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(54) **A telecommunications antenna support structure**

(57) A telecommunications antennae support structure with a supporting pole; at least two arms mounted on and arranged independently about the pole and extending radially outwardly from the pole. Each arm has a first end attached to the pole, and a second free end. At least one antennae is mounted on each of said free ends of said at least two arms. A cover is provided for each of said at least two antennae; and a work platform mounted about the pole for allowing access to the antennae and the covers. The invention provides a simple yet attractive design. The arrangement may be arranged to resemble a street lamp standard.

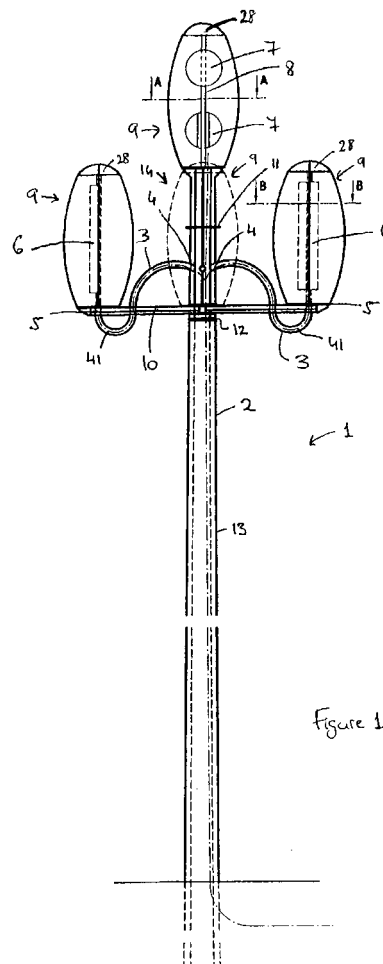


Figure 1

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Description

Field of the Invention

[0001] The present invention relates to the field of telecommunication support structures for antennae. The telecommunication of interest in the present invention are wireless communication where the support structure supports antennae which are used to receive and/or transmit communications signals, for example radio, television or telephone communication signals. Of particular interest to the present invention is the field of mobile phone communications and telecommunications antennae support structures for use therewith. The structures often form part of a telecommunications base station.

Background and Object to the Invention

[0002] Telecommunications antennae support structures have been long known. Increasingly however it is desired to place the support structures (usually as part of a base station) in areas that have relatively high populations. For example in order to support a mobile phone network it is desirable that increasing numbers of telecommunications antennae support structures are used to transmit and receive mobile phone communication signals for many users and also to provide strong signals so that calls made are clear (voice data and other data is not corrupted or distorted) and are not inadvertently dropped also and of course to ensure that the telecommunications network is available at all geographic locations within a certain area. Planning authorities do not like some structures which can devalue properties and can be reluctant to grant permission to erect the structures.

[0003] On the other hand however despite the accepted need for telecommunications antennae increasingly people in general do not like to have telecommunication antennae structures near or close to their property or indeed any location where they spend time. There is a fear of the radiation emitted by the antennae on the support structure. Also many of these structures are found to be imposing and/or unattractive due at least in part to the necessity to have the antennae elevated above ground level. Accordingly it has become desirable to either locate these structures away from residential areas, in areas where they are not normally seen by the public, or to hide them away from view, for example by placing antennae on top of tall buildings.

[0004] However in areas where there are no tall buildings it is necessary to provide a reasonably tall structure which will form part of a telecommunications network.

[0005] It is also desirable to provide structures which will not be so undesirable to the general public. Some attempts have been made to camouflage antennae, for example by creating an antennae support structure that resembles a tree. Such structures are designed so that their function is not immediately evident.

[0006] An objective of the present invention is to provide an alternative solution to the problems associated with prior art telecommunication antennae support structure.

[0007] When used in relation to the present invention the word "antennae" means a transmitting or receiving device for telecommunications and includes what is commonly known as a dish.

Summary of the Invention

[0008] The present invention provides a telecommunications antennae support structure comprising:

- a (central) supporting pole;
- at least two arms mounted on and arranged independently about the pole and extending radially outwardly from the pole, each arm having a first end attached to the pole, and a second free end;
- at least two antennae, at least one antennae being arranged on each of said free ends of said at least two arms;
- a cover for each of said at least two antennae;
- a work platform mounted about the pole for allowing access to the antennae and the covers.

[0009] The present invention also provides a telecommunications antennae support structure comprising:

- a (central) supporting pole;
- at least two arms mounted on and arranged independently about the pole and extending radially outwardly from the pole, each arm having a first end attached to the pole, and a second free end;
- at least two antennae, at least one antennae being arranged on each of said free ends of said at least two arms;
- a cover for each of said at least two antennae;
- the arms being hollow or recessed to allow cables to run hidden in the arms.

[0010] In a further aspect the present invention also provides a telecommunications antennae support structure comprising:

- a (central) supporting pole;
- at least two arms mounted on and arranged independently about the pole and extending radially outwardly from the pole, each arm having a first end attached to the pole, and a second free end;
- at least two antennae, at least one antennae being arranged on each of said free ends of said at least two arms;

a cover for each of said at least two antennae, the covers being provided in two or more parts which can be opened to allow access to the interior of the cover.

[0011] Desirably the latter two embodiments also in-

clude a work platform such as described above.

[0012] Accordingly the present invention provides a simple yet attractive solution to the problems recited above. It is particularly desirable that the support structure of the invention is arranged to resemble a street lamp, in particular a street lamp having at least two lights. The arrangement is particularly designed to resemble a lamp standard.

[0013] It is particularly desirable that the supporting pole is located centrally to the arrangement. Such a structure is often referred to as a monopole structure. The pole is desirably a straight pole optionally formed by two or more pole portions. The pole sections may be fitted end to end or joined side to side to form the pole. In one arrangement of the invention part of the pole (the part supporting the arms) is constructed of metal such as steel; while the remainder of the pole is formed of an alternative material, desirably a castable material such as concrete. The entire pole, whether in pole portions or not can be made of the same material. Desirably the pole is provided with one or more conduits for receiving cables running to and/or from the antennae. In one arrangement the supporting pole is hollow. This allows cables to be accommodated internally in the pole. In another arrangement the supporting pole is additionally or alternatively provided with recessed channels (or grooves) on an exterior thereof. This allows cables to be at least partially accommodatable within the channels (so that it does not project proud of the channel to any substantial extent). Desirably an entire cable is accommodated within a channel. In one particular arrangement the channels run longitudinally (preferably in a straight line) from the base of the pole upwards. There are aesthetic advantages to having the cables running internally in the arms and/or internally and/or recessed in the pole. However there is also a significant technical advantage to having the cables recessed/carried internally in the pole is that the wind loading on the pole is substantially reduced. Similarly the loading on the arms is also reduced. Wind loading can be high due to weight/size of the cables, in particular as the length of the cable on the pole can be quite substantial. The wind loading combined with the weight of the cables themselves can cause great stress on the structure.

[0014] Desirably there are between three and six arms mounted on, and arranged independently about the pole. In one particularly desired construction at least one antennae is provided on the top of the pole. Some particularly desirable arrangements include those having at least one antennae on the top of the pole and two, three or four arms (each supporting desirably at least one antennae) mounted on or arranged independently about the pole. In this respect it is desired that the antennae/cover arrangement on the top of the pole is substantially centred about a longitudinal axis of the pole (again desirably in a manner resembling a street lamp).

