

May 23, 1961

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2,985,262

WALL PANEL

Filed Aug. 3, 1955

3 Sheets-Sheet 1

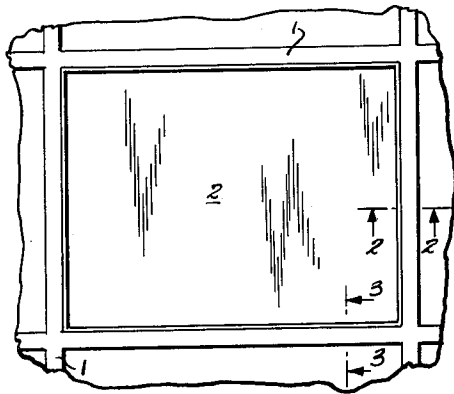


FIG. 1.

FIG. 2.

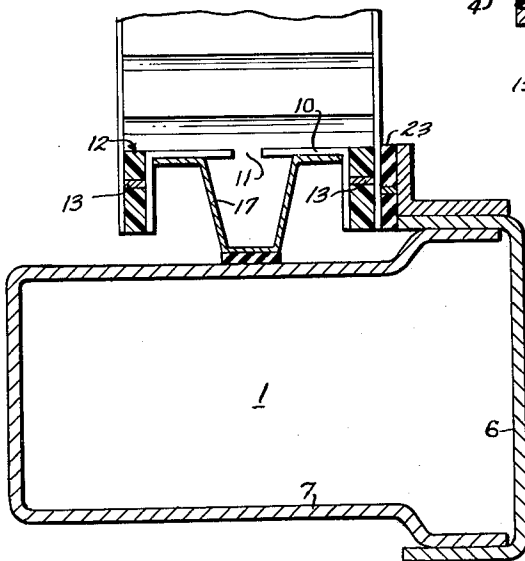
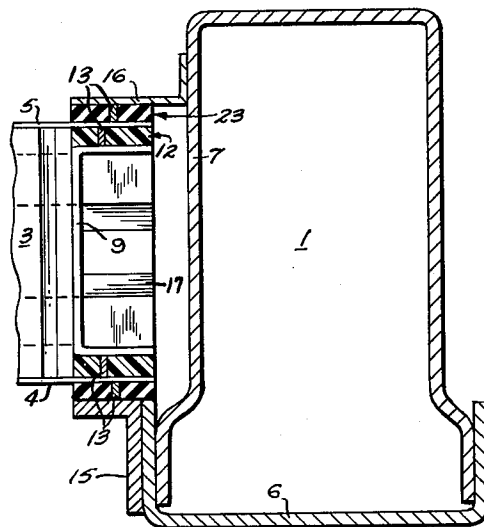


FIG. 3.

