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(54) WINDOW UNIT WITH SASH REMOVAL PREVENTION DEVICE

(71) We, YOSHIDA KOGYO K.K., a corporation duly organized under the laws of Japan and existing at No. 1, Kanda Izumi-cho, Chiyoda-ku, Tokyo, Japan, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to a window unit having devices for preventing window sashes installed in the outer frame from being taken out.

The present invention seeks to provide a window unit having sashes which, once mounted in the window outer frame, can be protected against removal therefrom.

The invention also seeks to provide a sash removal prevention device that can capture and release the sash reliably and speedily.

According to the invention, there is provided a window unit comprising a frame element, inwardly facing channels in opposite sides of the frame for receiving a sliding sash element, the sliding sash element having a dimension in the plane defined by the channels and in a direction at right angles to the length of the channels which is greater than the distance between the channel mouths but smaller than the distance between the mouth of one channel and the bottom of the other channel and rotary means having an axis at right angles to said plane on one element cooperating with abutment means on the other element for selectively preventing movement of the sash into the said one channel to an extent sufficient to clear the mouth of the said other channel.

In a preferred embodiment of the invention, the frame element includes a head and a sill, the head having a first pair of spaced side flanges extending downwardly, and the sill having a second pair of spaced side flanges extending upwardly wherein the sash element has a pair of top and bottom rails, the top rail comprising a first pair of spaced side walls extending upwardly and each having a distal edge disposed between the first pair of spaced side flanges, said

head further including a guide flange extending downwardly in between the first pair of spaced side walls and forming the abutment means, and the bottom rail comprising a second pair of spaced side walls extending downwardly and each having a distal edge which is disposed between the second pair of spaced flanges. The rotary means is provided on one of the first side walls and includes a rotatable member with its axis of rotation extending substantially perpendicularly to the said one of first side walls, said rotary means also including a blocking member fixedly mounted on one end of the rotatable member and located between the first side walls, the blocking member being, upon rotation of the rotatable member, locatable in a position in which the blocking member is situated beneath and spaced from the free edge of the guide flange whereby the possible upward movement of the sash element is reduced to an extent such that the sash element is protected against removal from the frame element.

The invention will now be described in greater detail, by way of example, with reference to the drawings, in which:—

Figure 1 is a front elevational view of a window unit having sash removal prevention devices constructed in accordance with the invention, the window unit being shown as seen from the interior of a building;

Figure 2 is an enlarged cross-sectional view taken along the line II—II in Figure 1; and

Figure 3 is an enlarged vertical cross-sectional view of a sash removal prevention device according to another embodiment.

Figure 1 shows a window unit generally indicated by the numeral 10, the window unit 10 comprising an outer frame 11 to be installed in a rough opening in an enclosing wall (not shown), and a pair of sashes 12, 13 mounted for horizontal opening and closing movement within the outer frame 11. The outer frame 11 includes a pair of side jambs 14, 15 and a pair of head and sill members 16, 17 connected endwise to the side jambs 14, 15. Each of the sashes 12, 13 has a pair of stiles 18, 19 and a pair of

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top and bottom rails 20, 21 connected endwise to the stiles 18, 19. Each sash is glazed with a sheet 22 of glass, which is surrounded and supported by the stiles 18, 19 and the rails 20, 21 that are put together. The top rail 20 carries a plurality of sash removal prevention devices 23 which are spaced along the top rail 20.

In Figure 2, the head 16 has a top plate 24 and a pair of spaced side flanges 25, 26 extending downwardly therefrom, and the sill 17 has a bottom plate 27 and a pair of spaced side flanges 28, 29 extending upwardly therefrom, the side flanges 25, 26 being aligned vertically with the side flanges 28, 29, respectively. The top rail 20 comprises a pair of spaced side walls 30, 31 extending upwardly and each having a distal edge 32 disposed between the side flanges 25, 26. The side walls 30, 31 are interconnected by a partition 33 remote from the distal edges 32.

