

[54] STUDS FOR DEMOUNTABLE PARTITION ASSEMBLY

1,852,042 4/1932 Dean..... 52/735 X  
2,005,146 6/1935 Kotreaty..... 52/580  
3,388,521 6/1968 Tillisch et al. .... 52/732

[75] Inventor: Maurice J. Marchello, Hickory Hill, Ill.

Primary Examiner—Price C. Faw, Jr.  
Attorney, Agent, or Firm—Samuel Kurlandsky, Esq.;  
Stanton T. Hadley, Esq.; Kenneth E. Roberts, Esq.

[73] Assignee: United States Gypsum Company, Chicago, Ill.

[22] Filed: Aug. 2, 1973

[21] Appl. No.: 384,820

[57] ABSTRACT

[52] U.S. Cl..... 52/732, 52/593, 52/735

Sheet metal studs in a demountable partition assembly are provided with tabs interlocking adjacent pairs of the studs at each joint against relative lateral movement, to prevent lipping at the panel joints. The tabs are resiliently retractable and are formed with angularly oriented outer surfaces to permit forcible retraction of the tabs by sliding a thin tool blade between a pair of such interlocked studs.

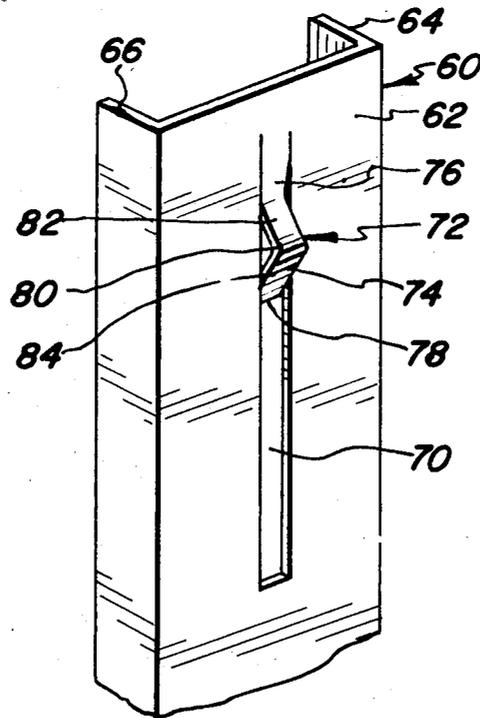
[51] Int. Cl..... E04c 3/07

[58] Field of Search ..... 52/732, 720, 730, 733, 52/735, 729, 593, 594, 578

[56] References Cited  
UNITED STATES PATENTS

930,610 8/1909 Pelton..... 52/363

5 Claims, 9 Drawing Figures



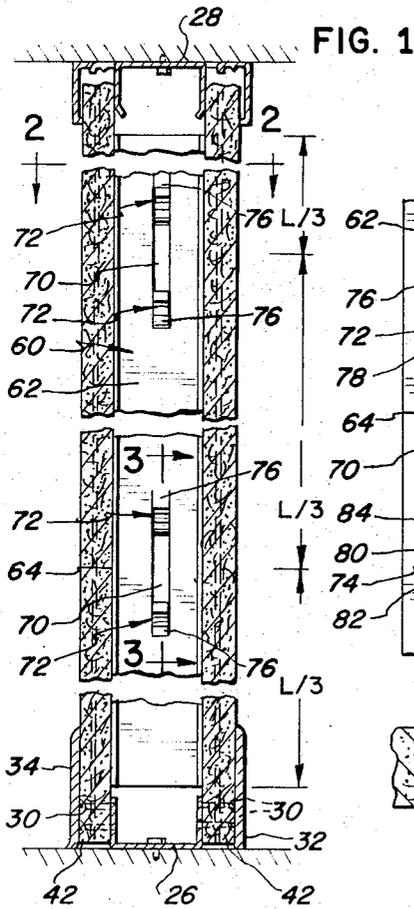
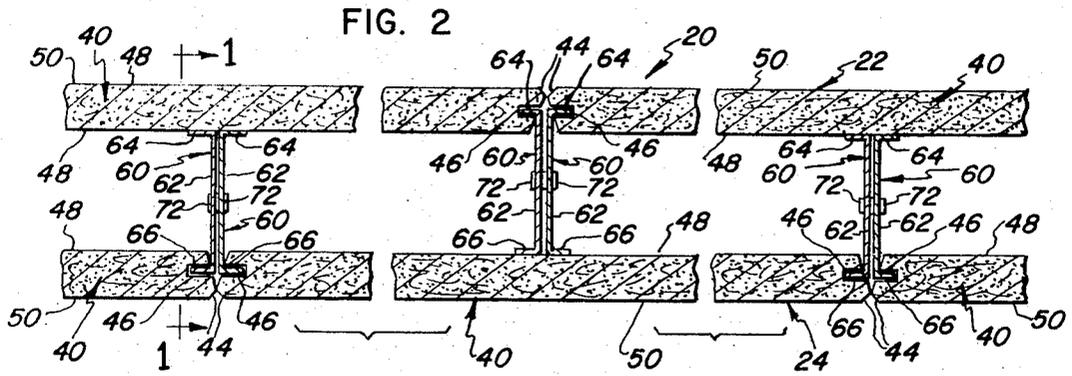


