

AN IMPROVED SLIDING WINDOW SYSTEM**FIELD OF THE INVENTION**

- 5 The present invention relates to an improved sliding widow system and relates particularly, though not necessarily exclusively, to a sliding window system that incorporates inward opening side-hung casement window panels.

BACKGROUND TO THE INVENTION

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Conventional windows installed in buildings can be classified broadly into three categories, namely, sliding windows, side-hung/casement windows, top-hung and louvred windows. The sliding window system allows the window panes to slide left to right or vice-versa. For side-hung/casement (casement) windows, the system is
15 generally designed to allow the window panes to be opened outwards, away from the inside of the room or building. There are also some sliding window systems available that allow the sliding window panes to operate as casement windows, but the casements open outwardly.

- 20 In a sliding window system, the cleaning of the window panes is tedious and can be dangerous. Although various devices are available to assist the window cleaning process, the cleaning of sliding windows in general can be hazardous and in fact life-threatening to the cleaner. This is particularly true for sliding windows installed in high-rise buildings, especially when the person cleaning the windows is short in stature and
25 needs to stand on a raised platform such as a chair or step ladder. Fatalities have occurred due to falls while cleaning windows as reported in the local newspapers.

While the cleaning of casement windows is easier, it is not necessarily safer, especially for persons of short stature who are unable to reach the full length of the glass panes
30 without standing on some form of support.

SUMMARY OF THE INVENTION

The present invention was developed with a view to providing an improved sliding window system that helps to make the cleaning of windows both easy and safe.

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According to the present invention there is provided an improved sliding window system comprising:

a rectangular window frame having top and bottom horizontal frame members;

first and second pairs of tracks provided on the top and bottom horizontal frame members respectively, each pair of tracks having at least one interconnecting track portion interconnecting said pair of tracks;

at least one slidable window panel slidably mounted in one of said parallel tracks on said window frame; and,

wherein said at least one sliding window panel can be moved transversely via said interconnecting track portion so as to slidably move from a first closed position in which it is flush with an adjacent window panel to a second open position in which it overlaps with said adjacent panel.

Preferably each of said first and second pairs of parallel tracks are provided in an elongate strip of semi-rigid material having a pair of parallel elongate grooves formed therein, said at least one interconnecting portion being formed by a transverse groove interconnecting said pair of parallel grooves. Preferably said semi-rigid material is a suitable low friction plastics material, for example, nylon. Typically there are two transverse interconnecting grooves and two diagonal interconnecting grooves interconnecting said pair of parallel grooves. Advantageously one of said parallel grooves also has at least one transverse exit/entry groove extending to an edge of said elongate strip.

Preferably said at least one slidable window panel has a pair of rollers provided on a bottom edge thereof adapted to roll in said grooves in said strip of semi-rigid material. Typically each said roller is in the form of a roller ball rotatably mounted in a ball transfer housing fixed to the bottom edge of the window panel.

Preferably the window panel is provided with a locking mechanism for locking the window panel in the closed position, said locking mechanism comprising a pair of elongate members slidably mounted in the window panel and adapted to engage apertures provided in connection with the window frame in an extended position. Advantageously, said elongate members can also be extended to engage said elongate strip of semi-rigid material when the window panel is in an intermediate position, wherein the window panel can be pivoted on said elongate members from the intermediate position. Advantageously the roller balls can be moved out of the parallel grooves via said exit/entry groove when pivoting the window panel on said elongate members from the intermediate position.

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In order to facilitate a more detailed understanding of the nature of the invention, a preferred embodiment of the improved sliding window system will now be described in detail, by way of example only, with reference to the accompanying drawings, in which:

15 Figure 1 is a front elevation of a preferred embodiment of a sliding window system according to the present invention;

Figure 2 is a plan view of one of a pair of parallel tracks provided in the window system of Figure 1;

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Figure 3 is an end elevation of the tracks illustrated in Figure 2;

Figure 4 is a section view in plan elevation of the sliding window system of Figure 1 showing how one panel can be rotated through 180°;

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Figure 5 is a section view in side elevation of the sliding window system of Figure 1 showing how both panels can slide in overlapping positions as in a conventional sliding window system;

30 Figure 6 illustrates a roller employed in the window system of Figure 1;

Figure 7 illustrates a lock mechanism employed in the window system of Figure 1; and

Figure 8 shows the position of the lock mechanism in the window system of Figure 1.

5 A preferred embodiment of the improved sliding window system 10 in accordance with the present invention as illustrated in the accompanying drawings comprises a rectangular window frame 12 having a top horizontal frame member 14 and a bottom horizontal frame member 16 joined by a pair of vertical uprights. Both the horizontal frame members and vertical uprights are made from aluminium extrusions joined together to form the window frame in a conventional manner. First and second slidable
10 window panels 18,20 are slidably mounted within the window frame 12. The bottom horizontal frame member 16 is also formed with a window sill 22 as can be seen most clearly in Figures 3 and 5.

