

SLIDING SASH WINDOW

BACKGROUND OF THE INVENTION

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Field of the Invention

The present invention relates generally to a sliding sash window, in which inner and outer sash assemblies are installed in a window frame so as to be slidably movable in the face direction.

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Description of the Related Art

Commonly owned Japanese Examined Utility Model Publication (Kokoku) No. Sho 62-43115 discloses one typical construction of a sliding sash window.

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In the disclosed construction, a window frame includes inner and outer upper rails integrally formed with an upper frame member, and inner and outer lower rails integrally formed with a lower frame member. An inner sash assembly and an outer sash assembly are installed along these rails so as to be slidably movable in the face direction, respectively. When the sliding sash window is closed, the inner and outer sash assemblies are pressed onto air-tight seal members mounted on the inner upper rail and the inner lower rail so as to establish air-tight sealing against the window frame.

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In such sliding sash window, wind enduring

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ability becomes greater when depth dimension of the inner and outer sash assemblies is increased and becomes smaller when depth dimension of the inner and outer sash assemblies is decreased.

5 On the other hand, since the sliding sash window has a construction in which the inner and outer sash assemblies are pressed onto the air-tight seal members mounted on the inner rails to establish air-tight sealing, the depth dimension of the inner and outer sash assemblies
10 to be installed in the same window frame is fixed. When the inner and outer sash assemblies having large depth dimension are to be installed, the window frame having large distance between the inner and outer rails and large depth dimension is used. When the inner and outer sash assemblies
15 having small depth dimension are to be installed, the window frame having small distance between the inner and outer rails and small depth dimension is used.

 Therefore, the window frame for the sliding sash window having high wind enduring ability has larger depth
20 dimension and larger distance between the inner and outer rails than that for the sliding sash window having low wind enduring ability. Therefore, for the sliding sash windows having different wind enduring abilities, different window frames having different depth dimensions and different
25 distances between the inner and outer rails become

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necessary, which incurs high cost.

Further, in a ultra-high building, relatively low wind enduring ability will serve for relatively lower floors, but high wind enduring ability is required for relatively higher floors. Therefore, in practice, sliding sash assemblies having low wind enduring ability are installed in the window frames having small depth dimension on relatively lower floors, and sliding sash assemblies having high wind enduring ability are installed in the window frames having large depth dimension on relatively higher floors, thereby satisfying requirement for wind enduring ability on various elevation of floors.

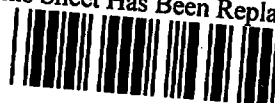
However, when wind frames having different depth dimensions are installed in a building, centers in the depth direction of sliding sash windows do not coincide with each other, which makes finishing work troublesome.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a sliding sash window which can solve the problems as described above.

More specifically, it is an object of the present invention to provide a sliding sash window which permits installation of sash assemblies having various depth dimensions in a common window frame and thereby achieves various wind enduring ability with a common window frame.

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In order to accomplish the above-mentioned object, a sliding sash window according to the present invention comprises:

5 a window frame including an upper frame having inner and outer upper rails, a lower frame having inner and outer lower rails, a left side vertical frame and a right side vertical frame, the inner upper rail and the inner lower rail being provided with lateral air-tight seal members;

10 an inner sash assembly to be installed in the window frame so as to be slidably movable along the inner upper rail and the inner lower rail, and in such positional relationship relative to the window frame that an exterior side surface of the inner sash assembly is at a
15 predetermined fixed position in the depth direction regardless of the depth dimension of the inner sash assembly while an interior side surface of the inner sash assembly is variable in position in the depth direction depending upon the depth dimension of the inner sash assembly; and

20 an outer sash assembly to be installed in the window frame so as to be slidably movable along the outer upper rail and the outer lower rail, and in such positional relationship relative to the window frame that an interior side surface of the outer sash assembly is at a
25 predetermined fixed position in the depth direction

regardless of the depth dimension of the outer sash assembly while an exterior side surface of the outer sash assembly is variable in position in the depth direction depending upon the depth dimension of the outer sash assembly.

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BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will be understood more fully from the detailed description given herebelow and from the accompanying drawings of the preferred embodiment of the invention, which, however, should not be taken to be
10 limitative to the invention but are for explanation and understanding only.

