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

(11) **EP 1 939 977 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
12.08.2009 Bulletin 2009/33

(51) Int Cl.:
H01Q 1/08 *(2006.01)* ***H01Q 1/32*** *(2006.01)*

(21) Application number: **07111343.5**

(22) Date of filing: **28.06.2007**

(54) **Method for separating a projecting body of an antenna from a base and vehicular antenna using said method**

Verfahren zur Trennung eines hervorstehenden Körpers einer Antenne von einer Basis und Fahrzeugantenne, auf die dieses Verfahren angewendet wurde

Procédé de séparation d'un corps de projection d'une antenne et antenne véhiculaire utilisant ce procédé

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

(30) Priority: **20.12.2006 IT VI20060358**

(43) Date of publication of application:
02.07.2008 Bulletin 2008/27

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EP 1 939 977 B1

Printed by Jouve, 75001 PARIS (FR)

Description

[0001] The present invention concerns a method for separating the projecting body of an antenna from a base, particularly suited to be applied to vehicular antennas.

[0002] The present invention concerns a vehicular antenna comprising at least one projecting body and a base shaped in such a way as to be able to be separated and a method for separating the projecting body from said base.

[0003] It is known that vehicular antennas are often used which are constituted by a base associated with the vehicle and by a projecting body, often constituted by a rod, that is constrained to the base generally by screwing.

[0004] Said removable constraint is necessary in order to ensure that the user can remove the projecting body from the base in order to comply with the regulations in force or to protect the antenna, for example while transporting the vehicle or when the vehicle passes through a car wash.

[0005] In this last situation, in fact, the rotating brushes could damage the antenna irreparably, so that it is advisable to remove the projecting body from the base.

[0006] Said known vehicular antennas, though presenting a firm but removable connection between the projecting body and the base, however pose some acknowledged drawbacks.

[0007] The first of these drawbacks is constituted by the fact that the projecting body of all these antennas must have a substantially circular cross section, at least in proximity of the base.

[0008] Since, in fact, it is not possible to determine the end of the screwing stroke with absolute precision, no other shape would make it possible to obtain the perfect continuity of the external surface of the antenna in proximity of the connection between projecting body and base.

[0009] A further drawback of this embodiment lies in that the screwing and unscrewing operations require a given time due to the length of the thread necessary to ensure the resistance of the constraint to the considerable stress to which the antenna is subjected while the vehicle is being used.

[0010] In order to overcome these drawbacks, it could be possible to apply a constraint obtained with a bayonet joint between the projecting body and the base of an antenna.

[0011] This type of constraint makes it possible to overcome the previously-mentioned drawbacks but has further new weaknesses.

[0012] In particular, said constraint could be not sufficiently stable with respect to the stress to which the antenna is subjected.

[0013] In this regard, mechanical friction has increased, but it tends to deteriorate progressively over time.

[0014] Furthermore, the execution of a bayonet coupling of this type is particularly complex and therefore expensive.

[0015] The document EP 0 443 172 A describes a vehicle antenna having an antenna foot which can be mounted on the vehicle bodywork and having an antenna rod. The antenna foot is produced from an elastic material and the antenna rod is connected mechanically and electrically in a detachable manner on the antenna foot by a latching connection. The antenna rod can thus be pulled out of the antenna foot and pushed into the antenna foot without additional tools being required but subjecting the latching connection to high mechanical friction.

[0016] The object of the present invention is to overcome the above-mentioned drawbacks that are typical of the known state of the art.

[0017] In particular, it is one object of the present invention to implement a method that allows the projecting body of a vehicular antenna to be separated from the respective base very quickly, without becoming a nuisance for the users.

[0018] It is a further object of the present invention to construct a vehicular antenna that allows the projecting body to be constrained to the base with no need for screw means.

[0019] It is another object of the present invention to ensure that said constraint is particularly stable and that the construction of the antenna remains rather simple.

[0020] It is another, yet not the least aim of the invention to construct a vehicular antenna that ensures the perfect connection, without any superficial non-homogeneity, between the projecting body of the antenna and the base, whatever the profile of the antenna.

[0021] The aims described above have been achieved by an antenna according to claim 1 and through the implementation of a method for separating the projecting body of an antenna from the respective base according to claim 23.

[0022] The other claims concern details of the method that is the subject of the invention, as well as a vehicular antenna that achieves the set objects, too.

[0023] By rotation of the electric contact means with respect to the retaining means it is possible to deform the latter elastically in order to be able to remove the constraint obtained through friction, said constraint being generated between the area with raised profile belonging to the electric contact means and the undercuts belonging to the retaining means and holding the base and the projecting body of the antenna together.

[0024] Still advantageously, after said rotary movement, whose amplitude is generally limited, it is possible to remove the projecting body from the base with a single movement in the coupling direction.

[0025] At the end of the removal operation, advantageously, the retaining means elastically return to the rest position, thus making it possible to successively restore the constraint between the two parts with a single movement in the coupling direction.

[0026] Said constraint, due to the configuration of the electric contact means and of the retaining means, is of

the snap-in type and therefore it can be obtained by simply forcing the electric contact means against the retaining means along the coupling direction.

[0027] The aforesaid objects and advantages, and others that will be described in greater detail below, are highlighted in the description of preferred embodiments of the invention, provided here as non-restrictive examples, with reference to the attached drawings, wherein:

- Figure 1 is an exploded axonometric view of the vehicular antenna carried out according to the invention;
- Figure 2 shows a cross section of a detail of the vehicular antenna that is the subject of the invention;
- Figure 3 is an exploded axonometric view of a construction variant of the vehicular antenna that is the subject of the invention;
- Figure 4 is a further exploded view of the vehicular antenna shown in Figure 3;
- Figure 5 is an exploded axonometric view of a further construction variant of the vehicular antenna that is the subject of the invention;
- Figure 6 shows a detail of the construction variant shown in Figure 5;
- Figure 7 shows a detail of the vehicular antenna that is the subject of the invention in operation;
- Figure 8 shows a detail of the construction variant shown in Figure 3 in operation;
- Figure 9 shows a detail of the construction variant shown in Figure 5 in operation.

[0028] The vehicular antenna that is the subject of the invention is represented in Figures 1 and 2, where it is indicated as a whole by **1** and where it can be observed that it comprises at least one projecting body **2** for receiving/sending radio-frequency signals, provided with electric contact means **3** that can be snapped in and thus constrained to retaining means **4** present in the base **5** of the antenna **1** according to a coupling direction **X.**

[0029] According to the invention, the lateral surface of the electric contact means **3** is provided with projecting elements **7** that can be positioned in contact with the retaining means **4,** said retaining means **4** being intrinsecally compliant to the contact with the projecting elements **7** in order to allow the separation of the electric contact means **3** from the retaining means **4** when the projecting body **2** is subjected to a torque that tends to set it rotating on a plane that is orthogonal to the coupling direction **X.**

[0030] It should be noted that the constraint created between the projecting body **2** and the base **5,** besides being, advantageously, particularly stable, determines a certain mutual position between the projecting body **2** and the base **5**, making it possible, still advantageously, to obtain the continuity of the external surface of the antenna **1** of the invention in the connection point, whatever the profile of the antenna **1**.

[0031] It should also be noted that, according to a construction variant of the invention, the retaining means can be identified on the projecting body and the electric contact means can be identified on the base.

[0032] It is obvious that said construction variant is totally analogous to the preferred embodiment of the invention described herein, so much that it is not illustrated and described in detail to avoid useless repetitions.

[0033] According to a preferred embodiment of the invention described herein, the electric contact means **3** present, on their lateral surface, friction areas **8** that, as shown also in Figure 2, rest against undercuts **9** present in the retaining means **4**.

[0034] This advantageously makes it possible to obtain the constraint of the projecting body **2** to the base **5,** a constraint that according to the invention is removable, as will be illustrated in greater detail below, through the rotary motion of the projecting body **2** that forces the projecting elements **7** against the retaining means **4** in order to expand them as much as needed to release the friction areas **8** from the undercuts **9**.

[0035] In the preferred embodiment of the antenna **1** described herein, the projecting body **2** is a rod, but this is not intended to represent a limitation for different embodiments of the invention according to which the projecting body can be a fin or any other element suited to receive/send radio-frequency signals.

[0036] As regards the electric contact means **3,** they comprise a shaped male element **10** arranged at the end of the projecting body **2** that is coupled with a shaped female element **11** belonging to the base **5.**

[0037] In particular, the shaped female element **11** is provided with a conical cavity **12** that houses at least the terminal section of the shaped male element **10** in order to generate the electric contact.

[0038] For this purpose, both the shaped male element **10** and the shaped female element **11** will be at least partially made of an electrically conductive material and furthermore, as can be seen in the figures, the shaped male element **10** has a central slot **13** that makes it elastically compliant in the axial directions.

[0039] This allows the shaped male element **10** to penetrate completely the conical cavity **12** of the shaped female element **11** and to generate the desired electric contact.

[0040] As regards the retaining means **4**, according to the preferred embodiment of the invention described herein they comprise two or more mainly laminate elements **15** opposing each other and projecting from the base **5** in the coupling direction **X**, in which the undercuts **9** mentioned above are defined.

[0041] According to the preferred embodiment of the invention described herein, said laminate elements **15** are defined by curved surfaces with opposing cavities.

[0042] Said laminate elements **15** are two and are provided with undercuts **9** constituted by an annular sector **16** protruding from the inner surface of the laminate elements **15**.

[0043] Accordingly, the friction area **8** of the electric

contact means **3** is constituted by a collar that projects from the lateral surface of the contact means **3** and that, during insertion, presents a shaping **17** shown in detail in Figure 2 that is such as to expand the retaining means **4**, said means being elastically compliant, as already explained.

[0044] Once the electric contact means **3** have been inserted inside the retaining means **4**, the same retaining means **4** can return to the rest position by carrying out the constraint described above between the undercuts **9** and the friction areas **8**.

