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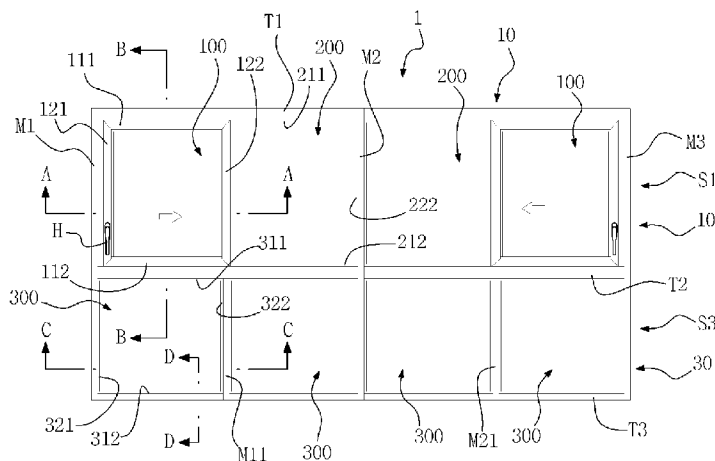
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(54) Title: SLIDING WINDOW SYSTEM FOR MULTISTORIED BUILDING

[Fig. 1]



(57) Abstract: The present invention discloses a sliding window system for a multistoried building, which has structural strength to endure external wind pressure and also allows natural ventilation of the indoor space. The sliding window system for a multistoried building comprises a curtain wall including a plurality of transoms and mullions and having a plurality of window installation spaces formed by the transoms and the mullions; a plurality of fixed windows disposed in some of the window installation spaces of the curtain wall, each fixed window comprising at least one fixed window frame mounted fixedly to two transoms and two mullions; and at least one sliding window disposed in the window installation space and mounted to two mullions and two transoms to be opened and closed. Here, each sliding window comprises a sliding window frame slidably mounted to rails mounted to the corresponding transoms and a fixed window frame fixed to the transoms and the mullions. In addition, each of the fixed window frame of the sliding window and the fixed window frame of the fixed window comprises upper and lower horizontal frames respectively fixed to the transoms and two vertical frames disposed at both ends of the horizontal frames and fixed to the mullions.

WO 2009/082138 A2

## Description

### SLIDING WINDOW SYSTEM FOR MULTISTORIED BUILDING

#### Technical Field

- [1] The present invention relates to a sliding window system, and more particularly, to a sliding window system for a multistoried building, which has structural strength and also allows ventilation of indoor air by mounting a sliding window to a partial space of a curtain wall and mounting a fixed window to the remaining space.

#### Background Art

- [2] As buildings become taller, significantly great external wind pressure is applied to windows installed to the buildings. Thus, windows having the excellent structural strength and being capable of ensuring an external wind pressure should be mounted to the multistoried buildings.
- [3] Generally, in the multistoried buildings, a fixed window is mounted through an aluminum curtain wall comprising transoms and mullions. This window is not opened for strength reinforcement, so that the building having such fixed windows cannot be naturally ventilated.
- [4] In order to solve this problem, a forcible ventilation device is installed to a multistoried building, but this forcible ventilation device consumes excessive energy in operation and also cannot ventilate the indoor space when there is a mechanical defect therein.
- [5] For natural ventilation of the indoor space, a hinged window may be installed to a partial region of the fixed window. However, the hinged window may give an influence on the structural strength of the entire window and cannot provide a satisfactory ventilation effect.

#### Disclosure of Invention

##### Technical Problem

- [6] An object of the present invention is to provide a sliding window system for a multistoried building, which has structural strength being capable of enduring the external wind pressure applied to the multistoried building and also allows natural ventilation of the indoor space.

##### Technical Solution

- [7] A sliding window system for a multistoried building according to the present invention for achieving the objects comprises a curtain wall including a plurality of transoms and mullions and having a plurality of window installation spaces formed by the transoms and the mullions; a plurality of fixed windows disposed in some of the window installation spaces of the curtain wall, each fixed window comprising at least

one fixed window frame mounted fixedly to two transoms and two mullions; and at least one sliding window disposed in the window installation space and mounted to two mullions and two transoms to be opened and closed.

