

VENTILATION FRAME

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a ventilation frame integrated to a shoji (a light-transmitting sliding door) in a style in which it is sandwiched between an upper frame or a lower frame and a panel for introducing outside air as necessary as shown by Fig. 13.

2. Description of the Related Art

As disclosed in JP-A-62-171736U, according to a ventilation frame sandwiched between an upper frame or a lower frame of a shoji and a panel of glass or the like, there is constructed a structure in which outside air introducing ports are formed in an outdoor facing piece and an indoor facing piece and a plate formed with ventilation ports is arranged between the two facing pieces slidably along either of the facing pieces. Introduction of outside air is realized when the ventilation ports of the plate coincide with the outside air introducing ports of either of the facing pieces and outside air is cut when the ventilation ports are away from the outside air introducing ports.

The ventilation frame is sandwiched between the upper frame or the lower frame and the panel in a form in which

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it is cut in accordance with a dimension of the panel within a section in the longitudinal direction in order to deal with a difference in a width dimension of the shoji, that is, a width dimension of the panel. According to the above-described conventional ventilation frame shown by Fig. 14, since the outside air introducing ports are formed at the outdoor facing piece exposed to the outdoor side and the indoor facing piece exposed to the indoor side, cutting portions L are restricted to portions where the outside air introducing ports are not formed and the ventilation frame cannot be cut at arbitrary positions.

Accordingly, the width direction of the panel which can be dealt with by the ventilation frame, is limited to a range up to a length produced by cutting a total length of a section capable of cutting the ventilation frame from a total length of the ventilation frame. Therefore, in order to deal with a panel having an arbitrary width dimension, a plurality of kinds of ventilation frames having different lengths of sections capable of cutting short the ventilation frames need to prepare and time and labor and cost are required in fabrication, further, the inventory control becomes complicated.

Further, a ventilation frame is held at an upper end or a lower end of an upper frame or a lower frame. Therefore, when a depth of the ventilation frame differs

from a depth of the upper frame or the lower frame, the ventilation frame cannot be held thereby. Therefore, the depth of the ventilation frame needs to unify to the depth of the upper frame or the lower frame. However, the depths of the upper frame and the lower frame are determined in accordance with a plate thickness of a panel, for example, in accordance with the panel which is constituted by single plate glass or double glazing. A plurality of kinds of ventilation frames having different depths need to prepare in order to deal with a plurality of kinds of upper frames or lower frames having different depths.

In addition thereto, when a ventilation frame is used in a shoji facing outdoors, in introducing outside air, not only rain water may be blown indoors, in addition, there poses a problem of invasion of insects and invasion of dust and dirt.

SUMMARY OF THE INVENTION

In view of the above-described background, according to the invention, there is proposed a ventilation frame capable of being cut at an arbitrary position in a longitudinal direction and capable of dealing with an upper frame or a lower frame having a different depth.

According to a first aspect of the invention, a depth piece having ventilation ports is formed at least either of a first shape having an outdoor facing piece and a second

shape having an indoor facing piece and an opening and closing plate for switching the ventilation ports in an opened state and in a closed state is supported movably by at least either of the first shape and the second shape by which there is no need of forming outside air introducing ports at the outdoor facing piece and the indoor facing piece and the ventilation frame can be cut at an arbitrary position in the longitudinal direction.

The first shape and the second shape are combined such that a lower end portion of the outdoor facing piece is disposed above a lower end portion of the indoor facing piece and gaps are produced between the lower end portion of the outdoor facing piece and a lower end portion of the second shape and between an upper end portion of the indoor facing piece and an upper end portion of the first shape.

A space between the lower end portion of the outdoor facing piece and the lower end portion of the second shape and a space between the upper end portion of the indoor facing piece and the upper end portion of the first shape, are made continuous in the longitudinal direction in the opened state and respectively constitute an outside air introducing port on the outdoor side and an outside air introducing port on the indoor side. Outside air introduced from the outdoor outside air introducing port into the ventilation frame is taken indoors from the indoor

outside air introducing port via the ventilation ports of the depth piece.

