(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 411 585 A1

# (12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
**21.04.2004 Bulletin 2004/17**

(51) Int Cl.[7]: **H01Q 1/12**, H01Q 1/32, H01Q 1/52, H01Q 1/42

(21) Application number: **03023235.9**

(22) Date of filing: **14.10.2003**

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LI LU MC NL PT RO SE SI SK TR**
Designated Extension States:
**AL LT LV MK**

(30) Priority: **15.10.2002 IT VI20020213**

(71) Applicant: **Calearo S.r.l.**
**36033 Isola Vicentina (VI) (IT)**

(72) Inventors:
- **Ambrogi, Andrea**
  **35124 Padova (IT)**
- **Collareda, Giovanna**
  **36010 Zane' (VI) (IT)**

(74) Representative: **Bonini, Ercole**
**c/o STUDIO ING. E. BONINI SRL**
**Corso Fogazzaro 8**
**36100 Vicenza (IT)**

## (54) Cover for vehicular antennas

(57) A cover (1) for vehicular antennas, comprising a lower part (2) covering a base (B) resting on a vehicle and an upper part (3) covering a monopole (M) that stands on the base (B) and is electrically connected to signal receiving and/or transmitting means installed on the vehicle. The parts (2, 3) consist of a single body inside which there is a notch (4) suited to reduce the thickness of the material in correspondence with the connection area between the lower part (2) and the upper part (3).

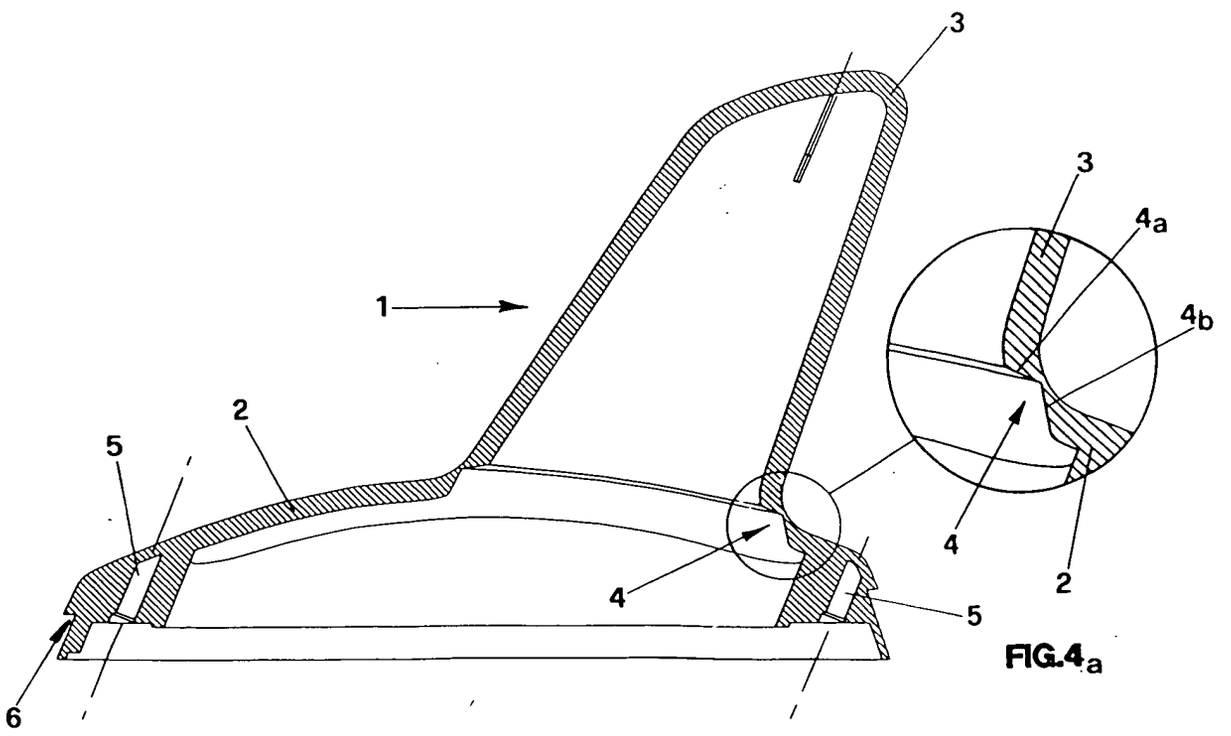


FIG.4

FIG.4a

EP 1 411 585 A1

## Description

**[0001]** The invention concerns a cover for vehicular antennas particularly suitable to be used for the protection of elements transmitting and/or receiving signals through the air and belonging to equipment installed on motor vehicles, e.g. telephones, car radios, satellite navigation systems.