In the drawings:

Fig. 1 is a longitudinal section of the preferred embodiment of a sliding sash window according to the present
15 invention, in which inner and outer sash assemblies having small depth dimension are installed;

Fig. 2 is a cross section of the sliding sash window illustrated in Fig. 1;

Fig. 3 is a longitudinal section of the preferred
20 embodiment of a sliding sash window according to the present invention, in which inner and outer sash assemblies having large depth dimension are installed; and

Fig. 4 is a cross section of the sliding sash window illustrated in Fig. 3.

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DESCRIPTION OF THE PREFERRED EMBODIMENT



The present invention will be discussed hereinafter in detail in terms of a preferred embodiment with reference to the drawings. In the following description, numerous specific details are set forth in order to provide a thorough understanding of the present invention. It will be obvious, however, to those skilled in the art that the present invention may be practiced without these specific details. In other instance, well-known structures are not shown in detail in order to unnecessarily obscure the present invention.

As shown in Figs. 1 and 2, a window frame A is constructed into a rectangular or square frame with an upper frame 1, a lower frame 2, a left side vertical frame 3 and a right side vertical frame 4. An inner upper rail 5 and an outer upper rail 6 are formed integrally with the upper frame 1. On the inner upper rail 5, an upper lateral air-tight seal member 7 for the inner sash assembly and an upper lateral air-tight seal member 8 for the outer sash assembly are mounted, being directed to the exterior side.

An inner lower rail 9 and an outer lower rail 10 are formed integrally with the lower frame 2. On the inner lower rail 9, a lower lateral air-tight seal member 11 for the inner sash assembly and a lower lateral air-tight seal member 12 for the outer sash assembly are mounted, being directed to the exterior side. On the left side vertical



frame 3, a left side contact piece 13 is formed integrally. Further, a left side vertical air-tight seal member 14 for the outer sash assembly is mounted on the left side vertical frame 3, being directed to the exterior side. On the right side vertical frame 4, a right side contact piece 15 is formed integrally. Further, a right side vertical air-tight seal member 16 for the inner sash assembly is mounted on the right side vertical frame 4, being directed to the exterior side.

10 An inner sash assembly B installed at the inner side (interior side) of the window frame A is constructed with an upper edge member 20, a lower edge member 21, a vertical center side edge member 22 and a vertical window frame side edge member 23 assembled in rectangular or square configuration. A glass pane 24 is surrounded with the edge members 20, 21, 22 and 23. Sash rollers 25 are mounted at the center portion in the depth direction of the lower edge member 21 to movably contact with the inner lower rail 9 so that the inner sash assembly B can slidingly move in the face direction along the inner upper rail 5 and the inner lower rail 9. When the inner sash assembly B thus constructed is moved up to its closed position, the inner sash assembly B is drawn up to the interior side in the depth direction by well-known function of a drawing-up block provided on the vertical window frame side edge

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member 23 for cooperating with the right side contact piece 15. As a result, an exterior side vertical plate 26 of the upper edge member 20 is pressed onto the upper lateral air-tight seal member 7, an exterior side vertical plate 27 of the lower edge member 21 is pressed onto the lower lateral air-tight seal member 11, and an exterior side vertical plate 28 of the vertical window frame side edge member 23 is pressed onto the right side vertical air-tight seal member 16, so that air-tight sealing is established between the window frame A and the inner sash assembly B.

An outer sash assembly C installed at the outer side (exterior side) of the window frame A is constructed with an upper edge member 30, a lower edge member 31, a vertical center side edge member 32 and a vertical window frame side edge member 33 assembled in rectangular or square configuration. A glass pane 34 is surrounded with the edge members 30, 31, 32 and 33. Sash rollers 35 are mounted at the center portion in the depth direction of the lower edge member 31 to movably contact with the outer lower rail 10 so that the outer sash assembly C can slidably move in the face direction along the outer upper rail 6 and the outer lower rail 10. When the outer sash assembly C thus constructed is moved up to its closed position, the outer sash assembly C is drawn up to the interior side in the depth direction by well-known function of a drawing-up



block provided on the vertical window frame side edge member 33 for cooperating with the left side contact piece 13. As a result, a projecting piece 36a integrally formed with an interior side vertical plate 36 of the upper edge member 30 is pressed onto the upper lateral air-tight seal member 8, a projecting piece 37a integrally formed with an interior side vertical plate 37 of the lower edge member 31 is pressed onto the lower lateral air-tight seal member 12, and an interior side vertical plate 38 of the vertical center side edge member 33 is pressed onto the left side vertical air-tight seal member 14, so that air-tight sealing is established between the window frame A and the outer sash assembly C.

