United States Patent

Sikes

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[54] **STRUCTURAL MEMBER CONSTRUCTION FOR BUILDING WALLS**

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Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 697,672, Jan. 15, 1968, abandoned.

[52] **U.S. Cl.** **52/276,** 52/582, 52/250

[51] **Int. Cl.**.....**E04b 1/343,** E04b 1/30

[58] **Field of Search**..... 287/64, 65, 103, 20.92, 20.92C, 20.92.4, 20.92.6, 20.92.7, 287/20.92 D, 127, 20.92 G; 52/396, 495, 489, 238, 242, 481, 250, 376, 704, 586, 584, 582, 217, 578, 276, 582

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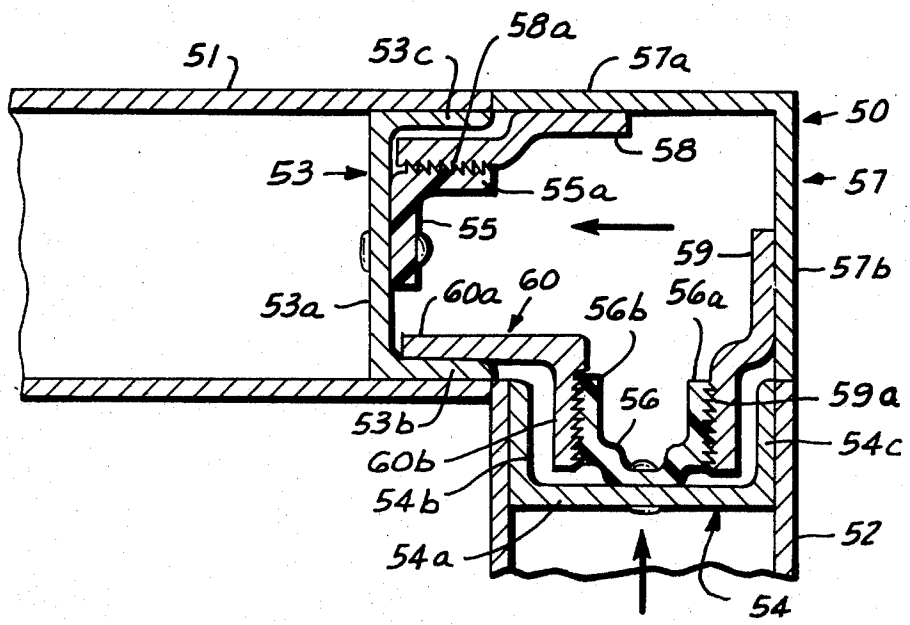
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Assistant Examiner—James L. Ridgill, Jr.
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[57] **ABSTRACT**

One embodiment comprises two structural channel members having edge abutting flanges having flange inner surfaces disposed in co-planar alignment by providing connector plates having first portions disposed against and secured to the inner surfaces of the flanges of one channel member and having vertically spaced apart latching slots formed in the other portions of such plates, the flanges of the other structural member having latch bolts extending inwardly from their inner surfaces to be received in the latching slots of such plates. With the space between the channel members filled, as with concrete, a strong column is provided to space wall sheaths which are mounted upon the opposite outer flange faces of the channel members.

In another embodiment, the channel members are latched to one another by means of overlapping-U-shaped connectors secured to the channel members intermediate the flanges thereof. The open end of one such connector is sized to fit snugly over the open end of the other connector, the legs of the outer connector being provided with inner ribs which engage outer ribs on the inner connector in an interlocking manner.