**[0002]** It is known that the transmitting and receiving elements that make up the antenna for the above mentioned equipment and in particular for telephones are applied externally to the roof of the vehicle and then protected with covers, commonly called "RADOME", which guarantee safe and efficient operation in any weather conditions.

**[0003]** For this purpose materials with particular physical-mechanical features are used, mainly nylon, which make it possible to obtain strong covers and at the same time, in the moulding phase, to satisfy the aesthetic requirements imposed by the manufacturer's design.

**[0004]** As regards the terminal elements that make up the antennas for transmitting and receiving signals through the air, in particular telephone signals with GSM or AMPS technology, they comprise mainly longitudinal metallic elements that constitute monopoles in tune with the signal transmitting/receiving frequency and are fixed to a base for installation on the vehicle's bodywork.

**[0005]** It is clear that these monopoles constitute elements that protrude from the external surface onto which they are applied, generally the car roof.

**[0006]** In this regard regulations are known, which set the maximum overall length admissible for the parts protruding from the car's bodywork, in particular for antennas.

**[0007]** Furthermore, in some cases car makers require that antennas have particularly restrictive flexibility characteristics, in such a way as to comply with the standards in force regarding protruding elements in the interior fittings of motor vehicles (European Norm 7460/EEC).

**[0008]** In order to meet the above mentioned requirements, the covers for vehicular antennas are carried out with specific geometric and physical-mechanical characteristics.

**[0009]** The covers produced according to a first known technique feature the coupling of two distinct elements: the first one of these elements, essentially in the shape of a shell, is suited to be coupled to the connection base on the motor vehicle's bodywork, while the second one comprises a hood wrapped around the monopole and fitted into the first element.

**[0010]** The structure of the cover obtained through the union of two separate elements has the flexibility necessary to comply with the regulation mentioned above.

**[0011]** One of the drawbacks of this technique is represented by the fact that the cover produced as described above requires several operations for the assembly of its various components during the installation of the antenna on the motor vehicle.

**[0012]** Another drawback of this technique consists in the fact that the production of the cover with separate elements negatively affects the aesthetic aspect of the antenna, since a line of discontinuity appears on its external surface.

**[0013]** To partially overcome these drawbacks, antenna covers made in one single piece, for example through moulding, have been designed, said covers having on their outer surface, and at predetermined heights, annular grooves suitable for creating areas with reduced thickness that make the protruding part flexible in case of impact.

**[0014]** This solution, however, does not ensure the desired aesthetic affect, that is, an external surface without discontinuities.

**[0015]** It is the objective of the present invention to overcome the drawbacks mentioned above.

**[0016]** A first objective of the invention is to produce a cover for vehicular antennas with physical-mechanical characteristics in compliance with the regulations in force and with external surface without discontinuities.

**[0017]** Another objective of the invention is to obtain a cover for antennas whose production requires simpler operations compared to the equivalent covers already known.

**[0018]** The objectives mentioned above are achieved through the implementation of a cover for vehicular antennas that, according to the main claim, comprises a lower part covering a base positioned on said vehicle and an upper part covering a monopole that stands on said base and is electrically connected to signal receiving and/ or transmitting means installed on said vehicle, said cover being characterized in that said parts constitute a single body inside which there is a notch suited to reduce the thickness of the material in correspondence with the connection area between said lower part and said upper part.

**[0019]** According to a preferred embodiment, the notch is annular with an elliptical profile.

**[0020]** To advantage, in the area where the notch is obtained, the cover has a lowered area that gives the cover itself the flexibility required by the above mentioned safety standards.

**[0021]** The objectives and advantages described above will be highlighted in greater detail in the description of a preferred embodiment of the invention among many possible ones, with reference to the attached drawings, wherein:

- Figure 1 is an axonometric view of the cover object of the invention combined with a vehicular antenna;
- Figure 2 is a rear plan view of the cover object of the invention;
- Figure 3 is a side plan view of the cover object of the invention;
- Figure 4 is a sectional view along plane I°-I° of Figure 2;

- Figure 4a shows an enlarged detail of Figure 4;
- Figure 5 is a sectional view along plane II°-II° with reference to Figure 3;
- Figure 5a shows an enlarged detail of Figure 5;
- Fig 6 is a view from below of the cover object of the invention;
- Figure 7 shows the cover object of the invention applied to a different type of antenna.

