

PANEL UNITBACKGROUND OF THE INVENTION

1. Field of the Invention:

This invention relates to panel units connected
5 vertically and horizontally on the same surface thereby
forming an external wall of a building or the like.

2. Description of the Prior Art:

There are so far known a plurality of panel units
mounted on the front surface of a building so as to form
10 an external wall of the building as shown in Japanese Laid-
open Patent Application No. 61-2133, each of these panel
units comprising a rectangular framework formed by an upper
rail, a lower rail, and left and right stiles, the frame-
work having glass plates and panels, etc. mounted thereon.

15 Since such a panel is comprised of one piece of
framework having one piece of panel mounted thereon, in
order to form an external wall of a building, it is
necessary to mount a plurality of panel units continuously
in the vertical and horizontal directions.

20 Whilst, it is important from the point of view of
external appearance to position the panel units to a
building body in the vertical and horizontal directions,
and align rectilinearly the jointing spaces each having the
same width and formed between adjacent panel units, which

are connected continuously in the vertical and horizontal directions.

Therefore, the operations of positioning and mounting a plurality of panel units on the outer surface of a building become very troublesome, and also since sealing members are mounted in the jointing spaces formed between the adjacent panel units at site, not only the operation of mounting the sealing members becomes very troublesome, but also the reliability of the operation will deteriorate.

SUMMARY OF THE INVENTION

The present invention has been devised in view of the above-mentioned circumstances in the prior art, and has for its object to provide a panel unit

having a plurality of panels mounted thereon and spaced apart with one another by a predetermined jointing space in such a manner that the difficulties and disadvantages incidental to the above-mentioned prior art can be eliminated and the operations of mounting panel units and attaching sealing members can be carried out reliably and readily.

According to the present invention there is provided a panel unit for a wall, said panel unit comprising: -

a rectangular main framework comprising at least one pair of intermediate members, each intermediate member having a portion recessed relative to a front surface of said main framework;

an auxiliary framework secured to said pair of or each of said pairs of intermediate members;

two or more panels mounted on a front surface of said main framework so as to be flush with one another; and

a panel mounted on a front surface of said auxiliary framework or each of said auxiliary frameworks;

wherein said panel(s) mounted on said auxiliary framework(s) is/are flush with said panels mounted on said main framework; and

wherein a jointing space is provided between each pair of adjacent panels, every jointing space associated with the panel unit having the same width.

In the present invention
since there is provided a panel unit
having a plurality of
panels mounted thereon,

mounting one panel unit on the front surface of
a building enables a plurality of panels to be mounted
thereon at once so that, since the operations of
assembling panel units and attaching sealing members
between the panels can be previously conducted before
mounting the panel units on the building body, these
operations can be performed simply and readily, and also
the reliability of the operations can be enhanced.

Further, since the outside walls of the first and
second intermediate rails 4 and 5 are formed in a stepped
shape, and the auxiliary frame B is mounted on the
recessed inner portions of the rails 4 and 5, the auxiliary
frame B can be mounted simply and readily on the latter,
and also the outer surface of the auxiliary frame B can be
located substantially flush with the outer portions on the
outside walls of the intermediate rails 4 and 5 so that
the panels mounted on the panel unit can be located

substantially flush with one another.

The above-mentioned and other objects, aspects and advantages of the present invention will become apparent to those skilled in the art by making reference to the following detailed description taken in conjunction with the accompanying drawings in which preferred embodiments incorporating the principles of the present invention are shown by way of examples only.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a schematic, longitudinal sectional view of a first embodiment of the present invention which is taken along line I-I in Fig. 4;

Fig. 2 is a schematic, cross-sectional view taken along line II-II in Fig. 4;

Fig. 3 is an exploded view showing a fragmentary perspective view of a connecting portion of a stile and a rail of the embodiment shown in Fig. 1, in combination with a fragmentary perspective view of a connecting portion of an auxiliary stile and an auxiliary rail of the same embodiment;

Fig. 4 is a front view of a framework of the embodiment shown in Fig. 1;

Fig. 5 is a schematic, longitudinal sectional view of a second embodiment of the present invention; and

Figs. 6 and 7 are a schematic cross-sectional view of a

third embodiment of the present invention and a longitudinal sectional view taken along line VII - VII in Fig. 6.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Fig. 4 is a front view of a main framework A, which comprises an upper rail 2, a lower rail 3, and upper and lower intermediate rails 4 and 5 extending transversely between the left and right stiles 1 and 1, thus forming a rectangular configuration, and an auxiliary frame B mounted between the upper and lower intermediate rails 4 and 5. The auxiliary frame B is a rectangular framework formed by an upper auxiliary rail 6, a lower auxiliary rail 7 and the left and right auxiliary stiles 8, 8.

Further, an aluminum panel 9 is mounted on a frame portion formed by the upper rail 2, the upper intermediate rail 4 and the left and right stiles 1, 1, a glass panel 10 is mounted on the auxiliary frame B, and an aluminum panel 11 is mounted on another frame portion formed by the lower intermediate rail 5, the lower rail 3 and the left and right stiles 1, 1. Thus, the three panels are mounted on one main framework A.

