| (54) Title | Tiled roof mounted antenna support arrangement |
| (51) International Patent Classification(s) | H01Q 1/12 (2006.01) |
| (21) Application No: | 2016203980 |
| (22) Date of Filing: | 2016.06.14 |
| (43) Publication Date: | 2016.06.30 |
| (43) Publication Journal Date: | 2016.06.30 |
| (62) Divisional of: | 2009208098 |
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ABSTRACT

An antenna support assembly for use on a tiled roof is disclosed. The assembly includes: a mast 24 for supporting an antenna 10 above the tiled roof; and at least two elongate support members 20 22 for laterally supporting the mast 24, each support member 20 22 including: a brace portion 21 having a distal end connected to the mast 24 and a proximal end terminating on or adjacent an upper surface of a tile; and a base support portion 14 having a proximal end, a distal end and a strap section 46 extending between the proximal and distal ends, the distal end of the base support portion 14 joined to the proximal end of the brace portion 21, the strap section 46 extendable from the distal end between overlapping tiles to the proximal end, the strap section 14 fixable to a tile that it overlays, the proximal end having a downwardly extending portion fixable to the side face 61 of the batten 62 by a fixing member 66.
FIELD OF THE INVENTION

This invention relates to radio frequency antenna supports for use on roofs.

BACKGROUND

Equipment for mounting a radio frequency antenna (also sometimes referred to as an aerial) on to the roof of a building includes a support that positions the antenna above the roof. The location of the antenna on the building and above the roof is selected so as to use avoid blockages and interference to radio frequency energy that is received and transmitted by the antenna.

The base end of the support is adapted to be fixed to the roof or building and the free end of the support has the antenna fixed to it.

The fixing arrangement used to fix the antenna to the support at its free end is arranged to ensure that the orientation of the antenna can be adjusted and then maintained in all weather conditions.

The fixing arrangement at the base end of the support is typically arranged to suit a particular roof structure.

One known example of a base end fixing arrangement includes a plate of suitable size and shape which abuts the timber facia along the eaves of a roof and which is fixed to the facia with coach screws or other like fixings. A first portion of the antenna support extends substantially outwardly from the plate and at right angles to the plate and lies substantially horizontal with respect to the ground. A second portion of the support extends vertically from the first portion so that its free end lies above the eaves and is spaced from the roof structure sufficiently to allow an attached antenna to perform its task. This type of support can be fitted to the building if its roof has a facia and the material and structure of the roof does not affect the fixing of the plate and roof fixing part of the antenna support. The antenna support typically has a single upright second portion supported wholly by a single cantilevered first portion and this limits the maximum weight and wind loading that can be supported, thus limiting the size and shape of antennae that can be used with this type of support and furthermore not all roofs have a facia which is suitable for this type of support.

Fascia mounts are typically fixed to the lowest part of the roof, and are therefore disadvantageous where there is a need to mount an antenna as high as possible to avoid blockages to the radio frequency (RF) energy.
A further known example is a support that is fixed to the material that covers the roof and the roof structure, in one example the roof cover material is sheet metal having corrugations. The bases of the support to be fixed to the roof are shaped to abut the roof material and fixings are applied through the abutting portion and through the roof material and sometimes but not always into the supporting roof structure such as a purlin, batten or roof rafter. This type of support has three generally upright members and corresponding bases that are fixed respectively at three positions on the roof. The free ends of the three members are joined to or form a single upright section on to which the antenna is fixed. This type of support typically has a maximum weight and wind loading that can be supported which is greater than the support described immediately above and thus has a greater range of antennas that can be used with this type of support. However, the fixing involves penetrating the existing roof material which can void warranties, and potentially lead to leakage at the location of any of the penetrations. Furthermore not all rooves or locations provided by the roof structure are suitable for this type of support.

An antenna support for a tiled roof (for example cement tiles having ridges and troughs) can not be fixed to the roof in the same manner as the type described in the previous paragraph as the tiles can not have fixings placed through them at any convenient place because of their brittleness. Thus a bracket is positioned below an upper tile and the base portion of the bracket is fixed to the top of a rafter. However, since the rafters are in fixed locations and the bracket is shaped for positioning in a trough of the tile, the coincidence of a trough and a rafter is required which does not necessarily occur where convenient. The bracket when fixed extends along the upper surface of a downwardly adjacent roof tile and below the overlapping upwardly adjacent tile providing an exposed tab to which the base of an upwardly extending support member is fixed, typically with a nut and bolt. The bracket is further fixed to the roof by using silicon or other suitable exterior sealing compound located between the bracket and the upper surface of the lower tile and between the bracket and the upper tile. This arrangement requires that there be a rafter near the desired location for the bases of the support and that there is only one mechanical fixing and reliance on sealing compounds which are exposed to external conditions and not necessarily designed to withstand the forces of dislodgement that impact on an assembly of this type.