[0045] As regards the projecting means **7**, according to the preferred embodiment of the invention described herein, they are constituted by at least one pin projecting in two directions that passes through the electric contact means **3** according to a direction **Y** orthogonal to the coupling direction **X** mentioned above.

[0046] Furthermore, the base **5** comprises at least one housing **21** that serves to house a respective end of the pin **7** projecting in two directions.

[0047] The connection between the pin **7** projecting in two directions and the housing **21** advantageously makes it possible to avoid an excessive rotation of the projecting body **2** that may cause the retaining means **4** to break due to the excessive stress to which the projecting elements **7** subject them.

[0048] In this regard, the coupling between the pin **7** and the housings **21** constitutes an end-of-stroke element suited to stop the rotation of the projecting body **2** with respect to the base **5**.

[0049] Obviously, the description given above is not intended to represent a limitation for different embodiments of the invention according to which, for example, the retaining means are constituted by a higher number of laminate elements.

[0050] An example of said different embodiment is represented in Figure 3 where the antenna that is the subject of the invention is indicated as a whole by **100** and where it can be observed that the laminate elements **115** are four.

[0051] Also in this case, the undercuts **109** are constituted by an annular sector protruding from the inner surface of the laminate elements **115.**

[0052] As regards, on the other hand, the projecting elements **107,** these are constituted by a prismatic body **130** positioned above the friction areas **108** and having at least one vertex **131** suited to be inserted between the retaining means **104**.

[0053] In particular, all the vertices **131** of the prismatic body **130** fit in the interspaces between the laminate elements **115** of the retaining means **104** in such a way as to force laterally the same laminate elements **115** when the projecting body **102** is set rotating with respect to the base **105**.

[0054] Furthermore, also in this case there is an end-of-stroke element suited to stop the rotation, constituted by a pin **123** that develops in the coupling direction **X** and that fits in a containing way **124** present on the projecting body **102** and illustrated in Figure 4.

[0055] It is evident that during the rotation of the rod **102** with respect to the base **105**, the pin **123** comes into contact with the lateral surface of the containing way **124** and thus stops the rotary movement.

[0056] According to a further different embodiment of the invention, represented in Figure 5 and indicated as a whole by **200,** the laminate elements **215** are constituted by plane surfaces opposing each other.

[0057] In this case, the undercuts **209**, as observed also in the detail of Figures 6 and 9, are constituted by at least one impression **235** recessed in the inner surface of the laminate elements **215.**

[0058] In order to enhance the constraining action exerted by said undercuts **209** on the friction areas **208,** a through hole **236** is provided in the laminate elements **215** and below the impressions **235**.

[0059] Furthermore, the laminate elements **215** are provided with at least one slot **237** that occupies at least one section of the laminate elements **215** in width, in such a way as to make them elastically compliant as already explained.

[0060] According to said construction variant, the projecting elements **207,** constituted by a prismatic body **230** like in the previous case, present at least one vertex **231**, constituting the friction areas 208 shown in Figure 5, and at least one edge **232** arranged in contact with the retaining means **204** and in particular with the section of the retaining means **204** made elastically compliant by the slot **237**.

[0061] In this case, advantageously, the coupling of the electric contact means **203** to the retaining means **204** takes place owing to the friction present between the vertices **231** of the prismatic body **230** and the lower surface of the impressions **235** at the height of the through holes **236**.

[0062] According to the explanation given above, the subject of the invention includes also a method for separating the projecting body **2** of the antenna **1** from the base **5**.

[0063] In particular, in operating conditions the projecting body **2** is snapped in and constrained to the base **5,** since the electric contact means **3,** as previously shown, present some friction areas **8** that rest against undercuts **9** provided in the retaining means themselves.

[0064] This condition is obtained by coupling the projecting body **2** to the base **5** along the coupling direction **X** so that the particular configuration of the friction areas **8** forces the retaining means **4** to expand elastically.

[0065] After the passage of the friction areas **8**, the retaining means **4** return to the rest position by constraining the undercuts **9** to the friction areas **8**.

[0066] Figure 7 shows the electric contact means **3** when inserted in the retaining means **4** of the base **5**.

[0067] The separation method described above comprises two steps:

- rotating the electric contact means **3** with respect to

the retaining means **4** on a rotation plane that is orthogonal to the coupling direction **X** in such a way as to release the friction areas **8** from the undercuts **9;**

- removing the projecting body **2** from the base **5** through a movement in the coupling direction X.

[0068] According to the invention, this method is characterized in that the release of the friction areas **8** form the undercuts **9** takes place due to the elastic deformation of at least one section of the retaining means **4**.

[0069] In particular, the rotation, which in Figure 8 is indicated as a counterclockwise rotation, makes the projecting elements **7** push on the sides of the laminate elements **15** of the retaining means **4** and forces their expansion owing, for example, to their intrinsic compliance or to a compliance due to structural modifications of the laminate elements themselves.

[0070] The housing **21**, furthermore, avoids an excessive rotation of the projecting body **2** that may damage the laminate elements **15** due to excessive stress.

[0071] According to the different embodiment of the invention shown in Figures 3 and 4, the release of the electric contact means **103** from the retaining means **104** takes place thanks to the stress generated on the laminate elements **115** by the vertices **131** of the prismatic body **130** constituting the projecting elements **107** of the electric contact means **103.**

[0072] In fact, as shown in Figure 9, the rotation of the projecting body **102** with respect to the base **105** generates, as a consequence, a force applied to the sides of the laminate elements **115** by the vertices **131.**

[0073] Said force causes the expansion of the laminate elements **115** with the consequent release of the friction areas **108** from the undercuts **109** shown in Figure 3.

[0074] Also in this case, the pin **123**, shown in Figure 3, cooperates with the containing way **124**, shown in Figure 4, to prevent an excessive rotation that may damage the laminate elements **115.**

[0075] The situation of the embodiment shown in Figure 9 is slightly different.

[0076] In this case, as shown in Figure 9, when the projecting body **202** is constrained to the base **205**, at least one pair of opposite vertices **231** is arranged in correspondence with the through holes **236** present in the laminate elements **215** below the impressions **235**.

[0077] To obtain the release of said vertices **231** from the impressions **235**, owing to the rotating movement of the projecting body **202** the edges **232** arranged in contact with the laminate elements **215** force the expansion of the sections of the laminate elements **215** made compliant by the slots **237.**

[0078] Said expansion allows the prismatic body **230** to be arranged obliquely with respect to the initial position, so that its vertices **231** come out of the through holes **236** present below the impressions **235,** thus releasing the constraint.

[0079] In this case, it is thus possible to remove the projecting body **202** from the base **205** of the antenna **200**.

[0080] According to this embodiment, the end-of-stroke element is constituted by the walls of the base **205** that prevent an excessive expansion of the sections of the laminate elements **215** provided with the slots **237.**

[0081] According to the above, both the vehicular antenna and the method for separating the projecting body of the vehicular antenna from the base achieve the set objects.

[0082] In particular, the invention achieves the object to implement a method that allows the projecting body of a vehicular antenna to be separated from the respective base very quickly, without becoming a nuisance for the users.

[0083] The invention also achieves the object to construct a vehicular antenna that allows the projecting body to be constrained to the base with no need for screw means.

[0084] The invention also achieves the object to ensure that said constraint is particularly stable and that the construction of the antenna remains rather simple.

[0085] The invention finally achieves the object to construct a vehicular antenna that ensures the perfect connection, without any superficial non-homogeneity, between the projecting body of the antenna and the base.

[0086] During the construction phase, the vehicular antenna that is the subject of the invention may undergo further changes that, though not illustrated and described herein, shall nonetheless be covered by the present patent, provided that they come within the scope of the claims that follow.

[0087] Where technical features mentioned in any claim are followed by reference signs, those reference sings have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. Vehicular antenna (1; 100; 00) comprising at least as a first part one projecting body (2; 102) suitable for receiving/sending radiofrequency signals and as a second part a base (5; 105; 205), electric contact means (3; 103; 203) situated in one of the two parts comprising a shaped male element (10), a shaped female,element (11) and retaining means (4; 104; 204) situated in the other part, said shaped male element (10) matching said shaped female element (11) and said retaining means (4; 104; 204) being configured to realize a constraint of the snap-in type with the electric contact means (3; 103; 203) wherein said projecting body can be snapped in and constrained to the base (5; 105; 205) in a coupling direction (X) through the contact of friction areas (8;

108; 208) belonging to electric contact means (3; 103; 203) with undercuts (9; 109; 209) that can be identified on retaining means (4; 104; 204), **characterized in that** the lateral surface of said electric contact means (3; 103; 203) presents projecting elements (7; 107; 207) to be positioned in contact with said retaining means (4; 104; 204), wherein said retaining means (4; 104; 204) are compliant to the contact with said projecting elements (7; 107; 207) to allow for separation of said electric contact means (3; 103; 203) from said retaining means (4; 104; 204) releasing said friction areas (8; 108; 208) from said undercuts (9; 109; 209) through elastic deformation of at least one section of said retaining means (4; 104; 204) caused by said projecting elements (7; 107; 207) when said projecting body (2; 102) is subjected to a torque that tends to set it rotating on a plane that is orthogonal to said coupling direction (X).

2. Antenna (1; 100; 200) according to claim 1), **characterized in that** said electric contact means (3; 103; 203) can be identified on said projecting body (2; 102) and said retaining means (4; 104; 204) can be identified on said base (5; 105; 205).

3. Vehicular antenna (1; 100; 200) according to claim 1) or 2), **characterized in that** said shaped male element (10) is arranged at the end of said projecting body (2; 102) and matches with the shaped female element (11) belonging to said base (5; 105; 205).

