DEVICE FOR ADJUSTING WINDOW TO OUT-OF-SQUARE FRAME WITH INSULATING STRIP


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7 Claims. (Cl. 20—52)

This invention relates in general to window construction including a horizontally sliding sash and, more particularly, to support structure for such sash by which the sash can be adjusted to fit and completely close an out-of-square frame within which said sash is used.

One type of window construction, which is widely used in high-grade residential and institutional buildings, has a horizontally sliding sash and a support structure underneath said sash for supporting and guiding same in its horizontal movement. Such window constructions normally comprise a completed and self-supporting frame structure within which the sash is mounted. The structure by which the sash is supported for horizontal movement is normally a horizontally positioned rail on the lower horizontal frame member together with rollers on the under side of the sash arranged for engaging the rail. It sometimes happens in the manufacturing and/or shipment of these windows from the factory to the job site that the frame will be moved slightly from its normal and desired rectangular condition into a somewhat out-of-square shape which defines a non-rectangular parallelogram. While this out-of-square condition can readily be corrected by the builder when the window frame is installed into a building, such correction frequently is not made. This may be because the condition is not noticed or it may be because of carelessness. In other cases, it sometimes happens that the out-of-square condition develops during the installation step by reason of irregularities, including the forming of an out-of-square window opening, in the masonry or other structure within which the window frame fits. Regardless of the reason, however, it is apparent that once the window frame is installed in an out-of-square condition, particularly in a masonry building, correction of such condition becomes virtually impossible.

Since the sash will not assume a corresponding out-of-square condition, the sash will fail to fit snugly against the vertical end members of the frame. This results in an unsightly appearance and possibly a leaking window, neither of which has been capable of correction within economic limits. Even though the cause for this condition is beyond the control of the window manufacturer, where it has originated in the installation step, the manufacturer is usually charged with responsibility for the unsightly appearance of the window. Inasmuch as the unsightly appearance results from the failure of the window frame and sash to match, it is desirable for the window manufacturer to incorporate into his window means by which the sash can be adjusted to the frame to compensate for the out-of-square condition of the frame and can close in a manner which will not reveal the irregularity.

This problem has been previously recognized and prior attempts have been made to overcome it, as shown in Patent No. 2,668,318. However, the previous structure for this purpose is relatively expensive and somewhat awkward to use. Therefore, it has not fully met the requirements of the condition under consideration and further improvement has been needed by the industry.

Other mechanisms suggested for this purpose involve notching the track or otherwise moving the sash with respect to the adjacent surface of the window sill. Some of these structures are inexpensive and effective, but they have the disadvantage of necessitating movement of the sash, in consequence of its adjustment, with respect to the upper surface of the sill. Thus, where a notch is used at the end of the track to effect the sash adjustment, a permanently mounted sealing strip must be sufficiently flexible to enable it to close under conditions involving different spacings between the sash and the sill. This requires either an extremely flexible sealing strip or it incurs the risk of failure to seal effectively in one position or another. Attempts to meet this condition have involved the use of an adjustable sealing strip which not only creates an added cost, but also requires a further step in the installation and adjustment of the window.

Accordingly, a major object of the invention is to provide a horizontally sliding window construction having a sash support structure by which the sliding sash may be adjusted to effect a snug fitting of the sash stile against the side element of the frame, when the sash is in the closed position, in order to compensate for a slight out-of-square condition in the frame.

A further object of the invention is to provide a window construction as aforesaid, wherein the sliding sash remains at a substantially constant distance from, and at a constant attitude with respect to, the track along which it moves and, therefore, said sliding sash remains at a substantially constant distance from the adjacent upper surface of the frame sill upon which the track is mounted, whereby a simple weather sealing strip can be effectively mounted on the sash to close the space between the sash and the sill.

A further object of the invention is to provide window construction, as aforesaid, wherein the sliding sash remains at a substantially constant distance from the adjacent lower surface of the frame sill upon which the track is mounted, whereby a simple weather sealing strip can be effectively mounted on the sash to close the space between the sash and the sill.

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therefore, be adapted to a variety of different specific window constructions presently available, and which is very easy to adjust without special tools and by any person capable of installing a window frame.

One object and purposes of the invention will be apparent to persons acquainted with constructions of this general type upon reading the following specification and inspecting the accompanying drawings, in which:

Figure 1 is a side elevational view of a window construction embodying the invention and as viewed from the interior of a building in which it is installed.

Figure 2 is a sectional view taken along the line II—II of Figure 1.

Figure 3 is a sectional view taken along the line III—III of Figure 2.

Figure 4 is a sectional view similar to that shown in Figure 2 and illustrating a modified structure.

