocco fan and a turbo fan may be used, and also not limited to the fan as long as it can generate a pressure difference. In addition, the atrium AT may utilize a space in which stairs are provided.

[0047] Here, the features of the embodiment of the building according to the present invention described above are summarized briefly as Items [1] to [8] below.

[1] A building (1) including:

upper floors (H1, H2, BH) having floor parts (C, F 1, F2),
a directly lower floor (H1) located directly below the floor part,
a pillar (P) provided on the floor part,
an outer wall (OW) attached to the pillar and having one side facing an exterior space and the other side facing an interior space, and

an air-conditioning panel (AP) adopted for at least a part of the outer wall and providing an air-conditioning effect in the interior space, in which the floor part has a gap (S) between the floor part and the outer wall, in which the gap (S) is within a thickness range of the pillar, and the floor part is configured to allow air circulation between the directly lower floor and the upper floor through the gap.

[2] The building according to [1] further including a girth part (BD) with a beam width narrower than that of the pillar, in which the gap (S) is formed between the girth part and the outer wall.

[3] The building according to [1] or [2] further including a furring strip (BE) attached to the outside of the pillar, in which the gap (S) is formed by attaching the outer wall to the pillar via the furring strip.

[4] The building according to any one of [1] to [3], in which the air-conditioning panel has a heat insulation layer that insulates the interior space and the exterior space, and does not include an interior material on an indoor surface such that the indoor surface is directly exposed to an indoor air.

[5] The building according to any one of [1] to [4], further including:

a pressure difference generating means (ceiling fan SF) for generating a pressure difference between one side and the other side, and an atrium (AT) vertically extends through the upper floor and the directly lower floor and having a size equal to or greater than the thickness of the pillar and provided with the pressure difference generating means.

[6] The building according to [5], in which the building further includes at least one floor above the upper floor or below the directly lower floor,

the atrium vertically extends through at least three floors, and

the building further includes, among the floors that are vertically extended through, on a middle floor (the second floor H2) except for highest and lowest floors, a shielding means (roll screen RS, first to third roll screens RS1 to RS3) for closing a space portion (SP) facing the atrium and the middle floor.

[7] The building according to any one of [1] to [6], in which the upper floor is an attic (BH).

[8] The building according to any one of [1] to [6], in which the directly lower floor is an underfloor floor (UF).

[0048] This application is based upon Japanese Patent Application (Application No. 2021-105690), filed on June

25, 2021, the entire contents of which are incorporated herein by reference.

REFERENCE SIGNS LIST

[0049]

1: building
 10: wall part
 AP: air-conditioning panel
 AT: atrium
 BD: girth part
 BE: furring strip
 BH: attic
 C, F1, F2: floor part
 H1: first floor
 H2: second floor
 H1, H2, BH: upper floor
 OW: outer wall
 P: pillar
 RS: roll screen (shielding means)
 S: gap
 SF: ceiling fan (pressure difference generating means)
 SP: space portion
 UF: underfloor floor
 W1: beam width
 W2: pillar width

Claims

1. A building comprising:

an upper floor having a floor part;
 a directly lower floor located directly below the floor part;
 a pillar provided on the floor part;
 an outer wall attached to the pillar and having one side facing an exterior space and the other side facing an interior space; and
 an air-conditioning panel adopted for at least a part of the outer wall and providing an air-conditioning effect to the interior space,
 wherein the floor part has a gap between the floor part and the outer wall, wherein the gap is within a thickness range of the pillar, and the floor part is configured to allow air circulation between the directly lower floor and the upper floor through the gap.

2. The building according to claim 1, further comprising a girth part with a beam width narrower than that of the pillar,
 wherein the gap is formed between the girth part and the outer wall.

3. The building according to claim 1, further comprising

a furring strip attached to an outside of the pillar, wherein the gap is formed by attaching the outer wall to the pillar via the furring strip.

4. The building according to claim 1, wherein the air-conditioning panel has a heat insulation layer that insulates the interior space and the exterior space, and does not include an interior material on an indoor surface such that the indoor surface is directly exposed to an indoor air.

