United States Patent

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[15] **3,665,668**

[45] **May 30, 1972**

[54] CONSTRUCTION JOINT FOR BUILDINGS AND THE LIKE

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[22] Filed: **Mar. 3, 1970**

[21] Appl. No.: **15,977**

[52] **U.S. Cl.** **52/275,** 52/436, 52/571, 52/593, 52/619

[51] **Int. Cl.** **E04c 1/10,** E04b 2/32

[58] **Field of Search** 52/589, 591, 593, 436, 571, 52/275, 309, 234, 424, 429, 572, 619

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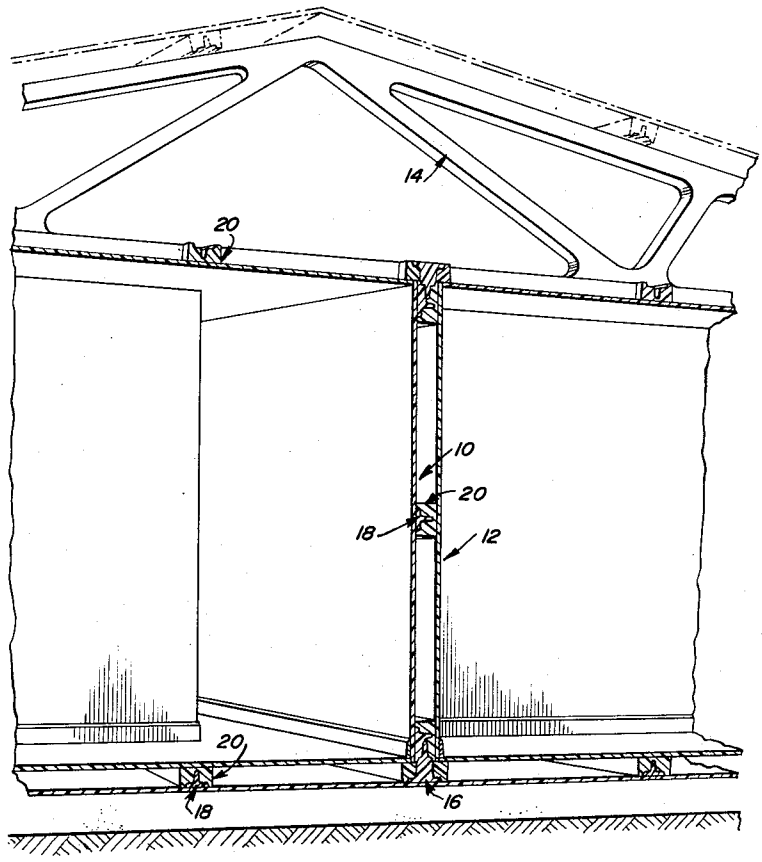
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[57] **ABSTRACT**

A construction joint in the nature of interengaging elongated male and female connectors utilized in interlocking all of the components of a prefabricated building including the structural members and partition units. The male component basically includes a wide base with a narrow rib projecting centrally therefrom along the length thereof. The female connector has a recess defined therein configured so as to closely receive both the rib and base of the male connector. Basic variations are provided for joining adjacent panels and interlocking with similarly configured enlarged male connector beams.