By taking the outside air from the space between the lower end portion of the outdoor facing piece and the lower end portion of the second shape into the ventilation frame and taking the outside air from the space between the upper end portion of the indoor facing piece and the upper end portion of the first shape to the indoor side, there is no need of forming the outside air introducing ports in the outdoor facing piece and the indoor facing piece and accordingly, there is no restriction of a cutting position for cutting the ventilation frame except a position of a knob connected to the opening and closing plate for operating, for example, movement of the opening and closing plate and the ventilation frame can be cut at an arbitrary position in the longitudinal direction.

By cutting the ventilation frame at an arbitrary position, one kind of the ventilation frame can deal with a panel having an arbitrary width dimension, fabrication and inventory control thereof is simplified and a reduction in costs respectively required therefor is achieved.

There is a case in which the opening and closing plate is supported movably in the longitudinal direction along the depth piece as specified in a second aspect of the invention and there is a case in which the opening and

closing plate is supported movably around an axis in the longitudinal direction as specified in a third aspect of the invention. According to the case of the second aspect of the invention, the opening and closing plate is formed with ventilation ports capable of coinciding with the ventilation ports of the depth piece. According to the case of the third aspect of the invention, a blind plate is used for the opening and closing plate since all of the ventilation ports of the depth piece need to close simultaneously when the opening and closing plate is closed.

The opening and closing plate according to the second aspect of the invention opens the ventilation ports of the depth piece when the ventilation ports of the opening and closing plate coincide with the ventilation ports of the depth piece and the opening and closing plate according to the third aspect of the invention opens the ventilation ports of the depth piece in the opened state to thereby communicate the outside air introducing port on the outdoor side with the outside air introducing port on the indoor side.

Blowing of rain water caused by opening the space between the lower end portion of the outdoor facing piece and the lower end portion of the second shape, is prevented by forming drip pieces at faces of the outdoor facing piece and the indoor facing piece opposed to each other as

specified in a fourth aspect of the invention. The drip pieces also operate to promote out-of-plane rigidities of the outdoor facing piece and the indoor facing piece.

As mentioned above, the outdoor outside air introducing port is disposed at the lower end portion of the outdoor facing piece and the indoor outside air introducing port is disposed at the upper end portion of the indoor facing piece by which a height difference is produced between the two outside air introducing ports and accordingly, the ventilation frame per se according to the first aspect of the invention is provided with a structure in which even when rain water invades from the outdoor outside air introducing port, the rain water is hardly blown up to the indoor outside air introducing port and accordingly, the effect of preventing rain water from blowing in is promoted by forming the drip pieces.

Invasion of insects or invasion of dust and dirt caused by opening the space between the lower end portion of the outdoor facing piece and the lower end portion of the second shape and the space between the upper end portion of the indoor facing piece and the upper end portion of the first shape, is prevented by arranging to overlap a filter on the depth piece as specified in a fifth aspect of the invention. An insect proof net is used as a filter when preventing only invasion of insects.

In preventing invasion of insects or invasion of dust and dirt to the indoor side, the filter may be arranged at any position between the outdoor outside air introducing port and the indoor outside air introducing port. However, when the filter is arranged to overlap the depth piece, in attaching the filter, the filter can be held by utilizing the depth piece. Further, particularly when the filter is arranged on the upper face side of the depth piece, the filter can be interchanged via the outside air introducing port on the indoor side.

A plurality of kinds of upper frames or lower frames having different depths are dealt with by a single one of the ventilation frame as follows. As specified in a sixth aspect of the invention, an attached portion for being attached with a gasket or a spacer held by an upper frame or a lower frame is formed at the upper end portion of the first shape or the lower end portion of the second shape. Or, as specified in a seventh aspect of the invention, a held portion held by an upper frame or a lower frame and having a depth which is reduced from a side of the upper end portion of the first shape to a side of the upper frame or from a side of the lower end portion of the second shape to a side of the lower frame, is formed at the upper end portion of the first shape or the lower end portion of the second shape.

In the case of the sixth aspect of the invention, the ventilation frame is held by the upper frame or the lower frame via the gasket or the spacer attached to its attached portion and accordingly, by attaching the gasket or the spacer having a different depth to the attached portion, or by reducing the depth of the gasket or the spacer from the side of the ventilation frame to the side of the upper frame or the lower frame, the ventilation frame can be held by the upper frame or the lower frame having the different depth.

