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(54) PANEL ASSEMBLIES HAVING AT LEAST ONE HORIZONTALLY ROLLING SASH AND MEANS FOR PREVENTING THE ACCIDENTAL DETACHMENT OF THE HORIZONTALLY ROLLING SASH FROM A SUPPORTING FRAME

(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:—

10 This invention relates generally to panel assemblies, including windows, doors, shutters and window screens, of the type having one or more sashes mounted within a generally rectangular supporting frame for horizontal rolling movement.

15 According to an example of the prior art, a separate hook member engageable with the rail on the sill of a supporting frame for a sash window is screwed to a structure rotatably supporting each roller of the sash. This known arrangement necessitates the extra assembly operation of screwing the several hook members to the respective roller supporting structures of the sash. Moreover, the bottom horizontal member of each sash must be apertured to permit insertion of a screw-driver for use in securing the hook members to the roller supporting structures, so that the manufacture of the sashes also requires the expenditure of extra time and labor.

20 The present invention seeks to provide, in a panel assembly having at least one sash of horizontally rolling type, improved means for holding the sash on the sill of a rectangular supporting frame practically without any possibility of accidental detachment.

25 The invention further seeks to provide the means of the above described character which are equally well adaptable for various panel assemblies, such as windows, doors, shutters and window screens, that include a horizontally rolling sash or sashes.

30 According to the invention, there is provided a panel assembly comprising at least one sash which is installed within a supporting frame and which has a plurality of rollers for horizontal rolling movement relative to

35 said supporting frame, a rail formed on the sill of said supporting frame, said rail including at least one overhang extending the full length thereof, means defining a downwardly opening channel in a bottom horizontal member of said sash, said channel extending the full length of said bottom horizontal member, a plurality of roller supports each in the shape of an inverted "U" including a pair of opposed side portions between which a respective one of said rollers is rotatably supported, said roller support being fixedly mounted in a selected position in said channel to hold said roller in rolling engagement with said rail, and a hook of resilient material at the bottom end of at least one of said side portions of said roller support, the end of said hook being located under said overhang of said rail.

40 The invention will be described by way of examples with reference to the accompanying drawings in which like reference characters refer to like parts throughout the several views, and wherein:

45 Figure 1 is a partial vertical sectional view showing a preferred form of the means for preventing the accidental detachment of a horizontally rolling sash of a dual sash window from the sill of a supporting frame;

50 Figure 2 is a view similar to Figure 1 but showing another preferred embodiment of the invention as adapted to a window screen; and

55 Figure 3 is a view also similar to Figure 1 but showing a slight modification of the embodiment shown therein.

60 The invention will now be described in terms of an embodiment thereof illustrated in Figure 1. The reference numeral 10 in the drawing designates the sill of a generally rectangular supporting frame for a dual sash window, which frame is to be rigidly set in the opening of an enclosing wall. In addition to the sill 10, the supporting frame comprises, of course, the header and the pair of jambs that are not shown in the drawing.

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(11) a pair of sashes 11 which are rollable horizontally along respective rails 12 extending the full length of the sill 10 in parallel, closely spaced arrangement. Only one of the sashes 11 together with the associated rail 12 is shown in the drawing for the sake of simplicity of illustration. The rail 12 includes an upstanding web 13 terminating in a thickened head 14, the latter forming a pair of overhangs 15 that are arranged on the opposite sides of the rail throughout the complete length thereof.

The sash 11 comprises a bottom horizontal member 16, a top horizontal member and side vertical members extending around and embracing the periphery of a pane or panel 17 of glass. Also for the sake of simplicity of illustration, the top horizontal member and side vertical members of the sash 11 are not shown.

The bottom horizontal member 16 of the sash 11 has a pair of opposed rims 18 extending downwardly therefrom to define a downwardly opening channel which extends the full length of the bottom horizontal member and which accommodates aligned rollers 19 for rolling engagement with the thickened head 14 of the rail 12.

Each roller 19 is rotatably supported between the pair of opposed side portions 20 of a respective roller support 21 in the shape of an inverted "U". The roller support 21 is made of somewhat resilient material, and its side portions 20 are folded inwardly, or toward each other at their bottom ends to provide a pair of hooks 22. The roller support 21, together with its roller 19 can be screwed or otherwise fixedly mounted in a selected position between the opposed rims 18 of the bottom horizontal member 16 of the sash 11.

