



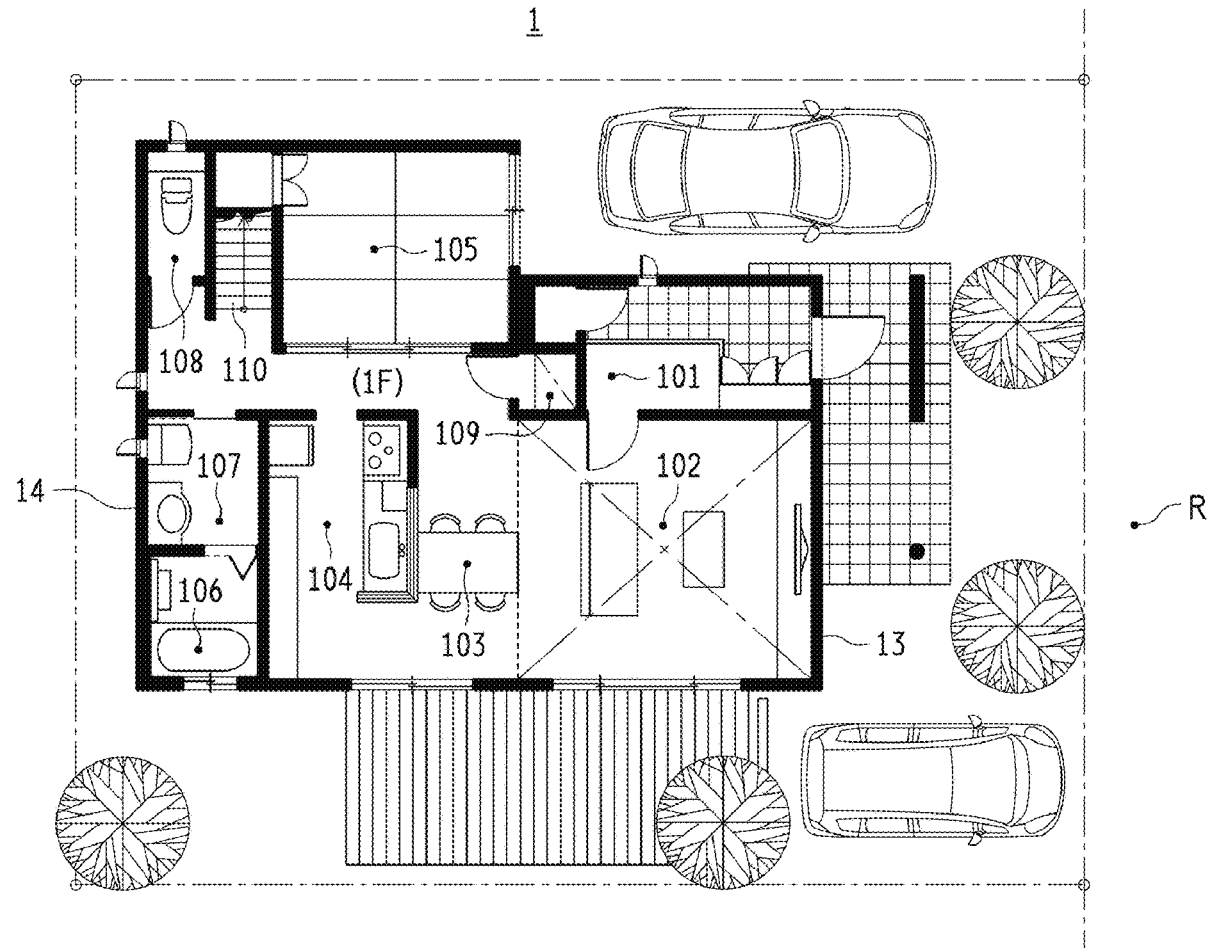
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MIKURIYA et al.(10) **Pub. No.: US 2023/0077703 A1**(43) **Pub. Date: Mar. 16, 2023**(54) **BUILDING FRAME****Publication Classification**(71) Applicant: **SEKISUI HOUSE, LTD.**, Osaka-shi,
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E04B 7/02 (2006.01)(72) Inventors: **Jun MIKURIYA**, Osaka-shi (JP);
Kazumi HIJIKATA, Osaka-shi (JP);
Akira HIROSE, Osaka-shi (JP);
Akihiko KINOMURA, Osaka-shi (JP);
Shouhei KIMURA, Osaka-shi (JP)(52) **U.S. Cl.**
CPC **E04H 1/02** (2013.01); **E04B 7/02** (2013.01)(73) Assignee: **SEKISUI HOUSE, LTD.**, Osaka-shi,
Osaka (JP)(57) **ABSTRACT**(21) Appl. No.: **17/627,753**(22) PCT Filed: **Jun. 1, 2020**(86) PCT No.: **PCT/JP2020/021589**

§ 371 (c)(1),

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A ridge is directly supported by a ridge supporting post that is erected on a floor plane of a floor right below a gable roof to provide a stable building frame having a pentagon shape in front view and furthermore to realize a beamless space where no lower chord member such as a roof beam extends above the floor right below the gable roof. Also, a tall window extending continuously toward the vicinity of the ridge is provided between the ridge supporting post of a gable end wall and each of gable end side sub-pillars erected on both sides of the ridge supporting post. Thus, a living space gives a feeling of spaciousness and openness in spite of a compact appearance of a building.