4 Claims, 11 Drawing Figures



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SHEET 1 OF 2

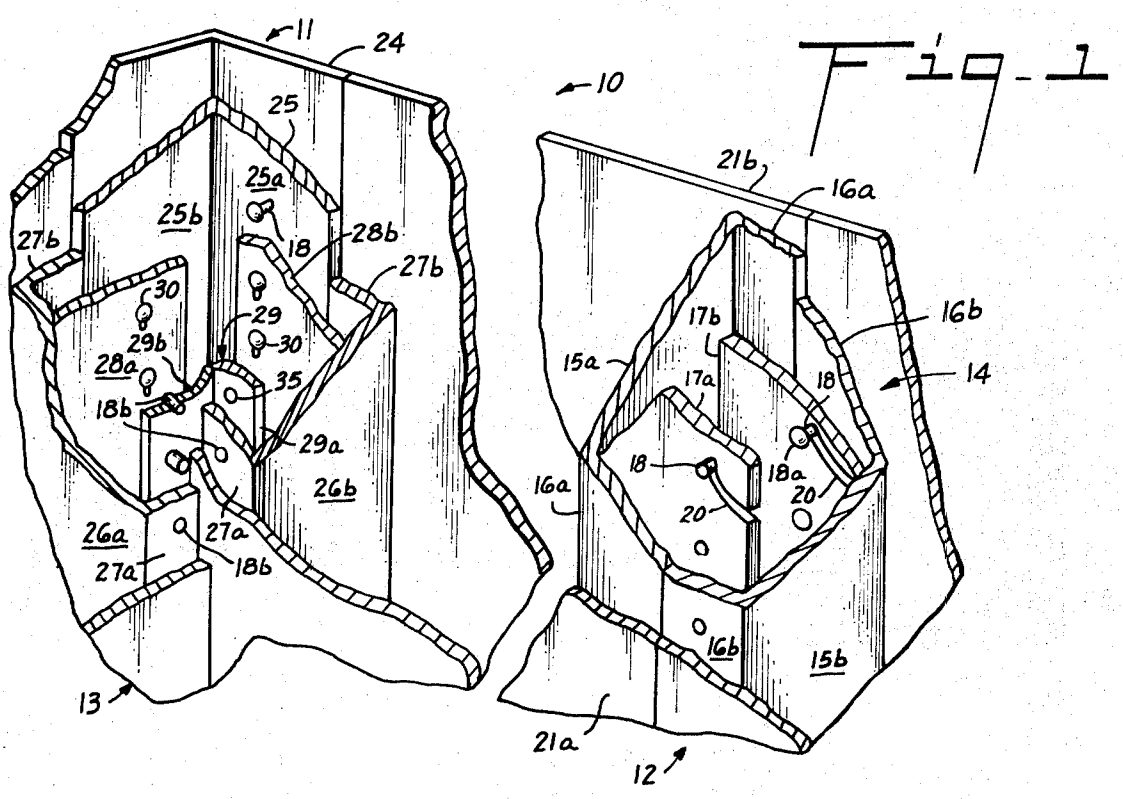


Fig. 1

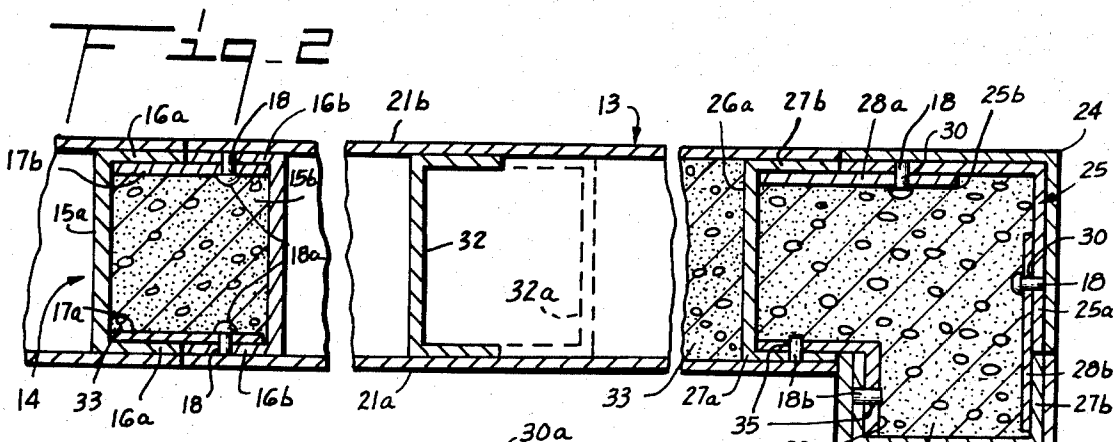


Fig. 2

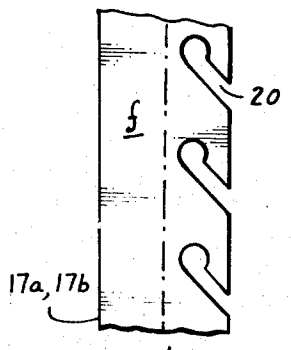


