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(54) ANTENNA MODULE FOR A VEHICLE, AND METHOD FOR INSTALLING AN ANTENNA MODULE

ANTENNENMODUL FÜR EIN FAHRZEUG UND VERFAHREN ZUR INSTALLATION EINES ANTENNENMODULS

MODULE D'ANTENNE POUR VÉHICULE ET PROCÉDÉ PERMETTANT D'INSTALLER UN MODULE D'ANTENNE

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Description

[0001] The invention relates to an antenna module for a vehicle, and to a method for installing an antenna module as per the preamble of claim 1.

[0002] DE 10 2012 002 953 A1 has disclosed an antenna module for a vehicle, which antenna module comprises a first, upper assembly and a second, lower assembly, wherein the upper assembly comprises at least one electrical contact component and at least one guide means, wherein the lower assembly comprises at least one electrical counterpart contact component and at least one counterpart guide means, wherein the counterpart guide means of the lower assembly can be slid with a linear sliding-on movement in a sliding-on direction onto the guide means of the upper assembly into a pre-installation position such that the at least one contact component and the at least one counterpart contact component are situated opposite one another.

[0003] Further antenna modules are known from DE103 30 962 A1, US 2 875 442 A, DE 10 2015 210321 A1 or DE 10 2015 104543 A1.

[0004] It is an object of the invention to propose an antenna module for a vehicle and a method for installing an antenna module, in the case of which installation and uninstallation can be performed in a manner which is particularly space-saving and gentle on the product.

[0005] Said object is achieved, proceeding from the features of the preambles of claims 1 and 6, by means of the characterizing features of claims 1 and 6 respectively. The respective subclaims specify advantageous and expedient refinements.

[0006] In the case of the antenna module according to the invention, the lower assembly comprises an actuation means, wherein the at least one counterpart contact component is movable relative to the at least one contact component along a contacting direction, which is aligned orthogonally with respect to the sliding-on direction, out of the pre-installation position of the two assemblies by means of a contacting movement which can be generated by the counterpart guide means and by the actuation means, such that complete contacting of the at least one counterpart contact component and of the at least one contact component is effected. By means of an L-shaped installation movement, which is made up of a linear movement for the alignment of the at least one counterpart contact component with the at least one contact component and a linear movement for the contacting of the at least one counterpart contact component and of the at least one contact component, one long movement path is replaced by two short, differently aligned movement paths, which are possible in a compact space. Furthermore, in this way, a gentle joining-together process is possible, because it is clear to the technician when the manufacturing step of the orientation or alignment and when the manufacturing step of the sliding-on or contacting is taking place. Thus, in particular, the manufacturing step of the sliding-on or contacting can always be performed with the required care, without the need for further auxiliary means for this purpose.

[0007] The lower assembly comprises a housing, wherein the counterpart guide means is guided on the housing, wherein the counterpart guide means is, in the pre-installation position, held in positively locking fashion in the upper assembly, and wherein the counterpart guide means is, in order to generate the contacting movement, movable by the actuation means on the housing of the lower assembly such that said counterpart guide means can be pulled into the lower housing and, here, owing to its positively locking retention, pulls the lower housing against the upper assembly. By the counterpart guide means, which is movable by the actuation means relative to the housing of the lower assembly and which is preferably formed as a guide bolt, it is possible to realize contacting of the counterpart contact component with the contact component, without the need to exert an undefined pressure force on the upper assembly. Provision is also made for the counterpart guide means to comprise a head, by way of which said counterpart guide means can, similarly to a tongue-and-groove connection, be inserted into a rail guide of the upper assembly and displaced therein. In this way, the sliding-on movement is optimally predefined.

[0008] The lower assembly comprises a fixing pin, for the upper assembly to comprise a pin receptacle, wherein the fixing pin is, in the pre-installation position, situated in a release position and aligned with the pin receptacle such that the fixing pin can be moved into the pin receptacle of the upper assembly by means of a movement of the actuation means relative to the housing of the lower assembly. In this way, locking of the lower assembly on the upper assembly is realized, such that the contacting means and the counterpart contacting means do not have to accommodate any transverse forces in the fully installed state.

[0009] Provision is furthermore made for the actuation means to move the counterpart guide means and the fixing pin in opposite directions during the contacting movement. In this way, it is ensured that the fixing pin, at the end of the contacting movement, protrudes into the upper assembly, but nevertheless the counterpart contacting means does not change its position relative to the upper assembly.

[0010] Provision is also made for the actuation means to be formed as a clamping lever, wherein the clamping lever comprises a lever arm, a pivot axle, an eccentric head with a sliding surface which runs, in particular, eccentrically with respect to the pivot axle, and at least one eccentric peg, wherein the clamping lever is connected by way of its pivot axle pivotably to the counterpart guide means, wherein the clamping lever is guided by way of each eccentric peg in in each case one slotted guide formed on the housing of the lower structural unit, and wherein the clamping lever is supported by way of its eccentric pegs on the housing of the lower component such that the pivot axle of said clamping lever moves,

during the turning-over of the lever arm, counter to a contacting direction, such that the counterpart guide means moves into the housing of the lower assembly. By means of such a clamping lever and a corresponding attachment of the clamping lever to the housing and the counterpart guide means, the relative movement between the counterpart guide means and the counterpart contact means or between the counterpart guide means and the housing of the lower assembly, relative to which the counterpart contact means is arranged so as to be fixed, can be easily generated. Here, a pivoting-over of the clamping lever through 90° is sufficient to perform the contacting movement. Such a movement can be performed quickly, and here also with the required sensitivity, by a technician.

[0011] Provision is also made for the counterpart guide means to be formed in particular as a mushroom-head bolt, wherein the fixing pin is guided on the counterpart guide means, and wherein the fixing pin is in particular guided in a passage bore of the counterpart guide means. In this way, a particularly compact construction of the lower assembly is realized.

[0012] Additionally, provision is made for the fixing pin to be spring-loaded by a spring, wherein the spring pushes the fixing pin in the direction of the actuation means, and wherein the spring pushes the fixing pin in particular against at least one of the sliding surfaces of the clamping lever, and wherein the spring is in particular supported on the counterpart guide means. It is ensured in this way that, during the sliding-on movement, during which the clamping lever is in an open position, the fixing pin does not project in a disruptive manner out of the counterpart guide means and prevent a sliding-on action.

[0013] The method according to the invention for installing an antenna module, in which method the antenna module comprises a first, upper assembly and a second, lower assembly, provides the following steps:

- fixing the upper assembly to a vehicle and in particular a vehicle roof of a vehicle;
- sliding the lower assembly onto the upper assembly with a linear sliding-on movement in a sliding-on direction, wherein the lower and the upper assembly are, after the sliding-on, aligned with one another such that at least one electrical contact component of the upper assembly is aligned with at least one electrical counterpart contact component of the lower assembly and such that a counterpart guide means of the lower assembly engages by way of a head behind a guide means of the upper assembly,
- sliding the lower assembly further onto the upper assembly in a contacting direction which is orthogonal with respect to the sliding-on direction. By means of an L-shaped installation movement, which is made up of a linear movement for the alignment of the at least one counterpart contact component with the at least one contact component and a linear movement for the contacting of the at least one counterpart contact component and of the at least one contact component, one long movement path is replaced by two short, differently aligned movement paths, which are possible in a compact space. Furthermore, in this way, a gentle joining-together process is possible, because it is clear to the technician when the manufacturing step of the orientation or alignment and when the manufacturing step of the sliding-on or contacting is taking place. Thus, in particular, the manufacturing step of the sliding-on or contacting can always be performed with the required care, without the need for further auxiliary means for this purpose.