**[0022]** The cover of the invention is shown in Figure 1, where it is indicated as a whole by 1.

**[0023]** It is represented in combination with the parts that comprise the antenna, a base B and the relative case G for the connection to the roof of the motor vehicle and a monopole M that stands on the base B.

**[0024]** The monopole M is electrically connected to signal receiving and/or transmitting means installed on the vehicle, not shown in the figure to simplify the representation and because they are of the known type.

**[0025]** The monopole M represented here substantially comprises an antenna that receives and/or transmits telephone signals, e.g. signals used for GSM or AMPS communication.

**[0026]** It has an elongated geometric shape to ensure its correct operation in the frequency band of the analogue or digital signal to which it is tuned.

**[0027]** The cover for antennas 1 object of the invention substantially comprises a lower part 2 covering the base B on which it rests and an upper part 3 covering the monopole M when the antenna is assembled.

**[0028]** According to the invention, the lower part 2 and the upper part 3 make up a single body inside which, as shown in figures 4 and 5, a notch 4 is obtained to reduce the thickness of the material of which the cover is made in correspondence with the connection area between the lower part 2 and the upper part 3.

**[0029]** Said notch 4, as shown in the view from below of Figure 6, is annular in shape, with an elliptical profile and reflects the shape of the upper part 3 of the cover 1.

**[0030]** As can be seen in the detail of Figure 4a, the cross section of the notch 4 has a substantially right shape and comprises two concurrent walls 4a, 4b that cut the cover 1 in the connection area between the lower part 2 and the upper part 3.

**[0031]** To advantage, the notch 4 is obtained during the moulding of the cover 1, which is preferably made of nylon PA6, commercially known as WELLAMID.

**[0032]** It is evident that in other embodiments the profile of the notch 4 may be different, according to the design, the moulding techniques and the material used.

**[0033]** The annular notch 4 obtained in this way, independently of its shape, makes it possible to obtain a reduced resistance area compared to the other parts of the cover 1, so that in case of impact the upper part 3 will yield and even come off the lower part 2, according to the provisions of the regulations in force.

**[0034]** The upper part 3, as can be seen in detail in Figure 3, is substantially fin-shaped and adapts to the shape of the monopole, which makes it possible to obtain better aerodynamic penetration coefficients for the antenna.

**[0035]** On the perimeter 2a of the lower part 2, as shown in Figure 6 and in Figure 1, holes 5 are provided, which are suited to receive fixing screws V for fastening to the base B during the assembly of the antenna.

**[0036]** A lower annular circle 6 is also obtained on the lower part 2 and is suited to house the sealing gasket G associated to the base B that, upon completion of the assembly, guarantees the protection of the antenna from seepage of water. In Figure 7 the cover 1 object of the invention is applied to an antenna in which, in addition to the monopole M for transmitting and receiving telephone signals, means S are provided for receiving satellite signals, e.g. the GPS type, said means being substantially flat in shape and housed in a compartment in the base B.

**[0037]** The above description shows that the cover object of the invention achieves the objectives set and offers the advantages needed.

**[0038]** Upon implementation, modifications that are not described and represented herein may be made on the cover object of the invention.

**[0039]** Said variants may for example involve a different shape of the lower and upper parts, as well as a different shape of the notch, or even a different type of connection to the support base.

**[0040]** These and other variants not described and not represented herein are all to be construed as protected by the present patent, provided that they are carried out in compliance with the innovative concepts expressed in the following claims.

## Claims

1. Cover (1) for vehicular antennas of the type comprising a lower part (2) covering a base (B) resting on said vehicle and an upper part (3) covering a monopole (M) that stands on said base (B) and is electrically connected to signal receiving and/or transmitting means installed on said vehicle, **characterized in that** said parts (2,3) comprise a single body inside which there is a notch (4) suited to reduce the thickness of the material in correspondence with the connection area between said lower part (2) and said upper part (3).

2. Cover (1) according to claim 1), **characterized in that** said notch (4) is annular.

3. Cover (1) according to claim 2), **characterized in that** said annular shape has an elliptical profile.

4. Cover (1) according to claim 1), **characterized in that** said notch (4) has a substantially right cross section and comprises two concurrent walls (4a, 4b)

that cut said cover (1) in the connection area of said parts (2, 3).

