April 26, 1960 F. F. LARSEN 2,934,179

STRUCTURAL ELEMENTS

Filed Jan. 23, 1953

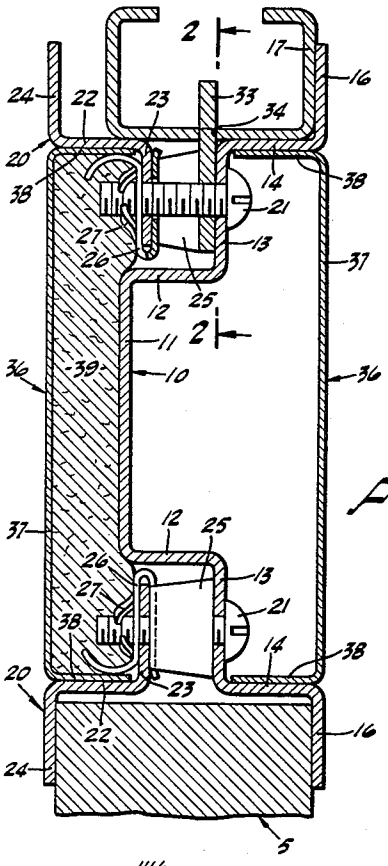


FIG. 1.

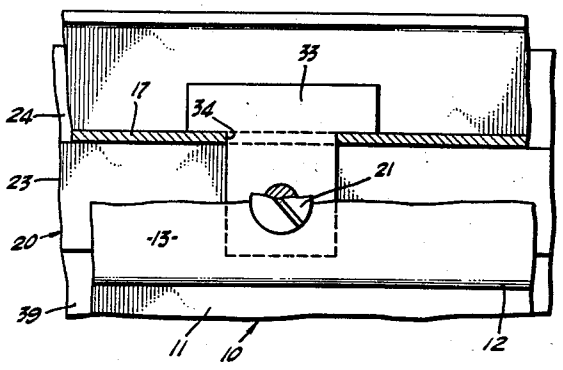


FIG. 2.

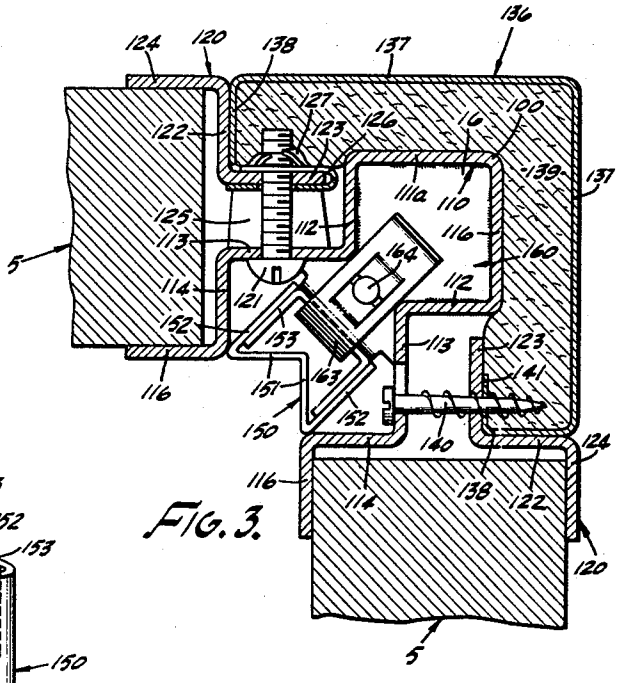


FIG. 3.

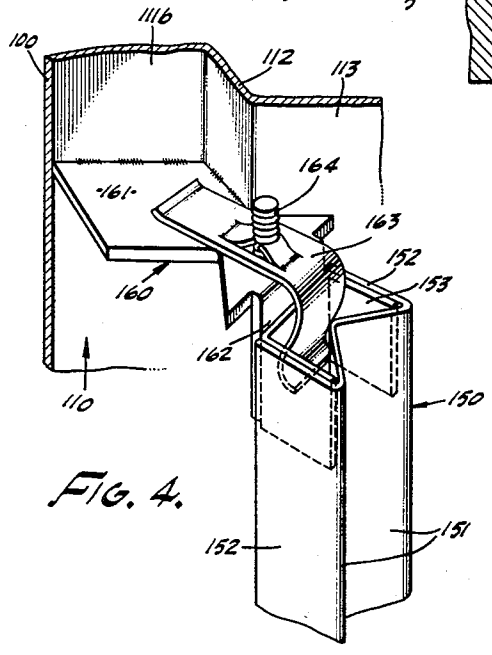


FIG. 4.

