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(54) COVER ASSEMBLY FOR THE ANGULAR PORTIONS OF A TUBULAR TRUSS FRAME

(57) A cover assembly (10) for the angular portions of a tubular truss frame is described. The tubular truss frame is preferably of, but not limited to, the so-called "American truss" type and consists of a main truss (F) made of a plurality of tubular elements (T) joining together at the vertices (V) of such main truss (F). The cover assembly (10) comprises at least one first component (12) or clip, which is preferably manufactured with an elastically deformable synthetic material and arranged to be fixed on a respective tubular element (T) at one of the vertices (V) of the main truss frame (F), at least one second component (14) or cover component, which is preferably manufactured with a metal material and arranged to be fixed on one or more first components (12) and at least partially cover a tubular element (T), and at least one third component (16) or angular component, which is preferably manufactured with an elastically deformable synthetic material and arranged to be connected to two or more second components (14) and cover a respective vertex (V) of the main truss (F).

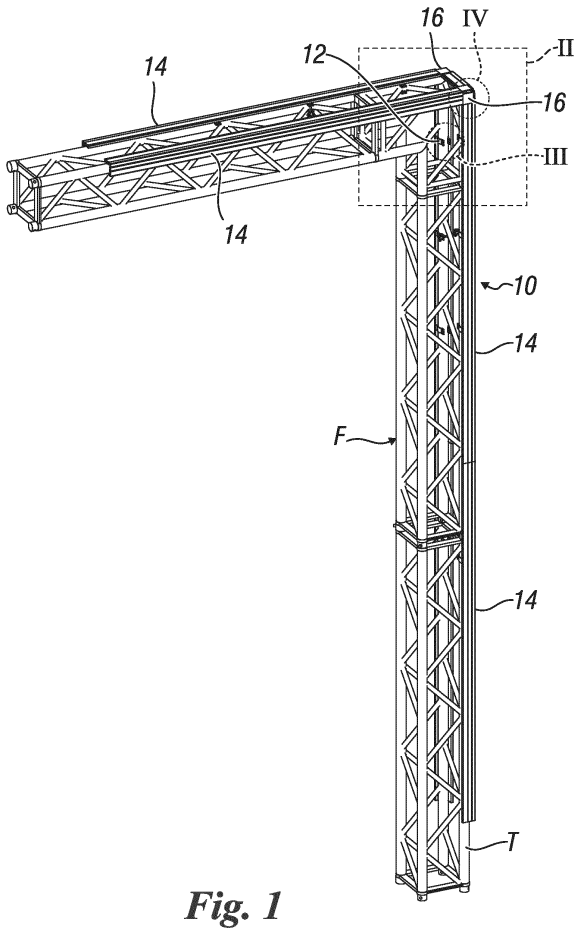

Fig. 1

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Description

[0001] The present invention relates to a cover assembly for the angular portions of a tubular truss frame, in particular but not exclusively a tubular truss frame called "American truss".

[0002] A tubular truss frame of the "American truss" type is a particular structure used in the staging of the performing arts (concerts, theatrical performances, ballets, etc.) that allows the lighting system to be raised above the stage. Acoustic or scenic material, as well as film projection screens, nylon covers, etc. can also be connected to this "American truss".

[0003] Generally, an "American truss" consists of a main truss formed by a plurality of tubular elements, typically made of aluminium. In the most common use, the main truss is rectangular in shape and arranged parallel to the stage. For its being relatively easy to assemble and disassemble, the "American truss", is mainly used for those events that are set up outdoors or in structures which are not usually used for entertainment.

[0004] As shown for example in Figures 1, 2 and 4, a typical "American truss" is provided with sharp edges at the vertices of the respective main truss. As is known, in solid geometry, the "vertex" is referred to as the point at which the edges and faces of a polyhedron meet. As used herein, the "vertex" is referred to as the point at which the tubular elements of the main truss meet at a given angular portion of an "American truss". In the event that screens and/or covers are mounted on the "American truss", the sharp edges at the vertices of the main truss can damage these screens and/or the covers, causing them to tear or rip.

[0005] Currently, before mounting the screens and/or covers, cardboard angular coverings are applied to the vertices of the main truss of an "American truss", in an attempt to reduce the risk of tears or rips of the screens and/or the covers. In addition to being ineffective in achieving this goal, as they are relatively fragile, these cardboard angular covers also require a considerably long time to be shaped and installed on the "American truss".

[0006] An assembly that can be used to connect and cover the angular portions of a tubular frame is disclosed, for example, in document US 2010/192506 A1, on which the preamble of claim 1 is based.

[0007] The object of the present invention is therefore to provide a cover assembly for the angular portions of a tubular truss frame which is capable of solving the aforementioned drawbacks of the prior art in an extremely simple, economical and particularly functional way.

[0008] In detail, it is an object of the present invention to provide a cover assembly which allows the users of tubular truss frames, in particular but not limited to a tubular truss frame of the "American truss" type, to make the angular portions of the tubular truss frame smooth and even, thus making them suitable for being covered with film projection screens, nylon covers, etc.

[0009] This and other objects according to the present invention will be achieved by providing a cover assembly for the angular portions of a tubular truss frame as set forth in claim 1.

[0010] Further features of the invention are highlighted by the dependent claims, which are an integral part of the present description.

[0011] The features and advantages of a cover assembly according to the present invention for covering the angular portions of a tubular truss frame will be clearer from the following exemplifying and hence non-limiting description, referring to the attached schematic drawings in which:

Figure 1 is a perspective view of an angular portion of a tubular truss frame upon which a cover assembly according to the present invention is mounted;
Figure 2 is a detailed view of the detail shown by II in Figure 1;
Figure 3 is a detailed view of the detail shown by III in Figure 1;
Figure 4 is a detailed view of the detail shown by III IV in Figure 1;
Figure 5 is a perspective view of a first component of the cover assembly according to the present invention;
Figure 6 this is a side elevation view of the first component of Figure 5;
Figure 7 is another perspective view of the first component of Figure 5, provided with a respective fastening means;
Figure 8 is a side elevation view of the first component and of the fastening means shown in Figure 7;
Figure 9 is a perspective view of a second component of the cover assembly according to the present invention;
Figure 10 is a side elevation view of the second component of Figure 9;
Figure 11 is a cross-sectional view of the components of Figures 5 to 10, shown in an assembled configuration;
Figure 12 is a perspective view of a third component of the cover assembly according to the present invention;
Figure 13 is a side elevation view of the third component of Figure 12; and
Figure 14 is a side elevation view of a variant of the second component of Figure 9.

