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Jureit et al.

[11] **3,861,094**

[45] **Jan. 21, 1975**

[54] **BUILDING STRUCTURE HAVING UNITIZED JOINT AND CONNECTOR STRAP THEREFOR**

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[73] Assignee: **Automated Building Component Inc.,** Miami, Fla.

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[52] **U.S. Cl.** **52/86,** 52/79, 52/644, 52/285, 85/11, 85/13

[51] **Int. Cl.** **E04b 1/348**

[58] **Field of Search** ..... 52/644, 639, 643, 79, 90, 52/92, 93, DIG. 6, 86, 712, 285; 85/11, 13; 217/70

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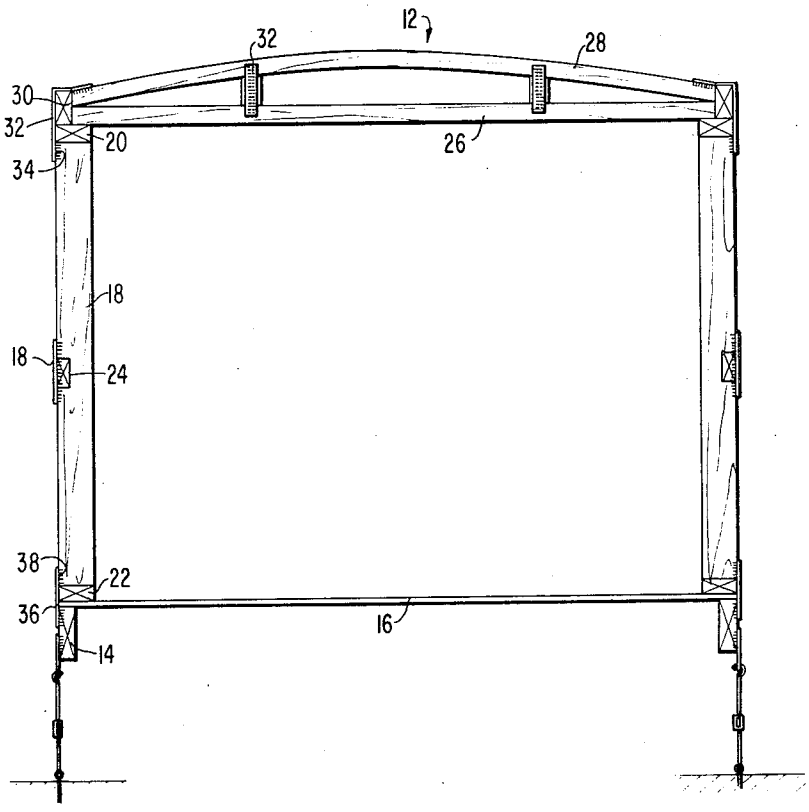
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Primary Examiner—Ernest R. Purser
Assistant Examiner—Henry Raduazo
Attorney, Agent, or Firm—LeBlanc & Shur

[57] **ABSTRACT**

Straps of the type having groups of elongated nail-like teeth struck to project to one side of the strap at its opposite ends are applied between the side wall frames and trusses as well as between the side wall frames and joists in a wooden building construction. Particularly, the group of teeth at one end of the strap is embedded into the outer edge of the stud of the side wall frame while the group of teeth at the other end of the strap is embedded along the upper edge of the upper chord of the truss. In floor joists to side wall frame joints, the group of teeth at one end of the strap is embedded into the outer face of the joist while the group of teeth at the other end of the strap is embedded into the outer edge of the stud of the side wall frame with the foregoing joints. Also, tie-down straps are provided. These straps interconnect between a plate having teeth struck therefrom and embedded into the joist and an anchor whereby the building structure is secured to the anchor. With the foregoing joints, a initized building structure is formed wherein relative separating movement between the truss and side wall frame, the side wall frame and floor joist, and the floor joist and a ground anchor is precluded.