4. Vehicular antenna (1; 100) according to claim 3), **characterized in that** said shaped female element (11) is provided with a conical cavity (12) suited to receive at least one section of said shaped male element (10) in order to generate said electric contact.

5. Vehicular antenna (1; 100; 200) according to any of the claims from 1) to 4), **characterized in that** said retaining means (4; 104; 204) comprise one or more mainly laminate elements (15; 115; 215) opposing one another and projecting from said base (5; 105; 205) in said coupling direction (X), in which said undercuts (9; 109; 209) are defined.

6. Antenna according to claim 1), **characterized in that** said electric contact means can be identified on said base and said retaining means can be identified on said projecting body.

7. Vehicular antenna according to claim 1) or 6), **characterized in that** said shaped female element is arranged at the end of said projecting body and matches with a shaped male element belonging to said base.

8. Vehicular antenna according to claim 7), **characterized in that** said shaped female element is provided with a conical cavity suited to receive at least one section of said shaped male element in order to generate said electric contact.

9. Vehicular antenna according to any of the claims from 6) to 8), **characterized in that** said retaining means comprise one or more mainly laminate elements opposing one another and projecting from said projecting body in said coupling direction, in which said undercuts are defined.

10. Vehicular antenna (1; 100) according to claim 5) or 9), **characterized in that** said laminate elements (15; 115) are defined by curved surfaces with opposing concavities.

11. Vehicular antenna (200) according to claim 5) or 9), **characterized in that** said laminate elements (215) are defined by opposing plane surfaces.

12. Vehicular antenna (1; 100) according to claim 10), **characterized in that** said undercuts (9; 109) are constituted by an annular sector (16) projecting from the inner surface of said laminate elements (15; 115).

13. Vehicular antenna (200) according to claim 11); **characterized in that** said undercuts (209) are constituted by at least one impression (235) recessed in the inner surface of said laminate elements (215).

14. Vehicular antenna (200) according to claims 13), **characterized in that** said laminate elements (215) are provided with a through hole (236) below said impression (235).

15. Vehicular antenna (200) according to claim 13) or 14), **characterized in that** said laminate elements (215) are provided each with at least one slot (237) that occupies at least one section of said laminate elements (215) in width.

16. Vehicular antenna (1; 100; 200) according to any of the preceding claims, **characterized in that** said projecting body (2; 102) is a rod.

17. Vehicular antenna (1) according to any of the claims from 1) to 16), **characterized in that** said projecting elements (7) are constituted by at least one pin projecting in two directions that passes through said electric contact means (3) in a direction (Y) that is orthogonal to said coupling direction (X).

18. Vehicular antenna (1) according to claim 17), **characterized in that** it comprises at least one housing (21) suited to receive a corresponding end of said pin (7) projecting in two directions.

19. Vehicular antenna (100) according to any of the

claims from 1) to 16), **characterized in that** said projecting elements (107) are constituted by a prismatic body (130) positioned above said friction areas (108) and having at least one vertex (131) suited to be inserted in said retaining means (104).

20. Vehicular antenna (200) according to any of the claims from 1) to 16), **characterized in that** said projecting elements (207) are constituted by a prismatic body (230) having at least one vertex (231) constituting said friction areas (208) and having at least one edge (232) arranged in contact with said retaining means (204).

21. Vehicular antenna (1; 100; 200) according to any of the preceding claims, **characterized in that** it comprises an end-of-stroke element suited to stop the rotation of said projecting body (2; 102) with respect to said base (5; 105; 205).

22. Vehicular antenna (100) according to claim 21), **characterized in that** said end-of-stroke element suited to stop the rotation comprises at least one pin (123) belonging to said base (105) and developing in said coupling direction (X), said pin (123) being suited to fit in a containing way (124) present on said projecting body (102).

23. Method for separating the projecting body (2; 102) from the base (5; 105; 205) of the antenna (1; 100; 200) according to anyone of the claims 1)-22), said method including the following steps:

- rotating said electric contact means (3; 103; 203) with respect to said retaining means (4; 104; 204) on a rotation plane that is orthogonal to said coupling direction (X) in such a way as to release said friction areas (8; 108; 208) from said undercuts (9; 109; 209);
- removing said projecting body (2; 102) from said base (5; 105; 205) through a movement in said coupling direction (X),

wherein said release of said friction areas (8; 108; 208) from said undercuts (9; 109; 209) takes place through elastic deformation of at least one section of said retaining means (4; 104; 204) and wherein said elastic deformation is obtained when said projecting body (2; 102) is subjected to a torque that tends to set it rotating on a plane that is orthogonal to said coupling direction (X) by forcing the projecting elements (7; 107; 207) belonging to the lateral surface of said electric contact means (3; 103; 203) against said section of said retaining means (4; 104; 204).

24. Method according to claim 23), **characterized in that** said electric contact means (3; 103; 203) can be identified on said projecting body (2; 102) and said retaining means (4; 104; 204) can be identified on said base (5; 105; 205).

25. Method according to claim 23), **characterized in that** said electric contact means can be identified on said base and said retaining means can be identified on said projecting body.

26. Method according to any of the preceding claims, **characterized in that** said elastic deformation takes place due to the intrinsic compliance of said section of said retaining means (4; 104; 204).

Patentansprüche

1. Fahrzeugantenne (1; 100; 200), die zumindest als ersten Teil einen vorstehenden Körper (2; 102), der dazu geeignet ist, Hochfrequenzsignale zu empfangen/senden, und als zweiten Teil einen Fuß (5; 105; 205) umfasst, wobei elektrische Kontaktmittel (3; 103; 203), die ein Steckerformelement (10) umfassen, in einem der zwei Teile angeordnet sind und ein Buchsenformelement (11) und Haltemittel (4; 104; 204) im anderen Teil angeordnet sind, wobei das Steckerformelement (10) zum Buchsenformelement (11) passt und die Haltemittel (4; 104; 204) dazu konfiguriert sind, mit den elektrischen Kontaktmitteln (3; 103; 203) eine Sperre vom Einschnapptyp bereitzustellen, wobei der vorstehende Körper durch den Kontakt zwischen Reibungsbereichen (8; 108; 208), die zu den elektrischen Kontaktmitteln (3; 103; 203) gehören, und Hinterschneidungen (9; 109; 209), die an den Haltemittel (4; 104; 204) definiert sind, in eine Kopplungsrichtung (X) in den Fuß (5; 105; 205) einschnappen und an diesem gesperrt werden kann, **dadurch gekennzeichnet, dass** die Seitenfläche der elektrischen Kontaktmittel (3; 103; 203) vorstehende Elemente (7; 107; 207) aufweist, die in Kontakt zu den Haltemitteln (4; 104; 204) anzuordnen sind, wobei die Haltemittel (4; 104; 204) hinsichtlich des Kontakts zu den vorstehenden Elementen (7; 107; 207) nachgiebig sind, um die Trennung der elektrischen Kontaktmittel (3; 103; 203) von den Haltemitteln (4; 104; 204) zuzulassen, wobei die Reibungsbereiche (8; 108; 208) durch die elastische Verformung von zumindest einem Abschnitt der Haltemittel (4; 104; 204), verursacht durch die vorstehenden Elemente (7; 107; 207), von den Hinterschneidungen (9; 109; 209) gelöst werden, wenn der vorstehende Körper (2; 102) einem Drehmoment unterworfen wird, das diesen zu einer Drehung auf einer Ebene veranlasst, die orthogonal zur Kopplungsrichtung (X) steht.

2. Antenne (1; 100, 200) nach Anspruch 1), **dadurch gekennzeichnet, dass** die elektrischen Kontaktmit-

tel (3; 103; 203) am vorstehenden Körper (2; 102) definiert sein können und die Haltemittel (4; 104; 204) am Fuß (5; 105; 205) definiert sein können.

3. Fahrzeugantenne (1; 100; 200) nach Anspruch 1) oder 2), **dadurch gekennzeichnet, dass** das Stekkerformelement (10) am Ende des vorstehenden Körpers (2; 102) angeordnet ist und zum Buchsenformelement (11) passt, das zum Fuß (5; 105; 205) gehört.

4. Fahrzeugantenne (1; 100) nach Anspruch 3), **dadurch gekennzeichnet, dass** das Buchsenformelement (11) einen konischen Hohlraum (12) aufweist, der dazu geeignet ist, zumindest einen Abschnitt des Stekkerformelements (10) aufzunehmen, um den elektrischen Kontakt herzustellen.

5. Fahrzeugantenne (1; 100; 200) nach einem der Ansprüche 1) bis 4), **dadurch gekennzeichnet, dass** die Haltemittel (4; 104; 204) ein oder mehrere im Wesentlichen laminare Elemente (15; 115; 215) aufweisen, die einander gegenüberliegen und vom Fuß (5; 105; 205) in die Kopplungsrichtung (X) vorstehen und in denen die Hinterschneidungen (9; 109; 209) definiert sind.

6. Antenne nach Anspruch 1), **dadurch gekennzeichnet, dass** die elektrischen Kontaktmittel am Fuß definiert sein können und die Haltemittel am vorstehenden Körper definiert sein können.

7. Fahrzeugantenne nach Anspruch 1) oder 6), **dadurch gekennzeichnet, dass** das Buchsenformelement am Ende des vorstehenden Körpers angeordnet ist und zu einem Steckerformelement passt, das zum Fuß gehört.

8. Fahrzeugantenne nach Anspruch 7), **dadurch gekennzeichnet, dass** das Buchsenformelement einen konischen Hohlraum aufweist, der dazu geeignet ist, zumindest einen Abschnitt des Steckerformelements aufzunehmen, um den elektrischen Kontakt herzustellen.

9. Fahrzeugantenne nach einem der Ansprüche 6) bis 8), **dadurch gekennzeichnet, dass** die Haltemittel ein oder mehrere im Wesentlichen laminare Elemente aufweisen, die einander gegenüberliegen und vom vorstehenden Körper in die Kopplungsrichtung vorstehen und in denen die Hinterschneidungen definiert sind.