[0012] With reference to the figures, a preferred embodiment of a cover assembly according to the present invention for covering the angular portions of a tubular truss frame is shown. The tubular truss frame may be preferably of, but not limited to, the "American truss" type and generally consists of a main truss frame F (see figure 1) made of a plurality of tubular elements T joining together at the vertices V of such main truss F. The main

truss F usually has a rectangular shape, with the tubular elements T joining together at right angles at the vertices V.

[0013] The cover assembly is indicated as a whole with reference number 10. The cover assembly 10 comprises at least one first component 12 or clip (shown in detail in Figures 5 to 8), which is arranged to be fixed on a respective tubular element T at one of the vertices V of the main truss frame F. The cover assembly 10 further comprises at least one second component 14 or cover component (shown in detail in Figures 9 and 10), which is arranged to be fixed on the first component 12 and to at least partially cover a tubular element T. The cover assembly 10 also comprises at least one third component 16 or angular component (shown in detail in Figures 12 and 13), which is arranged to be connected to two or more second components 14 and cover one of the vertices V of the main truss F.

[0014] With reference to Figures 5 to 8, each first component 12 of the cover assembly 10 is clip-shaped and firstly comprises a flexible fastening portion 18 for snap fastening onto a respective tubular element T. As shown in the Figures, this connection portion 18 has an open cross-sectional C-shaped profile. Each first component 12 further comprises a first connection portion 20, which is integrally formed in a single piece with the fastening portion 18 and is arranged in an opposite position relative to the opening of the C-shaped profile. This first connection portion 20 is provided with first sliding connection means 22 for sliding connection with at least one second component 14, as will be better specified below.

[0015] Preferably, each first component 12 is manufactured with an elastically deformable synthetic material. Even more preferably, this elastically deformable synthetic material is made of nylon. Nylon is considered the most suitable material for the manufacture of each first component 12, as it has a relatively high mechanical resistance.

[0016] As shown in Figures 7 and 8, two opposite protruding walls 46, 48 can be obtained on each first component 12, at the opening of the C-shaped profile of the respective flexible fastening portion 18. On each of these two opposite protruding walls 46, 48 a respective slot 50, 52 is provided in which a corresponding fastening means 54, 56 engages to keep said first component 12 fastened onto a respective tubular element T. Preferably, this fastening means 54, 56 can consist of a bolt 54 with a wing nut 56. This fastening means 54, 56 can be useful to prevent the respective first component 12, when fitted around a specific tubular element T of the main truss F, from rotating with respect to the tubular element T when, for example, a screen and/or a cover is pulled over the tubular truss frame.

[0017] With reference to Figures 9 and 10, each second component 14 of the cover assembly 10 is a substantially plate-like component which acts as a cover component and can have any shape suitable for at least partially covering one or more tubular elements T of the main truss F, when connected to one or more first components 12. As shown in Figure 1, each second component 14 may also have a variable length but in any case, suitable for covering a predefined section of the tubular elements T at any angular portion of a tubular truss frame.

[0018] Each second component 14 comprises at least one internal surface 24, 26, on which second sliding connection means 28 are obtained for sliding connection with the first sliding connection means 22 of each first component 12. Preferably, the first sliding connection means 22 of each first component 12 consist of respective linear protuberances, which are integrally formed in a single piece with the first connection portion 20 of each first component 12 and have a double hook or mushroom-like cross-sectional shape, with respective free ends 58, 60 diverging from each other. The second sliding connection means 28 of each second component 14, therefore, consist of respective linear cavities, which are obtained on the internal surface 24, 26 of such second component 14 and have a cross-sectional shape which is compatible with the double hook or mushroom-like cross-sectional shape of the linear protuberances obtained on each first component 12. This interlocking system for interlocking connection by sliding between each first component 12 and each second component 14 is advantageous in that the operators in charge of assembling the cover assembly 10 can assemble such cover assembly 10 in any position on the tubular truss frame, without the need to use specific tools.

[0019] Each second component 14 further comprises at least one external surface 30, 32, which is opposite to the internal surface 24, 26 and is arranged to cover all the first components 12 and the respective tubular element T on which all these first components 12 are fixed. Finally, each second component 14 comprises first engagement means 34, 36 for engagement with at least one third component 16. These first engagement means 34, 36 are obtained on opposite ends of each second component 14, between the external surface 30, 32 thereof and the internal surface 24, 26 thereof.

[0020] Preferably, as shown in Figures 9 and 10, each second component 14 has a cross-sectional L shape, with two distinct internal surfaces 24, 26 orthogonal to each other and two corresponding external surfaces 30, 32 orthogonal to each other. Again preferably, each second component 14 is manufactured with a metal material. Even more preferably this metal material is made of aluminium. Aluminium is considered the most suitable material for the manufacture of each second component 14 because, during the manufacture of such second component 14, the respective external surfaces 30, 32 and internal surfaces 24, 26 always remain flat. Conversely, using a polymeric material (plastic), this material could cool inhomogeneously during the manufacturing phases of the second component 14, generating external and/or internal surfaces that are not perfectly flat ("warped"). Another advantage of aluminium is that

the second component 14 can be manufactured, by extrusion, in the form of bars up to 6 metres in length, which can then be cut and optimised according to requirements. Conversely, using a polymeric material (plastic), it is not normally possible to obtain bars longer than 2 metres each.

[0021] Again with reference to Figures 9 and 10, at least one channel 66, or recess, can be obtained between the two internal surfaces 24, 26 orthogonal to each other of each second component 14, within which parts of the main truss F can be housed when the cover assembly 10 is mounted at an angular portion of the tubular truss frame. In fact, the tubular truss frames of the "American truss" type are usually connected to each other by one or more nails (not shown), which may have variable lengths depending on the brand or type. Consequently, in order to also cover these nails with the cover assembly 10, the channel or recess 66 has been created on each second component 14. The presence of the nail or nails inside the channel or recess 66 also prevents each second component 14, and therefore the entire cover assembly 10, from accidentally rotating with respect to the tubular element T on which it is mounted.