**5.** Cover (1) according to claim 1), **characterized in that** on the perimeter (2a) of said lower part (2) holes (5) are provided for the insertion of fixing screws (V) for fastening to said base (B).

**6.** Cover (1) according to claim 1), **characterized in that** said lower part (2) comprises a lower annular circle (6) suited to receive a sealing gasket (G) associated to said base (B).

**7.** Cover (1) according to claim 1), **characterized in that** said lower part (2) internally houses auxiliary signal receiving means (S).

**8.** Cover (1) according to claim 7), **characterized in that** said auxiliary signal receiving means (S) comprises a GPS antenna for receiving satellite signals.

**9.** Cover (1) according to claim 1), **characterized in that** said upper part (3) has a fin-shaped profile.

**10.** Cover (1) according to claim 1), **characterized in that** said cover (1) is produced through a single moulding phase.

**11.** Cover (1) according to claim 1), **characterized in that** it is made of nylon PA6.

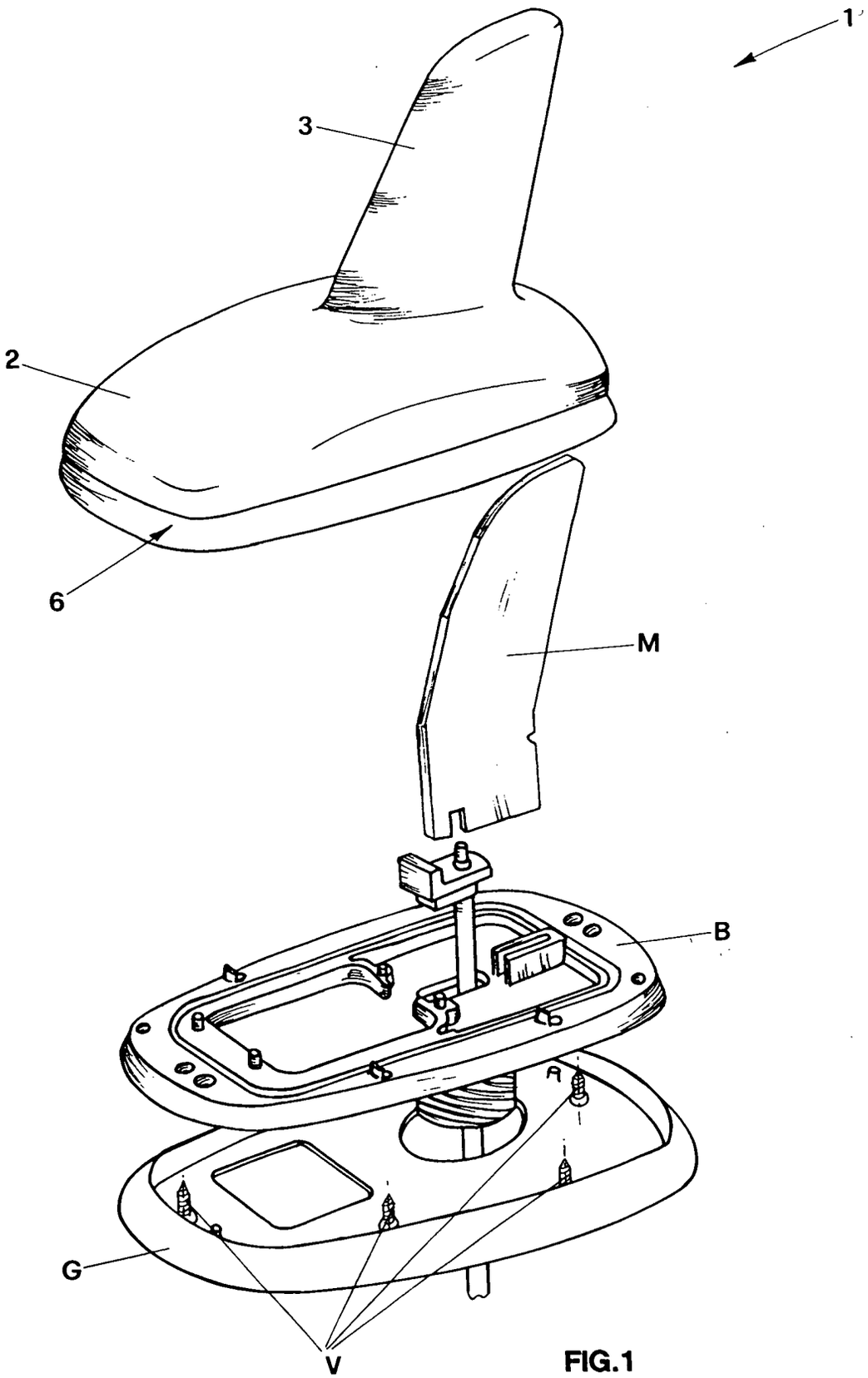


FIG.1

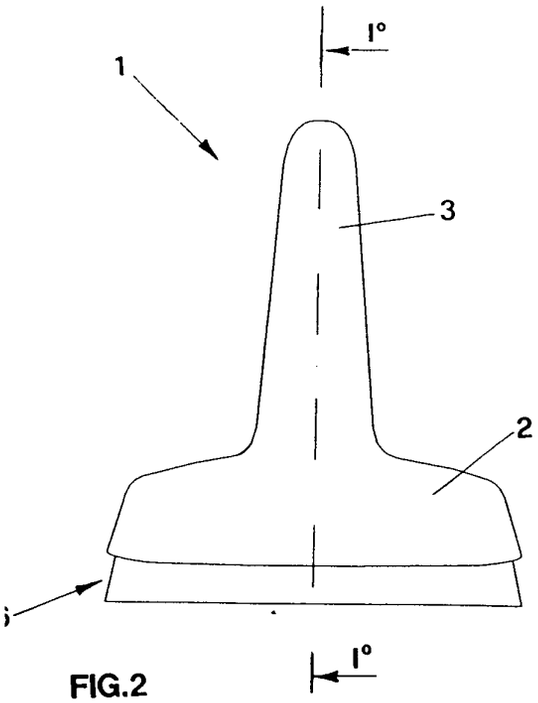


FIG.2

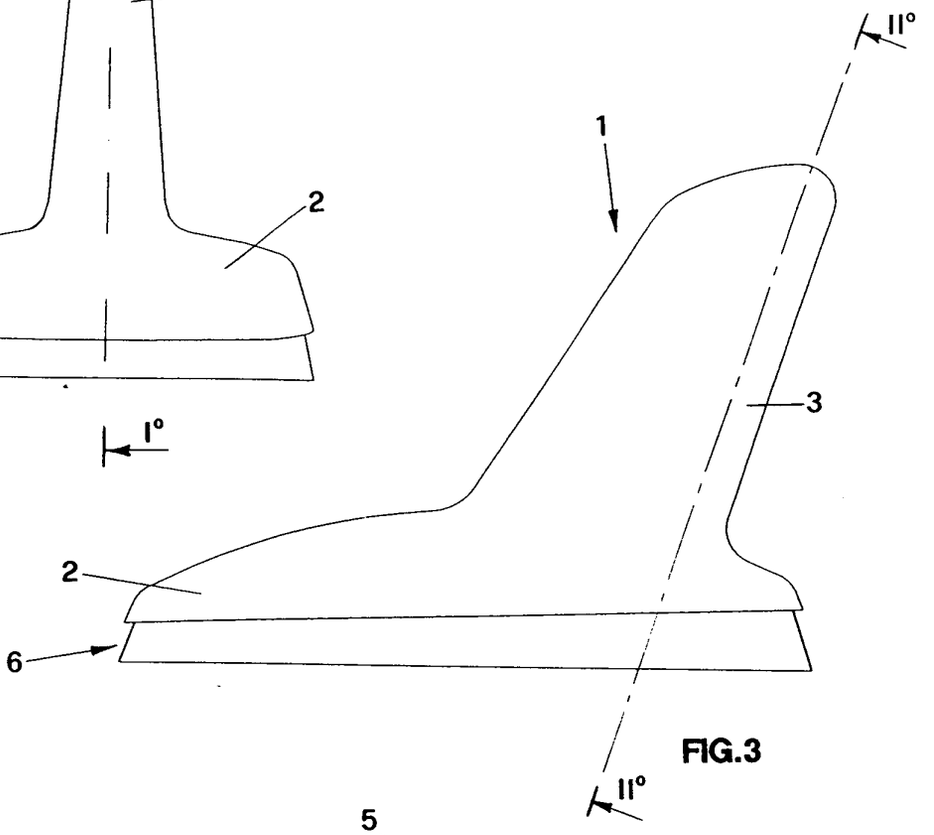


FIG.3

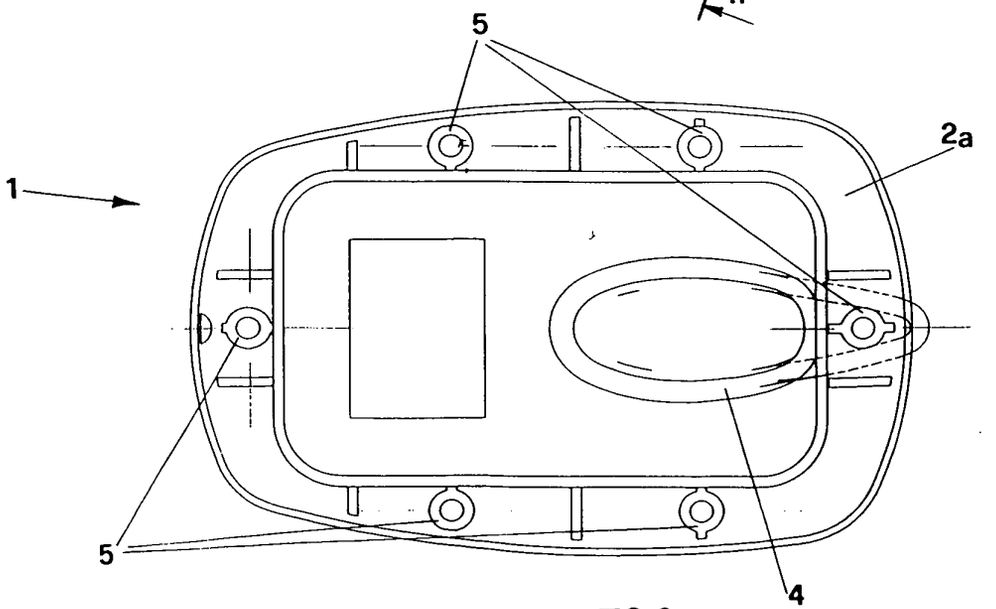


FIG.6

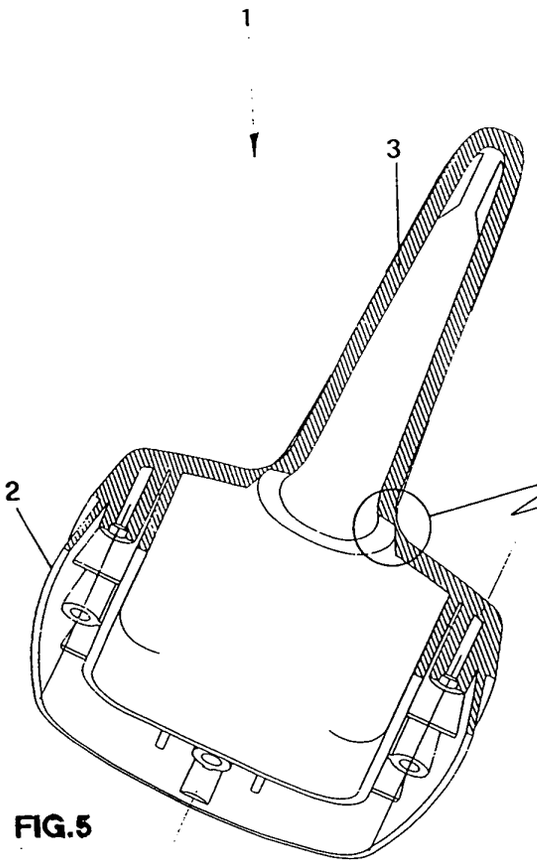


