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L. L. PULLING ETAL

3,037,591

WALL CONSTRUCTION

Filed Oct. 12, 1956

FIG. 1

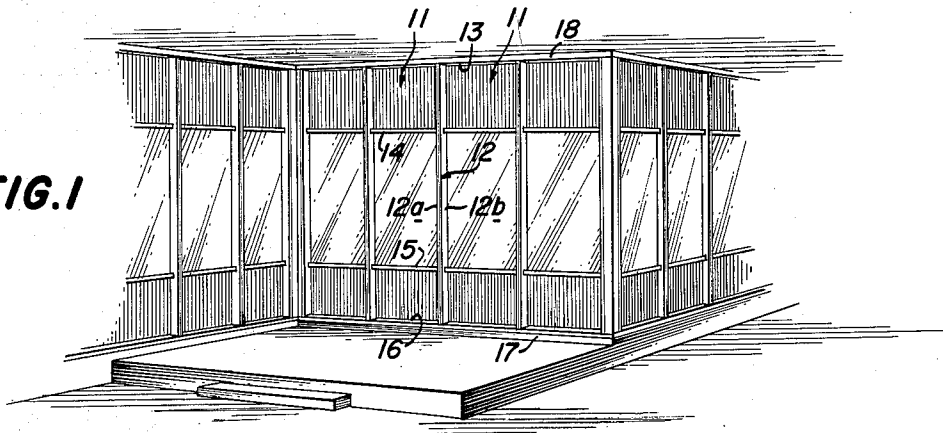


FIG. 2

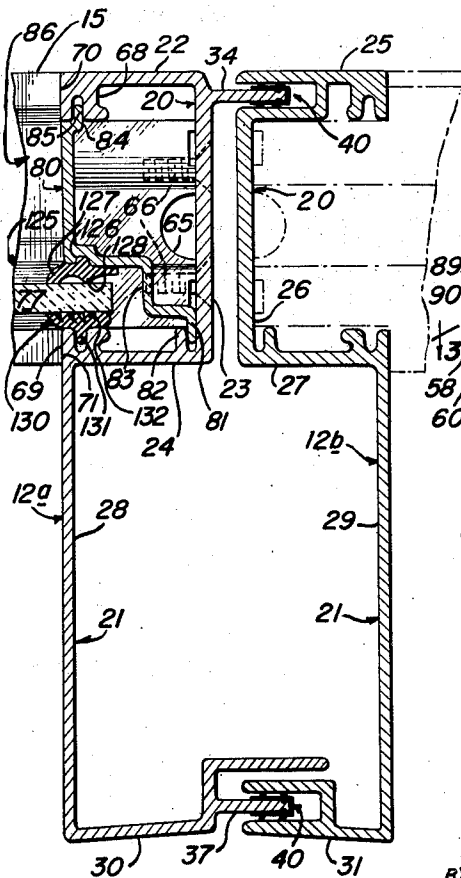
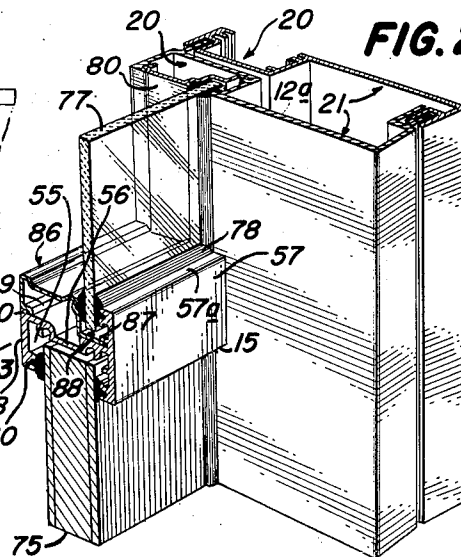


FIG. 3

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3,037,591

WALL CONSTRUCTION

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3 Claims. (Cl. 189—34)

The present invention relates to wall constructions and more particularly to outside walls of the curtain wall type.

A principal object of the present invention is to provide a new and improved curtain wall.

Another object of the present invention is to provide a new and improved structural member for use in curtain walls and the like.

Still another object of the present invention is to provide a new and improved vertical mullion for use in curtain walls and the like.

