

[54] **BUILDING FRAME STRUCTURE**

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**Related U.S. Application Data**

[60] Continuation of Ser. No. 218,626, Jan. 17, 1972, abandoned, which is a division of Ser. No. 44,848, June 9, 1970, Pat. No. 3,706,169.

[30] **Foreign Application Priority Data**

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 Mar. 10, 1970 Germany..... 2011258

[52] **U.S. Cl.**..... 52/263, 52/586

[51] **Int. Cl.**..... E04b 2/72

[58] **Field of Search** ..... 52/263, 299, 292, 301,  
 52/730, 731, 732, 281, 627, 601, 584, 585,  
 586, 593, 594, 595

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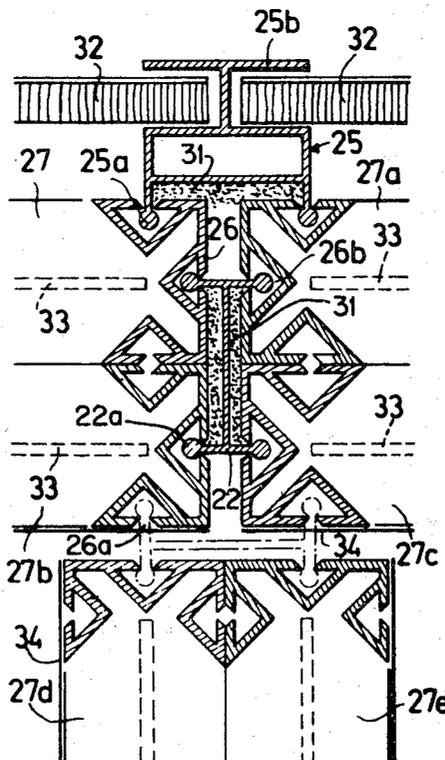
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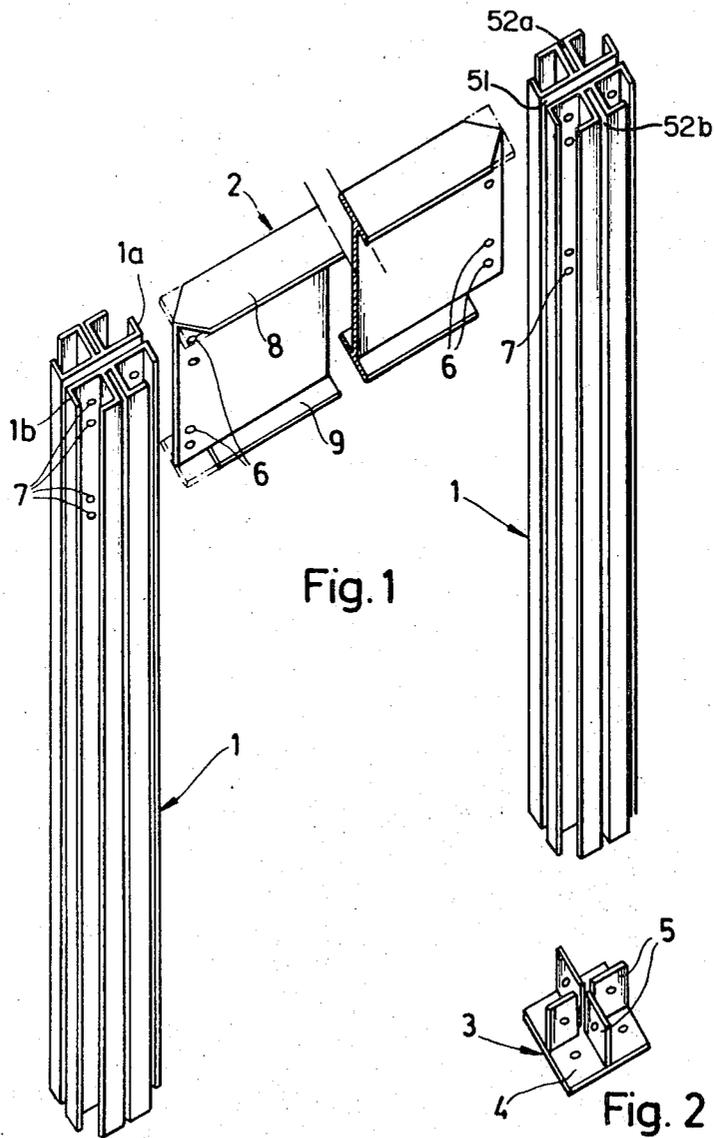
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[57] **ABSTRACT**

Several aligned wall members of a building-frame structure are tied together by a connector provided with a plurality of vertical ribs bridged by a web, each of these ribs being received in a vertical channel formed as an undercut in a frame having a vertical access slit for each channel. A sealing layer is inserted between the connector and the coplanar wall members held together by same. The connector web may be secured to a column to which the associated wall members are to be anchored.