FRANKLIN F. LARSEN
INVENTOR.

BY Allen & Kattler

ATTORNEYS

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# STRUCTURAL ELEMENTS

Franklin F. Larsen, Reseda, Calif.

Application January 23, 1953, Serial No. 332,895

5 Claims. (Cl. 189—34)

The present invention relates to structural elements in general and particularly to structural elements used in the fabrication of buildings. More specifically the invention comprises a structural assembly adapted for use as a girder or as a stud in the fabrication of buildings including but not limited to residences.

The availability of preshaped structural elements of metal for use in building constructions and particularly residences has made possible tremendous savings in assembly time in addition to providing more rigid and durable structures. The present invention makes use of elements which are preformed and which in large part are simple in that they may be mass produced in large quantities economically by rolling or stamping. Delivered to the job, these structural elements are brought together in cooperative relationship, according to the present invention, to form a stud or girder combination useful in the supporting of walls, panels and other elements. They may be used with walls or panels of different thicknesses and their presence is substantially concealed by the use of appearance covers which serve not only to enclose the insulation, which enables them effectively to function as a continuation of the wall or panel which they support, but additionally to provide wiring chases useful in the placing of electrical conduits and which are particularly desirable because of the ease with which entrance may be gained to the wiring.

The combination construction comprising the present invention may serve either as a girder or as a stud, depending upon its arrangement and while its use is not so limited the construction is particularly effective when used simultaneously with the sill combination disclosed and claimed in applicant's copending application Serial No. 332,896, filed January 23, 1953 and now Patent No. 2,730,209.

It is an object of the present invention to provide a new and improved assembled structural element adapted to function either as a girder combination or as a stud combination.

It is another object of the present invention to provide a stud or girder combination useful in the supporting of walls of various thicknesses and incorporating within its own construction a wiring chase.

It is another object of the present invention to provide a stud or girder combination useful in the supporting of walls of various thicknesses and incorporating within itself an insulation unit enabling it to provide a continuation of the insulating properties of the mounted wall.

A still further object of the invention is to provide a combination structural element adapted along its opposite edges to position walls or panels and carrying upon its opposite sides appearance covers which form respectively insulated bases and a wiring chase.

A still further object of the invention is to provide a new and improved combination structural element suitable for positioning at the conjunction of two adjacent walls lying in angularly related planes.

A still further object of the invention is to provide a



corner stud or girder combination incorporating wall-clamping elements, an insulation enclosure, and a removable inner closure channel.

These and other more specific objects will appear upon reading the following specification and claims and upon considering in connection therewith the attached drawing to which they relate.

Referring now to the drawing in which preferred embodiments of the present invention are disclosed:

Figure 1 is a transverse section through the combination building element constructed in accordance with the present invention showing the unit functioning as a girder in the connection of a wall to a horizontal joist;

Figure 2 is a partial section looking in the direction of the arrows upon the broken line 2—2 of Figure 1;

Figure 3 is a horizontal section through a modified form of the combination structural unit in which the unit has been folded upon itself as to function at the corner of a building; and

Figure 4 is a view in perspective illustrating the mounting of the cover channel relative to the girder or stud proper.

Referring now to Figures 1 and 2 of the drawing in particular, the first preferred embodiment is illustrated and is seen to include a central support element indicated generally by the reference character **10** and which, it is to be understood, may be either a girder or a stud. Viewed in transverse section element **10** is seen to include an elongated central run **11** from the opposite ends of which extend at right angles relatively short runs **12** connected to runs **13** parallel to central run **11**. Runs **13** in turn connect to runs **14** parallel to runs **12** and of about the same extension and which themselves terminate in external runs **16**. Runs **13** may be identified as connection runs, runs **14** as abutment runs, and external runs **16** as clamping runs.