[0022] As shown in Figure 11, at least one seat 62 can be obtained on at least one surface 32 of said two external surfaces 30, 32 of each second component 14 for interlocking or sliding insertion of at least one corresponding fastening base 64 provided with at least one flat surface. On the flat surface of each fastening base 64 pointed fastening means (not shown) can be inserted, by infixing. In fact, a screen and/or a cover can be directly fixed onto this fastening base 64, for example using self-tapping screws, nails, staples, tacks, etc., so that the screen and/or the cover can remain stably mounted on the tubular truss frame.

[0023] According to a variant of the second component 14, shown in Figure 14, the seat 62 can be provided with a grooved central portion 76 having a depth greater than the average depth of the seat 62. This deeper grooved central portion 76 allows for the housing, in the seat 62, of the fastening bases 64 which, again, are provided with at least one flat surface, but have a greater thickness for receiving particularly long pointed fastening means.

[0024] Preferably, each fastening base 64 is manufactured with a deformable material having a hardness which is lower than the hardness of the material with which each second component 14 is manufactured. For example, each fastening base 64 can be made of medium density fibreboard panels, commonly called MDF (medium density fibreboard). MDF is preferable because it is an inexpensive material, but any suitably milled material, such as various types of wood or transparent or opaque polymeric materials, can be used. If transparent polymeric materials are used, for example, the seat 62 of each second component 14 could also be used to house LED lighting elements (not shown), capable of emitting coloured or white light. Again by way of example, another suitable material for the manufacture of each fastening base 64 could be a particular type of polyethylene called "polyzene", which has high impact resistance (even at low temperatures), a low coefficient of friction and excellent non-stick properties.

[0025] With reference to Figures 12 and 13, each third component 16 of the cover assembly 10, or angular component, has a shell shape and comprises at least one cover wall 38, 40, 42, which is arranged to cover a respective vertex V of the main truss F (see detailed view in Figure 4). Each third component 16 further comprises second engagement means 44 for engagement with the first engagement means 34, 36 of a respective second component 14.

[0026] Preferably, the first engagement means 34, 36 of each second component 14 consist of respective holes (see Figure 10). Hence, the second engagement means 44 of each third component 16 consist of pins insertable into such holes. Additional fastening means (not shown), for example screws, can be provided for joining each third component 16 to a respective second component 14.

[0027] As shown in Figures 12 and 13, each third component 16 preferably has the shape of a portion of a three-sided cube, with three cover walls 38, 40, 42 orthogonal to each other, three respective edges 68, 70, 72 and a single vertex 74. This particular shape of each third component 16 allows each single vertex V of the main truss F to be more properly covered when three distinct tubular elements T converge at that vertex V to join at a right angle.

[0028] Preferably, each third component 16 is manufactured with an elastically deformable synthetic material. Even more preferably, this deformable synthetic material is made of nylon. Alternatively, this elastically deformable synthetic material can also be made of polyamide (PA). Given the relatively small size of each third component 16, in addition to the fact that it is a component completing the cover assembly 10, the use of materials obtainable through injection moulds is generally not recommended (while it is instead preferable for the material with which each first component 12 or clip is manufactured); the use of materials that can be easily obtainable through 3D printing is, instead, deemed to be more appropriate for each third component 16.

[0029] It has thus been highlighted that the cover assembly according to the present invention for covering the angular portions of a tubular truss frame achieves the purposes previously highlighted.

[0030] The cover assembly, for covering the angular portions of a tubular truss frame, thus conceived is however susceptible of numerous modifications and variations, all of which falling within the scope of the same inventive concept; furthermore, all the details can be replaced by technically equivalent elements. In practice, the materials used, as well as the shapes and dimensions, may be any according to the technical requirements.

[0031] The scope of protection of the invention is therefore defined by the attached claims.

Claims

1. A cover assembly (10) for the angular portions of a tubular truss frame, wherein the tubular truss frame consists of a main truss (F) made of a plurality of tubular elements (T) joining together at the vertices (V) of said main truss (F), the cover assembly (10) comprising:

    - at least one first component (12), which is arranged to be fixed on a respective tubular element (T) at one of said vertices (V), and
    - at least one second component (14), which is arranged to be fixed on said at least one first component (12) to at least partially cover said tubular element (T),
    wherein each first component (12) comprises:

        - a flexible fastening portion (18) for snap fastening onto a respective tubular element (T), said fastening portion (18) having an open cross-sectional C-shaped profile, and
        - a first connection portion (20), which is integrally formed in a single piece with the fastening portion (18) and is arranged in an opposite position relative to the opening of the C-shaped profile, said first connection portion (20) being provided with first sliding connection means (22),

    wherein each second component (14) is a substantially plate-like component comprising:

        - at least one internal surface (24, 26), and
        - at least one external surface (30, 32), which is opposite to said at least one internal surface (24, 26) and is arranged to cover said at least one first component (12) and the respective tubular element (T) on which said at least one first component (12) is fixed,

    the cover assembly (10) being **characterized in that** it comprises at least one third component (16), which is arranged to be connected to two or more second components (14) and to cover said vertex (V),

        - wherein said first sliding connection means (22) of each first component (12) are arranged for sliding connection with said at least one second component (14),
        - wherein second sliding connection means (28) for sliding connection with the first sliding connection means (22) of said first component (12) are obtained on said at least one internal surface (24, 26) of each second component (14),
        - wherein first engagement means (34, 36) for engagement with said at least one third component (16) are obtained on opposite ends of each second component (14), between said at least one external surface (30, 32) and said at least one internal surface (24, 26), and
        - wherein each third component (16) has a shell shape and comprises:

            - at least one cover wall (38, 40, 42), which is arranged to cover a respective vertex (V) of said main truss (F), and
            - second engagement means (44) for engagement with the first engagement means (34, 36) of said second component (14).

2. The cover assembly (10) according to claim 1, **characterized in that** two opposite protruding walls (46, 48) are obtained on said at least one first component (12), at the opening of the C-shaped profile of the respective flexible fastening portion (18), on each of said two opposite protruding walls (46, 48) a respective slot (50, 52) is provided in which a corresponding fastening means (54, 56) engages to keep said first component (12) fastened onto a respective tubular element (T).