Thus, when the sash 11 is installed within its rectangular supporting frame, the thickened head 14 of the rail 12 forces the hooks 22 of each inverted-U-shaped roller support 21, which have suitable resiliency as aforesaid, away from each other to intrude therebetween and hence to make rolling engagement with the roller 19 rotatably supported by the roller support. As illustrated, the hooks 22 of each roller support 21 are normally held under the respective overhangs 15 of the rail 12 with suitable clearances therebetween, so that the sash is free to roll over the rail. As the sash is about to be accidentally detached from the supporting frame, however, either or both of the hooks 22 becomes engaged by the corresponding overhang or overhangs of the rail 12 to retain the sash in position over the sill 10.

In another preferred embodiment of the invention illustrated in Figure 2, a window screen is designed to rollably fit inside the supporting frame of a window to prevent the intrusion of insects when the window is open. The window screen includes netting

17a of wire or other material which is set within a sash 11a of which the bottom horizontal member 16a is a part.

As in the preceding embodiment, the bottom horizontal member 16a of the sash 11a has the pair of opposed rims 18 defining the downwardly opening channel. Inverted-U-shaped roller supports 21a, each rotatably supporting the roller 19 between its opposed side portions 20, are securely mounted in selected positions between the opposed rims 18 of the bottom horizontal member 16a in a suitable manner. Only one of the side portions 20 of each roller support 21a, which is made of resilient material, has its bottom end folded inwardly to provide the hook 22, whereas the other side portion 20 has its bottom end 23 bent inwardly at a right angle.

The sill 10a constituting a part of the generally rectangular supporting frame for at least one such window screen has a rail 12a thereon which includes the upstanding web 13 with a thickened head 14a forming the overhang 15 only on one side of the rail where the hook 22 of the roller support 21a is to be arranged.

As may be apparent from the foregoing description, the thickened head 14a of the rail 12a forces the hook 22 at the bottom end of one of the side portions 20 of each inverted-U-shaped roller support 21a away from the other side portion and intrudes between the side portions to establish rolling engagement with the roller 19 when the sash 11a of the window screen is installed within the supporting frame. Since the hook 22 of each roller support 21a is normally engageably held under the overhang 15 of the rail 12a, and since the web 13 of the rail is held between the relatively narrow spacing between the hook 22 and the end 23 of each roller support, the possibility of accidental detachment of the window screen from over the sill 10a is effectively precluded.

Figure 3 illustrates a slight modification of the embodiment shown in Figure 1, which modification includes an inverted-U-shaped member 24 made of relatively rigid but resilient material, via which roller support 21b is fixedly mounted in the channel. Other details of construction and operation will be apparent from the foregoing description of Figure 1.

It may be mentioned that this invention is applicable to a panel assembly having rollers of adjustable height type for horizontally moving sashes, because then the accidental detachment of the sashes can be prevented regardless of the positions of the rollers adjustably varied up or down with respect to the sashes.

WHAT WE CLAIM IS:—

1. A panel assembly comprising at least one sash which is installed within a support-

11 a pair of sashes 11 which are rollable horizontally along respective rails 12 extending the full length of the sill 10 in parallel, closely spaced arrangement. Only one of the sashes 11 together with the associated rail 12 is shown in the drawing for the sake of simplicity of illustration. The rail 12 includes an upstanding web 13 terminating in a thickened head 14, the latter forming a pair of overhangs 15 that are arranged on the opposite sides of the rail throughout the complete length thereof.

The sash 11 comprises a bottom horizontal member 16, a top horizontal member and side vertical members extending around and embracing the periphery of a pane or panel 17 of glass. Also for the sake of simplicity of illustration, the top horizontal member and side vertical members of the sash 11 are not shown.

The bottom horizontal member 16 of the sash 11 has a pair of opposed rims 18 extending downwardly therefrom to define a downwardly opening channel which extends the full length of the bottom horizontal member and which accommodates aligned rollers 19 for rolling engagement with the thickened head 14 of the rail 12.

Each roller 19 is rotatably supported between the pair of opposed side portions 20 of a respective roller support 21 in the shape of an inverted "U". The roller support 21 is made of somewhat resilient material, and its side portions 20 are folded inwardly or toward each other at their bottom ends to provide a pair of hooks 22. The roller support 21, together with its roller 19 can be screwed or otherwise fixedly mounted in a selected position between the opposed rims 18 of the bottom horizontal member 16 of the sash 11.

