United States Patent

Pilish

[15] **3,706,168**

[45] **Dec. 19, 1972**

[54] **PREFABRICATED BUILDINGS**

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[22] Filed: **Sept. 15, 1970**

[21] Appl. No.: **72,467**

[52] **U.S. Cl.** **52/234**, 52/262, 52/285, 52/294

[51] **Int. Cl.** **E04b 2/00**

[58] **Field of Search**.....52/284, 285, 270, 262, 292, 52/293, 294, 295, 299, 274, 261, 234

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[57] **ABSTRACT**

A prefabricated reinforced concrete building is disclosed, wherein pre-cast separate footings are spaced in an arrangement defining the floor plan of the building, and pre-cast wall-forming panels, disposed in edge-abutting relation, are supported by the footings. Roof-forming panels overlie the upper edges of the wall-forming panels. The abutting wall-forming and overlying roof-forming panels are interconnected by parallel upwardly extending studs, anchored in adjacent abutting portions of the wall-forming panels, and extending successively through a first apertured tie plate overlying upper edge portions of the wall-forming panels; the roof-forming panels; and a second tie plate overlying the roof-forming panels. The studs and tie plates are embedded in cast in situ concrete, so that the roof and wall-forming panels form a monolithic membrane.

4 Claims, 11 Drawing Figures

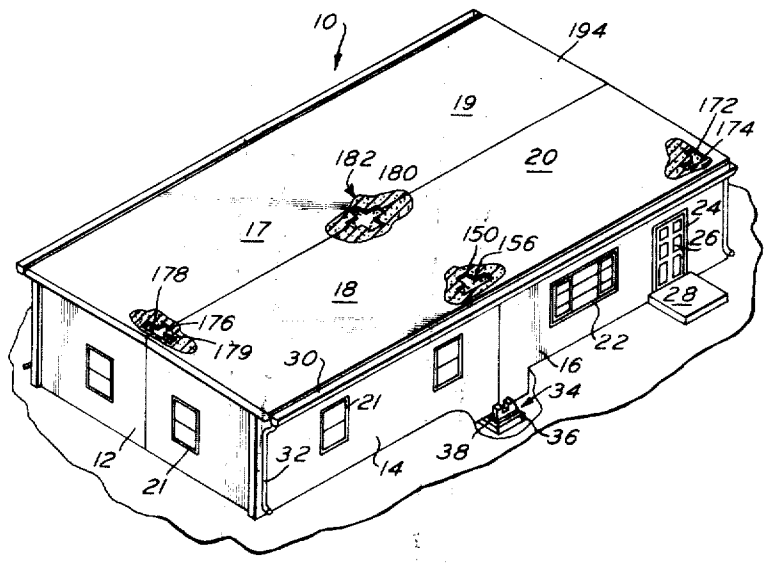
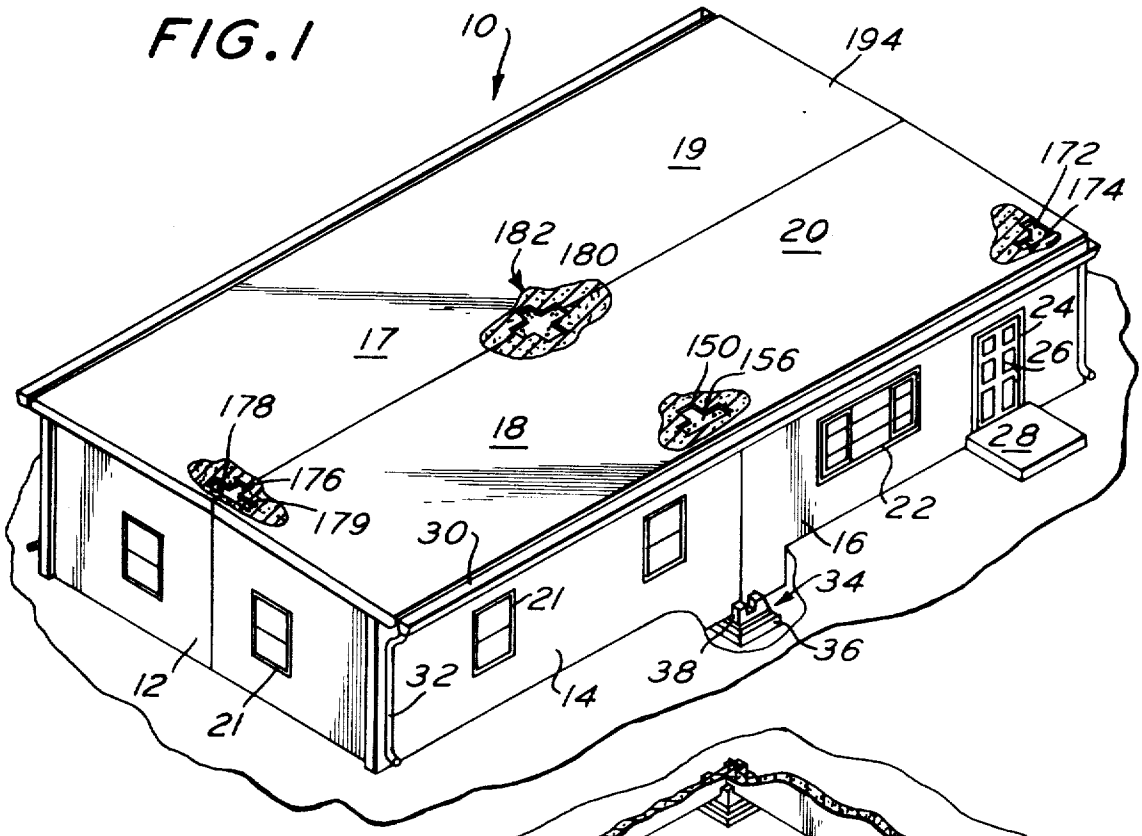