There is a need for an antenna support that overcomes or reduces the abovementioned problems or that provides an alternative arrangement.
BRIEF DESCRIPTION OF THE INVENTION

According to a first aspect of the invention there is provided an antenna support for use on a tiled roof, the tiled roof having tiles each having a fixing aperture, the tile being located over a batten which is part of the roof structure supporting the tiles, the antenna support includes:

- two or more base support elements having one or more fixing apertures wherein in use a respectively located tile having a fixing aperture and at least one of the fixing apertures in the base support element are aligned so as to allow a fixing to pass through the aligned fixing apertures to fix both the base support element and the respective tile to a batten, and each base support element further having a support portion extending above the respective roof tile;
- two or more elongate support members, each member having two ends, one end of which is adapted to be fixable to a respective support portion of a base support element and the other end of at least one other of the elongate support members arranged to support at least one of the elongate support members orientated with respect to the roof structure for supporting an antenna.

According to a second aspect of the invention there is provided a method of installing an antenna support on a tiled roof, the tiled roof having tiles with at least one fixing aperture and each tile located over a batten being a part of the roof structure supporting the tiles, the method includes the steps of:

- a) displacing one or more tiles to access one or more tiles to which an antenna support is to be fixed;
- b) fixing two or more base support elements having one or more fixing apertures wherein in use a respectively located tile having a fixing aperture and at least one of the fixing apertures in the base support element are aligned so as to allow a fixing to pass through the aligned fixing apertures to fix both the base support element and the respective tile to a batten, and each base support element further having a support portion extending above the respective roof tile,
- c) fixing two or more elongate support members, each member having two ends, one end of which is adapted to be fixable to a respective support portion of a base support element and the other end of at least one other of the elongate support members arranged to support at least one of the elongate support members orientated with respect to the roof structure for supporting an antenna.

According to a third aspect of the invention there is provided an antenna support assembly for use on a tiled roof, the tiled roof having tiles, the tiles being located over rectangular battens, the battens having a tile support face and a side face orthogonal to the side face, the assembly
including:

- a mast for supporting an antenna above the tiled roof; and
- at least two elongate support members for laterally supporting the mast, each support member including:
  - a brace portion having a distal end connected to the mast and a proximal end terminating on or adjacent an upper surface of a tile; and
  - a base support portion having a proximal end, a distal end and a strap section extending between the proximal and distal ends, the distal end of the base support portion joined to the proximal end of the brace portion, the strap section extendable from the distal end between overlapping tiles to the proximal end, the strap section fixable to a tile that it overlays, the proximal end having a downwardly extending portion fixable to the side face of the batten by a fixing member,

whereby a first fixing member is fixable to the batten by passing through an aperture within the strap section, through a tile, and into the batten in a direction orthogonal to the tile support face of the batten and a second fixing member is fixable to the batten by passing through an aperture within the downwardly extending portion and penetrating the batten in a direction parallel to the tile support face, thereby securing the base support portion to the batten such that rotation of the base support portion with respect to the batten is restrained.

In one form the mast includes a distal end for receiving an antenna and a proximal end terminating on or adjacent an upper surface of a tile.

A detailed description of one or more preferred embodiments of the invention is provided below along with accompanying figures that illustrate by way of example the principles of the invention. While the invention is described in connection with such embodiments, it should be understood that the invention is not limited to any embodiment. On the contrary, the scope of the invention is limited only by the appended claims and the invention encompasses numerous alternatives, modifications, and equivalents. For the purpose of example, numerous specific details are set forth in the following description in order to provide a thorough understanding of the present invention. The present invention may be practiced according to the claims without some or all of these specific details.

Throughout this specification and the claims that follow unless the context requires otherwise, the words 'comprise' and 'include' and variations such as 'comprising' and 'including' will be understood to imply the inclusion of a stated integer or group of integers but not the exclusion of any other integer or group of integers.
The reference to any prior art in this specification is not, and should not be taken as, an acknowledgment or any form of suggestion that such prior art forms part of the common general knowledge.

