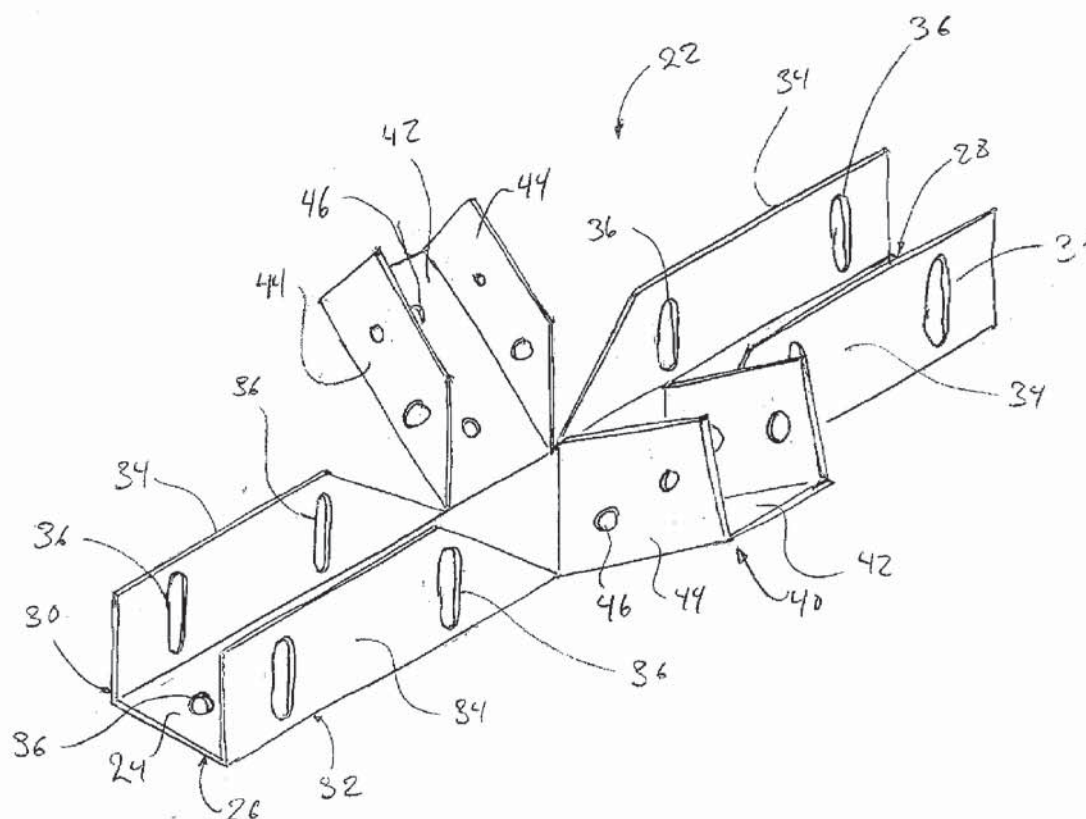


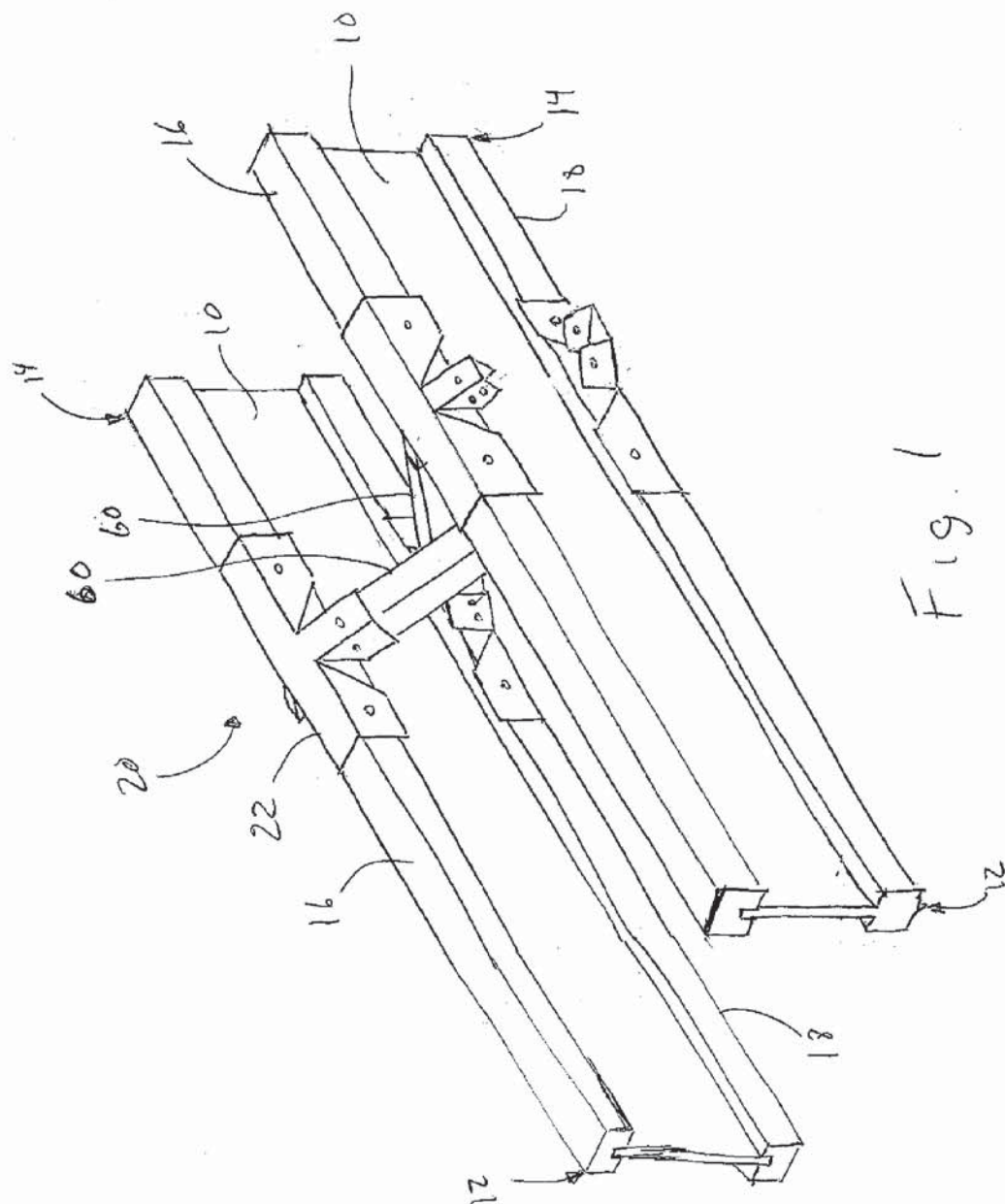


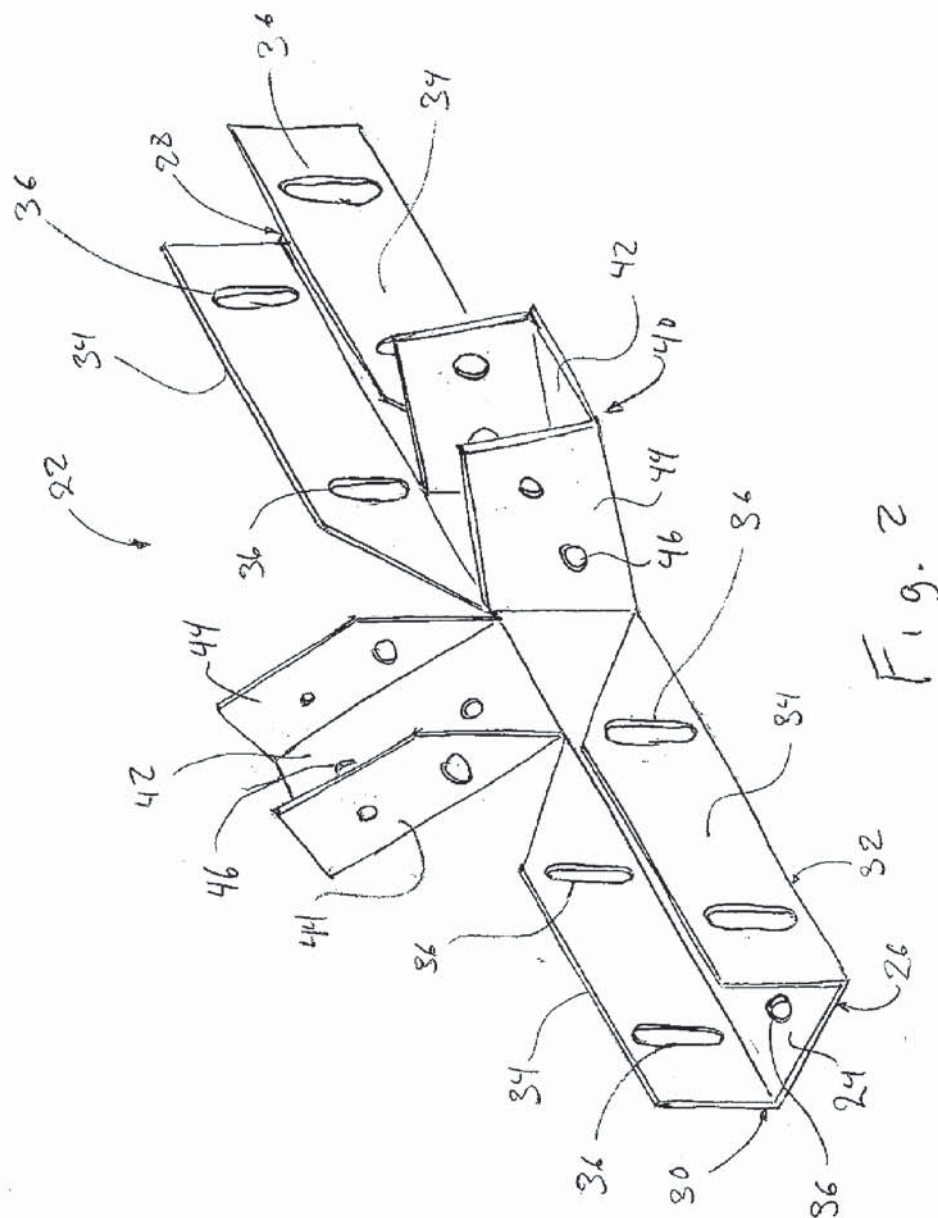
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(19) **United States**(12) **Patent Application Publication**
Sidhu(10) **Pub. No.: US 2014/0338282 A1**(43) **Pub. Date: Nov. 20, 2014**(54) **MODULAR JOIST BRACE BRACKET**(71) Applicant: **Global Utility Patent Corp., Kelowna (CA)**(72) Inventor: **Geoffrey Rajay Sidhu, Kelowna (CA)**(73) Assignee: **Global Utility Patent Corp., Kelowna (CA)**(21) Appl. No.: **13/897,317**(22) Filed: **May 17, 2013****Publication Classification**(51) **Int. Cl.**
E04B 1/18 (2006.01)(52) **U.S. Cl.**CPC **E04B 1/185** (2013.01)USPC **52/702**(57) **ABSTRACT**

An apparatus for supporting brace members between a plurality of adjacent parallel spaced apart joists wherein each of the joists extends between top and bottom edges comprises a joist engaging cup adapted to receive one of the top or bottom edge of the joist therein and a brace supporting platform angularly extending from each side of the cup in a direction towards the other of the top or bottom edge of the joist. A plurality of brace members may be sized to be received on the brace supporting platforms and extend diagonally between a top and bottom edges of adjacent joists.