FIG. 1



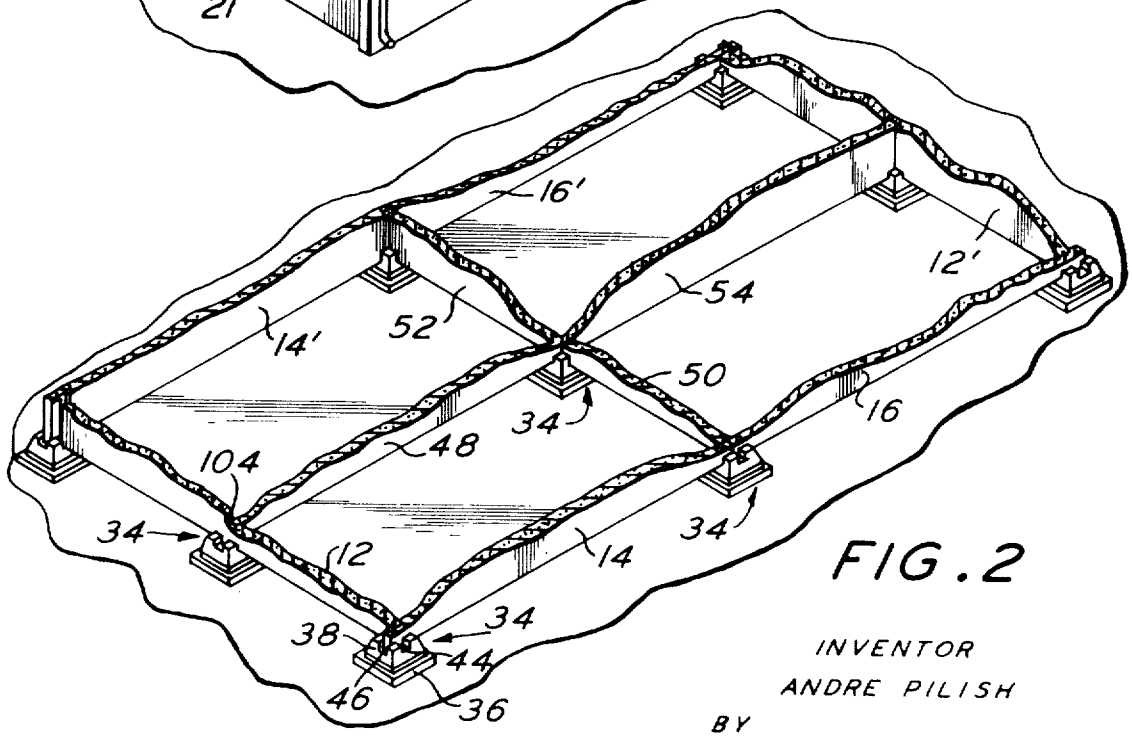


FIG. 2

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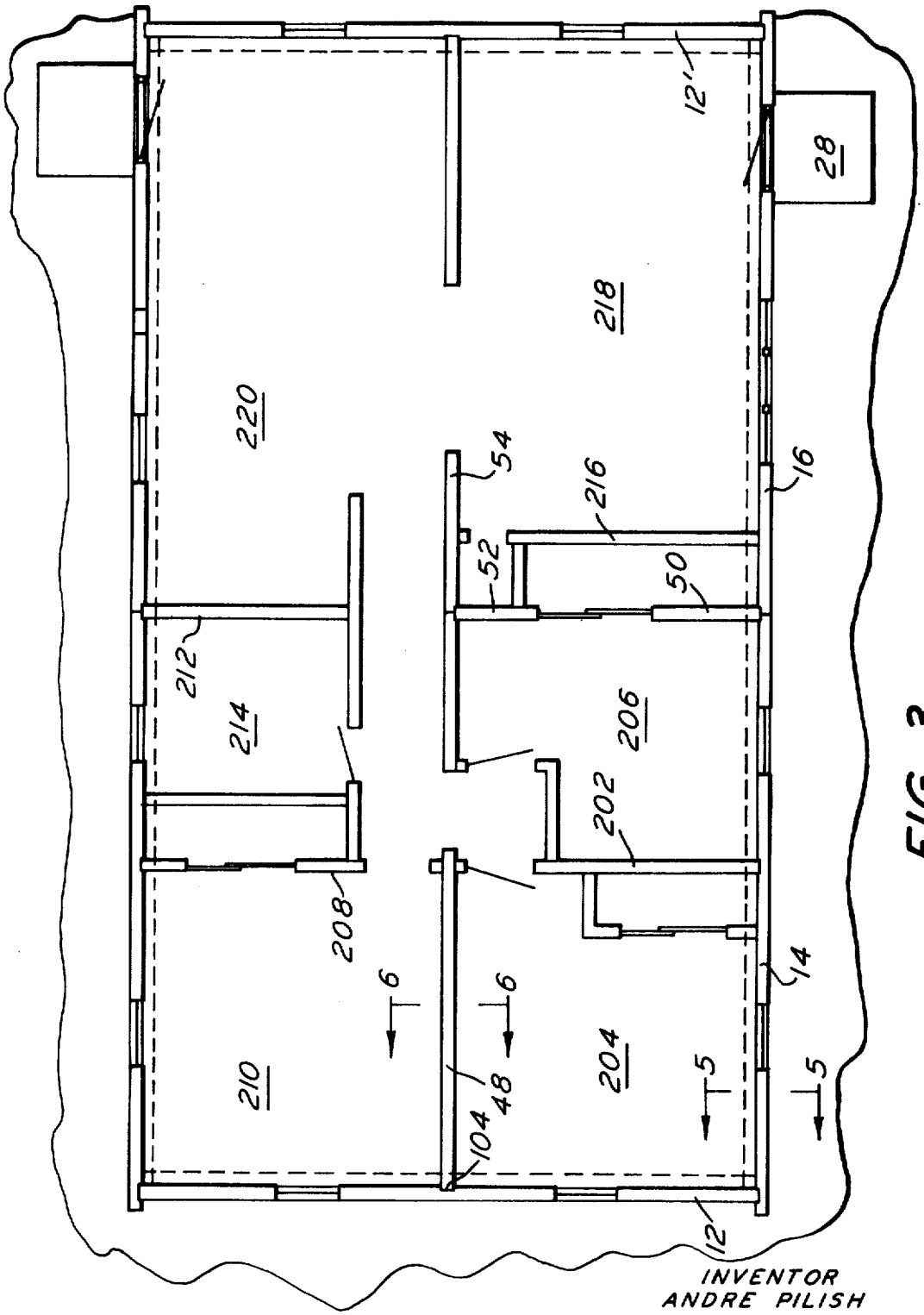