**5 Claims, 20 Drawing Figures**





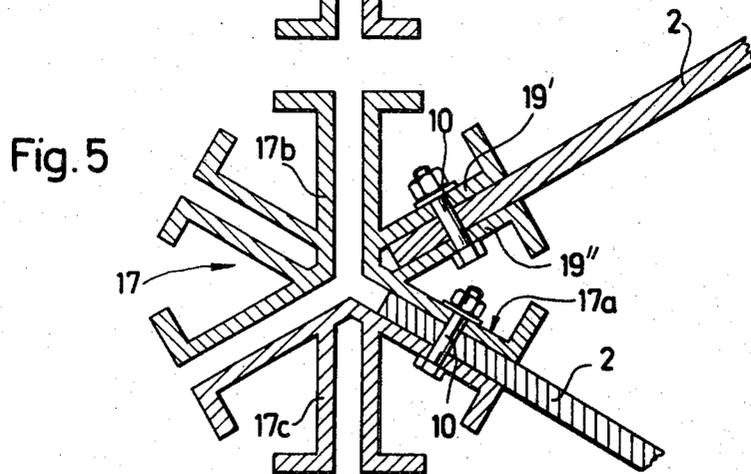
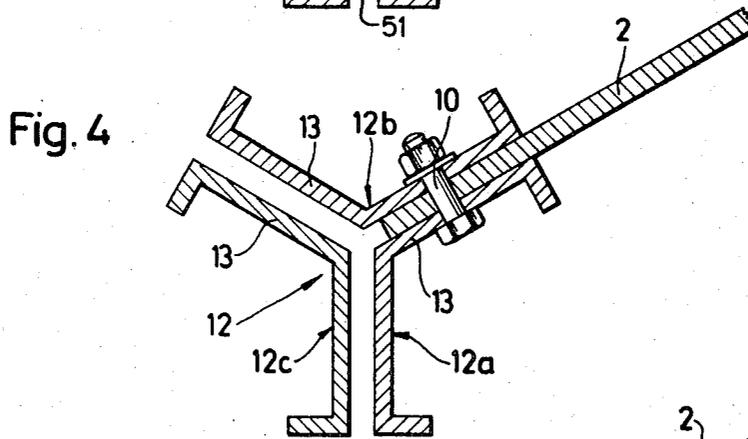
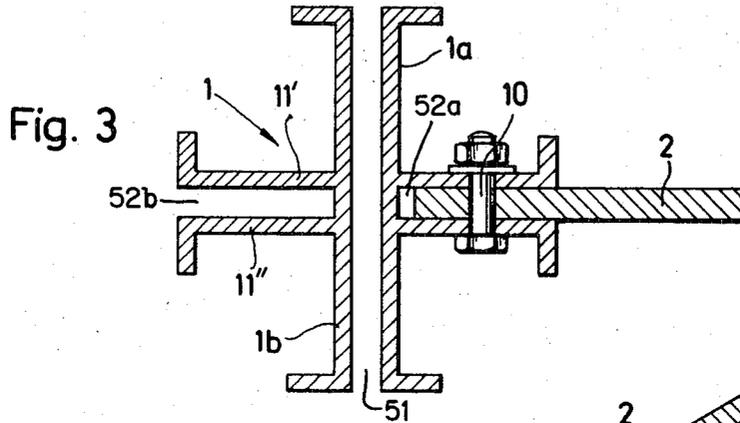