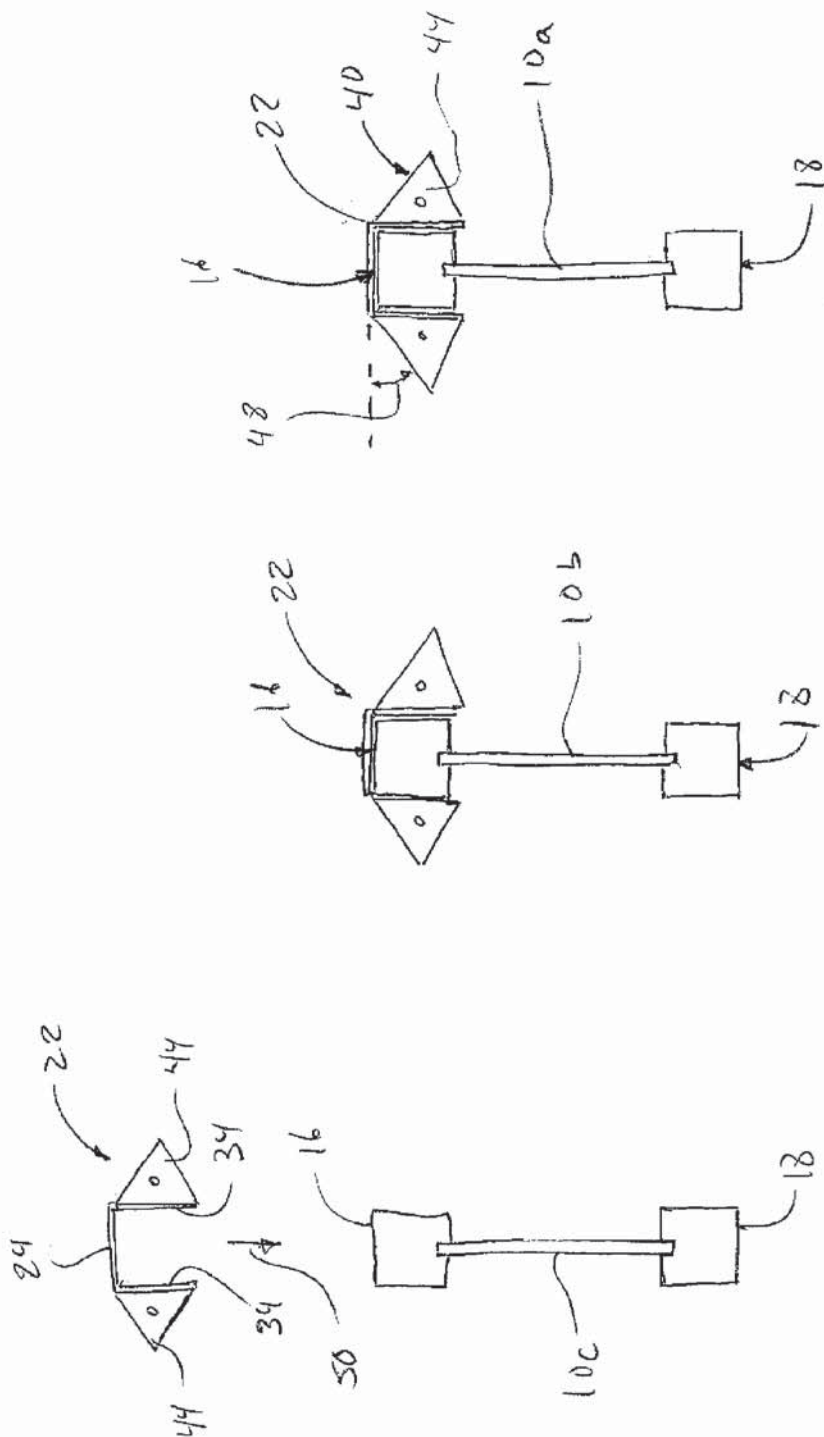


Fig. 3

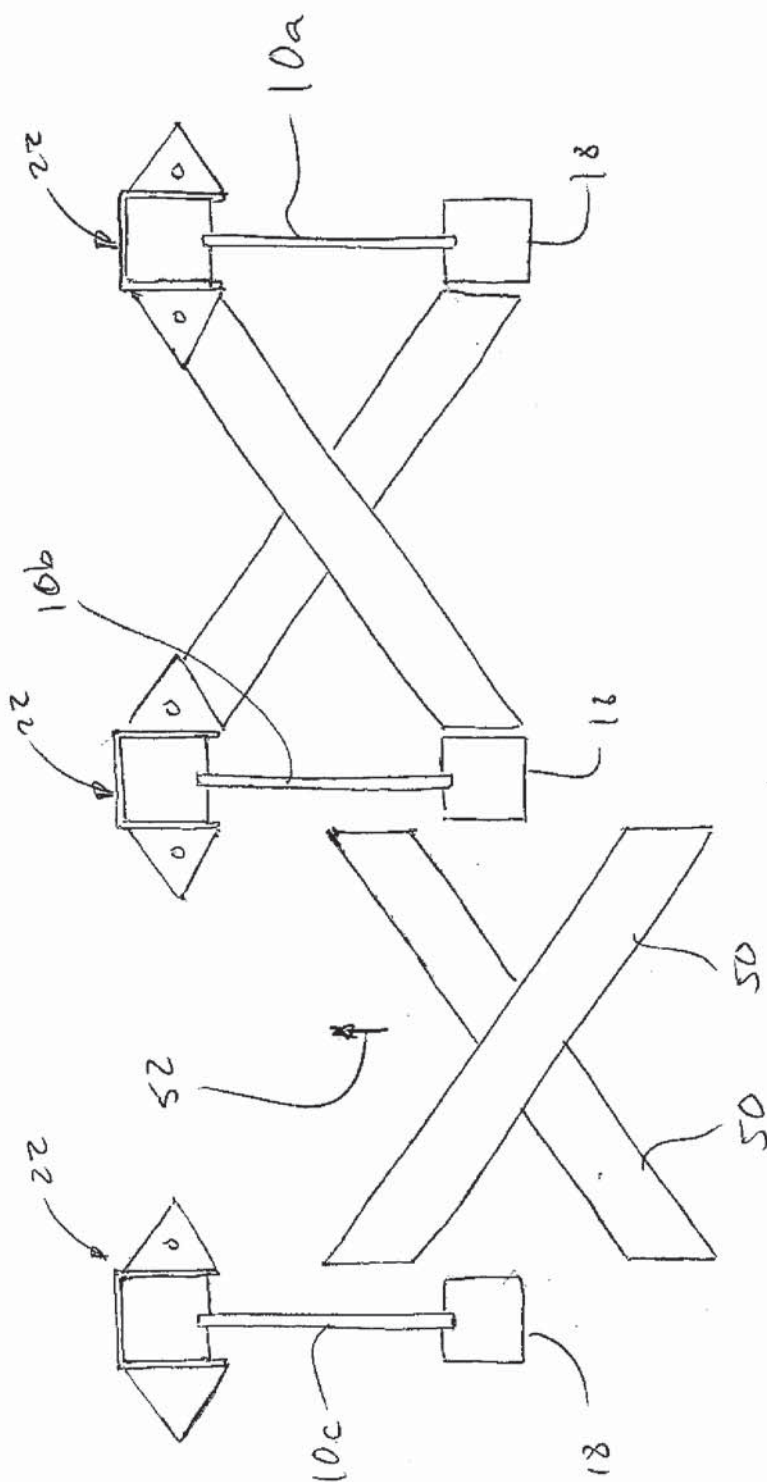