FIG. 3

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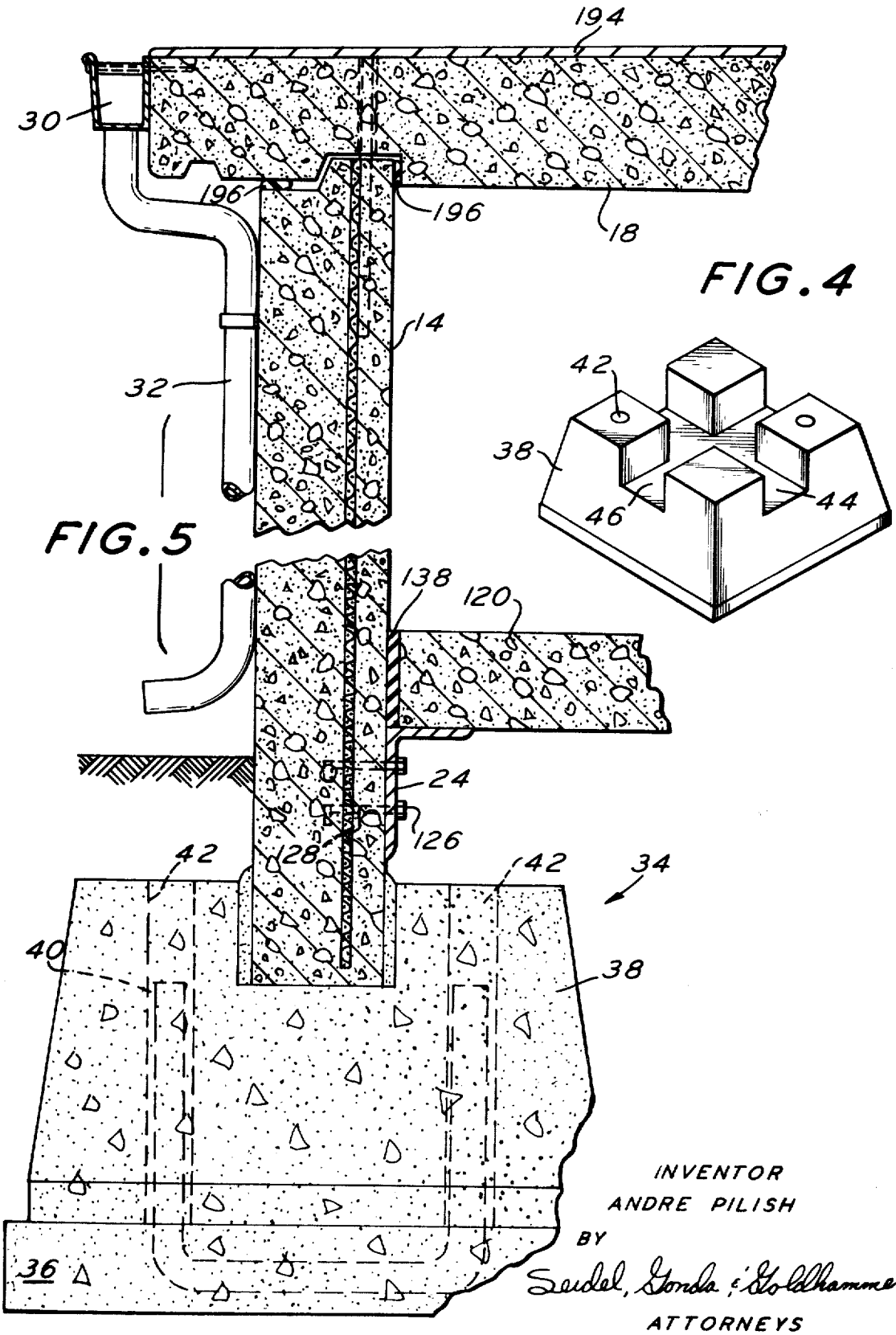


FIG. 4

FIG. 5

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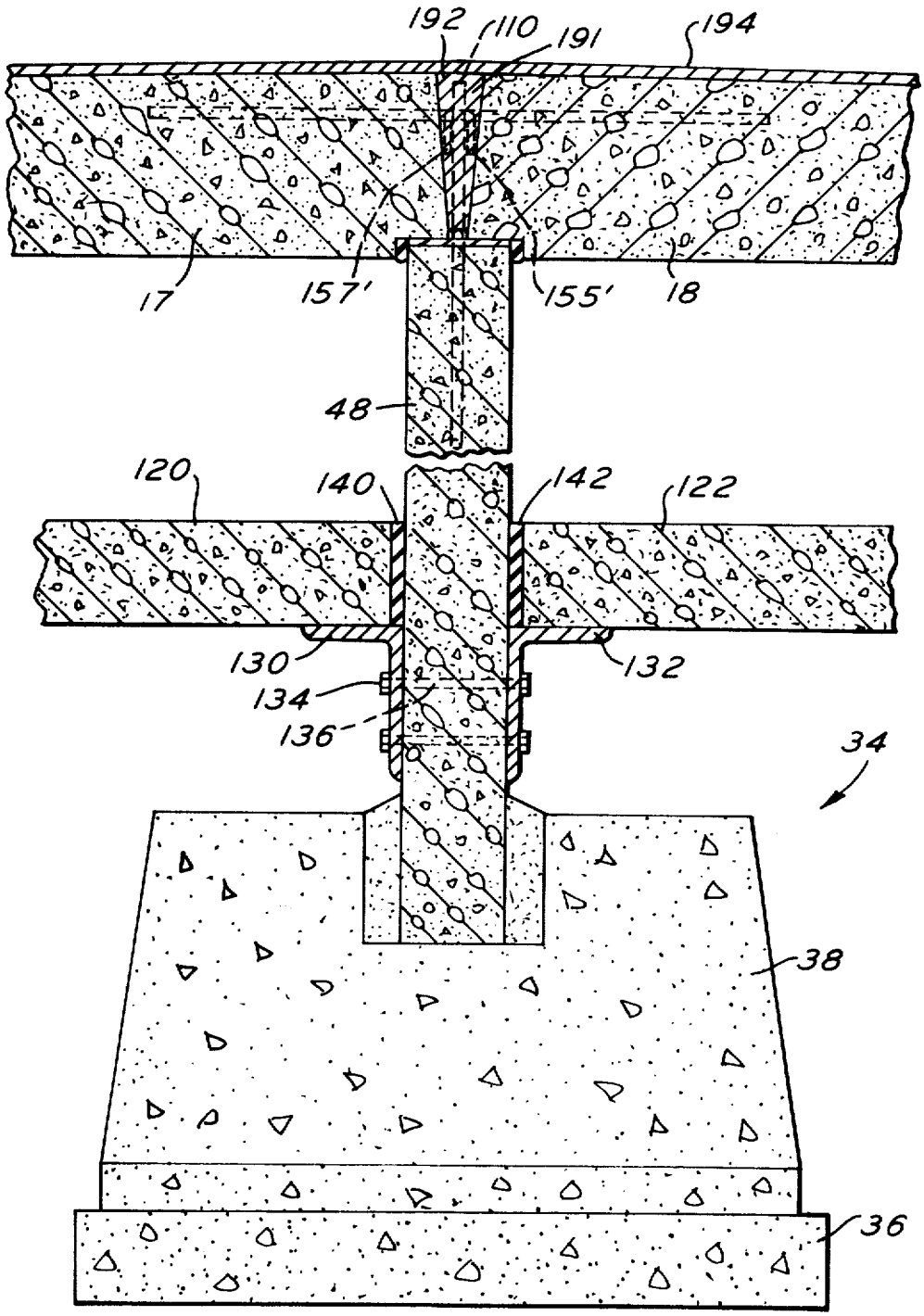