The head 16 further includes a guide flange 34 extending downwardly from the top plate 24 and situated substantially midway between the side flanges 25, 26, the guide flange 34 extending in between the side walls 30, 31 of the top rail 20, but terminating far short of the partition 33. The side walls 30, 31 have a pair of support flanges 35, 35 on edges opposite to the distal edges 32, 32, the flanges 35, 35 supporting an upper margin of the glass sheet 22 with a gasket 36 therebetween.

The bottom rail 21 comprises a pair of spaced side walls 37, 38 extending downwardly and each having a distal edge 39 disposed between the side flanges 28, 29. The side walls 37, 38 are interconnected by a pair of partitions 40, 41, the partition 40 supporting a plurality of rollers 42, only one of which is herein shown. The sill 17 further includes a rail flange 43 extending upwardly from the bottom plate 27 and situated substantially midway between the side flanges 28, 29, on which rail flange 43 the rollers 42 rotatably ride for horizontal rolling movement of the sash 13. The side walls 37, 38 have a pair of support flanges 44, 44 on edges opposite to the distal edges 39, 39, the flanges 44, 44 supporting a lower margin of the glass sheet 22 with a gasket 45 therebetween.

The side walls 30 and 37 have channels 46, 46 receiving sealing strips 47, 47 engageable with one of the sides of the guide and rail flanges 34, and 43, respectively.

To install the sash 13 in the outer frame 11, the sash 13 outside the frame 11 is inclined with the top rail 20 beneath the head 16, and is lifted to allow the side wall 30 to enter between the side flange 25 and the guide flange 34, and the side wall 31 to enter between the side flange 26 and the guide flange 34. Continued upward move-

ment of the sash 13 is possible because there is much vertical space between the free edge 48 of the guide flange 34 and the partition 33, and the sash 13 is lifted until the distal edges 39 of the side walls 37, 38 of the bottom rail 21 are located upwardly of the free edge 49 of the side flange 28. With the sash 13 thus raised, the bottom rail 21 is shifted sidewise until the distal edge 39 of the side wall 38 clears the rail flange 43, and the distal edge 39 of the side wall 37 clears the side flange 28. Then, the sash 13 is allowed down to place the rollers 42 on the rail flange 43, when installation of the sash 13 is completed.

At this time, the distal edges 39 of the side walls 37, 38 are spaced a distance L_1 downwardly from the free edge 49 of the side flange 28. Thus, for removal of the sash 13 from the outer frame 11, the sash 13 is required to be lifted vertically from the position of Figure 2 at least by the distance L_1 .

The sash removal prevention device 23 has a circular attachment base 50 mounted in a circular through hole 51 formed in the side wall 31. The attachment base has an annular flange 52 fixed by a screw 53 to the side wall 31. The attachment base 50 has an annular stepped portion 54 on the flange 52, the portion 54 being fitted in the hole 51. A headed machine screw 55 extends threadedly through the attachment base 50, the screw 55 having its axis of rotation extending substantially perpendicularly to the side wall 31. The base 50 further includes a bore 56 which receives and is coaxial with the screw 55, the bore 56 being greater in diameter than the head 57 of the machine screw 55 so as to accommodate the screw head 57 therein. The screw head 57 has a slot 58 for receiving the wedge-shaped end of a screwdriver or the peripheral edge of a coin used as a screwdriver. A portion 59 of the attachment base 50 extends inwardly from the side wall 31 towards the side wall 30.