[0014] The method furthermore provides for the further sliding-on to be performed using an actuation means by which the counterpart guide means is pulled against a housing of the lower assembly and, here, the housing of the lower assembly is moved towards the upper assembly such that the at least one electrical counterpart contact component is completely contacted with the at least one contact component. By means of this method step, contacting in a manner gentle on the product is ensured.

[0015] The lower assembly comprises a fixing pin, and the fixing pin is actuated by the actuation means such that said fixing pin is slid out of the housing of the lower assembly, into a pin receptacle of the upper assembly, oppositely to the movement of the counterpart guide means. In this way, it is ensured that the fixing pin, at the end of the contacting movement, protrudes into the upper assembly, but nevertheless the counterpart contacting means does not change its position relative to the upper assembly. Finally, provision is made for the actuation means to be formed as a clamping lever, wherein the counterpart guide means is, during the contacting, pulled by the clamping lever into the housing of the lower assembly, and wherein the fixing pin is pushed out of the counterpart guide means in a contacting direction by the clamping lever. By means of such a method step, in which a clamping lever is used, the relative movement between the counterpart guide means and the counterpart contact means or between the counterpart guide means and the housing of the lower assembly, relative to which the counterpart contact means is arranged so as to be fixed, can be easily generated. Here, it is sufficient for the clamping lever to be pivoted over through 90° to perform the contacting movement. Such a movement can be performed quickly, and here also with the required sensitivity, by a technician. Further details of the invention will be described in the drawing on the basis of schematically illustrated exemplary embodiments.

[0016] In the drawing:

Figure 1 shows an antenna module with a lower assembly and an upper assembly in a sectional view, wherein the lower assembly has been mounted onto the upper assembly for the purposes of performing a sliding-on movement;

Figure 2 shows the antenna module shown in Figure 1, during the sliding-on movement, in a sectional perspective view;

figure 3 shows the antenna module shown in Figure 1 after the sliding-on movement has been performed;

Figure 4 shows the antenna module shown in Figure 1, during the contacting movement, and

Figure 5 shows the antenna module shown in Figure 1, after the contacting movement has been performed.

[0017] Figure 1 shows, in a sectional view, an antenna module 1 which is designed as a vehicle roof antenna module. The antenna module 1 comprises a first, upper assembly 101 and a second, lower assembly 201, wherein the lower assembly 201 has been mounted onto the upper assembly 101 for the purposes of performing a sliding-on movement ASB. The upper assembly 101 comprises electrical contact components 102, 103 and a guide means 104. The lower assembly 201 comprises electrical counterpart contact components 202, 203 (see Figure 2) and a counterpart guide means 204. From an initial position P1-201 shown in Figure 1, the lower assembly 201 is displaceable by means of the sliding-on movement ASB via an intermediate position P2-201 shown in Figure 2 into a central position P3-201 shown in Figure 3. Here, the counterpart guide means 204 of the lower assembly 201 can be slid, by means of the linear sliding-on movement ASB in a sliding-on direction ASR, onto the guide means 104 of the upper assembly 101 into the central position P3-101 or into a pre-installation position V101 (see Figure 3), such that, in the pre-installation position V101, the contact components 102, 103 and the counterpart contact component 202, 203 are situated opposite one another.

[0018] As can be seen from Figure 1, the lower assembly 201 comprises not only the counterpart contact components 202, 203 and the counterpart guide means 204 but also a housing 205, in which a circuit board 206 is accommodated, an actuation means 207, and a fixing pin 208. The counterpart guide means 204 is formed as a mushroom-head bolt 209 in the manner of a guide bolt, and comprises a head 210. Similarly to a tongue-and-groove connection, the lower assembly 201 is slid, by way of the head 210 of its counterpart guide means 204, into the guide means 104, formed as an undercut groove 105, of the upper assembly 101, such that the lower assembly 201 is suspended on the guide means 104 of the upper assembly 101. After being fully slid into or slid onto the guide means 104, the lower assembly is situated in the central position P3-201 (see Figure 3), in which its counterpart contact components 202, 203 are aligned with the contact components 102, 103 of the upper assembly 101.

[0019] From the pre-installation position V201 shown in Figure 3, the housing 205 of the lower assembly 201 can, together with the circuit board 206 and the counterpart contact components 202, 203 arranged on the circuit board, be displaced in a contacting direction KTR with a contacting movement KTB via a further intermediate position P4-201 shown in Figure 4 into an end position P5-201 shown in Figure 5, and assumes an installation position M201 therein. Here, during the displacement into the installation position M201, the counterpart contact components 202, 203 of the lower assembly 201 are slid onto the contact components 102, 103 of the upper assembly 101, such that these are contacted with one another in electrically conductive fashion. Here, the contact components 101, 102 are formed as coaxial plugs, and the counterpart contact components 201, 202 are formed as coaxial bushings. The contacting direction KTR is oriented orthogonally with respect to the sliding-on direction ASR (see Figure 3), such that the lower assembly 201 is, with the exception of the counterpart guide means 204, connected or contacted to the upper assembly 101 in an L-shaped movement.

[0020] Here, the contacting movement KTB is generated by the actuation means 207, by which the counterpart guide means 204 is pulled into a guide channel 211 formed on the housing 205. The actuation means 207 is formed as a clamping lever 212. The clamping lever 212 comprises a lever arm 213, an axle bolt 214, which geometrically defines a pivot axle 215, an eccentric head 216 which is of U-shaped cross section and which has two sliding surfaces 217a, 217b see in particular Figure 4) which run eccentrically, at least in sections, with respect to the pivot axle 215, and two eccentric pegs 218 which are arranged opposite one another on the eccentric head 216. The eccentric peg 218 is illustrated in Figure 2. The second eccentric peg is arranged on the eccentric head 216 opposite the eccentric peg 218, but is concealed in the illustration of Figure 2 by the housing 205. It can be seen in particular from Figure 5 that the clamping lever 212 is, by way of its eccentric head 216, connected pivotably to the counterpart guide means 204 by means of the axle bolt 214. Thus, the lever arm 213 of the clamping lever 212 can be pivoted from its release position S1-213 shown in Figure 3 via an intermediate position S2-213 shown in Figure 4 into a blocking position S3-213 shown in Figure 5. During its movement from the release position S1-213 into the blocking position S3-213 or from the blocking position S3-213 into the release position S1-213, the lever arm 213 is guided by way of the eccentric pegs 218 (see Figure 2) on the housing 205 of the lower assembly 201 in mutually oppositely situated slotted guides 219a, 219b (see Figures 2 and 5), wherein only the slotted guide 219a is visible in Figure 2, and the second slotted guide 219b, like the second eccentric peg, is concealed by the housing 205. The second slotted guide 219b can be seen in Figure 5. During the movement between the release position S1-213 and the blocking position S3-213, the clamping lever 212 is guided and

supported by way of its eccentric pegs 218 in the slotted guides 219a, 219b of the housing 205. Furthermore, the clamping lever 212 is guided by the counterpart guide means 204, which is displaceable in the guide channel 211 of the housing 205. During the turning-over of the lever arm 213 into the blocking position S3-213, it is then the case, correspondingly to the profile of the slotted guides 219a, 219b, that the counterpart guide means 204 is pulled in the arrow direction y' into the housing 205 of the lower assembly 201. However, since the counterpart guide means 204 is held by way of its head 210 in the guide means 104 of the upper assembly 101, which is fixed to a vehicle roof 302, merely schematically indicated in Figure 4, of a vehicle 301, this has the effect that the lower housing 205 together with the circuit board 206, the counterpart contact components 202, 203 and the actuation means 207 moves in the arrow direction y towards the upper assembly 101, such that complete contacting of the counterpart contact components 202, 203 with the contact components 102, 103 occurs.