5. The building according to claim 1, further comprising:
 a pressure difference generating means for generating a pressure difference between one side and the other side; and
 an atrium vertically extends through the upper floor and the directly lower floor and having a size equal to or greater than the thickness of the pillar and provided with the pressure difference generating means.

6. The building according to claim 5, wherein
 the building further comprises at least one floor above the upper floor or below the directly lower floor,
 the atrium vertically extends through at least three floors, and
 the building further comprises, among the floors that vertically extended through, on a middle floor except for highest and lowest floors, shielding means for closing a space portion facing the atrium and the middle floor.

7. The building according to any one of claims 1 to 6, wherein the upper floor is an attic.

8. The building according to any one of claims 1 to 6, wherein the directly lower floor is an underfloor floor.

FIG. 1

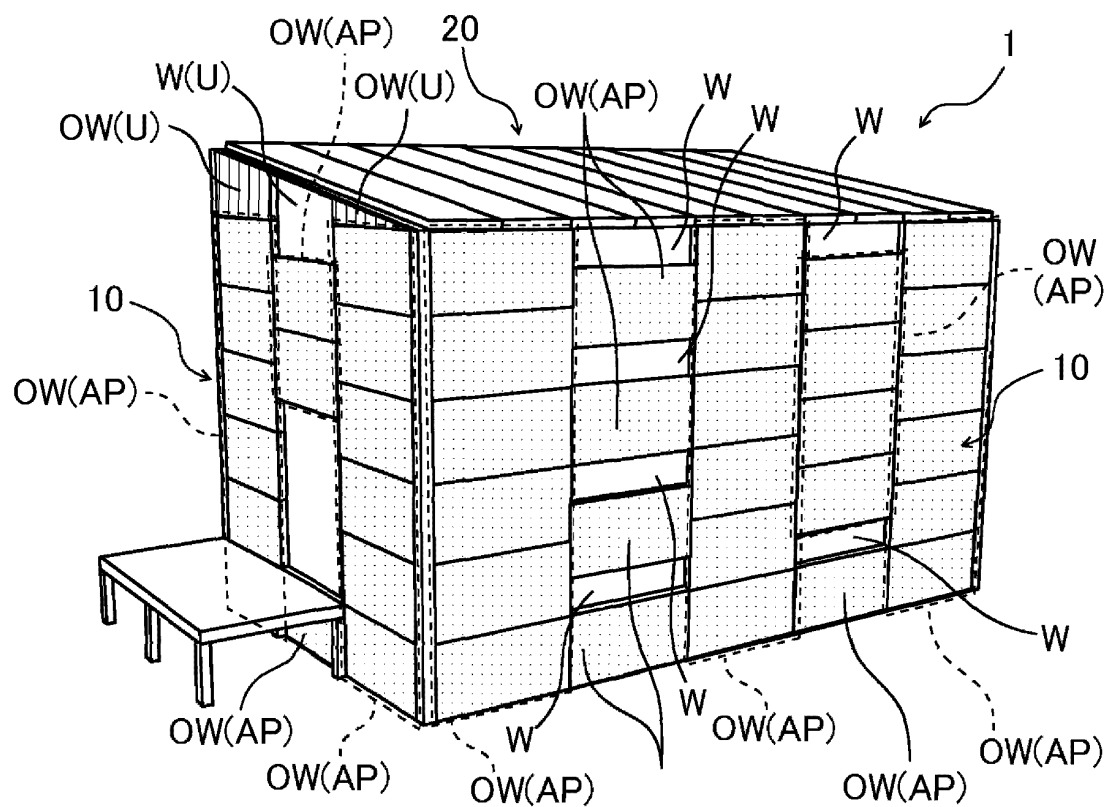


FIG. 2

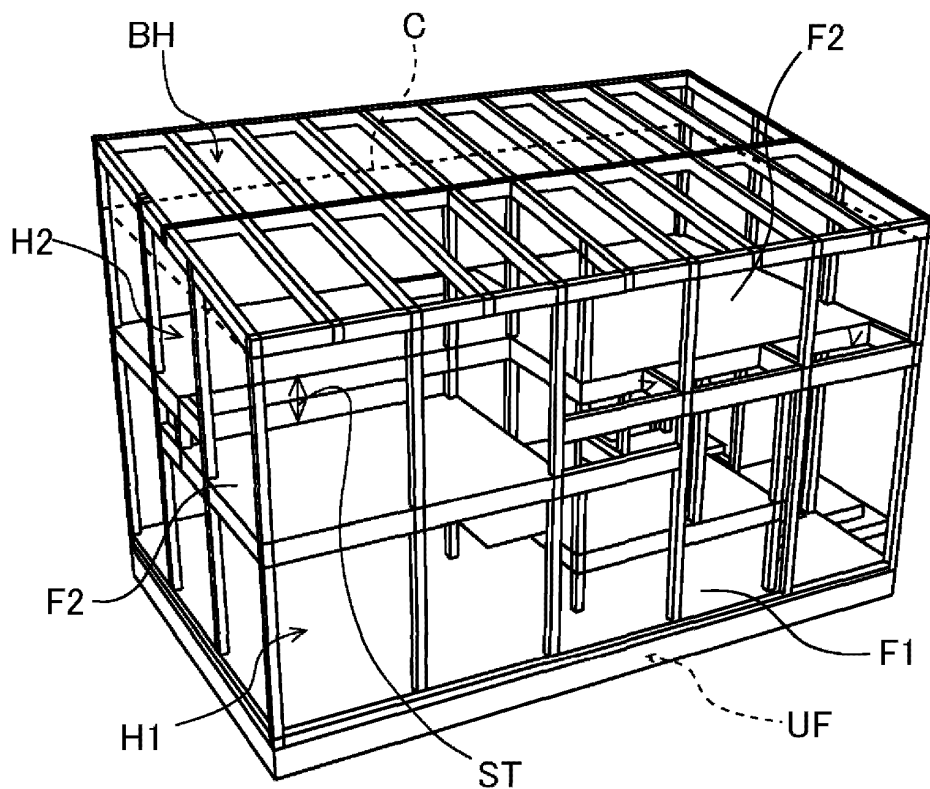


FIG. 3

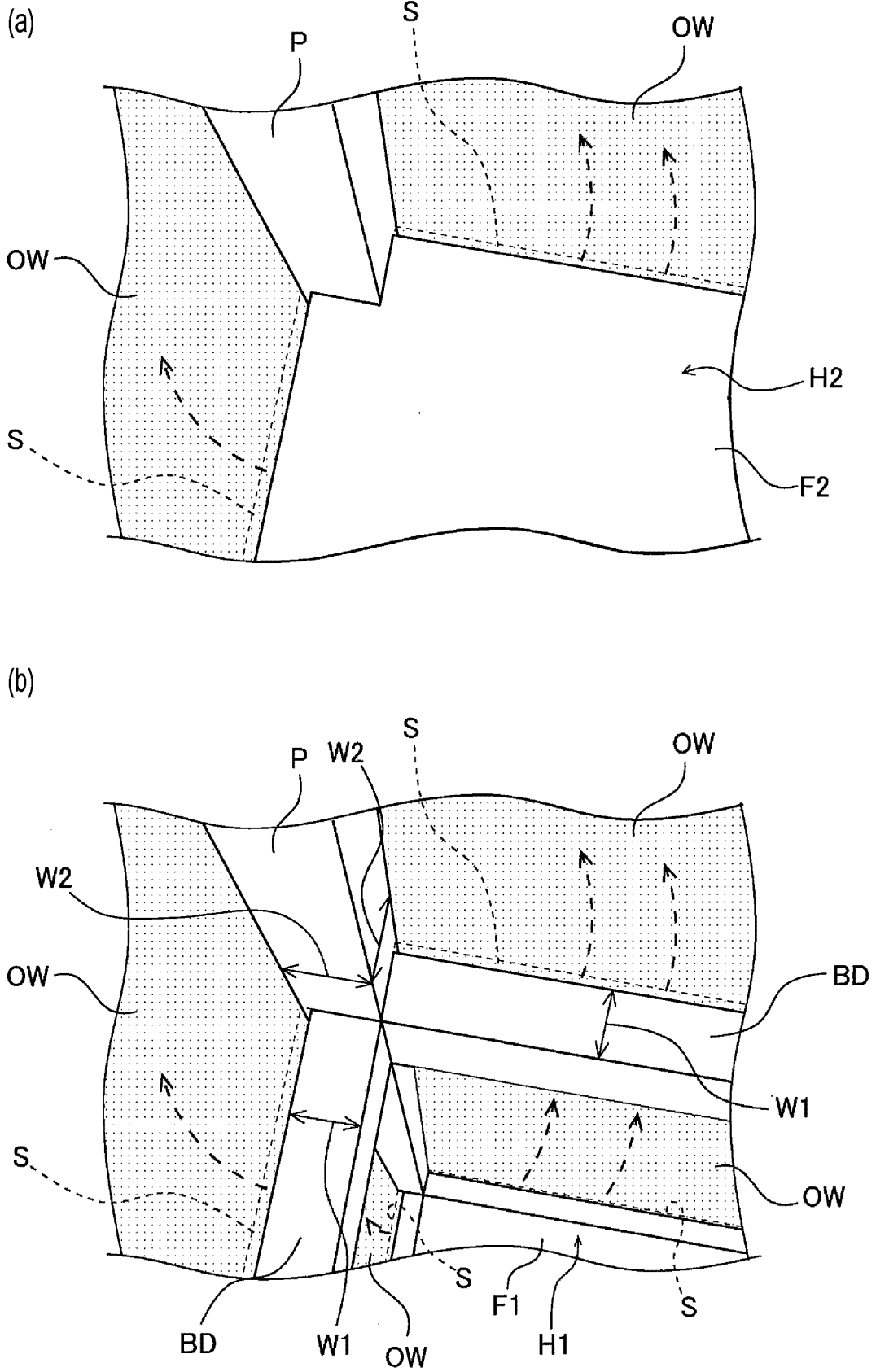


FIG. 4

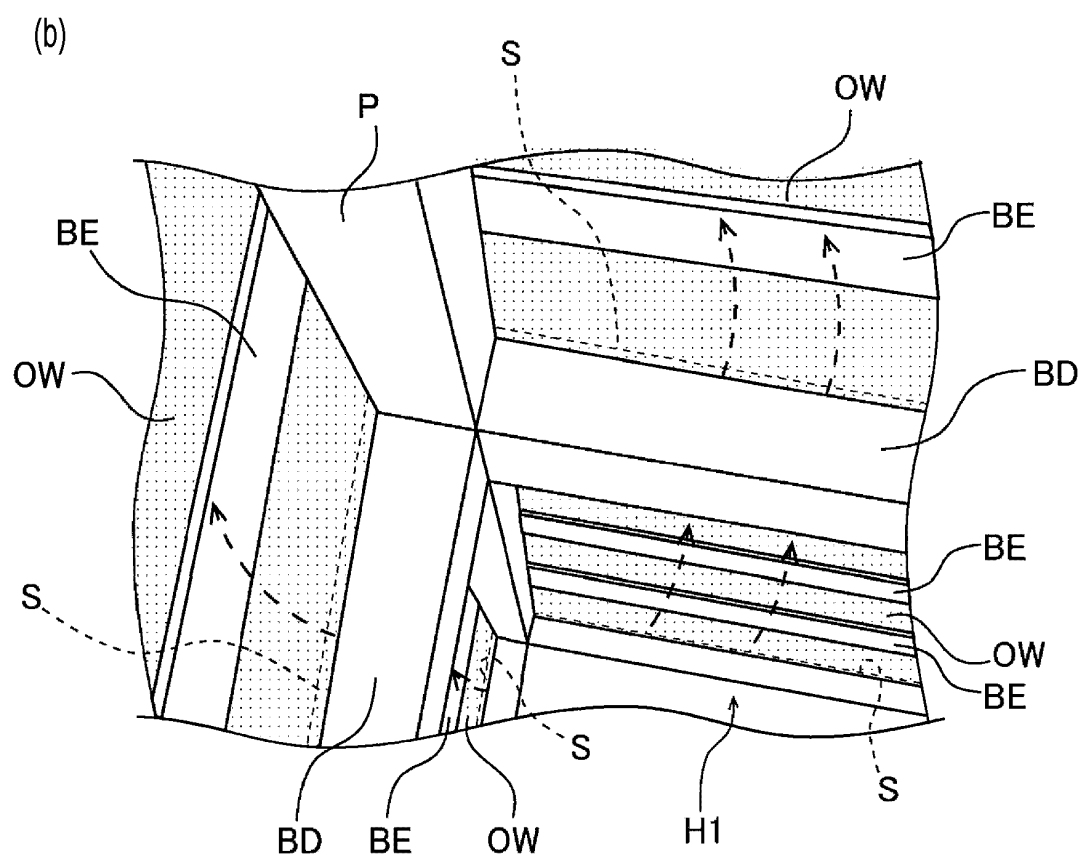
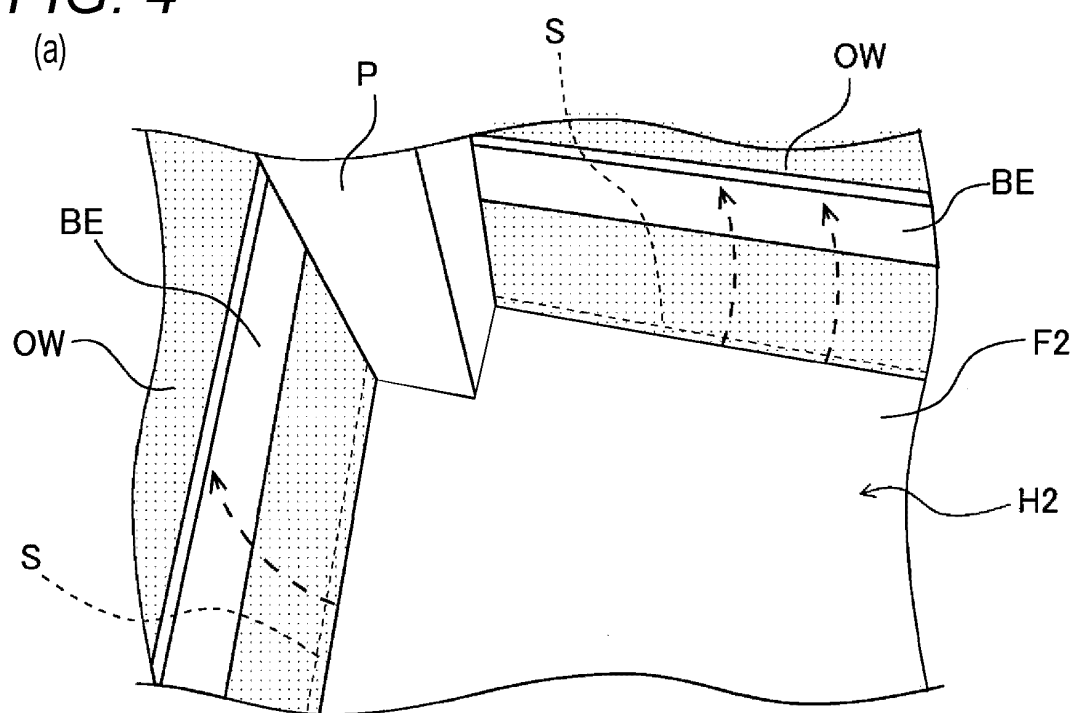