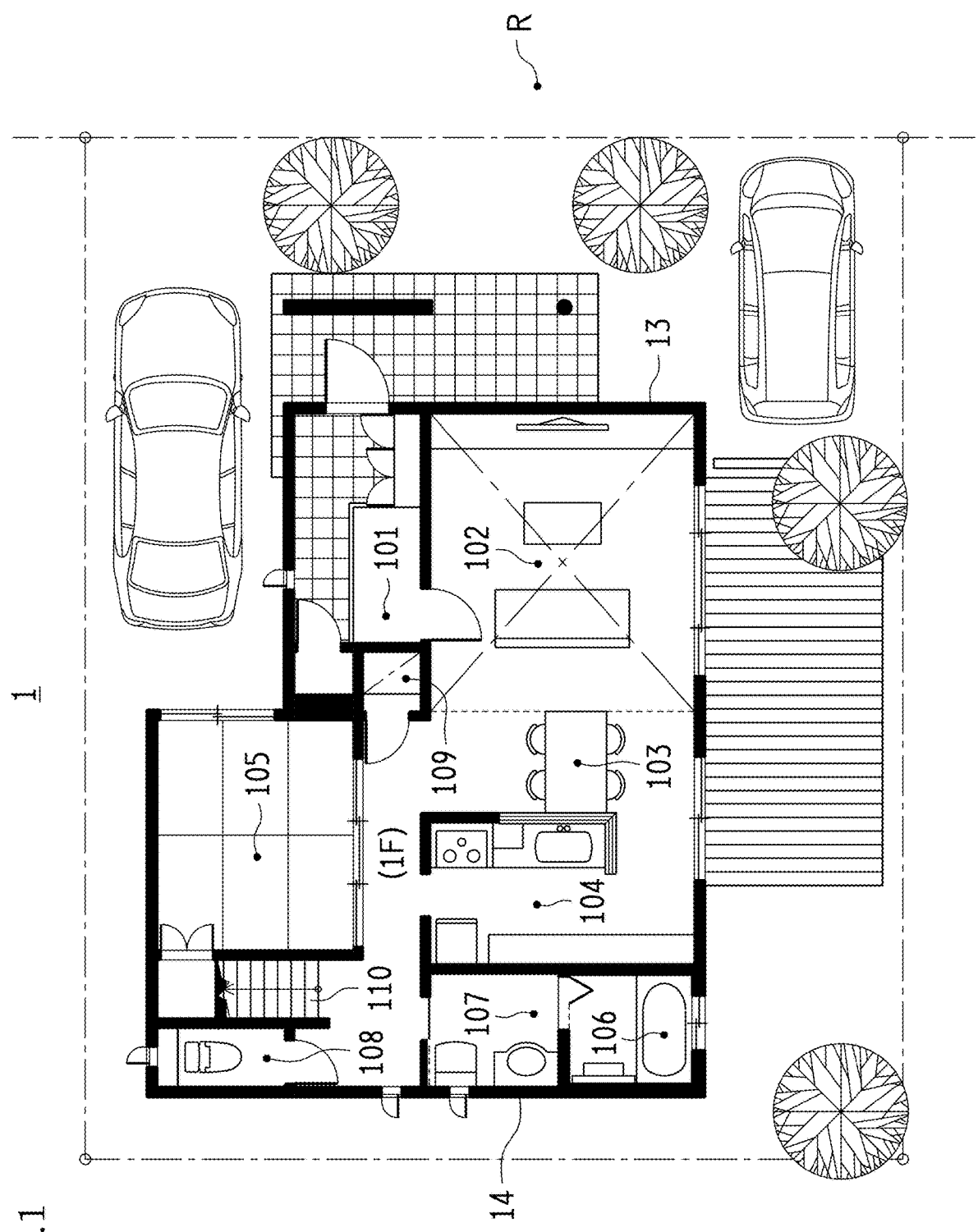


FIG.1

FIG.2

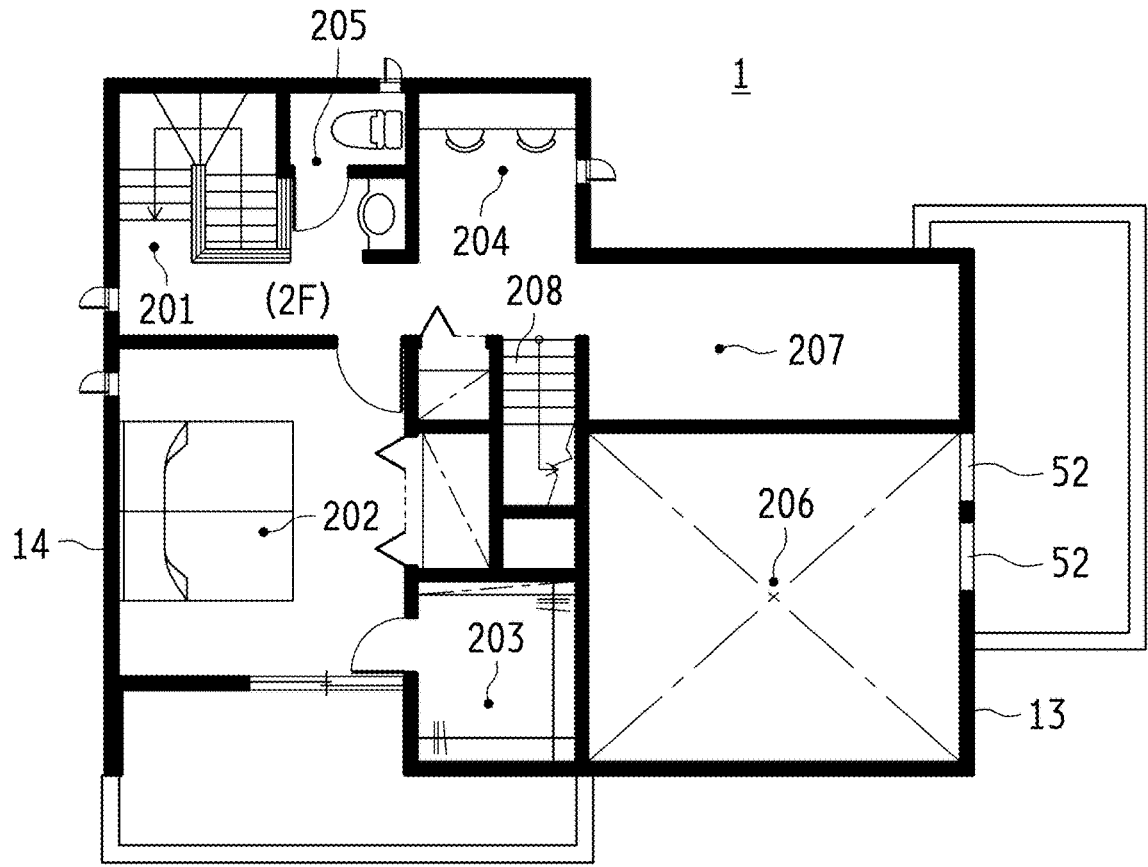


FIG.3

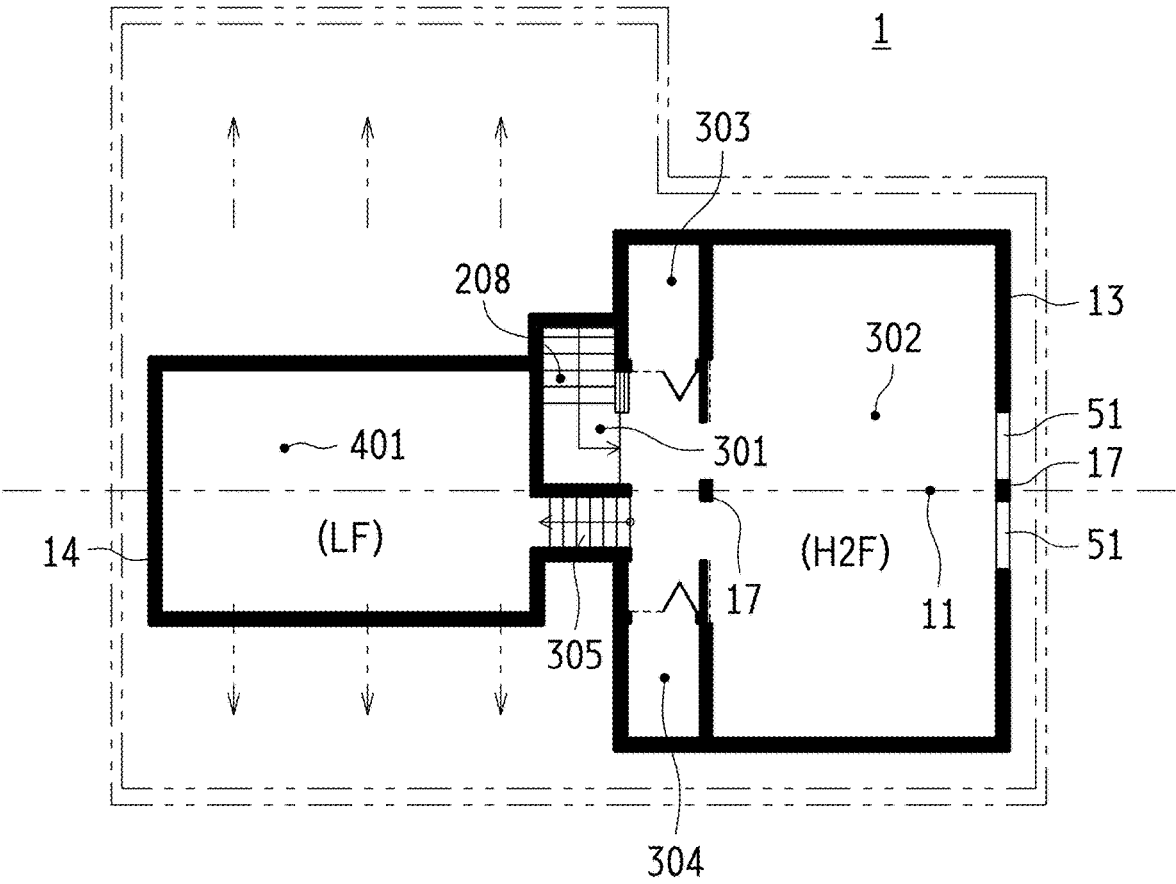


FIG.4

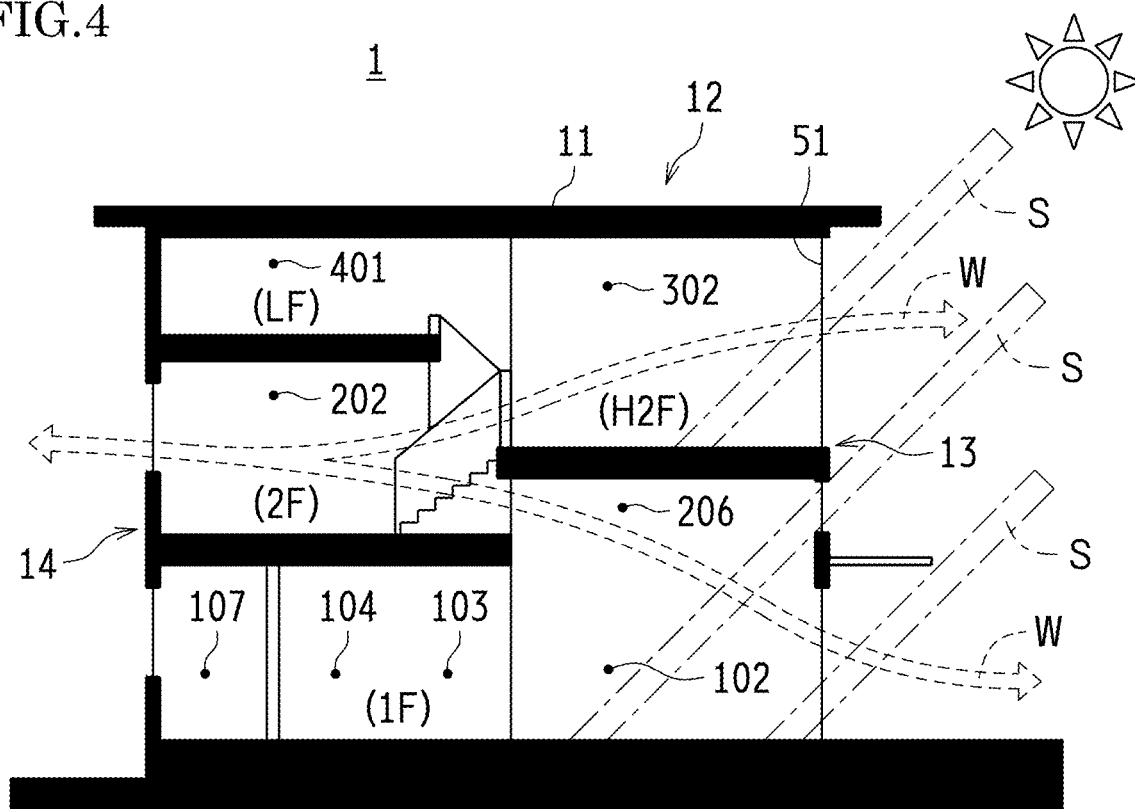


