

May 2, 1939.

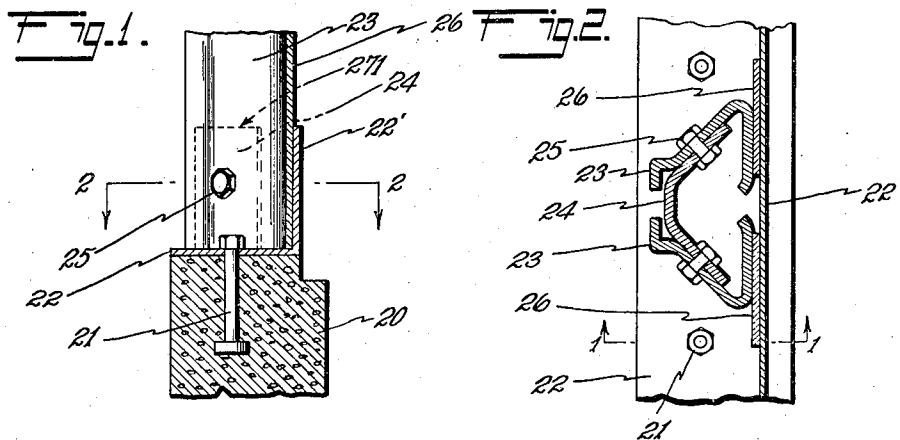
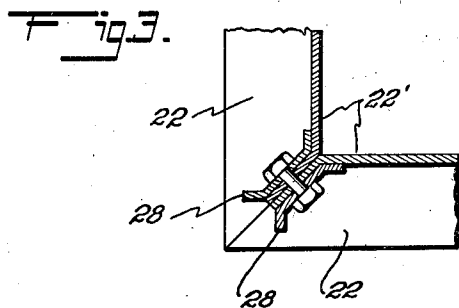
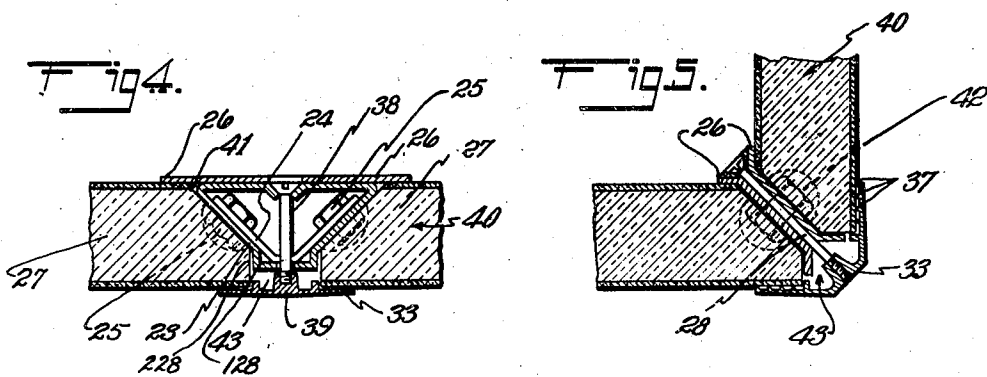
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2,156,347

STUD AND LIKE ELEMENT

Filed June 8, 1935

2 Sheets-Sheet 1



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Fig. 6.

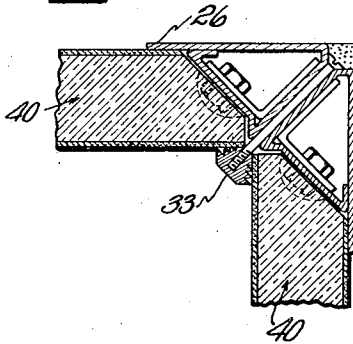


Fig. 7.

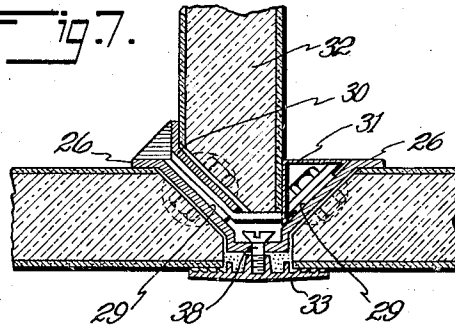


Fig. 8.

