Wall to Overhead Structure Bracket Assembly and Method

The invention relates to a wall to overhead structure bracket assembly for providing positive connection there between in buildings and to a method of installation. The invention is directed particularly but not solely towards connection to walls to overhead structures but to any upright structures to overhead structures to provide structural integrity to a building in response to any extreme events.

Background of Invention

Connections of the top of a partition or wall structure to a overhead structure like for example a roof structure can be very important in seismic events or any event where the building is subject to external forces beyond normal day to day use. It is desirable from a point of view of reducing injury or loss of life, to enable any building to hold together for as long as possible to not collapse straight away on top of people and to allow safe evacuation.

Some existing methods of connecting the roof structure to a wall partition usually involve simply attaching fasteners like nails or bolts through the ceiling or roof structure to the top of a wall partition. Attaching such fasteners is awkward and not very effective in providing good positive fastening to both structures. Yet other methods involve cutting existing bracing structures to attach to walls and roof structures for different angles or distances which in it self can cause structural weakness to the bracing structure.

All references, including any patents or patent applications cited in this specification are hereby incorporated by reference. No admission is made that any reference constitutes prior art. The discussion of the references states what their authors assert, and the applicants reserve the right to challenge the accuracy and pertinency of the cited documents. It will be clearly understood that, although a number of prior art publications may be referred to herein; this reference does not constitute an admission that any of these documents form part of the common general knowledge in the art, in New Zealand or in any other country.

Object of the Invention

It is an object of the invention to provide a wall to overhead structure bracket assembly and method of installation that ameliorates some of the disadvantages and limitations of the known art or at least provide the public with a useful choice.

Summary of Invention

In a **first aspect** the invention may broadly be said to reside in a wall to overhead structure bracket assembly comprising a bracket, bearing member, sleeve member, overhead fixing members being interconnected together wherein one end of the bracket is connectable to the overhead fixing members to the overhead structure and the other end of the bracket is connectable to the top plate member of a wall with the bearing member and sleeve member being located and connected between the bracket and the top plate member such that the bracket rests on the bearing member which then rests on the sleeve member which when in use rests on the top plate member, being adapted to provide structural integrity between the wall and overhead structure and to not be connected to a ceiling structure.

Preferably the bracket is a truncated V shape in cross section.

Preferably, the sleeve member spaces the bearing member from the top plate member.

Preferably there is at least one fastener which can applied from the top to connect to the top plate member to hold and connect in between, a bracket, bearing member, washer, and sleeve member.

Alternatively there are upper and lower fasteners whereby the upper fastener connects the bracket to the bearing member and sleeve member, and the lower fastener connects the sleeve member to the top plate member.

Preferably the sleeve member is an elongate member having a length with ends and width wherein the width is selected to be less than a diameter of a hole made through the ceiling tile but greater than the diameter of a hole through the top plate member wherein the sleeve

member is hollow having an internal thread to allow the upper and lower fasteners to connect therein at each end.

Preferably the overhead fixing members are connected to link members which are connected to the bracket wherein the link members are elongate members having a length and width and the overhead fixing members have a foot portion and angled portion wherein the foot portion is afixable to the overhead structure and the angled portion is attachable to the link member.

Preferably the link member includes adjustment means to allow the length of link member to be varied.

Preferably the assembly includes two overhead fixing members and two link members.

Preferably the link member has shaped selected from a solid timber member, angle member or box section.

Preferably the upper and lower fastening means include bolt members

Preferably the bracket and overhead fixing members are formed of elongate plate like members.

In a **second aspect** the invention may broadly be said to reside in a method of installing a wall to overhead structure bracket assembly as disclosed in the first aspect, comprising the following steps of:

- drilling hole in ceiling tile 13 of one diameter and another hole of a smaller diameter in top plate member 7 to ensure the assembly does not contact a ceiling structure;
- upwardly inserting lower fastener 24 with spring washer 22 to protrude there from the ceiling tile 13;
- sliding down sleeve member 20 onto top of top plate member 7;
- screw lower fastener 24 into sleeve member 20;
- sliding upper fastener 15 downwardly through middle portion 27 of bracket 16;

- upwardly sliding bearing member 18 to fastener to abut underside of middle portion 27;
- upwardly sliding washer 19 onto upper fastener 15 abutting the bearing member 18;
- screw upper fastener 15 downwardly into protruding end of sleeve member 20;
- drilling and fastening foot 29 of overhead fixing members 26 to overhead structure 2
- attaching link member 27 to angled portion 30 and to wing members 28.

