WALL STUD BRACE

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ABSTRACT
An apparatus for reinforcing a plurality of parallel spaced apart structural members to each other comprises a rigid member having first and second ends and is sized to extend diagonally across the plurality of adjacent structural members. Each structural member extends between first and second ends and has first and second edges. The apparatus further comprises a plurality of sockets extending from the rigid member. Each socket is oriented diagonally relative to the rigid member and sized and shaped to receive a first edge of one of the plurality of parallel spaced apart structural member therein.
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BACKGROUND OF THE INVENTION

[0001] 1. Field of Invention

[0002] The present invention relates to structural reinforcement in general and in particular to reinforcing adjacent wall studs to each other.

[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 to 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 joists.

[0006] One difficulty that exists is the tendency of relatively long structural members to lose strength and rigidity as their length increases. This is particularly a difficulty for relatively long slender members such as wall studs and the like. Such structural members may commonly be subject to buckling failure. Another difficulty that exists with wall studs is that walls formed by conventional wall studs is that such construction techniques may be less resistant to shear loads than they are to compressive loads. Under such loads, wall studs may be prone to rotate about their end connections to the top and bottom plate. The resulting deflection of the entire load above such a wall may contribute to an entire building failing or collapsing.

SUMMARY OF THE INVENTION

[0007] According to a first embodiment of the present invention there is disclosed apparatus for reinforcing a plurality of parallel spaced apart structural members to each other. Each structural member extends between first and second ends and has first and second edges. The apparatus comprises a rigid member having first and second ends and is sized to extend diagonally across the plurality of adjacent structural members. The apparatus further comprises a plurality of sockets extending from the rigid member. Each socket is oriented diagonally relative to the rigid member and sized and shaped to receive a first edge of one of the plurality of parallel spaced apart structural member therein.

[0008] The first and second sockets may comprise c-shaped channels. The c-shaped channels may extend diagonally across a longitudinal axis of the rigid member. The c-shaped channel may be formed of a pair of opposed flanges and a web portion therebetween.

[0009] The c-shaped channels may include at least one fastener bore sized to pass a fastener therethrough so as to secure the c-shaped channel to the structural member. At least one of the flanges may include a perpendicular connecting tab extending from an edge thereof away from the c-shaped channels.

[0010] The first and second sockets may be rigidly affixed to the rigid member. The first and second sockets may be integrally formed with the rigid member. The rigid member and the first and second caps may be formed of metal. The rigid member may comprise an elongate beam. The beam may be selected from the group consisting of a tube, a bar, a box section, an I-beam, a c-shaped channel, an L-shaped channel and a triangular cross section beam.

[0011] The rigid member may extend diagonally across the plurality of adjacent parallel spaced apart structural members. The rigid member may extend across corresponding edges of the plurality of parallel spaced apart structural members.

[0012] 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

[0013] In drawings which illustrate embodiments of the invention wherein similar characters of reference denote corresponding parts in each view,

[0014] FIG. 1 is a perspective view of an apparatus according to a first embodiment of the present invention for reinforcing structural members located across wall studs.

[0015] FIG. 2 is a cross sectional view of the apparatus of FIG. 1 as taken along the line 2-2.

[0016] FIG. 3 is a front profile view of an apparatus of FIG. 1.

[0017]FIG. 4 is a front profile view of an apparatus according to a further embodiment of the present invention.

[0018] FIG. 5 is a front profile view of an apparatus according to a further embodiment of the present invention.

[0019] FIG. 6 is a detailed perspective view of a socket of the apparatus of FIG. 1 having connecting tabs according to a further embodiment of the present invention.

[0020] FIG. 7 is a cross sectional view of two of the apparatus of FIG. 1 as taken along the line 2-2 applied to opposed surfaces of the wall studs.

[0021] FIG. 8 is a plan view of a cut sheet for forming the apparatus of FIG. 3.

DETAILED DESCRIPTION

[0022] Referring to FIGS. 1 and 2, an apparatus for stabilizing a plurality of structural members 6 according to a first embodiment of the invention is shown generally at 20. As illustrated in FIG. 1, the structural members may comprise wall studs extending between top and bottom plates, 5 and 4, respectively. The wall studs 6 may be of any conventional type, such as by way of non-limiting example dimensioned lumber, engineered studs, composite material studs or metal studs and extend between top and bottom ends, 8 and 10, respectively. It will also be appreciated that the present apparatus may be useful for stabilizing any other type of wall structural member, such as, by way of non-limiting example, floor joists roof trusses or the like. The wall studs 6 as illustrated have front and rear surfaces, 12 and 14, respectively, as are conventionally known.

