

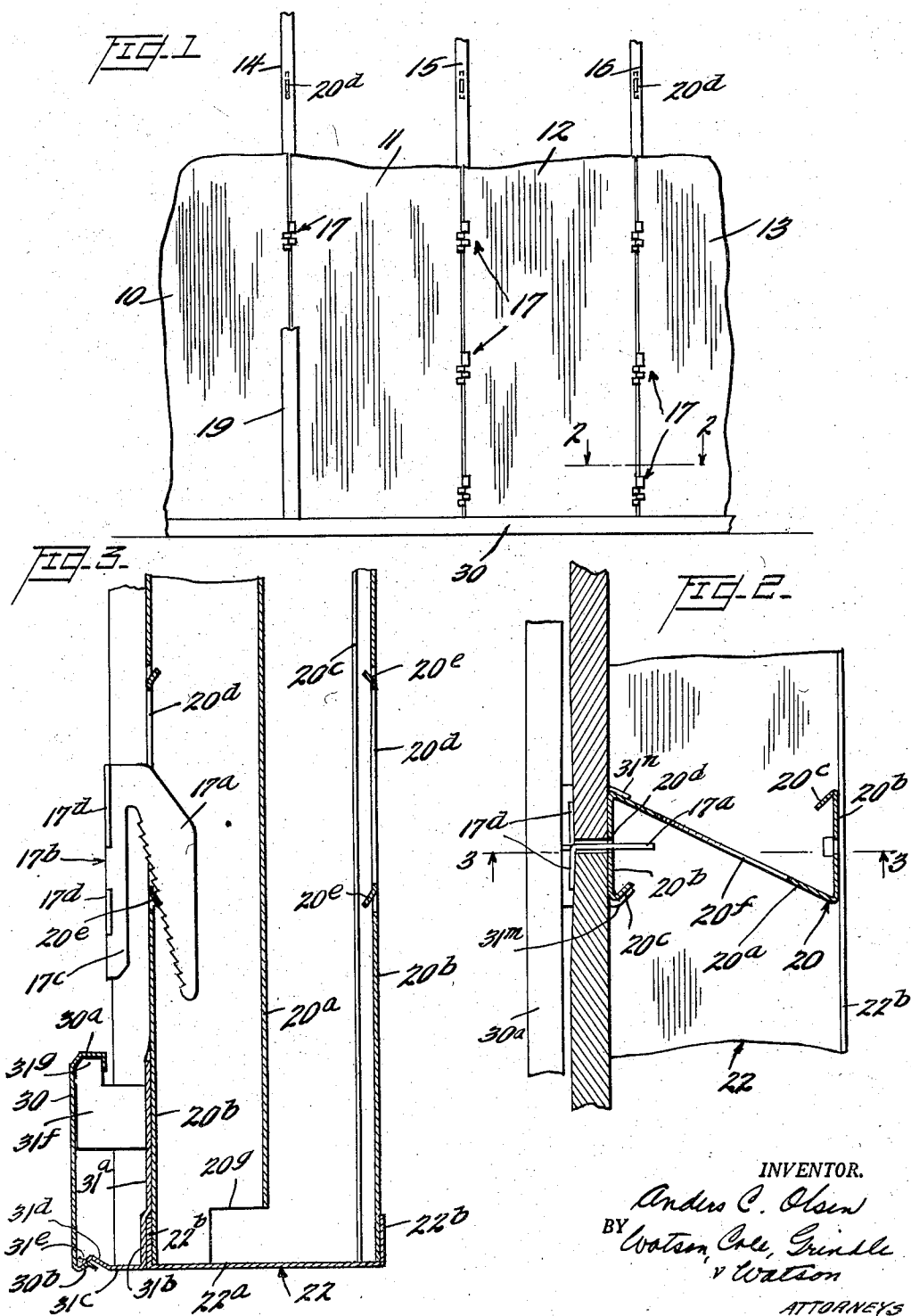
April 14, 1959

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BUILDING STRUCTURE

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Original Filed Aug. 23, 1948