8 Claims, 7 Drawing Figures



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2 Sheets-Sheet 1

Fig . 1

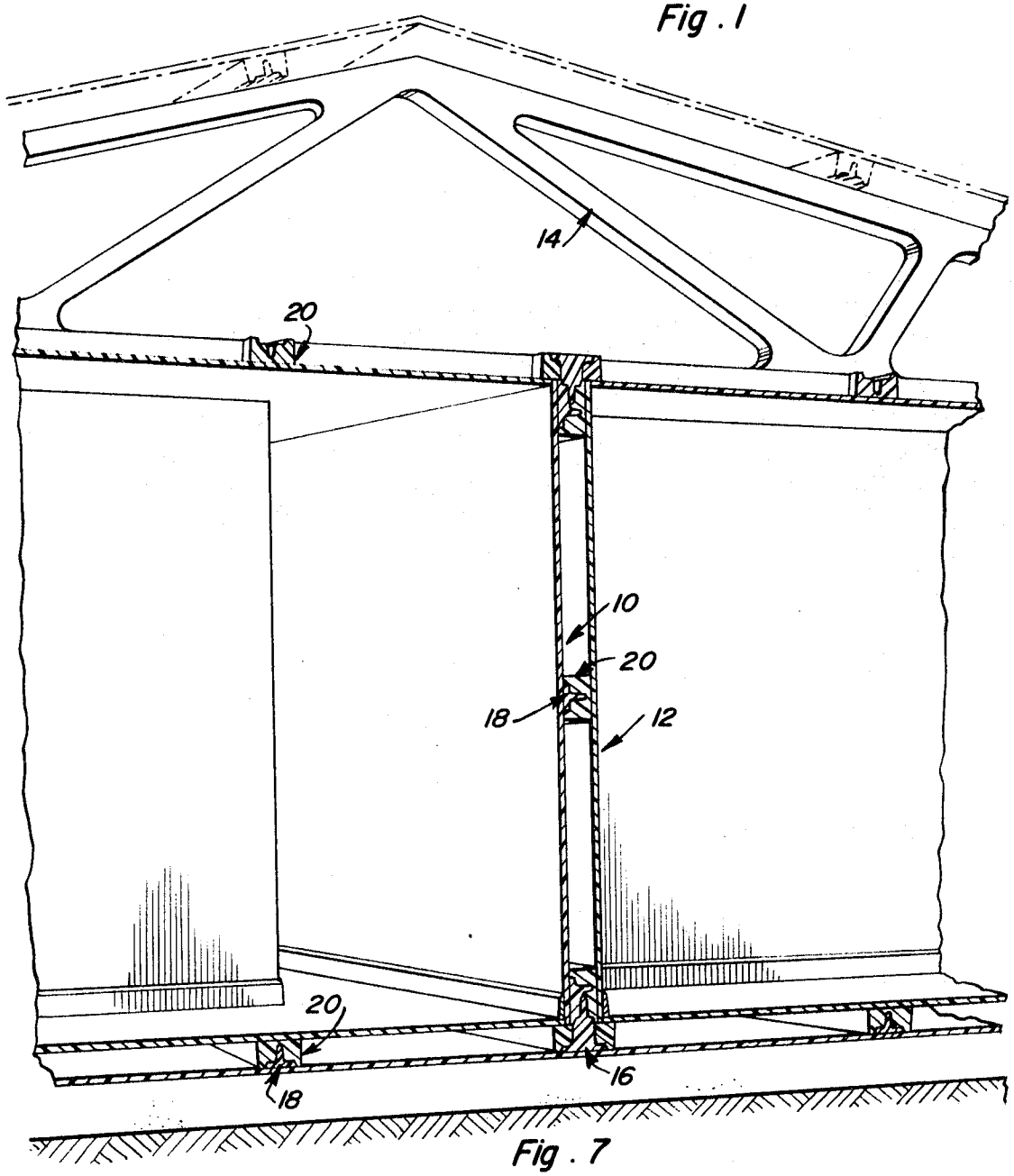
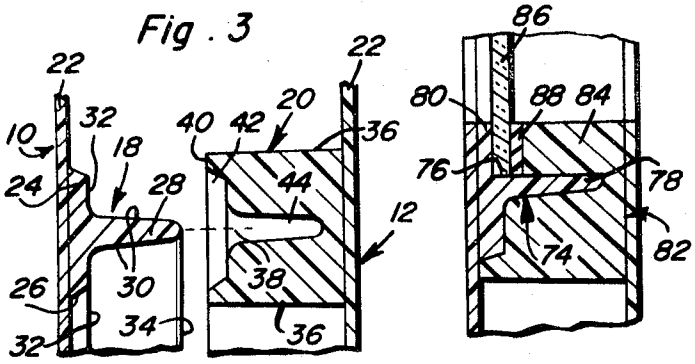