5 BRIEF DESCRIPTION OF THE FIGURES

Figure 1a depicts a perspective view of an antenna support according to a first embodiment of the invention and supported antenna in place on a tiled roof;

Figure 1b depicts a perspective view of an antenna support according to a second embodiment of the invention and supported antenna in place on a tiled roof;

Figure 2 depicts top views of two arrays of roof tiles showing options for repositioning three roof tiles in preparation for installation of an antenna support;

Figure 3 depicts a top view of a roof tile showing the location of a fixing aperture;

Figure 4 depicts a perspective view of the shape and configuration of a base support element;

Figure 5 depicts a front perspective view of the positioning and fixing of a base support element on to a tile and batten of a tiled roof structure;

Figure 6 depicts a front perspective view of two base support elements fixed to a tiled roof structure and a third partly exposed;

Figure 7 depicts a front perspective view of the detail of the fixing of an elongate support member to a base support element;

Figure 8 depicts a front perspective view of a base support element fixed to an elongate support member;

Figure 9 depicts a top perspective view of an installed base antenna support with many of the tiles removed, including those that would, in use be respectively associated with a base support element; and

Figure 10 depicts a perspective view of the detail of the fixing of elongate support members to each other in a partial state of connection but not fixed.
Figure 11 shows the drilling of a hole for mounting an antenna support accordingly to a second embodiment of the invention;

Figure 12 is a similar view of that to figure 11 but shows the application of a sealant;

Figure 13 is again a similar to figures 11 and 12 but shows a base support portion according to the second embodiment of the invention in position;

Figure 14 is a similar view that of figure 13 but shows fixing elements being installed;

Figure 15 shows adjustment of the ends of braces of the second embodiment of the invention;

Figure 16 shows connection of a brace to a base support portion;

Figure 17 is a further view showing installation of a brace portion to a base support portion over a roof tile;

Figure 18 depicts the perspective view of the detail of the fixing of the elongate support members of the second embodiment of the invention to a mast element.

DETAILED DESCRIPTION OF EMBODIMENTS OF THE INVENTION

A perspective view of a first and a second embodiment of an antenna support in place on a tiled roof is depicted in Figures 1a and 1b.

There are many potential locations for an antenna on a roof, however considerations such as the antenna size, shape and orientation as well as the size and shape of the antenna support need to be carefully considered so that they are both located a safe distance from power lines and other hazards and potential hazards; where the roof structure is structurally sound for the worker installing the antenna but also sufficient to support the antenna's dead and live (wind, rain and snow) loading; the antenna is to be located such that it can perform its designed function for receiving and if necessary transmitting a radio frequency signal; and in such a manner that the installation meets or exceeds local regulations and safety laws.

Figures 1a and 1b depict an antenna 10 designed to receive free-to-air (FTA) television frequencies but this is but one example of an antenna that may need to be supported on and above a tiled roof structure using an antenna support.
Not all the parts of the antenna support assembly 12 are visible in figures 1a or 1b but the most clearly visible are the three elongate support members 20, 22 and 24. While base support elements 14, 16 and 18, to which the lower end of the elongate support members are attached, are only partially visible as the majority of those base support elements are located below roof tiles.

It will be noted that the antenna 10 is fixed to the mast 24 while the elongate support members 20 and 22 prop the mast 24. This is but one of many possible configurations of two or more elongate support members that are fixed at their bases to strategically located base support elements. In one example not depicted, two elongate support members are used to brace the mast 24 where the mast is formed by part of the roof, such as a chimney or an existing vertical pipe or an existing or new bracket extending outwardly from a part of the roof structure such as a chimney. The antenna support described and defined herein can be part of an antenna support arrangement which is not solely provided by the antenna support but partially so.

By way of illustration and example, an installation process for installing an antenna support of the type depicted in Figure 1a is described. Having chosen an appropriate location for the antenna taking in to consideration at least the issues described earlier, the preferred location for the base of the three elongate support members can be estimated. Based on that estimation, three tiles, which are spaced from each other in the manner depicted in Figure 2, will need to be moved to allow for installation of the base support elements 14, 16 and 18. The existing fixings for each tile are removed (if they are in place - as not every tile is fixed in that manner) after the relevant tiles 26, 28 and 30 have been slid away to expose the tile below. This process provides access to the upper surface of the tile/s below (for example 32 and 34) in particular to the portion of a lower tile that has a fixing aperture 36 (as shown in Figure 2 and in detail in Figure 3) noting that the fixing aperture is located at the apex region of the ridge of the tile. If a fixing is in place, it is removed and if not the fixing aperture is cleaned out by any suitable method or using any suitable instrument.