For convenience in description, the terms "upper," "lower" and derivatives thereof will have reference to the window construction in its usual position of operation, as shown in Figure 1. The terms "interior," "exterior" and derivatives thereof will have reference to the inside and outside surfaces of the wall structure in which the window is installed. The terms "inner," "outer" and derivatives thereof will refer to the geometric center of said window construction.

General description

In order to meet the objects of the invention, including those set forth above, there has been provided a window construction including a sash-supporting frame and a horizontally movable sash. The lower horizontal element of said frame supports a removable sill plate having an integral, sash-supporting track. Resilient means, such as a relatively thick piece of elastomeric material, are then interposed between the sill plate and the lower horizontal frame element, and these parts are then connected by a plurality of screws arranged along their respective lengths. By tightening some of these screws more than others, the sill plate, hence the track, may be tilted in either direction lengthwise thereof and thereby tilt the movable sash until its stiles are in alignment with the corresponding jamb element of the frame, regardless of which way the jamb elements are tilted. The elastomeric material also tends to deaden the sound created when the window moves along said track.

Detailed construction

The window construction 10 (Figure 1), which has been selected to illustrate the invention, is comprised of a substantially rectangular frame 11 which is supported within and upon a wall structure 12 fabricated from conventional material, such as masonry or wood. A fixed sash 13 and a horizontally movable sash 14 are disposed within said frame 11, which has a header 16, a sill 17 and a pair of upright jamb elements 18 and 19.

The movable sash 14 has an upper rail 21, a lower rail 22 and a pair of stiles 23 and 24. Said movable sash 14 has a pair of rollers, such as that indicated at 25 in Figure 2, which are supported upon the lower edge of the sash near its opposite ends in a manner substantially as set forth in the preceding application entitled "Device for Adjusting Window to Out-of-Square Frame," Ser. No. 716,813, filed concurrently herewith.

As shown in Figures 2 and 3, the sill 17 has an elongated, substantially horizontal portion 27 disposed substantially directly below the movable sash 14 and projecting beyond both sides of said lower sash rail 22. Said sill 17 also includes an upstanding flange 28 affixed to the interior edge of the horizontal sill portion 27.

An elongated, substantially flat sill plate 30 which is preferably approximately as wide as the horizontal sill portion 27, is disposed directly above and lengthwise of the sill portion 27.

In this particular embodiment, an elongated strip 32 (Figures 2 and 3) of elastomeric material, such as sponge rubber, is disposed between the sill plate 30 and sill portion 27 and preferably extends between the corresponding exterior, interior, and end edges thereof. Said elastomeric material 32 is preferably selected so that the normal weight of the sash 14 will not materially compress said material. However, said material can be compressed by any suitable means, such as the adjustment screws 33, which slidably extend through appropriate openings 34 and 35 in the sill plate 30 and elastomeric strip 32, respectively, for threaded reception into the threaded openings 37 in the sill portion 27. The adjustment screws 33 prevent upward movement of the sill plate 30 from its desired position with respect to the sill portion 27.

The elasticity of the resilient strip 32 permits some downward movement of the sill plate 30 to absorb vibrations and shocks. It will be observed that the adjustment screws 33 are alternately disposed upon opposite sides of the track 42 in order to effect a uniformly controllable compression of the elastomeric strip 32 during the adjustment of the sill plate 30 with respect to the sill 17.

The sill plate 30 (Figure 2) has an integral, upstanding track 42 which is spaced from both the interior and exterior edges of the sill plate and is engaged along its upper edge by the rollers 26 mounted upon the movable sash 14 for the purpose of supporting same. The lower rail 22 of the movable sash 14 has in its lower edge a channel-shaped recess 43 extending lengthwise thereof for reception of the track 42. Sealing means, such as the pile 44, is mounted upon the side walls of the channel recess 43 for sealing and sliding engagement with the adjacent side walls of the track 42. The pile 44 also serves to prevent accidental lateral movement of the movable sash 14 and derailment of the rollers 26 from the track 42.

A sealing element 45, which is preferably resilient and flexible, is secured to and extends along the lower edge of the lower rail 22 on the exterior side of the track 42. Said element 45 projects downwardly for sealing engagement with the upper surface of the horizontal sill portion 27.

Operation

The frame 11 and sashes 13 and 14 of the window construction 10 are normally assembled at the factory and shipped in the assembled form to the location of their use. The frame 11, often without sashes in place, is then installed in the wall structure 12 of the building in which the window construction is to be provided.

Although the frame has not been previously damaged and great care is exercised in such installation, it is extremely difficult to prevent some distortion of the frame during its installation, especially where large window constructions are involved. Furthermore, even though the frame 11 is perfectly square when it is installed, the wall structure may expand or contract adjacent to the window frame in an uneven manner after such installation, thereby shifting the frame out of its square condition.

