

(19)



(11)

EP 4 819 386 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:

07.10.2026 Bulletin 2026/41

(51) International Patent Classification (IPC):

H01Q 1/42 (2006.01) H01Q 1/12 (2006.01)

H01Q 1/24 (2006.01) H01Q 1/44 (2006.01)

(21) Application number: **25165946.2**

(52) Cooperative Patent Classification (CPC):

H01Q 1/44; H01Q 1/1228; H01Q 1/1242;

H01Q 1/246; H01Q 1/42

(22) Date of filing: **25.03.2025**

(84) Designated Contracting States:

**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC ME MK MT NL
NO PL PT RO RS SE SI SK SM TR**

Designated Extension States:

BA

Designated Validation States:

GE KH MA MD TN

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(30) Priority: **27.03.2024 ES 202430604 U**

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(54) **CAMOUFLAGE STRUCTURE FOR MULTI-SECTOR 2G+3G+4G+5G ANTENNAS**

(57) A camouflage structure for multi-sector 2G+3G+4G+5G antennas comprising a mast (1) and a prismatic textile enclosure (3) with a polygonal plan. The enclosure is mounted on profiles (4) and maintained under constant tension via vertical spring tensioners (6) that pull the membrane from top to bottom. It further features lateral tensioners (5) at the vertical edges that push the textile outward to create rounded corners. This configuration ensures the concealment of six or more antennas with minimal impact on gain, radiation patterns, and SWR, while keeping mechanical tension outside the radiation area.

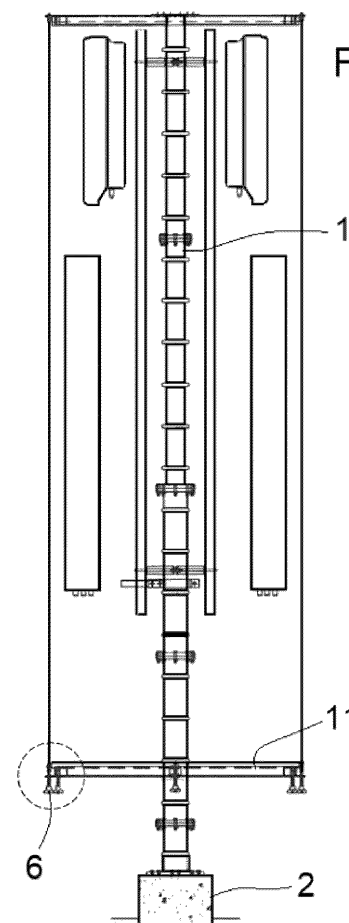


Fig. 1

EP 4 819 386 A1

Description

Field of the invention

[0001] The present invention falls within the field of communication antennas and more specifically the details or arrangements associated with antennas, since the subject matter of the invention relates to a camouflage structure for antennas.

[0002] The aim of the invention is therefore to provide a structure that allows antennas to be concealed therein, both second and third generation (2G+3G), as well as fourth (4G) and fifth generation (5G), with low IMD (Intermodulation Product), minimum disturbance in the diagrams, minimum gain drop and minimum disturbance in the SWR (standing wave ratio) of the antennas.

[0003] In summary, this structure is intended for camouflaging 2G-5G generation antenna types without the problems of intermodulation products, known as IMD, with minimal alteration of antenna gain and patterns, and minimal variation of antenna SWR.

Background of the invention

[0004] Antenna masking structures are well known, in which an antenna support mast is established, mounted on a baseplate and in which the antenna electronics are covered by a housing or radome that protects said electronics. The housing has a cylindrical configuration, precisely because this configuration is optimal from the point of view of gain, radiation patterns and SWR (standing wave ratio). However, this type of casing can only accommodate 3 antennas therein.

[0005] Parallelepiped camouflage structures are also known to accommodate more antennas in the 3G, 4G and 5G mobile phone bands with chamfered corners, but they are difficult to assemble as well as expensive.

