

April 18, 1939.

H. J. MACKIN

2,154,520

BUILDING UNIT

Filed April 17, 1937

2 Sheets-Sheet 1

Fig. 1.

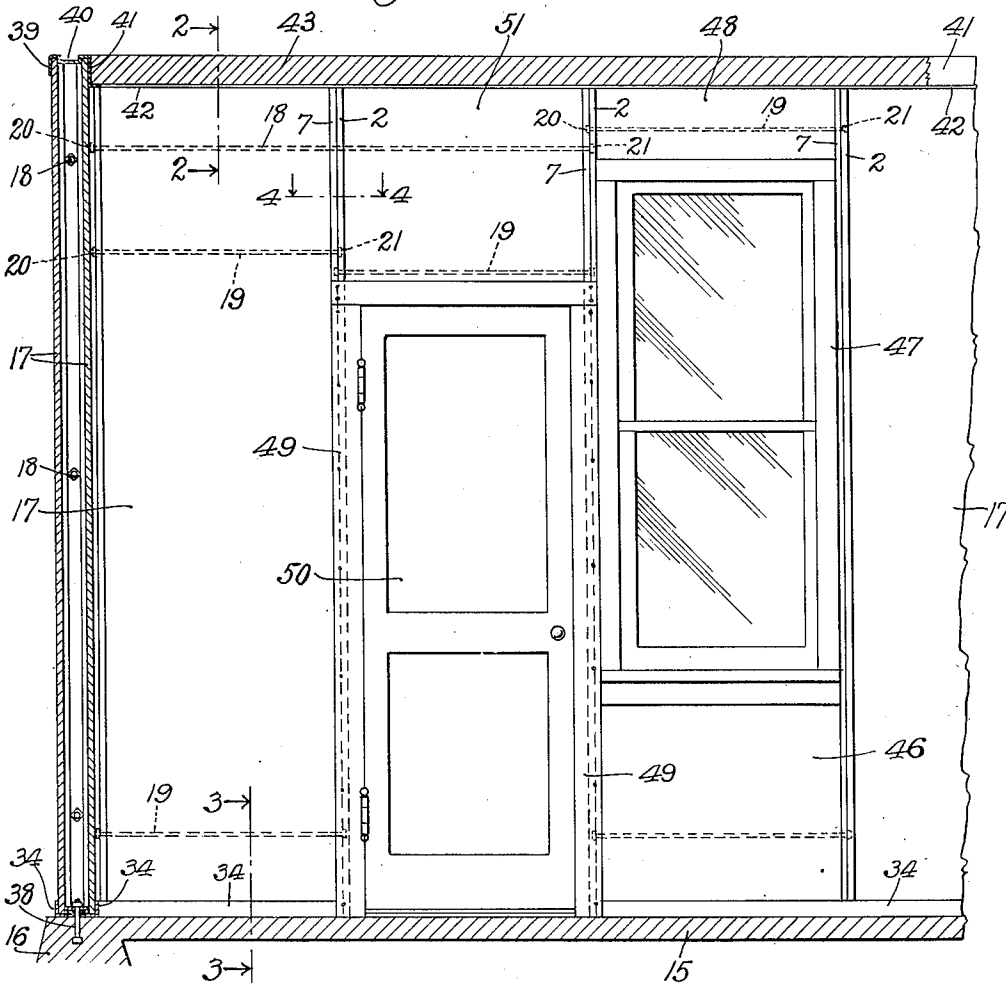


Fig. 7.

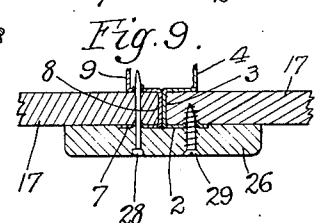
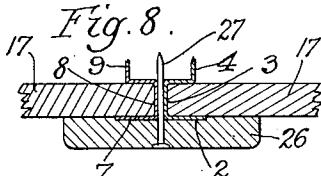
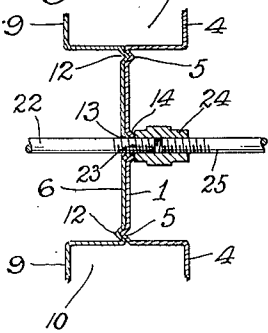
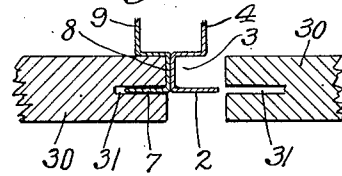


Fig. 10.