10. Fahrzeugantenne (1; 100) nach Anspruch 5) oder 9), **dadurch gekennzeichnet, dass** die laminaren Elemente (15; 115) von gebogenen Flächen mit gegenüberliegenden Rundhöhlungen definiert sind.

11. Fahrzeugantenne (200) nach Anspruch 5) oder 9), **dadurch gekennzeichnet, dass** die laminaren Elemente (215) von gegenüberliegenden, flachen Flächen definiert sind.

12. Fahrzeugantenne (1; 100) nach Anspruch 10), **dadurch gekennzeichnet, dass** die Hinterschneidungen (9; 109) von einem ringförmigen Abschnitt (16) gebildet sind, der von der Innenoberfläche der laminaren Elemente (15; 115) vorsteht.

13. Fahrzeugantenne (200) nach Anspruch 11), **dadurch gekennzeichnet, dass** die Hinterschneidungen (209) von zumindest einer Vertiefung (235) gebildet sind, die in der Innenoberfläche der laminaren Elemente (215) ausgebildet ist.

14. Fahrzeugantenne (200) nach Anspruch 13), **dadurch gekennzeichnet, dass** die laminaren Elemente (215) unter der Vertiefung (235) mit einem Durchgangsloch (236) versehen sind.

15. Fahrzeugantenne (200) nach Anspruch 13) oder 14), **dadurch gekennzeichnet, dass** die laminaren Elemente (215) jeweils mit zumindest einem Schlitz (237) versehen sind, der zumindest einen Abschnitt der laminaren Elemente (215) der Breite nach in Anspruch nimmt.

16. Fahrzeugantenne (1; 100; 200) nach einem der vorangegangenen Ansprüche, **dadurch gekennzeichnet, dass** der vorstehende Körper (2; 102) ein Stab ist.

17. Fahrzeugantenne (1) nach einem der Ansprüche 1) bis 16), **dadurch gekennzeichnet, dass** die vorstehenden Elemente (7) durch zumindest einen Stift gebildet sind, der in zwei Richtungen vorsteht und einer Richtung (Y) folgend, die orthogonal zur Kopplungsrichtung (X) steht, durch die elektrischen Kontaktmittel (3) tritt.

18. Fahrzeugantenne (1) nach Anspruch 17), **dadurch gekennzeichnet, dass** sie zumindest ein Gehäuse (21) aufweist, das dazu geeignet ist, ein entsprechendes Ende des in zwei Richtungen vorstehenden Stifts (7) aufzunehmen.

19. Fahrzeugantenne (100) nach einem der Ansprüche 1) bis 16), **dadurch gekennzeichnet, dass** die vorstehenden Elemente (107) durch einen prismatischen Körper (130) gebildet sind, der oberhalb der Reibungsbereiche (108) angeordnet ist und zumindest einen Scheitel (131) aufweist, der dazu geeignet ist, in die Haltemittel (104) eingeführt zu werden.

20. Fahrzeugantenne (200) nach einem der Ansprüche 1) bis 16), **dadurch gekennzeichnet, dass** die vor-

stehenden Elemente (207) durch einen prismatischen Körper (230) gebildet sind, der zumindest einen Scheitel (231) aufweist, der die Reibungsbereiche (208) bildet, und zumindest eine Kante (232) aufweist, die in Kontakt zu den Haltemitteln (204) angeordnet ist.

21. Fahrzeugantenne (1; 100; 200) nach einem der vorangegangenen Ansprüche, **dadurch gekennzeichnet, dass** sie ein Endanschlagelement umfasst, das dazu geeignet ist, die Drehung des vorstehenden Körpers (2; 102) in Bezug auf den Fuß (5; 105; 205) zu stoppen.

22. Fahrzeugantenne (100) nach Anspruch 21), **dadurch gekennzeichnet, dass** das Endanschlagelement, das dazu geeignet ist, die Drehung zu stoppen, zumindest einen Stift (123) umfasst, der zum Fuß (105) gehört und sich in die Kopplungsrichtung (X) ausdehnt, wobei der Stift (123) dazu geeignet ist, in einen Eingrenzungsweg (124) zu passen, der am vorstehenden Körper (102) ausgebildet ist.

23. Verfahren zum Trennen des vorstehenden Körpers (2; 102) vom Fuß (5; 105; 205) der Antenne (1; 100; 200) nach einem der Ansprüche 1) bis 22), wobei das Verfahren die folgenden Schritte umfasst:

- das Drehen der elektrischen Kontaktmittel (3; 103; 203) in Bezug auf die Haltemittel (4; 104; 204) auf einer Drehebene, die orthogonal zur Kopplungsrichtung (X) steht, sodass die Reibungsbereiche (8; 108; 208) von den Hinterschneidungen (9; 109; 209) gelöst werden;
- das Entfernen des vorstehenden Körpers (2; 102) vom Fuß (5; 105; 205) durch eine Bewegung in die Kopplungsrichtung (X),

wobei das Lösen der Reibungsbereiche (8; 108; 208) von den Hinterschneidungen (9; 109; 209) durch die elastische Verformung von zumindest einem Abschnitt der Haltemittel (4; 104; 204) erfolgt, und wobei die elastische Verformung erhalten wird, indem die vorstehenden Elemente (7; 107; 207), die zur Seitenfläche der elektrischen Kontaktmittel (3; 103; 203) gehören, gegen den Abschnitt der Haltemittel (4; 104; 204) gedrückt werden, wenn der vorstehende Körper (2; 102) einem Drehmoment unterworfen wird, das diesen zu einer Drehung auf einer Ebene veranlasst, die orthogonal zur Kopplungsrichtung (X) steht.

24. Verfahren nach Anspruch 23), **dadurch gekennzeichnet, dass** die elektrischen Kontaktmittel (3; 103; 203) am vorstehenden Körper (2; 102) definiert sein können und die Haltemittel (4; 104; 204) am Fuß (5; 105; 205) definiert sein können.

25. Verfahren nach Anspruch 23), **dadurch gekennzeichnet, dass** die elektrischen Kontaktmittel am Fuß definiert sein können und die Haltemittel am vorstehenden Körper definiert sein können.

26. Verfahren nach einem der vorangegangenen Ansprüche, **dadurch gekennzeichnet, dass** die elastische Verformung aufgrund der intrinsischen Nachgiebigkeit des Abschnitts der Haltemittel (4; 104; 204) stattfindet.

Revendications

1. Antenne véhiculaire (1; 100; 200) comprenant au moins comme première partie un corps saillant (2; 102) apte à recevoir/envoyer des signaux radiofréquence et comme deuxième partie une base (5; 105; 205), des moyens de contact électrique (3; 103; 203) positionnés dans une des deux parties comprenant un élément mâle galbé (10), un élément femelle galbé (11) et des moyens de retenue (4; 104; 204) positionnés dans l'autre partie, ledit élément mâle galbé (10) s'accouplant audit élément galbé femelle (11) et lesdits moyens de retenue (4; 104; 204) étant configurés de façon à réaliser une contrainte du type emboîtable avec les moyens de contact électrique (3; 103; 203) où ledit corps saillant peut être emboîté et contraint à la base (5; 105; 205) dans une direction d'accouplement (X) à travers le contact de zones de frottement (8; 108; 208) appartenant aux moyens de contact électrique (3; 103; 203) avec des contre-dépouilles (9; 109; 209) qui peuvent être identifiées dans des moyens de retenue (4; 104; 204), **caractérisée en ce que** la surface latérale desdits moyens de contact électrique (3; 103; 203) présente des éléments saillants (7; 107; 207) devant être positionnés en contact avec lesdits moyens de retenue (4; 104; 204), où lesdits moyens de retenue (4; 104; 204) ne résistent pas au contact avec lesdits éléments saillants (7; 107; 207) afin de permettre la séparation desdits moyens de contact électrique (3; 103; 203) desdits moyens de retenue (4; 104; 204) dégageant lesdites zones de frottement (8; 108; 208) desdites contre-dépouilles (9; 109; 209) par déformation élestique d'au moins une section desdits moyens de retenue (4; 104; 204) causée par lesdits éléments saillants (7; 107; 207) quand ledit corps saillant (2; 102) est sujet à un couple qui tend à le mettre en rotation sur un plan qui est orthogonal par rapport à ladite direction d'accouplement (X).

2. Antenne (1; 100; 200) selon la revendication 1), **caractérisée en ce que** lesdits moyens de contact électrique (3; 103; 203) peuvent être identifiés sur ledit corps saillant (2; 102) et lesdits moyens de retenue (4; 104; 204) peuvent être identifiés sur ladite base (5; 105; 205).

3. Antenne véhiculaire (1; 100; 200) selon la revendication 1) ou 2), **caractérisée en ce que** ledit élément mâle galbé (10) se trouve sur l'extrémité dudit corps saillant (2; 102) et s'accouple avec l'élément femelle galbé (11) appartenant à ladite base (5; 105; 205).

4. Antenne véhiculaire (1; 100) selon la revendication 3), **caractérisée en ce que** ledit élément femelle galbé (11) est doté d'une cavité conique (12) apte à recevoir au moins une section dudit élément mâle galbé (10) afin de générer ledit contact électrique.

5. Antenne véhiculaire (1; 100; 200) selon l'une quelconque des revendications de 1) à 4), **caractérisée en ce que** lesdits moyens de retenue (4; 104; 204) comprennent un ou plusieurs éléments principalement laminaires (15; 115; 215) opposés entre eux et saillant de ladite base (5; 105; 205) dans ladite direction d'accouplement (X), où lesdites contre-dépouilles (9; 109; 209) sont définies.

6. Antenne selon la revendication 1), **caractérisée en ce que** lesdits moyens de contact électrique peuvent être identifiés sur ladite base et lesdits moyens de retenue peuvent être identifiés sur ledit corps saillant.

