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ANTENNA POLE AND POSITIONING BASE STATION

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(71) Applicant(s)
SHENZHEN HANYANG TECHNOLOGY CO., LTD.

(72) Inventor(s)
HUANG, Yang;ZHU, Taotao;SONG, Yongqi;HAN, Baofeng

(74) Agent / Attorney
LAMINAR IP PTY LTD, PO Box 1188, North Sydney, NSW, 2059, AU

ABSTRACT

The present application provides an antenna pole and a positioning base station, the antenna pole includes: at least two connecting rods; a base; a plurality of sleeve members, including upper sleeves and lower sleeves, the upper sleeves are sleeved with the connecting rods, and the lower sleeves are sleeved with the base; and connecting members, which are provided between the connecting rods at different positions and connected to the lower sleeves connected to the head and tail ends of the connecting rods.

ANTENNA POLE AND POSITIONING BASE STATION

TECHNICAL FIELD

[0001] The present application relates to the technical field of robotics, and in particular to an antenna pole and a positioning base station.

BACKGROUND

[0002] Garden robots utilize Global Navigation Satellite System (GNSS) Real Time Kinematic (RTK) technology for positioning. RTK is a real-time dynamic positioning technology based on carrier phase observations, capable of providing real-time three-dimensional positioning results of a survey station in a specified coordinate system. An RTK system usually consists of a positioning base station and a rover station. The positioning base station is used to receive satellite signals and calculate correction data, while the rover station is used to receive satellite signals and correction data from the base station to achieve high-precision positioning.

[0003] To ensure improved signal reception and transmission performance, and to ensure a good radio transmission path between the positioning base station and the rover station (thereby extending the operating distance), the positioning base station needs to be elevated using a pole.

[0004] For ease of packaging and transportation, the antenna pole is usually disassembled before packaging. Before using the garden robot, the user needs to install and configure the positioning base station in advance. However, the installation and disassembly of the pole in the related art are cumbersome, and the installation sequence of each pole must be strictly followed, resulting in poor user experience.

[0005] Therefore, those skilled in the art are in urgent need of a new technical solution to solve the above problem.

SUMMARY

[0006] The embodiments of the present application aim to provide an antenna pole and a positioning base station, which can solve the technical problem of poor user experience during pole installation in the prior art.

[0007] An antenna pole disclosed in the present application includes:

[0008] at least two connecting rods;

[0009] a base;

[0010] a plurality of sleeve members, including upper sleeves and lower sleeves, the upper sleeves being sleeved with the connecting rods, and the lower sleeves being sleeved with the base;

[0011] and connecting members, which are provided between the connecting rods at different positions and connected to the lower sleeves connected to the head and tail ends of the connecting rods.

[0012] A positioning base station disclosed in the present application includes: the above antenna pole and a signal communication device, and the signal communication device is provided on the antenna pole.

[0013] In the above antenna pole and positioning base station, the connecting rods and the base are connected through the sleeve members and the connecting members, specifically through the sleeving between pipes. This eliminates the need to consider the installation sequence of the connecting rods, making installation and disassembly convenient and helping to improve user experience.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] One or more embodiments are illustrated by the accompanying figures. These illustrative descriptions do not limit the embodiments. Elements with the same reference numerals in the drawings represent similar elements. Unless otherwise stated, the figures in the drawings are not drawn to scale.

[0015] FIG. 1 is a schematic structural view of the antenna pole according to an embodiment of the present application.

[0016] FIG. 2 is an exploded schematic structural view of the antenna pole according to the embodiment of the present application.

[0017] FIG. 3 is a schematic structural view of the connecting rod of the antenna pole according to the embodiment of the present application.

[0018] FIG. 4 is a schematic structural view of the base of the antenna pole according to the embodiment of the present application.

[0019] FIG. 5 is a schematic structural view of the base of the antenna pole according to the embodiment of the present application from another angle.

[0020] FIG. 6 is a schematic structural view of the sleeve member of the antenna pole

according to the embodiment of the present application.

[0021] FIG. 7 is a schematic structural view of the connecting member of the antenna pole according to the embodiment of the present application.

[0022] FIG. 8 is a schematic structural view of the antenna pole according to the embodiment of the present application from another installation angle.

[0023] FIG. 9 is a schematic structural view of the signal communication device according to an embodiment of the present application.

[0024] FIG. 10 is a schematic structural view of the antenna fixing structure according to an embodiment of the present application.

[0025] FIG. 11 is a schematic structural view of the signal communication device according to another embodiment of the present application.

[0026] FIG. 12 is a schematic structural view of the antenna fixing structure according to another embodiment of the present application.

[0027] FIG. 13 is a schematic structural view of the signal communication device according to another embodiment of the present application.

[0028] FIG. 14 is a schematic structural view of the antenna fixing structure according to another embodiment of the present application.

[0029] FIG. 15 is a schematic structural view of the signal communication device according to another embodiment of the present application.

[0030] FIG. 16 is a schematic structural view of the antenna fixing structure according to another embodiment of the present application.

[0031] Reference numerals and their corresponding meanings:

[0032] 1. connecting rod; 101. fourth mounting hole; 102. threading hole; 2. base; 201. connecting column; 2011. mounting groove; 2012. mounting block; 3. sleeve member; 301. upper sleeve; 3011. second mounting hole; 302. lower sleeve; 3021. first mounting hole; 303. clamping block; 304. clamping groove; 4. connecting member; 401. pipe; 402. third mounting hole; 403. sleeved pipe; 5. antenna pole; 6. connector head; 7. locking member; 8. sheathing member; 801. first mounting space; 802. sheathing part; 803. extension part; 804. third connecting plate; 805. second mounting space; 9. fixing member; 901. first connecting plate; 902. second connecting plate; 903. fixing plate; 904. clamping plate; 9041. left clamping plate; 9042. right clamping plate; 9043. jaw plate; 90431. left jaw plate; 90432. right jaw plate; 9044. fourth connecting plate; 9045. second connecting member; 10. protective member; 1001. third mounting space; 11. first connecting member; 12. clamping member; 13. antenna fixing structure; 14. signal communication device; 1401. RTK antenna; 1402. housing connection; 15.

antenna; 1501. antenna housing; 1502. antenna connection; 16. device housing; 17. positioning base station.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0033] To facilitate understanding of the present application, the present application will be described in more detail below with reference to the accompanying drawings and specific embodiments. It should be noted that when an element is described as being "fixed to" another element, it may be directly on the other element, or there may be one or more intermediate elements between them. When an element is described as being "connected to" another element, it may be directly connected to the other element, or there may be one or more intermediate elements between them. The terms "upper", "lower", "inner", "outer", "vertical", "horizontal" and the like used in this specification indicate orientations or positional relationships based on the orientations or positional relationships shown in the drawings, only for the convenience of describing the present application and simplifying the description, and do not indicate or imply that the device or element referred to must have a specific orientation, be constructed and operated in a specific orientation, and therefore cannot be understood as a limitation on the present application.