14 Claims, 15 Drawing Figures



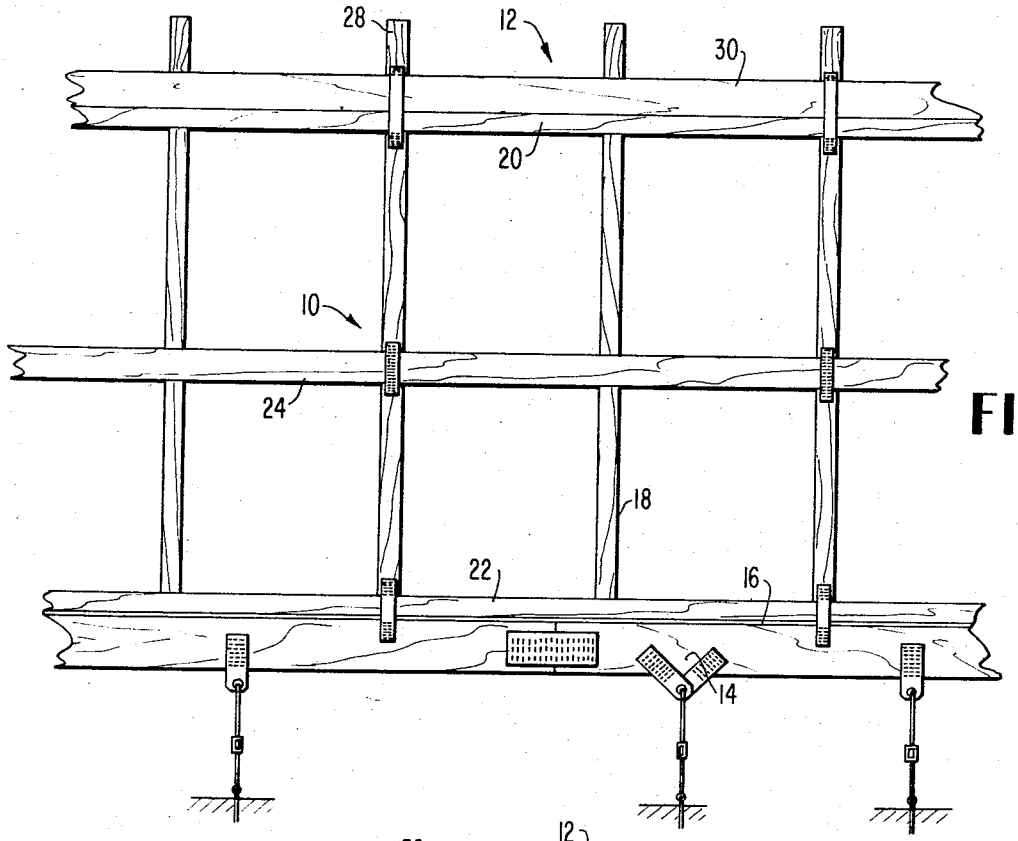

28
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FIG. 1

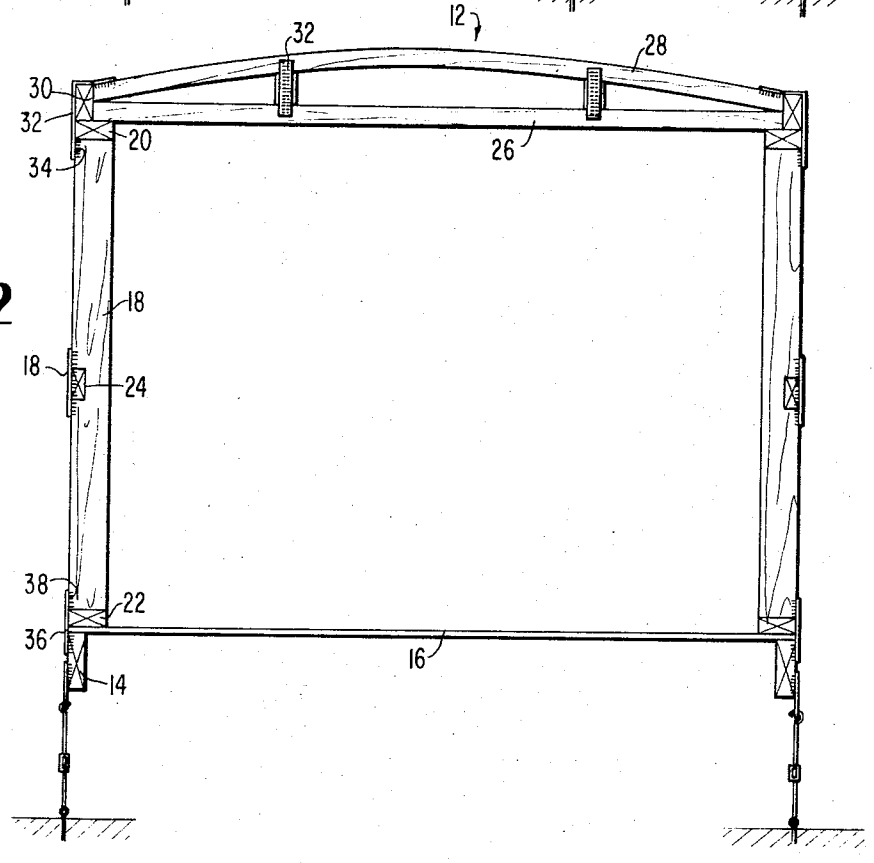

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FIG. 2

FIG. 3

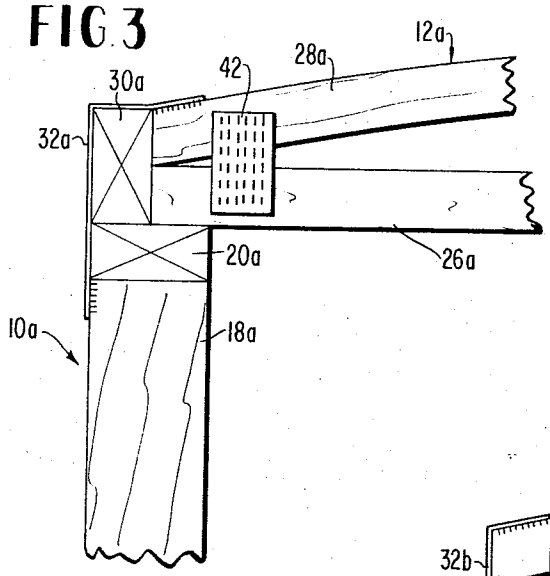


FIG. 4

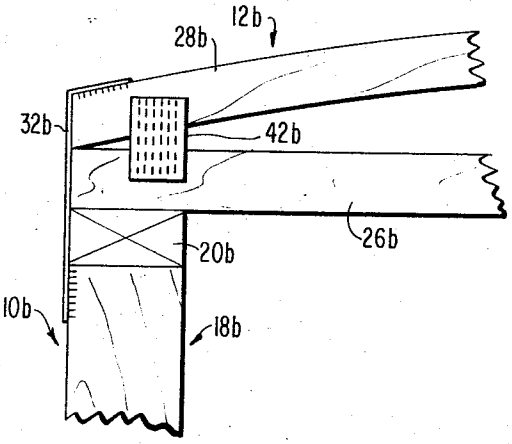


FIG. 5

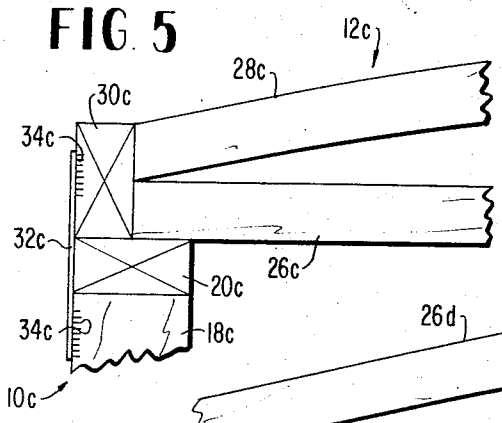


FIG. 5A

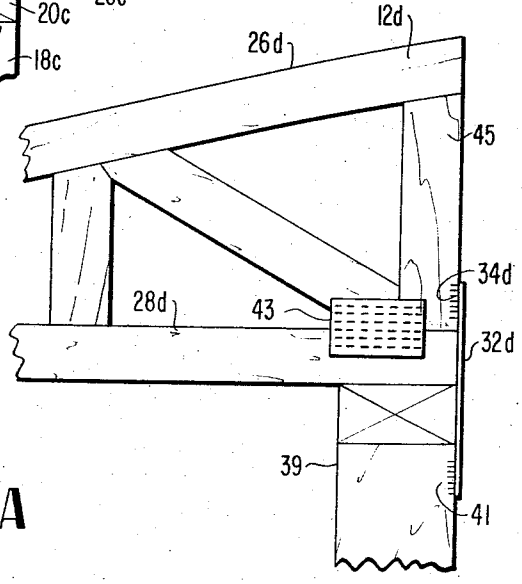
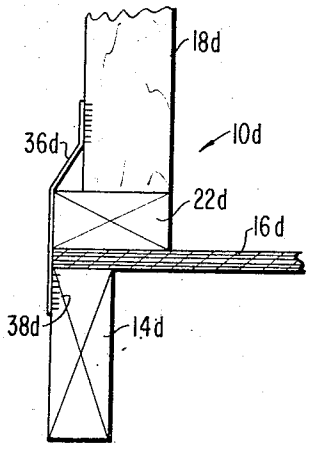


