



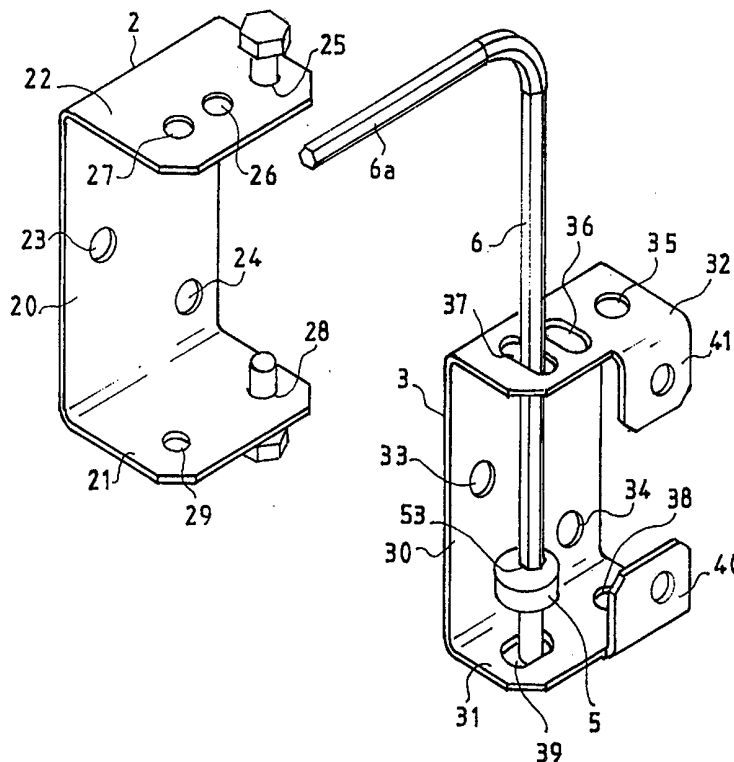
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(54) Title: ANTENNA FIXING DEVICE PROVIDED WITH AN ALIGNMENT ADJUSTMENT SYSTEM

(57) Abstract

The present invention concerns an antenna fixing device including a first support element (1) to be secured to a pole, a second support element (2) mounted pivotable on the first support element (1) for allowing for a height adjustment, and a third support element (3) on which the antenna is fixed mounted pivotable on the second support element (2) for allowing for a fine azimuth adjustment, the fine azimuth adjustment being carried out by using a control element forming an excentric type cam (5) whose rotation of 360° ensures a complete to-and-fro scanning by said third support element (3) of the fine azimuth adjustment range.



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ANTENNA FIXING DEVICE PROVIDED WITH AN ALIGNMENT ADJUSTMENT SYSTEM

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The present invention concerns the fixing of antennae and more particularly parabola type high frequency antennae whose performances are known to be maximum if they are perfectly aligned.

10 To this effect, they are conventionally fitted with a fixing device provided with a height adjustment means (site angle) and a fine azimuth adjustment means, said device including a first support element to be mounted stationary onto a pole or similar element by using flanges allowing a
15 first rough azimuth adjustment, a second intermediate support element mounted pivotable on the first for allowing the height adjustment, and a third support element on which the antenna is fixed and mounted pivotable on the second element for allowing a fine azimuth adjustment to be made.

20 As regards all currently known fixing devices of this type, the fine azimuth adjustment means is a screw system which, although fully effective, does have certain drawbacks in this application whose relative complexity adversely affects the cost price in a highly competitive
25 field, its lack of ergonomics given the fact that it is generally used at altitudes in misaligned awkward working positions, often in severe weather conditions making it difficult to handle the required tools, keys or screwdrivers and with moreover the risk of letting them
30 fall.

Secondly, it is essential to know that the alignment technique with such a fixing device consists of firstly placing according to original height and azimuth positions determined in advance, then of carrying out with the fine
35 azimuth adjustment means a series of scannings for height positions around the initial position so as to correct it according to the indications given by a measuring device, and finally of carrying out the fine azimuth adjustment.

Thus, it seems that for such a procedure, the azimuth adjustment by screws is excessively awkward in that the screwing-unscrewing corresponding to each scanning is an operation so difficult and long that in practice it is almost impossible to be implemented as it should be.