[0034] In addition, the terms "first" and "second" are only used for descriptive purposes and cannot be understood as indicating or implying relative importance. The terms "including" or "comprising" and the like mean that the element or item preceding the term covers the element or item listed after the term and their equivalents, but does not exclude other elements or items. The terms "connection" or "linkage" and the like are not limited to physical or mechanical connections, but may include electrical connections, whether direct or indirect. Unless otherwise defined, the terms "parallel", "perpendicular" and "identical" used in the embodiments of the present application include not only the strict "parallel", "perpendicular" and "identical" but also "substantially parallel", "substantially perpendicular" and "substantially identical" that include certain errors. For example, the above "substantially" may mean that the difference between the compared objects is within 10% or 5% of the average value of the compared objects. When the number of a component or element is not specified in the embodiments of the present application, it means that the component or element may be one or more, or it can be understood as at least one. "At least one" means one or more, and "a plurality" means at least two.

[0035] Unless otherwise defined, all technical and scientific terms used in this specification have the same meaning as commonly understood by those skilled in the technical field of the

present application. The terms used in the specification of the present application are only for the purpose of describing specific embodiments and are not used to limit the present application. The terms "and/or" used in this specification include any and all combinations of one or more related listed items.

[0036] Furthermore, the technical features involved in the different embodiments of the present application described below can be combined with each other as long as they do not conflict with each other. Obviously, the described embodiments are part of the embodiments of the present application, not all of them. Based on the embodiments described in the present application, all other embodiments obtained by those of ordinary skill in the art without creative work shall fall within the protection scope of the present application.

[0037] As shown in FIG. 1 to FIG. 8, an antenna pole 5 disclosed in the embodiment of the present application includes: at least two connecting rods 1, a base 2, a plurality of sleeve members 3 and connecting members 4.

[0038] The plurality of sleeve members 3 includes upper sleeves 301 and lower sleeves 302, the upper sleeves 301 are sleeved with the connecting rods 1, and the lower sleeves 302 are sleeved with the base 2.

[0039] The connecting members 4 are provided between the connecting rods 1 at different positions and connected to the lower sleeves 302 connected to the head and tail ends of the connecting rods 1.

[0040] In an embodiment, the connecting rod 1 may be in a straight strip structure. After the connecting rods 1 are connected to each other, they may form a straight 180-degree configuration. The interiors of the connecting rods 1 are connected to form a wire-passing channel, which is used to accommodate wires such as SMA wires on the signal communication device 14. In addition, the connecting rods 1 may also form a 90-degree configuration after connection. In the straight 180-degree configuration, the antenna pole 5 can stand upright on the ground; in the 90-degree configuration, the antenna pole 5 can be fixedly connected to an obstacle such as a wall. It should be noted that the connecting rods 1 in this case have the same specifications, so when the user installs the antenna pole 5, there is no need to confirm which section of the antenna pole 5 is in the front or rear; the base 2 is provided with a connecting column 201 and a base body, the base body is connected to the connecting column 201, and the base body can be fixedly connected to an obstacle or vertically fixed on the ground. A threading hole 102 is opened at the middle position inside the base 2, and the cable can extend through the threading hole 102 inside the antenna pole 5 until it is electrically connected to the signal communication device 14 provided at the end of the antenna pole 5; the sleeve member 3 may be

in the form of a sleeve, which can be divided into two sleeve parts. The two sleeve parts may be integrally connected or connected in other ways such as mutual sleeving. In one case, one end of the sleeve member 3 may be sleeved on the base 2, and the other end of the sleeve member 3 may be sleeved on the connecting rod 1; in another case, one end of the sleeve member 3 may be sleeved on the connecting rod 1, and the other end of the sleeve member 3 may be sleeved on the connecting member 4; the connecting member 4 may include non-fully enclosed pipes 401 in three directions and a sleeved pipe 403 fixed on the three pipes 401. The sleeved pipe 403 plays a role in reinforcing and connecting the pipes 401. It should be noted that to form a usable antenna pole 5, at least 4 sleeve members 3 are required, as shown in FIG. 2;

[0041] In this embodiment, the connecting rods 1 and the base 2 are connected through the sleeve members 3 and the connecting members 4, specifically through the sleeving between the pipes 401. This eliminates the need to consider the installation sequence of the connecting rods 1 (the connecting rods 1 have the same specifications and are directly sleeved with the connecting members 4 through the sleeve members 3), making installation and disassembly convenient and helping to improve user experience.

[0042] As shown in FIG. 4 to FIG. 6, in some embodiments, a plurality of protruding clamping blocks 303 are arranged in a ring on the inner side of one end of the sleeve member 3, and clamping grooves 304 are formed between the clamping blocks 303; the base 2 is provided with a connecting column 201, and the connecting column 201 is provided with mounting grooves 2011 adapted to the clamping blocks 303 and mounting blocks 2012 adapted to the clamping grooves 304; after the sleeve member 3 is inserted into the connecting column 201, the mounting blocks 2012 of the connecting column 201 are adapted to and clamped with the clamping grooves 304, and the mounting grooves 2011 of the connecting column 201 are adapted to and clamped with the clamping blocks 303.

[0043] In an embodiment, a plurality of protruding clamping blocks 303 are provided at the circumferential position inside one end of the sleeve member 3. The clamping blocks 303 may be in the shape of bosses, and clamping grooves 304 are provided between the clamping blocks 303. The connecting column 201 of the base 2 is provided with mounting grooves 2011 adapted to the clamping blocks 303 (each mounting groove 2011 is surrounded by two opposite mounting blocks 2012) and mounting blocks 2012 adapted to the clamping grooves 304; in this way, after the connecting rod 1 is sleeved on the base 2, the two can be in adaptive clamping connection, which not only improves the stability of the connection between the two but also improves the convenience of installation and disassembly.

[0044] As shown in FIG. 6, in some embodiments, a first mounting hole 3021 for mounting

an elastic member is provided on the surface of the lower sleeve 302, and a second mounting hole 3011 for mounting a locking member 7 is provided on the surface of the upper sleeve 301.

[0045] In an embodiment, the elastic member may consist of an elastic part and a ball plunger. The elastic part can undergo elastic deformation, and the elastic part is arranged inside the tube of the connecting column 201. The ball is connected to one end of the elastic part. The lower sleeve 302 is provided with a first mounting hole 3021 (two first mounting holes 3021 may be circumferentially provided on the cross-section of the surface of the lower sleeve 302), and the ball protrudes from the first mounting hole 3021. The elastic part pushes the ball toward the first mounting hole 3021. In this way, the connection between the lower sleeve 302 and the base 2 can be disconnected by pressing the elastic member, and disassembly is simple and fast; the locking member 7 may be a screw or other fixing members. A plurality of second mounting holes 3011 at different height positions may be distributed on the surface of the upper sleeve 301 (12 second mounting holes 3011 may be circumferentially provided on the cross-section of the surface of the upper sleeve 301, and every 3 second mounting holes 3011 are circumferentially provided on the cross-section at one height position). The locking member 7 can be inserted through the selected second mounting holes 3011 (all second mounting holes 3011 can be inserted through by the locking member 7, and the second mounting holes 3011 on the cross-sections at two different height positions can be inserted through by the locking member 7). In this way, different insertion positions can increase the connection distance between the sleeve member 3 and the connecting rod 1, thereby controlling the vertical height of the antenna pole 5.

[0046] As shown in FIG. 6 and FIG. 7, in some embodiments, the connecting member 4 is provided with non-fully-enclosing pipes 401 in at least two different directions, a third mounting hole 402 is opened on the surface of each pipe 401, and the elastic member is connected to both the third mounting hole 402 and the first mounting hole 3021 of the lower sleeve 302.