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3 Sheets-Sheet 2

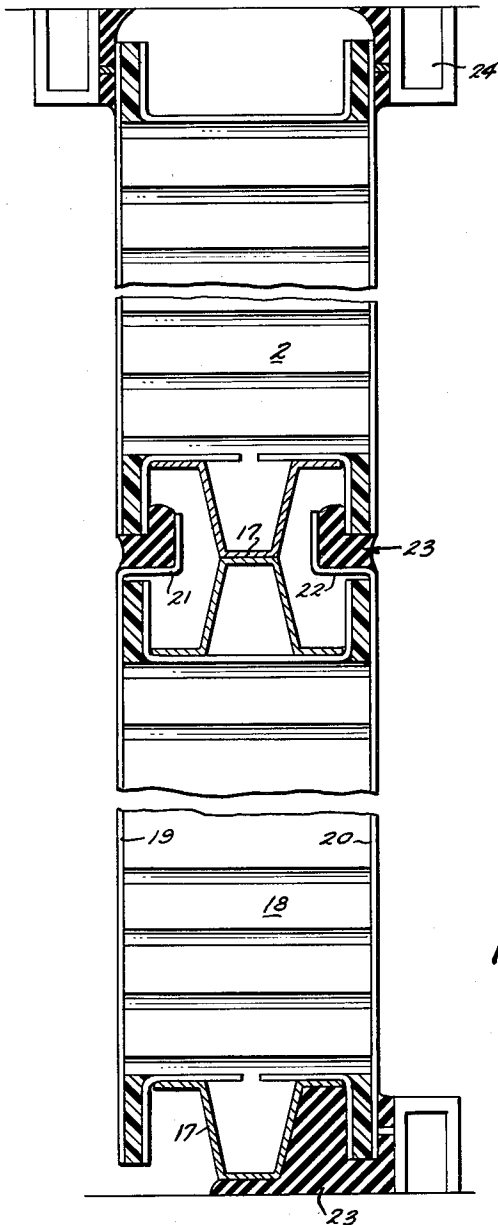


FIG. 3A.

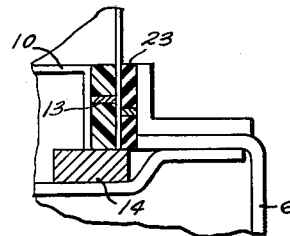


FIG. 5.

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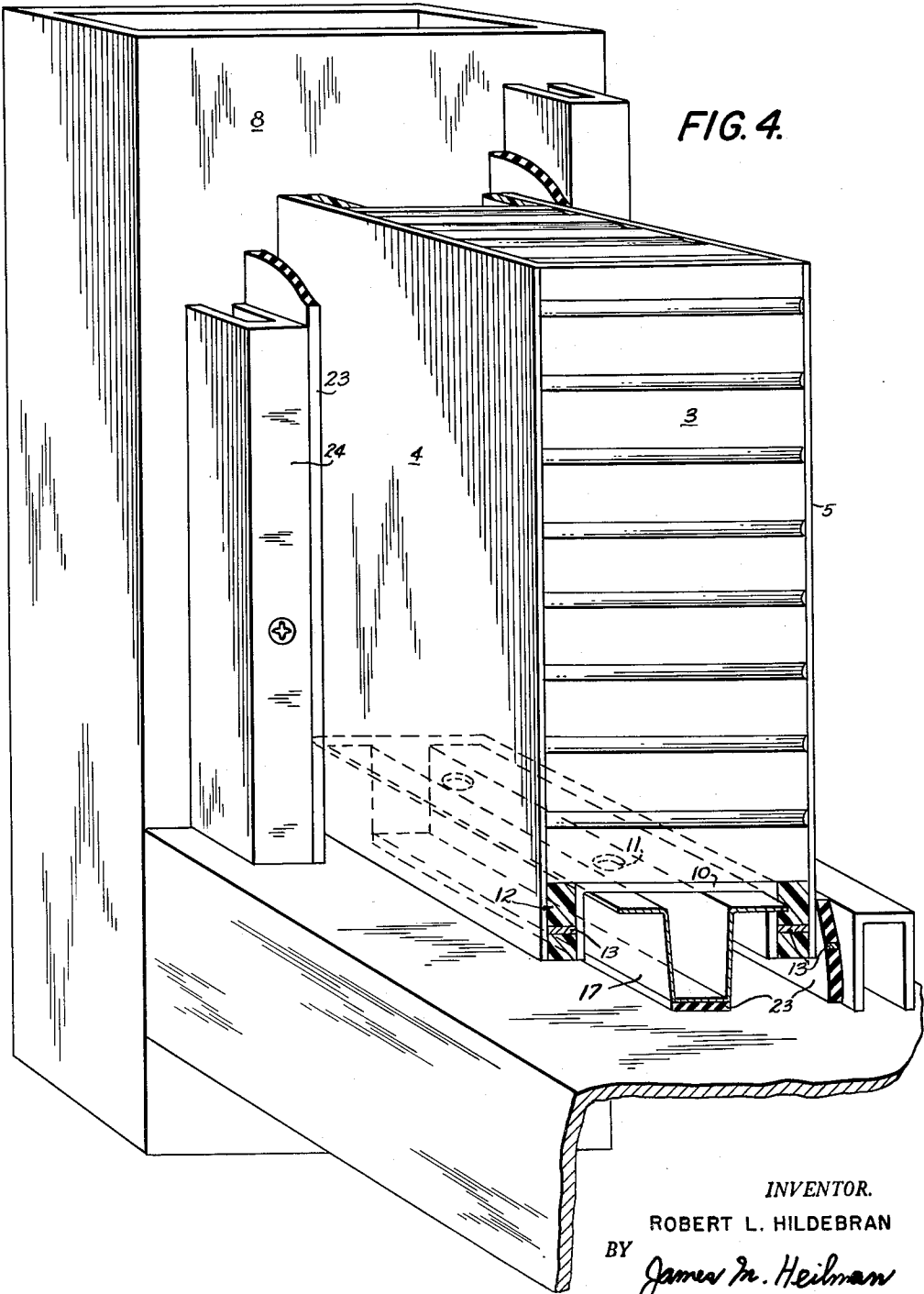
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3 Sheets-Sheet 3



