Jan. 3, 1967 J. B. GRIFFITH ETAL 3,295,283

PANEL STRUCTURE AND FRAME MEMBER THEREFOR

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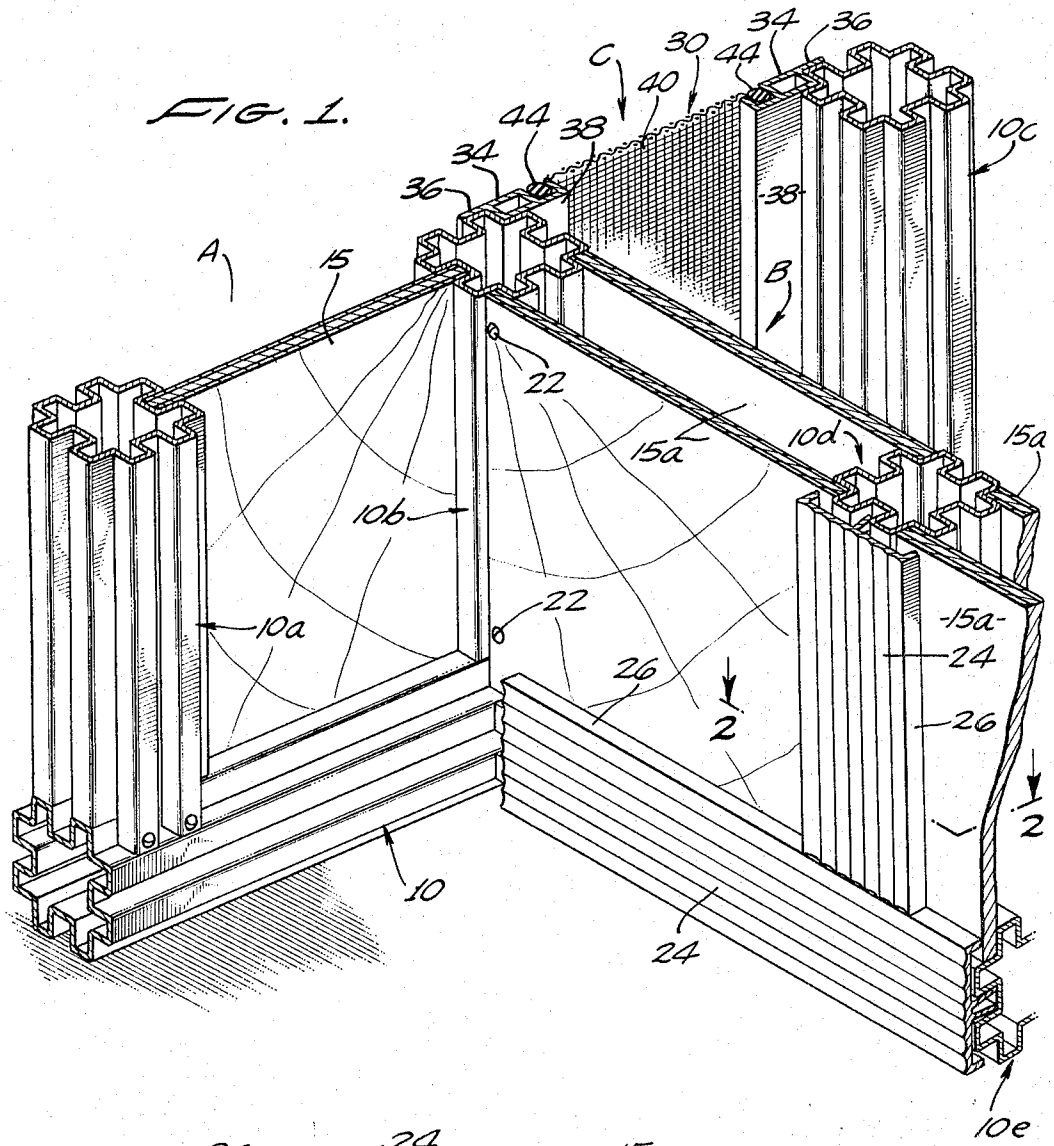
FIG. 1.