[0047] In an embodiment, the three pipes 401 on the connecting member 4 all have gaps. A third mounting hole 402 is opened on the surface of each of the three pipes 401 (two third mounting holes 402 may be circumferentially provided on the cross-section of the surface of the pipe 401). The above-mentioned elastic member can be connected to both the third mounting hole 402 and the first mounting hole 3021 of the lower sleeve 302. In this way, a connection relationship between the connecting member 4 and the sleeve member 3 can be established, and subsequent disassembly and installation can be conveniently realized by pressing the ball on the elastic member. Specifically, the ball in the elastic member is arranged to protrude relative to the first mounting hole 3021 and the third mounting hole 402 (that is, after the elastic part of the

elastic member is abutted inside the pipe 401 of the connecting member 4, the ball of the elastic member passes through both the first mounting hole 3021 and the third mounting hole 402). The ball can be clamped in the first mounting hole 3021 and the third mounting hole 402 to realize a stable connection between the connecting member 4 and the sleeve member 3.

[0048] As shown in FIG. 6 and FIG. 7, in some embodiments, a sleeved pipe 403 is provided at the joint of the three pipes 401 in the connecting member 4, and the sleeved pipe 403 is used to connect the three pipes 401 at the same time.

[0049] In an embodiment, the sleeved pipe 403 is equivalent to a connecting pipe 401, which can connect different pipes 401 in three directions. The arrangement of the pipes 401 in multiple directions can realize the relative angle relationship between the connecting rods 1 (such as the vertical and straight relationships mentioned above). At the same time, the sleeved pipe 403 is provided at the joint of the three pipes 401, which can also increase the stability of the pipes 401.

[0050] As shown in FIG. 6 and FIG. 7, in some embodiments, the pipe 401 in the connecting member 4 is connected to the sleeve member 3, and the sleeve member 3 is connected to both the pipe 401 and the connecting rod 1 at the same time.

[0051] In an embodiment, one end of the pipe 401 of the connecting member 4 is sleeved with one end of the sleeve member 3 (for example, the pipe 401 is sleeved with the sleeve member 3), and one end of the connecting rod 1 is sleeved with one end of the sleeve member 3 (for example, the sleeve member 3 is sleeved with the connecting rod 1). In this way, the connection between the three components (connecting rod 1, sleeve member 3 and connecting member 4) is realized through the mutual sleeving relationship mentioned above.

[0052] As shown in FIG. 1, FIG. 2, FIG. 7 and FIG. 8, in some embodiments, one end of the connecting rod 1 is connected to one pipe 401, the other end of the connecting rod 1 is connected to another sleeve member 3, and the sleeve member 3 is sleeved on the base 2.

[0053] In an embodiment, the connecting rod 1 that has been connected to the pipe 401 of the connecting member 4 and the sleeve member 3 is connected to one end of another sleeve member 3, and the sleeve member 3 is then sleeved on the base 2. In this way, the connection between the four components (connecting rod 1, sleeve member 3, connecting member 4 and base 2) is realized through the mutual sleeving relationship mentioned above.

[0054] As shown in FIG. 3, in some embodiments, a fourth mounting hole 101 corresponding to the second mounting hole 3011 is provided at one end of the connecting rod 1, and the locking member 7 is mounted in both the second mounting hole 3011 and the fourth mounting hole 101 at the same time.

[0055] In an embodiment, the locking member 7 can be inserted through the second

mounting hole 3011 and the fourth mounting hole 101 that are in a corresponding relationship (12 fourth mounting holes 101 may be circumferentially provided on the cross-section of the surface of the connecting rod). The insertion direction can be set as required, such as the insertion direction from the second mounting hole 3011 to the fourth mounting hole 101, to establish a locking connection relationship between the antenna pole 5 and the sleeve member 3. In addition, the locking member 7 can also be fixedly connected through a non-insertion relationship.

[0056] It should be noted that the locking member 7 can be inserted through the second mounting holes 3011 and the fourth mounting holes 101 at two different height positions (cross-sections at different positions) as shown in FIG. 1, or through the second mounting holes 3011 and the fourth mounting holes 101 at four different height positions as shown in FIG. 8. In an embodiment, the more layers inserted through, the stronger the locking stability.

[0057] As shown in FIG. 3, in some embodiments, a threading hole 102 is provided at a position of the antenna pole 5 spaced from the fourth mounting hole 101.

[0058] In an embodiment, a plurality of threading holes 102 are provided on the side wall of the antenna pole 5. For example, two threading holes 102 are provided on the side wall of the antenna pole 5. In this way, the cables related to the positioning base station can be electrically connected to the signal communication device 14 along the inside of the antenna pole 5 through the threading holes 102. It should be noted that the two wire outlet directions of the threading holes 102 (including the threading hole 102 in the base 2) can be adapted to the wire outlet requirements in different directions.

[0059] As shown in FIG. 1, FIG. 2 and FIG. 8, a positioning base station disclosed in the embodiment of the present application includes: an antenna pole 5 and a signal communication device 14, the signal communication device 14 being provided on the antenna pole 5.

[0060] In an embodiment, the signal communication device 14 can be fixedly connected to the antenna pole 5 through a connector head 6 (the connector head 6 can be provided at the end of the antenna pole 5, and is locked and connected to the antenna pole 5 through a mounting hole opened in the connector head 6. At the same time, the connector head 6 is sleeved inside the lower sleeve 302 of the sleeve member 3, and the upper sleeve 301 of the sleeve member 3 is sleeved inside the connecting rod 1). It can be provided at a high position of the antenna pole 5 to facilitate the interaction of positioning information (GPS) with the rover station (garden robot) in the outside world.

[0061] The present application also proposes an antenna fixing structure 13 and a positioning base station 17, aiming to solve the problems of poor signal receiving and transmitting quality of

the antenna of the existing signal communication device 14 and easy water ingress (specifically, the garden robot can walk automatically in the garden area, which is inseparable from the interactive communication between the positioning device provided on the garden robot and the signal communication device arranged in the garden area. For example, the RTK positioning device provided on the garden robot and the outdoor RTK positioning device arranged in the garden area communicate through at least one communication method; the existing signal communication device is provided with a vertically extending antenna, but the signal communication device is arranged outdoors, and the antenna is easily swung due to wind interference, which directly affects the quality of signal receiving and transmitting of the antenna. Especially when the antenna swings to a vertically downward state, the impact on the quality of signal receiving and transmitting of the antenna is more significant. At the same time, when the antenna swings to a vertically downward state, water can easily enter through the gap at the antenna connection, which directly damages the communication of the antenna).

[0062] As shown in FIG. 9 to FIG. 16, in an embodiment of the present application, the positioning base station 17 (serving as a signal communication device) further includes an antenna fixing structure 13; the antenna fixing structure 13 includes: a sheathing member 8, and a fixing member 9.

[0063] The sheathing member 8 is sheathed on the outer periphery of the antenna 15 of the signal communication device 14.

[0064] One end of the fixing member 9 is connected to the sheathing member 8 and the other end of the fixing member 9 is connected to the signal communication device 14, for enhancing the stability of the sheathing member 8 on the antenna 15.

