US 20190280392A1

(19) United States

(12) Patent Application Publication

Wilde et al.

(10) Pub. No.: US 2019/0280392 A1

(43) Pub. Date: Sep. 12, 2019

(54) SPACE FRAME ANTENNA

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(21) Appl. No.: **16/351,265**

(22) Filed: **Mar. 12, 2019**

Related U.S. Application Data

(60) Provisional application No. 62/641,586, filed on Mar. 12, 2018.

Publication Classification

(51) **Int. Cl.**

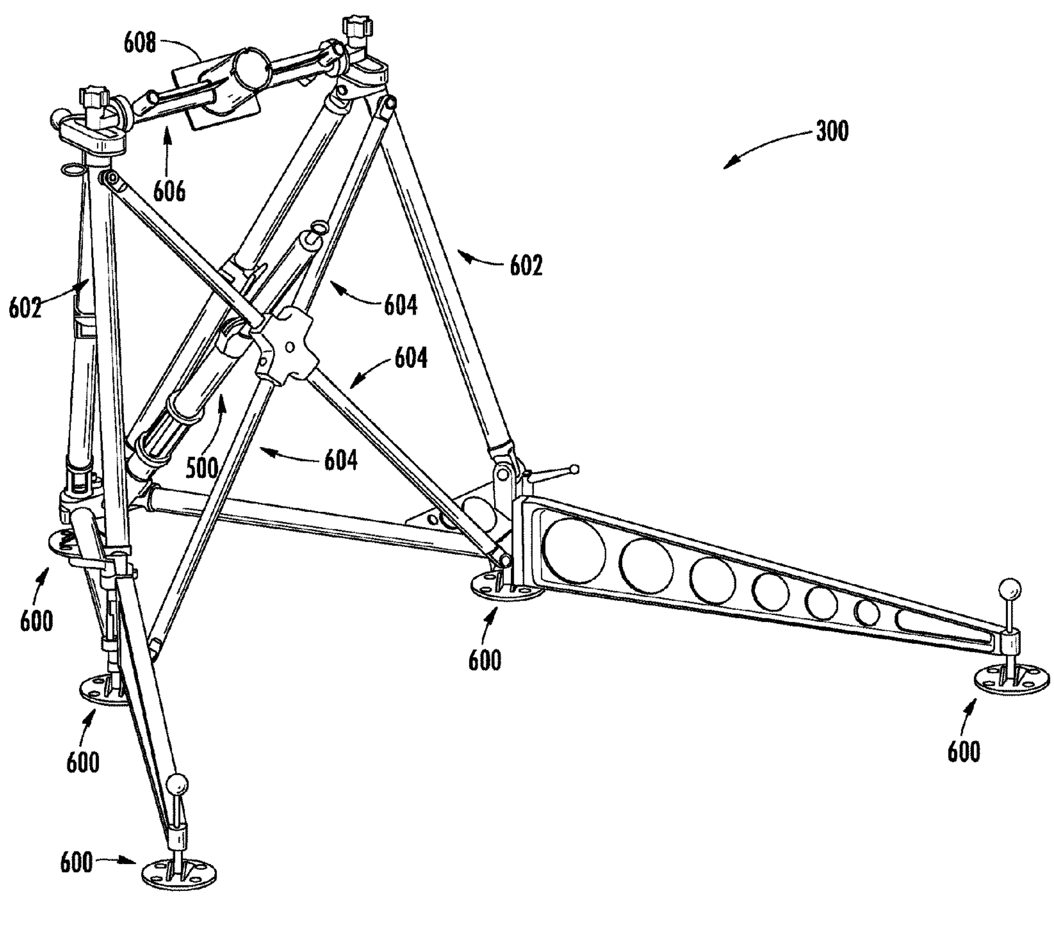
H01Q 15/16	(2006.01)
H01Q 3/08	(2006.01)
H01Q 1/12	(2006.01)
H01Q 15/20	(2006.01)

(52) **U.S. Cl.**

CPC ***H01Q 15/162*** (2013.01); ***H01Q 3/08*** (2013.01); ***H01Q 1/1235*** (2013.01); ***H01Q 15/20*** (2013.01); ***H01Q 1/125*** (2013.01)

(57) **ABSTRACT**

A lightweight and portable space frame antenna includes a first plurality of reflector panels and a second plurality of reflector panels each being sized and configured such that each one of said first plurality of reflector panels can be nested inside a corresponding one of said second plurality of reflector panels, thereby defining a nested pairing; a plurality of helical cam latching devices for joining together each of the first and second pluralities of reflector panels; a reflector hub consisting of two pieces, wherein the first and second pluralities of reflector panels are mounted on the reflector hub to form a parabolic reflector; a foldable positioner for supporting the parabolic reflector; a telescoping actuator that is structured and disposed for providing elevation adjustment and may be selectively disconnected from the parabolic reflector; and an elevation-azimuth bar that is structured and disposed for providing azimuth adjustment through a bearing-free azimuth rotation.



