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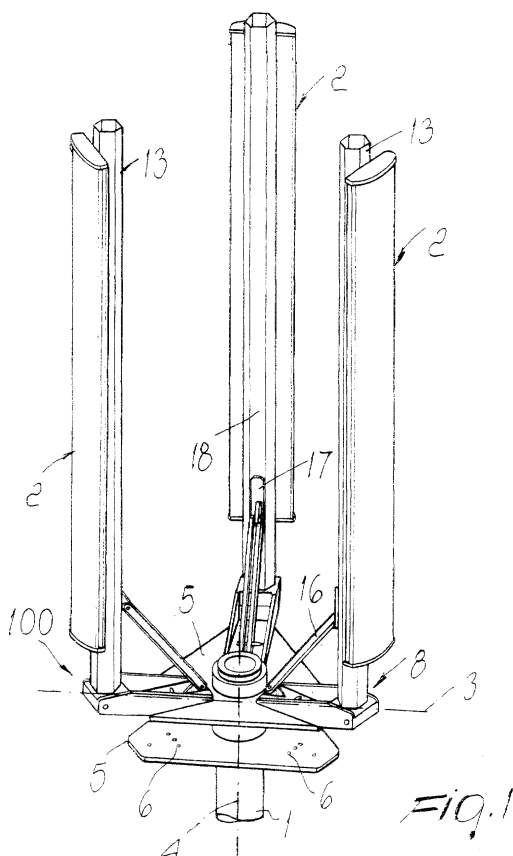
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(54) **Support for antennas for cellular telephony**

(57) A support for cellular telephony antennas, whose particularity consists of the fact that it comprises: a base supporting element, which lies substantially vertically and can be operatively connected to an anchoring

surface; and coupling means for the connection of at least one antenna, which are suitable to operatively interconnect, in a substantially bracket-like fashion, the antenna to the base element.



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Description

[0001] The present invention relates to a support for antennas for cellular telephony having improved functions and characteristics.

[0002] It is known from the state of the art that supports for cellular telephony antennas generally use a supporting pole which is fixed to an anchoring surface, for example the ground or the roof of a building; in turn, the antennas, which are generally of the panel type, are connected to the pole by using appropriate connection means which, in addition to structurally connecting the antennas to the pole, are conceived so as to allow adjustment of the spatial position of the antennas.

[0003] In the current state of the art, the use of known types of support has drawbacks and disadvantages as regards construction and as regards functional aspects.

[0004] Known types of solution in fact generally use many construction elements which allow to connect each antenna to the pole in two or more points, according to complicated constructive solutions which require long and laborious operations for the assembly and the position adjustment of the antennas and as regards maintenance interventions; furthermore, indeed because of their complex constructive structure, they have a considerable environmental impact.

[0005] For example, in one type of support which is widely known in the art each antenna is positioned along the length of the pole and is connected thereto by using appropriate connection means which are arranged at the two opposite ends of said antenna. These connection means comprise an annular plate which is screwed around the supporting pole and a usually pipe-shaped connecting arm which is meant to connect the antenna to the plate and space it from the pole. In order to be able to adjust the position of the antenna, articulated mechanisms are arranged between the arms and said antenna; in particular, a hinge mechanism is generally arranged at a lower end of the antenna, while a pantograph mechanism is arranged at the upper end. In this manner, by acting on the pantograph mechanism, the antenna is rotated about the hinge so as to adjust its position with respect to the supporting pole; furthermore, in order to adjust the position of the antenna about the vertical axis of the pole it is necessary to act on the systems that fix the annular plates to said pole.

[0006] Although this solution allows to adequately connect the antennas to the pole and to effectively adjust their position, it is evidently expensive and complicated from the constructive point of view, since it requires long and laborious installation operations. Furthermore, during the installation and adjustment of the antennas and when performing maintenance interventions it is necessary to be able to access the upper part of the antenna. Accordingly, the supporting pole and the corresponding safety ladder which is structurally coupled thereto must reach the top of the antenna, consequently increasing construction costs and environmen-

tal impact.

[0007] The aim of the present invention is to provide a support for cellular telephony antennas which has a simplified structure which facilitates connection to the antennas and significantly reduces environmental impact.

[0008] Within the scope of this aim, an object of the present invention is to provide a support for cellular telephony antennas whose structure allows to simplify and speed up installation and positioning of the antennas as well their maintenance.