[0065] In an embodiment, the positioning base station 17 includes: an antenna fixing structure 13 and a signal communication device 14. The signal communication device 14 includes an antenna 15 and a device housing 16. The antenna 15 includes an antenna housing 1501. The fixing structure is sleeved on the antenna housing 1501 and then connected to the housing; the signal communication device 14, as a communication device, can be provided with an RTK positioning device and a communication module inside. The communication module may include one or more of a WiFi communication module, a Halow communication module, a 4G communication module and a 5G communication module. The communication module can communicate with the garden robot and send the positioning data obtained by the RTK positioning device to the garden robot, so that the garden robot can perform positioning processing, etc.; the number of positioning devices provided on the garden robot can be set according to requirements. For example, positioning devices are respectively provided on the left

and right sides of the garden robot, and the positioning devices can complete the positioning of the garden robot together with the signal communication device 14;

[0066] The mounting space opened on the sheathing member 8 can be integrally sleeved on the outer periphery of the antenna 15. The structure of the antenna 15 can be divided into an antenna housing 1501 and an antenna connection 1502 (the antenna connection 1502 and the antenna housing 1501 are foldably connected). The outer periphery of the antenna 15 may be the housing corresponding to the antenna housing 1501 and the antenna connection 1502. The antenna connection 1502 can be connected to the signal communication device 14 through at least one connection method, such as threaded connection; the fixing member 9 and the sheathing member 8 may be integrally connected or non-integrally connected, and only a fixed connection relationship needs to exist between them. After the sheathing member 8 is sleeved on the antenna 15, the fixing member 9 is used to increase the fixity of the sheathing member 8 to the antenna 15, so that the antenna 15 is always fixed and maintained at an ideal angle;

[0067] In this embodiment, the sheathing member 8 is first sleeved on the antenna 15, and then the fixing member 9 connected to the sheathing member 8 is connected to the signal communication device 14. In this way, the entire antenna fixing structure 13 can keep the antenna 15 in a vertically upward state at all times, thereby improving the quality of the signal communication device 14 in receiving and transmitting signals of the antenna 15 and preventing water from entering the inside of the wire through the gap at the antenna 15 connection.

[0068] As shown in FIG. 15 and FIG. 16, in an embodiment, the fixing member 9 and the sheathing member 8 are connected through a straight plate, the fixing member 9 is arranged in a sheathing structure consistent with the sheathing member 8, and the sheathing structure is sleeved on the outer periphery of the RTK antenna 1401 of the signal communication device 14.

[0069] As shown in FIG. 9 and FIG. 10, in an embodiment, a first mounting space 801 is defined inside the sheathing member 8, the first mounting space 801 is adaptively mounted with the outer periphery of the antenna 15, and the antenna 15 is passed through the first mounting space 801.

[0070] In an embodiment, the sheathing member 8 may be a cylindrical structure, and a first mounting space 801 adapted to the outer periphery of the antenna housing 1501 may be opened in the center inside it. The antenna housing 1501 may be a structure with a thin upper part and a thick lower part (that is, the thickness of the bottom is greater than that of the end), and the antenna 15 can be fixed at the thick position of the lower end after passing through the first mounting space 801;

[0071] In this embodiment, through the first mounting space 801 adapted to the antenna 15,

it can be ensured that the antenna 15 can be quickly and accurately positioned during the installation process. At the same time, due to the existence of the first mounting space 801, the antenna 15 can be maintained at an ideal vertically upward angle.

[0072] As shown in FIG. 9 and FIG. 10, in an embodiment, the fixing member 9 includes a first connecting plate 901 and a second connecting plate 902, the first connecting plate 901 is integrally fixedly connected to the sheathing member 8, the second connecting plate 902 is fixedly connected to the signal communication device 14, and the connection position between the first connecting plate 901 and the second connecting plate 902 is arranged in a bent manner.

[0073] In an embodiment, the bent arrangement between the first connecting plate 901 and the second connecting plate 902 means that the two plates are not arranged in a straight line (there is an arc angle at the connection position between the two plates). The bent arrangement between the first connecting plate 901 and the second connecting plate 902 can not only adapt to the shape of the housing of the signal communication device 14 (a connection space is formed at the connection position between the first connecting plate 901 and the second connecting plate 902, and the connection space is used to adapt to the shape of the outermost housing of the signal communication device 14) but also disperse the force on the connecting plates, so that the connecting plates are not easy to break or deform;

[0074] The connection position with the bent arrangement in this embodiment can effectively disperse the force and increase the overall rigidity and stability of the fixing member 9, so that the fixing member 9 can better resist deformation and breakage when subjected to external forces, ensuring that the antenna 15 is always maintained at an ideal vertically upward angle; the fixing member 9 with a traditional straight connection is prone to stress concentration at the connection point, which may lead to fatigue fracture after long-term use. However, the connection position with the bent design can effectively disperse these stresses, reduce the impact of stress concentration on the fixing member 9, and thus extend the service life.

[0075] As shown in FIG. 11 and FIG. 12, in an embodiment, the sheathing member 8 includes a sheathing part 802 and an extension part 803, the extension part 803 extends at the side of the sheathing part 802, a third connecting plate 804 with a connection position is provided at the side of the extension part 803, a second mounting space 805 is defined inside the sheathing part 802, the second mounting space 805 is adaptively mounted with the outer periphery of the antenna 15, and the antenna 15 is passed through the first mounting space 801.

[0076] In an embodiment, the sheathing part 802 may also be a cylindrical structure. The principle that the second mounting space 805 (a hollow space inside) opened in it is adaptively mounted on the antenna housing 1501 is the same as the principle that the above-mentioned first

mounting space 801 is adaptively mounted on the antenna housing 1501, which will not be repeated here; the extension part 803 is extended at the tail end of the sheathing part 802, and a mounting space (a hollow space inside) is also opened under the extension part 803 to adapt to the housing of the antenna device. A third connecting plate 804 may be provided at the lower position of the extension part 803, and a connection position may be opened on the third connecting plate 804;

[0077] In this embodiment, a second mounting space 805 (a hollow space inside) is defined inside the sheathing part 802, and its shape and size are closely adapted to the outer periphery of the antenna 15, ensuring the accuracy and stability of the antenna 15 during the installation process; the extension design of the extension part 803 at the side of the sheathing part 802 increases the connection length for the connection between the fixing member 9 and the signal communication device 14; the connection position can increase the stability of the entire antenna fixing structure 13 on the antenna 15.

[0078] As shown in FIG. 11 and FIG. 12, in an embodiment, the antenna fixing structure 13 further includes a protective member 10, a first connecting member 11 and a clamping member 12, a third mounting space 1001 is defined inside the protective member 10, a mounting access position of the third mounting space 1001 is aligned with the connection position, and after the first connecting member 11 is passed through both the third mounting space 1001 and the connection position, the clamping member 12 is clamped to the first connecting member 11.

[0079] In an embodiment, the first connecting member 11 may be a bolt. A third mounting space 1001 through which the first connecting member 11 can pass is defined inside the protective member 10. After passing through the third mounting space 1001, the first connecting member 11 can pass through the connection position and be fixed; a connection hole may be opened on the first connecting member 11, the clamping member 12 is in a strip structure, and after the clamping member 12 can pass through the connection hole, the first connecting member 11 is fixed on the connection position;

[0080] In this embodiment, the protective member 10 is provided to pass through the first connecting member 11, which can avoid friction between the first connecting member 11 and the bottom of the antenna 15.