Fig. 4

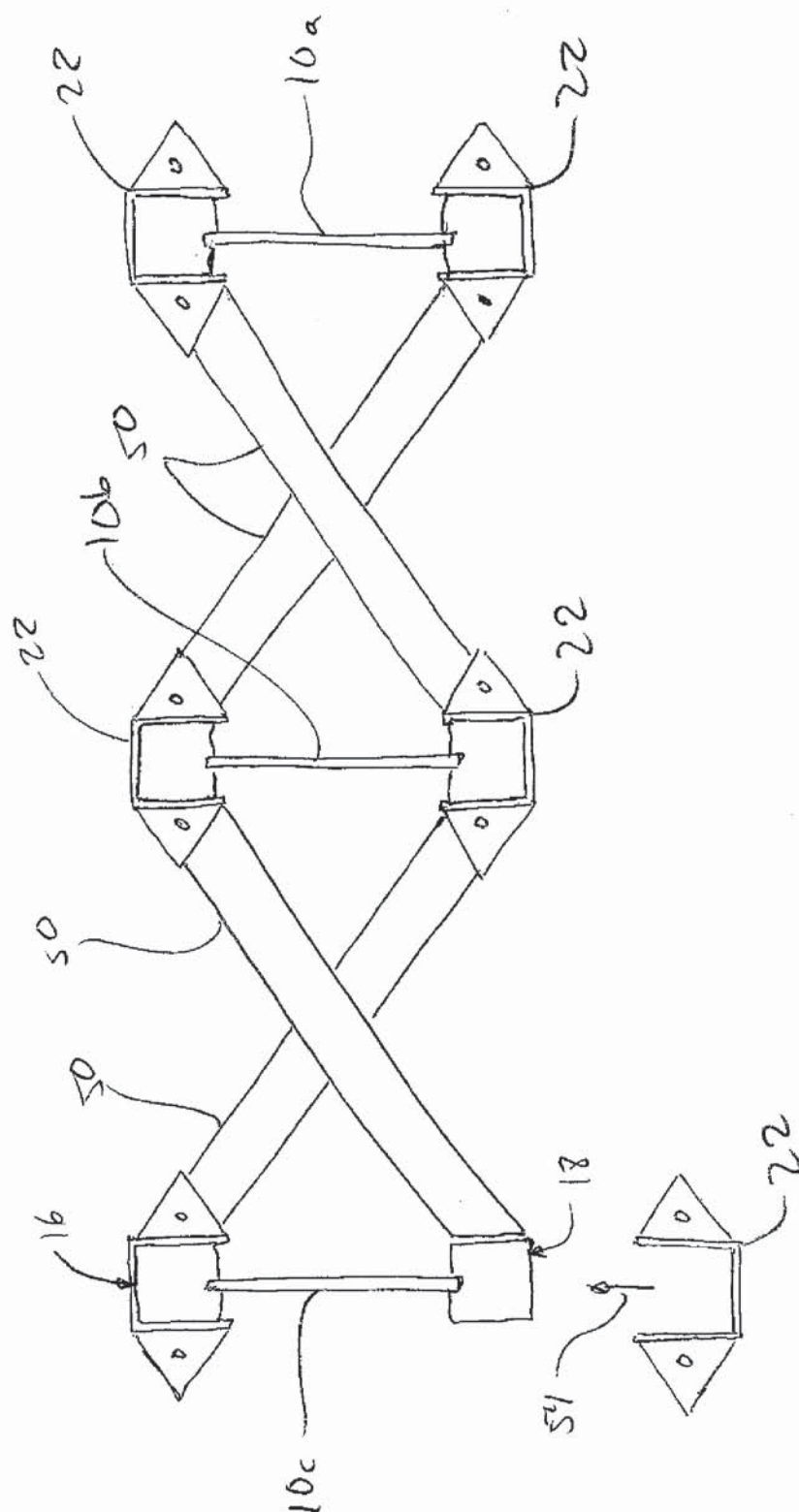


Fig. 5

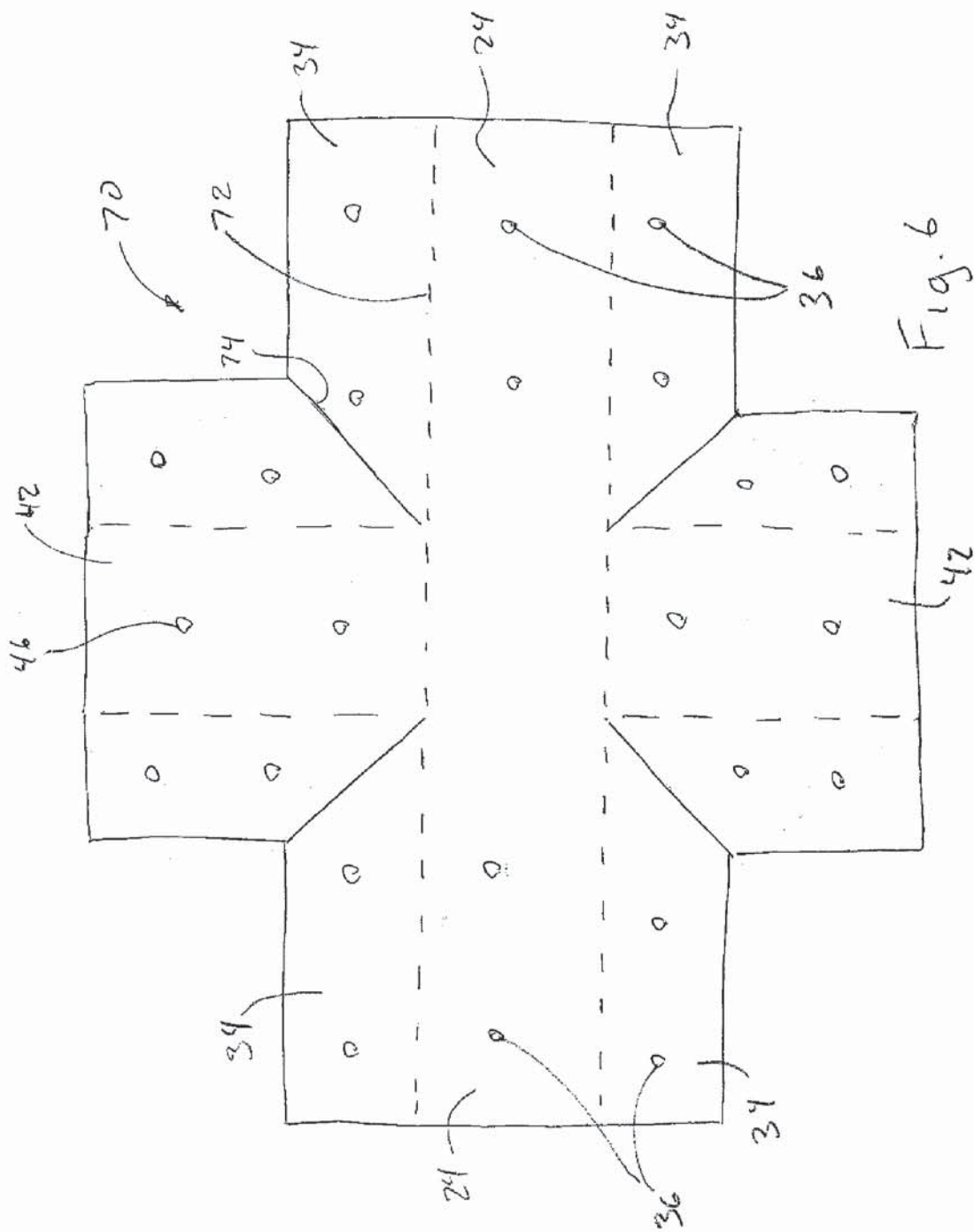