In the case of the seventh aspect of the invention, the depth of the held portion per se is reduced from the side of the ventilation frame to the side of the upper frame or the lower frame and accordingly, the ventilation frame can directly be held by the upper frame or the lower frame having the different depth without interposing a gasket or a spacer.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective view showing a ventilation frame when an opening and closing plate is movable in the longitudinal direction;

Fig. 2A is a plane view of the ventilation frame shown by Fig. 1 and Fig. 2B is a vertical view of Fig. 2A;

Fig. 3 is a sectional view taken along a line x-x of Fig. 2B;

Fig. 4A is a plane view showing a ventilation frame having an attached portion different from that of the ventilation frame shown by Figs. 2A, 2B and Fig. 4B is a vertical view of Fig. 4A;

Fig. 5 is a sectional view taken along a line y-y of Fig. 4B;

Fig. 6 is a perspective view showing a ventilation frame where an opening and closing plate is rotatable;

Fig. 7 is a vertical view of Fig. 6;

Fig. 8A is a sectional view taken along a line x-x of Fig. 7 and Fig. 8B is a sectional view taken along a line y-y thereof;

Fig. 9 is a sectional view showing other ventilation frame where an opening and closing plate is movable in the longitudinal direction;

Fig. 10 is a sectional view showing other ventilation frame where an opening and closing plate is rotatable;

Fig. 11A is a sectional view showing a ventilation frame on a side of an upper frame where an opening and closing plate is movable in the longitudinal direction and where a depth piece is inclined and Fig. 11B is a sectional view showing a ventilation frame on a side of a lower frame;

Fig. 12A is a vertical view of Fig. 11A and Fig. 12B is a vertical view of Fig. 11B;

Fig. 13 is a vertical view showing a shoji integrated with ventilation frames; and

Fig. 14 is a vertical view on an indoor side showing a conventional ventilation frame.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

A ventilation frame 1 according to the invention is integrated by shapes formed by extrusion of an aluminum alloy or synthetic resin. As shown by Fig. 1 and Fig. 3, the ventilation frame is constituted by combining a first shape 2 in a form where L is inverted in the up and down direction having an outdoor facing piece 2a and a second shape 3 in a form where L is inverted in the left and right direction having an indoor facing piece 3a. Outside air is introduced indoors via ventilation ports 4a of a depth piece 4 formed at least either of the first shape 2 and the second shape 3.

According to the first shape 2 and the second shape 3, the first shape 2 is disposed relatively upward from the second shape 3. The depth piece(es) 4 formed at either or both of the first shape 2 and the second shape 3 is(are) integrated in a form where the depth piece(es) 4 is(are) abutment with other side(s) thereof. The first shape 2 and the second shape 3 are coupled to end caps 6 by screws 5 screwed in screw holes 2b and 3b respectively formed in the first shape 2 and the second shape 3 at both ends thereof

in the longitudinal direction to thereby integrate together.

In the drawings, as mentioned later, drip pieces 2c and 3c are formed in a labyrinth-like shape above an outdoor outside air introducing port 7 and in accordance therewith, the depth piece 4 is formed at a vicinity of an upper end portion of the second shape 3. However, the depth piece 4 may be formed at either of the first shape 2 and the second shape 3 and may be formed at any position in the depth direction. Fig. 1 through Fig. 8B and Fig. 10 through Fig. 12B show a case in which the depth piece 4 is formed at the second shape 3 and Fig. 9 shows a case in which the depth shapes 4 are formed at the first shape 2 and the second shape 3.

Further, in the drawings, when the first shape 2 and the second shape 3 are integrated, an interval between both is maintained and a front end of the depth piece 4 on the side of the first shape 2 is engaged and connected with the first shape 2 such that no gap is produced between the front end of the depth piece 4 on the side of the first shape 2 and the first shape 2 when an opening and closing plate 9, mentioned later, closes the ventilation ports 4a of the depth piece 4. However, when the gap between the first shape 2 and the second shape 3 is closed by the opening and closing plate 9, the front end of the depth piece 4 needs not to be brought into abutment with the

opposed side.