Adjacent one edge of central support element **10** is a wall or panel, indicated generally by the reference character **5**, seen to be positioned adjacent abutment run **14** and in contact with clamping run **16** along its side. Along the other edge of central support element **10** is a U-shaped channel member **17** which may perform any desired function in the building of which it is a part but which is of a type adapted to function as a joist bearing runner. Element **17** is connected to central support element **10** as will be described and is seen to be in contact with abutment run **14** and also clamping run **16** of element **10**.

Secured to the connection runs **13** of the central support element **10** by means of screw headed bolts **21** are a pair of clamping elements indicated generally by the reference character **20** each including a central or abutment run **22**, an inner or connection run **23** and which is apertured and through which the threaded shank of bolt **21** extends, and an outer or clamping run **24**. A bolt-seating spacer nut element **26** is carried by the inner run **23** of clamping member **20** and, with its flexible prongs **27**, forms a retaining seat for the threaded shank of bolt **21**. Spacer nut element **26** may be viewed as part of clamping member **20** and is retained in place relative to the connection run **23** of that member by its own clamping action and by the extension of the threaded screw shank through the aligned apertures in both the run and the nut member. Each nut is seen to include integral flanges or walls **25** extended in planes parallel to each other and to the axis of bolt **21**. It is these flanges which give to the nut its spacing function and their width determines the spacing of elements **10** and **20** and enables the unit to accommodate walls **5** of varying thicknesses.

Referring now to the relationship of wall **5** to the unit it is seen that clamping runs **16** and **24** of the central support element **10** and the clamping element **20** abut the

adjacent sides of the wall and secure it in alignment with the central run 10 of the support element. The abutment runs 14 and 22 of the central support element 10 and the clamping element 20, respectively, limit the displacement of the wall toward the construction element and can, if desired, be in contact with it.

At the opposite edge of the unit from that in which the wall 5 is seated, a U-shaped element 17 is located which, as previously stated, may be a bearing runner for a joist in the building. Member 17 rests upon the abutment runs 14 and 22 of central support element 10 and clamping element 20, respectively, and is secured in place with one side abutting the clamping run 16 of member 10 by a T-shaped tie down clip 33 the leg of which extends downwardly through a slot 34 in the center wall of element 17 to seat the threaded shank of bolt 20 between the spacer nut 26 and the abutment run 13 of element 10. As is clear from a comparison of nuts 26 at the opposite sides of support element 10 the upper nut is of somewhat less thickness by virtue of the presence of the clip 33. The contact of clamping run 16 of element 10 with the side of U-sectioned element 17 prevents lateral displacement in one direction, a restraining force which is supplemented by the extension of the clip 33 through the slot 34 in element 17 and its engagement by screw 21. Displacement toward wall 5 is prevented by contact with the abutment runs 14 and 22 while displacement in the opposite direction is prevented by the extension of the threaded bolt shank through the leg of the clip.

To provide a substantially planar extension of the surface of the wall 5 and also to cover the structural details of the assembly there is provided a channel-shaped cover element 36 including an elongated central run 37 and perpendicularly extending side runs 38 which abut the abutment runs 22 of clamping elements 20. Member 36 fits snugly between the elements 20, is frictionally retained in place, and cooperates with the opposing support element 10 to provide a chamber in which, in a preferred form, is positioned a body 39 of suitable insulating material. The side closed by cover 36 under normal circumstances would be the exterior side or face of the construction.

The side opposite cover 36 is closed by a duplicate cover 36 but in this case the end runs 38 abut the abutment runs 14 of the support element 10. The space between the second cover and the support element is, by virtue of the configuration of element 10, larger than the space filled by insulation 39 and forms a passage which is useful as a wiring chase. This second cover 36, as in the case of the first cover, is readily removable so that ready access may be had to electrical elements positioned in the passage.

The assembly and disassembly of the structural unit constructed in accordance with the present invention is believed to be clear. The main supporting element 10, which may be a girder or a stud, is positioned and the wall or panel 5 to be supported is brought in juxtaposition relative thereto. The cover elements 36 are at this time removed leaving element 10 exposed upon both of its sides. The clamping element 20 to retain the wall in place is next positioned with its spacer nut 26 in place. Bolt 21 is then positioned and tightened whereupon element 20 is drawn toward support element 10 and its clamping run 24 moves toward the wall which is then clamped between clamping runs 16 of the support element and 24 of the clamping element. Were walls 5 to be positioned upon both sides of the supporting element 10 the operation would be duplicated at both sides but where a structural element such as a runner 17 is positioned upon the opposite side assembly is somewhat different.