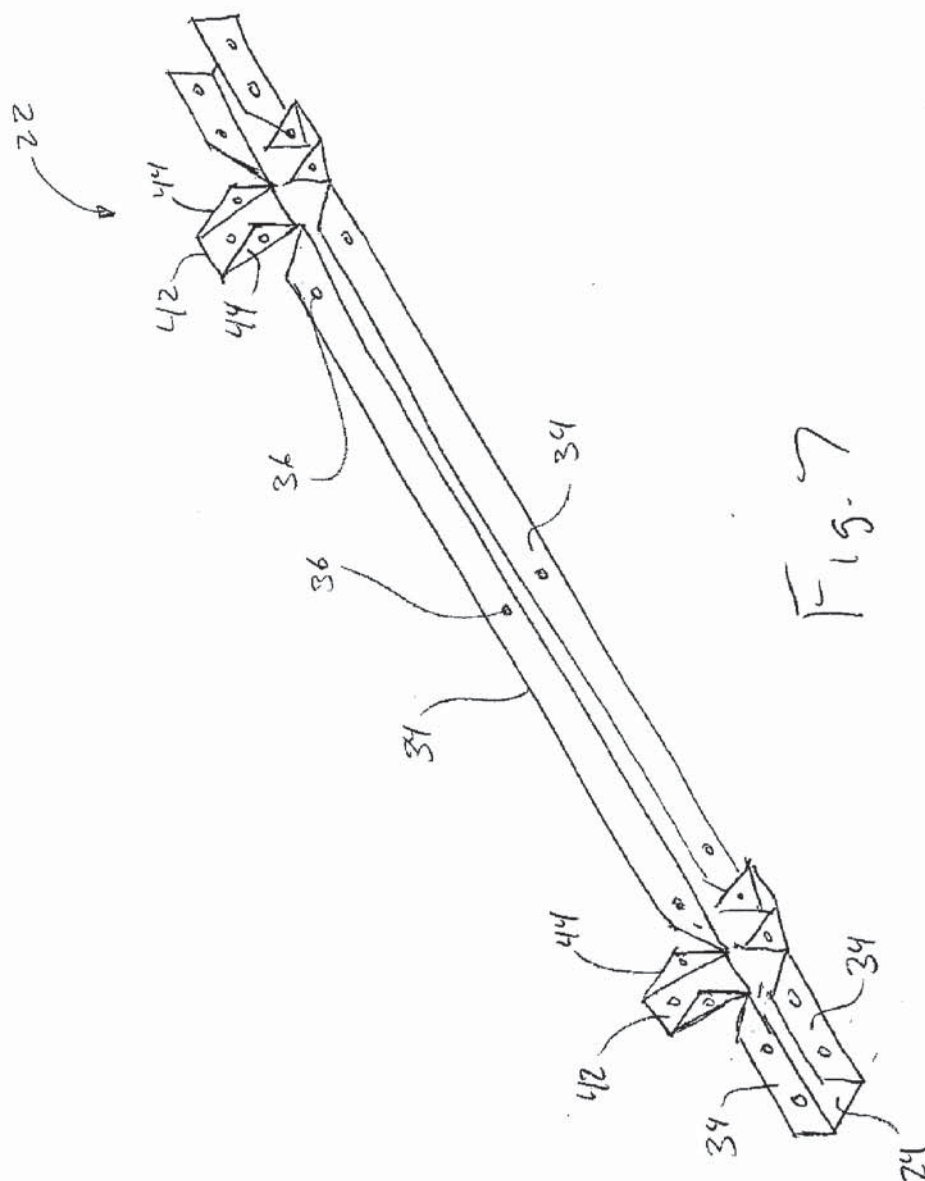
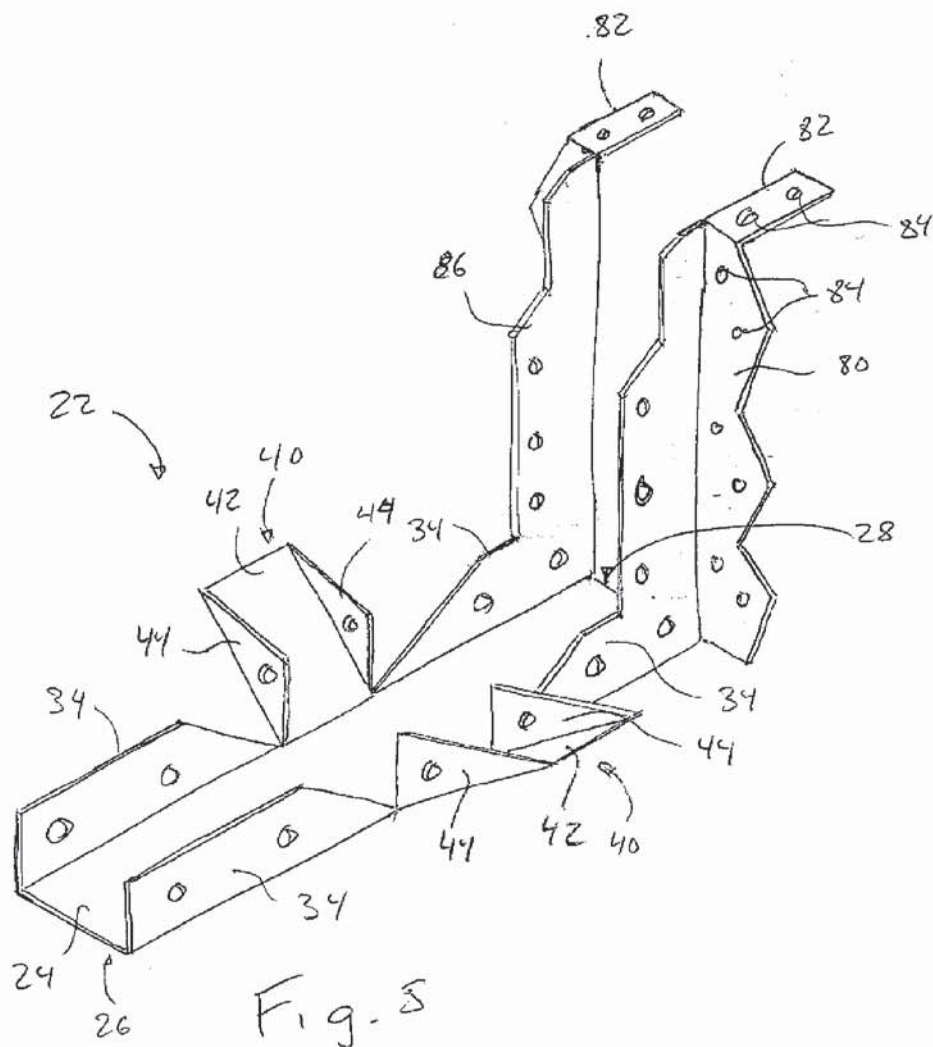


