

SPECIFICATION

Title of the Invention

LARGE-OPENING SASH

Field of the Invention

[0001]

The present invention relates to a sash, and particularly to a large-opening sash with the size of a sliding door (or sliding window) being set larger than a general sash.

Description of the Related Art

[0002]

Large-opening sashes that exhibit superiority in terms of view and design have been put into practical use, mainly in Europe (see Non-patent Literature 1), and are expected to be widely used in Asian regions including Japan in the future.

Such large-opening sashes tend to be heavy (e.g., 250 to 400 kg) in comparison with general Japanese sliding door due to the large size of individual sliding door (e.g., 3,000 to 3,500 mm in height/2,000 to 2,500 mm in width), and therefore the method that moves the sash by rotating the sash rollers attached to the sliding door over a rail laid on the lower surface of the window frame makes smooth opening and closing difficult.

Accordingly, there has been employed the so-called "abacus rail" method with sash rollers embedded in the lower

surface of the sash and a sliding door mounted thereon (see Patent Literature 1).

[0003]

Non Patent Literature 1 : Invisible Frame

Internet URL:<http://www.vitrocsa.ch/invisible-frame>

Search Date: November 27, 2015

Patent Literature1: WO 94/17275

Summary of the Invention

Problem to be solved by the Invention

[0004]

As has been described above, although demand for large-opening sashes is expected to expand also in Asia including Japan, they are fittings of an unprecedented category and therefore, in reality, the industry is currently depending on import from foreign (mainly European) countries.

Accordingly, they not necessarily satisfy climate and culture, or legal systems of Japan or other countries, and many problems are pointed in terms of waterproofness, durability, or the like.

[0005]

It is an object of the present invention, which has been made to solve a variety of problems with regard to existing large-opening sashes, to provide a structure of a large-opening sash that exhibits superior waterproofness, durability, or the

like.

Means for solving the Problem

[0006]

To achieve the aforementioned object, a large-opening sash described in claim 1 is characterized in including: a rectangular frame provided with a lower frame, an upper frame, and a pair of vertical frames, so as to be installed in a window aperture of a building; a plurality of sash rollers provided in the lower frame in a freely rotatable manner; a flat plate-like cover member covering the sash rollers; a plurality of apertures formed on the cover member to cause the upper ends of the sash rollers to protrude therefrom; a sliding door mounted on the cover member in a reciprocally movable manner; and a first gap filling member contacting an outer periphery of the sliding door, and a second gap filling member contacting an inner periphery of the sliding door, which are provided at the side of the rectangular frame, wherein at least one of the first gap filling member and the second gap filling member is made of a flexible rubber material.

[0007]

In addition, the large-opening sash described in claim 2 is characterized in including: a rectangular frame provided with a lower frame, an upper frame, and a pair of vertical frames, so as to be installed in a window aperture of a building; a plurality of sash rollers provided in the lower frame in a freely rotatable manner; a flat plate-like cover member covering the sash rollers; a plurality of apertures formed on the cover

member to cause the upper ends of the sash rollers to protrude therefrom; and a sliding door mounted on the cover member in a reciprocally movable manner, wherein the lower end of the outer surface of the sliding door has attached thereto a flexible water-stop packing that fills the gap between the sliding door and the lower frame.

[0008]

The large-opening sash described in claim 3 is characterized in including: a rectangular frame provided with a lower frame, an upper frame, and a pair of vertical frames, so as to be installed in a window aperture of a building; a plurality of sash rollers provided in the lower frame in a freely rotatable manner; a flat plate-like cover member covering the sash rollers; a plurality of apertures formed on the cover member to cause the upper ends of the sash rollers to protrude therefrom; a sliding door mounted on the cover member in a reciprocally movable manner, wherein the lower end of the outer surface of the sliding door has attached thereto an eave-shaped water drip covering the gap between the sliding door and the lower frame.