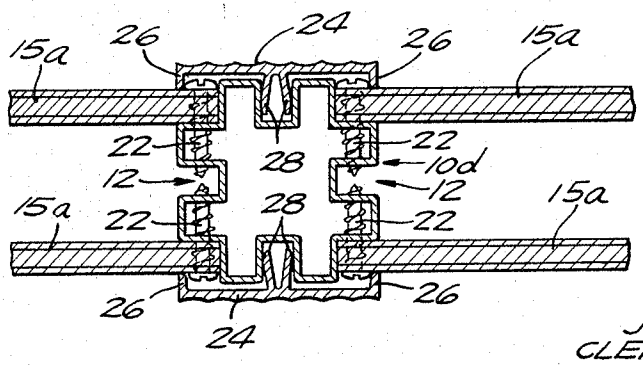


FIG. 2.

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PANEL STRUCTURE AND FRAME MEMBER THEREFOR

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FIG. 3.

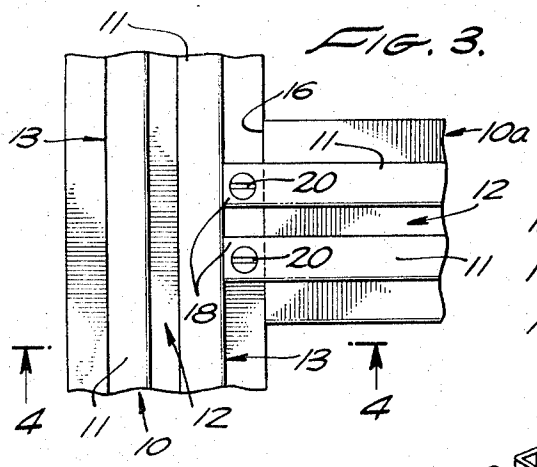


FIG. 4.

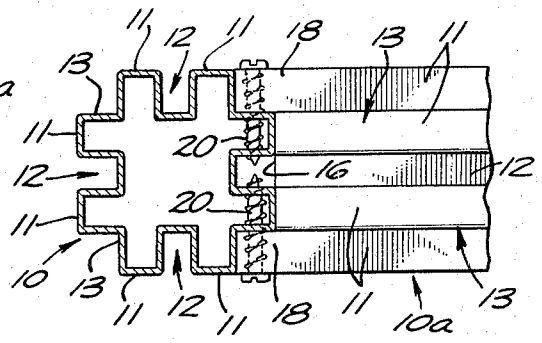
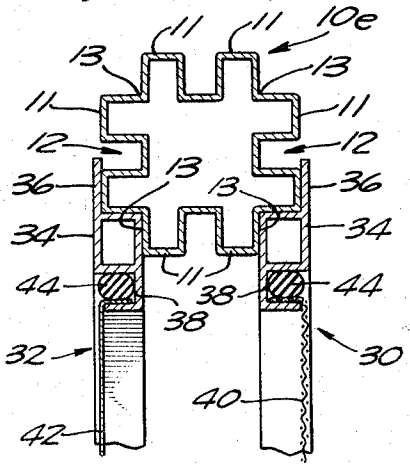


FIG. 5.



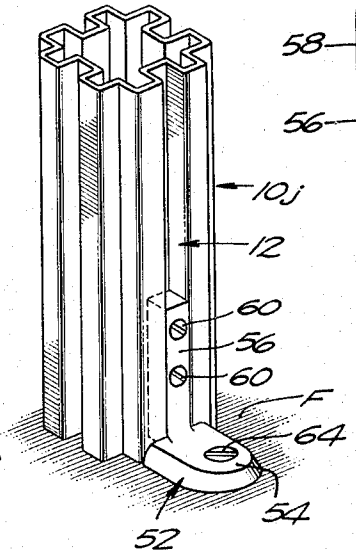


FIG. 8.

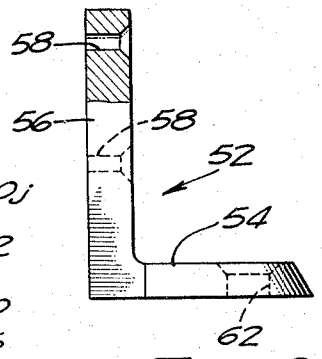


FIG. 9.

FIG. 6.