FIG. 6

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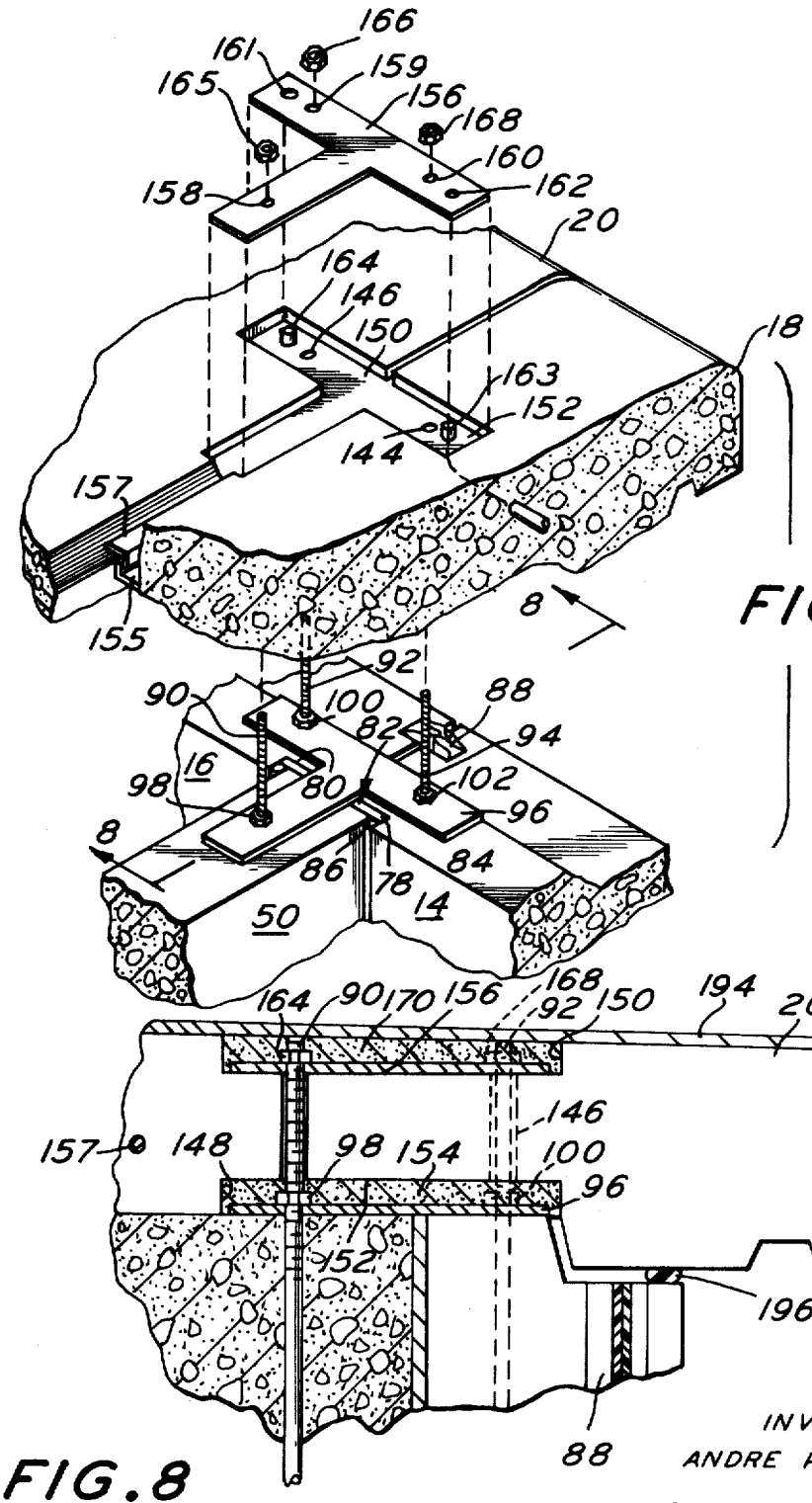