In a **third aspect** the invention may broadly be said to reside in a method of installing a wall to overhead structure bracket assembly as disclosed in the first aspect, comprising the following steps of:

- drill hole in ceiling tile 13 of one diameter and another hole of a smaller diameter in top plate member 7 to ensure the assembly does not contact a ceiling structure 10;
- arrange sleeve member 20 downwardly into the one diameter, followed by washer 19, followed by bearing member 18 followed by the bracket 16;
- insert and screw, a screw downwardly to attach to top plate member 7;
- drill and fasten foot 29 of overhead fixing members 26 to overhead structure 2
- attach link member 27 to angled portion 30 and to wing members 28.

Brief Description

The invention will now be described, by way of example only, by reference to the accompanying drawings:

Figure 1 is a side view of the wall to overhead structure bracket assembly in accordance with a first preferred embodiment of the invention.
Figure 2 is a close up perspective view of one end of the bracket of figure 1.
Figure 3 is a perspective view of a lower portion of the bracket of figure 1.
Figure 4 is a cross sectional side view of the bracket of figure 3
Figure 5 is an exploded perspective view of the parts of the bracket of figure 3
Figure 6 is a side view of the parts of the bracket of figure 5.

Description of Drawings

The following description will describe the invention in relation to preferred embodiments of the invention, namely a wall to overhead structure bracket assembly 1 and method of installation. The invention is in no way limited to these preferred embodiments as they are purely to exemplify the invention only and that possible variations and modifications would be readily apparent without departing from the scope of the invention. The assembly 1 is arranged and constructed to connect and be supported by a wall structure such as a partition rather than a ceiling structure.

As shown in figures 1-6 wall to ceiling bracket assembly 1 is adapted to be removably affixed between and to, an overhead structure 2 and wall structure 3 to provide structural integrity there between especially if the building, wall and overhead structure is meant to stay together for a limited period in a limited capacity in response to an extreme even like storms or earthquakes and not to be connected to a ceiling structure. As seen in figure 1 the overhead structure 2 which can be for example a substantially horizontally oriented member comprising a floor or roof slab which includes a lower surface 4 facing a top of the wall structure 3. Wall structure 3 can be for example a partition wall comprising a horizontally mounted top plate member 7 with vertical dry wall facing panel members 8. Typically a ceiling 10 is suspended from the lower surface 4 to rest on top of an outer or top surface 12 of top plate members 7. Ceiling 10 comprises abutting panels or tiles 13 which are located and or affixed to outside surface 9 of the top plate member 7.

Wall to overhead structure bracket assembly 1 as seen in figures 3-6 includes but is not limited to the following components of: an upper fastening means in the form of upper fastener 15, a bracket member16, bearing member 18, washer member 19, sleeve member 20, spring washer 22, lower fastening means 24 in the form of a lower fastener 24. Figures 1 and 2 show further components of the assembly 1, which include overhead fixing members 26 and link members 27.

Upper and lower fasteners 15 and 24, for example can be threaded bolts which are adapted to threadingly engage with sleeve 2. Sleeve member 20 is tubular having a length with ends, with an internal thread, having the ends adapted to receive the upper and lower fasteners 15

& 24. Bracket member 16 is shaped from plate like strip member formed as a truncated V shape in cross section having a middle horizontal portion 27 with outwardly splayed wing portions 28 on each side of middle horizontal portion 27.

Bearing member 18 is cylindrically shaped with a certain diameter, which is formed of a flexible resilient material like for example rubber to allow the middle portion of the bracket member to bear and be cushioned somewhat thereon.

Overhead fixing members 26 are shaped having a foot portion 29 being horizontal in orientation when in use, leading to an angled portion 30. Link members 27 are each shaped as elongate members having ends which need to structurally interconnected overhead fixing members 26 to the bracket member 16. One end is adapted to be removably connected to one angled portion 30 and the other end, to one wing portion 28. Each foot portion 29 is adapted to be affixed to lower surface 4 of overhead structure 2. In this example a fastener such as a bolt 31 is can be used to fasten the foot portion 29 to the overhead structure 2.

As shown in the figures, upper fastener means 15 is located from the top, through an aperture in the middle portion 27 of bracket member 16. Underneath middle portion 27 bearing member 18 rests directly on washer member 19 which is smaller in diameter that the diameter of bearing member 18. Underneath washer 19 the sleeve member 20 is located. In this example the diameter of washer 19 is greater than a diameter of sleeve member 20. Underneath the sleeve member 20 but underneath a lower surface of the top plate member 7, there is spring washer 22 followed by lower fastener 24. In this example spring washer 22 is of smaller diameter than washer 19.