FIG. 3

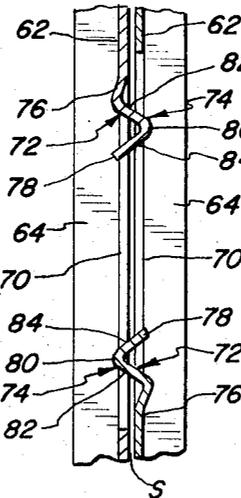


FIG. 4

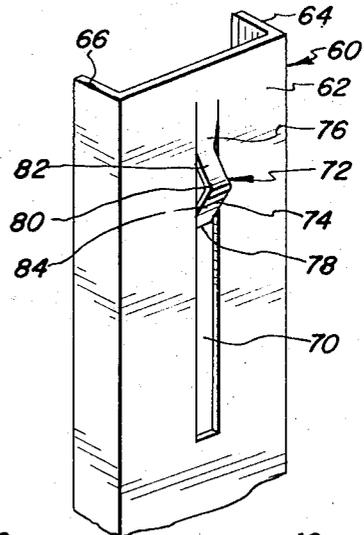


FIG. 5

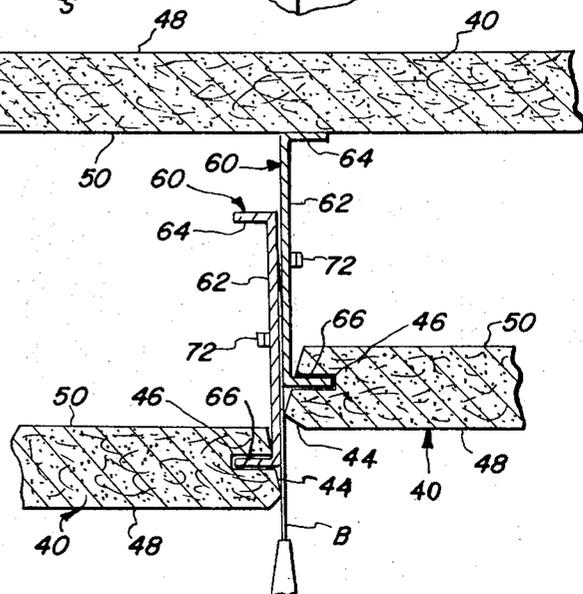


FIG. 6

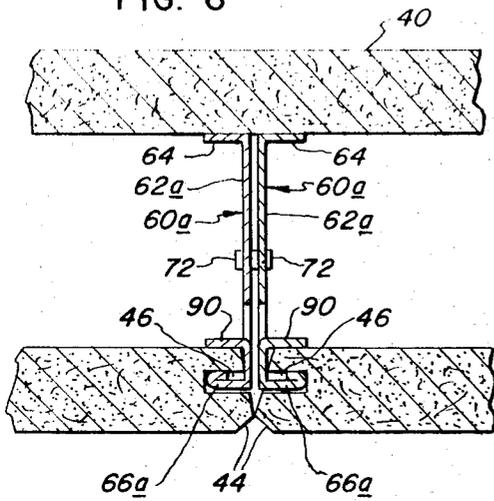


FIG. 7

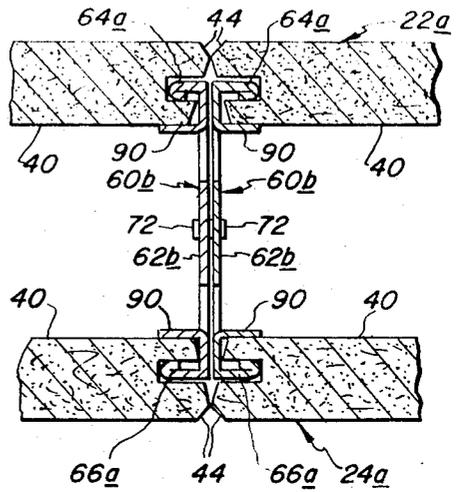


FIG. 9

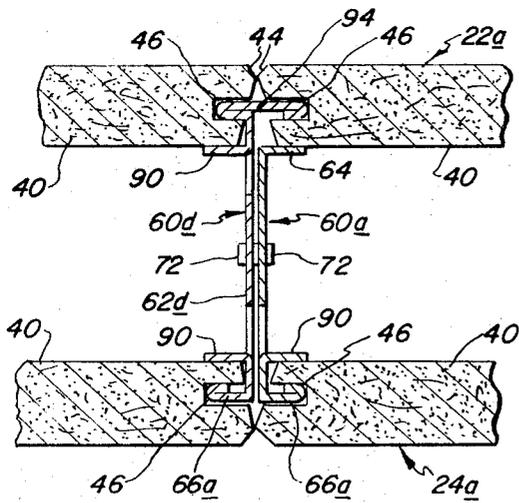
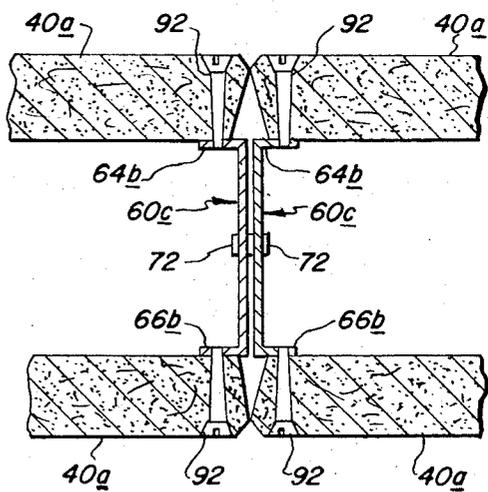


FIG. 8



## STUDS FOR DEMOUNTABLE PARTITION ASSEMBLY

This application relates to hollow wall partition assemblies of the type in which one or more panel units may be removed from the assembly, and more particularly pertains to improvements in assemblies of the type disclosed in U.S. Pat. No. 3,732,657 of Nels Nelsson, issued May 15, 1973.

Various demountable partition assemblies and components for such assemblies have been proposed heretofore. By way of example, some prior types of such assemblies are discussed in the aforementioned U.S. Pat. No. 3,732,657 as well as in the co-pending application Ser. No. 288,197 of Nels Nelsson, filed Sept. 11, 1972, and assigned to the assignee of the present application. Reference is also made to that patent and prior application for discussions of the demand for, advantages of and requirements to be met by such assemblies.

The particular problem and concomitantly the particular desirable characteristic to which the present invention is directed is to avoid so-called "lipping" in demountable partition assemblies. Where adjacent or abutting panels at a joint each are attached to separate studs, such as adjacent "C" studs, which are not secured together in mid-span, the inherent flexibility of the studs will permit some lateral displacement of each of the adjacent panels with respect to the other if a greater lateral force is applied to one panel than to the other. Moreover, the elastic strength of the studs may not be sufficient to return the displaced panel to a position of being precisely co-planar with the adjacent panel. Offset of the panels relative to one another normal to the planes of the panels, such as may result from the aforementioned displacement, is the condition known as "lipping" and is undesirable in that it creates an apparent discontinuity and shadow lines in a wall construction where a unified uniplanar appearance is desirable. Also, with some types of joint treatments, such lipping can cause damage or disarray to the joint treatment element or elements. Thus, and as is also pointed out in the aforementioned patent and application, it is desirable to provide a partition assembly which will maintain a fixed co-planar relationship between adjacent panels in a row, while providing removability or accessibility of individual panel units without removing or dismantling adjacent panel units.

