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(54) **HOUSING ASSEMBLY COMPRISING A SPRING-LIKE MODULE RETAINER**

(57) The invention relates to a housing assembly (67), comprising an outer housing (1) with at least one module receptacle (3) for receiving at least one connector-like terminal module (5) and with a connector face (11) at which the outer housing (1) can be connected with a complementary part (15), and with at least one module retainer (17) for retaining at least one terminal module (5) in the module receptacle (3) in an assembled state

(69), wherein the module retainer (17) is adapted to be at least partially insertable into a retainer receptacle (19) of the outer housing (1). In order to secure the position of the terminal module (5) in the module receptacle (3), the at least one module retainer (17) is adapted to spring-load a terminal module (5) in the module receptacle (3) towards the connector face (11) in the assembled state (69).

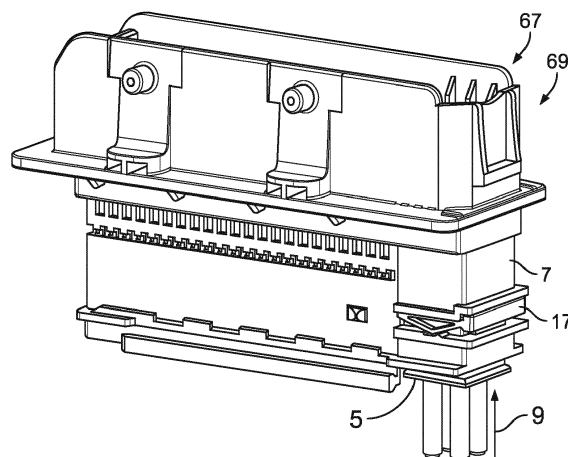


FIG. 6

Description

[0001] The invention relates to a housing assembly, in particular for a connector, the housing assembly comprising an outer housing with at least one module receptacle for receiving at least one connector-like terminal module and with a connector face at which the outer housing can be connected with a complementary part, such as a housing or a connector, the housing assembly further comprising at least one module retainer for retaining at least one terminal module in the module receptacle in an assembled state of the housing assembly, wherein the module retainer is adapted to be at least partially insertable into a retainer receptacle of the outer housing.

[0002] Housing assemblies of the aforementioned type are known in the art. They can be used for a connector, in particular forming a male or female part of a connector. The terminal module may be preassembled and subsequently inserted into the module receptacle in order to fully assemble the housing assembly. In the case a housing comprises several parts, positioning of these parts with respect to each other is often very difficult due to manufacturing tolerances of the parts. In particular in the case of several parts, the tolerances of each part add up.

[0003] It is therefore an object of the invention to facilitate assembling of a housing assembly.

[0004] For the housing assembly mentioned above, this object is achieved in that the at least one module retainer is adapted to spring load a terminal module in the module receptacle towards the connector face in the assembled state.

[0005] Spring loading the terminal module towards the connector face has several benefits: Firstly, a terminal module may always keep a constant predefined distance from the connector face. Secondly, the module retainer may actively counter a pressure against the terminal module or inserted terminals of the terminal module away from the connector face when the housing assembly is pressed together with a complementary part. The presence of the module retainer may thus prevent gaps between the terminal module and its corresponding counterpart of a mating connector.

[0006] The at least one terminal module is "connector-like" in the sense that the terminal module may constitute a connector in and of itself. In other words, the terminal module may be provided with a module body that is provided with terminal receptacles for receiving terminals. The terminal module may be inserted into the module receptacle similar to a connector being inserted into a bushing. In the assembled state of the housing assembly, the terminal receptacles in the terminal module may be accessible at the connector face for connecting the terminals of the terminal module with their corresponding counterparts.

[0007] In the following, further improvements of the invention are described. The additional improvements may be combined independently of each other, depending on whether a particular advantage of a particular improve-

ment is needed in a specific application.

[0008] According to a first advantageous improvement, the at least one retainer receptacle may be connected with the at least one module receptacle. In other words, both receptacles may be connected by a common open volume. Consequently, a module retainer that is arranged in the retainer receptacle may interact with a terminal module in the module receptacle.

[0009] In order to form a retainer receptacle in a simple manner, the outer housing may be provided with at least one opening in a side wall through which the module receptacle and/or the terminal module is accessible from outside of the outer housing. The term side wall may correspond to a wall that extends parallel with a module insertion direction of the terminal module.

[0010] Preferably, the terminal module is adapted for being inserted into the module receptacle along a module insertion direction. Said module insertion direction may be parallel with a housing assembly direction of the housing assembly. The module insertion direction may be directed towards the connector face.