FIG.5

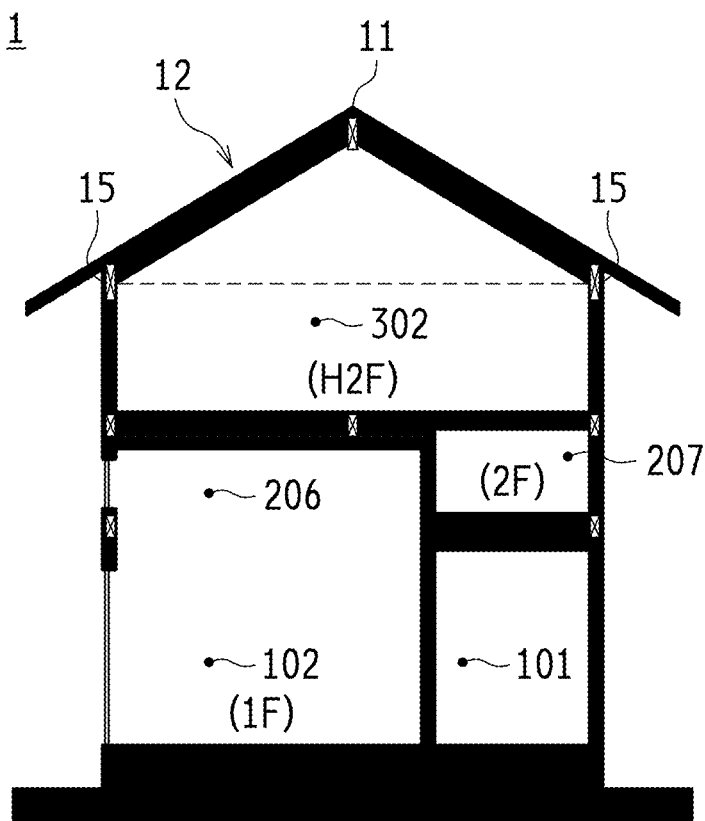


FIG.6

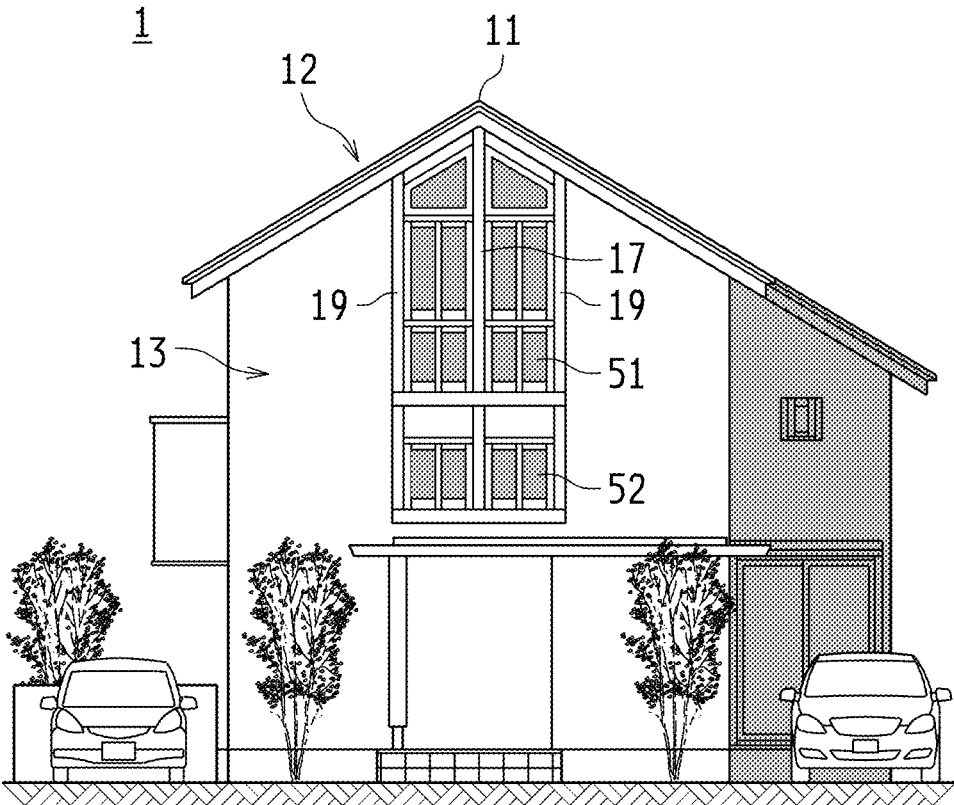


FIG.7

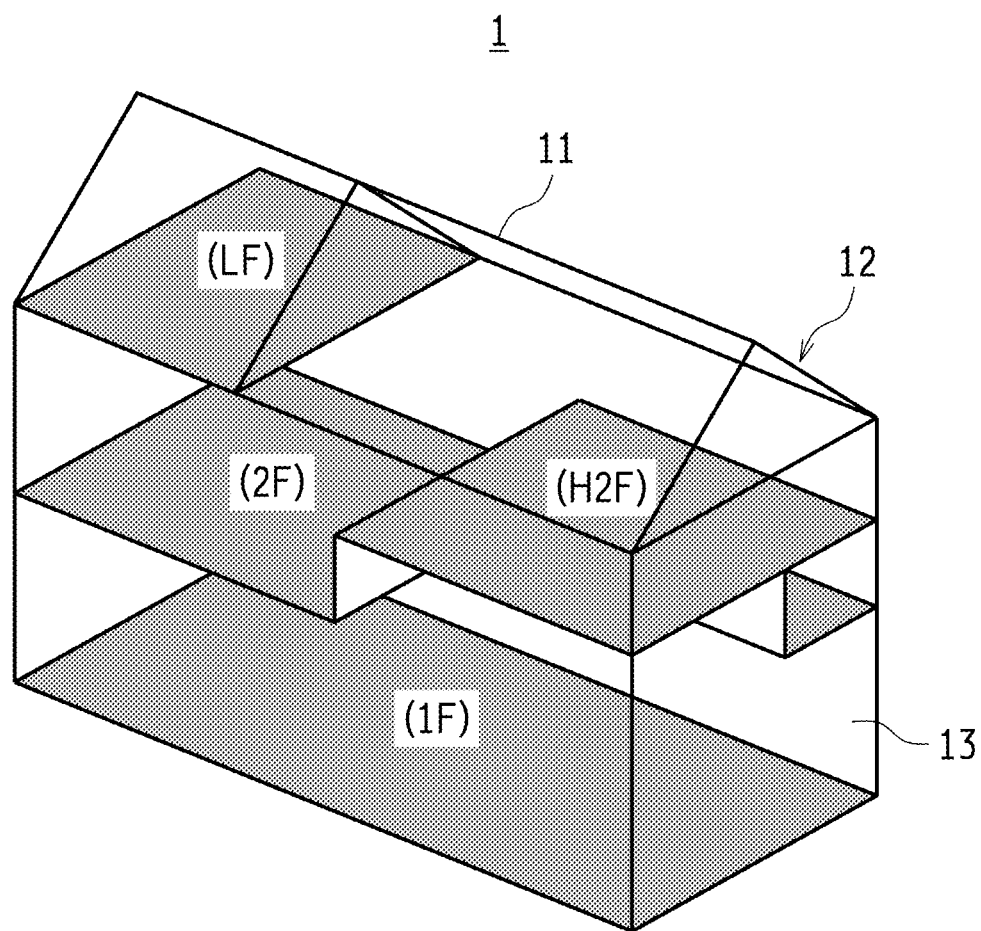


FIG.8(a)