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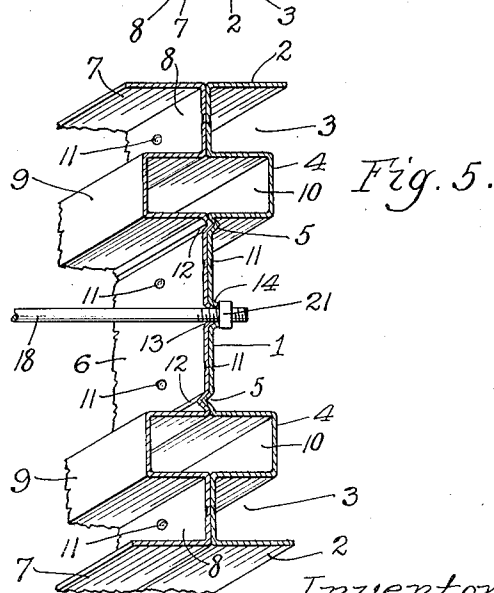
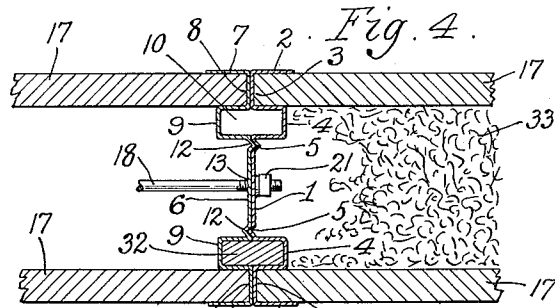
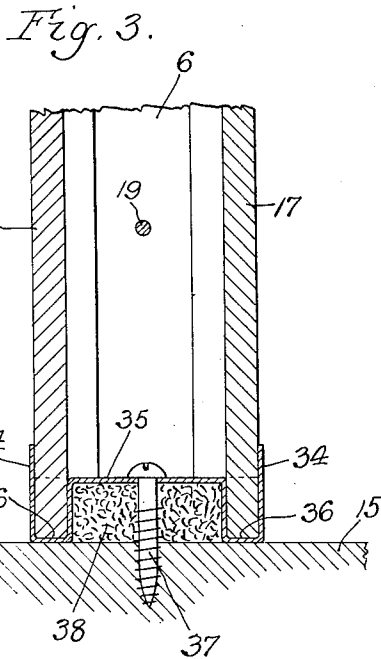
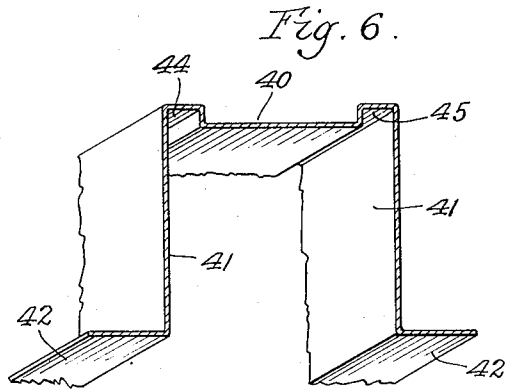
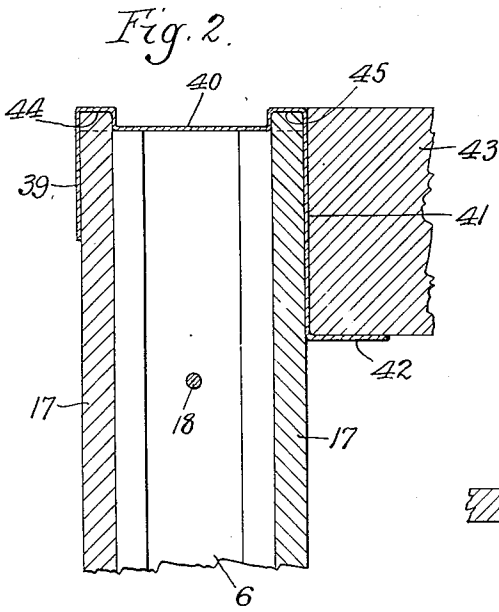
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

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BUILDING UNIT

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Application April 17, 1937, Serial No. 137,398

16 Claims. (Cl. 72—115)

This invention relates to a building member or unit, to a method of using it and to a method of building construction.