[0009] Another object of the present invention is to provide a support for cellular telephony antennas which allows to reduce the number of components that can be used.

[0010] Another object of the present invention is to provide a support for cellular telephony antennas which is highly reliable, relatively easy to provide and at competitive costs.

[0011] This aim, these objects and others which will become apparent hereinafter are achieved by a support for cellular telephony antennas, characterized in that it comprises a base supporting element, which lies substantially vertically and can be operatively connected to an anchoring surface, and coupling means for the connection of at least one antenna, which are suitable to operatively interconnect, in a substantially bracket-like fashion, the antenna to the base element.

[0012] The support according to the invention has a constructive structure which allows to fix the antenna in a single point of the pole, according to a solution which allows to reduce environmental impact, to optimize the number of components used, and to considerably simplify and speed up the operations for installing and maintaining said antennas.

[0013] Further characteristics and advantages of the invention will become apparent from the description of preferred but not exclusive embodiments of the support according to the invention, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

Figure 1 is a perspective view of a set of three panel antennas for cellular telephony, mounted on a support according to the invention, in an active position; Figure 2 is a perspective view of a set of three panel antennas for cellular telephony, mounted on a support according to the invention, in which one of the antennas is arranged in an inactive position; Figure 3 is a perspective view of a first set and a second set of three panel antennas for cellular telephony, mounted on the support according to the invention and arranged mutually opposite with respect to a transverse reference plane; Figure 4 is a perspective view of a detail of a portion of the support according to the invention.

[0014] The support according to the invention is de-

scribed hereafter with particular reference to its use with panel-type antennas without thereby intending to limit in any way the scope of its application.

[0015] With reference to the above cited figures, the support for cellular telephony antennas according to the invention comprises a base supporting element 1 which is arranged substantially vertically and can be operatively connected to an anchoring surface such as for example the ground or the roof of a building or any other type of surface to which the element 1 can be operatively connected; furthermore, according to the various application requirements, the element 1 can be connected to the anchoring surface either directly or indirectly by interposing additional elements suitable for this purposes.

[0016] In the embodiment shown in Figures 1 to 3, the base element 1 is constituted by a supporting pole; alternatively, it might be provided by means of other components, so long as they are compatible with the application.

[0017] Advantageously, the support according to the invention furthermore comprises coupling means for the connection of at least one antenna 2 which are generally designated by the reference numeral 100 and are suitable to operatively connect, substantially in a bracket-like fashion, the antenna 2 to the base element 1; the connection to said base element 1 is provided at only one end of said antenna. In the embodiment shown in Figures 1 and 2 there are three panel antennas 2 which are connected to the supporting pole 1; obviously, the number of antennas 2, as well as their type and shape, may be varied according to application requirements. Furthermore, as shown in Figure 1 and according to a particularly preferred solution, the antennas 2 can be operatively connected to the supporting pole 1 at its free end that lies opposite the anchoring end, so that the antennas protrude substantially completely above the body of the pole; in this case, fixing to the pole occurs at a lower end of the antennas. Alternatively, the antennas 2 can be arranged so that their body lies parallel to the pole 1 along part of the extension of the body of said pole; in this case, fixing to the pole occurs at an upper end of the antennas.

[0018] According to a particularly preferred embodiment, and in the manner described in greater detail hereinafter, the coupling means 100 are suitable to connect each antenna 2 to the base element 1 so as to allow movement between a first active position, shown in Figure 1, and a second inactive position, shown in Figure 2 for a single antenna; at these positions, each antenna 2 is arranged in mutually opposite positions with respect to a reference plane 3 which lies transversely to the longitudinal axis 4 of the pole 1.

[0019] The expression "active position" is to be understood as designating a position in which the antenna is arranged so as to perform the telephone transmission functions that it is normally required to perform, while the expression "inactive position" is to be understood as designating a position in which the antenna is positioned

for other purposes, for example for performing maintenance.

[0020] In this manner, the operations for installation and maintenance of the antennas are significantly simplified, since the operative connection to the supporting pole 1 occurs at a single end of the antennas; accordingly, the installation times are reduced and the components used are optimized. Furthermore, a considerable advantage is provided by the possibility to move each antenna 2 between said two positions while keeping the antennas connected to the pole 1; accordingly, it is not necessary to access both ends of each antenna for mounting and positioning the antennas and for maintenance operations, and it is therefore possible to eliminate a portion of the supporting pole 1 and of the safety ladder that is coupled thereto and is not illustrated.