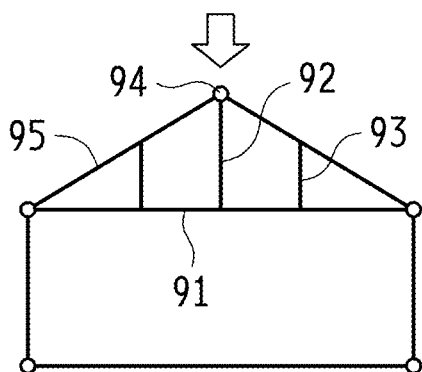


FIG.8(b)

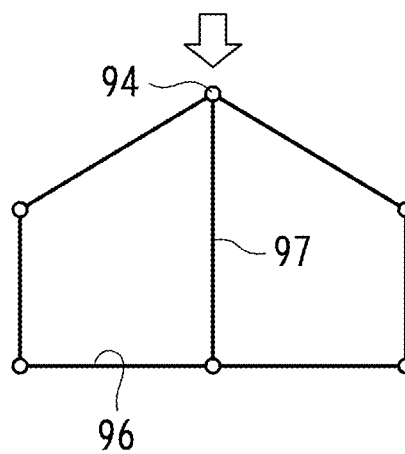


FIG.11

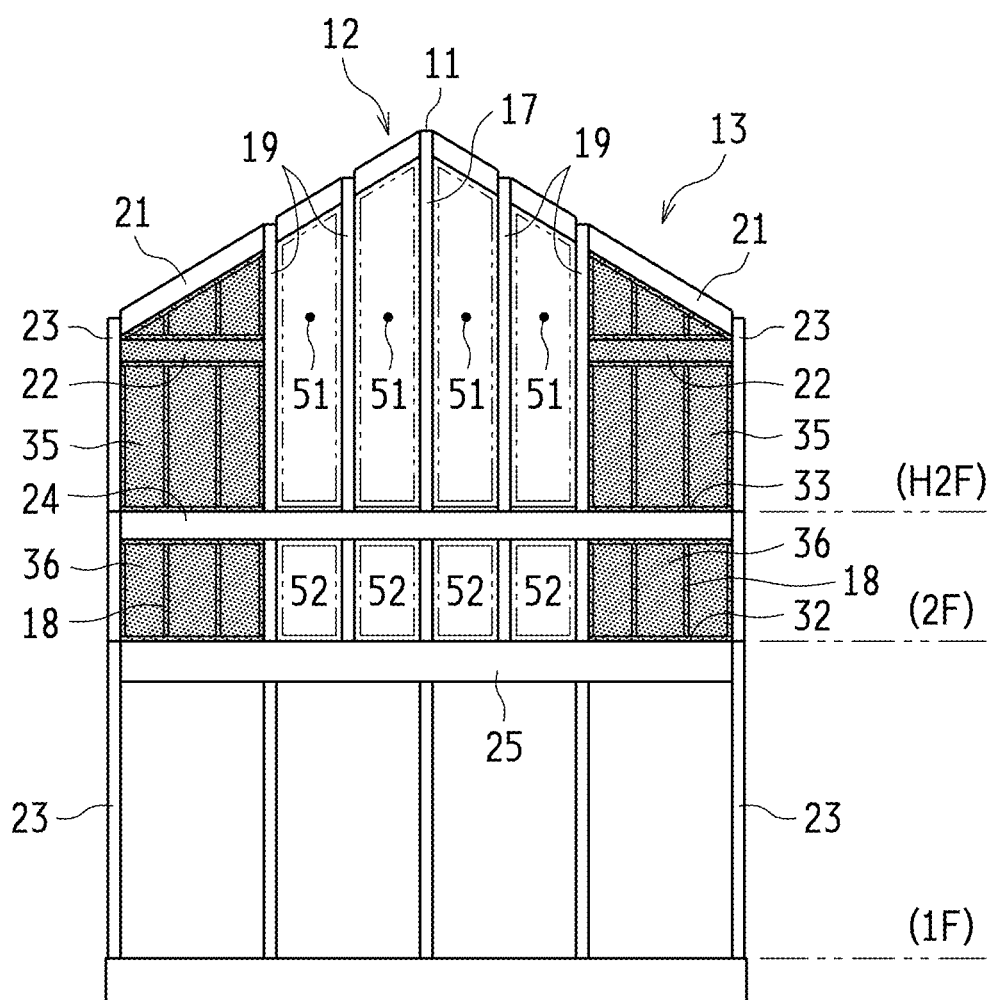
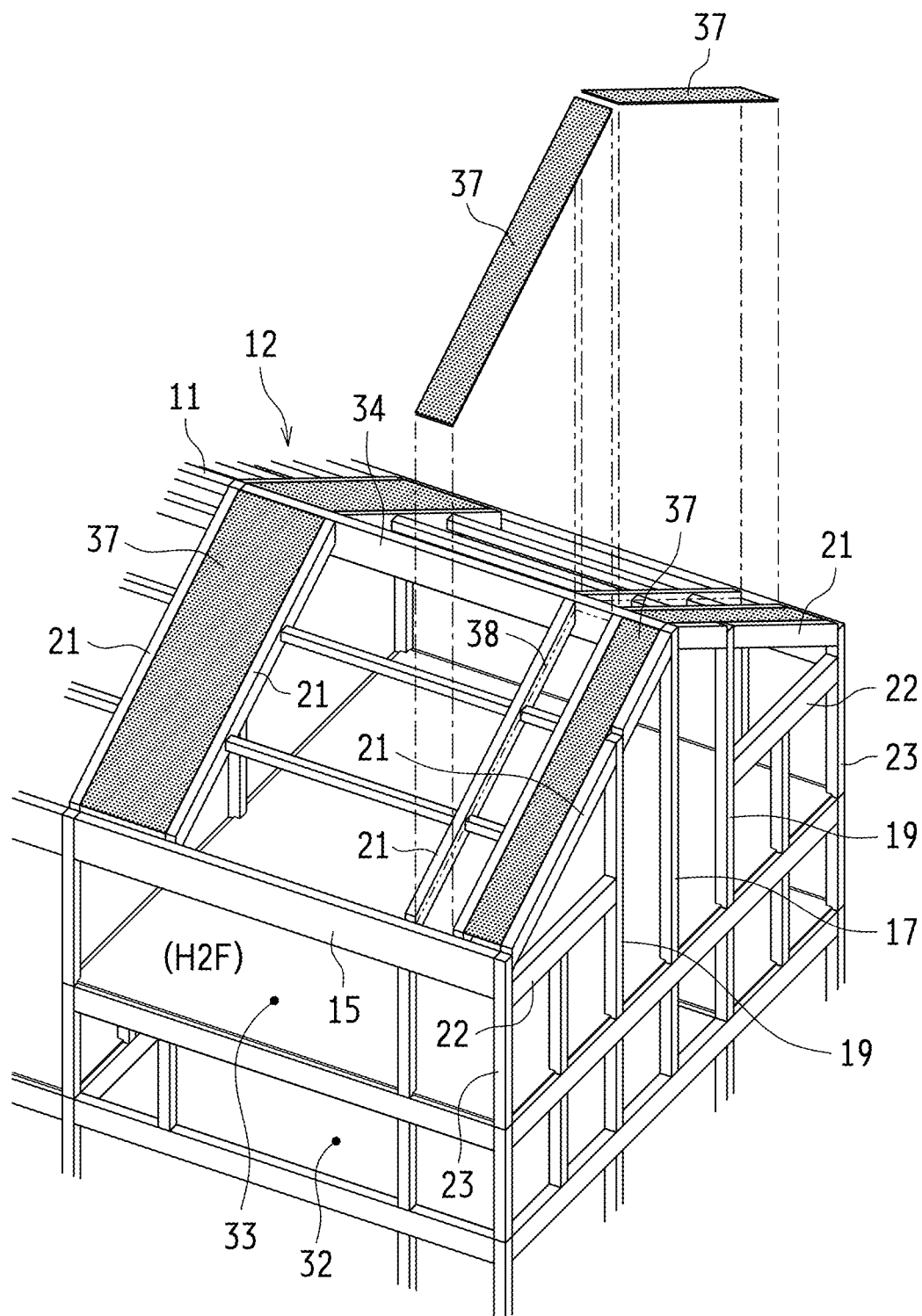