Mounted coaxially on an end 60 of the screw 55 which is opposite to the headed end 57 is a circular blocking member 61 which is positioned in a space between the side walls 30, 31. The blocking member 61 has a diameter slightly smaller than that of the hole 51, so that the blocking member 61 can pass through the hole 51 for insertion or removal. The blocking member 61 is fixed to the screw end 60 by means of a pin 62 extending diametrically across and through them. When the screw 55 is rotated so as to be advanced, the blocking member 61 as it is rotated is moved forwardly or toward the side wall 30. With the screw 55 fully threaded in, the blocking member 61 underlies or is located just beneath the guide flange 34. At this time, the blocking member

61 has a circumferential surface 63 spaced from the free edge 48 of the guide flange 34 a distance L_2 which is shorter than the distance L_1 . Therefore, when the sash 13 is raised within the outer frame 11 for removal, the blocking member 61 becomes engaged by the free edge 48 of the guide flange 34 that is in the way, whereby the sash 13 can be prevented from moving up beyond the distance L_2 . The distal edges 39, 39 of the side walls 37, 38 of the bottom rail 21 cannot clear the side flange 28, so that removal of the sash 13 out of the outer frame 11 is impossible. With the device 23 thus actuated, it does not present any obstruction to opening and closing movement of the sash 13 within the outer frame 11. The device 23 can be used on existing sashes simply by drilling their top rails to provide the attachment holes 51.

To provide as wide a surface that is engageable with the free edge 48 of the guide flange 34 as is possible, the blocking member 61 has an annular flange 64 coaxial therewith, which can accommodate therein the projecting portion 59 of the attachment base 50.

When the screw 55 is rotated so as to be retracted, the blocking member 61 as it is rotated is moved rearwardly or toward the side wall 31. With the screw 55 fully retracted, the blocking member 61 is placed out of the way of the guide flange 34. In this position, the sash 13 is permitted to move up the distance L_1 or more since there is no obstacle in the passage of the guide flange 34 between the side walls 30, 31, thereby allowing the sash 13 to be taken out of the outer frame 11.

In accordance with another embodiment illustrated in Figure 3, a sash removal prevention device 70 comprises an annular attachment base 71 mounted in a circular through hole 72 formed in the side wall 31. The attachment base 71 has an aperture 73 therethrough and a counterbore 74 at one end. A cylinder 75 is rotatably fitted in the aperture 73 and has an annular flange 76 rotatably fitted in the counterbore 74. The attachment base 71 further includes a flange 77, which is covered with an annular plate 78 that is fixed together with the flange 77 by a screw 79 to the side wall 31. The cover plate 78 has a central opening 80 that is equal in diameter to the aperture 73 in the base 71. The annular edge bounding the central opening 80 closes the open side of the counterbore 74 to capture the cylinder flange 76 in place.

The aperture 73 has an inner circumferential surface knurled or otherwise roughened to provide increased frictional resistance to rotation of the cylinder 75 therein. The cylinder 75 has at one end an integral blocking bar 71 positioned eccentrically and ex-

tending parallel to the axis of rotation of the cylinder 75, the bar 81 being located below the guide flange 34. The other end of the cylinder 75 has therein a diametrical slot 82 to receive the edge of a screw-driver. The slotted end lies flush with the outer surface of the cover plate 78.

Upon revolution of the cylinder 75, the blocking bar 81 is movable vertically between an uppermost position in which the bar 81 has an outer surface 83 spaced from the free edge 48 of the guide flange 34 by a distance L_2 that is shorter than the distance L_1 , and a lowermost position in which the bar 81 is spaced from the free edge 48 of the guide flange 34 by a distance that is longer than the distance L_1 .

With the structure shown in Figure 3, the sash 13 can be installed with the bar 81 down in the lowermost position. Upon installation of the sash 14, the cylinder 75 is turned through 180° to bring the bar 81 up to the uppermost position, thereby confining the sash 13 to upward movement for the distance L_2 . This modification is more beneficial than the embodiment of Figure 2, because the sash 13 can be captured or released only by 180° revolution of the cylinder 75.

WHAT WE CLAIM IS:—

1. A window unit comprising a frame element, inwardly facing channels in opposite sides of the frame for receiving a sliding sash element, the sliding sash element having a dimension in the plane defined by the channels and in a direction at right angles to the length of the channels which is greater than the distance between the channel mouths but smaller than the distance between the mouth of one channel and the bottom of the other channel and rotary means having an axis at right angles to said plane on one element cooperating with abutment means on the other element for selectively preventing movement of the sash into the said one channel to an extent sufficient to clear the mouth of the said other channel.