As shown in figure 4 for the assembly to be attached to top plate member 7, there needs to be an aperture drilled into the top plate member 7 having a diameter larger than sleeve member 20 forming a peripheral gap 35 there between. This gap 35 is designed to keep the assembly 1 separate from a ceiling structure or ceiling tiles 13. This means that the assembly 1 is affixed or connected only to the top plate member and not the ceiling structure or tiles. A lower end of sleeve member 20 rests on the top of the top plate member 7 with lower fastening means 24 located underneath the top plate to upwardly protrude there through and threadingly into a lower end of sleeve member 20. The length 19 of sleeve member 20 is

selected to be greater (eg 28mm) than the thickness of ceiling tiles 13 thereby spacing or keeping the bearing member 18 and washer 19 spaced above the top surface of the ceiling tiles 13.

Overhead fixing members 26 can have at least one aperture for fixing or several apertures 26a to allow multiple fixing into lower surface 4 or to allow for different distances between overhead structure 2 to the partition or for differences in levels of the lower surface and partition.

One Method of installation

- drill hole in ceiling tile 13 of one diameter and another hole of a smaller diameter in top plate member 7 to ensure the assembly does not contact a ceiling structure;
- upwardly insert lower fastener 24 with spring washer 22 to protrude there from the ceiling tile 13;
- slide down sleeve member 20 onto top of top plate member 7;
- screw lower fastener 24 into sleeve member 20;
- slide other fastener 15 downwardly through middle portion 27 of bracket 16;
- upwardly slide bearing member 18 to fastener to abut underside of middle portion 27;
- upwardly slide washer 19 onto the upper fastener 15 abutting the bearing member 18;
- screw upper fastening means 15 downwardly into protruding end of sleeve member 20;
- drill and fasten foot 29 of overhead fixing members 26 to overhead structure 2
- attach link member 27 to angled portion 30 and to wing members 28.

Variations to this method are also possible such as for example, firstly assembling the bracket 16 with upper fastener 15, bearing member 18, washer 19 and sleeve member 20 before upwardly screwing the lower fastener 24 with its washer 22. Additionally the method may include removing or not installing one wall lining 8 or at least part thereof, to gain access to underneath the top plate member 7 to allow for screwing a bolt/lower fastener 24 upwardly.

Second method of installation

For a retrofit situation or even a new build, instead of upper and lower fasteners 15 & 24, one can use just one fastener applied from the top by first drilling down and then screwing in a screw rather than a bolt to self fasten the assembly 1 (eg the bracket, bearing member, sleeve member and washers to the top plate member 7. For example following is such a method including the following steps of:

- drill hole in ceiling tile 13 of one diameter and another hole of a smaller diameter in top plate member 7 to ensure the assembly does not contact a ceiling structure 10;
- arrange sleeve member 20 downwardly into the one diameter, followed by washer 19, followed by bearing member 18 followed by the bracket 16;
- insert and screw, a screw downwardly to attach to top plate member 7;
- drill and fasten foot 29 of overhead fixing members 26 to overhead structure 2
- attach link member 27 to angled portion 30 and to wing members 28.

Advantages

a) Modest cost
b) Easy to install
c) Able to be adjusted
d) Simple manufacture
e) Robust construction
f) Can be torque adjusted
g) Can be adapted for many different situations
h) Can be retro-fitted or put in during construction
i) No connection or support to or from a ceiling structure
j) Can provide positive connection between wall structure and roof structure
k) Can be designed to meet certain load or structural characteristics
l) Assists in keeping wall and ceiling together during extreme events

Variations

Throughout the description of this specification, the word "comprise" and variations of that word such as "comprising" and "comprises", are not intended to exclude other additives, components, integers or steps. The words "upper" and "lower" prefixing the fasteners are merely labels to indicate their in use positions and are not strictly necessary. Equally they can be called first and second. The washers 19 and 22 can be selected of any suitable size and can be as shown in the drawings as just one washer for each though any number of washers is possible.

Bearing members 18 like the sleeve members 20 can be of any shape or length. For example bearing member 18 can be circular or square shaped of a material (eg rubber or some special plastic or possibly a biasing means like a spring) type to at least provide adequate bearing or cushioning for the load from above down to the partition. Sleeve member 20 can be for example circular or hexagonal in cross sectional shape.

Middle portion 27 can be for example 40mm in length 36 and wing portions 28, can be 70mm long 37 and angled 38 at 45 degrees with respect to a substantially horizontal in use plane. The angle portion 30 of overhead fixing members 26 can be angled with respect horizontal foot portion 29 to a similar angle 39 to that of the wing portion 28.