The invention is the outcome of a search to improve these antennae fixing devices, especially so as to provide solutions to resolve said drawbacks.

The main objectives of the invention were as follows :

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- providing good ergonomics to the fine azimuth adjustment system ,
- providing a good adaptability of the system to the requirements of the application so as in particular make it possible to carry fast and easy scanning operations whilst keeping satisfactory fineness quality and grade of accuracy,
- simplifying the device so as to favour the cost price.

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These objectives can be attained by using the antenna fixing device of the invention, said device including a first support element intended to be secured to a pole or similar element, a second support element mounted pivotable onto the first support element so as to allow a height adjustment, and a third support element on which the antenna is fixed mounted pivotable onto the second support element around an azimuth pivoting axis so as to allow a fine azimuth adjustment, and characterised in that the fine adjustment azimuth means includes a control element forming an excentric type cam intended to be engaged at a distance from said azimuth pivoting axis, in two adjacent portions, respectively from said second support element and from said third support element so as to control them so that the immobilisation in rotation of said control element ensures the bilateral locking on pivoting around said pivoting azimuth axis of the third support element with respect to the second support element, and so that the rotation in either direction of said control element results in a

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controlled pivoting in a corresponding direction of said third support element around said azimuth pivoting axis and with respect to the second support element, a rotation of 360° of said control element ensuring a full to-and-fro scanning by said third support element of the azimuth fine adjustment range.

In a preferred embodiment of the invention, said second and third support elements have complementary general stirrup shapes making it possible to insert the third into the second so that the lower and upper extremity returns of the third support element are respectively in contact with the lower and upper extremity returns of the second support element, the third support element being joined in the second support element around said azimuth pivoting axis perpendicularly traversing said returns ; two adjacent returns respectively of said second support element and of said third support element, comprise the one an opening radially elongated with respect to said azimuth pivoting axis and the other a circular hole, said opening and said hole being disposed so as to come into coincidence; and said control element forming an excentric type cam comprises an axial tail intended to enter virtually without any clearance into said circular hole, extended by a disk moved out of centre with respect to it and intended to enter into said opening virtually without any transverse clearance.

Said azimuth fine adjustment control element is rotated by using a key, preferably a male key commonly known as an awl-shaped key whose radial manoeuvre portion is long enough to permit rotation increments of the desired fineness.

In a preferred embodiment, said opening and said circular hole for receiving said control element forming an excentric type cam are respectively in the lower return of the third support element and the lower return of the second support element. As said control element is then rotated via the top, holes or notches for the passage of the manoeuvre key can be provided in the upper returns of

the second and third support elements, said holes or notches ensuring said key is retained in the use position.

Said control element forming an excentric type cam is preferably intended to remain in place once the fine
5 azimuth adjustment has been made, and can then be used to lock the third support in the second support, said extremity tail being thus threaded to receive a nut. As a variant, said control element can be removed after use so as to be replaced by a locking bolt. In this case, said
10 control element could even be integral with the manoeuvre key so as to form with the latter a tool specific to the system.

These and other characteristics of the invention will appear more clearly from a reading of the following
15 description with reference to the accompanying drawings in which :

Figure 1 is a schematic perspective view of an antenna mounted on a pole with a fixing device of the invention ;

Figure 2 is a perspective view on larger scale of the
20 main non-assembled elements of said device, and

Figure 3 is a perspective view of one of these elements.

Figure 1 shows a parabolic antenna A mounted on a pole B by means of a fixing device D of the invention which
25 therefore comprises a height adjustment means, as well as a fine azimuth adjustment means.

The device D conventionally includes a first support element 1 which defines an approximately vertical support plane 10 and which is fixed to the pole with a plurality of
30 flanges 11 whilst taking care to align as best as possible the azimuth plane 10.

Fixed to the plane 10 is a second support element 2, shown more clearly on fig 2, and which has the shape of a stirrup or clevis, namely that it comprises a flat
35 intermediate portion 20 extended to 90° by two lower 21 and upper 22 returns. The support element 2 is applied to the plane 10 via its intermediate portion 20, the returns 21 and 22 being outwardly directed. It is secured to the plane

10 with a bolt and to this effect comprises a hole 23 in its intermediate portion 20. The height adjustment is carried out by pivoting the support element 2 around the pivot constituted by this bolt. A second hole 24 in the intermediate portion 20 at a certain distance from the hole 23 is in coincidence with an elongated slot in the support plane 10 of the first support element 1 so as to admit a bolt for locking pivoting of the second support element 2 on the first support element 1.

