SPECIFICATION

Clamping Sliding Panes of Glass in Window Sashes

The present invention relates to a window sash comprising a sliding pane of glass in a fixed frame and a device for clamping the pane. An application of the invention is to such a window sash in which the device is adapted for fastening in perfect water-tightness a pair of panes of glass that are set in a ventilation opening provided in an upper part of the fixed frame of the window sash.

It has recently become popular in the equipment of residential buildings to have a sliding window provided with an independent, framed small opening in its upper part for air ventilation purposes, which is composed of a pair of panes, one pane being tightly fixed to the frame, while the other is permitted to move freely along the grooves in the frames in order either to open a ventilation opening or to close it. The movable pane when closed is usually locked against the fixed pane by a known locking device. However, the known locking device has been found insufficiently water-tight, permitting rainwater to penetrate from outside into inside the window through gaps formed by rattling of the pane in stormy weather. Further, the locking device hitherto known has been found inconvenient in operation. For example, when one tries to operate the locking device in order to allow the movable pane to slide or close, it is necessary to keep the lock pushed or pulled by one hand while moving the pane to open or close by the other hand. Furthermore, the known prior art locking device is liable to become unlocked or damaged when the pane is forcedly pushed from outside.

According to the present invention there is provided a window sash comprising a sliding pane of glass in a fixed frame and a device for clamping the pane, said device comprising:—

(a) a base frame which is fixed to the fixed frame of the window sash by a first part of the base frame, a second part thereof being in a substantially U-shaped form with two wings;

(b) at least one pin bridging the two wings of the base frame;

(c) a press lever with a contact member pivotally supported by the pin and capable of rotating around the pin;

(d) a slider handle member in a substantially U-shaped form with two wings, each of the wings being provided with at least one oblong hole, supported by the pin penetrating the opposing oblong holes to be capable of moving to and fro between an operative position and an inoperative position, guided by the oblong holes;

(e) a coiled spring penetrated by the pin to exert a force in such a direction as to bias the press lever relative to the base frame away from the pane when the slider handle member is in said inoperative position; and

(f) a screw capable of advancement or retraction by being turned whereby the distance between the press lever and the slider handle member is varied so that the contacting pressure between the contact member and the pane can be adjusted;

(g) said slider handle member when in said operative position being engageable with the base frame to cause the contact member to be held against the force of the spring in a pane-engaging position.

A preferred embodiment of the invention permits a single operation for clamping and unclamping. Clamping effects using the device of the preferred embodiment of this invention are very reliable such that the sliding sash when locked no longer rattles in the wind and can be completely impervious to rainwater even in stormy weather. The clamping device of the preferred embodiment of the invention can be operated simply by one hand only in order to fasten or release the pane, compared to the prior art in which the handle of the clamping device must be pushed by one hand, while the sliding pane is moved by the other hand.

Some preferred embodiments according to the present invention will now be described by way of example with reference to the accompanying drawings, in which:

Fig. 1 depicts a double-sliding window sash, one on the right having a ventilation opening in the upper part and the right-side pane in the ventilation opening being clamped at the lower left corner;

Figs. 2 to 5 and 6a to 6b illustrate an embodiment of the inventive clamping device, of which:

Fig. 2 is a cross-sectional side view of the device;

Fig. 3 is a horizontal view of the device as seen from the back;

Fig. 4 is a plan view of the device;

Fig. 5 shows a perspective view of each part member of the device as disassembled; and

Fig. 6a to Fig. 6d show cross sectional side views of the device illustrating the movement of the individual part members.

Fig. 7 is a perspective view of another type of the device modified in the shape of the contact member fitting at the pane.

Figs. 8 to 10, 11a and 11b illustrate another embodiment of the inventive clamping device, of which:

Fig. 8 is a cross-sectional side view of the device;

Fig. 9 is a horizontal view of the device as seen from back;

Fig. 10 is a perspective view of the individual part members of the device as disassembled; and

Fig. 11a and Fig. 11b are cross-sectional side views of the device illustrating the movement of the individual part members.