2. A window unit according to claim 1 wherein the frame element includes a head and a sill, the head having a first pair of spaced side flanges extending downwardly, and the sill having a second pair of spaced side flanges extending upwardly wherein the sash element has a pair of top and bottom rails, the top rail comprising a first pair of spaced side walls extending upwardly and each having a distal edge disposed between the first pair of spaced side flanges, said head further including a guide flange extending downwardly in between the first pair of spaced side walls and forming the abutment means, and the bottom rail comprising a second pair of spaced side walls extend-



61 has a circumferential surface 63 spaced from the free edge 48 of the guide flange 34 a distance L_2 which is shorter than the distance L_1 . Therefore, when the sash 13 is raised within the outer frame 11 for removal, the blocking member 61 becomes engaged by the free edge 48 of the guide flange 34 that is in the way, whereby the sash 13 can be prevented from moving up beyond the distance L_2 . The distal edges 39, 39 of the side walls 37, 38 of the bottom rail 21 cannot clear the side flange 28, so that removal of the sash 13 out of the outer frame 11 is impossible. With the device 23 thus actuated, it does not present any obstruction to opening and closing movement of the sash 13 within the outer frame 11. The device 23 can be used on existing sashes simply by drilling their top rails to provide the attachment holes 51.

To provide as wide a surface that is engageable with the free edge 48 of the guide flange 34 as is possible, the blocking member 61 has an annular flange 64 coaxial therewith, which can accommodate therein the projecting portion 59 of the attachment base 50.

When the screw 55 is rotated so as to be retracted, the blocking member 61 as it is rotated is moved rearwardly or toward the side wall 31. With the screw 55 fully retracted, the blocking member 61 is placed out of the way of the guide flange 34. In this position, the sash 13 is permitted to move up the distance L_1 or more since there is no obstacle in the passage of the guide flange 34 between the side walls 30, 31, thereby allowing the sash 13 to be taken out of the outer frame 11.

In accordance with another embodiment illustrated in Figure 3, a sash removal prevention device 70 comprises an annular attachment base 71 mounted in a circular through hole 72 formed in the side wall 31. The attachment base 71 has an aperture 73 therethrough and a counterbore 74 at one end. A cylinder 75 is rotatably fitted in the aperture 73 and has an annular flange 76 rotatably fitted in the counterbore 74. The attachment base 71 further includes a flange 77, which is covered with an annular plate 78 that is fixed together with the flange 77 by a screw 79 to the side wall 31. The cover plate 78 has a central opening 80 that is equal in diameter to the aperture 73 in the base 71. The annular edge bounding the central opening 80 closes the open side of the counterbore 74 to capture the cylinder flange 76 in place.

The aperture 73 has an inner circumferential surface knurled or otherwise roughened to provide increased frictional resistance to rotation of the cylinder 75 therein. The cylinder 75 has at one end an integral blocking bar 71 positioned eccentrically and ex-

tending parallel to the axis of rotation of the cylinder 75, the bar 81 being located below the guide flange 34. The other end of the cylinder 75 has therein a diametrical slot 82 to receive the edge of a screwdriver. The slotted end lies flush with the outer surface of the cover plate 78.

Upon revolution of the cylinder 75, the blocking bar 81 is movable vertically between an uppermost position in which the bar 81 has an outer surface 83 spaced from the free edge 48 of the guide flange 34 by a distance L_2 that is shorter than the distance L_1 , and a lowermost position in which the bar 81 is spaced from the free edge 48 of the guide flange 34 by a distance that is longer than the distance L_1 .

With the structure shown in Figure 3, the sash 13 can be installed with the bar 81 down in the lowermost position. Upon installation of the sash 14, the cylinder 75 is turned through 180° to bring the bar 81 up to the uppermost position, thereby confining the sash 13 to upward movement for the distance L_2 . This modification is more beneficial than the embodiment of Figure 2, because the sash 13 can be captured or released only by 180° revolution of the cylinder 75.