[0021] At the same time as this movement in the y direction, the fixing pin 208 is, by means of the eccentric head 216 rotating about the pivot axle 215, moved in the y direction towards the upper assembly 101, such that the fixing pin 208 protrudes into a pin receptacle 106 of a main body 107 of the upper assembly 101 (see Figures 3 to 5). By means of the fixing pin 208, the lower assembly 201 is then, on the upper assembly 101, secured in the installation position M201 so as to be prevented from moving counter to the sliding-on movement ASB, such that corresponding forces do not have to be accommodated by the contact components 102, 103 or the counterpart contact components 202, 203.

[0022] The fixing pin 208 is guided in a passage bore 221 which is formed in the counterpart guide means 204. Here, the passage bore 221 is formed as a stepped bore 222, which has a shoulder 223, and the fixing pin 208 is formed as a stepped pin 224, which likewise has a shoulder 225. For the spring loading of the fixing pin 208, the lower assembly 201 comprises a spring 226. Here, the spring 226 is arranged in the passage bore 221 between the stated shoulders 223, 225, such that the fixing pin 208 is pushed by the spring 226 in the y' direction in the direction of the clamping lever 212, and the fixing pin 208, in the release position S1-213 of the lever arm 213, protrudes out of the counterpart guide means 204 towards the eccentric head 216 of the clamping lever 212. During the turning-over of the lever arm 213 into the blocking position S3-213, the eccentric head 216 of the clamping lever 212 acts by way of its sliding surface 217a on the fixing pin 208 and pushes the latter through the counterpart guide means 204 counter to a force of the spring 226 in the y direction in the direction of the upper assembly, such that the fixing pin 208 emerges from the counterpart guide means 204 and protrudes into the pin receptacle 106.

[0023] Uninstallation of the lower assembly 201 from the upper assembly 101 is performed in the opposite direction to the installation. By virtue of the clamping lever 212 being opened, the housing 205 can move downwards on the counterpart guide means 204 in the arrow direction y' counter to the contacting direction KTR, and the entire lower assembly 201 can subsequently be pulled off the guide means 104 of the upper assembly 101 counter to the sliding-on direction ASR.

List of reference designations:

[0024]

1	Antenna module
101	First, upper assembly
102	Contact component
103	Contact component
104	Guide means
105	Undercut groove
106	Pin receptacle for 208
107	Main body
201	First, lower assembly
202	Counterpart contact component
203	Counterpart contact component
204	Counterpart guide means
205	Housing
206	Circuit board
207	Actuation means
208	Fixing pin
209	Mushroom-head bolt
210	Head
211	Guide channel
212	Clamping lever
213	Lever arm
214	Axle bolt
215	Pivot axle
216	Eccentric head
217a, 217b	Sliding surface on 216
218	Eccentric peg on 216
219a, 219b	Slotted guide for 218 on 205
220	not used
221	Passage bore in 204
222	Stepped bore
223	Shoulder of 222
224	Stepped pin
225	Shoulder of 224
226	Spring of 201
301	Vehicle
302	Vehicle roof
ASB	Sliding-on movement
ASR	Sliding-on direction
KTB	Contacting movement
KTR	Contacting direction
M201	Installation position

P1-201 Initial position of 201
P2-201 Intermediate position of 201
P3-201 Middle position of 201
P4-201 Further intermediate position of 201
P5-201 End position of 201

S1-213 Release position of 213
S2-213 Intermediate position of 213
S3-213 Blocking position of 213

V201 Pre-installation position

y Direction
y' Direction

Claims

1. Antenna module (1) for a vehicle (301), in particular vehicle roof antenna module,

- wherein the antenna module (1) comprises a first, upper assembly (101) and a second, lower assembly (201),
- wherein the upper assembly (101) comprises at least one electrical contact component (102, 103) and at least one guide means (104),
- wherein the lower assembly (201) comprises at least one electrical counterpart contact component (202, 203) and at least one counterpart guide means (204),
- wherein the counterpart guide means (204) of the lower assembly (201) can be slid with a linear sliding-on movement (ASB) in a sliding-on direction (ASR) onto the guide means (104) of the upper assembly (104) into a pre-installation position (V201) such that the at least one contact component (102, 103) and the at least one counterpart contact component (202, 203) are situated opposite one another,
- wherein the lower assembly (201) comprises an actuation means (207), wherein the at least one counterpart contact component (202, 203) is movable relative to the at least one contact component (102, 103) along a contacting direction (KTR), which is aligned orthogonally with respect to the sliding-on direction (ASR), out of the pre-installation position (V201) of the two assemblies (101, 201) by means of a contacting movement (KTB) which can be generated by the counterpart guide means (204) and by the actuation means (207), such that complete contacting of the at least one counterpart contact component (202, 203) and of the at least one contact component (102, 103) is effected;
- wherein the lower assembly (201) comprises a housing (205), the counterpart guide means (204) being guided on the housing (205), wherein the counterpart guide means (204) is, in the pre-installation position (V201), held in positively locking fashion in the upper assembly (101), wherein the counterpart guide means (204) is, in order to generate the contacting movement (KTB), movable by the actuation means (207) on the housing (205) of the lower assembly (201) such that said counterpart guide means can be pulled into the lower housing (205) and, here, owing to its positively locking retention, pulls the lower housing (205) against the upper assembly (101),

Characterized in that:

- the lower assembly (201) comprises a fixing pin (208), and **in that** the upper assembly (101) comprises a pin receptacle (106), wherein the fixing pin (208) is, in the pre-installation position (V201), situated in a release position and aligned with the pin receptacle (106) such that the fixing pin (208) can be moved into the pin receptacle (106) of the upper assembly (101) by means of a movement of the actuation means (207) relative to the housing (205) of the lower assembly (201).

2. Antenna module according to Claim 1, **characterized in that** the actuation means (207) moves the counterpart guide means (204) and the fixing pin (208) in opposite directions (y, y') during the contacting movement (KTB).

3. Antenna module according to at least one of the preceding claims, **characterized**

- **in that** the actuation means (207) is formed as a clamping lever (212),
- wherein the clamping lever (212) comprises a lever arm (213), a pivot axle (215), an eccentric head (216) with a sliding surface (217a, 217b) and at least one eccentric peg (218),
- wherein the clamping lever (212) is connected by way of its pivot axle (215) pivotably to the counterpart guide means (204),
- wherein the clamping lever (212) is guided by way of each eccentric peg (218) in in each case one slotted guide (219a, 219b) formed on the housing (205) of the lower structural unit (201),
- wherein the clamping lever (212) is supported by way of its eccentric peg (218) on the housing (205) of the lower component (201) such that the pivot axle (215) of said clamping lever moves, during the turning-over of the lever arm (213), counter to a contacting direction (KTR), such that the counterpart guide means (204) moves into the housing (205) of the lower assembly (201).

4. Antenna module according to at least one of the preceding claims, **characterized in that** the counterpart guide means (204) is formed in particular as a mushroom-head bolt (209), wherein the fixing pin (208) is guided on the counterpart guide means (204), and wherein the fixing pin (204) is in particular guided in a passage bore (221) of the counterpart guide means (204).

5. Antenna module according to claim 3 or according to claim 4 when depending on claim 3, **characterized in that** the fixing pin (208) is spring-loaded by a spring (226), wherein the spring (226) pushes the fixing pin (208) in the direction of the actuation means (207), and wherein the spring (226) pushes the fixing pin (208) in particular against at least one of the sliding surfaces (217a, 217b) of the clamping lever (212), and wherein the spring (226) is in particular supported on the counterpart guide means (204).