FIG. 5

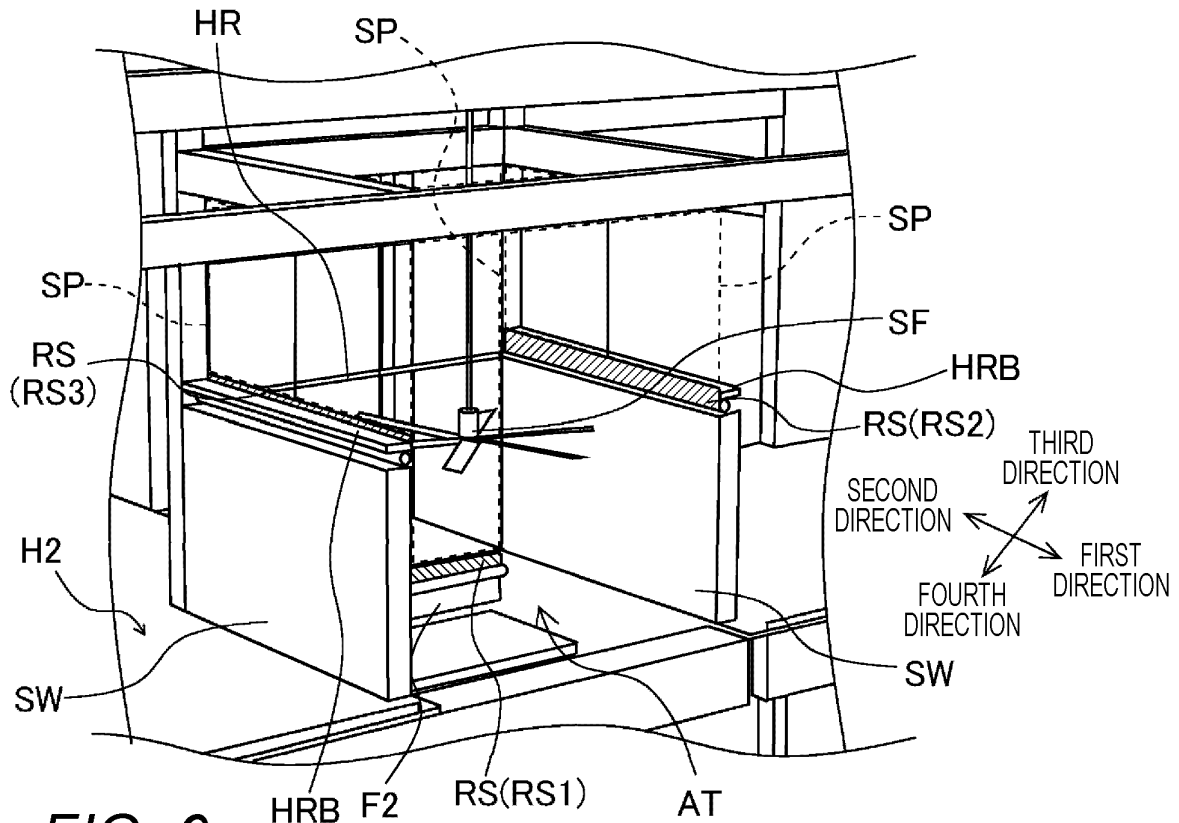
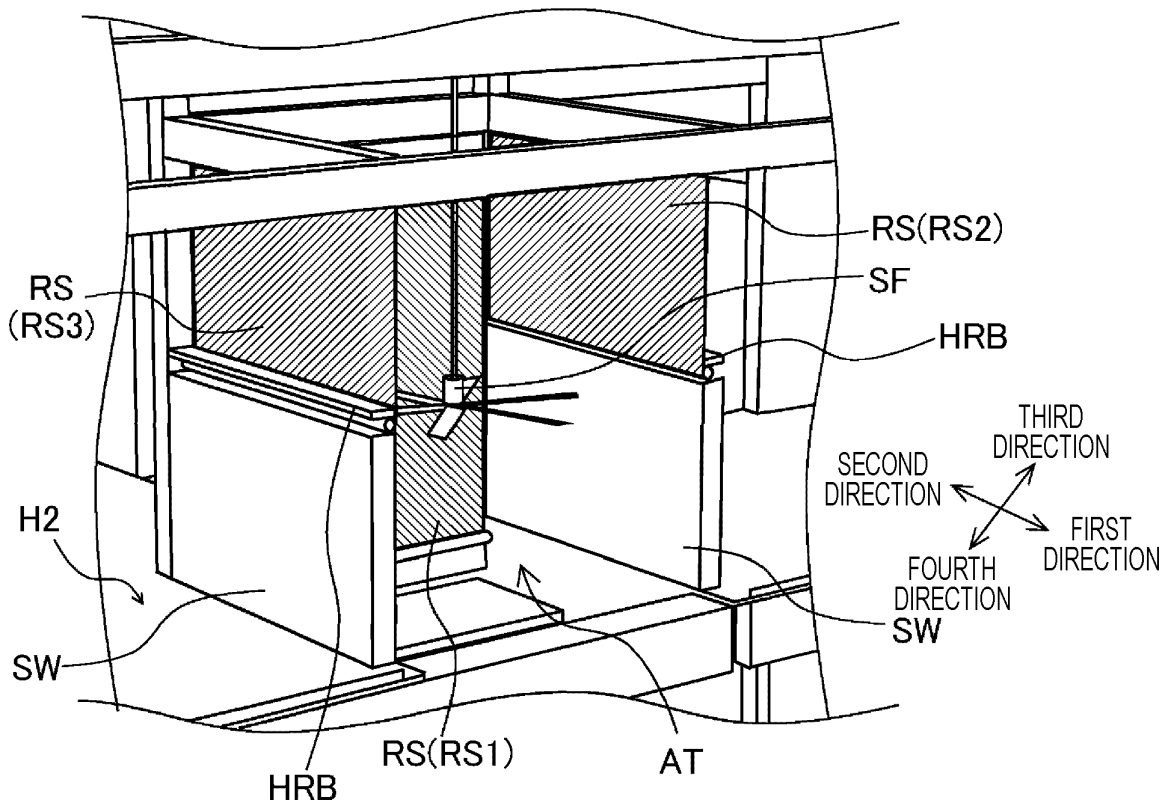


