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Cook

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[54] **STACK-WALL**

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[58] **Field of Search** ..... 52/169, 98, 220, 370, 503, 52/377, 582, 378, 349, 127, 173; 248/354, 354 S, 226 D, 226 R, 226 C; 249/44, 46, 47; 24/268

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[57] **ABSTRACT**

A masonry wall construction of a plurality of preformed modules employed in lieu of conventionally used concrete block, brick or clay masonry wall structures. Knee braces are provided for properly aligning the first course of modules and subsequent courses are set in a bed of mortar and properly aligned and positioned by the use of brackets and ties and each module is set in place by a crane or other suitable lifting and manipulating device by engagement with eyebolts provided for erection only.

7 Claims, 8 Drawing Figures

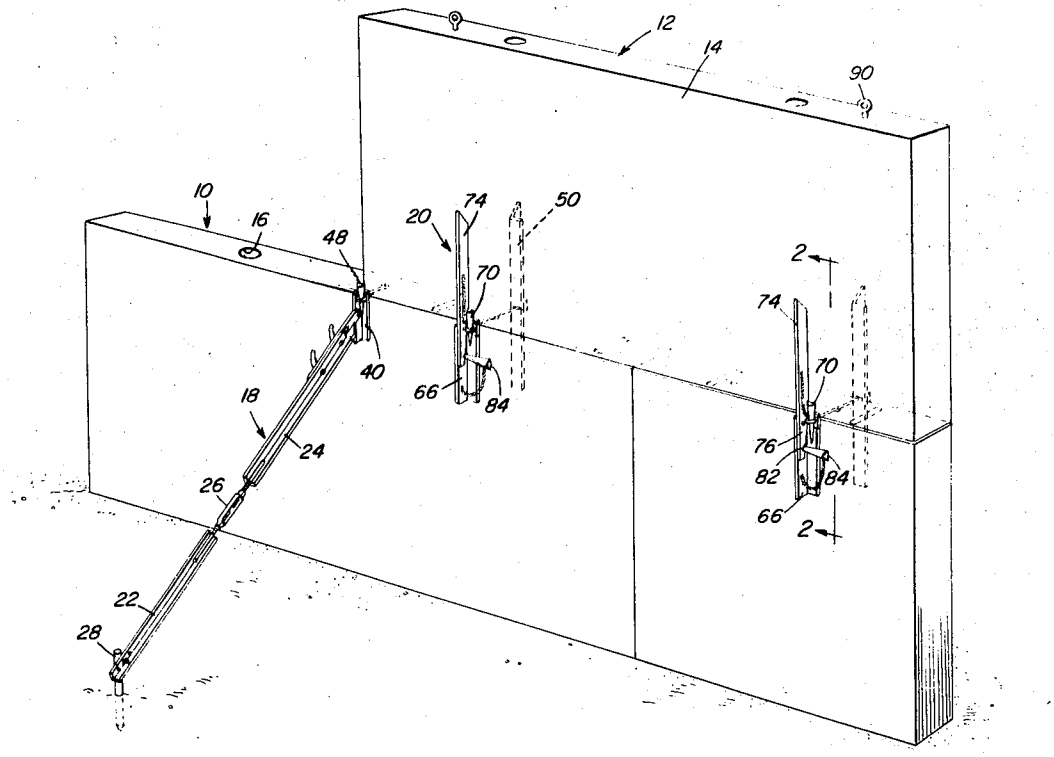
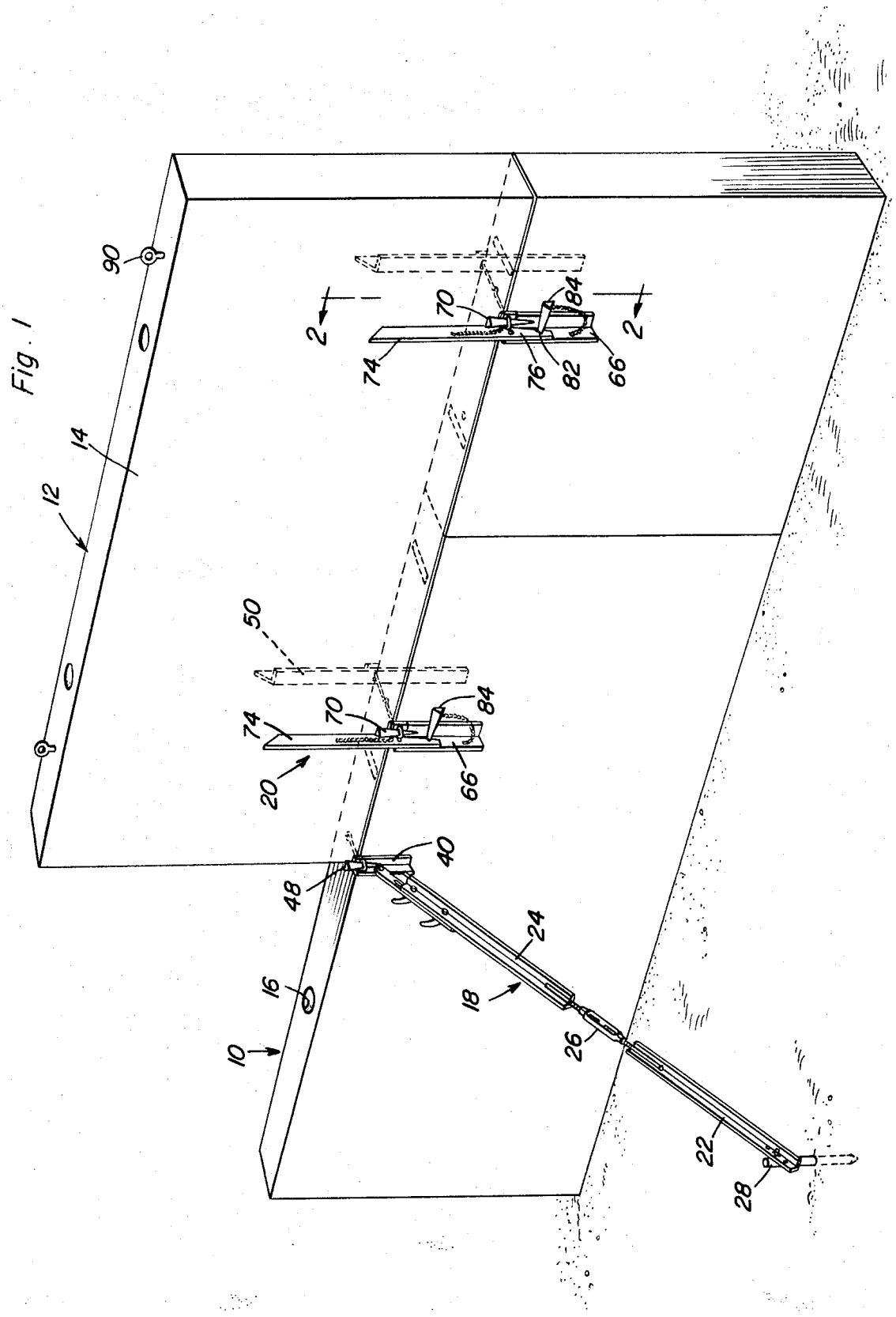
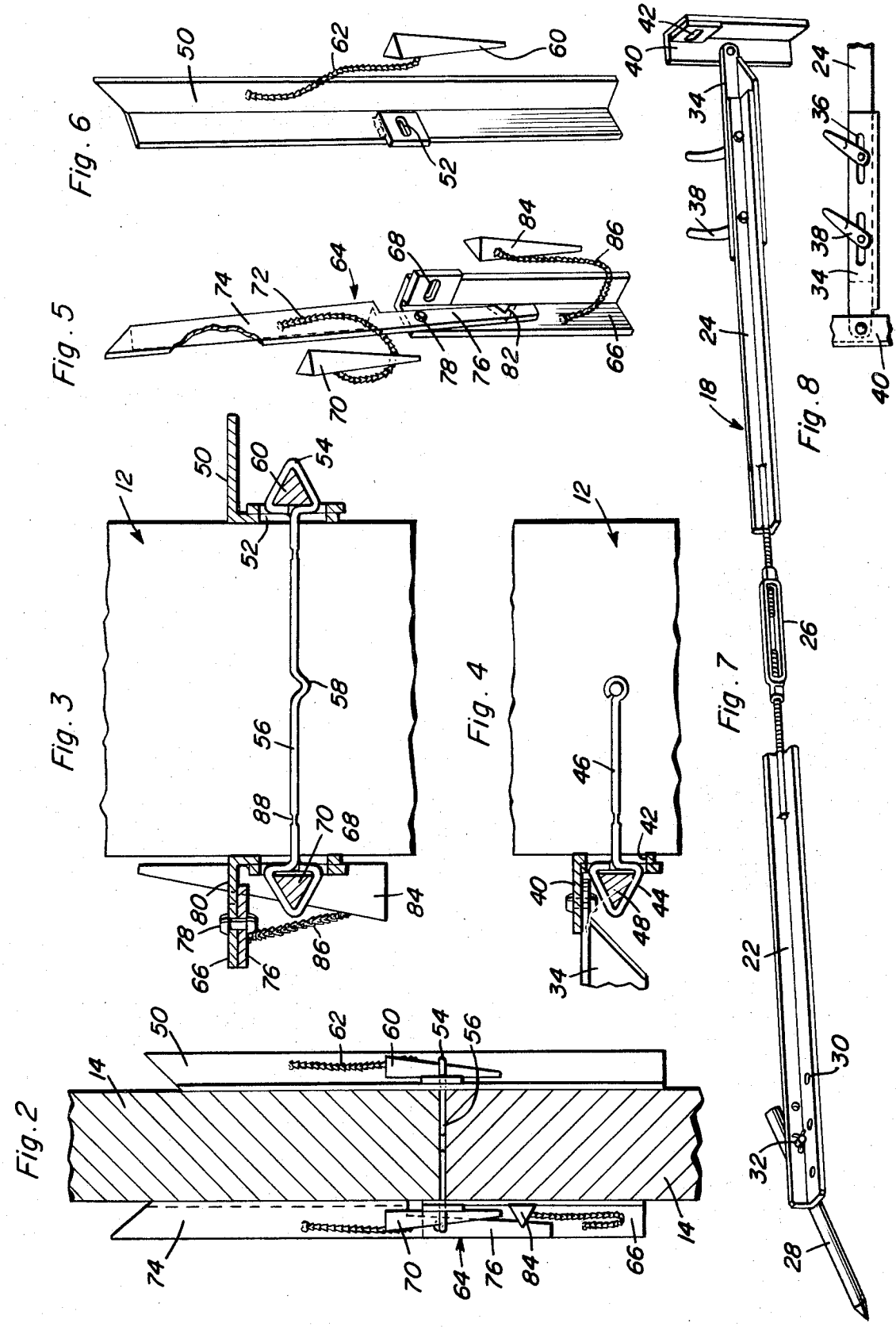