- [8] In the sliding window system according to the present invention, each sliding window comprises a sliding window frame slidably mounted to rails mounted to the corresponding transoms and a fixed window frame fixed to the transoms and the mullions.
- [9] In addition, the sliding window frame of the sliding window may comprise upper and lower horizontal frames corresponding to the transoms, two vertical frames fixed to both ends of the horizontal frames, and a window glass mounted to the frames; and guide bars may be fixed to an upper end of the upper horizontal frame and a lower end of the lower horizontal frame in correspondence to the rails mounted to the transoms.
- [10] Meanwhile, a buffering member may be fixed to one end of the vertical frame of the sliding window frame, and a shock absorbing member corresponding to the buffering member may be fixed to a surface of the corresponding mullion.
- [11] In the sliding window system according to the present invention, each of the fixed window frame of the sliding window and the fixed window frame of the fixed window may comprise upper and lower horizontal frames respectively fixed to the transoms and two vertical frames disposed at both ends of the horizontal frames and fixed to the mullions; and wherein glazing beads for fixing the window glass may be mounted to an indoor side border between each vertical frame of each fixed window frame and the mullions and to an indoor side border between the horizontal frames and the mullions.
- [12] Particularly, the sliding window may further comprise locking means mounted to the sliding window frame and the fixed window frame to restrain the movement of the sliding window caused by external wind pressure. Here, the locking means may comprise a first locking member mounted to a vertical frame of the sliding window frame and a second locking means mounted to a vertical frame of the fixed window frame; and the first locking member may be a base fixed to the vertical frame of the sliding window frame and have a cut portion formed in one end of the base, the cut portion having a groove with a predetermined depth formed in a surface thereof. Also, the second locking member may comprise a base fixed to the vertical frame of the fixed window frame, a stopper fixed to the base to be positioned in the cut portion of the first locking member, and an extension piece formed on an upper end of the stopper to be received in the groove of the first locking member.

### **Advantageous Effects**

- [13] According to the sliding window system for a multistoried building of the present invention constructed as above, there are advantages that the sliding window system

provides sufficient structural being strength capable of enduring external wind pressure and can ventilate naturally the indoor space by partitioning a curtain wall composed of mullions and transoms into plural spaces and then mounting sliding windows to some spaces and mounting fixed windows to the other spaces.

### **Brief Description of Drawings**

- [14] Fig. 1 is a front view of a sliding window system for a multistoried building according to an embodiment of the present invention;
- [15] Fig. 2 is a sectional view taken along the line A-A of Fig. 1;
- [16] Fig. 3 is a sectional view taken along the line B-B of Fig. 1;
- [17] Fig. 4 is a perspective view of an "a" portion of Fig. 2;
- [18] Fig. 5 is a sectional view taken along the line C-C of Fig. 1; and
- [19] Fig. 6 is a sectional view taken along the line D-D of Fig. 1.

### **Best Mode for Carrying out the Invention**

- [20] Hereinafter, a window system for a multistoried building according to an embodiment of the present invention will be described in detail with reference to the accompanying drawings.
- [21] Fig. 1 is a front view of a sliding window system for a multistoried building according to an embodiment of the present invention. The window system according to the embodiment of the present invention comprises a curtain wall 1 fixed to a wall of a building to function as a window frame, and a plurality of fixed windows 30 and sliding windows 10 mounted to the curtain wall 1.
- [22] The curtain wall 1 comprises a plurality of vertical mullions M1, M2 and M3 fixed to a building, and upper, middle and lower transoms T1, T2 and T3, which are horizontally disposed between the mullions M1, M2 and M3. The mullions M1, M2 and M3 and the transoms T1, T2 and T3 allow the curtain wall 1 to be divided into a plurality of upper and lower spaces S1 and S3. The fixed windows 30 and the sliding windows 10 are mounted to the mullions M1, M2 and M3 and the transoms T1, T2 and T3, each of which forming a single space.
- [23] In this embodiment, as shown in Fig. 1, the sliding windows 10 are respectively mounted in two upper spaces S1 of the curtain wall 1, and the fixed windows 30 are respectively mounted in two lower spaces S3.
- [24] The sliding window 10 mounted in each upper space S1 comprises a sliding window frame 100 movable along rails on the upper and middle transoms T1 and T2, and a fixed window frame 200 fixed to the transoms T1 and T2 and the mullion M2.
- [25] The sliding window frame 100 is movable toward the fixed window frame 200 (in the arrow direction of Fig. 1), and so when the sliding window 10 is opened, the sliding window frame 100 overlaps with the fixed window frame 200.

