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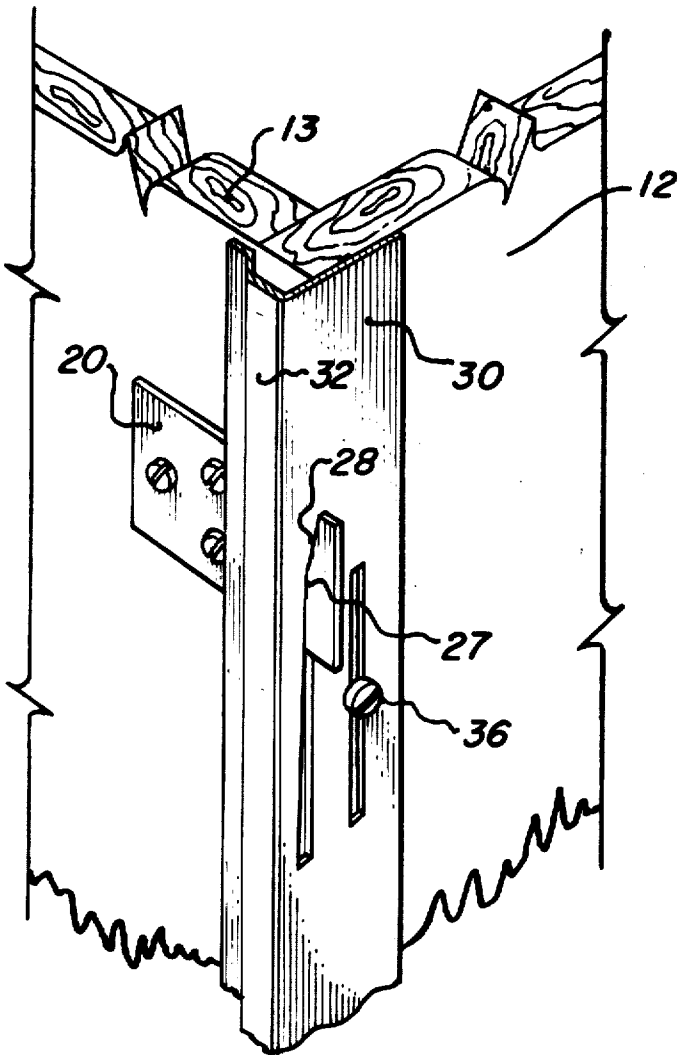
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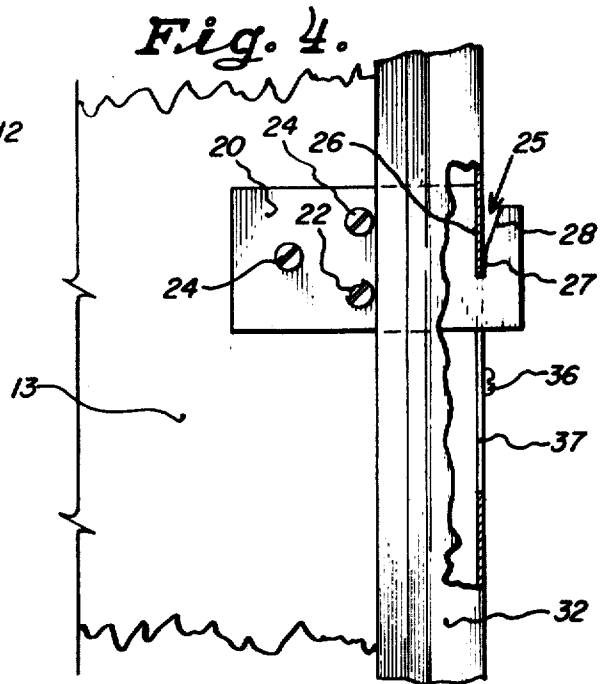