Fig. 1




Fig. 2
Fig. 3
Fig. 4
Fig. 5
Fig. 6
Fig. 7
Fig. 8

STACK-WALL

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention generally relates to a wall construction and more particularly a masonry wall constructed of a plurality of modules of predetermined standard sizes such as 8 inch × 4 inch panels together with structure for erecting a wall in a manner to effect a considerable saving in time and labor. 2. Description of Prior Art

Conventionally, masonry walls are constructed from bricks, concrete blocks or the like in which the individual bricks or blocks are laid by hand which results in a substantial cost for time and labor of the skilled artisan engaged in this work. Some efforts have been made to reduce the expense involved in constructuon walls but most efforts have been directed toward the concept of pouring a complete wall as a monolithic slab either in situ in a vertical position or in a horizontal position with the complete wall being tilted upwardly to a vertical position after formation. Other efforts have been made to prefabricate complete building walls at a factory site and then transport them to a building site for installation. However, such procedures require rather elaborate machinery, forms and the like to form a complete wall and eliminate flexibility in design, size and the like of a wall.

SUMMARY OF THE INVENTION

An object of the invention is to provide a wall structure comprising a plurality of standard size modules and an apparatus for setting up the modules into a wall structure which enables the modules to be constructed at a point remote from the building site and effectively transported thereto and then erected to form a building wall or the like without requiring the use of elaborate machinery, transportation equipment or erection equipment.

A further object of the invention is to provide a wall structure employing a plurality of modules together with a knee brace for erecting the initial course of modules and alignment brackets for erecting subsequent courses of modules with the knee braces and alignment brackets being secured by ties disposed in the mortar bed or joint between adjacent modules.

Another important object of the present invention is to provide a bracket structure for aligning courses of wall modules which engage the vertical surfaces of the modules and include adjustment means to enable limited adjustable vertical orientation of the upper module to properly align it vertically with a lower module.

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 thereof, wherein like numerals refer to like parts throughout.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of the wall construction illustrating two courses of modules with the knee brace and brackets being employed.

FIG. 2 is a vertical sectional view, on an enlarged scale, taken substantially upon a plane passing along section line 2—2 of FIG. 1 illustrating the relationship of the brackets to the modules.

FIG. 3 is a plan view of the lower module with the brackets being illustrated in section.

FIG. 4 is a plan view of the lower module illustrating the upper end of the knee brace in section.

FIG. 5 is a perspective view of one part of the alignment bracket between modules.

FIG. 6 is a perspective view of the other component of the bracket.

FIG. 7 is a perspective view of the knee brace for the module.

FIG. 8 is a fragmental elevational view of a portion of the knee brace illustrating one of the adjustment features thereof.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now specifically to the drawings, a building wall **10** is disclosed and is constructed from a plurality of substantially identical modules **12** each of which may be 8 inches × 4 inches in dimension and is in the form of a panel having vertically disposed substantially parallel face surfaces which may be provided with any pattern desired such as simulated brick, stone, concrete block or the like or the panel may have a plain concrete appearance and for the purposes of this application will be defined as a substantially rectangular rigid panel **14** provided with passageways **16** for utility lines and suitable reinforcement (not shown) may be provided in each of the panels to rigidify the same.

The first course of modules **12** are oriented vertically and retained in position by a knee brace **18.** The first course of modules may be supported in any suitable manner such as on a foundation, footing, concrete slab or the like in a well known and approved manner in the building industry with the vertical joint between adjacent modules being filled with mortar to provide a sealed joint therebetween. Subsequent courses of modules **12** are positioned on the lower course in alignment therewith with the joints staggered and with a mortar bed between the modules with a bracket assembly **20** being employed between the lower course of modules and an upper course of modules.

The knee brace **18** is illustrated in more detail in FIG. **7** and includes a lower angle iron member **22** and an upper angle iron member **24** interconnected by a turnbuckle assembly **26** to longitudinally adjust the members **22** and **24** in relation to each other. The lower end of the member **22** is provided with a pointed ground stake **28** adjustably attached to either flange of the member **22** by a plurality of holes **30** provided therein receiving a fastener bolt or pin **32** so that either of the flanges of the member **22** may be disposed vertically with the stake **28** being pivotal and oriented vertically when in use as illustrated in FIG. **1.** The upper end of the upper member **24** is provided with a longitudinally adjustable angle iron extension **34** having longitudinal slots **36** therein receiving handle-equipped fastener bolts **38** to provide a further adjustment of the overall length of the knee brace. The upper end of the extension **34** is pivotally attached to an angle iron member **40** having a reinforced slot **42** therein which receives a generally triangular shaped end **44** of a tie **46** that is embedded in the mortar bed and thus anchored to the wall or a suitable means may be provided for anchoring the tie to the lower course of modules **12.** A wedge **48**

is inserted vertically down through the triangular shaped loop or eye **44** with one surface of the wedge engaging the bracket **40** above and below the slot **42** thereby securing the bracket flat against the lower module **12** so that by adjustment of the turnbuckle **26,** the lower module **12** may be accurately positioned in vertical orientation.