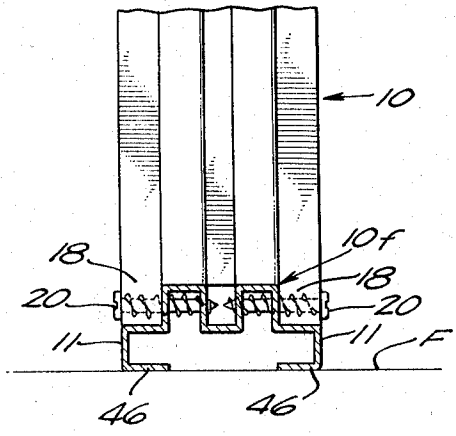
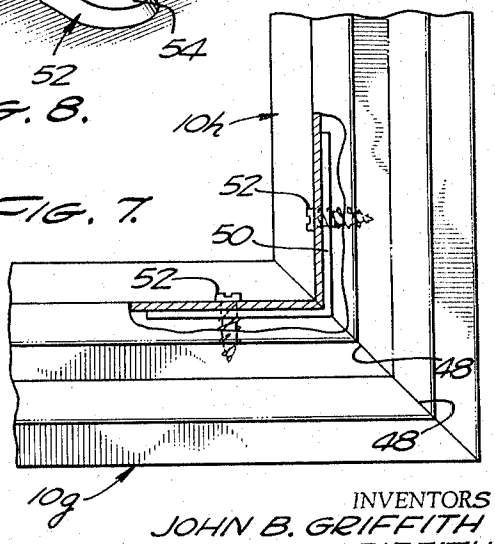


FIG. 7.



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PANEL STRUCTURE AND FRAME MEMBER THEREFOR

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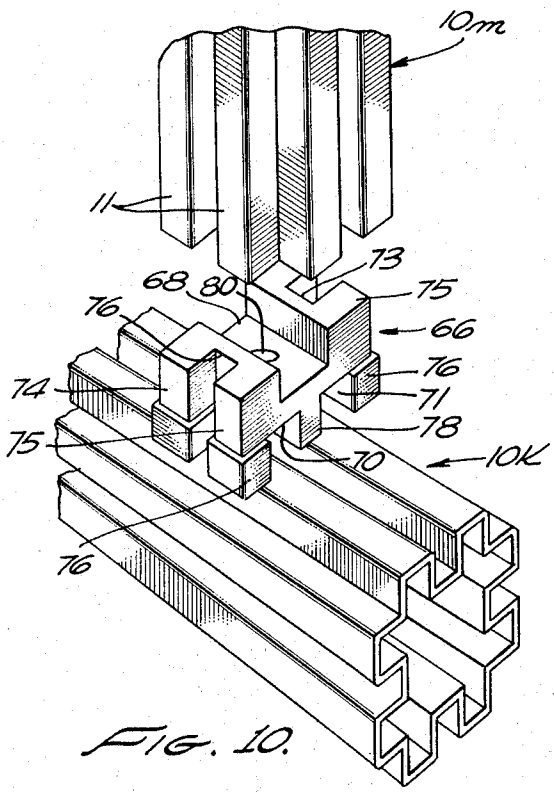


FIG. 10.

FIG. 12.

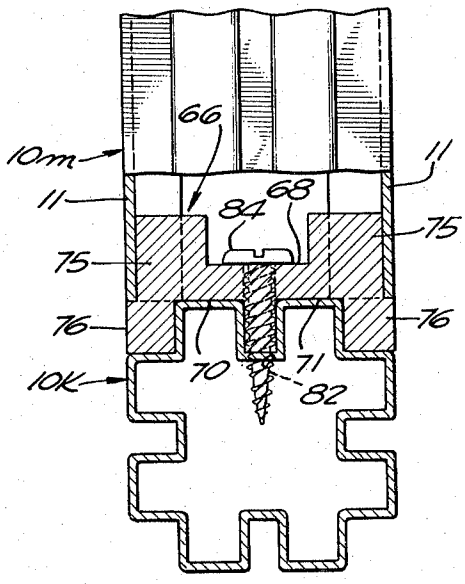
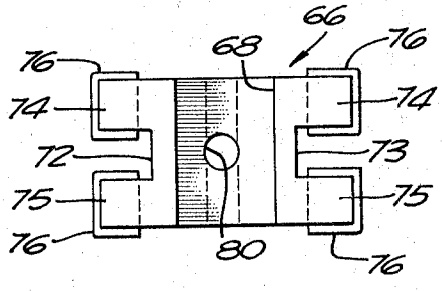


FIG. 13.