Link members 27 can be of any suitable cross section and length such as for example timber 4x2'', box section, or angle etc, having means to allow connection to the overhead fixing members 26 and bracket 16 eg screws bolts or rivets or welding. Additionally link members 27 can be formed as or including means to allow adjustment or extension means. For example adjustment can include telescoping members and/or slotted members to allow appropriate extension if required.

It is acknowledged that the term 'comprise' may, under varying jurisdictions, be attributed with either an exclusive or an inclusive meaning. For the purpose of this specification, and unless otherwise noted, the term 'comprise' shall have an inclusive meaning - i.e. that it will be taken to mean an inclusion of not only the listed components it directly references, but also other non-specified components or elements. This rationale will also be used when the

term 'comprised' or 'comprising' is used in relation to one or more steps in a method or process.

It will of course be realised that while the foregoing has been given by way of illustrative example of this invention, all such and other modifications and variations thereto as would be apparent to persons skilled in the art are deemed to fall within the broad scope and ambit of this invention as is hereinbefore described.

What we claim is:

Claim 1: A wall to overhead structure bracket assembly comprising a bracket, bearing member, sleeve member, overhead fixing members being interconnected together wherein one end of the bracket is connectable to the overhead fixing members to the overhead structure and the other end of the bracket is connectable to the top plate member of a wall with the bearing member and sleeve member being located and connected between the bracket and the top plate member such that the bracket rests on the bearing member which then rests on the sleeve member which when in use rests on the top plate member, being adapted to provide structural integrity between the wall and overhead structure and to not be connected to a ceiling structure.

Claim 2: A method of installing a wall to overhead structure bracket assembly as disclosed in the claim 1, comprising the following steps of:

- drilling hole in ceiling tile 13 of one diameter and another hole of a smaller diameter in top plate member 7 to ensure that the assembly does not contact a ceiling structure;
- upwardly inserting lower fastener 24 with spring washer 22 to protrude there from the ceiling tile 13;
- sliding down sleeve member 20 onto top of top plate member 7;
- screw lower fastener 24 into sleeve member 20;
- sliding upper fastener 15 downwardly through middle portion 27 of bracket 16;
- upwardly sliding bearing member 18 to fastener to abut underside of middle portion 27;
- upwardly sliding washer 19 onto upper fastener 15 abutting the bearing member 18;
- screw upper fastener 15 downwardly into protruding end of sleeve member 20;
- drilling and fastening foot 29 of overhead fixing members 26 to overhead structure 2
- attaching link member 27 to angled portion 30 and to wing members 28.

Claim 3: A method of installing a wall to overhead structure bracket assembly as disclosed in the claim 1, comprising the following steps of:

- drill hole in ceiling tile 13 of one diameter and another hole of a smaller diameter in top plate member 7 to ensure the assembly does not contact a ceiling structure 10;
- arrange sleeve member 20 downwardly into the one diameter, followed by washer 19, followed by bearing member 18 followed by the bracket 16;
- insert and screw, a screw downwardly to attach to top plate member 7;
- drill and fasten foot 29 of overhead fixing members 26 to overhead structure 2
- attach link member 27 to angled portion 30 and to wing members 28.

