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Heath et al.

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(54) **COLLAR MOUNT FOR A CELLULAR COMMUNICATIONS MONOPOLE**

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E04G 5/04 (2006.01)
H01Q 1/12 (2006.01)

(52) **U.S. Cl.**
CPC ***E04G 5/067*** (2013.01); ***E04G 5/04*** (2013.01); ***E04G 5/045*** (2013.01); ***H01Q 1/1242*** (2013.01)

(58) **Field of Classification Search**
CPC E04G 5/045; E04G 5/067; E04G 3/24; E04G 3/243; H01Q 1/1242; E06C 5/24
See application file for complete search history.

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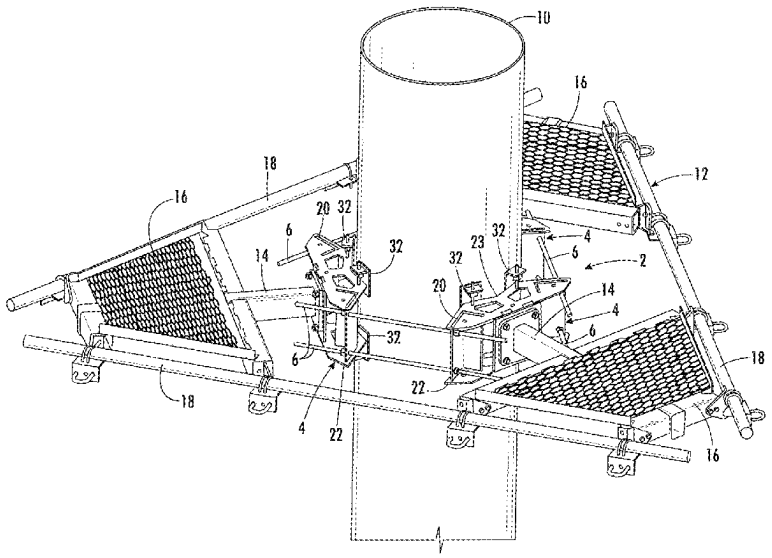
(57) **ABSTRACT**

A collar mount for a base station monopole has a plurality of pressure members that surround the monopole. Threaded members are connected between adjacent pressure members to tighten the pressure members against the monopole. Pressure plates of the pressure members have a forward edge configured to engage the monopole at a pressure point. A dispersement plate is positioned at the pressure point where the dispersement plate is non-rigidly connected to the pressure plates. A second threaded member may connect the upper pressure plates of each two adjacent pressure members together. Each of the pressure members may include a plurality of pressure plates where the pressure plates have a width direction extending parallel to the monopole and a thickness direction extending perpendicular to the width direction where the width direction is larger than the thickness direction.

18 Claims, 11 Drawing Sheets



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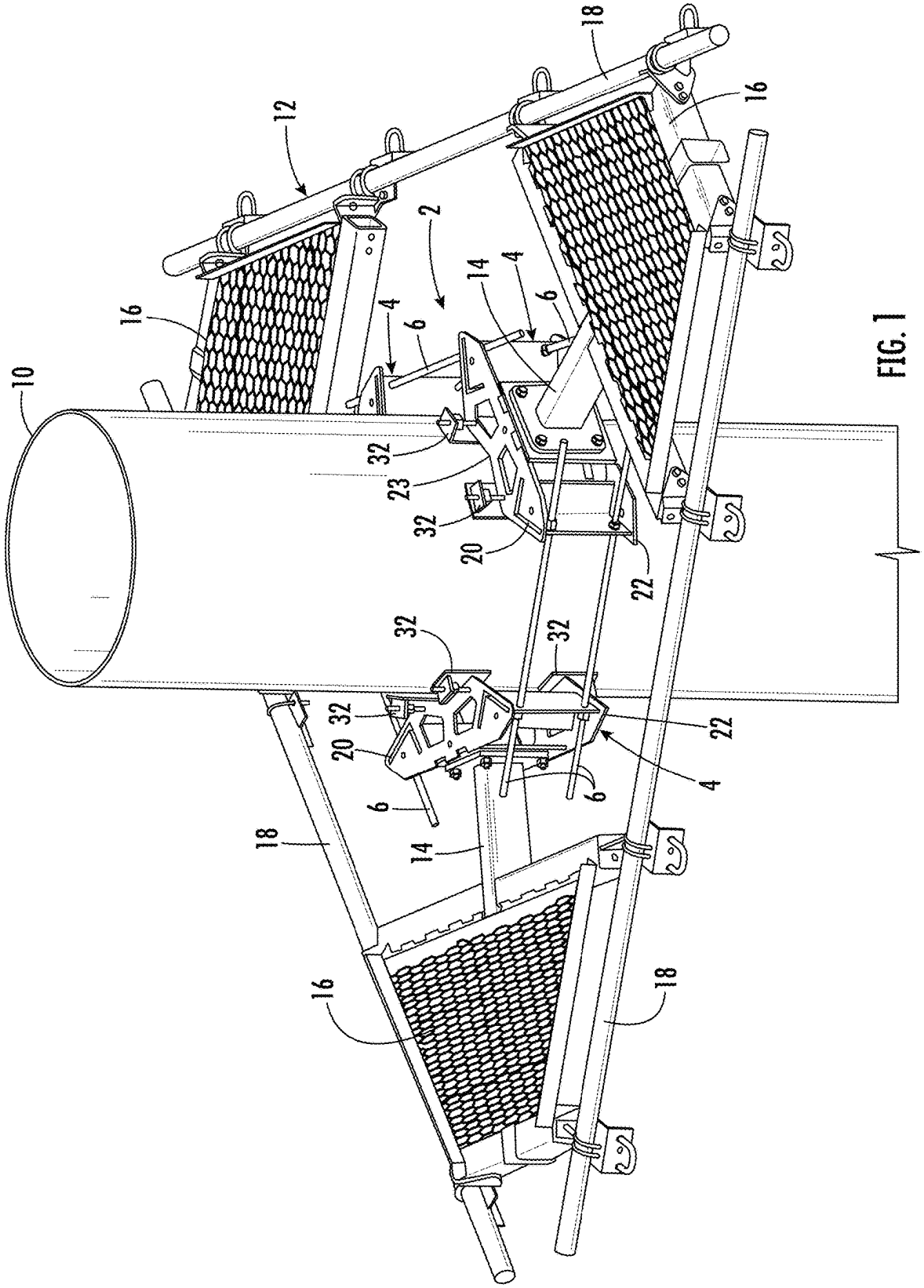
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FIG. 1

