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(54) EXTERIOR WINDOW UNIT

(71) We, YOSHIDA KOGYO K.K., a corporation duly organized under the laws of Japan and existing at No. 1, Kanda Izumicho, 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 to an exterior window unit.

Frame sills of the heretofore-proposed exterior window units generally include a generally horizontally extending base portion having a plurality of parallel spaced rails or flanges formed on its upper surface for rolling engagement with respective rollers carried by the associated sashes at their lower edges for guiding the horizontal movement of the sashes therealong, and a vertical mounting portion extending upwardly from the horizontal base portion at its inner edge adapted to be mated with and secured to a vertical exterior surface of a pre-installed sill in a building opening. Since a plurality of rails are disposed in parallel side by side relation, the horizontal base portion has a relatively great width, which detracts from the appearance of the frame sill. Even more important is the ability of the horizontal base portion to support the overall load of the sashes. Where the sashes have heavy weights, the horizontal base portion is susceptible to deformation along a line of connection along which the horizontal base portion and the vertical mounting portion are connected together. To avoid this, it is necessary to reinforce the horizontal base portion. The most common approach is to provide a frame sill in the form of a hollow structure of generally rectangular cross section. This procedure is undesirable, however, because it not only adds to the material cost but also does retard the installation of the frame sill. A further difficulty encountered with the conventional frame sills is the problem of preventing rain water from intruding into the interior of a building through the exterior window unit. It is

necessary to increase the height of the vertical mounting portion to provide a better weather resistance.

The present invention seeks to provide an exterior window unit having a frame which is simplified in design, sturdy in construction, and inexpensive in manufacture.

The invention further seeks to provide a frame which is capable of providing a good weather resistance and of easy and rapid installation.

According to the invention, there is provided an exterior window unit comprising a frame, one side of the frame for extending along the appropriate side of a window aperture, the said one side having a mounting portion adapted to be secured to a vertical exterior surface around the window aperture, a plurality of rail portions provided on a vertical surface of the mounting portion and extending the length of the mounting portion, the rail portions being spaced apart on the vertical surface of the mounting portion and comprising flanges extending parallel to but spaced from the said vertical exterior surface.

Preferably the side of the frame is a sill and is adapted to be mounted in an original sill of the window aperture. A plurality of sashes may be mounted within the frame in parallel closely spaced relation, the plurality of sashes corresponding in number to the plurality of rail portions, said sashes having engaging means at their lower edges, respectively, and the upper edges of the rail portions being disposed in engagement with said engaging means, respectively, for guiding the horizontal movement of said sashes therealong.

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

Figure 1 is a vertical cross-sectional view through an exterior window unit having an improved frame sill which unit is provided in accordance with the present invention;

Figure 2 is a vertical cross sectional view of the frame sill shown mounted to a fixed sill disposed in an opening of a building wall; and

Figures 3 and 4 are views similar to Figure 1 but showing modified frame sills, respectively.

Figure 1 shows an exterior window unit 10 mounted on the exterior of a building wall 11 and covering an opening 12 therein. The building wall 11 has a horizontally extending wooden sill 13 having in its top surface 14 a longitudinal groove 15 in which the lower edge of an interior sash 16 is received for horizontal sliding movement therealong.