Both the top and bottom horizontal frame members 14,16 are provided with first and
15 second pairs of parallel tracks. Each of the window panels 18,20 are slidably mounted in one of said sets of parallel tracks. In this embodiment, each of the first and second pairs of parallel tracks are provided in an elongate strip of semi-rigid plastics material 30 having a pair of parallel elongate grooves 24,26 formed therein as can be seen most clearly in Figure 2. In the illustrated embodiment the semi-rigid material is a low
20 friction plastics material, such as nylon. In Figure 2, a pair of parallel grooves 26 formed in the strip of nylon 30 provided on the bottom horizontal frame member 16 is illustrated in plan view.

A key feature of the present invention is the provision of at least one interconnecting
25 track portion interconnecting the pair of parallel tracks. In this embodiment the at least one interconnecting track portion is formed by a transverse groove 32 interconnecting the pair of parallel grooves 26. In fact, there are two transverse interconnecting grooves 32 and two diagonal interconnecting grooves 34 interconnecting the pair of parallel grooves 26. These interconnecting track portions enable at least one of the sliding
30 window panels 18,20 to be moved transversely so as to slidably move from a first closed position, (as shown in Figure 4 in solid outline), in which it is flush with the adjacent window panel, to a second open position, (as shown in Figure 5), in which it overlaps

with the adjacent panel.

Advantageously each slidable window panel 18,20 is provided with a pair of rollers 36 provided on a bottom edge thereof and adapted to roll in the grooves 26 in the strip 30 of nylon material. In this embodiment, each roller 36 is in the form of a roller ball 38 rotatably mounted in a ball transfer housing 40 as illustrated most clearly in Figure 6. The roller ball 38 is in the form of a stainless steel ball bearing that seats into the grooves 26 of the nylon track to provide a sliding effect. The ball transfer housing 40 is provided with a ball transfer body 42 adapted to connect to the bottom edge of the window panels 18,20. In this manner, the weight of the window panel is transferred to the roller ball 38 via the ball transfer housing 40. The roller 36 is typically rated to carry a load of up to 20 kilograms.

Stainless steel pins 44 are provided on the upper edge of the window panels 18,20 and seat in the grooves 24 provided in a nylon strip 46 on the top horizontal frame member 14. The nylon strip 46 is formed with grooves therein having a substantially identical configuration to that of the grooves in the nylon strip 30 as illustrated in Figure 2. Advantageously, both the top and bottom elongate strips 46,30 also have at least one transverse exit/entry groove provided in connection with one of the parallel grooves 24,26 and extending to an edge of the nylon strip. In the illustrated embodiment, there are four such exit/entry grooves as can be seen most clearly in Figure 2.

When the window panels 18,20 are flush in their closed position as shown in Figure 4, a locking mechanism 60 is provided to lock the window panels into the frame 12 of the sliding window system. The locking mechanism 60 comprises a pair of elongate stainless steel members 62 which may be driven by gear well 64 to protrude from the upper and lower edges respectively of the window panel so as to engage with apertures 56 provided in the window frame 12. The locking mechanism 60 also serves as a pivot to enable the window panels to be rotated through 180°, as will be described in more detail below. Figure 8 illustrates the position of the locking mechanism 60 within the window panels 18,20.

It will be seen that either one of the window panels 18,20 can be positioned by sliding movement in the parallel grooves 26 to an intermediate position as shown in Figure 4, until both of the roller balls 38 can be moved out of the parallel grooves via the exit/entry grooves 48. The elongate members 62 of the locking mechanism 60 can then
5 be extended to engage with apertures 56 provided in the elongate strip of semi-rigid material. The window panel can then be pivoted on the elongate members 62. The window panel can rotate up to 180° by means of the elongate members 62 engaging with the apertures 56. The locking mechanism 60 effectively acts as a hinge on which the window panel can be pivoted. The grooves are designed such that the roller balls 38 on
10 the window panel are able to slide outwards or inwards and along the track simply by a thumb-push on the window panel. A fixed "spring blade" (not shown) helps force the window panel to slide out to the next track.

In this embodiment, the window panels are designed to open inwards only. The
15 aluminium extrusion of the bottom frame member 16 has an upwardly projecting portion 50 adjacent the window sill 22 to prevent the window panels from opening outwards, like a conventional casement window. The upwardly projecting portion 50 also helps to prevent the window panels from falling off externally and serves to prevent water penetration with the anchoring of weather strips along the length of the window
20 sill 22. As can be seen most clearly in Figure 5, the window panels 18,20 are prevented from falling inwards by removable transom pieces 52 also made from extruded aluminium. A transom piece 52 is removably attached to both the top and bottom horizontal frame members 14,16 and also served to inhibit the penetration of rain into the building. Weather strips 54 provided along the top and bottom edges of the window
25 panels also serve to seal the window panels within the window frame 12. When it is desired to pivot either one of the window panels 18,20 inwards, the transoms 52 are opened downwards and upwards via a clip-catch system as illustrated in broken outline in Figure 5.