FIG. 6



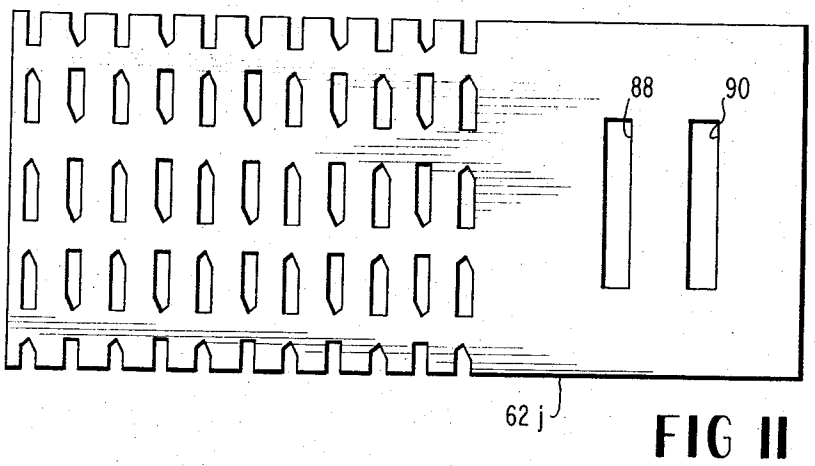


FIG 11

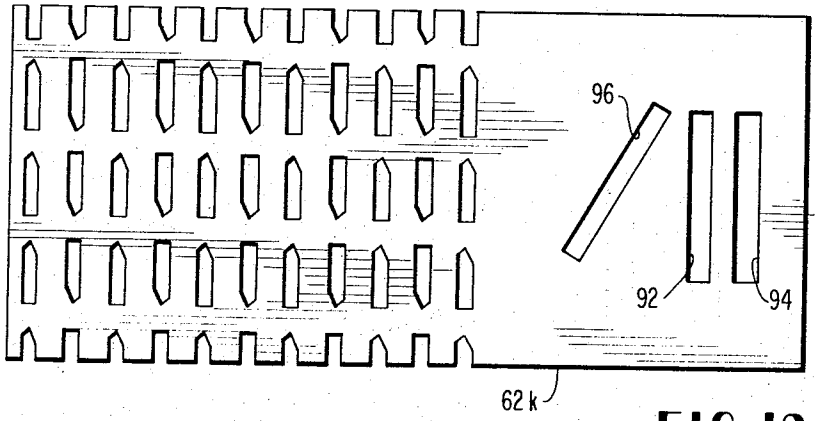


FIG. 12

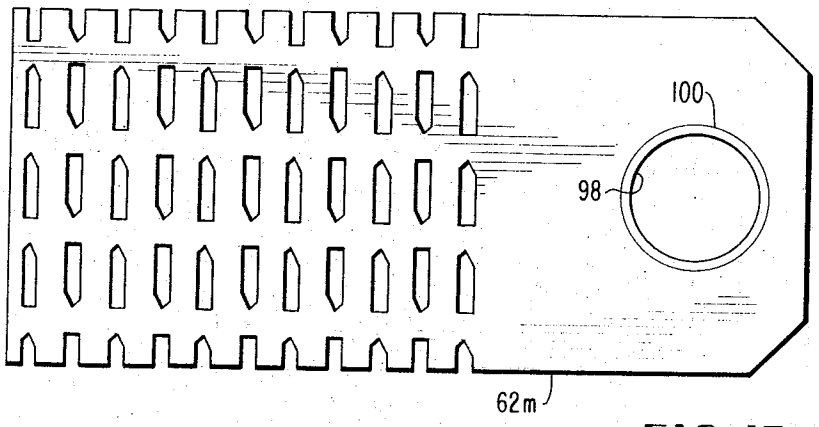


FIG. 13

FIG. 7

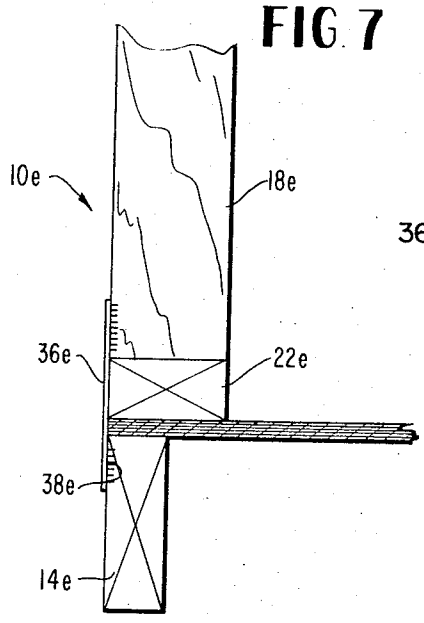


FIG. 8A

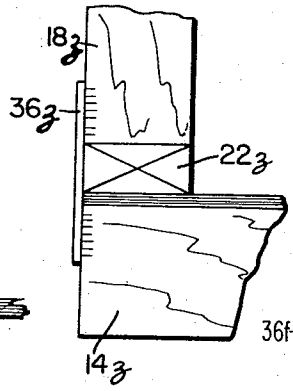


FIG. 8

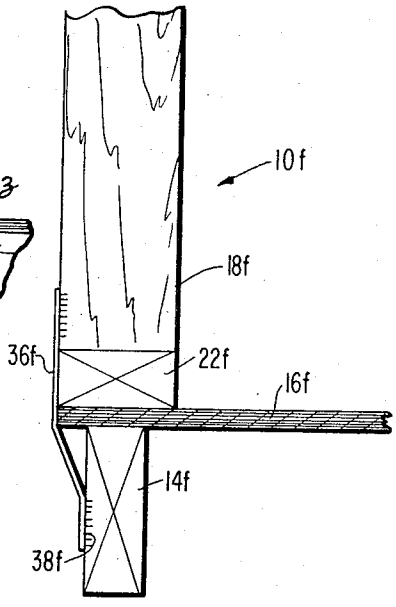


FIG. 9

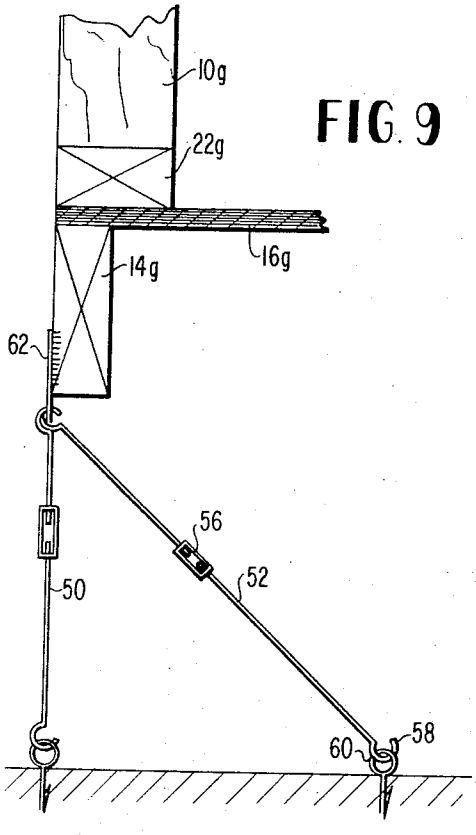
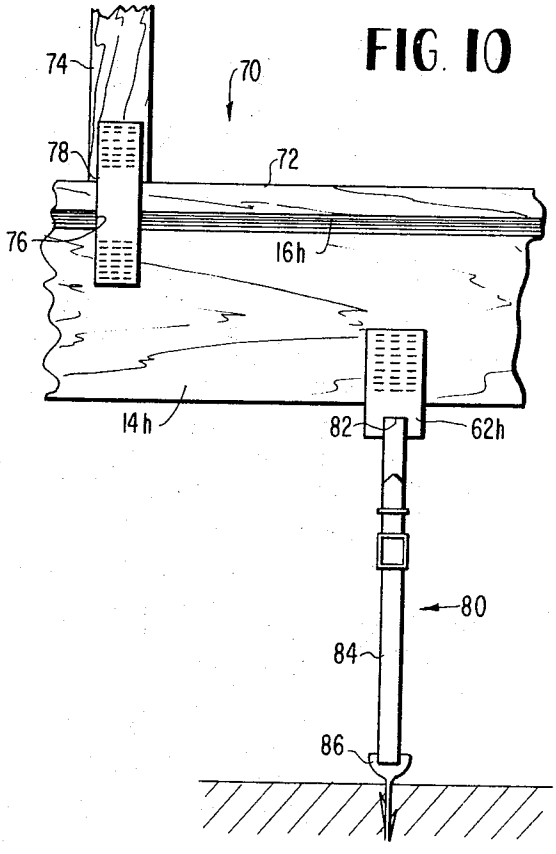


FIG. 10



BUILDING STRUCTURE HAVING UNITIZED JOINT AND CONNECTOR STRAP THEREFOR

The present invention relates to wooden building structures and joints therefor, and particularly relates to connector straps for reinforcing the joints between trusses and the side wall frames and the joints between the side wall frames and the floor joists, whereby relative separating movement of these discrete building elements is substantially precluded. The present invention also relates to tie-down straps for the building structure whereby the structure can be anchored.

In usual wooden building construction, the side wall frames are normally nailed to the floor joists with a flooring or decking interposed therebetween. Also, the roof trusses are normally nailed to the upper plates of the side wall frames. For example, in mobile home building construction, the lower plates of the side wall frames are generally nailed to either longitudinally or transversely extending floor joists with a plywood floor or decking interposed therebetween. Also, bow-string type trusses are usually nailed at opposite ends to the upper plates of the side wall frames. It has been found, however, that relative separating movement of the side wall frames and joists as well as between the trusses and the side wall frames does occur, particularly during wind uplift periods. Thus it is possible that at such times the trusses will move away and become detached from the side wall frame. Also, the sidewall frames can move away and become detached from the floor joists. Likewise the entire wooden building structure can move away from its foundation during such times.

The present invention provides a unitized joint construction for building structures which minimizes and/or eliminates the problems of preventing relative separating movement between building elements, i.e., trusses, side wall frames, and joists and provides novel and improved unitary joints having various advantages in construction, use and result in comparison with conventional methods of joining these elements one to the other. The present invention also provides tie-down straps for anchoring the entire building structure.