[0015] Desirably the arms are non-linear for example curved. In one particularly desired arrangement the

arms curve downwardly toward the base of the pole so that the second free end thereof is at a position lower than the first end thereof relative to the pole.

[0016] Alternatively the arm may first extend upwardly and then downwardly or vice versa, in all cases desirably in a full or partial "s" or "u" shape. This allows for design of particularly attractive structures. It is particularly desirable that the arm has at least one generally u-shaped portion which is up-turned toward the top of the pole or down-turned towards the base of the pole.

[0017] In one arrangement the antennae may be placed on the up-turned end of the arm so that each of the arm forms a mounting base for the antennae, so that if desired the antennae and/or any associated cover may be centred about a longitudinal axis of the arm(s). The antennae may sit higher than the general u-shape.

[0018] In a second arrangement the antennae are attached to the down-turned end (again desirably the antennae and/or cover are centred about a longitudinal axis of the arm) of the arm so that it can be mounted at a position lower than the general U-shape arrangement. One particularly attractive design is where the arms are each of a general S-shape (in general having at least two bends in the arm).

[0019] It is desirable that any single antennae or a group of antennae provided on a free end of any given arm is/are cover by a cover. It will be appreciated that additional ("dummy") covers which do not house an antennae can be provided, for example, for aesthetic reasons. It is particularly desirable that any cover provided surrounds (and desirably entirely houses) the antennae. One particularly desirable arrangement is where the cover fits over the antennae. In particular it is desirable that the cover surrounds the antennae and obscures it from view.

[0020] In one particularly desirable arrangement where the antennae is up-standing or dependent from the free end of the arm, the cover surrounds the arm on all sides with an aperture provided in the cover through which the antennae and/or the arm extends to allow the antennae and the arms to be fixed one to another.

[0021] In this respect it is desirable that the covers are each globe shaped. The term globe as used herein refers to a continuous solid cover (desirably with an aperture as described immediately above) and optionally with a top cover/lid. It is desirable that the cover is a continuous solid (a closed cover) and may for example be transparent, translucent or opaque to visible light. Desirably it is translucent. It is particularly desirable that the cover does not interfere to any substantial extent with the telecommunication signals emitted or received by the antennae. One particular material which is useful for construction of the covers of the structure of the present invention is fibreglass reinforced plastic (FRP). The cover can also be consider a protective shell and/or camouflage. The wall thickness of the covers is desirably between 3 - 6mm. The covers are desirably weatherproof.

[0022] Desirably the cover is of curvilinear shape, for example, of a spherical, elliptical or other such shapes, through it will be appreciated that it could have irregular/angular shapes.

[0023] It is particularly desired that the covers are translucent to visible light, i.e. sufficiently opaque to obscure the view of the antennae, but not so opaque that the covers may not transmit visible light e.g. from an internal visible light source to the exterior thereof.

[0024] In one particularly convenient arrangement the cover is divided in two or more parts which can be opened to allow access to the interior of the cover (and thus the antennae). In one particularly desirable arrangement the cover has a top wall portion, side-wall portions and a base. Desirably an aperture is provided in the base. The side-walls surround the antennae when *in situ*. The top-wall portion desirably covers over the top of the antennae (*in situ*).

[0025] The present invention extends to covers employed in the present invention.

[0026] It is particularly desirable for all embodiments of the invention that the cover is provided in at least two portions for example as two parts which are relatively movable to open (preferable providing an opening in the side wall thereof). This may be done, for example by providing the cover in two or more parts joined along one or more longitudinal and/or transverse joints. Preferably at least one longitudinal joint is provided (which in use runs top to bottom along the side-wall of the cover). Alternatively a removable or hinged portion may be provided in the side wall to form for example an access door. In one arrangement the cover is desirably formed by two part shells (desirably substantially half shells) and the top portion is formed by a lid which mates with the shells. It is also particularly desirable to form the cover in three portions (desirably substantially each a one third portion of the cover) to allow access at three portions about the cover.

[0027] Desirably an opening or access point is provided for each antennae or group of antennae provided. For example where three antennae are provided spaced approximately 120° apart about the pole desirably the cover opens to allow access at three points coinciding with the positions of the antennae.

[0028] Desirably the material of the cover is colourable by dyeing with a colorant, for example, a dye or other material which will colour the cover to any particularly desired colour.

[0029] The covers of the invention may have a height of 0.5 to 2 metres with a suitable radius for example 0.4 to 1 metre.

[0030] The cover(s) may be supported by the arms and/or the platform.

[0031] As before the antennae may be single or grouped antennae comprising transmitting and/or receiving devices, for example, including dishes.

[0032] The work platform mounted about the pole is desirable circular in shape and is mounted sufficiently

close to the antennae to allow a person to work on the antennae from the platform. Suitable therefore the platform is desirable located within 2m of each (at least those which are radially arranged and desirably within said distances of all antennae) antennae, more preferably within 1.5m of each antennae and where possible within 1m of the antennae. The platform may be provided with an access door for access through the platform to the walking distance thereof from the underside thereof.

[0033] It is to be particularly noted that where the arms turn downwards along the pole it is desirable that they and the platform are arranged so that the antennae (and any associated cover) is proximate the platform. In particular in certain embodiments of the present invention the platform is provided about the pole so that a part of an (desirably each) arm between the first fixed end and the second free end thereof passes through the platform. As it is particularly desired that the arms are substantially identical in shape and at substantially the same position relative to the pole, this may be achieved relatively easily with the present invention. Allowing the arms to pass through the platform at least once allows the working surface thereof to be placed closer to the antennae/covers that would otherwise be possible.

[0034] In particular it is desired that the free end of the arms are located proximate to a top (working surface) of the platform. Desirably the arm passes through the platform twice. For example downward turning through the platform and then turning upwardly again and extending through the platform.

[0035] In one arrangement at least one of the radially arranged antennae /cover assemblies is at least partly supported by the platform. The arms could for example be arranged so that all, or a substantial portion of, the weight of the antennae and/or cover is borne by the platform. In such case the arms can be considered to be ornamental though the appearance is still that the antennae /cover is supported by the end of the arm.

[0036] Desirably cables for the antennae run in the arms. For example the arms may be hollow to accommodate cables for the antennae. This is a particularly attractive arrangement where the cables may be hidden internally.

[0037] The invention extends to the support structure shown in the accompanying figures.

Brief Description of the Drawings

[0038]

Figure 1 is a side elevational, part-sectional view, of a telecommunications antennae support structure of the present invention;

Figure 2 is a (top) plan part-sectional view thereof; Figure 3 is a (top) plan enlarged part sectional view along the line A-A of Figure 1 of an antennae/cover assembly forming part of a telecommunication an-

tennae support structure of the present invention; Figure 4 is a (top) plan enlarged part sectional/view along the line B-B of Figure 1 of an alternative antennae/cover assembly forming part of a telecommunication antennae support structure of the present invention;

Figure 5 is a front elevational view of a second support structure similar to that shown in Figure 1;

Figure 6 is a third embodiment of a telecommunication antennae support structure of the present invention;

Figure 7 is a fourth embodiment of a telecommunication antennae support structure of the present invention;

Figure 8 is a fifth embodiment of a telecommunication antennae support structure of the present invention;

Figure 9 shows a structure similar to the Figure 1 embodiment;

Figure 10 shows a structure similar to the Figure 1 embodiment;

Figure 11 shows a structure similar to the Figure 1 embodiment.