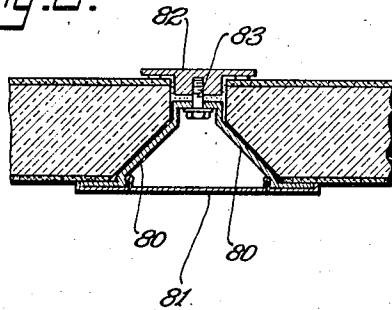


Fig. 9.

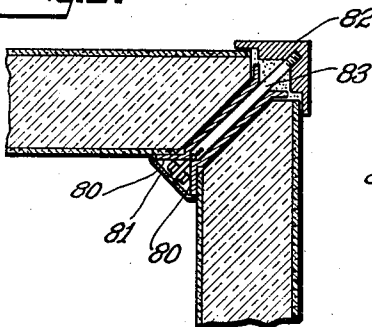
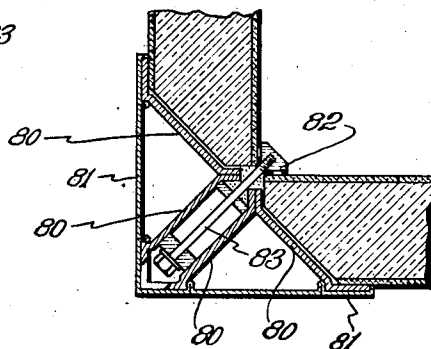


Fig. 10.



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2,156,347

STUD AND LIKE ELEMENT

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Application June 8, 1935, Serial No. 25,581

11 Claims. (Cl. 189—34)

This invention relates to improvements in studs and like elements and to improvements in co-operating wall panel elements, and more especially relates to the employment of such structures in connection with prefabricated houses and prefabricated building construction.

An object of the invention is to provide co-operating stud and wall panel elements which may be readily formed and economically manufactured, and which when embodied in a building structure require a minimum of labor to erect.

A further object is to provide by the use of the improved stud and wall elements of the invention a building structure which may be readily altered as to form or changed in plan or dimension.

A still further object of the invention is the provision of a stud element having a cross section roughly that of a right-angled triangle, and the provision of cooperating wall panel elements so shaped as to provide a maximum of insulation when formed into a building structure with said studs.

A still further object is to provide in a prefabricated house structure employing wall panels of substantially uniform width supported by stud elements, studs and cooperating wall panels of such conformation and shape that the space between the outer surfaces of adjacent wall panels is reduced to a minimum, whereby the cost of cover plates or battens for the joints between adjacent wall panels is reduced to a minimum and the insulating properties of the structure generally through the studs and adjacent elements is substantially increased.

A still further object of the invention is to provide a frame and more particularly a stud construction for a prefabricated house which is adapted to have outside corners, inside corners and like sections and to receive and secure co-operating closure or wall panel elements without the necessity of cutting or shaping the closure elements.

Other objects of the invention will in part be obvious and will in part appear hereinafter.

The invention accordingly comprises an article of manufacture possessing the features, properties, and the relation of elements which will be exemplified in the article hereinafter described and the scope of the application of which will be indicated in the claims.

For a fuller understanding of the nature and objects of the invention reference should be had to the following detailed description taken in

connection with the accompanying drawings, in which:

Fig. 1 is a view in vertical section showing the manner in which the stud assemblies may be connected to the sill member and the manner of fastening the sill to the foundation;

Fig. 2 is a cross-sectional view of the structure shown in Fig. 1 along the line 2—2;

Fig. 3 is a similar sectional view of the structure adapted for use on an outside corner of a dwelling;

Fig. 4 is a detailed cross-sectional view showing the construction of one of the vertical frame stud assemblies and the manner of supporting the wall panels thereby;

Fig. 5 is a similar view showing the corner post construction for an outside corner and the manner of supporting the wall panels or sections thereby;

Fig. 6 is a similar view showing the stud and wall panel assembly at an inside corner;

Fig. 7 is a similar view showing a stud and wall panel assembly where a T connection is to be made; and

Figs. 8, 9 and 10 are respectively views in cross section similar to Figs. 4, 5 and 6 and showing a typical wall stud structure, an outside corner structure, and an inside corner structure where a modified form of the invention is employed.

In general the invention contemplates the use of wall panels of uniform width and shape to the end that any panel may be employed at any portion of the building structure, whether it be adjacent a corner of the structure or in the center of a wall thereof. The wall panels are preferably laminated structures having an outer surface of weather-resistant material, such for example as an asbestos composition and having an interior porous cellular body of high insulating properties. One face of each panel, that intended to stand adjacent the interior of the finished dwelling, may be finished to receive directly any suitable wall covering material, such as wall paper, paint or the like.