FIG.5

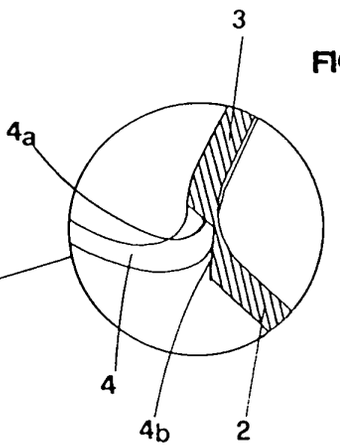


FIG.5a

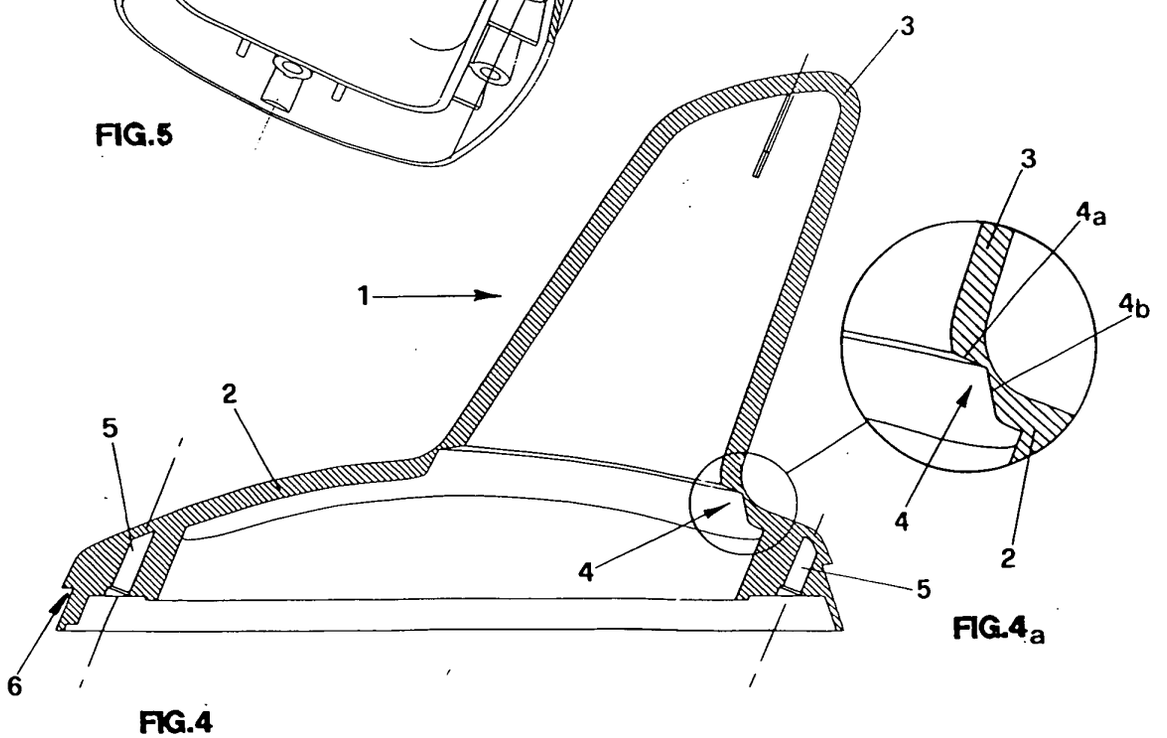


FIG.4




FIG.4a

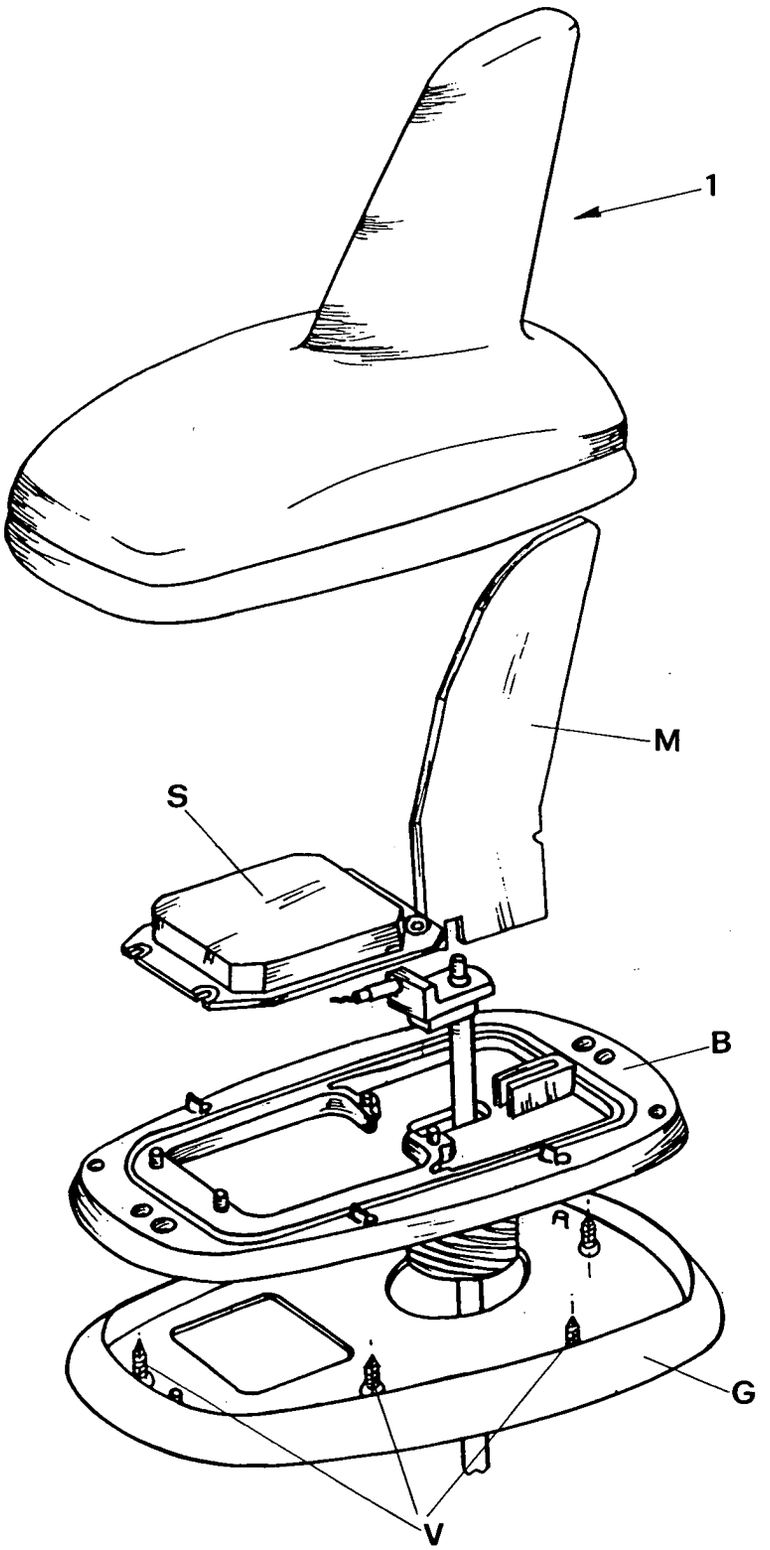


FIG.7

European Patent Office

# EUROPEAN SEARCH REPORT

Application Number
EP 03 02 3235

## 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) |
|---|---|---|---|
| Y | US 6 275 194 B1 (ANSORGE CHRISTIAN) 14 August 2001 (2001-08-14) * column 5, line 29 - line 41; figures 3,4 * | 1-11 | H01Q1/12 H01Q1/32 H01Q1/52 H01Q1/42 |
| Y | EP 0 989 629 A (NIPPON ANTENA KABUSHIKI KAISHA) 29 March 2000 (2000-03-29) * figure 2 * | 1-11 | |
