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(71) Applicant (for all designated States except US): **Tyco Electronics AMP GmbH** [DE/DE]; Ampèrestrasse 13-14, 64625 Bensheim (DE).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **GLASER, Stefan** [DE/DE]; Friedrich-Ebert-Strasse 3, 64646 Heppenheim (DE). **GOSEN, Konstantin** [DE/DE]; Zehnesweg 5, 64686 Lautertal (DE). **HOTEA, Gabriel** [DE/DE]; Kaiserstrasse 115 a, 63065 Offenbach (DE). **KOCH, Frank** [DE/DE]; Im Feldwingert 24, 64560 Riedstadt

(DE). **THIEL, Franz-Josef** [DE/DE]; Am Burgweg 107, 67551 Worms (DE).

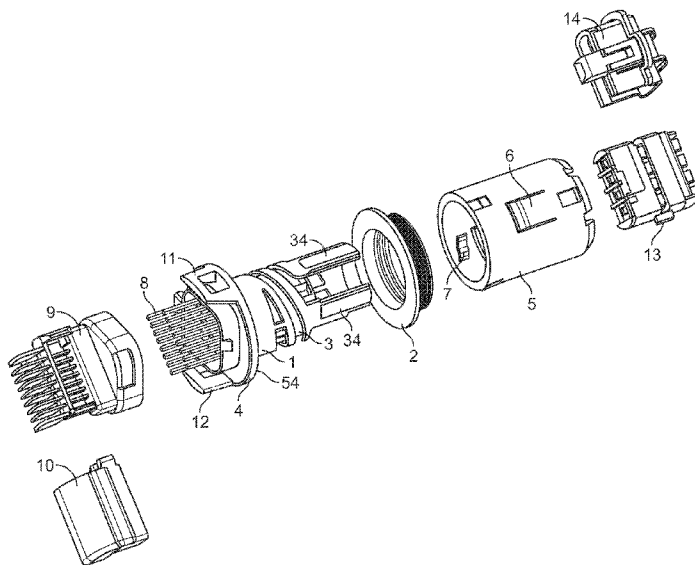
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(54) Title: PLUG TYPE CONNECTOR, ARRANGEMENT HAVING A PLUG TYPE CONNECTOR AND ASSEMBLY METHOD



(57) Abstract: Plug type connector having a housing, having a component, for example, a sleeve, the sleeve being connected to the housing by means of a screw thread, the sleeve having at least one engaging plate having an abutment face at an outer side, the engaging plate projecting with the abutment face beyond the periphery of the sleeve, the housing having a lateral flange which projects beyond the periphery of the housing and the sleeve and which has a second abutment face, the spacing between the first and second abutment face being reduced from an assembly position to an end position by the sleeve being rotated by means of the screw thread.

WO 2008/015128 A1

Plug Type Connector Arrangement Having Plug Type Connector and Assembly Method

The invention relates to a plug type connector according to patent claim 1, an
5 arrangement having a plug type connector according to patent claim 21 and a method for
assembling a plug type connector according to patent claim 23.

Plug type connectors are used in various technical fields in order to connect two
electrical lines to each other. Plug type connectors further serve in various configurations
to bring about fluid-tight passage of a line through a partition wall, for example, in an
10 internal combustion engine or a motor vehicle. In particular, plug type connectors are
used in order to guide an electrical line in an oil-tight manner from a gear compartment to
a clutch compartment.

The problem addressed by the invention is to provide an improved plug type
connector and an improved arrangement having a plug type connector.

15 The problem addressed by the invention is solved by the plug type connector
according to patent claim 1, the arrangement having a plug type connector according to
patent claim 21, and the method for assembling a plug type connector according to patent
claim 23.

Further advantageous configurations of the invention are set out in the dependent
20 claims.

One advantage of the plug type connector is that the plug type connector can be
moved into abutment with a wall in a sealing manner by means of a screw type movement
of a component, for example, a sleeve. To that end, there is provision for the plug type
connector to have an abutment flange which is arranged with spacing from the engaging
25 plate of the component. The component is connected to the housing of the plug type
connector by means of a screw thread. By simply rotating the component, the spacing
between the engaging plate and the abutment flange is reduced so that the plug type
connector can readily be assembled in an opening of the wall.

In a development, the engaging plate is constructed so as to be resilient and can
30 move resiliently in the direction of the sleeve in an assembly position. In this manner, the
abutment face is pushed back in the direction of the sleeve in order to be pushed, for
example, into an opening of a wall, with the engaging plate moving resiliently out again

after passing through the opening and the abutment face of the engaging plate being associated with the wall. Simple assembly of the plug type connector in an opening of the wall is thereby possible.

In another configuration, the housing of the plug type connector has securing
5 means, with which the plug type connector can be secured to a carrier. It is thereby possible for the plug type connector not to have to be pushed individually into the opening of a wall, but instead to be assembled in a wall by means of a carrier and/or together with a carrier.

In another configuration, the housing is constructed in such a manner that the
10 engaging plate cannot move resiliently in the direction of the sleeve in an end position. Inadvertent unlocking of the clamping retention means of the plug type connector with respect to the wall is thereby prevented.

In another configuration, the housing and the sleeve have an opening for receiving a connector housing. Adjustment means which allow the connector housing to be inserted
15 only in the end position of the sleeve are further provided on the sleeve and housing. That ensures that the plug type connector is first correctly assembled, and the connector housing can be inserted only subsequently. Consequently, when the connector housing is inserted, further automatic checks are performed to ascertain that the plug type connector is correctly assembled.

In another configuration, there are provided on the housing, engaging means with
20 which the sleeve engages with the housing in at least one fixed rotation position. It is thereby possible to fix predetermined rotation positions, such as, for example, a start position and an end position.

In another configuration, the securing means are constructed so as to be releasable
25 with respect to the carrier so that the plug type connector can be released from the carrier by rotating the sleeve during the assembly operation. It is thus possible to use the carrier to introduce the plug type connector and subsequently to release the plug type connector at least partially from the carrier when the plug type connector is assembled in the wall so that there is no longer a positive-locking connection between the plug type connector and
30 the carrier. Mechanical decoupling of the plug type connector from the carrier is achieved. This affords the advantage that, for example, mechanical vibrations are not transmitted from the carrier to the plug type connector. Consequently, it is possible to

have an assembly position in which the plug type connector is mechanically secured substantially only to the wall.

In another configuration, the plug type connector has a tension relief means in the form of a foldable clip.

5 In another configuration, a guide cam, which is provided to guide the sleeve in a groove of the screw thread, is constructed at the inner side of the sleeve. In another configuration, the guide cam has a chamfer, that is to say, an inclined face, so that it is possible to pull the sleeve off the screw thread with reduced force.

10 In another configuration, the engaging means are in the form of raised portions which are arranged in the groove of the screw thread.

In another configuration, a lateral wall of the groove of the screw thread has a chamfer, that is to say, an angled face, which allows the sleeve to be pulled off the housing with reduced force.

15 In another configuration, the plug type connector is secured to the carrier by means of the securing means, the carrier having a guide element with which the carrier is guided in the insertion direction when the plug type connector is inserted into the opening of the wall. Precise introduction of the plug type connector into the opening of the wall is supported.

20 In another configuration, an annular seal which allows fluid-tight abutment with a peripheral region of the opening of the wall is constructed at the inner side of the flange that faces the sleeve.

The invention is explained in greater detail below with reference to the Figures in which:

25 Figure 1 is an exploded view of a plug type connector,
Figure 2 shows a pre-assembled plug type connector having a connector housing,
Figure 3 shows a plug type connector mounted on a carrier,
Figure 4 is a schematic illustration of a wall having a connector opening,
Figure 5 is a cross-section through the wall having a connector opening and guide opening,
30 Figure 6 is a perspective view of a wall with the connector housing being inserted in a pre-engagement position,

Figure 7 is a perspective view of the wall with the connector housing being inserted in an end position,

Figure 8 is a perspective view of a plug type connector mounted in the wall,

Figure 9 is a perspective view of part of the sleeve,

5 Figure 10 is a schematic partial cross-section through the engaging plate and the wall,

Figure 11 is a perspective view of part of the housing,

Figure 12 is a top view of an opening 47 of the plug type connector in the end position,

10 Figure 13 is a cross-section through the plug type connector mounted on the carrier,

Figure 14 is a perspective view of another securing cap,

Figure 15 is another perspective view of the other securing cap, and

Figure 16 is a perspective view of a third securing cap.