Fig. 6a

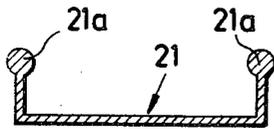


Fig. 6b

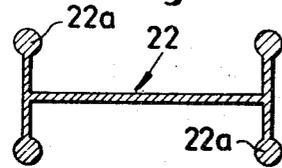


Fig. 6c

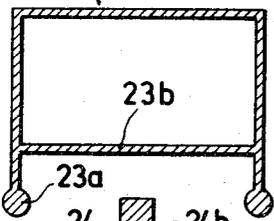


Fig. 6d

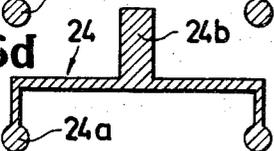


Fig. 6e

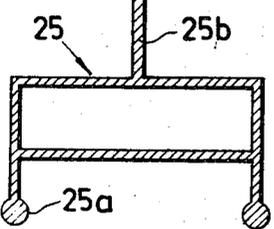


Fig. 7b

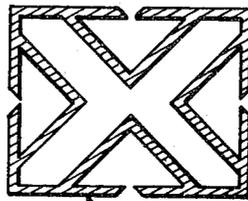


Fig. 7a

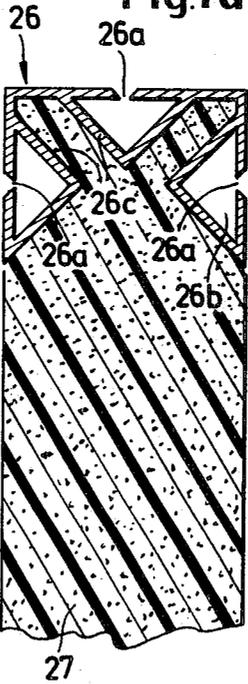


Fig. 9

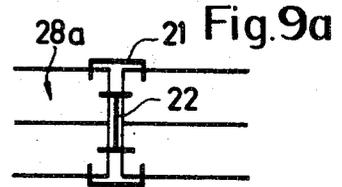
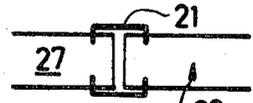


Fig. 9b

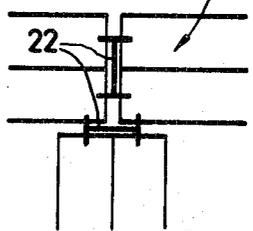


Fig. 9c

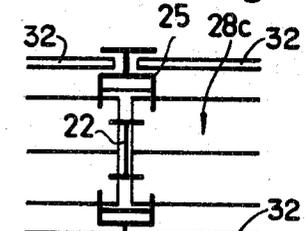


Fig. 9d

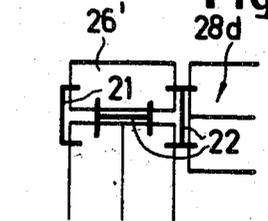


Fig. 8a

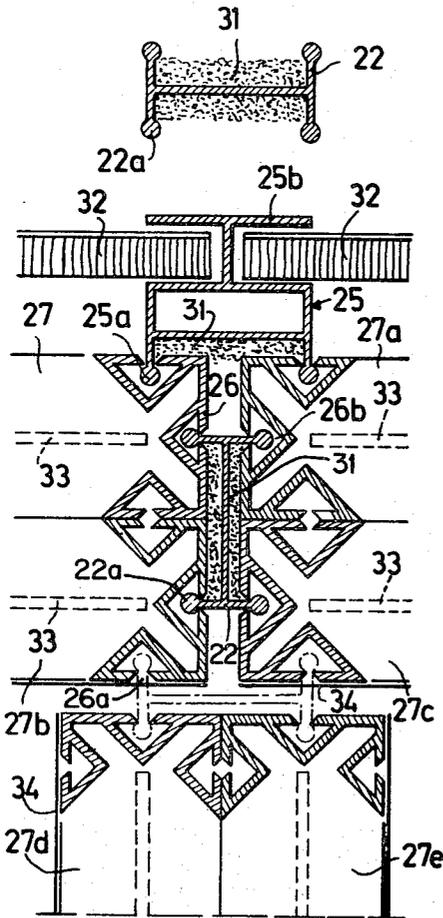
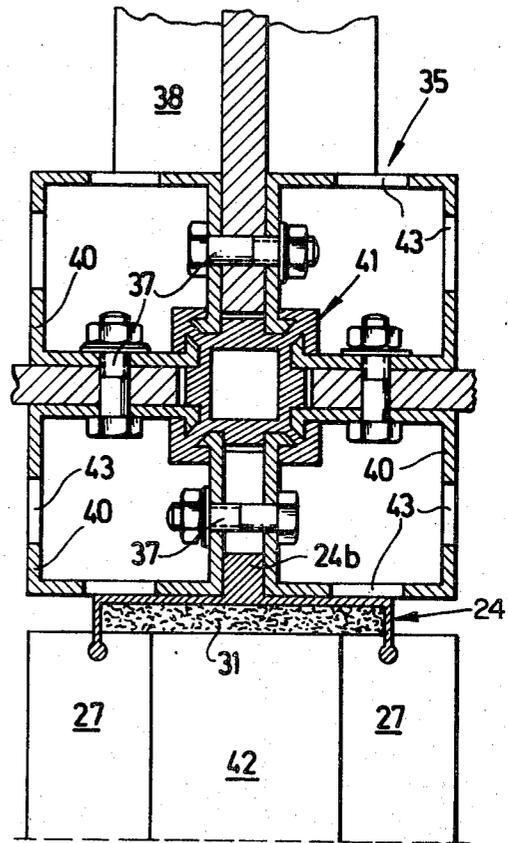