Fig. 3

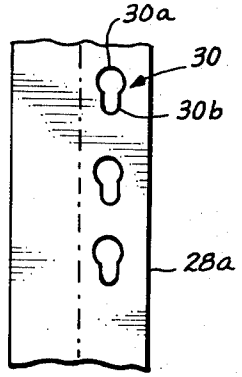


Fig. 4

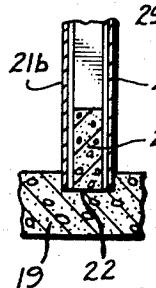


Fig. 5

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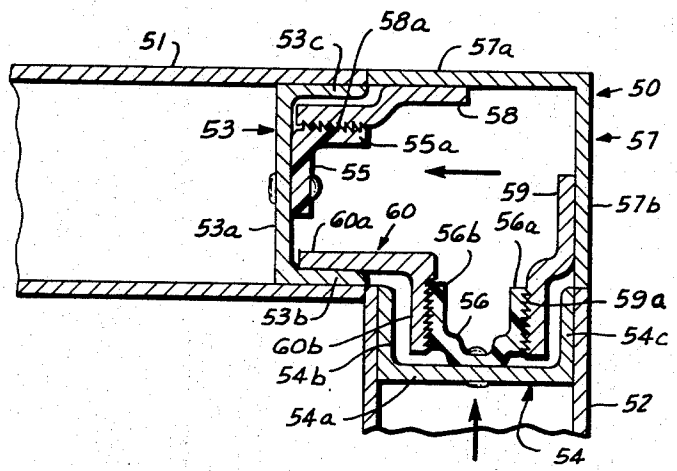


