



IMPROVEMENTS TO CASEMENT WINDOWS

FIELD OF THE INVENTION

The present invention relates to certain improvements to casement windows of the type having an inner frame pivotally attached to an outer frame by means of first and second hinge connections and relates particularly, though not exclusively, to casement windows that employ four bar friction stays for hinge connections.

BACKGROUND TO THE INVENTION

Casement windows are commonly used in buildings, particularly in housing apartments, as they can be pre-fabricated in large quantities off-site and easily installed on-site. A typical casement window comprises an outer frame made from an extruded aluminium section, and an inner frame (holding the glass) also made from extruded aluminium section. The inner frame is also referred to as the window leaf. There may be two or more window leaves in a single outer frame. Each window leaf is pivotally attached to the outer frame by means of first and second hinge connections provided on upper and lower edges respectively of the window leaf. One form of hinge connection commonly used is the four bar friction stay, so called because it consists essentially of four flat metal bars pivotally interconnected in a parallelogram-type configuration. One bar is mounted with fasteners on the edge of the window leaf and another bar is secured with fasteners to the edge of the outer frame.

A problem has been encountered with this type of casement window in that the window leaf can fall out of the outer frame due to failure of the fasteners at the friction stay. Apart from the inconvenience and expense of having to replace the window leaf, a falling window leaf also presents a serious safety hazard to pedestrians and bystanders, particularly if the window leaf falls from the second or higher storeys of a building. Failure of the fasteners can occur at the connection of the friction stay to the outer frame and/or at the connection of the



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friction stay to the inner frame. Failure may be due to any one or more of the following factors:

- (i) wear and tear of fasteners
- (ii) improper installation of fasteners
- 5 (iii) failure of the fasteners due to metal fatigue
- (iv) excessive stress induced onto the fasteners during opening of the window leaf when the friction stay is jammed.

Usually, the failure occurs suddenly when a force is imposed on the window leaf. If one of the fasteners should fail, the remainder of the fasteners will be
10 subject to additional loading from the weight of the window leaf. This typically leads to a near immediate failure of the rest of the fasteners and results in the window leaf falling out of the outer frame.

SUMMARY OF THE INVENTION

The present invention was developed with a view to providing certain
15 improvements to a casement window that will at least minimise the possibility of, if not prevent, falling window leaf.

Throughout this specification the term "comprising" is used inclusively, in the sense that there may be other features and/or steps included in the invention not expressly defined or comprehended in the features or steps subsequently
20 defined or described. What such other features and/or steps may include will be apparent from the specification read as a whole.

According to one aspect of the present invention there is provided an improvement to a casement window of the type having an inner frame pivotally attached to an outer frame by means of first and second hinge connections

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provided on upper and lower edges respectively of the inner frame, the improvement comprising:

5 a mounting means provided on said upper edge of the inner frame and adapted to slidably receive a mounting element of said first hinge connection therein whereby, in use, in the event that a fastener holding said mounting element on the inner frame should fail, said mounting means will prevent the mounting element from separating from the inner frame.

10 Preferably said mounting means is in the form of a channel adapted to slidably receive said mounting element therein in a close fit. Typically said channel is provided by first and second rails forming a slot therebetween. Preferably said lower edge of the inner frame is provided with a second mounting means adapted to slidably receive a mounting element of said second hinge connection therein.

15 Advantageously the improvement further comprises a securing means provided on a lower edge of the outer frame, facing said outer edge of the inner frame when the window is closed, and adapted to receive a securing element of the first hinge connection therein whereby, in use, in the event that a fastener holding said securing element on the outer frame should fail said securing means will prevent the securing element from separating from the outer frame.

20 Preferably said securing means is in the form of a pair of rails provided on the lower edge of said outer frame, said rails being spaced apart a sufficient distance to enable said securing element to be clipped onto the outer frame between said rails. Preferably said upper edge of the outer frame is provided with a second securing means adapted to receive a securing element of the second hinge connection therein.