3. The cover assembly (10) according to claim 2, **characterized in that** said fastening means (54, 56) consists of a bolt (54) with a wing nut (56).

4. The cover assembly (10) according to any claims 1 to 3, **characterized in that** the first sliding connection means (22) of each first component (12) consist of respective linear protuberances, which are integrally formed in a single piece with said first connection portion (20) and have a double hook cross-sectional shape, with respective free ends (58, 60) diverging from each other, and **in that** the second sliding connection means (28) of each second component (14) consist of respective linear cavities, which are obtained on said at least one internal surface (24, 26) and have a cross-sectional shape which is compatible with the double hook cross-sectional shape of said linear protuberances.

5. The cover assembly (10) according to any claims 1 to 4, **characterized in that** each second component (14) has a cross-sectional L shape, with two distinct internal surfaces (24, 26) orthogonal to each other and two corresponding external surfaces (30, 32) orthogonal to each other.

6. The cover assembly (10) according to claim 5, **characterized in that** at least one seat (62) is obtained on at least one surface (32) of said two external surfaces

(30, 32) for interlocking or sliding insertion of at least one corresponding fastening base (64) provided with at least one flat surface on which pointed fastening means can be inserted, by infixing.

7. The cover assembly (10) according to claim 6, **characterized in that** said fastening base (64) is manufactured with a deformable material having a hardness which is lower than the hardness of the material with which said at least one second component (14) is manufactured.

8. The cover assembly (10) according to any claims 5 to 7, **characterized in that** at least one channel (66) is obtained between said two internal surfaces (24, 26) orthogonal to each other within which parts of said main truss (F) are housed when the cover assembly (10) is mounted at an angular portion of a tubular truss frame.

9. The cover assembly (10) according to any claims 1 to 8, **characterized in that** the first engagement means (34, 36) of each second component (14) consist of respective holes, and **in that** the second engagement means (44) of each third component (16) consist of pins insertable into said holes.

10. The cover assembly (10) according to any claims 1 to 9, **characterized in that** the shell of each third component (16) has the shape of a portion of a three-sided cube, with three cover walls (38, 40, 42) orthogonal to each other, three respective edges (68, 70, 72) and a single top (74).

11. The cover assembly (10) according to any claims 1 to 10, **characterized in that** each first component (12) and/or each third component (16) is manufactured with an elastically deformable synthetic material.

12. The cover assembly (10) according to claim 11, **characterized in that** said elastically deformable synthetic material is nylon.

13. The cover assembly (10) according to any claims 1 to 12, **characterized in that** each second component (14) is manufactured with a metal material.

