The invention relates to a modular unit for forming multiaxial structures, and more particularly, to a pre-fabricated, readily integratable panel.

Contemporary construction employs increasing amounts of glass areas as well as solid pre-cast or pre-formed structural units. However, there is lacking, prior to the present invention, glaze-type units which may be pre-fabricated, having as their ultimate purpose, the support of panels such as glass, porcelain, or other structural sheets. Applicants have provided a new structural unit completely pre-fabricated, wherein it may readily be interconnected to form a multi-panel wall or other structure.

More particularly, in accordance with one aspect of the invention, there is provided a modular unit which comprises a rectangular frame forming an inner bay having a peripheral stop adapted to receive a panel in a zone of intermediate depth in the frame. One edge of the frame is provided with a coupling flange extending away from the frame in a plane parallel to the plane of the stop, and adjacent to a first side of the frame. The edge of the frame opposite to the first edge has a flanged coupling member extending away from the frame in a plane parallel to the plane of said stop, but adjacent to the side of the frame opposite to said first side.

Further, in accordance with the present invention, a support is provided for securing said flange coupling member to complementary units of adjacent frames to form structural rigid tubes, each pair of tubes thus formed supporting a structural sheet secured against the support therein.

In a more specific aspect of the invention, an extruded metallic member, preferably of aluminum, is employed to form a frame. The metal section, of given thickness, is provided with a stop and a lock receiving means on one face thereof. A flange is provided, extending away from said face at one edge thereof in a direction opposite to said stop. A coupling rib is set back from the other edge of a distance equal to said thickness, to provide a bearing surface. Similarly, said coupling flange is provided with a longitudinal rib extending the length thereof to provide a bearing surface set back from the edge of the coupling flange a distance equal to said thickness. An opposite side of said frame is formed by an extrusion having a stop and lock receiving means on one face thereof and a coupling flange extending from the face opposite to said stop, the widths of said coupling flange and of said second face being less than the width of the coupling flange and face of said first extrusion respectively, by an amount equal to said thickness.

For a more complete understanding of the present invention and for a further description thereof, reference may now be had to the following description taken in conjunction with the accompanying drawing in which:

FIG. 1 is an isometric view of three modular units adapted to be coupled together;
FIG. 2 is a cross-section taken along lines 2-2 of FIG. 1;
FIG. 3 is a sectional view of a right hand terminal unit;
FIG. 4 is a sectional view of a left hand terminal unit;
FIG. 5 is a vertical wall section embodying the present invention;
FIG. 6 is a horizontal sectional view of a wall embodying the present invention, and
FIG. 7 is a modification of the invention.

Referring now to FIG. 1, there is illustrated the upper portion of a first modular unit 10 coupled to a second modular unit 11. Modular unit 11 is positioned to receive and to be coupled to a third modular unit 12. In unit 11, the left hand vertical member or jamb 13 is an extruded metal section having an exposed surface on which there is formed a stop which is in the form of a channel-shaped rib 14, extending perpendicularly from the exposed face of jamb 13. There also is provided a lock releasing rib 15 which extends the length of jamb 13, spaced from stop 14.

A coupling flange 16, forming an integral part of the extruded section, extends perpendicularly from the exposed face of jamb 13 in a direction opposite the stop 14. Flange 16 is provided with a rib 17 which extends the length of the jamb and is set back from the edge of flange 16 a distance equal to the thickness of the flange. In a similar manner, a rib 18 is provided at the opposite edge of the extrusion, the face of the rib 18 being parallel to the face of flange 16 and set back from the extremity of the extrusion a distance equal to the metal wall thickness.

The side of unit 11 opposite the jamb 13 is formed by a second extrusion 20 which for the purpose of the present description will be termed "complementary" with respect to jamb 13. More particularly, jamb 20 is provided with a stop 21 extending from the exposed face thereof in the direction of jamb 13, and is also provided with a lock releasing rib 22. Jamb 20 is also provided with a coupling flange 23 which extends away from the exposed face of jamb 20 in a direction opposite stop 21, and for a distance equal to the width of the complementary flange 16 minus the metal wall thickness. Thus the jamb 20 is positioned adjacent to jamb 13 of unit 10 with the inside edge of jamb 20 in contact with the inner surface of flange 16, and also with the surface of the rib 17. The extremity of the coupling flange 23 contacts the surface of the rib 18 and the edge of jamb 13. Jams 20 and 13' are secured in the illustrated positions by rivets 24 which extend through and are set in ribs 17' and 18'.