Thus, when the sash 11 is installed within its rectangular supporting frame, the thickened head 14 of the rail 12 forces the hooks 22 of each inverted-U-shaped roller support 21, which have suitable resiliency as aforesaid, away from each other to intrude therebetween and hence to make rolling engagement with the roller 19 rotatably supported by the roller support. As illustrated, the hooks 22 of each roller support 21 are normally held under the respective overhangs 15 of the rail 12 with suitable clearances therebetween, so that the sash is free to roll over the rail. As the sash is about to be accidentally detached from the supporting frame, however, either or both of the hooks 22 becomes engaged by the corresponding overhang or overhangs of the rail 12 to retain the sash in position over the sill 10.

In another preferred embodiment of the invention illustrated in Figure 2, a window screen is designed to rollably fit inside the supporting frame of a window to prevent the intrusion of insects when the window is open. The window screen includes netting

17a of wire or other material which is set within a sash 11a of which the bottom horizontal member 16a is a part.

As in the preceding embodiment, the bottom horizontal member 16a of the sash 11a has the pair of opposed rims 18 defining the downwardly opening channel. Inverted-U-shaped roller supports 21a, each rotatably supporting the roller 19 between its opposed side portions 20, are securely mounted in selected positions between the opposed rims 18 of the bottom horizontal member 16a in a suitable manner. Only one of the side portions 20 of each roller support 21a, which is made of resilient material, has its bottom end folded inwardly to provide the hook 22, whereas the other side portion 20 has its bottom end 23 bent inwardly at a right angle.

The sill 10a constituting a part of the generally rectangular supporting frame for at least one such window screen has a rail 12a thereon which includes the upstanding web 13 with a thickened head 14a forming the overhang 15 only on one side of the rail where the hook 22 of the roller support 21a is to be arranged.

As may be apparent from the foregoing description, the thickened head 14a of the rail 12a forces the hook 22 at the bottom end of one of the side portions 20 of each inverted-U-shaped roller support 21a away from the other side portion and intrudes between the side portions to establish rolling engagement with the roller 19 when the sash 11a of the window screen is installed within the supporting frame. Since the hook 22 of each roller support 21a is normally engageably held under the overhang 15 of the rail 12a, and since the web 13 of the rail is held between the relatively narrow spacing between the hook 22 and the end 23 of each roller support, the possibility of accidental detachment of the window screen from over the sill 10a is effectively precluded.

Figure 3 illustrates a slight modification of the embodiment shown in Figure 1, which modification includes an inverted-U-shaped member 24 made of relatively rigid but resilient material, via which roller support 21b is fixedly mounted in the channel. Other details of construction and operation will be apparent from the foregoing description of Figure 1.

It may be mentioned that this invention is applicable to a panel assembly having rollers of adjustable height type for horizontally moving sashes, because then the accidental detachment of the sashes can be prevented regardless of the positions of the rollers adjustably varied up or down with respect to the sashes.

WHAT WE CLAIM IS:—

1. A panel assembly comprising at least one sash which is installed within a support-



ing frame and which has a plurality of rollers for horizontal rolling movement relative to said supporting frame, a rail formed on the sill of said supporting frame, said rail including at least one overhang extending the full length thereof, means defining a downwardly opening channel in a bottom horizontal member of said sash, said channel extending the full length of said bottom horizontal member, a plurality of roller supports each in the shape of an inverted "U" including a pair of opposed side portions between which a respective one of said rollers is rotatably supported, said roller support being fixedly mounted in a selected position in said channel to hold said roller in rolling engagement with said rail, and a hook of resilient material at the bottom end of at least one of said side portions of said roller support, the end of said hook being located under said overhang of said rail.

2. A panel assembly according to claim 1, wherein said hook is formed by inwardly folding the bottom end of said one side portion of said roller support.

3. A panel assembly according to claim 2, wherein the bottom end of the other side portion of said roller support is bent inwardly.

4. A panel assembly according to claim 1, wherein said roller support is fixedly mounted in said channel via a member which is also in the shape of an inverted "U" and which is made of relatively rigid and suitably resilient material.

5. A panel assembly substantially as herein described with reference to and as illustrated in Figure 1 of the accompanying drawings.

6. A panel assembly substantially as herein described with reference to and as illustrated in Figure 2 of the accompanying drawings.

7. A panel assembly substantially as herein described with reference to and as illustrated in Figure 1 modified as in Figure 3 of the accompanying drawings.

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