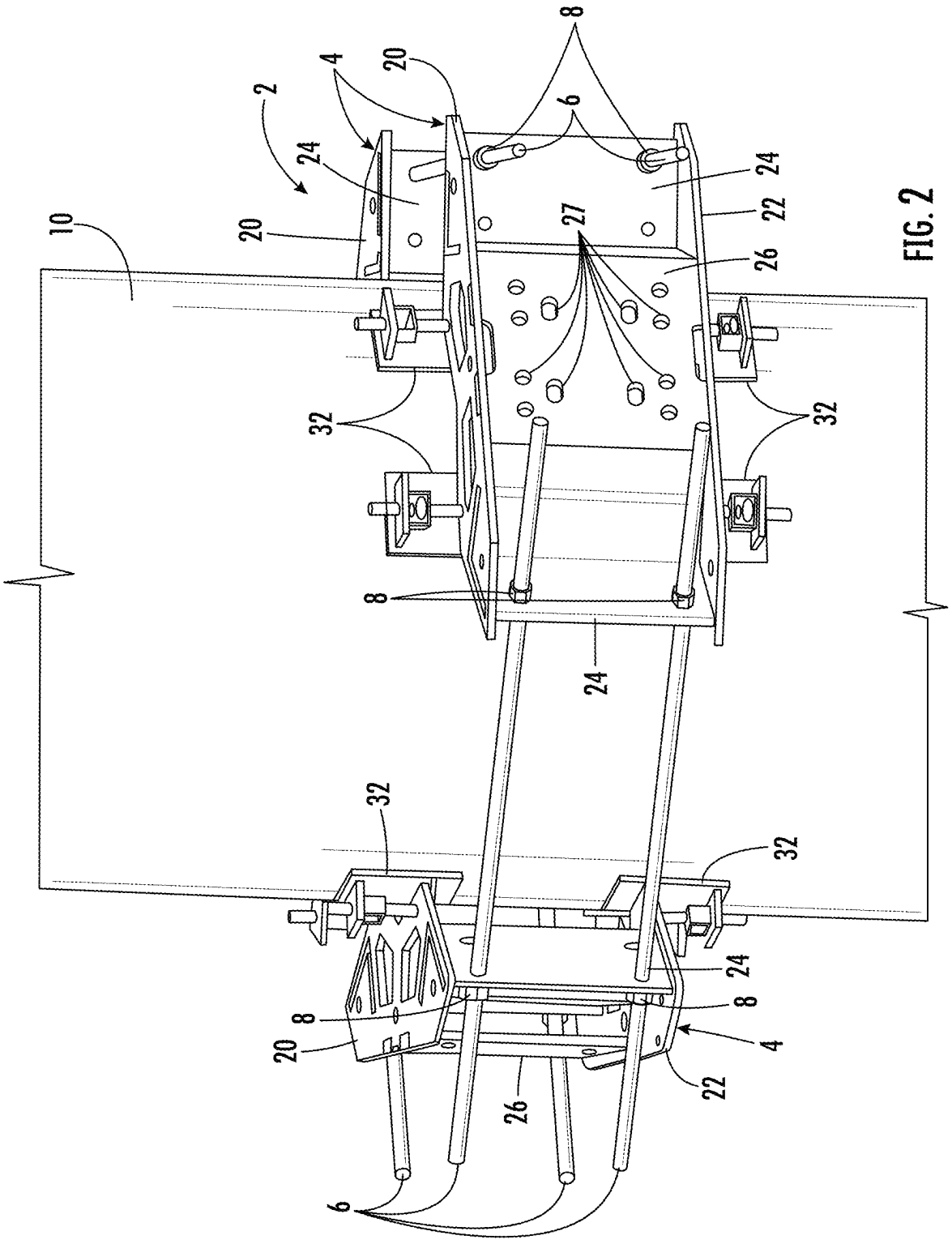

FIG. 2

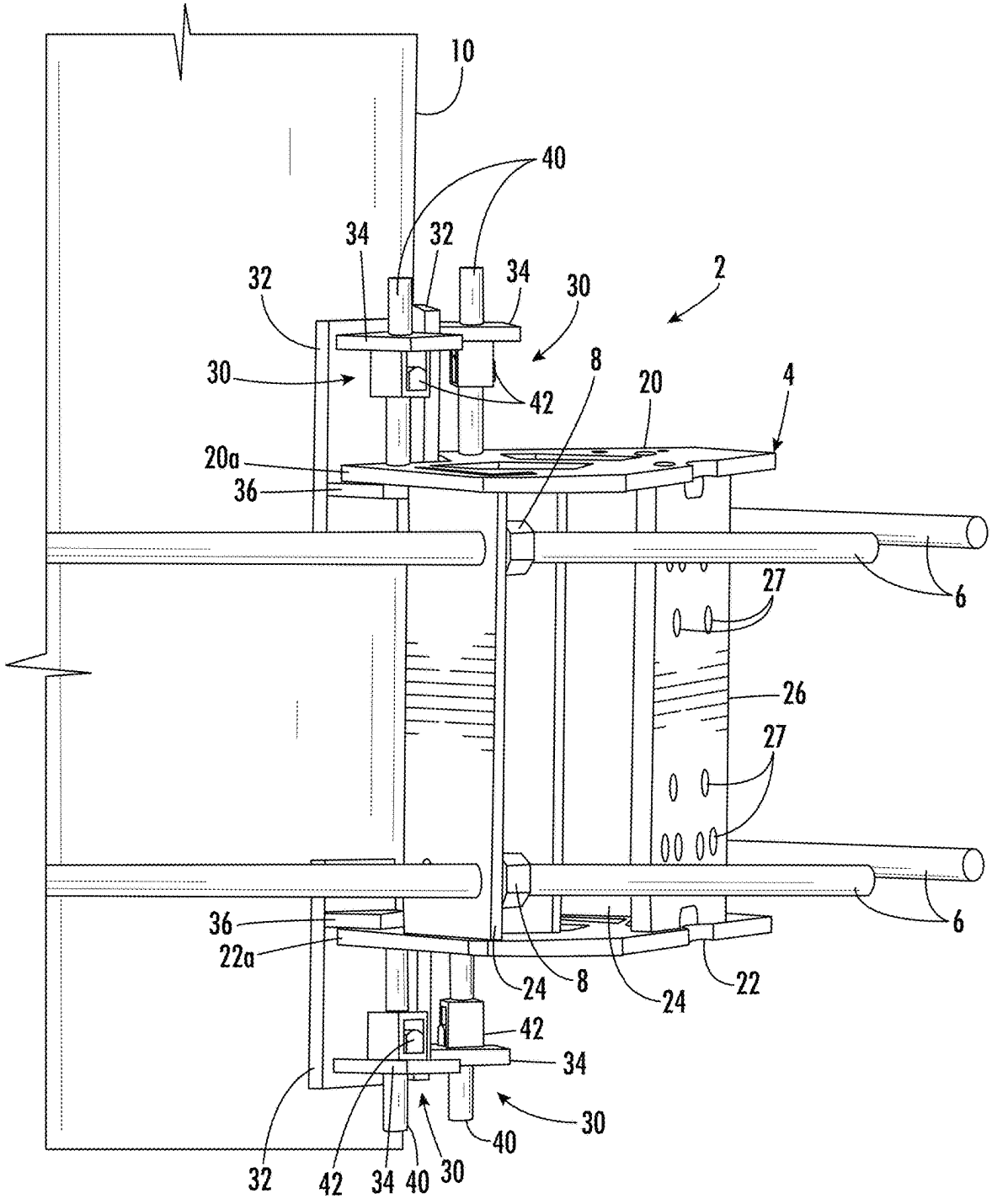
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FIG. 3