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2,985,262

WALL PANEL

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10 Claims. (Cl. 189—34)

This invention pertains to a panel adapted for forming the outside surface of a building, either as the structural member itself as in a low building, or to be hung between columns and beams as in curtain wall construction.

Another object is to form a panel having a clean, decorative face which is common today in modern construction, the face being made of aluminum, stainless steel, porcelainized metal, embossed metal or other decorative face.

Another object of my invention is to provide metal-faced panels, having a honeycomb core, which are vented to the atmosphere for breathing purposes whereby internal pressure built up by changes in temperature will be relieved.

A further object of my invention is to provide a vented building panel in which an accumulation of moisture normally will be prevented, but if any accumulation does occur, the water droplets can drain to the outside thereby preventing an excess of moisture within the panel and thereby avoiding deterioration and delamination.

A still further object is to provide a panel which eliminates the former pan construction of the faces and by reason of the extended edges of the plain flat faces can be cut readily so that the tolerance in making the panels prior to setting them in the previously formed framework of the building does not have to be kept within close limits.

Another object is to eliminate a metal-to-metal contact between the inner and outer faces of the panel.

Other objectives will be apparent from a reading of the following description and claims.

With the foregoing and other objects in view as will appear from a reading of the following specification and claims, the invention resides in the novel arrangement and combination of parts and in the details of construction and process of installation hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention may be made within the scope of what is claimed without departing from the spirit of the invention. It will be further understood that my invention is susceptible of embodiment in many and various forms, some of which are illustrated in the accompanying drawings, and that the structural details and particular steps of the method herein set forth may be varied to suit particular purposes and still remain within my inventive concept.

Referring to the figures;

Fig. 1 shows the general environment of the panel in the framework of a structure such as in a large, multi-story building.

Fig. 2 is a cross-sectional view taken on the line 2—2 of Fig. 1.

Fig. 3 is a cross-sectional view taken on the line 3—3 of Fig. 1.

Fig. 3a is a view similar to Fig. 3 but showing a shim 14 of substantial dimensions at spaced intervals being used to support the panel instead of hat-shaped supporting member 17.

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Fig. 4 is a modified isometric and enlarged view wherein a different type framing system is used, i.e., different type frame members and different type positioning stops.

Fig. 5 is a further modified view showing two panels arranged within a single opening in the framework. In this construction, a different type head structure is provided at the top of the lower panel.

In Fig. 1, 1 indicates the framing or framework of a building into which panel 2 is positioned. Panel 2 comprises a honeycomb core or other type of grid core 3 and two faces 4 and 5.

The framework 1 may comprise two elements, such as, a U-shaped member 6, and an interfitting member 7, or may be in the shape of a boxlike structure 8 as shown in the modification of Fig. 4, or may be in various other shapes. Panel 2 is closed around three of its sides by a U-shaped channel 9. On the lower side of the panel, this U-shaped member 10 is provided with venting and drainage apertures 11, as shown in Figs. 4 and 5.