Figure 12 shows a front elevational view of an alternative arrangement of a structure according to the present invention;

Figure 13 shows a sectional view along the line C-C of the recessed pole of the structure of Figure 12; and

Figure 14 shows a sectional view along the line B-B of a spherical cover forming part of the structure of Figure 12.

Detailed Description of the Drawings

[0039] The present invention will now be described in relation to the accompanying Figures.

[0040] Figure 1 shows a telecommunication antennae support structure 1 having a central support pole 2 and a series of four arms 3 (all four arms are best seen in Figure 2). The arms 3 are mounted on and arranged independently about the pole 2. Each arm extends radially outwardly from (a side of) the pole 2 and has a first end 4 attached to the pole 2 and a second free end 5 (see Figure 1) on which antennae are arranged (mounted).

[0041] In particular antennae 6 are provided on the free ends 5 of the arms 3. The antennae are normal telecommunication antennae. Three dishes 7 (only two seen in Figure 1) also act as antennae within the meaning of the present invention. The dishes 7 face in directions 120° apart and are provided on a further supporting pole portion 8 which may be considered a portion of the central pole 2. Each antennae or set of antennae is provided with a cover 9. In the embodiment there are four antennae or sets of antennae and thus four covers 9. A work platform (a pedestal) 10 which is circular in shape (flat disk shaped) is provided about the pole. In the

embodiment shown the work platform extends the entire way (360°) about the pole and this is preferred.

[0042] The body of the central supporting pole 2 may be made of steel or pre-stressed concrete, for example in the form of a pre-stressed concrete tube. The body may be hollow to facilitate internal cabling and optionally access thereto and may for example support a safety ladder. The main body of the structure can come in a variety of lengths, such as from 5 to 20 metres long for example from 8 - 20m long. Normally it would be divided in two or more sections for ease of assembly. Where concrete is used it can be dyed (steel can also be coloured) to a variety of colours so as to better blend the colours into the surrounding environment.

[0043] In the embodiment of Figure 1 the joint 12 indicates the boundary between the lower concrete section 13 and the upper steel section 14 (which includes pole 8). Up to about 14 metres in height it would be normal to construct the support pole in only one piece.

[0044] It will be appreciated that the position of the pole 14 may be placed on top of the remainder of the pole 13 which is first erected. Where the system is to be fitted to a building the section 13 of the pole may be included. That part of the structure above the joint 12 can be considered a structure within the present invention. A steel safety ring 11 is attached to the pole approximately 1.1 m above the platform. The safety ring is used for attachment of safety harnesses for maintenance crew workers. Rungs can be provided on the exterior of the pole to form a climbing ladder for maintenance purposes etc. to access the antenna.

[0045] The (disk shaped) platform or pedestal 10 would normally be about 3 - 3.1m in diameter. Desirably in a grid portion, for example with steel concentric rings 15. An underneath cross arm support 16 supports the platform on the pole. If the weight of the cover/antennae is high relative to the support capability of the arm, or in any event it is useful to have all or a substantial portion of the weight of the cover/antenna taken up by the platform. In particular it is desirable however to maintain at least the illusion of the antenna (and also desirably the covers) being mounted on the ends of the arms.

[0046] As will be appreciated from Figures 1 and 2 (and indeed later Figures) it is desirable that the arms are arranged an equal distant apart about the pole.

[0047] Figure 3 shows the central antennae/cover assembly, 7, 9 which sits on the top of the pole while Figure 4 shows the antennae/cover assembly 6, 9 four of which are held circumferentially about the pole 2. In Figures 3 and 4 (and indeed all the Figures) the cover 9 is formed of a solid shell 20 of fibreglass reinforced plastics. It is thus made of material that is sufficiently opaque to visible light to obscure the view of antennae 7 from view. However if desired one or more of the globes formed by the covers could be lit up e.g. by a light source inside some or all of the covers 9. Additionally or alternatively the entire structure may be lit up by an external light source e.g. a "up lighter".

[0048] The cover 20 is in three pieces or section respectively labelled 21, 22, 23 (in the embodiment each section is of equal size) so that the cover 9 can be removed/opened in each of three sections. The sections 21, 22, 23 of the cover meet along joint lines 24. In particular it will be noted that removal of section 21 will allow access to one particular antennae 7 as will removal of each of sections 22, 23 of the cover. A flange or rim 25 is formed on the top surface 25 of the cover (the flange is also sectioned) matching the sections 21, 22, 23 of the cover. The flange 25 is formed about a central aperture 26. The aperture 26 is covered using a lid or cover 28 (see Figure 1) which may be fixed to the sections 21, 22, 23 by bolts or other such fasteners through apertures 27 provided in the flange 25. If desired the lid or cover 28 may also be provided in the same number of sections as the cover 9. The cover 9 incorporates a grip for the manually opening the cover. The cover 9 may be profiled for example by forming a grip such as a recess or upstanding portion on at least one side of the joint lines 24. In the embodiment a groove 29 is provided symmetrically about the joint line. This allows for ease of manual gripping of each section 21, 22, 23 of the cover 9 for removal.

[0049] Desirably parts of the covers 9 which open are hinged to allow ease of access to the cover i.e. portions of the cover. It would be appreciated that it is not then necessary for a maintenance person to remove and place aside a separate piece of the cover in order to carry out maintenance etc. and that antennae can be accessed conveniently.

[0050] Figure 4 shows a top part-sectional view of the remaining cover/antennae assembly formed about the pole.

[0051] In general the arrangement is similar to Figure 3 though in this particular embodiment the cover 9 is formed of two half shelves 30, 31 which meet along joint line 32. Antennae 6 are present within the cover 9 and a flange 25 is provided with (a lesser number of) apertures 27 for receiving both.

[0052] One particular embodiment of the type of telecommunication support structure 1 of the present is shown as an elevational view in Figure 5.

[0053] It will be appreciated that in both Figure 1 and Figure 5 the arms 3 are of a general S-shape. In Figure 1 the arm 3 up-turn to form a generally u-shaped 41 portion. In the embodiment the free ends 5 of the arms point substantially vertically upwards. The antennae 6 can thus be placed directly on top of the free ends 5 of the arm. The covers/antennae structures are thus easily centred about a longitudinal axis of the arms.

[0054] Cable(s) can be run through the arm 3 to the antennae 6 easily. It will be noted in the embodiment of Figure 1 that the arms 3 extend through the pedestal 10 twice allowing the cover/antennae arrangement to lie very close to the platform 10 thus providing for ease of access for maintenance. The sectional covers also allow for ease of removal of at least part of the covers 9

so that a maintenance person working on the platform does not have to remove the entire cover 9 to access any given antennae.