[0009]

The large-opening sash described in claim 4 is characterized in including: a rectangular frame provided with a lower frame, an upper frame, and a pair of vertical frames, so as to be installed in a window aperture of a building; a plurality of sash rollers provided in the lower frame in a freely rotatable manner; a flat plate-like cover member covering the

sash rollers; a plurality of apertures formed on the cover member to cause the upper ends of the sash rollers to protrude therefrom; a sliding door mounted on the cover member in a reciprocally movable manner; and a lower frame receiving member provided below the lower frame, wherein the lower frame receiving member is made of integrally molded aluminum, and includes: barrier parts provided in parallel and spaced apart from the indoor side partition of the lower frame so as to block water overflowed from the lower frame not to flow out into the room; a plurality of bolt storage parts for storing level adjusting bolts; and an eave-shaped water drip part that guides the water discharged from the discharge port of the lower frame to the outside of the room.

[0010]

The large-opening sash described in claim 5 is characterized in including: a rectangular frame provided with a lower frame, an upper frame, and a pair of vertical frames, so as to be installed in a window aperture of a building; a plurality of sash rollers provided in the lower frame in a freely rotatable manner; a flat plate-like cover member covering the sash rollers; a plurality of apertures formed on the cover member to cause the upper ends of the sash rollers to protrude therefrom; a sliding door mounted on the cover member in a reciprocally movable manner; an aluminum protruding edge part formed on the rear end frame of the sliding door; a storage space provided in the protruding edge part; and a reinforcing steel member inserted in the storage space.

[0011]

The large-opening sash described in claim 6 is characterized in including: a rectangular frame provided with a lower frame, an upper frame, and a pair of vertical frames, so as to be installed in a window aperture of a building; a plurality of sash rollers provided in the lower frame in a freely rotatable manner; a flat plate-like cover member covering the sash rollers; a plurality of apertures formed on the cover member to cause the upper ends of the sash rollers to protrude therefrom; a sliding door mounted on the cover member in a reciprocally movable manner; and a first door end grip-shaped member and a second door end grip-shaped member attached to the leading end frame of the sliding door, wherein the first door end grip-shaped member is provided at one side of the sliding door, and the second door end grip-shaped member is provided at the other side of the sliding door, a front-end engaging part of the first door end grip-shaped member and a front-end engaging part of the second door end grip-shaped member are coupled by a pair of heat-insulating members provided in a manner spaced apart from each other by a constant interval, and as a result, both sides of the sliding door are sandwiched by the first door end grip-shaped member and the second door end grip-shaped member.

Effects of the Invention

[0012]

In the case of the large-opening sash described in claim

1, at least one of the first gap filling member and the second gap filling member is made of a flexible rubber material, whereby it is possible to realize high airtightness and waterproofness between the sliding door and the periphery thereof.

[0013]

In the case of the large-opening sash described in claim 2, a flexible water-stop packing that fills the gap between the sliding door and the lower frame is provided on the lower end of the outer surface of the sliding door, thereby making it difficult for rainwater to infiltrate in the lower frame from the gap, and allowing for effectively preventing water from overflowing from the lower frame and flowing into the room.

[0014]

In the case of the large-opening sash described in claim 3, an eave-shaped water drip covering the gap between the sliding door and the lower frame is attached to the lower end of the outer surface of the sliding door, thereby making it difficult for rainwater to infiltrate in the lower frame from the gap, and allowing for effectively preventing water from overflowing from the lower frame and flowing into the room.

[0015]

In the case of the large-opening sash described in claim 4, a lower frame receiving member provided below the lower frame includes barrier parts provided in parallel and spaced apart from each other by a constant interval between the sliding door and the indoor side partition of the lower frame, whereby it

is possible to effectively prevent water from flowing out into the room even when water has leaked from the lower frame.

In addition, the bolt storage parts are integrally included, whereby it becomes possible to load the level adjusting bolts without bothering to connect an attachment frame member for mounting the level adjusting bolts.

[0016]

In the case of the large-opening sash described in claim 5, a storage space is preliminarily provided in the aluminum protruding edge part formed on the rear end frame of the sliding door, with a structure provided with a reinforcing steel member inserted therein, which allows for securing required stiffness without degrading the appearance, thereby sufficiently enduring the wind pressure of a typhoon or the like.