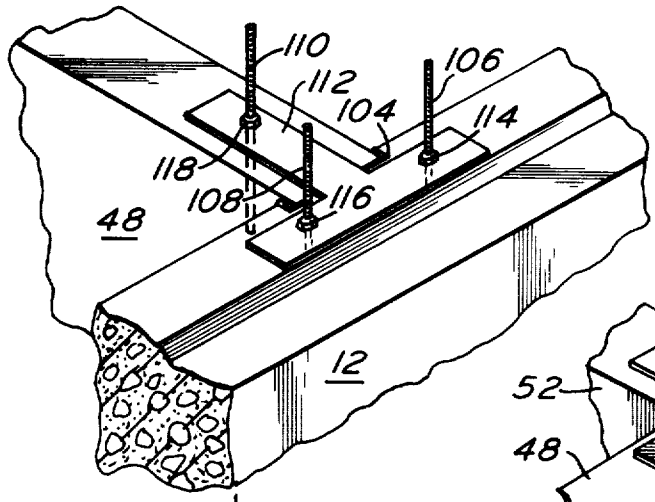
FIG. 7

FIG. 8

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FIG. 9



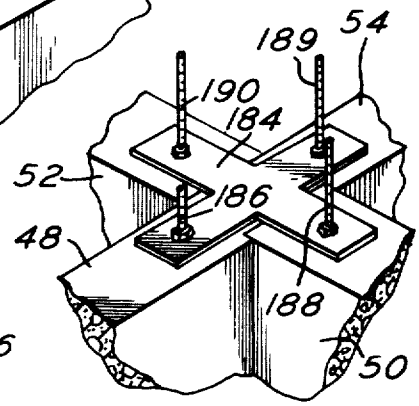


FIG. 11

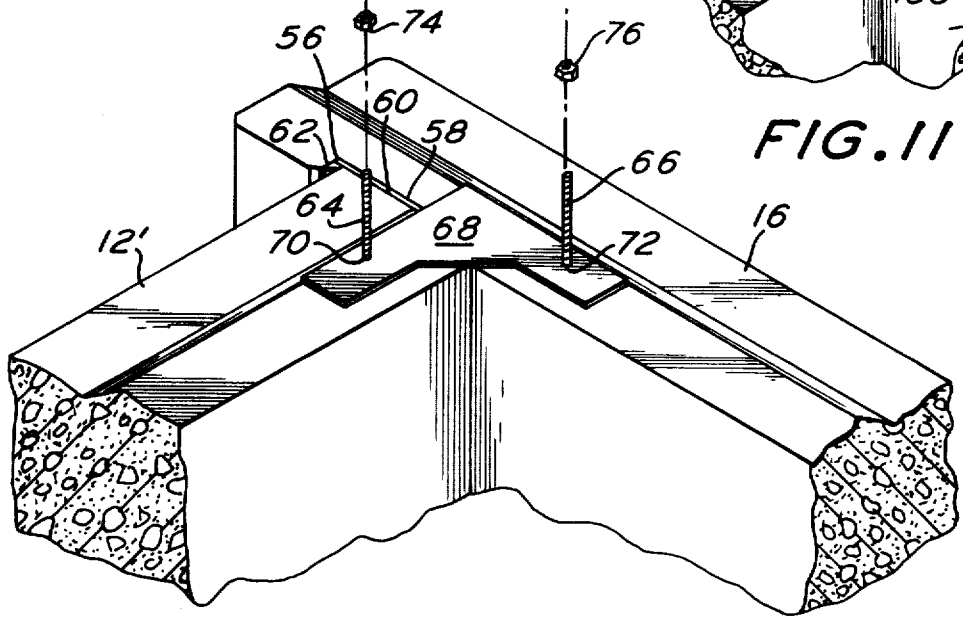


FIG. 10

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PREFABRICATED BUILDINGS

This invention relates to prefabricated buildings, and more particularly, to prefabricated buildings of the pre-cast concrete type intended for permanent use.

It is known to construct dwellings and other buildings using pre-cast monolithic panels. Such panels, when assembled, form the walls, floor and roof of the structure.

Important advantages of such buildings are ease and rapidity of construction, durability, and low cost. Ideally, such buildings are capable of rapid assembly with a minimum of skilled labor and on-site preparation. It is extremely important, however, that the durability and structural integrity of the finished building not be compromised for simplicity and ease of construction. It is, therefore, a principal object of this invention to provide a prefabricated permanent building which is easy to erect, fireproof, and healthy to live in.

Numerous pre-cast concrete structures have heretofore been proposed. For example, in U.S. Pat. No. 2,372,200, there is shown a structure wherein pre-cast wall and floor slabs are erected over conventional foundation footings. Spaced inner and outer walls are provided, with intersecting wall panels interconnected by welded and grouted joints. Roof panels are coupled to the wall panels by means of bolts extending from the edges of the wall panels, through the roof panels.

In the present invention, spaced individual footings are provided. Pre-cast footings blocks establish perpendicularity of the intersecting wall-forming panels, and greatly simplify on-site construction of the foundation. Moreover, the only on-site interconnection of abutting and intersecting wall-forming panels is made by means of bolted joints, located only at the upper edges of the panels.

U.S. Pat. No. 2,351,856 illustrates the use of individual footing blocks in prefabricated building structures. In such patent, however, the footing blocks support vertical columns, to which wall-forming panels and girders are affixed. It is another object of this invention to provide a prefabricated building structure, supported by individual footings wherein the need for vertical structural members other than wall-forming panels is eliminated.

It is still another object of this invention to provide a building structure wherein the need for foundation beams is eliminated, the wall-forming panels performing the function of such members.

It is a general object of this invention to provide a prefabricated building structure wherein wall and roof-forming panels are structurally interconnected to form a monolithic structure without need for internal structural members, such as girders, and wherein the wall and roof-forming members are interconnected by a minimum number of structural ties.

Other objects will appear hereinafter.

The foregoing and other objects are accomplished, in a preferred form of the invention, by a building supported by spaced individual pre-cast footing blocks, disposed in an arrangement defining the floor plan of the building. Wall-forming panels are supported in grooves in the footing blocks. Such grooves insure mutual perpendicularity of intersecting wall panels and "trueness" of wall panels in edge-to-edge relation. Grooved joints between intersecting wall panels insure "plumbness" of all wall-forming panels after the first-installed. Tie plate members interconnect studs extending from respective upper corners of adjacent wall-forming panels to maintain the panels in assembled relation. Roof-forming panels are coupled to these same studs, and the studs embedded in concrete, so that the wall and roof-forming panels are structurally interconnected to yield a monolithic structure.

For the purpose of illustrating the invention there is shown in the drawings a form which is presently preferred; it being understood, however, that this invention is not limited to the precise arrangements and instrumentalities shown.

FIG. **1** is a perspective view showing a sample building constructed in accordance with the present invention.

FIG. **2** is a perspective view, in cross-section, showing details of the foundation of the present building structure, and the interengagement between the wall-forming members and the foundation.

FIG. **3** is a floor plan of a building in accordance with the invention.

FIG. **4** is a perspective view of a typical footing block.

FIG. **5** is a cross-sectional view, taken along the line **5—5** in FIG. **3**, showing the structural interrelationship of an outer wall-forming panel, the foundation, a roof-forming panel, and a floor-forming panel.

FIG. **6** is a cross-sectional view taken along the line **6—6** in FIG. **3**, showing the structural interrelationship of an interior wall-forming panel, the foundation, a pair of roof-forming panels, and a pair of floor-forming panels.

FIG. **7** is a partly exploded detailed view showing the intersection of interior and exterior wall-forming panels, and the manner in which a roof-forming panel is secured to the wall-forming panels.

FIG. **8** is a cross-sectional view taken along the line **8—8** in FIG. **7**.

FIG. **9** is a detail view showing the intersection of a typical interior wall-forming panel and an exterior wall-forming panel.

FIG. **10** is a detail view showing the manner in which two intersecting exterior wall-forming panels are interconnected.

FIG. **11** is a detail view showing the intersection of four interior wall-forming panels.

Referring now to the drawings in detail, wherein like reference numerals indicate like elements, there is seen in FIG. **1** a representative building, designated generally by the reference numeral **10**, the main structural components of which are of pre-cast cementitious material, such as concrete or the like.

The building **10** in FIG. **1** includes external wall-forming panels, namely end wall panel **12** and side panels **14** and **16**, and roof-forming panels **17**, **18**, **19** and **20** overlying and coupled to upper peripheral edges of the end wall panels **12** and side wall panels **14**, **16**.

The external wall forming panels **12**, **14**, **16** are provided with appropriate window openings and cast-in window frames **21** and **22**. The side wall panel **16**, in the illustrated building **10**, also includes a cast-in door frame **24**, for supporting a door **26**.

Pre-cast entrance slabs, **28** in various shapes, may be placed on grade adjacent the door opening in the side wall panel **16**.

Conventional rain gutters **30** and downspouts **32** are provided at side extremities of the roof-forming panels **17, 18, 19, 20**. These are connected to cast-in fittings, not shown, in the panels.