In a state where the first shape 2 and the second shape 3 are integrated to each other, a lower end portion of the outdoor facing piece 2a is disposed above a lower end portion of the second shape 3 and an upper end portion of the indoor facing piece 3a is disposed below an upper end portion of the first shape 2.

Gaps are produced in the height direction between the lower end portion of the outdoor facing piece 2a and the lower end portion of the second shape 3 and between the upper end portion of the indoor facing piece 3a and the upper end portion of the first shape 2 and the gaps are opened continuously in the longitudinal direction. A space between the lower end portion of the outdoor facing piece 2a and the lower end portion of the second shape 3 and a space between the upper end portion of the indoor facing piece 3a and the upper end portion of the first shape 2, respectively constitute the outdoor outside air introducing port 7 and an indoor outside air introducing port 8.

By the height difference between the outdoor outside air introducing port 7 and the indoor outside air introducing port 8, even when rain water invades from the opened outdoor outside air introducing port 7, the rain water is hardly blown indoors from the indoor outside air introducing port 8. However, to promote an effect of

preventing rain water from blowing in, the drip pieces 2c and 3c are formed at faces of the outdoor facing piece 2a and the indoor facing piece 3a respectively opposed to each other in the drawings.

The drip pieces 2c and 3c are formed to be inclined downwardly from sides of forming thereof to opposed sides. In the drawings, the respective drip pieces 2c and 3c of the outdoor facing piece 2a and the indoor facing piece 3a are arranged alternately and a labyrinth is formed by the two kinds of drip pieces 2c and 3c to be able to prevent rain water from blowing in while taking in outside air.

The opening and closing plate 9 for switching the ventilation ports 4a of the depth plate 4 to an opened state or a closed state is movably supported by at least either of the first shape 2 and the second shape 3. The opening and closing plate 9 is arranged between the outdoor outside air introducing port 7 and the ventilation ports 4a or between the indoor outside air introducing port 8 and the ventilation ports 4a, maintains the ventilation ports 4a in the opened state by communicating the outdoor outside air introducing port 7 with the ventilation ports 4a or communicating the indoor outside air introducing port 8 with the ventilation ports 4a and maintains the ventilation ports 4a in the closed state by cutting.

Fig. 1 through Fig. 5 show an example of a case in

which the opening and closing plate 9 formed with ventilation ports 9a capable of coinciding with the ventilation ports 4a of the depth piece 4, is supported by the first shape 2 and the second shape 3 movably in the longitudinal direction along the depth piece 4.

In the case in which the opening and closing plate 9 is moved in the longitudinal direction, outside air can be introduced when the ventilation ports 9a of the opening and closing plate 9 coincide with the ventilation ports 4a of the depth piece 4 and outside air is cut when the ventilation ports 9a are away from the ventilation ports 4a. Therefore, the opening and closing plate 9 is supported by the first shape 2 or the second shape 3 or both of them slidably to overlap the depth piece 4 such that outside air is cut with certainty when the ports are closed.

Fig. 1 through Fig. 5 show a case in which a filter 10, mentioned later, is arranged on an upper face side of the depth piece 4 and in accordance therewith, the opening and closing plate 9 is arranged to overlap a lower face of the depth piece 4. In this case, the opening and closing plate 9 overlapping the depth piece 4 is integrated with an operation plate 9b overlapping a rear face of the indoor facing piece 3a and a lower end of the operation plate 9b is supported by the second shape 3 by which movement in the depth direction and movement in the facing direction of the

opening and closing plate 9 is constrained.

The opening and closing plate 9 is slid in the length direction by operating a knob 11 connected to the operation plate 9b on the surface side of the indoor facing piece 3a via an opening, not illustrated, formed at the indoor facing piece 3a. The opening of the indoor facing piece 3a is provided with a length having an amount of a distance for moving the opening and closing plate 9. For example, when as shown by Fig. 1, a number of the ventilation ports 4a of the depth piece 4 and a number of the ventilation ports 9a of the opening and closing plate 9 are formed in the longitudinal direction at constant intervals, a distance between continuous ones of the ventilation ports 4a (9a) constitutes the moving distance of the opening and closing plate 9.