A further object of the present invention is to provide a new and improved glazing arrangement including an improved glass stop for particular use in prefabricated panel units.

Briefly, certain of the above and further objects are realized in accordance with the present invention by providing a curtain wall system which comprises a number of contiguously arranged prefabricated panel units. Each of the panel units consists of a frame and associated panels. The panels are provided with opposed grooves in the legs of a U-shaped panel receiving section and the section is additionally provided with an additional groove internally of one of the legs thereof near the bottom of the U-shaped section so that the section is adapted selectively to receive securing means comprising a pair of resilient gaskets and selectively to receive securing means comprising a resilient gasket and a glass stop to accommodate panels of various thickness.

The invention, both as to its organization and method of operation, together with further objects and advantages thereof, will best be understood by reference to the following detailed description taken in connection with the accompanying drawings, in which:

FIG. 1 is a perspective view of a portion of a building employing the curtain wall of the present invention;

FIG. 2 is a fragmentary perspective view of a portion of the wall shown in FIG. 1; and

FIG. 3 is a cross-sectional view of the structure shown in FIG. 2 taken along the line 3—3 thereof.

Referring now to the drawings and particularly to FIG. 1 thereof, there is shown a portion of a building employing a curtain wall of the present invention. The wall comprises a plurality of contiguously arranged prefabricated panel units 11, which each consist of vertical frame members 12a and 12b (FIG. 3) and horizontal frame or mullion members 13, 14, 15, and 16. Suitable panels, which may be translucent, transparent or otherwise and of various compositions and thicknesses, are mounted in the panel frames prior to assembly of the panel units 11 into a wall. Ordinarily, the translucent panels are assembled in the frames at the factory and the transparent panels, being glass and relatively frangible, are assembled in the field. The panel units 11 are contiguously mounted on a sill framing member 17, and the top and bottom horizontal mullions 13 and 16 are respectively bolted to a head framing member 18 and the sill 17. The vertical frame members 12a and 12b of adjacent panel units 11 provide separate sections of split vertical mullions 12. The mullion sections 12a and 12b are inter-fitted but not directly secured together so as to permit relative movement of the separate mullion sections 12a and 12b which occurs as the respective panel units 11 expand and contract in response to temperature changes.

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Referring to FIGS. 2 and 3, it may be seen that the mullion sections 12a and 12b are each generally S-shaped, each including a glazing channel 20 and an adjacent and oppositely directed stiffening channel 21. In the mullion section 12a, the channel 20 is defined by a side flange 22, a bottom web 23 and a side flange 24. In the mullion section 12b, the channel 20 is defined by a side flange 25, a bottom web 26 and a side flange 27. The side flanges 24 and 27 in the sections 12a and 12b also define one wall of the associated channels 21 which are also respectively made up of webs 28 and 29 and side flanges 30 and 31. As viewed from the outside of the building, the mullion sections 12a form the right-hand vertical frame member of each panel unit 11 and the sections 12b form the left-hand vertical frame sections.

Since the sections 12a and 12b of each split mullion 12 are not directly secured together, in order to prevent relative transverse movement between adjoining panel units 11 and also to provide a weather-tight seal between adjacent panel units 11, a pair of tongue-in groove joints generally illustrated at 34 and 37 which extend throughout the lengths of the mullions 12 are provided. One of the tongue-in groove joints is provided near the internal edge of the mullion 12 and the other tongue-in groove joint is provided near the external edge.

There is thus provided a pair of offset U-shaped portions at the external terminal edges of the mullion sections 12a and 12b, which U-shaped portions are inter-fitted in the assembled wall to prevent relative transverse movement between adjacent panel units 11. It will be apparent that when a pair of adjacent panel sections 11 have been assembled, the completed split mullion 12 comprises a pair of glazing channels 20 which are arranged in back-to-back relationship and a tubular forwardly extending portion which gives an attractive appearance to the overall wall and, more importantly, increases the strength thereof.

In order to provide a weather-tight seal between the mullion sections 12a and 12b a plurality of elongated sealing gaskets 40 are respectively attached over each of the tongues 34 and 37.