[0017]

In the case of the large-opening sash mentioned in claim 6, a first door end grip-shaped member and a second door end grip-shaped member sandwiching both sides of the sliding door are coupled by a pair of heat-insulating members provided in a manner spaced apart from each other by a constant interval, and it is difficult for the door end grip-shaped member to open outward even when a large force is applied on either one of the door end grip-shaped members in the closing direction, thereby allowing for reducing the risk of falling off from the leading end frame of the sliding door.

Best mode for carrying out the Invention

[0018]

FIGs. 1 and 2 are perspective views illustrating the basic structure of a large-opening sash 10 according to the present invention, FIGs. 3 and 4 are vertical cross-sectional views, and FIG. 5 is a horizontal cross-sectional view.

As can be seen in the drawings, the large-opening sash 10 includes a rectangular frame 15 surrounded by a lower frame 11, an upper frame 12, and a pair of vertical frames 13 and 14, all of which are made of aluminum.

[0019]

In addition, the rectangular frame 15 has installed thereto an outside-moving sliding door 16 provided outside the room, and an inside-moving sliding door 17 provided inside the room.

The outside-moving sliding door 16 and inside-moving sliding door 17 include a pair-glass 20 formed by a pair of glasses 19 and 19 which are separated by a constant interval by a spacer 18. The four edges of the pair-glass 20 have attached thereto aluminum frame members (leading end frame, rear end frame, upper end frame and lower end frame).

[0020]

The lower frame 11 is partitioned by a center partition 30 into an outdoor area and an indoor area.

In addition, a plurality of sash rollers 31 forming an abacus rail are provided at the outdoor side and the indoor side of the lower frame 11 in a freely rotatable manner (FIGs. 3 and 4).

Each sash roller 31 is covered with an aluminum cover member 32, with the upper end of the sash roller 31 protruding out from an aperture 33 provided on the cover member 32.

[0021]

The outside-moving sliding door 16 is made slidable rightward and leftward (opening and closing direction) by mounting the outside-moving sliding door 16 on the sash roller 31 provided at the outdoor side and inserting the upper end thereof into a rail groove 36 between an outdoor side partition 34 and a center partition 35 of the upper frame 12.

In addition, inside-moving sliding door 17 is made slidable rightward and leftward (opening and closing direction) by mounting inside-moving sliding door 17 on the sash roller 31 provided at the indoor side and inserting the upper end into a rail groove 38 between an indoor side partition 37 and the center partition 35 of the upper frame 12.

[0022]

The aforementioned configuration is almost common with the conventional large-opening sash.

In the following, the characteristics of the present invention will be described in comparison with the conventional large-opening sash.

[0023]

[1] Improvement of gap filling member

As illustrated in FIGs. 6 and 7, in the case of a conventional large-opening sash 100, the inner surface of the outdoor side partition 102 of the lower frame 101, the outer

surface and the inner surface of the center partition 103, and the inner surface of the indoor side partition 104 of the lower frame 101 have provided thereon an elongated gap filling member 105 made of mohair, in the longitudinal direction of the lower frame 101.

[0024]

The gap filling member 105 is not only provided on the lower frame 101, but also on the inner surface of the indoor side partition of the upper frame, the outer surface and the inner surface of the center partition of the upper frame, and the inner surface of the outdoor side partition of the upper frame, in a similar manner (illustration omitted).

In addition, the gap filling member 105 is also provided on the inner surface of the outdoor side partition of each vertical frame, the outer surface and the inner surface of the center partition of each vertical frame, and the inner surface of the indoor side partition of each vertical frame in a similar manner (illustration omitted).

[0025]

As thus described, providing the gap filling member 105 made of mohair at the rectangular frame side, when the outside-moving sliding door 106 and the inside-moving sliding door 107 are placed on the closed position, causes to abut both surfaces of the periphery, thereby suppressing contact with fresh air.

In addition, the fact that the gap filling member 105 is made of mohair minimizes the resistance at the time of opening

and closing, thereby ensuring smooth movement of the outside-moving sliding door 106 and the inside-moving sliding door 107.

However, on the other hand, lack of airtightness and waterproofness comes under question because the entire gap filling member 105 is made of mohair, i.e., a fiber material, which has actually been causing rain to infiltrate into the room in a region with a large annual amount of rainfall such as Japan.