Studs have been provided in the past which rely on lanced or struck portions of the webs and receiving openings in the webs of adjacent studs for interlocking with each other. Examples of such constructions are shown in U.S. Pat. Nos. 930,610, 1,821,015, 2,005,145, 2,010,848 and 2,075,773. However, in such previously proposed constructions, the interlocking portions have been designed for permanent interlocking engagement or require sequential installation and removal of the panel units. Such interlocking arrangements have not provided ready selective disengagement of individual panel units in the manner of the present invention. Such selective removability is highly desirable in various circumstances of demountable wall installations.

Accordingly, it is an object of this invention to provide improved demountable wall assemblies which overcome the lipping problem.

It is a further object of this invention to provide demountable wall assemblies which overcome the lipping

problem and in which individual panel units may be installed and removed selectively.

It is a further object of this invention to provide improved studs for use in demountable wall assemblies which meet the aforesaid objects.

It is a further object of this invention to provide for readily releasable positive interlocking engagement between adjacent studs in hollow wall assemblies.

It is a more specific object of this invention to provide an improved interlocking arrangement in sheet metal studs which permits economical production and installation of the studs and of demountable wall assemblies utilizing such studs while providing positive interlocking of pairs of adjacent studs and affording easy removability of individual panel units.

It is a more specific object of this invention to provide a positive blind lock arrangement comprising integral portions of adjacent studs, wherein each stud may be of uniform design, and which permits easy release of the locking arrangement.

Further and additional objects and advantages will appear, particularly to those skilled in the art, from the description, accompanying drawings and appended claims.

In carrying out this invention in one illustrative form, a hollow wall partition assembly is provided of the type having generally C-shaped studs which support wall panels along one or both longitudinal edges of the studs. A pair of such studs are positioned in back-to-back relationship at each joint, with the web portions of the studs adjacent to one another. The web of each stud member of such pair is formed with an elongated opening oriented with its major dimension parallel to the length of the respective stud member and overlapping the opening in the other member, and a locking tab is resiliently attached to the web portion of one stud member of the respective pair, with the tab being in registry with the overlapped openings and extending into the opening in the other stud member of that pair. The tab is of a width corresponding generally to the width of the receiving opening and engages the sides of that opening to interlock the pair of stud members against relative lateral movement. The tab is resiliently attached at one end to the web and is otherwise unattached, thereby being resiliently retractable into the opening in the first stud member. The locking portion of the tab which extends into the receiving opening is provided with sloping cam portions on each side extending from an outermost bight section to the attached end on one side and, on the opposite side, to a free distal end which terminates on the opposite side of the front plane of the web of the first stud member, for engagement by a tool inserted between the adjacent web portions to effect retraction of the tab by cam action.

For a more complete understanding of this invention, reference should now be had to the embodiment illustrated in greater detail in the accompanying drawings and described below by way of an example of the invention.

In the drawings,

FIG. 1 is a vertical section of a partition assembly employing teachings of this invention, as seen generally along line 1-1 of FIG. 2;

FIG. 2 is a fragmentary section taken along line 2-2 of FIG. 1;

FIG. 3 is an enlarged partial section taken along line 3—3 of FIG. 1;

FIG. 4 is a partial perspective view of a sheet metal stud of the type included in the assembly of FIGS. 1-3, and employing teachings of this invention;

FIG. 5 is an enlarged partial horizontal section view of a joint in a wall assembly as in FIGS. 1-3, illustrating a manner of assembly and disassembly of panel units; and

FIGS. 6, 7, 8 and 9 are enlarged horizontal section views of different embodiments of joints in wall assemblies, each also employing teachings of this invention.

The wall assembly illustrated and described herein is of the same overall type, construction and purpose as the wall assembly described and discussed in the aforementioned U.S. Pat. No. 3,732,657, and application Ser. No. 288,197, to which reference may be made. Accordingly, in the interest of brevity, the overall assembly and its basic functions and advantages will not be discussed in detail here. Moreover, terms used in this specification will be understood to have the same meaning and context as in the cited prior patent and application.

Referring now to the accompanying drawings, and more particularly to FIGS. 1 and 2, the partition assembly 20 comprises generally two spaced-apart, back-to-back parallel sides or rows 22 and 24 of partition members or panels 40. These partition members abut against or are confined within floor and ceiling runners 26 and 28, respectively, in a conventional manner. For example, screws 30 can be utilized to fix the bottom horizontal edges 42 of the partition members in place, with a base and attachment clip 32 or a single "top set" base 34 being used to cover the screws. The spacing of the two rows 22 and 24 is accomplished by the studs 60.