15 Figure 1 is an exploded view of a plug type connector which has a housing 1 which is constructed so as to be substantially cylindrical with a stepped portion in the form of a flange 4. On the cylindrical body, the housing 1 has a screw thread 3 in the form of grooves. Electrical lines 8 are guided out at a first end of the housing 1. A line guide 9 which can be fitted to the first end of the housing 1 is provided for guiding the
20 electrical lines 8. A cap 10 for covering the line guide 9 is provided. At the first end, the housing 1 has, at two opposing sides, two retaining plates 11, 12 which are constructed so as to be flexible and which have openings for receiving engaging hooks.

At the second end, the housing 1 has two opposing pins 34 which serve to guide and retain a connector housing 13. An annular sealing ring 2 is also provided and this
25 sealing ring is pushed onto the cylindrical body of the housing 1 in abutment with an abutment face of the flange 4. A sleeve 5 which has at least one cam 7 on the inner side is also provided. At the outer side, the sleeve 5 has at least one plate 6 which projects laterally beyond the outer periphery of the sleeve 5 in the rest position and which has an abutment face which is directed toward the flange 4 in the assembled state. For assembly,
30 the sleeve 5 having the cams 7 is introduced into the screw thread 3 from the second end of the housing 1. The connector housing 13 serves to supply electrical lines to the housing 1 and can be covered with a securing cap 14. The securing cap 14 serves to cover the

opening of the connector housing 13 and also, depending on the configuration, to secure the lines to the connector housing 13. The electrical lines 8 are guided through the housing 1 and have, in the second end region of the housing 1, connection contacts for connecting additional electrical lines. The housing 1 and the components illustrated in
5 Figure 1 are produced from an insulating material, for example, from a plastic material, except for the conductors of the electrical lines 8. A different component may also be provided in place of the sleeve 5 and this component is connected to the housing 1 by means of a screw connection and which has the plates 6. The component can be, for example, in the form of a ring or part-ring. Depending on the configuration selected,
10 another positive-locking connection, with which the component can be moved from the assembly position to the end position, can also be selected in place of the screw thread.

Figure 2 shows a pre-assembled plug type connector 16 wherein the sleeve 5 is in an assembly position. A connector housing unit 15 which is formed by the connector housing 13 and the fitted securing cap 14 is also illustrated. The connector housing unit
15 15 is subsequently inserted into a connector housing opening 35 which is constructed at the second end of the housing 1 opposite the cap 10.

In one embodiment, the housing 1 and the sleeve 5 are constructed in such a manner that the connector housing opening 35 in the assembly position as illustrated in Figure 2 is at least not completely released so that the connector housing unit 15 cannot
20 be introduced into the connector housing opening 35. To that end, the housing 1 and/or the sleeve 5 have corresponding projections and/or recesses which block a cross-section necessary for introducing the connector housing unit 15. The connector housing opening 35 is released in the end position of the sleeve 5.

Figure 3 shows a pre-assembled plug type connector 16 which is secured to a
25 carrier 17. For securing, the carrier 17 has retention arms with engaging projections 19 which engage in the openings of the retention plates 11 when the housing 1 is fitted. The retention plates 11 are constructed so as to be flexible and are bent outward when the housing 1 is fitted. The retention plates 11 move resiliently back inward so that the pre-assembled plug type connector 16 is secured to the carrier 17 after passing over the
30 engaging projections 19 and after the engaging projections 19 have moved into the openings of the retention plates 11. The pre-assembled connector housing 16 can be used for being mounted in a wall 20, as illustrated in Figure 4, with or without a carrier. In

another configuration, the carrier 17 has a stud 18 which is arranged parallel with a longitudinal direction of the pre-assembled plug type connector 16.

Figure 4 is a cut-out of the wall 20 which has a connector opening 21. In another configuration, the wall 20 also has a guide opening 22. The wall 20 may also have
5 another opening 23. The connector opening 20 is constructed in the embodiment illustrated so as to be circular, with the connector opening 21 being surrounded by an annular sealing edge 36. The guide opening 22 is arranged with spacing from the connector opening 21.

Figure 5 is a cross-section A-A through the wall 20, with the connector opening
10 21 and the guide opening 22 being illustrated in section. The guide opening 22 is in the form of a blind hole whose center axis is arranged parallel with the center axis of the connector opening 21. For assembly, the pre-assembled plug type connector 16 can be introduced into the connector opening 21. In a development in which the wall 20 also has the guide opening 22, the pre-assembled plug type connector 16 can be introduced into
15 the connector opening 21 in a state secured to the carrier 17. The introduction of the plug type connector 16 is supported by the stud 18 which is introduced into the guide opening 22 and is guided along the longitudinal axis of the guide opening 22.

Figure 6 shows a plug type connector 16 which is secured to the carrier 17 and which is fitted through the connector opening 21. When the plug type connector 16 is
20 fitted through the connector opening 21, the plates 6 are pressed inward by the edge of the connector opening 21. After passing through the wall 20, the plates 6 move resiliently outward again so that abutment faces 37 of the plates 6 project laterally beyond the connector opening 21 and are directed toward a peripheral region of the wall 20.

Depending on the configuration selected, it is also possible for other geometries of
25 the connector opening 21 and configurations of the plates 6 to be used which make it unnecessary for the plates 6 to move resiliently inward when the plug type connector 16 is assembled.

In one configuration, the plates 6 are in the form of partial cut-outs of the sleeve wall of the sleeve 5. In the pre-assembled state of the plug type connector 16, the plates 6
30 are arranged between the pins 34 in the embodiment illustrated so that resilient movement in the direction toward the center axis of the sleeve 5 is possible. In one configuration, the

plates 6 have additional engaging projections 38, on which the abutment faces 37 are constructed.

In order to completely assemble and seal the connector opening 21, the sleeve 5 is rotated by means of the screw thread 3 from the assembly position as illustrated in Figure 6 to an end position in the direction toward the flange 4. The plates 6 adjoin the wall 20 with the abutment faces 37 and draw the flange 4 toward the wall 20 due to the pitch of the screw thread 3. The sealing ring 2 is pressed against the sealing edge 36 and sealing of the connector opening 21 is achieved.

Depending on the configuration selected, the position of the carrier 17 in relation to the wall 20 is selected in such a manner that the connection between the retention plates 11 and the engaging projections 19 of the carrier 17 is released by the flange 4 being pulled in the direction toward the wall 20. To that end, for example, the length of the stud 18 is selected in such a manner that a front end of the stud 18 adjoins the end of the blind hole of the guide opening 22 before the plug type connector 16 adjoins the wall 20. By the sleeve 5 being rotated further, the plug type connector 16 is released from the carrier 17 and drawn toward the wall 20. This situation is illustrated in Figure 7. In the embodiment illustrated, consequently, the carrier 17 is connected in a positive-locking manner to the wall 20 by means of the stud 18 and the plug type connector 16 is released from the positive-locking connection to the carrier 17 and is only secured mechanically to the wall 20 by means of the clamping force of the sleeve 5. In the end position of the sleeve 5, the insertion opening is released for the introduction of the connector housing unit 15 so that the connector housing unit 15 can be introduced into the connector housing opening 35 as illustrated in Figure 7.

Figure 8 shows a partial cut-out of a wall 20 with a completely assembled plug type connector 16, in which the connector housing unit 15 is inserted. The plug type connector 16 is released from the carrier 17 and the electrical lines 8 of the plug type connector 16 are connected to a sensor 24 which is secured to the carrier 17.

The wall 20 can be, for example, a partition wall in an engine compartment of a motor vehicle. In another configuration, the wall 20 can also be a partition wall between a gear compartment and a clutch compartment. The carrier 17 is arranged in the gear compartment and the sensor 24 detects, for example, a position of a gear, in particular a position of a toothed wheel or a rotation speed of a shaft or a toothed wheel. The plug

type connector is used in order to guide electrical signals from the gear compartment to the clutch compartment, with the passage being sealed in an oil-tight manner. However, the invention can also be used in other arrangements.