[0021] In particular, in the embodiment of the support according to the invention, the coupling means 100 comprise means for fixing to the base element 1, means for connection to the antennas 2, and means for the interconnection of the connecting means with the fixing means.

[0022] The fixing means comprise at least one first base plate 5, in which holes 6 are formed, and a through collar 7, which is structurally rigidly coupled to said plate 5 and protrudes transversely thereto. Said collar 7 is suitable to be fitted on the supporting pole 1 and to accommodate means for connection to said pole 1, for example screws which are inserted in holes formed along the surface of said collar.

[0023] In the embodiments shown in Figures 1 to 4, the fixing means comprise two plates 5 which are arranged parallel to each other and are structurally connected by means of the through collar 7. In this manner, and according to a solution which is highly flexible from the point of view of application, it is possible for example to use two sets of three antennas 2, i.e., a first one which is operatively associated with a plate 5 and a second one which is associated with the second plate 5, the two sets of three being arranged mutually opposite, as shown in Figure 3.

[0024] As shown in detail in Figure 4, the interconnection means comprise at least one connecting arm 8 which has a base wall 9 from which two substantially mutually parallel side walls 10 protrude; a slot 11 is formed in the base wall 9. Each arm 8 is rested against the plate 5 so that the slot 11 overlaps the corresponding said holes 6; in this manner it is possible to adjust with good precision and speed the position of the arm 8 and therefore of the corresponding antenna 2 that is operatively connected thereto by turning it about a first reference axis 12 which is substantially parallel to the longitudinal axis 4 of the pole 1. Once the intended position has been reached, mutual fixing between the plate 5 and the base wall 9 can be easily provided by virtue of ordinary connection means, for example bolts.

[0025] In turn, for each antenna 2, the connection means comprise a rod-like element 13 on which a cor-

responding antenna 2 is connected; said rod-like element has an aerodynamically shaped body so as to adapt to the shape of the antenna 2 according to a solution which is effective as regards wind drag and is particularly clean from an environmental standpoint. The element 13 furthermore has a shaped end 14 which is inserted between the two side walls 10 of the connecting arm 8 and is connected thereto substantially in a hinge-like manner; in particular, this connection can be provided effectively by using a connection pin 15 which is inserted in a through seat of the end 14 and in two through holes formed in the walls 10.

[0026] The support according to the invention furthermore comprises a connecting element 16, for example of the linkage type, in which a first end is articulately connected to the base wall 9 of the connecting arm 8 and a second end is connected to a slider 17 which slides within a slot 18 formed longitudinally in the rod-like element 13 along at least part of its length. Said slider 17 allows to adjust the position of the antenna simply and effectively; by sliding the slider 17 in the slot 18, the antenna is in fact turned about the axis of the pivot 15, which is substantially perpendicular to the longitudinal axis 4 of the pole, until the intended position is reached; the slider 17 can then be locked in the new position, for example by means of a screw-type system, according to a quick solution which does not require complicated adjustment systems and significantly facilitates operator interventions. Alternatively, the connecting element 16 can be provided as an adjustable element, for example as an element of the screw-coupling type.

[0027] In practice it has been found that the support according to the invention fully achieves the intended aim and objects, since it allows to significantly reduce environmental impact, to minimize the number of constructive components used, to reduce the time required to install and adjust the position of the antennas and to perform maintenance interventions.

[0028] Moreover, the fact should not be ignored that all the innovative functions and inventive aspects of the device can be achieved by using commonly commercially available elements and materials with modest costs. For example, the collar 7-plate 5 assembly can be provided as a single aluminum casting, while the rod-like elements 13 can be provided by means of aluminum extrusions. In this manner it is therefore possible to have constructive components which are very light and at the same time adequately strong.

[0029] Furthermore, the supporting device, by virtue of the simplicity and effectiveness of its constructive structure, is suitable in a highly flexible manner to provide different constructive configurations, as shown for example in Figure 3, and is structurally usable also with microwave link units which can be fixed to the pole 1 or to the coupling means 100.