In the embodiments of the invention here shown and described, the vertical studding assemblies provide hollow interior spaces which may be packed with any suitable insulating material, such as mineral wool, or which may be employed as conduits for electric wiring, etc. Finishing battens are also provided as covering plates for the vertical joints between adjacent wall panel elements and at corners. As shown, different shapes of battens may be employed at the cor-

ners and to cover the joints on the straight wall surfaces.

It is an object of this invention to provide a structure wherein the battens may be reduced to a minimum width, especially where they are employed to cover the joints in a flat wall surface. Wherever employed the battens are arranged to tightly seal with the side closure elements and to protect the frame against the influences of weather. The battens are preferably so shaped as to provide dead air spaces beneath them. These spaces may, if desired, be packed with insulating material.

In the embodiment of the invention shown in the drawings and particularly Figs. 1 to 7 inclusive thereof, 20 represents generally the foundation, which may be of any form, preferably concrete or concrete blocks. Suitable sill-supporting bolts 21 may be provided in the foundation and by these bolts the sills 22 may be rigidly fastened thereto. The sill preferably comprises an L-shaped metallic member, as shown in Fig. 1, the vertical part 22' of the angle being disposed toward the interior of the structure.

In Figs. 1 to 3 inclusive there is shown a preferred structure for mounting and affixing the stud elements to the sill. The stud elements preferably employed are so shaped as to give a roughly triangular cross section to the completed stud where the stud is employed as in Fig. 4, for example, in a flat wall surface.

With reference to Figs. 2 and 4, the stud elements 23 are bolted to a supporting V-shaped member 24, which is in turn welded to the sill 22. As shown, the studs 23 are fastened to the member 24 by the bolts 25. A similar construction may be employed at the upper end of the stud elements to secure a rigid positioning of the elements within the frame of the building.

The stud elements 23 are preferably provided with an extending element or lip 26 formed by welding to the stud element a flat metallic strip. As shown in Fig. 4, this extension 26 acts as an abutment against which the wall panels 27 may be firmly held in a manner hereinafter to be described.

It is to be understood that the element 24 need be only of such height as to permit a firm attachment with the stud elements 23. This is indicated by the dotted line 271 in Fig. 1, which is intended to represent the upper edge of the element 24, which is shown as of substantially the same height as the extension 22' of the sill.

In Figs. 3 and 5 a typical stud member assembly is shown in connection with the outside corner construction. As there shown the stud elements 28 may be bolted to extensions of the vertical parts 22' of the sills 22, these extensions being bent and if desired welded together and to the top of the main body of the sill, as shown for example in Fig. 3. The stud elements 28 employed in the corner construction shown in Figs. 3 and 5 are roughly trough-shaped preferably with each arm of the trough making an angle with the base thereof of approximately 135°, and are mounted with respect to the bent extensions of the upright portions of the sills so that the trough-like studs are substantially back-to-back, being spaced apart a distance equal to the thickness of the combined sill extensions. The tops of the said extensions lie below the cross sectional plane in which Fig. 5 is taken, the plane of Fig. 5 being above the plane of Fig. 3.

In Fig. 6 a suitable stud construction for an inside corner is shown. Here two roughly triangu-

lar stud elements are employed so mounted and welded to the sill as to provide a roughly triangular stud assembly, the hypotenuse of which faces outwardly toward the exterior walls.

In Fig. 7 is shown a typical stud assembly adapted for use where a T-intersection of three walls arises. It will be noted that in this figure the elements 29 and 26 correspond roughly in general contour to the elements 23 and 26 of Fig. 4, while the element 30 corresponds roughly to one of the elements 28 of Fig. 5. The elements 29 and 30 comprise the stud proper in Fig. 7. A filler plate 31 may be assembled with one of the elements 29 in the manner shown in order that a smooth, unbroken interior surface may be presented and in order that adequate support may be presented for the intermediate wall panel designated as 32.