Figure 9 is a perspective view of part of the sleeve 5, with the plate 6 being
5 constructed as part of the wall of the sleeve 5 which is constructed so as to be flexible by means of a U-shaped slot 27. The cam 7 is illustrated at an inner side of the sleeve 5. Depending on the embodiment selected, there are constructed at least two cams 7 which are arranged opposite each other on the inner side. The cams 7 are constructed, for example, identically. The cam 7 illustrated in Figure 9 has a central notch 26. The notch
10 26 supports engagement of the sleeve 5 on raised engaging portions of the screw thread 3. The notch 26 is constructed so as to be wedge-like from the inner side in the direction toward the sleeve 5 on the cam 7. In one configuration, the cam 7 also has, at an upper side, chamfers 25 which form inwardly and downwardly inclined faces from the upper side. It is more readily possible to remove the sleeve 5 from the housing 1 due to the
15 chamfers 25.

Figure 10 is a schematic partial cross-section through the plate 6 of the sleeve 5 after the plug type connector has been inserted into the connector opening 21. The plate 6 has, at the outer side of the sleeve 5, the additional engaging projection 38 with the abutment face 37 which is associated with the wall 20. An inclined face 39, which leads
20 from the outer side of the sleeve 5 to the upper side of the additional engaging projection 38 that is outwardly spaced apart from the outer side of the sleeve, is constructed opposite the abutment face 37. When the plug type connector 16 is inserted into the connector opening 21, the inclined face 39 first moves into abutment with the sealing edge 36. When the plug type connector 16 is inserted, the inclined face 39 slides along the edge of
25 the connector opening 21 and the plate 6 is pivoted inward. After passing through the connector opening 21, the plate 6 moves resiliently outward so that the abutment face 37 is associated with the peripheral region of the wall 20 which surrounds the connector opening 21, as schematically illustrated in Figure 10.

In the end position, the plate 6 is further screwed to the housing 1 and is located
30 above the screw thread 3 so that the plate 6 can no longer move resiliently inward. This situation is schematically illustrated in Figure 10, with the housing 1 being indicated with broken lines. Consequently, the plate 6 is prevented from moving away inward in the end

position and securing of the sealing ring 2 with respect to the wall 20 is prevented from being loosened.

Figure 11 is a perspective view of the second end of the housing 1 having the screw thread 3 and the pins 34. Electrical contacts 40 are also illustrated, these contacts protruding out of the housing 1 and being connected to the electrical lines 8 in an electrically conductive manner. When the sleeve 5 is fitted to the housing 6, the cams 7 are inserted into insertion recesses 41 of the screw thread 3. A first and a second raised engaging portion 28 are arranged in the groove 42 of the screw thread 3 adjacent to the insertion recess 41. In one configuration, the raised engaging portions 28 have a wedge-like shape which is constructed symmetrically relative to the wedge-like notch 26 of the cams 7. The engaging position when the sleeve 8 is rotated is fixed by the raised engaging portion 28. A second inclined face 29 is further constructed at a lateral wall of the groove 42 that is directed toward the second end and is adjacent to the first raised engaging portion 28. The second inclined face is a second chamfer 29 and facilitates removal of the sleeve 5 from the housing 1. The screw thread 3 has, in an end region, a second raised engaging portion 44 in the groove 42. The second raised engaging portion 44 is also constructed in one embodiment so as to be wedge-like in accordance with the notch 26 of the cams 7. As a result, the sleeve 5 can be engaged in two engagement positions in the end engagement position.

Consequently, there are provided securing means with which the sleeve 5 is retained in a start position and an end engagement position. The end engagement position ensures that the pressing pressure with which the abutment face 37 pretensions the sealing ring 2 against the wall 20 is maintained.

Depending on the embodiment selected, it is possible for a larger or smaller number of raised engaging portions to be provided in order to fix rotational positions of the sleeve 5 or to make them perceptible.

A receiving region for receiving the connector housing unit 15 is provided between the pins 34. In the embodiment illustrated, there are provided guide faces 46 which are arranged at the inner sides of the pins 34 and which fix an insertion direction and an orientation of the connector housing unit 15 for insertion into the housing 1.

Figure 12 is a schematic top view of the connector housing opening 35 of the plug type connector 16. Figure 12 shows the sleeve 5 in the end position, in which an opening 47 of a cover 55 of the sleeve 5 coincides with the spacing of the two guiding faces 46 of the pins 34 and consequently the connector housing opening 35 is released. The opening 47 has a rectangular cross-section in accordance with the cross-section of the connector housing unit 15. In this position, it is possible to insert the connector housing unit 15. If the sleeve 5 is rotated relative to this position, however, the opening 47 is rotated relative to the pins 34 so that it is no longer possible to insert the connector housing unit 15.

Figure 13 is a perspective view of an additional securing cap 30 which can be fitted to the line guide 9 in place of the cap 10. The additional securing cap 30 has a foldable curved clamping member 31 which can be engaged with the additional securing cap 30 in a retention position. The electrical lines 8 are clamped between the curved clamping member 31 and a support face 48 of the additional securing cap 30 in the retention position so that tension is relieved.

Figure 14 is a side view with the electrical lines 8 being schematically illustrated and being guided out of the line guide 9 of the plug type connector 16 and the additional securing cap 30, for example, to a sensor of the carrier 17. Two mutually associated engaging hooks are constructed in order to secure the curved clamping member 31. The additional securing cap 30 has a removal face 49 which is arranged on a lower side of a projection 53. In the assembled state, an arm 50 of the carrier 17 is arranged between the removal face 49 and the housing 1.

Figure 15 is a cross-section through an assembled plug type connector 16 with the additional securing cap 30 between the removal face 49 and the housing 1. A U-shaped arm 50 of the carrier 17 is illustrated and is guided under the removal face 49 of the additional securing cap 30. If the carrier 17 is removed from the wall 20, the arm 50 is, at the same time, positioned against the removal faces 49 of the additional securing cap 30 and the plug type connector 16 is withdrawn from the connector opening 21. To that end, the sleeve 5 can preferably be rotated back into the assembly position beforehand or can be completely removed from the plug type connector. Consequently, it is possible to withdraw the plug type connector 16 from the connector opening 21 without additional tools. Instead of being U-shaped, the arm 50 may also be of any other shape which

engages behind a removal face 49 of the additional securing cap. Depending on the embodiment selected, a removal face 49 can also be constructed on the housing 1.

Figure 16 shows a third securing cap 51 which is fitted to the connector housing 13 of the connector housing unit 15 and which has an eyelet 52 as a securing means for a
5 tool. A tool in the form of a hook can be inserted into the eyelet 52 and the connector housing unit 15 can be withdrawn from the plug type connector 16 as a result.

Claims

1. Plug type connector (16) having a housing (1), having a component (5), the component (5) being connected to the housing (1) by means of a screw thread (3), the
5 component (5) having at least one engaging plate (6) having an abutment face (37), the engaging plate (6) projecting with the abutment face (37) beyond the periphery of the housing (1), the housing (1) having a lateral flange (4) which projects beyond the periphery of the housing (1) and which has a second abutment face (54), a spacing between the first and second abutment face (37, 54) being reduced from an assembly
10 position to an end position by the component (5) being rotated by means of the screw thread (3).
2. Plug type connector according to claim 1, characterized in that retention means (44, 45) which retain the component (5) in the end position are provided.
3. Plug type connector according to either claim 1 or claim 2, characterized in that
15 the engaging plate (6) projects with the abutment face (37) beyond the periphery of the housing (1) in a rest position, and in that the engaging plate (6) is resiliently secured to the component (5) so that the engaging plate (6) can be pushed back in the direction toward the housing.
4. Plug type connector according to any one of claims 1 to 3, characterized in that a
20 securing means (11, 12) is provided on the housing (1) in order to secure the plug type connector (16) to a carrier (17).
5. Plug type connector according to either claim 3 or claim 4, characterized in that, in the end position, the engaging plate (6) is arranged above a support face of the housing (1) so that resilient movement of the engaging plate (6) inward in the direction of the
25 housing (1) is prevented.
6. Plug type connector according to any one of claims 1 to 5, characterized in that the housing (1) has an opening (35) opposite the flange (4) in order to receive a connector housing unit (15), and in that there are provided, on the component (5) and/or on the housing (1), adjustment means (34, 47) which release the opening (35) only in the end
30 position of the component (5) in order to insert the connector housing unit (15).