The bracket assembly **20** includes a rigid one-piece angle iron unit **50** bridging the horizontal joint between the lower and upper course of modules **12** with one flange of the member **50** having a reinforced horizontal slot **52** therein for receiving a triangular eye or loop **54** on one end of a wire tie **56** that includes a similar loop or eye on the other end thereof and is provided with a central offset **58** which is disposed between the courses of modules and received in the mortar bed. The loop **54** extends through the slot **50** and receives a vertically disposed wedge **60** tethered to the member **50** by a flexible chain or the like **62** so that one flange of the angle iron member **50** is secured flush against the aligned surfaces of the lower and upper modules.

Each bracket assembly **20** also includes a two-piece component generally designated by numeral **64** which includes a lower angle iron member **66** having a reinforced horizontal slot **68** adjacent the upper end thereof which receives the eye or loop **54** on the end of a wire tie **56** with a vertical wedge **70** being received therein and tethered to the angle iron member **66** by a flexible chain **72** or the like so that angle iron member **66** will be fixedly secured to the surface of the lower module with the upper end thereof bridging the joint between the upper and lower panels **14** which form the modules **12** as illustrated in FIG. **2.** The two-piece component **64** of the bracket assembly **20** also includes an upper angle iron member **74** having a downwardly extending leg **76** on one flange thereof and forming a continuation thereof which is pivotally attached to the outwardly extending flange of the angle iron member **66** adjacent the upper end thereof by a pivot pin or bolt **78.** The flange on the angle iron member **66** to which the leg or extension **76** is pivotally attached includes a triangular shaped opening **80** and the inner edge of the extension **76** is provided with a smaller triangular shaped notch **82** communicating with the inner edge for receiving a horizontally disposed wedge **84** that is tethered to the angle iron member **74** by flexible chain **86** or the like. Thus, by inserting the wedge **84** horizontally as illustrated in FIG. **3,** the notch **82** and the extension **76** will engage the inclined apex of the wedge and be forced outwardly as the wedge is inserted thereby clampingly engaging the surface of the upper module by swinging the member **74** inwardly about pivot pin or bolt **78** thus clamping the module against the one-piece component **50** and orienting the upper module in exact alignment with the lower module.

As illustrated, the wire ties may be provided with weakened point adjacent the outer ends to enable the outer ends thereof to be broken off after assembly of the wall. The weakened points may be in the form of notches **88** and the wire ties may be of well known structure which facilitate breakage thereof. Also, eyebolts or ties **90** may be provided in the top edge of each module to enable a crane or other lifting equipment to be employed to place the modules in position with these eyebolts either being removed or broken off after assembly of the modules. Also, each of the wedges are tethered to their associated structure to prevent loss thereof and enables assembly of the wall with very minimum tools inasmuch as a conventional hammer or other impact instrument may be employed for securing the knee braces in position and also the bracket assemblies in position.

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 restored to, falling within the scope of the invention.