[0081] As shown in FIG. 11 and FIG. 12, in an embodiment, the fixing member 9 includes a fixing plate 903 and a clamping plate 904, one end of the fixing plate 903 is connected to the extension part 803, and the other end of the fixing plate 903 is connected to the clamping plate 904.

[0082] In an embodiment, one end of the fixing plate 903 can be connected to the end of the

extension part 803, and the two side ends are connected to the clamping plate 904. The fixing plate 903 can be arranged in the middle of the clamping plate 904 relative to the clamping plate 904;

[0083] In this embodiment, the fixing plate 903, as a key component connecting the extension part 803 and the clamping plate 904, has a design that makes the entire fixing member 9 more stable in structure, ensuring that the antenna 15 can maintain stable performance during long-term use after installation.

[0084] As shown in FIG. 11 and FIG. 12, in an embodiment, the clamping plate 904 includes a left clamping plate 9041 and a right clamping plate 9042, and the left clamping plate 9041 and the right clamping plate 9042 jointly clamp the housing of the signal communication device 14 to realize fixed connection.

[0085] In an embodiment, the sizes of the left clamping plate 9041 and the right clamping plate 9042 may be inconsistent, and they can be adapted to the shape of the edge of the housing of the signal communication device 14;

[0086] In this embodiment, the left clamping plate 9041 and right clamping plates 9042 can clamp the housing of the signal communication device 14 to realize fixed connection, and the fixing member 9 will not easily fall off from the signal communication device 14.

[0087] As shown in FIG 13 and FIG. 14 in an embodiment, the antenna fixing structure 13 further includes a second connecting member 9045, the fixing member 9 includes a jaw plate 9043 and a fourth connecting plate 9044, one end of the fourth connecting plate 9044 is connected to the jaw plate 9043, the other end of the fourth connecting plate 9044 is connected to the sheathing member 8, and the second connecting member 9045 is passed through the connection position in the fourth connecting plate 9044.

[0088] In an embodiment, two or more jaw plates 9043 may be provided. The jaw plates 9043 are arranged with a certain arc and can cover the connection position between the signal communication device 14 and the antenna 15 (an arc structure is provided at this position). After one end of the fourth connecting plate 9044 is fixedly connected to the jaw plate 9043, the connecting member is inserted through the connection position of the fourth connecting plate 9044 to increase the stability of the sheathing member 8 on the antenna 15; the second connecting member 9045 may be a screw or a bolt, and after being inserted through the connection position in the fourth connecting plate 9044, it increases the stability of the antenna 15 mounted on the sheathing member 8.

[0089] The jaw plate 9043 in this embodiment can tightly wrap the housing of the signal communication device 14, ensuring the stability of the sheathing member 8 on the antenna 15

and reducing the swing of the antenna 15; the fourth connecting plate 9044 firmly connects the jaw plate 9043 and the sheathing member 8 to form a stable support structure. This stable connection method enables the antenna 15 to resist interference and damage from the external environment after installation and maintain long-term stable operation.

[0090] As shown in FIG. 13 and FIG. 14, in an embodiment, the jaw plate includes a left jaw plate 90431 and a right jaw plate 90432, and the left jaw plate 90431 and the right jaw plate 90432 are jointly arranged around the housing connection 1402 on the signal communication device 14.

[0091] In an embodiment, the space enclosed by the left jaw plate 90431 and the right jaw plate 90432 is used to match the antenna 15 connection on the signal communication device 14, realizing a stable connection between the antenna fixing structure 13 and the signal communication device 14.

[0092] The antenna fixing structure 13 and the positioning base station 17 provided in the embodiments of the present application belong to the technical field of antenna 15 structures. The antenna fixing structure 13 includes: a sheathing member 8, which is sheathed on the outer periphery of the antenna 15 of the signal communication device 14; and a fixing member 9, one end of which is connected to the sheathing member 8 and the other end of which is connected to the signal communication device 14, for enhancing the stability of the sheathing member 8 on the antenna 15. The solution of the present application first sleeves the sheathing member 8 on the antenna 15, and then connects the fixing member 9 connected to the sheathing member 8 to the signal communication device 14. In this way, the entire antenna fixing structure 13 can keep the antenna 15 in a vertically upward state at all times, thereby improving the quality of the signal communication device 14 in receiving and transmitting signals of the antenna 15 and preventing water from entering the inside of the wire through the gap at the antenna 15 connection.

[0093] Finally, it should be noted that the above embodiments are only used to illustrate the technical solutions of the present application, not to limit them; in accordance with the concept of the present application, the technical features in the above embodiments or different embodiments can also be combined, and the steps can be implemented in any order, and there are many other variations of the different aspects of the present application as described above, which are not listed in detail for the sake of brevity; although the present application has been described in detail with reference to the foregoing embodiments, those of ordinary skill in the art should understand that: they can still modify the technical solutions described in the foregoing embodiments, or replace some of the technical features with equivalents; and these modifications

or replacements do not make the essence of the corresponding technical solutions deviate from the scope of the technical solutions of the embodiments of the present application..

CLAIMS

What is claimed is:

1. An antenna pole, comprising:

at least two connecting rods;

a base;

a plurality of sleeve members; and

connecting members;

wherein the sleeve members comprise upper sleeves and lower sleeves, the upper sleeves are sleeved with the connecting rods, and the lower sleeves are sleeved with the base; and

the connecting members are provided between the connecting rods at different positions, and the connecting members are connected to the lower sleeves, and the lower sleeves are connected to head and tail ends of the connecting rods.

2. The antenna pole according to claim 1, wherein a plurality of protruding clamping blocks are provided in a ring on an inner side of one end of the sleeve member, and clamping grooves are formed between the clamping blocks; the base is provided with a connecting column, and the connecting column is provided with mounting grooves and mounting blocks, the mounting grooves are adapted to the clamping blocks and the mounting blocks are adapted to the clamping grooves; after the sleeve member is inserted into the connecting column, the mounting blocks of the connecting column are adapted to and clamped with the clamping grooves, and the mounting grooves of the connecting column are adapted to and clamped with the clamping blocks.

3. The antenna pole according to claim 2, wherein a first mounting hole for mounting an elastic member is provided on the surface of the lower sleeve, and a second mounting hole for mounting a locking member is provided on the surface of the upper sleeve.

4. The antenna pole according to claim 3, wherein the connecting member is provided with a plurality of non-fully enclosed pipes in different directions, a third mounting hole is provided on the surface of each pipe, and the elastic member is connected to the third mounting hole and

the elastic member is connected to the first mounting hole of the lower sleeve.

5. The antenna pole according to claim 4, wherein a sleeved pipe is provided at the joint of the plurality of pipes in the connecting member, and the sleeved pipe is configured to connect the plurality of pipes at the same time.

6. The antenna pole according to claim 4, wherein the pipes in the connecting member are connected to the sleeve members, and any two sleeve members are connected to both the pipes and the connecting rods at the same time.

7. The antenna pole according to claim 6, wherein one end of the connecting rod is connected to one pipe, the other end of the connecting rod is connected to another sleeve member, and the sleeve member is sleeved on the base.

8. The antenna pole according to claim 3, wherein a fourth mounting hole corresponding to the second mounting hole is provided at an end of the connecting rod, and the locking member is provided at the second mounting hole and the locking member is provided at the fourth mounting hole.