A horizontal header member 25 has a cross-section the same as jamb 20. Member 25 is suitably shaped at each end thereof, as by punching to permit stops 21 and 22 and lock ribs 15 and 12 to nest therein. The contact or abutting zones between member 25 and jamb 20 are welded as indicated by the shaded area 27. Welding preferably is accomplished using an arc, shielded by an inert gas such as helium to assure fusion of the metals forming the jamb 20 and horizontal member 25. A similar weld secures horizontal member 25 to jamb 13. Zones between each jamb and horizontal member wherein a continuous weld cannot be made, preferably will be filled with a suitable caulking compound to assure water-tight construction.

It is to be understood that the other horizontal sill members (not shown, but which complete a given frame) may comprise extrusions having the same cross-section as jamb 20, and/or complementary thereto.

It will be recognized that jamb 13 has the same cross-section as the right hand member shown in detail in FIG. 2. Corresponding parts have been identified with like reference characters. As viewed in FIG. 2, section 13' has an L-configuration (shown reversed) while section 20 has a T-configuration (also reversed). The stem and
bar of section 20, have dimensions complementary to
those of the stem and bar of section 13. It will be seen
from Fig. 2 that a pane of glass 30 may be secured in
position against stop 14 by a snap lock channel 31. Stop
14 is provided with a rib 32 to provide a point of con-
tact for the glass 30. A positioning or lock rib 33 on
snap lock channel 31 is registered in a groove in the
rib 15, so that pressure applied to the channel 31 in the
direction of the arrow 34 will force tip 35 behind the
beveled edge of rib 15. The space 36 may be filled with
a suitable caulking compound or, alternatively, the edge
of the glass 30 may be encased in a rubber channel so
that, combined with the pressure applied by channel 31,
a fluid-type seal is effected between the glass 30 and the
jamb 13. Rivets 37 and 38 of the self-setting type, se-
cure jamb 13 to jamb 20 so that, together, they form a
rigid tube.

Referring again to Fig. 1, it will be noted that module
units 10 and 11 are inter-locked whereas unit 12 is posi-
tioned to be moved laterally into place, the illustration
representing the relationship of parts as viewed from the
inside of the wall being formed. Construction is such
that jamb 40 of unit 12 may be moved along a direction
represented by line 41 to set modular unit 12 in position
so that jamb 40 can be secured to jamb 13, to form a part
of the modular wall structure comprised of units 10 and
11. Horizontal member 25 illustrated in Fig. 3 may be
secured to an extruded angle 45 having the same thick-
ness of section as member 25, and having widths the
same as the face of jamb 20 and flange 25 of jamb
20, respectively. By uniting the combination shown in
Fig. 3, a smooth top is provided for each modular unit.
As illustrated in Fig. 1, the angle section 45 forms a
flat cap for section 10. Cap 45 is formed at each end
to receive stop 46 and lock rib 47, and is welded along
the lines of contact therebetween.

It will be recognized that the structure shown in Fig. 3
may also be employed to form the terminal jamb of a modular
wall formed by a number of units. Similarly, the com-
bination shown in Fig. 4 may be employed to form
the terminal jamb at the opposite end of the same
modular wall. Note, however, that the angle unit 50 is
provided with a rib 51 and is adapted to receive and be
connected to jamb units such as jamb 20 in Fig.
2. In Fig. 4 the snap lock unit 31 is shown disconnect-
ed from the glass stop.

In Fig. 5, there is illustrated a vertical section through
a wall which is equipped with the angle section such as
section 13. The rib 17 bears against the face of the wall
55 and when suitably caulked, provides a moisture-proof
bond. Horizontal members 56 and 57 have sections the
same as jamb 13 and 20. The unit at the level of the
floor 58 is a channel having suitable gap stops 60
and 61. A floor seal is provided by caulking compound in
the zone 62. Alternatively, the floor unit may be a section
with a coupling flange extending down over the edge of the
floor, generally, in the same manner as the ceiling
connection.

