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(54) **FITTINGS FOR METAL FRAMING**

Related U.S. Application Data

(75) **Inventor: Charles O. Nehls, Allen Park, MI (US)**

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Correspondence Address:
TYCO INTERNATIONAL
9 ROSZEL ROAD
PRINCETON, NJ 08540 (US)

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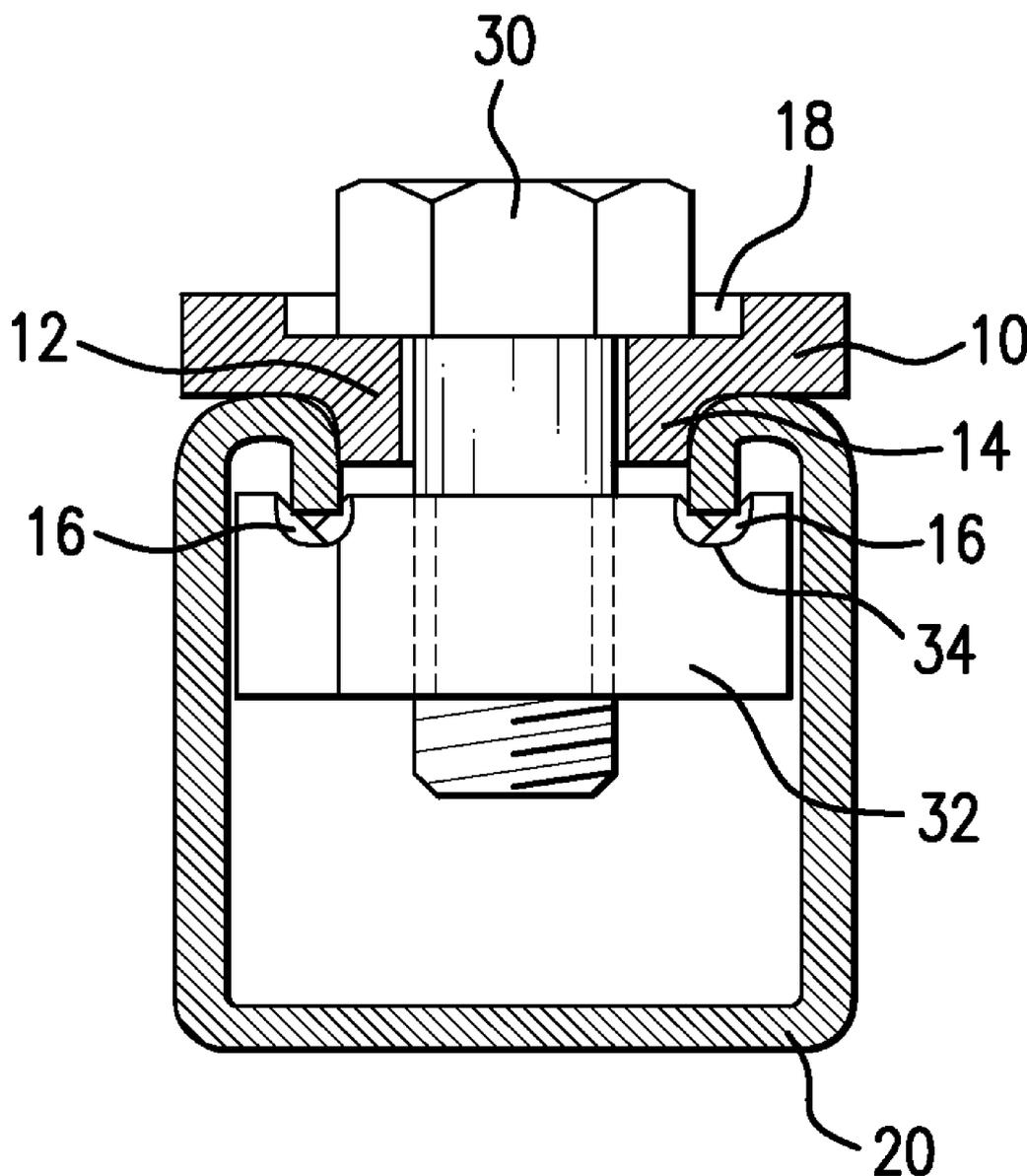
(73) **Assignee: UNISTRUT INTERNATIONAL CORPORATION, Wayne, MI (US)**

(57) **ABSTRACT**

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A metal framing fitting has protrusions along its length and an attaching mechanism to secure the protrusion within a channel member of a strut.