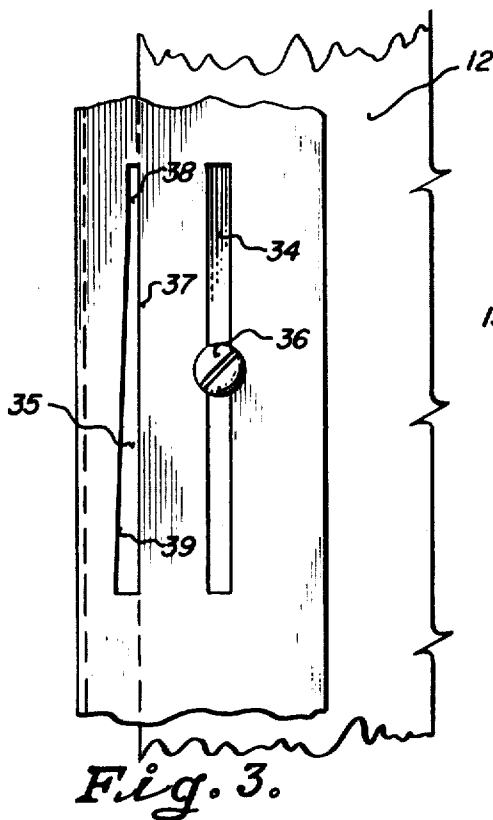
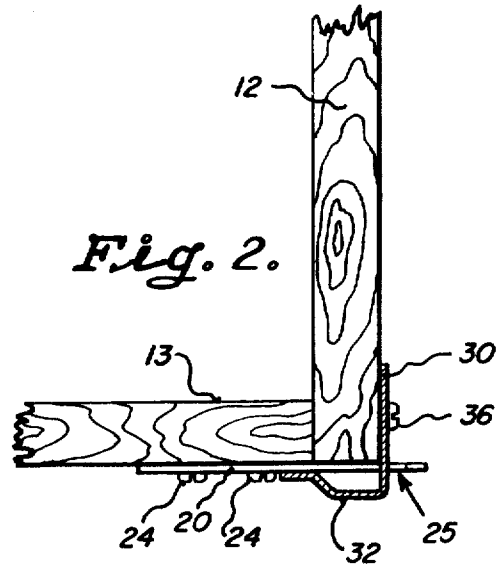
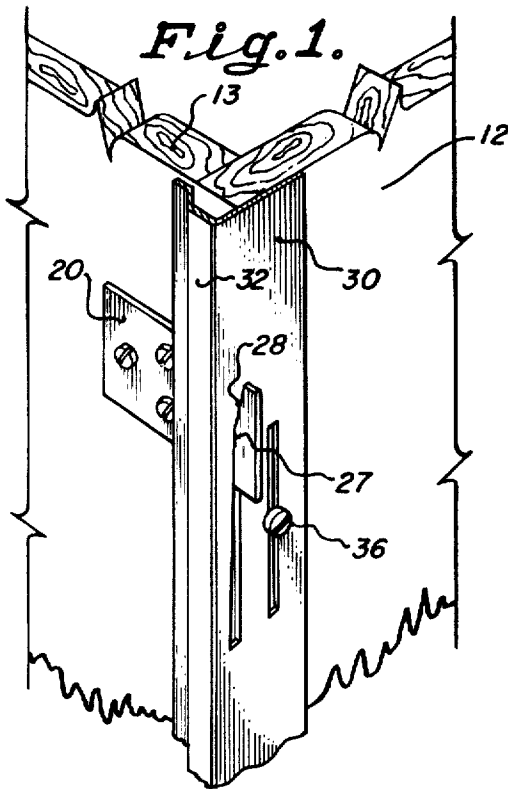
[54] **PANEL JOINING STRUCTURES**  
**12 Claims, 6 Drawing Figs.**