In Fig. 6 a horizontal section of a wall showing two
different modes for finishing the terminal sections is
shown. On the right hand end a smooth tubular finish is
provided for contact with the wall 63, the unit being the
same as shown in Fig. 3. As the left hand end an ex-
trusion 64 is employed where a coupling flange 65 is
adapted to extend over the edge of the opening in the
wall and to contact the outer face 66 of the wall. Unit
64 and 65 corresponds with section 13 of Fig. 2.

In Fig. 7 there is illustrated a modification of the inven-
tion in which the angle-sections have the same con-
figuration. For purpose of simplicity, certain details of
the sections have been omitted, showing only the rela-
tionship between the edges thereof. Provision is made
for securing two angle-sections together to form a rec-
tangular tube by riveting along a single line adjacent to
one corner of the tube.

More particularly, a first angle-section 70 is provided
having an L-cross-section. A rib 71 extends the length
of the strip, located adjacent to the tip of the bar 72,
but set back therefrom a distance equal to the wall thick-


ness. The edge of the stem 73 is of the form of a U-
shaped channel. A second angle-section 75 is provided
having a T-cross-section. A rib 76 integral with sec-
tion 75 and carried by bar 77 is adapted to rest in U-
shaped channel 74. In similar manner a second U-channel
integral with section 75, is adapted to receive rib 71. Thus
the only visible joints in any completed tube will be along
the sides adjacent to opposite corners and will not ap-
pear on the faces (bars 72 and 77) of the tube.

A single course of rivets, such as rivet 79, may be suf-
ficient to se-
cure sections 70 and 75 together where it is desirable to
eliminate rivets on one side of a given wall or panel.
However, two rows of rivets may be employed, the rows
being located adjacent to opposite corners of the tube.
It will be recognized that the sections 70 and 75 are ident-
ical, except that the stops (not shown) will provide a
bearing surface facing the same direction on opposite
sides of any given tube.

Having described the invention, it should be appreciated
that complete walls or partitions may be prefabricated
in the shop, glazed, and, if desired, painted and estab-
lished at the location of their ultimate application in
the shop. It has been found preferable, from the standpoint
of weight involved, to transport the modules, after fabri-
cation, to a job site before glazing. The units may be
secured successively along the length of a wall. Being
light of weight, they require a minimum of manpower
and in effect permit substitution of machine time in a
fabricating shop for man power otherwise utilized at a job
site. The units are particularly adapted to store fronts
or units of height such that the jams can be extruded in
single units. However, modules may be stacked one
above the other if desired, one jamb and one horizontal
member being moved into contact with complementary
members as each module is added.

By providing extrusions, coupling one to the other, and
having means for coupling them together at points on op-
posite sides of the plane in which the structural panel
is located, complete fabrication is permitted and results in
a rigid structure, water-proof in nature, when completely
assembled.

Having described the invention in connection with cer-
tain modifications thereof, it will be understood that other
modifications may now suggest themselves to those skilled
in the art and it is intended to cover such modifications
as fall within the scope of the appended claims.

What is claimed is:
1. In a wall structure the combination which comprises
a pair of frames each of which has sides of integrally
preformed elongated elements each having a jamb member
and a facing strip disposed at an angle to said jamb mem-
ber with header members interconnecting the upper ends
of the elongated elements of each said pair and sill
members secured to the lower ends of each of the ele-
ments of said pair, each said jamb member having con-
fronting faces and said sill member having a surface
facing a surface on said header member each of said
frames having a panel stop extending around the inner
periphery thereof on the confronting jamb faces of the
jamb members thereof and on the confronting surfaces
of said header members and said sill members, said elon-
gated elements in each of said frames being oriented
with the said facing strips thereof positioned on
opposite sides of the plane of said panel stop, a bearing
rib formed on the inner surface of each said facing strip
along a line set back from the free edges of said facing
strips a distance equal to the thickness of the free edge of
said jamb members extending from said inner surface
toward the plane of said panel stops and means extend-
ing through adjacent sides of said pair of frames to inter-
lock them with the free edges of said jamb members bear-
ing on the surface of the bearing ribs to form a rigid
supporting tube at the boundary between said pair of frames. 3. In a structural system in which a pair of panels are to be supported in a common plane on bearing surfaces of peripheral stops in a pair of adjacent modular units, the combination which comprises an integrally preformed L-shaped member having a first facing plate and a first jamb plate, which first jamb plate supports one side of a pair of said tops with the plane of the bearing surface thereof perpendicular to said first jamb plate, an integrally preformed 7-shaped member having a second facing plate and a second jamb plate, which second jamb plate supports one side of the second of said stops with the plane of the bearing surface thereof perpendicular to said second jamb plate, and means providing said ribs to said free edges of said jamb plates to form an intermediate tubular support between said panels.