The fixed sash 13 can be installed in an out-of-square frame, by using any one of several well known procedures, so that its misalignment is not particularly noticeable. Since this sash is not removable, there is no problem of sealing. With the window construction 10 of this invention, proper alignment of the movable sash 14 is also relatively simple.

The movable sash 14 is first mounted upon the track 42 of the sill plate 30 and moved therealong into the closing position adjacent to the rightward jamb element 19 as appearing in Figure 1. If the stile 24 is not exactly parallel with the jamb element 19, the sill plate 30 is adjusted with respect to the sill portion 27, until said jamb element 19 and stile 24 are parallel. More specifically, the movable sash 14 is moved leftwardly away from its closing position and the adjustment screws 33 are tight-
ened or loosened as the case may be to effect the desired slope in the sill plate 30 hence the track 42. The movable sash 14 is then moved rightward into the closing position and a visual check is made to see if the sill 24 is parallel with the jamb element 19. Further adjustments can be made in the above described manner until the proper parallel relationship exists between the jamb element 19 and the sill 24. It will be seen that where the jamb element 19 leans rightward ("rightwardly") being taken as appearing in Figure 1) it is necessary to lower the rightward end of the sill plate 30 by tightening the adjustment screws 33 adjacent to the rightward end thereof. Under such circumstances, the screws are tightened in progressively increasing amounts toward the rightward end in order to provide a uniform slope of the sill plate 30. Under some circumstances, it may be necessary to loosen the adjustment screws 33 adjacent to the leftward end of the sill plate 30 in order to provide the proper vertical adjustment of the sash 14 while maintaining the proper slope of the track 42.

As shown in Figure 1, there is sufficient clearance between the upper edge of the upper sash rail 21 and the opposing surface 46 on the header 16 to permit the vertical adjustment of the sill plate 30 with respect to the sill 17 without jamming the movable sash 14 within the frame 24.

Regardless of the amount of raising, lowering or slope of the sill plate 30 with respect to the sill portion 27, the movable sash 14 will always remain at substantially the same distance from the upper surface of said sill plate 30 throughout the length thereof, regardless of its position along the track 42. Accordingly, the sealing element 45 along the lower exterior edge of the lower rail 22 will at all times engage said sill plate 30 in a uniform manner which is gentle enough to avoid unnecessary friction and wearing, but firm enough to provide an effective weather seal between the movable sash 14 and the sill plate 30. In other words, the adjustment of the sill plate 30 for the purpose of effecting alignment of the sash 14 with respect to the jamb element 19, if properly effected by the adjustment screws 33, will not have any effect upon the sealing capability of the sealing strip 45. Furthermore, since the sill plate 30 constitutes the upper surface of the sill 17 when viewed from the exterior side, the lower sash rail 22 will also appear to be aligned with said sill on its external side.

Alternate structure

As shown in Figure 4, the sill portion 51 has downwardly extending interior and exterior flanges 52 and 53, respectively. The sill plate 54 has a downwardly extending flange 56 which, in this particular embodiment, is disposed adjacent to the exterior flange 52 of the sill portion 51. The sill plate 54 has an integral upstanding track 57 along its interior edge which, like the track 42 shown in Figure 2, is utilized to support a movable sash 58, having along its lower exterior edge a downwardly projecting sealing strip 59 which is engageable with the sill plate 54.

In this alternate embodiment, the sill plate 54 is supported upon a plurality of leaf springs 63, which are secured to the sill portion 51 by means such as the rivets 62 and which urge the sill plate 54 upwardly away from said sill portion 51. The sill plate 54 is positioned with respect to the sill portion 51 by means of the adjustment screws 63 which are slidably received through openings in the sill plate 54 and are threaded received into the threaded openings 64 in said sill portion 51. The adjustment screws 63 are preferably staggered along the sill plate 54 in order to effect substantially uniform adjustment thereof with respect to the sill portion 51. A resiliently compressible sealing strip 66 is disposed between the sill plate 54, near the interior edge thereof, and the opposing surface of the sill portion 51.

The holding flange 56 may have a plurality of vertical slots 67 therethrough which are aligned with threaded openings 68 in the exterior flange 52 for the threaded reception of holding screws 69 which slidably extend through the vertical slots 67. The holding screws 69 assist the screws 63 and springs 61 to hold the sill plate 54 in the desired position, which has been obtained by appropriate adjustment of the screws 63.