It has for one object to provide a metallic stud or post suitable for use in building walls, partitions, ceilings, floors or other structural assemblies.

Another object is to provide such a post so shaped that it receives and retains other members, such as boards or sheets of material without the necessity of nails, screws or other fastening parts although they may be used if desired.

A further object is to provide a wall, ceiling or analogous construction using the said posts and fastened together as a unit.

Other objects will appear from time to time in the specification and claims.

The invention is illustrated more or less diagrammatically in the accompanying drawings, wherein:

Figure 1 is a vertical section of a building, showing a wall or partition of the present invention in elevation and showing the floor, wall and ceiling in section;

Figure 2 is a vertical sectional detail on an enlarged scale taken at line 2—2 of Figure 1;

Figure 3 is a vertical section on an enlarged scale taken at line 3—3 of Figure 1;

Figure 4 is a horizontal sectional view taken on an enlarged scale at line 4—4 of Figure 1;

Figure 5 is an elevational view with parts in section showing the post or stud on an enlarged scale;

Figure 6 is a sectional view showing a modified form of top member;

Figure 7 is a view generally similar to Figure 4, showing a modified form of attaching means;

Figure 8 is a horizontal sectional detail showing a post and means for attaching a finishing strip;

Figure 9 is a similar view showing a modified means for attaching a finishing strip;

Figure 10 is a horizontal sectional detail showing a modified form of sheet member and the manner in which it is received upon the post or stud.

Like parts are designated by like characters throughout the specification and drawings.

The stud or post will first be described. As shown generally in the figures and particularly in detail in Figure 5, it is a two-part member formed of a sheet 1, having end flanges 2, 2. The sheet is bent to form board or wall member receiving pockets 3, 3. It is further bent to form outwardly facing depressions or pockets

4, 4. It may have one or more centering members 5, 5 which are useful when two such members are fitted together. A similar plate 6 has edge flanges 7, 7. It is shaped to provide board or plank receiving pockets 8, 8. It is also shaped to provide inwardly facing depressions or pockets 9, 9 which correspond preferably in size and shape to the pockets 4, 4 in the sheet 1 and which after assembly of two sheets together forms with the pockets 4, 4 tubular elements 10, 10. In making a completed stud or post two such sheets are preferably secured together and may be spot or otherwise welded as at 11, 11. They may in fact be secured together in any desired way.

The sheet has preferably centering or guiding deformations 12, 12 which correspond in size, shape and location to the similar members 5, 5 formed in the sheet 1. When two sheets are to be secured together the cooperation of the members 5 and 12 makes centering and proper relative positioning simple and almost automatic.

To assist in fastening up the posts or studs in a completed wall each is perforated at one or more places as at 13 and at each perforation a ferrule or fillet 14 is preferably formed about the punching. This serves to strengthen and stiffen the sheet generally and particularly at the point of perforation.

When the stud is to be used it is preferably mounted on some sort of a foundation or supporting member, for example the foundation or floor 15, as shown in Figures 1 and 3. Figure 1 illustrates a house, and the member 15 is to some degree supported upon a footing 16. Upon some such support or floor the posts or studs are positioned, end up. Plank or sheet members 17 of any desired material are then put in place, their edges fitting within the depressions 3 and 8 as shown particularly in Figure 4. These members 17 may be of any desired size, shape or material, and the exact contour of the stud is made to correspond to the shapes or edges of the members 17 which are to cooperate with the studs and be supported by them.

It will be understood that at each joint one stud is used and that it engages on each side ordinarily two pairs of members 17, or their equivalents. The members 17 may be omitted on one side if desired so that only a single wall is made, but if a double wall is desired the stud carries provision in the two pockets or depressions 3 or 8 for receiving two members 17 to make a double wall. When the desired number of sections of the wall have been set up, rods 18 are passed

through the perforations 13. One rod 18 may span several sections as indicated in the upper left hand corner of Figure 1, where the rod passes through two sections and engages the edges of two more, or a shorter rod 19 may be used, as indicated in the upper right hand of Figure 1 where a rod passes through one section. Ordinarily the rod will have a head 20 at one end and a nut 21 at the other by means of which it is tightened and the parts are held together. Thus after the desired number of studs have been put in place and the desired number of planks or sheet members have been put in place, the wall is tied together by one or more tie rods and becomes thus a unit structure.