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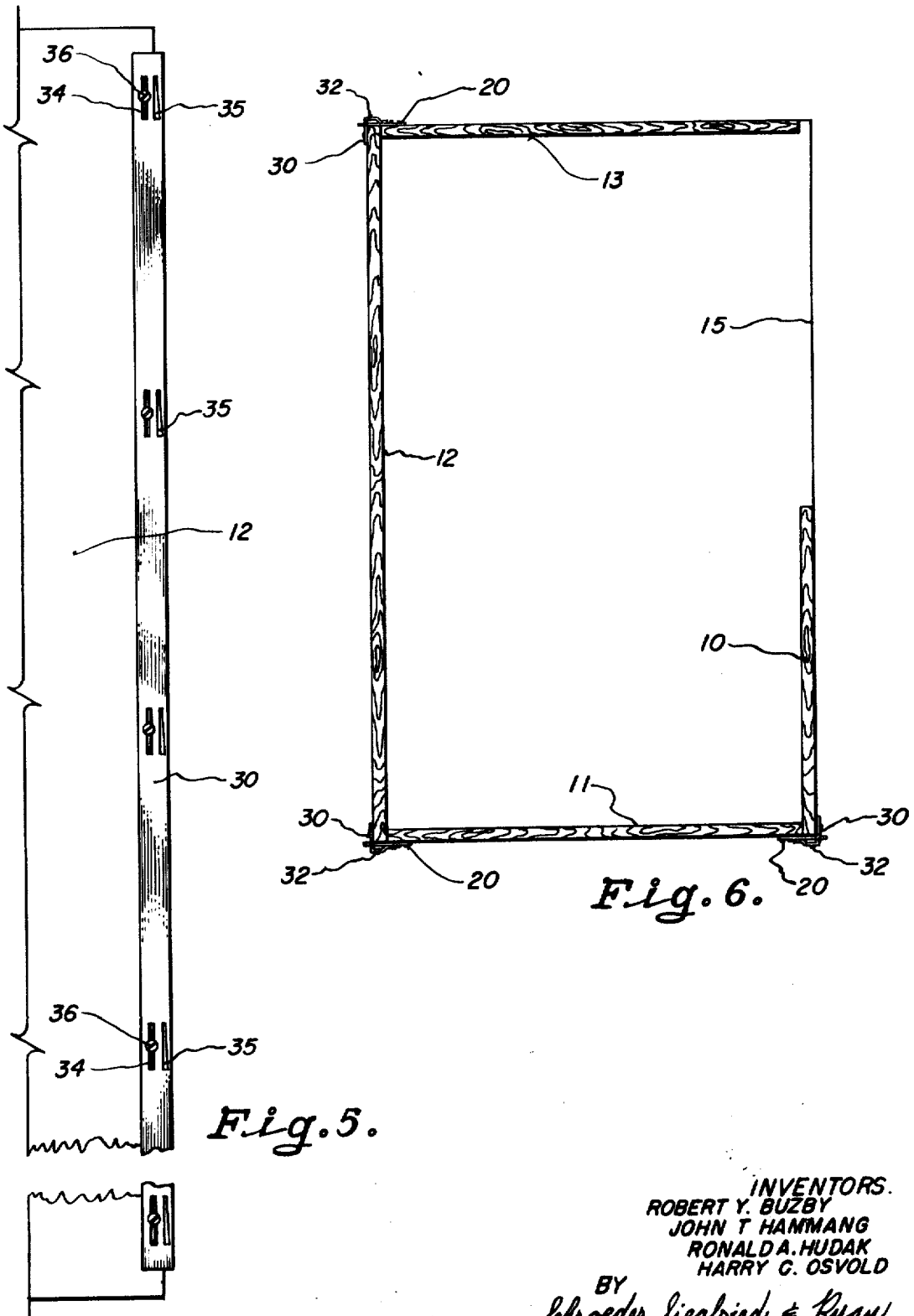
**ABSTRACT:** An improved panel joining structure for panel assemblies of the modular-type to facilitate construction or assembly of the panels. The structure includes flange members mounted on the side edge of a panel to be connected to another panel in a normal or perpendicular relationship. The flange members each include a camming notch therein with a straight portion for locking of the structure in assembled relationship. The panel to be joined has an elongated locking member extending along the extent of the side of the panel with a plurality of pairs of slots therein, one slot of each pair having a camming surface thereon adapted to fit over the slotted camming surface in the flange members and move the panels to assembled relationship. The second slot of the pair is a straight sided mounting slot permitting the locking member to be slidably moved on the panel being joined.