[0030] The device thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the inventive concept; all the details

may furthermore be replaced with other technically equivalent elements. In practice, the materials and the dimensions may be any according to the requirements and the state of the art.

Claims

1. A support for cellular telephony antennas, **characterized in that** it comprises:

- a base supporting element, which lies substantially vertically and can be operatively connected to an anchoring surface, and
- coupling means for the connection of at least one antenna, which are suitable to operatively interconnect, in a substantially bracket-like fashion, the antenna to the base element.

2. The support according to claim 1, **characterized in that** said coupling means are suitable to connect the antenna to the base element so as to allow movement between a first active position and a second inactive position, the antenna being arranged, in said first and second positions, on mutually opposite sides with respect to a reference plane which lies transversely to the longitudinal axis of the base element.

3. The support according to claim 1, **characterized in that** the antenna is connected to the base element at a free end of said base element.

4. The support according to one or more of the preceding claims, **characterized in that** said coupling means comprise means for fixing to the base element, means for connection to the antenna, and means for the interconnection of said connection means with said fixing means, said interconnection means being arranged proximate to a first lower end of the antenna with respect to the longitudinal axis of the base element.

5. The support according to one or more of claims 1 to 3, **characterized in that** said coupling means comprise means for fixing to the base element, means for connection to the antenna, and means for the interconnection of said connection means with said fixing means, said interconnection means being arranged proximate to a second upper end of the antenna with respect to the longitudinal axis of the base element.

6. The support according to claim 4 or 5, **characterized in that** said interconnection means are articulately connected to the connection means so as to facilitate the rotation of the antenna about a first reference axis which is substantially parallel to the lon-

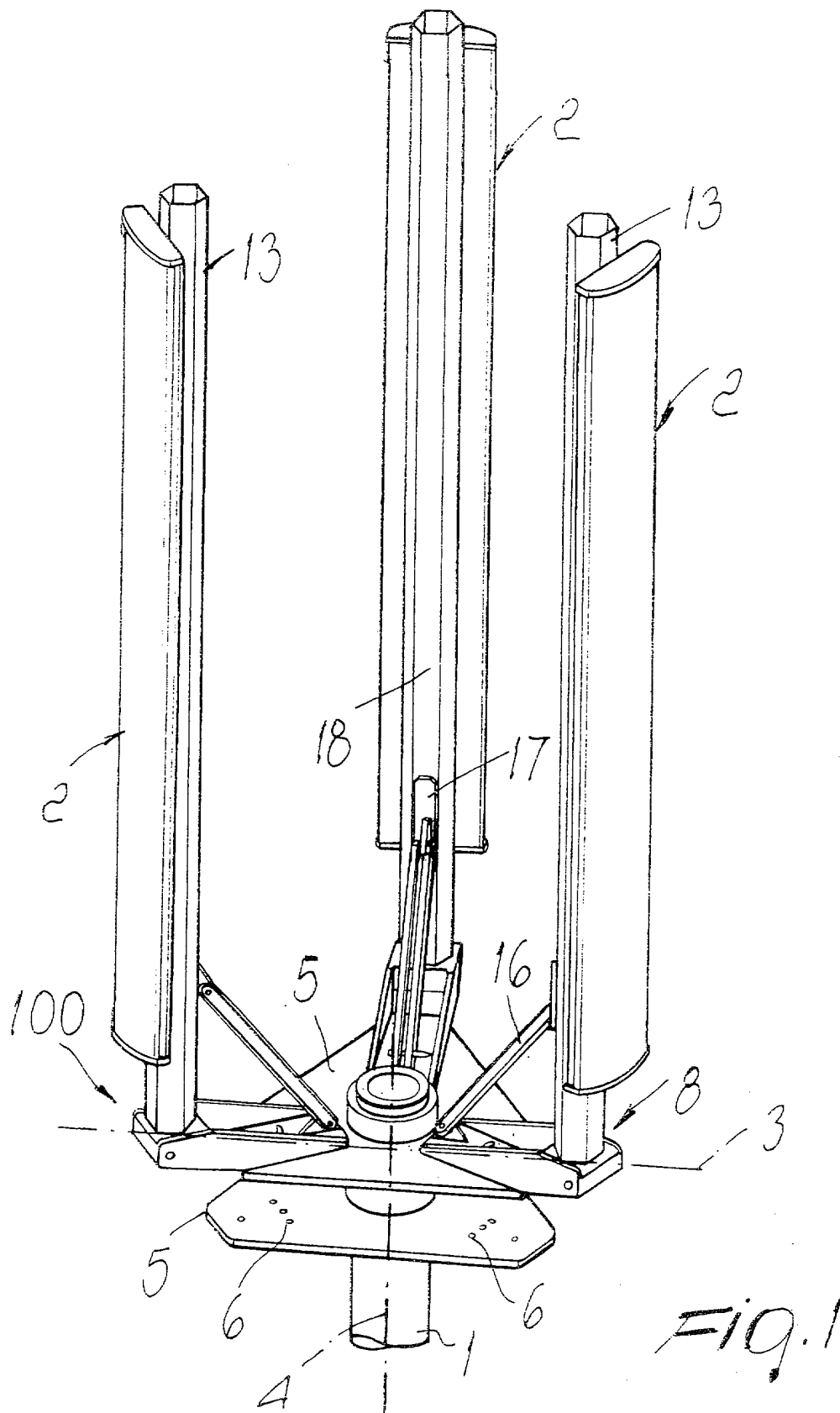
gitudinal axis of the base element.