The individual partition members 40 illustrated in FIGS. 1 and 2 are conventional gypsum wallboard panels of any appropriate width and height, having horizontal edges 42 and vertical edges 44. The later edges 44 are formed with groove-like kerfs 46 extending approximately centrally thereinto, generally parallel to the planes of the major surfaces 48 and 50 of the members 40. The back surface portion 48 of the member 40 may be of slightly less width than the front surface portion, so as to taper the edges 44 inwardly from front to back, in a known manner. Because of the nature of the interengagement of the members 40 with the studs at the kerfs 46, the partition members preferably are formed from monolithic hard-edged fiberglass reinforced gypsum wallboard.

In accordance with teachings of this invention, at least some of the joints of the wall assembly 20 are of the type in which a pair of stud members 60 are positioned in back-to-back relation to one another, with each stud supporting the respective edge of one of the panels forming the joint. These two adjacent studs are interlocked in a manner as shown in FIGS. 1-3 to avoid relative lateral movement between the two studs and thereby to avoid lateral displacement of one of the panels relative to the other at the joint, i.e., so-called "lip-ping," while at the same time permitting ready disengagement of either of these studs from the other for selective removal and replacement of individual panel assemblies in the overall partition construction. As used herein, the terms panel assembly and panel unit refer

to a partition member together with the studs which engage and support that member. Such a panel assembly or unit normally is installed in and removed from the wall assembly as a pre-assembled unit or subassembly.

In the embodiment of FIGS. 1-5, each stud 60 is an elongated member of generally channel-shaped or C-shaped cross-section, comprising a web 62 and flanges 64 and 66 extending in one direction laterally of the web 62 from opposite longitudinal edges of the web. Each or both of the flanges 64 and 66 may be reverse bent to provide a double thickness for engaging in a kerf of a panel member, as will be referred to further below in discussing the embodiments of FIGS. 6-8.

The web 62 of each stud member 60 is formed with at least one elongated slot 70. A locking tab 72 is provided at one end of each of these slots, with the tab being resiliently secured to the web adjacent the respective slot and having a locking portion 74 of a width equal to or only slightly less than the width of the slot and extending in registry with the slot. The locking portion 74 normally protrudes beyond the forward or front plane of the web 62, in a direction opposite the direction of extension of the flanges 64 and 66. The tab is resiliently attached to the web 62 so that the tab, and particularly the locking portion 74, may be forcibly retracted or pressed into the respective slot 70, as will be referred to further below. In the preferred embodiment, the studs 60 are formed of sheet metal, e.g., so-called cold-formed steel studs of 25 gauge (about 0.021 inches) thickness sheet stock, the slots 70 are centered on the longitudinal center line of the respective studs, and the locking tabs 72 each have one end unitary with the web 62, being formed as strike-outs when forming the slots 70. As is seen particularly in FIGS. 3 and 4, each of the slots 70 is of a length considerably greater than the length of the respective locking tab 72, and in the preferred embodiment the length of each slot 70 is greater than twice the length of the tab.

Referring now particularly to FIGS. 3 and 4, one end of each tab 72 remains unitary with the web 62 at one end of the respective slot 70. The remainder of the tab is free and unattached, extending in cantilever fashion from the attached end in registry with the respective slot 70. As considered outwardly from the end or line of attachment to the respective web 62, each tab 72 includes a base portion 76, the intermediate or locking portion 74, and a distal end portion 78. The base portion 76 is bent normally extend slightly rearwardly relative to the outer face or plane of the web 62. The end 78 also is disposed rearwardly of the front plane of the web 62, as illustrated. The locking portion 74 extends outwardly or forwardly from the plane of the web 62 for interlocking engagement in a slot 70 of an adjacent stud as shown in FIG. 3. The portion 74 is U-shaped or V-shaped comprising an outermost bight section 80, a first side section 82 extending from the section 76 to the bight 80 and a second side section 84 extending from the bight 80 to the free distal end 78.