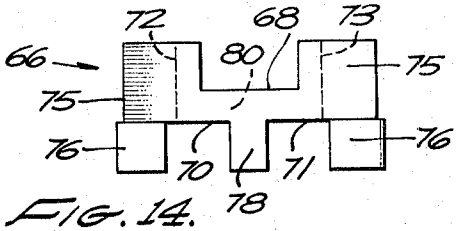


FIG. 14.

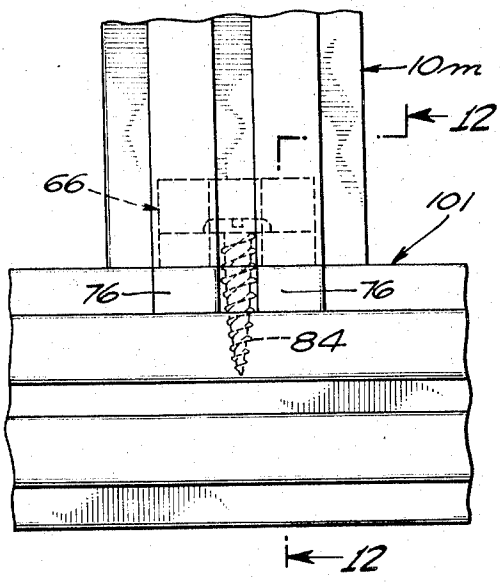


FIG. 11.

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3,295,283

PANEL STRUCTURE AND FRAME MEMBER THEREFOR

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Filed Dec. 24, 1963, Ser. No. 333,099

7 Claims. (Cl. 52—475)

The present invention relates generally to panel structures, and more particularly to a post member of novel configuration which can be used in conjunction with rectangular panels of plywood, plastic, framed insect screening, and the like, to construct curtain walls or partitions, screened patios, room enclosures, wind screens, pool fences, room dividers, and various other structures.

The primary object of the invention is to provide a partition, or wall, consisting primarily of post members and prefinished flat panels, which can be erected quickly on the job with a minimum of disturbance, and which results in a finished partition or wall that is attractive in appearance, extremely strong and rigid, and of relatively low cost compared to comparable structures of conventional construction.

Another object of the invention is to provide an extremely versatile metal post member that can be joined together with other like members in a variety of different ways, using only sheet metal screws and a minimum of connecting brackets or fittings, thereby forming a structural framework to which rectangular panels of plywood, plastic, chipboard, etc., may be attached to complete a wall or partition of great strength and rigidity. These same post members may also be joined together to form an open framework into which frames of insect screening may be inserted for the purpose of making a screened patio enclosure, or into which other frames of transparent or translucent plastic or glass may be inserted to form a windbreak for exposed patios or swimming pools.

Because of the ease and speed with which the structural post member of the present invention and prefinished panels of plywood or the like may be pre-cut at the shop and then assembled on the job with a minimum of noise and distraction, and the versatility of the construction method involved, the invention lends itself particularly well to making privacy partitions or dividing walls for office buildings, where the construction work must be accomplished quickly and with a minimum of disturbance.

Another object of the invention is to provide a panel structure of the class described which can be disassembled and reassembled, without damage to the component parts thereof.

A further object of the invention is to provide wall or partition construction embodying post members of novel configuration and using, alternatively, either a single flat panel mounted centrally between the sides of the post members, or spaced-apart, double panels mounted on the post members adjacent the side edges thereof.

Another object of the invention is to provide a structural post member of the class described which is adapted to be assembled with other like members to form a framework into which rectangular panels of plywood or the like are inserted to form a wall or partition, and which is also adapted to receive a snap-on cover plate that covers the exposed side of the post member and the adjacent edge of the panel, including the heads of any screws used to attach the edge of the panel to the post member.

Still another object of the invention is to provide a structural post member which is extremely strong in compression and torsion, and when combined with panels of plywood or the like, produces a completed wall or partition of great strength and rigidity.