[0011] The at least one module retainer, or a part of the same, may extend into the module receptacle in the assembled state, preferably perpendicular to the module insertion direction.

[0012] In order to facilitate the insertion of the terminal module into the module receptacle, and in order to allow for flexibility in the design of the module retainer, the at least one module retainer is preferably formed as a separate component. In other words, the module retainer is preferably not formed monolithically with the outer housing and/or the terminal module. Of course, such an embodiment does not exclude the module retainer being detachably connected with the outer housing and/or the module receptacle, for example by use of a cord, a strap or other means.

[0013] In order to define the position for a terminal module in the assembled state, in particular with respect to the connector face, the outer housing is preferably provided with at least one stop element for stopping a movement of the terminal module in the module insertion direction. Such a stop element may be a protrusion that protrudes into the module receptacle. Another exemplary embodiment of a stop element may be a structure of the outer housing that also forms the connector face, for example a frame or a wall that is provided with openings for terminals from the terminal module to be accessed from outside the housing assembly.

[0014] In order to generate a spring force, or, in other words, for spring loading the terminal module towards the connector face, the at least one module retainer is preferably provided with at least one elastically deformable spring member which is adapted to generate the spring force.

[0015] According to a preferred embodiment, the at least one spring member is formed as an elastically deflectable lever. Preferably, the elastically deflectable lever extends from a base, wherein the base has a fixed

position with respect to the outer housing in the assembled state. Preferably, the lever extends in a direction that has a component that is parallel with the module insertion direction.

[0016] In the alternative to the above mentioned lever, the at least one spring member may be formed as a deformable structure, in particular an elastically compressible structure, which is connected to a base at at least two positions, said positions being spaced apart from each other in a direction perpendicular to the module insertion direction.

[0017] Preferably, the at least one module receptacle is adapted for receiving the at least one terminal module along a module insertion direction, i.e. towards the connector face, and the at least one retainer receptacle is opened to an outside of the outer housing along a retainer insertion direction, wherein the retainer insertion direction differs from the module insertion direction. Preferably, both directions are basically perpendicular to each other. The at least one retainer receptacle is preferably opened to an outside of the outer housing for insertion of the module retainer into the retainer receptacle.

[0018] The at least one retainer receptacle is preferably provided with at least one opening in a side wall of the outer housing, a longitudinal direction of the opening being basically parallel with the retainer insertion direction. The at least one opening in the side wall is preferably formed as a slit.

[0019] The retainer insertion direction being perpendicular to the module insertion direction may facilitate the insertion of both elements. In particular, inserting the actual retainer into the retainer receptacle when the terminal module is already arranged in the module receptacle will not influence the position of the terminal module along the module insertion direction, except for the spring load exerted on the terminal module towards the connector face.

[0020] In order to prevent the module retainer from being unintentionally removed from its final position in the assembled state, the module retainer is preferably provided with at least one locking means for locking the retainer against removal from the outer housing and/or from a terminal module in the assembled state, at least along the retainer insertion direction.

[0021] Preferably, the outer housing and/or the terminal module are provided with at least one counter locking means for locking the locking means of the module retainer in the assembled state. Just by way of example, the at least one locking means and/or the at least one counter locking means may each be formed as a protrusion protruding basically parallel to the module insertion direction of the terminal module, i.e. perpendicular to the module retainer insertion direction.

[0022] The locking means and/or the counter locking means may latch the module retainer to the outer housing and/or the terminal module. A force may be needed to be overcome during insertion of the module retainer into the retainer receptacle in order to lock the complementary

locking means with each other.

[0023] In case the module retainer is provided with at least one spring member, the at least one locking means may be part of the at least one spring member of the module retainer. Hence, a compact design of the module retainer may be achieved.

[0024] In order to facilitate assembling the housing assembly, said housing assembly may be provided with at least one guide system adapted to guide at least a part of the module retainer into the retainer receptacle, in particular along the retainer insertion direction. Preferably, the at least one guide system is further adapted to block a movement of the module retainer in a direction perpendicular to the retainer insertion direction and/or perpendicular to the module insertion direction. Just by way of example, rims of the retainer receptacle, in particular in a side wall of the outer housing, may form rails for the guide system. Preferably, the at least one module retainer is provided with complementary means that can slide along said rails.

[0025] In order to form a compact module retainer with a simple design, the at least one module retainer is provided with at least one leg for being inserted into the retainer receptacle, in particular between the outer housing and the terminal module. Preferably, the at least one leg is provided with at least one spring member and/or with at least one rail for the guide system. The rail may be part of a base and the leg may extend from said base. The at least one leg may also be provided with at least one locking means for locking the module retainer in the assembled state.