Fig. 6





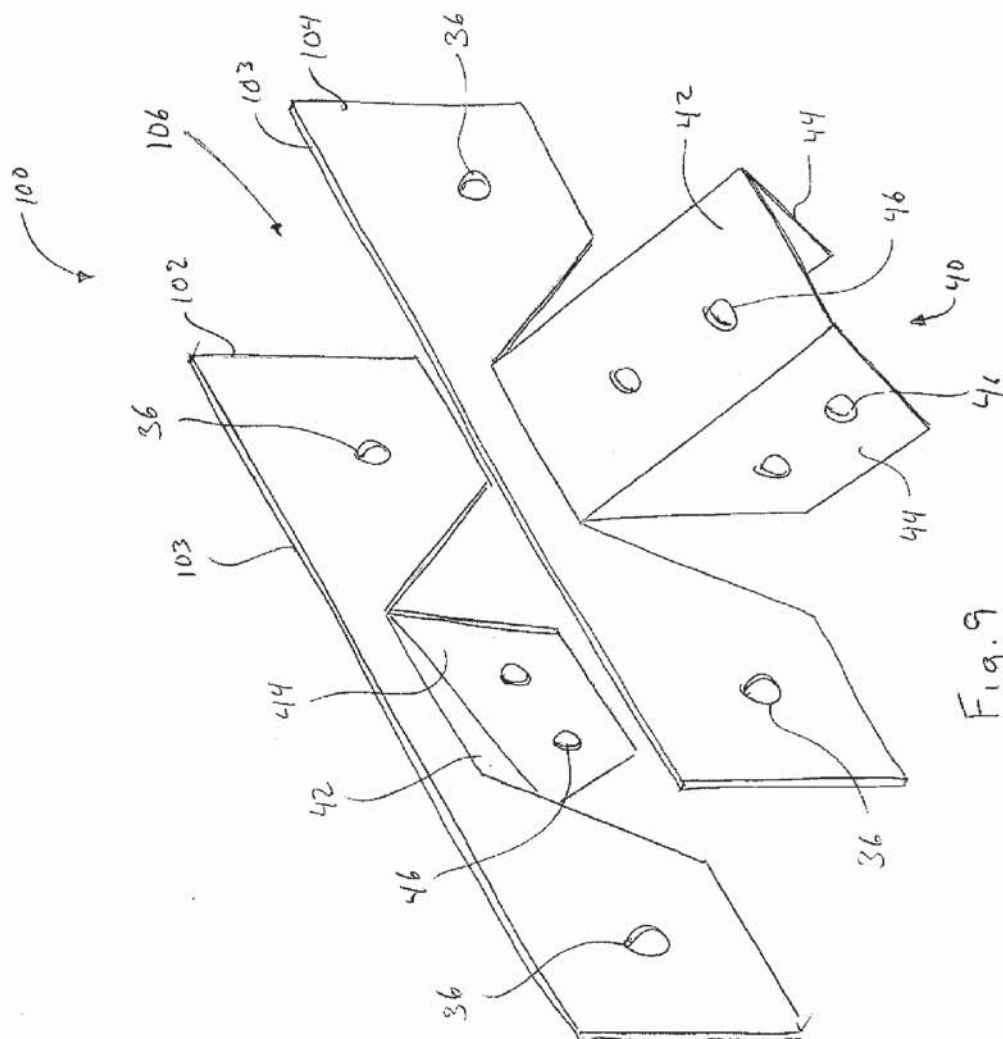


Fig. 9

MODULAR JOIST BRACE BRACKET**BACKGROUND OF THE INVENTION**

[0001] 1. Field of Invention

[0002] The present invention relates generally to structural reinforcement and in particular to an apparatus and system for modularly supporting a plurality of joists.

[0003] 2. Description of Related Art

[0004] In the field of construction, it is often desirable to make a structure as strong as possible. The strength of a building is desirable for the purposes of load bearing ability as well as resistance to outside loads such as earthquakes, wind and other environmental loading.

[0005] Building construction typically includes a plurality of elongate members connected each other to form walls, ceilings, floor and the like. In the case of walls, such elongate wall members are often referred to as studs while in ceilings and roofs, they may be referred to as joist.

[0006] One difficulty that exists is the tendency of relatively long structural members to loose strength and rigidity as their length increases. This is often required for floor and ceiling joists so as to provide larger rooms unobstructed by supporting walls and columns. Such long joists may commonly be subject to torsional buckling failure. Another difficulty that exists with floor joists is when they are exposed to dynamic environmental loads such as earthquakes, strong winds and the like. Under such loads, the floor joists may rotate axially along their length so as to lay flat instead of upright. The resulting horizontal and vertical deflection of the entire load above such a floor may contribute to an entire building failing or collapsing.

[0007] Conventional methods of reinforcing structural members has not been adequate to resolve the above difficulties. Previous attempts have tried to locate bridges or blocks between adjacent joists to distribute point loads located near a single joist to adjacent joists so as to distribute the load between more than one joist. Bridging involves locating a pair of crossed diagonal wooden members between adjacent joist whereas blocking typically includes locating a shortened length of the joist member transversely between the joists. Such attempts have not adequately solved the above difficulties.

[0008] In particular, blocking or bridging is only able to act as a compressive member between the joists and will have a very limited ability to prevent the edges of the joists from moving away from each other.

[0009] When the joist members are subjected to torsional loading, the blocking members on one side of the joist are subjected to opposite loads. For example, when a torsional load is applied to the joist along the longitudinal axis of the structural member, the blocking member abutting one side of the top chord of the joist is subjected to a primarily compressive load, and the blocking member abutting opposite side of the top chord is subject to a tensile load. Similarly, for the same torsional load, the bottom chord on the same side of that joist will also be subjected to a tensile load. The compressive load may be conveyed efficiently to the blocking member abutting the top chord through the contacting surfaces of the blocking and the joist chord. However the tensile load on both blocking member on the opposite side of the top chord and on the bottom blocking member is born entirely by the fastening device used. Therefore unless such fasteners are specifically designed to bear tensile loads under repeated loading cycles, this is likely to lead to cause premature failure of the structure

when such fasteners, such as a nail or a screw pulls out. Due to the inability of bridging and blocking to effectively handle loads in tension, such reinforcing will not significantly assist in the reinforcing of a structure under cyclical environmental loads such as earthquakes, winds and the like.

SUMMARY OF THE INVENTION

[0010] According to a first embodiment of the present invention there is disclosed an apparatus for supporting brace members between a plurality of adjacent parallel spaced apart joists wherein each of the joists extends between top and bottom edges. The apparatus comprises a joist engaging member adapted to engage the joist proximate to a top or bottom edge thereof and a brace supporting platform angularly extending from each side of the cup in a direction towards the other of the top or bottom edge of the joist.

[0011] The joist engaging member may comprise a cup adapted to receive one of the top or bottom edge of the joist therein. The cup may comprise a base plate and at least one joist engaging side plate extending from the base plate, wherein the base plate and the at least one side plates are positioned to receive one of the top or bottom edge of the joist therein. The side plates may include fastener bores extending therethrough. The base plate includes fastener bores extending therethrough. The base plate may extend substantially a length corresponding substantially to the length of the joist.

[0012] The brace supporting platform may comprise a substantially planar member extending from the cup. The brace supporting platform may include fastener bores extending therethrough. The brace supporting platform may have a width between first and second side edges corresponding substantially to a width of the brace member.

[0013] The brace supporting platform may further include side walls extending from the first and second side edges. The side walls may include fastener bores extending therethrough. The base cup and the brace supporting platform may be formed of a unitary sheet of material.

[0014] The apparatus may further comprise at least one hanger member extending from the joist engaging cup, the hanger member having fastener bore therethrough for passing fasteners so as to suspend the apparatus from a beam.

[0015] According to a further embodiment of the present invention there is disclosed a system for supporting a plurality of adjacent parallel spaced apart joists, each of the joists extending between top and bottom edges. The system comprises a plurality of brackets comprising a joist engaging cup adapted to receive one of the top or bottom edge of the joist therein and a brace supporting platform angularly extending from each side of the cup in a direction towards the other of the top or bottom edge of the joist. The system further comprises a plurality of brace members sized to be received on the brace supporting platforms and extend diagonally between a top and bottom edges of adjacent joists.