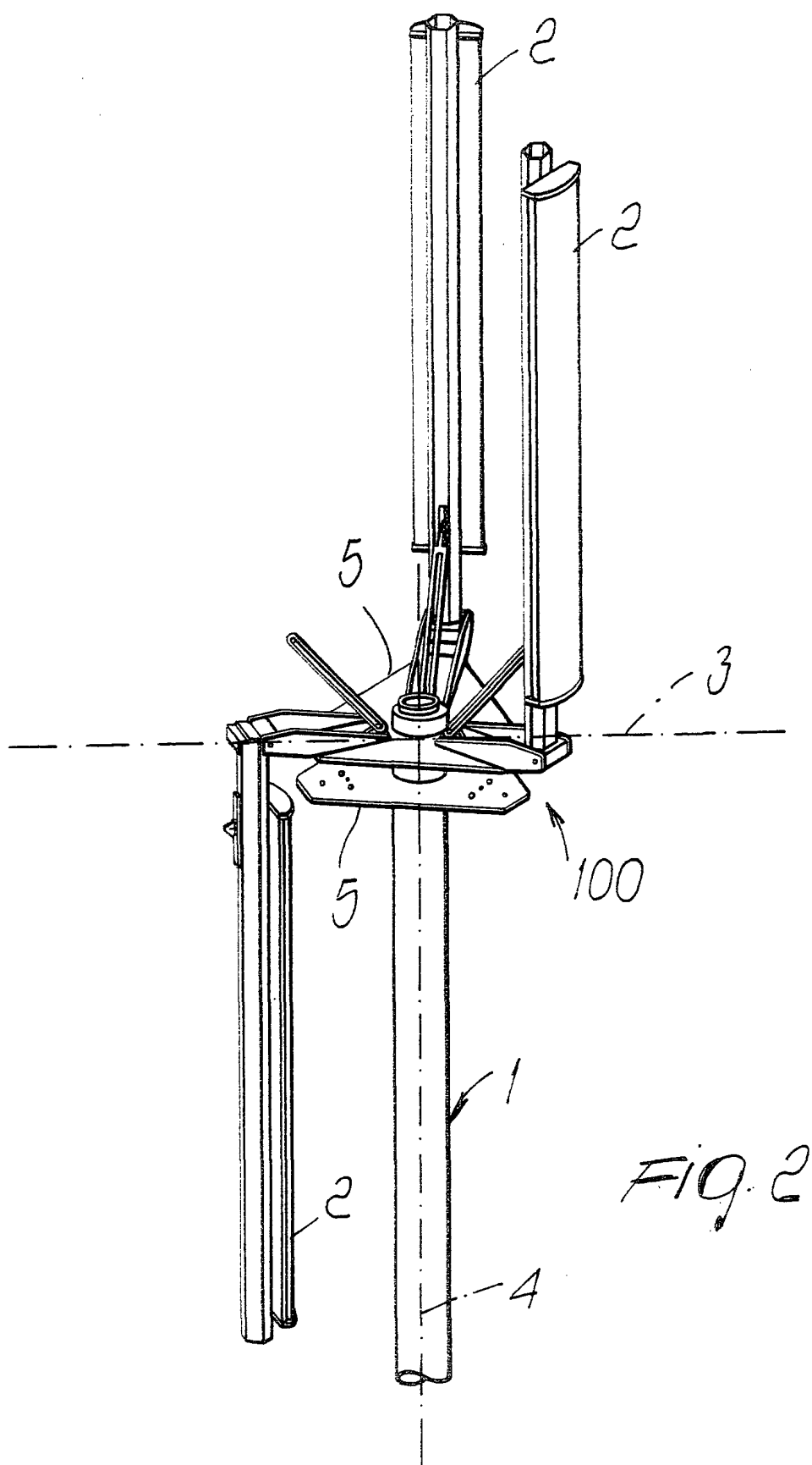
7. The support according to claim 6, **characterized in that** said interconnection means are articulately connected to the fixing means in order to allow the rotation of the antenna about a second reference axis which is substantially perpendicular to said first reference axis. 5
8. The support according to claim 6, **characterized in that** said fixing means comprise at least one first perforated base plate and a through collar which protrudes from said plate transversely thereto, said collar being suitable to be fitted on the base element and to accommodate means for connection to said base element. 10 15
9. The support according to claim 8, **characterized in that** said interconnection means comprise at least one connecting arm which has a base wall from which two substantially mutually parallel side walls protrude, a through seat being formed in said base wall and being suitable to accommodate means for connection to said first base plate. 20 25
10. The support according to claim 9, **characterized in that** said connection means comprise a rod-like element which is coupled to the antenna and has a shaped end which is inserted between the two side walls of the connecting arm and is connected thereto in a substantially hinge-like manner. 30
11. The support according to claim 10, **characterized in that** said interconnection means comprise a linkage-like element in which a first end is connected to the base wall and a second end is connected to a slider which can slide within a slot formed in said rod-like element, said slider being lockable on the walls of said slot at a chosen position of the antenna. 35 40