FIG.12



BUILDING FRAME**TECHNICAL FIELD**

[0001] The present invention relates to a building frame including a gable end wall of a wooden building (or a part thereof) that has a gable roof as at least a part of the roof.

BACKGROUND ART

[0002] Generally in small and medium-sized two-story buildings, every room has the same floor height and ceiling height (i.e. story height) for each story due to its structure. However, in the case where a house or the like is constructed in urban areas, it has sometimes a skip floor whose floor surface is shifted by a half story so as to ensure the living space and the storage space as large as possible while the site area is not so large. When the skip floor is adopted, it is possible to effectively use the limited indoor space by arranging spatially a living room and an underfloor storage space having a half story height.

[0003] A loft, which is provided using an attic space under the sloping roof, is also well known. The loft has a small ceiling height and is used as a storage room or a hobby room. The above technical ideas are disclosed, for example, in Patent Documents 1 to 3 below.

PRIOR ART DOCUMENTS**Patent Documents**

- [0004]** [Patent Document 1] JP H07-054402 A
- [0005]** [Patent Document 2] JP H07-062900 A
- [0006]** [Patent Document 3] JP 2002-364189 A

SUMMARY OF THE INVENTION**Problem to Be Solved by the Invention**

[0007] When constructing a building, the area and the height of the building that can be constructed in a site of a district are defined by the Building Standards Act depending on use districts designated by the City Planning Act. Especially in the category 1 or 2 low-rise exclusive residential districts among the above use districts, the height and the setback of the building are strictly restricted in order to maintain a good living environment. As a result, construction freedom is highly limited regarding the layout of the building and/or the shape of the roof.

[0008] Under the above-described site conditions, it is difficult to ensure a sufficient ceiling height of each story when the skip floor disclosed in the above patent documents is desired to be adopted. Thus, it is difficult to obtain indoor comfort. Also, even when a loft is provided in the attic space, the use of this loft may be limited due to a cramped space having a low ceiling.

[0009] Furthermore, in order to make the heights of respective parts of the building meet the setback regulation, a part of the roof may have an unnatural shape that affects the balance of the appearance, which may prevent harmonization with the townscape.

[0010] The present invention was made in consideration of the above circumstances, an object of which is to provide a building frame of a building such as a house that is constructed in a site under a strict regulation for the height and setback of the buildings, in particular, a building frame of a wooden building having a wooden frame structure or its

equivalent. With this building frame, a living space gives a feeling of spaciousness and openness while the building has a height-reduced and compact appearance.

Means for Solving the Problem

[0011] In order to achieve the above object, the present invention provides a building frame having a pentagon shape in front view, which includes a gable end wall on at last one side of a gable roof that is included, as at least a part of a roof, in a wooden building. The building frame includes: a floor plane provided on a floor right below the gable roof so as to have a rectangle shape in plan view; corner posts respectively erected on four corners of the floor plane; a pair of pole plates facing each other to connect respectively upper ends of the corner posts in a ridge direction; a plurality of sloping beams placed from each of the pair of pole plates to a ridge of the gable roof at appropriate intervals in a manner of making a vertex of a triangle; a ridge pole connecting upper ends of the sloping beams; a ridge supporting post erected on the floor plane, on a position that is right below the ridge and that includes the gable end wall on the at last one side of the gable roof, so as to support the ridge pole on the floor plane; and gable end side sub-pillars erected on the floor plane, on both left and right sides of the ridge supporting post of the gable end wall at appropriate intervals so as to support a pair of sloping beams that is on the gable end wall out of the plurality of sloping beams. A window with an opening area from the floor plane to a gable height of the gable end wall is provided between the ridge supporting post of the gable end wall and each of the gable end side sub-pillars. The ridge supporting post bears vertical load that acts on the gable roof so as to form, on the floor plane, a beamless space where no lower chord member of a roof truss constituting the gable roof extends.

[0012] With the above-described configuration, a tall window that extends from the vicinity of the floor surface of the floor right below the gable roof to the vicinity of the ridge can be provided in the center of the gable end wall on the at last one side of the gable roof. This window has a vertical continuity without the middle part thereof in the height direction being divided by the roof beam or other structural materials. By providing such a window in the gable end wall, a remarkably bright space with open feeling is realized inside the gable end wall.

[0013] Since the above-described configuration in which the ridge pole is directly supported by the ridge supporting post on the floor plane is adopted, it is possible to omit partly the roof beam and/or the flat beam as the lower chord member of the roof truss. By making a ceiling of the floor right below the gable roof as a sloping ceiling along the slope of the gable roof using this configuration, it is possible to ensure the substantial ceiling height while reducing the ridge height, which leads to a comfortable indoor space that gives a feeling of spaciousness in the vertical direction.

[0014] Also in the above-described building frame, a reinforcing surface plate may be provided, in a tense state, on each part sandwiched between one of the corner posts of the gable end wall and the corresponding one of the gable end side sub-pillars. Since the reinforcing surface plate provided in the tense state structurally serves as a load-bearing wall, the rigidity of the gable end wall in the above-described building frame is improved.

[0015] Furthermore, in the above-described building frame, the floor plane of the floor right below the gable roof

may be supported by a floor beam of the floor right below the gable roof, which is provided to surround four sides of the floor plane. Also, a floor plane of a lower floor may be provided lower than the floor plane of the floor right below the gable roof so as to be shifted by a substantially half story height or less, and the floor plane of the lower floor may be supported by a floor beam of the lower floor.

[0016] With this configuration, the building frame is supported by the double floor structure of the floor plane right below the gable roof and the floor plane of the lower floor shifted by a substantially half story height or less (1.0-1.5 meters as a standard height). The floor plane of the floor right below the gable roof and the floor plane of the lower floor are structurally integrated by connecting the respective floor beams each surrounding the four sides of the corresponding floor plane via short posts and surface plates. By adopting such a double floor structure, it is possible to stably support the building frame having a pentagon shape in front view, from which is omitted the lower chord member of the roof truss, while reducing the cross-sectional size of the members such as the floor beams each surrounding the four sides of the corresponding floor plane. Also, by providing a skip floor and/or an underfloor storage space using such a double floor structure, it is possible to effectively use the indoor space of the building.