[0026]

By contrast, in the case of the large-opening sash 10 according to the present invention, as illustrated in FIGs. 8 and 9, although the inner surface of the outdoor side partition 40 of the lower frame 11 and the inner surface of the center partition 30 have provided thereon a first gap filling member 41 conventionally made of mohair, the outer surface of the center partition 30 and the inner surface of the indoor side partition 42 of the lower frame 11 have provided thereon an elongated second gap filling member 43 made of rubber, in the longitudinal direction of the lower frame 11.

[0027]

In addition, not only the lower frame 11 but also the outer surface of the center partition 35 of the upper frame 12 and the inner surface of the indoor side partition 37 of the upper frame 12 has provided thereon the second gap filling member 43 made of rubber in place of conventional mohair, in the longitudinal direction of the upper frame 12 (see FIGs. 3 and 4).

By contrast, the inner surface of the outdoor side partition 34 and the inner surface of center partition 35 of the upper frame 12 have provided thereon the first gap filling member 41 made of mohair.

[0028]

In addition, also the inner surface of the indoor side partition 85 of a vertical frame 13 has provided thereon the second gap filling member 43 made of rubber, in the height direction of the vertical frame 13 (see FIG. 5).

By contrast, the inner surface of a center partition 86 of the vertical frame 13 has provided thereon the first gap filling member 41 made of mohair.

[0029]

Furthermore, also the outer surface of a center partition 87 of a vertical frame 14 has provided thereon the second gap filling member 43 made of rubber, in the height direction of the vertical frame 14 (see FIG. 5).

By contrast, the inner surface of the outdoor side partition 88 of the vertical frame 14 has provided thereon the first gap filling member 41 made of mohair.

[0030]

The second gap filling member 43, including a pair of flexible contact strips 44, as illustrated in FIG. 10, may exhibit high airtightness and waterproofness because the front end of each contact strip 44 being comes in close contact with an inner periphery of the outside-moving sliding door 16 and also in close contact with the inner periphery of the

inside-moving sliding door 17.

The second gap filling member 43 is fixed by a base end 45 thereof being inserted within a concave groove 46 formed on the outer surface, or the like, of the center partition 30.

Note that the outdoor side of each sliding door has provided thereon the first gap filling member 41 conventionally made of mohair, whereby slidability of the sliding door is not degraded.

[0031]

[2] Installation of water-stop packing

Conventionally, as illustrated in FIG. 7, there has not been taken any waterproofing measures for a gap 108 between the outdoor side lower end of the inside-moving sliding door 107 and the lower frame 101 (center partition 103), and therefore it has resulted in a structure that allows rainwater hitting the outer surface of the inside-moving sliding door 107 to easily infiltrate into the lower frame 101.

Although the structure is originally intended such that the rainwater which has infiltrated into the lower frame 101 in the aforementioned manner is discharged outside the room from a discharge port 109 provided on the lower frame 101, the lower frame 101 is easily filled with water when there is a large amount of rainfall, and there has been a possibility that the overflowed water may flow into the room from the gap 110 between the indoor side lower end of the inside-moving sliding door 107 and the indoor side partition 104 of the lower frame 101.

[0032]

By contrast, in the case of the large-opening sash 10 according to the present invention, there is provided a water-stop packing 50 to fill a gap 48 between the outdoor side lower end of the inside-moving sliding door 17 and the lower frame 11 (center partition 30), as illustrated in FIG. 9.

The water-stop packing 50 is made of a flexible rubber material and provided in the longitudinal direction of the lower end of the outer surface of the inside-moving sliding door 17 as illustrated in FIGs. 1 and 2.

[0033]

The water-stop packing 50 includes a flexible contact strip 51 with a J-shaped cross-section, as illustrated in FIG. 10, and is capable of effectively preventing rainwater from infiltrating into the lower frame 11 from the gap 48 between the center partition 30 and the lower end of the outer surface of the inside-moving sliding door 17 because the front end of the contact strip 51 is in close contact with the top surface of the center partition 30.

The water-stop packing 50 has a base end 52 thereof inserted within a concave groove 53 formed on the lower end of the outer surface of the inside-moving sliding door 17.