2 Sheets-Sheet 1



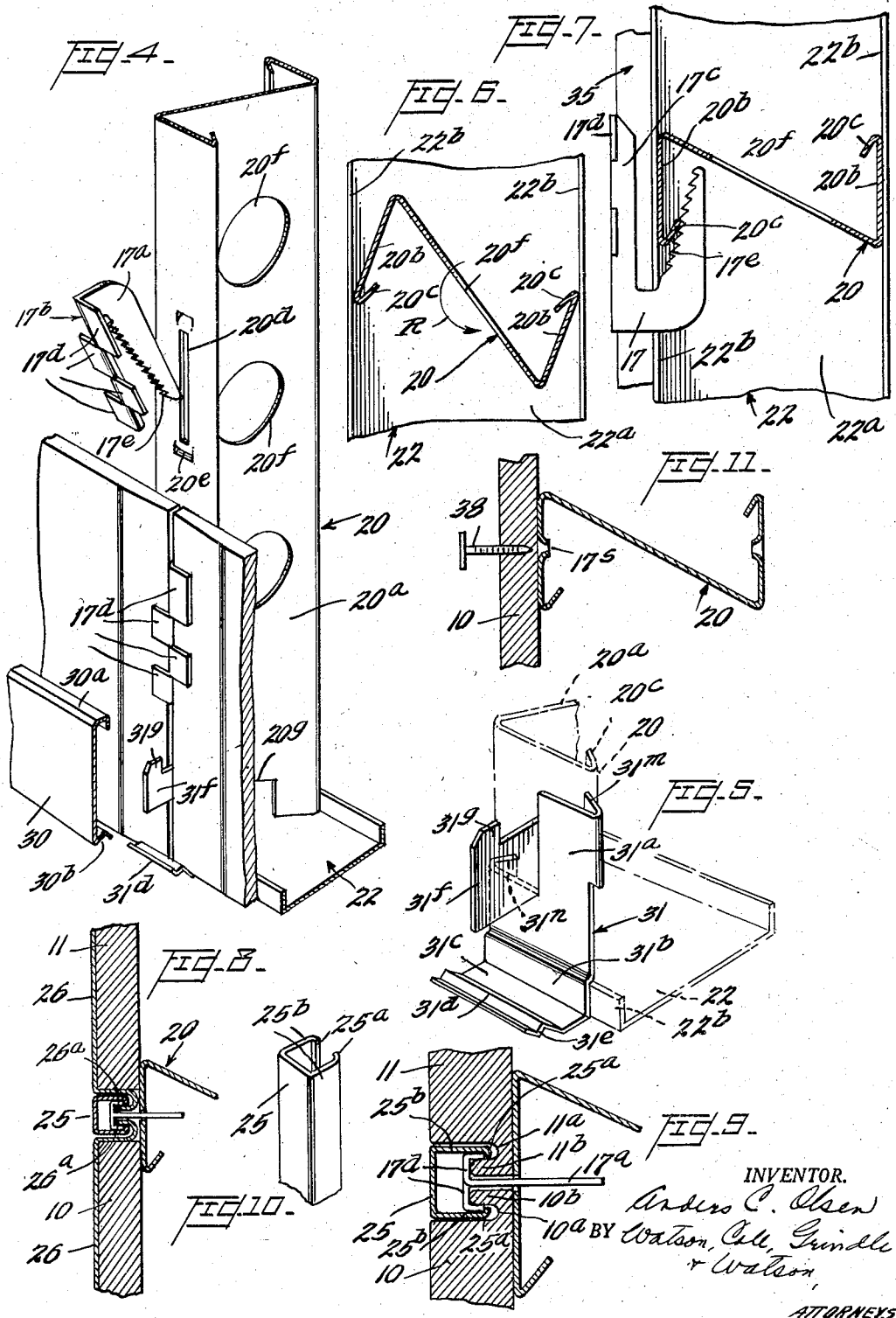
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BUILDING STRUCTURE

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Continuation of abandoned application Serial No. 45,595, August 23, 1948. This application April 12, 1954, Serial No. 422,333

4 Claims. (Cl. 189—34)

The present invention relates to building structures and particularly to wall and partition structures of the build-up panel type, and is a continuation of my co-pending application for "Building Structures," Serial No. 45,595, filed August 23, 1948, now abandoned.