For some purposes it may be desirable, as shown in detail in Figure 7, to have a tie rod extend clear through the structure and as there shown the rod 22 is threaded as at 23 and engages one part of a nut 24. Up to that point, a part of a wall or partition may be made and tied together. When further parts are put in place a rod 25 extends through them and is threaded into the unoccupied end of the nut 24 and thus a continuous tie rod is built up from several separate members.

For some purposes it may be desirable to use a finishing strip to cover the edge of the stud or the joint formed at that edge. As shown in Figure 8 a finishing strip 26 is used and extends throughout all or part of the length of the stud and is held in place by one or more nails 27 which are driven between the two sheets which make up the stud. Since the sheets are directly in contact or close to each other sufficient friction is ordinarily present to hold the nail in place.

If desired the finishing strip 26 may be held in place as shown in Figure 9 by a nail 28 which is driven directly through the flange 7, as there shown, through one of the members 17 and farther into the stud if desired, or, as also shown in Figure 9, a screw 29 may be used instead of the nail and this screw, when used, will ordinarily penetrate through one of the flanges of the stud and engage one of the members 17.

Instead of fitting the member 17 into one of the pockets 3 or 8, a member 30, as shown in Figure 10, may be slotted on its edge as at 31 to fit over the flange 2 or the flange 7. When this is done the wall is the same as otherwise described above and is preferably secured together by the tie rods.

As shown particularly in Figures 4 and 5, one or more cavities 10 remain in each of the studs. A filling strip 32 may be inserted in one of these cavities or both may be filled by such strips. These strips have sound and heat insulating effect and to some degree strengthen the structure. They may or may not be used, as desired, and if used, one or two may be used.

As shown particularly in Figure 4, when two members 17 are used, a hollow wall is formed, leaving a space within which plumbing, wire conduits and other utilities may be positioned. Where desired, insulating material of any sort may be put into the hollow wall. Such insulation is indicated at 33 in the right hand portion of Figure 4.

The studs or posts may rest directly upon the foundation sheet 15 or bottom members may be used. Such bottom members are shown in Figure 3. As there shown each such member is formed of a sheet having upwardly extending flanges 34, 34, and an upwardly extending intermediate portion 35. Between this and the flanges 34 are formed two grooves 36 within which the

lower ends or edges of the members 17 may be received. Where such bottom channel members are used they may be secured to the foundation by screws 37 as shown in Figure 3, or by a bolt 38, as shown in Figure 1. The foundation or floor 15 or 16 may be shaped to interlock with the channel member or the floor is left flat and insulating material 38 may be inserted between the portion 35 and the floor or foundation 15 or 16.

If it is desired to have the wall or partition carry a ceiling or any other structural member, one or more top strips or channels are used. These are illustrated in detail in one form in Figure 2, and in a modified form in Figure 6. As shown in Figure 2 the top member comprises a downwardly bent flange 39, a downwardly indented portion 40, a second downwardly depending flange 41, which may extend downward farther than the flange 39 and which preferably carries a generally laterally extending flange 42 which serves as a support for a ceiling member or section 43 of any desired shape or construction. Between the downwardly depending flanges 39 and 41 and the downwardly indented section 40 are formed two grooves or pockets 44 and 45, each of which may receive the upper edge or end of a wall member 17.

The modified form of top member shown in Figure 6 is generally the same as that shown in Figure 2 except that instead of having a relatively short downward flange 39 there are two of the flanges 41, each of which carries a lateral or generally horizontal flange 42. Such a top member is utilized where the wall or partition is to support other structural members on both sides.

In building a wall or partition where it is desired to have openings such as doors or windows, the stud or post of Figure 5 may be used throughout, but instead of the full wall sections 17 smaller sections are used. Thus where a window is to be used it may be a relatively low wall section 46 which is retained in place between the studs in the same manner as that described for the sections or members 17. A window frame of any desirable construction is inserted between adjacent studs and is indicated diagrammatically as at 47. The particular details of the window frame and of the window construction form no essential part of the present invention and are not illustrated. If the window frame does not extend fully to the top of the studs, a further or finishing wall member 48 is inserted between the studs and above the window frame 47.