7. Plug type connector according to any one of claims 1 to 6, characterized in that there are provided on the housing (1) engaging means (28, 43, 44, 45), with which the component (5) engages in at least one fixed rotation position with the housing (1).
8. Plug type connector according to any one of claims 4 to 7, characterized in that
5 the securing means (11) are in the form of releasable securing means which are released by means of a tensile force which is applied to the housing (1) when the sleeve (5) is rotated so that positive-locking securing of the plug type connector (16) with respect to the carrier (17) is released.
9. Plug type connector according to any one of claims 1 to 8, characterized in that a
10 securing cap (10) is secured to the housing (1), and in that the securing cap (10) has a curved clamping member (31) in order to clamp conductor cables (8).
10. Plug type connector according to any one of claims 1 to 9, characterized in that a cam (7) which is guided in a groove (42) of the screw thread (3) is constructed at an inner side of the sleeve (5), and in that the cam (7) has a chamfer (25) in order to facilitate
15 withdrawal of the component (5) from the screw thread (3).
11. Plug type connector according to any one of claims 7 to 10, characterized in that the engaging means are in the form of raised portions (28, 44) which are provided in the groove (42) of the screw thread (3).
12. Plug type connector according to any one of claims 1 to 11, characterized in that
20 lateral wall of the groove (42) of the screw thread (3) has a chamfer (29) which facilitates withdrawal of the component (5) from the housing (1).
13. Plug type connector according to any one of claims 1 to 12, characterized in that the plug type connector (16) is secured to a carrier (17), in that the carrier (17) has a guide element (18) with which the carrier (17) is guided in an insertion direction when the plug
25 type connector (16) is inserted into an opening (21) of a wall (20).
14. Plug type connector according to claim 13, characterized in that the guide element is in the form of a stud (18) which is arranged substantially parallel with a longitudinal axis of the housing (1).
15. Plug type connector according to any one of claims 1 to 14, characterized in that
30 an annular seal (2) is arranged at an inner side of the flange (4) that faces the sleeve.
16. Plug type connector according to any one of claims 11 to 15, characterized in that a removal face (49) is constructed on the plug type connector (16), and in that there is

constructed on the carrier an arm (50) which is arranged between the component (5) and the removal face (49) so that the plug type connector (16) can be pulled out of the opening (21) of the wall (20) with the arm (50).

17. Plug type connector according to claim 16, characterized in that the removal face
5 is constructed on a cap (30) which is fitted to the housing (1).

18. Plug type connector according to any one of claims 11 to 15, characterized in that a cap (51) is fitted to the connector housing unit (15), and in that the cap (51) has a retention means (52) which can be connected to a tool, with which the connector housing unit (15) can be pulled out of the plug type connector (16).

10 19. Plug type connector according to any one of claims 1 to 18, characterized in that the component is in the form of a sleeve (5), and in that the engaging plate (6) projects beyond the periphery of the sleeve (5) with the abutment face (37), a spacing between the first and second abutment face (37, 54) being reduced from an assembly position to an end position by the sleeve (5) being rotated by means of the screw thread (3).

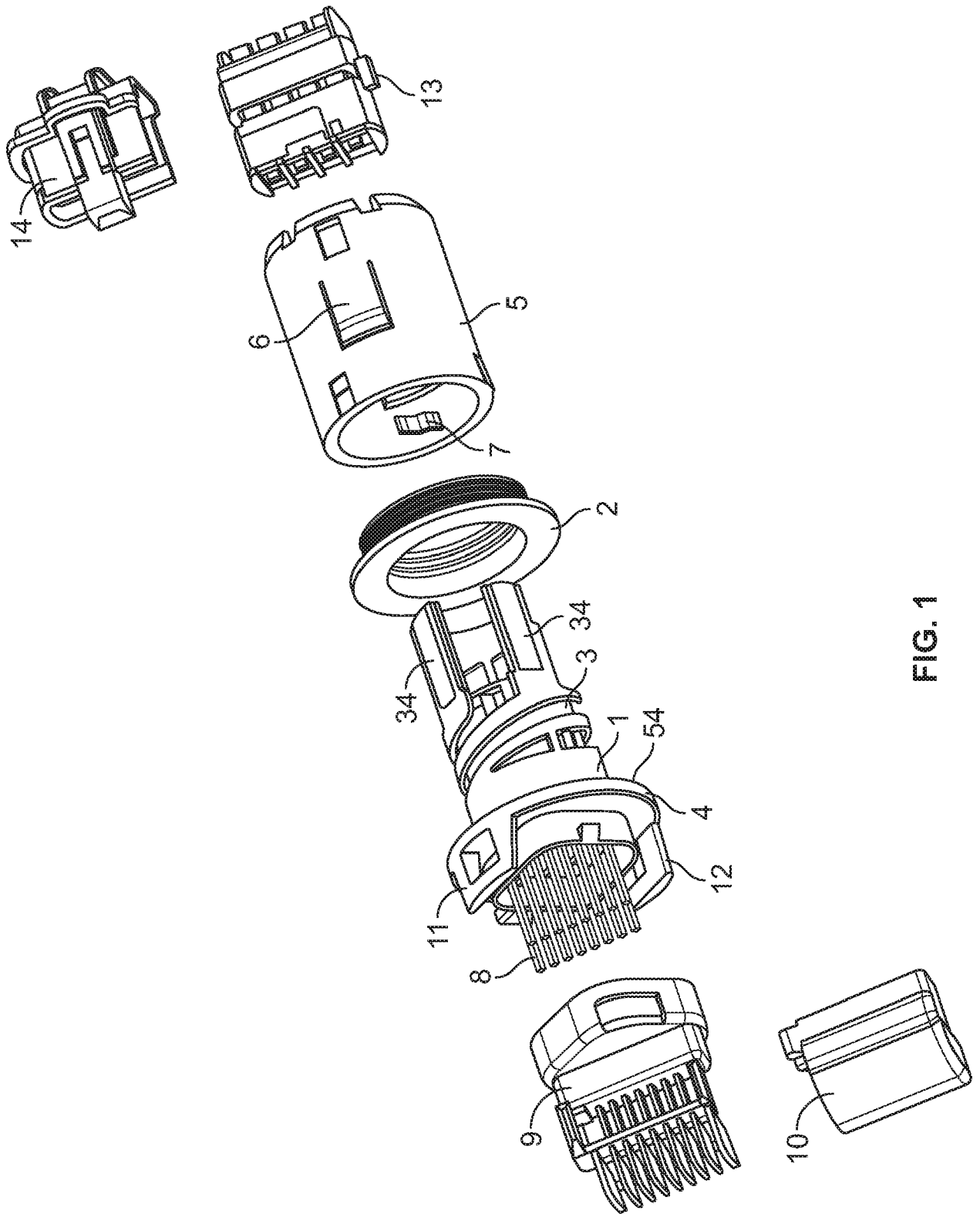
15 20. Plug type connector according to claim 19, characterized in that the engaging plate (6) projects beyond the periphery of the sleeve (5) in a rest position with the abutment face (37), and in that the engaging plate (6) is resiliently secured to the sleeve (5) so that the engaging plate (6) can move resiliently back in the direction toward the sleeve (5).

20 21. Arrangement having a wall (20), having an opening (21), through which a plug type connector (16) extends, the plug type connector (16) having a seal (2) which adjoins a peripheral region (36) of the opening (21), the seal (2) adjoining a flange (4) of the plug type connector (16), the plug type connector (16) being pretensioned against the wall (20) by means of an abutment face (37) of a component (5), the component (5) being
25 connected to a housing (1) of the plug type connector (16) by means of a screw thread (3), the plug type connector (16) having electrical lines (8) which are connected to a carrier (17), the carrier (17) being inserted with a guide element (18) into a guide opening (22) of the wall (20), the guide element (18) being orientated in a longitudinal direction of the housing (1) of the plug type connector (16).