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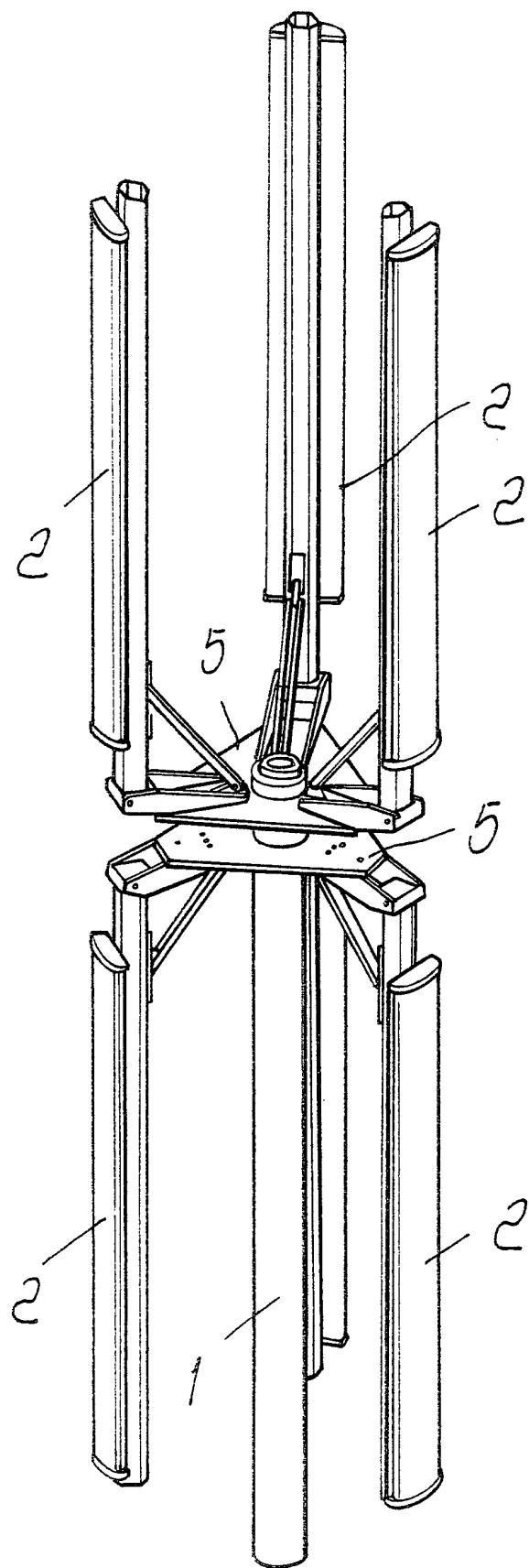