The sections 82 and 84 extend in opposite angular relationship and present outer surfaces having opposite angles of inclination relative to the plane of web 62. These surfaces serve as cam or wedge surfaces to effect forcible retraction of the locking portion of the tab into the web section 62 upon being engaged by a tool moved longitudinally of the stud member along the forward surface of web 62. The flexible attachment of the

tab to the web 62, as by being a unitary tab of sheet metal, is sufficiently resilient to permit retraction of the locking portion 74 into the respective slot 70 for disengagement of the locking portion from a slot 70 of an adjacent stud, and to automatically return the tab to its normal position when the retraction force is removed. Since sections 82 and 84 are inclined in opposite directions longitudinally of the stud, and the inward ends corresponding to section 76 and distal end 78 are disposed rearwardly of the front surface of web 62, a tool positioned immediately adjacent to or in contact with this web surface will properly and reliably engage the outer or cam surfaces of sections 82 and 84 and result in the described retraction of the tab 72 upon movement of the tool in either direction of movement longitudinally of the stud against the locking tab.

Section 76 must be of sufficient length to permit the tab 72 to flex for movement of the locking portion 74 as described above. Such length will of course vary with the particular sheet material. By way of example, with sheet steel of light gauge, such as 25 gauge, satisfactory operation is obtained with a tab having a section 76 of a length of about 1 inches, and a width of about one-fourth inch.

The tabs 72 and slots 70 are of substantially identical width, with the tabs being only slightly narrower as required for ready movement of the tabs into and out of the slots. Accordingly, when a tab 72 is engaged in a slot 70 of an adjacent stud, as shown in FIGS. 1-3, the two studs thereby are locked together in a manner to prevent relative lateral movement between the two studs and to prevent relative lateral movement between the panel members attached to these studs.

One or more slots 70 and locking tabs 72 of the type described may be provided over the length of each stud 60 as is found necessary to obtain a desired relative rigidity between interlocked studs, taking into consideration use conditions and loadings and the length and flexibility of the individual stud members. In a preferred embodiment, the slots 70 and tabs 72 are located so that the tab or tabs of one stud will be positioned in registry with the slot or slots of an identical stud upon simply reversing one of the studs relative to the other, i.e., end for end or side for side, when positioning two of the studs in web-to-web pairs as in FIGS. 1-3. This result is provided in one particularly advantageous manner by locating the slots symmetrically with respect to the transverse center line of each stud 60 as well as with respect to the longitudinal centerline, with each tab of each stud being located at the same end of the respective slot. The tabs thus are asymmetrically positioned, but with asymmetrical displacement which is equal and opposite to the asymmetrical displacement of the opposite end portion of each slot, whereby the tabs will register with such opposite end portions of the slots in a like stud as shown in FIGS. 1 and 3 upon reversal of one stud relative to the other. Such an arrangement permits forming the tabs as strikeouts when forming the slots, in a single stamping production operation.

A specific example of the foregoing is to provide two slots 70 and related tabs 72 on the longitudinal centerline of each stud, with the two slots located longitudinally at the one-third points of the stud, as illustrated in FIG. 1, i.e., a slot positioned with its center one-third of the length of the stud ( $L/3$ ) from each end of the stud. The slots 70 extend such that each tab is displaced

longitudinally from the respective one-third point a distance equal to the extent of the respective slot on the opposite side of the same one-third point. By such a symmetrical arrangement of the slots, with the concomitant asymmetrical but registering positions of the tabs, the described interlocking of the tabs 72 and slots 70 of adjacent studs may be obtained by the simple expedient of one stud of each pair being reversed end for end relative to the other stud of that pair, thereby providing the dual interlock arrangement shown in FIG. 3 at each one-third point. Other examples of symmetrical arrangements are to provide a single slot 70 at the center of the stud, i.e., centered on both the longitudinal and transverse centerlines, or to locate the slots similarly at the one-fourth points.

The wall assembly of FIGS. 1 and 2 is of the type in which one flange of each of the studs 60 supporting the partition members 40 of one row engages an edge portion of the partition member being supported by that stud, and the opposite edge flange of the stud simply abuts the inner surface of a partition member 40 of the opposite row. Thus the panel units of one row may be installed and removed independently of the installation and/or removal of the panel units of the opposite row, in the general manner described in the aforementioned patent and application with respect to so-called C-shaped studs. As shown, a pair of studs 60 are positioned with the outer surfaces of the respective webs 62 in face-to-face closely adjacent relationship to one another, or even in abutting contact, at each joint. Thus, the joint defined by the respective panel edges 44 is aligned with the interface between the adjacent webs 62 of this pair of studs.