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*Fig. 5.*

*Fig. 6.*

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## PANEL JOINING STRUCTURES

Our invention relates to panel assemblies of the modular type and more particularly to an improved panel joining structure to facilitate construction of such units.

In the past, modular units have taken a variety of forms and construction methods with a variety of couplings or structural connections for holding the sections of the modular units in assembled relationship. Normally such structures are enclosures formed from prefabricated sections which are erected in situ. Such structures normally require accessibility from either side of the same to complete assembly and in most instances coupling connections for the same are exposed on the interior of the enclosure. None of the prior constructions are particularly adapted for assembly of modular units, such as elevator cabs, when the construction space is limited and the units are to be constructed or assembled from a position within the enclosure they will define while at the same time providing for all of the structural connections to be positioned on the exterior surface of the panel sections forming the same and insuring positive tight connections between joints of the panels.

In the present invention, an improved panel joining assembly is provided which is particularly adaptable for the construction of elevator cab assemblies. It provides for the mounting of coupling units on the exterior surface of the panels forming the walls of the assembly and the positioning of the panels into desired locations in situ with a coupling of the joining structures in a final assembly insuring positive clamping connections to eliminate warpage and a resultant rigid structure wherein the joining structures or couplings are positioned exterior of the enclosure defined by the panels. In the present invention, a plurality of flange members are adapted to be so positioned in spaced relationship on certain of the panels to be connected or joined, and a locking member is so positioned on the other panel to be joined with each of said members having slots or notches therein with cam surfaces thereon which permit connection of the panels at wall joints, normally perpendicular to one another, with a camming action to draw the panels together to eliminate warpage and to provide a smooth rigid coupling surface with the connection members on the exterior of the panels. The assembly takes place by sliding the locking member relative to the panels and the flange members to perform the camming action, as will be hereinafter defined.

Therefore it is the principal object of this invention to provide an improved panel joining assembly or structure.

Another object of this invention is to provide in an improved panel joining structure an arrangement which permits assembly of panels to form an enclosure in situ with the coupling parts positioned on the external surface of the panels remote from the interior of the enclosure.

Another object of this invention is to provide an improved panel joining structure in which assembly of the parts can take place from the interior of the enclosure and the clamping of the panels in assembled relationship be effected by moving one of the parts from above to clamp the panels in assembled relationship.

A further object of this invention is to provide a panel joining structure which is simple in design, low in cost and which permits ease in assembly in situ.

A still further object of this invention is to provide an improved panel joining assembly or structure particularly adapted for the use of assembly of elevator cabs.

These and other objects of this invention will become apparent from reading of the attached description together with the drawings wherein:

FIG. 1 is a fragmentary perspective view of a portion of the panel joining structure,

FIG. 2 is a top elevation view of the same,

FIG. 3 is an enlarged elevation view of a portion of the panel joining structure,

FIG. 4 is an enlarged elevation view of the panel joining structure, with parts broken away, showing the relationship of parts,

FIG. 5 is an elevation view of the locking member of the panel joining structure mounted on a panel, and

FIG. 6 is a top view of a panel enclosure utilizing the panel joining structures.

Our improved panel joining structures for constructing a panel assembly or modular unit is shown in the drawings as being applied to join panels in an abutting relationship normal to one another wherein the edge of one panel overlaps a side surface of another panel to which it is to be joined at the end of the same. A typical modular unit or enclosure is shown in FIG. 6 to simulate the wall structure of an elevator cab wherein a plurality of panels form the sidewalls of the enclosure with an access opening therein over which would be mounted a conventional door closure. Thus, as will be seen in the drawings, a plurality of panels 10, 11, 12 and 13 would be joined together at their ends with certain of the panels having edges abutting the end surface of the adjoining panel to which it is to be connected. Such panels would be generally rectangular or square with a uniform thickness and would have straight sides, top and bottom edges. In addition, such panels would normally be finished on one surface only which would form the interior of the enclosure. In the assembled relationship, the panels forming the walls will be drawn together in a substantially seamless or gapless joint providing positive location of the panels relative to one another in a locked rigid connection therebetween.