In all of the stud assemblies shown in Figs. 4 to 7 inclusive, the exterior joint between adjacent wall sections is covered by an ornamental batten designated throughout as 33. In every instance this batten acts not only to close the joint, but acts as a means to force the wall panels held and supported by the stud assemblies into close engagement with flange or lip elements or abutting means designated throughout as 26, which are associated with the studs and which cooperate with the battens to fix the position of the wall elements and to effect a seal between the wall elements and the stud. The stud elements 23, as shown for example in Fig. 4, may have portions 128 positioned substantially perpendicular to the general plane of the wall and to the element 26. The stud assembly, as shown in Fig. 4, then presents a plurality of trough-like surfaces, the portions 26 and 128 comprising the sides or arms of the troughs, these portions meeting the bases of the troughs preferably at angles of 135°.

The battens are preferably provided with gripping teeth 37, which may penetrate slightly into the outer covering of the wall panels and thus aid in effecting a tight seal and a rigid positioning of the panels. The battens are held in close engagement with the outer surfaces of adjacent wall panels by any suitable means. In the embodiment of the invention shown in Figs. 4 to 7 inclusive, this is accomplished by a threaded bolt, as for example 38 in Fig. 4, which may be caused to engage a continuous extruded thread 39 on the inner face of the batten. The bolt preferably is caused to traverse the stud assembly at any point. In the corner assemblies, for example those shown in Figs. 5 and 6, the spacing of the stud elements provides a suitable channel to receive the threaded bolt, and the lips 26 in Fig. 5 and extensions of those lips in Fig. 6 serve as seating means to receive the head of the bolt. In the typical side wall construction shown, for example, in Figs. 4 and 7, the bolt may be adapted to traverse the entire stud assembly (see Fig. 4) or a portion only thereof (see Fig. 7). In either case the spaced stud elements 23 in Fig. 4 and 29 in Fig. 7 provide a slot to receive the bolt.

It will be obvious that other means of tightly holding the battens against the wall elements 40 may be employed. For example, a toggle bolt structure, such as is shown in my copending application Serial No. 724,469, filed May 8, 1934, for Studding construction for prefabricated houses and buildings, may be employed to advantage.

It will be noted that the stud structures described are preferably of such shape, e. g., trough-shaped and so positioned that when the wall

panels are brought into close contact with them, as shown in Figs. 4 to 7 inclusive, the greater portion of the plane of contact between the end of the wall elements and the studs is at an angle preferably of about 45° to the exterior wall face. The wall elements are preferably cut away, as at 41, for a considerable portion of their thickness, preferably about two-thirds, so that it may be said that the ends of the wall panels are beveled.

10 The base of each trough-shaped portion of the stud assembly is adapted to receive the beveled or cut-away surface of a wall closure element. The outer and inner faces of each wall panel are preferably parallel. That part 228 of the end of each panel which is not cut away or beveled is preferably perpendicular to the main faces of the panel. Where the abutting face of the wall panel comes in contact with a bolt or rivet used in positioning the stud elements and fastening them to supporting elements welded to the sill, the panel may be cut away, as indicated at 42 in Fig. 5, to provide a notch or recess to receive the bolt.

So also where necessary and where the stud elements are spaced apart, as in Figs. 5 and 6 for example, filler elements, not shown, may be inserted between the opposed faces of the studs to increase the rigidity of the structure.

The normal dead air space between the covering batten and the stud and wall elements, and shown for example as 43, may if desired be filled with any heat-insulating material, such as mineral wool. The hollow space within the stud structure itself may be similarly insulated or may remain open for use as a conduit for electric wiring, etc.

If desired, the interior surface overlying the connecting bolts, corners, etc., may be sparkled and suitably finished.

In general, the upright stud elements are made preferably of rolled steel and the cooperating battens of some weather-resistant material, such for example as aluminum. As it is an object of prefabricated house design to reduce the cost of the elements entering into the structure to a minimum, it is distinctly important that the size of the battens be kept small and that a minimum amount of rolled steel be employed in the stud structure. It is a distinct advantage of the invention disclosed herein that the generally triangular stud assembly shape provides adequate strength and rigidity and at the same time substantially reduces the amount of material employed in the stud construction. It is a further distinct advantage that the stud structure and wall panel structure cooperate to provide a narrow external joint, and hence the covering batten may be reduced to a minimum width.

It is a further advantage of the structure that in every instance the exterior portions of the wall panels are caused to closely approach, so that only narrow sections through the stud assembly are left unprotected by wall panel insulation. In every type of wall construction shown, except possibly the inside corner construction shown in Fig. 6, the insulating properties of the wall panels are utilized to a maximum with a correspondingly increased insulating efficiency over the structure shown, for example, in my copending application Serial No. 624,469. Even in so far as the inside corner is concerned (Fig. 6), the loss in insulating efficiency is slight, if any.