The demand for fire resistant, light weight and readily assembled building structures has brought about various suggestions for the improvement of partition wall structures, particularly where the partitions are not of the load-bearing variety but are provided for the purpose of dividing floor space into rooms and corridors. The present invention relates primarily to a wall or partition structure of this non-load-bearing type and has for its object the provision of such a wall structure which is fire resistant, light in weight, structurally strong, which does not readily permit the passage of sound from room to room, and which may be easily assembled and disassembled.

The wall structure comprises a number of parts which are united by securing devices other than nails and screws and which devices, while holding the wall assembly intact and binding its several elements into one rigid structure, permit disassembly without injury to any of its major parts. Dismantling and removal of a wall or partition constructed in accordance with the invention may be effected with almost the same ease as the wall was erected in the first instance and the various panels, studs, securing devices, etc., which together comprise the structure may be transported to a new location and the walls re-erected in a minimum of time.

The number of securing devices employed in the erection of the wall is reduced to a minimum. Ordinarily the vertically extending main members of a wall or partition are positively attached at their upper and lower ends to the overhead and floor structures of the building in which the wall is erected. In the case of the present structure, however, the floor and overhead structures of the room in which the partition is to be erected are provided with stud engaging runners, preferably channels, and the several studs are, at least at their ends, somewhat resilient in cross section so that, when placed in operative position, oppositely facing surfaces of the end of a stud press closely against the mutually facing surfaces of a runner, the stud being in effect prevented from movement only by reason of its frictional engagement with the upper and lower runners. After the wall structure has been completed, however, the studs are positively locked against movement by the coaction of the panels of the wall covering, the individual panels thereof being locked to the several studs and the assembly thus united into one rigid structure.

More particularly, the present invention contemplates the provision of a wall structure which by virtue of the novel structure of the stud employed therein is capable of almost universal application, regardless of whether the partition to be erected extends vertically or horizontally. This desideratum is achieved by providing the studs with alternative means for cooperating with spe-

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cially designed panel securing devices, in one case the devices extending longitudinally of the stud and in the other, transversely of the stud. Thus, with the present invention it is not essential that a builder stock a variety of studs and securing devices as a stud constructed in the manner disclosed herein may be satisfactorily employed in virtually any position necessary to the construction of a partition and the improved securing device will cooperate with the stud in any of such positions.

By way of example, one embodiment of the improved wall structure is illustrated in the accompanying drawings, modified forms of several of the individual elements of the assembly being illustrated to indicate the possibility of modification in detail.

In the drawings:

Figure 1 is a side elevation of a portion of a wall or partition structure embodying the invention;

Figure 2 is a section on line 2—2 of Figure 1, upon a larger scale, showing one of the studs in horizontal section;

Figure 3 is a section on line 3—3 of Figure 2;

Figure 4 shows in perspective portions of two adjacent wall panels and the metal supporting members which serve to maintain the panels in position;

Figure 5 is a similar view, many of the portions having been omitted in order that a base clip for supporting a base strip or base board at the bottom of the partition may be more clearly perceived;

Figure 6 is a plan view of one of the runners showing in section one of the studs, the stud being shown in one position which it may occupy during assembly;

Figure 7 is a generally similar view showing the final relationship of the stud and runner and likewise showing the somewhat different relationship of panel and securing means to the stud than is shown in Figures 1 to 4 inclusive;

Figure 8 is a section generally similar to Figure 2 through a modified form of partition;

Figure 9 is a similar section through a still further modified form of partition;

Figure 10 is a perspective view of a detail; and

Figure 11 discloses one of the studs in horizontal section a somewhat different means for attaching a panel to the stud being indicated.