The exterior window unit 10 generally comprises a frame 17 made of extruded aluminum and including a horizontally extending sill 18, a pair of intermediate sashes 19, 20, a screen sash 21, and an exterior sash 22, these sashes being mounted within the frame 17 in parallel closely spaced planes. Although not shown in the drawings, the frame 17 also include a horizontally extending header and a pair of spaced apart vertical jambs interconnecting the header and sill 18 at their respective opposite ends to define a rectangular opening. The frame sill 18 extends along the length of the wooden sill 13 and includes a solid body of generally inverted L-shaped cross section having a vertical mounting portion 23 and a horizontal mounting portion 24 extending inwardly and right-angularly from the vertical mounting portion 23 at its upper edge, as best shown in Figure 2. The frame sill 18 also includes a plurality of longitudinal rail portions 25, 26, 27, 28 formed integrally on the exterior surface of the vertical mounting portion 23, the plurality of rail portions extending along the length of the vertical mounting portion 23 and being spaced vertically along the height thereof. The first and second rail portions 25, 26 are identical in configuration and each includes a body of L-shaped cross section having a horizontal part 25a, 26a extending outwardly from the vertical mounting portion 23 and a vertical flange part 25b, 26b extending upwardly from the horizontal part at its outer edge. The upper edge portion 25c, 26c of the flange part 25b, 26b is formed into a thickened cross section. The third rail portion 27 has generally the same configuration as, but is slightly thinner in cross section than, each of the first and second rail portions 25, 26. Also, a flange part 27b of the third rail portion 27 is shorter than that of each of the first and second rail portions 25, 26. The fourth rail portion 28 differs from the first and second rail portions 25, 26 only in that it has a substantially shorter flange part 28b. Since the horizontal parts 25a to 28a have the same length, the upstanding flange parts 25b to 28b are disposed in vertical registry with one another and hence lie in a common

plane. The vertical mounting portion 23 has a series of screw holes 23a formed therethrough and disposed intermediate the third and fourth rail portions 27, 28. The horizontal mounting portion 24 has a series of screw holes 24a formed therethrough.

The intermediate sash 19 comprises a rectangular frame 19a including a bottom rail 19b of generally H-shaped cross section having a pair of upwardly and downwardly opening channel portions 29, 30. Received in the upwardly opening channel portion 29 is a gasket member 31 which in turn embraces a lower peripheral margin of a glass pane 32. Rotatably mounted within the downwardly opening channel portion 30 is a roller 33 which has a peripheral groove 34 for rolling engagement with the thickened upper edge portion 25c of the upstanding flange part 25b. As shown in the drawings, the roller 33 is arranged in the median plane of the intermediate sash 19 in which the glass pane 32 is disposed.

The other intermediate sash 20 comprises a rectangular frame 20a including a bottom rail 20b having a lower hollow portion 35 of rectangular cross section and an upper hollow portion 36 of rectangular cross section extending upwardly from the lower portion 35, the lower portion 35 being substantially equal in height to but greater in width than the upper portion 36. Exterior side parts 37, 38 of the upper and lower portions 36, 35 are disposed in coplanar relationship to each other. The upper hollow portion 36 has an upwardly opening channel section 39 formed at its upper end for holding a lower peripheral margin of a glass pane 40 through a gasket member 41. The lower hollow portion 35 has a downwardly opening channel part 42 formed at its interior side in which a roller 43 is rotatably mounted for rolling engagement with the thickened edge portion 26c of the upstanding flange part 26b, the downwardly opening channel part 42 being disposed in vertical registry with the downwardly opening channel portion 30. Thus, the roller 43 is arranged in offset relation to the median plane of the upper hollow portion 36 in which the glass pane 40 is disposed.

The screen sash 21 comprises a rectangular frame 21a including a bottom rail 21b having an outer hollow portion 44, a downwardly opening inner channel portion 45, and a horizontal web portion 46 lying between the hollow outer portion 44 and the inner channel portion 45. The hollow outer portion 44 has an outwardly opening groove section 47 formed at its upper end for retaining a lower peripheral margin of a screen 21c through a retaining bar 48 adapted to be received therein. A roller 49 is rotatably mounted within the downwardly