Fig. 8

Fig. 10



## BUILDING FRAME STRUCTURE

The present application is a continuation of my application Ser. No. 218,626, now abandoned, which was filed Jan. 17, 1972 as a division of my application Ser. No. 44,848 filed June 9, 1970, now U.S. Pat. No. 3,706,169.

Industrialization of the building industry calls, on the one hand, for a simple but multi-purpose framework or grid structure adapted to conform to a selected floor plan and, on the other hand, for prefabricated or partition systems to be used therewith.

My present invention relates to a frame structure for buildings and to a wall or partition system to subdivide that frame structure or to be incorporated into same. As compared to prior-art structures, the frame structure according to the present invention is a simple assembly of basic structural elements designed to fit various grid types.

An improved wall or partition system described hereinafter, satisfying the requirements for prefabrication, thermal insulation and simple assembly, may be used in connection with a frame structure according to the present invention in the case of wall materials which are not self-supporting.

In accordance with the present invention I provide, in a building-frame structure, a plurality of upstanding wall members each having at least one profiled edge with a preferably rearwardly converging vertical slit and with an undercut behind that slit to form an enlarged vertical channel, these wall members being clipped to one another by a connector having a plurality of vertical ribs each traversing an edge slit of a corresponding wall member and terminating in a vertical bead received in the corresponding channel.

According to a more specific feature of this invention, each wall member comprises a panel surrounded by a frame which forms its profiled edge or edges, this frame advantageously having a generally triangular rearwardly pointing formation behind that edge which defines the vertical channel thereof.

The connector may also be used to secure the clipped-on wall members to an adjoining column spacedly confronting a pair of coplanar edges of two such wall members, the connector then having a web paralleling these coplanar edges which is secured to the column and bridges the slit-engaging ribs. A sealing layer may be imbedded between these coplanar edges and the web.

Embodiments of the present invention will now be discussed in detail with reference to the accompanying drawing in which:

FIG. 1 is a perspective view of two supporting columns with a horizontally extending girder;

FIG. 2 isometrically illustrates a foot plate for a column;

FIG. 3 is a cross-sectional view, drawn to a larger scale, of one of the columns of FIG. 1;

FIG. 4 is a cross-sectional view of a modified column;

FIG. 5 is a cross-sectional view of a further modification of the column of FIG. 4;

FIGS. 6a - 6e show different clamping profiles;

FIGS. 7a and 7b show frame profiles in cross-sectional views;

FIG. 8 is a cross-sectional view of a connection between a number of panel elements;

FIG. 8a shows the clamping element of FIG. 6b with two sealing layers;

FIGS. 9a - 9d are diagrammatic views of several kinds of panel connection; and

FIG. 10 is a cross-sectional view of another embodiment of a supporting column according to my invention.

FIG. 1 shows two columns 1 according to the present invention as well as a girder or beam 2 to be placed between them as part of a framework or grid structure conforming to a predetermined floor plan. Each column 1 comprises two profiles 1a and 1b and may be connected with the foundation via foot portions 3 (FIG. 2) including a plate 4 and upright flanges 5 receivable in vertical channels 51, 52a, 52b defined by the column profiles. It is also possible, of course, to connect the profiles directly with the foundation by means of angle irons.

In order to establish a detachable junction between the columns 1 and the beam 2, the web of the latter is inserted into the channel 51 separating the profiles 1a and 1b and is bolted to the flanges of these profiles by screws passing through bores 6 in the beam and 7 in the column. As is also apparent from FIG. 1, the fastening of the web of the beam to the two profiles defining the throughgoing channel 51 joins these profiles to each other besides connecting the column to the beam. The length of the beams and the relative positioning of the columns depend, of course, upon the static requirements of the selected floor plan.