As in the case of the elastomeric strip 32 of Figure 2, the leaf springs 61 provide a resilient means for urging the sill plate 54 away from the sill portion 51, against the contrary limitation imposed by the screws 63, while permitting adjustment therewith. Said leaf springs may also provide a resilient support for the sill plate 54, hence for the movable sash 58 supported thereon by means of the track 57, particularly where no holding screws 69 are used. Accordingly, downwardly directed shocks imparted to the movable sash 58 are absorbed and cushioned by the springs 61. Furthermore, vibrations initiated in the wall structure 10, or some other media connected to the wall structure 12, will be dampened somewhat by the leaf springs 61 before they reach the movable sash 58.

As in the case of the sealing element 45 for the window structure 10 (Figure 2), the sealing element 59 will be in continuous uniform sealing engagement with the sill plate 54 at all times without unnecessary drag and regardless of the adjustments effected between the sill plate 54 and the sill portion 51 by means of the adjustment screws 63 and holding screws 69.

During the adjustment of the movable sash 58, the holding screws 69 are loosened, the adjustment screws 63 are properly positioned and the holding screws 69 are then tightened. The sealing strip 66, which may be fabricated from an elastomeric material, such as sponge rubber, is provided primarily for the purpose of preventing foreign materials from entering between the sill plate 54 and the sill portion 51.

Although particular preferred embodiments of the invention have been disclosed in detail hereinabove for illustrative purposes, it will be understood that variations or modifications of such disclosure, which lie within the scope of the appended claims, are fully contemplated.

I claim:

1. In a window construction including a substantially rectangular frame having a sill, a header and a pair of jamb elements, a fixed sash and a horizontally movable sash disposed within said frame, structure arranged for supporting said movable sash upon said sill and adjusting said movable sash with respect to the said jamb element adjacent to said movable sash when it is in the closing position, comprising: a sill plate extending along the upper surface of said sill beneath said movable sash and between said jamb elements; resiliently compressible means disposed between said sill and said sill plate and resisting movement of said sill and sill plate toward each other; an upstanding track extending lengthwise of and fixed with respect to said sill plate; a track engaging means on the lower edge of said movable sash for supporting said movable sash, said compressible means being at least partially uncompressible by the weight of said movable sash; and resiliently compressible means connecting said sill plate to said sash for selectively compressing said compressible means and thereby adjusting the position of said sill plate with respect to said sill, whereby said movable sash is aligned with said one jamb element, said compressible means being completely compressed only by said adjustable means.

2. The structure of claim 1 wherein said compressible means is a strip of elastomeric material and said connecting means includes a plurality of screws slidably extending through said sill plate and said elastomeric material and threadedly engaged with said sill, said screws being disposed at uniform intervals lengthwise of said sill plate.

3. The structure of claim 1 wherein the connection between said sill and said sill plate is weather tight, and
said lower edge of said movable sash remains at all times substantially within a horizontal plane fixed with respect to said sill plate.

4. The structure of claim 1 wherein a resiliently flexible sealing element is mounted upon, extends along and projects downwardly from said lower edge of said movable sash near the exterior surface thereof, said element being at all times in sealing engagement throughout its length with said upper surface of said sill plate.

5. The structure of claim 1 wherein said sill plate has an integral, downwardly projecting flange extending along its exterior edge and bridging the space between said sill plate and said sill; wherein said resilient means includes a plurality of spaced springs; and wherein said adjustable means includes a plurality of screws extending through said sill plate and said flange for threaded engagement with said sill.

6. In a window construction including a substantially rectangular frame having a sill, a header and a pair of jamb elements, a fixed sash and a horizontally movable sash disposed within said frame, structure arranged for supporting said movable sash upon said sill and adjusting said movable sash with respect to the one jamb element adjacent to said movable sash when it is in the closing position, comprising: a sill plate extending along the upper surface of said sill beneath said movable sash and between said jamb elements; resiliently compressible means disposed between said sill and said sill plate and resisting relative movement of said sill and sill plate toward each other; a track extending lengthwise of and fixed with respect to the upper surface of said sill plate; track engaging means on the lower edge of said movable sash for supporting said movable sash for movement along said sill plate; means defining a plurality of openings through said sill plate, said openings being arranged in two spaced rows substantially parallel with said track; a plurality of screws slidably received through said openings and threadedly engaged with said sill for selectively moving said sill plate toward said sill and thereby compressing said compressible means, whereby the position of said sill plate is adjusted with respect to said sill and the movable sash is aligned with said one jamb element, said compressible means being completely compressed only when said screws are completely tightened with respect to said sill.

7. The structure of claim 6 wherein said two rows of openings in said sill plate are disposed upon opposite sides of said track.

References Cited in the file of this patent

UNITED STATES PATENTS

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