- [26] Also, the fixed window 30 mounted in the lower space S3 comprises a plurality of fixed window frames 300 laterally disposed while being fixed to the middle and lower transoms T2 and T3 and the mullions M1, M11, M2, M21 and M3.
- [27] Here, it will be apparent that window glasses are fixed to the sliding and fixed window frames of the sliding window and the fixed window frames of the fixed window.
- [28] Meanwhile, it will be apparent that, contrary to the configuration shown in Fig. 1, fixed windows may be mounted in two upper spaces of the curtain wall and sliding windows may be mounted in two lower spaces.
- [29] Hereinafter, the sliding window 10 and the fixed window 30 shown in the left side of Fig. 1 will be described with reference to Figs. 1, 2 and 3.
- [30] Sliding Window (10)
- [31] The sliding window 10 mounted to the upper space S1 of the curtain wall 1 comprises the slidable sliding window frame 100 and the fixed window frame 200.
- [32] Fig. 2 is a sectional view taken along the line A-A of Fig. 1, and Fig. 3 is a sectional view taken along the line B-B of Fig. 1. Figs. 2 and 3 illustrate the sliding window frame 100 constituting the sliding window 10.
- [33] Meanwhile, reference symbols "T1" and "T2" of Figs. 2 and 3 respectively designate the upper and middle transoms fixed to a side defining an open portion of a building wall, and "M1" designates the mullion.
- [34] The sliding window frame 100 comprises upper and lower horizontal frames 111 and 112 corresponding to the upper and middle transoms T1 and T2 and two vertical frames 121 and 122 fixed to both ends of the horizontal frames 111 and 112, respectively. Window glasses W are respectively fixed to the upper and lower horizontal frames 111 and 112 and the two vertical frames 121 and 122.
- [35] Rails 21 and 22 for guiding the sliding movement of the upper and lower horizontal frames 111 and 112 are respectively installed on the surfaces of the upper and middle transoms T1 and T2, and guide bars 113 and 114 corresponding to the rails 21 and 22 are respectively fixed to an upper end of the upper horizontal frame 111 and a lower end of the lower horizontal frame 112 of the sliding window frame 100.
- [36] Thus, the sliding window frame 100 may be slid along the rails 21 and 22 of the upper and middle transoms T1 and T2.
- [37] Meanwhile, sealing elements 115 and 116 are respectively mounted in an upper surface of the upper horizontal frame 111 of the sliding window frame 100 and a lower surface of the lower horizontal frame 112 through their entire lengths, and these sealing elements 115 and 116 are vertically moved by the operation of a handle H installed on the indoor side surface of any one vertical frame 121.
- [38] For example, if the handle H is rotated in the clockwise direction about its axis, the

sealing element 115 mounted in the upper surface of the upper horizontal frame 111 is moved upward as shown in Fig. 3 (which is indicated by a thin solid line 115-1), and at the same time, the sealing element 116 mounted in the lower surface of the lower horizontal frame 112 is moved downward (which is indicated by a thin solid line 116-1). The sealing elements 115 and 116 moved as mentioned above are respectively brought into close contact with the rails 21 and 22 installed to the upper and middle transoms T1 and T2. As a result, the indoor space is perfectly isolated from the outdoor space by the sealing elements 115 and 116.

[39] On the contrary, if the handle H is rotated in the counterclockwise direction about its axis, the sealing element 115 mounted in the upper surface of the upper horizontal frame 111 is moved downward, and the sealing element 116 mounted in the lower surface of the lower horizontal frame 112 is moved upward, as indicated by thick solid lines in Fig. 3. Thus, the sealing elements 115 and 116 do not give any influence on the sliding movement of the sliding window frame 100.