14. The cover assembly (10) according to claim 13, **characterized in that** said metal material is aluminium.

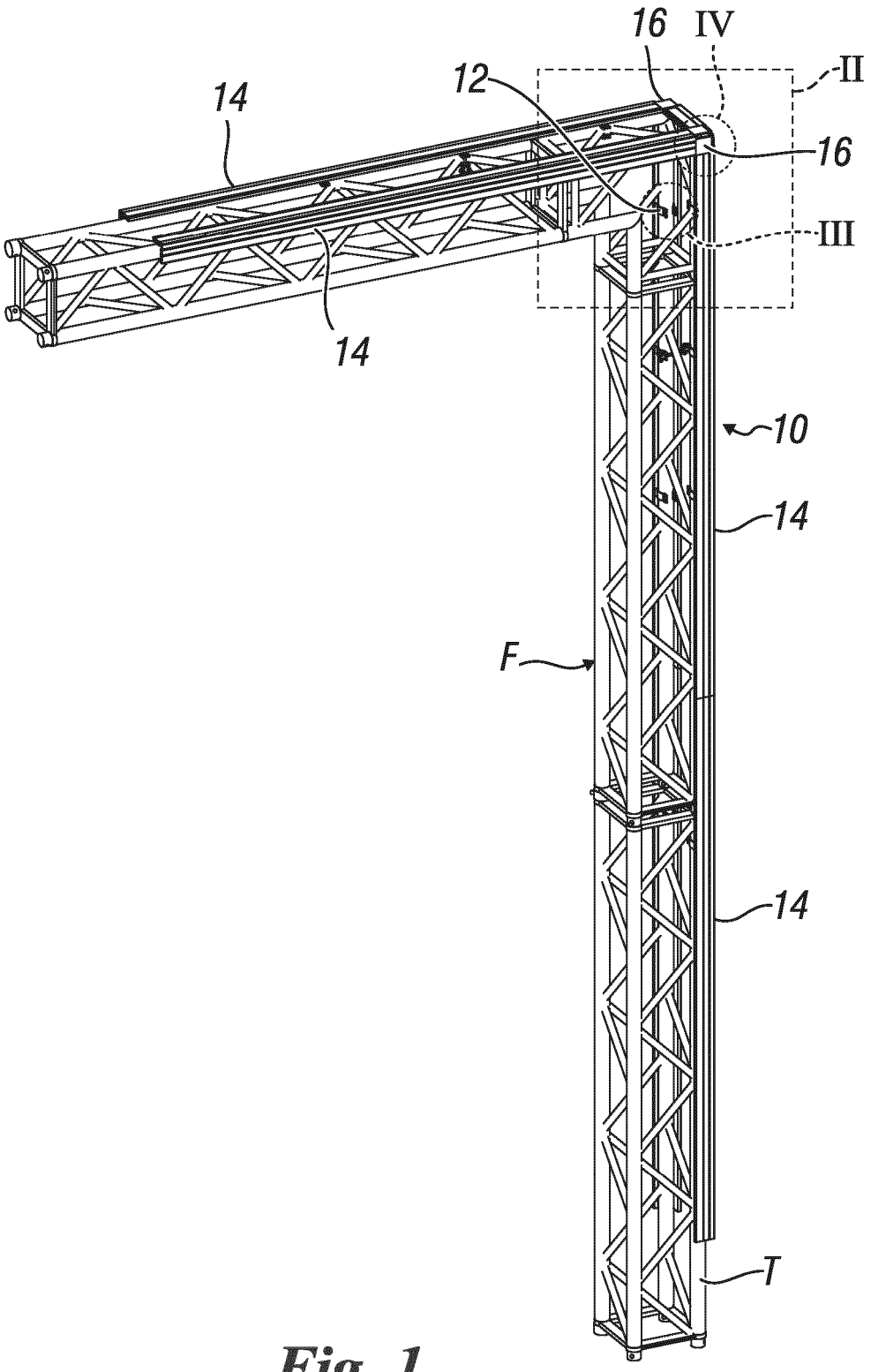

Fig. 1

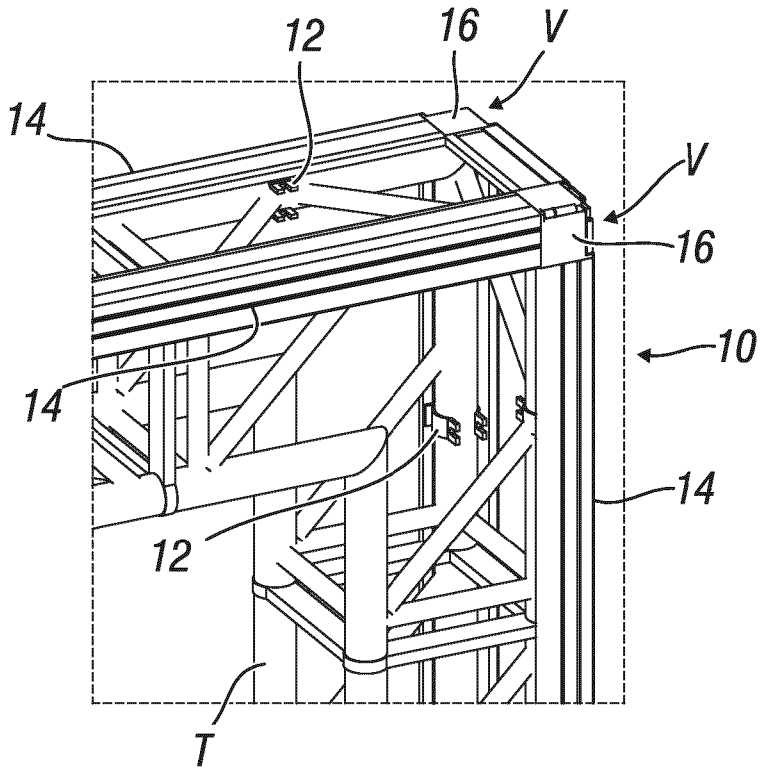

Fig. 2

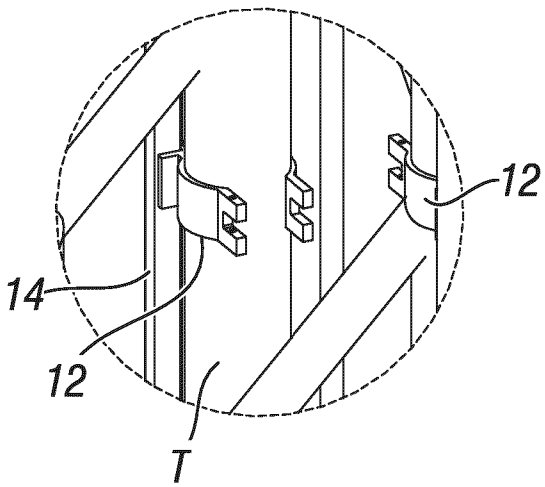

Fig. 3

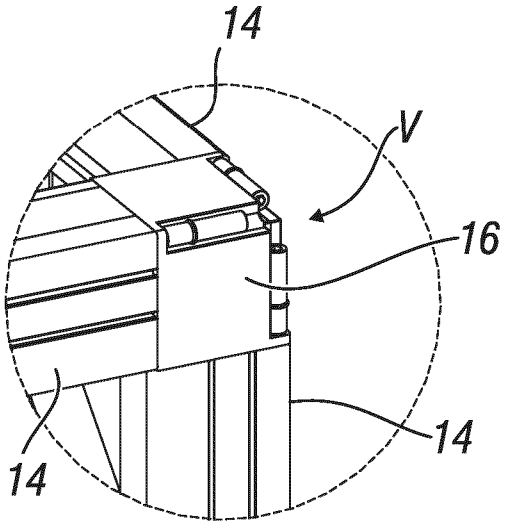