| A | EP 0 862 239 A (NIPPON ANTENA KABUSHIKI KAISYA) 2 September 1998 (1998-09-02) * abstract * | 1-11 | |
| A | WO 01 39321 A (SMARTEQ WIRELESS AB ;GUSTAFS ROGER (SE)) 31 May 2001 (2001-05-31) * figure 5 * | 1-11 | |

TECHNICAL FIELDS SEARCHED (Int.Cl.7)
H01Q

The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| THE HAGUE | 22 January 2004 | Moumen, A |

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

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

EPO FORM 1503 03.82 (P04C01)

## ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 03 02 3235

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

22-01-2004

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
|---|---|---|---|
| US 6275194 B1 | 14-08-2001 | DE 19923661 A1 | 23-11-2000 |
| | | EP 1056153 A2 | 29-11-2000 |
| EP 0989629 A | 29-03-2000 | JP 2000077923 A | 14-03-2000 |
| | | EP 0989629 A1 | 29-03-2000 |
| EP 0862239 A | 02-09-1998 | JP 3065949 B2 | 17-07-2000 |
| | | JP 10093327 A | 10-04-1998 |
| | | EP 0862239 A1 | 02-09-1998 |
| | | WO 9811624 A1 | 19-03-1998 |
| WO 0139321 A | 31-05-2001 | SE 515504 C2 | 20-08-2001 |
| | | AU 1749801 A | 04-06-2001 |
| | | WO 0139321 A1 | 31-05-2001 |
| | | SE 9904320 A | 30-05-2001 |

EPO FORM P0459

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