[0017] In the building frame using the double floor structure, it is possible to provide a window in the gable end wall between the floor plane of the floor right below the gable roof and the floor plane of the lower floor. This window has the same width as that of the above-described window extending from the floor right below the gable roof to the vicinity of the ridge.

[0018] Furthermore, in the above-described building frame, a reinforcing surface plate may be put between one of the pair of sloping beams on the gable end wall and an adjacent sloping beam thereto so that the reinforcing surface plate is attached to both the sloping beams. Thus, the horizontal rigidity of the whole of the above-described building frame is reinforced by the roof surface on which the reinforcing surface plate is provided in the tense state, which serves as a component having a horizontal load-carrying capacity of the roof truss. Also, it is possible to omit angle braces and the like that are to be provided at the corners of the bottom surface of the normal roof truss frame (for example, joined portions of the roof beams and the pole plates).

Effects of the Invention

[0019] In the building frame of the present invention, a ridge pole is directly supported by a ridge supporting post that is erected on a floor plane of a floor right below a gable roof. Thus, a beamless space is formed, where no lower chord member such as a roof beam extends above the floor right below the gable roof. Also, a space configuration including a tall window is provided. This window extending toward the vicinity of the ridge is provided between the ridge supporting post of a gable end wall and each of the gable end side sub-pillars erected on both sides of the ridge supporting post. Thus, a bright indoor space is provided, which gives a feeling of openness and spaciousness in the vertical direction in spite of a compact appearance of a building of which the ridge height is reduced.

[0020] By adopting the above-described building frame, it is possible to provide excellent habitability while maintain-

ing the well-balanced appearance of the building without unnaturally distorting the shapes of the roof and wall surfaces even on the site under a strict regulation for the height and setback of the buildings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021] FIG. 1 is a layout and a first floor plan view of a house adopting a building frame according to an embodiment of the present invention.

[0022] FIG. 2 is a second floor plan view of the house.

[0023] FIG. 3 is a plan view of a higher second floor and an attic space floor of the house.

[0024] FIG. 4 is a cross-sectional view of the house in the ridge direction.

[0025] FIG. 5 is a cross-sectional view of the house in the beam direction.

[0026] FIG. 6 is an elevational view of the house viewed from a frontal road.

[0027] FIG. 7 is a perspective view schematically illustrating the layout of floors of the house.

[0028] FIGS. 8 are explanatory diagrams each schematically illustrating a support structure of a triangular roof truss frame.

[0029] FIG. 9 is a perspective view schematically illustrating a building frame of the house.

[0030] FIG. 10 is an elevational view illustrating a gable end wall of the building frame.

[0031] FIG. 11 is an elevational view illustrating another configuration example of the wall of the building frame.

[0032] FIG. 12 is a perspective view partly illustrating a configuration example of a sloping roof surface of the building frame.

MEANS FOR CARRYING OUT THE INVENTION

[0033] Hereinafter, an embodiment of the present invention will be described with reference to the drawings. FIGS. 1 to 7 and 9 to 11 show a wooden house adopting a building frame according to an embodiment of the present invention.

[0034] A house 1 exemplarily shown is assumed to be constructed on a substantially flat site having the site area of about 140 to 200 square meters located in the category 1 or 2 low-rise exclusive residential districts in urban areas or suburban areas. In FIG. 1, the right side of the site faces the frontal road R, and the remaining three sides of the site abut a neighboring site.

[0035] The house 1 is constructed by, for example, a wooden frame method so as to have a height equal to or less than the standard two-story building height. FIGS. 1 to 3 show planar configurations of respective stories. FIGS. 4 to 7 show configurations of respective parts of the building in the height direction.

[0036] The house 1 has a gable roof 12 that slopes away from one ridge 11 toward both sides. The slope of the gable roof 12 is, for example, so-called "6-sun slope" in Japanese, which means that the rise over run of the slope is 6/10. A part of the roof on one side (on the right side in FIG. 6) is extended slightly lower than the standard height of the eaves of the second floor.

[0037] As shown in FIGS. 1 and 2, the planar shape of a main body of the building is a substantially L-shape. The ridge 11 is disposed in a direction orthogonally intersecting with the frontal road R. A gable end wall 13 having a smaller

width faces the frontal road R. The width of the gable end wall 13 on the side of the frontal road R is about 6 meters while a gable end wall 14 including the extended roof part on the opposite side is about 8 meters. The elevational view in FIG. 6 shows the outer appearance of the gable end wall 13 having the smaller width viewed from the frontal road R.

[0038] Floor surfaces of the first floor (1F) have substantially the same level (provided at about 0.5 meter height from the ground level of the site). The first floor includes: an entrance hall 101; a living room 102; a dining room 103; a kitchen 104; a Japanese-style room 105; a bath 106; a utility room 107; a toilet 108; and a cabinet 109. The living room 102 is located facing the gable end wall 13 on the side of the frontal road R. The living room 102 is formed so as to be spatially integrated with the dining room 103 and the kitchen 104. Stairs 110 that lead to the second floor (2F) are disposed between the Japanese-style room 105 and the toilet 108.

[0039] The floor surface of the second floor is located so as to overlap with a part of an upper area of the first floor. The floor surface of the second floor is positioned about 3.0 meters higher than the floor surface of the first floor. The ceiling height of the first floor right below the second floor is about 2.5 meters. The second floor includes: a stair hall 201; a Western-style room 202 to be used as a master bed room; a walk-in closet 203; a study corner 204; and a toilet 205. The upper part of the living room 102 of the first floor is a void 206. Also, a second floor storage room 207 is provided above the entrance hall 101 of the first floor.

[0040] The second floor leads to a higher second floor (H2F) positioned higher than the second floor by about a half story via a short flight of stairs 208. The floor surface of the higher second floor, which corresponds to substantially the second and half floor, is provided so as to spread across the full width of the gable end wall 13 on the side of the frontal road R so as to cover the void 206 above the living room 102 and the second floor storage room 207. The floor surface of the higher second floor is positioned about 1.3 meters higher than the floor surface of the second floor. The ceiling height of the first floor right below the higher second floor is about 3.8 meters.

[0041] The ceiling height of the second floor storage room 207 provided where the floor surface of the higher second floor is overlapped with the floor surface of the second floor is about 1.0 meter. The storage room provided using the underfloor part of the skip floor as described above is not included in the floor area in principle if the storage room meets the following conditions: the ceiling height thereof is not more than 1.4 meters; and the horizontal projected area thereof is less than $\frac{1}{2}$ of the corresponding floor area (second floor) and furthermore less than $\frac{1}{2}$ of the respective floor areas of the right below story (first floor) and the right above story (higher second floor). (This principle might differ from community to community).

[0042] The higher second floor includes: a stair hall 301; a Western-style room 302; and cabinets 303 and 304. The Western-style room 302 is provided so as to spread across the full width of the gable end wall 13 including a right below part of the ridge 11. The Western-style room 302 is used, for example, as a children's room. The ceiling of the Western-style room 302 and the cabinets 303 and 304 is a sloping ceiling having a boat bottom shape along the slope of the gable roof 12 (so-called "Ogami-ceiling (having a shape of hands when they are put together for praying)" or "Yakata-ceiling (having a Japanese residence shape)" in

Japanese), which is integrated with the attic space under the gable roof 12. The height of the ceiling is about 1.6 meters in the vicinity of the both end parts of the gable end wall 13, and is about 3.3 meters right below the ridge 11. The center part of the Western-style room 302 has the high ceiling height. Thus, when the Western-style room 302 is used as a children's room, it is possible to divide the Western-style room 302 by placing, for example, a bunk bed on the center part according to the growth of the children.

[0043] The higher second floor further leads to the attic space floor (LF) via a short flight of stairs 305 disposed substantially right below the ridge 11. The floor surface of the attic space floor is positioned about 1.5 meters higher than the floor surface of the higher second floor. The ceiling height of the second floor right below the attic space floor is about 2.5 meters. On the attic space floor, an attic storage space 401 is provided. The attic storage space 401, whose center part is right below the ridge 11, has a width of about 3.0 meters. The ceiling of the attic storage space 401 is also a sloping ceiling along the slope of the gable roof 12. The height of the ceiling is about 0.9 meter at both sides in the sloping direction of the roof, and is about 1.8 meters right below the ridge 11.