Fig. 6

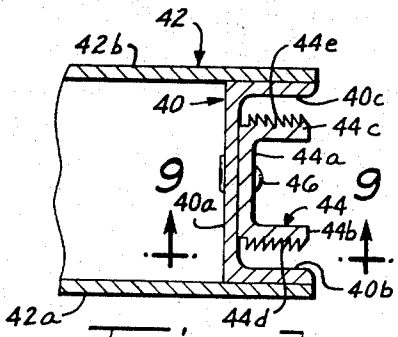


Fig. 7

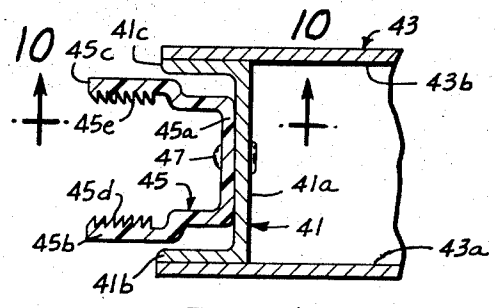


Fig. 8

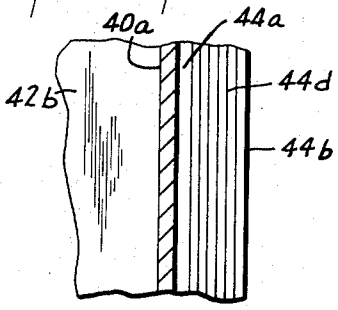


Fig. 9

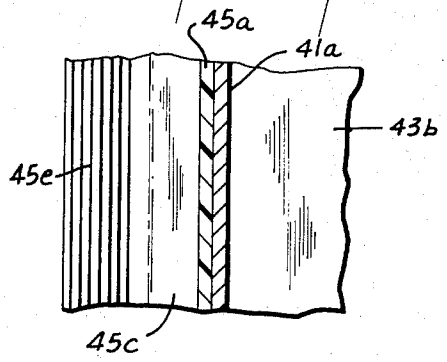


Fig. 10

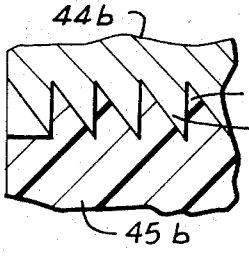


Fig. 11

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STRUCTURAL MEMBER CONSTRUCTION FOR BUILDING WALLS

CROSS-REFERENCE TO RELATED APPLICATION

This application is a continuation-in-part of applicant's copending application Ser. No. 697,672 filed on Jan. 15, 1968 now abandoned.

BACKGROUND AND OBJECTS OF THE INVENTION

This invention relates to novel and efficient methods and structures for use in erecting the walls of buildings. Though not limited thereto, the present invention is particularly useful in interconnecting prefabricated wall panels.

One object of the invention is to provide new and improved columnar structures for supporting the wall sheaths forming the two sides of a building wall.

Another object of the invention is to provide new and improved columnar structures for forming the corners at the meeting places of pairs of building walls running in different directions.

Other and further objects will be apparent when the specification herein is considered in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an isometric view of a corner construction which also shows a columnar construction spaced from the corner and spacing wall sheath sections transversely apart;

FIG. 2 is a plan view of a corner construction, as shown in FIG. 1, the figure also showing a columnar construction spaced to the left of the corner construction and corresponding in construction with the columnar construction shown to the right of the corner construction in FIG. 1;

FIG. 3 is a fragmentary elevational view of a connector plate as used to connect columnar channels in FIGS. 1 and 2;

FIG. 4 is a fragmentary elevational view of a connector plate as used to connect corner members to a corner angle, as shown in FIGS. 1 and 2;

FIG. 5 is an elevational cross-sectional view through a portion of one of the walls shown in FIGS. 1 and 2;

FIG. 6 is a cross-sectional plan view of a modified embodiment of corner construction;

FIGS. 7 and 8 are cross-sectional plan views of the adjacent ends of wall panels which are to be connected to one another, such views showing a modified embodiment of structure for interconnecting the wall panels;

FIG. 9 is an elevational view taken along section line 9—9 of FIG. 7;

FIG. 10 is an elevational view taken along section line 10—10 of FIG. 8; and

FIG. 11 is an enlarged fragmentary view showing in greater detail the interlocking of the interconnecting structures of FIGS. 7 and 8.

DESCRIPTION OF THE ILLUSTRATED EMBODIMENTS

Referring now in detail to the drawings in which like reference numerals are applied to like elements in the various views, a building construction **10** is shown in

FIGS. 1 and 2 in which a corner construction **11** is shown and also wall constructions **12** and **13** extending from the corner **11** at right angles to each other. An intermediate column and wall sheath spacer construction **14** is shown at the right of the corner **11** in FIG. 1 and to the left of the corner **11** in FIG. 2, which is illustrative of the columnar construction comprising an important portion of this invention.

In detail, a column **14** is shown as comprising upstanding channels **15***a*, **15***b* with respective pairs of channel flanges **16***a*, **16***b* in outer edge face abutment. Outer and inner upstanding connector plates **17***a*, **17***b* are shown disposed against the inner faces of the outer channel flanges **16***a* and **16***b* and against the inner faces of the inner channel flanges **16***a* and **16***b*, with the flanges **16***b* being provided with latch bolts or rivets **18** with heads **18***a* disposed at a spaced distance inwardly from the inner faces of the respective channel flanges **16***b*, such spaced distance being a distance slightly greater than the thickness of the plates **17***a* and **17***b*.