In the case of Fig. 1 through Fig. 5 in which the knob 11 is connected to the operation plate 9b, as shown by Fig. 2 and Fig. 4, only the knob 11 is exposed at the surface of the indoor facing piece 3a. Therefore, when the ventilation frame 1 in the form of combining the first shape 2 and the second shape 3 is cut, the ventilation frame 1 can be cut at any position of a portion of the frame except a range of moving the knob 11.

The filter 10 is arranged to overlap the depth piece 4 in order to prevent insects from invading or dust and dirt

included in outside air from invading. In the drawings, except Fig. 9, the filter 10 is arranged on the upper face side of the depth piece 4 to be able to interchange the filter 10 via the indoor outside air introducing port 8. The filter 10 may be arranged between the outdoor outside air introducing port 7 and the ventilation ports 4a or between the indoor outside air introducing port 8 and the ventilation ports 4a.

In the illustrated case, the filter 10 is held by an openable and closable or attachable and detachable hold member 12 having an opening 12a in order to avoid preventing introduction of outside air. As illustrated, the openable and closable hold plate 12 is supported by the first shape 2 or the second shape 3 rotatably around an axis in the longitudinal direction. When only invasion of insects is to be prevented, an insect proof net is used for the filter 10.

In the case of Fig. 9, the filter 10 is arranged between the depth piece 4 of the first shape 2 and the depth piece 4 of the second shape 3 and the filter 10 is held by the two depth pieces 4 and accordingly, the hold member 12 is not needed.

Fig. 6 through Fig. 8B show an example of a case in which the opening and closing plate 9 is supported by either of the first shape 2 and the second shape 3

rotatably around an axis in the longitudinal direction. In this case, the opening and closing plate 9 is supported by the first shape 2 in view of a convenience in the opening and closing operation on the indoor side. However, when a supporting side of the opening and closing plate 9 can be operated to open and close on the indoor side by connecting a knob exposed above the surface of the indoor facing piece 3a to the supporting side such that the knob is capable of moving up and down or the like, as shown by Fig. 10, there is a case in which the opening and closing plate 9 is supported by the second shape 3.

Further, when the opening and closing plate 9 is rotatably supported by either of the first shape 2 and the second shape 3, a blind plate is used for the opening and closing plate 9 to close the ventilation ports 4a of the depth piece 4 in the closing operation. Therefore, the opening and closing plate 9 needs not to necessarily overlap the depth piece 4 in the closing operation but the opening and closing plate 9 may cut outside air between the indoor outside air introducing port 8 and the ventilation ports 4a as shown by Fig. 6 through Fig. 8B or between the outdoor outside air introducing port 7 and the ventilation ports 4a as shown by Fig. 10.

In the case of Fig. 10, outside air is cut between the outdoor outside air introducing port 7 and the ventilation

ports 4a by bringing the opening and closing plate 9 into close contact with any portion of the first shape 2 from an upper face side or a lower face side thereof.

Fig. 6 through Fig. 8B show a case in which the knob 11 is connected to the opening and closing plate 9 at a central portion of the ventilation frame 1 in the longitudinal direction and the opening and closing plate 9 is opened and closed by operating the knob 11. There is a case in which the opening and closing plate 9 is made continuous over an entire length of the ventilation frame 1 and there is a case in which the opening and closing plate 9 is divided to the both sides thereof in the longitudinal direction by a position of an operating box 13, mentioned later. In the latter case, divided portions of the opening and closing plate 9 are connected by a hold member 11a, mentioned later and are moved in cooperation with the operation of the knob 11.

In Fig. 6 through Fig. 8B, the operating box 13 restricting a movement range of the knob 11 is fixed to a central portion of the indoor outside air introducing port 8 an indoor side of which is opened and the knob 11 is arranged movably in the longitudinal direction relative to the opening and closing plate 9 and movably in the up and down direction along with the opening and closing plate 9 in the operating box 13.