[40] The mechanism for moving the sealing elements 115 and 116 by the manipulation of the handle H is disclosed in Korean Laid-open Patent Publication No. 2005-0054455, and thus, its configuration and function are not described in detail.

[41] Meanwhile, Figs. 1 and 2 show a portion of the fixed window frame 200 constituting the sliding window 10.

[42] The fixed window frame 200, which is another component of the sliding window 10, is installed in the upper space S1 of the curtain wall 1 together with the sliding window frame 100. The fixed window frame 200 comprises upper and lower horizontal frames 211 and 212 respectively fixed to the upper and middle transoms T1 and T2 and two vertical frames 221 and 222 respectively fixed to both ends of each horizontal frame 211 or 212 (here, only the vertical frame 222 is shown in Fig. 1, and only the vertical frame 221 is shown in Fig. 2). Among two vertical frames, the vertical frame 222 is fixed to the mullion M2.

[43] Window glasses are respectively fixed to the upper and lower horizontal frames 211 and 212 and the two vertical frames 222 of the fixed window frame 200. Meanwhile, the reference symbol "B1" in Fig. 2 designates a glazing bead, which is mounted to indoor side borders between the window glass W and each frame 211, 212, 221 or 222 after the window glasses W are mounted to the horizontal frames 211 and 212 and the vertical frames 221 and 222 of the fixed window frame 200. The glazing bead B1 allows the window glass W to be firmly fixed to the fixed window frame 200.

[44] As shown in the right side of Fig. 2, when the sliding window 10 is closed, the vertical frame 221 of the fixed window frame 200 is positioned in the front of the vertical frame 122 (not corresponding to the mullion) of the sliding window frame 100.

[45] Further, in this configuration, when the sliding window frame 100 is moved and then

becomes a complete open state, the sliding window frame 100 and the fixed window frame 200 are overlapped with each other.

[46] As shown in Fig. 2, if the external wind pressure is applied to the sliding window frame 100 (in an arrow direction) in a state where the sliding window 10 is closed, the sliding window frame 100 is shaken. Thus, in the sliding window system according to the present invention, a locking means is installed to the vertical frame 122 of the sliding window frame 100 and the vertical frame 221 of the fixed window frame 200, which correspond to each other in a closed state, for preventing the sliding window frame 100 from being shaken by the external wind pressure.

[47] Fig. 4 is a perspective view of an "a" portion of Fig. 2, showing first and second locking members constituting the locking means provided for preventing a shaking of the sliding window frame.

[48] The second locking member installed to a rear surface of the vertical frame 221 of the fixed window frame 200 is a base 290 with a predetermined area, and an arc-shaped cut portion 291 with an opened outer end is formed on one side of the base 290. A groove 292 with predetermined height and depth is formed on the surface of the cut portion 291 over the entire length of the cut portion 291.

[49] Meanwhile, the first locking member installed to a front surface of the vertical frame 122 of the sliding window frame 100 comprises a base 190 fixed to the vertical frame 122, and a cylindrical stopper 191 fixed to the base 190 and having a predetermined height. An extension piece 192 extended in parallel with the base 190 is formed on an upper end of the stopper 191. A thickness of the extension piece 192 is identical to or slightly smaller than the height of the groove 292 formed in the cut portion 291 of the base 290 that is the second locking member of the fixed window frame 200.

[50] When the sliding window frame 100, which is in the open state, is slid in a direction opposite to the arrow direction of Fig. 1 and then becomes the closed state (i.e., a state shown in Figs. 1 and 2), the base 190 fixed to the sliding window frame 100 and the base 290 fixed to the fixed window frame 200 are overlapped with each other as shown in Fig. 2.

[51] In this process, the stopper 191 fixed to the base 190 of the sliding window frame 100 is positioned within the cut portion 291 formed in the base 290 of the fixed window frame 200, and particularly, the extension piece 192 at the upper end of the stopper 191 is received in the groove 292 formed on the side surface of the cut portion 291.