FIG. 3

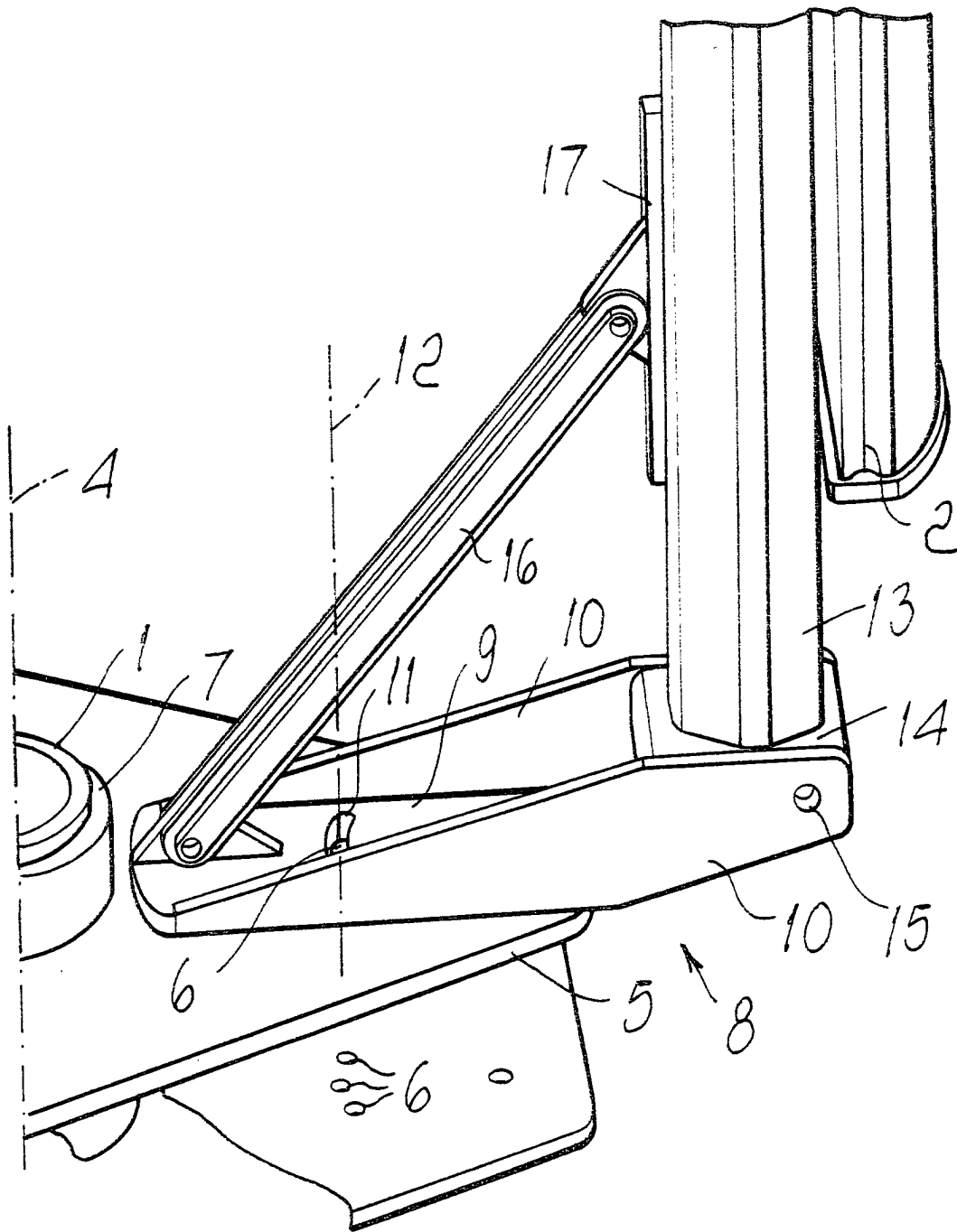


FIG. 4