[0034]

[3] Installation of aluminum water drip

Conventionally, as illustrated in FIG. 6, there has not been taken any waterproofing measures for a gap 111 between the lower end of the outer surface of the outside-moving sliding door 106 and the lower frame 101 (outdoor side partition 102),

and therefore it has resulted in a structure that allows rainwater hitting the outer surface of the outside-moving sliding door 106 to easily infiltrate into the lower frame 101.
[0035]

By contrast, in the case of the large-opening sash 10 according to the present invention, there is provided, as illustrated in FIG. 8, an aluminum water drip 56 at the lower end of the outer surface of the outside-moving sliding door 16 to prevent infiltration of rainwater from a gap 55 between the lower end of the outer surface of the outside-moving sliding door 16 and the outdoor side partition 40 of the lower frame 11.

The water drip 56 has an eave-shaped inclined surface 57 and, as illustrated in FIG. 1, the inclined surface 57 is provided in the longitudinal direction of the lower end of the outer surface of the outside-moving sliding door 16 so as to cover the gap 55. Accordingly, when the window is closed, it is possible to effectively prevent rainwater from infiltrating into the lower frame 11 from the gap 55.

[0036]

[4] Improvement of lower frame receiving member

As illustrated in FIGs. 6 and 7, in the conventional the large-opening sash 100, a lower frame receiving member 112 has been provided below the lower frame 101 to receive the lower frame 101.

The lower frame receiving member 112, which is made of an aluminum extrusion material, includes an eave-shaped water

drip part 113 to guide the rainwater discharged from the discharge port 109 of the lower frame 101 to the outside of the room.

Additionally, to prevent external temperature from being transferred into the room, polyamide heat-insulating members 114 are respectively provided at a position below the outside-moving sliding door 106 and at a position below the inside-moving sliding door 107.

[0037]

Although a lower frame receiving member 60 is provided also in the case of the large-opening sash 10 according to the present invention to receive the lower frame 11 as illustrated in FIGs. 8 and 9, its shape and structure has evolved, and has been subjected to multi-functionalization as well, in comparison with the conventional lower frame receiving member 112 as illustrated in FIG. 11.

[0038]

In other words, although the lower frame receiving member 60 is integrally molded by aluminum extrusion, similarly to the conventional method, it includes, besides an eave-shaped water drip part 62 that guides the rainwater discharged from a discharge port 61 of the lower frame 11 to the outside of the room, a barrier part (rising part) 63 to prevent the water which has leaked from the lower frame 11 from infiltrating into the room.

The barrier part 63 is formed to be in parallel with the indoor side partition 42 of the lower frame 11 and spaced apart

from each other by a constant interval. In addition, the gap between the barrier part 63 and the indoor side partition 42 of the lower frame 11 is filled with a backer member 68 and a sealing member 69 made of silicon.

Accordingly, even in the case where water in the lower frame 11 has leaked, the barrier part 63 and the sealing member 69 block rainwater and therefore it is possible to prevent water from infiltrating into the room.

[0039]

In addition, since a plurality of bolt storage parts 64 and a bolt derivation port 89 are included, providing a level adjusting bolt 65 thereto allows for adjusting the level when mounting the large-opening sash 10 on the window aperture of a building.

The conventional lower frame receiving member 112 is not provided with such bolt storage parts or a bolt derivation port, and therefore it is necessary to connect a separate attachment frame member to mount the level adjusting bolt (illustration omitted), which has brought about the increased number of parts, and increased complexity of work flow.

[0040]

In addition, polyamide heat-insulating members 66 are respectively provided doubly at a position below the outside-moving sliding door 16 and at a position below the inside-moving sliding door 17 (see FIGs. 8 and 9).

Each of heat-insulating member 66, having an elongated belt-like shape, is fixedly provided in the longitudinal

direction of the lower frame 11, by causing both ends thereof to engage with an engaging groove 67 provided at the side of the lower frame receiving member 60.

As thus described, providing a pair of heat-insulating members 66 up and down in a manner constantly spaced apart from each other improves the heat-insulation effect in comparison with the case of providing only a single heat-insulating member 114 and also allows for suppressing deformation of the lower frame receiving member 60.