[0006] Antennas for 5G have a wider radiation beam-width than antennas up to 4G, in fact their beam actually performs a path or scanning and are able to radiate more energy to the sides of the antenna than antennas that only reach up to 4G. This is the reason the shapes and materials of existing radomes (traditional ones) do not fulfil their purpose and it is necessary to use other materials to conceal or camouflage antennas of this type.

[0007] CN116826372 (A) describes a camouflage device for an outdoor satellite antenna, comprising a shell of the antenna body on which a camouflage net is attached, positioned on the roof surface and on the outer side of the roof, so that a camouflage effect is achieved, also avoiding a situation where the camouflage net can float when the wind blows, while making it easier to expose the antenna for servicing and maintenance.

[0008] CN114498021 (A) relates to a method of camouflaging a communication antenna, providing for the use of a fabric with camouflage and communication functions, arranged on an antenna casing, which, compared to a camouflage system using a metamaterial

antenna casing, has a lower cost, close to that of a conventional antenna.

[0009] KR20200112338 (A) and KR20200108387 (A) describe antenna camouflage devices in which the camouflage material is a film or fabric material.

[0010] Document ES1145533 (U) describes a structure for camouflaging antennas, especially for telephone antennas, whether of the "monosector", "bisector" or "trisector" type, in which the antenna itself is protected by an enclosure or radome, obtained from an element of a textile nature, specifically based on a polyester core textile with a PVC coating.

[0011] Document ES1295316 (U) describes a camouflage structure for 2G+3G+4G+5G multi-sector antennas, of the type incorporating a mast associated with a base, pillar, facing or similar, including a radome or enclosure for said antenna array, which has a prismatic configuration with a polygonal ground plan, preferably square, obtained from panels of textile material, with chamfered edges, a radome which is finished with an upper cover and which is connected to said mast by means of fastenings, characterised in that the panels of textile material are attached together by means of non-metallic screws to a supporting structure of the radome associated with the mast, in correspondence with the vertical edges of the prism.

[0012] Existing radome structures made of textile materials have two problems: on the one hand, they do not have effective tensioning means for tensioning said enclosure and, on the other hand, straight edges are formed at the corners, which have a great influence on the characteristics of the antennas.

Description of the invention

[0013] In order to overcome the problems mentioned in the previous section, the invention proposes a camouflage structure for multi-sector 2G+3G+4G+5G antennas, which has the characteristics of claim 1.

[0014] The proposed structure has a polygonal ground plan, in principle square but it could also be triangular or with more sides, a parallelepiped that conceals the antennas therein without causing noticeable disturbances in the antenna parameters.

[0015] To this end, and more specifically, the camouflage structure of the invention is based on a base plate as a stabilising element for the antenna itself, and incorporates a low weight and high stability mast, as well as reducing the number of parts and simplifying the assembly and installation process.

[0016] The camouflaging itself is achieved by means of a membrane, preferably obtained from a textile material; this material being neither limiting nor exclusive of other materials. This closed membrane can be in one piece or in several pieces.

[0017] The faces of the structure are flat and the corners are rounded, facilitating the low influence of this radome on the characteristics of the antennas; so that the

textile takes its parallelepiped shape with rounded corners due to the fastening parts that maintain the mechanical tension from top to bottom.

[0018] In addition, this geometry is able to house from one antenna up to 6 or more and to add more parabolic type antennas therein for signal transmission.

[0019] In such a camouflaging, second, third, fourth and fifth generation antennas or 2G+3G+4G+5G antennas are installed with their corresponding protective radome. This radome, as described above, has a square ground plan made up of 4 flat faces characterised in that said radome-mast assembly is finished with an upper cover to prevent water from entering. In this way, a multi-sector and self-stable antenna is achieved, which easily allows second, third, fourth and fifth generation 2G+3G+4G+5G antennas to be installed in the same device.