Where a door is to be inserted a door frame 49 of any desirable shape or construction is inserted between adjacent studs. The door frame 49 may carry a door 50 of any desired shape or construction. If the door frame and door do not fully fill the opening between the adjacent studs, a wall section 51 is inserted above the door as indicated in Figure 1.

The details of the door and window frames are not shown in full as they form no essential part of the present invention. Ordinarily such frames will have one or two members which will engage the studs in the manner shown in Figure 4 and in Figures 8, 9 or 10, or otherwise. Preferably the shape and manner of engagement of the door and window frames will either be identical with the manner of engagement of the wall sections 17, or will be such as to conform to or harmonize with them. It is to be understood that where a door or window is inserted in a wall section the wall may be finished either as a double wall, as

shown in Figure 4, or as a single wall, by the omission of one of the members 17, 46, 48 or 51.

Where a door or window is inserted the total length of the wall may be tied together in any manner as, for example, shown in Figure 1, in which a single tie rod 18 spans a solid wall section and a door section, or as in Figure 7 in which one tie rod 22 is secured to a continuing and aligned tie rod 25 by means of a nut 24 or by other similar means.

It will be realized that whereas I have herewith shown and described a practical operative device, nevertheless many changes might be made in the size, shape, number and disposition of parts without departing from the spirit of my invention and I wish, therefore, that my showing be taken as in a sense diagrammatic.

The use and operation of my invention are as follows:

In general, three or four types of channel-like members will be shaped. There is thus the member 1, which when fastened together in pairs, forms the stud or post of Figure 5. There is the bottom channel member as shown in Figure 3, one form of top member as shown in Figure 2 and a modified form of top member as shown in Figure 6. With these three or four basic channel-like members the structure is built up.

First the members which form the studs are secured together in pairs by welding, bolting or otherwise, and the studs are assembled on a foundation or support. Wall members, either to produce a single or a double wall, are inserted, and the wall is tied together by tie rods in any desired manner. If desired the bottom and top of the wall may rest upon the bottom and top members of Figures 3 and 2, respectively.

Either or both of these bottom or top members may be omitted.

Whatever the details of the building or partition or structure, it comprises in the main a series of studs, such as that of Figure 5, and a series of wall members which may be closed or may provide openings of one sort or another, and the walls are then tied together by one or more tie rods which may extend clear through the length of a wall or be interrupted.

I claim:

1. A structural member formed of a plurality of sheet-like parts, secured together back to back, each of said sheet-like parts shaped to define a plurality of outwardly facing parallel walled grooves, adapted for the reception of wall members, and further shaped to provide an inwardly facing groove, which, when the two sheets are together, define a longitudinal closed cavity extending lengthwise of the unit and adapted to stiffen it and to receive a structural member.

2. A wall or the like, formed of a plurality of stud members, each of which is formed of a pair of channel-like members, secured together back to back, each channel-like member shaped to define in its outer face a pair of longitudinal parallel sided grooves, sheet-like wall members positioned in and filling said grooves and forming with said studs a wall, and retaining means joining a plurality of said studs and holding them and the sheet members together and forming a composite wall structure, said retaining means positioned within the space enclosed by said sheet-like wall members.

3. A wall or the like, formed of a plurality of stud members, each of which is formed of a pair of channel-like members, secured together back to back, each channel-like member shaped to de-

fine in its outer face a pair of parallel sided longitudinal grooves, sheet-like wall members positioned in and filling said grooves and forming with said studs a wall, and retaining means joining a plurality of said studs and holding them and the sheet members together and forming a composite wall structure, said retaining means positioned within the space enclosed by said sheet-like wall members, extending across a plurality of stud members and a plurality of wall members and securing all of them together.

4. A wall or the like, formed of a plurality of stud members, each of which is formed of a pair of channel-like members, secured together back to back, each channel-like member shaped to define in its outer face a pair of parallel sided longitudinal grooves, sheet-like wall members positioned in and filling said grooves and forming with said studs a wall, and retaining means joining a plurality of said studs and holding them and the sheet members together and forming a composite wall structure, said retaining means extending across a plurality of stud members, and a plurality of wall members and securing them all together.