30 22. Arrangement according to claim 19, characterized in that the wall (20) separates a clutch compartment from a gear compartment of an engine.

23. Method for assembling a plug type connector in an opening of a wall, the plug type connector being releasably secured to a carrier, the plug type connector being inserted into the opening by means of the carrier, the plug type connector being secured in a sealing manner to the opening by a component on the plug type connector being actuated, the plug type connector being released from the carrier during the securing operation.
24. Method according to claim 23, characterized in that the component is connected to a housing of the plug type connector by means of a screw thread, and in that the plug type connector is securely clamped to the wall by a rotation movement of the component.
25. Method according to either claim 23 or claim 24, characterized in that the carrier has a guide element, and in that the guide element is inserted into a guide opening of the wall when the plug type connector is assembled.

1/9



2/9

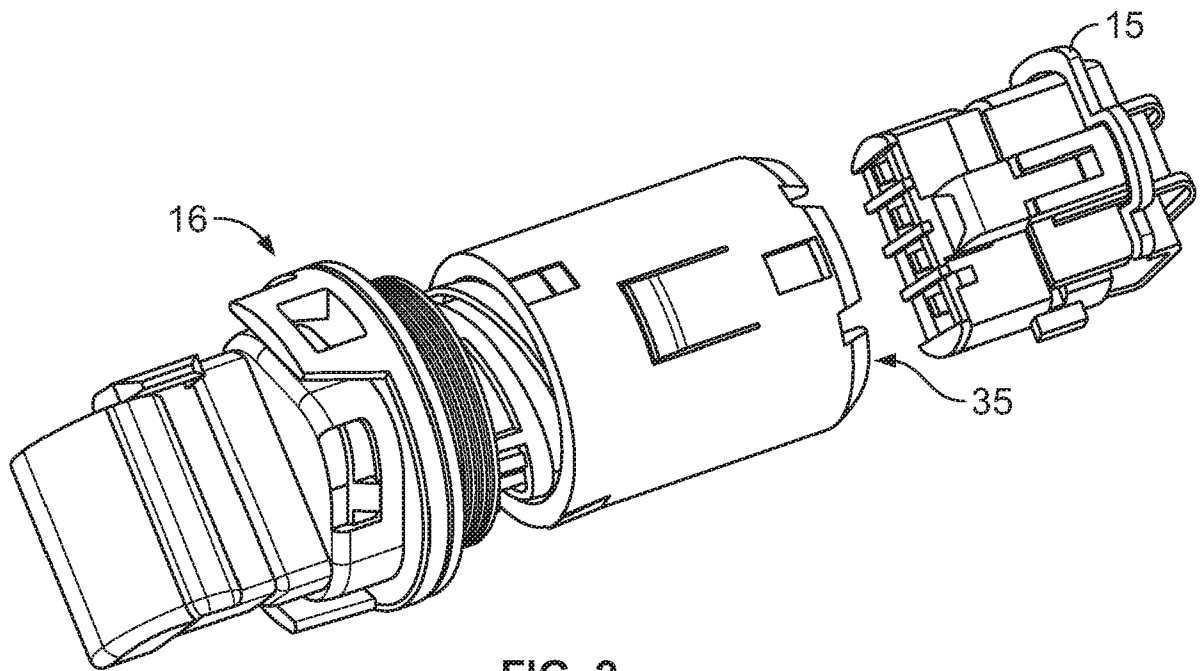


FIG. 2

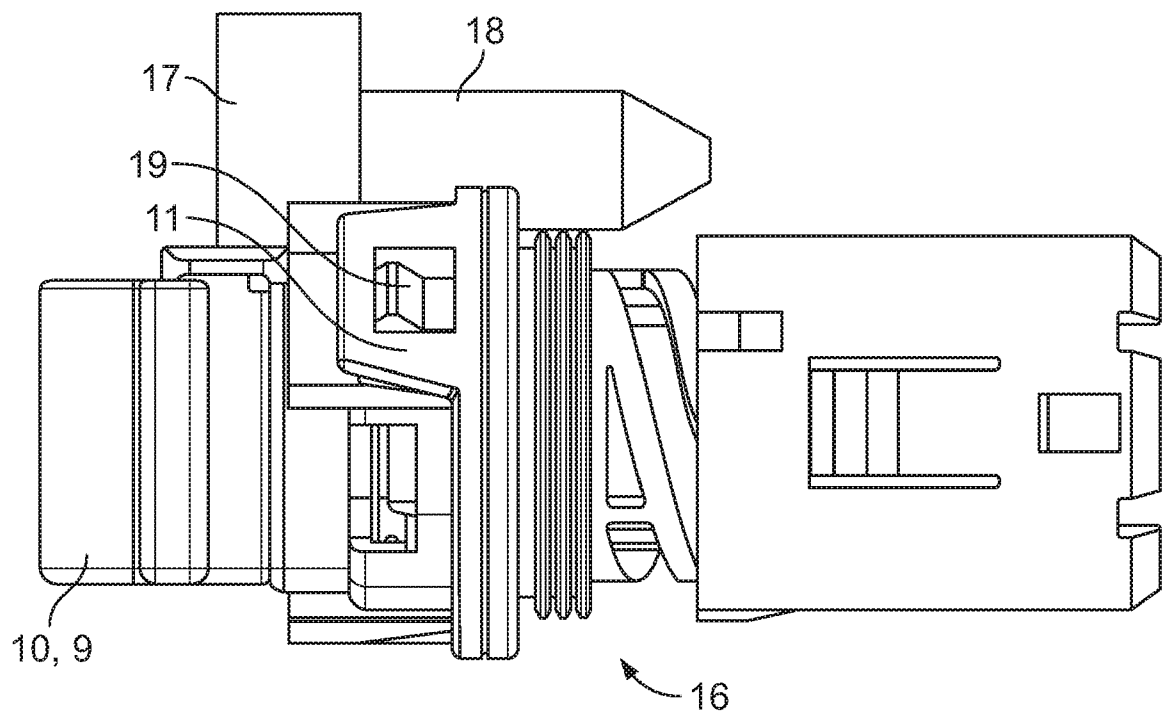


FIG. 3

3/9

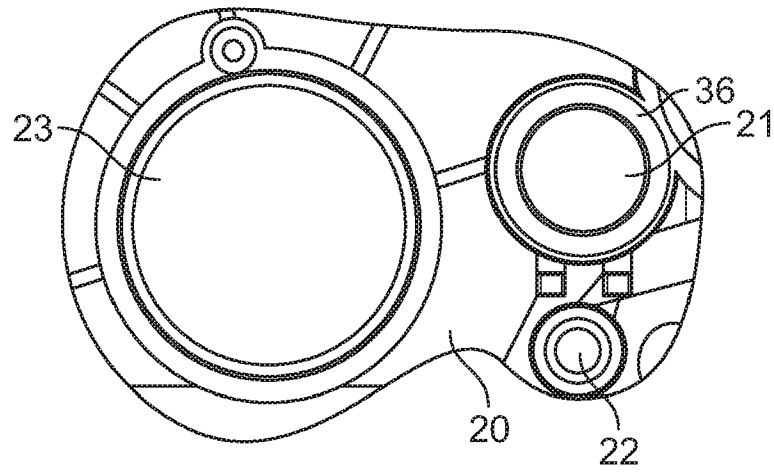


FIG. 4

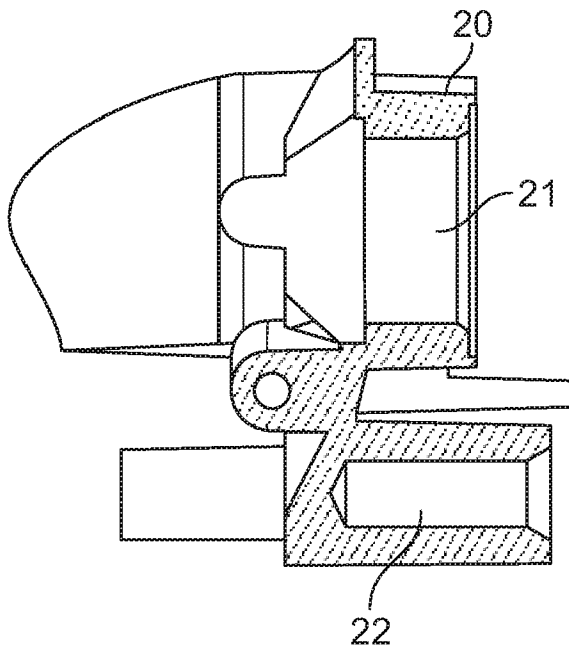


FIG. 5

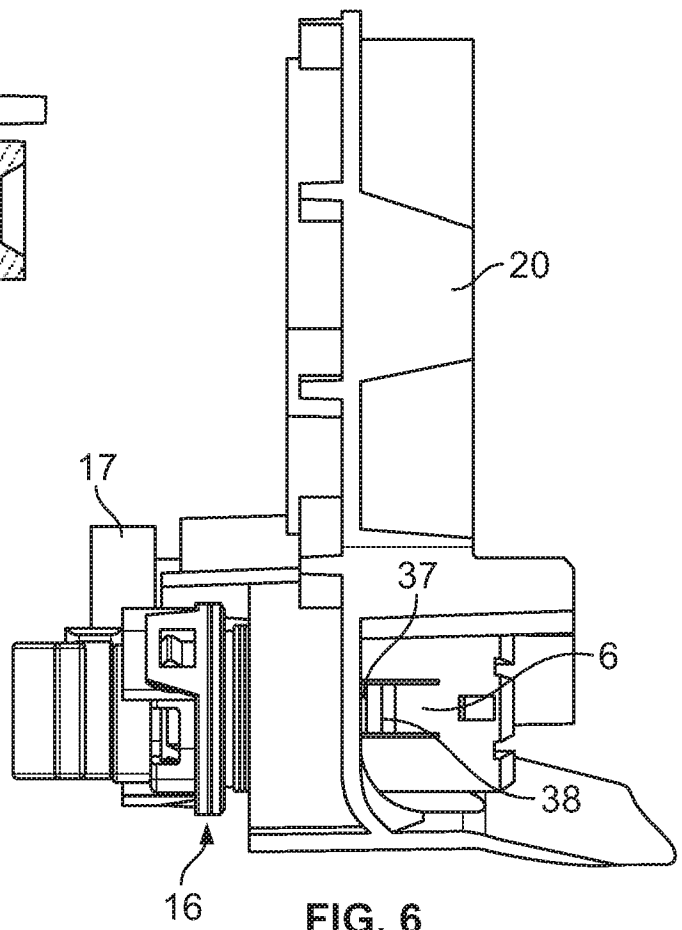


FIG. 6

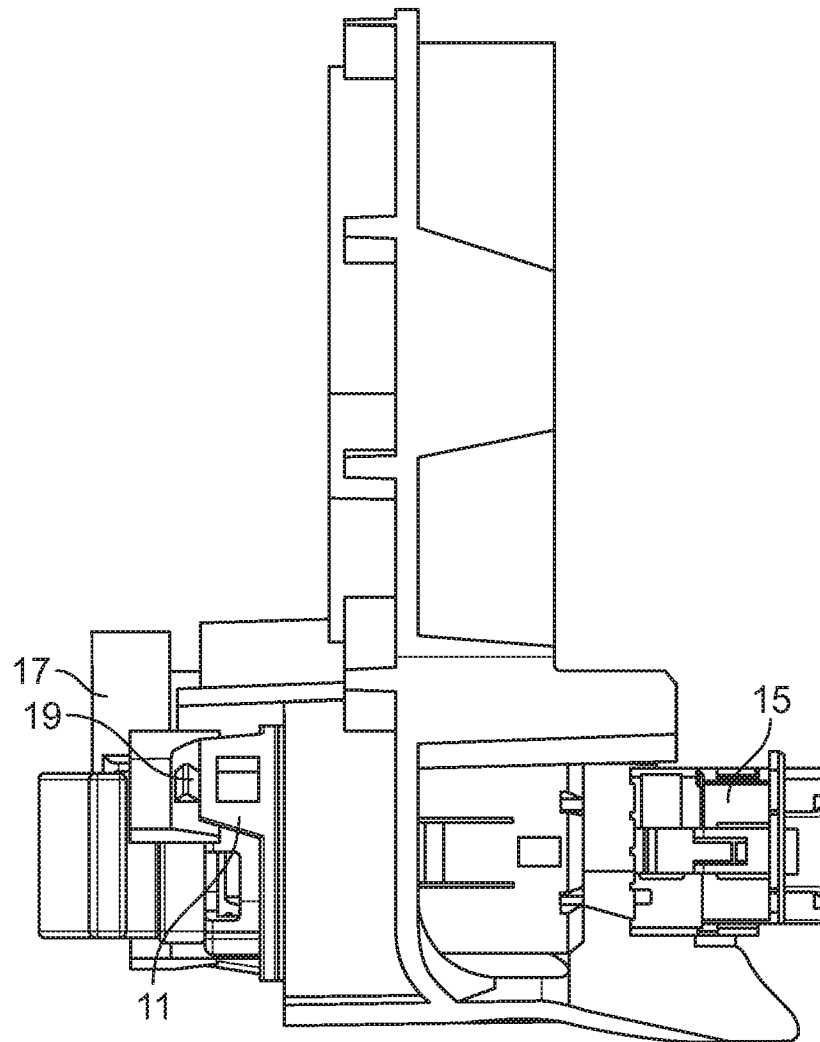


FIG. 7

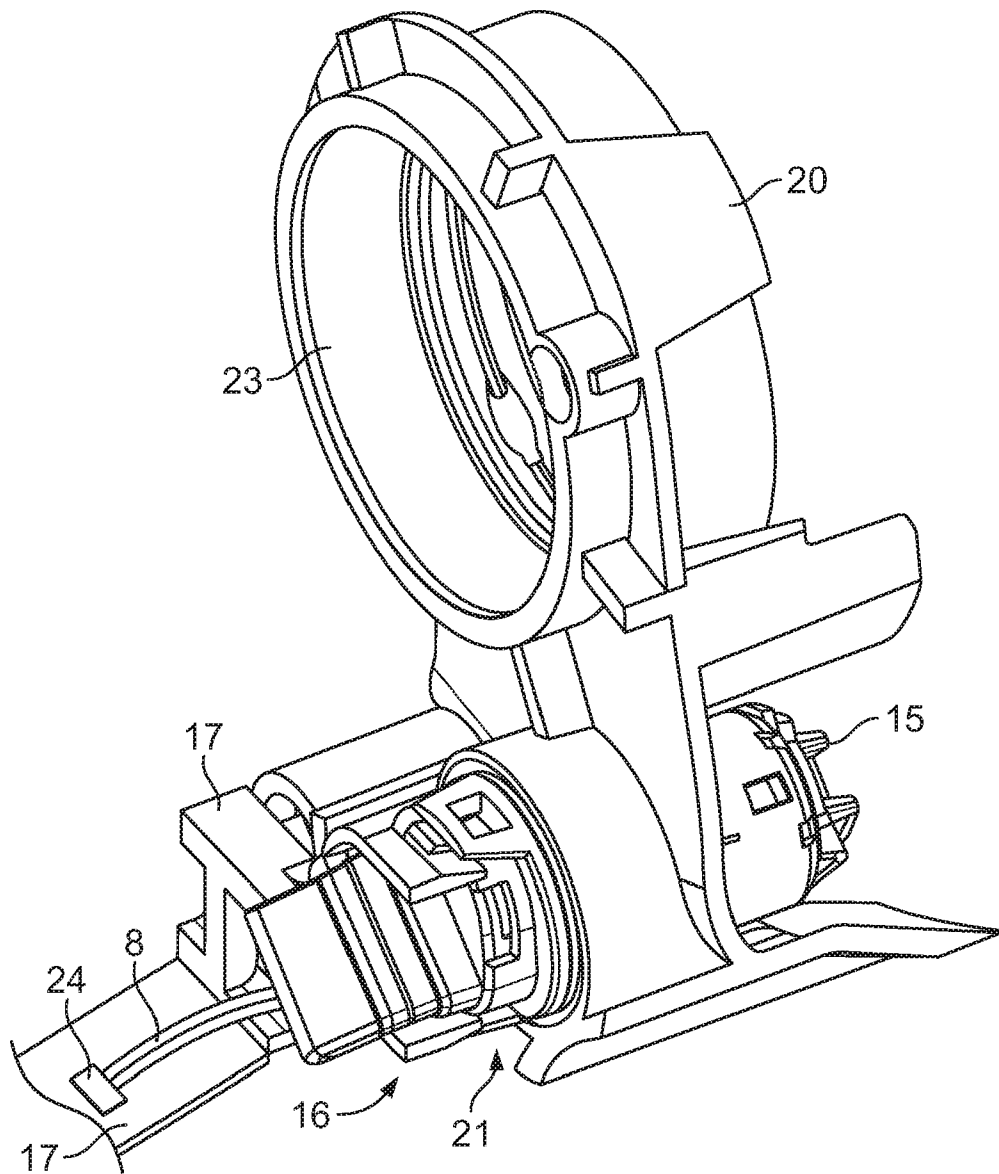


FIG. 8

6/9

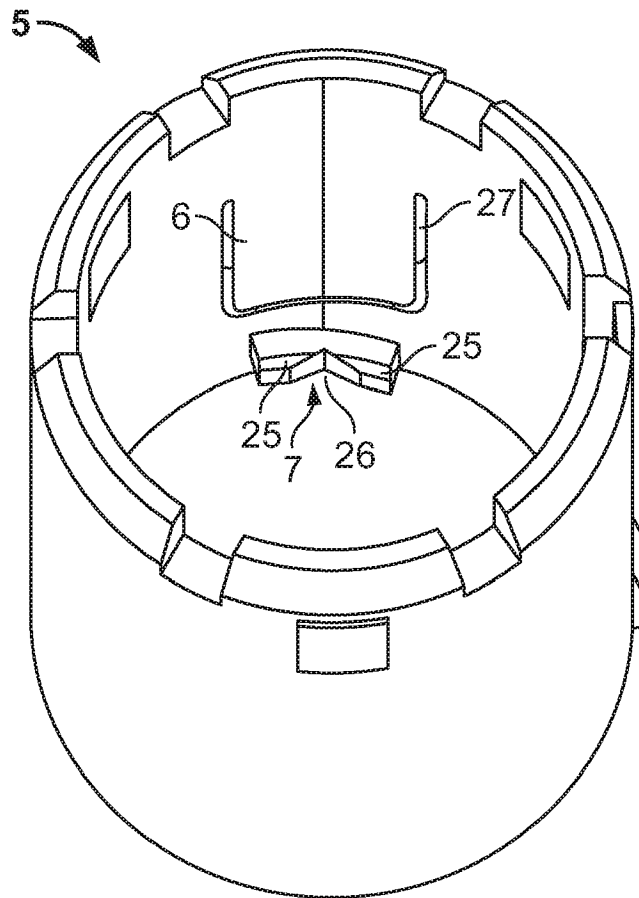


FIG. 9

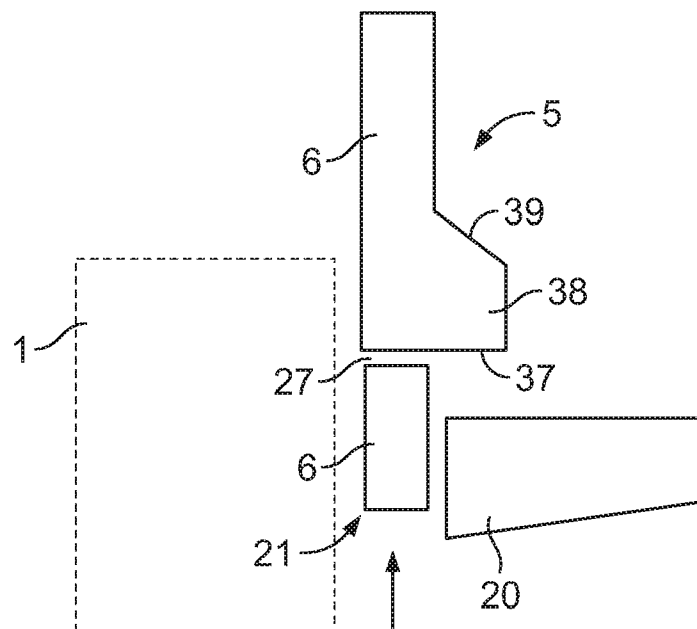


FIG. 10

7/9

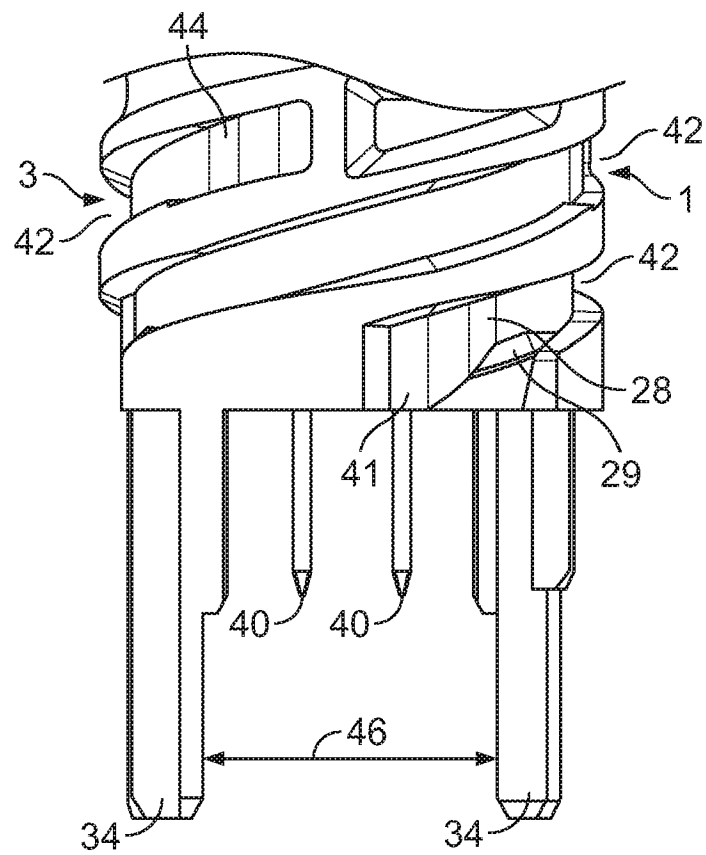


FIG. 11

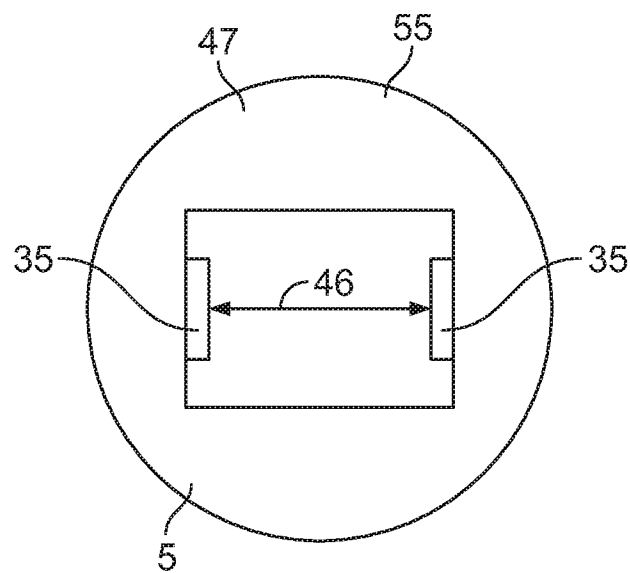


FIG. 12

8/9

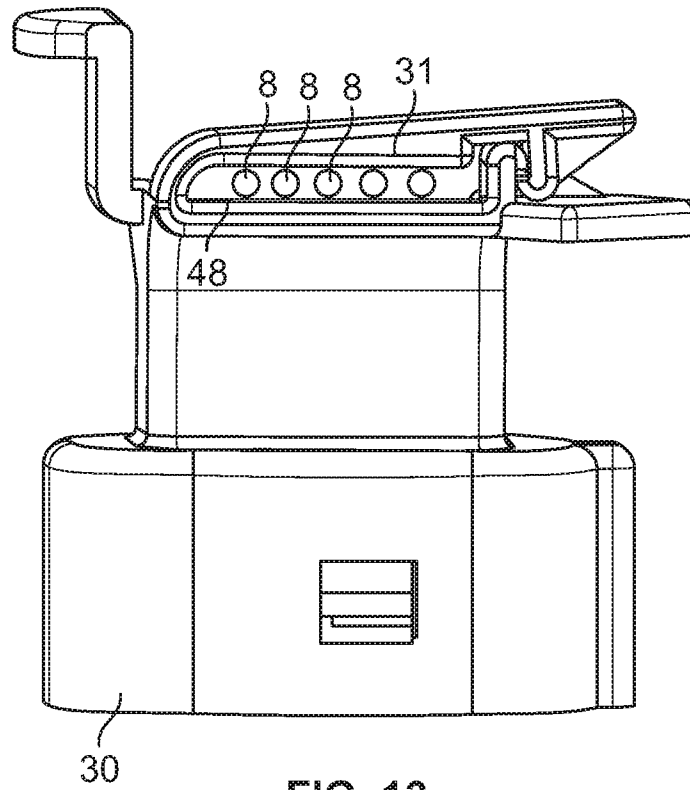


FIG. 13

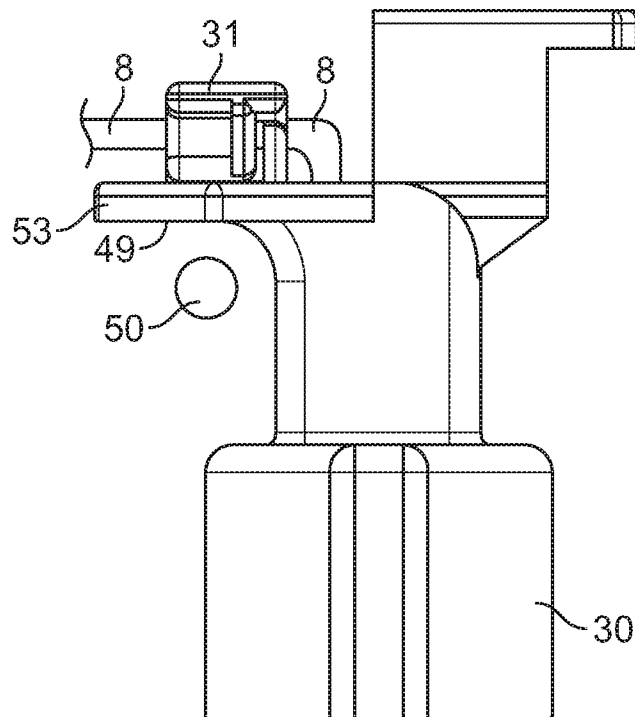


FIG. 14

9/9