6. Method for installing an antenna module (1), wherein the antenna module (1) comprises a first, upper assembly (101) and a second, lower assembly (201), comprising the steps:

- fixing the upper assembly (101) to a vehicle (301) and in particular a vehicle roof (302) of the vehicle (301);
- sliding the lower assembly (201) onto the upper assembly (101) with a linear sliding-on movement in a sliding-on direction (ASR), wherein the lower and the upper assembly (201, 101) are, after the sliding-on, aligned with one another such that at least one electrical contact component (102, 103) of the upper assembly (101) is aligned with at least one electrical counterpart contact component (202, 203) of the lower assembly (201) and such that a counterpart guide means (204) of the lower assembly (201) engages by way of a head (210) behind a guide means (104) of the upper assembly (101),
- sliding the lower assembly (201) further onto the upper assembly (101) in a contacting direction (KTR) which is orthogonal with respect to the sliding-on direction (ASR), the further sliding-on being performed using an actuation means (207) by which the counterpart guide means (204) is pulled against a housing (205) of the lower assembly (201) and, here, the housing (205) of the lower assembly (201) being moved towards the upper assembly (101) such that the at least one electrical counterpart contact component (202, 203) is completely contacted with the at least one contact component (102, 103), the lower assembly (201) comprising a fixing pin (208), and the fixing pin (208) being actuated by the actuation means (207) such that said fixing pin is slid out of the housing (205) of the lower assembly (201), into a pin receptacle (106) of the upper assembly (101), oppositely to the movement of the counterpart guide means (204).

7. Method according to Claim 6, **characterized in that** the actuation means (207) is formed as a clamping lever (212), wherein the counterpart guide means (204) is, during the contacting, pulled by the clamping lever (212) into the housing (205) of the lower assembly (201), and wherein the fixing pin (208) is pushed out of the counterpart guide means (204) in a contacting direction (KTR) by the clamping lever (212).

Patentansprüche

1. Antennenmodul (1) für ein Fahrzeug (301), insbesondere Fahrzeugdachantennenmodul,

- wobei das Antennenmodul (1) eine erste, obere Anordnung (101) und eine zweite, untere Anordnung (201) umfasst,
- wobei die obere Anordnung (101) mindestens ein elektrisches Kontaktbauteil (102, 103) und mindestens ein Führungsmittel (104) umfasst,
- wobei die untere Anordnung (201) mindestens ein elektrisches Gegenkontaktbauteil (202, 203) und mindestens ein Gegenführungsmittel (204) umfasst,
- wobei das Gegenführungsmittel (204) der unteren Anordnung (201) mit einer linearen Aufschiebebewegung (ASB) in einer Aufschieberichtung (ASR) auf das Führungsmittel (104) der oberen Anordnung (104) in eine Vormontagestellung (V201) derart aufgeschoben werden kann, dass sich das mindestens eine Kontaktbauteil (102, 103) und das mindestens eine Gegenkontaktbauteil (202, 203) einander gegenüberliegend angeordnet sind,
- wobei die untere Anordnung (201) ein Betätigungsmittel (207) umfasst, wobei das mindestens eine Gegenkontaktbauteil (202, 203) in Relation zu dem mindestens einen Kontaktbauteil (102, 103) entlang einer Kontaktierungsrichtung (KTR), die orthogonal in Bezug auf die Aufschieberichtung (ASR) ausgerichtet ist, aus der Vormontagestellung (V201) der zwei Anordnungen (101, 201) mittels einer Kontaktierungsbewegung (KTB), die durch das Gegenführungsmittel (204) und durch das Betätigungsmittel (207) erzeugt werden kann, derart bewegbar ist, dass eine vollständige Kontaktierung des mindestens einen Gegenkontaktbauteils (202, 203) und des mindestens einen Kontaktbauteils (102, 103) bewirkt wird;
- wobei die untere Anordnung (201) ein Gehäu-

se (205) umfasst, wobei das Gegenführungsmittel (204) an dem Gehäuse (205) geführt ist, wobei das Gegenführungsmittel (204) in der Vormontagestellung (V201) auf formschlüssige Weise in der oberen Anordnung (101) gehalten ist, wobei das Gegenführungsmittel (204), um die Kontaktierungsbewegung (KTB) zu erzeugen, durch das Betätigungsmittel (207) an dem Gehäuse (205) der unteren Anordnung (201) derart bewegbar ist, dass das Gegenführungsmittel in das untere Gehäuse (205) gezogen werden kann und hier aufgrund seiner formschlüssigen Rückhaltung das untere Gehäuse (205) gegen die obere Anordnung (101) zieht,

dadurch gekennzeichnet, dass:

- die untere Anordnung (201) einen Fixierungsstift (208) umfasst, und dass die obere Anordnung (101) eine Stiftaufnahme (106) umfasst, wobei der Fixierungsstift (208) in der Vormontagestellung (V201) in einer Freigabestellung angeordnet und mit der Stiftaufnahme (106) derart ausgerichtet ist, dass der Fixierungsstift (208) in die Stiftaufnahme (106) der oberen Anordnung (101) mittels einer Bewegung des Betätigungsmittels (207) in Relation zu dem Gehäuse (205) der unteren Anordnung (201) bewegt werden kann.

2. Antennenmodul nach Anspruch 1, **dadurch gekennzeichnet, dass** das Betätigungsmittel (207) das Gegenführungsmittel (204) und den Fixierungsstift (208) während der Kontaktierungsbewegung (KTB) in entgegengesetzte Richtungen (y, y') bewegt.

3. Antennenmodul nach mindestens einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet,**

- **dass** das Betätigungsmittel (207) als ein Spannhebel (212) ausgebildet ist,
- wobei der Spannhebel (212) einen Hebelarm (213), eine Schwenkachse (215), einen Exzenterkopf (216) mit einer Gleitfläche (217a, 217b) und mindestens einen Exzenterzapfen (218) umfasst,
- wobei der Spannhebel (212) mittels seiner Schwenkachse (215) schwenkbar mit dem Gegenführungsmittel (204) verbunden ist,
- wobei der Spannhebel (212) mittels jedes Exzenterzapfens (218) in jeweils einer schlitzförmigen Führung (219a, 219b) geführt ist, die an dem Gehäuse (205) der unteren Baueinheit (201) ausgebildet ist,
- wobei der Spannhebel (212) mittels seines Exzenterzapfens (218) an dem Gehäuse (205) des unteren Bauteils (201) derart gestützt ist, dass sich die Schwenkachse (215) des Spannhebels während des Herumdrehens des Hebelarms (213) entgegengesetzt zu einer Kontaktierungsrichtung (KTR) derart bewegt, dass sich das Gegenführungsmittel (204) in das Gehäuse (205) der unteren Anordnung (201) bewegt.

4. Antennenmodul nach mindestens einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** das Gegenführungsmittel (204) insbesondere als ein Flachrundkopfbolzen (209) ausgebildet ist, wobei der Fixierungsstift (208) an dem Gegenführungsmittel (204) geführt ist, und wobei der Fixierungsstift (204) insbesondere in einer Durchgangsbohrung (221) des Gegenführungsmittels (204) geführt ist.

5. Antennenmodul nach Anspruch 3 oder nach Anspruch 4, wenn abhängig von Anspruch 3, **dadurch gekennzeichnet, dass** der Fixierungsstift (208) durch eine Feder (226) federbelastet ist, wobei die Feder (226) den Fixierungsstift (208) in die Richtung des Betätigungsmittels (207) drückt, und wobei die Feder (226) den Fixierungsstift (208) insbesondere gegen mindestens eine der Gleitflächen (217a, 217b) des Spannhebels (212) drückt, und wobei die Feder (226) insbesondere an dem Gegenführungsmittel (204) gestützt ist.