[0041]

[5] Improvement of mating part

In the case of the foreign-made large-opening sash 100, protruding edge parts of the mating part at which the rear end frame of the outside-moving sliding door 106 and the rear end frame of the inside-moving sliding door 107 overlap are respectively made of an aluminum material only, and may not be endurable against the wind pressure of a typhoon or the like due to lack of strength.

Therefore, conventionally, measures have been taken, as illustrated in FIG. 12, such as notching a protruding edge part 120 at the side of the outside-moving sliding door 106 and a protruding edge part 122 at the side of the inside-moving sliding door 107 and press-fitting a steel plate 124 inside to increase the stiffness of the mating part.

Accordingly, although the stiffness has been increased without question, it has resulted in increase of fabrication work and degradation of the appearance.

[0042]

By contrast, in the case of the large-opening sash 10 according to the present invention, there is provided a structure, as illustrated in FIG. 13, in which a storage space 72 is preliminarily provided to aluminum protruding edge parts 70 and 71 provided in the mating part of the outside-moving sliding door 16 and the inside-moving sliding door 17 with a steel plate 73 stored therein for reinforcement. The upper end of the storage space 72 is covered with an aluminum cover member (not illustrated).

As a result, it is possible to secure required stiffness without degrading the appearance, thereby allowing for sufficiently enduring against the wind pressure of a typhoon or the like.

[0043]

[6] Improvement of arrangement of heat-insulating member provided at doorstep part of sliding door

When opening and closing the sash, although the user generally puts a hand on the door end grip-shaped member provided in the vicinity of the doorstep part of the outside-moving sliding door or the inside-moving sliding door and pulls it in a required direction, the weight of the sliding door itself is heavy in the case of a large-opening sash and therefore a large load is supposed to be applied on the joint part of the door end grip-shaped member and the leading end frame of the pair glass.

[0044]

FIG. 14 illustrates the doorstep part of the outside-moving sliding door 106 in the conventional large-opening sash 100 in which, as illustrated in the drawing, a front-end engaging part 131 of an outdoor side door end grip-shaped member 130 and a front-end engaging part 133 of an indoor side door end grip-shaped member 132 are coupled by a single heat-insulating member 134, and the surface of a leading end frame 137 of a pair glass 135 (a pair of glasses 136 and 136) is sandwiched between the outdoor side door end grip-shaped member 130 and the indoor side door end grip-shaped member 132. The leading end frame 137 of the pair glass 135, the outdoor side door end grip-shaped member 130, and the indoor side door end grip-shaped member 132 are fixed by adhesion.

Although illustration is omitted, a doorstep part of the inside-moving sliding door 107 has a similar structure.

[0045]

As thus described, since there has conventionally been only a single heat-insulating member 134 connecting the front-end engaging part 131 of the outdoor side door end grip-shaped member 130 and the front-end engaging part 133 of the indoor side door end grip-shaped member 132, application of a large force to either the outdoor side door end grip-shaped member 130 or the indoor side door end grip-shaped member 132 in the closing direction makes it easy for the door end grip-shaped member to open outward and, as a result, there has been a risk of falling off from the leading end frame 137 of the pair glass 135.

[0046]

By contrast, in the case of the large-opening sash 10 according to the present invention, a front-end engaging part 76 of an outdoor side door end grip-shaped member 75 and a front-end engaging part 78 of an indoor side door end grip-shaped member 77 of the outside-moving sliding door 16 are coupled by two polyamide heat-insulating members 79 and 80, as illustrated in FIG. 15.

Each of the heat-insulating members 79 and 80, having an elongated belt-like shape, is fixedly provided in the height direction of the outside-moving sliding door 16 by causing both ends thereof to engage with an engaging groove provided at the side of the front-end engaging part 76 and front-end engaging part 78.

The vicinity of the doorstep part of the inside-moving sliding door 17 also has a similar structure (see FIG. 5).

The reference numeral 81 in the drawing indicates a doorstep rubber.

[0047]

As thus described, since the pair of heat-insulating members 79 and 80 are provided in a manner spaced apart from each other by a constant interval, thereby coupling the front-end engaging part 76 of the outdoor side door end grip-shaped member 75 and the front-end engaging part 78 of the indoor side door end grip-shaped member 77 of the outside-moving sliding door 16, it becomes difficult for the door end grip-shaped member to open outward even when a large force is

applied to either the outdoor side door end grip-shaped member 75 or the indoor side door end grip-shaped member 77 in the closing direction, thereby eliminating the risk that the outdoor side door end grip-shaped member 75 and the indoor side door end grip-shaped member 77 may fall off from the leading end frame 82 of the pair-glass 20.