[0023] The apparatus 20 comprises a rigid member having a plurality of parallel spaced apart sockets 24 and 26 spaced therealong. The sockets may be either end sockets 24 or middle sockets 26. The sockets may be selected to have a size and shape adapted to receive the front or rear surface 12 or 14, respectively, of the structural members therein. Accordingly, the apparatus may be applied to the front or rear of the wall across the wall studs so as to brace them to each other as will be more fully described below.
Turning now to FIGS. 2 and 6, a cross sectional view of one of the middle sockets 26 of the apparatus 20 as applied to a wall stud 6 is illustrated. The socket is formed of first and second walls, 21 and 23, respectively, extending perpendicularly from the rigid member 22. The first and second walls 21 and 23 may be spaced apart from each other by an amount corresponding substantially to the thickness of the structural member. The first and second walls 21 and 23 may optionally also have flanges 28 and 30 extending from a distal end thereof as illustrated in FIG. 3. As illustrated, the rigid member 22 may have a hole 32 therethrough corresponding to the socket 26 so as to permit a nail, screw or other suitable fastener 40 therethrough into the wall stud 6. Similarly, the first and second walls 21 and 23 may also have bores 34 and 36, respectively therethrough adapted to pass a nail, screw or other suitable fastener 40 therethrough into the wall stud 6. As illustrated, the bores 34 and 36 are offset from each other along either the horizontal or vertical length of the wall stud so as to prevent the fasteners 40 from coming into contact with each other as well as to preserve the strength of the wall stud. Optionally, the sockets 24 and 26 may include barbs, spikes or other suitable projections from an interior surface thereof so as to engage the wall stud when the apparatus 20 is secured thereto. Adhesives may also be applied between the front and rear surfaces 12 and 14 of the structural member and the sockets 24 and 26. The flanges 28 and 30 may optionally include bores 42 therethrough so as to permit a first apparatus to be secured to a front surface 14 of the wall studs and a second apparatus 20 to be secured to the rear surface 12 of the wall studs wherein the bores may have fasteners 46 passed therethrough to secure them together as illustrated in FIG. 7.

The rigid member 22 may be formed of any known shape. As illustrated in the accompanying Figures, the rigid member 22 may be substantially planar. Optionally, the rigid member 22 may also be formed of any suitable shape as is conventionally known, such as, by way of non-limiting example, a tube, a bar, a box section, an I-beam, a C-shaped channel, an L-shaped channel or a triangular cross section beam. The rigid member 22 may be formed of any suitable material, such as, by way of non-limiting example, metal, plastic, ceramics or the like. It will also be appreciated that although the apparatus 20 may be formed of bent sheet metal, it may also be formed by other means such as an extruded, cast or welded structure. It will also be appreciated that one or both of the sides 34 or 36 may be omitted depending on the strength requirements of the application.

With reference to FIG. 3, the embodiment of the present invention as illustrated in FIG. 1 is illustrated in a front profile view. The embodiment illustrated in FIGS. 1 and 3 may have a substantially straight rigid member 22 such that a plurality of sockets 24 and 26 are spaced therealong. Such an embodiment will be adapted to span a plurality of wall studs in a straight line with a single socket engaging each wall stud. It will be appreciated that in such an embodiment, the rigid member 22 may be sized to have a length sufficient to extend from adjacent to the bottom plate 4 on one wall stud to another wall stud adjacent to the top plate 5. Such an apparatus will therefore have an overall height corresponding substantially to the height of the wall to be reinforced. As illustrated, each socket 24 or 26 is angularly oriented relative to the rigid member 22 by an angle 45 as measured between the rigid member and an axis 47 of the socket 24 or 26. The angle 45 is selected to permit the rigid member to extend diagonally across a plurality of wall members 6. The angle 45 may be selected to any angle as desired for the given application such as, between 10 and 80 degrees. It will be appreciated that in some applications it will be desirable to extend the apparatus from a bottom corner of the wall to an opposite top corner of the wall to provide a maximum amount of reinforcement thereto.

As illustrated in FIG. 3, the apparatus will have a spacing between adjacent sockets 24 and 26, generally indicated at 44 corresponding to the spacing distances between the wall studs that it is intended to reinforce. Such spacing will be dictated by the wall construction type and may therefore be of any suitable range, such as by way of non-limiting example, 16 inches (406 mm) for 16 inch on center construction walls. It will be appreciated that other distances may be suitable as well. As illustrated in FIG. 3, the rigid member has an angle of inclination relative to the center of a wall stud that is to be located within one of the sockets 24 or 26 generally indicated at 50. Such an angle may be selected to correspond to the dimensions of the wall being formed therewith. It will also be appreciated that the overall height of the apparatus 20 that is desired by the user for a particular wall construction will determine the angle of inclination. By way of non-limiting example, the angle 50 may be selected to be between 10 and 80 degrees although it will be appreciated that other angles may be useful as well.