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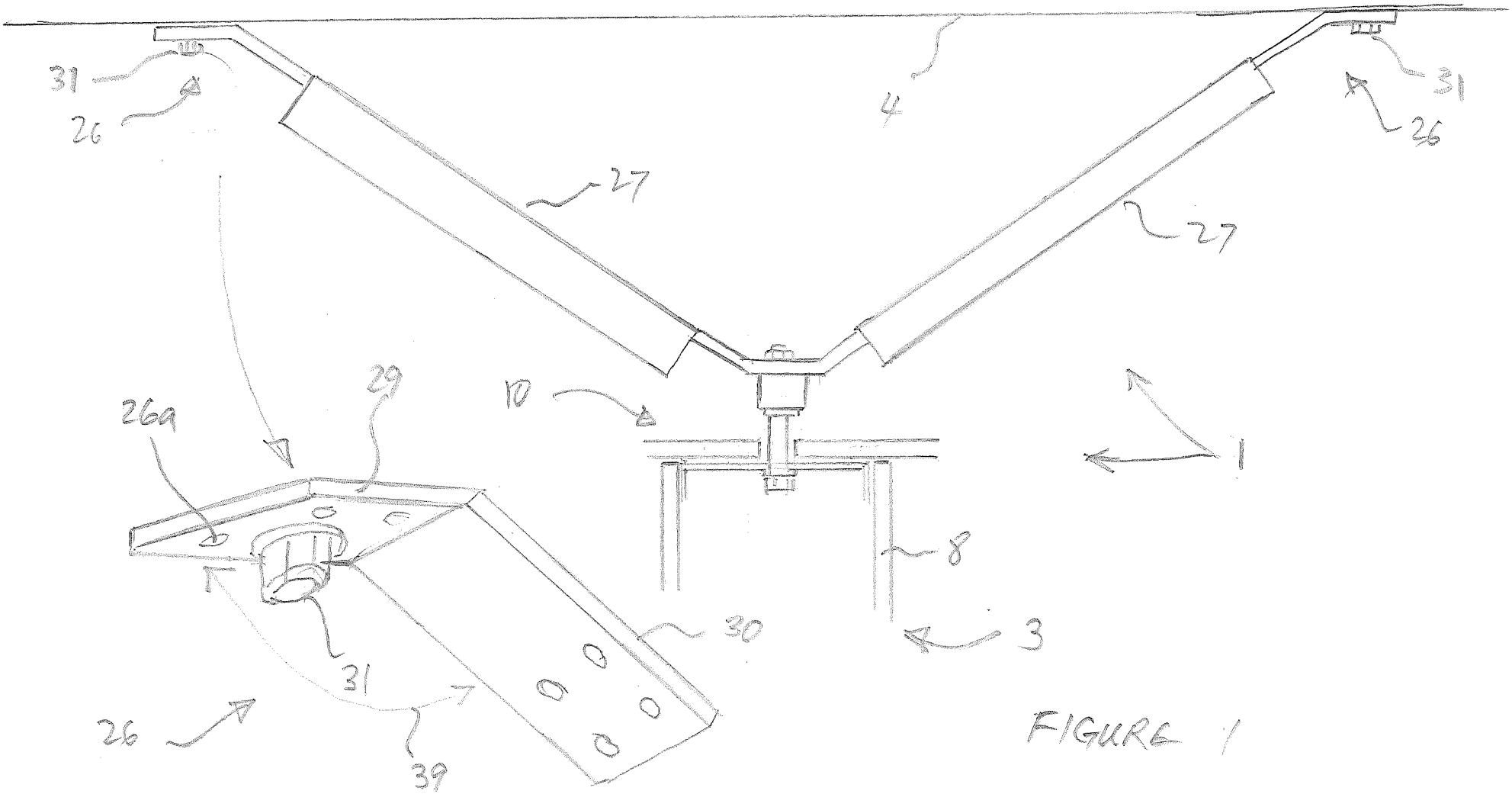