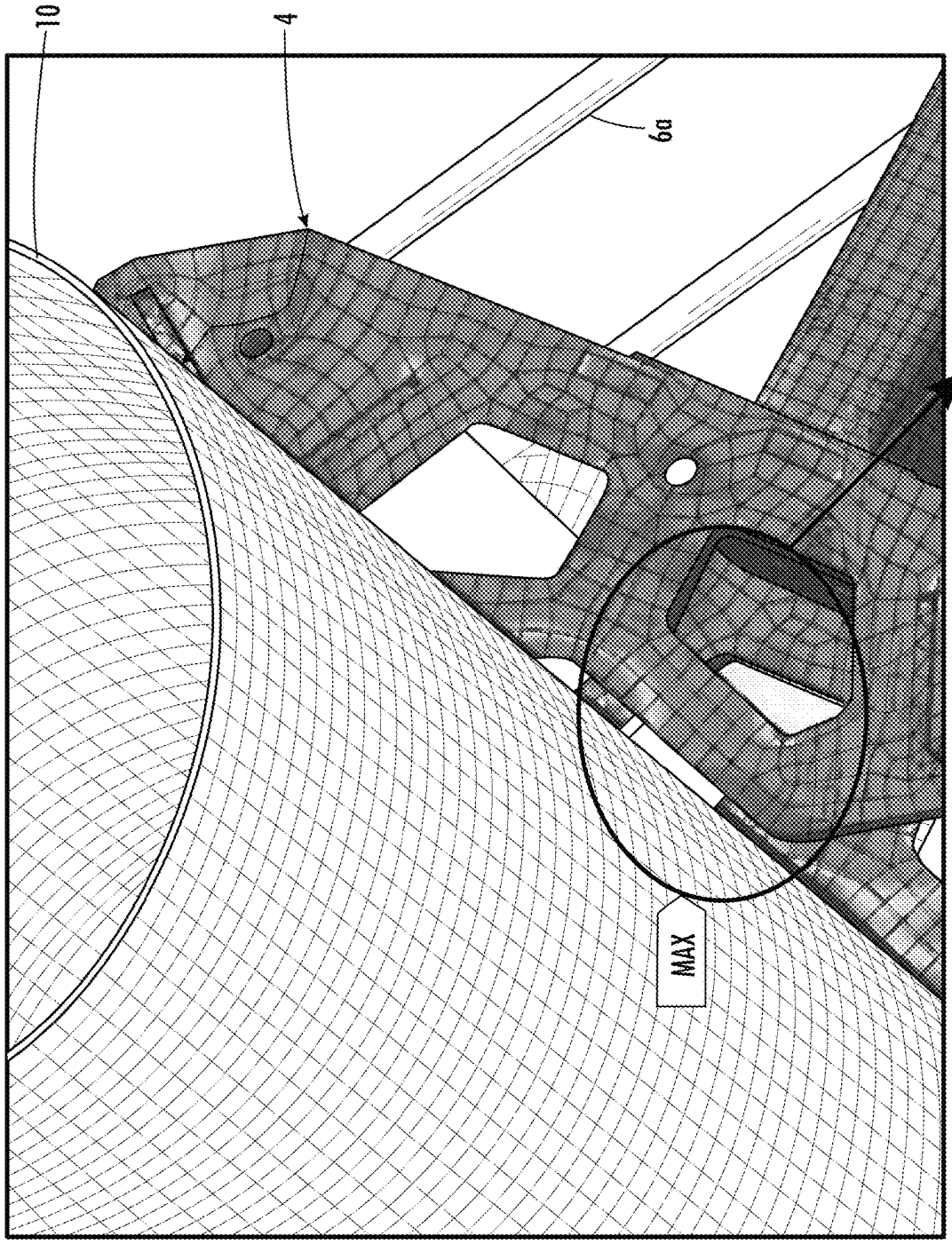

FIG. 4

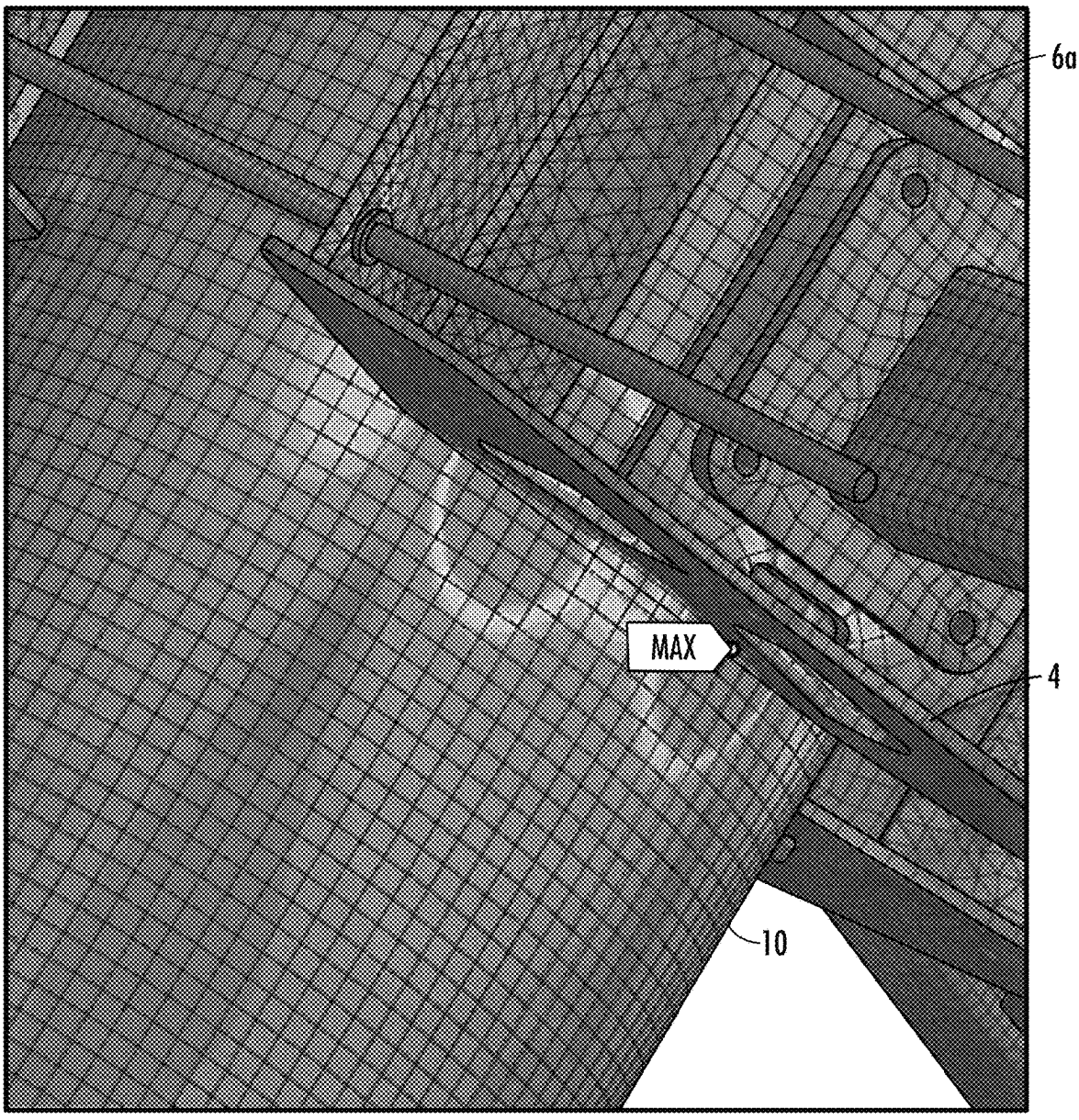

FIG. 5

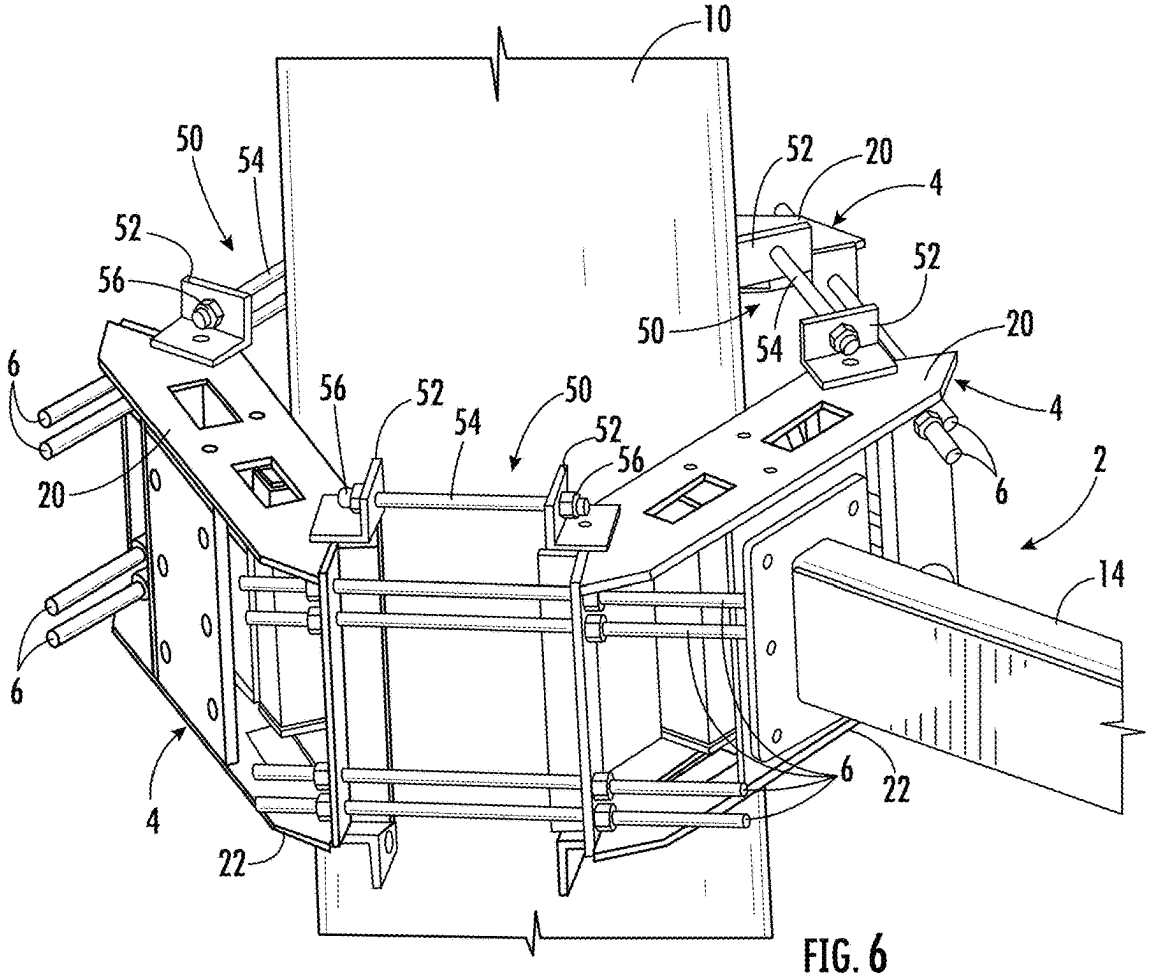
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FIG. 6

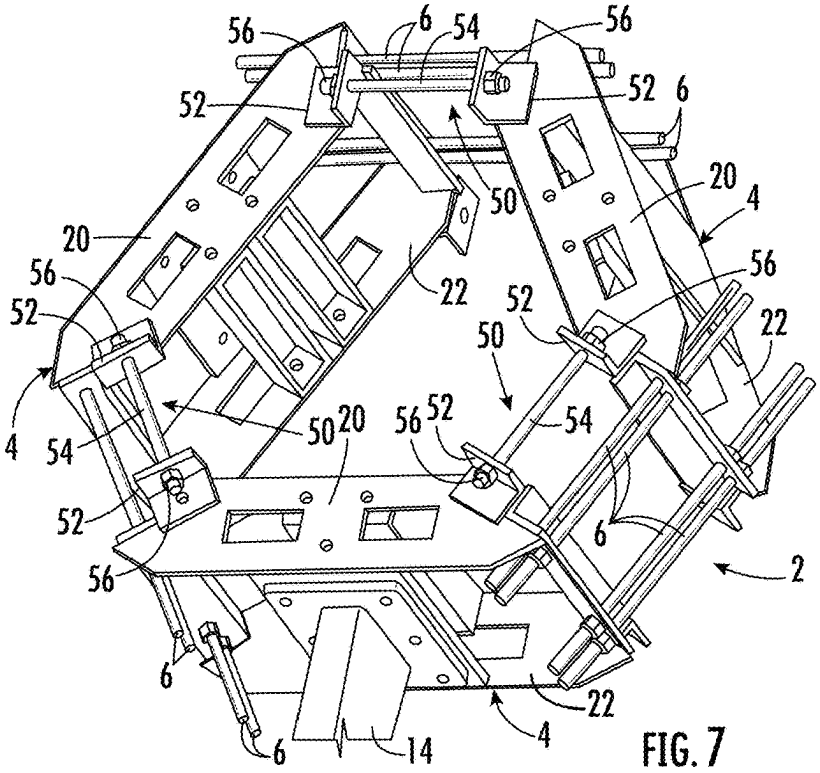
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FIG. 7