The upper return 22 of the second support element or stirrup 2 has three circular holes 25, 26 and 27 aligned parallel to its extremity edge.

The lower return 21 includes a circular hole 28 opposite the hole 25 of the upper return and intended to admit together with the latter respective aligned bolts so as to define an azimuth pivoting axis X-X, fig 1.

The lower return 21 includes another circular hole 29 opposite the hole 27, in the upper return 22 and whose function shall be explained subsequently.

A third support element 3 to which the antenna A is fixed, also has the shape of a stirrup comprising an intermediate portion 30 and two returns at 90°, a lower one 31 and an upper one 32. The stirrup 3 has its outer height which corresponds to the internal height of the stirrup 2 so as to be able to embed it there, as shown on figure 1. Two brackets opposing each other 40 and 41 used to fix the antenna extend inwardly from the returns 31 and 32 at 90°.

The upper 32 and lower 31 returns have circular openings, respectively 35 and 38 which come into correspondence with the holes 25 and 28 of the second support element 2 so as to admit together with them said bolts defining the azimuth pivoting axis X-X.

The upper return 32 also has an elongated slot 37 parallel to its sides and which comes into coincidence with the hole 27 of the upper return of the stirrup 2. Opposite the opening 37, the lower return 31 has a slot 39 radially elongated with respect to the circular hole 38 and accordingly with respect to the azimuth pivoting axis X-X.

Finally, the upper return 32 has a slot 36 elongated parallel to the slot 37, between the latter and the hole 35, which comes into coincidence with the hole 26 of the upper return 22 of the stirrup 2 so as to admit together
5 with the latter a bolt for locking pivoting of the stirrup 3 in the stirrup 2.

In accordance with the invention, the hole 29 in the lower return 21 of the second support element 2 and the opening 39 radially elongated with respect to the axis X-X
10 in the lower return 31 of the third support element 3 are intended to collectively admit an azimuth fine adjustment control element 5, which prohibits any pivoting movement around the axis X-X of the third support element with respect to the second support element if it is immobilised
15 in rotation, and results in a controlled pivoting of the third support element in the second support element around the axis X-X when it is manoeuvred in rotation in one direction or in an opposing direction.

As shown more clearly on figure 3, the control element
20 5 is a monolithic element which includes an axial tail 50 intended to enter closely the hole 29, extended by a disk-shaped portion 51 having a diameter corresponding to the width of the oblong slot 39 so as to be engaged closely inside it and rotate. The disk-shaped portion 51 is moved
25 out of centre with respect to the tail 50 by a distance calculated according to the distance to the azimuth pivoting axis X-X and the desired amplitude of the fine azimuth adjustment range which generally shall not be less than 3° or greater than 10° and more often about 7°.

30 Beyond the disk 51, the control element 5 comprises a manoeuvre head 52 having an axial hole 53 for receiving a male key 6.

Secondly, the tail 50 of the control element 5 is preferably threaded so as to receive a locking nut once the
35 azimuth adjustment has been carried out.

As shown on figure 2, the hole 27 in the second support element 2 and the elongated slot 37 in the third support element 3 collectively constitute a passage for the

key 6 which, when in the use position, is thus positively retained inside the support elements 2 and 3. As a variant, the hole 27 and the slot 37 can be open notches in the extremities of the upper returns 22 and 32, which make it possible to engage the key 6 via the side, for example in a case where the key 6 and the element 5, designed to be removed after use for the fine azimuth adjustment, would be integral so as to constitute a tool for the system. Secondly, figure 2 shows that the manoeuvre portion 6a of the key 6 beyond its elbow has a length sufficient to make it possible to control rotation increments of the element 5 corresponding to the desired resolution for the azimuth adjustment.