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Preferably said inner frame and outer frame are made from extruded aluminium sections, and said mounting means and securing means are formed integral to the aluminium sections for the inner frame and the outer frame respectively.

BRIEF DESCRIPTION OF THE DRAWINGS

- 5 In order to facilitate a better understanding of the nature of the invention a preferred embodiment of the improvements to the casement window will now be described in detail, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 illustrates a prior art casement window;

- 10 Figure 2 illustrates the manner in which a four bar friction stay can be mounted on the inner frame of a casement window in accordance with a preferred embodiment of the present invention;

Figure 3 is a section view through the inner frame of Figure 2;

- 15 Figure 4 illustrates the manner in which the four bar friction stay can be secured to the outer frame of a casement window in accordance with a preferred embodiment of the present invention; and,

Figure 5 is a section view through the outer frame of Figure 4.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

- 20 The preferred embodiments of the present invention relate to certain improvements to casement windows of the type illustrated in Figure 1. The casement window 10 of Figure 1 has two inner frames 12 (only one illustrated) pivotally attached to an outer frame 14 by means of first and second hinge connections 16, 18. The first hinge connection 16 is connected between an upper edge of the inner frame (window leaf) 12 and an upper edge of the outer frame
- 25 14, whereas the second hinge connection 18 is connected between the lower edge

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of the inner frame 12 and the lower edge of the outer frame 14. In this case, the first and second hinge connections 16, 18 are both in the form of a four bar friction stay as illustrated more clearly in Figure 2. The friction stay 16 of Figure 2 includes a mounting element 20 for mounting the friction stay on the inner frame 12. Mounting element 20 of friction stay 16 includes first and second apertures 22 for receiving threaded fasteners (not illustrated) for fastening the mounting element 20 to the edge of the inner frame 12. It is the failure of these fasteners which can result in the problem of falling window leaf.

A preferred embodiment of an improvement to the casement window is illustrated in Figure 2. A mounting means 24 is provided on an upper edge 26 of the inner frame 12 and is adapted to slidably receive the mounting element 20 of friction stay 16 therein. As can be seen most clearly in Figure 3, the mounting means 24 is in the form of a channel adapted to slidably receive the mounting element 20 therein in a close fit. The channel is provided by first and second rails 28 extending the full length of the upper edge 26 of the inner frame and forming a slot 30 therebetween. Mounting bar 20 of friction stay 16 is provided with slightly broadened sections in the vicinity of the apertures 22, and these sections can be slotted into the slot 30 on the inner frame and then locked into position with screw fasteners through the apertures 22 in the usual manner. In the event that the fasteners holding the mounting bar 20 on the upper edge 26 of the inner frame 12 should fail, the rails 28 will prevent the mounting bar from separating from the inner frame 12. The window leaf may become misaligned as the mounting bar slides within the slot 30, but the friction stay 16 and the window leaf will still be locked together. This will give maintenance personnel sufficient time to have the casement window repaired.

Preferably, the lower edge of the inner frame 12 is also provided with a similar slot adapted to slidably receive a mounting element of the second friction stay 18 therein. Advantageously, the first and second rails 28 forming slot 30 are provided integral to the extruded aluminium section used for forming the inner frame 12, as can be seen most clearly in Figure 3.

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A similar improvement is provided on the outer frame of the casement window in order to overcome the problem of falling window leaf. Figures 4 and 5 illustrate a preferred embodiment of the improvement to the outer frame 14 of the casement window. Friction stay 18 is provided with a securing element 32 for securing the friction stay to the lower edge 34 of the outer frame 14 (see also Figure 2). First and second apertures 36 are provided in the securing bar 32 of the friction stay to receive fasteners for fastening the securing bar 32 to the lower edge 34 of the outer frame 14. A securing means 38 is provided on the lower edge 34 of the outer frame and is adapted to receive the securing bar 32 of the friction stay 18 therein as can be seen most clearly in Figure 5. In this embodiment, the securing means 38 is in the form of an additional rail 40 provided on the lower edge 34 of the outer frame 14, and running parallel to an existing rail 42. The additional rail 40 is spaced from the existing rail 40 a sufficient depth to permit the securing bar 32 of the friction stay to be clipped onto the outer frame 14 between the rails 40, 42. As can be seen most clearly in Figure 5, the outer frame 14 is made from an extruded aluminium section, and the additional rail 40 is formed integral to the aluminium section. Due to the resilient nature of the aluminium material, the additional rail 40 is able to flex slightly to permit the securing bar 32 of the friction stay to be clipped into the slot formed between the rails 40, 42 in a tight fit. It can then be locked into position with fasteners. In the event that the fasteners fail, the turning moment of the friction stay produced by the falling window leaf will act to lock the securing bar 32 of the friction stay under the rail 40 to prevent the securing bar 32 from separating from the lower edge 34 of the outer frame 14.