FIG. 6



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2022/022562

A. CLASSIFICATION OF SUBJECT MATTER <i>E04B 1/76</i> (2006.01)i FI: E04B1/76 200A 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) E04B1/62 - 1/99																
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Published examined utility model applications of Japan 1922-1996 Published unexamined utility model applications of Japan 1971-2022 Registered utility model specifications of Japan 1996-2022 Published registered utility model applications of Japan 1994-2022																
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)																
C. DOCUMENTS CONSIDERED TO BE RELEVANT																
<table border="1"> <thead> <tr> <th>Category*</th> <th>Citation of document, with indication, where appropriate, of the relevant passages</th> <th>Relevant to claim No.</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>JP 2002-70192 A (OGOSHI, Osamu) 08 March 2002 (2002-03-08) paragraphs [0012]-[0016]</td> <td>1-8</td> </tr> <tr> <td>A</td> <td>JP 2017-106289 A (HOME RESEARCH KK) 15 June 2017 (2017-06-15) paragraphs [0019]-[0029]</td> <td>1-8</td> </tr> <tr> <td>A</td> <td>JP 2002-332705 A (TOPICS KK) 22 November 2002 (2002-11-22) paragraphs [0017]-[0027]</td> <td>1-8</td> </tr> <tr> <td>A</td> <td>JP 62-160344 A (NATIONAL HOUSE IND. CO., LTD.) 16 July 1987 (1987-07-16) page 2, upper left column, line 11 to page 3, upper right column, line 8</td> <td>1-8</td> </tr> </tbody> </table>	Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	A	JP 2002-70192 A (OGOSHI, Osamu) 08 March 2002 (2002-03-08) paragraphs [0012]-[0016]	1-8	A	JP 2017-106289 A (HOME RESEARCH KK) 15 June 2017 (2017-06-15) paragraphs [0019]-[0029]	1-8	A	JP 2002-332705 A (TOPICS KK) 22 November 2002 (2002-11-22) paragraphs [0017]-[0027]	1-8	A	JP 62-160344 A (NATIONAL HOUSE IND. CO., LTD.) 16 July 1987 (1987-07-16) page 2, upper left column, line 11 to page 3, upper right column, line 8	1-8	
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Date of the actual completion of the international search 09 August 2022	Date of mailing of the international search report 16 August 2022															
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Information on patent family members

International application No.
PCT/JP2022/022562

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Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
JP 2002-70192 A	08 March 2002	(Family: none)	
JP 2017-106289 A	15 June 2017	(Family: none)	
JP 2002-332705 A	22 November 2002	(Family: none)	
JP 62-160344 A	16 July 1987	(Family: none)	

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