[52] In this state, the sliding window frame 100 is supported to the fixed window frame 200 firmly fixed to the mullion M2 and the transoms T1 and T2 of the curtain wall 1 through the shaking preventing means. Thus, in a state where the sliding window frame 100 is closed, the sliding window frame 100 is not shaken even though great

external wind pressure is applied thereto.

[53] Meanwhile, as shown in Fig. 2, metallic reinforcing members 281 and 282 are mounted within each of the vertical frames 221 and 222 and the horizontal frames 211 and 212 of the fixed window frame 200 in order to prevent deformation of each frame. These reinforcing members 281 and 282 are fixed to each frame by a fixing means such as bolts and preferably arranged in a direction parallel with an external wind pressure direction.

[54] In addition, finishing materials 191 and 192 may be respectively fixed to indoor side surfaces of the upper and lower transoms T1 and T2 on which the sliding window frame 100 is slid.

[55] As shown in Fig. 3, borders between the upper transom T1 and the upper horizontal frame 111 of the sliding window frame 110 and between the middle transom T2 and the lower horizontal frame 112 are exposed to the outside. In particular, the rails 21 and 22 respectively mounted to the transoms T1 and T2 and the guide bars 113 and 114 respectively mounted to the horizontal frames 111 and 112 and corresponding to the rails 21 and 22 are exposed to the outside.

[56] In this embodiment, finishing material is mounted to inner sides of the upper and lower transoms for interior decoration. This finishing material has the length same as those of the upper and lower transoms.

[57] The finishing material 191 mounted to the upper transom T1 has a lower portion corresponding to an upper end of the upper horizontal frame 111, and also the finishing material 192 mounted to the lower transom T2 has an upper portion corresponding to a lower end of the lower horizontal frame 112. Thus, the rails 21 and 22 and the guide bars 113 and 114 are not observed from the indoor side, thereby improving aesthetic conditions for the interior decoration.

[58]

[59] Fixed Window (30)

[60] As shown in Fig. 1, the fixed window 30 is mounted in the lower space S3 of the curtain wall 1 and comprises the plurality of fixed window frames 300. Each fixed window frame 300 has the same configuration and function, and so the fixed window 30 shown in the left side of Fig. 1 will be described as an example below.

[61] Meanwhile, although Fig. 1 illustrates that the additional middle mullions M11 and M21 are respectively installed between the mullions M1 and M2 and between the mullions M2 and M3 and the fixed window frames 300 are respectively mounted therebetween, it will be apparent that the fixed window frames 300 may be mounted without any middle mullion.

[62] The fixed window frame 300 constituting the fixed window 30 mounted in the lower space S3 of the curtain wall 1 is fixedly installed to the transoms T2 and T3 and the

mullions M1 and M11.

- [63] Fig. 5 is a sectional view taken along the line C-C of Fig. 1, and Fig. 6 is a sectional view taken along the line D-D of Fig. 1.
- [64] The fixed window frame 300 comprises upper and lower horizontal frames 311 and 312 respectively fixed to the middle and lower transoms T2 and T3, and two vertical frames 321 and 322 fixed to the mullions M1 and M11. Meanwhile, it will be apparent that the window glass W is fixed to the fixed window frame 300.
- [65] The fixed window frame 300 of the fixed window 30 has the structure same as that of the fixed window frame 200 constituting the sliding window 10 (see the right portion of Fig. 2 and the lower portion of Fig. 3). In particular, although Figs. 5 and 6 illustrate for convenience that the vertical and horizontal frames 321, 322, 311 and 312 of the fixed window frame 300 have a box shape, the inner structure of each of the frames of the fixed window frame is the same as that of each of the vertical and horizontal frames 221, 222, 211 and 212 constituting the fixed window frame 200 of the sliding window 10.
- [66] That is, each of the vertical and horizontal frames 321, 322, 311 and 312 of the fixed window frame 300 comprises a metallic reinforcing member mounted therein to prevent each frame from being deformed by external wind pressure.
- [67] Meanwhile, in Figs. 5 and 6, reference symbol "B2" designates a glazing bead. Glazing bead B2 for fixing the window glass W are mounted to indoor side borders between each of the vertical frames 321 and 322 of the fixed window frame 300 and each of the mullions M1 and M11 and between each of the horizontal frames 311 and 312 and each of the transoms T2 and T3. These glazing beads B2 allow the window glass W to be firmly fixed to the fixed window frame 300.
- [68] As shown in Figs. 2, 3, 5 and 6, structures for mounting the glazing beads B1 and B2 utilized for fixing the window glasses W are provided in the fixed window frame 200 of the sliding window 10 and the fixed window frame 300 of the fixed window 30 at the indoor side. Thus, in a state where the fixed window frame 200 of the sliding window 10 and the fixed window frame 300 of the fixed window 30 are fixed to the mullions M1 and M2 and the transoms T1, T2 and T3, a worker can mount the window glasses W in the indoor side.
- [69] The aforementioned preferred embodiment of the present invention is disclosed only for illustrative purposes. Accordingly, it will be understood by those skilled in the art that various modifications, changes and additions can be made thereto within the spirit and scope of the invention. The modifications, changes and additions will be considered to fall in the scope of the present invention defined by the appended claims.