[0026] According to another advantageous improvement, the at least one module retainer is provided with at least two legs, in particular parallel legs, which are spaced apart from each other. Particularly in the case of parallel legs, the legs are preferably spaced apart from each other in a direction perpendicular to the longitudinal directions of the legs. In the assembled state, the legs preferably extend parallel to the retainer insertion direction and/or perpendicular to the module insertion direction. The module retainer may have the overall shape of a U. Thereby, the two legs are parallel with each other and are interconnected by a pressing portion for pressing the module retainer into the retainer receptacle. The pressing portion preferably extends perpendicular to the legs and thereby perpendicular to the retainer insertion direction in the assembled state. The module retainer may have the shape of a clamp, a hoop or a bracket, each basically forming a "U".

[0027] Preferably, each leg is provided with a spring member, a locking means and a guide rail. Said locking means may, as mentioned above, be part of the spring member.

[0028] Preferably, the outer housing is provided with at least one support element for supporting the at least one module retainer in the assembled state. The support element may be an outer side of the side wall, in particular shaped as a rib extending along the retainer insertion

direction. The support element may serve to support the module retainer, in particular the spring member of the same, or, in other words, to serve as an abutment, such that the spring force may be directed against the terminal module and push the terminal module towards the connector face.

[0029] Preferably, the housing assembly further comprises at least one terminal module that is insertable into the module receptacle. In the assembled state of the housing assembly, the at least one module retainer is preferably arranged between the outer housing or at least a section thereof and the terminal module or at least a section thereof. In the assembled state, the at least one module retainer may spring-load the terminal module in the module insertion direction towards the connector face. The term "between the outer housing and the terminal module" is to be understood as the module retainer extending between sections of the outer housing and the terminal module along the module insertion direction to apply the spring force between these two parts.

[0030] The at least one module retainer is preferably made from a plastic material and/or from metal. This does not exclude the module retainer being made from other materials or combinations of materials.

[0031] The at least one terminal module is preferably provided with terminal receptacles for receiving coaxial connectors. The connectors or terminals may be male or female. The housing assembly according to the invention is particularly beneficial for coaxial connectors for transmitting signals.

[0032] In the following, the invention and its improvements are described in greater detail using exemplary embodiments and with reference to the drawings. As described above, the various features shown in the embodiments may be used independently of each other in specific applications.

[0033] In the following figures, elements having the same function and/or the same structure will be referenced by the same reference signs.

[0034] In the drawings:

- Fig. 1 shows a first embodiment of an outer housing for a housing assembly according to the invention and terminal module in a perspective view;
- Fig. 2 shows the embodiment of Fig. 1 with the terminal module inserted in the outer housing and a module retainer prior to being inserted in the retainer receptacle;
- Fig. 3 shows a close up view of the region around the retainer receptacle of the outer housing from Fig. 1;
- Fig. 4 shows a close up view of the terminal module shown in Fig. 1;
- Fig. 5 shows a cut view of the terminal module in the module receptacle of the outer housing;
- Fig. 6 shows the assembly of Fig. 2 in the fully assembled state with the module retainer being

inserted;

- Fig. 7 shows a first embodiment of the module retainer;
- Fig. 8 shows a second embodiment of the module retainer;
- Fig. 9 shows the module retainer from Fig. 7 in a different perspective;
- Fig. 10 shows the module retainer from Fig. 9 in a compressed state;
- Fig. 11 shows a close up view of the housing assembly in the fully assembled state as shown in Fig. 6 in the region of the module retainer;
- Fig. 12 shows a cut view through the housing assembly with terminals of the terminal module being connected to complementary terminals in a housing assembly without the inventive module retainer; and
- Fig. 13 shows a similar cut out for a housing assembly according to the invention.

[0035] Fig. 1 shows an exemplary embodiment of an outer housing 1 that can be used for a housing assembly according to the invention. The outer housing 1 is preferably adapted for receiving terminals (not shown) or other means that need to be connected to complementary means of a complementary part 15 (indicated by the dashed lines).

[0036] The outer housing according to the invention is provided with at least one module receptacle 3 for receiving a terminal module 5. The terminal module 5 in itself is preferably connector-like in the sense of the terminal module 5 being able to carry terminals 7 to be connected to corresponding counter terminals from another connector.

[0037] The terminal module 5 may be inserted into the module receptacle 3 along a module insertion direction 9. In a fully assembled state, when the terminal module 5 is arranged in the outer housing 1, the outer housing 1 provides a connector face 11 at which terminals 7 inside the terminal module 5 are accessible for a mating connector 15.