[0055] In the arrangement of Figure 5 the arms 3 do not extend through the platform 10 but extend very close to it position again allowing for ease of access. The arms 3 are still generally provided with a u-shaped 41 proximate the free ends of the arms.

[0056] Figure 6 shows a perspective view of an alternative embodiment of a telecommunication support structure of the present invention. It shows two covers 9 concealing antennae spaced 180° apart about the central pole 2. No antennae/cover is provided at the top of the pole 2 and a portion of the pole 40 normally a steel extension part to the otherwise concrete pole 2 extends upwardly from the platform 10. A cover alone could be provided on top of the pole for aesthetic reasons even if one additional antennae are not considered necessary.

[0057] Figure 7 shows a further embodiment where three covers/antennae assemblies are provided.

[0058] Figure 8 shows a further alternative where four cover/antennae assemblies are provided. They are each equally spaced from the next about the pole. Like the embodiment of Figure 6 no cover/antennae assembly is formed on the extension portion 40 of the pole.

[0059] Figure 9 shows an arrangement generally similar to Figures 1 and 5 where there are 5 cover/antennae. Four of which are spaced equal distantly about the tunnel on arms and 6 of which sits at the top of the pole. In the embodiment the pole 2 the platform 10 and the arms 3 are generally indicated in darker shading showing that the colour of the pole can be selected as desired e.g. by colouring concrete if the pole is made from concrete or by applying an appropriate colour to steel if the pole is made of steel. In general the arms 3 and the platform 10 will be constructed of steel.

[0060] Figures 10 and 11 show respectively a perspective and elevational view of a telecommunication structure 1 of the present invention having different shading (colour) achieved by dying concrete that the pole is made from or by colouring steel that the pole is made from.

[0061] Figure 12 shows a further embodiment of the invention where the arms 3 again are curved and end in downturned ends 5 on which antenna 6 are arranged (the antennae 6 depend from the arms 3). Again as with previous embodiments covers 9 are provided about the antenna and house them obscuring them from view. In the embodiment the three upper covers are provided in a spherical shape. The platform 10 may be used to support some of the weight of the covers/antenna.

[0062] As seen from Figure 13 the pole 13 is recessed for accommodating cables. In particular recesses in the form of round bottomed channels 50 are provided, in one or more of which, cable may be run.

[0063] Figure 14 shows a sectional view of one of the spherical covers 9. It can be seen from the drawing that

the cover 9 is provided in two shell-halves and is similar in construction to the covers described above.

[0064] It is appreciated that certain features of the invention, which are, for clarity, described in the context of separate embodiments, may also be provided in combination in a single embodiment. Conversely, various features of the invention which are, for brevity, described in the context of a single embodiment, may also be provided separately or in any suitable subcombination.

[0065] The words "comprises/comprising" and the words "having/including" when used herein with reference to the present invention are used to specify the presence of stated features, integers, steps or components but does not preclude the presence or addition of one or more other features, integers, steps, components or groups thereof.

Claims

1. A telecommunications antennae support structure comprising:

a supporting pole;
at least two arms mounted on and arranged independently about the pole and extending radially outwardly from the pole, each arm having a first end attached to the pole, and a second free end;
at least two antennae, at least one antennae being arranged on each of said free ends of said at least two arms;
a cover for each of said at least two antennae;
a work platform mounted about the pole for allowing access to the antennae and the covers.

2. A telecommunications antennae support structure comprising:

a supporting pole;
at least two arms mounted on and arranged independently about the pole and extending radially outwardly from the pole, each arm having a first end attached to the pole, and a second free end;
at least two antennae, at least one antennae being arranged on each of said free ends of said at least two arms;
a cover for each of said at least two antennae;
the arms being hollow or recessed to allow cables to run hidden in the arms.

3. A telecommunications antennae support structure comprising:

a supporting pole;
at least two arms mounted on and arranged independently about the pole and extending ra-

dially outwardly from the pole, each arm having a first end attached to the pole, and a second free end;

at least two antennae, at least one antennae being arranged on each of said free ends of said at least two arms;

a cover for each of said at least two antennae; the covers being provided in two or more parts which can be opened to allow access to the interior of the cover.

4. A telecommunication antennae according to claim 2 or claim 3 further comprising a work platform.

5. A telecommunication antennae according to claims 1 or 2 wherein the covers are provided in two or more parts which can be opened to allow access to the interior of the cover.

6. A telecommunications antennae support structure according to any preceding claim which is arranged to resemble a street lamp.

7. A telecommunications antennae support structure according to any preceding claim wherein the supporting pole is located centrally to the arrangement.

8. A telecommunications antennae support structure according to preceding claim wherein the pole is formed by two or more pole portions.

9. A telecommunications antennae support structure according to any preceding claim wherein the pole is provided with one or more conduits for receiving cables running to and/or from the antennae.

10. A telecommunications antennae support structure according to any preceding claim wherein the supporting pole is provided with recessed channels on an exterior thereof.

11. A telecommunications antennae support structure according to any preceding claim wherein between three and six arms are mounted on, and arranged independently about the pole.

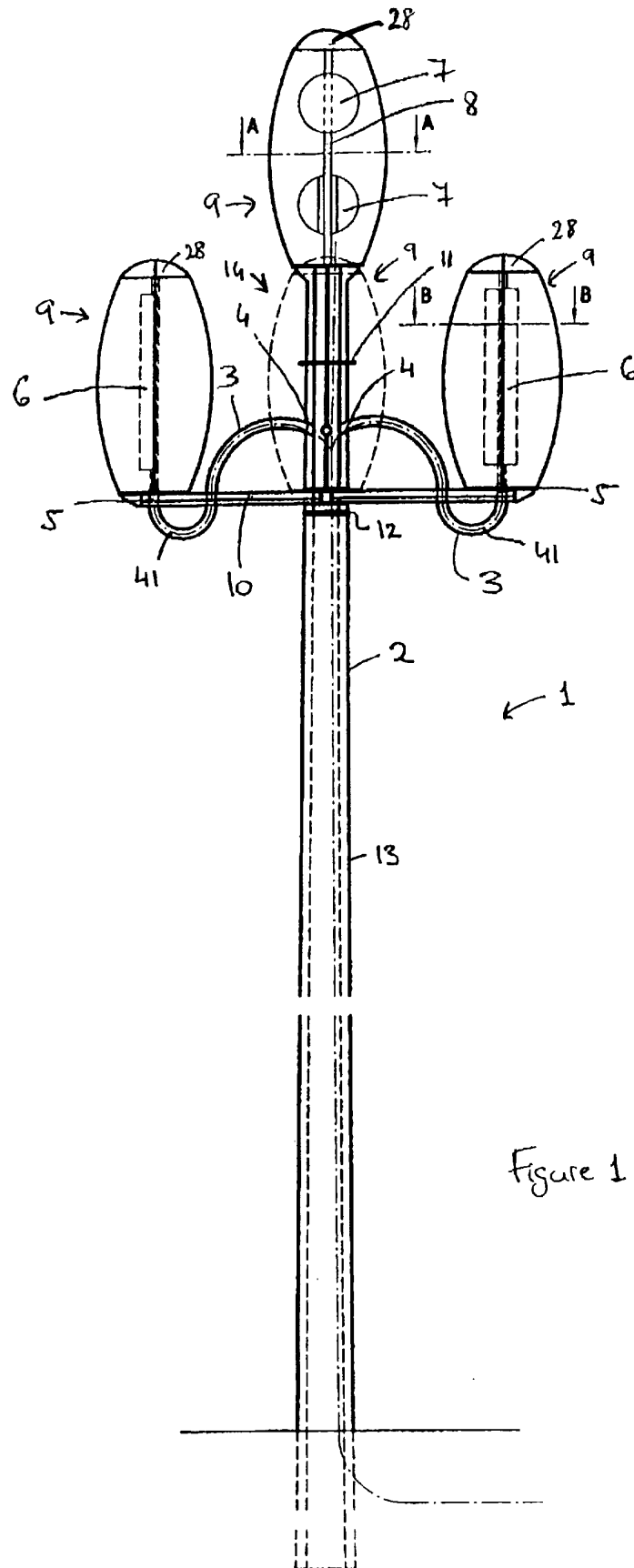
12. A telecommunications antennae support structure according to any preceding claim wherein at least one antennae is provided on the top of the pole.