As shown in Fig. 1, the above-mentioned upper and lower rails 2 and 3 are of a substantially rectangular, hollow section. The inner walls (or elements) 2a and 3a of the upper and lower rails 2 and 3 have inwardly directed pieces 2b and 3b, respectively, formed integrally therewith at

substantially intermediate portions thereof between their inner and outer surfaces. The outside walls (or elements) 2c and 3c of the upper and lower rail 2 and 3c are flush, and the outside wall 2c of the upper rail 2 projects inwardly from the inner wall 2a thereby forming a projecting piece 2d integrally therewith.

The above-mentioned upper intermediate rail 4 is comprised of a generally rectangular, hollow upper body 12, and a lower body 13 formed integrally with the inside, lower surface of the upper body 12. The upper body 12 has an upper wall (or element) 12a having a projecting piece 12b formed integrally therewith, and an outside wall (or element) 12c projecting upwardly from the upper wall 12a thus forming a projecting piece 12d integrally therewith. The outside wall 13a of the lower body 13 is located inside of the outside wall 12c of the upper body 12, and inner walls (or elements) 12e and 13b are formed continuously and flush with each other, and the wall of the upper intermediate rail 4 is of a stepped shape recessed on the indoor side.

The above-mentioned lower intermediate rail 5 is comprised of a generally rectangular hollow lower body 14, and an upper body 15 formed integrally with the inside, upper wall of the lower body. The lower body 14 has a lower wall 14a having a projecting piece 14b formed integrally therewith, and an outer wall 14c projecting

downwardly from the lower wall 14a thus forming a projecting piece 14d integrally therewith. The outside wall 15a of the upper body 15 is located inside of the outside wall 14c of the lower body 14, the inside walls 15b and 14e are formed continuously and flush with each other, and the outside wall of the lower intermediate rail 5 is of a stepped shape recessed on the indoor side. Thus, the lower intermediate rail 5 is in a vertically symmetrical relationship with the upper intermediate rail 4.

As shown in Fig. 2, each of the above-mentioned stiles 1 is comprised of a rectangular, hollow, inner body 20, and an outer member 21. The outer member 21 is an L-shape member which is formed by a projecting plate or element 21a and a mounting plate or element 21b and which forms an inward recess 22 together with an outside wall 20b of the inner body 20. The inner body 20 has an inner surface 20c having a projecting piece 20d formed integrally therewith.

Further, the upper and lower rails 2 and 3 are abutted against and connected to the inner surfaces of the stiles 1 in such a manner that the outside walls 2c and 3c thereof are located flush with the mounting plates 21b, and the inwardly turned pieces 2b and 3b are located flush with the outside walls 20b of the inner bodies 20. Moreover, the projecting pieces 20d of the inner bodies 20 are cut off

at a portion thereof to be located opposite to the upper and lower rails 2 and 3.

The above-mentioned upper and lower intermediate rails 4 and 5 are abutted against and connected to the outside walls of the stiles 1 in such a manner that the outside walls 12c and 14c of the upper and lower bodies 12 and 14 are located flush with the mounting plates 21b of the stiles 1, and the inside walls thereof 12e, 13b, 14e and 15b are abutted against the projecting pieces 20d of the stiles 1, thereby positioning the stiles and the rails in a horizontal direction at right angles to the surface of the panels. Thus, the upper portions of the left and right stiles 1, 1, the upper rail 2 and the upper intermediate rail 4 form a rectangular framework having the aluminium plate 9 mounted on the outer surface thereof.

Stating more specifically, the aluminum plate 9 is fixedly secured by means of bolts to the mounting plates 21b of the stiles 1, the projecting plate 2d of the upper rail 2, and the projecting plate 12d of the upper intermediate rail 4.

The lower portions of the above-mentioned left and right stiles 1, 1, the lower rail 3, and the lower intermediate rail 5 form a rectangular framework having the aluminum plate 11 mounted on the outer surface thereof by means of bolts in the same manner as mentioned above.

As shown in Fig. 1, the auxiliary upper and lower rails 6 and 7 of the above-mentioned auxiliary frame B comprise hollow bodies 6a and 7a having hook-shaped support pieces 6b and 7b, respectively, formed integrally therewith thus forming inward recesses 6c and 7c, and also having mounting pieces 6d and 7d, respectively, formed integrally therewith. The above-mentioned auxiliary stile 8 is rectangular and hollow as shown in Fig. 2, and the inside wall of the auxiliary stile 8 is connected to the upper and lower auxiliary rails 6 and 7 thus forming the auxiliary frame B as shown in Fig. 4. The upper and lower edges of the glass plate 10 are supported by the inward recesses 6c and 7c, and the left and right edges of the glass plate 10 are adhesively bonded and secured through structural seals 30 to the outside walls 8a of the auxiliary stiles 8, and each of the auxiliary stiles 8 is covered by the glass plate 10 so that it cannot be seen from the outdoor side.