Referring now to FIGS. **2, 5** and **6**, it is seen that the foundation of the building **10** is formed by a group of separate or individual footings, designated generally by the reference numeral **34**, disposed in an arrangement defining the floor plan of the building **10**. Each of the footings **34** includes a poured on site leveling block **36**, and a pre-cast footing block **38**, dimensioned in accordance with the load-bearing ability of the soil, secured to the leveling block **36**. Securement of the footing block **38** and leveling block **36** may be accomplished by providing a generally U-shaped anchor bar **40**, embedded in the leveling block **36**. The holes **42** in the footing block **38**, it should be understood, are of slightly larger diameter than the anchor bar **40**. Thus, the upwardly projecting legs of the anchor bar **40** may be grouted into the holes **42**, thereby making a monolith of the leveling block **36** and footing block **38**.

It should be noted that the leveling blocks **36** are the only components of the building **10** which need be poured on site. Those skilled in the art will readily understand that the size of the leveling blocks **36** is also determined by soil conditions, and that the spaced leveling blocks **36** establish a common plane in which the footing blocks **38** lie.

FIG. **4** illustrates in detail the configuration of a footing block **38**. The upper face of the footing block **38** includes crossed mutually perpendicular slots **44** and **46**, parallel to respective edges of the block **38**.

Referring to FIG. **2**, it is seen that the footings **34** are located at the intersection of the vertically oriented structural elements of the building **10**. For example, one lower corner of the end wall panel **12** seen in FIG. **1** rests in the slot **44** of one of the footing blocks **38**. The same footing block **38** receives in its slot **46** a lower corner of the side wall panel **14**.

Another footing **34** is disposed beneath the mid point of the end wall panel **12**, and in addition to the end wall panel **12**, receives a longitudinal interior wall panel **48**. The other end of the longitudinal interior wall panel **48** rests on yet another of the footings **34**, such other footing also supporting transverse interior wall panels **50** and **52** and another longitudinal interior wall panel **54**. The outer end of the transverse interior wall panel **50** shares a footing **34** in common with the side wall panels **14** and **16**.

The manner in which the various above-described wall panels are structurally interconnected is believed best seen in FIGS. **7, 9** and **10**.

Referring first to FIG. **10**, there is seen a typical corner joint, such as the one between the side wall panel **16** and the end wall panel opposite the end wall panel **12**, here designated **12'**. The side wall panel **16** provided with an upright rabbet **56** of a width sufficient to accomodate the width of the intersecting panel **12'**. A layer of insulation **58** may be provided in the bottom of the rabbet **56**, adjacent the end face **60** of the panel **12'**. Beads **62** of an elastic sealant may be provided at the sides of the rabbet **56**, in contact with the opposite faces of the panel **12'** where the panel **12'** extends into the rabbet **56**.

An anchor bolt or stud **64**, embedded in the panel **12'** extends upwardly adjacent the upper corner of that panel. A similar anchor bolt or stud **66** is embedded in the side wall panel **16**, at a point adjacent the rabbet **56**. A tie plate **68**, which includes apertures **70** and **72** spaced in accordance with the spacing of the anchor bolts **64** and **66** when the panels **12'** and **16** are in assembled relation, is received over the anchor bolts **64** and **66**. Respective nuts **74** and **76** are received on the anchor bolts **64** and **66**, and serve to firmly clamp the tie plate in a position overlying the upper edge portions of the panels **12'** and **16**.

Referring now to FIG. **7**, there is seen a joint between a pair of coplanar external wall-forming panels, such as the panels **14** and **16**, and an interior panel, such as the panel **50**. In this instance, the panels **14** and **16** are provided with respective right-angle grooves **78** and **80**, juxtaposed when the panels **14** and **16** are in assembled relation. It will now be seen that the grooves **78** and **80**, taken together, define a rabbet, designated generally by reference numeral **82**, not unlike the above-described rabbet **56**. An edge of the panel **50** is received in the rabbet **82**. Insulation **84** and beads **86** of sealant may be provided as in the previously described joint.

A weather seal **88** may be provided between abutting end faces of the side wall panels **14** and **16**.

An anchor bolt or stud **90** is embedded in the panel **50**, and extends upwardly therefrom. Similar anchor bolts or studs **92** and **94** are embedded in the side wall panels **14** and **16**. A tie plate **96**, which includes apertures, not visible, is received over the anchor bolts **90, 92**, and **94**, and is securely clamped to the panels **14, 16** and **50** by nuts **98, 100** and **102**, associated with the anchor bolts **90, 92** and **94**, respectively.

Referring now to FIG. **9**, there is seen the arrangement whereby an interior wall panel, such as longitudinal interior wall panel **48**, is joined to an exterior wall, such as the end wall panel **12**. The panel **12** is provided with a rabbet **104**, adapted to receive an edge of the panel **48**. Embedded in the panel **12** on either side of the rabbet **104** are a pair of anchor bolts or studs **106** and **108**. Embedded in the panel **48** is another anchor bolt or stud **110**. A T-shaped tie plate, similar to the previously described tie plate **96**, engages and interconnects each of the studs **106, 108** and **110**. Nuts **114, 116** and **118** are associated with the studs **106, 108** and **110**, and clampingly engage the tie plate **112**.

FIGS. **5** and **6** illustrate the manner in which floor-forming panels, such as the pre-cast panels **120** and **122**, may be installed. Referring first to FIG. **5**, a channel member **124** of inverted L-shaped cross-section is affixed to the interior face of the wall panel **14** by nuts **126** affixed to embedded studs **128**. Referring to FIG. **6**, similar channel members **130** and **132** are affixed by nuts **134** and through-bolts **136** to opposite faces of the longitudinal interior wall panel **48**. The floor-forming panel **120** simply rests freely upon the horizontal flanges of the channel members **124** and **130**. Similarly, the floor-forming panels **122** rests on the horizontal flange of the channel member **132**, and a similar flange, not shown, of a channel member affixed to the parallel wall panel. Buffer strips **138** (FIG. **5**) and **140** and **142** (FIG. **6**), of elastic material such as neoprene or the like, serve as buffers between end faces of the floor-forming panels **120** and **122** and the wall panels.

Referring now to FIGS. 7 and 8, the manner in which the roofsforming panels 18 are structurally interconnected with the vertically oriented structural members of the building 10, such as a side wall panel 14 and 16 and the transverse interior wall panel 50, will now be described.