More particularly, the present invention provides straps for unitizing the joints between the trusses and the side wall frames, between the side wall frames and the joist, and between the joists and an anchor for the building whereby the building structure is substantially unitary with these elements being reinforced against separating movement one from the other. To accomplish this, straps of the type having groups of elongated nail-like teeth struck from each of its opposite ends are employed to span the joints between the respective elements of the building structure. For example, in one form of the present invention, a strap is applied to each joint between a truss and a side wall frame with the teeth at one end of the strap being embedded into the outer end of the stud of the side wall frame and the teeth at the opposite end of the strap being embedded into the outer face of the upper chord of the truss. In this manner the truss and side wall frame are reinforced against relative separating movement and form a substantial unitary structure. Also, it will be noted that the strap is attached to the members of the truss and side wall frame which constitute the principal structure members. Thus the end member of the truss and the upper plate at each strapped joint hereof are clamped between the upper chord of the truss and the stud of the side wall frame thereby effectively eliminating any

tendency toward separation of the upper plate from the stud or the truss end member from both the upper plate and the chord ends. With respect to the joint between the joist and the side wall frame, a similar type strap is applied. Specifically, the teeth at one end of the strap are embedded into the outer edge of the stud while the teeth at the other end of the strap are embedded into the outer face of the joist. The intermediate portions of the strap void of teeth span the lower plate and the floor or decking disposed between the lower plate and floor joist. Thus, the strap interconnects the principal members of each of the building elements, i.e., a side wall frame and joist, and reinforces the same against relative separating movement.

Tie-down straps are also used in conjunction with the present invention. Particularly, plates of the type having a plurality of elongated nail-like teeth struck from the major portion thereof are embedded into the outer face of the joists. The ends of the plates free of the teeth and which extend below the joists are provided with openings whereby tie-down straps can be secured to the plates. The opposite ends of the tie-down straps are, of course, secured to anchors, for example concrete pilings or blocks. Thus, with the foregoing joints and tie-down straps, a substantially unitized building structure, for example a mobile home, is provided with the principal structural elements reinforced against separating movement one from the other.