With the above arrangement of a mounting means 24 and securing means 38 on the respective upper and lower edges of the inner frame 12 and outer frame 14, the possibility of the window leaf falling out of the casement window due to failure of the fasteners is substantially reduced, if not eliminated.

In the preferred embodiment, the rails forming the mounting means 24 and securing means 38 extend substantially the full length of the upper and lower

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edges of the inner and outer frame members respectively, as they are formed integral to the aluminium sections used for constructing the inner and outer frames. However, it will be understood that this is not essential to the invention, as the mounting means 24 and securing means 38 need only be of sufficient size to mount the mounting bar 20 and secure the securing bar 32 of the friction stay respectively.

Now that preferred embodiments to the casement window have been described in detail, it will be apparent that the improvements have a number of advantageous features, including the following:

- 10 (a) the improvements prevent the window leaf from falling without warning should the fasteners fail
- (b) they are of low cost, and can be readily incorporated into the existing aluminium extrusions for the inner and outer frames
- (c) they do not interfere with the normal operation of the casement windows.

Numerous variations and modifications will suggest themselves to persons skilled in the manufacturing arts, in addition to those already described, without departing from the basic inventive concepts. For example, the mounting means and securing means need not take the form of rails, but may be provided in the form of clips which are welded or otherwise fixed to the upper and lower edges of the inner and outer window frames. All such variations and modifications are to be considered within the scope of the present invention, the nature of which is to be determined from the foregoing description and the appended claims.

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CLAIMS

1. An improvement to a casement window of the type having an inner frame pivotally attached to an outer frame by means of first and second hinge connections provided on upper and lower edges respectively of the inner
5 frame, the improvement comprising:

a mounting means provided on said upper edge of the inner frame and adapted to slidably receive a mounting element of said first hinge connection therein whereby, in use, in the event that a fastener holding said mounting element on the inner frame should fail, said mounting means will
10 prevent the mounting element from separating from the inner frame.

2. An improvement to a casement window as defined in claim 1, wherein said mounting means is in the form of a channel adapted to slidably receive said mounting element therein in a close fit.

3. An improvement to a casement window as defined in claim 2,
15 wherein said channel is provided by first and second rails forming a slot therebetween.

4. An improvement to a casement window as defined in claim 3, wherein said lower edge of the inner frame is provided with a second mounting means adapted to slidably receive a mounting element of said second hinge
20 connection therein.

5. An improvement to a casement window as defined in claim 1, wherein the improvement further comprises a securing means provided on a lower edge of the outer frame, facing said outer edge of the inner frame when the window is closed, and adapted to receive a securing element of the first
25 hinge connection therein whereby, in use, in the event that a fastener holding

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said securing element on the outer frame should fail said securing means will prevent the securing element from separating from the outer frame.

6. An improvement to a casement window as defined in claim 5,
wherein said securing means is in the form of a pair of rails provided on the
5 lower edge of said outer frame, said rails being spaced apart a sufficient distance
to permit said securing element to be clipped onto the outer frame between said
rails.

7. An improvement to a casement window as defined in claim 6,
wherein preferably said upper edge of the outer frame is provided with a
10 second securing means adapted to receive a securing element of the second
hinge connection therein.