These and other objects and advantages of the present invention will become apparent to those skilled in the art upon consideration of the following detailed description of the preferred embodiment thereof, reference being had to the accompanying drawings, wherein:

FIGURE 1 is a fragmentary perspective view of a section of a building structure, showing various ways in which the structural post member of the invention can be used with one or two panels of different types of materials, to make walls or partitions for various purposes;

FIGURE 2 is a sectional view, taken at 2—2 in FIGURE 1;

FIGURE 3 is a fragmentary elevational view of a detail, showing how one structural post member can be brought in at right angles to another similar member, and attached thereto by screws;

FIGURE 4 is a sectional view taken at 4—4 in FIGURE 3;

FIGURE 5 is a cross-sectional view through one of the structural post members of the invention, showing how it may be used with both an insect screen and storm window;

FIGURE 6 is a cross-sectional view, showing a vertical post connected into a horizontal base member formed by ripping one of the structural posts of the invention lengthwise;

FIGURE 7 is a partially cut-away elevational view of a mitered corner, showing how the members may be joined together by means of an angle bracket;

FIGURE 8 is a fragmentary perspective view, showing a post of the invention connected to the floor by a special bracket member, which fits into the central groove on one side of the post;

FIGURE 9 is a partially cut-away side elevational view of the bracket shown in FIGURE 8;

FIGURE 10 is an exploded fragmentary view, showing one form of connector which is used to join two post members together, where one of the members abuts perpendicularly against the other;

FIGURE 11 is a side elevational view, showing the parts joined together;

FIGURE 12 is a sectional view, taken at 12—12 in FIGURE 11;

FIGURE 13 is a top plan view of the connector shown in FIGURES 10, 11 and 12; and

FIGURE 14 is a side elevation of the same.

In the drawings, the preferred structural post member of the present invention is designated in its entirety by the reference numeral 10. The member 10 is seen as generally square in overall cross-sectional configuration, and is a relatively thin-walled metal tube, preferably of high strength extruded aluminum alloy. Formed on each side of the square tube are two outwardly projecting, flat-sided, parallel ridges 11, extending lengthwise of the member. The ridges 11 are spaced apart laterally from one another, and between them, each pair of ridges defines a channel 12 having parallel flat sides. At the four corners of the member 10, the outer sides of the adjoining ridges 11 meet at right angles to one another, thereby defining a rabbet groove 13.

The post member 10, ridges 11, channel 12 and rabbet grooves 13 may have any desired dimensions to suit the conditions of use, but by way of illustration, the post member may be two inches across on each side, with the ridges 11 approximately one-half inch across on the outside, and three-eighths inch high. The rabbet grooves 13 on the four corners of the post member are three-eighths inch on each side, and the center channel 12 is one-quarter inch across. A wall thickness of .064" has been found to be about optimum, and one aluminum alloy that has been found to be excellent for this service is known as 6063–T6.

The structural post member **10** is intended to be joined together with other like members to form a structural framework into which rectangular panels of quarter-inch thick plywood, chipboard, plastic, framed insect screening, or the like, are inserted. FIGURE 1 shows three typical panel installations, by way of illustration. The section of wall extending from the center of the drawing toward the left-hand side thereof, and designated "A," shows a single panel construction, in which a rectangular panel **15** of plywood or the like is mounted in the framework of post members **10**. The four edges of the panel **15** are seated in the inwardly facing channels **12** of the post members **10** which define the surrounding frame therefor. The edges of the panel **15** may be loose in the channel **12**, or they may be bonded to the channel by means of a suitable cement, such as epoxy cement. The panel **15** is preferably finished in any desired manner on both sides, or it may be faced with sheet metal or plastic to make it durable and resistant to exposure.

In panel A, the bottom member **10** has vertical members **10***a* and **10***b* extending perpendicularly upward therefrom at spaced intervals. The members **10***a* and **10***b* are joined to the top side of the member **10**, and for this purpose, the bottom ends of the members **10***a*, **10***b* are cut off square and then recessed transversely at **16**, as best shown in FIGURES 3 and 4, leaving two projecting ridge end portions **18** on each of the two opposite sides of the members **10***a*, **10***b*. The recess **16** is cut to the same depth as the height of the ridges **11**, so that when the ends of the members **10***a*, **10***b* are pushed down onto the top side of the member **10**, the projecting ridge end portions **18** seat in the rabbet grooves **13** on opposite sides of the top of member **10**. The projecting ridge end portions **18** and the underlying ridges **11** of member **10** are then drilled to provide pilot holes, and sheet metal screws **20** are screwed through the assembled parts, as shown in FIGURE 4. It will be noted that the screws **20** go through both side walls of the ridge **11** underlying each of the ridge end portions **18**. This stabilizes the screws **18**, and greatly strengthens the joint. The transverse recess **16** may be cut into the end of the post member **10** by using a metal cutting saw which is first passed through the end of the member **10** in two laterally spaced cuts parallel to the longitudinal axis of the member, so as to form the sides of the recess **16**, and then is lowered transversely into the sides of the member **10***a* on each side, so as to cut out the two ridges **11** and the bottom of the channel **12** lying between the two end cuts. Alternatively, the ends of the members **10***a*, **10***b* may be cut off square, and connectors such as those shown in FIGURES 10–14 may be used, the said connectors being described more fully hereinafter.