The structure which has been described is inexpensive, durable, strong, rigid, readily assembled, and possesses high insulating properties.

It will be obvious that the structure described is susceptible of substantial modification and variation without departing from the invention. In Figs. 8, 9 and 10 are shown three sections, respectively, a typical straight wall stud connection, illustrating a modified form of the invention, an outside corner connection, and an inside corner connection, illustrating a modified form of the invention. In these figures, 80 represents generally the stud elements, 81 interior cover plates which may be snap-fastened upon the stud elements, 82 the exterior battens which as shown may take the form of aluminum covered steel plates drilled and tapped in the shop before assembly, and 83 the threaded bolt holding the battens into contact with the wall panel elements.

It will be obvious also that in any event the battens or covering elements may be modified so that the bolt which holds them against the wall elements may extend completely through the battens, in the manner shown, for example, in my copending application Serial No. 724,469. With such a structure it is unnecessary to provide an interior access to the opening within the stud structure and the cover plates 81 in Figs. 8 to 10 inclusive may then be converted into structural stud elements welded directly to the other stud elements.

It will be understood that floor construction, ceiling construction, etc., have been omitted, but that any suitable floor, ceiling, roof, and interior partition construction may be employed.

Since certain changes may be made in the above article and different embodiments of the invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein described, and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

Having described my invention, what I claim as new and desire to secure as Letters Patent is:

1. In a device of the character described, wall elements, vertical stud elements comprising a plurality of wall engaging surfaces intercepting at an angle of approximately 135°, and mechanical means cooperating therewith for holding the said wall elements in close contact with said surfaces, said wall elements being substantially non-penetrated by said stud elements or said mechanical means, every said wall element being adapted to engage the stud element adjacent thereto in the manner described.

2. A stud assembly comprising a plurality of spaced stud elements, each of said elements comprising means adapted to form a shallow, trough-like wall-element-engaging portion, those means forming the sides of said trough being adapted to receive respectively an end and a side surface of a cooperating wall element, and those means forming the base of said trough being adapted to receive a surface of said wall element which intersects the said end and side surfaces thereof at angles other than 90°.

3. A stud assembly comprising a plurality of spaced stud elements, each of said elements comprising means adapted to form a shallow, trough-like wall-element-engaging portion, those means forming the sides of said trough being adapted to receive respectively an end and a side surface of a cooperating wall element, and those means

It will be obvious that the structure described

forming the base of said trough being adapted to receive a surface of said wall element which intersects the said end and side surfaces thereof at angles of approximately 135°.

4. In a device of the character described, a plurality of wall panel elements adapted to abut against cooperating stud elements, the abutting ends of every pair of adjacent wall elements being so formed as to provide a plurality of surfaces intersecting at an angle of substantially 90°, and a plurality of surfaces positioned in substantial parallelism, the stud elements being designed to present surfaces cooperating with said intersecting and said parallel surfaces to hold and position said wall elements, and each said stud element being provided with means engaging a still further surface of a wall element to resist movement thereof.

5. In a building construction, in combination, vertical stud elements, each of said elements comprising a plurality of wall-engaging surfaces intersecting at an angle of approximately 135°, wall elements, each of said elements having adjacent stud-engaging surfaces intersecting at an angle of approximately 135°, and mechanical means cooperating with said wall and said stud elements for holding said wall elements in close contact with the said intersecting surfaces of said stud elements.

6. In a building construction, in combination, wall elements, stud assemblies positioned between each pair of adjacent wall elements, each of said assemblies comprising a plurality of vertical stud members, each member being provided with a plurality of wall-engaging surfaces, the said plurality of surfaces of each member being adapted to engage adjacent intersecting surfaces of a wall element, which surfaces intersect at an angle of approximately 135°, any wall element being adapted to engage any stud member.

7. In combination, a pair of wall elements, cooperating stud and batten elements, an abutting portion of said stud element being adapted to engage a surface of one of said wall elements and said batten element being adapted to engage another surface of said one wall element, said stud-engaged and said batten-engaged surfaces being spaced and parallel, another abutting portion of said stud element being adapted to engage a surface of the other of said wall elements and said batten element being adapted to engage another surface of said other wall element, said stud-engaged and said batten-engaged surfaces of said other wall element being spaced and parallel, said batten-engaged surface of said one wall element extending substantially beyond the stud-engaged surface of said one wall element, said batten-engaged surface of said other wall element extending substantially beyond the stud-engaged surface of said other wall element, said batten and said abutting portions of said stud holding said wall elements under compression said wall elements having converging surfaces in engagement with said stud element, said batten element being the principal means for holding said wall element to said stud element, said batten and said converging surfaces acting to cause a substantial compressive force to be exerted in the plane of the wall element for bracing successive stud and wall elements.