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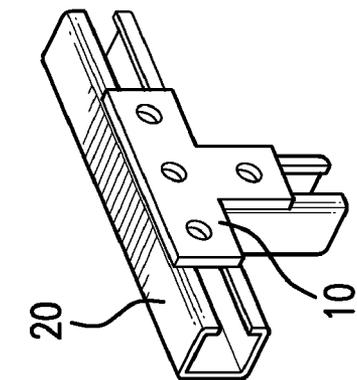


FIG. 1A

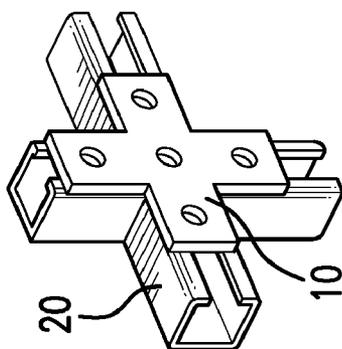


FIG. 1B

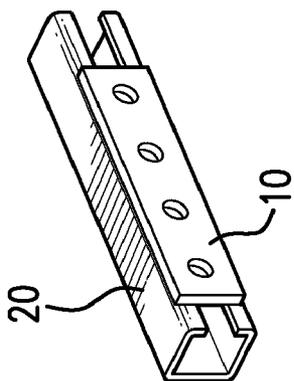


FIG. 1C

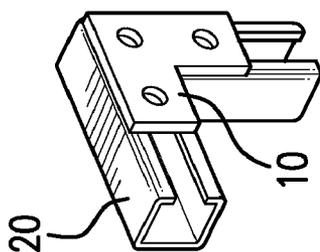


FIG. 1D

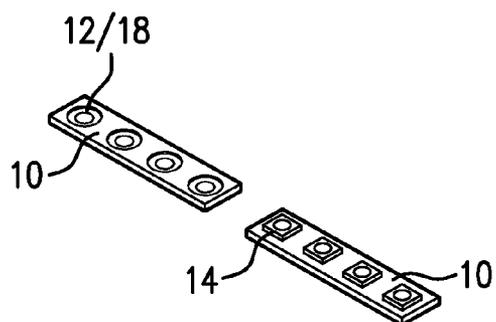


FIG. 2

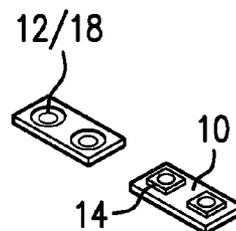


FIG. 2A

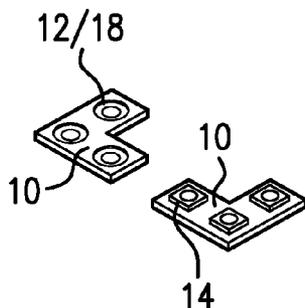


FIG. 2B

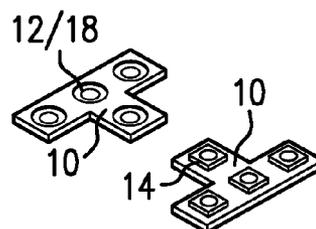


FIG. 2C

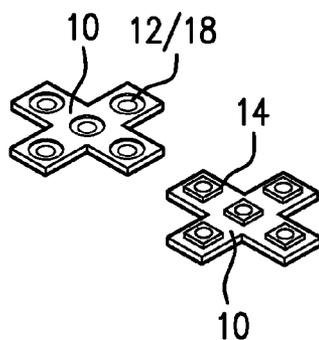


FIG. 2D

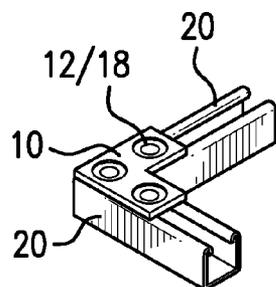


FIG. 3A

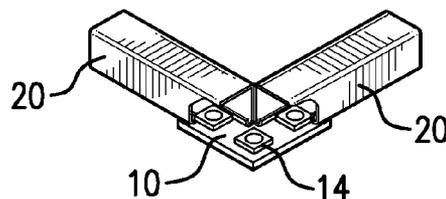


FIG. 3B

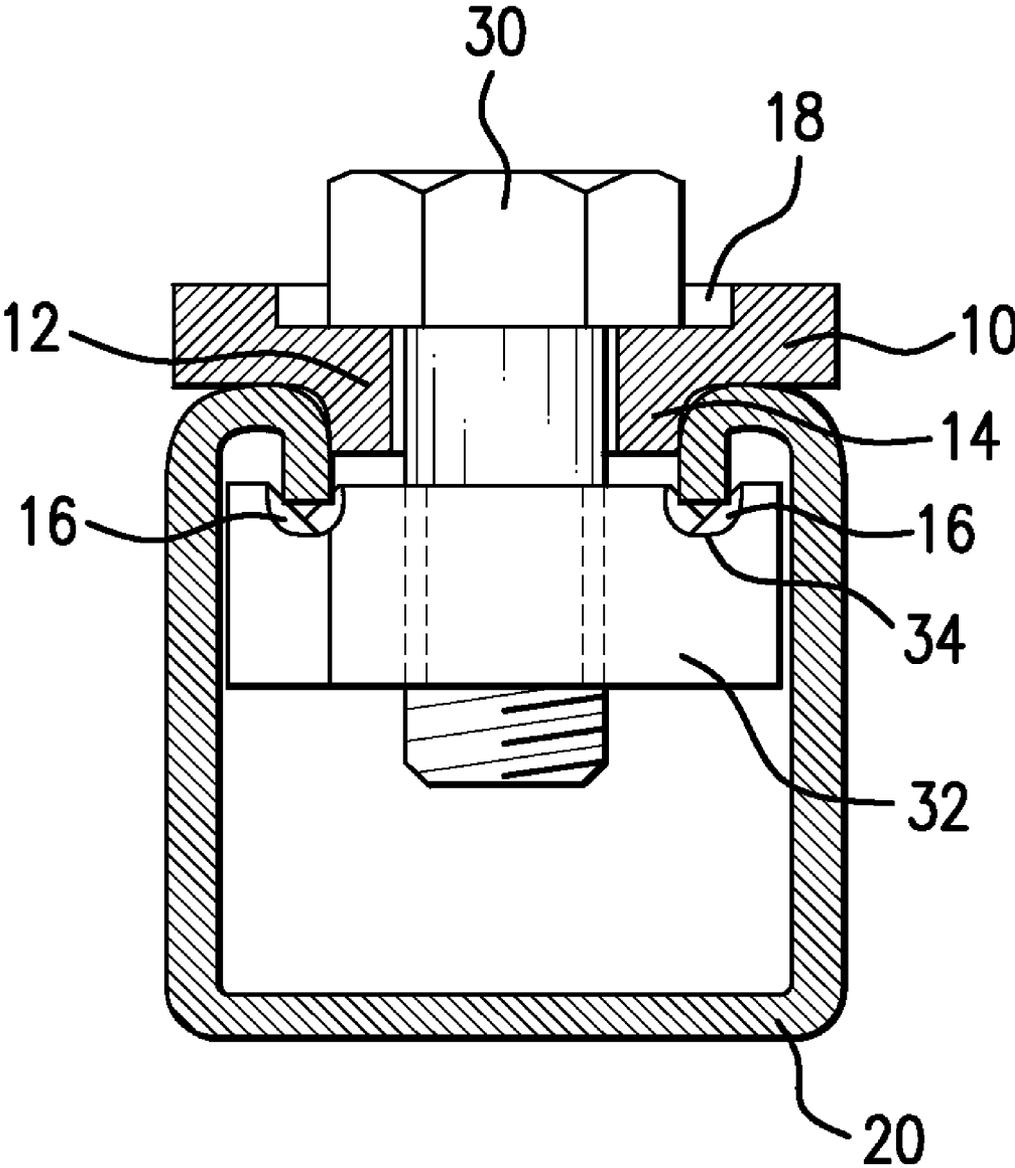


FIG.4

FITTINGS FOR METAL FRAMING

BACKGROUND OF THE INVENTION

[0001] The present disclosure relates generally to a metal framing fitting for fixing strut framing members together into a unified structure.

SUMMARY OF THE INVENTION

[0002] The present invention includes a metal framing fitting having a metal strip having a linear dimension, one or more protrusions along the linear dimension of the metal strip and an attaching mechanism effective for fixing the at least two protrusions within a channel member of a strut.

[0003] The present invention also includes a metal framing structure having a first strut member having a channel therein, a second strut member having a channel therein, the second strut member aligned relative to the first strut member, a metal framing fitting having at least two protrusion along the linear dimension and an attaching mechanism fixing the at least two protrusions within the channels of the first and second strut members.

BRIEF DESCRIPTION OF THE DRAWINGS

[0004] FIGS. 1A-1D are illustrations of the flat metal fittings of the present invention shown supporting various strut configurations;

[0005] FIGS. 2A-2D illustrate protrusions that are formed into the metal framing fittings of the present invention;

[0006] FIGS. 3A and 3B show the orientation of the metal framing fittings, and the protrusions therein, aligned with strut members; and,

[0007] FIG. 4 illustrates the insertion of a screw holding member to lock the metal framing fitting against a strut member to secure it thereto.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0008] The present includes a flat metal fitting for connecting units of metal framing together. These flat metal fittings are used to join strut framing components into a combined structure. The fittings generally connect the strut components at 90 degree attitudes or join lengths of strut end-to-end. During the assembly process, maintaining the 90 degree or linear alignment relationships between the strut members requires the assembling tradesmen to employ various hand tools such as squares or other devices.