[0038] The module receptacle 3 may be formed by an open volume inside the outer housing 1 that is adapted for receiving the terminal module 5. The module receptacle 3 may be opened to an outside of the outer housing 1 from a rear side 13 of the outer housing 1. The rear side 13 is the side of the outer housing 1 that lies opposite the connector face 11 seen in a direction parallel with the module insertion direction 9.

[0039] A complementary connector 15 is only indicated by the dashed lines in Fig. 1.

[0040] In order to assure that an inserted terminal module 5 keeps a predefined position with respect to the connector face 11, a module retainer 17 can be used. In order to receive the module retainer 17 in the outer housing 1, said outer housing 1 is provided with a retainer receptacle 19. The retainer receptacle 19 will be described in greater detail with respect to Fig. 3. The module

retainer 17 will be described in greater detail later on with respect to Figs. 7 to 10.

[0041] Fig. 2 shows the outer housing 1 from Fig. 1 with the terminal module 5 being inserted in the module receptacle 3. A module retainer 17 is shown next to the outer housing 1 prior to insertion into the retainer receptacle 19. The module retainer may be inserted into the retainer receptacle along a retainer insertion direction 21. The retainer insertion direction 21 is preferably basically perpendicular to the module insertion direction 9. This is, however, not mandatory. The two directions 9 and 21 must not be perpendicular to each other, but it is preferred that the directions at least differ from each other.

[0042] When the terminal module 5 is arranged inside the module receptacle 3, at least a section of the terminal module 5 is accessible for the module retainer 17 from the retainer receptacle 19.

[0043] A close up view of the retainer receptacle 19 is shown in Fig. 3. The retainer receptacle 19 is basically formed by two openings 23 which are formed as slits 25. The openings 23 extend with longitudinal directions 27 basically parallel with the retainer insertion direction 21. The openings 23 are formed in side walls 29 of the outer housing 1.

[0044] Preferably, the side walls 29 also enclose the module receptacle 3. The openings 23 in the side walls 29 therefore form a common open volume 31 with the module receptacle 3. In other words, through the openings 23 of the retainer receptacle 19, the module receptacle 3 is opened to an outside 33 of the outer housing 1.

[0045] The slits 25 extend parallel to each other along the longitudinal direction 27 and are spaced apart perpendicular to the same and also perpendicular to the module insertion direction 9. In other words, the slits 25 are spaced apart in a width direction 35 of the outer housing 1.

[0046] Between the two slits 25, a recess 37 is arranged in a front wall 39 of the outer housing 1. The recess 37 may receive a pressing portion 73 of the module retainer 17 in the assembled state.

[0047] The slits 25 are bordered by a lower rim 41 and an upper rim 43 which are preferably both formed monolithically with the outer housing 1. The rims 41 and 43 are spaced apart from each other along the module insertion direction 9 and extend basically parallel with the retainer insertion direction 21. The rims 41 and 43 protrude from the side walls 29 to the outside 33. The rims 41 and 43 may serve to protect the module retainer 17 in the assembled state. Furthermore, at least the upper rim 43 may be part of a guide system 45 of the housing assembly.

[0048] The lower rim 41 is preferably provided with at least one counter locking means 47 that protrudes in the direction of the upper rim 43. Said counter locking means 47 may interact with a locking means 83 of the module retainer 17 in the assembled state by preventing a movement of the same against the retainer insertion direction

21.

[0049] Preferably, the counter locking means 47 defines an end of a recess 49 in which a locking means 83 of the module retainer 17 may rest in the assembled state. During insertion of a module retainer 17 into the retainer receptacle 19, the locking means 83 of the module retainer 17 must overcome the counter locking means 47 before being arranged inside the recess 49.

[0050] The lower rim 41 may further serve as support element 51 for supporting the module retainer 17 in the assembled state. The module retainer 17 may be arranged between the support element 51 and a part of the terminal module 5 in order to spring load the terminal module 5 in the direction of the connector face 11.

[0051] Fig. 4 shows a terminal module 5 in an enlarged view. As already mentioned above, the terminal module 5 is provided with terminals 7. Preferably, the terminals 7 are coaxial connectors.

[0052] The terminal module 5 is formed basically complementary to the module receptacle 3 for being easily inserted into the same.

[0053] In order to interact with the module retainer 17, the terminal module 5 is provided with two counter support elements 53. The counter support elements 53 are formed as areas 55, wherein the areas 55 extend perpendicular to the module insertion direction 9. The counter support elements 53 can be abutted by the module retainer 17. The module retainer 17 may thus push against the counter support elements 53 and thereby spring-load the terminal module 5 towards the connector face 11.