A typical wall structure of the type contemplated by the invention includes a plurality of relatively large pre-formed panels, preferably fabricated of plaster, gypsum board, asbestos or other fireproof material, and in Figure 1 of the drawings portions of four such panels, which are indicated at 10, 11, 12 and 13, are shown. These panels may vary in area, shape and composition within wide limits and such variations may be freely permitted in erecting the partition structure since the spacing of the studs may be varied at will. Preferably the panels are positioned with their longer dimensions extending vertically but they may, nevertheless, be disposed horizontally, the adjacent longer sides of two superposed panels separated by a narrow horizontally extending space instead of by a vertically extending space as shown in Figure 1.

Studs are indicated at 14, 15 and 16 in Figure 1 and securing devices at 17, all of these securing devices being identical. A base strip or board is indicated at 30 and short section of a snap-on molding, which may be employed to cover up the securing devices and the gaps between adjacent panels, is indicated at 19. The snap-on moldings 19 may or may not be used and, if not used, the partition is usually finished with a coat of plaster. When the molding is used the wall appears to have vertically elongated, narrow strips at equally spaced intervals, the effect being decorative.

One of the studs employed in the partition structure

is indicated at 20 in Figures 2, 3, and 4 and it will be observed that the stud is, in horizontal section, shaped like the letter Z with a diagonal web 20a, parallel flange members 20b, the free edge of each of which is bent over to form a narrow marginal flange, these marginal flanges being indicated at 20c. The studs are fabricated of sheet metal and may be said to be resilient in cross section. Thus the flange portions 20b of the stud may be flexed relatively to the diagonal 20a by the application of pressure to their free edges. This resiliency may be advantageously employed in the erection of the partition, in a manner to be hereinafter wholly described.

One of the runners is indicated at 22 in Figures 3, 4, 6 and 7, this runner being that which is intended to be secured to the floor upon which a partition is to rest. It comprises a flat web portion 22a and parallel upwardly extending flanges 22b, these flanges comprising elements for limiting the lateral movement of the lower ends of the several studs used in the partition. A similar runner (not illustrated) is disposed directly above runner 22 and disposed parallel to runner 22, the flanges of the runner thus attached to the overhead structure extending downwardly. The lower end of each stud is received within the lower runner and the upper end of each stud engages the upper runner in a similar manner, the relatively movable flanges 20b of the studs pressing outwardly against the inner faces of the runner flanges and each stud being held in vertical position, after having been thus assembled, by the frictional engagement of the outer surfaces of its flanges 20b with the inner surfaces of the flanges of the runners. No securing means of positive character is needed to secure the studs in vertical position and in properly spaced relationship during assembly and, when the wall is finally completed, the whole structure, including the studs, is so locked together that the studs may not move.

In assembling a stud with the upper and lower runners, it may first be moved into substantially vertical position with its lower end between the opposed flanges 22b of the lower runner and its upper end between the corresponding opposed flanges of the runner secured to the overhead structure. Thus it may be caused to occupy the position in which it is shown in Figure 6 and, when manually revolved in the direction of the arrow R, the flange portions 20b will first be flexed inwardly and will thereafter return to their original positions, as indicated in Figure 7, the outer surfaces of these flange portions pressing tightly against the inner surfaces of the runner flanges 22b. The static friction between the ends of the studs and the upper and lower runners is sufficiently great to hold the studs in position after the assembly operation described has been completed.

Each flange 20b of the stud is provided with a plurality of slots 20d extending longitudinally of the stud and just above and below each slot is a small aperture which is caused by the striking up from the flange of a small tongue which comprises a catch 20e. The web 20a of each stud is provided with a number of openings, such for instance as 20f, these openings preferably being circular and serving to lighten the weight of the stud without injury to its effectiveness as a wall supporting member. At its lower end each stud is cut away as at 20g to provide an aperture through which wires may be passed. The securing devices 17 are the type intended to apply pressure against the outer faces of the panels to be supported.