6. Verfahren zum Montieren eines Antennenmoduls (1), wobei das Antennenmodul (1) eine erste, obere Anordnung (101) und eine zweite, untere Anordnung (201) umfasst, umfassend die Schritte:

- Fixieren der oberen Anordnung (101) an einem Fahrzeug (301) und insbesondere einem Fahrzeugdach (302) des Fahrzeugs (301);
- Schieben der unteren Anordnung (201) auf die obere Anordnung (101) mit einer linearen Aufschiebebewegung in einer Aufschieberichtung (ASR), wobei die untere und die obere Anordnung (201, 101) nach dem Aufschieben derart miteinander ausgerichtet sind, dass mindestens ein elektrisches Kontaktbauteil (102, 103) der oberen Anordnung (101) mit mindestens einem elektrischen Gegenkontaktbauteil (202, 203) der unteren Anordnung (201) ausgerichtet ist, und derart dass ein Gegenführungsmittel (204) der unteren Anordnung (201) mittels eines Kopfs (210) hinter ein Führungsmittel (104) der oberen Anordnung (101) eingreift,
- Schieben der unteren Anordnung (201) weiter auf die obere Anordnung (101) in einer Kontaktierungsrichtung (KTR), die in Bezug auf die Aufschieberichtung (ASR) orthogonal ist, wobei das weitere Aufschieben unter Verwenden eines Betätigungsmittels (207) durchgeführt wird, durch das das Gegenführungsmittel (204) ge-

gen ein Gehäuse (205) der unteren Anordnung (201) gezogen wird, und wobei hier das Gehäuse (205) der unteren Anordnung (201) derart hin zu der oberen Anordnung (101) bewegt wird, dass das mindestens eine elektrische Gegenkontaktbauteil (202, 203) vollständig mit dem mindestens einen Kontaktbauteil (102, 103) in Kontakt ist, wobei die untere Anordnung (201) einen Fixierungsstift (208) umfasst, und der Fixierungsstift (208) durch das Betätigungsmittel (207) derart betätigt wird, dass der Fixierungsstift entgegengesetzt zu der Bewegung des Gegenführungsmittels (204) aus dem Gehäuse (205) der unteren Anordnung (201), in eine Stiftaufnahme (106) der oberen Anordnung (101) geschoben wird.

7. Verfahren nach Anspruch 6, **dadurch gekennzeichnet, dass** das Betätigungsmittel (207) als ein Spannhebel (212) ausgebildet ist, wobei das Gegenführungsmittel (204) während des Kontaktierens durch den Spannhebel (212) in das Gehäuse (205) der unteren Anordnung (201) gezogen wird, und wobei der Fixierungsstift (208) durch den Spannhebel (212) in einer Kontaktierungsrichtung (KTR) aus dem Gegenführungsmittel (204) gedrückt wird.

Revendications

1. Module d'antenne (1) pour un véhicule (301), plus particulièrement module d'antenne pour toit de véhicule,

   - le module d'antenne (1) comprenant un premier ensemble supérieur (101) et un deuxième ensemble inférieur (201),
   - l'ensemble supérieur (101) comprenant au moins un composant de contact électrique (102, 103) et au moins un moyen de guidage (104),
   - l'ensemble inférieur (201) comprenant au moins un composant de contact électrique homologue (202, 203) et au moins un moyen de guidage homologue (204),
   - le moyen de guidage homologue (204) de l'ensemble inférieur (201) étant susceptible de glisser avec un mouvement de glissement linéaire (ASB) dans une direction de glissement (ASR) sur le moyen de guidage (104) de l'ensemble supérieur (104) jusque dans une position de préinstallation (V201) de telle manière que l'au moins un composant de contact (102, 103) et l'au moins un composant de contact homologue (202, 203) soient situés en regard l'un de l'autre,
   - l'ensemble inférieur (201) comprenant un moyen d'actionnement (207), l'au moins un composant de contact homologue (202, 203) étant déplaçable par rapport à l'au moins un composant de contact (102, 103) suivant une direction de mise en contact (KTR), laquelle est alignée orthogonalement par rapport à la direction de glissement (ASR), pour quitter la position de préinstallation (V201) des deux ensembles (101, 201) grâce à un mouvement de mise en contact (KTB) qui est susceptible d'être produit par le moyen de guidage homologue (204) et par le moyen d'actionnement (207), de manière à effectuer une mise en contact complète de l'au moins un composant de contact homologue (202, 203) et de l'au moins un composant de contact (102, 103) ;
   - l'ensemble inférieur (201) comprenant un boîtier (205), le moyen de guidage homologue (204) étant guidé sur le boîtier (205), le moyen de guidage homologue (204) étant, dans la position de préinstallation (V201), maintenu en verrouillage positif dans l'ensemble supérieur (101), le moyen de guidage homologue (204) étant, dans le but de produire le mouvement de mise en contact (KTB), déplaçable par le moyen d'actionnement (207) sur le boîtier (205) de l'ensemble inférieur (201) de telle manière que ledit moyen de guidage homologue puisse être tiré jusque dans le boîtier inférieur (205) et, là, du fait de sa retenue par verrouillage positif, tire le boîtier inférieur (205) contre l'ensemble supérieur (101),

   caractérisé en ce que :

   - l'ensemble inférieur (201) comprend une broche de fixation (208), et **en ce que** l'ensemble supérieur (101) comprend un logement (106) de broche, la broche de fixation (208) étant, dans la position de préinstallation (V201), située dans une position de déblocage et alignée avec le logement (106) de broche de manière à permettre à la broche de fixation (208) de s'introduire dans le logement (106) de broche de l'ensemble supérieur (101) grâce à un mouvement du moyen d'actionnement (207) par rapport au boîtier (205) de l'ensemble inférieur (201).

2. Module d'antenne selon la revendication 1, **caractérisé en ce que** le moyen d'actionnement (207) déplace le moyen de guidage homologue (204) et la broche de fixation (208) dans des directions opposées (y, y') au cours du mouvement de mise en contact (KTB).

3. Module d'antenne selon au moins une des revendications précédentes, **caractérisé**

   - **en ce que** le moyen d'actionnement (207) prend la forme d'un levier de serrage (212),
   - le levier de serrage (212) comprenant un bras

(213) de levier, un axe de pivotement (215), une tête excentrée (216) pourvue d'une surface de glissement (217a, 217b) et au moins un ergot excentré (218),

- le levier de serrage (212) étant relié à pivotement au moyen de guidage homologue (204) par le biais de son axe de pivotement (215),
- le levier de serrage (212) étant guidé, par le biais de chaque ergot excentré (218), dans une fente de guidage (219a, 219b) respective ménagée sur le boîtier (205) de l'unité structurale inférieure (201),
- le levier de serrage (212) étant supporté par le biais de son ergot excentré (218) sur le boîtier (205) du composant inférieur (201) de telle manière que l'axe de pivotement (215) dudit levier de serrage se déplace, au cours de la rotation du levier de serrage (213), dans un sens opposé à la direction de mise en contact (KTR), de telle manière que le moyen de guidage homologue (204) s'introduise dans le boîtier (205) de l'ensemble inférieur (201).

4. Module d'antenne selon au moins une des revendications précédentes, **caractérisé en ce que** le moyen de guidage homologue (204) prend plus particulièrement la forme d'un boulon à tête bombée (209), la broche de fixation (208) étant guidée sur le moyen de guidage homologue (204) et la broche de fixation (204) étant plus particulièrement guidée dans un alésage de passage (221) du moyen de guidage homologue (204).