Description of the figures

[0020] As a complement to the description that will be provided herein, and for the purpose of helping to make the features of the invention more readily understandable, according to a preferred practical exemplary embodiment thereof, said description is accompanied by a set of drawings constituting an integral part thereof in which, by way of illustration and not limitation, the following is represented:

- Figure 1 shows an elevation view of the overall radome structure of the invention.
- Figure 2 shows a plan view of the above structure.
- Figure 3 shows a detail of the corner pieces.
- Figure 4 shows a view of the membrane stressing system.
- Figure 5 shows an elevation view of a solution including an access door that can be opened by means of an access rack (7).

Preferred embodiment of the invention

[0021] In view of the figures shown, it can be seen that the camouflage structure of the invention is based on a mast (1) as a support element for the 2G, 3G, 4G and 5G antennas, which is connected to a base (2) by means of screws, as well as by means of oblique bars (without ruling out other resistive elements, such as pillars, walls and the like).

[0022] In accordance with the invention, the mast and antennas assembly is covered by a radome having a prismatic configuration, with rounded corners, which is finished with an upper cover, and which is connected to the said mast (1) by means of fastenings such as those shown in detail in figures 3 and 4.

[0023] More specifically, the radome is obtained from an enclosure (3) that closes the parallelepiped, preferably by means of a textile membrane, formed from one or more pieces, which are attached together and mounted

at the top and bottom in profiles (4), on which a stressing tension is applied, by means of several springs that pull the lower profiles to keep said enclosure membrane (3) stretched from top to bottom. Figure 4 shows one of these tensioners (6), which include a knob and a spring that pulls down the profile (4) hanging from the bottom of said membrane; the aforementioned spring is interposed between one of the support arms (11) that runs from the central mast (1), exerting a downward traction force with its action. Along the profiles (4) hanging from the enclosure membrane (3) there are several tensioners (6) of this nature.

[0024] At the corners of the enclosure (3), a series of lateral tensioners (5) are fitted which act against said enclosure (3) in the area of its vertical edge, pushing it outwards, so that said enclosure forms rounded corners, while keeping the lateral mechanical tension out of the radiation area.

[0025] In a preferred embodiment, the enclosure (3) with which the faces of the radome prism are obtained is made in a single piece, without vertical seams or opening or closing racks.

[0026] In one embodiment (see figure 5) an opening means for opening the enclosure (3) has been incorporated, which includes non-metallic racks (7), to allow access to the interior of the radome. In this case, the racks (7) are provided with non-metallic straps (8), which support the mechanical tension of the textile material when the rack is closed.

[0027] Having sufficiently described the nature of the invention, in addition to a preferred exemplary embodiment, it is hereby stated for the relevant purposes that the materials, shape, size and layout of the described elements may be modified, provided that it does not imply altering the essential characteristics of the invention claimed below:

Claims

1. A camouflage structure for 2G+3G+4G+5G antennas, which are integrated in a mast (1) associated with a bench, pillar, facing or similar (2), and includes a radome or enclosure (3) for said antenna array, with a prismatic configuration with a polygonal ground plan, which is finished with an upper cover having the same number of sides as the ground plan, and which is connected to said mast (1) by means of fastenings (11), **characterised in that** said prismatic enclosure (3) is obtained from one or more pieces of textile material which are attached together, which are mounted at the top and bottom in profiles (4) on which a tensioning stress is applied by means of several springs which pull the lower profiles keeping said enclosure (3) stretched from top to bottom, and with a series of lateral tensioners (5) which act against the enclosure (3) in the area of its vertical edge, pushing same outwards, so that said enco-

sure forms rounded corners, keeping the lateral mechanical tension out of the radiation area.