Depth dimensions of the upper edge members 20 and 30 and the lower edge members 21 and 31, namely, depth dimensions of the inner and outer sash assemblies B and C are L_1 , and the distance between the inner sash assembly B and the outer sash assembly C in the depth direction is S_1 . The depth dimensions of the upper frame 1, the lower frame 2 and the left and right side vertical frames 3 and 4 are H_1 .

Next, discussion will be given for the condition where the inner and outer sash assemblies B and C having the depth dimension L_2 ($L_2 > L_1$) are installed in the above described same window frame A, with reference to Figs. 3 and 4.



When the inner and outer sash assemblies B and C having the depth dimension L_2 is installed in the same window frame A as that in Fig. 1, the upper edge member 20 of the inner sash assembly B is so positioned that the distance
5 between the exterior side vertical plate 26 and the inner upper rail 5 in the depth direction is maintained same as that in Fig. 1 while the interior side vertical plate 40 is shifted toward the interior side in the depth direction as compared with the case in Fig. 1, thereby allowing the depth
10 dimension of the upper edge member 20 to be L_2 .

Namely, with maintaining the exterior side surface 20a of the upper edge member 20 at the fixed position in the depth direction, the interior side surface 20b is shifted toward the interior side to increase the
15 depth dimension from L_1 to L_2 .

The lower edge member 21 of the inner sash assembly B is so positioned that the distance between the exterior side vertical plate 27 and the inner lower rail 9 in the depth dimension is maintained same as that in Fig. 1
20 while the interior side vertical plate 41 is shifted toward the interior side in the depth direction as compared with the case in Fig. 1, thereby allowing the depth dimension of the lower edge member 21 to be L_2 .

Namely, with maintaining the exterior side surface 21a of the lower edge member 21 at the fixed
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position in the depth direction, the interior side surface 21b is shifted toward the interior side to increase the depth dimension from L_1 to L_2 .

It is to be noted that sash rollers 25 are mounted on the lower edge member 21 at a position shifting from the center to the exterior side in the depth direction depending upon the increase in the depth dimension of the inner sash assembly B.

The vertical window frame side edge member 23 of the inner sash assembly B is so positioned that the distance between the exterior side vertical plate 28 and the right side contact piece 15 in the depth direction is maintained same as that in Fig. 2 while the interior side vertical plate 42 is shifted toward the interior side in the depth direction as compared with the case in Fig. 2, thereby allowing the depth dimension of the vertical window frame side edge member 23 to become greater.

Namely, with maintaining the exterior side surface 23a of the vertical window frame side edge member 23 at the fixed position in the depth direction, the interior side surface 23b is shifted toward the interior side to increase the depth dimension.

The vertical center side edge member 22 of the inner sash assembly B is so positioned that the exterior side vertical plate 43 and the wind preventing piece 44 are

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maintained at the same positions in the depth direction as those in Fig. 2 while the interior side vertical plate 45 and a hollow portion 46 are shifted toward the interior side in the depth direction as compared with the case in Fig. 2, thereby allowing the depth dimension of the vertical center side edge member 22 to become greater.

Namely, with maintaining the exterior side surface 22a of the vertical center side edge member 22 at the fixed position in the depth direction, the interior side surface 22b is shifted toward the interior side to increase the depth dimension.

The upper edge member 30 of the outer sash assembly C is so positioned that the distance between the interior side vertical plate 36 and the outer upper rail 6 in the depth direction is maintained same as that in Fig. 1 while the exterior side vertical plate 50 is shifted toward the exterior side in the depth direction as compared with the case in Fig. 1, thereby allowing the depth dimension of the upper edge member 30 to be L_2 .

Namely, with maintaining the interior side surface 30a of the upper edge member 30 at the fixed position in the depth direction, the exterior side surface 30b is shifted toward the exterior side to increase the depth dimension from L_1 to L_2 .

The lower edge member 31 of the outer sash



assembly C is so positioned that the distance between the interior side vertical plate 37 and the outer lower rail 10 in the depth direction is maintained same as that in Fig. 1 while the exterior side vertical plate 51 is shifted toward the exterior side in the depth direction as compared with the case in Fig. 1, thereby allowing the depth dimension of the lower edge member 31 to be L_2 .

Namely, with maintaining the interior side surface 31a of the lower edge member 31 at the fixed position in the depth direction, the exterior side surface 31b is shifted toward the exterior side to increase the depth dimension from L_1 to L_2 .