This antennae fixing device is designed so as provide the additional advantage of being easily adapted to a modularity making it possible to offer on the basis of the same elements a version with the fine azimuth adjustment as an option, and a basic version without said option. To this effect, as can be seen on Figure 2, the intermediate portion 30 of the third support element 3 comprises holes 33 and 34 similar to the holes 23 and 24 in the intermediate portion 20 of the second support element, making it possible to directly fix in the place of the latter and in the same way the third support element 3 on the first support element 1, the basic version therefore being extremely simplified since it does not have the elements 2, 5 and 6.

CLAIMS

1) Antennae fixing device comprising a first support
5 element (1) to be fixed to a pole or similar element, a
second support element (2) mounted pivotable onto the first
support element (1) so as to allow for a height adjustment,
and a third support element (3) on which the antenna is
10 fixed and mounted pivotable onto the second support element
(2), around an azimuth pivoting axis (X-X) so as to make it
possible to carry out a fine azimuth adjustment,
characterised in that the fine azimuth adjustment means
comprises a control element (5) forming an excentric type
15 cam and intended to be engaged at a distance from said
azimuth pivoting axis (X-X) in two adjacent portions (21,
31), respectively of said second support element (2) and
said third support element (3) so as to control them so
that immobilisation on rotation of said control element (5)
20 ensures the bilateral locking on pivoting around said
azimuth pivoting axis (X-X) of the third support element
(3) with respect to the second support element (2), and
that rotation in either direction of said control element
(5) results in a controlled pivoting in a corresponding
25 direction of said third support element (3) around said
azimuth pivoting axis (X-X) and with respect to the second
support element (2), a rotation of 360° of said control
element (5) ensuring a full to-and-fro scanning by said
third support element (3) of the fine azimuth adjustment
range.

30 2) Device according to claim 1, characterised in
that said fine azimuth adjustment range is between about 3°
and 10°.

3) Device according to claim 2, characterised in
that the fine azimuth adjustment range is about 7°.

35 4) Device according to one of claims 1 to 3,
characterised in that said second and third support
elements (2, 3) have the general complementary shapes of a
stirrup enabling the third support (3) to be inserted in

the second support (2) so that the lower (31) and upper (32) extremity returns of third support element (3) are respectively in contact with the lower (21) and upper (22) support extremity returns of the second support element (2), the third support element (3) being joined in the second support element (2) around said azimuth pivoting axis (X-X) perpendicularly passing through said extremity returns (21, 22, 31, 32), in that two adjacent returns, respectively of said second support element (2) and said third support element (3) with one comprising an opening (39) elongated radially with respect to said azimuth pivoting axis (X-X) and the other a circular hole (29), the opening (39) and the hole (29) being disposed so as to come into coincidence, and in that said control element (5) forming an excentric type cam comprises an axial tail (50) for entering virtually without any clearance into said circular hole (29) extended by a disk (51) moved out of centre with respect to it and intended to enter said elongated opening (39) virtually without any transverse clearance.

5) Device according to claim 4, characterised in that said elongated opening (39) and said circular hole (29) for receiving said control element (5) forming an excentric type cam are respectively inside the lower return (31) of the third support element (3) and the lower return (21) of the second support element (2).

6) Device according to claim 5, characterised in that holes or notches (27, 37) are provided inside the upper returns (22, 32) of the second and third support elements (2, 3) and intended for the passage of a manoeuvre key (6) of said control element (5) and which ensure the key (6) is retrained in the use position.

7) Device according to one of claims 4 to 6, characterised in that the axial tail (50) of said control element (5) is threaded so as to receive a tightening nut.

8) Device according to one of claims 4 to 6, characterised in that said control element (5) is integral with its manoeuvre key (6) so as to form with the latter a

tool for the system.

9) Device according to one of claims 4 to 8, characterised in that the third support element (3) comprises means (33, 34) similar to the means (23, 24) of
5 the second support element (2) so as to enable to fix it directly in the place of said second support (2) and in the same way on said support element (1).