The improved panel joining structures which provide for such assembly will best be seen in FIGS. 1-5 respectively. In these views, fragmentary portions of the individual panels are shown and portions of the connecting parts to disclose the shape and relationship of the same are included. Thus in FIGS. 1 and 2, the corner formed between panels 12 and 13 in FIG. 6 is shown in perspective and top view with the face side of panel 12 having abutted thereto the edge of the panel 13. Attached to the back sides of the panels, as seen in the perspective view, are the connecting members which include a plurality of flange platelike connecting members 20 and an elongated locking member or bar 30. As will be seen in the drawings the platelike flange members include a plurality of mounting apertures 22 therein through which screw means 24 secures the same to the back side of a panel. The flange members are generally rectangular in form having a notch, indicated generally at 25, at the opposite extremity of the same with the notch having a straight line surface 26 extending from one edge of the same toward the middle of the platelike member and with the notch being further defined by a second straight lined portion 27 parallel thereto and spaced therefrom to define a straight portion of the notch and terminating with a surface 28 at an acute angle thereto defining a cam surface for the notch with the upper tip of the flange member being removed, for purposes to be later noted. The angle or taper of the side 28 with respect to camming action will move a cooperating surface toward the straight side 26 and the notch formed between sides 26, 27 or the straight portion of the notch for locking purposes and to eliminate the effect of panel warpage.

A plurality of flange members 20 are mounted on the backside of one of the panels in spaced relationship with a predetermined spacing therebetween. Further, they are positioned on the straight sides or edges of the panels such that the notch formed therein will be positioned a predetermined distance from the edge of the panel to which it is attached. This distance is the thickness distance of the panel to be joined thereto when the overlapping joint is as shown in FIG. 1. Thus the straight side 26 of the notch will align with the backside of the panel 12 in final assembled relationship to provide a joined surface in which no gap appears between the panels along the extent of the same.

The locking member 30 is an elongated platelike member having a flat surface adapted to fit against the back of a panel and be slidably mounted thereon and with a portion or extremity bent normal thereto, such as is indicated at 32. It includes along its extent a plurality of pairs of slots each pair having a straight side mounting slot 34 and a tapered or flared slot 35 of the same length positioned parallel to the same. The

spacing between the pairs of slots coincides with the spacing between the mounting of the flange members 20 on the panel to be joined thereto and the mounting slots are so positioned on the straight portion and are of such dimension that a mounting screw may be positioned through the same, such as is indicated at 36, to slidably mount the locking member on the backside of a panel. The locking slot 35 has a straight side 37 with a portion of the slot having a second straight side spaced therefrom as indicated at 38 to provide a straight portion for the locking slot and an inclined side 39 at an acute angle thereto providing a camming surface such that the opposite end of the slot will have a width dimension at least twice the width dimension of the straight portion thereof. Further, the camming side will be in such a direction as to move the flange member 20 which is adapted to be positioned therethrough in a direction toward the straight portion as the locking member is slidably positioned on the back of a panel. The locking members are positioned on the backside of a panel such that the straight side or edge 37 of the slot 35 will be substantially aligned with the edge of the panel to which it is mounted and will maintain such alignment to eliminate warpage as the locking member is moved longitudinally with respect to the panel.

In FIG. 5 it will be seen that the plurality of pairs of slots positioned in the locking member 30 are spaced along the extent of the same and that the locking member is of such dimension as to be substantially equal to the height or length of the side or edge of the panel to which it is attached. It will be mounted thereon such that the locking member may be elevated so that the upper extremity of the same is exposed above the end of the panel and such that it may be forced downward such that the extremities of the same will align with the edge of the panel for the locked position.

The actual mounting of the flange members and the locking member on panels will be effected by predrilling of the panels to a particular dimension through jiggling or accurate location of the drill holes and the mounting of the same; hence that the panel joining parts will accurately align with the edges and surfaces of the panels to be joined such that when the parts are positioned in cooperating relationship a smooth abutting joint will be obtained. It will also be evident from the drawing that the width dimension of the straight portions of the slots will be such as to be substantially equal to the thickness of the flange member 20 and the locking member which are normally made of the same gauge metal. Further the locking member will be mounted on the back of a panel with the screws advanced into the panel to a point where the locking member may be slidably moved thereon under friction and accurately maintained thereon.