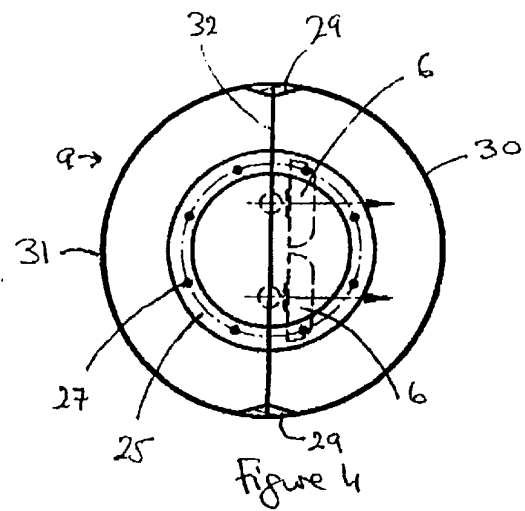
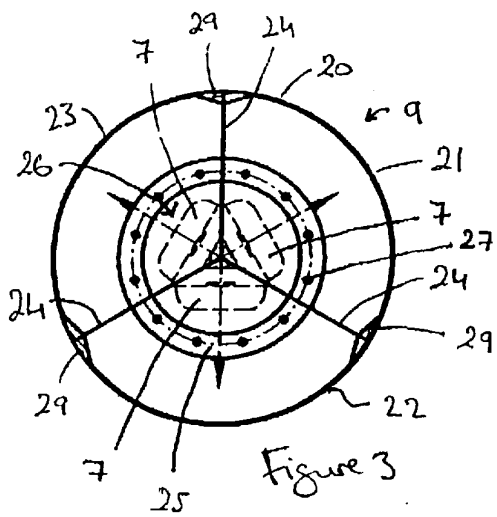
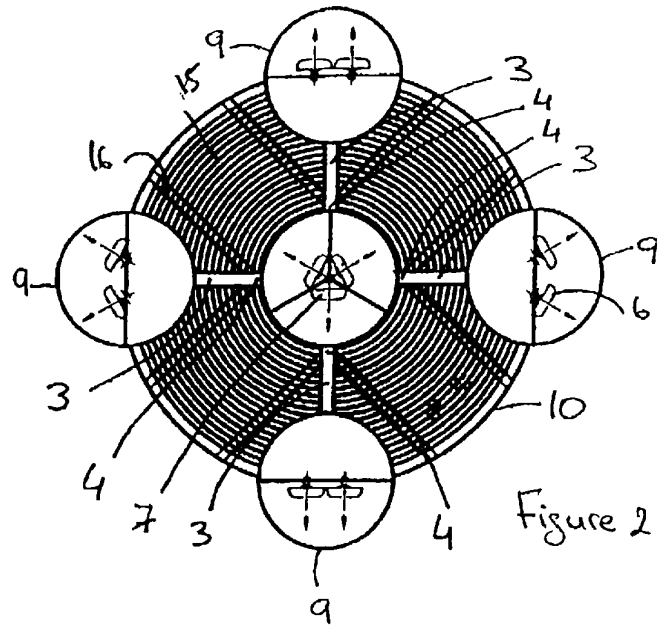
13. A telecommunications antennae support structure according to any preceding claim wherein at least one cover is provided on top of the pole.

14. A telecommunications antennae support structure according to any preceding claim wherein the said at least two arms are of a general S-shape.

15. A telecommunications antennae support structure according to any preceding claim wherein said at least two antennae are up-standing or dependent from the free end of an arm. 5
16. A telecommunications antennae support structure according to any preceding claim wherein said cover is globe shaped. 10
17. A telecommunications antennae support structure according to claim 16 wherein the cover is of curvilinear shape. 15
18. A telecommunications antennae support structure according to on of claims 1, 2 or 4 to 17 wherein the covers are comprise two or more parts which can be opened to allow access to the interior of the cover. 20
19. A telecommunications antennae support structure according to claim 14 wherein the cover are desirably formed by two or three- part shells. 25
20. A telecommunications antennae support structure according to any preceding claim wherein the platform is located within 2m of each radially arranged antennae, more preferably within 1.5m of each antennae for example within 1m of the antennae. 30
21. A telecommunications antennae support structure according to any preceding claim wherein the said at least two arms pass through the platform at least once. 35
22. A telecommunications antennae support structure according to claim 1 or claims 4 to 21 wherein said at least two arms are hollow for accommodating cables for the antennae. 40
23. A telecommunications antennae support structure substantially as described herein with reference to and/or as discussed in the accompanying figures. 45
24. A cover for covering a telecommunications antennae comprising a hollow shell within which the antennae is/are housable the cover being provided in two or more parts which can be opened to allow access to the interior of the cover. 50
25. A cover according to claim 24 wherein the cover is sectioned. 55