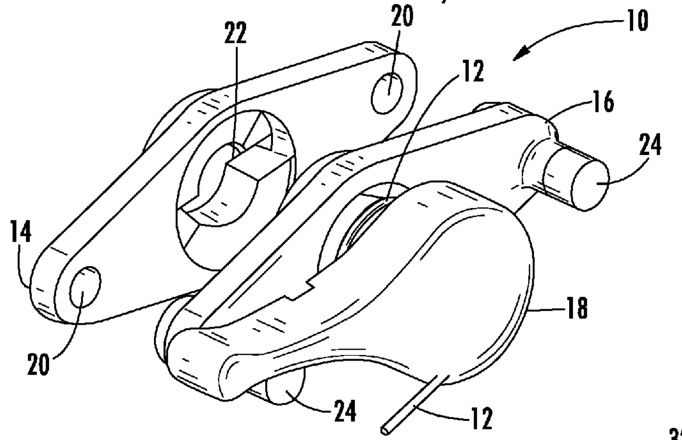


FIG. 1

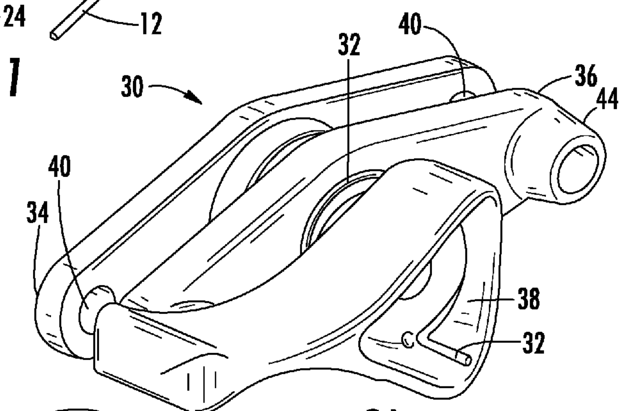


FIG. 2A

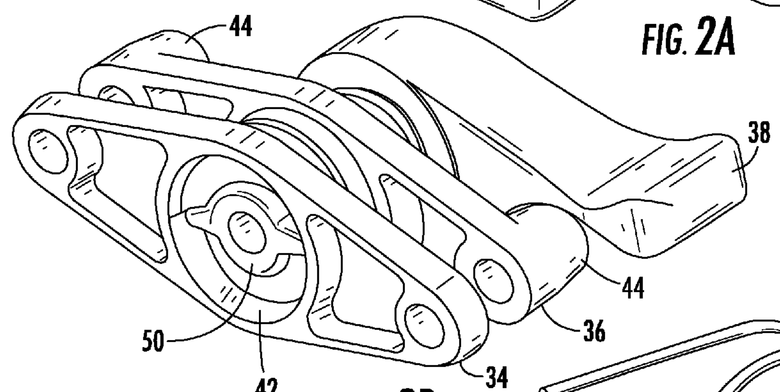


FIG. 2B

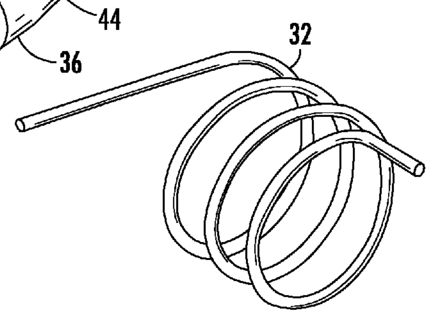
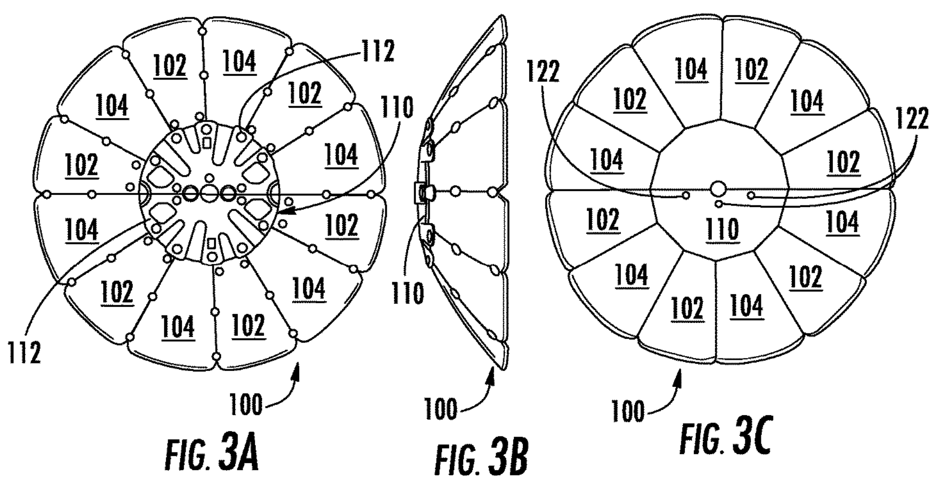