2. The structure, according to claim 1, wherein the enclosure (3) with which the faces of the radome prism are obtained is made in a single piece, without vertical seams. 5
3. The structure, according to claim 1, wherein the enclosure (3) incorporates in one of the flat faces an entrance provided with at least one non-metallic rack (7) for access. 10
4. The structure, according to claim 3, wherein the rack (7) is complemented with a non-metallic tape (8) that supports the mechanical tension to which said rack (7) is subjected. 15

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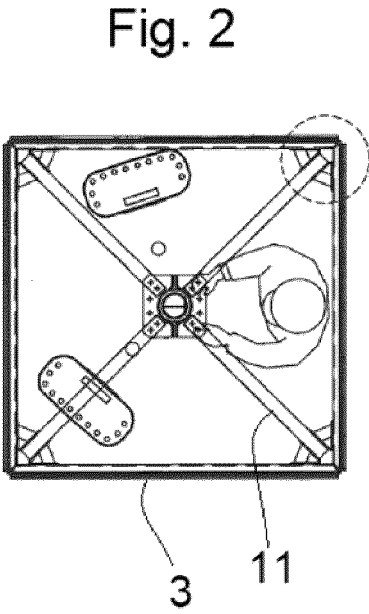
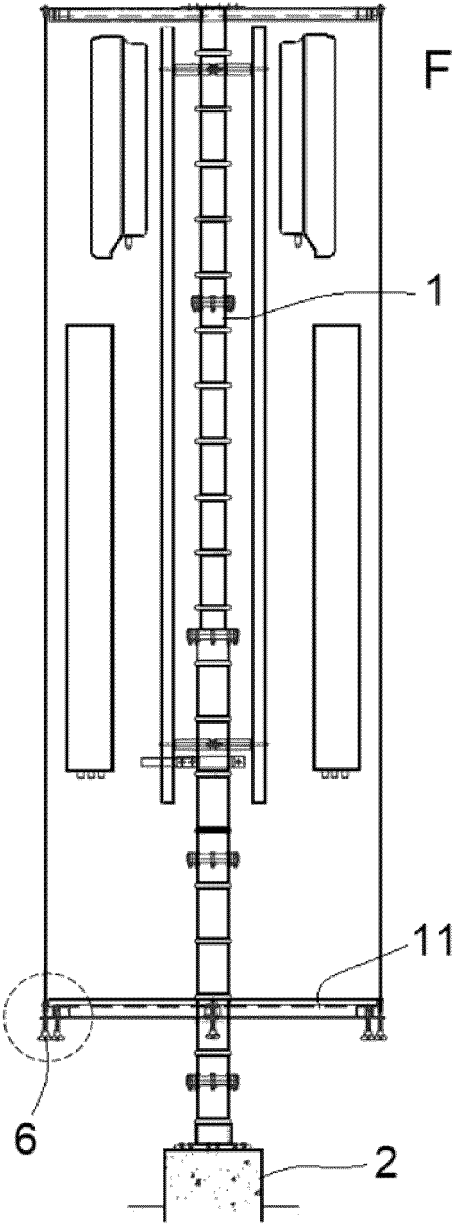