[0044] As to the heights of the respective parts of the building from the ground level in FIG. 5, the height of the floor surface of the first floor (1F) is about 0.5 meter, the height of the floor surface of the second floor (2F) is about 3.5 meters, the height of the floor surface of the higher second floor (H2F) is about 4.8 meters, the eaves height (i.e. the height to the upper face of a pole plate 15 that supports the roof truss) is about 6.5 meters, and the height to the ridge 11 as the topmost part is about 8.3 meters.

[0045] FIG. 7 is a diagram schematically illustrating the configuration of the floor surfaces of the respective stories of the house 1. In this way, by adopting the space configuration combining the skip floors having the heights of the floor surfaces each shifted by a half story in the direction of the ridge 11 with the sloping ceiling along the slope of the gable roof 12, it is possible to provide a house having high ceiling spaces vertically stacked as two stories along the gable end wall 13 (i.e. the living room 102 of the first floor and the Western-style room 302 of the higher second floor) while having, as the house itself, the standard two-story building height. These high ceiling spaces serve as rooms full of openness, which have the ceiling heights 1.3 to 1.5 times higher than those of the rooms provided in the standard two-story buildings. Furthermore, since the high ceiling spaces are connected to other rooms in a skipped manner, the inside of the entire house can give a feeling of spaciousness in the vertical direction.

[0046] The essential part of the present invention is a building frame to realize the above-described spaces. Hereinafter, a detail description is given on the building frame of the house 1 according to the embodiment.

[0047] When the roof truss frame having a triangle cross-section is placed on the wooden frame skeleton, a lower chord member 91 (also called as a "roof beam", a "flat beam" or a "tie beam") is generally laid as the base of the triangle so as to prevent both ends of the triangle from opening, as schematically shown in FIG. 8(a). Struts 92 and 93 are erected on the lower chord member 91 so as to support a ridge pole 94 placed on the vertex of the triangle and sloping beams 95 placed on the inclined sides of the triangle. However, adoption of this structure results in the

lower chord member **91** being provided across the ceiling part as a space right below the roof truss.

[0048] Taking into account the above problem, a configuration is adopted in the present invention, in which the ridge pole **94** is directly supported by a ridge supporting post **97** that is erected on a floor plane **96** of the floor right below the gable roof as shown in FIG. **8(b)**. Since the vertical load (compressive load and tensile load) that acts on the roof is borne by the ridge supporting post **97**, the planar structure constituting the pentagon is stably maintained. As a result, the lower chord member **91** of the triangle is allowed to be omitted.

[0049] In the house **1** according to this embodiment shown in FIGS. **9** and **10**, a building frame having a pentagon shape in front view is formed by: a floor plane **33** of the higher second floor (H2F) that is a floor right below the gable roof **12**; corner posts **23** respectively erected on four corners of the floor plane **33**; a pair of pole plates **15** facing each other to connect upper ends of the corner posts **23** in the ridge direction; a plurality of sloping beams **21** placed from the respective pole plates **15** to the ridge **11** so as to make a vertex of a triangle with an increasing degree of slope equal to each other; and a ridge pole (ridge purlin) **34** connecting upper ends of the sloping beams **21** in the direction of the ridge **11**. In this building frame, the gable end wall on the opposite side of the floor plane **33** may be connected to another part of the building to the extent that the building frame includes at least one gable end wall **13** that is positioned on the outer periphery of the building. The corner post **23** may be a through column erected from the first floor or may be a jointed column erected on the floor plane **33** of the higher second floor.

[0050] Also, both ends of the ridge pole **34** are directly supported by ridge supporting posts **17** that are erected, respectively: on the middle part of the side of the gable end wall **13** on the floor plane **33** of the higher second floor; and on the middle part of the opposite side, which is about **3** meters away from the middle part of the side of the gable end wall **13** along the ridge **11**. In this example, the lower ends of the ridge supporting posts **17** are erected on a floor beam **24** that surrounds the floor plane **33** of the higher second floor such that the floor beam **24** is a continued beam. On the other hand, the upper ends of the ridge supporting posts **17** are connected to the ridge pole **34** such that the ridge supporting posts **17** are continued posts. However, the lower ends of the ridge supporting posts **17** may be connected to the floor beam **24** such that the ridge supporting posts **17** are continued posts. Also, the upper ends of the ridge supporting posts **17** may be connected to the ridge pole **34** such that the ridge pole **34** is a continued pole (continued girder).

[0051] In this example, the length of the ridge supporting post **17** is **3.3** to **3.4** meters, and the cross-sectional shape thereof is a substantially square shape. When the length of the ridge supporting post **17** further increases, it is possible to improve wind resisting performance by making the cross-sectional shape of the ridge supporting post **17** a rectangle elongated in the direction of the ridge **11**. When the length of the floor plane **33** of the higher second floor in the direction of the ridge **11** exceeds **5** meters as a reference value, it is preferable that an additional ridge supporting post (not shown) is erected on the center part of the floor plane **33** so as to support the middle part of the ridge pole **34**.

[0052] Gable end side sub-pillars **19** are erected on both (left and right) sides of the ridge supporting post **17** of the

gable end wall **13**, respectively at an appropriate interval (in this example, about **1** meter) from the ridge supporting post **17**. Similarly to the ridge supporting post **17** of the gable end wall **13**, the lower ends of the gable end side sub-pillars **19** are erected on the floor beam **24** surrounding the floor plane **33** of the higher second floor such that the floor beam **24** is a continued beam.

[0053] On the other hand, the upper ends of the gable end side sub-pillars **19** are connected to the sloping beam **21** on the gable end wall **13** such that the gable end side sub-pillars **19** are continued pillars. However, the lower ends of the gable end side sub-pillars **19** may be connected to the floor beam **24** such that the gable end side sub-pillars **19** are continued pillars. Also, the upper ends of the gable end side sub-pillars **19** may be connected to the sloping beam **21** such that the sloping beam **21** is a continued beam.

[0054] Furthermore, a vertically long window **51** that reaches the gable height of the gable end wall **13** from the floor plane **33** of the higher second floor is provided between the ridge supporting post **17** of the gable end wall **13** and the respective gable end side sub-pillars **19**. Here, the “gable height” means at least a position higher than the line horizontally connecting the pole plates **15** (i.e. the base of the triangle of the roof truss; see FIG. **5**). In this configuration, since the lower chord member does not extend across the base of the roof truss, the window **51** is made so as to continue in the vertical direction without their middle parts being divided by the roof beam or other structural materials. By providing the tall window as described above in the center of the gable end wall **13**, a remarkably bright space with open feeling is realized inside the gable end wall **13**. When the window **51** can be opened and closed, the ventilation is also sufficient. Note that even when the opening surface of the window **51** is divided into a plurality of parts by frames and the like to glass the window **51**, it does not damage the continuity of the window **51** as a whole.

[0055] To the parts of the gable end wall **13** other than the window **51** (more specifically, to the wall surfaces with about **2** meter width, each of which is sandwiched between the gable end side sub-pillar **19** and the corner post **23** erected on one of both corners of the gable end wall **13**), appropriate short beams **22** are attached, and also reinforcing surface plates such as structural plywood are provided in a tense state. Thus, the window **51** is sandwiched between load-bearing walls **35** formed on the left and right side thereof. Therefore, the in-plane rigidity of the gable end wall **13** is improved, and accordingly the building frame including the gable roof **12**, which has a pentagon shape in front view, is further reinforced.

[0056] Furthermore, in the exemplarily shown house **1**, the floor plane **33** of the higher second floor (H2F) that supports the ridge supporting posts **17** and the gable end side sub-pillars **19** is provided so as to superimpose on a floor plane **32** of the second floor (2F) that is a lower floor shifted by a substantially half story. The floor beam **24** surrounding the floor plane **33** of the higher second floor is integrally connected to a floor beam **25** surrounding the floor plane **32** of the second floor via short posts **18** and reinforcing surface plates (not shown). In this way, a load-bearing wall **36** is formed between the higher second floor and the second floor. By adopting the double floor structure in which the floor beams **24** and **25** supporting the floor planes of the respective stories are vertically superimposed on each other, it is possible to further improve stability of the building frame

having a pentagon shape in front view while reducing the cross-sectional size of the members such as the floor beams **24** and **25**. The hatched parts in FIG. **10** indicate the load-bearing walls **35** and **36** of the gable end wall **13**. The floor plane of the attic space (LF) positioned higher than the higher second floor by a substantially half story is supported by a roof beam **16** that is laid at the height of the lower chord member of the roof truss (see FIG. **9**).