5. A structural member formed of a plurality of sheet-like parts, secured together back to back, each of said sheet-like parts shaped to define an outwardly facing groove having two opposed parallel walls, adapted for the reception of wall members, and further shaped to provide an inwardly facing groove having two opposed walls parallel with the parallel walls of the outwardly facing groove, which, when the two sheets are together, defined longitudinal closed cavities extending lengthwise of the unit and adapted to stiffen it and to receive a building member and longitudinal mating, centering parts formed in each said sheet-like part between the grooves.

6. A wall or the like, formed of a plurality of stud members, each of which is formed of a pair of channel-like members positioned together in pairs, back to back, each channel-like member defining in its outer face a pair of longitudinal grooves, sheet-like members positioned in said grooves, and forming with the stud members a plurality of wall sections associated together to form a wall and retaining means effective upon a plurality of said sections to secure them and the said sheet-like members within them together and added finishing strips on said sheet-like wall members and secured to said stud members by fastening devices passing through said finishing strips and into said stud members.

7. A wall structure, including a stud having two pairs of open sided, parallel walled grooves, arranged back to back, abutting wall members inserted in and held in position by said grooves and forming a hollow wall, a web perpendicular to the wall, joining the pairs of pockets, a multi-walled closed pocket formed in said stud, two of the walls of said pocket being perpendicular to and two of them parallel with the wall members, said pocket being located between the web and one pair of open grooves.

8. A wall structure, including a stud having two pairs of open sided, parallel walled pockets, arranged back to back, abutting wall members inserted in and held in position by said pockets to form a hollow wall, a web perpendicular to the wall, joining the pairs of pockets, a closed pocket, two of the walls of which are perpendicular to and two of them parallel with the wall members, located between the web and one pair of open pockets, there being a plurality of such studs,

each engaging opposite edges of each wall member and means interposed between the webs for tying the studs together.

9. A wall structure, including a stud having two pairs of open sided, parallel walled pockets, arranged back to back, abutting wall members inserted in and held in position by said pockets to form a hollow wall, closed pockets formed in said stud, each located immediately adjacent one pair of open sided pockets and a web perpendicular to the wall members joining said closed pockets.

10. A wall structure, including a stud having two pairs of open sided parallel pockets arranged back to back in continuous contact with each other, abutting wall members inserted in and held in position by said pockets to form a hollow wall, a web perpendicular to the wall members joining the pairs of pockets.

11. A wall structure, including a stud having two pairs of open sided parallel pockets arranged back to back, abutting wall members inserted in and held in position by said pockets to form a hollow wall, a web perpendicular to the wall members joining the pairs of pockets, there being a plurality of such studs, each engaging opposite edges of each wall member and means interposed between the webs tying the wall structure together, as a whole.

12. A structural member comprising a flat sheet bent to form three parallel walled longitudinal grooves in one face and two parallel walled longitudinal grooves in the other face, the two last named grooves being intermediate the three first named grooves, the width of one of the three grooves being materially greater than the widths of the others all of said grooves extending longitudinally of the structural member.

13. A construction member comprising a relatively wide flat web bounded on each side by

grooves having two walls perpendicular to and one wall parallel with the web, there being in addition two grooves, one beyond each of the two first named grooves facing in opposite directions having one wall perpendicular to and the other parallel with the web, the web being wider than either of the grooves all of said grooves extending longitudinally of the structural member.

14. A wall structure, including a stud having two pairs of open sided parallel grooves arranged back to back in continuous contact with each other, abutting wall members inserted in and held in position by said grooves to form a hollow wall, a web perpendicular to the wall members joining the pairs of grooves, means associated with the webs and interlocking with them to prevent lateral movement of one web with respect to the other all of said grooves extending longitudinally of the structural member.

15. A wall structure, including a stud having two pairs of open sided parallel pockets arranged back to back, abutting wall members inserted in and held in position by said pockets to form a hollow wall, a web perpendicular to the wall members joining the pairs of pockets, means associated with the webs and interlocking with them to prevent lateral movement of one web with respect to the other, said means including longitudinal ribs and channels formed in the web.

16. A structural member comprising a flat web, two rectangular pockets whose opposed side walls are perpendicular to the web, one bounding each longitudinal side thereof, two pockets whose side walls are parallel with the walls of the first named pockets arranged outside of the first two mentioned pockets, the first two mentioned pockets being open toward one side of the web and the last two named pockets being open toward the opposite side of the web.

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