8. In combination, a pair of wall elements, cooperating stud and batten elements, an abutting portion of said stud element being adapted to engage a surface of one of said wall elements and said batten element being adapted to engage another

surface of said one wall element, said stud-engaged and said batten-engaged surfaces being spaced and parallel, another abutting portion of said stud element being adapted to engage a surface of the other of said wall elements and said batten element being adapted to engage another of said other wall element, said stud-engaged and said batten-engaged surfaces of said other wall elements being spaced and parallel, said batten-engaged surface of said one wall element extending substantially beyond the stud-engaged surface of said one wall element, said batten-engaged surface of said other wall element extending substantially beyond the stud-engaged surface of said other wall element, said stud element being provided with a surface adapted to engage at least a portion of that edge of said one wall element which portion lies between the batten-engaged and stud-engaged surfaces of said one wall element, said stud element being provided with a surface adapted to engage at least a portion of that edge of said other wall element which portion lies between the batten-engaged and stud-engaged surfaces of said other wall element, and means to cause said batten and said abutting portions of said stud to hold said wall elements under compression said wall elements having converging surfaces in engagement with said stud element, said batten element being the principal means for holding said wall element to said stud element, said batten and said converging surfaces acting to cause a substantial compressive force to be exerted in the plane of the wall element for bracing successive stud and wall elements.

9. In combination, a wall element, a stud element, and a batten, means to clamp the batten against the wall element, abutting means on the stud element cooperating with the batten to hold the wall element rigidly in place, the wall element being held under compression between the batten and the abutting means, a portion only of that surface of the wall element, intersecting the surfaces thereof engaged by the batten and the abutting means, lying in a plane which intersects the planes formed by the surfaces engaging the batten and abutting means at an angle other than 90°, the stud comprising a surface adapted to engage the last-mentioned surface of said wall element, a second wall element, said batten and said abutting means each extending, on a side of the combination opposite from the other, from a surface of said first wall element to a surface of said second wall element, said batten being a structural component of said combination and giving said combination substantial structural strength.

10. In combination, a wall element, cooperating stud and batten elements, an abutting portion of said stud element being adapted to engage a predetermined surface of said wall element, said batten element being adapted to engage an opposite parallel surface of said wall element, the batten-engaging surface of said wall element extending substantially beyond the surface thereof in engagement with the abutting portion of said stud whereby the width of the batten element may be maintained at a minimum, the batten element cooperating with the abutting portion of the stud element to hold the wall panel under compression, a second wall element, said batten and said abutting portion of said stud element each extending, on a side of the combination opposite from the other, from a surface of said first wall element to a surface of said second

5 wall element, said batten being a structural component of said combination and giving said combination substantial structural strength, said wall elements having converging surfaces in engagement with said stud element, said batten element being a principal means for holding said wall element to said stud element, said batten and said converging surfaces acting to cause a substantial compressive force to be exerted in the plane of the wall element for bracing successive studs and wall elements.

10 11. In combination, a wall element, cooperating stud and batten elements, an abutting portion of said stud element being adapted to engage a predetermined surface of said wall element, said batten element being adapted to engage an opposite parallel surface of said wall element, the batten-engaging surface of said wall element extending substantially beyond the surface thereof which is in engagement with the abutting portion of said stud, whereby the width of the batten element may be maintained at a minimum, the stud element being provided with

a surface adapted to engage at least a portion of that edge of the wall element, which portion lies between the first-mentioned batten-engaging and stud-engaging surfaces of said elements, the batten element cooperating with the abutting portion of the stud element to hold the wall panel under compression, a second wall element, said batten and said abutting portion of said stud element each extending, on a side of the combination opposite from the other, from a surface of said first wall element to a surface of said second wall element, said batten being a structural component of said combination and giving said combination substantial structural strength, said wall elements having converging surfaces in engagement with said stud element, said batten element being a principal means for holding said wall element to said stud element, said batten and said converging surfaces acting to cause a substantial compressive force to be exerted in the plane of the wall element for bracing successive studs and wall elements.

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