Accordingly, it is a primary object of the present invention to provide a novel and improved, substantially rigid, unitary wooden building structure.

It is another object of the present invention to provide a novel and improved, substantially rigid, unitized building structure wherein the joints between the building elements are reinforced against relative separating movement.

It is still another object of the present invention to provide a novel and improved rigid building structure which is reinforced against wind uplift.

It is a further object of the present invention to provide a novel and improved rigid utilized building structure employing straps of the type having a plurality of elongated nail-like teeth struck therefrom for joining the various building elements one to the other and spanning the juncture of such building elements.

It is a still further object of the present invention to provide a novel and improved rigid unitized building structure having various and novel tie-down straps and ancillary plates therefor whereby the building structure can be anchored to the ground.

These and further objects and advantages of the present invention will become more apparent upon reference to the following specification and appended claims and drawings wherein:

FIG. **1** is a fragmentary side elevational view of a wall frame utilizing joints constructed in accordance with the present invention;

FIG. **2** is an end elevational view thereof illustrating the framework of a mobile home;

FIGS. **3**, **4**, and **5** are enlarged fragmentary elevational view of joints formed between a truss and the side wall frame of a mobile home;

FIG. **5A** is a fragmentary side elevational view of a joint formed between a truss and an interior wall frame;

FIGS. **6**, **7**, and **8** and **8A** are fragmentary elevational views of various forms of joints hereof between the side wall frames and the floor joist;

FIG. 9 is a fragmentary enlarged elevational view of a joint between an outer side wall frame and a floor joist and further illustrating a form of tie-down for the mobile home;

FIG. 10 is a fragmentary enlarged elevational view of a joint between an inner side wall frame and an intermediate floor joist and further illustrating another form of tie-down for the mobile home; and

FIGS. 11, 12 and 13 are plan views of various forms of plates utilized herein for forming discrete parts of tie-down structures, i.e., as illustrated in FIGS. 9 and 10.

Referring now to FIGS. 1 and 2, there is illustrated a pair of side wall frames generally indicated 10 surmounted by a plurality of transversely extending longitudinally spaced bow string trusses generally designated 12. As in typical mobile home constructions, the side wall frames 10 are mounted on joists 14 and a decking or floor 16 is secured over the joists 14. As will be appreciated from conventional constructions, each side wall frame 10 includes a plurality of longitudinally spaced studs 18 joined at upper and lower ends by upper and lower plates 20 and 22, respectively. In the present construction, an intermediate structural member 24 is inset in notches formed along outer edges of studs 18 and extends generally parallel to the plates 20 and 22. Surmounted on the upper plates 20 of the side wall frames 10 is a plurality of longitudinally spaced bow string trusses 12 each comprised of a lower chord 26 and an upper chord 28 having a camber. In the form of trusses illustrated in FIG. 2 the upper and lower chords are joined one to the other at their opposite ends by longitudinally extending members 30 suitably secured and butted against the ends of chords 26 and 28. Intermediate struts or braces 32 are provided at spaced positions along the bow string truss between the upper and lower chords and these may comprise the sheet metal struts disclosed in U.S. Pat. No. 3,298,151, of common assignee herewith.

It will be appreciated from the foregoing introduction to this application that an important object of this invention is the provision of a unitary or unitized frame particularly for the purpose of adding rigidity to the structural frame and preventing separation of floor joists, wall and truss during wind uplift periods.

To this end, the various joints between the trusses and the side wall frames, and the side wall frames and joists are reinforced in a manner which will now be explained. First, with respect to the joint between the truss and the side frame, there is provided at opposite ends of the truss an elongated sheet metal strap designated 32 preferably having adjacent its opposite ends a plurality of teeth 34 struck to project to one side thereof. The teeth may be configured and arranged as set forth in U.S. Pat. No. 2,877,520 of common assignee herewith. The slots left by the teeth extend therefrom in a direction parallel to the length of the strap. It will be appreciated that the portion of the plate intermediate the groups of teeth 34 struck from opposite ends thereof is free of teeth. The strap 32 is applied along the sides of frame 10, and along the sides and upper portions of truss 12. Particularly, the group of teeth 34 at one end of each strap 32 are embedded into the outer edge of the corresponding stud directly below the top plate 20. The plate 32 extends over the outside edge of the top plate 20 along the outer face member 30 and along its upper edge, and along the upper edge of chord 28. The teeth at the opposite end of the strap are embedded into the upper edge of chord 28 whereby the strap 32 spans the juncture between chord 28 and member 30, the juncture between the member 30 and top plate 20 and between top plate 20 and the stud 18. In this manner any forces tending to separate the truss and side wall frame are resisted by the strap. It will be appreciated that this strap is applied to each of the joints between the truss and the side wall frame at each longitudinal position of the studs and trusses or may be applied to to alternate studs or on various centers as desired. It will also be appreciated that the groups of teeth can be struck from the intermediate portions of the strap and embedded into either the upper plate 20 or the member 30 or both as desired.

Referring now to the joint between side wall frame 10 and joist 14, there is provided a strap 36 preferably having a plurality of elongated nail-like teeth struck to project to one side thereof and from opposite end portions of the strap. The intermediate portion of the strap is clear of struck teeth. The strap is applied to this joint by embedding the teeth at one end of strap 36 into the lower outer face of stud 18 just above lower plate 32 and the teeth at the opposite end of strap 36 into the outer face of the joist 14. In this manner, strap 36 spans the junction between joist 14 and deck 16, the juncture between deck 16 and lower plate 22 and the juncture between plate 22 and stud 18. The joint in effect unitizes the connection between stud 18 and joist 14 and prevents relative separating movement of side wall frame 10 and joist 14. It will be appreciated that the intermediate portion of the strap may be provided with struck teeth for embedment into the lower plate 22 on the floorboard 16 or both.

Again, referring to FIG. 2, a plate 40 may be applied along the outer edge of stud 18 in overlying relation to member 24 which is inset along the outer edge of studs 18. Plate 40 is preferably provided with a plurality of elongated nail-like teeth struck from each of its opposite ends to project to one side thereof, leaving the intermediate portion of the strap free of struck teeth. Thus, plate 40 may be applied by embedding the teeth at its opposite ends thereof into the outer edges of stud 18 on each of the opposite sides of member 24 leaving the intermediate portion overlying members 24. Thus, any tendency of member 24 to separate from stud 18 is resisted by plate 40. Also, the plate 40 will strengthen the vertical beam of the panel at the cutout and will also protect any electrical wiring passing through the cutout.