7. Antenne véhiculaire selon la revendication 1) ou 6), **caractérisée en ce que** ledit élément femelle galbé est positionné sur l'extrémité dudit corps saillant et s'accouple avec un élément mâle galbé appartenant à ladite base.

8. Antenne véhiculaire selon la revendication 7), **caractérisée en ce que** ledit élément femelle galbé est doté d'une cavité conique apte à recevoir au moins une section dudit élément mâle galbé afin de générer ledit contact électrique.

9. Antenne véhiculaire selon l'une quelconque des revendications de 6) à 8), **caractérisée en ce que** lesdits moyens de retenue comprennent un ou plusieurs éléments principalement laminaires opposés entre eux et saillant dudit corps saillant dans ladite direction d'accouplement, où lesdites contre-dépouilles sont définies.

10. Antenne véhiculaire (1; 100) selon la revendication 5) ou 9), **caractérisée en ce que** lesdits éléments laminaires (15; 115) sont définis par des surfaces courbes avec concavités opposées.

11. Antenne véhiculaire (200) selon la revendication 5) ou 9), **caractérisée en ce que** lesdits éléments laminaires (215) sont définis par des surfaces planes opposées.

12. Antenne véhiculaire (1; 100) selon la revendication 10), **caractérisée en ce que** lesdites contre-dépouilles (9; 109) sont constituées par un secteur annulaire (16) saillant de la surface intérieure desdits éléments laminaires (15; 115).

13. Antenne véhiculaire (200) selon la revendication 11), **caractérisée en ce que** lesdites contre-dépouilles (209) sont constituées par au moins une empreinte (235) rentrant dans la surface intérieure desdits éléments laminaires (215).

14. Antenne véhiculaire (200) selon la revendication 13), **caractérisée en ce que** lesdits éléments laminaires (215) sont dotés d'un trou passant (236) se trouvant au-dessous de ladite empreinte (235).

15. Antenne véhiculaire (200) selon la revendication 13) ou 14), **caractérisée en ce que** chacun desdits éléments laminaires (215) est doté d'au moins une fente (237) qui occupe au moins une section de la longueur desdits éléments laminaires (215).

16. Antenne véhiculaire (1; 100; 200) selon l'une quelconque des revendications précédentes, **caractérisée en ce que** ledit corps saillant (2; 102) est une tige.

17. Antenne véhiculaire (1) selon l'une quelconque des revendications de 1) à 16), **caractérisée en ce que** lesdits éléments saillants (7) sont constitués par au moins une cheville saillant en deux directions qui passe à travers lesdits moyens de contact électrique (3) dans une direction (Y) qui est orthogonale à ladite direction d'accouplement (X).

18. Antenne véhiculaire (1) selon la revendication 17), **caractérisée en ce qu'**elle comprend au moins un logement (21) apte à recevoir une extrémité correspondante de ladite cheville (7) saillant en deux directions.

19. Antenne véhiculaire (100) selon l'une quelconque des revendications de 1) à 16), **caractérisée en ce que** lesdits éléments saillants (107) sont consitités par un corps prismatique (130) positionné au-dessus desdites zones de frottement (108) et présentant au moins un sommet (131) apte à être inséré dans lesdits moyens de retenue (104).

20. Antenne véhiculaire (200) selon l'une quelconque des revendications de 1) à 16), **caractérisée en ce que** lesdits éléments saillants (207) sont constitués par un corps prismatique (230) présentant au moins un sommet (231) constituant lesdites zones de frottement (208) et présentant au moins une arête (232) se trouvant en contact avec lesdits moyens de retenue (204).

21. Antenne véhiculaire (1; 100; 200) selon l'une quelconque des revendications précédentes, **caractérisée en ce qu'**elle comprend un élément de fin de course apte à arrêter la rotation dudit corps saillant (2; 102) par rapport à ladite base (5; 105; 205).

22. Antenne véhiculaire (100) selon la revendication 21), **caractérisée en ce que** ledit élément de fin de course apte à arrêter la rotation comprend au moins un pivot (123) appartenant à ladite base (105) et se developpant dans ladite direction d'accouplement (X), ledit pivot (123) étant apte à s'insérer dans une voie de contenance (124) se trouvant sur ledit corps saillant (102).

23. Méthode pour la séparation du corps saillant (2; 102) de la base (5; 105; 205) de l'antenne (1; 100; 200), selon l'une quelconque des revendications de 1) à 22), ladite méthode comprenant les phases suivantes:

- rotation desdits éléments de contact électrique (3; 103; 203) par rapport auxdits moyens de retenue (4; 104; 204) sur un plan de rotation qui est orthogonal à ladite direction d'accouplement (X) de façon à dégager lesdites zones de frottement (8; 108; 208) desdites contre-dépouilles (9; 109; 209);
- éloignement dudit corps saillant (2; 102) de ladite base (5; 105; 205) grâce à un mouvement dans ladite direction d'accouplement (X),

où ledit dégagement desdites zones de frottement (8; 108; 208) desdites contre-dépouilles (9; 109; 209) se vérifie par déformation élastique d'au moins une section desdits moyens de retenue (4; 104; 204) et où ladite déformation élastique est obtenue quand ledit corps saillant (2; 102) est sujet à un couple qui tend à le mettre en rotation sur un plan qui est orthogonal à ladite direction d'accouplement (X) en forçant les éléments saillants (7; 107; 207) appartenant à la surface latérale desdits moyens de contact électrique (3; 103; 203) contre ladite section desdits moyens de retenue (4; 104; 204).

24. Méthode selon la revendication 23), **caractérisée en ce que** lesdits moyens de contact électrique (3; 103; 203) peuvent être identifiés sur ledit corps saillant (2; 102) et lesdits moyens de retenue (4; 104; 204) peuvent être identifiés sur ladite base (5; 105; 205).

25. Méthode selon la revendication 23), **caractérisée en ce que** lesdits moyens de contact électrique peuvent être identifiés sur ladite base et lesdits moyens de retenue peuvent être identifiés sur ledit corps saillant.

26. Méthode selon l'une quelconque des revendications précédentes, **caractérisée en ce que** ladite déformation élastique se vérifie grâce à la ductilité intrinsèque de ladite section desdits moyens de retenue (4; 104; 204).