Each of the securing devices 17 comprises a stud engaging portion 17a and a panel engaging portion or head 17b and when in use functions to draw the edges of two adjacent panels into close contact with the outer face of one of the stud flanges 20b and to maintain that contact during the life of the partition. Each such device 17 is preferably fabricated by stamping and bending operations from a single piece of sheet metal. The panel engaging head 17b has a rib portion 17c in the plane of the stud

engaging portion 17a and panel face engaging flanges 17d, in the form shown, there being four such flanges, alternate flanges extending in the same direction from the rib 17c and adjacent flanges in opposite directions from this rib, this formation being brought about by slitting the securing device as it comes from the stamping machine along three parallel lines normal to the rib 17c and bending the alternate tongues in opposite directions into a plane normal to the rib.

The stud engaging portion 17a and the rib 17c together define a notch in the form of an inverted V and the relatively inclined stud engaging edge of the wedge portion 17a is serrated, as indicated at 17e. The teeth or serrations 17e are so formed that, when the securing device is forced into its operative or panel securing position as shown in Figure 3, one or the other of these teeth will engage the lower edge of the tongue 20e of the associated stud, as illustrated in Figure 3. The securing device may therefore not recede from its operative position. Should looseness occur for any reason during the period of useful life of the partition, the securing device 17 may be forced downwardly until the free edge of the tongue 20e is engaged by another notch of the series of notches 17e and the structure will be tightened. Inasmuch as it is to be desired that either end of any stud may be placed uppermost or lowermost, each stud is provided with two spaced tongues or catches 20e, one at each end of the slot 20d provided for the reception of the stud engaging portion of the securing device. In the erection of a partition embodying studs and securing devices of the type described, therefore, either end of any stud may be placed uppermost in the wall structure.

In Figures 1 through 4 of the drawings the panels are shown to be of substantially equal thickness throughout, with the marginal portions tapering slightly only toward the edges thereof, this tapering being shown in Figures 2 and 4, and being almost imperceptible when the partition is viewed from the front. Under certain circumstances, however, it may be desired to cut away the vertical margins of the panels as illustrated in Figure 9 and to provide securing devices of special type and to cover the heads of the securing devices and the slots between adjacent panels by molding strips which extend from floor to ceiling, the outer face of each such molding strip being flush with the plane of the outer face of the panels.

Thus in the modified form of the invention disclosed in Figure 9, each of the adjacent edges of panels 10 and 11 is shown to be deeply grooved, the grooves being indicated at 10a and 11a, panel marginal beads or ribs 10b and 11b being left for engagement by the heads of the securing devices. The securing devices employed in this instance to secure the panel margins to the associated stud is formed in the manner previously described and illustrated in Figures 3 and 4 but the ends of the flanges 17d of the head are bent into parallelism with the rib 17c and wedge portion 17a so as to extend around and embrace the oppositely facing surfaces of the panel ribs 10b and 11b. The snap-on molding 25 is so formed in section that, when the inturned free edges 25a of the parallel flanges 25b thereof are in the position shown in Figure 9, they lie in rear of and interlock with the rearwardly facing edge surfaces of the flanges of the head of the securing device and the molding is thus locked in the position in which it is shown. The outer face of the molding 25 is flush with the outer faces of the panels 10 and 11 and the heads of the securing devices and the gap between adjacent panels is completely concealed. A wall surface of panels so secured, with the intermediate moldings 25, may be painted and will then appear as one unbroken surface.

It is sometimes desired to provide partition structures in which the various panels are faced with metal and the joint between adjacent panels of a metal faced partition is illustrated in horizontal section in Figure 8. The edges of the panels are not grooved or tapered as in the forms

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of the partition structure previously described, the securing devices are the same as those employed in the modified form of the invention illustrated in Figure 9 and the snap-on molding or trim 25 is formed in substantially the same manner as that illustrated in Figure 9 and engages and interlocks with the head of the securing device in the same way. Metal facings for the panels are indicated at 26 and it will be observed that the margin of each such metal facing is turned around the panel edge and extends substantially to the face of the stud, being then turned laterally and forwardly so that its terminal edge 26a is embraced and confined by the flanges of the separately formed head of the securing device. The terminal flanges 26a of the metallic facing plates 26 of the form of the invention shown in Figure 8 therefore correspond to the terminal ribs 10b and 11b of the panels 10 and 11 shown in Figure 9. The metal faced partition may be painted or not as desired. If painted the surface will appear to be continuous and if left unpainted will appear to be a substantially continuous metal surface, the small crevices between the panel facings 26 and the snap-on molding 25 being hardly perceptible.