9. The antenna pole according to claim 8, wherein a threading hole is provided at a position of the antenna pole spaced from the fourth mounting hole.

10. A positioning base station, comprising:
the antenna pole according to any one of claims 1 to 9; and
a signal communication device,
wherein the signal communication device is provided on the antenna pole.

11. The positioning base station according to claim 10, further comprising:
an antenna fixing structure, wherein the antenna fixing structure comprises:
a sheathing member; and

a fixing member,

wherein the sheathing member is sheathed on an outer periphery of an antenna of the signal communication device; and

one end of the fixing member is connected to the sheathing member and the other end of the fixing member is connected to the signal communication device, for enhancing the stability of the sheathing member on the antenna.

12. The positioning base station according to claim 11, wherein a first mounting space is defined inside the sheathing member, and after the first mounting space is adaptively mounted with an outer periphery of the antenna, the antenna is passed through the first mounting space.

13. The positioning base station according to claim 12, wherein the fixing member comprises a first connecting plate and a second connecting plate, the first connecting plate is integrally fixedly connected to the sheathing member, the second connecting plate is fixedly connected to the signal communication device, and the connection position between the first connecting plate and the second connecting plate is provided in a bent manner.

14. The positioning base station according to claim 11, wherein the sheathing member comprises a sheathing part and an extension part, the extension part extends at a side of the sheathing part, a third connecting plate with a connection position is provided at the side of the extension part, a second mounting space is defined inside the sheathing part, the second mounting space is adaptively provided with the outer periphery of the antenna, and the antenna is passed through the second mounting space.

15. The positioning base station according to claim 14, further comprising:

a protective member, a first connecting member and a clamping member,

wherein a third mounting space is defined inside the protective member, a mounting access position of the third mounting space is aligned with the connection position, and after the first connecting member is passed through both the third mounting space and the connection position, the clamping member is clamped to the first connecting member.

16. The positioning base station according to claim 14, wherein the fixing member comprises a fixing plate and a clamping plate, one end of the fixing plate is connected to the extension part, and the other end of the fixing plate is connected to the clamping plate.

17. The positioning base station according to claim 16, wherein the clamping plate comprises a left clamping plate and a right clamping plate, and the left clamping plate and the right clamping plate jointly clamp the housing of the signal communication device to realize fixed connection.

18. The positioning base station according to claim 10, further comprising:

a second connecting member,

wherein the fixing member comprises a jaw plate and a fourth connecting plate, one end of the fourth connecting plate is connected to the jaw plate, the other end of the fourth connecting plate is connected to the sheathing member, and the second connecting member is passed through a connection position in the fourth connecting plate.

19. The positioning base station according to claim 18, wherein the jaw plate comprises a left jaw plate and a right jaw plate, and the left jaw plate and the right jaw plate are jointly provided around a housing connection part on the signal communication device.