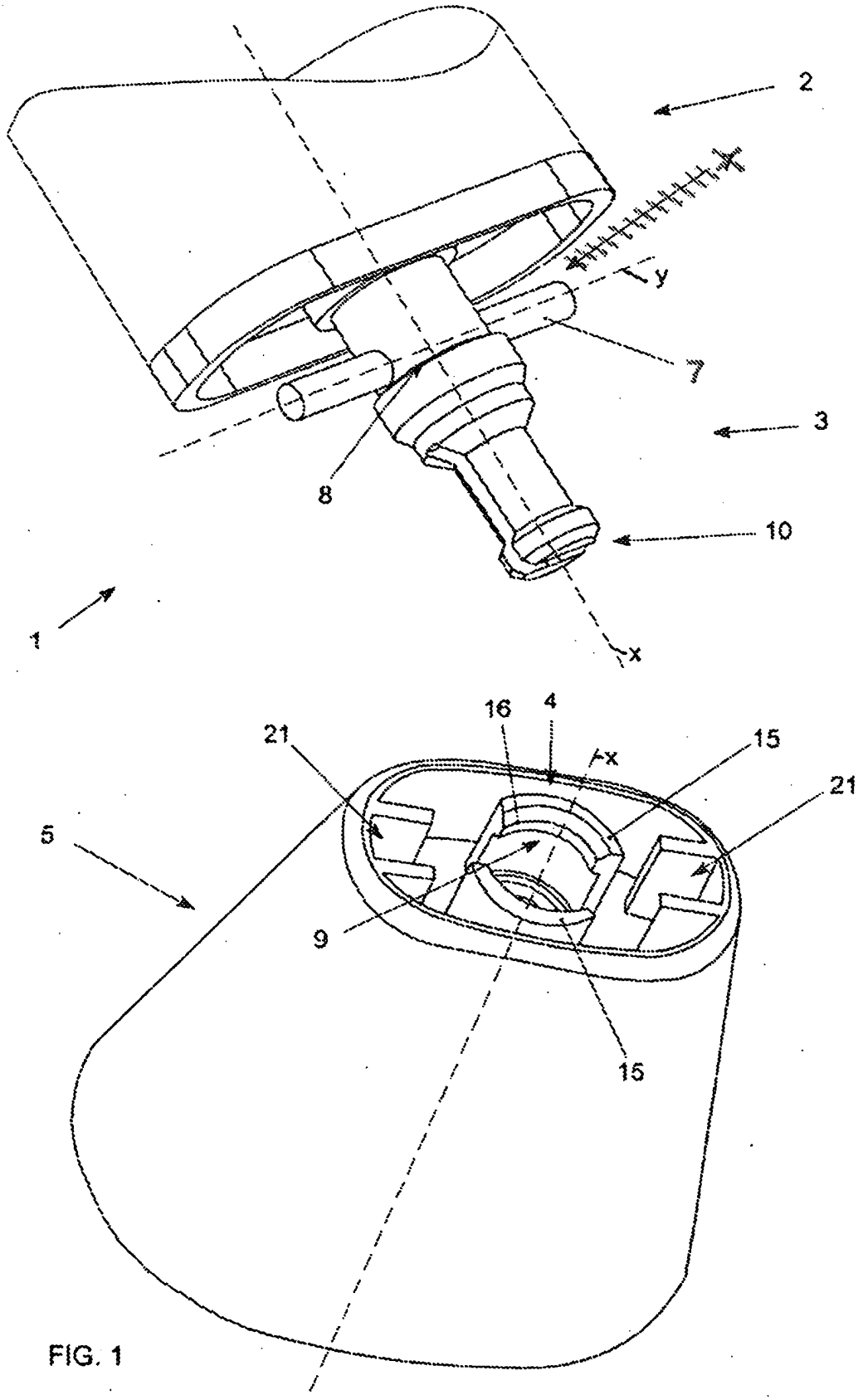

FIG. 1

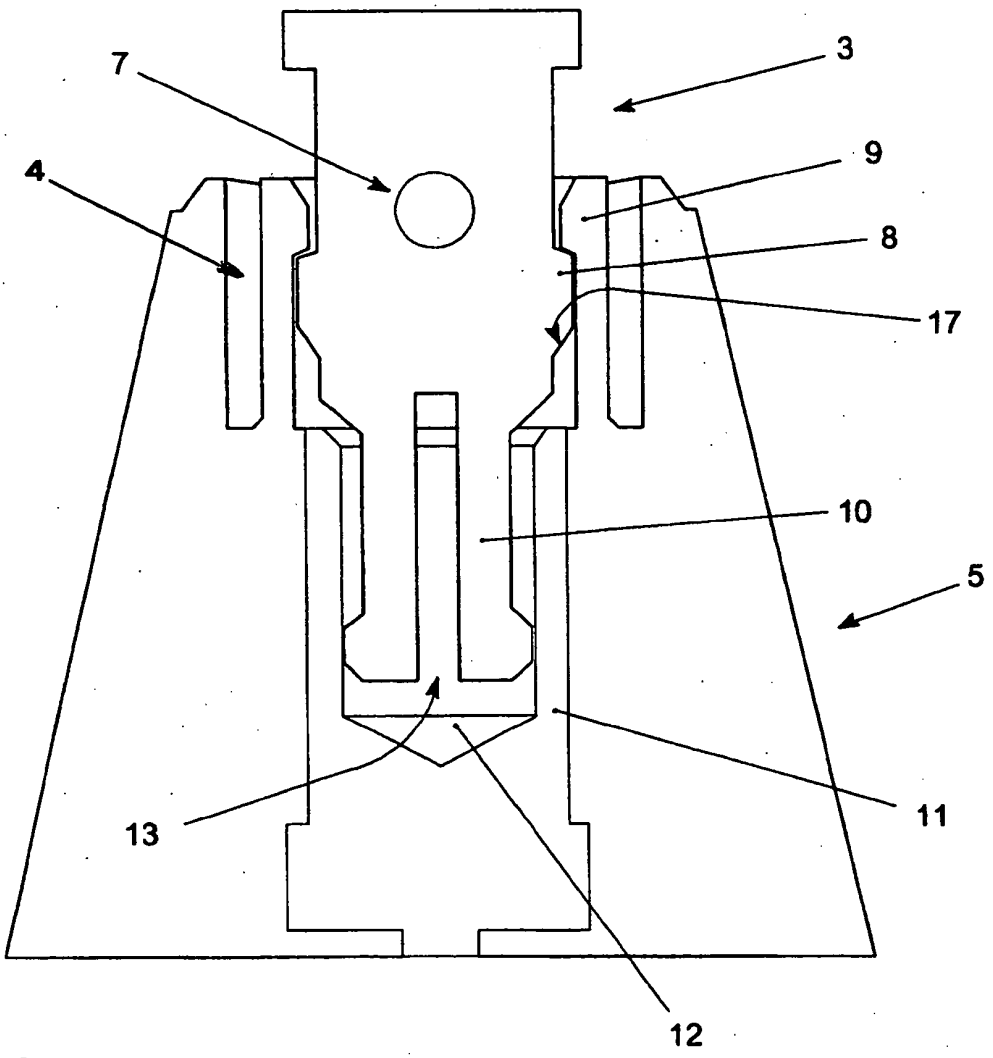

FIG. 2

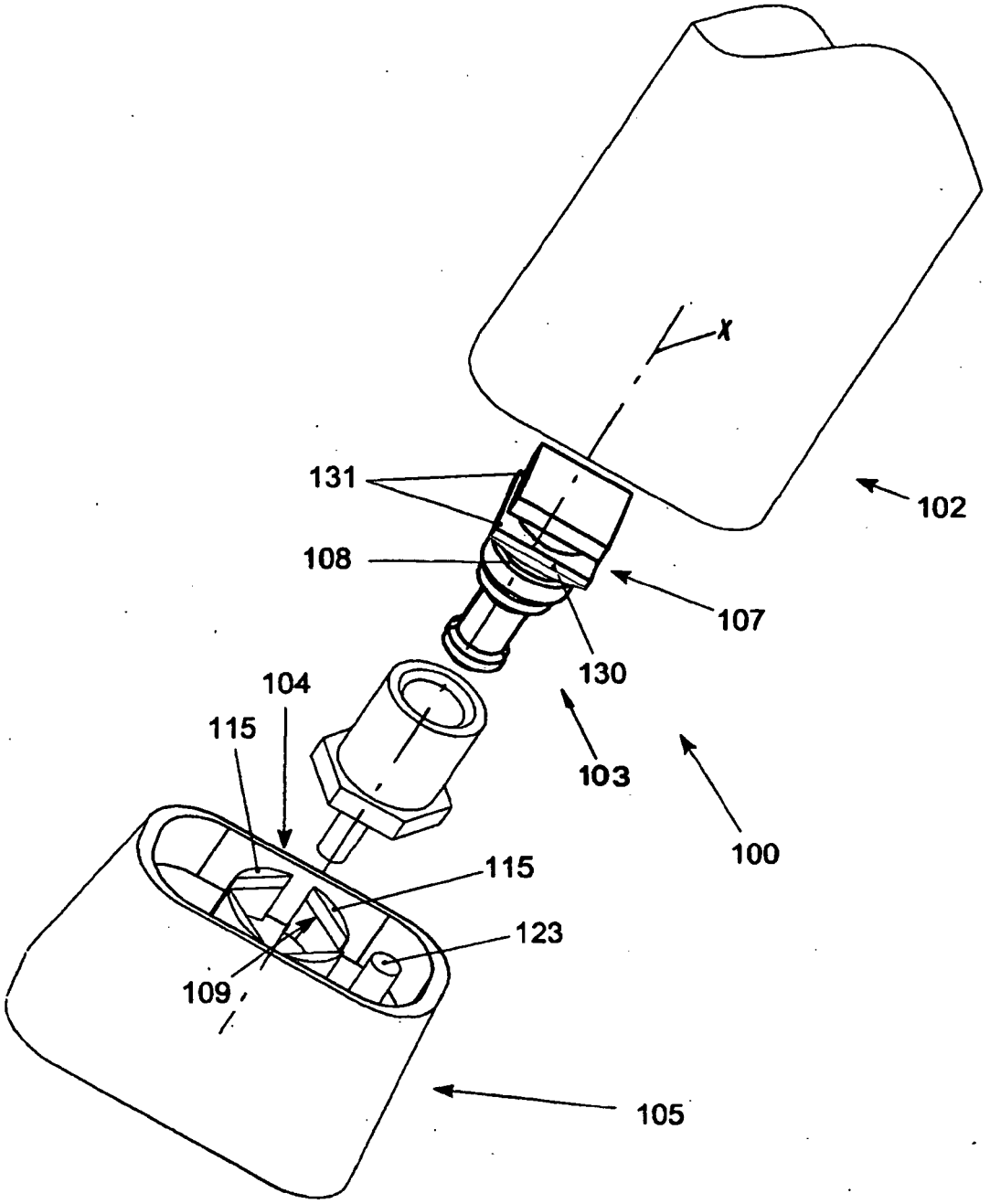

FIG. 3

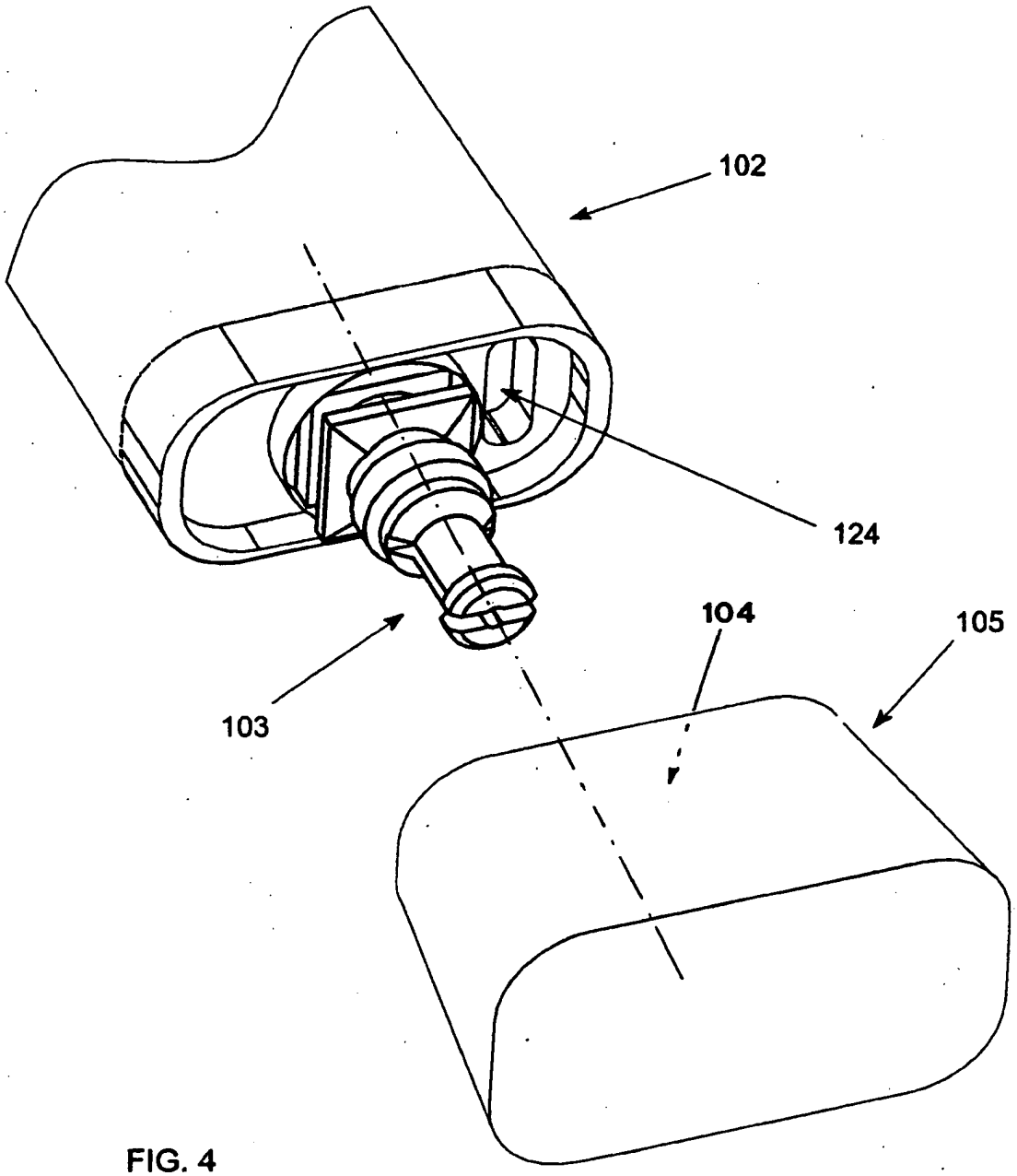