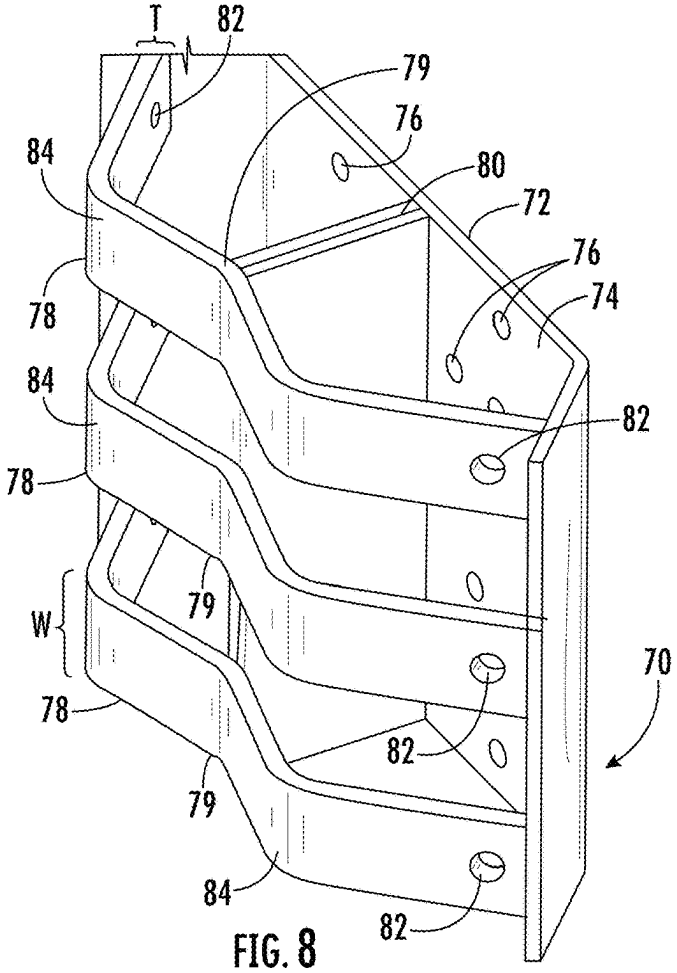
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FIG. 8

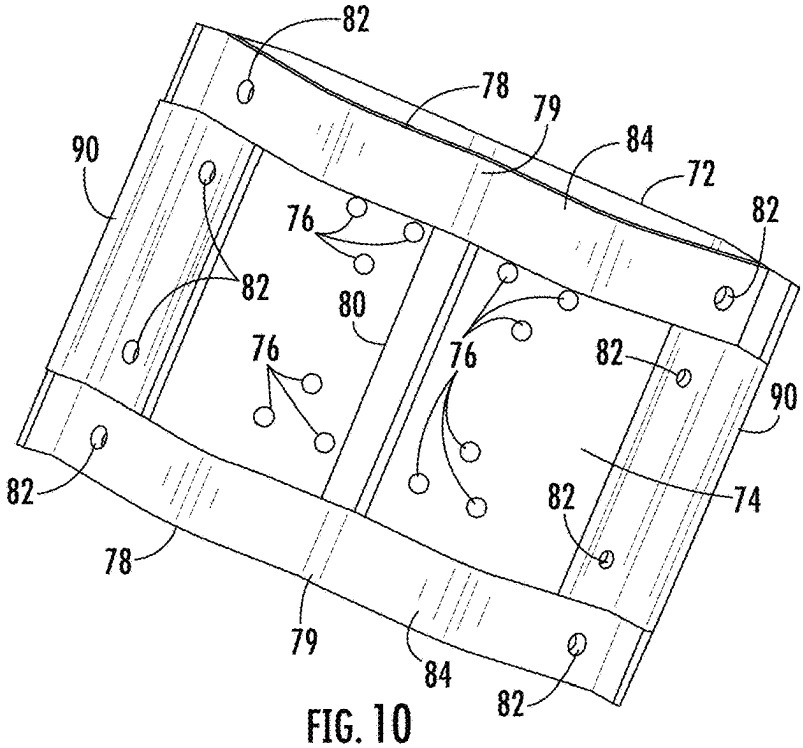
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FIG. 10