Fig. 4

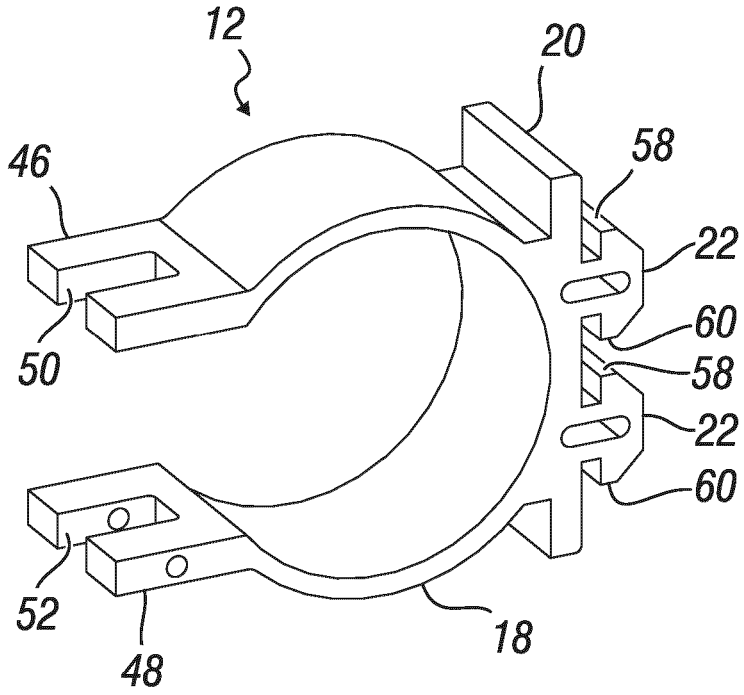

Fig. 5

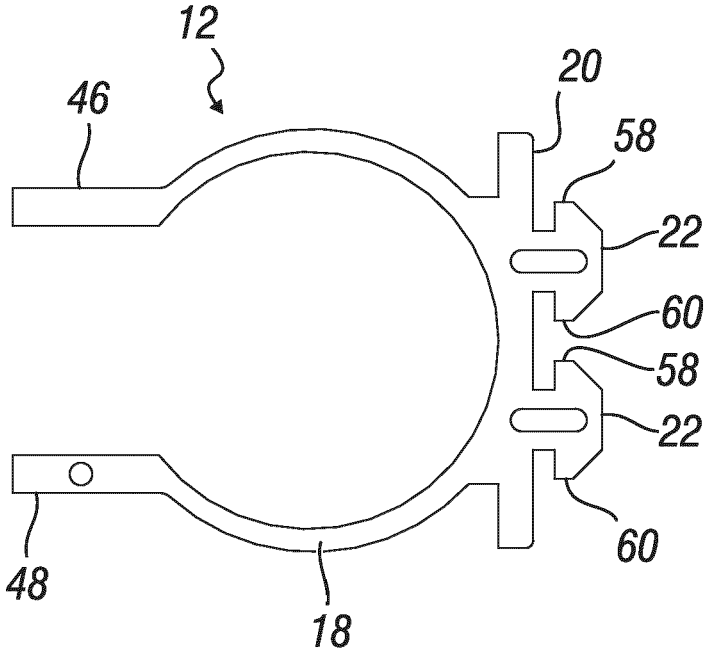

Fig. 6

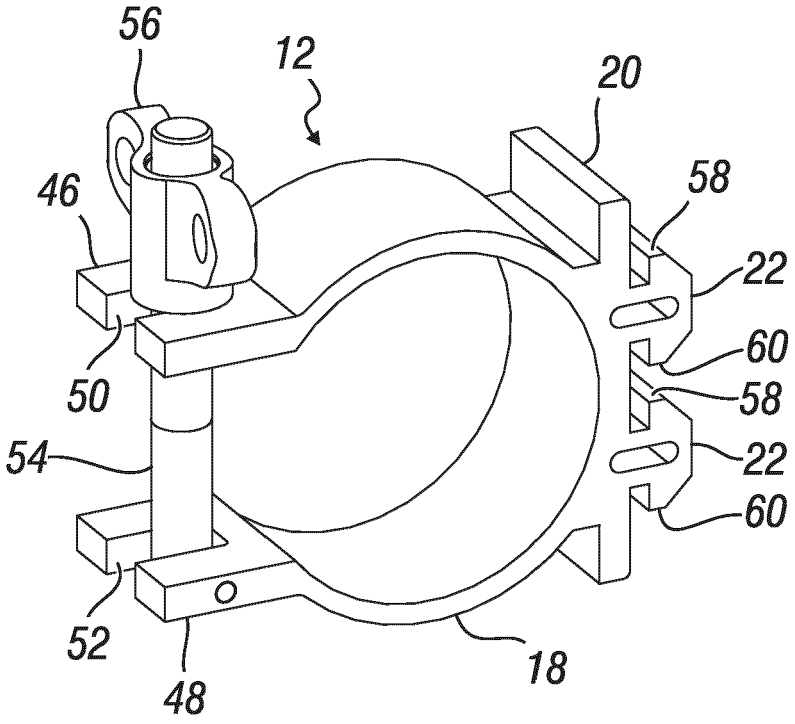
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Fig. 7

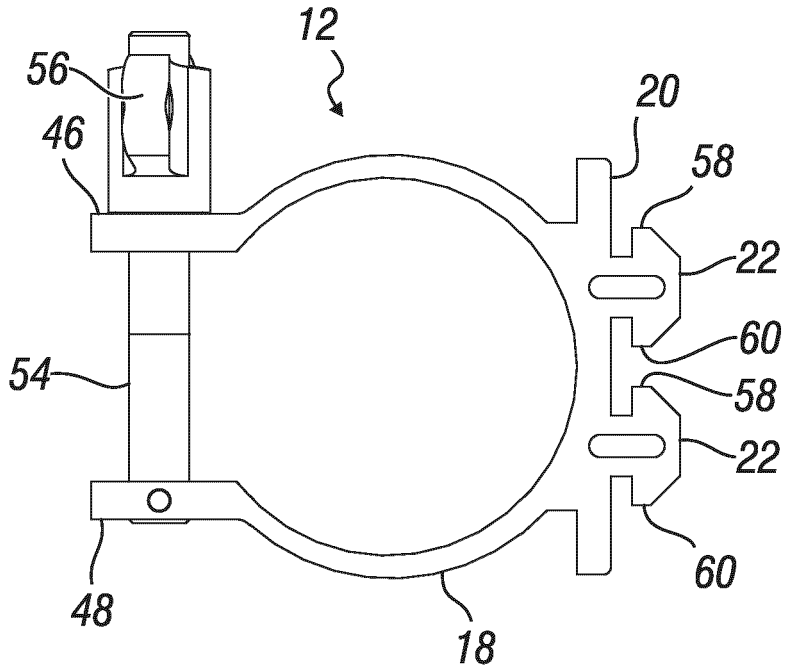
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Fig. 8