[0016] The cup may comprises a base plate and at least one joist engaging side plate extending from the base plate, wherein the base plate and the at least side plate are positioned to receive one of the top or bottom edge of the joist therein.

[0017] Other aspects and features of the present invention will become apparent to those ordinarily skilled in the art upon review of the following description of specific embodiments of the invention in conjunction with the accompanying figures.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] In drawings which illustrate embodiments of the invention wherein similar characters of reference denote corresponding parts in each view,

[0019] FIG. 1 is a perspective view of a system for supporting a plurality of parallel spaced apart joists according to a first embodiment of the present invention.

[0020] FIG. 2 is a perspective view of an apparatus for supporting braces between the joists of the system of FIG. 1 according to a further embodiment of the present invention.

[0021] FIG. 3 is a side view of the system of FIG. 1 being installed on a plurality of joists at a first step.

[0022] FIG. 4 is a side view of the system of FIG. 1 being installed on a plurality of joists at a second step.

[0023] FIG. 5 is a side view of the system of FIG. 1 being installed on a plurality of joists at a third step.

[0024] FIG. 6 is a plan view of a cut sheet for forming the apparatus of FIG. 2.

[0025] FIG. 7 is a perspective view of an apparatus for supporting braces between the joists of the system of FIG. 1 according to a further embodiment of the present invention.

[0026] FIG. 8 is a perspective view of an apparatus for supporting braces between the joists of the system of FIG. 1 according to a further embodiment of the present invention.

[0027] FIG. 9 is a perspective view of an apparatus for supporting braces between the joists of the system of FIG. 1 according to a further embodiment of the present invention.

DETAILED DESCRIPTION

[0028] Referring to FIG. 1, a system for supporting a plurality of parallel spaced apart joists 10 according to a first embodiment of the invention is shown generally at 20. Each joist 10 comprises an elongate member extending between first and second ends, 12 and 14, respectively having top and bottom edges 16 and 18, respectively. It will be appreciated that although the present system is described for use with a joist, other structural members, such as, by way of non-limiting example, beams, trusses or the like may also be supported in a similar manner as described herein. As described herein, the joist 10 may comprise a floor or ceiling joist, such as by way of non-limiting example dimensioned lumber, space frame or I-joists formed of wood, composite materials, metal or the like.

[0029] As illustrated in FIG. 1, the system 20 comprises a plurality of brace brackets 22 located on the top and bottom edges 16 and 18 of the joists 10 and a plurality of brace members 60 extending diagonally therebetween. As will be more fully described below, the brace brackets 22 and the brace members 60 extending therebetween serve to operably couple the top of one joist with the bottom of the two adjacent joists and vice versa. In such a manner it will be appreciated that any load applied to one joist will be distributed to the adjacent joists so as to more evenly distribute such loads along the floor structure. It will also be appreciated that vibrations and movements applied to one joist will be similarly distributed across the entire floor. Additionally, each joists will be more fully braced to resist torsional or twisting forces applied to each joist by the brace members both tensionally and compressively resisting such twisting movements.

[0030] With reference to FIG. 2, each brace bracket comprises an elongate planar base member 24 extending between first and second ends, 26 and 28, respectively and first and second sides, 30 and 32, respectively forming a cup for

receiving one of the top or bottom edges 16 or 18 of the joist 10 therein. The base member 24 includes a pair of brace supporting platforms 40 extending from the first and second sides 26 and 28 thereof as will be more fully described below. The brace bracket 22 includes at least one side plate 34 extending from each of the first and second sides 30 and 32. As illustrated in FIG. 2, the brace supporting platforms 40 may extend from substantially a midpoint between the first and second side 30 and 32 wherein the brace bracket 22 includes a side plate located to each side of the brace supporting platform 40. As illustrated in FIG. 2, each of the side plates 34 may include one or more fastener apertures 36 extending therethrough. The fastener apertures 36 are sized to receive a fastener, such as, by way of non-limiting example, a nail, screw or the like therethrough to fasten the side plates 34 to the joist. As illustrated in FIG. 2, the fastener apertures 36 may comprise slots, although it will be appreciated that other opening shapes, such as, by way of non-limiting example, circular bores or a plurality of bores may also be utilized. As illustrated in FIG. 2, the base member 24 may also include fastener apertures 36 extending therethrough. Optionally, the side plates 34 may include barbs, spikes or other suitable projections from an interior surface thereof so as to engage the joist when the brace bracket 22 is secured thereto. Adhesives may also be applied between the base member 24 and side plates 34 and the joist to secure the brace bracket 22 to the joist. The brace bracket 22 will have a length between the first and second ends 26 and 28 to provide for sufficient strength to engage the joist 10 and retain the brace members 60 in sufficient engagement to provide increased strength to the joists. By way of non-limiting example, it has been found that a length of at least 4 inches (102 mm) has been adequate.

[0031] The side plates 34 are spaced apart by a distance to correspond to the top or bottom edge 16 or 18 of the joist 10. In many applications, the structural member 6 will comprise a floor or ceiling joist, such as by way of non-limiting example dimensioned lumber, space frame or I-joists formed of wood, metal or the like. Dimensioned lumber is commonly of a 1.5 inch width and therefore for such applications the side plates 34 will be spaced apart by a similar distance. It will be appreciated that other thicknesses of structural members in general and joists in particular may also be utilized, such as, by way of non-limiting example, sized to accommodate a doubled up floor joist, a 2½ inch wide floor joist or other common wood or metal floor joist sizes. In some applications, the side plates 34 and 56 may be spaced apart by a distance slightly larger than the width of the joist so as to facilitate installation. In particular, the side plates 34 may be spaced apart by a distance of up to 3.2 mm (⅛ of an inch) larger than the joist for which they are designed.

[0032] The brace supporting platforms 40 comprise substantially planar angled plates 42 extending from the base at an angle 48 as illustrated in FIG. 3. The angle 48 is selected to align with a brace member 60 extending between the top edge 16 of one joist 10 and the bottom edge 18 of an adjacent joist.

[0033] The angled plate 42 includes side plates 44 extending therefrom in the same direction from the base plate as the angled plate 42 as illustrated. The side plates 44 are substantially parallel to each other and are spaced apart by a distance corresponding to the width of the brace member 60. As illustrated, each of the angled plate 42 and the side plates 44 may include fastener apertures 46 extending therethrough which may comprise slots, circular bores or a plurality of bores as set out above. In such a manner, it will be observed that the brace

supporting platform 40 is sized and shaped to receive and retain a brace member 60 therein. By way of non-limiting example, the side plates 44 may be substantially rectangular as illustrated in FIGS. 1, 2 and 6 or triangular as illustrated in FIGS. 3-5, 7 and 8 although it will be appreciated that other shapes may be utilized as well.

[0034] The brace members 60 may be formed of any suitable elongate rigid material, such as, by way of non-limiting example, wood, metal, plastic or composite materials. In particular, it has been found useful to form the brace members 60 of dimension lumber such as, by way of non-limiting example, 2x2, 2x3s or the like. In such a manner, the brace members 60 may be cut to the desired length to extend between the top and bottom edges 16 and 18 of adjacent joists 10 as will be more fully described below. As illustrated, each brace member 60 may be separate although connected to the brace brackets 22 in matching crossed pairs. Alternatively, the pairs of brace members 60 may be secured to each other in a cross before installation.