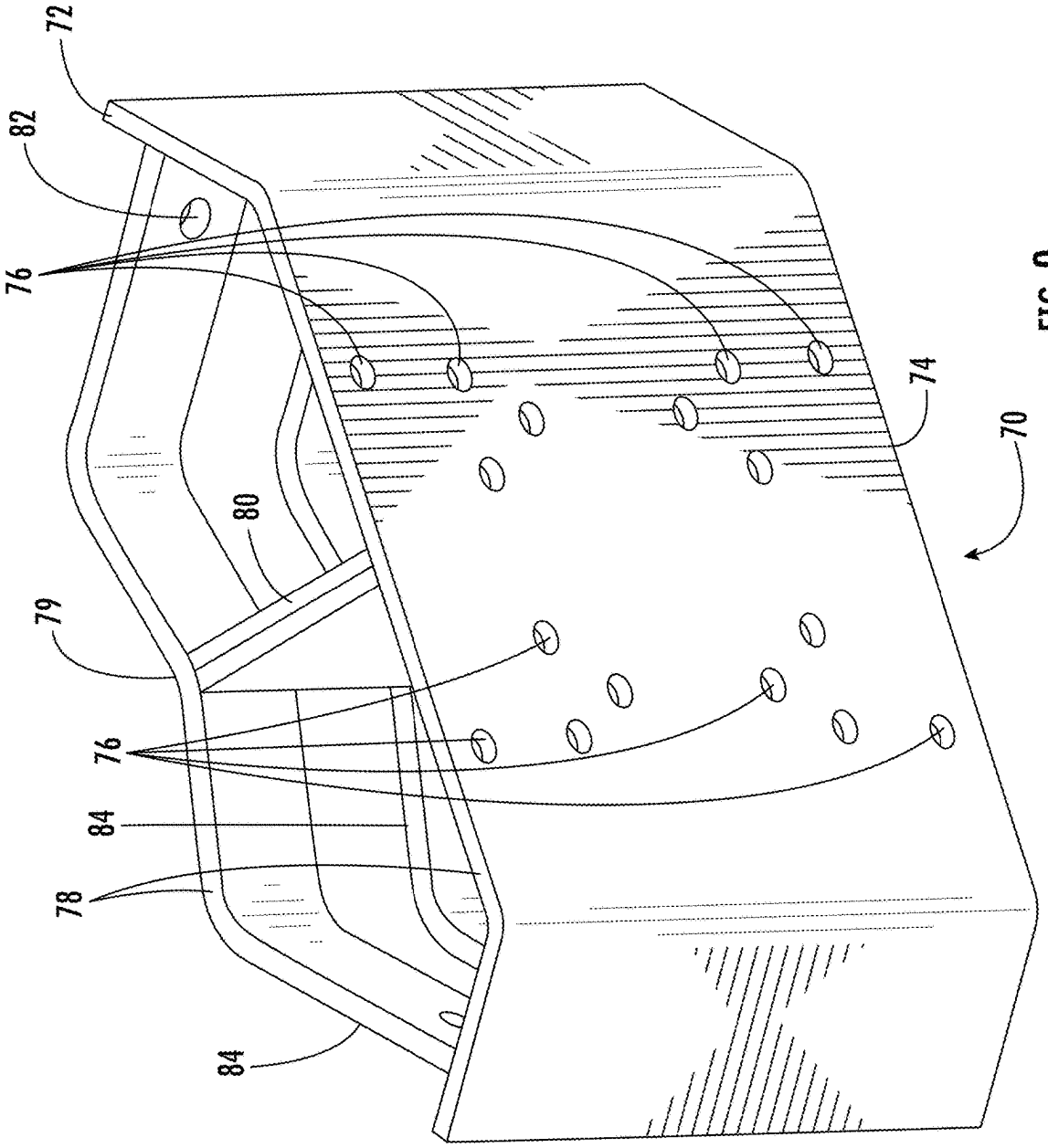

FIG. 9

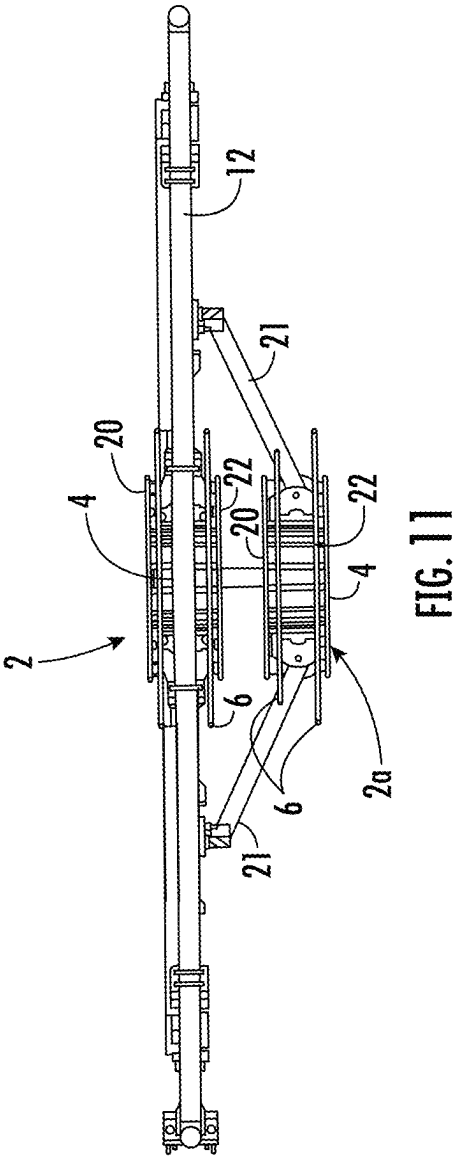

FIG. 11

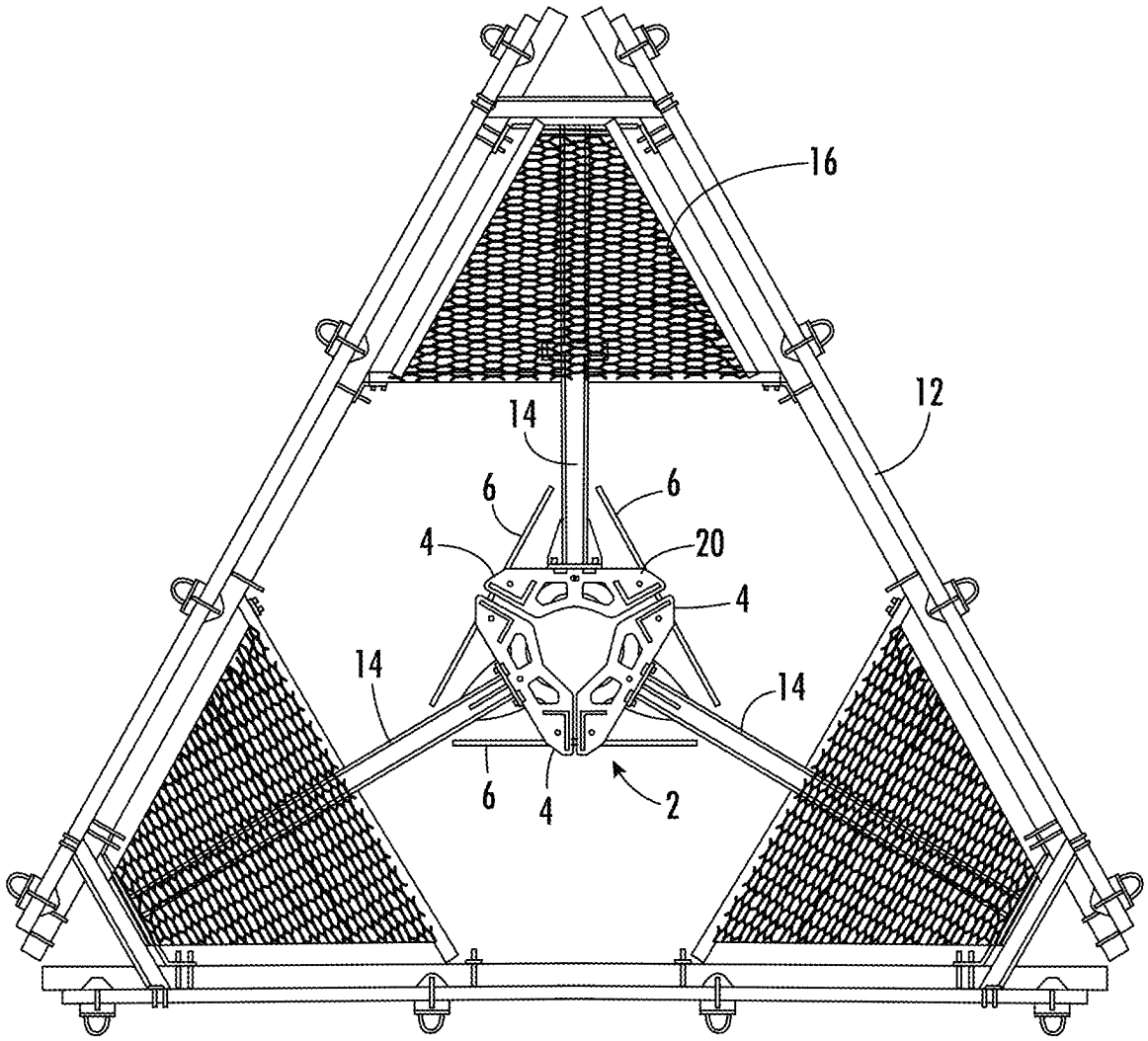

FIG. 12

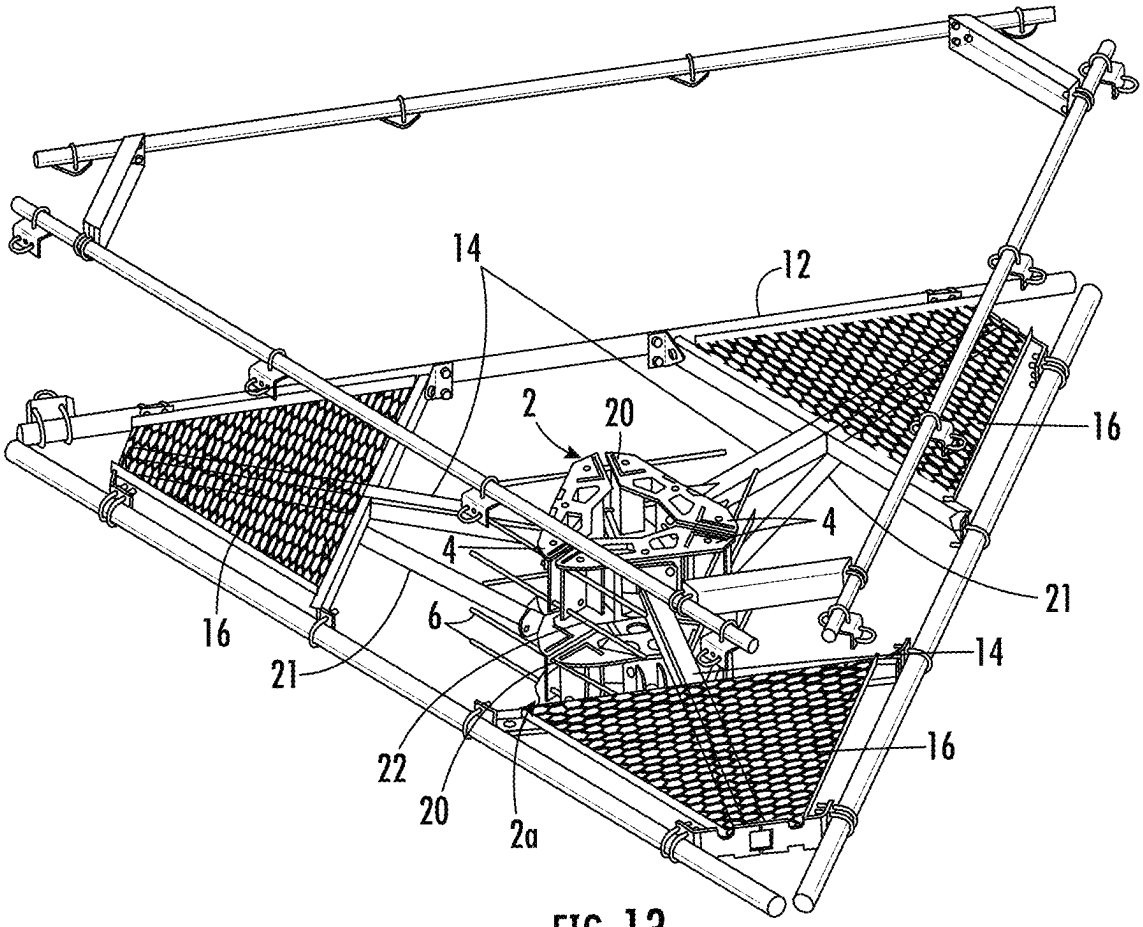

FIG. 13

COLLAR MOUNT FOR A CELLULAR COMMUNICATIONS MONOPOLE

RELATED APPLICATION

The present application claims priority from and the benefit of U.S. Provisional Patent Application No. 63/033,333, filed Jun. 2, 2020, the disclosure of which is hereby incorporated herein by reference in full.

BACKGROUND

The present invention generally relates to base station support structures for cellular communications systems and, more particularly, to an improved collar mount for such systems.