The panel joining structures in the form of the flange members 20 and the locking member 30 will normally be preassembled on the rear sides of the panels forming the walls of the enclosure in a predetermined manner, depending upon the abutting relationship of the respective panels. In the assembly of an elevator cab within an elevator shaft, the surrounding area in the shaft prevents working from the backside of a panel and consequently the cab assembly is put together on a base or floor of the elevator by locating panels in position and connecting the same to one another from the face side thereof, or the interior of the enclosure. Thus, for example, as shown in FIG. 6, the backwall 12 or that wall opposite the access opening 15 of the cab will be first positioned on the floor of the elevator and located thereon. It will have the locking members 30 mounted on the sides of the same and with the locking members moved such that the upper extremity of the same will project above the top of the panel. The sidewalls 13 or 11 would then be introduced with the flange members projecting from the edge or beyond the edge which is to abut against the facing surfaces of the back panel 12 and the panels will be moved toward one another with the flange members 20 positioned through the slots 35 in the locking member. The length of the slots 35 and 34 will normally be at least as long as the flange members are wide so that the notched extremity

may fit into the slot 35. With all of the flange members on the backside of the panel to be joined to the panel having the locking member thereon positioned through the slots adjacent the same to a point where the notched surface 25 is exposed in the flange members, the locking member may be moved downwardly causing the tapered or cam surfaces of the notch and slots to engage the surface of the opposite member and urge the panels toward a position of alignment overcoming any warpage wherein the edge of the one panel will abut the surface of the other in a 90° corner with no gap therein. The locking member will normally be urged down against the frictional forces of the screws 36 holding the same through suitable means, such as by hammering, causing the panels to be drawn into a tight abutting relationship defining the corner or joint between the two panels of the assembly. The locking member will be moved such that the straight portions of the respective notches and slots will coincide and fit together at which position the ends of the slots will contact with the ends of the notches to provide a locked joint. In this portion or relationship, the contacting sides are straight or parallel to the surfaces adjoined so that no force would be applied to separate the members. As will be seen in the drawings, the inclined surface 39 causes the panels to be moved into alignment so that the back of the panel 13 aligns with the edge of the panel 12 and the inclined surface in the notch 28 will bring the panel 12 against the edge of the panel 13 in abutting relationship thereto. The straight portions are aligned with the respective edges of the panels so that in the locked position the panels are joined in a perfect gapless joint with the connecting hardware being positioned external of the interior of the enclosure. The locking members may then be secured by tightening at least one of the screws 36 accessible from the top of the panel. It will be understood, however, though not shown, that other locking braces at the top and the bottoms of the panel will secure the enclosure to the floor and may provide cross bracing between the tops of the panels. The additional wall sides are assembled in the same manner with the panels being located relative to one another from the inside of the enclosure and the panels moved to a locking relationship through movement of the panel joining structure or the locking member relative to the flange members 20 to bring the panels into abutting relationship.

In considering this invention it should be remembered that the present disclosure is illustrative only and the scope of the invention should be determined by the appendant claims.

What panel-joining is:

1. A panel joining structure comprising; at least a pair of panel structures having straight sides and adapted to be secured to one another along the edges of the straight sides in a normal relationship with respect to one another, a plurality of spaced platelike flange members mounted on the edge of one of the panels with each flange member having a portion projecting beyond the edge of the panel, said portion of said flange member projecting beyond the edges of the panel having a notch therein with a straight sided portion and an outwardly tapered portion terminating at an edge of the flange member, a single-locking member slidably mounted on the edge of the other of the straight sided panel structure to be joined with the edge of said one of said panel structures and having a portion projecting beyond the edge of said other of said panel structures, said locking member having a plurality of slots in the portion projecting beyond the edge of the panel structure which slots are spaced apart the same distance as the spacing between the flange members on said one of said panels, said slots having straight-sided portions and an outwardly flared portion, said locking member and said flange members being positioned on the respective panel structures with the locking member being adapted to be fitted over the flange members on said one of said panels and moved until the straight sided portions of the slots and the notches in the flange and locking members contact such that the panel structures abut and eliminate warpage therebetween.