The preferred form of my invention is to join the foregoing channel members into a tight frame. This may be done by welding, brazing, or mechanically joining the members together. However, the various channel members may be individually positioned and later joined together after the panel has been assembled and cured. It is, of course, desirable that the joint at the corners be water-tight.

In assembling the panel 2, the channel frame assembly or the individual members 9—10 are positioned between the faces 4 and 5 by means of spacer blocks or shims 13. The channel members are sealed in this space by a heavy dark mastic 12 which is non-conductive of heat, is non-toxic and is resistant to water, weather, non-oxidizing acids and diluted alkalis. The type mastic which is used is very important, since it must have excellent temperature adaptability to withstand not only the movement of the metal components during normal weather conditions, but also during the fabricating process. It has been found that "Igas," a black non-meltable mastic, manufactured from refined asphalts, resins and plasticizing compounds reinforced with long fibered asbestos, is particularly suitable as a panel sealant.

In positioning the frame assembly or the channel members within the extending faces 4 and 5, spacers or shims 13 are used in order to place the channel equidistant from both faces and to prevent the mastic from being squeezed out from either side. Almost any type or dimension of shim structure can be used. For example, the shims can be in the form of round knobs having a diameter of from $\frac{3}{16}$ to $\frac{1}{4}$ " and a thickness of approximately like dimensions. These shims are spaced along the length of the panel and generally two or three on each side are sufficient. The dimensions of shims are subject to considerable variation.

The faces are bonded to the core normally under low pressure of the order of 1 to 5 pounds per square inch. Depending upon the particular adhesive used to bond the core to the faces, the range of temperature is between 175 to 325° F. The heavy mastic 12, preferably of low viscosity, is primarily a sealant and adds very little to the bonding strength of the panel.

After the panel proper is fabricated, it is positioned against the stops of the framework. These stops may be of L-shaped construction, such as indicated by 15 and 16 of Fig. 2, or of U-shaped construction, such as indicated by element 24 of Fig. 4. In setting the curtain wall panels in place a different type of moisture-resistant and flexible seal must be used for optimum results. This sealing compound should be a non-oxidizing, non-staining and non-toxic compound with good adhesion to building materials, such as aluminum, steel, porcelain enamel, etc., and must be softer than the panel mastic 12 to

insure that best sealing in the framing. I have found that "Weldflex," otherwise known as "Parflex #14" (indicated by numeral 23), a mixture of polyisobutylene, asbestos fibers and certain mineral fillers and titanium dioxide, is particularly suitable as a panel-to-frame sealant. This sealant 23 may be in the shape of individual ribbons as shown in Fig. 4, or may be packed to fill the entire area as shown in Fig. 5. Here again shims 13 are used to maintain a fixed distance between the faces of the panel and the stops.

As shown in Fig. 3a, two or three supporting blocks or shims 14 may be spaced along the length of the panel to raise the panel above the supporting framework and permit the panel to breathe without restraint. These shims may be small, for example, $\frac{1}{4}$ " x $\frac{1}{2}$ " x 2" in size, and may be made of hardwood, tempered hardboard, high pressure plastic laminate, etc. These supporting shims are made of the same material as shims 13, but obviously perform an entirely different function and therefore must be of considerable larger size. However, due to the danger that in a heavy rainstorm water may be blown beneath the outer edge of the panel and through the vents 11 into the panel, in my preferred construction, illustrated in Fig. 3, I use a combination supporting and covering or shielding member 17 and thereby dispense with supporting shims 14.

Referring to Figs. 3 and 4, there is provided a hat-shaped supporting member contacting the lower U-shaped channel member 10. The purpose of the supporting member is to shield or protect the venting apertures against any possible ingress of moisture even during hurricanes or other unseasonable weather conditions, and also to support the panel a fixed distance from the sill or frame member 6. The interior of the panel is at all times free to breathe through the vent 11 and support 17 to the outside atmosphere. There is thus provided a circuitous passage since the support 17 extends past the bottom horizontal channel member but stops short of the frame elements 1 and 8 (note Figs. 2, and 4, respectively) whereby an unobstructed passage is provided at the bottom of the panel at the two vertical edges thereof (note Fig. 3).