What is claimed as new is as follows:

1. A wall structure comprising a plurality of courses of modules, each of said modules being defined by a substantially rectangular panel with the panels being vertically and horizontally aligned and secured to each other, and means retaining the modules in position during assembly, said means including a longitudinally adjustable knee brace having means at one end for anchoring to the modules in a lower course and means at the other end for anchoring to the ground, and bracket assemblies securing upper modules in vertical alignment with the lower modules, each of said bracket assembles comprising a first bracket including a rigid member extending vertically along one surface of two vertically superimposed modules in engagement with the surface thereof and bridging the joint therebetween, a second bracket engaging the opposite surface of the modules, means extending between the brackets for securing them onto the modules, said means being disposed in the juncture between the modules to vertically orient the bracket assembly in relation thereto, said second bracket including a lower angle iron member rigidly secured to the means extending between the brackets, and an upper angle iron member having a depending extension pivotally attached to the lower member for pivotal movement about a substantially horizontal axis parallel with the adjacent surface of the modules, and means engaging the extension and the lower member for swinging the upper end of the extension toward the modules for securing the upper module in place.

2. The structure as defined in claim **1** wherein said knee brace includes a pair of longitudinally aligned and spaced angle iron members, a turnbuckle interconnecting said angle iron members to enable longituidnal adjustment thereof, said means for engaging the ground surface including a pointed stake for insertion into the ground, means pivotally and detachably connecting the upper end portion of the stake to either of the flanges of the angle iron member to enable the knee brace to be oriented in various positions in relation to the ground surface, said means on the knee brace engaged with the module including an angle iron member pivotally connected to the knee brace for pivotal movement about an axis paralleling the surface of the module to enable the angle iron member to lay flat against the module, said angle iron member having a horizontally disposed slot therein, a wire tie secured to the upper edge of the lower module and including a loop projecting through the slot, and a wedge extending down through the loop and securing the angle iron member to the module.

3. The structure as defined in claim **1** wherein said means for swinging the upper end portion of the upper

member includes a wedge insertable through an opening in the lower member and engaging the inner edge of the extension on the upper member for forcing the inner edge of the extension outwardly to cause the upper member to pivot about its pivot axis to engage with the surface of the module.

4. The structure as defined in claim **3** wherein each module includes passageways to enable installation of utility conduits, and spacers between the courses of the modules.

5. The structure as defined in claim **4** wherein said knee braces includes a pair of longitudinally aligned and spaced angle iron members, a turnbuckle interconnecting said angle iron members to enable longitudinal adjustment thereof, said means for engaging the ground surface including a pointed stake for insertion into the ground, means pivotally and detachably connecting the upper end portion of the stake to either of the flanges of the angle iron member to enable the knee brace to be oriented in various positions in relation to the ground surface, said means on the knee brace engaged with the module including an angle iron member pivotally connected to the knee brace for pivotal movement about an axis paralleling the surface of the module to enable the angle iron member to lay flat against the module, said angle iron member having a horizontally disposed slot therein, a wire tie secured to the upper edge of the lower module and including a loop projecting through the slot, and a wedge extending down through the loop and securing the angle iron member to the module.

6. A bracket assembly for retaining vertically superimposed building wall modules in vertical alignment and being disposed in bridging relation to the joint between vertically aligned and superimposed building wall modules, said bracket assembly comprising a first bracket in the form of an elongated rigid member extending vertically along one surface of two vertically superimposed modules in bridging relation to the joint therebetween and in engagement with the surface of both modules, a second bracket extending vertically along the opposite surface of the two modules in substantially opposed relation to the first bracket, means extending between the first and second brackets for securing them onto the modules, said means being disposed in the joint between the two vertically superimposed modules, said second bracket including a lower rigid member rigidly secured to the means extending between the brackets, an upper rigid member having a depending extension pivotally attached to the lower rigid member for pivotal movement about a horizontal axis generally parallel with the adjacent surface of the modules, and means interconnecting the extension and the lower member for swinging the portion of the upper member above the horizontal axis toward the upper module for securing the upper module securely in place by clamping it between the upper end portion of the first bracket and the upper end portion of the second bracket.

7. The structure as defined in claim **6** wherein said means interconnecting the extension and lower member includes a wedge insertable through an opening in the lower member and engaging the inner edge of the extension on the upper member below the axis for forcing the inner edge of the extension outwardly to cause the upper portion of the upper member to pivot about its pivot axis to engage the surface of the module.

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