In fabrication, the channel **15b** is first placed in proper upright position on a conventional runner or slab **19**, as shown in FIG. **5**, with the bolts or rivets **18** vertically spaced along flanges **16***b* at predetermined distances apart. Then the channel **15***a* (with the left outer faces of the connector plates **17***a* and **17***b* secured to the respective inner faces of the channel flanges **16***a*, as by gluing, welding, bolting, or by any appropriate means) is maneuvered to latch the connector plates **17***a* and **17***b*, having therein the appropriately spaced latching slots **20** shown in FIG. **3** over the aforesaid bolts or rivets **18** which extend inwardly from the flanges **16***b*.

With the opposed or abutting channels **15***a* and **15***b* thus positioned and latched together, the inner wall sheaths **21***a* and outer wall sheaths **21***b* are disposed against and secured to the outer faces of the channel flanges **16***a* and **16***b* of spaced apart aligned columns **14** whereby the wall sheaths **21***a* and **21***b* are properly longitudinally aligned and transversely spaced apart. As shown in cross-section in FIG. **5**, a wall construction **12** or **13**, comprised of wall sheaths **21***a* and **21***b*, thus spaced apart, fits at bottom into rectangularly cross-sectioned groove means **22** in a concrete slab or runner **19**, concrete **23** having been poured to a depth between the wall sheaths or within the column **14** to anchor a wall **12** or **13** to the base or slab **19**.

The corner construction **11**, as shown in FIGS. **1** and **2**, includes an outer corner angle member **24** which may be of the same construction material as the walls **21***a* and **21***b*, or of any suitable light material. Then inwardly of the angle member **24**, in the finally assembled views of FIGS. **1** and **2**, a structural angle **25** is shown, such angle **25** have appropriately, vertically spaced apart bolts or rivets **18** which extend inwardly from the inner faces of the angle legs **25***a* and **25***b*. Angle **25** is secured to angle member **24** by gluing, welding, or the like. Also, the corner construction **11** includes a channel **26***a* across the wall construction **13** to the left, and a channel **26***b* across the wall construction **12** at ninety degrees to the wall construction **13**. Each of the channels **26***a* and **26***b* has vertically spaced apart inwardly extending studs **18***b* mounted on the flange **27***a* thereof.

A connector plate **28***a* is shown in FIGS. **1** and **2** as having its left, outer face disposed against and secured

to the inner face of the flange 27*b* of the channel 26*a*, such connector plate having vertically spaced apart slots 30 in the right-hand side thereof. As indicated in FIG. 4, the slots 30 each have an enlarged upper portion 30*a* and a smaller, lower portion 30*b*, for purposes to be hereinbelow described. Also, a second connector plate 28*b* is shown in FIGS. 1 and 2 as having its right, outer face disposed against and secured to the inner face of the flange 27*b* of the channel 26*b*, such plate having vertically spaced apart slots 30, as hereinabove described, in the left-hand side thereof as viewed in FIG. 1. A further angle 29 is shown in FIGS. 1 and 2 as having holes 35 vertically spaced apart in both legs 29*a* and 29*b* thereof.

The assembly of the corner construction 11 is accomplished first by disposing channels 26*a* and 26*b* in upright positions in the relative plan positions indicated in FIG. 1 and best visualized from FIG. 2. Then the inner angle 29 is placed in proximity to the respective inner flanges 27*a* of the channels 26*a* and 26*b* and in a manner such that the oversized holes 35 receive the studs 18*b* therein. Next, with the connector plates 28*a* and 28*b* in established contact with the channel flanges 27*b* of the respective channels 26*a* and 26*b*, the angle 25 is moved toward the position shown in FIG. 1. As best visualized in FIG. 2, the bolt heads 18*a* are passed through the larger, uppermost portions 30*a* of the slots 30 in the connector plates 28*a* and 28*b* and then lowered into the smaller, lower portions 30*b* thereof.