Cellular communications systems are well known in the art. In a cellular communications system, a geographic area is divided into a series of regions that are referred to as "cells" and each cell is served by abase station. The base station may include one or more base station antennas that are configured to provide two-way radio frequency ("RF") communications with mobile subscribers that are geographically positioned within the cells served by the base station. In addition to the antennas, base stations typically comprise a large number of components including remote radio units (RRU's), over voltage protection packages (OVP's), coaxial cables, fiber trunks, connectors, jumper cables, and a number of support components such as hangars, hoists, and junction boxes.

Typically, the antennas and related equipment are mounted outdoors. The antennas and related equipment are mounted on a structural support that is secured to a main structure. In one typical base station, the main structure comprises a tower or monopole and the structural support comprises a platform mounted to the monopole by a collar mount.

An improved collar mount for a base station support structure is desired.

SUMMARY

As a first aspect, embodiments of the invention are directed to a collar mount for a base station monopole. The collar mount comprises: at least one pressure plate having a forward edge configured to engage a monopole at a pressure point; and at least one dispersement plate positioned at the pressure point, the dispersement plate being non-rigidly connected to the pressure plate.

As a second aspect, embodiments of the invention are directed to a collar mount for a base station monopole comprising: a plurality of pressure members, each of the plurality of pressure members having a top end and a bottom end; a plurality of first threaded members connecting the plurality of pressure members, wherein at least one of the plurality of first threaded members is connected between each two adjacent pressure members of the plurality of pressure members and is positioned between the top end and the bottom end; and at least one second threaded member connecting each two adjacent pressure members of the plurality of pressure members, the at least one second threaded member being positioned at or above the top end.

As a third aspect, embodiments of the invention are directed to a collar mount for a base station monopole comprising: a plurality of pressure members; and a plurality of threaded members connecting the plurality of pressure members, wherein at least one of the plurality of threaded members is connected between each two adjacent pressure members of the plurality of pressure members. Each of the plurality of pressure members comprises a plurality of pressure plates where each of the plurality of pressure plates have a width direction extending parallel to the monopole and a thickness direction extending perpendicular to the width direction where the pressure plate is significantly larger in the width direction than in the thickness direction.

As a fourth aspect, embodiments of the invention are directed to a support for a monopole comprising: a collar mount for a base station monopole comprising at least one pressure plate having a forward edge configured to engage a monopole at a pressure point and at least one dispersement plate positioned at the pressure point, the dispersement plate being non-rigidly connected to the pressure plate; and a structural support connected to the collar mount.

As a fifth aspect, embodiments of the invention are directed to a base station support structure comprising: a monopole; a collar mount comprising at least one pressure plate having a forward edge configured to engage the monopole at a pressure point and at least one dispersement plate positioned at the pressure point, the dispersement plate being non-rigidly connected to the pressure plate; and a structural support connected to the collar mount.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view of an exemplary collar mount according to embodiments of the present invention and associated structural support mounted on a monopole.

FIG. **2** is a detailed perspective view of the collar mount of FIG. **1** mounted on a monopole.

FIG. **3** is a detailed perspective view of a portion of the collar mount of FIG. **1** mounted on a monopole.

FIGS. **4** and **5** are top and bottom perspective views, respectively, of a legacy collar mount useful in illustrating the loads of a collar mount on a monopole.

FIG. **6** is a perspective view of an exemplary collar mount according to another embodiment of the present invention mounted on a monopole.

FIG. **7** is a perspective view of the collar mount of FIG. **6**.

FIGS. **8** and **9** are perspective views of an exemplary pressure member for a collar mount according to another embodiment of the present invention.

FIG. **10** is a perspective view of a modification of the pressure member of FIGS. **8** and **9**.

FIG. **11** is a side view of another embodiment of a collar mount.

FIG. **12** is a top view of the embodiment of the collar mount of FIG. **11**.

FIG. **13** is a perspective view of the embodiment of the collar mount of FIG. **11**.

DETAILED DESCRIPTION

Pursuant to embodiments of the present invention, a collar mount, also sometimes referred to as a ring mount, is provided for mounting a structural support to a monopole. The collar mount better supports the load of the antennas and related equipment and minimizes point loads on the monopole.

As base stations become more complex, the amount of technology incorporated into the antennas and the equipment carried by the structural support is increasing. The additional effective projected area (EPA) and weight of the equipment and larger collar mounts are increasing contact

forces through the collar mount to the monopole. Monopole structures are typically round or polygonal in cross-section and are typically manufactured out of 3/16" formed or rolled plate.

An embodiment of a collar mount in accordance with the invention is shown in FIGS. **1** through **3**. The collar mount **2** comprises a plurality of pressure members **4** where adjacent ones of the pressure members **4** are connected by threaded members **6**. In the illustrated embodiment, three pressure members **4** are used where each pair of the adjacent pressure members **4** are connected by two threaded members **6**. The threaded members **6** engage mating threaded connectors **8** such that the threaded connectors **8** may be threaded onto and off of the threaded members **6** to decrease or increase the spacing between the pressure members **4**. The monopole **10** is located inside of the pressure members **4** such that the pressure members **4** may be tightened into engagement with the monopole **10** using threaded members **6** and threaded connectors **8** to secure the collar mount **2** to the monopole **10**.

A structural support **12** is connected to the pressure members **4** by standoff arms **14**. One embodiment of a structural support **12** is shown in FIG. **1** comprising a plurality of platforms **16** and poles **18**. In a typical structural support **12**, vertical poles (not shown) may be attached to the platforms **16** and/or horizontal poles **18** that support the antennas in a known manner. While one embodiment of a structural support **12** is shown, the structural support **12** may vary from that specifically shown in the drawings. Another example of a support structure is described in U.S. Patent Publication No. 2020/0411945, for a "Rooftop Sector Frame" by Heath et al., the contents of which is incorporated by reference herein in its entirety. The collar mount **2** as described herein may be used with any suitable type of structural support and the term "structural support" is not intended to be limited to the structural support **12** as shown in the drawings.

Another embodiment of a collar mount structure is shown in FIGS. **11** through **13**. The collar mount structure of FIGS. **1**I through **13** is similar to the collar mount of FIGS. **1** through **3** where the same reference numbers are used in FIGS. **11** through **13** to identify elements previously described with respect to FIGS. **1**-**3**. In the embodiment of FIGS. **11** through **13**, a plurality of kicker arms **21** are provided in addition to the standoff arms **14** to add additional support for the structural support **12**. The kicker arms **21** are mounted to the pressure members **4** of a second collar mount **2***a* and the structural support **12**. The kicker arms are rotatably adjustable relative to the structural support **12** and the second collar mount **2***a* such that the angle of the kicker arms **21** is adjustable. The second collar mount **2***a* and the kicker arms **21** may be used to support larger loads.

The inventors have discovered that legacy collar mounts may create unacceptably high point loads on the monopole. In legacy collar mounts, when the pressure members **4** of the collar mount **2** are tightened into engagement with the monopole **10**, the collar mount **2** is held on the monopole **10** by a friction connection. As the weight of the equipment supported on the support structure **12** increases, the forces generated by the increased equipment weight and wind loads resulting from larger EPA's requires increased pre-tension at the connection between the supporting collar mount **2** and monopole **10**. The bending moment on the collar mount **2** resulting from the load on the standoff arms **14** requires a very high pretension force in the threaded rods **6** to counter tilting of the collar mount **2** at the collar mount/monopole connection. The pretension force and bending moment create localized contact pressures at small areas of the monopole **10** which may cause a potential failure of the monopole due to local yielding and a stress higher than tensile strength of the material of the monopole **10**. Moreover, as the load on the collar mount **2** increases, the top ends of the pressure members **4** can be forced away from and separate from the monopole **10** as show in FIG. **4**. The tension in the top threaded rod **6***a* causes it to stretch and potentially exceed the yield or tensile strength of the material. The top ends of the pressure members **4** can be forced away from the monopole **10** when the moment created by the load on the structural support **12** is greater than the pretension load of the threaded rods **6**. As the top end of the pressure member **4** is forced away from the monopole **10**, the pressure member **4** tilts causing the lower edge of the pressure member **4** to "knife" into the monopole **10** as shown in FIG. **5**. This causes point loads and localized stresses in the monopole **10**. Because of the typical position of the antennas and radios at the farthest radial point on the support structure **12** from the monopole **10**, a significant load is carried in tension to the lower edges of the pressure members **4** and into the monopole **10**. These localized stresses may cause plastic deformation of the monopole **10** resulting in a possible failure of the entire mounting system.

While the monopole **10** may be modified to carry the larger load; modification of the monopole is expensive and time consuming. Embodiments of the collar mounts described below disperse the load on the monopole **10** and may be used with existing monopoles without the need to reinforce the monopole. Moreover, the system of the invention allows for the retrofitting of existing collar mounts.