The metallic strip, indicated at 30, may be positioned horizontally at the floor level so as to resemble the normally used base board and this strip is supported by means of a special base clip which is generally indicated at 31 in Figure 5. It comprises a flat portion 31a of substantial area which is adapted to engage the face of the Z-shaped stud with which it is associated, face 31a having a lower offset portion 31b to provide space in the plane of the portion 31a for the upturned flange 22b of the bottom runner 22. Integral with the offset portion 31b is an outwardly extending floor engaging flange 31c which terminates in a spring tongue 31d having a downturned rib 31e which serves as a catch for the lower edge of the base strip 30. A forwardly extending flange 31f, disposed normally to the flat portion 31a of the clip is provided with an upwardly extending part 31g which is designed to also engage the base strip 30 and support the same.

In Figure 3 the relationship of the base strip 30 and its supporting clip may be clearly perceived, the base strip having a turned-over upper margin 30a which embraces the upwardly extending part 31g of the clip 31 and likewise having an intumed lower flange 30b with an upturned annular rib adapted to underlie the resilient flange 31d of the clip 31, the rib 30b being forced past the rib 31e of the clip 31 and rib 31e serving as a catch owing to the resiliency of the tongue portion 31d of the clip, the base strip 30 thus being retained in position.

It will be understood that one of the clips 31 will be affixed to the lower end of each stud so that the base strip 30 will be supported at a number of points along its length. Each of these clips 31 is maintained in the position in which it is shown by reason of the fact that the portion 31c thereof rests directly upon the floor and the clip is provided with vertically spaced flanges 31m and 31n which extend around and embrace the stud, flange 31m embracing the terminal rib 20c of the stud and flange 31n closely engaging the web 20a of the stud. The clip is applied to the stud by placing the flat portion 31a against the face of the stud while the clip as an entirety is arranged diagonally with respect to the stud so that the flanges 31m and 31n clear the edges of the stud. The clip may then be turned so that the flanges 31m and 31n are in stud embracing position and then slid downwardly until portion 31c engages the floor whereupon it is definitely positioned. From an inspection of Figures 3 and 4 it will be observed that the lower edges of the corners of adjacent panels rest upon the upper surface of the horizontal flat portion 31c of the clip 31 and the clip is further held in position by the very considerable pressure exerted by these panels.

As shown in Figure 7 a partition embodying the novel stud and panel securing devices may be built up with the panels so disposed that their greatest dimensions are horizontal instead of vertical, the securing devices being

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inserted through horizontal gaps or spaces between superposed panels instead of between vertically extending parallel edges of the panels as before, such an arrangement being illustrated in Figure 7. In this figure the upper edge surface of a panel is indicated at 35, the panel securing device at 17, and stud at 20, the serrated edge 17e of the securing device engaging the rib 20c of the Z stud and a tooth of the serrated edge engaging the edge of the rib 20c. A primary purpose of the flange 20c of the stud 20 is to engage the securing device 17 in the manner described when it is desired to erect a partition structure with the major axes of the panels horizontally disposed.

At various points in the erection of a partition embodying the elements described it may be necessary to place studs intermediate the panel edges and to secure panels to such studs. In cases such as this the securing devices 17 may not be employed and it is necessary to pass securing devices through the panels and into the studs. A simple arrangement for making this possible is illustrated in Figure 11, the stud illustrated in section in that figure being shown to be vertically slotted as at 17s, the margins of the slots being intumed as shown. A securing device such as a nail or screw 38 may be passed through the panel 10 and forced through the slot 17s, which is relatively narrow as compared with the diameter of the securing device 38, the securing device being thus firmly clamped by the stud after having been positioned. It will be appreciated that this method of securing the panels to the studs will be employed only where necessary, the edges of the panels being secured to the studs by the securing devices 17 and, in the ordinary case it being necessary only to secure the panel edges in order to obtain a partition structure of entirely satisfactory type and amply strong for the purpose intended.