One embodiment of the base support element 40 is depicted in Figure 4. Galvanised sheet metal or hot-dipped galvanised flat bar is the preferred material for this element as it is readily available and easily punched and formed and will withstand the adverse effects of weather over the life time of the roof.

Features of the base support element 40 include the, in use, downwardly extending base portion 42 having at least one aperture 44 sized to allow fixings to pass into an adjacent batten.
and preferably multiple apertures to allow for variations of heights of tiles and widths of battens or for multiple fixings to be used. The adjacent batten is the same batten on which the relevant tile is located.

The base support portion 40 has an intermediate strap section 46 extendable from the distal end 55 between overlapping tiles to the proximal end 45. The strap section 46 is fixable to a tile that it overlays and the proximal end 46 has a downwardly extending portion 42 that is fixable to the side face 61 of the batten 62 as is shown in figure 5. With this first embodiment of the invention, a first fixing aperture 50 is arranged, in use, to be coincident with the fixing aperture 36 in a respective tile located below the base support portion 40. In a second embodiment of the invention, which is discussed below, a separate hole in the tile is provided for fixing screw 64.

The first fixing aperture 50 may be a slot, or a series of space fixing apertures to allow for variations in the manufacture of tiles and thus allow easy alignment of a fixing aperture with the fixing aperture in the tiles, should this be required.

A yet further feature of the base support element 40 is a support portion 48 located at the end opposite the downwardly projecting portion 42, which in use extends above a respective roof tile, with which it is fixed to a batten of the roof structure (as depicted most clearly in Figures 5 and 6). In one embodiment of a fixing arrangement suited to fixing a first end of an elongate support member, an aperture 54 is provided in the support portion 48, to allow for the use of a bolt-like fixing of a first end of an elongate support member to the support portion 48. However, any suitable form of fixing which may not involve the use of an aperture is possible. Alternative fixing associated with the support portion 48 of the base support element may include a slot/tab/catch element which is shaped or adapted to engage with the suitably adapted base of an elongate support member. In practice either or both of the support portion of the base support element or the respective end of the elongate support member can be suitably adapted to be fixable together.

Referring to Figures 4 and 5, an optional step in fixing the base support elements is the provision of a pliable seating compound 56 between the base support element 40 and the tile 58, in particular the top surface 60 of the tile, is more to provide a cushion-like interface between the parts to minimise wear if there is any relative movement between the two parts. The use of a compound is a preferred arrangement rather than being essential, since the base support element will be mechanically fixed at two locations to the roof structure, as will be described later in the specification, which will sufficiently support and fix the base support.
elements when the elongate support members and antenna are installed. Neutral cure silicon suitable for external use is usable as the cushioning compound. The principle of cushioning the possible relative movement between the two parts can be achieved in a number of alternative ways, including; providing a cushioning material on an, in use, underside surface of the base support element; providing a suitably shaped (for example a strip) of elastomeric material between the tile and the base support element; etc.

Locating the base support element for fixing is achieved by aligning the aperture 50 of the base support element 40 over the fixing aperture 36 in the tile with the downwardly projecting portion 42 positioned downwards relative to the roof structure. As depicted in figures 5 and 6 the fixing aperture 36 in the tile is located on a ridge of the tile. A fixing, for example, a screw 64 (in one example, a hex head screw having a rubber grommet of suitable dimensions, say 5mm x 55mm) is one example of a suitable fixing. A torque controlled screw driver is useful in ensuring that no undue pressure is applied to the tile when the screw passes through the coinciding fixing apertures. A suitable nail is but one of many alternative fixings.

The second of two mechanical fixings which could be a screw 66, or a nail or any other suitable fixing, is passed through an aperture 44 located in the downwardly projecting portion 42 and forced into the batten 62 as depicted in Figure 5. The dimensions of the tile, the thickness of the batten and accessibility will determine which of the multiple apertures 44 is used.

With both fixings in place not only is the tile firmly secured to the roof structure but the base support element is too. The shifted tiles can now be re-positioned to their original locations.