FIG. 2C



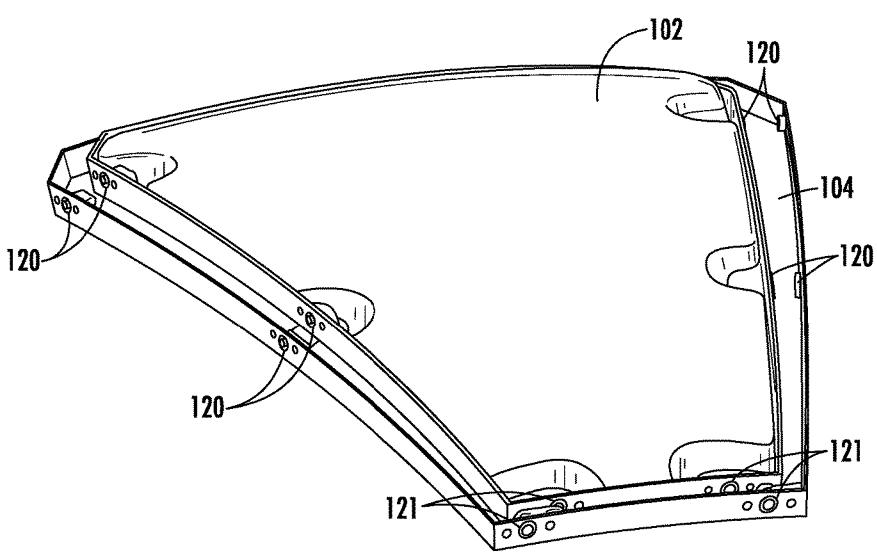


FIG. 4

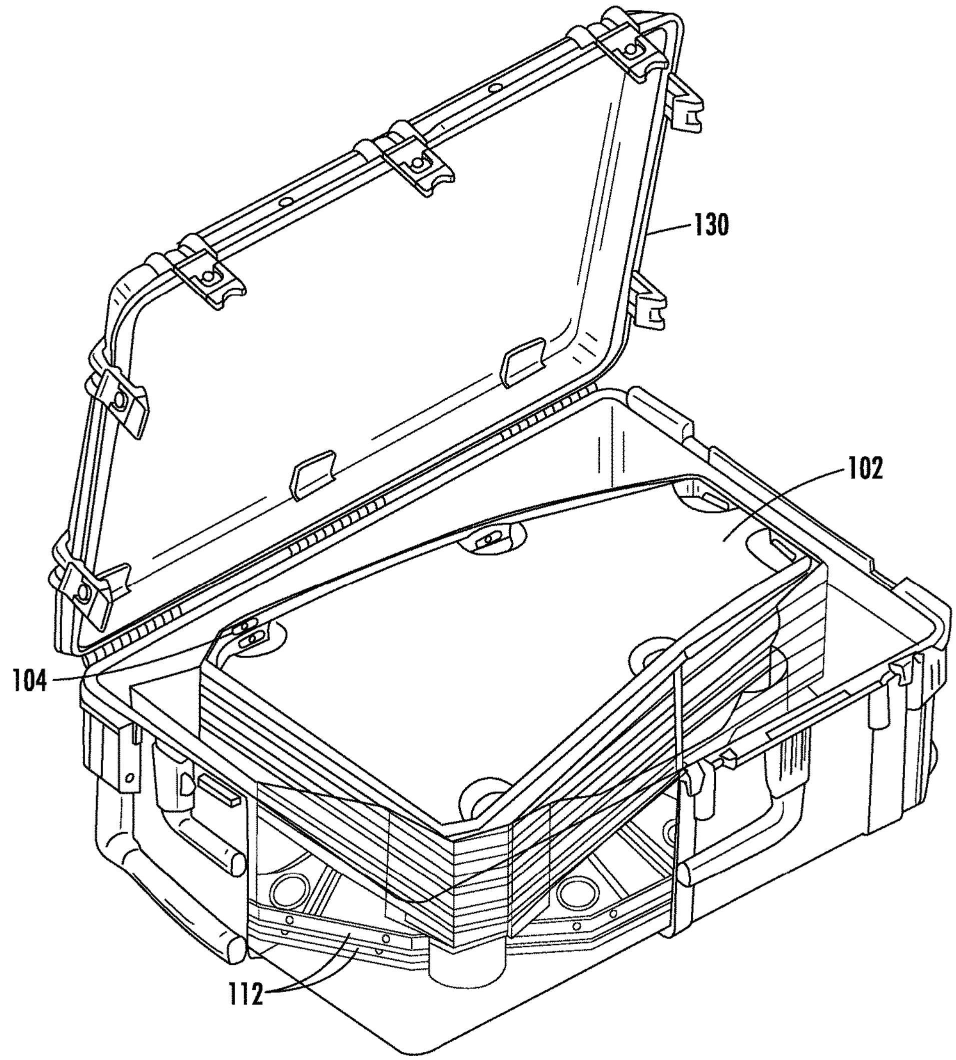


FIG. 5

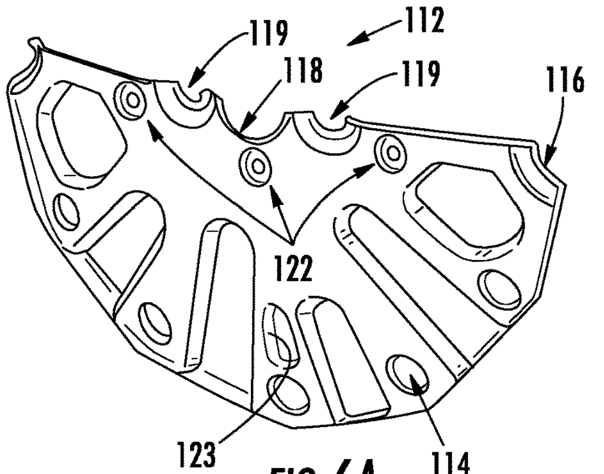


FIG. 6A

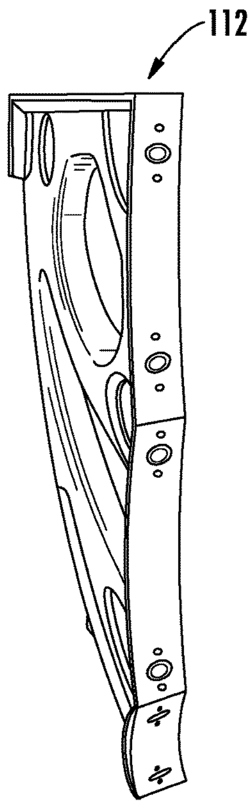


FIG. 6B

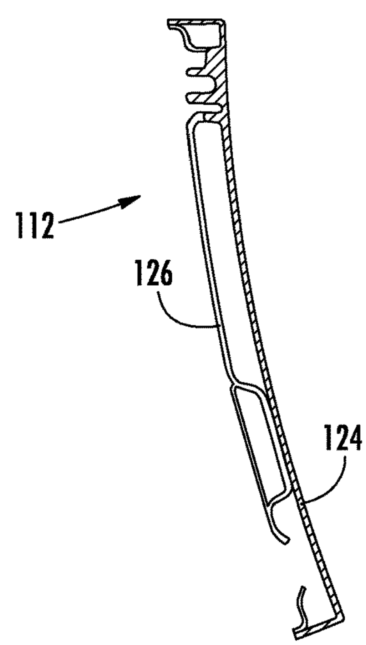


FIG. 6C

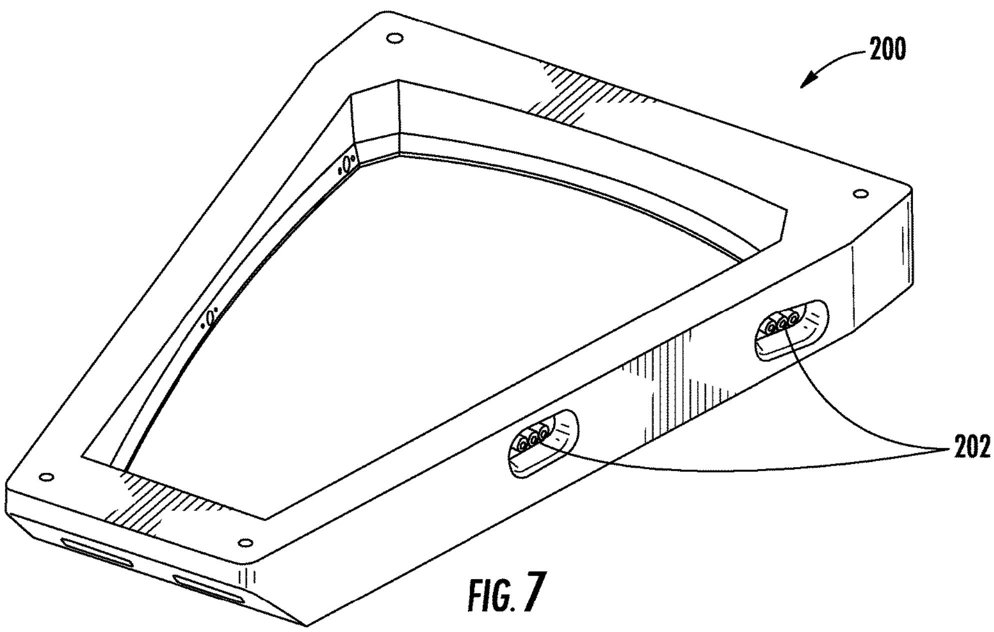


FIG. 7

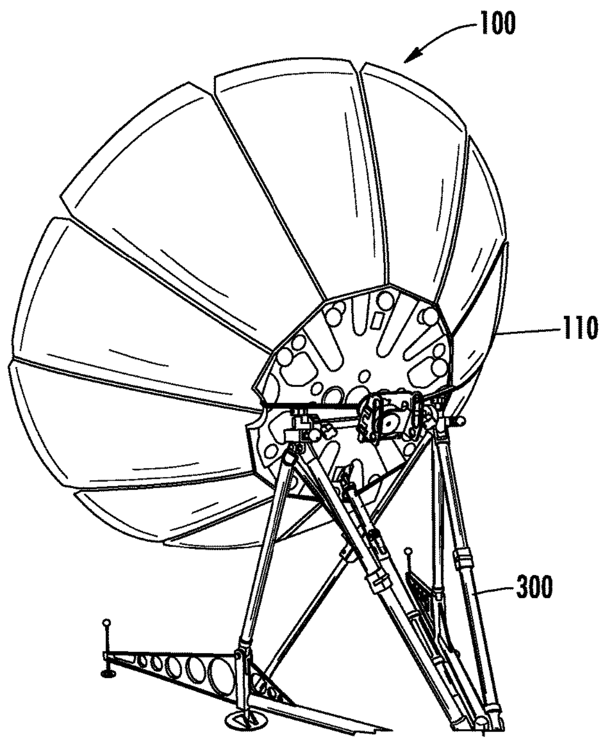


FIG. 8

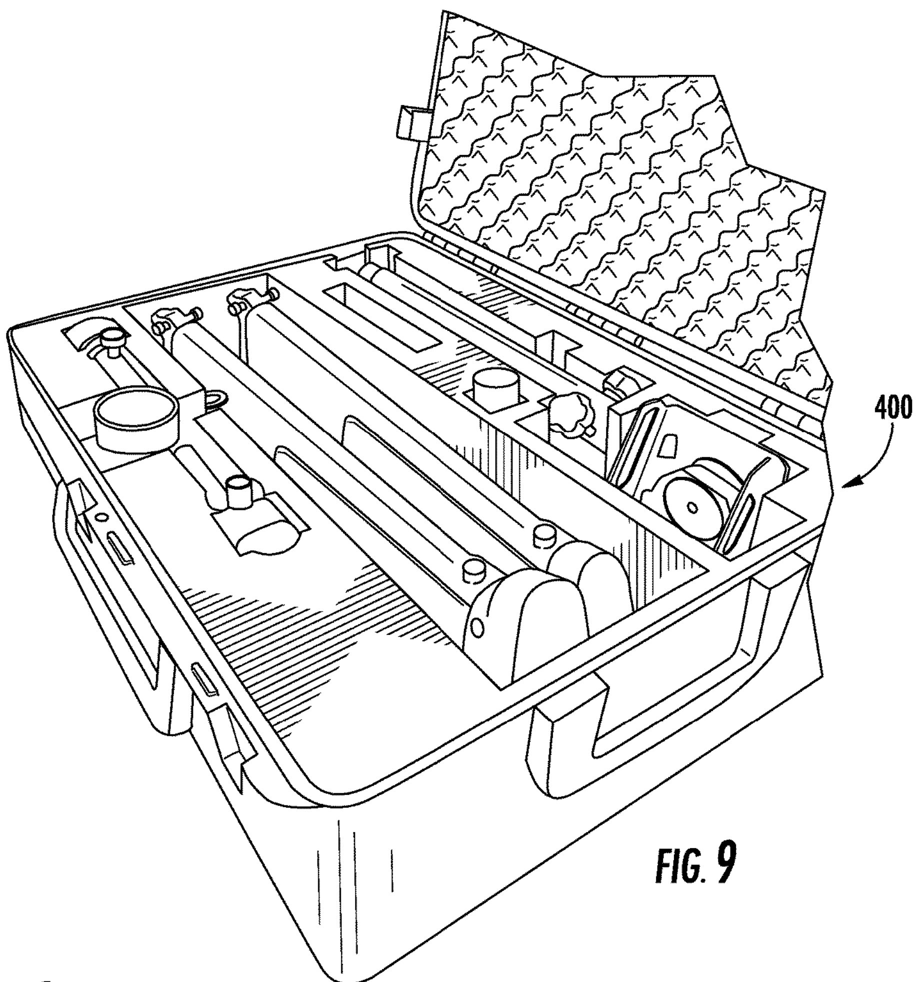


FIG. 9

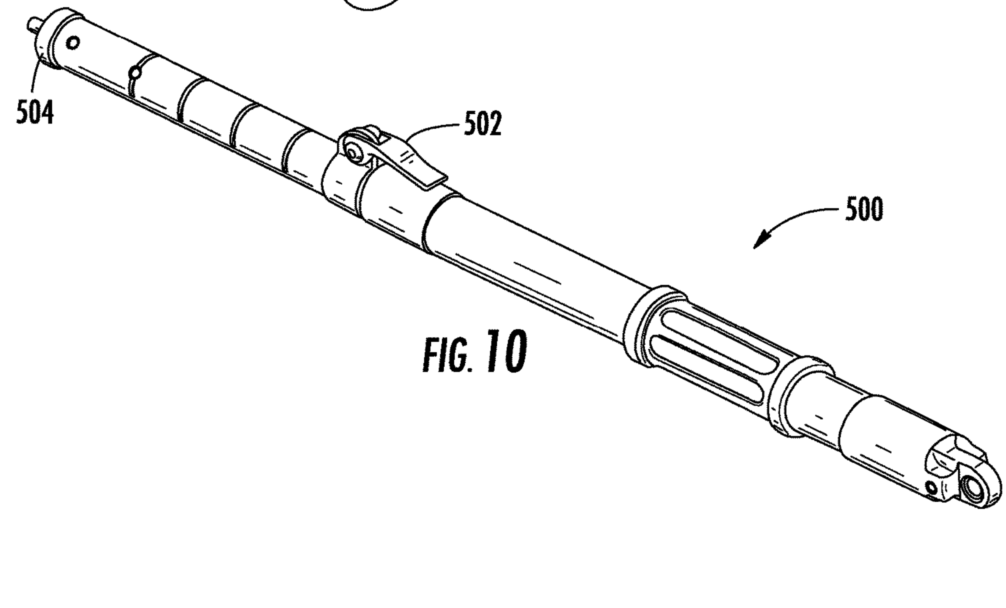


FIG. 10

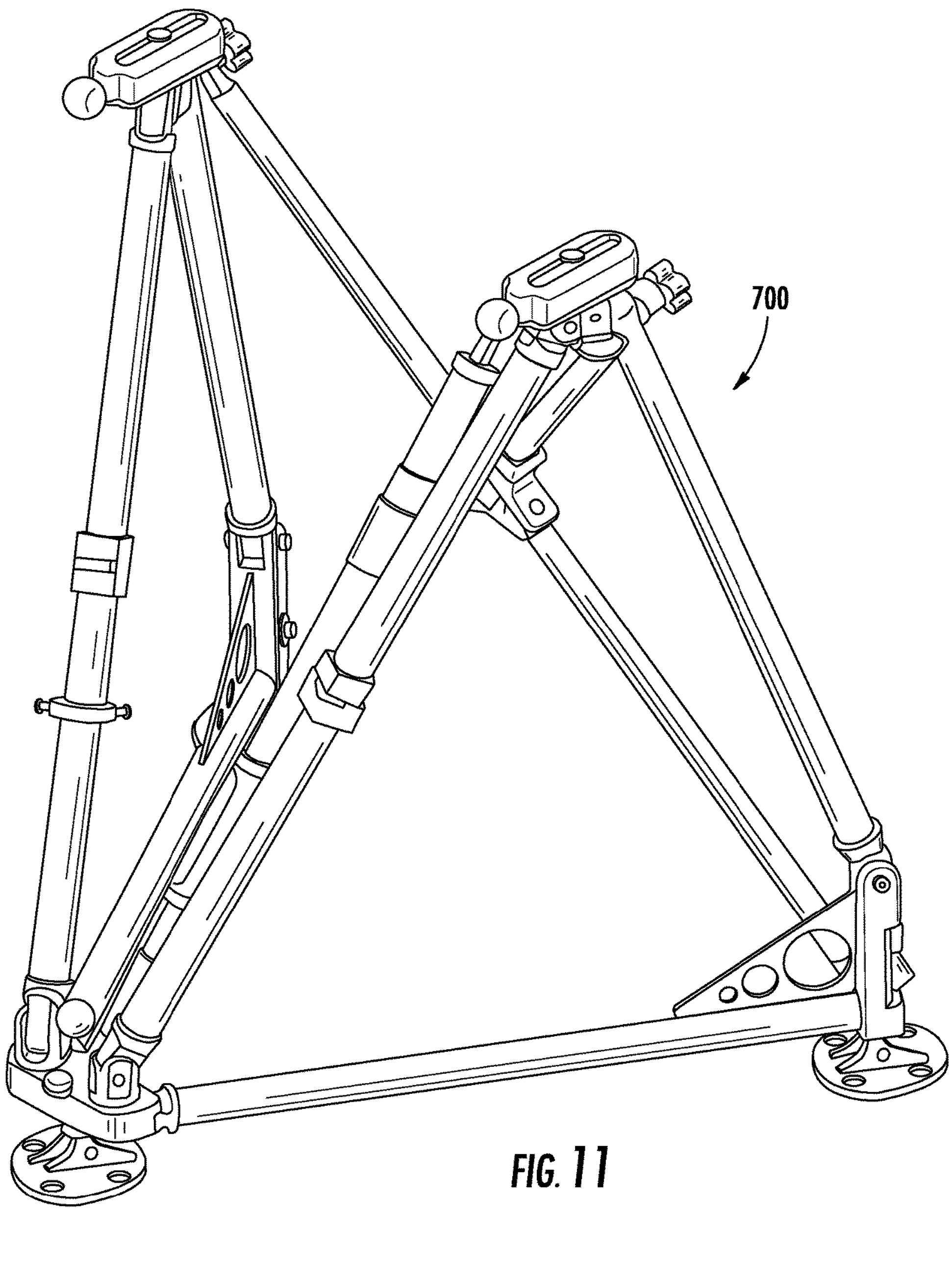


FIG. 11

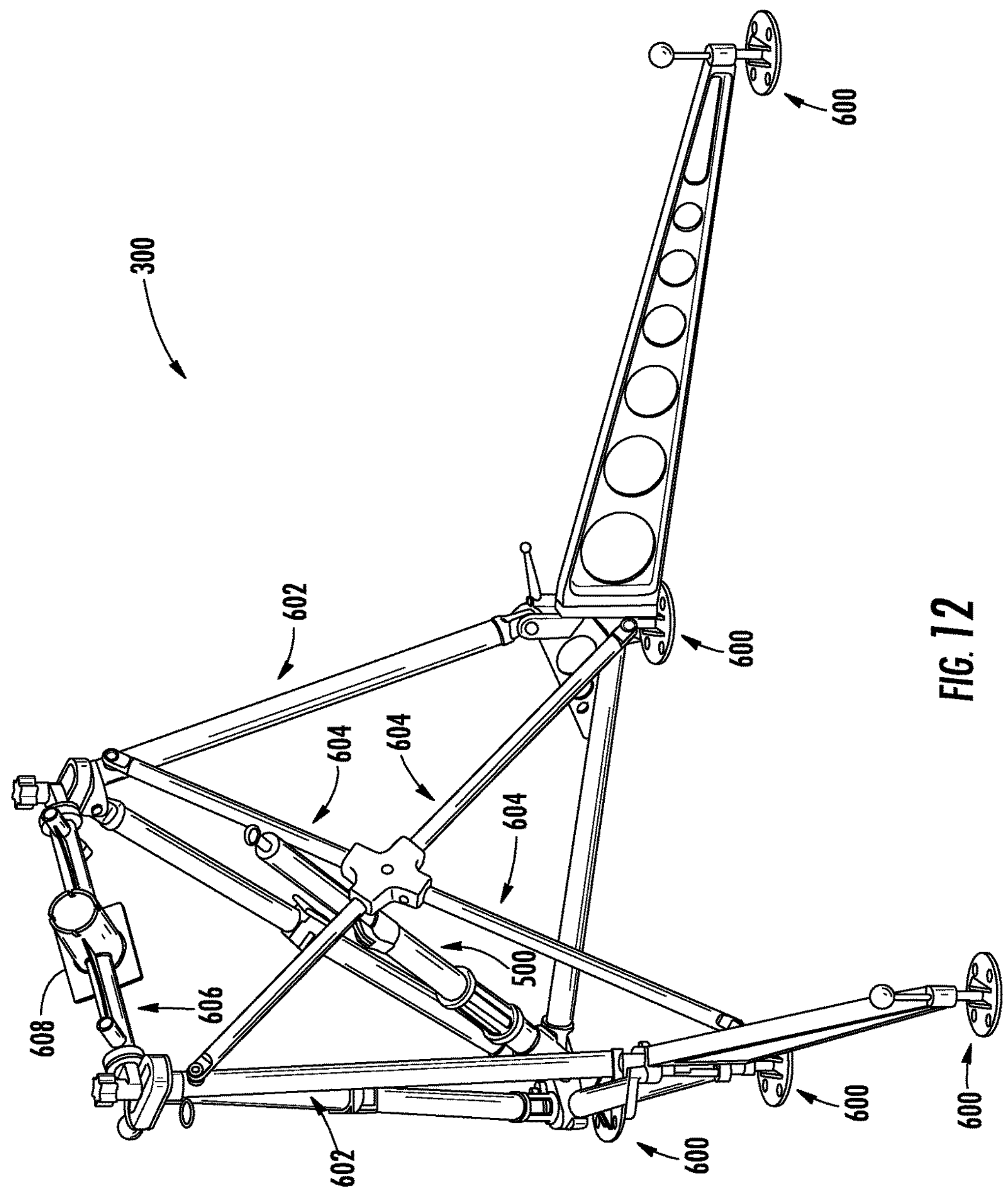


FIG. 12

SPACE FRAME ANTENNA

RELATED APPLICATION

[0001] This application claims the benefit of U.S. Provisional Patent Application Ser. No. 62/641,586 filed on Mar. 12, 2018.

FIELD OF THE INVENTION

[0002] This invention relates to a space frame antenna and, more specifically, a 2.0M portable antenna with nesting panels and bearing-free azimuth adjustment.

BACKGROUND OF THE INVENTION