[0035] Turning now to FIGS. 3 through 5, in operation, one brace bracket 22 may be located on each top edge 16 of a plurality of adjacent joists 10a, 10b and 10c by lowering the brace bracket 22 in a direction generally indicated at 50 so as to rest the base member 24 upon the top edge 16 with the side plates 34 located to each side of the joist. Once positioned, fasteners (not shown) may be passed through the fastener apertures of the brace bracket 22 to secure it to the joist. Thereafter, a pair of brace members 60 may be raised in a direction generally indicated at 52 into engagement into each of the brace supporting platforms 40 on the top edges 16 of the joists 10 so as to extend between the top edge 16 of one joist and the bottom edge 18 of an adjacent joist as illustrated in FIG. 4. Fasteners may then be passed through the fastener apertures 46 to secure the brace member 60 therein. Finally, a bottom brace bracket 22 may be positioned onto each bottom edge 18 of the joists 10a, 10b and 10c by raising the brace bracket 22 in a direction generally indicated at 54 so as to receive the bottom edge 18 of the joist 10 upon the base member 24 with the side plates 34 located to each side of the joist. Once positioned, fasteners (not shown) may be passed through the fastener apertures of the brace bracket 22 to secure it to the joist.

[0036] The brace brackets 22 may be cut from a single sheet of metal, such as, by way of non-limiting example, steel, stainless steel, aluminium or galvanized steel. The sheet metal may be cut into a blank 70 as illustrated in FIG. 6 according to known methods and thereafter bend into the desired shape as illustrated and described above. In particular, the blank 70 may be cut along cut lines 74 to separate the side plates 44 and 34 from each other and thereafter bent along bend lines 72 to form the brace bracket 22 as set out above. Any thickness of metal as required to provide the necessary strength may be utilized such as between 12 and 22 gauge. In particular, it has been found that sheet metal of between 16 and 20 gauge has been useful. It will also be appreciated that the brace bracket 22 may also be formed of non-metal materials, such as, by way of non-limiting example, carbon fibre, fibreglass, plastics, ceramics and composite materials.

[0037] Although the above system is described as having a single pair of brace support platforms 40 extending from each brace bracket 22, each brace bracket 22 may also include more than one set of brace support platforms as illustrated in FIG. 7. In such embodiments, the brace support platforms 40 will be spaced along the brace bracket 22 to support the joists

10 at different locations therealong as desired by a user. In such embodiments, the brace bracket 22 may extend substantially the length of the joists 10 so as to provide continuous contact therewith.

[0038] Turning now to FIG. 8, an alternative embodiment of the present invention is illustrated in which the brace brackets 22 include hanger plates 80 extending from one of the first or second ends 26 or 28 (illustrated as extending from the second end in FIG. 8). The hanger plates 80 extend in the same direction away from the base member 24 as the side plates 34 in a generally perpendicular direction. As illustrated in FIG. 8, the hanger plates may be supported from the side plates 34 at the second end 28 of the brace bracket 22. Optionally, the hanger plates 80 may extend from extension tabs 86 extending upwardly from the side plates 34. The hanger plates 80 comprise substantially planar members having a plurality of fastener bores 84 extending therethrough for passing a fastener to secure the hanger plates 80 and thereby the brace bracket 22 to a beam or the like at an end of the joist 10. In such a manner, it will be appreciated that the brace bracket 22 may be utilized to support the joist 10 therefrom similar to a joist hanger. As illustrated in FIG. 8, the hanger plates 80 may include bent over top portions 82 adapted to be located on top of the beam (not shown). The hanger plates 80 may extend any distance up the beam as desired by a user including, but not limited to, the full height of the beam. Additionally, although the hanger plates 80 are illustrated as extending to opposed sides of the side plates 34, it will be appreciated that they may also extend towards each other from the side plates 34.

[0039] With reference to FIG. 9, an alternative embodiment of the present invention is illustrated in which the base member is omitted leaving a pair of side plates 102 and 104 spaced apart by a distance 106 and each having a brace supporting platform 40 extending therefrom. As illustrated in FIG. 9, the brace supporting platform 40 may extend from the side plates 102 or 104 at a distances spaced apart from the top edge of the side plates. It will also be appreciated that this feature may be included in the embodiments illustrated above as well. The embodiment illustrated in FIG. 9 will be useful where it is undesirable or impractical to locate the base member over the top of a truss, such as, by way of non-limiting example, for retrofitting of an existing joist installation.

[0040] While specific embodiments of the invention have been described and illustrated, such embodiments should be considered illustrative of the invention only and not as limiting the invention as construed in accordance with the accompanying claims.

1. An apparatus for supporting brace members between a plurality of adjacent parallel spaced apart joists, each of said joists extending between top and bottom edges, the apparatus comprising:

- a base member;
 - first and second side walls extending from said base member, adapted to receive a top or bottom edge of said joist therebetween of so as to engage said base member; and
 - a brace supporting platform angularly extending from each side of said base member in a direction towards the other of said top or bottom edge of said joist,
- wherein said first and second side walls and said base member are adapted to extend along said joist to each side of said brace supporting platform.

2. (canceled)

3. (canceled)

4. The apparatus of claim 1 wherein said side plates include fastener bores extending therethrough.

5. The apparatus of claim 1 wherein said base plate includes fastener bores extending therethrough.

6. The apparatus of claim 1 wherein said base plate extends substantially a length corresponding substantially to the length of said joist.

7. The apparatus of claim 1 wherein said brace supporting platform comprises a substantially planar member extending from said base member.

8. The apparatus of claim 7 wherein said brace supporting platform includes fastener bores extending therethrough.

9. The apparatus of claim 7 wherein said brace supporting platform has a width between first and second side edges corresponding substantially to a width of said brace member.

10. The apparatus of claim 9 wherein said brace supporting platform further includes side walls extending from said first and second side edges.

11. The apparatus of claim 10 wherein said side walls includes fastener bores extending therethrough.

12. The apparatus of claim 1 wherein said base base member and said brace supporting platform are formed of a unitary sheet of material.

13. The apparatus of claim 1 further comprising at least one hanger member extending from said base member, said hanger member having fastener bore therethrough for passing fasteners so as to suspend said apparatus from a beam.

14. A system for supporting a plurality of adjacent parallel spaced apart joists, each of said joists extending between top and bottom edges, the system comprising:

a plurality of brackets comprising:

a base member;

first and second side walls extending from said base member, adapted to receive a top or bottom edge of said joist therebetween of so as to engage said base member; and

a brace supporting platform angularly extending from each side of said base member in a direction towards the other of said top or bottom edge of said joist, wherein said first and second side walls and said base member are adapted to extend along said joist to each side of said brace supporting platform; and

a plurality of brace members sized to be received on said brace supporting platforms and extend diagonally between a top and bottom edges of adjacent joists.

15. (canceled)

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