With all the required base support elements fixed in place the elongate support members can be fixed in place. Figures 7 and 8 depict the use of a bolt 70 and nut 72 to fix the base end of the antenna support which has been adapted in this embodiment by flattening of the base end portion and forming of a suitable aperture, such as for example a square aperture there would not normally be a square hole in the elongate support member 20, rather in support member 40, adjacent to the head of the bolt. Square neck or splined bolts and self locking flange nuts are but some examples of suitable fixings that can pass through the apertures provided and once properly fitted form a suitable fixing of the base support element 14 to one end of an elongate support member 20. Some adjustment of the angle of the ends of either or both the ends of the support portion of the base support element and the base of the elongate support member may be required to bring the elements into abutment with each other before being fixed together. The fixing is repeated for all the base support elements and corresponding
elongate support members which are orientated as required to suit the needs for appropriate orientation of the antenna to be supported.

The dimension of the intermediate portion of the base support element is such that the support portion is spaced away from the tile is replaced into its original location as is depicted in Figures 7 and 8.

Figure 9 depicts a top perspective view of an installed base antenna support without all the tiles in place so that a clearer view of the arrangement is provided, where the base support elements 14, 16 and 18 as well as the elongate support members 20, 22 and 24 described above can be seen more clearly. In particular note that the respective tiles that would have been below at least two of the base support elements are not shown in Figure 9. In the embodiment shown in Figure 9 elongate support member 24 is orientated substantially vertically while members 20 and 22 are sloped towards member 24 to prop and support that member and are joined at their suitably adapted free ends to elongate support member 24 with a suitable U shaped bolt 100 and bracket 102 with nuts 104 as depicted in detail in Figure 10. Alternative methods of securing the stays 20 and 22 to the mast 24 may be used.

With the antenna support in place the 10 antenna can be fitted as shown in Figure 1. There exist a large variety of antennas and one or more fittings are available for securing the antennas to vertical supports. Most of the fittings allow for the antenna to be rotated about the vertical support and some allow for tilting so that the antenna can be orientated for optimal reception (in the case of FTA antennas) and/or transmission as the case may be.

Now referring to figures 11 to 19, a second embodiment of the invention will be described.

With the second embodiment of the invention, the intermediate strap portion 46 of the base support portion 40 is positioned such that it sits flat over an area where the tile is in contact with the batten 62 underneath. A hole is drilled through the tile at the centre of the batten 62 as shown in figure 11. This operation is repeated at two other tiles.

A bed of neutral cure silicone sealant 56 is then applied to the area to be occupied by the bracket to act as a cushion between the bracket and the tile as is illustrated in figure 12. The base support portion 40 is then positioned on the bed of silicone 56 so that the hole in the base support portion lines up with the newly drilled hole and tile (refer figures 13 and 14). A metal thread screw 64 is then fixed to the batten 62 by passing through an aperture within the strap section 46, through the tile, and into the batten 62 in the direction substantially orthogonal to...
the tile support face 63 of the batten 62. Next a hole in the downwardly extending portion 42 of the base support portion 40 is selected. The selection is made to provide a hole approximately in line with the centre of the side face 61 of the batten 62. A screw 66 is then driven through the downward extending portion 42 into the batten 62. By having screw 66 oriented approximately orthogonal to screw 64, the base support portion is held such that rotation of the base support portion with respect to the batten is restrained.

The tiles are then repositioned back into their original positions.

The angles on the ends of the brace portions or stays 20 and 22 are then adjusted as illustrated in figure 15 using a spanner 73 for instance. The distal end of the base support portion is now jointed to the proximal end of the brace portion as is illustrated in figures 16 and 17.

Finally, the distal ends of the braces are fastened to the mast 24 with a Vee block, “U” bolt and nuts as is shown in figure 18. There are many alternative ways of achieving a similar connection.

The final assembly is illustrated in figure 1b with tiles removed for clarity.

With the embodiments of the invention described above and illustrated in the drawings, the brace portion 21 of the support member 20 is a separate component to the base support portion 14. These components are joined together by a bolt 70 and a nut 72. In other embodiments in the invention, not shown, the support member 20 may be a unitary element with a flexible area at the join between the brace portion 21 and the base support portion 14.

For instance, the support member 20 could be made from sheet metal or other flexible materials. Similarly, the support member 22 and the mast 24 may be unitary components with integrated base support portions 14.