Referring now to FIG. 3, there is illustrated another form of joint between a truss 12*a* and a side wall frame 18*a*. In this form, the top and bottom chords 28*a* and 26*a*, respectively, are joined at their ends by a pair of connector plates 42 of the type having a pair of elongated nail-like teeth struck to project to one side thereof. These plates may be of the type disclosed in prior referenced U.S. Pat. No. 2,877,520 of common assignee herewith, the disclosure of which is incorporated herein by reference as though fully set forth. As in the previous embodiment, the teeth hereof are embedded into the outer edges of stud 18*a* and into the upper edges of chord 12*a* with its intermediate portion overlying the longitudinally extending member 30*a*.

Referring now to FIG. 4, there is illustrated a still further form of joint between a truss 12*b* and a side wall frame 18*b*. In this form, the longitudinally extending

member **30** is omitted and the ends of the upper and lower chords **28***b* and **26***b*, respectively, are joined one to the other solely by a plate **42***b* similar to the plate **42** described in the previous embodiment. The teeth at the opposite ends of the strap **32***b* are embedded into the outer edges of stud **18***b* and upper chord **28***b*, respectively, with the intermediate portion thereof directly overlying the ends of chords **26***b* and **28***b*. As in the previous embodiments, the upper end of the strap **32***b* overlies and forms a part of the roof structure of the mobile home. It will be appreciated that teeth can be provided along the intermediate portion of strap **32***b* for embedment into the end of chord **28***b* or **26***b* or both as desired.

Referring now to FIG. **5**, there is illustrated another form of unitized joint hereof for preventing separating movement between truss **12***c* and side wall frame **10***c*. Particularly, in this point, the upper and lower chords **26***c* and **28***c*, respectively, of truss **12***c* are joined one to the other by a longitudinally extending member **30***c*. The ends of truss **12***c* rest on upper plate **20***c* of side wall frame **10***c*. In this form, however, a strap **32***c* which extends solely along the side wall of the mobile home is applied. Particularly, the strap **32***c* is provided with a plurality of teeth struck to project from its opposite ends as at **34***c*. As in the previous embodiments, the teeth at one end of strap **32***c* are embedded into the outer edge of stud **18***c* while the teeth **34***c* at the opposite end of strap **32***c* are embedded into the outer face of member **30***c* with the intermediate portion of strip **32***c* thus spanning between the stud and the member **30***c* in overlying relation to plate **20***c*. Thus, any separating movement of the truss and wall frame is resisted by strap **32***c* which spans the joint therebetween. Teeth may also be provided the intermediate portion of plate **32***c* for embedment into the upper plate **20***c*.

Referring now to FIG. **5A**, there is illustrated another form of unitized joint hereof for preventing separating movement between a truss **12***d* and an interior wall frame **39** having interior wall studs **41** and an upper plate **43**. In this form, the truss **12***d* includes upper and lower chords **36***d* and **28***d* respectively which are separated adjacent their inner ends by a web member **45**. The truss rests on the upper plate **43** of interior wall frame **39**. To unitize this joint, a strap **32***d* similar to the strap illustrated in FIG. **5** interconnects the truss **12***d* and the wall frame **39**. Particularly, the strap **32***d* is provided with a plurality of teeth struck to project from its opposite ends as at **34***d*. The teeth at one end of the strap **32***d* are embedded into the outer edge of the stud **41** while the teeth at the opposite end of the strap are embedded into the web **45** with the intermediate portion of the strap **32***d* spanning between the stud **41** and web member **45** in overlying relation to plate **43** and the end of lower chord **28***d*. Thus, any separating movement of the truss and interior wall frame is resisted by strap **32***d* which spans the joint therebetween.

Referring now to FIGS. **6–8**, there are illustrated various forms of a unitized joint formed between side wall frames **18** and floor joists **14**. Three forms of joint are illustrated in FIGS. **6–8**, respectively, with FIG. **6** illustrating a joint having a stud gap, FIG. **7** illustrating a joint without a gap, and FIG. **8** illustrating a joint with a joist gap. Referring now to FIG. **6**, it will be appreciated that studs **18***d* are inset from bottom plate **22***d* whereby the outer edges of the stud frame and the outer faces of the bottom plate and joists **22***d* and **14***d*, respectively, lie in respective parallel offset planes. To complete the unitized joint hereof, a strap is applied along the outer edges of the wall frame and joist. Particularly, strap **36***d* comprises an elongated sheet metal plate having a plurality of elongated nail-like teeth **38***d* struck from its opposite ends to project to one side thereof. To apply the plate, the teeth at one end of the strap are embedded into the outer face of joist **14***d* while the teeth of the other end of the plate **36***d* are embedded into the outer edge of stud **18***d* at a location spaced above plate **22***d*. The intermediate portion of strap **36***d*, which is void of teeth, extends along the outer face of the lower plate **22***d* and inclines inwardly and upwardly toward the studs **18***d* thereby spanning the gap between the outer faces of the joist and lower plate on the one hand and the outer edge of the stud on the other hand. It will be appreciated that straps of this type (and also of the type illustrated in FIGS. **7** and **8** as described below) are located at each stud location or every other stud location as desired throughout the length of the side wall frame.

In FIG. **7**, the outer edge of the stud frame **10***e* lies flush with the outer edge of joist **14***e* as well as with the lower plate **22***e*. Accordingly, to form the unitized joint hereof, the strap **36***e*, formed similarly as the strap **36***d* described previously, is applied to the outer edge of the joist and wall frame with the teeth **38***e* at the opposite ends thereof embedded into the side wall of the joist and the outer edge of the stud **18***e*, respectively. Thus, the strap **36***e* prevents relative separating movement of the side wall frame **103** and joist **14***e*.

Referring now to FIG. **8**, the gap is formed by an inset joist **14***f*. That is, the outer face of the side wall frame lies parallel to but laterally outwardly of the outer face of joist **14***f*. Also, lower plate **22***f* lies in alignment with studs **18***f*. The strap **36***f*, formed similarly as strap **36***d* described above, is thus applied along the outer face of the side wall frame and joist with the teeth **38***f* applied to the joist and stud, respectively. Consequently, the intermediate portion of the plate **36***f*, which is void of teeth, spans lower plate **22***f*, decking **16***f* and inclines downwardly and inwardly toward the joist **14**. The unitized joint similarly prevents relative separating movement of the side wall frame **10***f* and joist **14***f*.