FIGURE 1

FIGURE 2

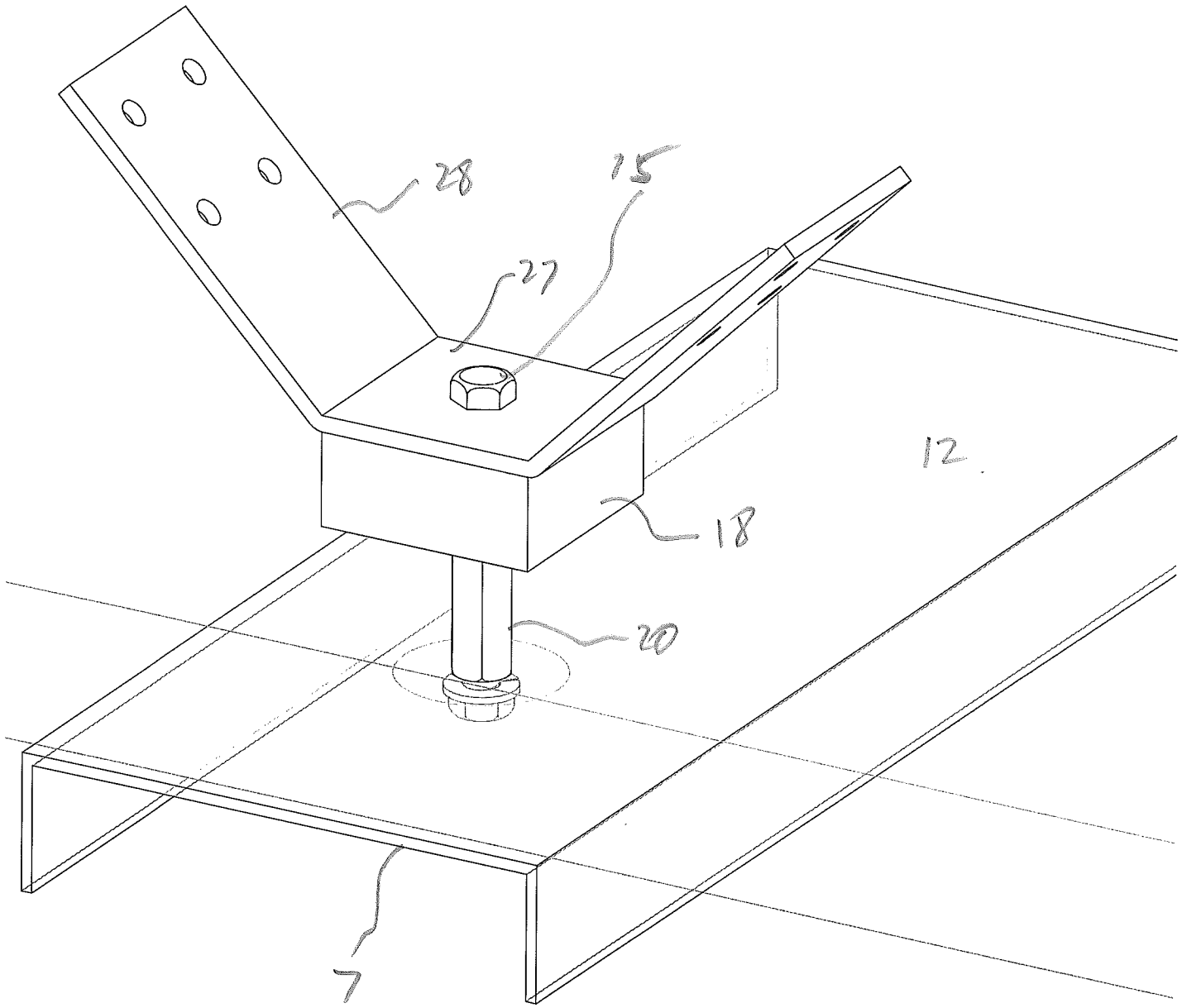

FIGURE 3