5. Module d'antenne selon la revendication 3 ou selon la revendication 4 lorsqu'elle dépend de la revendication 3, **caractérisé en ce que** la broche de fixation (208) est rappelée par ressort par un ressort (226), le ressort (226) poussant la broche de fixation (208) dans la direction du moyen d'actionnement (207), et le ressort (226) poussant la broche de fixation (208) plus particulièrement contre au moins une des surfaces de glissement (217a, 217b) du levier de serrage (212), et le ressort (226) étant plus particulièrement supporté sur le moyen de guidage homologue (204).

6. Procédé d'installation d'un module d'antenne (1), le module d'antenne (1) comprenant un premier ensemble supérieur (101) et un deuxième ensemble inférieur (201), comprenant les étapes suivantes :

- fixation de l'ensemble supérieur (101) à un véhicule (301) et, plus particulièrement, un toit (302) de véhicule du véhicule (301) ;
- glissement de l'ensemble inférieur (201) sur l'ensemble supérieur (101) avec un mouvement de glissement linéaire dans une direction de glissement (ASR), les ensembles inférieur et supérieur (201, 101) étant, suite au glissement, alignés entre eux de telle manière qu'au moins un composant de contact électrique (102, 103) de l'ensemble supérieur (101) soit aligné avec au moins un composant de contact électrique homologue (202, 203) de l'ensemble inférieur (201) et de telle manière qu'un moyen de guidage homologue (204) de l'ensemble inférieur (201) s'engage derrière un moyen de guidage (104) de l'ensemble supérieur (101) par le biais d'une tête (210),
- glissement plus poussé de l'ensemble inférieur (201) sur l'ensemble supérieur (101) dans une direction de mise en contact (KTR) qui est orthogonale par rapport à la direction de glissement (ASR), le glissement plus poussé s'effectuant à l'aide d'un moyen d'actionnement (207) grâce auquel le moyen de guidage homologue (204) est tiré contre un boîtier (205) de l'ensemble inférieur (201) et, là, le boîtier (205) de l'ensemble inférieur (201) se rapprochant de l'ensemble supérieur (101) de telle manière que l'au moins un composant de contact électrique homologue (202, 203) se mette complètement en contact avec l'au moins un composant de contact (102, 103), l'ensemble inférieur (201) comprenant une broche de fixation (208) et la broche de fixation (208) étant actionnée par le moyen d'actionnement (207) de telle manière que ladite broche de fixation glisse hors du boîtier (205) de l'ensemble inférieur (201) jusque dans un logement (106) de broche de l'ensemble supérieur (101), dans une direction opposée au mouvement du moyen de guidage homologue (204).

7. Procédé selon la revendication 6, caractérisé en cde que le moyen d'actionnement (207) prend la forme d'un levier de serrage (212), le moyen de guidage homologue (204) étant, au cours de la mise en contact, tiré par le levier de serrage (212) jusque dans le boîtier (205) de l'ensemble inférieur (201) et la broche de fixation (208) étant poussée hors du moyen de guidage homologue (204) dans une direction de mise en contact (KTR) par le levier de serrage (212).

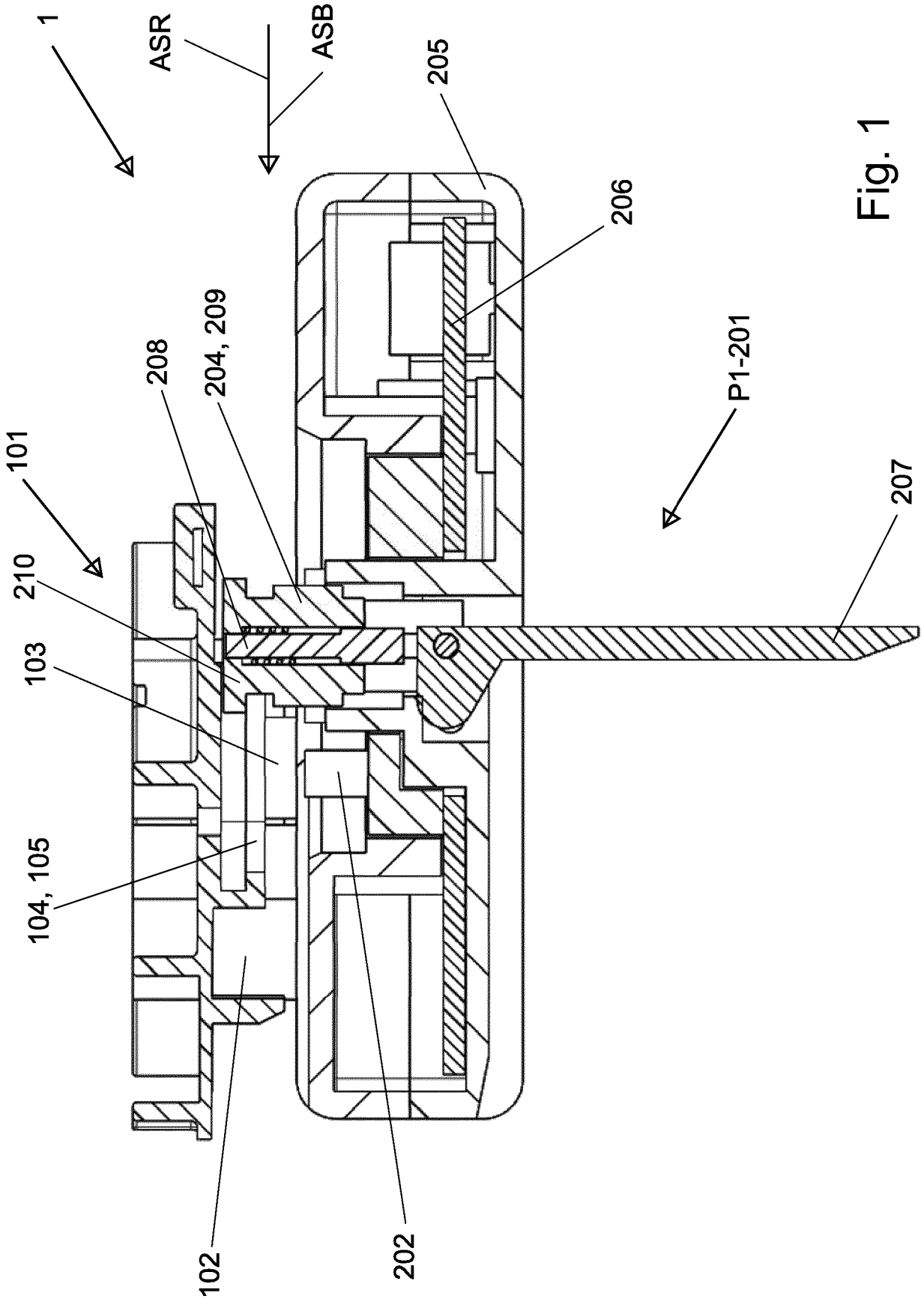
1
ASR
ASB
205
206
P1-201
207
208
204, 209
101
210
103
104, 105
102
202