It will be appreciated that the floor joists, of the embodiments hereof illustrated in FIGS. **6–8**, extend lengthwise of the wall frames. The joists **14**, however, may extend laterally of the side wall frames with the ends of the joists extending outwardly beyond the side wall frames, or lying flush with the side wall frames. In each such arrangement, the straps **36***d*, **36***e* and **36***f* would operate similarly to form the unitized joints with the teeth **38** at the lower end of the strap embedded endwise into the end of the joist. Obviously, in this latter form, the joist must be laterally aligned with the stud in order to effect proper securement thereof. For example, strap **26***z* may span between the sidewall studs and the ends of the floor joist with the teeth at end end of the strap embedded into the end face of the joists as illustrated in FIG. **8A**. In FIG. **8A**, the joist **14***b* extends normal to the sidewall frame which is comprised of studs **18***z* and upper and lower plates, the lower plate **22***z* being illustrated.

To anchor a building structure employing the unitized joints hereof, tie-down straps are utilized. Referring now to FIG. **9**, there is illustrated a joint between a joist **14***g* and a side wall frame **10***g*. A pair of tie-down

straps or rods **50** and **52** are also illustrated for anchoring the building structure. It will be appreciated that the straps or rods are spaced along the sides and ends of a building structure to anchor the same throughout its length. The tie-down rods **50** and **52** each comprise a pair of rods each being threaded at one end for threaded reception in a turn-buckle **56** while the opposite ends thereof terminate in hooks **58.** Eye bolts **60** are secured in a supporting structure, which for example, may comprise a concrete base, and are adapted to receive the hooks **58** at the end of the tie rods. To secure the tie rods to the building structure, a plate **62** having a plurality of teeth struck therefrom to project to one side is applied to the joist **14***g*. Particularly, the teeth of the plate are embedded into the outer face of joist **14***g*. the plate having an end **64** which projects beyond the lower edge of joist **14***g*. The end **64** is provided with one or more openings for receiving the upper ends of hooks **58** of tie rods **50** and **52.** Once the building structure is sited, the tie rods are applied and the turn-buckles rotated to render the latter taut.

Referring to FIG. **10,** there is illustrated an inside wall frame **70** comprised of a bottom plate **72,** and upstanding studs **74,** the upper ends of which are connected to one another by an upper plate, not shown. The wall frame **70** is secured to the underlying joist **14***h* through a deckboard or flooring **16***h*. To form a unitized joint between an interior wall panel and the joist, an opening **76** is formed through the floor or deck **16***h*. A tie-down strap **78** of the type having a plurality of elongated nail-like teeth struck from its opposite end portions is received within the opening **76** and the teeth thereof are respectively embedded into the joist **14***h* and stud **74.** It will be appreciated that the intermediate portion of the plate **78,** which is void of teeth, spans the floor or deck **16***h* as it passes through the opening, and the lower plate **72.** Thus, any separating movement of the interior wall frame and the joist relative to one another is precluded by the strap **78.**

A tie-down strap for the building structure, of which the joint illustrated in FIG. **10** forms a part, is illustrated at **80.** As in the previous embodiments, a plate **62***h* having a plurality of elongated nail-like teeth struck therefrom is secured to the joist with a lower end thereof projecting beyond the lower edge of the joist. The lower end of the plate is provided with a slot **82** which receives a tie-down strap **84.** Strap **84** is in the form of a sheet metal belt, the length of which can be selectively adjusted. The lower end of the belt is secured to a suitable bolt **86** anchored, for example, in concrete or the like.

Referring now to FIGS. **11, 12,** and **13,** there are illustrated various forms of tie-down plates **62***j*, **62***k* and **62***m*, each of which is provided with a plurality of elongated nail-like teeth struck to project to one side of the plate as illustrated. In each form hereof the teeth are struck in transversely extending rows with the slots in each row extending from the teeth in like directions and the slots in adjacent rows extending from their associated teeth in opposite directions. In plate **62***j*, a pair of slots **88** and **90** are provided in the end of the plate which would normally extend beyond the joist or member to which the plate is applied. The slots **88** and **90** are adapted to receive tie-down straps. In FIG. **12** the plate **62***k* is provided with a pair of generally parallel slots **92** and **94** and an inclined slot **96.** In this manner, the tie-down straps can be applied in angular relation one to the other. In FIG. **13,** a circular opening **98** is provided in the plate **62***m*. Preferably, edges of the opening are formed or pealed back to reinforce the metal about the opening **98.** Thus, the tie-down strap applied to the plate **62***m* can be applied at any angular orientation.

Referring back to FIG. **1,** an alternative tie-down construction is illustrated at **110.** In this form, a pair of plates each similar to the plate **62***m* illustrated in FIG. **13** are hinged one to the other about the axis of the circular opening **112** formed through each. Particularly, the margins of one plate about its circular opening are formed through the opening in the other plate. This form of hinged plate is described and illustrated in U.S. Pat. application Ser. No. 303,939 filed Nov. 6, 1972 of common assignee herewith, the disclosure of that application being incorporated herein by reference thereto as though fully set forth herein. Once the plates **110** are secured to the joists, however, they cannot pivot relative to one another. However, these plates do provide a strong secure connecting point between the anchor and the building construction.

It will be appreciated that the objects of the present invention are fully accomplished in the foregoing in that there is provided a substantially unitized building construction wherein the joints between the various elements of the structure are spanned by straps which in effect form structures, unitizes the building, i.e., renders integral floor joists side walls and trusses of the structure in a manner which precludes relative separating movement of such elements. Moreover, the foregoing is provided in a simple and economical manner and in a manner which is readily applicable to existing building structures.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiments are therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

What is claimed and desired to be secured by United States Letters Patent is:

1. A building structure comprising a truss including upper and lower chords, means for joining the ends of the chords one to the other, a generally vertically extending side wall frame including a plurality of studs joined at opposite ends to upper and lower plates, means for joining one end of said truss to said frame with said lower chord resting on said upper plate including an elongated sheet metal strap having first and second groups of elongated nail-like teeth struck from respective opposite end portions of the strap to project to one side thereof, said strap being applied to said joint along the outer surfaces of said frame and said truss with the first group of teeth at one end of the strap being embedded into the frame and the second group of teeth at the opposite end of the strap being embedded into said truss whereby said strap interconnects said truss and said frame to reinforce the truss and frame against relative separating movement and to form a substantial unitary joint therebetween, said first group of teeth being embedded into the outer edge of one of the studs of the frame.