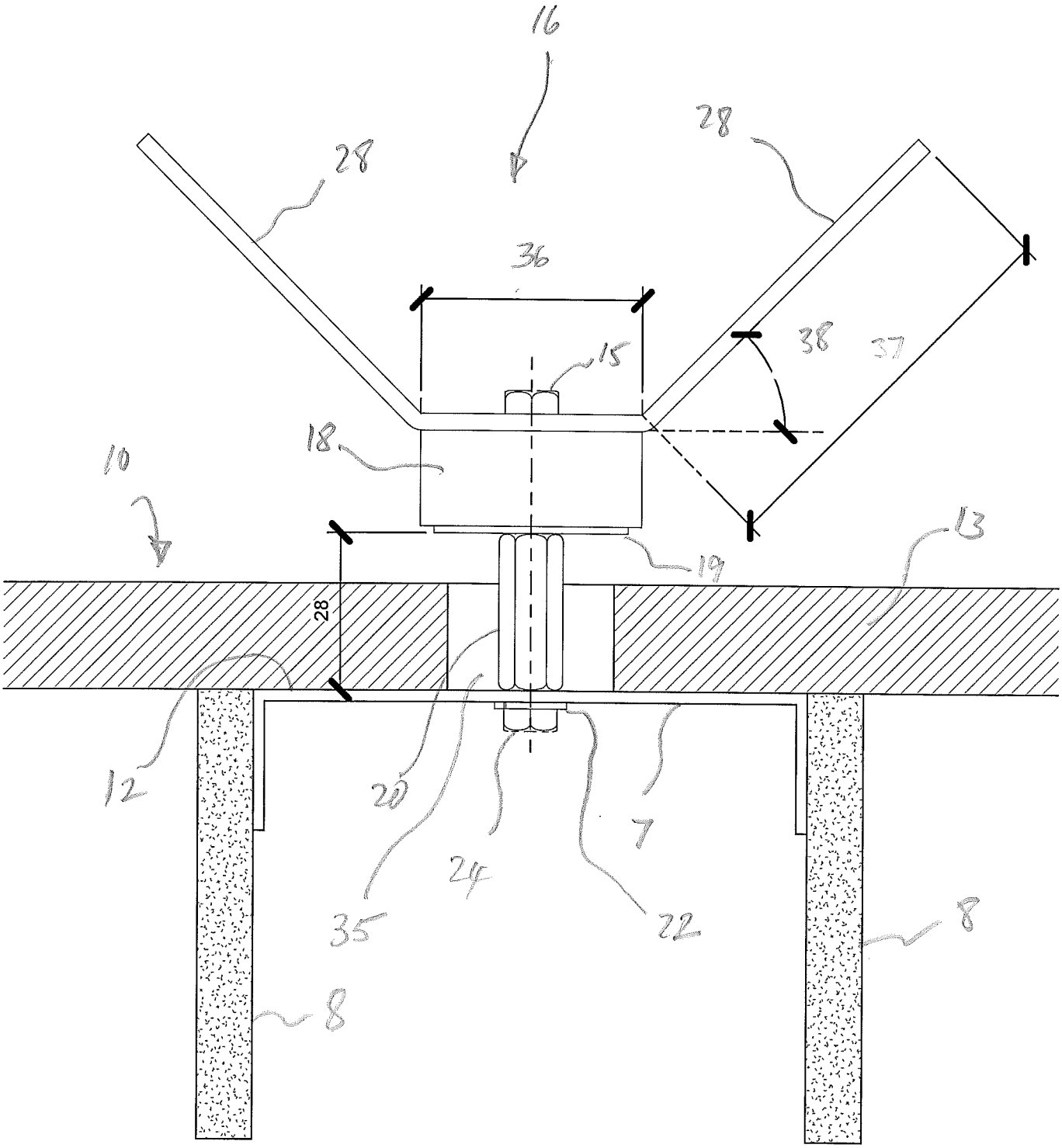

FIGURE 4

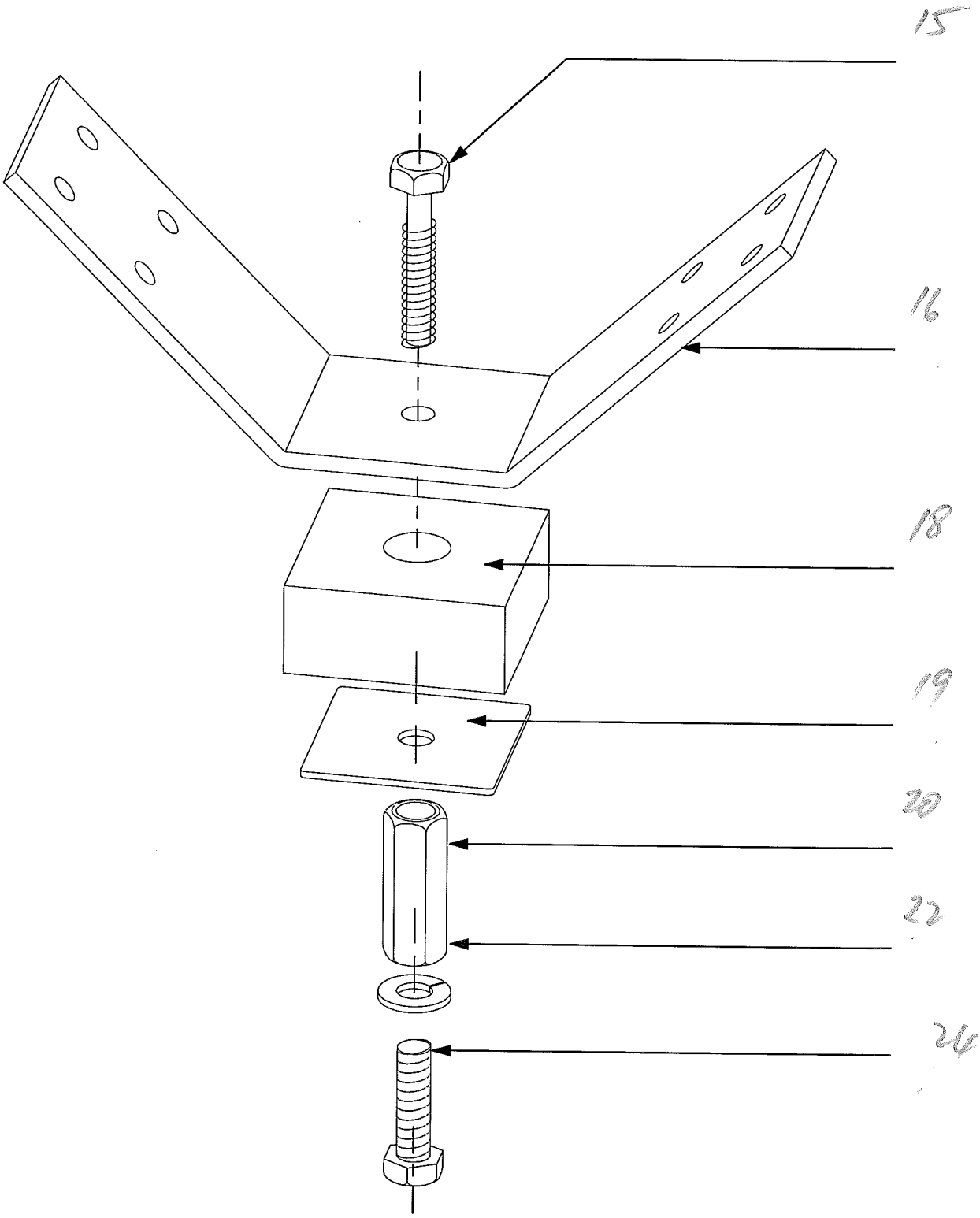