As is best seen in FIG. 7, the roof-forming panels 18 and 20 are provided with apertures 144 and 146, at locations corresponding to the locations of the studs 92 and 94 when the panels 14, 16 and 50 are maintained in assembled relation by the tie plate 96. Referring to FIGS. 7 and 8, the roof-forming panel 20 is provided with recesses 148 and 150 in its upper and lower faces, respectively. The roof-forming panel 18 is provided with similar recesses in its upper and lower faces. A recess 152, corresponding to the recess 150 in the panel 20 is seen in FIG. 7. The recess 148 in the lower face of the panel 20, and the recess in the lower face of the panel 18, taken together, correspond generally in shape to the previously described tie plate 96. It is apparent, therefore, that the roof-forming panels 18 and 20 can be placed in contact with the respective upper edges of the panels 14, 16 and 50. When the roof-forming panels 18 and 20 are so placed, the tie plate 96 and nuts 98, 100 and 102 associated with the studs 90, 92 and 94 are received within the respective recesses in the lower faces of the panels 18 and 20. Upper ends of the studs 92 and 94 extend through the apertures 144 and 146, into the recesses 150 and 152. The stud 90 extends between the panels 18 and 20. Prior to placement of the roof-forming panel 18, a quantity of grout 154, seen in FIG. 8, is applied to the tie plate 96. The grout conforms to the shape of the recess 154 when the roof-forming panel 20 is lowered to its final position. Similarly, the grout 154 conforms to the shape of the recess in the panel 18 when that panel is positioned. The grout 154 surrounds the nuts 98 and 100, and prevents them from working or corroding after assembly.

Grout is also provided in the gap between edge faces of the roof-forming panels 18 and 20. Angled bars 155 and 157, seen in FIG. 7 and embedded in the roof-forming panels 18 and 20 respectively, extend into the gap between the panels 18 and 20. The bars 155 and 157 are then grouted over. Similar angled bars may be provided at spaced points on the edge faces of the panels 18 and 20. Grouting over the bars 155 and 157 makes the roof-forming panels 18 to 20 a unitary, monolithic structure.

A hold-down plate 156, which includes apertures 158, 159 and 160, is received in the recesses 150 and 152 of the apertures 158, 159 and 160 being received over the protruding upper ends of the studs 90, 92 and 94. The hold-down plate 156 also includes apertures 161 and 162. The apertures 161 and 162 receive upper ends of rod members 163 and 164, embedded in the roof-forming panels 18 and 20, and projecting into the recesses 150 and 152. Nuts 165, 166 and 168 cooperate with the studs 90, and 92 and 94 to clamp the hold-down plate 156 firmly in engagement with the bottoms of the recesses 150, with the rod members 163 and 164 in the apertures 161 and 162. The hold-down plate 156 and nuts 164, 166 and 168 can thereafter be covered by grout, indicated by the reference numeral 170 in FIG. 8.

Hold-down plates are provided in association with each of the joints between intersecting panels. For example, referring to FIG. 1, a hold-down plate 172, received in a recess 174 in the roof-forming panel 18, is associated with the studs 64 and 66 shown in FIG. 10. A hold-down plate 176, received in recesses 178 and 179 in the roof panels 17 and 18 cooperate with the studs 106, 108 and 110 illustrated in FIG. 9.

A cruciform hold-down plate 180, received in a recess designated generally by the reference numeral 182 formed in quarter-segments in the roof-forming panels 17–20 overlies the intersection of the longitudinal interior wall panels 48 and 54, and the transverse interior wall panels 50 and 52.

Rod members, not shown, embedded in the respective roof-forming panels 17 and 18 extend into the recesses by the hold-down plate 176. Similarly, rod members not shown, embedded in the roof-forming panels 17–20 extend into the quarter-segments of the recess 182, and are interconnected by the hold-down plate 182.

Referring to FIG. 11, the panels 48, 50, 52 and 54 are interconnected by a joint generally similar to the one provided for the panels 14, 16 and 50, and illustrated in FIG. 7. Thus, the longitudinal interior wall panels 48 and 54 are tied to the transverse interior wall panels 50 and 52 by a cruciform tie plate 184. The tie plate 184 engages upstanding anchor bolts 186, 188, 189, 190 embedded in the respective wall panels 48, 50, 52 and 54, and is retained by nuts, not numbered, associated with the respective anchor bolts 186, 188, 189, 190.

The joints illustrated in detail in FIGS. 7 to 10 are typical of those not specifically illustrated. Thus, aligned abutting side wall panels use joints similar to the one illustrated in FIG. 7. Longitudinal interior wall panels are tied to end wall panels in the manner illustrated in FIG. 9. Intersecting side and end wall panels, such as the panels 16 and 12, are joined in the manner illustrated in FIG. 10. Intersecting interior wall panels are interconnected in the manner shown in FIG. 11.

The tie plates 68, 96, 112 and 184 of each of the joints is associated with its corresponding hold-down plate 172, 156, 176 and 180 in the manner illustrated in FIG. 8. Thus, in association with each of the interpanel joints, the roof panels 18 are provided with opposed recesses similar to the recesses 150 and 152 to provide for grouting over of the tie and hold-down plates.

The manner in which tying down of the roof-forming panels 17-20 is completed is illustrated in FIG. 6, wherein the joint between roof-forming panels 17 and 18 is seen.

Angled bars or plates 155' and 157', similar to the above-described bars 155 and 157, extend into the gap 191 between edges of the panels 17 and 18. Grout 192 is placed in the gap 191, and securely holds the bars 155' and 157'. The combined effect of the hold-down plates 150, 172, 176, 180, etc. and the grouted-in bars or plates 155, 155', 157, 157' is to provide an exceptionally strong structural connection between the roof-forming panels 17–20 and the various wall panels.

After installation of the roof-forming panels 17–20, roofing 194 may be applied to the upper surfaces.

The joints between the roof-forming panels 18 and the vertically oriented exterior wall panels, such as the

side wall panels **14** and **16** and end wall panels **12, 12'**, may be sealed by elongated elastomeric sealant beads **196** similar to the previously mentioned sealant beads **62**. The sealant beads **196**, allow for limited movement between the panels due to settling, or thermally induced expansion and contraction.

Conventional rain gutters **30** and downspouts **32** may be installed as required.

In view of the foregoing description, the manner in which the building **10** is erected is believed evident. Thus, the site is first prepared by locating and emplacing the leveling blocks **36**, the upper surfaces of the leveling blocks **36** being disposed in a common plane. Next, the pre-cast footing blocks **38** are installed upon the leveling blocks **36**, and grouted in to complete the footings **34**. The slots **44** and **46** in each of the footing blocks **38** are aligned upon installation.

Next, a first wall-forming panel, such as an end wall panel **12**, is erected by placing its lower edge in an aligned slot **44** of respective footings **34**. After adjustment of the panel to its correct position, it may be grouted to the footings **34**. It is evident that once the first-installed panel is properly positioned, the proper positions of all of the remaining panels are determined. This is so because, assuming proper leveling of the footings **34**, the true vertical positions of panels intersecting the first-installed panel are determined. Referring to FIG. **2**, for example, the vertical orientation of the longitudinal interior wall panel **48** is established by the rabbet **104** in the first-installed panel **12**. Similarly, the rabbet joint and tie plate which interconnect the end wall panel **12** and side wall panel **14** constrain the side wall **14** to a true vertical orientation. The remaining panels fall into position in a similar manner.