It is to be noted that sash rollers 35 are mounted on the lower edge member 31 at a position shifting from the center to the interior side in the depth direction depending upon the increase in the depth dimension of the outer sash assembly C.

The vertical window frame side edge member 33 of the outer sash assembly C is so positioned that the distance between the interior side vertical plate 38 and the left side contact piece 13 in the depth direction is maintained same as that in Fig. 2 while the exterior side vertical plate 52 is shifted toward the exterior side in the depth direction as compared with the case in Fig. 2, thereby allowing the depth dimension of the vertical window frame



side edge member 33 to become greater.

Namely, with maintaining the interior side surface 33a of the vertical window frame side edge member 33 at the fixed position in the depth direction, the exterior side surface 33b is shifted toward the exterior side to increase the depth dimension.

The vertical center side edge member 32 of the outer sash assembly C is so positioned that the interior side vertical plate 53 and the wind preventing piece 54 are maintained at the same positions in the depth direction as those in Fig. 2 while the exterior side vertical plate 55 is shifted toward the exterior side in the depth direction as compared with the case in Fig. 2, thereby allowing the depth dimension of the vertical center side edge member 32 to become greater.

Namely, with maintaining the interior side surface 32a of the vertical center side edge member 32 at the fixed position in the depth direction, the exterior side surface 32b is shifted toward the exterior side to increase the depth dimension.

Thus, when the inner and outer sash assemblies B and C having large depth dimension of L_2 are installed as set forth above, the distance between the inner and outer sash assemblies B and C in the depth direction becomes S_1 , which is the same as that in case the inner and outer sash

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assemblies B and C having small depth dimension of L_1 are installed.

Accordingly, with employing common window frames having the same depth dimension and the same distance
5 between the inner and outer rails, the inner and outer sash assemblies having variety of depth dimensions can be installed. That is, the sliding sash window having high wind enduring ability and the sliding sash window having low wind enduring ability can be constructed with the common
10 window frames.

It should be noted that when the depth dimension of the inner and outer sash assemblies is increased, the gravity center positions in the depth direction of the inner and outer sash assemblies do not fall on the inner and outer
15 rails, respectively. In this view, there is naturally a limit to the variety of depth dimensions of the inner and outer sash assemblies which can be installed in the same window frame.

As set forth above, according to the present
20 invention, since the inner and outer assemblies having variety of depth dimensions can be installed in the same window frame, the sliding sash windows having different wind enduring ability can be constructed with the same window frames. This contributes to lowering the cost.
25 Further, when the sliding sash windows are to be installed

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on the super high building from lower floors to higher floors, the depth dimension of the window frames can be made the same from lower floors to higher floors, so that the center positions in the depth direction of the sliding sash windows coincide with each other from lower floors to higher floors. This facilitates finishing work.

While the present invention has been disclosed in detail in terms of the preferred embodiment of the invention, it should be obvious to those skilled in the art to modify, change or re-constructed the embodiment set forth above, or to implement the invention in different way encompassed by the principle of the invention defined in the appended claim. Therefore, the invention should be appreciated to include all possible modifications, constructions established without departing from the invention.

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WHAT IS CLAIMED IS:

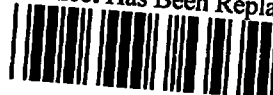
1. A sliding sash window comprising:

a window frame including an upper frame having inner and outer upper rails, a lower frame having inner and outer lower rails, a left side vertical frame and a right side vertical frame, said inner upper rail and said inner lower rail being provided with lateral air-tight seal members;

an inner sash assembly to be installed in said window frame so as to be slidably movable along said inner upper rail and said inner lower rail, and in such positional relationship relative to said window frame that an exterior side surface of the inner sash assembly is at a predetermined fixed position in the depth direction regardless of the depth dimension of the inner sash assembly while an interior side surface of the inner sash assembly is variable in position in the depth direction depending upon the depth dimension of the inner sash assembly; and

an outer sash assembly to be installed in said window frame so as to be slidably movable along said outer upper rail and said outer lower rail, and in such positional relationship relative to said window frame that an interior side surface of the outer sash assembly is at a predetermined fixed position in the depth direction regardless of the depth dimension of the outer sash assembly

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while an exterior side surface of the outer sash assembly is variable in position in the depth direction depending upon the depth dimension of the outer sash assembly.

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