Fig . 7

Fig . 3



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Fig. 2

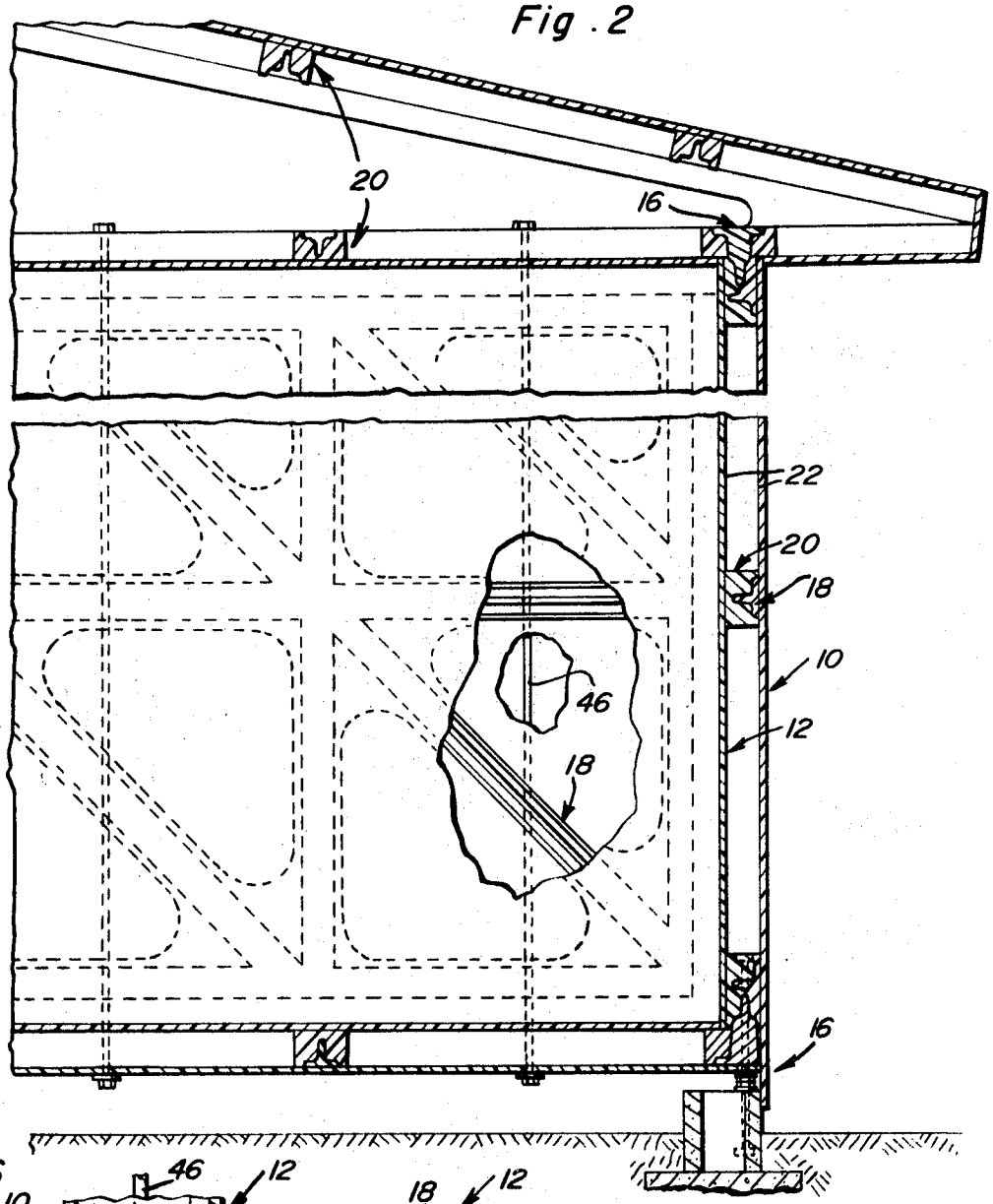
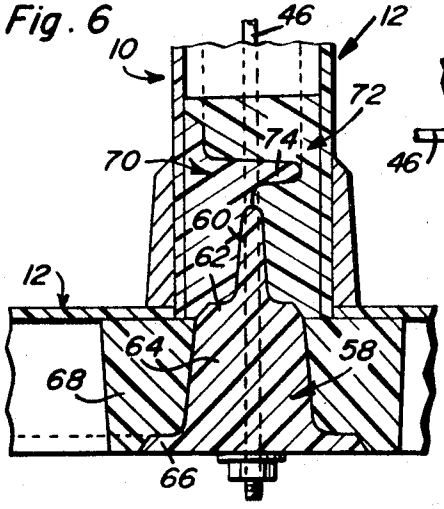