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opening channel portion 45 for rolling en-
gagement with the upper edge portion of
the upstanding flange part 27b, and the
channel portion 45 is disposed in vertical
5 registry with the aforesaid downwardly
opening channels 30, 42.
The exterior sash 22 comprises a rectan-
gular frame 22a including a bottom rail 22b
having a horizontally disposed hollow base
10 portion 50 of rectangular cross section and
an upper hollow portion 51 of rectangular
cross section extending upwardly from the
base portion 50 adjacent its outer end, ex-
terior side sections 52, 53 of the base and
15 upper portions 50, 51 being disposed in
coplanar relationship to each other. The
upper portion 51 has an upwardly opening
channel section 54 formed at its upper end
for snugly receiving a lower peripheral mar-
20 gin of a panel member 55. The base por-
tion 50 has a downwardly opening channel
part 56 formed at its inner side within which
a roller 57 is rotatably mounted for rolling
engagement with the upper edge of the
25 flange part 28b, the channel section 56
being disposed in vertical registry with the
aforesaid channels 30, 42, 45.
When the exterior window unit 10 is to
be installed, the window frame 17 is first
30 fixedly mounted relatively to the building
opening 12 in such a manner that the frame
sill 18 is fixedly secured to the wooden sill
13, with the vertical and horizontal mount-
ing portions 23, 24 mated with and secured
35 to the vertical exterior and horizontal top
surfaces 58, 14 of the wooden sill 13, re-
spectively, by a pair of series of screws
59, 60 passing through the respective screw
holes 23a, 24a into the wooden sill 13.
40 Then, the pair of intermediate sashes 19,
20, the screen sash 21 and the exterior sash
22 are mounted in position within the win-
dow frame 17, with the rollers 33, 43, 49,
57 riding on their respective flange sections
45 25b, 26b, 27b, 28b.
Figure 3 shows a modified form of the
invention in which that portion of the
frame sill 18 extending downwardly beyond
the third rail portion 27 is removed to pro-
50 vide a modified sill 18a of shorter height
which is employed where it is not required
to install the exterior sash 22.
Figure 4 shows another modification in
which that portion of the frame sill 18
55 extending downwardly beyond the second
rail portion 26 is removed to provide an-
other modified sill 18b of still shorter height
which is utilized where it is not required
to mount the exterior sash 22 and the
60 screen sash 21.
Since the sashes 19 to 22 are supported
by their respective vertically spaced rail
portions 25 to 28, the overall load of the
sashes are suitably distributed along the
65 height of the vertical mounting portion 23.

This arrangement is advantageous because
the frame sill 18 does not need to be pro-
vided in the form of a hollow structure,
say, of a generally rectangular cross section
in view of the mechanical strength thereof.
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By virtue of the provision of the verti-
cally spaced rail portions 25 to 28, the
vertical mounting portion 23 has a substan-
tially increased height to prevent rain water
from intruding into the interior of the
75 building through the exterior unit 10.

WHAT WE CLAIM IS:—

1. An exterior window unit comprising 80
a frame, one side of the frame for extend-
ing along the appropriate side of a window
aperture, the said one side having a mount-
ing portion adapted to be secured to a ver-
tical exterior surface around the window 85
aperture, a plurality of rail portions pro-
vided on a vertical surface of the mounting
portion and extending the length of the
mounting portion, the rail portions being
spaced apart on the vertical surface of the 90
mounting portion and comprising flanges
extending parallel to but spaced from the
said vertical exterior surface.
2. A unit according to claim 1, wherein
the side of the frame is a sill and is adapted 95
to be mounted on an original sill of the
window aperture.
3. A unit according to claim 2, where-
in a plurality of sashes are mounted within
the frame in parallel closely spaced rela- 100
tion, the plurality of sashes corresponding
in number to the plurality of rail portions,
the sashes having engaging means at their
lower edges, respectively, and the upper
edges of the rail portions being disposed in 105
engagement with the engaging means, re-
spectively, for guiding the horizontal move-
ment of the sashes therealong.
4. A unit according to claim 2 or 3,
wherein the sill has a horizontal mounting 110
portion extending inwardly and right-ang-
ularly from the vertical mounting portion at
its upper edge, the horizontal mounting
portion being adapted to be mated with and
secured to a horizontal top surface of the 115
first sill.
5. A unit according to claim 1, 2 or 3,
wherein the rail portions have horizontal
parts, respectively extending between the
lower edge of a vertical flange part and the 120
vertical mounting portion, respectively.
6. A unit according to claim 5, where-
in the horizontal parts have the same width
so that vertical flange sections are disposed
in vertical registry with one another, and 125
in which the engaging means are also ar-
ranged in vertical registry with one another
so that all of the engaging means except
for that of the innermost one of the sashes

opening channel portion 45 for rolling engagement with the upper edge portion of the upstanding flange part 27b, and the channel portion 45 is disposed in vertical registry with the aforesaid downwardly opening channels 30, 42.