In connecting the central support element 10 to the structural element 17 the latter is first brought into abutting contact with the runs 14 and 16 of element 10 in the manner illustrated in Figure 1 and thereafter the T-shaped tie down clip 33 inserted through the slot 34 in the base of element 17. Clamping element 20 and nut 26 are next positioned and bolt 21 inserted therethrough and tightened to draw the assembly together into the relationship illustrated at the top of Figure 1.



The construction is then ready to receive the exterior cover 36 in which the insulation body 39 may be positioned prior to placement if preferred. Exterior cover 36 is merely forced into place between the clamping elements 20 and is frictionally retained in place, the body 39 of insulation forming an extension of the insulating characteristics of the wall 5.

Upon the opposite side of the supporting element 10 from the insulation 39 any wiring to be positioned is first put in place before the cover 36 is seated. When this is to be done the positioning is exactly similar to the positioning of exterior cover 36.

A second preferred embodiment of the invention is illustrated in Figures 3 and 4 which is basically similar to the first embodiment but differs therefrom in that the design is intended for positioning at the corner of two angularly related walls or panels which are indicated generally by the reference character 5. The construction again includes the central supporting element, here indicated generally by the reference character 110, and comprising the counterpart of central support element 10 of the first embodiment but differing therefrom primarily in that central runs 111*a* and 111*b* are separated by a right angle bend or corner 100 which is not present in the first embodiment in which the central run comprises a single flat run 11. Clamping runs 116, abutment runs 114, attachment runs 113, and runs 112 correspond in each instance to their counterparts 16, 14, 13, and 12 in the first embodiment and perform duplicate functions. Clamping elements 120 are identical to the elements 20 of the first embodiment and include runs 122, 123, and 124 which correspond to runs 22, 23, and 24 of clamping element 20.

As in the first embodiment each clamping element includes a spacer nut element, here indicated by the reference character 126, and which includes integral spacer walls 125 and thread-forming prongs 127. The connection run 113 of element 110 is again secured to the clamping element 120 by means of a bolt, indicated by the reference character 121, the threaded shank of which extends through aligned apertures in the runs 113, 123 of the support element 110 and the clamping element 120, respectively, the runs 113, 123 being spaced by the walls 125 of nut 126 identical to the nut 26 of the first embodiment.

In this form of the invention the exterior surface is provided by a removable cover indicated generally by the reference character 136 and including two main runs 137 which extend at right angles to each other and are parallel to the central runs 111*a* and 111*b* of support element 110. At the ends of central runs 137 of the cover 136 are inturned end runs 138 which contact the central or abutment runs 122 of the clamping elements 120. In the first embodiment, the cover 36 was retained frictionally in place but because of the angular arrangement of the abutment runs 122 in the present construction, it is desirable to provide positive retaining means for the cover 136 which means are provided in the form of self-seating screws 140. The latter extend in each instance between the connection runs 113, 123 of the support element 110 and the clamping element 120, respectively, passing through suitable aligned apertures in each and through an angularly extending inturned run 141 formed on the inner end of end runs 138 of cover 136. Screws 140 are spaced longitudinally of element 110 as to be positioned between the securing bolts 121.

Again, and similarly to the first embodiment, the space between the removable cover and the central support element forms a chamber suitable for the positioning of a

body of insulation here indicated by the reference character **139**.

The interior angle of the assembly is closed by a removable channel-shaped cover which finds no counterpart in the first embodiment and which is indicated generally by the reference character **150**. Cover **150** includes two central runs which are extended at right angles to each other as to form continuations of the planes of the clamping runs **116** of the support element **110** and which central runs are indicated by the reference character **151**. From the outer sides of runs **151** extend end runs **152** which carry, at spaced points, U-shaped brackets **153** suitably secured in place as by welding and which provide mounting means as will be described.