FIG. 4

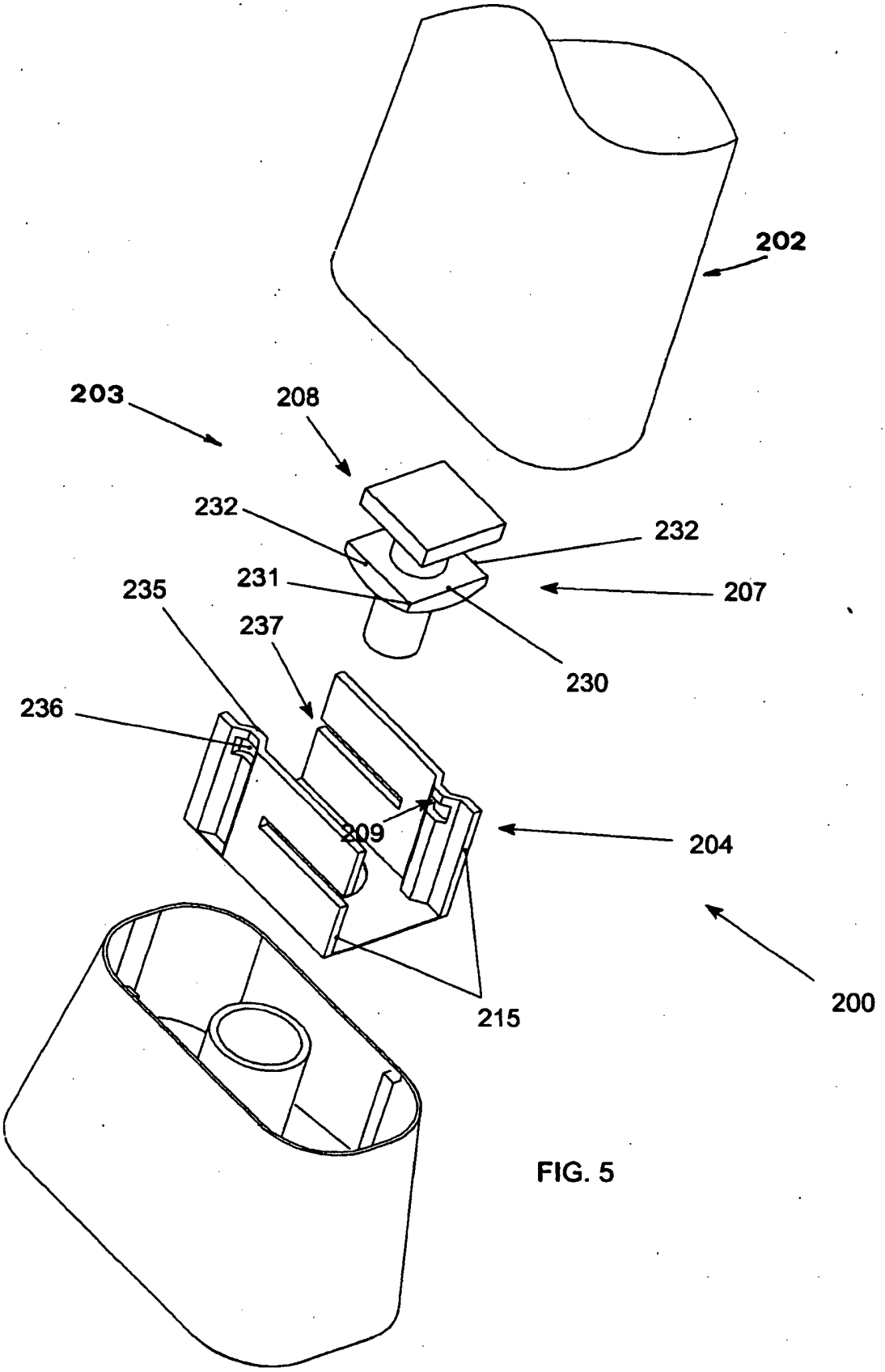

FIG. 5

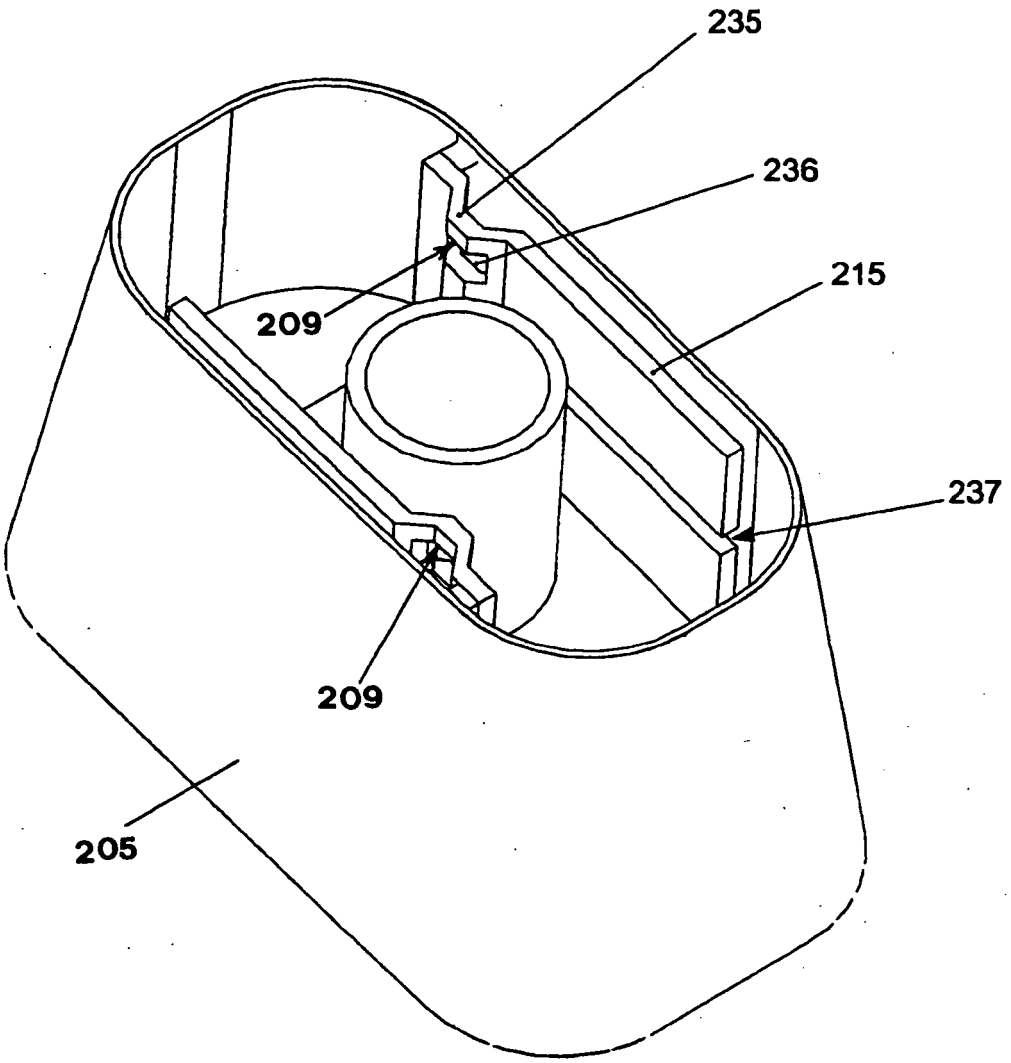

FIG. 6

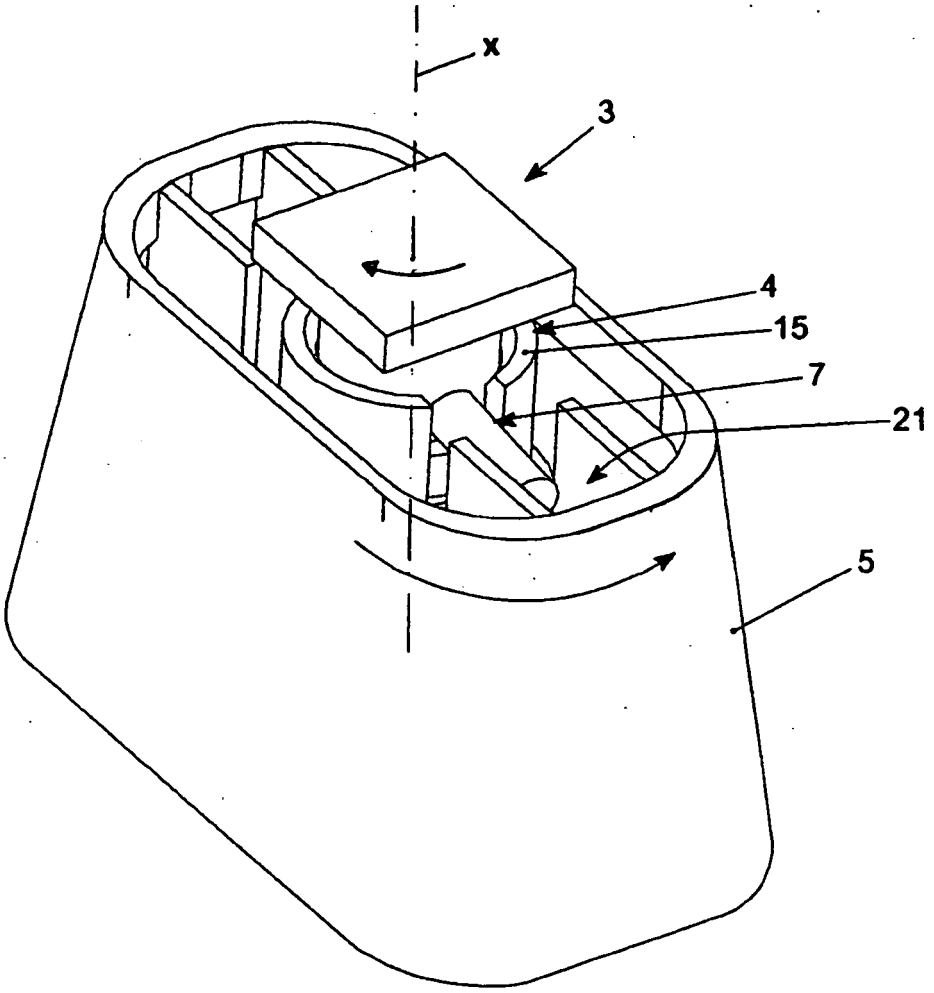

FIG. 7