The exterior sash 22 comprises a rectangular frame 22a including a bottom rail 22b having a horizontally disposed hollow base portion 50 of rectangular cross section and an upper hollow portion 51 of rectangular cross section extending upwardly from the base portion 50 adjacent its outer end, exterior side sections 52, 53 of the base and upper portions 50, 51 being disposed in coplanar relationship to each other. The upper portion 51 has an upwardly opening channel section 54 formed at its upper end for snugly receiving a lower peripheral margin of a panel member 55. The base portion 50 has a downwardly opening channel part 56 formed at its inner side within which a roller 57 is rotatably mounted for rolling engagement with the upper edge of the flange part 28b, the channel section 56 being disposed in vertical registry with the aforesaid channels 30, 42, 45.

When the exterior window unit 10 is to be installed, the window frame 17 is first fixedly mounted relatively to the building opening 12 in such a manner that the frame sill 18 is fixedly secured to the wooden sill 13, with the vertical and horizontal mounting portions 23, 24 mated with and secured to the vertical exterior and horizontal top surfaces 58, 14 of the wooden sill 13, respectively, by a pair of series of screws 59, 60 passing through the respective screw holes 23a, 24a into the wooden sill 13. Then, the pair of intermediate sashes 19, 20, the screen sash 21 and the exterior sash 22 are mounted in position within the window frame 17, with the rollers 33, 43, 49, 57 riding on their respective flange sections 25b, 26b, 27b, 28b.

Figure 3 shows a modified form of the invention in which that portion of the frame sill 18 extending downwardly beyond the third rail portion 27 is removed to provide a modified sill 18a of shorter height which is employed where it is not required to install the exterior sash 22.

Figure 4 shows another modification in which that portion of the frame sill 18 extending downwardly beyond the second rail portion 26 is removed to provide another modified sill 18b of still shorter height which is utilized where it is not required to mount the exterior sash 22 and the screen sash 21.

Since the sashes 19 to 22 are supported by their respective vertically spaced rail portions 25 to 28, the overall load of the sashes are suitably distributed along the height of the vertical mounting portion 23.

This arrangement is advantageous because the frame sill 18 does not need to be provided in the form of a hollow structure, say, of a generally rectangular cross section in view of the mechanical strength thereof.

By virtue of the provision of the vertically spaced rail portions 25 to 28, the vertical mounting portion 23 has a substantially increased height to prevent rain water from intruding into the interior of the building through the exterior unit 10.

WHAT WE CLAIM IS:—

1. An exterior window unit comprising a frame, one side of the frame for extending along the appropriate side of a window aperture, the said one side having a mounting portion adapted to be secured to a vertical exterior surface around the window aperture, a plurality of rail portions provided on a vertical surface of the mounting portion and extending the length of the mounting portion, the rail portions being spaced apart on the vertical surface of the mounting portion and comprising flanges extending parallel to but spaced from the said vertical exterior surface.

2. A unit according to claim 1, wherein the side of the frame is a sill and is adapted to be mounted on an original sill of the window aperture.

3. A unit according to claim 2, wherein a plurality of sashes are mounted within the frame in parallel closely spaced relation, the plurality of sashes corresponding in number to the plurality of rail portions, the sashes having engaging means at their lower edges, respectively, and the upper edges of the rail portions being disposed in engagement with the engaging means, respectively, for guiding the horizontal movement of the sashes therealong.

4. A unit according to claim 2 or 3, wherein the sill has a horizontal mounting portion extending inwardly and right-angulantly from the vertical mounting portion at its upper edge, the horizontal mounting portion being adapted to be mated with and secured to a horizontal top surface of the first sill.

5. A unit according to claim 1, 2 or 3, wherein the rail portions have horizontal parts, respectively extending between the lower edge of a vertical flange part and the vertical mounting portion, respectively.

6. A unit according to claim 5, wherein the horizontal parts have the same width so that vertical flange sections are disposed in vertical registry with one another, and in which the engaging means are also arranged in vertical registry with one another so that all of the engaging means except for that of the innermost one of the sashes



are disposed in offset relationship to the median planes of their respective sashes.

7. An exterior window unit substantially as herein described with reference to the drawings.

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