The girder 2 is designed as an I-beam whose upper flange 8 is beveled at both ends and whose lower flange 9 is foreshortened to facilitate insertion of the web into the column channels. The beveling of flange 8 of a beam received in, say, channel 51 allows that flange to come to rest on the profiles 1a, 1b without interfering with the insertion of a similar beam into channel 52a or 52b.

FIG. 3 shows the column 1 of FIG. 1 in greater detail, yet with a beam 2 inserted in one of the shorter channels (i.e. the channel 52a individual to profile 1a) instead of the throughgoing channel 51. These individual channels are formed between a pair of ribs 11' and 11'' of each profile perpendicular to the main channel 51. A detachable connection between profile 1a and beam 2 is formed with the aid of a screw 10. Thus, 20 beams secured to the column in the manner shown in FIGS. 1 and 3 include with each other an angle of 90°, forming part of an orthogonal grid.

A grid structure with beams radiating at 120° angles may be set up with the aid of a column 12, FIG. 4, comprising three profiles 12a, 12b and 12c each forming an obtuse angle of 120°. Screws 10 can again be used to connect adjoining profiles each other as well as with an interposed beam 2.

In a modified structure as shown in FIG. 5, a column 17 formed from three 120° profiles 17a, 17b and 17c is additionally provided with a pair of ribs 19', 19'' on each profile defining a channel to accommodate a beam 2 extending along the bisector of the profile angle. Thus, the column 17 can be used to support beams including angles of 60° with one another.

In FIGS. 6a - 6e I have shown several profiles of different cross-sections designed to connect wall panels to one another or to other structural elements such as a column. Profile 21 of FIG. 6a has a C- or U-section with flanges terminating in thickened bead portions

21a. Profile 22 of FIG. 6b has an I- or H-section with four beads 22a. Profile 23 of FIG. 6c has a U-section with flanges terminating in beads 23a and an ancillary reinforcing web 23b spanning these flanges. Profile 24 of FIG. 6d is another U-section with enlarged flange ends 24a and with a median rib 24b extending in the opposite direction over preferably the entire length of the profile. Profile 25 of FIG. 6e combines the bridged U-section of FIG. 6c, terminating in beads 25a, with a T-section 25b including a central leg taking the place of rib 24b in FIG. 6d.

In FIG. 7a I have shown a profiled frame 26 enclosing a panel element 27 to protect its edges and to facilitate the establishment of a connection between that element and an adjoining structural part. Advantageously, related materials are used for the panel and the frame, such as foam polystyrene for the former and extruded polystyrene for the latter.

The cross-section of frame 26 is generally U-shaped, its web and flanges being centrally slitted at 26a and having their respective halves interconnected by inwardly extending triangular bridge pieces 26c defining voids 26b. These voids accommodate the beads 21a - 25a of the various profiles 21 - 25 which can be introduced through the slits 26a whose edges are outwardly flared for easier introduction of the beads.

In FIG. 7b I have shown a profile 26' similar in cross-section to frame profile 26 but of rectangular outline, with four slitted sides internally reinforced by rectangular bridges as described with reference to FIG. 7a.

FIG. 8 illustrates the manner in which four panels 27, 27a, 27b, 27c, juxtaposed in pairs to form a wall of twice their thickness, may be interconnected with the aid of an H-section profile 22 (FIG. 6b) engaging their frames 26 in the manner just described. The beads 22a of this profile are received in voids 26b of respective frames, the corresponding flanges traversing the slits 26a. As separately illustrated in FIG. 8a, a sealing medium 31 such as foam rubber or permanently elastic putty may be inserted within the profile 22 on both sides of its web to fill the spaces between that web and the adjoining frame surfaces. The inwardly tapering slit edges, converging toward the inserted beads 22a, insure the maintenance of a secure connection.

As further shown in FIG. 8, a profile 25 of the type illustrated in FIG. 6e may be laterally clipped onto the frames of confronting panels 27, 27a and, with the aid of its T-section 25b, may engage a pair of facing panels 32 protecting the wall structure 27, 27a, 27b, 27c against atmospheric influences and mechanical damage. The facings 32 may be made of synthetics, glass, asbestos cement or metal and may be assembled with profile 25 prior to its attachment to the panel frames.

Besides serving as a connector for the facings 32, profile 25 also closes the gap between the frames of panels 27 and 27a, again with the interposition of a sealing layer 31.

Two further panels 27d and 27e, extending at right angles to the four-panel wall on the side of members 27b and 27c, may be connected with these members by means of another I-section profile 22 as illustrated in dot-dash lines.