Referring again to FIGS. **1** through **3**, the collar mount **2** comprises a plurality of pressure members **4** spaced evenly about the periphery of the monopole **10** and connected by threaded members **6** as previously described. The pressure members **4** are substantially identical such that one of the pressure members **4** will be described in detail. The pressure member **4** comprises an upper pressure plate **20** defining the top end of the pressure member **4** and a lower pressure plate **22** defining the bottom end of the pressure member **4**. The upper pressure plate **20** and lower pressure plate **22** extend substantially perpendicular to the wall of the monopole **10**, which, in the typical installation, means that the upper pressure plate **20** and lower pressure plate **22** extend generally horizontally. The upper pressure plate **20** and lower pressure plate **22** are generally planar members having narrow forward edges **20***a* and **22***a*, respectively, that are configured to engage the outer surface of the monopole **10**. The typical monopole **10** has a generally cylindrical shape that may be circular or polygonal in cross-section. In order to engage both styles of monopoles, the forward edges **20***a* and **22***a* of the upper pressure plate **20** and the lower pressure plate **22**, respectively, may have a generally shallow V-shaped depression **23** (FIG. **1**). The depression **23** allows the forward edges **20***a*, **22***a* to engage a monopole **10** having either a cylindrical wall or a polygonal cylindrical wall. However, in some embodiments, the forward edges **20***a*, **22***a* may be configured to mate with a specific style of monopole. Support beams **24** connect the upper pressure plate **20** to the lower pressure plate **22** and hold the pressure plates in spaced relationship. The support beams **24** may be connected to the upper pressure plate **20** and the lower pressure plate **22** using any suitable mechanism such as welding, bolts or the like. A support plate **26** is also connected between the upper pressure plate **20** and the lower pressure plate **22** such that the support plate **26** extends vertically between the upper pressure plate **20** and the lower

pressure plate **22** and faces outwardly away from the monopole **10**. The support plate **26** may be connected to the upper pressure plate **20** and the lower pressure plate **22** using any suitable mechanism such as welding, bolts or the like. At least one standoff arm **14** is connected to and extends from the support plate **26** and supports the structural support **12** on the collar mount **2**. The standoff arm **14** may be connected to the support plate **26** using any suitable mechanism such as welding, bolts or the like. In the illustrated embodiment, the support plate **26** may include holes **27** for receiving bolts that connect the standoff arm **14** to the support plate **26**.

The threaded members **6** extend between and engage each of the adjacent pressure members **4**. In the illustrated embodiment, two threaded members **6** extend between and engage each of the adjacent pressure members **4**. The threaded members **6** are inserted through apertures formed in the support beams **24**. A threaded connector **8** engages each of the threaded members **6** and is disposed to the outside of the support beams **24**. Rotation of the threaded connectors **30** in a first, tightening direction causes the pressure members **4** to move toward one another to tighten the collar mount **2** against the monopole **10**. Rotation of the connectors **30** in a second, loosening direction allows the pressure members **4** to move away from one another to loosen the collar mount **2** from the monopole **10**. When the pressure members **4** are tightened into engagement with the monopole **10**, the collar mount **2** and/or collar mount **2***a* is fixed in position relative to the monopole **10**.

As previously explained, the load on the support structure **12** tends to force the top end of the collar mount **2** and/or collar mount **2***a* away from the monopole **10** which can cause the bottom end of the collar mount **2** to knife into the monopole **10**. To ameliorate this situation, the collar mount **2** and/or collar mount **2***a* uses non-fixed dispersement plates **32** to spread the load from the collar mount **2** over a wider area of the monopole **10** and/or to reduce the tilting of the collar mount **2** and related damage to the monopole **10**. Specific reference will be made to collar mount **2** to describe the structure and operation of the dispersement plates **23**, it being understood that the dispersement plates **32** may be used with the second collar mount **2***a* in the same manner. Each dispersement plate **32** comprises a relatively small, flat, rigid planar plate that is disposed between the points of contact of the upper and lower pressure plates **20**, **22** and the monopole **10**. In the illustrated embodiment, each of the upper pressure plate **20** and the lower pressure plate **22** would have two areas of contact with the monopole **10** such that each pressure member **4** uses four disbursement plates **32** with two disbursement plates **32** positioned between the upper pressure plate **20** and the monopole **10** and two disbursement plates **32** positioned between the lower pressure plate **22** and the monopole **10**. The disbursement plates **32** alleviate the local point stresses by distributing the load over a greater area of the monopole **10** than the narrow edges **20***a*, **22***a* of the upper and lower pressure plates **20**, **22**, respectively. Using non-fixed dispersement plates **32** with the collar mount **2** better distributes the local stresses at the bottom end of the collar mount **2**.

It has been determined that non-fixed dispersement plates **32** may work better than either fixed disbursement plates (i.e. plates that are permanently and rigidly fixed to the pressure plates **20**, **22** such as by welding) or collar mounts having large, continuous pressure plates that engage the monopole **10**. "Non-fixed" as used herein to describe the dispersement plates **32** means that the dispersement plates **32** and the collar mount **2** are not fixed to one another to thereby allow the collar mount **2** to be in a tilted position relative to the monopole (e.g. the upper pressure plate **20** and the lower pressure plate **22** may be in a position other than perpendicular to the monopole) yet the displacement plates **32** remain flush and parallel to the surface of the monopole to provide greater contact surface displacement. It is believed that fixed dispersement plates that are formed rigidly with the collar mount do not work as well as the non-fixed dispersement plates **32** because the fixed disbursement plates carry the load to the bottom of the collar mount. It is believed that simply using pressure plates with large, uninterrupted contact areas do not work as well as the non-fixed dispersement plates **32** because the pretension load generated by threaded members **6** that is required to secure such a design to the monopole is greater than capacity of the monopole. Moreover, simply using a separate large plate between the points of contact between the collar mount and the monopole does not work because the plate may separate from the collar mount **2** when the collar mount tilts under loads. The use of non-fixed dispersement plates **32** as described herein, in addition to reducing the stresses on the monopole, also has the added advantage of being able to be used in retrofit applications where the non-fixed disbursement plates **32** can be added to existing collar mounts.

Referring again to FIGS. **1** and **2**, in one embodiment, each non-fixed dispersement plate **32** includes a connection mechanism **30** comprising a pair of opposed flanges **34**, **36** and a threaded member **40**. The opposed flanges **34**, **36** extend substantially perpendicularly from the dispersement plate **32**. When the disbursement plate **32** is in the installed position abutting the monopole **10**, the flanges **34**, **36** are disposed substantially parallel to the pressure plates **20** and **22**. One of the flanges **34** receives threaded member **40** that may extend through an aperture in the flange **34**. Threaded member **40** threadably engages a threaded connector **42**. The threaded connector **42** is fixed to the flange **34** such that rotation of the threaded member **40** causes the threaded member **40** to move linearly toward and away from the opposing flange **36**.

A dispersement plate **32** is mounted to one of the pressure plates **20**, **22** at each potential point of contact between that pressure plate **20**, **22** and the monopole **10**. Specifically, the dispersement plate **32** is positioned such that the dispersement plate **32** abuts the monopole **10** and the forward edges **20**, **22***a* of pressure plates **20**, **22**. The dispersement plate **32** is also positioned such that the pressure plates **20**, **22** are positioned between the flanges **34**, **36**. The threaded member **40** is rotated such that is extended into engagement with the pressure plate **20**, **22**. As the threaded member **40** is tightened, the pressure plate **20**, **22** is trapped between the threaded member **40** and the opposed flange **36**. The use of the connection mechanism **30** fixes the disbursement plate **32** to the pressure member **4** during installation of the pressure plate **4** on the monopole **10** and if the pressure member **4** tilts. However, the use of the connection mechanism **30** holds the disbursement plates in position without rigidly fixing the disbursement plates **32** in position relative to the collar mount **2**.

The use of the dispersement plates **32** and connection mechanism **30** also allows the dispersement plates **32** to be used with pressure plates **20**, **22** that are disposed either horizontally, as shown in the figures, or vertically.

After the dispersement plates **32** are connected to the pressure plates **20**, **22**, the pressure members **4** are tightened into engagement with the monopole **10** using threaded members **6**. When the pressure members **4** are tightened into engagement with the monopole **10** the dispersement plates **32** engage the monopole and are positioned at the location

of the potential points of contact between the pressure plates **4** and the monopole **10**. The use of the separate non-fixed pressure plates **32** spreads the forces on the monopole over a larger area on the monopole to prevent localized stresses that may damage and cause failure of the monopole.

While one connection mechanism **30** for securing the dispersement plates **32** to the pressure plates **20**, **22** in a non-fixed manner is shown, other connection mechanisms may be used provided that these connection mechanisms do not rigidly fix the dispersement plates **32** to the pressure plates **20**, **22**. Moreover, a greater number of connection mechanisms **30** may be used with each dispersement plate **32**, the threaded connectors **42** may be secured to the dispersement plates **32** in a different manner than as specifically shown herein, the shapes of the dispersement plates **32** and flanges **34**, **36** may vary, or the like.