2. The panel-joining structure of claim 1 in which the panel structures are plural in number each having straight sides, top and bottom with uniform thickness, and in which certain of said panel structures have flange members mounted thereon while other of said panel structures to be connected thereto having locking members thereon and positioned at the edges of the same.

3. The panel-joining structure of claim 2 in which the adjacent panels are positioned in an overlapping relationship and perpendicular to one another with the edge of one panel being positioned in abutting relationship with an end surface of the adjacent panel and with the panel structures forming walls of a plural sided enclosure having an access opening therein with the locking members and the flange members attached to the individual structures being positioned external of the enclosure.

4. The panel-joining structure of claim 1 in which the straight portions of the notches and the slots in the flange members and the locking member have a width dimension equal to a thickness dimension of the flange member.

5. The panel-joining structure of claim 1 in which the tapered portions of the notches and the slots in the flange members and the locking member have a surface aligned with the edge of the straight portion of the notches and slots and a surface inclined at an acute angle thereto to provide a camming action between the flange members and the locking member urging the panels connected thereto for relative movement toward one another.

6. The panel-joining structure of claim 1 in which the locking member is slidably mounted on a panel by means of a plurality of screw means extending through a plurality of slots in the locking member.

7. The panel-joining structure of claim 1 in which the locking member has a plurality of pairs of spaced slots therein one slot of each pair having straight sides throughout and one slot of each pair having the tapered and straight portions with the pairs of slots being spaced along the extent of the locking member in the same spacing as the flange members are positioned on the panel structure to which the panel structure carrying the locking member is to be attached.

8. The panel-joining structure of claim 7 in which the locking member has a length dimension substantially equal to a height dimension of the panel structure to which it is attached.

9. The panel-joining structure of claim 8 in which the locking member is slidably attached to a panel structure and the edge of the same remote from the attached portion is bent normal to the extent of the attached portion to fit around a

flange member and contact a surface of the same.

10. A panel-joining structure adapted to connect panels having straight sides and which are to be secured to one another along the edges of said straight sides with an edge in overlapping relationship with a side surface of a panel along the end of the same comprising, a plurality of platelike flange members adapted to be mounted along the edge of one of the panels with each of the flange members having a camming notch therein, an elongated locking member adapted to be slidably mounted on another of the panels along the edge of the same and having a plurality of slots therein with each slot having an inclined camming surface thereon, said locking members being adapted to be positioned on one of said panel structures and over the flange members when said locking members and said flange members are attached to the edges of panels such that the slots therein cooperate with the notches in the flange members to cam the panels toward one another and lock the same in abutting relationship to lock said panel structures in abutting and nonwarping relationship.

11. The panel-joining structure of claim 10 in which the slots and notches in the locking member and the flange members have straight locking portions joining the camming surfaces which are adapted to be aligned with a surface of the respective panels opposite that to which the flange members and locking member are attached when mounted on the panel.

12. A panel-joining structure comprising; at least a pair of panel structures having straight sides and adapted to be secured to one another along the edges of the straight sides in a normal relationship with respect to one another, a plurality of spaced platelike flange members mounted on the edge of one of the panels with each flange member having a portion projecting beyond the edge of the panel, said portion of said flange member projecting beyond the edges of the panel having a notch therein with a straight side and an outwardly angled side terminating at an edge of the flange member, a single-locking member slidably mounted on the edge of the other of the straight sided panel structure to be joined with the edge of said one of said panel structures and having a portion projecting beyond the edge of said other of said panel structures, said locking member having a plurality of slots in the portion projecting beyond the edge of the panel structure which slots are spaced apart the same distance as the spacing between the flange members on said one of said panels, said slots having a straight side and an outwardly angled side, said locking member being adapted to be fitted over the flange members on said one of said panels and moved until the straight sides of the slots and the notches in the flange and locking members contact.

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