In Figs. 1 to 5, 6a and 6b, 1 is a sash in which a pair of sliding windows 3, 3 are put having respective panes 2, 2. The right-hand window pane is partitioned by a central rail 2c bridging between right and left-side stiles 2b, 2b to

provide a ventilation opening 4 above the central rail 2c. The ventilation opening 4 is divided into right and left portions, each being provided with a pane 4a or 4b. The left-hand pane 4a is fixed to a upper rail 2a, a left side stile 2b and the central rail 2c water-tightly and, usually, incapable of sliding along the frames. On the other hand, the right-hand glass pane 4b is capable of sliding freely along the rails 2a and 2c towards the right and left for respectively closing or opening the ventilation opening 4.

When the ventilation opening 4 is closed with the pane 4b in the right-hand end within its sliding range, the pane 4b is clamped with a clamping device A of the invention which is attached and fixed to the central rail 2c at the lower left corner of the pane 4b where the panes 4a and 4b are overlapping on each other, pushing the pane 4b on to the pane 4a so that the ventilation opening 4 can be closed water-tight by virtue of a sealing material 5.

The clamping device A of the invention is fixed to the inside surface of the central rail 2c at a base plate 7a as the lower part of a base frame 7 with two or more screws 6. The base frame 7 is composed of the lower part as the base plate 7a and a upper part 7b which is substantially U-shaped as viewed from above containing inside a slider handle member 8, also substantially U-shaped as viewed from above, inside of which a press lever 9 is in turn contained being supported by a pin 10 permitting free rotation of the press lever 9 as well as the slider handle member 8 around it. The pin 10 penetrates a coiled spring 11, one leg 11a being in contact with the inside wall of the U-shaped part 7b of the base frame 7 and the other leg 11b being in contact with the inside surface of the press lever 9 to exert a pushing force to rotate the press lever 9 around the pin 10 in the direction that the lever tip 9a comes apart from the pane 4b.

The pin 10 penetrates the slider handle member 8 through a pair of oblong holes 8a, 8a on both wings thereof as shown in Fig. 5 so that the slider handle member 8 can move up and down relative to the base frame 7 along the oblong holes 8a, 8a by pushing the handle end 8b up or down with one finger. The slider handle member 8 has notches 8c, 8c on both wings below the oblong holes 8a, 8a so that the rotational movement of the slider handle member 8 is prevented when the slider handle member 8 is in the lowered position by the base plate 7a in contact with the slider handle member 8 at the notches 8c, 8c. The lever tip 9a of the press lever 9 facing the pane 4b is covered with a contact member 12 made of a resilient material such as nylon resin. The peripheral edge of the contact member 12, which is an L-shaped piece, coming into contact with the glass pane 4b is rounded and the contact member 12 is provided with a screw-threaded hole 12b at the lower part of it, into which an adjustment screw 13 is screwed through an opening 9b in the press lever 9 with the screw tip 13a protruding toward the upper part 7b of the base frame 7. The adjustment screw 13 being in contact with the peripheral edge of an aperture 8d functions to adjust the position of the contact member 12 in accordance with the thickness of the pane 4b with which the peripheral edge of the contact member 12 comes into contact. The position of the adjustment screw 13 can be varied in advancing or retreating by turning it with a tool such as a screw driver through the aperture 8d in the slider handle member 8 so that the tip of the adjustment screw 13 is in contact with the inside surface of the U-shaped upper part 7b of the base frame 7.

In order to release the clamping of the device, the slider handle member 8 is elevated as shown in Fig. 6a by pushing up the handle end 8b with one finger so that the notches 8c, 8c of the slider handle member 8 are no longer in contact with the base frame 7 permitting the rotation of the slider handle member 8 together with the press lever 9 being pushed by the coiled spring 11 in the direction that the peripheral edge of the contact member 12 is away from the pane 4b.

When the pane 4b is to be clamped with the clamping device, the handle end 8b of the slider handle member 8 is pushed toward the pane 4b along with simultaneous downward pressing with a finger so that the notches 8c, 8c come into contact with the base plate 7a of the base frame 7 as shown in Fig. 6b where the slider handle member 8 and, consequently, the press lever 9 are locked in the position, the peripheral edge of the contact member 12 being in press-contact with the pane 4b to give a water-tight sealing between the pane 4b and the sealing material 5.