In certain construction, it is desirable to insert two panels between the framework 1. A construction of this type is shown in Fig. 5, wherein the lower panel 18 has the upper edge of its faces 19 and 20 bent inwardly to form a seat 21 and 22 for the upper panel 2. In this particular construction, there is no need for shims within the sealing compound 23 since the rigid supports 17 provide the predetermined spacing distance between the seat formed in the lower panel and the edges of the upper panel. The upper edge of the upper panel can be positioned by means of stop members 24 similar to the member illustrated in Fig. 4. Obviously, three or more panels arranged in a vertical direction could be provided.

It is thus seen that I have provided a new construction which while open to the outdoor atmosphere and permitting breathing during periods that excessive temperature develops within the panel, nevertheless, prevents rain from being blown up into the panel.

A very important feature of my invention is that the tolerance between the frame members providing the openings for the panel may vary within comparatively wide limits, thereby providing flexibility for installation. In other words, if the panels 2 will not fit normally within the framework 1 of the structure, the U-shaped channels 9 and 10, together with the ends of the faces, may be cut off on one side, or on three or four sides if necessary, and the width, height, or both, of the panels substantially reduced. This cutting of the edges of the panel will not affect the efficiency of the panel, since as long as the channel members 9 have a slight overhanging or extending edge which is satisfactorily sealed and shimmed, there will be no leakage of air or moisture into the interior of the panel. Thus it can be seen with the in-

creased use of porcelain enamelled, aluminum, and stainless steel faces on buildings, this invention has been a substantial contribution to the art, and particularly over the former pan type construction wherein both the pan type panels and the frame openings had to be held within close tolerances.

The major advantages obtained by my improved construction may be summarized as follows:

(1) Flexibility for installation as mentioned in the preceding paragraph.

(2) Maximum insulation qualities, i.e., metal-to-metal contact, which provides heat conductance, is eliminated.

(3) Dry interior of panel, i.e., sealed edges, exclude entrance of water which causes deterioration of bond and delamination between faces and core.

(4) Downspout provided by channels, i.e., if the panel is not sealed properly and leakage occurs between the framing and the panels, or in other joints in the wall structure, a gutter is provided by the upper channel member and a downspout effect by the side channel members.

(5) Ease of manufacturing panels, i.e., no special assembly tools, special press, or fixtures required.

(6) Clean-up of pressed panel eliminated, i.e., the edge sealant acts to prevent the flashing out of the face core bonding adhesive making final clean-up after pressing the panel unnecessary.

(7) Ease of carrying inventory, i.e., plain faces (as compared with former pan type construction) may be carried in stock as porcelain enamel aluminum and steel, and aluminized aluminum.

(8) Standard sheet sizes utilized, i.e., plain skins make possible maximum utilization of standard commercial sheet widths. In the past, panel dimensions with skins of pan construction have on occasion necessitated sheets of extra width which are difficult to obtain and more expensive.

(9) Minimum cost, i.e., uses simplified, standard type face, and standard rolled channel sections for edging. The use of a flexible edge sealant compound between the channels and the faces permits ordinary commercial tolerances for the channels to be acceptable since the give in the sealant at the necessary point overcomes variation in the channel width measured across the legs.

(10) Ease of shipping, i.e., plain faces are less susceptible to damage both when shipped as unassembled faces and also after assembly.

(11) Less susceptible to damage, i.e., as a rule, faces of pan construction are not flat, hence in the laminating process of making the panel, these distorted pans are forced into a flat condition developing stress concentrations which frequently result in the enamel coat fracturing from the base metal.

While I have illustrated and described my invention particularly with a honeycomb core, it could also be used in other types of cores, i.e., plywood, low density rigid plastics, etc. Also, while my preferred form of channel members and hat shaped supporting member is made of steel, aluminum or other metals, any structural materials which accomplish the aforesaid purposes may be used.