In addition, it also becomes possible to further increase the heat-insulation effect by providing a pair of heat-insulating members 79 and 80 in a manner spaced apart from each other by a constant interval mutually.

[0048]

Although there has been exemplified the large-opening sash 10 including the outside-moving sliding door 16 and the inside-moving sliding door 17 in the foregoing description, the present invention is not limited thereto and may be widely applied to a large-opening sash having one, alternately three or more sliding door installed in a rectangular frame.

When installing three or more sliding door, a plurality of internal partitions are formed in the lower frame and the upper frame, whereby the lower frame and the upper frame are partitioned into three or more areas. Subsequently, respective areas in the lower frame are respectively provided with sash rollers and cover members dedicated for each sliding door.

[0049]

In addition, although the present invention is preferable for a so-called large-opening sash with the sliding door formed

with a larger dimension than a sliding door of a general sash as describe above, there is neither an explicit criterion as to whether or not a sash is large, nor a necessity to limit the size

In summary, the present invention may be widely applied to an abacus rail type sash having sash rollers embedded in the lower frame.

In addition, it is assumed that "sash roller" includes a spherical ball bearing freely rotatably attached to the lower frame.

[0050]

The large-opening sash 10 has provided therein a pair of polyamide or the like heat-insulating members 90 and 91 in the longitudinal direction also at the side of the rectangular frame 15 side including the lower frame 11, the upper frame 12, the vertical frame 13, and the vertical frame 14, as illustrated in FIGs. 3 to 5, 8, 9 and 15, with a constant distance being secured between each other, whereby it is possible to exhibit a high heat-insulation effect.

[0051]

In the aforementioned case, although both of the heat-insulating members 90 and 91 provided in each frame have a same curved shape, and respective concave parts are provided in opposite directions, the configuration of the heat-insulating member of the rectangular frame 15 is not limited thereto.

For example, as illustrated in FIGs. 16 to 21, one of the

heat-insulating members (heat-insulating member 91 located outward in the drawing) may be formed as an unbent flat plate-like heat-insulating member 92. Although illustration is omitted, both heat-insulating members may be formed as flat plate-like heat-insulating members.

[0052]

In addition, although there has been illustrated an example of the large-opening sash 10 in which each of the sash rollers 31 is supported by an individual axis 93 and a bearing 94 in a freely rotatable manner, as illustrated in FIGs. 3, 4, and 8 to 10, the present invention is not limited to the configuration of such a sash roller.

[0053]

For example, as illustrated in FIGs. 16 to 19, there may be a configuration that causes a common axis 95 to penetrate through two sash rollers 31 and 31 provided side-by-side and supports the axis by a common bearing 96 in a freely rotatable manner. As a result, it becomes possible to simplify the configuration and to smoothen the movement of the sliding door.

Brief Description of Drawings

[0054]

FIG. 1 is a perspective view illustrating basic structure of a large-opening sash according to the present invention;

FIG. 2 is a partial perspective view illustrating a basic structure of the large-opening sash according to the present invention;

FIG. 3 is a vertical cross-sectional view illustrating a basic structure of an outside-moving sliding door of the large-opening sash according to the present invention;

FIG. 4 is a vertical cross-sectional view illustrating a basic structure of an inside-moving sliding door of the large-opening sash according to the present invention;

FIG. 5 is a horizontal cross-sectional view illustrating a basic structure of the large-opening sash according to the present invention;

FIG. 6 is a partial vertical cross-sectional view illustrating the structure of a lower part (outside-moving sliding door side) of a conventional large-opening sash;

FIG. 7 is a partial vertical cross-sectional view illustrating the structure of the lower part (inside-moving sliding door side) of a conventional large-opening sash;

FIG. 8 is a partial vertical cross-sectional view illustrating the structure of the lower part (outside-moving sliding door side) of the large-opening sash according to the present invention;