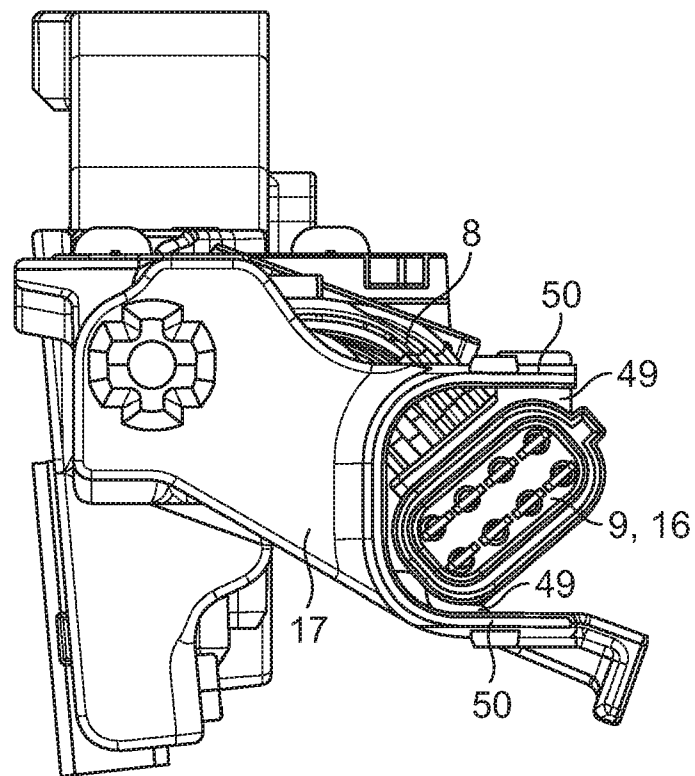


FIG. 15

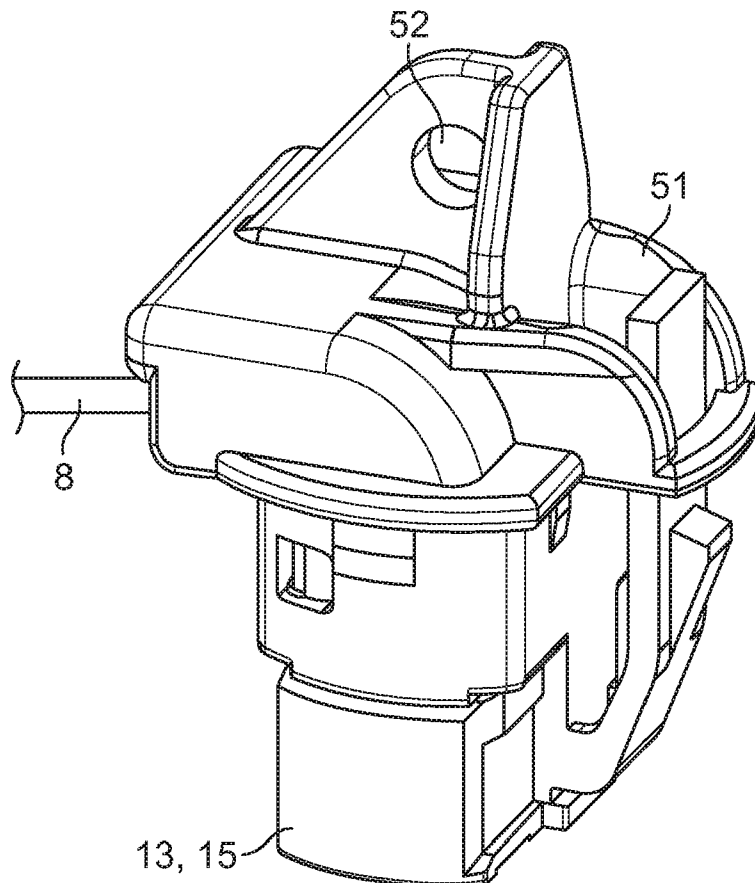


FIG. 16

INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2007/057625

A. CLASSIFICATION OF SUBJECT MATTER

INV. H01R13/623 H01R13/74 H01R13/64

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

H01R

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

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

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y A	US 6 364 681 B1 (WATANABE HIROSHI [JP]) 2 April 2002 (2002-04-02) column 5, line 3 - column 9, line 53 figures 1-6	1-5,7,9, 11,13-20 21,23
Y	EP 0 638 965 A (WHITAKER CORP [US]) 15 February 1995 (1995-02-15) column 3, line 39 - column 10, line 5 figures 1-29	1-5,7,9, 11,13-20
A	DE 297 19 333 U1 (INTERCONNECTRON GMBH [DE]) 25 February 1999 (1999-02-25) the whole document	13,14, 21,25



Further documents are listed in the continuation of Box C.



See patent family annex.

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O document referring to an oral disclosure, use, exhibition or other means

P document published prior to the international filing date but later than the priority date claimed

T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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Y document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

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Date of the actual completion of the international search

27 December 2007

Date of mailing of the international search report

17/01/2008

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NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Ledoux, Serge

INTERNATIONAL SEARCH REPORT

International application No
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