## Claims

- [1] A sliding window system for a multistoried building, comprising:  
a curtain wall including a plurality of transoms and mullions and having a plurality of window installation spaces formed by the transoms and the mullions;  
a plurality of fixed windows disposed in some of the window installation spaces of the curtain wall, each fixed window comprising at least one fixed window frame mounted fixedly to two transoms and two mullions; and  
at least one sliding window disposed in the window installation space and mounted to two mullions and two transoms to be opened and closed,  
wherein each sliding window comprises a sliding window frame slidably mounted to rails mounted to the corresponding transoms and a fixed window frame fixed to the transoms and the mullions.
- [2] The sliding window system as claimed in claim 1, wherein the sliding window frame of the sliding window comprises upper and lower horizontal frames corresponding to the transoms, two vertical frames fixed to both ends of the horizontal frames, and a window glass mounted to the frames; and guide bars are fixed to an upper end of the upper horizontal frame and a lower end of the lower horizontal frame in correspondence to the rails mounted to the transoms.
- [3] The sliding window system as claimed in claim 2, wherein each of the fixed window frame of the sliding window and the fixed window frame of the fixed window comprises upper and lower horizontal frames respectively fixed to the transoms and two vertical frames disposed at both ends of the horizontal frames and fixed to the mullions; and wherein glazing beads for fixing the window glass are mounted to an indoor side border between each vertical frame of each fixed window frame and the mullions and to an indoor side border between the horizontal frames and the mullions.
- [4] The sliding window system as claimed in claim 2, wherein a metallic reinforcing member is mounted to each of the vertical and horizontal frames of each fixed window frame to prevent each frame from being deformed by external wind pressure.
- [5] The sliding window system as claimed in claim 1, wherein a finishing material is fixed to an indoor side of the transom corresponding to the sliding window frame of the sliding window to finish a border between the transom and a horizontal frame of the sliding window frame.
- [6] The sliding window system as claimed in claim 1, wherein the sliding window further comprises sealing means respectively installed to upper and lower frames of the sliding window frame, the sealing means can be moved vertically by