Further, the outer mounting plates 21 of the left and right stiles 1 are partially cut off at their vertically intermediate portions, respectively, through the cut-off portions of which the auxiliary frame B is mounted.

Stating in brief, the cut-off end faces 21e of the outer mounting plates 21 are identical in shape to the outdoor side upper wall of the upper intermediate rail 4

and the outdoor side lower wall of the lower intermediate rail 5, and the former are connected to the latter as shown in Fig. 3. The auxiliary frame B is inserted between the upper and lower intermediate horizontal members 4 and 5, and the mounting pieces 6d and 7d of the upper and lower auxiliary rails 6 and 7 are mounted on the outside walls 13a and 15a of the lower and upper bodies 13 and 15, respectively, by means of screws 31. A jointing space 32 is formed between the upper body 12 and the upper auxiliary rail 6, whilst a jointing space 33 having the same lateral width as that of the jointing space 32 is formed between the lower auxiliary rail 7 and the lower intermediate rail 5 so that the screws 31 may be tightened through the jointing spaces 32 and 33, respectively. Further, the outside wall 8a of the auxiliary stile 8 is located substantially flush with the end face of the glass plate 10.

In a second embodiment, shown in Fig. 5, the main framework comprises a plurality of pairs of transversely extending upper and lower intermediate horizontal members 4 and 5, each pair having an auxiliary frame B mounted thereon. The pairs of intermediate members are mounted between the left and right stiles 1 and 1.

In a third embodiment, shown in Figs. 6 and 7, the main framework comprises vertical left and right intermediate stiles 40, 40 which have stepped outdoor-side surfaces, recessed on the indoor side. The recessed portions 40a, 40a of the intermediate stiles are disposed opposite each other.

The intermediate stiles 40,40 are mounted between the upper and lower rails 2 and 3, and an auxiliary frame B is mounted on the recessed portions 40a, 40a of the left and right intermediate stiles 40, 40.

It is to be understood that the foregoing description is merely illustrative of preferred embodiments of the present invention, and that the scope of the invention is not to be limited thereto, but is to be determined by the scope of the appended claims.

**CLAIMS:**

1. A panel unit for a wall, said panel unit comprising: -

a rectangular main framework comprising at least one pair of intermediate members, each intermediate member having a portion recessed relative to a front surface of said main framework;

an auxiliary framework secured to said pair of or each of said pairs of intermediate members;

two or more panels mounted on a front surface of said main framework so as to be flush with one another; and

a panel mounted on a front surface of said auxiliary framework or each of said auxiliary frameworks;

wherein said panel(s) mounted on said auxiliary framework(s) is/are flush with said panels mounted on said main framework; and

wherein a jointing space is provided between each pair of adjacent panels, every jointing space associated with the panel unit having the same width.

2. A panel unit as set forth in claim 1 wherein

(a) said main framework comprises: -

left and right stiles extending vertically in parallel relationship to each other and spaced horizontally apart from each other; an upper rail



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connected horizontally between respective upper portions of said stiles; a lower rail connected horizontally between respective lower portions of said stiles; and first and second intermediate members connected horizontally between said left and right stiles, said first and second intermediate members being provided at vertically intermediate positions between said upper and lower rails, respective outdoor-side walls of said first and second intermediate rails being located opposite to and substantially flush with respective outdoor-side walls of said upper and lower rails, respectively, and said first and second intermediate members each having a portion recessed relative to their respective outdoor-side wall, said recessed portions being located opposite each other;

(b) said auxiliary frame comprises: - left and right auxiliary stiles located on the outdoor-side surface of a respective one of said left and right stiles; an upper auxiliary rail connected between respective upper portions of said left and right auxiliary stiles and mounted on the recessed portion of said first intermediate rail; and a lower auxiliary rail connected between respective lower portions of said left and right auxiliary rails and mounted on the recessed portion of said second intermediate rail;

(c) said panel unit comprises a first panel



mounted over the respective outdoor-side walls of said upper rail and said first intermediate rail, and a second panel mounted over the respective outdoor-side walls of said second intermediate rail and said lower rail;

(d) said panel unit comprises a third panel mounted over the outdoor-side walls or surfaces of said auxiliary frame, and

(e) respective adjacent panels are spaced apart from one another by predetermined jointing spaces, respectively, every jointing space associated with the panel unit having the same width.

3. A panel unit as set forth in claim 1 wherein said auxiliary frame means is mounted on a recessed portion of said main framework, said main framework comprising: - a pair of upper and lower rails respectively connected horizontally between respective upper and lower portions of a pair of left and right stiles, said left and right stiles extending vertically and being spaced apart from each other; and a pair of intermediate vertical members being respectively connected vertically by a predetermined space between said pair of upper and lower rails and being provided with stepped portions, respectively, having recessed outdoor-side surfaces at their respective opposite portions.