As indicated in FIG. 2, spacer members 32 (and 32a if desired) may be located intermediate the column structures 14 or between the corner column structure 11 and the nearest such column structure 14.

After the corner structure 11 and the wall structures 12 and 13 have been assembled and erected, the centers of the column structures 14 (the regions enclosed by each pair of channel members 15*a* and 15*b*) and the center of the corner column structure 11 (the region enclosed by channel members 26*a* and 26*b* and angle member 25) are preferably filled with a filler material such as concrete. Such concrete is indicated by reference numeral 33 in FIG. 2. After the concrete hardens, it seals the joint defined by the structural members forming the column structures. Such concrete also provides a weight bearing columnar structure for supporting the next floor level or the roof or the like of the building.

The column structures 11 and 14 are particularly useful for interconnecting prefabricated wall panels. Considering, for example, the column structure 14 shown in FIG. 2, the wall panel structure connected to the channel 15*a* can be prefabricated at a factory location with the channel 15*a* and connector plates 17*a* and 17*b* mounted in the left-hand end thereof. In a similar manner, the wall panel structure connected to the right-hand channel 15*b* can be prefabricated at the factory with the channel 15*b* and latch bolts 18 mounted in the left-hand end thereof. Thereafter, when the wall panels arrive at the building site, they can be quickly connected together by lowering the wall panel having the connector plates 17*a* and 17*b* so as to cause the latch bolts 18 to move upwardly into the latching slots 20 in such connector plates 17*a* and 17*b*. After the concrete is poured into the center space intermediate the channels 15*a* and 15*b* and allowed to harden, a relatively permanent connection of the wall panels is obtained.

Referring now to FIGS. 6–11, there will be described modified forms of construction for the corner and non-corner column structures. Considering first FIGS. 7 and 8, there is shown in a disengaged or disconnected manner the two parts which, when connected together, form a structural column which is located at an intermediate point in a building wall. This column structure includes first and second upstanding structural members 40 and 41. Member 40 is a structural channel member having a web 40*a*, an inner flange 40*b*, and an outer flange 40*c*. The second structural member 41 is also a structural channel member having a web 41*a*, an inner flange 41*b*, and an outer flange 41*c*. Channel member 40 is mounted in the righthand end of a wall panel 42 having wall sheaths 42*a* and 42*b*. The second channel member 41, on the other hand, is mounted in the left-hand end of a wall panel 43 having wall sheaths 43*a* and 43*b*. When the wall panels 42 and 43 are connected together, the inner flanges 40*b* and 41*b* abut one another. Similarly, the outer flanges 40*c* and 41*c* likewise abut one another.

The column construction of FIGS. 7 and 8 further includes first connector means 44 mounted on the first structural channel member 40 between the flanges 40*b* and 40*c* thereof. This connector means or connector 44 is a generally U-shaped channel member having a web 44*a* secured to the web 40*a* of the channel 40 and having a pair of legs 44*b* and 44*c* which constitute ribbed elements which extend toward the second structural channel member 41. The ribs are provided by cutting series of longitudinally extending notches in the outer surfaces of the legs 44*b* and 44*c*. The notches or ribs on leg 44*b* are indicated at 44*d*. The notches or ribs on leg 44*c* are indicated at 44*e*. As can be seen from the elevational type view of FIG. 9, these ribs 44*d* and 44*e* run at right angles to the direction of extension of the legs 44*b* and 44*c*.

The column structure of FIGS. 7 and 8 also includes second connector means 45 mounted on the second structural channel member 41 between the flanges 41*b* and 41*c* thereof. This second connection means or connector 45 is also a generally or approximately U-shaped channel member. As such, the connector 45 includes a web 45*a* which is secured to the web 41*a* of the structural channel 41 and a pair of legs 45*b* and 45*c* which constitute ribbed elements which extend toward the first structural channel 40. The ribs are indicated at 45*d* and 45*e*. These ribs 45*d* and 45e are formed by cutting series of longitudinally extending notches in the inner surfaces of the legs 45*b* and 45*c*. These notches or ribs 45*d* and 45*e* run at right angles to the direction of extension of the legs 45*b* and 45*c*.