[0003] Space frame antennas are lightweight, portable and versatile for geostationary satellite acquisition and peaking required for a specific use. Typically, a space frame antenna has a dish-type reflector and a positioner that is steerable while supporting the reflector. Traditional designs in the 2.0M class antennas are bulky and cannot be packed very efficiently. In the satellite industry to date, the high packability of a 2.0M class of space frame antenna has been somewhat achieved utilizing an inflatable ball and a prime focus feed mounted on the exterior of the ball. While this inflatable approach is useful for its intended purpose, there still exists considerable drawbacks relating to the high-volume storage needs for transporting the antenna and associated parts.

[0004] There exists a need in the art for a space frame antenna including a highly packable parabolic reflector and a collapsible positioner that is both space efficient and weight efficient.

SUMMARY OF THE INVENTION

[0005] In accordance with one form of the present invention, there is provided a lightweight and portable space frame antenna, the antenna including a first plurality of reflector panels and a second plurality of reflector panels each being sized and configured such that each one of said first plurality of reflector panels can be nested inside a corresponding one of said second plurality of reflector panels, thereby defining a nested pairing of reflector panels; a plurality of helical cam latching devices each being structured and disposed for joining each of the first plurality of reflector panels and each of the second plurality of reflector panels; a reflector hub consisting of two semi-circle pieces, wherein the first plurality of reflector panels and the second plurality of reflector panels are mounted on the reflector hub to form a parabolic reflector; and a foldable positioner that is sized and configured for supporting the parabolic reflector and both elevation and azimuth adjustments; a telescoping actuator that is structured and disposed for providing elevation adjustment and may be selectively disconnected from the parabolic reflector; and an elevation-azimuth bar that is structured and disposed for providing azimuth adjustment through a bearing-free azimuth rotation.