WHAT WE CLAIM IS:—

1. A window unit comprising a frame element, inwardly facing channels in opposite sides of the frame for receiving a sliding sash element, the sliding sash element having a dimension in the plane defined by the channels and in a direction at right angles to the length of the channels which is greater than the distance between the channel mouths but smaller than the distance between the mouth of one channel and the bottom of the other channel and rotary means having an axis at right angles to said plane on one element cooperating with abutment means on the other element for selectively preventing movement of the sash into the said one channel to an extent sufficient to clear the mouth of the said other channel.

2. A window unit according to claim 1 wherein the frame element includes a head and a sill, the head having a first pair of spaced side flanges extending downwardly, and the sill having a second pair of spaced side flanges extending upwardly wherein the sash element has a pair of top and bottom rails, the top rail comprising a first pair of spaced side walls extending upwardly and each having a distal edge disposed between the first pair of spaced side flanges, said head further including a guide flange extending downwardly in between the first pair of spaced side walls and forming the abutment means, and the bottom rail comprising a second pair of spaced side walls extend-



ing downwardly and each having a distal edge which is disposed between the second pair of spaced side flanges and wherein the rotary means is provided on one of the first side walls and includes a rotatable member with its axis of rotation extending substantially perpendicularly to the said one of first side walls, said rotary means also including a blocking member fixedly mounted on one end of the rotatable member and located between the first side walls, the blocking member being, upon rotation of the rotatable member, locatable in a position in which the blocking member is situated beneath and spaced from the free edge of the guide flange whereby the possible upward movement of the sash element is reduced to an extent such that the sash element is protected against removal from the frame element.

3. A window unit according to claim 2, wherein the said one of the first side walls has a through hole, and the said rotary means further includes an attachment base fixedly mounted in the hole, the rotatable member comprising a headed machine screw extending threadedly through the attachment base, the blocking member being coaxially attached to an end of the screw which is opposite to the headed end, and the blocking member having a peripheral surface which, when the screw is screwed in comes to lie just beneath the free edge of the guide flange.

4. A window unit according to claim 3, wherein the attachment base has a flange fixed by a screw to the said one of the first side walls and includes a bore receiving and coaxial with the machine screw and greater in diameter than the head of the screw so as to accommodate the screw head therein, and the blocking member having an annular flange which can receive therein a portion of the base which extends inwardly from the said one of the first side walls toward the other.

5. A window unit according to claim 4, wherein the blocking member is fixed to the screw by a pin extending diametrically across and through them.

6. A window unit according to claim

2, wherein said one of the first side walls has a through hole, and the said means further includes an attachment base fixedly mounted in the hole and having an aperture there-through, the rotatable member comprising a cylinder rotatably fitted in the aperture, the blocking member being a bar positioned eccentrically and extending parallel to the axis of rotation of the cylinder, and the bar being located below said guide flange and being movable vertically between an uppermost position in which the bar has a surface spaced from the free edge of the guide flange by a short distance such that the sash element is protected from removal from the frame element, and lowermost position in which the bar is spaced from the free edge of the guide flange by a longer distance such that the sash element can be removed from the frame element.

7. A window unit according to claim 6, wherein the attachment member has a counterbore, the cylinder having an annular flange rotatably fitted in the counterbore, the attachment base further having a flange, which is covered with a cover plate that is fixed together with the base flange by a screw to the said one of the first side walls, and the cover plate having an annular edge which closes the open side of the counterbore to capture the annular flange.

8. A window unit according to claim 6, wherein the aperture has a knurled inner circumferential surface.

9. A window unit according to claim 6, wherein the cylinder has a diametrical slot in one end thereof which is opposite to the end at which the bar is provided.

10. A window unit according to claim 9, wherein the slotted end lies flush with the outer surface of the cover plate.

11. A window unit according to claim 6, wherein the bar is formed integrally with the cylinder.

12. A window unit substantially as herein described with reference to the drawings.

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