When the clamping is too loose in this case due to the thickness of the pane 4b or the positioning of the base frame 7 relative to the pane 4b or the sealing material 5, the clamping force can be adequately adjusted as is shown in Fig. 6c by turning the adjustment screw 13 to retreat before the device is set to clamping as is shown in Fig. 6d where sufficient pressure is exerted to the pane 4b which becomes into water-tight contact with the sealing material 5.

In the above description, the clamping device of the invention is attached and fixed to the lower corner of the pane 4b where the pane 4b overlaps with the fixed pane 4a. It is of course an alternative that the clamping device is attached upside-down to the upper rail 2a at the upper left corner of the pane 4b where it overlaps with the pane 4a or any other part of the pane 4b to give satisfactory clamping. It is also possible as shown in Fig. 7 that the peripheral edge of the contact member 12 is shaped in a stepwise form with a level difference 12a with which the pane is clamped at the overlapping.

Another embodiment of the present invention is illustrated with reference to Figs. 8 to 11. As is shown in Fig. 8, the clamping device is attached and fixed to the central rail 2c with two or more screws 6 at a base plate 27a as the lower part of a base frame 27, of which an upper part 27b is shaped in a substantially U-shaped form as

viewed from above. A slider handle member 30, also in a substantially U-shaped form as viewed from above, is inserted inside the U-shaped part 27b, being supported by two pins 28 and 29 bridging between both wings of the U-shaped part 27b of the base frame 27 at a distance from each other permitting the up and down movement of the slider handle member 30 guided by oblong holes 30a, 30a and 30b, 30b provided on both wings of the slider handle member 30 when the handle end 30c is pushed up or pushed down with a finger. The slider handle member 30 is provided with a screw-threaded hole in the face opposing to the pane 4b, into which a pushing screw 31 is screwed so that it is able to advance toward or retreat from the pane 4b by turning it with a tool such as a screw driver through an aperture 27c in the back of the U-shaped part 27b of the base frame 27. The tip of the pushing screw 31 comes into contact with a press lever 32 when the clamping device is set to clamp the pane 4b as will be described below.

In the front face of the slider handle member 30 is provided a long slot 30d at a side of the pushing screw 31 and the lower part of one of the side wings of the press lever 32 is inserted into the slot 30d appearing inside the slider handle member 30 where the press lever 32 is pivotally supported by the lower pin 29 together with the other wing of the press lever 32 which is in the position along the side of the slider handle member 30. The lower pin 29 also penetrates a coiled spring 33 inside the slider handle member 30, one leg of the coiled spring 33 being engaged to the lateral inside surface of the slider handle member 30 and the other leg of the coiled spring 33 being engaged to a stopper 32a of the press lever 32 so that a pulling force is exerted to the press lever 32 in the direction to pull the upper end of the press lever 32 apart from the pane 4b. The press lever 32 has a longitudinally elongated stepped tongue 32b connected to the press lever 32 at the lower end 32c so that the tip of the pushing screw 31 comes into contact with the stepped tongue 32b when the slider handle member 30 is at the elevated position to push the press lever 32 toward the pane 4b, but is not in contact with the stepped tongue 32b when the slider handle member 30 is in the lowered position. The upper end of the press lever 32 is capped with the contact member 34 made of a resilient material such as plastics.

When the clamping of the device is released, the slider handle member 30 is at the lowered position as is shown in Fig. 11a being pushed down into the U-shaped part 27b of the base frame 27 so that the tip of the pushing screw 31 is off the stepped tongue 32b of the press lever 32 with the contact member 34 at the upper end of it, the press lever 32 being pulled by the coiled spring 33, exerting no contacting pressure to the pane 4b permitting free sliding of it.