[0006] In accordance with another form of the present invention, there is provided a lightweight and portable space frame antenna, the antenna including a first plurality of reflector panels and a second plurality of reflector panels each being sized and configured such that each one of said first plurality of reflector panels can be nested inside a corresponding one of said second plurality of reflector panels, thereby defining a nested pairing of reflector panels; a plurality of helical cam latching devices each being structured and disposed for joining each of the first plurality of reflector panels and each of the second plurality of reflector panels; a reflector hub consisting of two pieces, wherein the first plurality of reflector panels and the second plurality of reflector panels are mounted on the reflector hub in a bi-chordal and bi-radial (BCBR) configuration to form a parabolic reflector; and a foldable positioner that is sized and configured for supporting the parabolic reflector and both elevation and azimuth adjustments; a telescoping actuator that is structured and disposed for providing elevation adjustment and may be selectively disconnected from the parabolic reflector; and an elevation-azimuth bar that is structured and disposed for providing azimuth adjustment through a bearing-free azimuth rotation

[0007] In accordance with another form of the present invention, there is provided a method for erecting a lightweight and portable space frame antenna including the steps of forming a reflector hub by joining two semi-circle pieces; mounting a first plurality of reflector panels and a second plurality of reflector panels in a bi-chordal and bi-radial (BCBR) configuration to form a parabolic reflector; each of the first plurality of reflector panels and the second plurality of reflector panels being sized and configured such that each one of said first plurality of reflector panels can be nested inside a corresponding one of said second plurality of reflector panels; and supporting the parabolic reflector by a foldable positioner, wherein a telescoping actuator and an elevation-azimuth bar are structured and disposed for providing elevation adjustment and bearing-free azimuth adjustment for geostationary satellite acquisition.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] For a fuller understanding of the nature of the present invention, reference should be made to the following detailed description, taken in conjunction with the accompanying drawings in which:

[0009] FIG. **1** is a perspective view of a machined aluminum version of a helical cam latching device;

[0010] FIG. **2**A is a front elevational of an injection molded embodiment of the helical cam latching device;

[0011] FIG. **2**B is a perspective view of the injection molded embodiment of the helical cam latching device;

[0012] FIG. **2**C is a perspective view of a loaded spring within the helical cam latching device in both axial and torsional directions;

[0013] FIG. **3**A is a rear elevational view of the symmetric parabolic reflector in a bi-chordal and bi-radial (BCBR) configuration;

[0014] FIG. **3**B is a side elevational view of the symmetric parabolic reflector in a bi-chordal and bi-radial (BCBR) configuration;

[0015] FIG. **3**C is a front elevational view of a symmetric parabolic reflector in a bi-chordal and bi-radial (BCBR) configuration;

[0016] FIG. **4** illustrates a 28-degree reflector panel nested inside a 32-degree reflector panel;

[0017] FIG. **5** illustrates a transit case for the nested reflector panels in a vertical stack;

[0018] FIG. **6**A illustrates a perspective view of a semi-circle piece of the reflector hub;

[0019] FIG. **6**B illustrates a top plan view of a semi-circle piece of the reflector hub;

[0020] FIG. **6C** illustrates a cross-sectional view of a semi-circle piece of the reflector hub;

[0021] FIG. **7** is a carbon fiber layup tool for forming the reflector panels with highly repeatable mounting features;

[0022] FIG. **8** is an assembled symmetric parabolic reflector supported by a positioner that is foldable;

[0023] FIG. **9** is a transportation case accommodating the packed positioner;

[0024] FIG. **10** is a telescoping actuator for adjustment in elevation;

[0025] FIG. **11** illustrates a prior art design of a positioner without high-efficient packability; and

[0026] FIG. **12** illustrates a bearing-free azimuth adjustment mechanism of the foldable positioner.

[0027] Like reference numerals refer to like parts throughout the several views of the drawings.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0028] Referring to the several views of the drawings, a space frame antenna including a symmetric parabolic reflector with two different sized reflector panels which are joined in a bi-chordal and bi-radial (BCBR) configuration and a foldable positioner with fine azimuth adjustment is shown.

[0029] Referring initially to FIGS. **1** and **2**, a helical cam latching device **10** is shown. The helical cam latching device **10** may be formed using a variety of materials and methods. In one embodiment, the helical cam latching device **10** is a machined aluminum version. In the other embodiment, the helical cam latching device **10** is an injection molded version. The helical cam latching device **10** is structured and disposed for joining panels of a multi-panel parabolic reflector.

[0030] In accordance with one embodiment, and referring specifically to FIG. **1**, the helical cam latching device **10** is formed from machined aluminum and includes a spring **12**, a cam **14**, a base **16**, and a lever **18**. The lever **18** serves as a handle for operation of the helical cam latching device **10**. At opposing ends of the cam **14** there are two small through-holes **20**. The base **16** includes rivets **24** at opposing ends of the base **16**, each forming a positive stop for the spring-loaded lever **18** as it is actuated between the open and closed positions. The machined aluminum embodiment of the helical cam latching device **10** is a quarter turn latch such that the lever **18** can be selectively rotated back and forth ninety (90) degrees between the latched and unlatched positions. When the lever **18** is in the latched position, the spring **12** is loaded in both axial and torsional directions. The respective ranges of the axial and rotational motions are each restricted by the retainer (not shown) once it is riveted into the keyhole **22** on the cam **14**. Further, the use of the spring **12** provides a zero-backlash connection that accommodates reflector panels of varying thicknesses.

[0031] Referring now to FIGS. **2A** and **2B**, another embodiment of the helical cam latching device **10** is formed from injection molding. The injection molding process more readily provides for an ergonomic design of the helical cam latching device **10**, and includes a spring **32**, a cam **34**, a base **36**, and a lever **38**. The lever **38** serves as a handle for operation of the helical cam latching device **10**. There is a through-hole **40** at opposing ends of the cam **34**. Rivets **44** at opposing ends of the base **36**, each extending towards the lever **38**, each form a positive stop for the spring-loaded lever **38** as it is actuated between the open and closed positions. The injection molded version of the helical cam latching device **10** is also a quarter turn latch, such that the lever **38** can be selectively rotated back and forth ninety (90) degrees between the latched and unlatched positions. When the lever **38** is in the latched position, the spring **32** is loaded in both axial and torsional directions. The respective ranges of the axial and rotational motions are each restricted by the retainer **50** once it is riveted into the keyhole **42** of the cam **34**. Also, the use of the spring **32** provides a zero-backlash connection that accommodates reflector panels of varying thicknesses. Still referring to FIG. **2B**, the retainer **50** of the lever **38** is riveted in the keyhole **42** of the cam **34**.

[0032] FIGS. **3A-3C** illustrates a symmetric parabolic reflector **100** in a bi-chordal and bi-radial (BCBR) configuration, including a plurality of each of 28-degree and 32-degree panels **102** and **104**. In one embodiment, the symmetric parabolic reflector **100** includes six (6) 28-degree reflector panels **102** and six (6) 32-degree reflector panels **104**. As indicated, the central angle of the arc of each 28-degree reflector panel **102** is 28°, while the central angle of the arc of each 32-degree reflector panel **104** is 32°. The 28-degree reflector panels **102** and 32-degree reflector panels **104** are joined together in an alternating arrangement to form the symmetric parabolic reflector **100** and each reflector panel is mounted on a reflector hub **110** which resides internal of the symmetric parabolic reflector **100**.