Fig. 3

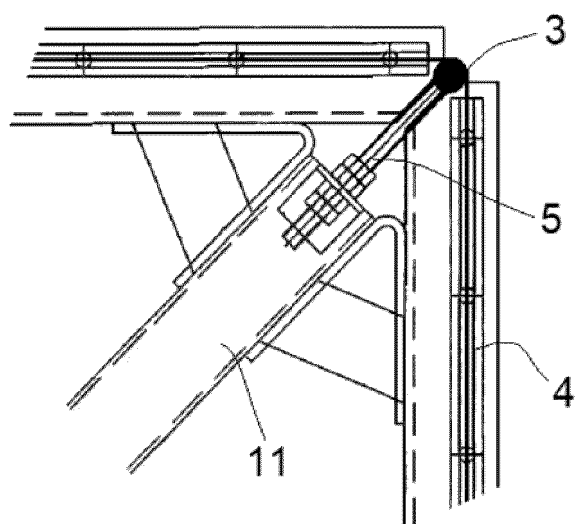
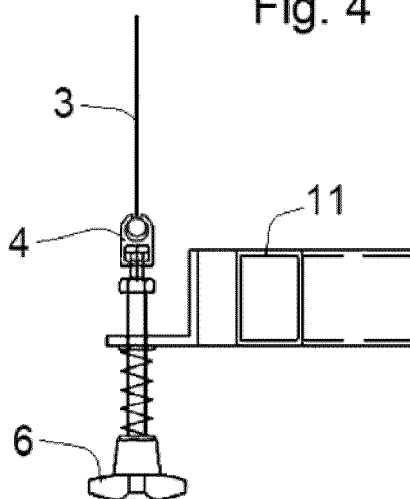
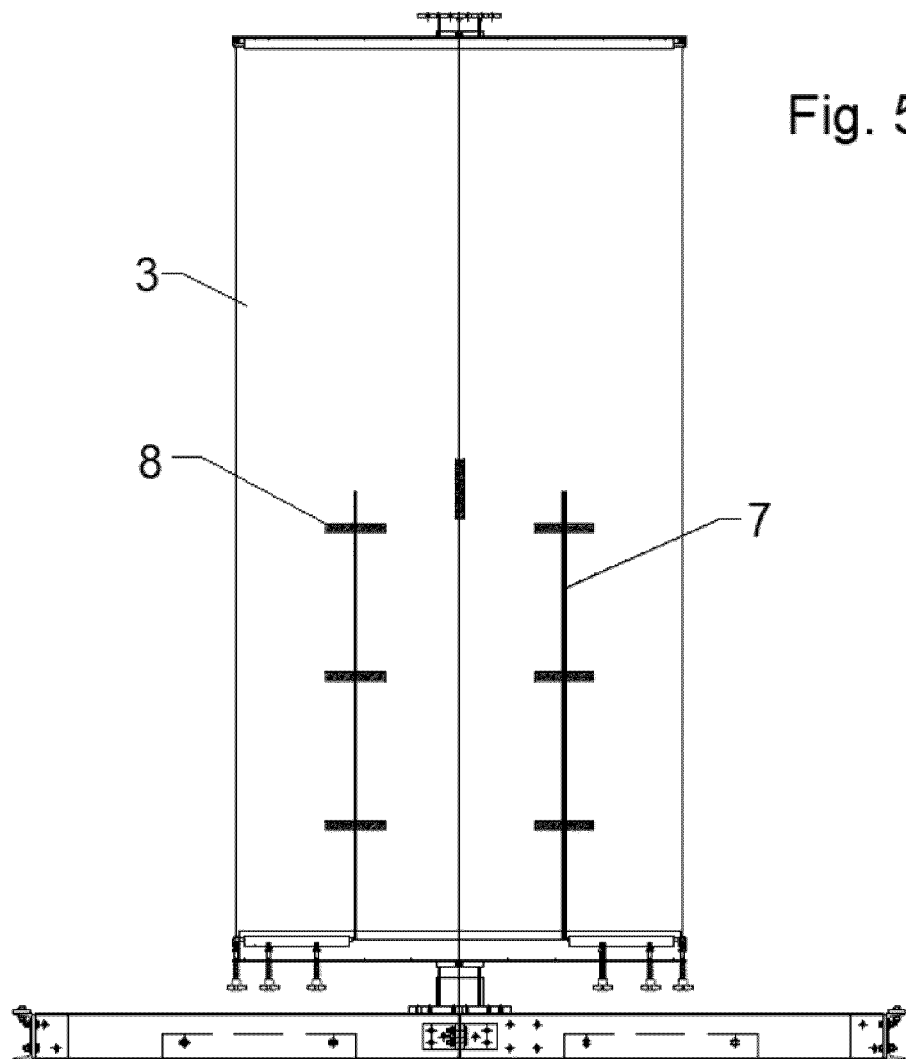


Fig. 4







EUROPEAN SEARCH REPORT

Application Number

EP 25 16 5946

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	KR 2019 0094493 A (KIM MOON KYU [KR]) 14 August 2019 (2019-08-14) * paragraph [0002] - paragraph [0037]; figures 1,2 *	1-4	INV. H01Q1/42 H01Q1/12 H01Q1/24 H01Q1/44
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			TECHNICAL FIELDS SEARCHED (IPC)
			H01Q
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		27 August 2026	Sípal, Vít
CATEGORY OF CITED DOCUMENTS			
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			
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EP 25 16 5946

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

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