FIG. 9 is a partial vertical cross-sectional view illustrating the structure of the lower part (inside-moving sliding door side) of the large-opening sash according to the present invention;

FIG. 10 is an enlarged partial vertical cross-sectional view illustrating the structure of the lower part of the large-opening sash according to the present invention;

FIG. 11 is a cross-sectional view illustrating the

structure of lower frame receiving member according to the present invention;

FIG. 12 is a partial horizontal cross-sectional view illustrating the structure of a mating part of a conventional large-opening sash;

FIG. 13 is a partial horizontal cross-sectional view illustrating the structure of a mating part of the large-opening sash according to the present invention;

FIG. 14 is a partial horizontal cross-sectional view illustrating the structure of a doorstop part of a conventional large-opening sash;

FIG. 15 is a partial horizontal cross-sectional view illustrating the structure of a doorstop part of the large-opening sash according to the present invention;

FIG. 16 is a vertical cross-sectional view corresponding to FIG. 3 and illustrating an exemplary variation of the configuration of the heat-insulating member at the rectangular frame side and the configuration of the sash roller;

FIG. 17 is a vertical cross-sectional view corresponding to FIG. 4 and illustrating an exemplary variation of the configuration of the heat-insulating member at the rectangular frame side and the configuration of the sash roller;

FIG. 18 is a partial vertical cross-sectional view corresponding to FIG. 8 and illustrating an exemplary variation of the configuration of the heat-insulating member at the rectangular frame side and the configuration of the sash roller;

FIG. 19 is a partial vertical cross-sectional view

corresponding to FIG. 9 and illustrating an exemplary variation of the configuration of the heat-insulating member at the rectangular frame side and the configuration of the sash roller;

FIG. 20 is a horizontal cross-sectional view corresponding to FIG. 5 and heat-illustrating an exemplary variation of the configuration of the insulating member at the rectangular frame side; and

FIG. 21 is a partial horizontal cross-sectional view corresponding to FIG. 15 and illustrating an exemplary variation of the configuration of the insulating member at the rectangular frame side.

Explanation of references

[0055]

- 10 large-opening sash
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- 12 upper frame
- 13 vertical frame
- 14 vertical frame
- 15 rectangular frame
- 16 outside-moving sliding door
- 17 inside-moving sliding door
- 18 spacer
- 19 glass
- 20 pair glass
- 30 center partition
- 31 sash roller

32 cover member
33 aperture
34 outdoor side partition of upper frame
35 center partition of upper frame
36 rail groove of upper frame
37 indoor side partition of upper frame
38 rail groove of upper frame
40 outdoor side partition of lower frame
41 first gap filling member
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43 second gap filling member
44 contact strip
50 water-stop packing
56 water drip
60 lower frame receiving member
62 water drip part
63 barrier part
64 bolt storage part
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75 outdoor side door end grip-shaped member
77 indoor side door end grip-shaped member
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80 heat-insulating member

- 82 leading end frame
- 90 curved heat-insulating member at rectangular frame
side
- 91 curved heat-insulating member at rectangular frame
side
- 92 flat plate-like heat-insulating member at
rectangular frame side
- 93 individual axis of each sash roller
- 94 individual bearing of each sash roller
- 95 common axis between a pair of sash rollers
- 96 common bearing between a pair of sash rollers

CLAIMS

1. A large-opening sash comprising:

a rectangular frame provided with a lower frame, an upper frame, and a pair of vertical frames, so as to be installed in a window aperture of a building;

a plurality of sash rollers provided in the lower frame in a freely rotatable manner;

a flat plate-like cover member covering the sash rollers;

a plurality of apertures formed on the cover member to cause the upper ends of the sash rollers to protrude therefrom;

a sliding door mounted on the cover member in a reciprocally movable manner; and

a lower frame receiving member provided below the lower frame, wherein

the lower frame receiving member is made of integrally molded aluminum, and includes:

barrier parts provided in parallel and spaced apart from sliding doorthe indoor side partition of the lower frame, so as to block water overflown from the lower frame not to flow out into the room;

a plurality of bolt storage parts for storing level adjusting bolts; and

an eave-shaped water drip part that guides the water discharged from the discharge port of the lower frame to the outside of the room.