30 Figure 4 illustrates the manner in which one of the window panels 18 can be slidably moved from a first closed position in which it is flush with the adjacent window panel 20, to a second open position shown in broken outline at 58 in which it overlaps with

the adjacent window panel 20. In order to get to this position, the first window panel 18 is slid out from one of the pair of parallel grooves 24,26 into the other one of the pair of parallel grooves by rolling the roller balls 38 through the interconnecting grooves 32,34 into the adjacent parallel groove. When the elongate members 62 have been extended, the roller balls 36 can be slid out through the exit/entry grooves 48 so that they are free altogether from the confines of the nylon strips 30,46. The window panel 18 is then free to pivot through 180° to its new overlapping position 58 as shown in Figure 4. At this new position, both the window panels 18,20 will be free to slide in their respective parallel grooves 24,26. In its new position 58 as shown in Figure 4, the original face of the window pane (that was facing outwards) becomes the inside face of the window pane, and hence it can be readily cleaned from inside the building. The window panel 18 can be returned to its closed, flush position by reversing the procedure described above. The adjacent window panel 20 can be reversed in a similar manner.

Now that a preferred embodiment of the improved sliding window system according to the present invention has been described in detail, it will be apparent that it provides a number of advantages over conventional sliding window and casement systems, including the following:

(i) by adopting an inward turnaround for a casement-style window panel, it facilitates cleaning of both sides of the glass window panes, making cleaning of windows safer and easier;

(ii) when the external obverse face of the window pane has been cleaned, there is no necessity to re-rotate this face back to its original position, as the window panel can serve as a two-way window panel;

(iii) when the sliding panels are locked, the window panels become fully flushed which not only provides a neater appearance but also improves the security of the window system; and,

(iv) the sliding window system can be used in a similar manner to a conventional

sliding window system, and is fully compatible with conventional building practices.

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, other systems for slidably mounting the window panels in the tracks may be employed. The use of stainless steel roller balls on a nylon track is preferred in order to reduce the rolling friction and minimise the sound produced by the stainless steel roller ball during sliding operation. However, other types of suitable roller mechanisms may also be employed. 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.



THE CLAIMS DEFINING THE INVENTION

1. An improved sliding window system comprising:
a rectangular window frame having top and bottom horizontal frame members;
5 first and second pairs of tracks provided on the top and bottom horizontal frame members respectively, each pair of tracks having at least one interconnecting track portion interconnecting said pair of tracks;
at least one slidable window panel slidably mounted in one of said parallel tracks on said window frame; and,
10 wherein said at least one sliding window panel can be moved transversely via said interconnecting track portion so as to slidably move from a first closed position in which it is flush with an adjacent window panel to a second open position in which it overlaps with said adjacent panel.
- 15 2. An improved sliding window system as defined in Claim 1, wherein each of said first and second pairs of parallel tracks are provided by an elongate strip of semi-rigid material having a pair of parallel elongate grooves formed therein, said at least one interconnecting track portion being formed by a transverse groove interconnecting said pair of parallel grooves.
- 20 3. An improved sliding window system as defined in Claim 2, wherein said semi-rigid material is a suitable low friction plastics material.
4. An improved sliding window system as defined in Claim 2, wherein said
25 transverse groove interconnecting said pair of parallel grooves is one of two transverse interconnecting grooves and two diagonal interconnecting grooves interconnecting said pair of parallel grooves.
5. An improved sliding window system as defined in Claim 2, wherein one of said
30 parallel grooves also has at least one transverse exit/entry groove extending to an edge of said elongate strip.

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6. An improved sliding window system as defined in Claim 5, wherein said at least one slidable window panel has a pair of rollers provided on a bottom edge thereof adapted to roll in said grooves in said strip of semi-rigid material.
- 5 7. An improved sliding window system as defined in Claim 6, wherein each said roller is in the form of a roller ball rotatably mounted in a ball transfer housing fixed to the bottom edge of the window panel.
8. An improved sliding window system as defined in Claim 7, wherein the window
10 panel is provided with a locking mechanism comprising a pair of elongate members slidably mounted in the window panel and adapted to engage in apertures provided in connection with the window frame in an extended position.
9. An improved sliding window system as defined in Claim 8, wherein said elongate
15 members can be extended to engage said elongate strip of semi-rigid material when the window panel is in an intermediate position, wherein the window panel can be pivoted on said elongate members from the intermediate position.
10. An improved sliding window system as defined in Claim 7, wherein the roller
20 balls can be moved out of the parallel grooves via said exit/entry groove when pivoting the window panel on said elongate members from the intermediate position.
11. An improved sliding window system as defined in Claim 10, wherein the window
25 panel can be pivoted through 180° so that the face of the window panel formerly facing outwards now faces inwards.
12. An improved sliding window system as defined in Claim 8, wherein when the
30 window panel is in the first closed position said elongate members are adapted to engage the window frame in an extended position for locking the window panel in the closed position.

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