If the protective facings 32 are not needed, the panel members preferably consisting of foam polystyrene may be directly covered with wallpaper or the like as

indicated at 34 for member 27d and 27e, possibly with interposition of a more solid intermediate layer.

The wall-forming panels may be provided with armatures 33 as illustrated in FIG. 8.

FIGS. 9 and 9a - 9d diagrammatically illustrate diverse possibilities of erecting different wall structures by the technique just described. According to FIG. 9, two panels 27 are interconnected by a pair of U-shaped profiles 21 (cf. FIG. 6a) to form a simple wall 28. FIG. 9a shows a double-wall structure 28a, similar to that of FIG. 8, with an I-profile 22 as its central connector and two U-profiles (or C-profiles) 21 on the sides to cover up the gaps. In FIG. 9B I have shown a structure 28b corresponding to the assembly of panels 27, 27a - 27e of FIG. 8 and interconnected in the same manner by two I-profiles 22. The structure 28e of FIG. 9c is again a double wall, with facings 32 on opposite sides secured to the main panels by composite profiles 25 as described in connection with FIG. 8. FIG. 9d shows a structure 28d with two double walls adjoining each other at right angles and with use of a rectangular profile 26' (see FIG. 7b) to complete the assembly, the several elements being interconnected by two I-profiles 22 while a C-profile 21 serves to cover the gap between the profile 26' and a confronting wall edge.

FIG. 10 shows, in cross-sectional view, a column 35 adapted to be used in essentially the same manner as the columns of FIGS. 3 - 5 for the support of beams or girders, here designated 38, which are detachably secured thereto with the aid of screws 37. Column 35 comprises a central core 41 and four hollow ports 40 of generally square cross-section which are open at one corner and provided with inturned lips engaging in corresponding grooves of the core, these ports being transversely spaced to form channels accommodating the webs of the beams. Holes 43 in the exposed sides of the post walls give access to the screw 37 passing through bores in the confronting sides of adjoining parts.

As further illustrated in FIG. 10, column 35 may also serve to connect the framework of a building with wall members of the general type described above, here specifically a wall formed from two panels 27 separated by a space 42. A profile 24, of the type described with reference to FIG. 6d, engages the framed panels 27 by its beaded flanges and is clamped with its rib 24b between two of the posts 40. Space 42 can be used to accommodate insulation or supply lines. Again, the clearance between the panels and the profiled connector is shown filled with a sealing layer 31. The elements of the framework and paneling thus interconnected may be reassembled in accordance with a different floor plan.

To assemble the wall structure, a connector profile is first fastened to the ceiling or to a wall member or column already standing; next, the wall-forming panels are attached to that profile, with the bottom element trimmed to the proper height. As soon as all wall elements are in place, the residual clearance beneath the wall may be filled with polystyrene or the like and covered by skirting boards bracketing the wall which, being suspended from above, may freely expand or contract in response to changing temperatures without undergoing deformation.

It will thus be seen that I have provided a building-frame structure wherein a plurality of upstanding wall members 27, 28 etc. comprise panels surrounded at least in part by frames 26, 26' forming profiled edges;

these profiled edges have vertical slits 26a and undercuts behind the slits forming enlarged vertical channels designed to receive vertical ribs 21a, 22a etc. of a connector 21-25 as illustrated in FIGS. 6a-6e. Two such wall members with coplanar profiled edges can thus be joined together, as shown in FIGS. 8-10, with insertion of a sealing layer as mentioned above between these coplanar edges and the connector web. It will further be noted that the slits 26a converge rearwardly toward their channels whose generally triangular horizontal cross-section has a vertex pointing away from the slit.

What we claim is:

1. A building-frame structure comprising a plurality of upstanding wall members each having a profiled edge provided with a vertical slit and with an undercut behind said slit forming an enlarged vertical channel; a connector provided with a plurality of substantially parallel vertical ribs each traversing an edge slit of a re-

spective wall member and terminating in a vertical bead received in said channel behind said slit, said connector including a web bridging said ribs, the profiled edges of said wall members being coplanar and spaced from said web; and a sealing layer inserted between said coplanar edges and said web.

2. A structure as defined in claim 1 wherein said slit converges rearwardly toward said channel.

3. A structure as defined in claim 1 wherein each of said wall members comprises a panel and a frame around said panel forming said profiled edge.

4. A structure as defined in claim 1, further comprising a column adjacent said wall members confronting said coplanar edges thereof, said web being secured to said column.

5. A structure as defined in claim 1 wherein said channel has a generally triangular horizontal cross-section with a vertex pointing away from said slit.

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