When the pane 4b is to be clamped with the clamping device, the slider handle member 30 is pushed up at the handle end 30c with a finger so that the tip of the pushing screw 31 comes into contact with the stepped tongue 32b of the press lever 32 exerting a pushing force in such a manner that the press lever 32 is rotationally moved toward the pane 4b counteracting the pulling force of the coiled spring 33 whereby the pane 4b is press-contacted by the contact member 34 to be clamped between the contact member 34 and the sealing material 5 with sufficient water-tightness to prevent the leakage of rainwater. The contacting pressure of the contact member 34 can be adjusted adequately by turning the pushing screw 31 to move it inwardly or outwardly in accordance with the thickness of the pane 4b and the position of the clamping device relative to the pane 4b to adjust the clamping force.

Of course, the clamping device of this embodiment can also be attached to the upper rail 2a of the sliding window in an upside-down position or in any position other than the overlapping of the panes 4a and 4b.

As has been described above, the clamping and unclamping operation can be done conveniently in a single motion, and the sliding pane can be clamped water-tightly and pressed against the sealing material so that leakage of rainwater or rattling of the glass pane do not occur even in stormy weather. Furthermore the contacting pressure of the contact member can be adjusted freely in accordance with the thickness of the pane and the relative position of the clamping device to the pane in such a manner that the effect of the adjustment once done can be maintained in subsequent repeated clamping operations reliably without the danger of breaking the pane by exerting an excessive force. In addition, the state of the device in clamping can be locked by mutual engagement of the slider handle member and the base frame or the press lever so that any forced pressure exerted from outside of the pane does not release the clamping tightness or damage the device itself, and a high security can be secured.

Claims

1. A window sash comprising a sliding pane of glass in a fixed frame and a device for clamping the pane, said device comprising:—

(a) a base frame which is fixed to the fixed frame of the window sash by a first part of the base frame, a second part thereof being in a substantially U-shaped form with two wings;

(b) at least one pin bridging the two wings of the base frame;

(c) a press lever with a contact member pivotally supported by the pin and capable of rotating around the pin;

(d) a slider handle member in a substantially U-shaped form with two wings, each of the wings being provided with at least one oblong hole, supported by the pin penetrating the opposing oblong holes to be capable of moving to and fro between an operative position and an inoperative position, guided by the oblong holes;

viewed from above. A slider handle member 30, also in a substantially U-shaped form as viewed from above, is inserted inside the U-shaped part 27b, being supported by two pins 28 and 29 bridging between both wings of the U-shaped part 27b of the base frame 27 at a distance from each other permitting the up and down movement of the slider handle member 30 guided by oblong holes 30a, 30a and 30b, 30b provided on both wings of the slider handle member 30 when the handle end 30c is pushed up or pushed down with a finger. The slider handle member 30 is provided with a screw-threaded hole in the face opposing to the pane 4b, into which a pushing screw 31 is screwed so that it is able to advance toward or retreat from the pane 4b by turning it with a tool such as a screw driver through an aperture 27c in the back of the U-shaped part 27b of the base frame 27. The tip of the pushing screw 31 comes into contact with a press lever 32 when the clamping device is set to clamp the pane 4b as will be described below.

In the front face of the slider handle member 30 is provided a long slot 30d at a side of the pushing screw 31 and the lower part of one of the side wings of the press lever 32 is inserted into the slot 30d appearing inside the slider handle member 30 where the press lever 32 is pivotally supported by the lower pin 29 together with the other wing of the press lever 32 which is in the position along the side of the slider handle member 30. The lower pin 29 also penetrates a coiled spring 33 inside the slider handle member 30, one leg of the coiled spring 33 being engaged to the lateral inside surface of the slider handle member 30 and the other leg of the coiled spring 33 being engaged to a stopper 32a of the press lever 32 so that a pulling force is exerted to the press lever 32 in the direction to pull the upper end of the press lever 32 apart from the pane 4b. The press lever 32 has a longitudinally elongated stepped tongue 32b connected to the press lever 32 at the lower end 32c so that the tip of the pushing screw 31 comes into contact with the stepped tongue 32b when the slider handle member 30 is at the elevated position to push the press lever 32 toward the pane 4b, but is not in contact with the stepped tongue 32b when the slider handle member 30 is in the lowered position. The upper end of the press lever 32 is capped with the contact member 34 made of a resilient material such as plastics.