2. A building structure comprising a truss including upper and lower chords, means for joining the ends of the chords one to the other, a generally vertically extending side wall frame including a plurality of studs joined at opposite ends to upper and lower plates, means for joining one end of said truss to said frame with said lower chord resting on said upper plate including an elongated sheet metal strap having first and second groups of elongated nail-like teeth struck from respective opposite end portions of the strap to project to one side thereof, said strap being applied to said joint along the outer surfaces of said frame and said truss with the first group of teeth at one end of the strap being embedded into the frame and the second group of teeth at the opposite end of the strap being embedded into said truss whereby said strap interconnects said truss and said frame to reinforce the truss and frame against relative separating movement and to form a substantial unitary joint therebetween, the second group of teeth being embedded into the outer edge of the upper chord of said truss.

3. A building structure comprising a truss including upper and lower chords, means for joining the ends of the chords one to the other, a generally vertically extending side wall frame including a plurality of studs joined at opposite ends to upper and lower plates, means for joining one end of said truss to said frame with said lower chord resting on said upper plate including an elongated sheet metal strap having first and second groups of elongated nail-like teeth struck from respective opposite end portions of the strap to project to one side thereof, said strap being applied to said joint along the outer surfaces of said frame and said truss with the frist group of teeth at one end of the strap being embedded into the frame and the second group of teeth at the opposite end of the strap being embedded into said truss whereby said strap interconnects said truss and said frame to reinforce the truss and frame against relative separating movement and to form a substantial unitary joint therebetween, said first group of teeth being embedded into the outer end of one of the studs of the frame, the second group of teeth being embedded into the outer edge of the upper chord of the truss, and the intermediate portion of said strap being free of struck teeth and overlying said plate and the end of said chord.

4. A building structure comprising a truss including upper and lower chords, means for joining the ends of the chords one to the other, a generally vertically extending side wall frame including a plurality of studs joined at opposite ends to upper and lower plates, means for joining one end of said truss to said frame with said lower chord resting on said upper plate including an elongated sheet metal strap having first and second groups of elongated nail-like teeth struck from respective opposite end portions of the strap to project to one side thereof, said strap being applied to said joint along the outer surfaces of said frame and said truss with the first group of teeth at one end of the strap being embedded into the frame and the second group of teeth at the opposite end of the strap being embedded into said truss whereby said strap interconnects said truss and said frame to reinforce the truss and frame against relative separating movement and to form a substantial unitary joint therebetween, a floor joist, a floor panel overlying said floor joist, means coupling said side frame to said joist including a second elongated sheet metal strap having a group of elongated nail-like teeth struck from each of the opposite end portions of the strap to project to one side thereof, the group of teeth at one end of the second strap being embedded into an outer surface of said floor joist and the group of teeth at the other end of the second strap being embedded into one of said studs whereby said latter strap interconnects said sidewall frame and said joist to reinforce the same against relative separating movement and to form a substantial unitary joint therebetween.

5. A structure according to claim 4 wherein said floor joist lies in a plane generally parallel to the plane of said side frame with one group of teeth being embedded into the outer side face of said joist.

6. A structure according to claim 4 wherein said floor joist lies in a plane generally normal to the plane containing said side frame with one group of teeth being embedded into the end face of said joist.

7. A structure according to claim 4 including means for anchoring said floor joist to an underlying anchor including a sheet metal plate having a plurality of nail-like teeth struck to project to one side thereof and embedded into said surface of said floor joist, said teeth being distributed over a major portion of said plate leaving an end thereof free of teeth and projecting beyond the lower edge of said floor joist, said projecting end of said plate defining an opening therethrough and means for securing said plate to an anchor including means engaging through said end opening in the plate.

8. A structure according to claim 4 wherein said joist is inset from the outer edge of said side frame.

9. A structure according to claim 4 wherein said joist is located outwardly of the outer edge of said side frame.

10. A structure according to claim 4 including an interior wall frame having a plurality of studs and upper and lower plates, a second floor joist and a floor panel overlying said second floor joist, said floor panel having an opening therethrough, means coupling said interior frame and said second floor joist including an elongated sheet metal strap having groups of a plurality of elongated nail-like teeth each struck from its opposite ends and to project to one side thereof, said strap being receivable through said opening with the group of teeth at one end of the latter strap embedded into a surface of said second floor joist and the group of teeth of the other end of the latter strap being embedded into a stud of said interior frame whereby the latter strap interconnects said interior frame and said second joist to reinforce the same against relative separating movement.

11. A building structure comprising a generally horizontally extending floor joist, a generally vertically extending side wall frame including a plurality of longitudinally spaced studs joined at opposite ends by upper and lower plates, means for joining said side wall frame and said joist one to the other including an elongated sheet metal planar strap having a group of elongated nail-like teeth struck from each of the opposite end portions of said strap to project from like sides thereof, the group of teeth at one end of said strap being embedded into an outer surface of said floor joist and the group of teeth at the other end of said strap being embedded into one of said studs with intermediate portions of said strap spanning said lower plate whereby said strap interconnects said side wall frame and said joist to reinforce the same against relative separating

movement and to form a substantial unitary joint therebetween.

12. A structure according to claim **11** wherein said floor joist lies in a plane generally parallel to the plane of said side frame with the one group of teeth being embedded into the outer side face of said joist.

13. A structure according to claim **11** wherein said floor joist lies in a plane generally normal to the plane containing said side frame with the one group of teeth being embedded into the end face of said joist.

14. A structure according to claim **11** wherein the slots left by the teeth extend in a direction parallel to the long axis of the strap.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,861,094 Dated January 21, 1975

Inventor(s) John Calvin Jureit and Carlos S. Rionda

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In the Abstract, line 20, "initized" should read --unitized--.

Col. 2, line 41, "utilized" should read --unitized--.
Col. 5, line 18 "point" should read --joint--.
Col. 6, line 26, "edge" should read --edges--; line 28, "wall" should read --face--; line 60, "end end" should read --one end--.

Signed and sealed this 10th day of June 1975.

(SEAL)
Attest:

RUTH C. MASON
Attesting Officer

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