FIGURE 5

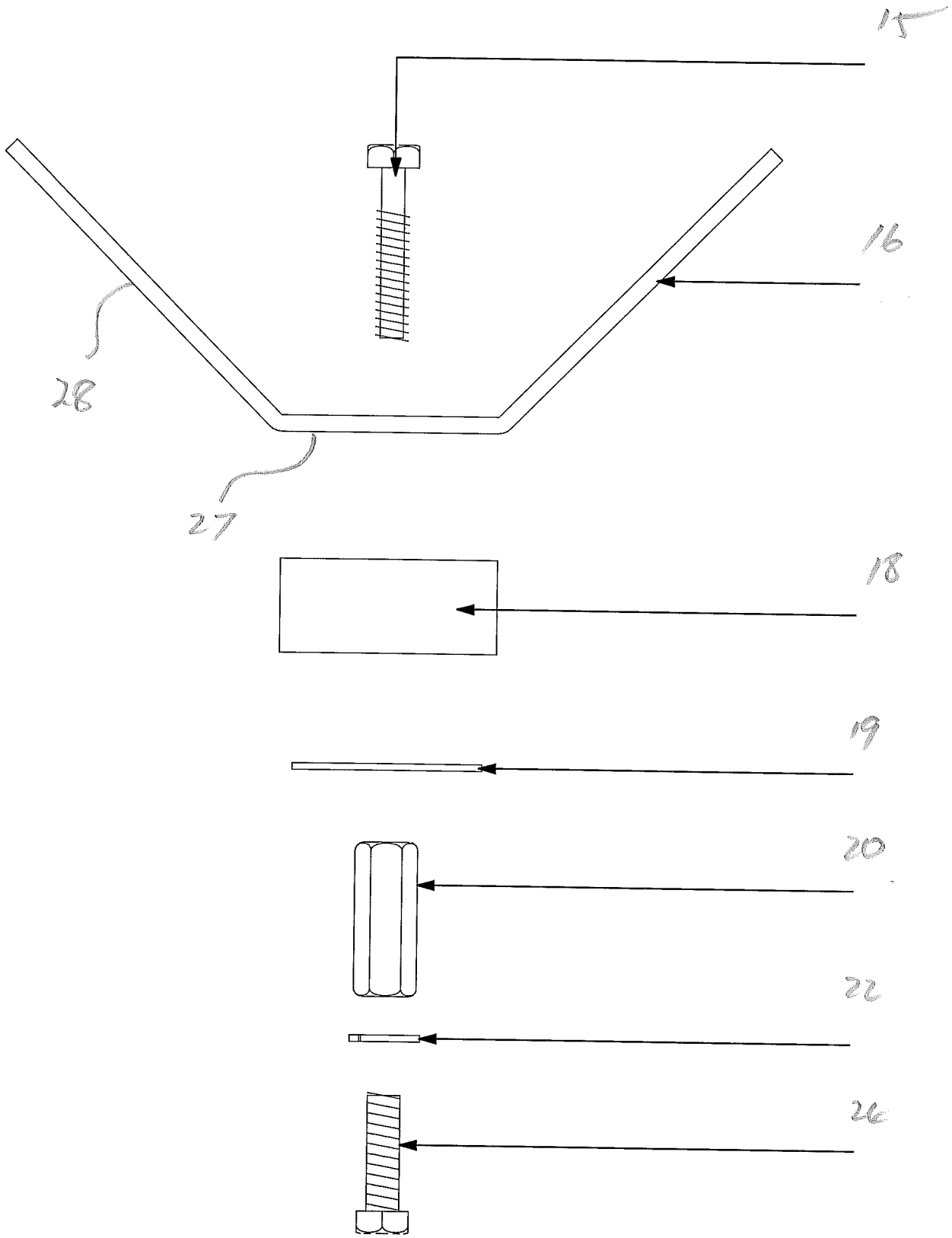

FIGURE 6