In many applications, the structural member 6 will comprise a wall stud, such as by way of non-limiting example dimensioned lumber or metal studs. Dimensioned lumber is commonly of a 1.5 inch width and therefore for such applications the sockets 24 and 26 may be sized to have a similar width opening. It will be appreciated that other thicknesses of structural members in general and wall studs particular may also be utilized.

With reference to FIGS. 4 and 5, an alternative embodiment of the present invention is illustrated generally at 70. The apparatus 70 has a rigid member with a bend centred at a bend socket 27. The apparatus 70 illustrated may be useful for locations where it is desired to add additional strength to the wall studs, such as a corner of the like. Optionally, the bend socket 27 may have a width greater than the width of the remaining sockets so as to be adapted to receive a doubled up wall stud therein or to be extended around the end stud of an adjacent perpendicular wall.

As illustrated in FIG. 8, the apparatus 20 may be cut from a single sheet of metal, such as, by way of non-limiting example, steel, stainless steel, aluminum or galvanized steel as a blank, generally indicated at 100. As illustrated in FIG. 9, the blank 100 may be shaped to form the apparatus of FIG. 3 although it will be appreciated that other arrangements and layouts of the blank may also be utilized. The sheet metal may be cut into a blank according to known methods and thereafter bent into the desired shape as illustrated and described above. In particular, the blank may include a central portion 102 which forms the rigid member 22 having end and middle flared portions, 106 and 104, respectively at intervals therealong. With reference to the end flared portions 106 the flared portions, may include first fold lines to form the first and second walls 21 and 23 and second fold lines to form the flanges 28 and 30 as described above.

The blank 100 may be folded along fold lines 110 to form the desired final apparatus. 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 apparatus 20—may also be formed of non-metal materials, such as, by way of non-limiting example, carbon fibre, fibreglass, plastics, ceramics and composite materials. It will also be appreciated that although elongate, substantially straight members are shown, non-straight members may also be utilized, such as, by way of non-limiting example, arcuate, space frame, plates or any other shape as long as the sockets 24 and 26 are rigidly translationally fixed relative to each other so as to securely locate the adjacent structural member relative to each other.

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.

What is claimed is:
1. An apparatus for reinforcing a plurality of parallel spaced apart structural members to each other, each structural member extending between first and second ends and having first and second edges, the apparatus comprising:
   a rigid member having first and second ends and being sized to extend diagonally across said plurality of adjacent structural members
   a plurality of sockets extending from said rigid member, each socket being oriented diagonally relative to said rigid member and being sized and shaped to receive a first edge of one of said plurality of parallel spaced apart structural members therein.
2. The apparatus of claim 1 wherein said first and second sockets comprise c-shaped channels.
3. The apparatus of claim 1 wherein said c-shaped channels extend diagonally across a longitudinal axis of the rigid member.
4. The apparatus of claim 1 wherein said c-shaped channel are formed of a pair of opposed flanges and a web portion therebetweent.
5. The apparatus of claim 1 wherein said c-shaped channels include at least one fastener bore sized to pass a fastener therethrough so as to secure the c-shaped channel to the structural member.
6. The apparatus of claim 1 wherein said at least one of the flanges includes a perpendicular connecting tab extending from an edge thereof away from the c-shaped channels.
7. The apparatus of claim 1 wherein said first and second sockets are rigidly affixed to the rigid member.
8. The apparatus of claim 1 wherein said first and second sockets are integrally formed with the rigid member.
9. The apparatus of claim 1 wherein said rigid member and the first and second caps are formed of metal.
10. The apparatus of claim 1 wherein said rigid member comprises an elongate beam.
11. The apparatus of claim 1 wherein said beam is selected from the group consisting of a tube, a bar, a box section, an I-beam, a c-shaped channel, an L-shaped channel and a triangular cross section beam.
12. The apparatus of claim 1 wherein said rigid member extends diagonally across said plurality of parallel spaced apart structural members.
13. The apparatus of claim 1 wherein said rigid member extends across corresponding edges of the plurality of parallel spaced apart structural members.
14. The apparatus of claim 1 wherein said rigid member may comprise first and second portions angularly oriented relative to each other.