In accordance with the present invention, each vertical mullion section 12a and 12b is provided with the glazing channel 20. Moreover, as best illustrated in FIG. 2, the horizontal mullion 15 includes a glazing channel 55 formed by a web 56 and a pair of side flanges 57 and 58 which are provided with reentrant lips 57a and 60 at the respective ends thereof. A plurality of threaded screws 66, FIG. 3, which extend through suitable holes in the web 23 of the mullion section 12a, secure the horizontal mullion 15 to the vertical mullion section 12a. Since the side flanges 22 and 24 of the glazing channel 20 include reentrant lips 68 and 69, the flanges 57 and 58 and the side portions of the web 56 are cut back from the end of the mullion 15 through a distance slightly less than the depth of the glazing channel 20 so that the central portion of the web 56 fits between the lips 68 and 69. A pair of shoulders 70 and 71, which are formed when the end portions of the flanges 57 and 58 are removed, fit snugly against the external sides of the lips 68 and 69 in the assembled panel unit 11. Also, for the purpose of providing a drain through which water from the internal gutter may flow into the adjacent mullion 12 on arcuate cut-out 65 is made at the end of the web 56.

As shown in FIG. 2, the mullion 15 is attached to the mullion section 12a with the channel 55 opening toward the bottom of the panel unit 11, and the upper edge of a relatively thick translucent panel 75 is mounted therein and in the glazing channel 20 of the section 12a. When the frame of the panel unit 11 has been completed, including any translucent panels such as the panel 75, it

may be shipped to the field where glass panes are added prior to assembly of the panel unit 11 into a wall.

In order to assemble a glass pane 77 into the otherwise completed panel unit 11, as best shown in FIG. 2, the right-hand side of the glass pane 77 is placed against the web 23 in the channel 20 and the pane 77 is then moved into the frame against the lip 57a on the upper end of the flange 57 of the mullion 15, a suitable sealing gasket 78 having previously been attached to the edge of the lip 57a. The pane 77 is then centered horizontally in the frame so that it extends in equal amounts into the glazing channels 20 of the associated mullion sections 12a and 12b.

With the pane 77 thus centered between the mullion sections 12a and 12b, a glass stop 80 is snapped into place to attach the pane 77 in the glazing channel 20. The glass stop 80 includes a toe portion 81, which fits in a groove defined by a rib 82 on the flange 24 and the web 23. The glass stop 80 also includes an intermediate offset or longitudinal step portion 83 and a heel 84 which snaps into a groove 85 in the reentrant lip 63. As shown, the step 83 is formed by a pair of reverse bends provided between the longitudinal edges of the glass stop 80. As shown, suitable sealing gaskets are provided between the glass pane 77 and the adjoining portions of the glass stop 80 and the lip 69. Since the channel 20 must have a depth at least twice the length of the bight of the pane 77 to permit assembly of the pane 77 after completion of the frame, the step 83 is provided to prevent the pane 77 from walking into the channel 20 in the mullion section 12a and thus from the glazing channel 20 on the associated mullion section 12b. The lower end (not shown) of the glass stop 80 rests directly on the top of the web 56 of the mullion 15, and as best shown in FIG. 3, the glass stop 80, the flange 22 and the web 23 provide a vertical pocket or shaft for directing the water which drains through the cut-out 65 onto the sill 17. Because the sill 17 is not sealed to the forward portions of the panel units 11 and is thus slightly spaced therefrom, this water flows outside of the building. In this way, any water, which may leak through the glazing gaskets does not get into the building.

After the glass stops 80 have been assembled, one on each vertical side of the pane 77, the pane 77 is lifted slightly into a downwardly opening glazing channel (not shown) in the upper mullion 14, and a pair of lead blocks are placed at the quarter points of the window on the web 56 directly below the edge of the pane 77. A toe 88 of a glass stop 86, which is notched at the location of the lead blocks is then slipped into a groove defined by a rib 87 on the flange 57 and the web 56, and a heel 89 is snapped under an undercut rib 90 on the mullion 15. An upper glass stop (not shown) is then snapped into place in the downwardly opening glazing channel in the upper mullion 14.