FIG. 5 illustrates, somewhat schematically, how the interlocking tabs or lugs 72 may be retracted from the slots 70 for removal of an individual panel assembly unit from a complete wall assembly without disassembling adjacent units. The blade B of a thin-bladed tool, such as a broad knife or putty knife, is inserted through the joint between the adjacent edges 44 of two partition members and between the adjacent surfaces of the webs 62 of the two adjacent studs. The opposing webs 62 of each pair of studs usually are spaced apart slightly in an actual installation, as shown, see space S in FIG. 3, and therefore will permit insertion of the tool blade. Moreover, since the studs are not locked against relative movement normal to the web portions, the studs will flex sufficiently to admit such a blade therebetween even if the webs of an adjacent pair otherwise happen to be in actual contact with one another. Vertical movement of the inserted tool and hence of the blade B, i.e., longitudinally of the studs, will result in the inserted blade engaging the inclined section 82 or 84 of each locking tab and, by the application of force in this direction of movement, will cause retraction of each tab 72 by cam action of the blade on the engaged inclined surface. As each tab 72, or adjacent pair of tabs 72, are retracted, a slight lateral outward movement of the stud being removed will move the retracted tab or tabs out of registry with the respective opposing slot 70. Thereafter the other tab or tabs interlocking the pair of studs may be released progressively in the same manner. Alternatively, multiple tools may be utilized to simultaneously effect and maintain the necessary retraction of each tab 72 normally interlocking a pair of studs. Each individual locking tab 72 may be retracted in this manner by engagement of a tool against either

side section 82 or 84 of the tab, whereby the point of insertion of the tool and the direction of movement during engagement and retraction of the tabs is not critical.

The same technique may be followed when inserting a panel unit in an otherwise completed row of such units, the respective locking tabs being depressed as by a thin bladed tool until the respective opposed web sections overlie the tabs to maintain them in retracted positions. The panel unit then may be moved laterally into its alignment position, whereupon the tabs 72 automatically snap outward into the opposing registered slots 70 to lock the two studs in the alignment position, due to the resilience of the tabs.

The outer or cam surfaces of the sections 82 and 84 may extend at any appropriate angle which will conveniently provide the desired camming action. A range of about 30° to about 60° inclination relative to the plane of the outer surface of the web section 62 being appropriate.

The locking arrangement described with respect to the embodiment of FIGS. 1-5 is equally applicable to studs having support flanges of other configurations, provided that unobstructed access is afforded from one edge to and along the surface of web 62 from which the locking tabs project for insertion and unlocking movement of a tool, generally as described above.

Embodiments illustrating some alternative configurations and assemblies are shown in FIGS. 6-9. In these figures, parts which are the same as those referred to in FIGS. 1-5 are identified by the same numeral. Components which are similar but modified in some manner bear the same numeral with a distinguishing suffix letter.

In the embodiment of FIG. 6, the panels are supported by studs 60a in the same manner as in the embodiment of FIGS. 1-5. However, here the studs 60a are provided with reverse bent flanges 66a along one edge, to facilitate snug engagement in the kerfs 46. Reinforcing tabs 90 also are struck from the webs 62a, and are bent parallel to the flanges 66a for additional lateral support of the members 40 as described in the aforementioned patent and application. The two studs 60a may be identical, with one being reversed end for end relative to the other, as noted in describing the embodiments of FIGS. 1-5.

FIG. 7 illustrates a wall installation in which opposite partition members of the two rows 22a and 24a are supported by the same stud members 60b, with the stud members being interlocked in the manner described above. In such an assembly, the joints between partition members of the opposite rows are aligned with one another transversely of the wall. It will be appreciated that in this arrangement two opposite panel members 40 together with the stud members 60b at their vertical edges comprise one panel subassembly unit. Upon unlocking of the tabs 72 of the opposing studs 60b at the respective joints, in the same manner as described above, this entire subassembly may be removed, thereby effecting an opening through the wall assembly. Such an arrangement may be utilized where security against unauthorized passage through the wall assembly is not important, and is particularly advantageous in instances where it may become desirable to remove a panel unit for substitution of a different unit, such as in providing a doorway in an existing wall, or substituting partition members with differing surface

treatments or functional purposes, e.g., a chalk board or cork board surface. In this embodiment, the studs 60b are provided with reverse bent flanges 64a and 66a and with reinforcing tabs 90 along both edges. The studs 62b also are provided with symmetrically located slots and tabs for reversal as described above.