[0057] In the building frame having the gable end wall **13** whose rigidity is reinforced as described above, it is possible to extend the window **51** of the gable end wall **13** downward to the vicinity of the floor surface of the second floor. That is, when the load-bearing wall **36** provided between the floor plane **33** of the higher second floor and the floor plane **32** of the second floor is arranged so as to have the same width as the part above the higher second floor, it is possible to provide also a window **52** between the higher second floor and the second floor. The window **52** has a smaller height than, and the same width as, the window **51**. With the window **52**, the living room **102** of the first floor further gives a feeling of openness. Although the window **52** is structurally separated from the window **51** above the higher second floor by the floor beam **24** supporting the floor plane **33** of the higher second floor, the outer appearance can give the impression as if the window continues in the vertical direction with the same width.

[0058] FIG. **11** indicates another configuration example of the windows **51** and **52** and the load-bearing walls **35** and **36** that are provided on the gable end wall **13** of the building frame. In this example, two gable end side sub-pillars **19** are erected on each of the left and right sides of the ridge supporting post **17** substantially at the same interval (in this example, about 0.75 meter). Between them, four windows **51** are formed in total. Furthermore, between the floor plane **33** of the higher second floor and the floor plane **32** of the second floor, four windows **52** are formed in total so as to each have the same width as that of the corresponding upper window **51**. The total opening width of the windows **51** and **52** is about 3 meters, which is about $\frac{1}{2}$ of the width of the gable end wall **13**. The wall surface having about 1.5 meter width, which is sandwiched between the outer gable end side sub-pillar **19** and the corner post **23** of the corresponding corner, is a load-bearing wall **35** similarly to the example as described above.

[0059] In the building frame of the present invention in which the gable roof **12** is supported by the ridge supporting posts **17** and the load-bearing walls **35** provided on both side parts of the gable end wall **13**, it is possible to provide the tall window **51** in the middle of the gable end wall **13** having the width approximately not more than 6 meters such that the width of the window **51** is about $\frac{1}{2}$ or less of the width of the gable end wall **13** and that no lower chord member of roof truss passes across the window **51**.

[0060] Furthermore, in the building frame shown in FIG. **12**, the horizontal load-carrying capacity against wind power and the like of the whole frame is reinforced by attaching reinforcing surface plates **37** to the surface of the sloping roof. In the illustrated example, the reinforcing surface plates **37** are respectively attached to three parts in total so as to have a symmetry shape in both sloping directions with the ridge **11** being interposed therebetween. The three parts are constituted of: a part between the sloping beam **21** that is connected to the end part of the ridge **11** on the gable end wall **13** and the adjacent sloping beam **21** that is the second

sloping beam **21** counted from the gable end wall **13** side; a part between the second sloping beam **21** and the third sloping beam **21** counted from the gable end wall **13** side; and a part between the fourth sloping beam **21** and the fifth sloping beams **21** counted from the gable end wall **13** side (the fifth sloping beam **21** is a sloping beam **21** located on the opposite side of the floor plane **33** of the higher second floor as a beamless space). However, the respective locations of the reinforcing surface plates **37** other than those of the roof edge that are provided along the gable end wall **13** may be appropriately disposed depending on the size of the roof surface and/or the interval at which the sloping beams **21** are arranged.

[0061] The reinforcing surface plate **37** is made of structural plywood or the like. The reinforcing surface plate **37** is put between the facing sloping beams **21** so that two long sides thereof are engaged with respective receiving materials **38** that are attached on the sides of the facing sloping beams **21**. Further in some cases, the short sides of the reinforcing surface plate **37** may be engaged with appropriate receiving materials that are attached on the ridge pole **34** and/or the pole plate

[0062] Thus, the horizontal rigidity of the whole frame is reinforced by the horizontal component of the reinforcing surface plate **37** fixed on the roof surface in the inclined state. As a result, in this building frame, reinforcing members such as angle braces can be omitted, which are generally attached to the corners of the bottom surface of the roof truss (in this example, joined portions of the short beams **22** and the pole plates **15**). In this way, the beamless space formed above the higher second floor can be further a neat space.

[0063] The present invention is applied to a building frame of a part that is right below the ridge of a gable roof and that includes at least a gable end wall on one side in a building having a gable roof as at least a part of its roof. Thus, the present invention does not particularly limit the building frame other than the part to which the present invention is applied. The story corresponding to the "floor right below" the gable roof may substantially be the first floor, or may be the third floor or above. Also, the present invention may be applied not only to the building frame including a gable end wall that is bilaterally symmetrical with respect to the ridge, but also to the building frame including a gable end wall having a slightly asymmetrical shape. Furthermore, the present invention may be applied not only to the building frame having a wooden frame structure, but also to various similar wooden building frames such as a panel structure, a framing so-called "two-by-four system" and their composite structures. The specific shape or joining of respective components may also be modified without departing from the gist or essential characteristics of the present invention. Also, the use and the layout of respective parts of the building are not limited to those in the particular examples as described above.

DESCRIPTION OF REFERENCE NUMERALS

- [0064]** 1 House
- [0065]** 11 Ridge
- [0066]** 12 Gable roof
- [0067]** 13 Gable end wall
- [0068]** 15 Pole plate
- [0069]** 16 Roof beam
- [0070]** 17 Ridge supporting post

- [0071] 18 Short post
- [0072] 19 Gable end side sub-pillar
- [0073] 21 Sloping beam
- [0074] 23 Corner post
- [0075] 24 Floor beam
- [0076] 32 Floor plane of second floor
- [0077] 33 Floor plane of higher second floor
- [0078] 34 Ridge pole
- [0079] 51 Window
- [0080] 52 Window

1. A building frame having a pentagon shape in front view and including a gable end wall on at least one side of a gable roof included, as at least a part of a roof, in a wooden building, the building frame comprising:

- a floor plane provided on a floor right below the gable roof so as to have a rectangle shape in plan view;
- corner posts respectively erected on four corners of the floor plane;
- a pair of pole plates facing each other, each of the pair of pole plates connecting upper ends of the corner posts in a ridge direction;
- a plurality of sloping beams respectively placed from each of the pair of pole plates to a ridge of the gable roof at appropriate intervals in a manner of making a vertex of a triangle;
- a ridge pole connecting upper ends of the sloping beams;
- a ridge supporting post erected on the floor plane, on a position that is right below the ridge and that includes the gable end wall on the at least one side of the gable roof, the ridge supporting post supporting the ridge pole on the floor plane; and

gable end side sub-pillars erected on the floor plane, on both left and right sides of the ridge supporting post of the gable end wall at appropriate intervals so as to support a pair of sloping beams that is on the gable end wall out of the plurality of sloping beams, wherein a window with an opening area from the floor plane to a gable height of the gable end wall is provided between the ridge supporting post of the gable end wall and each of the gable end side sub-pillars, and the ridge supporting post bears vertical load that acts on the gable roof so as to form, on the floor plane, a beamless space where no lower chord member of a roof truss constituting the gable roof extends.

- 2. The building frame according to claim 1, wherein a reinforcing surface plate is provided, in a tense state, on each part sandwiched between one of the corner posts of the gable end wall and the corresponding one of the gable end side sub-pillars.
- 3. The building frame according to claim 1, wherein the floor plane of the floor right below the gable roof is supported by a floor beam of the floor right below the gable roof, the floor beam being provided to surround four sides of the floor plane, and a floor plane of a lower floor is provided lower than the floor plane of the floor right below the gable roof so as to be shifted by a substantially half story height or less, and the floor plane of the lower floor is supported by a floor beam of the lower floor.
- 4. The building frame according to claim 1, wherein a reinforcing surface plate is put between one of the pair of sloping beams on the gable end wall and an adjacent sloping beam thereto so that the reinforcing surface plate is attached to both the sloping beams.

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