[0033] Referring to FIG. **3A**, the front elevational view shows the geometry of the reflector hub **110** and the symmetric parabolic reflector **100** are two concentric circles. The reflector hub **110** is made of two semi-circle pieces **112** associated with each other. The assembled symmetric parabolic reflector **100** includes the reflector panels, i.e. the 28-degree reflector panels **102** and 32-degree reflector panels **104**, secured to the perimeter of the reflector hub **110**. The connection between one 28-degree reflector panel **102** and one 32-degree reflector panel **104** is secured by two helical cam latching devices **10**. Each reflector panel **102** and **104** is mounted on the reflector hub **110** via two helical cam latching devices **10**. The difference in the central angels of the 28-degree reflector panels **102** and 32-degree reflector panels **104** is featured as bi-chordal.

[0034] Referring to FIG. **3B**, the assembled symmetric parabolic reflector **100** is shown mounted on the reflector hub **110**. Referring to FIG. **3C**, the length in the radial direction of the 28-degree reflector panel **102** is 28 inches, while the length in the radial direction of the 32-degree reflector panel **104** is 29 inches. The difference in the radial lengths of the reflector panels, i.e. the 28-degree reflector panels **102** and the 32-degree reflector panels **104**, is featured as bi-radial. This bi-chordal and bi-radial (BCBR) configuration of the symmetric parabolic reflector **100** provides sufficient room for the helical cam latching devices **10** to join the 28-degree reflector panels **102** and the 32-degree reflector panels **104**. In addition, the differences in the sizes of the reflector panels, i.e. the central angles of the arc and the radial lengths, proves suitable for high packability wherein the 28-degree reflector panels **102** may be nested inside the 32-degree reflector panels **104**.

[0035] FIG. **4** illustrates the 28-degree reflector panel **102** nested inside the 32-degree reflector panel **104**. There are two recessed pockets on each side edge of each reflector panel **102**, providing access to attachment points **120**. In one embodiment, the recessed pockets are semi-circle pockets. When two adjacent reflector panels **102** and **104** are joined together, the attachment points **120** on the respective reflector panels **102** and **104** are in alignment with each other. The helical cam latching devices **10** are then used to secure two adjacent reflector panels **102** and **104** together. When reflector panels **102** and **104** and the reflector hub **110** are put together, two attachment points **121** on each of the reflector panels **102** and **104** are configured for the helical cam latching devices **10** to mount the reflector panels **102** and **104** on the reflector hub **110**. There are two additional recessed pockets at both corners of the inner arc of each reflector panel **102** surrounding the corresponding attachment point **121**. In one embodiment, these recessed pockets are also semi-circle pockets. Due to the different sizes of the 28-degree reflector panel **102** and the 32-degree reflector panel **104** in both chordal and radial directions, the 28-degree reflector panel **102** can be entirely nested inside the 32-degree reflector panel **104**.

[0036] Referring to FIG. **5**, multiple pairings of nested reflector panels **102** and **104** form a well-defined vertical stack that fits efficiently and effectively in a transit case **130**. In one embodiment, all reflector panels **102** and **104**, two pieces of the reflector hub **110**, and all required helical cam latching devices **10** are stored in the transit case **130**.

[0037] FIGS. **6**A-**6**C illustrate a semi-circle piece **112** which forms a portion of the reflector hub **110**. As previously stated, the reflector hub **110** is formed from two semi-circle pieces **112**, and the combined contour of the outer perimeter of the assembled reflector hub **110** fits the inner arc of the ring of the reflector panels **102** and **104**. The semi-circle piece **112** is a hollowed carbon fiber thin-walled lightweight structure with a contoured parabolic carbon fiber reflector back structure (see below) for providing sufficient bending and torsional stiffness for operation of the reflector hub **110** in windy conditions.

[0038] Referring to FIG. **6**A, the semi-circle piece **112** includes five circled recessed pockets **114** along its outer contour allowing for latch access and providing local wall reinforcement to resist loading from the mounted reflector panels **102** and **104**. Two recessed semi-circular pockets **116** are located on both ends of the outer contour of the semi-circle piece **112**. Along the flat end of the semi-circle piece **112**, there is a recessed pocket **118** in the middle and two smaller pockets **119** on opposing sides of the recessed pocket **118**. When two semi-circle pieces **112** are put together, recessed pockets are formed for the helical cam latching device **10** to bond the two semi-circle pieces **112**, thereby forming the reflector hub **110**. There are three additional recessed pockets **122** for assisting in mounting of the symmetric parabolic reflector **100** to the foldable positioner **300**. An aluminum insert **123** provides a connection point for an elevation jack (see below) as well as a pocket for low profile storage of a spherical rod end joint.

[0039] Referring to FIGS. **6**B and **6**C, the top view of the semi-circle piece **112** and a cross-sectional view indicate its size, shape and the bonding structures for mounting the reflector panels **102** and **104** on the reflector hub **110**. Integral hard points provide a precision mounting surface for accurately aligning the back side of the symmetric parabolic reflector **100** relative to the vertex of the parabola and ties together structurally the front skin **124** and the embossed carbon fiber back skin **126**, which stiffens the overall carbon fiber structure.

[0040] FIG. **7** illustrates a carbon fiber layup tool **200** for forming the reflector panels **102** and **104** with highly repeatable mounting features on the sidewall regions of the reflector panels **102** and **104**. In one embodiment, the carbon fiber layup tool **200** is a case enclosing a space in the shape of the reflector panel **102**. In another embodiment, the carbon fiber layup tool **200** is a case enclosing a space in the shape of the reflector panel **104**. Along each side of the carbon fiber layup tool **200**, there are two recessed slots each containing three molding inserts **202**. The manufacturing of the reflector panels **102** and **104** is a vacuum infusion process. The carbon fiber layup tool **200** provides retractable features that allow the key mounting feature to be molded into the infused carbon fiber structure and then easily retracted to allow part ejection from the carbon fiber layup tool **200**. The retractable features are sealed for use with the vacuum infusion process and have a positive stop position to ensure position repeatability of the inserts that assure feature repeatability.

[0041] FIG. **8** illustrates an assembled symmetric parabolic reflector **100** supported by a foldable positioner **300**. The foldable positioner **300** is sturdy enough for the 2.0M antenna to operate in gusting winds. The elevation and azimuth adjustments of the foldable positioner **300** ensure the position and the orientation of the antenna for geostationary satellite acquisition and peaking. The foldable positioner **300** has a stable base that provides for leveling and serves as an anchor to avoid tipping over. Referring to FIG. **9**, the foldable positioner **300** is highly packable into a relatively small transportation case **400** for storage and transportation thereof.

[0042] FIG. **10** illustrates a telescoping manual actuator **500** for elevation adjustment. The telescoping manual actuator **500** is a lightweight stiff rod with ergonomic design. The movement of the telescoping actuator **500** is smooth enough for both coarse and fine adjustments in elevation for pointing and peaking the symmetric parabolic reflector **100** for geostationary satellite acquisition. An integral gas spring is incorporated to provide positive thrust in the telescoping actuator **500** to aid positioning in low look elevation positions. The telescoping actuator **500** includes a quick release mechanism **502** structured and disposed to permit the rod end **504** to be selectively disconnected from the reflector **100** for easy storage of the telescoping actuator **500**.