Another embodiment of a collar mount that operates to prevent the localized stresses caused by the tilting of the pressure members is shown in FIGS. **6** and **7**. Like reference numerals are used to identify like components previously described with reference to FIGS. **1** through **3**. In this embodiment, a separate top end connector **50** is used to connect the top ends of the pressure members **4** together. Use of the top end connector **50** helps to prevent the top ends of the pressure members **4** from tilting away from the monopole **10**. As shown in FIGS. **6** and **7**, two flanges **52** are mounted to the top side of each of the upper pressure plates **20**. The flanges **52** are disposed near the lateral ends of the pressure plates **20** and are arranged such that each flange **52** of a first pressure member **4** faces a flange **52** of an adjacent pressure member **4**. Each of the facing pairs of flanges **52** receive an end of a threaded member **54**. A threaded connector **56** is threaded on each end of the threaded members **54** to the outside of flanges **52**. The threaded member **54** is positioned at or above the top end of the pressure member **4**. The top end of the pressure member **4** may be defined by the upper pressure plate **20** as is the case with the embodiment shown in FIGS. **6** and **7** where the threaded member **54** is positioned above the upper pressure plate **20**. The threaded member **54** may be connected to the upper pressure plate **20** as shown in FIGS. **6** and **7**. When the collar mount **2** is mounted on a monopole **10** the threaded connectors **56** are tightened on the threaded members **54** such that the upper pressure plates **20** are pulled into tight engagement with the monopole **10**. The While separate flanges **52** are shown connected to the pressure plates **20**, the flanges **52** may be made as one piece with the upper pressure plates **20**. In the embodiment shown in FIGS. **6** and **7**, in addition to the upper end connector **50**, four threaded members **6** connect the adjacent pressure members **4** to one another rather than the two threaded members **6** shown in FIG. **1**. The additional threaded members **6** also help to prevent the tilting of the pressure members **4** to thereby minimize the localized stresses created on the monopole **10**.

Another embodiment of a pressure member **70** usable with a collar mount **2** that functions to prevent the localized stresses caused by the tilting of the pressure members **4** is shown in FIGS. **8** through **10**. In this embodiment, a larger contact area between the pressure member **70** and the monopole **10** is provided. The pressure member **70** comprises an exterior plate **72** that includes a connection area **74** for connecting the plate **72** to the standoff arm **14** such as described with respect to FIG. **1**. The connection area **74** may include holes **76** for receiving bolts that connect the standoff arm **14** to the pressure member **70**. A plurality of pressure plates **78** are connected to the exterior plate **72** where the pressure plates **78** face and contact the monopole **10** when the collar mount is installed. The pressure plates **78** have a shallow V-shape recess **79** that allows the pressure plates **78** to be connected to either a cylindrical monopole or a polygonal cylindrical monopole. Each pressure plate **78** have a width direction W that extends parallel to the monopole and a thickness direction T that extends perpendicular to the width direction and to the monopole **10** where the pressure plate **78** is significantly larger in the width direction W than in the thickness direction T.

A reinforcement rib **80** is provided between the exterior plate **72** and the pressure plates **78** to reinforce and prevent unwanted deflection of the pressure plates **78**. The pressure plates **78** include apertures **82** for receiving threaded members **6** such that the pressure members **70** may be connected to the monopole **10** as previously described. Unlike the pressure plates **20**, **22** of the previously described embodiments, the pressure plates **78** are arranged with the wider, flat surfaces **84** (rather than the narrow edge in the prior embodiments) facing the monopole **10**. The flat surfaces **84** present a much larger surface area to monopole **10** than the leading edges **20***a*, **20***b* such that the forces on the monopole **10** are spread over a much larger surface area to thereby reduce localized stresses on the monopole **10**. This is accomplished without using a single, large uninterrupted surface that requires that the pretension load generated by threaded members **6** to secure such a design to the monopole is greater than the load capacity of the monopole. In the embodiment of FIGS. **8** and **9** three pressure plates **78** are used and in the embodiment of FIG. **10** two pressure plates **78** are used. In the embodiment of FIG. **10**, a reinforcement flange **90** is provided along each side of the plate **72**. The reinforcement flange **90** may include additional apertures **82** for receiving additional threaded members **6**.

The present inventive concepts have been described above with reference to the accompanying drawings. The present inventive concepts are not limited to the illustrated embodiments. Rather, these embodiments are intended to fully and completely disclose the present inventive concepts to those skilled in this art. In the drawings, like numbers refer to like elements throughout. Thicknesses and dimensions of some components may be exaggerated for clarity.

Spatially relative terms, such as "under," "below," "lower," "over," "upper," "top," "bottom," and the like, may be used herein for ease of description to describe one element or feature's relationship to another element(s) or feature(s) as illustrated in the figures. It will be understood that the spatially relative terms are intended to encompass different orientations of the device in use or operation in addition to the orientation depicted in the figures. For example, if the device in the figures is turned over, elements described as "under" or "beneath" other elements or features would then be oriented "over" the other elements or features. Thus, the example term "under" can encompass both an orientation of over and under. The device may be otherwise oriented (rotated 90 degrees or at other orientations) and the spatially relative descriptors used herein interpreted accordingly.

Herein, the terms "attached," "connected," "interconnected," "contacting," "mounted," and the like can mean either direct or indirect attachment or contact between elements, unless stated otherwise.

Well-known functions or constructions may not be described in detail for brevity and/or clarity. As used herein the expression "and/or" includes any and all combinations of one or more of the associated listed items.

The terminology used herein is for the purpose of describing particular embodiments only and is not intended to be

limiting of the present inventive concepts. As used herein, the singular forms "a," "an," and "the" are intended to include the plural forms as well, unless the context clearly indicates otherwise. It will be further understood that the terms "comprises," "comprising," "includes," and/or "including" when used in this specification, specify the presence of stated features, operations, elements, and/or components, but do not preclude the presence or addition of one or more other features, operations, elements, components, and/or groups thereof.

The invention claimed is:

1. A collar mount, the collar mount comprising:

a plurality of pressure members, each of the plurality of pressure members comprising an upper pressure plate and a lower pressure plate each having a forward edge configured to engage a base station monopole at a pressure point;

a dispersement plate connected to each upper pressure plate and each lower pressure plate via a connection mechanism, each dispersement plate configured to be positioned at the pressure point between the forward edge of the respective pressure plate and the base station monopole; and

wherein each connection mechanism is configured to hold the respective dispersement plate in non-rigidly fixed position relative to the respective pressure plate, thereby allowing the collar mount to be in a tilted position relative to the base station monopole while each dispersement plate is in a flush and parallel position with an outer surface of the base station monopole.

2. The collar mount according to claim **1**, wherein the plurality of pressure members are spaced evenly about the collar mount.

3. The collar mount according to claim **1**, wherein the plurality of pressure members are connected by a plurality of threaded members.

4. The collar mount according to claim **3**, wherein at least one of the plurality of threaded members is connected between each two adjacent pressure members of the plurality of pressure members.

5. The collar mount according to claim **3**, wherein two of the plurality of threaded members are connected between each two adjacent pressure members of the plurality of pressure members.

6. The collar mount according to claim **3**, wherein four of the plurality of threaded members are connected between each two adjacent pressure members of the plurality of pressure members.

7. The collar mount according to claim **3**, wherein a threaded connector engages each of the plurality of threaded members.

8. The collar mount according to claim **1**, wherein the upper pressure plate and a lower pressure plate are configured to extend substantially perpendicular to the base station monopole.

9. The collar mount according to claim **1**, wherein a support plate is connected between the upper pressure plate and the lower pressure plate.

10. The collar mount according to claim **9**, wherein a standoff arm extends from the support plate.

11. The collar mount according to claim **1**, wherein each dispersement plate comprises a relatively small, flat, rigid planar plate.

12. The collar mount according to claim **1**, wherein the connection mechanism comprises a first flange and a second flange opposed to the first flange and a threaded member.

13. A collar mount, the collar mount comprising:

a plurality of pressure members;

a plurality of threaded members connecting the plurality of pressure members, wherein at least one of the plurality of threaded members is connected between each two adjacent pressure members of the plurality of pressure members;

each of the plurality of pressure members comprising a plurality of pressure plates, each of the pressure plates of a respective pressure member being coupled to an exterior plate, each of the plurality of pressure plates having a width direction extending parallel to a corresponding base station monopole and a thickness direction extending perpendicular to the width direction where the pressure plate is significantly larger in the width direction than in the thickness direction,

wherein each of the plurality of pressure plates has a shallow recess configured to receive at least a portion of the corresponding base station monopole.

14. The collar mount according to claim **13**, wherein the exterior plate provides a connection area for connecting the exterior plate to a standoff arm.

15. The collar mount according to claim **13**, comprising a reinforcement rib between the exterior plate and the plurality of pressure plates.

16. The collar mount according to claim **13**, wherein the plurality of pressure plates include a plurality of apertures for receiving one of the plurality of threaded members.

17. A collar mount, the collar mount comprising:

at least three pressure members, wherein adjacent pressure members are connected together via one or more threaded members;

each of the plurality of pressure members comprise an upper pressure plate and a lower pressure plate extending parallel to each other and coupled together via a support plate, the upper and lower pressure plates each having a forward edge configured to engage a base station monopole at a respective pressure point; and

a plurality of dispersement plates, each dispersement plate positioned at the respective pressure points between the forward edges of the upper and lower pressure plates and the base station monopole,

wherein each dispersement plate is non-rigidly connected to the respective upper and lower pressure plates.

18. The collar mount according to claim **17**, wherein each dispersement plate comprises a connection mechanism for connecting the dispersement plate to the respective upper or lower pressure plate.

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