Panel B of FIGURE 1 shows a two-panel construction, in which two laterally spaced panels **15***a* of plywood or the like are attached to the post members **10***b* and **10***d* on opposite sides thereof. As best shown in FIGURE 2, the edges of the panels **15***a* are seated in the rabbet grooves **13** and are secured therein by means of sheet metal screws **22**. The screws **22** are screwed through pilot holes drilled in the edge of the plywood **15***a* and in the sides of the underlying ridge **11**. The screws may pass through both sides of the ridge **11**, as in FIGURE 2, or through only one side thereof if desired.

The rough edges of panels **15***a* and exposed heads of the screws **22** are preferably covered by a snap-on cover plate **24**, as shown in FIGURES 1 and 2. The cover plate **24** is an elongated, generally flat strip of metal, the outer face of which may be fluted slightly for ornamental effect. Projecting rearwardly from the strip **24** along both edges thereof are lip flanges **26**, which bear against the outer surface of the panel **15***a*.

Also projecting rearwardly from the back of the strip **24** down the midpoint thereof are two diverging flanges **28**, the outer edges of which are tapered slightly, or rounded off, so as to facilitate insertion into the channel **12**. The flanges **28** are originally spread apart so that they are slightly wider than the channel **12** and must be sprung together slightly in order to be inserted into the channel. The amount of inward spring of the flanges **28** is relatively slight, and well within the elastic limit of the metal, so that the flanges exert a firm spring grip on the sides of the channel **12**.

As can be seen from the drawing, the cover strip **24** gives the panel B a neat, finished appearance, and adds greatly to the ornamental effect. The cover strips **24** are preferably made of extruded aluminum alloy, and may be anodized. The panels **15***a* are preferably finished only on the outer surfaces, and the space between the two panels may be filled with insulating or sound-absorbing material, if desired.

Panel C of FIGURE 1 shows an open framework of members **10**, **10***b* and **10***c*, with a framed panel **30** of insect screen mounted in the outer rabbet groove **13**. FIGURE 5 also shows a panel **30** of insect screen mounted in the rabbet groove **13** on the side of the member **10***e*, with a framed panel **32** of transparent plastic similarly mounted on the other side of the member **10** as a storm window. In both cases, the frame is made of thin-walled metal strips **34**, preferably of extruded aluminum, having a box-like cross-sectional shape, with an outer flange **36** projecting laterally from one edge thereof, and an inner channel **38** formed along the outer edge of the strip. The strips **34** are assembled into a rectangular frame, and insect screening **40** or transparent plastic sheet **42** is then attached to the frame by means of rubber splines **44**. The edges of the screening **40** or plastic sheet **42** are folded down into the channels **38**, and the rubber splines **44** are then pressed tightly down into the channels on top of the edge of the material **40**, **42**. The rubber spline **44** is initially of round cross section, and its diameter is slightly greater than the width of the channel **38**, so that when the spline is installed in the channel, it is compressed between the sides thereof and holds the material **40**, **42** tightly in place. The framed panels **30**, **32** may be held in place on the members **10** by suitable holders, of which there are many on the market, or they may be more or less permanently installed by passing sheet metal screws through pilot holes in the flanges **36** and underlying ridges **11**.

FIGURE 6 shows an alternative arrangement for the bottom edge of a panel, where it rests on the floor. In this case, one of the members **10** has been ripped on a metal cutting saw, so that slightly less than half of the original member is left. The ripped member **10***f* is cut so that the inner side walls of the ridges **11** form a base surface **46** that lies flat against the floor F. The member **10***f* may be secured to the floor F by screws (not shown) if desired.

FIGURE 7 shows a mitered corner of framework, wherein two members **10***g* and **10***h* having mitered ends **48** are joined together and held by an angle bracket **50**. One arm of the angle bracket **50** is inserted into the interior of one of the members **10***g*, **10***h* and secured by a screw **52**. The other member is then placed over the other arm of the angle bracket **50**, and the mitered surfaces **48**, **48** are matched together. The other screw **52** is then driven, which secures the two members together. This type of joint is used wherever a corner of the framework must be exposed.