What is claimed is:

1. A curtain wall panel comprising a low density core material, a pair of air impervious faces secured to said core material, and a U-shaped channel member having elongated leg portions positioned on at least one edge of said panel and wholly within the length and width of said panel, said low density core being a reticulated web, the air impervious faces being made of metal, and the U-shaped channel members encircling the panel on all four edges, one of said channel members having at least one aperture therein whereby the interior of the panel may breathe upon differential changes in temperature between the interior of the panel and the ambient outside temperature and excessive interior panel pressures are avoided, sealing compound positioned between each

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of said faces and said U-shaped channel member, and shims embedded in said sealing compound to center said U-shaped channel member equidistant between said faces.

2. A curtain wall panel as set forth in claim 1, a support therefor, and means provided whereby the lower edge of the panel is elevated above said support.

3. A curtain wall panel as set forth in claim 2 in which said means comprise a shim placed beneath the lower edge of said panel.

4. A curtain wall construction as set forth in claim 2 in which said means comprise a hat-shaped supporting member positioned almost wholly within the U-shaped channel member and extending slightly beyond the area of the U-shaped member in the direction of the height of the hat section proper.

5. A curtain wall panel as set forth in claim 4 in which the hat shaped supporting member is longer than said U-shaped channel member and therefore extends beyond the confines of the U-shaped channel member in a horizontal direction.

6. In a steel structure involving horizontal and vertical framing members, a curtain wall panel having U-shaped channel members encircling the panel member, one of said U-shaped channel members having an aperture therein so that excessive interior pressure in the panel may be freely relieved to the outside atmosphere, a hat-shaped supporting member positioned almost wholly within the U-shaped member, said hat-shaped member having substantially vertical walls spaced from the walls of the U-shaped channel member and resting on said horizontal framing member whereby the edge of said panel is elevated from the supporting structure.

7. In a steel structure involving horizontal and vertical framing members, a curtain wall panel having a core and two metal faces, U-shaped channel members encircling the panel member, one of said U-shaped channel members having an aperture therein so that excessive interior pressure in the panel may be freely relieved to the outside atmosphere, a hat-shaped supporting member positioned almost wholly within the U-shaped member, said hat-shaped member resting on said horizontal framing member whereby the edge of said panel is elevated from the supporting structure, metal stops used to position said panels between openings formed by said horizontal and vertical framing members, a mastic forming a seat between said panels and said stops, and shims embedded in said mastic to limit the movement of said panels and prevent the mastic from being forced out.

8. In a structure as set forth in claim 7 in which the edge of said metal faces and the ends of said U-shaped channel members extend beyond the area covered by said core whereby the edge and ends may be cut off on the site without damaging the panel and thereby be fitted within the horizontal and vertical framing members thus making close plant tolerance unnecessary.

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9. In a structure as set forth in claim 7 in which the upper and side U-shaped channel members are solid, non-perforated sheet metal so as to provide a gutter at the top of said panel and downspouts at the sides thereof, said downspouts leading directly to the outside for any water leakage past said mastic, and said hat-shaped supporting element covers and protects the interior of the panel from water being blown therein while at the same time providing a circuitous passageway for air into and from the interior of the panel to the outside.

10. In a steel structure involving horizontal and vertical framing members, a curtain wall panel having U-shaped channel members encircling the panel member, one of said U-shaped channel members having an aperture therein so that excessive interior pressure in the panel may be freely relieved to the outside atmosphere, a hat-shaped supporting member positioned almost wholly within the U-shaped member, said hat-shaped member having substantially vertical walls spaced from the walls of the U-shaped channel member, and resting on said horizontal framing member whereby the edge of said panel is elevated from the supporting structure, a second hat-shaped supporting member on the upper side of said panel member, the upper end of said panel member having an inwardly extending edge forming a seat, a mastic in said seat, a second curtain wall panel member positioned in and partially embedded in said mastic in said seat, and said second wall panel member positioned a predetermined distance above the edges of said first named curtain wall panel member by means of said cooperating hat-shaped supporting members, whereby to prevent the mastic from being forced out between said curtain wall panel members and thereby providing a moisture-proof seal between said abutting panel members.

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