Fig. 6



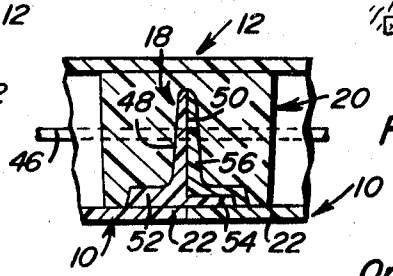
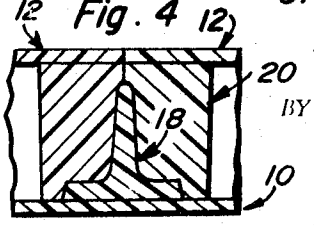


Fig. 5

Fig. 4



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CONSTRUCTION JOINT FOR BUILDINGS AND THE LIKE

The instant invention is generally concerned with prefabricated building construction wherein all of the building components, other than the wiring, which will be copper, and the concrete foundation, will be formed of a rigid plastic material, normally a polyester plastic. More specifically, the invention herein set forth concerns a unique construction joint specifically formed for use in a simplified interlocking of all of the components of a prefabricated building.

It is a significant object of the instant invention to provide a unique joint construction particularly adapted for use in prefabricated buildings and which significantly contributes to the formation of a highly practical and economically feasible construction system wherein only unskilled or semi-skilled labor and a few wrench-like tools are required for the complete erection of a building.

The construction joint itself consists of interlocking male and female connectors configured for a guided interfitting with a substantial amount of overlap for the accommodation of securing rods, normally nylon, therethrough. The connectors will be integrally bonded to one side of a partition panel with the interlocking nature of the connections enabling the formation of hollow walls, floors and the like. In addition, the structural members of the building will include or be in the nature of enlarged male connector shaped beams whereby an actual interfitting of all of the building components can be effected in substantially the same manner, this in itself significantly contributing to the ease of assembly desired.

The particular advantages derived from the joint construction of the instant invention are derived from the unique configuration of the male and female connectors, as well as the adaptability of the basic configurations to a variety of joint situations. The basic male connector is elongated, includes a relatively wide base and has a centrally located full length outwardly projecting rib. The rib is substantially narrower than the base so as to define a pair of shoulders on the base to the opposite sides of the rib. The female connector includes an elongated block-like member having an outwardly opening full length recess defined therein. This recess is configured so as to closely conform to and snugly receive the male connector, including the rib and base thereof.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIG. **1** is a perspective view of a cutaway portion of a prefabricated building wherein the various components incorporate the joint construction of the instant invention;

FIG. **2** is an elevational cross-sectional view through a portion of a building utilizing the joint construction of the instant invention;

FIG. **3** is a cross-sectional view, with the portions exploded, through a typical panel joint illustrating the basic joint construction of the instant invention;

FIG. **4** is a cross-sectional view through a joint at the abutting edges of a pair of male panels;

FIG. **5** is a cross-sectional view through the joint at the abutting edges of a pair of female panels;

FIG. **6** is a cross-sectional view illustrating a male connector beam and the internesting relationship thereof with the adjoining panels; and

FIG. **7** is a cross-sectional view illustrating the adaptability of the basic joint of the instant invention for the accommodation of a window.

Referring now more specifically to the drawings, the illustrated building components, incorporating the joint construction of the instant invention, include male panels **10**, female panels **12**, trusses **14**, and male connector beams **16**. As previously indicated, all of these components are to be formed of an appropriate plastic material.

With reference to FIGS. **1** and **2** in particular, the male and female panels **10** and **12** utilized in the formation of floors, walls, ceilings and roofs, respectively mount the male and female connectors **18** and **20**, the basic forms of which are illustrated in FIG. **3**. The connectors **18** and **20** will normally be formed independently of the facing sheet **22** of the respective panel and subsequently intimately bonded thereto in any appropriate manner so as to become an integral part thereof. The connectors **18** and **20** are orientated, on their respective panels, so as to extend peripherally thereabout and both transversely and diagonally there across so as to form a series of adjacent triangular units which will substantially contribute to the rigidity of the construction.