It will be appreciated by those skilled in the art that the invention is not restricted in its use to the particular application described. Neither is the present invention restricted in its preferred embodiment with regard to the particular elements and/or features described or depicted herein. It will be appreciated that various modifications can be made without departing from the principles of the invention. Therefore, the invention should be understood to include all such modifications within its scope.
THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. An antenna support for use on a tiled roof, the tiled roof having tiles each having a fixing aperture, the tile being located over a batten which is part of the roof structure supporting the tiles, the antenna support includes;
   two or more base support elements having one or more fixing apertures wherein in use a respectively located tile having a fixing aperture and at least one of the fixing apertures in the base support element are aligned so as to allow a fixing to pass through the aligned fixing apertures to fix both the base support element and the respective tile to a batten, and
   each base support element further having a support portion extending above the respective roof tile;
   two or more elongate support members, each member having two ends, one end of which is adapted to be fixable to a respective support portion of a base support element and the other end of at least one other of the elongate support members arranged to support at least one of the elongate support members orientated with respect to the roof structure for supporting an antenna.

2. An antenna support according to claim 1 wherein each base support element has a portion positioned near said batten and having at least one aperture through that portion and through one such aperture a further fixing passes to fix that portion of the base support element with respect to said batten.

3. An antenna support according to claim 1 further including a fixing arrangement wherein the support portion of a base support element and a respective elongate support member are each adapted for the fixing arrangement to fix the base support element to the respective elongate support member.

4. An antenna support according to claim 3 wherein two elongate support members support a third elongate support member which supports an antenna.

5. An antenna support according to claim 4 further including a bracket wherein said other ends of said two elongate support members are attached to the bracket and said bracket is attached to said third elongate support member.

6. An antenna support according to any preceding claim wherein each base support element is shaped in part to abut the top surface of a tile.
7. An antenna support according to claim 6 wherein the top surface of the tile is the at the apex region of the ridge of the tile.

8. A method of installing an antenna support on a tiled roof, the tiled roof having tiles with at least one fixing aperture and each tile located over a batten being a part of the roof structure supporting the tiles, the method includes the steps of:
   a) displacing one or more tiles to access one or more tiles to which an antenna support is to be fixed;
   b) fixing two or more base support elements having one or more fixing apertures wherein in use a respectively located tile having a fixing aperture and at least one of the fixing apertures in the base support element are aligned so as to allow a fixing to pass through the aligned fixing apertures to fix both the base support element and the respective tile to a batten, and each base support element further having a support portion extending above the respective roof tile,
   c) fixing two or more elongate support members, each member having two ends, one end of which is adapted to be fixable to a respective support portion of a base support element and the other end of at least one other of the elongate support members arranged to support at least one of the elongate support members orientated with respect to the roof structure for supporting an antenna.

9. A method of installing an antenna support according to claim 8, further including the step:
   d) fixing each base support element having a portion positioned near said batten and having an aperture through which a further fixing passes to fix the base support element with respect to said batten.

10. A method of installing an antenna support according to any preceding method claim further includes the step:
    locating a cushion between the base support element and a respective tile.

11. A method of installing an antenna support according to any preceding method claim further including the step
    replacing the displaced tiles in their original location so as to cover at least a portion of a respective base support element.

12. An antenna support assembly for use on a tiled roof, the tiled roof having tiles, the tiles being located over rectangular battens, the battens having a tile support face and a side
face orthogonal to the side face, the assembly including:

- a mast for supporting an antenna above the tiled roof; and
- at least two elongate support members for laterally supporting the mast, each support member including:
  
  - a brace portion having a distal end connected to the mast and a proximal end terminating on or adjacent an upper surface of a tile; and
  
  - a base support portion having a proximal end, a distal end and a strap section extending between the proximal and distal ends, the distal end of the base support portion joined to the proximal end of the brace portion, the strap section extendable from the distal end between overlapping tiles to the proximal end, the strap section fixable to a tile that it overlays, the proximal end having a downwardly extending portion fixable to the side face of the batten by a fixing member,

whereby a first fixing member is fixable to the batten by passing through an aperture within the strap section, through a tile, and into the batten in a direction orthogonal to the tile support face and a second fixing member is fixable to the batten by passing through an aperture within the downwardly extending portion and penetrating the batten in a direction parallel to the tile support face, thereby securing the base support portion to the batten such that rotation of the base support portion with respect to the batten is restrained.

13. An assembly as claimed in claim 12 wherein the mast includes a distal end for receiving an antenna and a proximal end terminating on or adjacent an upper surface of a tile.

14. An antenna support assembly as hereinbefore described with reference to and as illustrated in the accompanying figures 1a and 2 to 10.

15. An antenna support assembly as hereinbefore described with reference to and as illustrated in the accompanying figures 1b and 11 to 18.