The knob 11 is made movable in the longitudinal direction relative to the opening and closing plate 9 by connecting the opening and closing plate 9 slidably in the longitudinal direction relative to the hold member 11a directly holding the opening and closing plate 9 or by holding the opening and closing plate 9 by the hold member 11a slidably in the longitudinal direction as shown by Fig. 8B which is a sectional view taken along a line y-y of Fig. 7. By moving the knob 11 in the longitudinal direction and locking the knob 11 to the operating box 13 in the operating box 13, whether the opening and closing plate 9 is brought in an opened state or a closed state is displayed.

Further, in the drawings, the opened state and the closed state of the opening and closing plate 9 are held by fixing a stopper 14 for downwardly locking the knob 11 when the knob 11 is moved up from a neutral position along with the opening and closing plate 9 and moved to a side of opening the opening and closing plate 9 and a stopper 15 for upwardly locking the knob 11 when the knob 11 is moved down along with the opening and closing plate 9 and moved to a side of closing the opening and closing plate 9 in the operating box 13.

A receiving member 16 which is brought into close contact with a lower face of the opening and closing plate

9 when the opening and closing plate 9 is closed, is fixed on the indoor facing piece 3a except the operating box 13 and the opening and closing plate 9 closes the ventilation ports 4a of the depth piece 4 by being brought into close contact with the receiving member 16.

Also in Fig. 6 through Fig. 8B, the filter 10 is arranged on the upper face side of the depth piece 4 and the filter 10 is held by the attachable and detachable hold member 12 having the opening 12a. The attachable and detachable hold member 12 is attached to the depth piece 4 by a retaining piece 12b as shown by Fig. 8A which is a sectional view taken along a line x-x of Fig. 7, at a portion thereof other than portions of forming the opening 12a.

In the case of Fig. 6 through Fig. 8B, the operating box 13 is exposed at the surface of the indoor facing piece 3a and accordingly, when the ventilation frame 1 is cut, the ventilation frame 1 can be cut at any position except a position of installing the operating box 13.

An explanation will be given of an example of integrating the ventilation frame 1 to an upper frame 22 or a lower frame 23 when the ventilation frame 1 is integrated to a shoji as shown by Fig. 13.

At an upper end portion of the first shape 2 or a lower end portion of the second shape 3, there is formed an

attached portion 19 for being attached with a gasket 17 which is attached to the upper frame 22 or the lower frame 23 as shown by Fig. 3 or for being attached with a spacer 18 held by the upper frame 22 or the lower frame 23 as shown by Fig. 5 in order to deal with a difference in the depth of the upper frame 22 or the lower frame 23 holding the ventilation frame 1. The attached portion 19 is formed at the upper end portion of the first shape 2 when the ventilation frame 1 is held by the upper frame 22 and is formed at the lower end portion of the second shape 3 when the ventilation frame 1 is held by the lower frame 23.

Fig. 1 through Fig. 3 show a case in which the attached portion 19 in a shape in correspondence with the gasket 17 is formed at the upper end portion of the first shape 2. The gasket 17 is attached to the attached portion 19 in a form of pinching thereof. The upper frame 22 holds the gasket 17 in a depth groove for holding a panel of glass or the like to thereby hold the ventilation frame 1. The attached portion 19 may be provided with any length projected from the upper end portion of the first shape 2 and any shape so far as the attached portion 19 is pinched and held by the gasket 17.

The depth of the upper frame 22 or the lower frame 23 is in correspondence with the depth of a vertical frame and accordingly, as shown by Fig. 4, the attached portion 19

for being attached with the gasket 17 or the spacer 18 is formed also at the end cap 6 which is attached to each of both end portions of the ventilation frame 1 as necessary.

The upper frame 22 or the lower frame 23 maintains a state of holding the ventilation frame 1 by being coupled to the vertical frames by screws at both ends thereof in the longitudinal direction. Therefore, when the ventilation frame 1 is held via the gasket 17, it is not necessary to hold the gasket 17 to a degree of being connected to the ventilation frame 1.

As shown by Fig. 3, a distance between surfaces of both sides of the gasket 17 in the depth direction is reduced from the side of the ventilation frame 1 to the side of the upper frame 22 or the lower frame 23. Therefore, the gasket 17 can correspond to the upper frame 22 or the lower frame 23 having inside measurement in correspondence with a maximum depth and can correspond to the upper frame 22 or the lower frame 23 having inside measurement in correspondence with a minimum depth.