When the clamping of the device is released, the slider handle member 30 is at the lowered position as is shown in Fig. 11a being pushed down into the U-shaped part 27b of the base frame 27 so that the tip of the pushing screw 31 is off the stepped tongue 32b of the press lever 32 with the contact member 34 at the upper end of it, the press lever 32 being pulled by the coiled spring 33, exerting no contacting pressure to the pane 4b permitting free sliding of it.

When the pane 4b is to be clamped with the clamping device, the slider handle member 30 is pushed up at the handle end 30c with a finger so that the tip of the pushing screw 31 comes into contact with the stepped tongue 32b of the press lever 32 exerting a pushing force in such a manner that the press lever 32 is rotationally moved toward the pane 4b counteracting the pulling force of the coiled spring 33 whereby the pane 4b is press-contacted by the contact member 34 to be clamped between the contact member 34 and the sealing material 5 with sufficient water-tightness to prevent the leakage of rainwater. The contacting pressure of the contact member 34 can be adjusted adequately by turning the pushing screw 31 to move it inwardly or outwardly in accordance with the thickness of the pane 4b and the position of the clamping device relative to the pane 4b to adjust the clamping force.

Of course, the clamping device of this embodiment can also be attached to the upper rail 2a of the sliding window in an upside-down position or in any position other than the overlapping of the panes 4a and 4b.

As has been described above, the clamping and unclamping operation can be done conveniently in a single motion, and the sliding pane can be clamped water-tightly and pressed against the sealing material so that leakage of rainwater or rattling of the glass pane do not occur even in stormy weather. Furthermore the contacting pressure of the contact member can be adjusted freely in accordance with the thickness of the pane and the relative position of the clamping device to the pane in such a manner that the effect of the adjustment once done can be maintained in subsequent repeated clamping operations reliably without the danger of breaking the pane by exerting an excessive force. In addition, the state of the device in clamping can be locked by mutual engagement of the slider handle member and the base frame or the press lever so that any forced pressure exerted from outside of the pane does not release the clamping tightness or damage the device itself, and a high security can be secured.

Claims

1. A window sash comprising a sliding pane of glass in a fixed frame and a device for clamping the pane, said device comprising:—

(a) a base frame which is fixed to the fixed frame of the window sash by a first part of the base frame, a second part thereof being in a substantially U-shaped form with two wings;

(b) at least one pin bridging the two wings of the base frame;

(c) a press lever with a contact member pivotally supported by the pin and capable of rotating around the pin;

(d) a slider handle member in a substantially U-shaped form with two wings, each of the wings being provided with at least one oblong hole, supported by the pin penetrating the opposing oblong holes to be capable of moving to and fro between an operative position and an inoperative position, guided by the oblong holes;

(e) a coiled spring penetrated by the pin to exert a force in such a direction as to bias the press lever relative to the base frame away from the pane when the slider handle member is in said inoperative position; and

(f) a screw capable of advancement or retraction by being turned whereby the distance between the press lever and the slider handle member is varied so that the contacting pressure between the contact member and the pane can be adjusted;

(g) said slider handle member when in said operative position being engageable with the base frame to cause the contact member to be held against the force of the spring in a pane-engaging position.

2. A window sash as claimed in claim 1 wherein the press lever is positioned between the base frame and the slider handle member, the coiled spring urging the press lever toward the slider handle member, the slider handle member being provided with notches in both of its wings which come into contact with the base frame to prevent the rotation of the slider handle member around the pin when the device is set to clamping with the slider handle member in the operative position, and the screw being screwed into a screw-threaded hole provided in the press lever to adjust the position of the contact member relative to the slider handle member.

3. A window sash as claimed in claim 1 wherein the slider handle member is positioned between the base frame and the press lever, the coiled spring urging the press lever toward the slider handle member, the press lever being provided with a stepped tongue, and the screw being screwed into a screw-threaded hole provided in the slider handle member with the tip thereof coming into contact with the stepped tongue when the device is set to clamping with the slider handle member in the operative position whereby the contact member of the press lever comes into contact with the pane counteracting the force of the coiled spring.

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