FIG. 8 illustrates a joint and wall assembly wherein panel units may be removed as described above with respect to FIG. 7. However, in this embodiment the partition members 40a are not kerfed, and the flanges 64b and 66b of the stud members 60c are of sufficient extent for attachment of the partition members by suitable fasteners such as wallboard screws 92. These studs also may be made reversible in the manner described with respect to studs 60.

FIG. 9 illustrates a joint assembly utilizing one stud 60d which has a double flange 94 along one edge for engaging the kerfs 46 of both partition members forming the joint in one row 22a, and a single flange 66a along the opposite edge for engaging the kerf in one panel of an aligned joint in the opposite row 24a. Reinforcing tabs 90 are provided for supporting the opposite partition members on the side of web 62d corresponding to flange 66a. A stud 60a engages the other panel by a flange 66a, as in the embodiment of FIG. 6, and has its opposite support flange 64 in abutting and supporting relation to the inner surface of the respective edge of the opposite partition member as shown. The two studs 60a and 60d are interlocked by tabs 72 in the manner described above, with the tabs being accessible by a tool only from one side of the wall assembly, corresponding to the side of flanges 66a. This arrangement provides the advantage of support of both rows of partition members by the same pairs of studs and affords selective removal of certain panel assembly units from one side of the wall assembly, while preserving the integrity and security of the opposite row against such ready removal.

It will be apparent, particularly to those skilled in the art that other modifications and embodiments of the structure disclosed herein may be made without departing from the spirit and scope of the invention. For instance, and without limitation, other panel configurations and other panel materials and manners of attachment may be used, as well as other flange configurations on the stud members, and various joint treatments such as decorative trim or covering strips at the joints.

As will be appreciated, improvements have been provided in demountable partition assemblies, and studs for such assemblies, which meet the aforesaid objects.

While particular embodiments of this invention are shown and described herein, it will be understood, of course, that the invention is not limited thereto, since many modifications may be made by those skilled in the art, particularly in light of the teachings outlined, illustrated and described herein. It is contemplated, therefore, by the appended claims, to cover any such modifications as fall within the true spirit and scope of this invention.

What is claimed is:

1. An elongated support member for use in a partition construction, comprising an elongated web and a flange along at least one longitudinal edge of said web, said web being formed with an opening therethrough, a locking tab having one end resiliently attached to said

web adjacent said opening and extending longitudinally of said web from said one end as an otherwise unattached cantilever in registry with said opening, said tab including an intermediate locking portion projecting outwardly from the plane of one side of said web and a distal end portion terminating on the opposite side of such plane, said intermediate portion being adapted to be moved into said opening upon flexure of said resilient attachment, said intermediate portion including oppositely inclined outer surfaces extending longitudinally of said tab and positioned to be engaged by a tool moved along said one side of said web in either direction longitudinally of said web for displacing said tab into said slot by cam action in response to such tool engagement and movement, and said support member being of a configuration permitting unobstructed access of such a tool to said locking portion from one longitudinal edge of said web along said plane of said one side.

2. A support member as in claim 1 formed of sheet

25

30

35

40

45

50

55

60

65

metal and wherein one end of said tab is unitary with said web portion at one end of said opening.

3. A support member as in claim 1 wherein said web portion of said member is formed with a plurality of said openings and is provided with one of said tabs at one end of each said openings, each of said openings being of an extent beyond the respective tab to receive another such tab therein, said openings being symmetrically positioned relative to the longitudinal centerline and to the transverse centerline of said member, and each of said tabs being at the same end of the respective opening.

4. A support member as in claim 3 wherein said openings are positioned on such longitudinal centerline.

5. A support member as in claim 4 wherein each of said openings is elongated and is oriented with its major dimension parallel to the length of said member.

\* \* \* \* \*

UNITED STATES PATENT OFFICE  
CERTIFICATE OF CORRECTION

Patent No. 3,844,085 Dated October 29, 1974

Inventor(s) Maurice J. Marchello

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Col. 4, line 49, after "bent", insert -- to --.

Col. 6, line 27, after "of", insert -- the --.

Col. 10, line 6, after "each" (first occurrence),  
insert -- of --.

Signed and sealed this 14th day of January 1975.

(SEAL)  
Attest:

McCOY M. GIBSON JR.  
Attesting Officer

C. MARSHALL DANN  
Commissioner of Patents