Positioned within the main support element **110** and secured in position as by marginal welding are spacer clips indicated generally by the reference character **160** and comprising in each instance a plate-like body **161** which at its margins abuts the runs **111***a*, **111***b*, **112** and **113** of central support element **110**. Body **161** includes a depending extension **162** adapted to lie alongside the inner abutting surface of a cooperating bracket **153** carried by the cover channel **150**. Spacer clip **160** also includes a tension clip **163** formed of spring-like material and secured in place by a threaded bolt **164** and the outer extremity of which extends downwardly and along the depending leg **162** as to be adapted to hold resiliently thereagainst the abutting side of the cover bracket **153**. The spacer clips **160** may be spaced at intervals along element **110** which may, if desired, be sixteen inches more or less and, of course, the cooperating brackets **153** on the cover channel **150** are similarly spaced. Positioning is accomplished by placing the cover channel in approximately its intended position and then displacing it relative to the spacer clips **160** as to enable the tension clips **163** to engage the brackets **153** in the relationship illustrated.

The method of assembling this second embodiment of the invention is believed to be clear from its construction. As in the first embodiment, the central element **110** is first positioned as to function as either a stud or a girder and the cooperating walls **5** are brought into juxtaposition with relationship thereto. The clamping elements **120** are next positioned and secured by the adjustment of the clamping bolts **121** as in the first embodiment. Cover plate **136** is then located with the insulation body **139** positioned therein and the cover secured in place by the tightening of securing screws **140** from the interior of the angle between walls **5**, an operation made possible by the fact that the cover channel **150** has not as yet been positioned. Cover channel **150** is then positioned as previously described and the assembly is completed.

It is to be understood that the exact dimensions of the various parts in this embodiment, as in the first embodiment, are not of the essence. Variations in sizes and angles can be accomplished within the scope of the invention.

While the particular apparatus herein shown and described in detail is fully capable of attaining the objects and providing the advantages hereinbefore stated, it is to be understood that it is merely illustrative of the presently preferred embodiments of the invention and that no limitations are intended to the details of construction or design herein shown other than as defined in the appended claims.

I claim:

1. An assembled structural supporting unit of the type suitable for use as a girder and as a stud; a rigid support element proper comprising an elongated member having in transverse section a central run at the opposite ends of which extend, in the order recited and each at right angles to an adjacent run to which it connects, an inner run, a connection run, an abutment run, and a clamping run; a clamping element including in transverse section a connection run, an abutment run, and a clamping run, said runs of said clamping element extending parallel in each instance to the corresponding run of said support element; a manually adjustable headed screw extended between the connection runs of said clamping element and of said support element and threadedly seated at one of said runs to draw said connection runs together; an elongated structural element resting against the abutment runs of said support element and said clamping element and formed with an aperture opposite said screw; and a tie down clip overlying a portion of said elongated structural element and extended through said aperture therein and seating said screw to prevent displacement of said structural element.

2. An assembled structural supporting unit of the type suitable for use as a girder and as a stud; a rigid support element proper comprising an elongated member having in transverse section a central run at the opposite ends of which extend, in the order recited and each at right angles to an adjacent run to which it connects, an inner run, a connection run, an abutment run, and a clamping run; a clamping element including, in transverse section, a connection run, an abutment run, and a clamping run, said runs of said clamping element extending parallel in each instance to the corresponding run of said support element; a manually adjustable headed screw extended between the connection runs of said clamping element and of said support element and threadedly seated at one of said runs to draw said connection runs together; an elongated structural element resting against the abutment runs of said support element and said clamping element and formed with an aperture opposite said screw; and a T-shaped tie down clip including a head overlying said elongated structural element and a leg extended through the aperture therein and itself apertured and enclosing said screw to prevent displacement of said structural element.

3. An interior wall structure support comprising a first elongated rigid member of channel shape in cross-section, a second elongated rigid load bearing member of channel shape in cross-section and an outturned lip on the outer edge of one of its side flanges, the web of said first member having a slot to receive the stem of a T-shaped connector, a T-shaped connector inserted through said slot with the stem thereof lying beside the web portion of said second channel member, and means detachably securing the same to said second channel member with the outturned lip thereof lying beside a side flange of said first member.

4. A wall structure as defined in claim 3 characterized in the provision of elongated clip means cooperable with a second outturned lip of said second member to embrace the lateral edge of a wall panel, and fastener means holding said clip means detachably assembled to the web of said second channel member.

5. A wall structure as defined in claim 4 characterized in the provision of a channel shaped closure strip frictionally held assembled between the opposite side flanges of said second channel member with its exterior web portion lying substantially flush with said outturned lips.

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