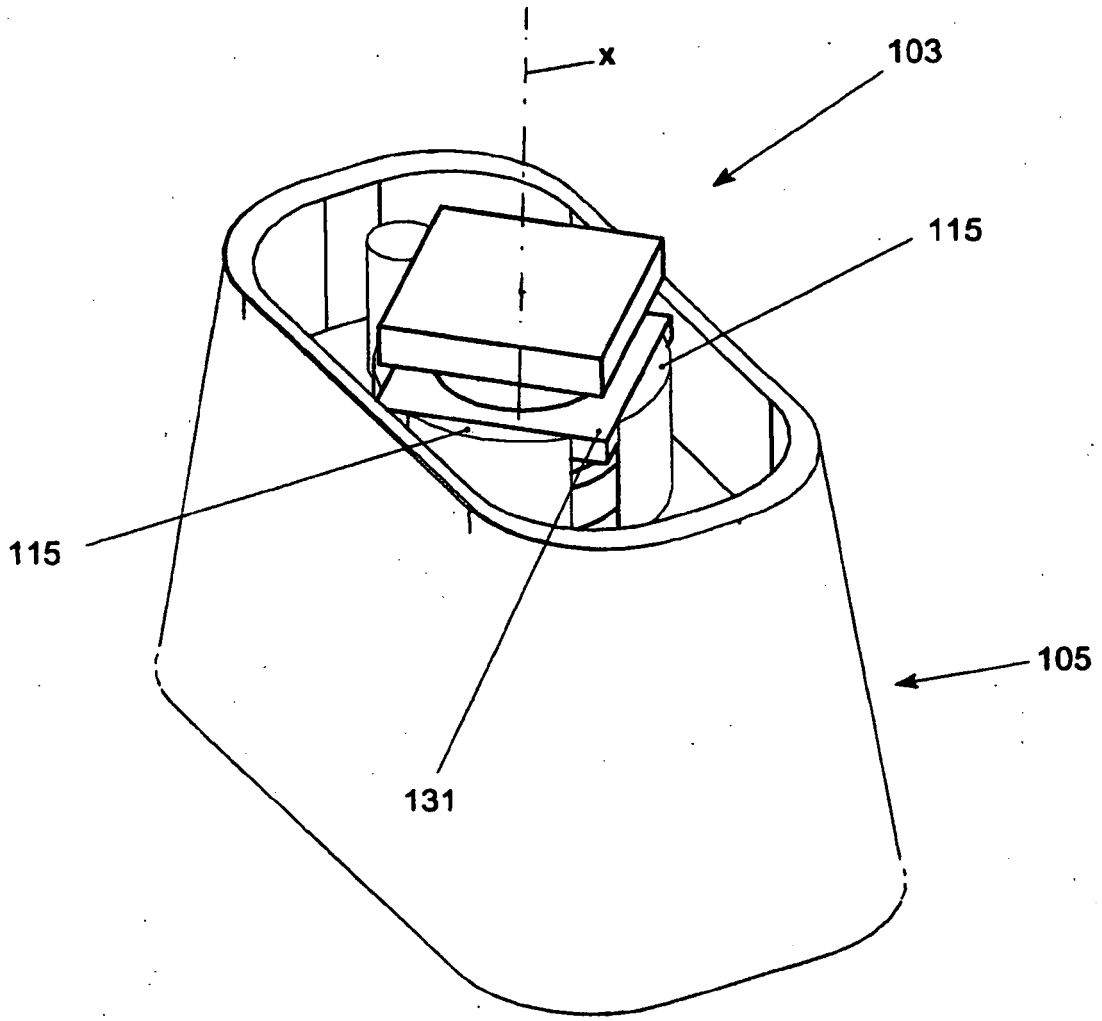

FIG. 8

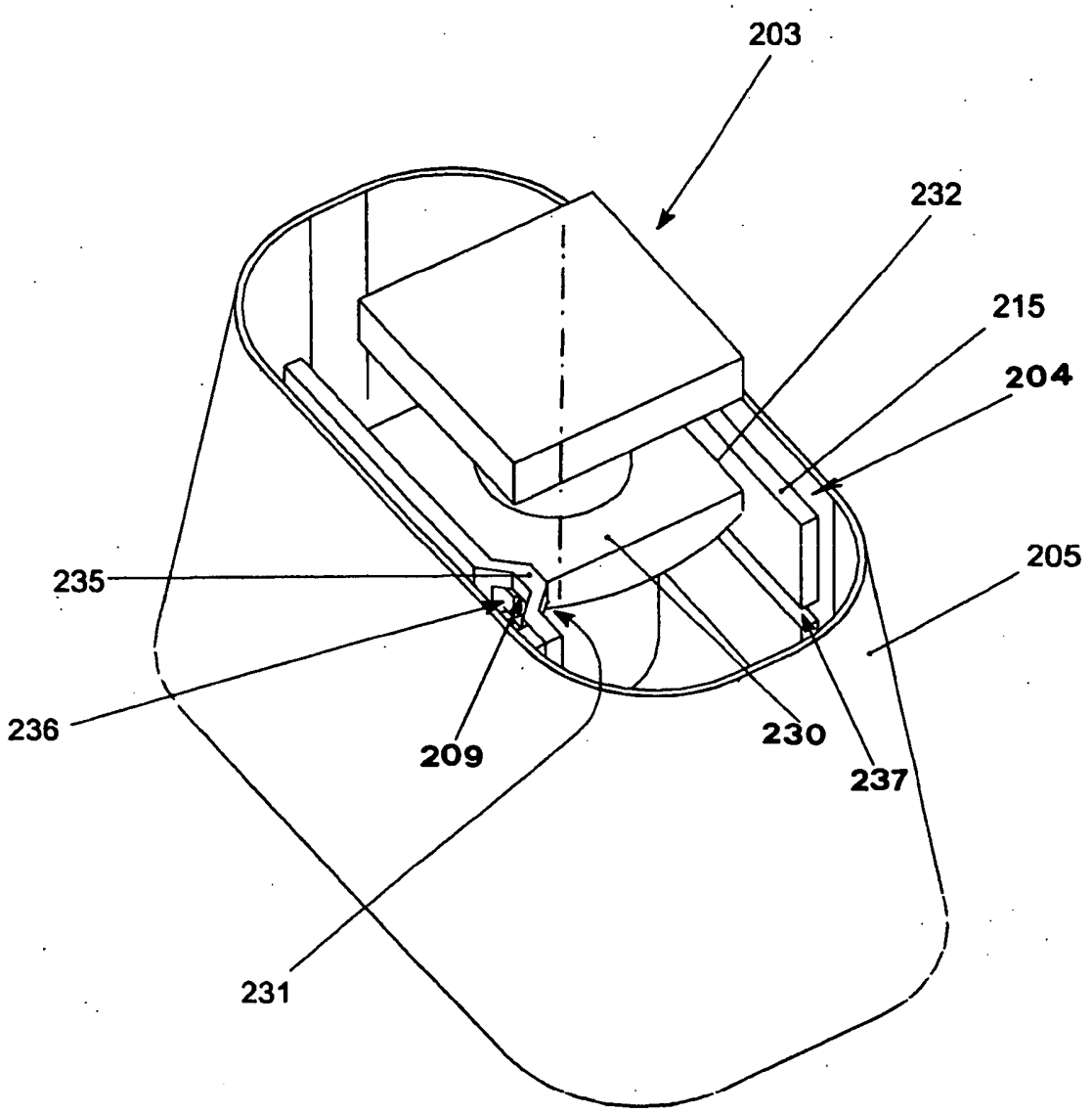

FIG. 9

REFERENCES CITED IN THE DESCRIPTION

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