FIGURES 8 and 9 are two views showing how the bottom end of a vertical post member **10***j* may be secured directly to the floor F. For this purpose, a right-angle bracket **52** is provided, which has a flat base portion **54** and an upstanding post **56**. The post **56** has parallel flat sides which fit snugly between the sides of the channel **12** in member **10***j*, and there are two vertically spaced, countersunk screw holes **58** provided therein, through which screws **60** are passed to secure the post **56** in the channel **12**. The base portion **54** also has a countersunk screw hole **62** provided therein, through which a screw **64** is passed to secure the angle bracket **52** to the floor F.

The angle bracket **52** is used primarily where post members stand directly from the floor.

FIGURES 10–14 show an alternative arrangement, mentioned earlier herein, for securing one post member to another, where the former abuts against one side of the latter. In this case, a horizontal bottom member is designated **10***k*, and the vertical member abutting against one side thereof is designated **10***m*. Member **10***m* has its bottom end cut off square, and inserted into the open end thereof is an adaptor, or connector **66**, which fits against and conforms to the top side of member **10***k*. The connector **66** is preferably made as a pressure die casting, and its rather complex shape is best shown in FIGURES 13 and 14. The over-all configuration of the connector **66** is basically that of a rectangular, six-sided polyhedron, the width of which is equal to the inside dimension between two opposite channels **12** of the members **10***k*, **10***m*, and the length of which is equal to the inside dimension between two opposite ridges **11**. Formed in the top of the connector **66** is a transverse notch **68**, and in the bottom thereof are two side-by-side notches **70** and **71**. The ends of the connector are formed with centrally located, vertical notches **72** and **73**, each of which defines a pair of laterally spaced, parallel ridges, or blocks **74** and **75**.

The lower end portions of the ridges **74**, **75** are stepped outwardly at **76** on the exposed three sides by an amount equal to the wall thickness of the member **10**, and the height of this stepped-out portion **76** is equal to the height of the ridges **11**. The width of each of the notches **70**, **71** is the same as the outside width of the ridges **11**, and the width of the center ridge **78** between the notches **70**, **71** is the same as the inside width of the channel **12**. The width of the upper end portions of the ridges **74**, **75** is the same as the inside width of the ridges **11**, and the width of the notches **72**, **73** is the same as the width across the outer sides of the channel **12**.

Thus, when the top portion of the connector **66** has been inserted into the bottom end of the member **10***m*, the projecting portions of the connector present an end configuration which conforms to the configuration of the facing side wall of the post member **10***k*. The stepped-out portions **76** of the ridges **74**, **75** fair smoothly into the outer surfaces of the ridges **11** on the member **10***m*, and thus form an unbroken continuation of the said ridges **11** down to the adjacent ridge on member **10***k*.

The connector **66** fits snugly into the end of the member **10***m* and into the side of member **10***k*, and in certain situations, as where panels **15***a* are secured at their edges by screws to the surrounding post members **10** (see FIGURE 2), the connector might be used without attaching screws, since the panels **15***a* hold the structure together. However, in many situations it is desirable to join the connector **66** solidly to the member **10***k*, and for this purpose a screw hole **80** is provided in the bottom of the notch **68**, which extends down through the center ridge **78**. At the time the connector **66** is attached to the member **10***k*, a hole **82** is drilled in the bottom of the channel **12**, using a drill jig for accurate centering of the hole, and a sheet metal screw **84** is inserted down into the hole **80** and screwed through the hole **82**, as best shown in FIGURE 12. The bottom end of member **10***m* is then pushed down onto the connector **66** and may be secured thereto by self-tapping screws (not shown) screwed into pilot holes drilled for that purpose through the wall of member **10***m* and into the connector.

The manner of using the invention, and its many advantageous features are believed to be self-evident from the foregoing description and the drawings. Structural panels may be quickly and easily erected on the job with a minimum of disturbance to persons nearby, using precut post members **10** and panels **15**. The completed panel is extremely strong and rigid, attractive in appearance, and requires no further finishing. The amount of labor required to build a partition or curtain wall is so small that the total cost of the finished installation is considerably less than any conventional construction of comparable finish. Another advantage of the construction is that the structure can be completely disassembled and reassembled, since the respective parts are either snapped into place, as in the case of the cover strips **24**, or they are joined together by screws, which may be backed out without damaging the members through which the screws pass.