FIG. **3** illustrates a typical floor plan of a building **10** constructed in accordance with the present invention, it being understood that numerous other plans may be used if desired. In FIG. **3**, a portion of the end wall panel **12**, the side wall panel **14** and the longitudinal interior wall panel **48**, with a nonload bearing interior partition and closet assembly **202**, define first and second bedrooms **204** and **206**. A further portion of the end wall panel **12**, portions of the longitudinal interior wall panel **48** and the side wall panel opposite the side wall panel **14**, and a non-load bearing partition and closet unit **208** define another bedroom **210**. A separately assembled modular plumbing wall unit **212**, which includes the various fixtures and associated piping, together with the partition and closet unit **208** and a portion of the side wall panel opposite the side wall panel **14**, define a bathroom **214**.

Other rooms are formed in a like manner. Thus, a pre-assembled partition and closet unit **216**, and portions of the side wall panel **16**, end wall panel **12'**, and longitudinal interior wall panel **54** define a living room **218**. A kitchen **220** is also provided.

The above-described building **10** is strong, permanent and easily constructed with a minimum of skilled labor. The tie plates **68, 96, 112** and **184**, etc. serve to retain the wall-forming panels in assembled relation during construction, even prior to installation of the roof panels **18**. This is in contrast to prior art arrangements, such as the one shown in U. S. Pat. No. 3,372,519, wherein the wall panels remain substantially unstable until installation of the roof-forming panels. Moreover, in the present building **10**, after installation of the roof-forming panels **18**, the tie-plates **68, 96, 112, 184**, etc. and hold-down plates **156, 174, 176** and **180** provide dual load paths to resist tension loads tending to separate the wall panels. In one presently preferred form of the invention, the tie and hold-down plates are of ¼ inch steel.

Those skilled in the art will appreciate that the building **10** may be erected with no welding, and a minimum of onsite concrete work and structural assembly. Such structural assembly as exists, moreover, is accomplished by means of easily made nut and bolt type connections.

An additional and important advantage of the present invention is the ease with which additions may be made to the building **10**. Thus, referring to FIG. **2**, for example, the slots **44** and **46** of the footing blocks **38** extend outwardly of the wall panels **12, 14** and can receive other panels, not shown, if it is desired to make a building of L-shaped floor plan.

The construction of the panels per se is not considered part of the present invention. It is contemplated, however, that exterior panels, such as side wall panels **14** and **16** and end wall panels **12** and **12'**, as well as the roof-forming panels **18**, will be provided with adequate insulation.

The present invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof, and accordingly, reference should be made to the appended claims, rather than to the foregoing specification as indicating the scope of the invention.

I claim:

1. A prefabricated building comprising a plurality of separate footings, a plurality of wall forming panels, and a plurality of roof forming panels, said footings being disposed in spaced relation to each other to define the building floor plan, some of said footings having two upwardly facing recesses, said recesses being in substantially mutually perpendicular relation to each other to permit intersecting and non-intersecting wall forming panels to be supported by said separate footings in mutually adjacent relation, each of said panels comprising upper and lower edges and side edges, a stud member extending upwardly from said upper edge on upper corner portions of said panels, spaced portions of said lower edges of said panels defining bearing surfaces, said bearing surfaces being disposed adjacent each of said side edges, at least two of said panels being supported by said footings in abutting relation along juxtaposed edges, said bearing surfaces on each of said two panels being received in said recesses, each of said juxtaposed edges having a right angle groove, said grooves defining a rabbet, a third wall forming panel, said panel being supported on its bottom edge with its side edge being in said rabbet, a T-shaped member for interconnecting said upper edges of said three panels to maintain said three panels in abutting relation, said T-shaped member having apertures therein for receiving said stud members, and said plurality roof-forming panels having apertures therein for receiving said stud members, and means overlying said roof-forming panels and associated with said stud members for coupling said roof-forming panels to the upper edges of said wall-forming panels.

2. A prefabricated building comprising a plurality of separate footings, each of said footings comprising an on-site cast leveling block and a pre-cast footing block coupled to and resting on said leveling block, said footing blocks being disposed in spaced relation to each other to define the building floor plan, some of said footing blocks having two upwardly facing recesses, said recesses being in substantially mutually perpendicular relation to each other and extending across the full width of said footing blocks to permit intersecting and non-intersecting wall forming panels to be supported by said separate footings in mutually adjacent relation, a plurality of wall forming panels, each of said panels comprising upper and lower edges and side edges, spaced portions of said lower edges defining bearing surfaces, said bearing surfaces being disposed adjacent each of said side edges, one of said footings receiving four adjacent wall forming panels in abutting relation, said bearing surfaces on each of said two panels being received in said recesses, and a cruciform member interconnecting said upper edges of said four wall forming panels to maintain said abutting relation.

3. A prefabricated building comprising a plurality of separate footings, a plurality of wall forming panels, and a plurality of roof forming panels, said footings being disposed in spaced relation to each other to define the building floor plan, some of said footings having two upwardly facing recesses, said recesses being in substantially mutually perpendicular relation to each other to permit intersecting and non-intersecting wall forming panels to be supported by said separate footings in mutually adjacent relation, each of said wall forming panels comprising upper and lower edges and side edges, spaced portions of said lower edges defining bearing surfaces, said bearing surfaces being disposed adjacent each of said side edges, at least two of said panels being supported by said footings in abutting relation, said bearing surfaces on each of said two panels being received in said recesses, and means for interconnecting said upper edges of said two panels to maintain said two panels in abutting relation, said roof forming panels being coupled to said upper edges of said wall forming panels, said means for interconnecting said upper edges of said wall forming panels being operative to couple said roof forming panels to said wall forming panels, said interconnecting means comprising upwardly directed stud members supported in said upper edges of said wall forming panels adjacent said side edges, said stud members being disposed in spaced relation to each other, first and second tie plates, each of said tie plates having a plurality of spaced apertures, said apertures corresponding to the arrangement of said stud members, said roof forming panels being provided with a plurality of spaced apertures, said last named apertures corresponding to the arrangement of said stud members and said apertures in said tie plates, said first and second tie plates and said roof forming panel members being supported on said wall forming panel members with said roof forming panel members being disposed between said first and second tie plates and said stud members extending upwardly through said spaced apertures in said tie plates and roof forming panel members, and means on said stud members for retaining said tie plates and said roof forming panel members on said wall forming panel members.

4. A pre-fabricated building in accordance with claim 3, wherein said clamping means associated with said studs are grouted between said roof-forming panels and said tie plate members.

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