[0009] Referring to FIG. 1, four representations of the flat metal framing fittings 10 are shown. As seen in FIG. 1, the metal framing fittings 10 include a metal strip having a longitudinal dimension. Referring to FIG. 1A, a ninety degree (90°) angle of metal framing is held together with a single piece of flat metal framing fitting 10. The flat metal framing conforms to the final configuration of the combined pieces of strut 20. Additionally, as seen in FIG. 1B, two straight pieces of strut 20 are combined together to form a singular structure. The flat metal framing in FIG. 1B forms a linear singular solid piece that extends between the two pieces of strut 20. In FIG. 1C, flat metal framing aligns within the connection of multiple sections of strut 20 forming a cross configuration. As seen in FIG. 1C, the flat metal fitting bridges between one or more horizontal and one or more vertical strut 20 pieces to support a combination of the strut 20 components into a singular structure. FIG. 1D shows the flat metal fitting sup-

porting the combination of two strut 20 members in a T-shape with the strut 20 members unified and locked together in a unitary structure.

[0010] The flat metal framing fittings 10 designs are used to connect strut 20 framing components to form a singular structural assembly. In addition to the configurations shown in FIGS. 1A-1D, the flat metal framing fittings 10 may include additional configuration and/or lengths of extensions to marry up and secure lengths of strut 20.

[0011] The metal framing fitting may be used in residential or commercial construction. Representative uses in commercial construction may include ceiling grids. When used to secure ceiling grids, multiple strut 20 members are assembled into a grid system to support HVAC equipment, lighting, power distribution, water distribution, fire protection, etc. The metal framing fittings 10 are used to fix the strut 20 members together in a solid structure that is structurally sufficient to align the strut 20 members into a coherent support structure while imparting sufficient strength into the structure to support objects of significant weight. As such the grids are assembled square and true to properly support and align the equipment and distribution systems. Proper assembly of the struts using the metal framing fittings 10 into an appropriate structure for support of commercial equipment within specific designs of the framed strut 20 members, is determinable by those skilled in the art of strut framing.

[0012] The ease of construction of the support structure is important. Ceiling heights, particularly within commercial building, create assembly challenges for tradesmen. Working at high elevations requires tradesmen to wear fall-protection devices that limit movement that complicates the grid assembly process. The necessity of verifying true assembly of fittings with separate hand tools adds labor and cost to projects. Special tools such as laser leveling devices may be employed and frequently fitting assemblies are tightened, loosened and adjusted and retightened several times to achieve perfect alignment of the grid. Generally, the most time consuming process associated with the assembly of a ceiling grid is the alignment and leveling of the grid system.

[0013] The unique design of the metal framing fittings 10 of the present invention resolves the above-identified problems encountered by tradesmen assembling commercial strut 20 support structures. Referring to FIG. 2, during the manufacturing process, a protrusion, such as 7/8" square protrusion, is formed on one side of the flat metal framing fitting 10, also referred to as a plate fitting, within a given design of the metal framing fittings 10. Additionally, openings or holes 12 may be formed within the metal framing fittings 10. As seen in the multiple examples of FIG. 2, two or more protrusions 14 may be formed into a single piece. For example, the flat linear metal framing fitting 10, shown in FIG. 2A, show a top view and bottom view of both four (4) and two (2) protrusions 14 within individual metal framing fittings 10. The top view shows a circular opening 12 for an attaching mechanism 30, such as a bolt, and the bottom view show the protrusions 14 extending from the longitudinal plane of the metal framing fittings 10 in a square configuration. In FIG. 2B, a metal framing fitting forming a ninety degree (90°) angle is shown with three (3) protrusions 14. Like the protrusions 14 shown in FIG. 2A, the protrusions 14 in FIG. 2B show a top view of circular openings for receiving a bolt, and a bottom view of the metal framing fitting showing the protrusions 14 in a square configuration on the opposite side of the metal framing fitting from the circular top openings. As seen in all of FIG. 2,

the openings preferably extend through the metal framing fittings 10 within the protrusions 14. As seen in FIG. 2C, four (4) protrusions 14 are formed within a metal framing fitting forming a T-shape. FIG. 2D shows the flat metal framing fittings 10 having four (4) protrusions 14 within a design of a cross configuration. As further described below, these protrusions 14 engage the continuous slot of the strut 20 member, also shown in FIG. 3, and securely orients the metal framing fitting in proper aligns, e.g., at a ninety degree attitude or in linear alignment with the strut 20 members being joined. This feature ensures that proper relationships are maintained, without the need for special tools and secondary checks of the assembly.