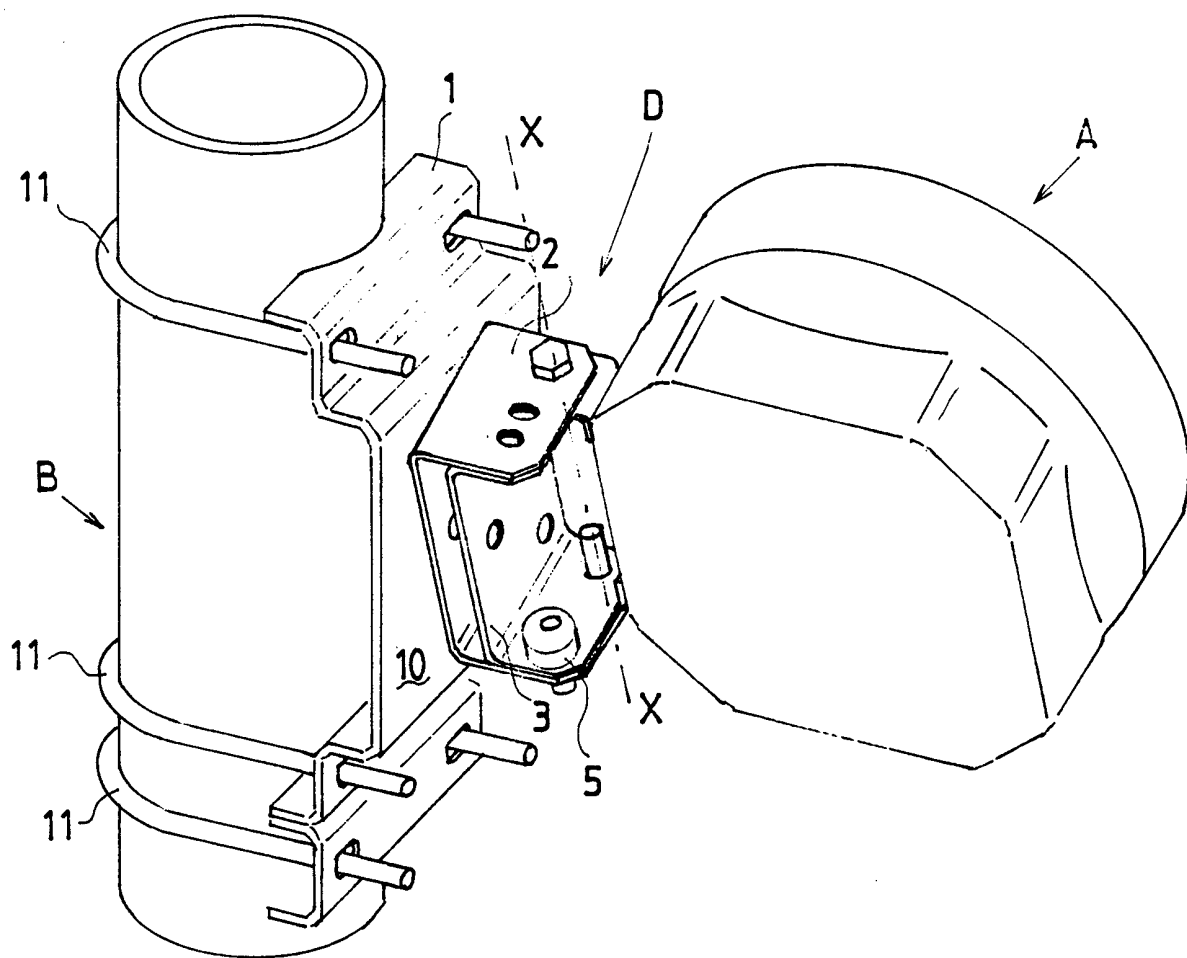
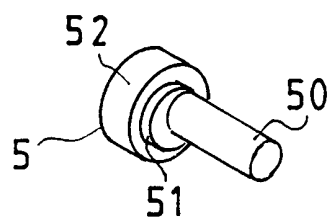
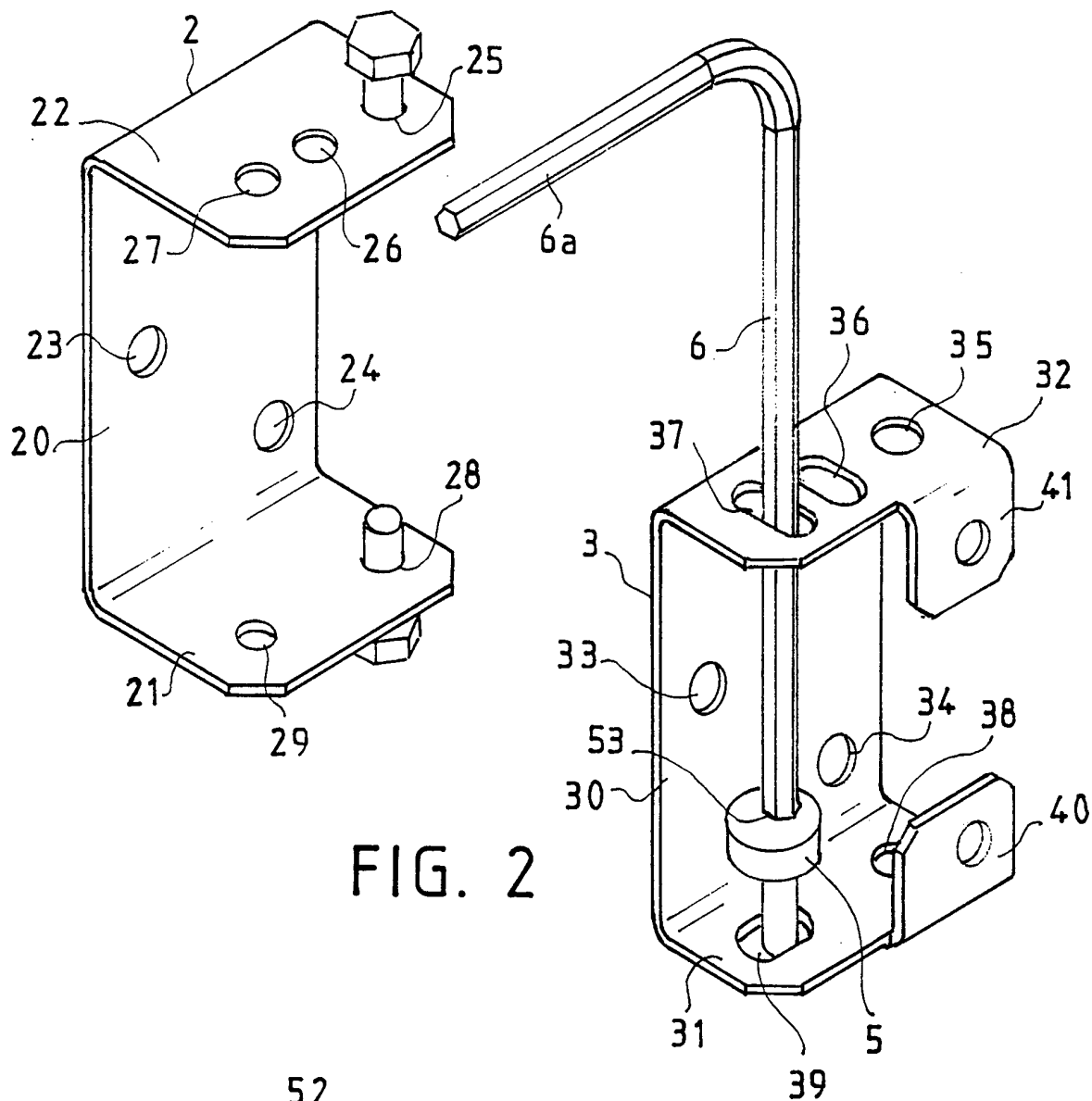


FIG. 1



INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP 99/00762

A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 H01Q1/12

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 H01Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y A	GB 2 310 542 A (FUJITSU) 27 August 1997 see abstract; figures 3-6 ---	1 4
Y A	EP 0 038 788 A (LUXOR) 28 October 1981 see page 7, line 17 - line 35; figures 1,8-10 ---	1 2-9
Y	EP 0 487 464 A (SMA SEGNALAMENTOMARITTIMO ED AEREO) 27 May 1992 see column 4, line 44 - column 56; figure 1 ---	1
A	GB 2 251 521 A (HSIAO-FENG CHOU) 8 July 1992 see page 6, line 17 - line 22; figures 1-5 --- -/--	1-9



Further documents are listed in the continuation of box C.



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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 875 052 A (ANDERSON ET AL.) 17 October 1989 see column 4, line 21 - line 68; figures 2,3 ---	1
A	DE 22 46 945 A (SIEMENS) 11 April 1974 see page 6 - page 9; figures 3-5 ---	1
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Information on patent family members

International Application No

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