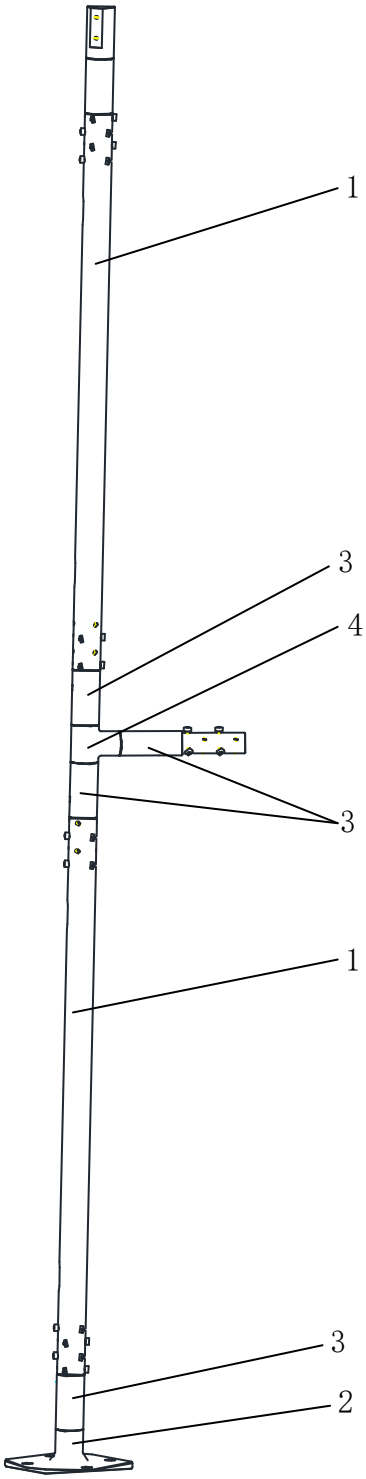

FIG. 1

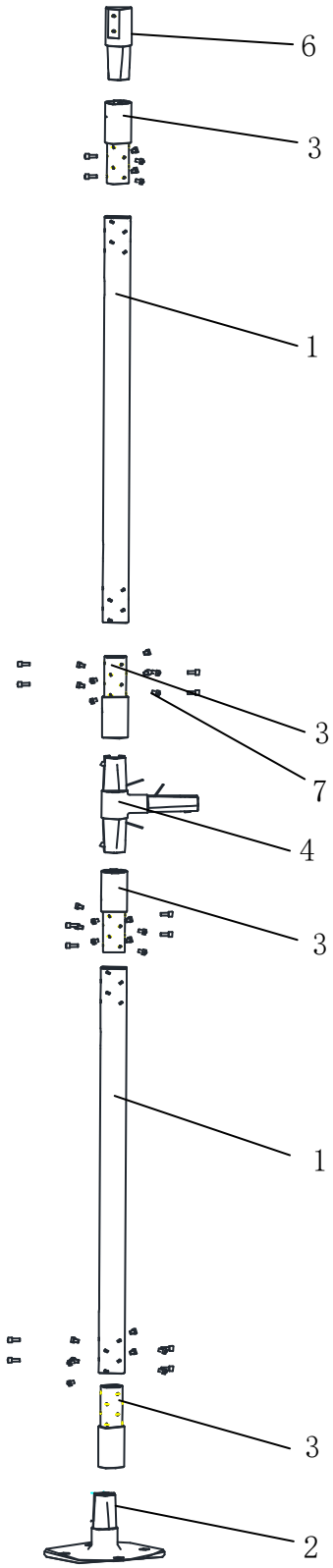

FIG. 2

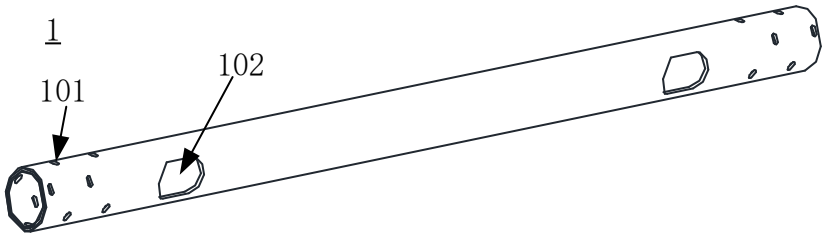

FIG. 3

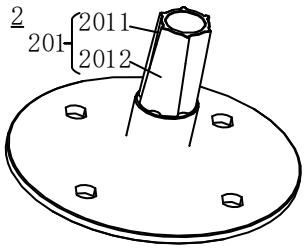

FIG. 4

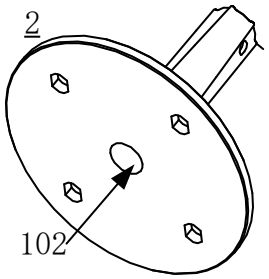

FIG. 5

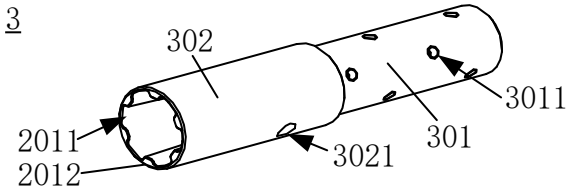

FIG. 6

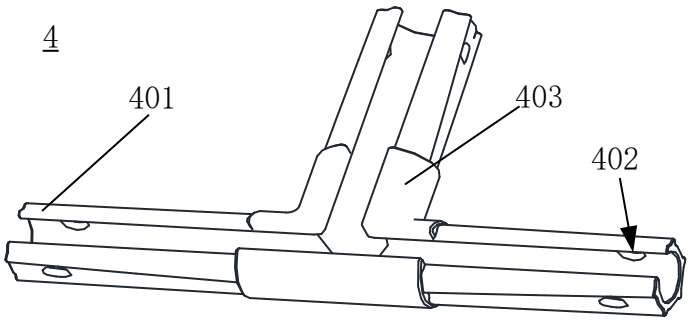

FIG. 7

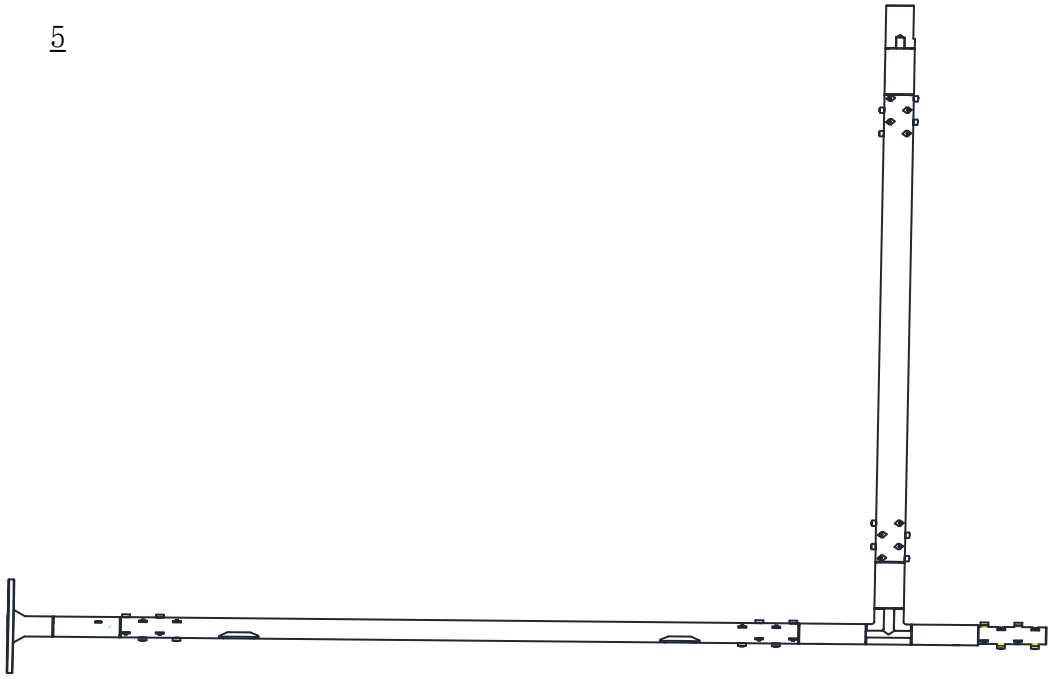

FIG. 8