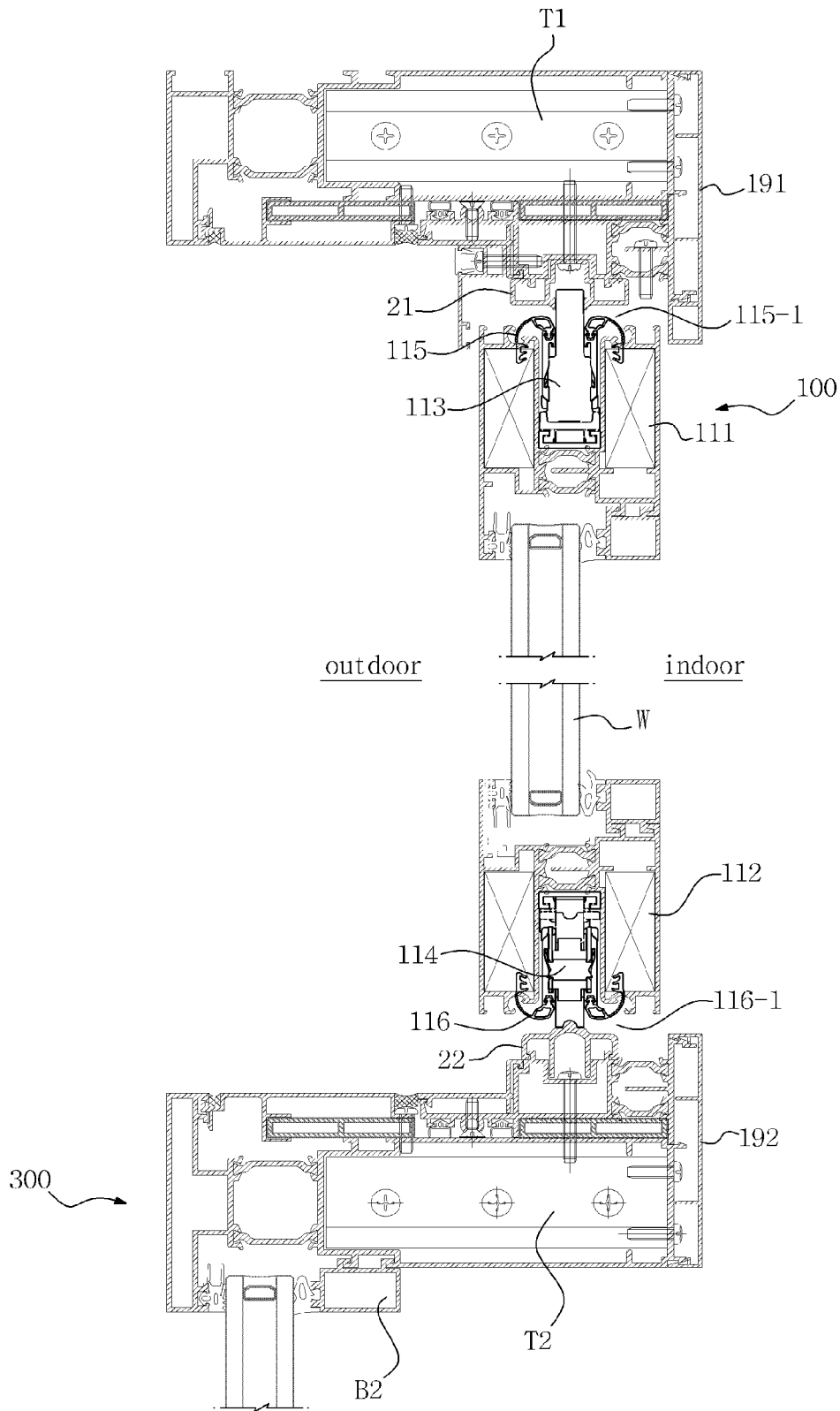
operation of a handle to seal a space between the transom and the sliding window.

[7] The sliding window system as claimed in claim 1, wherein the sliding window further comprises locking means mounted to the sliding window frame and the fixed window frame to restrain the movement of the sliding window caused by external wind pressure.

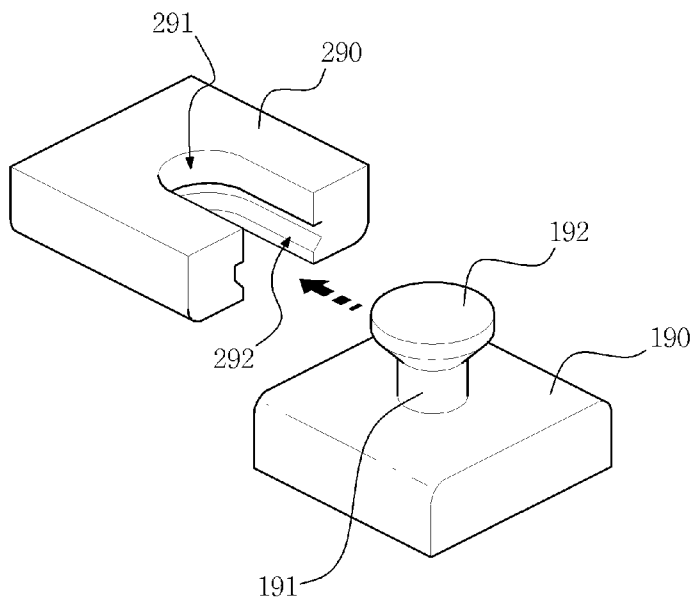
[8] The sliding window system as claimed in claim 7, wherein the locking means comprises a first locking member mounted to a vertical frame of the sliding window frame and a second locking means mounted to a vertical frame of the fixed window frame; wherein the first locking member is a base fixed to the vertical frame of the sliding window frame and has a cut portion formed in one end of the base, the cut portion having a groove with a predetermined depth formed in a surface thereof; and wherein the second locking member comprises a base fixed to the vertical frame of the fixed window frame, a stopper fixed to the base to be positioned in the cut portion of the first locking member, and an extension piece formed on an upper end of the stopper to be received in the groove of the first locking member.