[0014] Representative dimensions of the protrusion 14 include a 7/8" square protrusion 14 and other like dimensions appropriate for a given size and shape of a strut 20 member. The material used to form the 7/8" square protrusion 14 extending from the back of the fitting 10 may be displaced from a circular recess 18 stamped on the face of the fitting 10. The diameter of this circle is sized to accommodate the outside diameter of the socket typically used in the assembly process. This recess acts as a guide to aid the tradesman in aligning the tradesman's tools for the fast assembly of a connection. In an alternative embodiment, a singular protrusion 14 may extend along the length of the metal framing fitting 10.

[0015] Referring to FIGS. 3A and 3B, the orientation of the metal framing fittings 10, and the protrusions 14 therein, are shown aligned with perpendicular strut 20 members. These metal framing fittings 10 are preferably used with one or the other strut 20 members crossing the top of the other strut 20 member. In the cut away view of FIG. 3B, the protrusions 14 of the metal framing fittings 10 are shown in relation to the channel within the strut 20 member.

[0016] FIG. 4 illustrates a cross-sectional view of the metal framing fitting inserted into the channel of a strut 20 member. With the metal framing fitting 10 fix across the outside of the channel area, protrusions 14 formed within the metal framing fitting 10 are located within the channel. The insertion of a bolt 30, or other fastening device, through the formed holes 12 is used to lock the metal framing fitting 10 against a strut 20 member to secure it thereto. Indentations 34 are preferably resident within the nut component 32 of the bolt 30 to engage the end portions 16 of the channel member which further secures the bolt 30 in place. When secured in place, the metal framing fitting 10 provide built-in diagonal bracing, provided by the 7/8" square protrusion 14. As assembly of the metal framing fittings 10 to the strut 20 member is completed, the protrusion 14 within the metal framing fitting securely engages the continuous slot in the face of the channel of the strut 20 member. The screw holding member 30 is used to secure the metal framing fittings 10 against the strut 20 member. As the bolted connection draws the assembly tight, the protrusion 14 provides a strong "key lock" connection, restricting the metal framing fitting from twisting or other lateral movement. An assembly connected with the metal

framing fittings 10 of the present invention generally resists diagonal forces without the need for diagonal bracing. As such, the metal framing fittings 10 of the present invention are particularly beneficial for assemblies and supports located in seismic zones, or for assemblies and supports that may experience other sources of dynamic loading. In cases of dynamic loading, a conventional flat plate fitting connected to the strut 20 with a single bolt connection may tend to loosen over time. This loosening is caused by the flat plate twisting on the face of the strut 20. The "key lock" connection provided by the metal framing fittings 10 of the present invention resists these phenomena by not permitting the fitting to twist.

[0017] Additional uses of the metal framing fittings 10 of the present invention, include for example without limitation, medical support systems, racks and shelving, pipe supports, and other support systems needing structural rigidity. The metal framing fittings 10 provide for a square and true assembly, and resistance to dynamic loads with built in diagonal bracing all without the need for special squaring or alignment tools.

[0018] While certain embodiments of the disclosure have been described herein, it is not intended that the disclosure be limited thereto, as it is intended that the disclosure be as broad in scope as the art will allow and that the specification be read likewise. Therefore, the above description should not be construed as limiting, but merely as exemplifications of particular embodiments. Those skilled in the art will envision other modifications within the scope and spirit of the claims appended hereto.

What is claimed is:

1. A metal framing fitting, comprising:
a metal strip having a linear dimension;
one or more protrusions along the linear dimension of the metal strip; and,
an attaching mechanism effective for fixing the at least two protrusions within a channel member of a strut.
2. The metal framing fitting of claim 1, further comprising holes formed within the metal strip adjacent to the at least two protrusions.
3. The metal framing fitting of claim 1, wherein at least two protrusions are formed within the metal strip.
4. A metal framing structure, comprising:
a first strut member having a channel therein;
a second strut member having a channel therein, the second strut member aligned relative to the first strut member;
a metal framing fitting having at least two protrusion along the linear dimension; and,
an attaching mechanism fixing the at least two protrusions within the channels of the first and second strut members.
5. The metal framing structure of claim 4, wherein the attaching mechanism comprises a bolt.
6. The metal framing structure of claim 5, wherein the bolt comprises a nut having an indentation effective to receive the end portions of the channel of the strut member.

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