With specific reference to FIG. **3**, the basic male connector **18** includes an elongated relatively wide low height base **24** having opposed side edges **26**. A centrally located full length outwardly projecting rib **28** integrally extends from the base **24** and likewise includes opposed sides **30**. The rib **28** is substantially narrower than the base **24** whereby a pair of base shoulders **32** are defined on the base to the opposite sides of the central rib **28**. The outer edge **34** of the rib **28** will normally be rounded so as to facilitate its introduction into the female connector **20**.

The opposed sides **26** of the base **24**, as well as the opposed sides **30** of the rib **28**, normally taper or converge outwardly at a slight angle, thus also simplifying the introduction of the male connector into the female connector. By the same token, the opposed sides can be orientated so as to extend perpendicularly or at 90° from the surface sheet **22** or may be slightly undercut or reversely tapered at a maximum of 3° from the perpendicular. In other words, with regard to each pair of sides, one of the sides can be undercut 3° while the other side defines a 90° or an obtuse angle, or both sides can be undercut 1½° for a total of 3°. With these undercuts or reverse tapers, it will be appreciated that a slight snap locking of the panels together can be effected which might be of assistance in retaining the panels interlocked until the introduction of a securing rod as shall be described subsequently.

The female connector **20** has an elongated block-like configuration, the opposed sides **36** of which can be tapered in a manner similar to that referred to relative to the sides associated with the male connector **18**. The female connector **20** is wider than the corresponding male connector **18** and includes an outwardly directed recess **38** therein configured so as to completely receive both the base **24** and rib **28** of the male connector **18** with the extreme outer face or edge **40** of the female connector **20** seating against the inner face of the sheet **22** associated with the male connector **18**. The recess **38**, as indicated, very closely conforms to the configuration of the male connector **18** for a snug reception of the male connector **18** therein. As such, the recess **38** includes a wide base accommodating outer portion **42** and a centrally located communicating inwardly extending inner portion **44**, the sides of both portions tapering in accordance with the taper on the sides of the male connector base and rib. It will be appreciated that the male connector rib **28** projects a substantial distance into the female connector **20** for a firm non-moving seating therein. The interlocking of the male and female panels **10** and **12** is completed by the introduction of an elongated tying rod **46**, illustrated in connection with the joint variation in FIG. **5**. The deep penetration of the male connector **18** into the female connector **20** providing for a positive intersection of both the male and female connectors by the centrally located rod **46**. As will be appreciated, any number of rods **46** can be provided with the rods normally extending through the complete width or length of the mated panels and interlocking the elongated joint structure at the several points of intersection therewith.

Attention is now specifically directed to FIG. **4** wherein the basic joint construction of the instant invention occurs at adjoining edges of a pair of female panels **12**. Such a joint construction will normally occur at an intermediate portion of the associated male panel **10** so as to enable the use of a one piece

male connector **18**. The adjoining edges of the two female panels **12** combine to form the female connector **20**, each having one half of the female connector formed thereon immediately adjacent the edge as will be readily apparent from the drawing. Once the edges of the two female panels **12** are abutted, the resultant combination of the two halves of the female connector combine to form a complete recessed female connector for the reception of the male connector **18**, thus effectively positioning and joining the three involved panels.

FIG. **5**, on the other hand, illustrates the use of the basic connector shaped to join a pair of adjacent male panels **10**. In this situation, the two male panels **10** edge abut at a point corresponding to an intermediate portion of the corresponding female panel **12**, whereby a one piece female connector **20** is utilized. The male connector **18**, on the contrary, is formed in two sections. A first one of the male connector sections, designated by reference numeral **48**, includes one half of the projecting reduced width rib provided with a flat inner face **50**. This section **48** includes a full height base portion **52** projecting laterally from the outer side thereof and a reduced height base portion **54** projecting from the flat inner face **50** thereof. The extreme edge of the associated facing panel **22** terminates in alignment with the flat rib face **50**. The second male connector forming section, designated by reference numeral **56**, includes the second half of the male connector rib which likewise incorporates a flat inner face **50** abuttable against the first section rib face. The base portion of the second section **56** extends laterally outward from the outer face of the rib portion and lies along and down the side of the reduced height base portion **54** of the first section **48** so as to enclose this reduced height portion **54** and combine therewith in completing the base. The panel **22** associated with the second section **56** also extends to the flat rib face **50** so as to combine with the associated base portion in forming what in effect amounts to a full length pocket for the snug reception of the reduced height base portion **54** of the first section **48**. Thus, it will be appreciated that while the basic construction of the joint has been retained, specific provision is made for the joining of a pair of edge abutted male panels **10**. This joint, as is the case with all of the joints involved herein, can be completed by the introduction of an elongated retaining rod **46** there across.