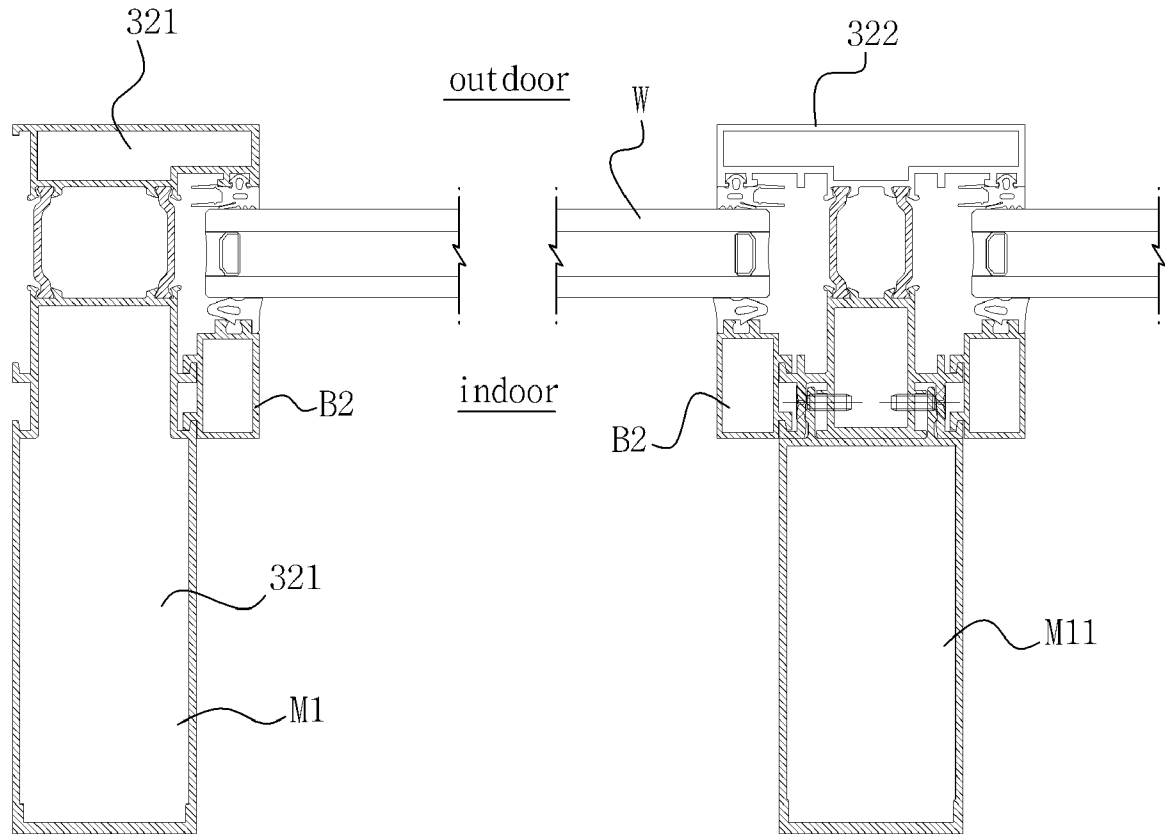
[Fig. 3]



[Fig. 4]



[Fig. 5]



[Fig. 6]