It is believed that the operations which must necessarily be performed in the erection of such partition structure have heretofore been made clear. After it has been determined that a partition of the type described shall be erected in a certain location the lower and upper runners 22 will be affixed by suitable securing devices, these runners being generally in parallelism and one directly above the other. The Z studs are then positioned one by one at the proper intervals, either being applied by vertically positioning each successive stud with the web and flanges as shown in Figure 6 and then rotating the stud in the manner previously described, to its final position, or by properly locating one end of the stud while the stud is in an inclined position and thereafter swinging the stud about its located end to a vertical position in the plane of the runners. The several studs when so erected frictionally grip the runners and maintain their positions during the application of the panels and base board and, as previously explained, after the partition has been completed the studs are held beyond all possibility of movement by the panels and the securing devices which connect the panels and studs. Such a partition comprises a minimum number of parts and the parts are of simplest nature. The partitions therefore are of low cost in so far as material is concerned and a minimum amount of labor is necessary for its erection. The resulting structure is fire resistant, may be insulated and sound proofed by the application of mineral wool and the like between two parallel layers of panels and, as previously explained, may be readily disassembled and shifted to a new position. Naturally, in adapting the invention to various situations minor details of its component elements may be varied to meet existing circumstances.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. In a wall structure at least one longitudinal metallic stud having a pair of spaced parallel planar flange members, a web member extending between said flange members, a short lip extending inwardly from at least one edge of each of said flanges, each of said flanges having

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longitudinal slots therein and at least one lip bent up therefrom adjacent one end of each of said slots; a plurality of panels mounted end to end on at least one side of said stud with marginal portions overlapping one of said flanges, one surface of said marginal portions being in contact with the outer face of said flange; and a plurality of clips for maintaining the panels in position, said clips being in contact with at least portions of the edges of adjacent panels on the side thereof opposite said flange and engaging the lips of said flange, at least one of said clips being in engagement with the short lip at the edge of the flange and at least one clip being in engagement with the bent-up lip adjacent the slot ends.

2. The structure as in claim 1 wherein each of said clips comprises panel edge engaging flanges disposed in a plane parallel to said stud flange and a tongue extending perpendicular to said panel engaging flanges between the panel end and rearwardly of said stud flanges, the edge of said tongue proximate to said panel engaging flanges being inclined away from said flanges and serrated for engagement with said lips.

3. A wall structure comprising a series of metallic stud members disposed parallel to each other, each of said members having two spaced parallel planar flange members, a web formed integrally with said flanges and extending angularly between opposite edges thereof, the remaining edges of said flanges being reversely bent to provide short lips extending in a direction generally opposite to that of said web, longitudinal apertures at spaced locations in said flanges, lips bent up from said flanges adjacent the ends of said apertures, said lips extending inwardly from said flanges and away from said slots;

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panels arranged in a plane on at least one side of said stud members and having one surface of two adjacent edges of each pair of panels in contact with a flange on said one side of the studs; and a plurality of identical clips for securing the panels, each of said clips having a portion overlapping and in contact with adjacent panel edges on the other surface of the panels and another portion extending inwardly between the panels and engaging a lip on one of said flanges, at least one of said clips being in engagement with a lip at the edge of one of the flanges and at least one of said clips being in engagement with the lip adjacent the aperture end on one of said flanges.

4. The structure as in claim 1 wherein each of said clips comprises a central rib, flanges disposed in a plane and extending on either side of said rib, a tongue connected to said rib at one end thereof and extending toward the other end thereof, the plane of said tongue being perpendicular to the plane of said flanges, the inner edge of said tongue being inclined away from said rib and provided with serrations whereby said tongue is adapted to wedge with said lips and to be locked in place by the engagement of said serrations with said lip.

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