As best shown in FIG. 3, the glazing gaskets which are used to seal the pane 77 to the glass stop 80 and to the lip 69 of the mullion section 12a are dissimilar. A gasket 125 having a rearwardly extending bead 126 received in a suitable groove in the glass stop 80 is provided with a pair of relatively thick glass engaging fingers 127 and 128 separated by an arcuate groove. A gasket 130 having a bead 131 received in a suitable groove in the lip 69 is provided with a plurality of relatively thin and flexible fingers 132 for engaging the glass. The gasket 125 and 130 are formed of a suitable resilient plastic such as polyvinyl chloride or neoprene and thus provide a relatively strong member for engaging the inside edge of the pane 77 and a considerably more flexible member for engaging the outside edge of the pane 77. In this manner movement of the pane toward the inside of the building due to high winds and the like is restricted while at the same time sufficient flexibility is provided to permit relatively wide variations in the dimensions of the associated mullion section and the glass stop 80.

It will be understood that in the event that it is desired to mount other type windows or doors in the panel sections 11 such, for example, as horizontally pivoted windows, doors, and the like, modifying members may be positioned in the channel portions 20 of the mullion 12 as well as the channel 55 of the rails 13, 14, 15, and 16. When such modifying members are used, elongated gaskets such as are used between the panel 75 and the channel 55 are attached to the lips on the associated channels to provide weather seals between the modifying members and the principal frame members.

While the present invention has been described in connection with particular embodiments thereof, it will be understood that those skilled in the art may make many changes and modifications without departing from the true spirit and scope of this invention as defined in the appended claims.

What is claimed as new and is desired to be secured by Letters Patent of the United States is:

1. In combination, an extruded metal construction element of unitary construction comprising a part of generally U-shaped section for receiving a panel element therewithin; spaced parts joining and extending laterally of the ends of the legs of said U-shaped part to provide external jamb surfaces which are disposed in substantially the same plane, the legs of said U-shaped part having portions defining opposed grooves disposed internally of the legs and spaced inwardly of said U-shaped part from the plane of said jamb surfaces, one of said legs being provided with an additional portion defining an additional groove internally of said one of said legs near the bottom of said U-shaped section; a panel element having opposed flat faces and an edge projecting within said U-shaped part; first securing means cooperating with the opposed groove in said one of said legs and a flat face of said panel element; and second securing means cooperating with said additional groove in said one of said legs, with the opposed groove in the other of said legs, and with the other of said flat faces; said first and said second securing means being effective to secure said panel element in position within said U-shaped part and to permit limited relative movement between said construction and panel element in a direction extending longitudinally of said panel element.

2. The combination as set forth in claim 1 above wherein said first securing means is a resilient gasket; and said second securing means is a glass stop formed of flexible material and comprising a first longitudinal securing portion engaged in said additional groove, a second longitudinal securing portion engaged in said opposed groove of said other of said legs, and a longitudinally extending portion intermediate said securing portions formed by a plurality of reverse bends and engaging the marginal edge of said panel element.

3. An elongated extruded metal construction element comprising a part of generally U-shaped section; spaced parts joining and extending laterally of the ends of the legs of said U-shaped part to provide external jamb surfaces which are disposed in substantially the same plane; parts extending toward each other from the opposed inner sides of the legs of said U-shaped part and cooperating with the opposed end portions of said laterally extending parts to provide opposed spaced grooves within said U-shaped part adjacent the leg ends thereof; and one of said legs being provided with an additional portion defining an additional groove internally of one of said legs near the bottom of said U-shaped section; said U-shaped section being adapted selectively to receive securing means comprising a pair of resilient gaskets having portions cooperatively associated with respective ones of said opposed grooves for receiving a relatively thick panel element in said U-shaped section, and adapted selectively to receive securing means comprising a resilient gasket cooperatively associated with the opposed groove in said one of said legs and a glass stop cooperatively associated with

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said additional groove and with said opposed groove in the other of said legs for receiving a relatively thinner panel element in said U-shaped section.

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**UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION**

Patent No. 3,037,591

June 5, 1962

Lewis Laverne Pulling et al.

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 1, line 64, for "millions" read -- mullions --;
column 2, line 64, for "on" read -- an --; column 3, line 66,
for "gasket" read -- gaskets --.

Signed and sealed this 16th day of October 1962.

SEAL)

Attest:

ERNEST W. SWIDER
Attesting Officer

DAVID L. LADD
Commissioner of Patents