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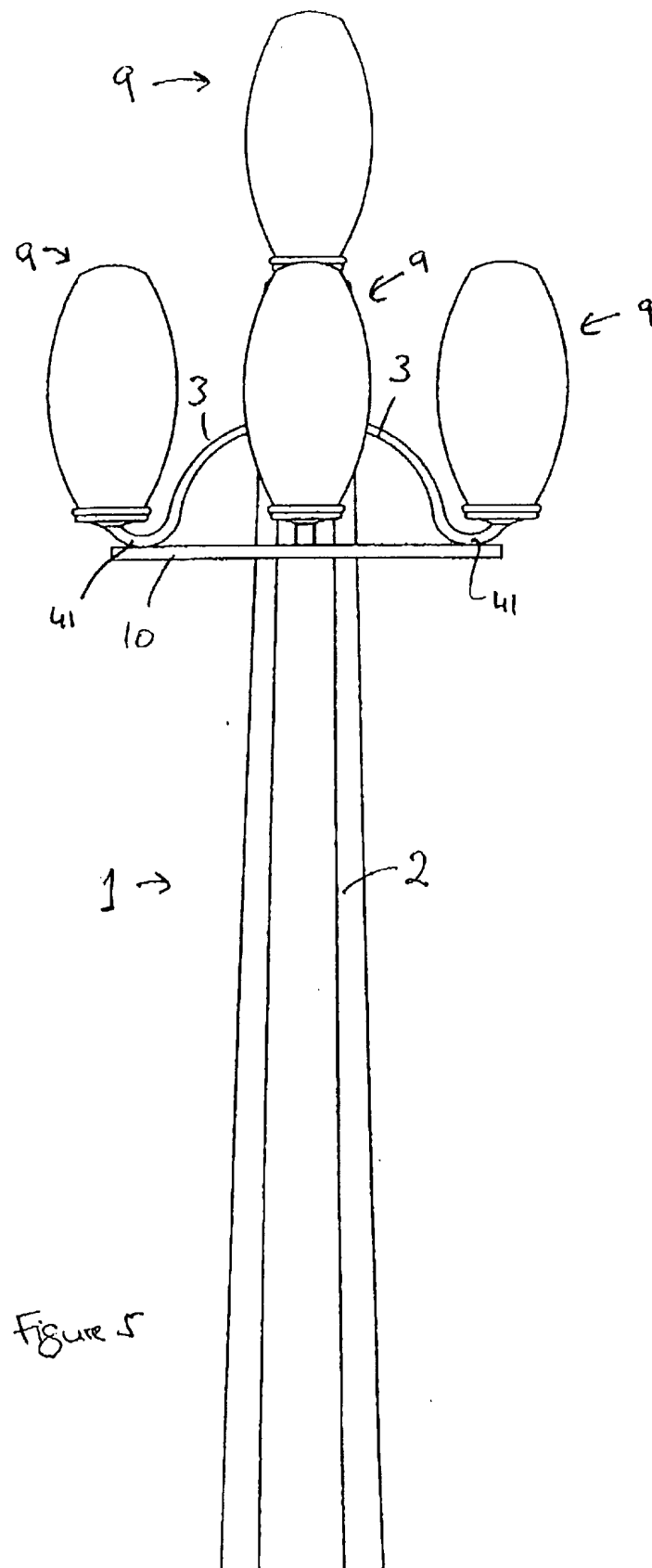