Fig. 1

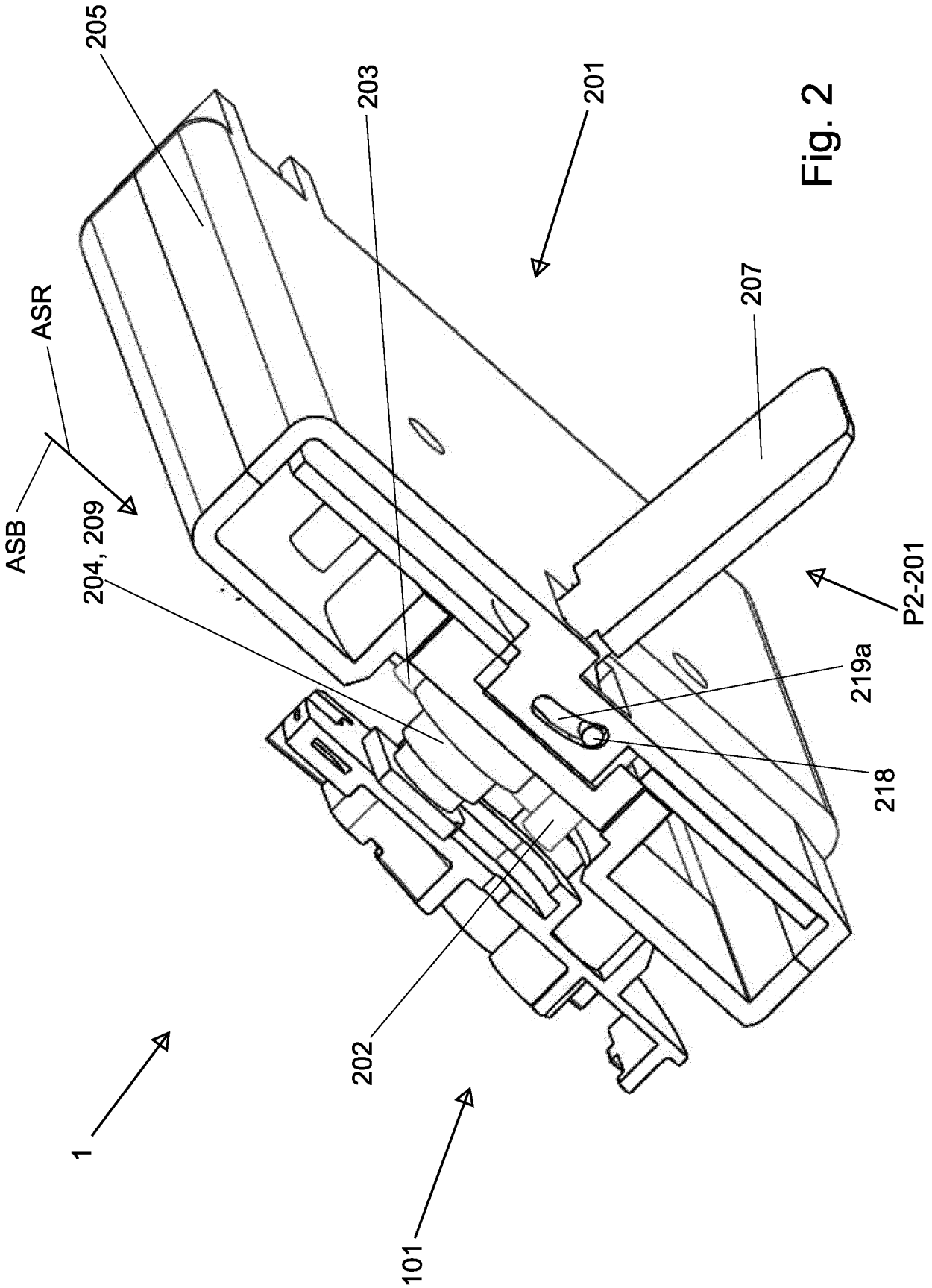

Fig. 2

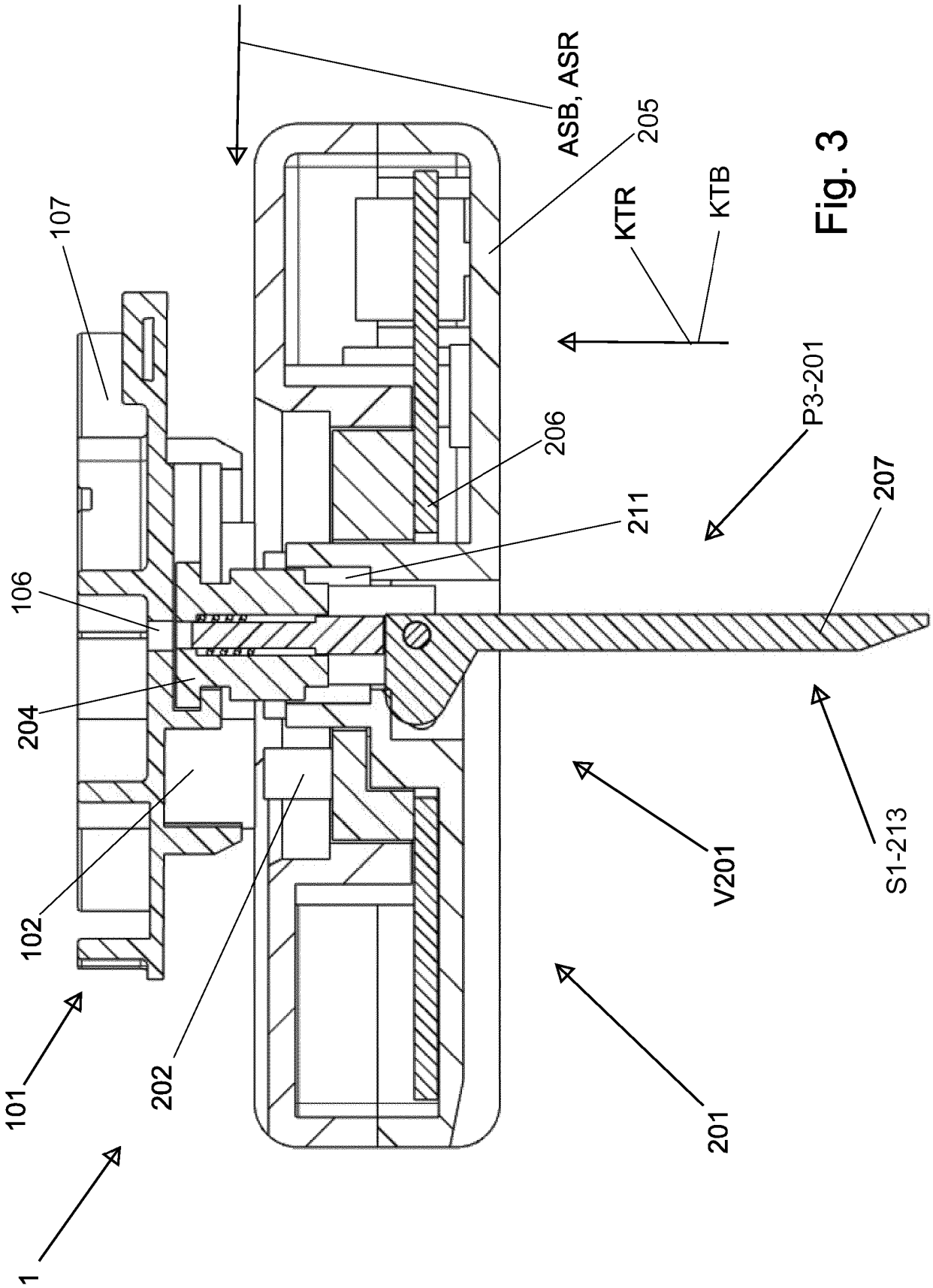
ASB, ASR
205
KTR
KTB
107
206
P3-201
211
207
106
204
102
V201
S1-213
202
101
201
1