While we have shown and described the preferred embodiment of our invention in considerable detail, it will be understood that various changes may be made in the shape and arrangement of the several parts without departing from the broad scope of the invention as defined in the appended claims.

We claim:

1. A panel structure comprising, in combination:

a plurality of elongated post members joined together to form a rectangular framework;

each of said post members consisting of a generally square, hollow tube having a pair of laterally spaced, parallel ridges protruding from each of the four sides thereof;

said ridges on each side of said post member cooperating with the adjacent ridges on the adjoining side to define a rabbet groove at each corner of the post member;

each of said ridges cooperating with an adjacent ridge to define a plurality of panel seats on each of the four sides of said post member;

each of said ridges and each of said panel seats on one of said post members registering with the corresponding ridge and panel seat on the adjoining post members, to form continuous ridges and panel seats around the inside of said rectangular framework;

a pair of rectangular panels mounted on said rectangular framework parallel to one another and spaced apart by a distance equal to the combined width of said pair of ridges and the channel defined therebetween;

and each of said panels having the edges thereof seated in one of said rabbet grooves on the adjacent side of said rectangular framework, said edges being secured to said post members by means of screws that are screwed into the sides of the ridges against which said panel bears.

2. A panel structure as defined in claim **1**, wherein there is a snap-on cover plate having resilient gripping means inserted into said channel on the side of said post member parallel to said panel, said cover plate overlying the exposed sides of said post member and the heads of said screws, so as to cover the same.

3. A panel structure as defined in claim **2**, wherein said cover plate consists of an elongated, generally flat plate, having rearwardly turned flanges along both edges thereof, which abut against the outer surface of said panels; and

said gripping means consisting of a pair of outwardly diverging flanges projecting from the back side of said cover plate along the midpoint thereof, said diverging flanges being a spring-fit within said channel on said post member.

4. A structural framework for a partition or the like, comprising:

a plurality of elongated post members joined together perpendicular to one another to form a framework defining at least one rectangular opening;

each of said post members consisting of a one-piece tube of generally square cross-section, each of the four sides of said tube having two longitudinally extending, parallel ridges which are spaced apart laterally to define a channel between them, the adjoining ridges at each corner of said tube defining a rabbet groove;

certain of said post members abutting against the sides of other post members, said certain post members having their ends notched so as to straddle said pair of ridges on said other post members;

said certain post members having projecting ridge end portions on opposite sides thereof, which extend down into said rabbet groove on said other post members; and

said projecting ridge end portions on said certain post members being secured to the underlying ridge on said other post member by means of a screw passing through said projecting ridge end portions and through both side walls of said underlying ridge.

5. A structural framework for a partition or the like, comprising:

a plurality of elongated post members joined together perpendicular to one another to form a framework defining at least one rectangular opening adapted to receive flat, rectangular panels, certain of said post members abutting against the sides of others of said post members;

each of said post members consisting of a one-piece tube of generally square cross-section, each of the four sides of said tube having two longitudinally extending, parallel ridges which are spaced apart laterally to define a channel between them, the adjoining ridges at each corner of said tube defining a rabbet groove between them;

said certain post members having the ends thereof cut off square; and

a connector joining each of said certain post members to said other post members, said connector having one portion thereof adapted to be inserted into one of the square cut ends of said certain post member and shaped to conform to the inside of said certain post member, and another portion projecting from the end of said certain post member and shaped to conform to the side of said other post member, said other portion including projections that extend down into said channel and said rabbet grooves.

6. A structural framework as defined in claim 5, wherein said connector has the general configuration of a rectangular, six-sided polyhedron, the opposite ends of which are notched to fit into the ridges on opposite sides of said certain post members, and the exposed bottom side of which has two side-by-side notches provided therein which straddle the ridges on said other post member, the portions of said connector projecting from said ridges on said certain post member being stepped outwardly, so that their outer surfaces are flush with the outer surfaces of said ridges.

7. A structural framework as defined in claim 6, wherein said connector has a screw hole provided therein, extending perpendicular to the longitudinal axis of said other post member through the center ridge between said side-by-side notches on the bottom side of said connector, said connector being secured to said other post member by a screw passed through said screw hole and screwed into said other post member.

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