Fig. 4 and Fig. 5 show a case in which the attached portion 19 having a shape in correspondence with the spacer 18 is formed at the upper end portion of the first shape 2. The spacer 18 is attached to the attached portion 19 also in a form of pinching the attached portion 19 and the upper frame 22 holds the ventilation frame 1 by holding the

spacer 18 at a depth groove thereof.

In Fig. 4 and Fig. 5, the attached portion 19 is formed in a shape having recess portions on both sides thereof in the depth direction and a pair of the spacers 18 are attached to the attached portion 19. However, the spacer 18 is held by the upper frame 22 or the lower frame 23 having inside measurement in correspondence with a distance between two faces thereof. Therefore, also in this case, the attached portion 19 may have any shape and the spacer 18 may have any shape so far as the spacer 18 is brought in a relationship in which the spacer 18 pinches and holds the attached portion 19.

When the spacer 18 is provided with a shape having flat surfaces as illustrated, the spacer 18 having a different distance between the two surfaces is attached to the attached portion 19 in respect of the upper frame 22 or the lower frame 23 having different inside measurement. However, when the spacer 18 per se is provided with a shape similar to that of the gasket 17, mentioned above, it is not necessary to use the spacers 18 having different distances between the two surfaces and the upper frame 22 or the lower frame 23 having different inside measurement can be dealt with by a single one of the spacer 18.

Fig. 6 through Fig. 8B show an example of a case in which a held portion 20 held by the lower frame 23 is formed

at the lower end portion of the second shape 3. Here is shown a case in which the held portion 20 is formed by parallel pieces parallelly arranged in the depth direction and is held by the lower frame 23 having a specific depth. In this case, the parallelly arranged pieces are remote from each other by a distance to a degree by which the lower frame 23 or the upper frame 22 is brought into contact therewith at the inner portions thereof.

Fig. 9 and Fig. 10 show a case in which a held portion 21 is formed at the upper end portion of the first shape 2 in a shape in which the depth is reduced from the side of the upper end portion of the first shape 2 to the side of the upper frame 22. In this case, the held portion 21 is provided with a shape similar to that of the gasket 17. Therefore, the held portion 21 can correspond to the upper frame 22 having a different depth without attaching the gasket 17 or the spacer 18. Fig. 10 shows a case in which the held portion 21 is formed in a step-like shape.

Figs. 11A and 11B and Figs. 12A and 12B show other constitution examples of the ventilation frame 1 held by the upper frame 22 or the lower frame 23 having a specific depth. In this case, the depth piece 4 is inclined to a degree visible from the indoor side, similar to the case of Fig. 1 through Fig. 5, and the opening and closing plate 9 formed with the ventilation ports 9a capable of coinciding

with the ventilation ports 4a, is arranged on the lower face side of the depth piece 4, and is supported by the first shape 2 and the second shape 3 movably in the longitudinal direction along the depth piece 4, while the filter 10 is made to overlap the upper face side of the depth piece 4 and the hold member 12 having the number of openings 12a is arranged thereon and attachably and detachably attached to the depth piece 4.

According to the example, the depth piece 4 is erected from the horizontal state and it is directed to the indoor side. Therefore, the knob 11 for operating to move the opening and closing plate 9 is connected to the opening and closing plate 9 by penetrating not the indoor facing piece 3a but the depth piece 4. Fig. 11A and Fig. 12A show the ventilation frame 1 held by the upper frame 22 and Fig. 11B and Fig. 12B show the ventilation frame 1 held by the lower frame 23.

According to the first through the third aspect of the invention, by forming the depth piece having the ventilation ports at least either of the first shape having the outdoor facing piece and the second shape having the indoor facing piece and supporting the opening and closing plate for switching the ventilation ports to the opened state and the closed state movably by either of the first shape and the second shape, there is no need of forming the

outside air introducing ports at the outdoor facing piece and the indoor facing piece and accordingly, there is no restriction in the cutting position in cutting the ventilation frame and the ventilation frame can be cut at an arbitrary position in the longitudinal direction.