Fig. 3

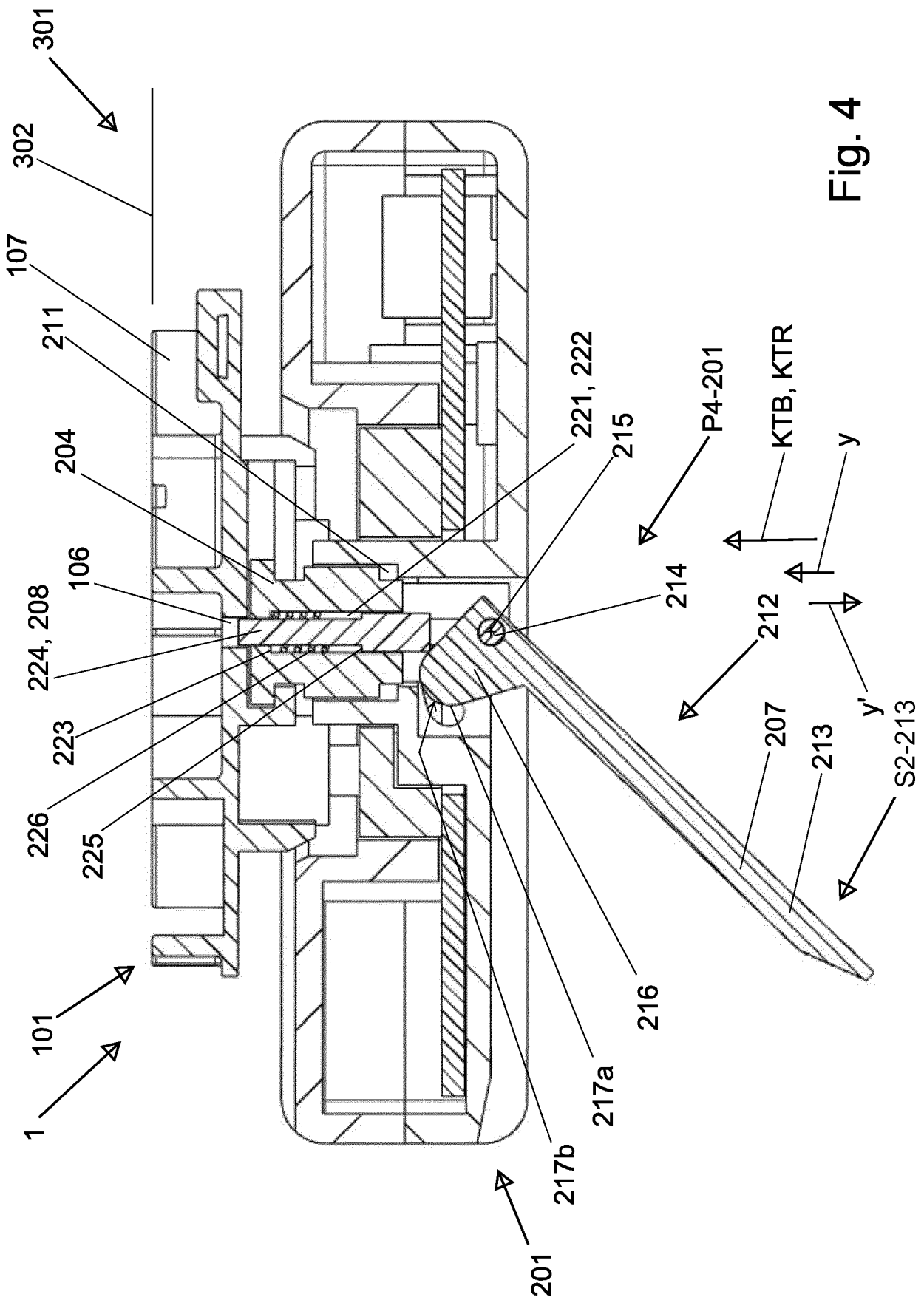
301
302
107
211
204
106
224, 208
223
226
225
1
101
201
217b
217a
216
214
215
221, 222
P4-201
KTB, KTR
y
y'
212
207
213
S2-213

Fig. 4

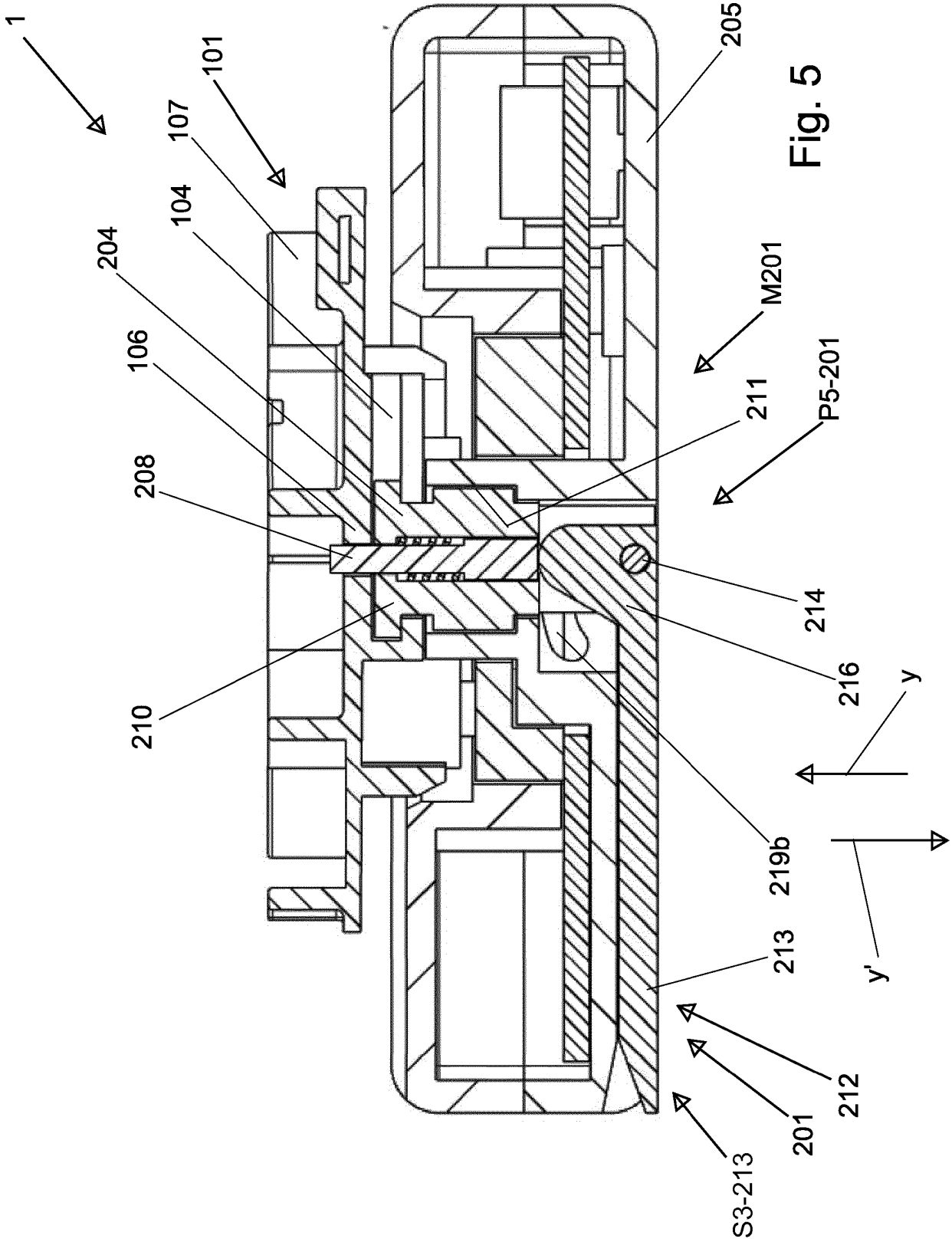
1
101
107
104
204
106
208
210
205
M201
211
P5-201
214
216
219b
213
212
201
S3-213
y
y'

Fig. 5

REFERENCES CITED IN THE DESCRIPTION

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