[0043] Referring to FIG. **11**, the traditional design of an antenna positioner **700** is generally bulky and not highly packable, thereby making transportation of the antenna positioner **700** relatively difficult. FIG. **12** illustrates the foldable positioner **300** with a bearing-free azimuth adjustment mechanism. The foldable positioner **300** includes upright tubes **602** extending from corresponding height-adjustable sand feet **600**. A first end of the telescoping actuator **500** is pivotally connected to one of the height-adjustable sand feet **600** and the opposing rod end **504** of the telescoping actuator **500** connects to the hub **100** at the aluminum insert **123**. The elevation-azimuth bar **606** is supported by the upright tubes **602** at opposing ends such that no bearing is used to obtain azimuth rotation. An RF package receiver plate **608** of the elevation-azimuth bar **606** is centrally secured to the reflector hub **110**. The vertical motion of the elevation-azimuth bar **606** changes the angle between the upright tubes **602** of the foldable positioner **300**. In such an arrangement, the telescoping actuator **500** does not have an axis of rotation, i.e. bearing-free, for geostationary acquisition. The bearing-free mechanism significantly reduces the load on the overall structure of the foldable positioner **300**. Thus, the foldable positioner **300** can be designed at lower cost and lighter weight for high packability. The smooth motion of the elevation-azimuth bar **606** generates small angle changes of the upright tubes **602** of the foldable positioner **300**, providing fine azimuth adjustment. The fine azimuth adjustment is up to a 20-degree azimuth adjustment by a 10-degree angular movement on both ends of the elevation axis weldment. The foldable positioner **300** also has braking and locking mechanisms to maintain the retention of its position under loads. Moreover, the components of the low-cost, lightweight, highly packable foldable positioner **300** can be selectively packed into a relatively small transportation case **400** (see FIG. **9**).

[0044] From the foregoing description of various embodiments of the invention, it will be apparent that many modifications may be made therein. It is understood that these embodiments of the invention are exemplifications of the invention only and that the invention is not limited thereto.

[0045] While the present invention has been shown and described in accordance with several preferred and practical embodiments, it is recognized that departures from the instant disclosure are contemplated within the spirit and scope of the present invention.

What is claimed is:

1. A lightweight and portable space frame antenna, the antenna comprising:

a first plurality of reflector panels and a second plurality of reflector panels each being sized and configured such that each one of said first plurality of reflector panels can be nested inside a corresponding one of said second plurality of reflector panels, thereby defining a nested pairing of reflector panels;

a plurality of helical cam latching devices each being structured and disposed for joining each of the first plurality of reflector panels and each of the second plurality of reflector panels;

a reflector hub consisting of two semi-circle pieces, wherein the first plurality of reflector panels and the second plurality of reflector panels are mounted on the reflector hub to form a parabolic reflector; and

a foldable positioner that is sized and configured for supporting the parabolic reflector and both elevation and azimuth adjustments; a telescoping actuator that is structured and disposed for providing elevation adjustment and may be selectively disconnected from the parabolic reflector; and an elevation-azimuth bar that is structured and disposed for providing azimuth adjustment through a bearing-free azimuth rotation.

2. The lightweight and portable space frame antenna as recited in claim **1** further comprising a first retractable layup tool that is structured and disposed for forming the first plurality of reflector panels and a second retractable layup tool that is structured and disposed for forming the second plurality of reflector panels, each through a vacuum infusion process.

3. The lightweight and portable space frame antenna as recited in claim **1** further comprising a transit case that is sized and configured for storing the plurality of nested pairings of the first and second pluralities of reflector panels on top of each other.

4. The lightweight and portable space frame antenna as recited in claim **1** further comprising a transportation case that is sized and configured for storing the foldable positioner.

5. The lightweight and portable space frame antenna as recited in claim **1** wherein each of the first plurality of reflector panels is a 28-degree panel.

6. The lightweight and portable space frame antenna as recited in claim **1** wherein each of the second plurality of reflector panels is a 32-degree panel.

7. The lightweight and portable space frame antenna as recited in claim **1** wherein the first plurality of reflector panels and the second plurality of reflector panels are joined together by the plurality of helical cam latching devices in a bi-chordal and bi-radial (BCBR) configuration.

8. The lightweight and portable space frame antenna as recited in claim **1** wherein the reflector hub has an outer contour sized and configured for selectively mounting the first plurality of reflector panels and the second plurality of reflector panels.

9. The lightweight and portable space frame antenna as recited in claim **1** wherein the telescoping actuator provides both coarse and fine elevation adjustments.

10. The lightweight and portable space frame antenna as recited in claim **1** wherein the fine azimuth adjustment is up to a 20-degree azimuth adjustment.

11. A lightweight and portable space frame antenna, the antenna comprising:

a first plurality of reflector panels and a second plurality of reflector panels each being sized and configured such that each one of said first plurality of reflector panels can be nested inside a corresponding one of said second plurality of reflector panels, thereby defining a nested pairing of reflector panels;

a plurality of helical cam latching devices each being structured and disposed for joining each of the first plurality of reflector panels and each of the second plurality of reflector panels;

a reflector hub consisting of two pieces, wherein the first plurality of reflector panels and the second plurality of reflector panels are mounted on the reflector hub in a bi-chordal and bi-radial (BCBR) configuration to form a parabolic reflector; and

a foldable positioner that is sized and configured for supporting the parabolic reflector and both elevation and azimuth adjustments; a telescoping actuator that is structured and disposed for providing elevation adjustment and may be selectively disconnected from the parabolic reflector; and an elevation-azimuth bar that is structured and disposed for providing azimuth adjustment through a bearing-free azimuth rotation.

12. The lightweight and portable space frame antenna as recited in claim **11** further comprising a first retractable layup tool that is structured and disposed for forming the first plurality of reflector panels and a second retractable layup tool that is structured and disposed for forming the second plurality of reflector panels, each through a vacuum infusion process.

13. The lightweight and portable space frame antenna as recited in claim **11** further comprising a transit case that is sized and configured for storing the plurality of nested pairings of the first and second pluralities of reflector panels on top of each other.

14. The lightweight and portable space frame antenna as recited in claim **11** further comprising a transportation case that is sized and configured for storing the foldable positioner.

15. The lightweight and portable space frame antenna as recited in claim **11** wherein each of the first plurality of reflector panels is a 28-degree panel.

16. The lightweight and portable space frame antenna as recited in claim **11** wherein each of the second plurality of reflector panels is a 32-degree panel.

17. The lightweight and portable space frame antenna as recited in claim **1** wherein the telescoping actuator provides both coarse and fine elevation adjustments.

18. The lightweight and portable space frame antenna as recited in claim **1** wherein the fine azimuth adjustment is up to a 20-degree azimuth adjustment.

19. A method for erecting a lightweight and portable space frame antenna comprising the steps of:

forming a reflector hub by joining two semi-circle pieces;

mounting a first plurality of reflector panels and a second plurality of reflector panels in a bi-chordal and bi-radial (BCBR) configuration to form a parabolic reflector; each of the first plurality of reflector panels and the second plurality of reflector panels being sized and configured such that each one of said first plurality of reflector panels can be nested inside a corresponding one of said second plurality of reflector panels; and

supporting the parabolic reflector by a foldable positioner, wherein a telescoping actuator and an elevation-azimuth bar are structured and disposed for providing elevation adjustment and bearing-free azimuth adjustment for geostationary satellite acquisition.

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