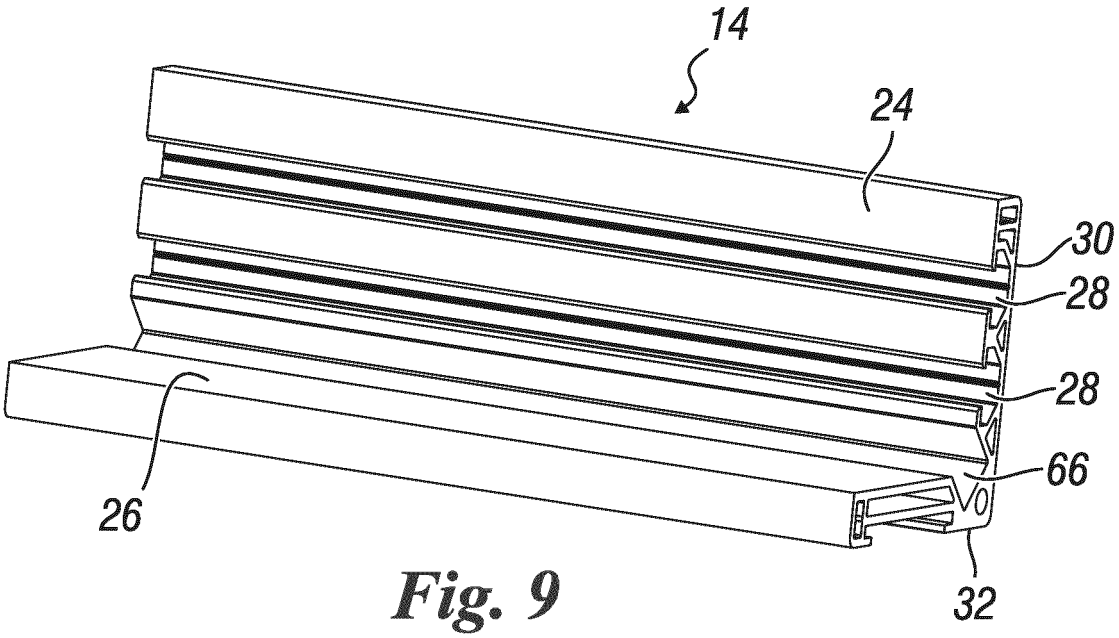

Fig. 9

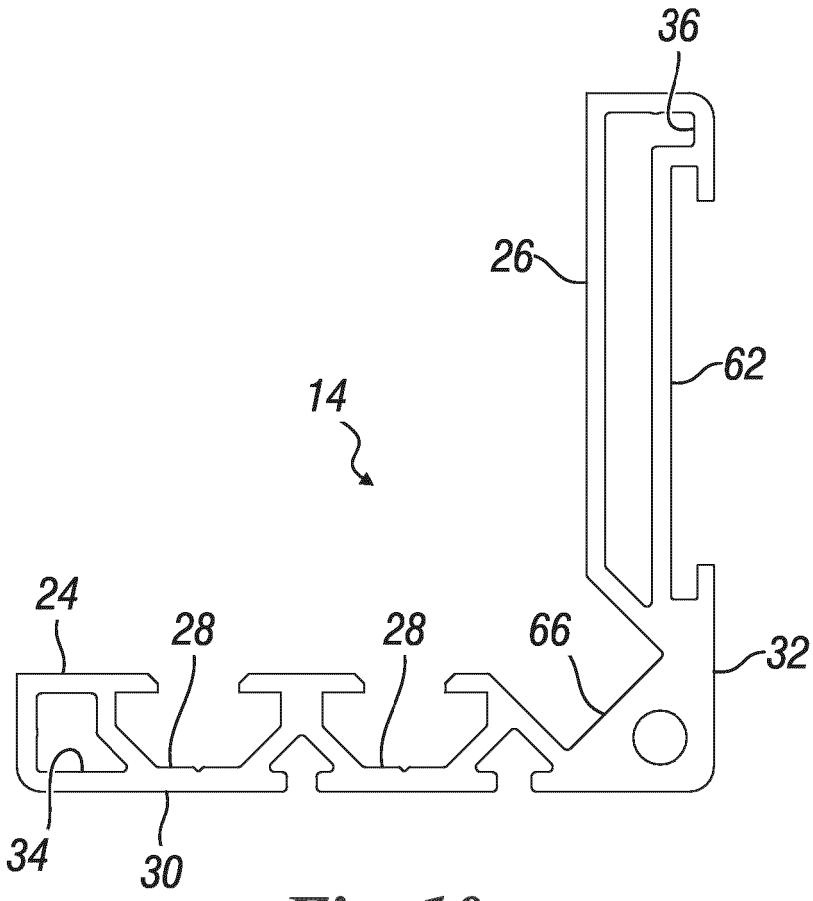

Fig. 10

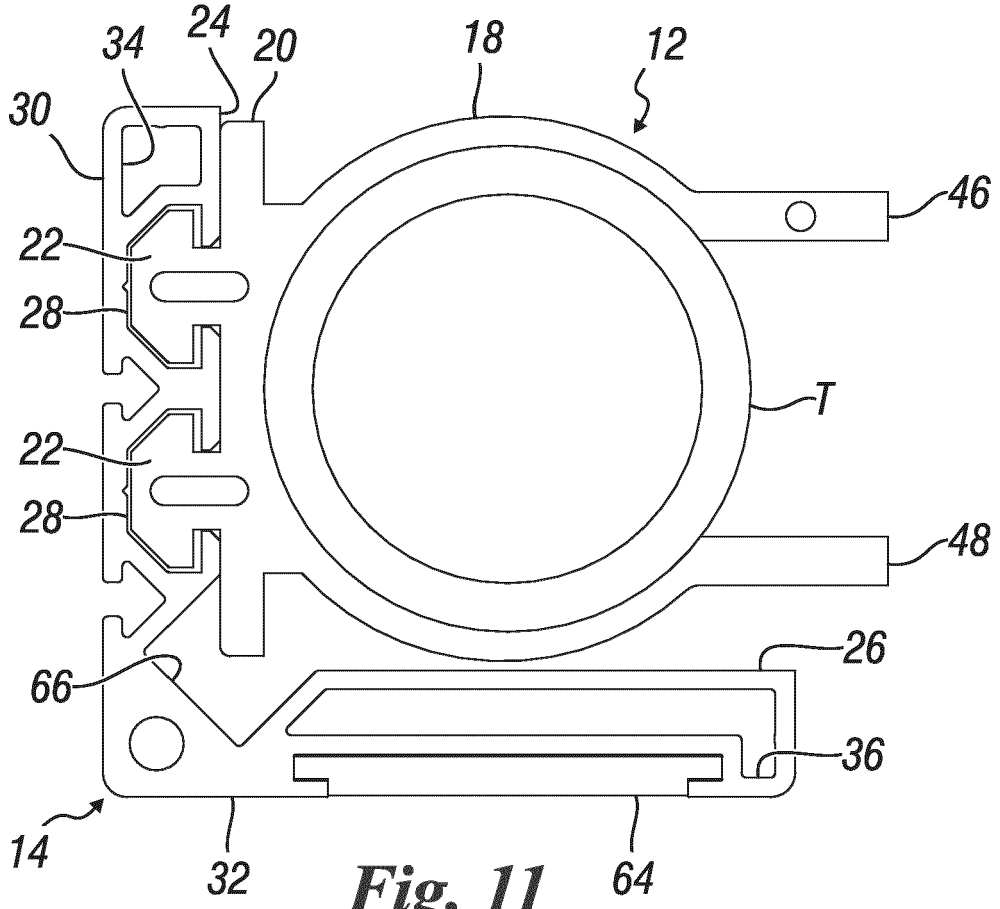

Fig. 11

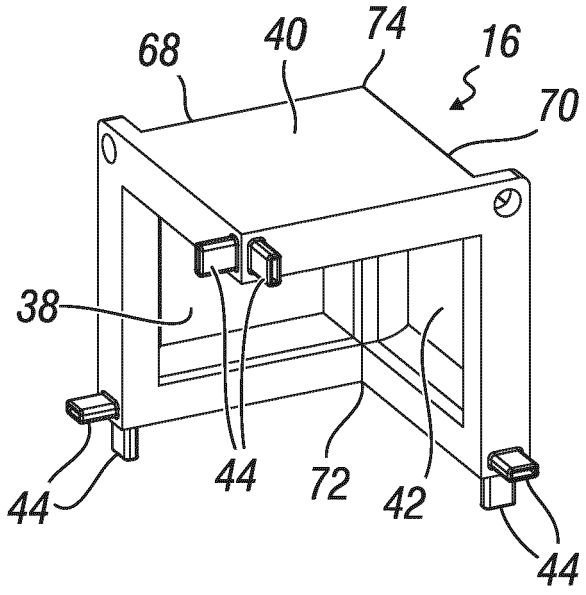

Fig. 12

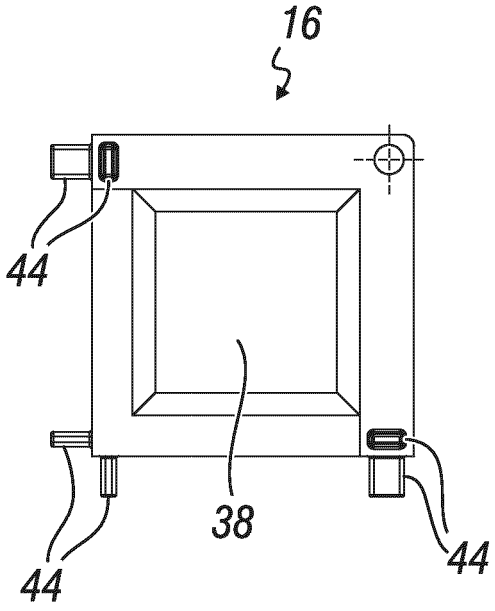

Fig. 13

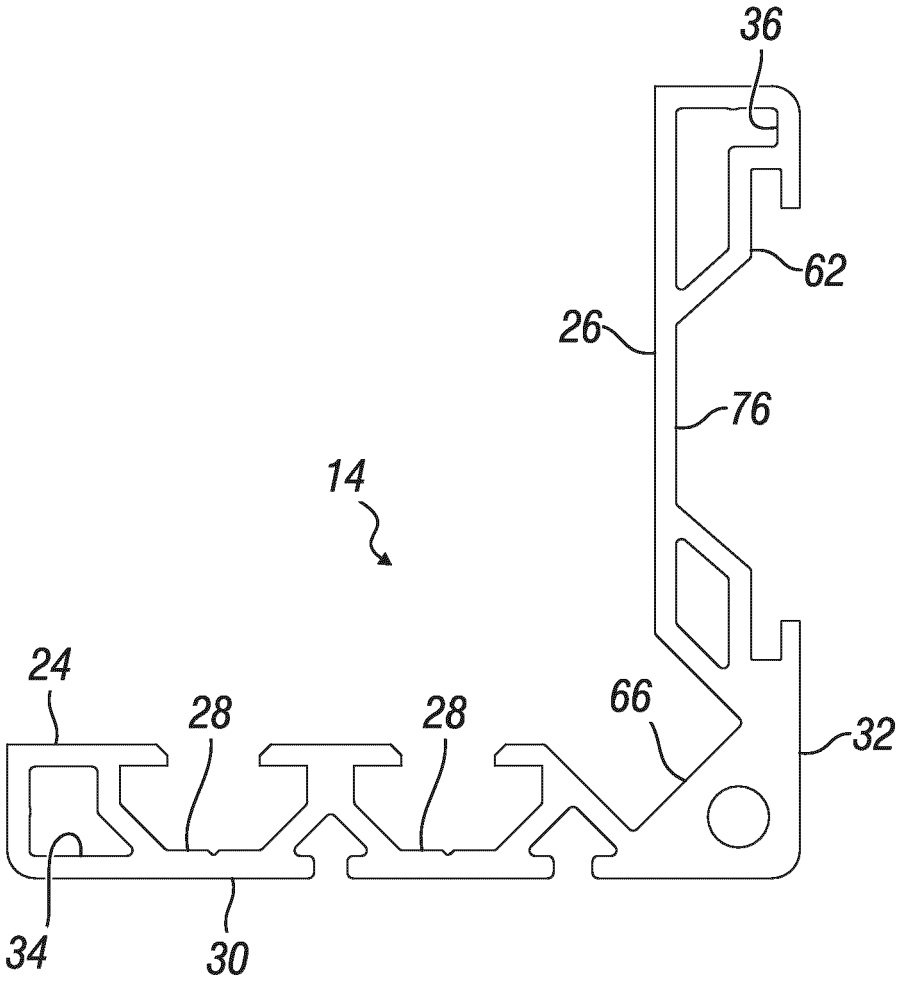

Fig. 14

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EUROPEAN SEARCH REPORT

Application Number
EP 24 21 8790

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 2010/192506 A1 (ALLRED III JIMMIE B [US] ET AL) 5 August 2010 (2010-08-05) * paragraph [0091] - paragraph [0092]; figures 14-16, 17a, 17b, 18, 19a, 19b *	1-14	INV. E04H3/24 ADD. E04C3/04
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Place of search	Date of completion of the search	Examiner
The Hague	7 April 2025	Galanti, Flavio

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