Figure 5

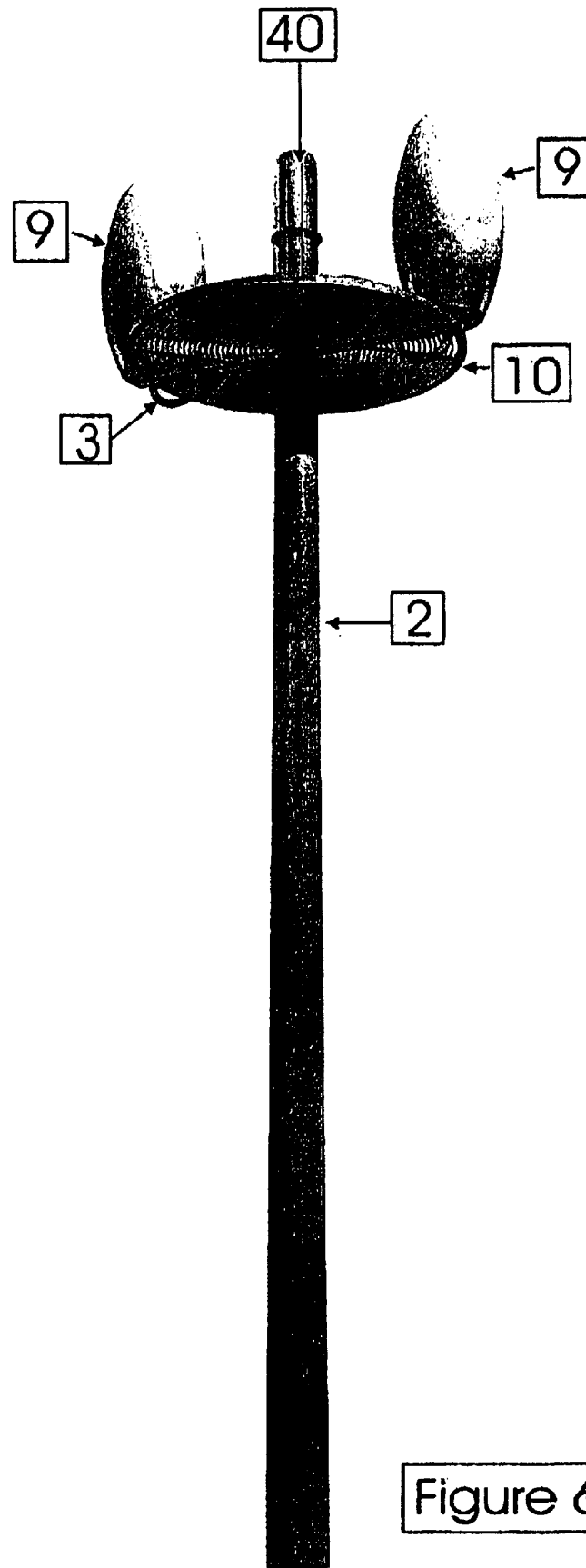


Figure 6

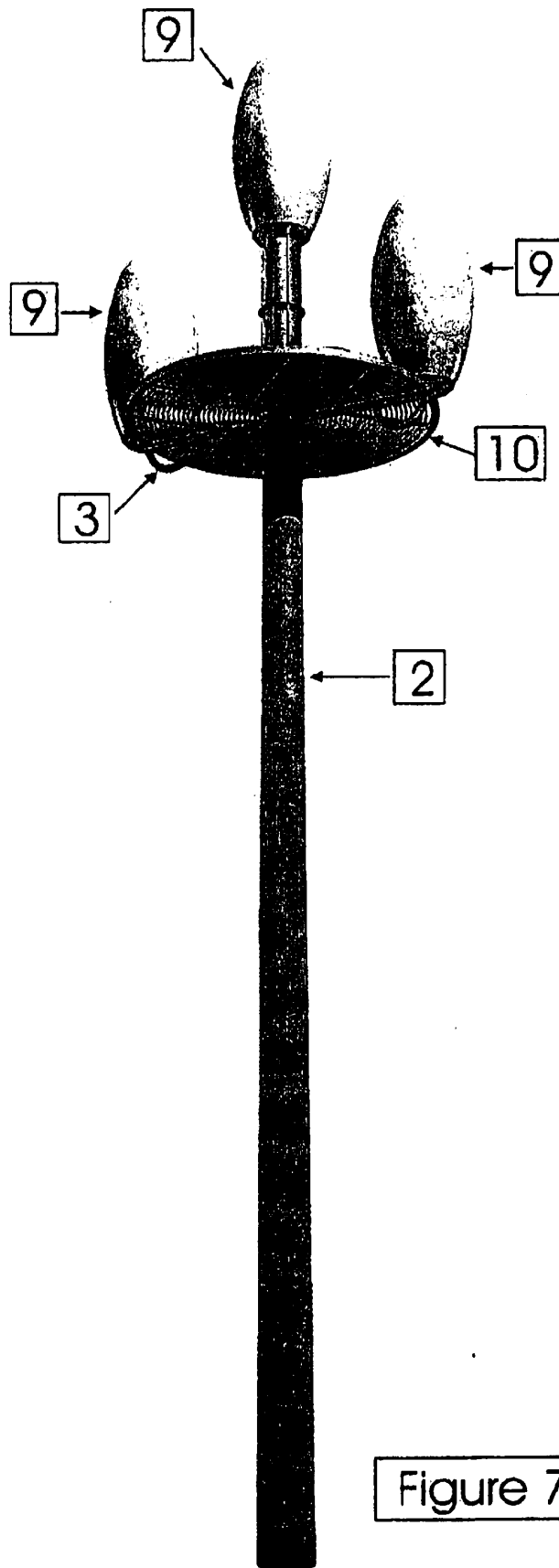


Figure 7

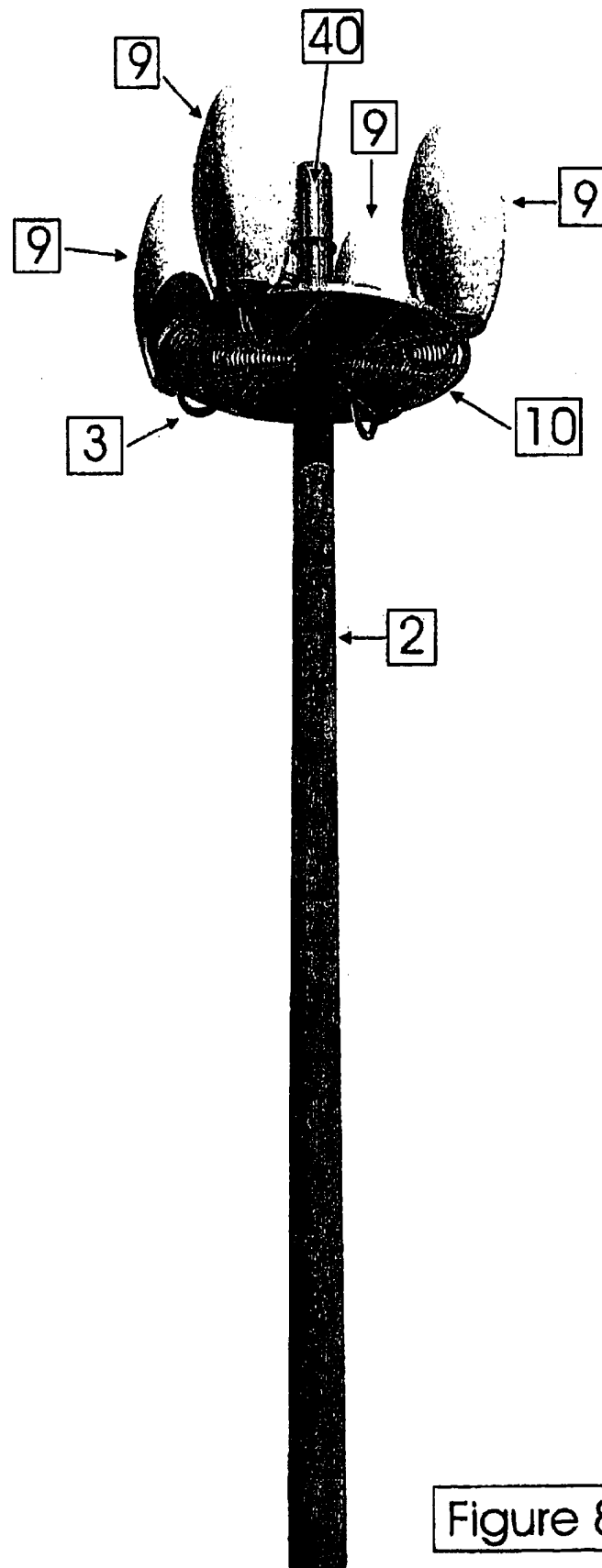


Figure 8

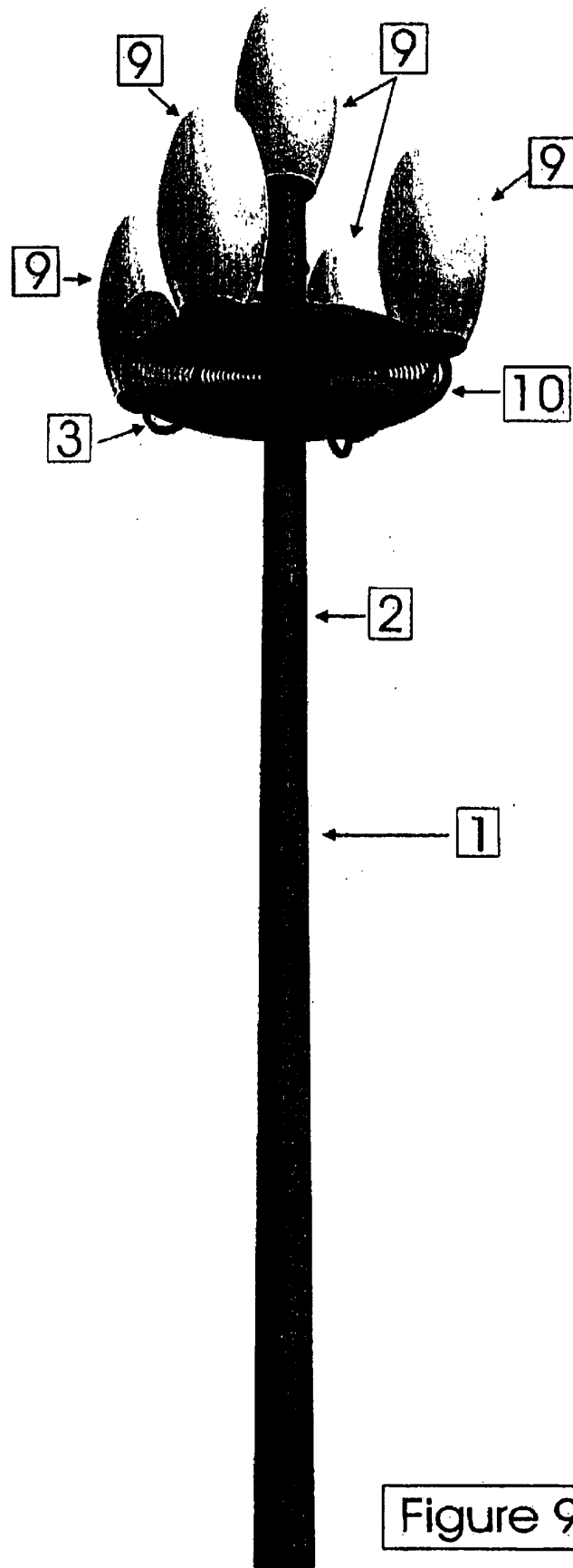
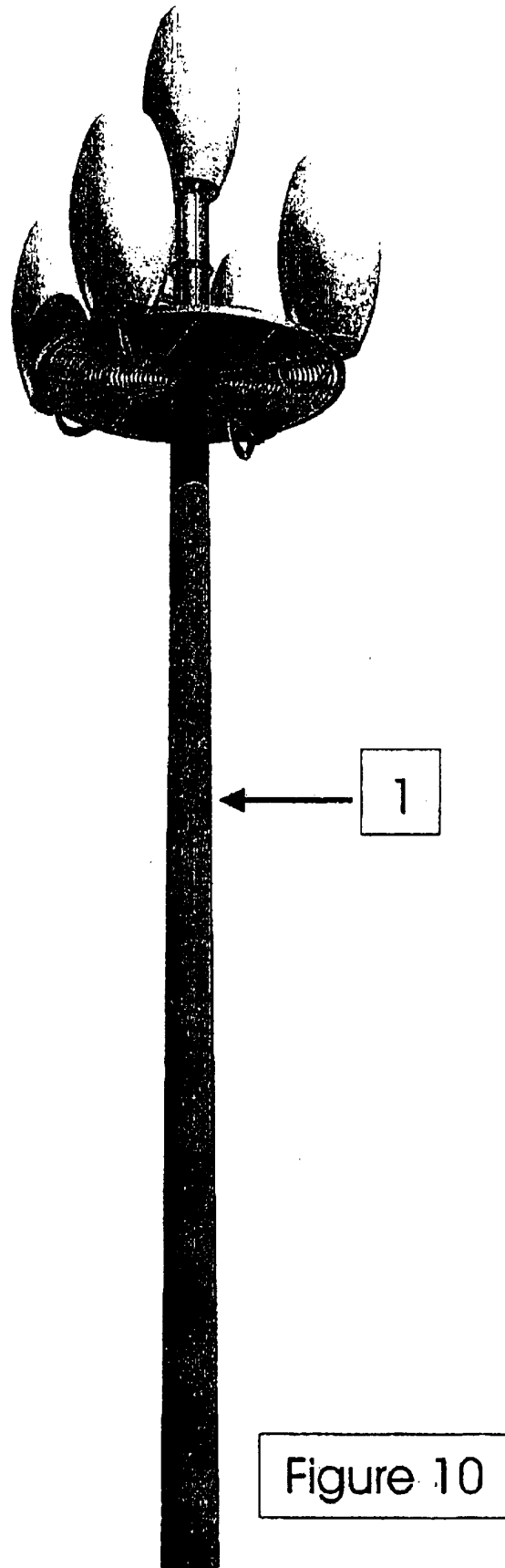
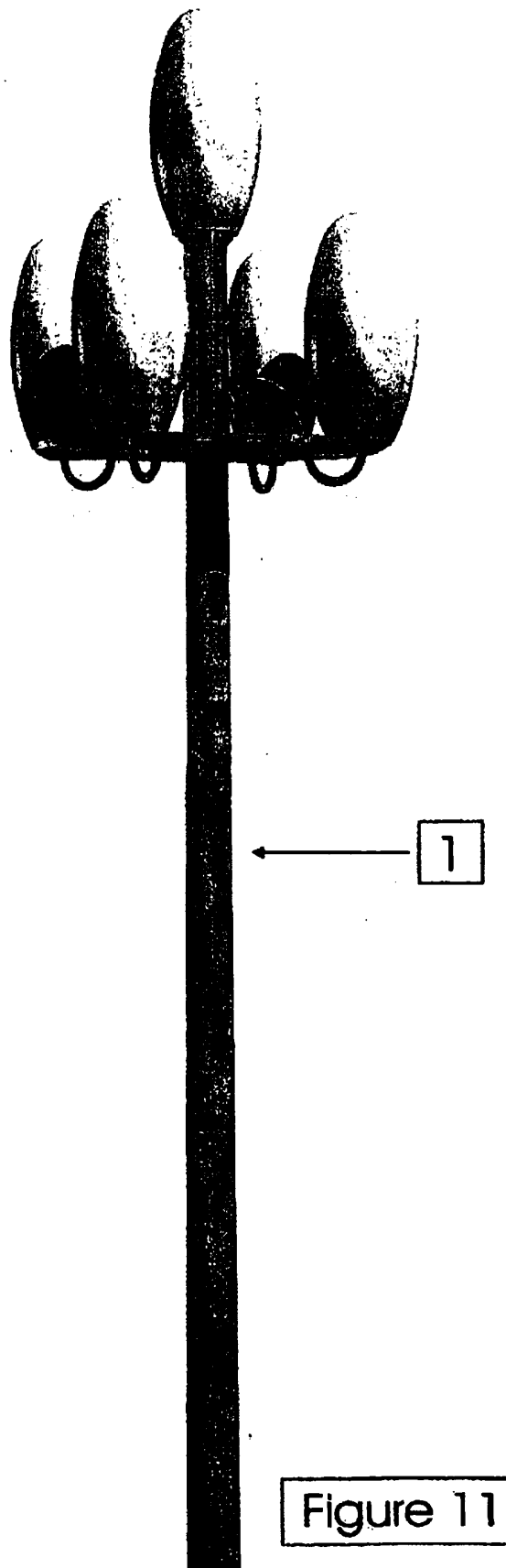


Figure 9







European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 03 39 4053

| DOCUMENTS CONSIDERED TO BE RELEVANT | | | |
|--|--|---|--|
| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (Int.Cl.7) |
| X | AT 5 157 U (ANDES TELECOM CONSULTING GMBH) 25 March 2002 (2002-03-25) * the whole document * | 2,3,5-7, 9,12,15, 18,19, 22-25 | H01Q1/12 H01Q1/06 H01Q1/42 |
| X | US 6 028 566 A (ULLRICH RAY D ET AL) 22 February 2000 (2000-02-22) * the whole document * | 1,4,7, 11,15, 20,23 | |
| A | CA 2 206 062 A (JOVIN COMMUNICATIONS INC) 6 December 1998 (1998-12-06) * the whole document * | 1-25 | |
| A | US 5 870 064 A (KAEGBEIN DANIEL P) 9 February 1999 (1999-02-09) * the whole document * | 2,9,10 | |
| A | US 5 963 178 A (JONES CHARLES H) 5 October 1999 (1999-10-05) * abstract * | 1,12,13 | |
| | | | TECHNICAL FIELDS SEARCHED (Int.Cl.7) |
| | | | H01Q |
| The present search report has been drawn up for all claims | | | |
| Place of search THE HAGUE | | Date of completion of the search 23 July 2003 | Examiner Wattiaux, V |
| <p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p> | | | |

EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 03 39 4053

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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23-07-2003

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
|---|---------------------|--|--|
| AT 5157 U | 25-03-2002 | AT 5157 U1 WO 02073736 A1 | 25-03-2002 19-09-2002 |
| US 6028566 A | 22-02-2000 | NONE | |
| CA 2206062 A | 06-12-1998 | CA 2206062 A1 | 06-12-1998 |
| US 5870064 A | 09-02-1999 | AU 747695 B2 AU 6783998 A CA 2300829 A1 EP 1025622 A1 NZ 503019 A WO 9917402 A1 | 16-05-2002 23-04-1999 08-04-1999 09-08-2000 30-05-2003 08-04-1999 |
| US 5963178 A | 05-10-1999 | AU 8057798 A BR 9806125 A EP 0990275 A1 WO 9858420 A1 | 04-01-1999 25-01-2000 05-04-2000 23-12-1998 |

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82