By cutting the ventilation frame at an arbitrary position, a panel having an arbitrary width dimension can be dealt with by one kind of the ventilation frame and therefore, fabrication and inventory control thereof is simplified and a reduction in cost is achieved.

Further, the outdoor outside air introducing port is disposed at the lower end portion of the outdoor facing piece, the indoor outside air introducing port is disposed at the upper end portion of the indoor facing piece and a height difference is produced between the two outside air introducing ports by which there is achieved an effect of preventing rain water from blowing in even when the rain water invades from the outdoor outside air introducing port.

According to the fourth aspect of the invention, the drip pieces are formed at faces of the outdoor facing piece and the indoor facing piece opposed to each other and accordingly, blowing of rain water or water caused by opening the space between the lower end portion of the outdoor facing piece and the lower end portion of the second shape can be prevented and the effect of preventing

rain water from blowing in is promoted in addition to the effect by the height difference between the two outside air introducing ports.

According to the fifth aspect of the invention, the filter is arranged to overlap the depth piece and accordingly, there can be prevented invasion of insects and invasion of dust and dirt caused by opening the space between the lower end portion of the outdoor facing piece and the lower end portion of the second shape and the space between the upper end portion of the indoor facing piece and the upper end portion of the first shape.

Further, the state of attaching the filter can be maintained by utilizing the depth piece, further, particularly when the filter is arranged on the upper face side of the depth piece, the filter is interchanged via the outside air introducing port on the indoor side.

According to the sixth aspect of the invention, by forming the attached portion attached with a gasket or a spacer held by the upper frame or the lower frame at the upper end portion of the first shape or the lower end portion of the second shape and accordingly, a plurality of kinds of upper frames or lower frames having different depths can be dealt with by a single one of the ventilation frame.

According to the seventh aspect of the invention,

there is formed the held portion held by the upper frame or the lower frame and having the depth which is reduced from a side of the upper end portion of the first shape or the lower end portion of the second shape to a side of the upper frame or the lower frame at the upper end portion of the first shape or the lower end portion of the second shape and accordingly, a plurality of kinds of upper frames or lower frames having different depths can be dealt with by a single one of the ventilation frame without interposing a gasket or a spacer.

What is claimed is:

1. A ventilation frame is constituted by combining a first shape having an outdoor facing piece and a second shape having an indoor facing piece,

wherein the first shape and the second shape are combined such that a lower end portion of the outdoor facing piece is disposed above a lower end portion of the indoor facing piece and gaps are produced between the lower end portion of the outdoor facing piece and a lower end portion of the second shape and between an upper end portion of the indoor facing piece and an upper end portion of the first shape, a depth piece having ventilation ports is formed at least either of the first shape and the second shape and an opening and closing plate for switching the ventilation ports of the depth piece to an opened state and a closed state is supported movably by at least either of the first shape and the second shape.

2. The ventilation frame according to Claim 1,

wherein the opening and closing plate includes ventilation ports capable of coinciding with the ventilation ports of the depth piece and is movable in a longitudinal direction along the depth piece.

3. The ventilation frame according to Claim 1,

wherein the opening and closing plate is rotatable around an axis in a longitudinal direction.



4. The ventilation frame according to any one of Claim 1 through Claim 3,

wherein drip pieces are formed at faces of the outdoor facing piece and the indoor facing piece opposed to each other.

5. The ventilation frame according to any one of Claim 1 through Claim 4,

wherein a filter is arranged to overlap the depth piece.

6. The ventilation frame according to any one of Claim 1 through Claim 5,

wherein the upper end portion of the first shape or the lower end portion of the second shape is formed with an attached portion to be attached with a gasket or a spacer held by an upper frame or a lower frame.

7. The ventilation frame according to any one of claim 1 through Claim 5,

wherein the upper end portion of the first shape or the lower end portion of the second shape is formed with a held portion to be held by an upper frame or a lower frame and having a depth which is reduced from a side of the upper end portion of the first shape to a side of an upper frame or from a side of the lower end portion of the second shape to a side of a lower frame.