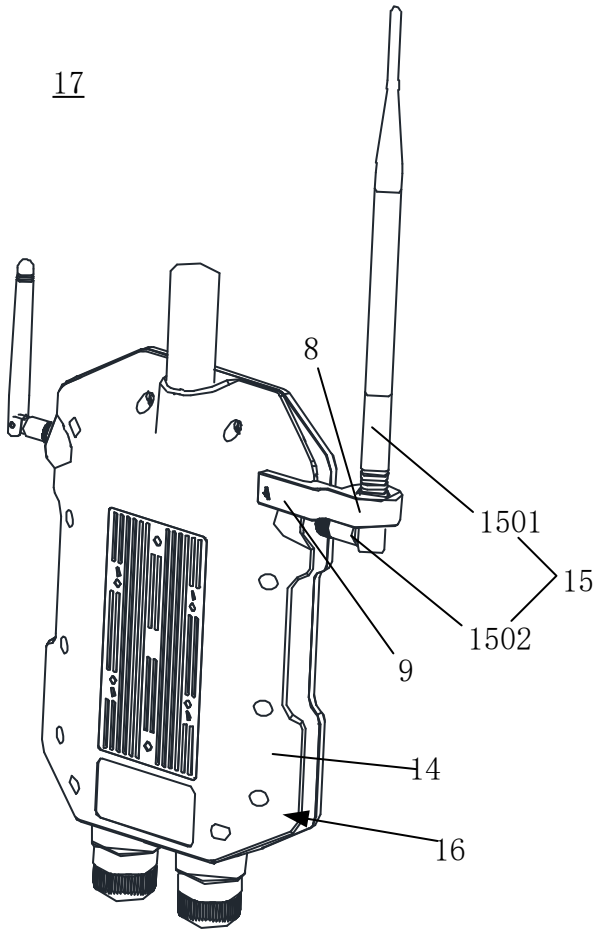

FIG. 9

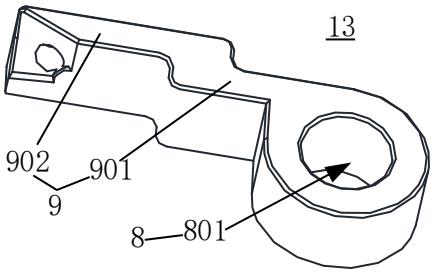

FIG. 10

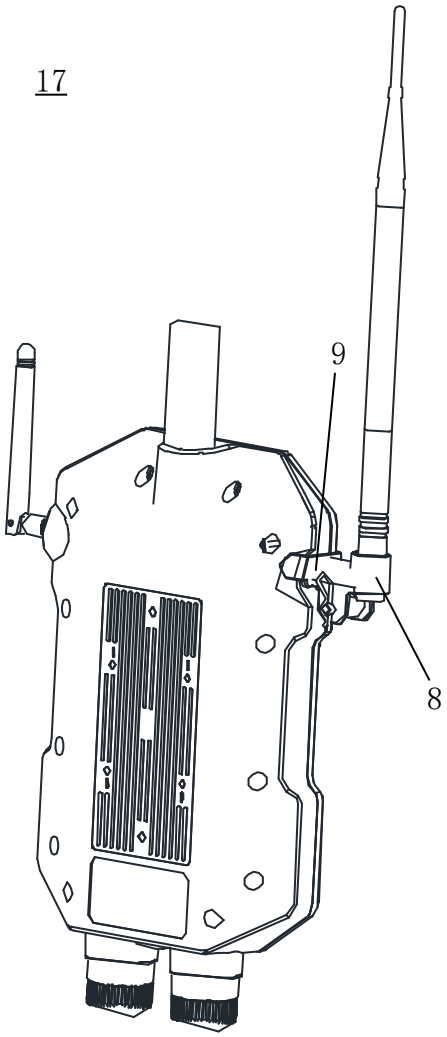

FIG. 11

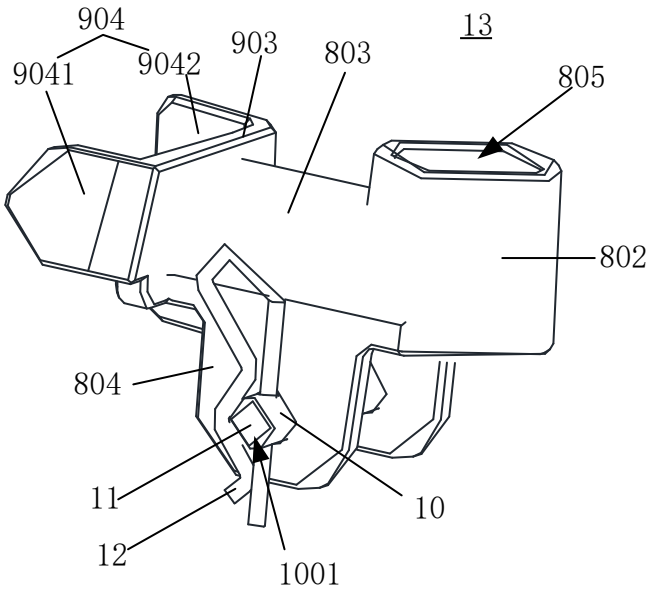

FIG. 12

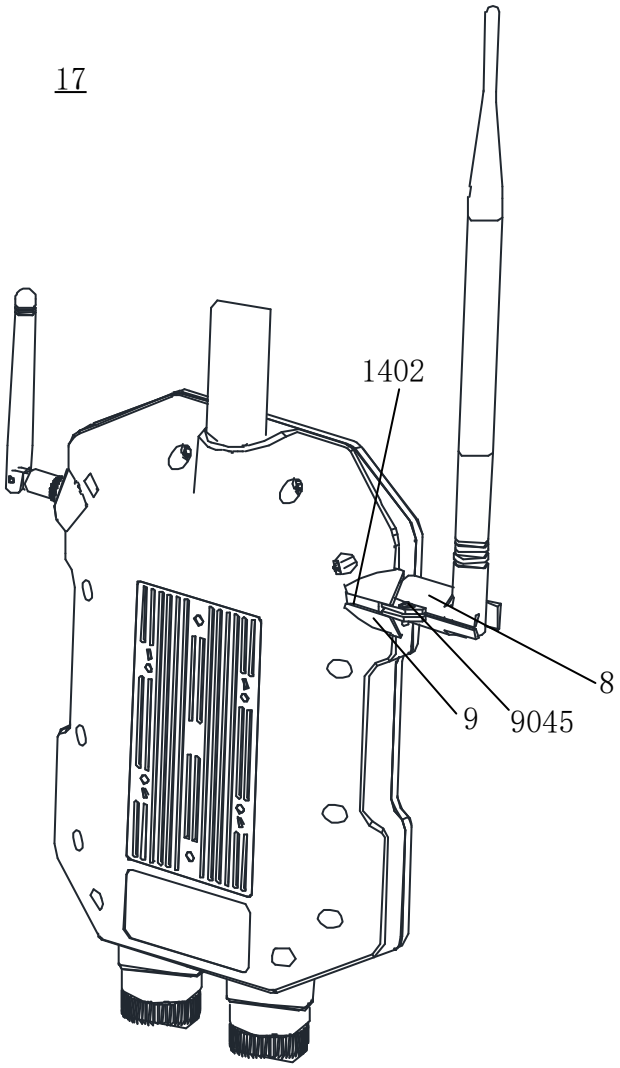

FIG. 13

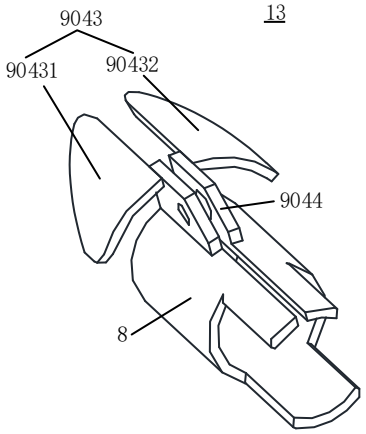

FIG. 14

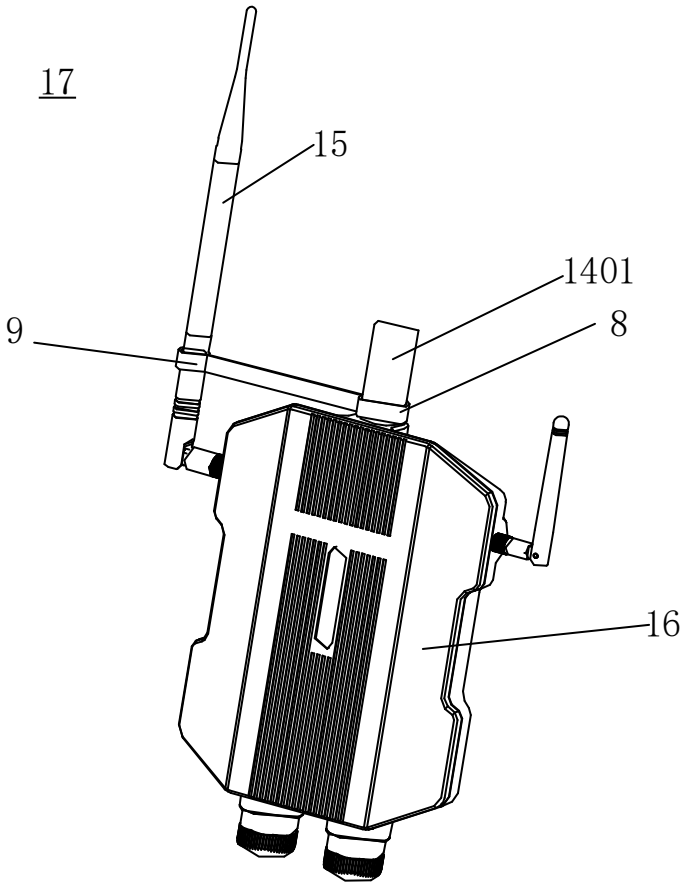

FIG. 15

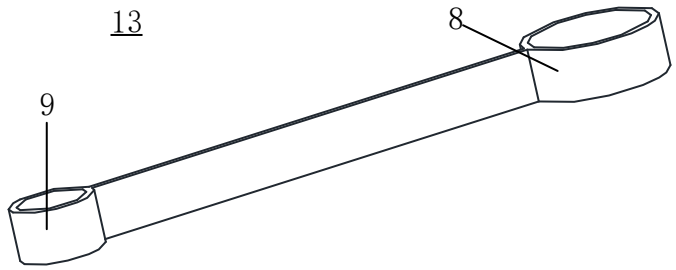

FIG. 16