3. In a structural system in which a pair of panels are to be supported in a common plane on bearing surfaces of peripheral stops in a pair of adjacent modular units, the combination which comprises an integrally preformed L-shaped member having a first facing plate and a first jamb plate, which first jamb plate supports one side of a pair of said tops with the plane of the bearing surface thereof perpendicular to said first jamb plate, an integrally preformed 7-shaped member having a second facing plate and a second jamb plate, which second jamb plate supports one side of the second of said stops with the plane of the bearing surface thereof perpendicular to said second jamb plate and coincident with the plane of the bearing surface of said first stop, and supporting ribs extending along the inner surfaces of said facing plates set back from the free edges thereof a distance equal to the thickness of the free edges of said jamb plates and extending away from said inner surfaces parallel to the planes of said jamb plates, and means providing said ribs to said free edges of said jamb plates to form an intermediate tubular support between said panels.

4. Frame construction for the sections of a multisectional wall, each section comprising a header member, a sill member and two side elements secured at the upper and lower ends thereof to said header member and said sill member, respectively, said side elements being of complementary dimensions and each having an inner jamb face, a panel stop means extending around the inside perimeter of said section on the confronting surfaces of said header member and said sill member and extending along each said inner jamb face of said side elements, said stop means having panel supporting surfaces lying in a plane parallel to but intermediate the edges of said elements, each side element provided with an integrally preformed jamb member and a facing member extending at an angle to said jamb member, the facing members each having an outer face parallel to said plane of said stop with one said outer face positioned on one side and at one edge of said section and the other said outer face positioned on the other side and at the other edge of said section, and structures on said side elements including upstanding ribs formed on inner faces of said facing members and extending toward and perpendicular with respect to said plane of said panel stop and roots on said facing members at points spaced from the edges of said facing members a distance approximately equal to the thickness of the edges of said jamb members for providing a bearing and positioning surface for the edges of jamb members of adjacent sections of said wall and adapted to be secured thereto by means extending through said jamb members. 6. Frame construction for the sections of a multisectional wall, each section comprising a header member, a sill member and two side elements secured at the upper and lower ends thereof to said header member and said sill member, respectively, a panel stop means extending around the inside perimeter of said section on the confronting surfaces of said header member and said sill member and extending along confronting jamb faces of said side elements to provide panel supporting surfaces lying in a plane parallel to but intermediate the edges of said elements, each side element comprising an integrally preformed jamb member and a facing member extending at an angle to said jamb member, the facing members each having an outer face parallel to said plane of said stop with one said outer face positioned on one side and at one edge of said section and the other said outer face positioned on the other side and at the other edge of said section, and structure on said side elements for connecting said section to adjacent sections of said wall including an upstanding rib rooted on the inner face of each of said facing members at points set back from the edges thereof a distance approximately equal to the thickness of said upstanding ribs for facilitating the alignment of said edges of said jamb members to receive and secure upstanding ribs on facing members of adjacent sections of said wall.

7. Construction for a multisectional wall, each section comprising a header member, a sill member and two side elements secured at the upper and lower ends thereof to said header member and said sill member, respectively, said side elements being of complementary dimensions and each having an inner jamb face, a panel stop means extending around the inside perimeter of said section on the confronting surfaces of said header member and said sill member and extending along said inner jamb faces of said side elements to provide panel supporting surfaces lying in a plane parallel to but intermediate the edges of said elements, each side element comprising an integrally preformed jamb member and a facing member extending at an angle to said jamb member, the facing members each having an outer face parallel to said plane of said stop with one said outer face positioned on one side and at one edge of said section and the other said outer face positioned on the other side and at the other edge of said section, and structure including edge supporting ribs on each of said side elements for interlocking sections of said wall by fastening means extending through each said jamb member with the edge of the jamb members at each junction between sections maintained in predetermined positional
relation with respect to the edge of each facing member by said ribs.

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