The second connector 45 is sized so that the legs 45b and 45c thereof will fit snugly over the legs 44*b* and 44*c* of the first connector 44. This enables the ribs 45d and 45e to lock in place intermediate the ribs 44*d* and 44*e*, respectively, of the first connector 44. This locked condition is shown for a portion of the ribs 44*d* and 45*d* in the fragmentary view of FIG. 11. The second connector 45 is of a resilient construction for enabling the ribs 45*d* and 45*e* thereof to slide over and then lock in place intermediate the ribs 44*d* and 44*e* of the first connector 44. In a preferred embodiment, the first connector 44 is

made of metal and the second connector **45** is made of a resilient plastic material.

Connector **44** is secured to the structural channel **40** by a series of vertically spaced apart bolts or rivets **46**. The second connector **45** is similarly secured to the second structural channel **41** by a series of vertically spaced apart bolts or rivets **47**.

Considering now the modified corner column construction of FIG. **6**, such construction is generally indicated at **50** and is used for forming a corner joint between a pair of wall panels **51** and **52** extending at right angles to one another. The corner structure **50** includes a first upstanding structural channel member **53** mounted in the end of the wall panel **51** and having a web **53***a* and a pair of flanges **53***b* and **53***c* which extend in the direction of the corner of the wall structure. The corner structure **50** also includes a second structural channel member **54** mounted in the end of the second wall panel **52** and having a web **54***a* and a pair of flanges **54***b* and **54***c* which extends in the direction of the desired corner joint. Secured to the first structural channel **53** is first connector **55** in the form of an angle member having a ribbed or notched leg **55***a* extending in the direction of the common corner location. Secured to the second structural channel **54** is a second connector **56** in the form of a channel-shaped member having ribbed or notched legs **56***a* and **56***b* which extend in the direction of the common corner location.

The corner structure **50** further includes an upstanding structure angle member **57** having legs **57***a* and **57***b* which adjoin the outer flanges **53***c* and **54***c* of the channels **54** and **54**, respectively. Secured to the leg **57***a* is a ribbed element **58** in the form of a bent plate which extends the vertical length of the angle **57**. The ribs or notches **58***a* of the element **58** engage the ribs or notches on the connector **55** in an overlapping and interlocking manner. Secured to the other leg **57***b* of the angle **57** is a second ribbed element **59** in the form of a bent plate which runs the vertical length of the angle **57**. The longitudinally extending ribs or notches **59***a* of the bent plate **59** engage the ribs or notches on the outer surface of the leg **56***a* of the second connector **56** in an overlapping and interlocking manner.

The corner structure **50** also includes an inner angle member **60**, having one leg **60***a* secured to the inner flange **53***b* of the first structural channel **53**. The other leg **60***b* of the angle member **60** includes a ribbed or notched portion for engaging the ribs or notches on the leg **56***b* of the connector **56**.

In a preferred embodiment of the invention, the connectors **55** and **56** are constructed of a resilient plastic material. These connectors **55** and **56** are secured to their respective structural channels **53** and **54** by means of bolts, rivets, or any other suitable securing mechanism or agent.

The corner structure **50** is assembled by first positioning the outer angle **57** so that the ribs **58***a* engage the ribs or connector leg **55***a* and then moving the second well panel **52** into position such that the connector **56** is inserted between the bent plate **59** and the inner angle member **60**.

After the various well panels have been erected and various column structure connectors have been interconnected, the interiors or centers of the various FIG. **6–11** type column structures are filled with an appropriate load sustaining material such as concrete.

If desired, some of the teeth forming the ribs on any one or more of connectors **44**, **45**, **55**, and **56** and members **58**, **59**, and **60** may be of a rounded character instead of a pointed character. Considering connector **44**, for example, the outer tips of all but the right-hand most ones of the teeth **44***d* and **44***e* may be rounded off, the right-hand most teeth in each set continuing to have a pointed tip as shown.