Turning now specifically to FIG. **6**, this figure illustrates, in cross-section, a typical interconnection of the partition defining panels **10** and **12** with a structural beam or male connector beam **58**. Such beams **58**, as will be appreciated from FIGS. **1** and **2**, can be used as either floor or ceiling beams, and for that matter, while not specifically illustrated, as the upper and lower chords of the roof trusses **14**. The beam **58**, and its relationship to the adjoining edges of both the vertical and horizontal panels, retains the basic joint construction initially described in connection with FIG. **3**. The beam **58** is of a height so as to internest with a pair of horizontal female panels **12** as well as a pair of laterally extending joined male and female panels **10** and **12**. That portion of the beam **58** outward of the adjacent horizontal female panels **12** is configured to conform to the basically formed male connector **18** of FIG. **3**. That is, this portion of the beam **58** includes an elongated projecting rib **60** integral with a wide base portion **62**. That portion of the beam **58** between the horizontal female panels **12** consists of an integral continuation of the base portion **62**, designated by reference numeral **64**, which generally follows the side taper of the rib **60** and terminates, at the opposite end thereof, in a laterally enlarged base portion **66** which, while substantially wider than the upper base portion **62**, generally conforms in shape thereto. Each of the horizontal female panels **28** is provided with an edge connector **68** which in effect forms one half of a female connector similar to the connector **20** with the opposed outwardly facing side edges of the connectors **68** conforming exactly to and lying against the enlarged beam portion **64** and enlarged base **66**, forming a female socket for this portion of the male beam **58**.

The laterally projecting interengaged male and female panels **10** and **12** include, respectively, a male connector **70** and a female connector **72** specifically modified so as to both interlock with each other and with the projecting outer portion of the male connector beam **58**. The inner portions of these edge located male and female connectors **70** and **72**, that is those portions inward from the outer edges of the panels **10** and **12**, are formed so as to correspond with the basic connector configuration of FIG. **3**. However, the outer portions of these connectors **70** and **72**, outward of the central rib **74** and accommodating recess portion therefor, form, along the central line between the facing sheets of the panels **10** and **12**, a laterally directed full length recess or female portion which closely conforms to and accommodates the beam rib **60** and adjoining upper base portion **62**. In this manner, a tie-rod **46** can be extended vertically through the beam **58** and the overlapped male and female portions aligned therewith for a tying of the beam **58** and the vertical wall panels **10** and **12** together. The horizontal female panels **12** will likewise be rod clamped or joined to the male beam **58** by a transversely extending rod **46** offset from the vertical rod **46**. Incidentally, it will be appreciated that the associated male and female connectors **70** and **72**, in forming the cooperating female portions for the accommodation of the rib **60**, are in fact substantially wider than the initially described male and female connectors **18** and **20**.

The final variation of the joint construction to be specifically described is illustrated in FIG. **7**. This variation is specifically formed for use about windows and door frames, or for that matter any wall inserts which one may desire to mount. The male connector **74**, secured peripherally about an opening defined in the male panel, is configured substantially in the manner of the male connector section **48** in FIG. **5**, presenting a panel or frame seating area **76** defined by the inner end of the rib portion **78** and the reduced height base portion **80**. The female connector **82** has the recess therein configured so as to closely conform to the rib **78** with the outer or upper portion of the female connector **82** having the outer portion, generally indicated by reference numeral **84**, truncated so as to accommodate the thickness of the panel or frame **86**, as well as an appropriate sealing gasket **88** or the like. There is thus provided a sealing connection completely about the mounted panel which, in addition to mounting the panel or window **86**, locks the partition forming panels together. With such an arrangement, should it become necessary to replace the window **86** or the like, the male and female panels can be slightly spread, and a new window **86** inserted, after which the male and female panels will be resealed.