While there have been described what are at present considered to be preferred embodiments of this invention, it will be obvious to those skilled in the art that various changes and modifications may be made therein without departing from the invention, and it is, therefore, intended to cover all such changes and modifications as fall within the true spirit and scope of the invention.

What is claimed is:

1. A structural member construction for building walls comprising first and second upstanding wall panels each including spaced apart, parallel, coterminously extending wall sheaths with end portions separated by respective spacer channels with flanges outermost and coterminous with said end portions whereby in assembly the wall sheath and channel flange end faces may meet in abutment, first connector means of channel construction mounted centrally in web of channel construction mounted centrally in web abutment on the first wall panel channel web and with first connector flanges spaced inwardly from said first wall panel sheaths, with the outer surfaces of the first connector flanges being ribbed second connector means of channel construction mounted centrally in web abutment on the second wall panel channel web and with second connector flanges spaced inwardly from said second wall panel sheaths, with the inner surfaces of the second connector flanges being ribbed, and with said second connector flanges being spaced apart and of such flange dimension that when first and second wall panel sheath end faces and spacer channel flange end faces are in respective end face abutment, the second connector flange ribs extend in engagement with the first connector flange ribs just short of the outer face of the web of the first spacer channel, one of said connector means being of a slightly yieldable plastic and the other connector means being metallic.

2. A structural member construction for building walls comprising building walls in corner abutment comprising first and second upstanding wall panels each including spaced apart, parallel, coterminously extending wall sheaths with end portions separated by respective spacer channels with flanges outermost and coterminous with said end portions, the end portion of the inner wall sheath of said second wall panel being disposed in outer surface abutment with the end face of the inner wall sheath of said first wall panel, and terminating substantially in the extended plane of the inner surface of said first wall panel inner sheath wall, one of said spacer channels having a connector angle member with one leg surface mounted in abutment centrally of the outer surface of one of said spacer channel webs, the other leg of said angle member having outer surface ribbed and spaced inwardly of the adjacent flange of the respective spacer channel on which said angle member is mounted, the other of said spacer channels having a connector member with a back surface thereof mounted in abutment centrally of the

spacer channel web surface and providing a ribbed surface to extend normal to said back surface and parallel to and spaced from, and facing the inner surface of the outer flange of said other spacer channel, a corner member including a corner angle with angle leg end faces to abut in assembly the respective end faces of the respective wall sheath of said respective wall panels, a connector plate mounted on the inner surface of each leg of said corner angle and providing a respective ribbed inner surface to extend in engaged assembly with the respective ribbed outer surface of the aforesaid other leg of said connector angle member, and providing a respective ribbed inner surface to extend in engaged assembly with the respective connector member ribbed surface, as said corner angle leg end faces are in abutment, as aforesaid, said connector angle and said connector member being of a slightly yieldable plastic and at least the respective connector plates being metallic.

3. A structural member construction as claimed in Claim 2, which additionally includes a metallic angle member with one leg secured to the inner surface of the inner flange of the spacer channel on the web of which a connector angle leg is mounted, and with the angle member other leg extending substantially normal thereto toward the spacer channel web on which a back surface of the connector member is mounted, and in which the angle member other leg provides a ribbed surface engaged in assembly by an inwardly disposed surface provided by said connector member as said connector member comprises a channel type construction.

4. A structural column construction for building wall corners comprising first and second upstanding structural members each having an inner and an outer flange, the flanges of the first member extending at right angles to the flanges of the second member with both sets of flanges facing a common building wall corner location, such structural members respectively including first and second connector means each having a ribbed element extending toward the common corner location, and an upstanding structural angle member having legs adjoining the outer flanges of the first and second structural members, such legs including ribbed elements engaging the ribbed elements of the first and second connector means in an overlapping and interlocking manner, said first and said second connector means being of slightly yieldable plastic.

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