From the foregoing, it will be appreciated that a highly unique construction joint for use in prefabricated building construction has been defined. This construction joint is, through variations thereof, utilized throughout the prefabricated building for an interlocking of all of the components thereof, including the partition forming panels and the structural members. The joint construction consists basically of male and female connectors selectively nestable together in a snug sealed manner with the male connector projecting to a substantial depth within the female connector for a final interlocking thereof by a transversely extending centrally located rod. The construction joints, as previously indicated, are elongated, extending along the full length of the structural components and along triangle forming lines on the partition panels, the connectors being modified in accordance with the specific function thereof, whether to interconnect intermediate portions of the panels or to join the various edge portions thereof.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. A construction joint for use in assembling prefabricated building components or the like, said construction joint comprising a male connector and a female connector generally coextensive with said male connector, said male connector being elongated and including a full length relatively wide base portion and a centrally located rib portion generally coextensive in length with said base portion and projecting outwardly therefrom, said female connector being block-like in shape and including an outwardly opening recess therein configured to closely receive at least a substantial part of both the base portion and the rib portion of the male connector, said male connector rib portion being substantially narrower than said base portion with said base portion projecting laterally beyond the opposite sides of said rib portion and terminating in generally parallel sides, said male connector being formed in two sections, each section comprising a partial rib portion and a partial base portion, the partial rib portion of each male connector section being of full height and approximately one half the width of the rib portion, the partial base portion of one section being of full height to one side of the partial rib portion and of a reduced height to the second side of the partial rib portion, the partial base portion of the second section extending solely beyond one side of the corresponding partial rib portion and combining with the reduced height extending part of the partial base portion of the first section so as to define a full height base portion.

2. A construction joint for use in assembling prefabricated building components or the like, said construction joint comprising a male connector and a female connector generally coextensive with said male connector, said male connector being elongated and including a full length relatively wide base portion and a centrally located rib portion generally coextensive in length with said base portion and projecting outwardly therefrom, said male connector rib portion being substantially narrower than said base portion with said base portion projecting laterally beyond the opposite sides of said rib portion and terminating in generally parallel sides, said female connector being block-like in shape and including an outwardly opening recess therein configured to exactly conform to and closely receive both the entire base portion and the entire rib portion of the male connector, said male and female connectors being respectively integrally secured to building components in the nature of a pair of partition forming planar panels, said connectors extending generally perpendicularly to their respective panels peripherally about the panels and across the intermediate portions of the panels inward of the peripheries thereof, for an interlocking and internal bracing of the panels in laterally spaced parallel relation to each other.

3. The construction joint of claim 2 wherein a portion of the peripherally located male and female connectors define, upon an interengagement thereof, a peripheral recess opening outward between the panels and configured generally in accordance with the configuration of the female connector recess, and a male connector beam located along the portion of the periphery of the panels, generally between the planes of the panels, wherein the outwardly directed recess is defined between the male and female connectors, said beam having a portion thereof generally conforming in shape to the male connector for close reception in the formed recess between the male and female connectors.

4. The construction joint of claim 3 wherein said male connector beam, outward of the portion thereof generally conforming to the male connector, includes an enlarged block-like base portion terminating in a pair of laterally directed full length base forming flange portions extending from the opposite sides thereof.

5. The construction of claim 2 wherein said female connector, upon engagement of the male connector therein, engages the panel mounting the male connector to the opposite sides of the male connector.

6. The construction of claim 5 wherein the connectors peripherally about the panels and across the intermediate portions of the panels define a plurality of generally triangular areas between the panels.

7. The construction of claim 2 wherein a portion of the male connector is formed in two sections, each section comprising a partial rib portion and a partial base portion, the partial rib portion of each male connector section being of full height and approximately one half the width of the rib portion, the partial base portion of one section being of full height to one side of the partial rib portion and of a reduced height to the second side of the partial rib portion, the partial base portion of the second section extending solely beyond one side of the corresponding partial rib portion and combining with the reduced height extending part of the partial base portion of the first section so as to define a full height base portion.

8. The construction of claim 2 wherein the connectors peripherally about the panels and across the intermediate portions of the panels define a plurality of generally triangular areas between the panels.

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