[0054] The counter support elements 53 or areas 55 are arranged in longitudinal recesses 57 which basically extend parallel with the retainer insertion direction 21 when the terminal module 5 is arranged inside the module receptacle 3. When the terminal module 5 is arranged inside the module receptacle 3, the recesses 57 are arranged at the same height as the openings 23 in the outer housing 1. Thus, the longitudinal recesses 57 are accessible for the module retainer 17 when the latter is inserted into the retainer receptacle 19.

[0055] In order to guide a module retainer 17 during insertion into the retainer receptacle 19 and in order to prevent a movement of the module retainer 17 in the width direction 35, each of the longitudinal recesses 57 is provided with a rail 59, wherein each rail 59 is based on a side wall 61 of its corresponding recess 57, wherein the side wall 61 is arranged opposite to the area 55 and thereby extends perpendicular to the module insertion direction 9.

[0056] Longitudinal directions of the rails 59 extend parallel with the longitudinal recesses 57. The rails 59 protrude towards the counter support element 53.

[0057] The terminal module 5 is further provided with stop surfaces 63 that abut the stop means 65 of the outer housing 1 in the assembled state and thereby define the position of the terminal module 5 in the outer housing 1 and the corresponding distance to the connector face 11.

This is also shown in a close-up view in Fig. 5.

[0058] In Fig. 6, a housing assembly 67 is shown in the fully assembled state 69. The housing assembly 67 according to the invention comprises the outer housing 1 and the module retainer 17. The housing assembly 67 may further comprise the terminal module 5. In the fully assembled state 69, the terminal module 5 is arranged inside the module receptacle 3 of the outer housing 1 and the module retainer 17 is arranged inside the retainer receptacle 19. In this state, the module retainer 17 applies a spring force F on the terminal module 5 towards the connector face 11 or, in other words, in the module insertion direction 9.

[0059] Now, two different designs of a module retainer 17 are described with respect to figures 7 and 8.,

[0060] First, the embodiment shown in Fig. 7 is described. Afterwards, the embodiment shown in Fig. 8 will be described with respect to only the differences to the embodiment shown in Fig. 7.

[0061] The module retainer 17 basically has the shape of a U. In other words, two legs 71 are present that extend with their longitudinal directions along the retainer insertion direction 21. The legs 71 are parallel with each other and spaced apart in the width direction 35. The legs 71 are interconnected by a pressing portion 73 of the module retainer 17. Both legs 71 are formed mirror symmetrically with each other, wherein a mirror plane extends between both legs 71 perpendicular to the width direction 35.

[0062] In the following, only one of the legs is described. However, the description refers to both legs, taking into account the symmetry of the legs 71.

[0063] Each leg 71 is provided with a part of the guide system 45, namely with a groove 75 for receiving the rail 59 of the terminal module 5. When the rail 59 is arranged inside the groove 75, the leg cannot be moved away from the terminal module 5 along the width direction 35. Next to the groove 75 and basically parallel with the same, each leg 71 is provided with an elastically deformable spring member 77 that is adapted to generate the spring force.

[0064] The spring member 77 of the embodiment shown in Fig. 7 may have an overall wedge-shape, wherein the wedge shape is constituted by two beams 79. The beams 79 basically form a triangle with the remaining leg 71. The two beams 79 extend from opposite ends of the leg 71, wherein "opposite" refers to the retainer insertion direction 21. In the middle of the legs 71, the two beams 79 are connected with each other forming a tip of the triangular shape. The portion of the leg 71 that is not part of the spring member 77 forms a base 78.

[0065] The triangular shape is elastically compressible parallel with the module insertion direction 9.

[0066] Each tip 81 forms a locking means 83 of the module retainer 17. The tip 81 basically protrudes into a direction that is parallel with the module insertion direction 9 in the assembled state 69, but oriented in the opposite direction. The groove 75 of a leg 71 is opened in the same direction into which the tip 81 protrudes.

[0067] On the opposite side of the leg 71, seen in the module insertion direction 9, is provided with a support surface 85 for abutting a counter support element 53 of the terminal module 5.

[0068] The module retainer 17 shown in Fig. 8 differs from the module retainer 17 shown in Fig. 7 in that the spring member 77 on each leg 71 is elastically deflectable instead of being compressible. This is achieved by one of the beams 79 being shortened compared with the first embodiment. In other words, one of the beams 79, namely the one that is closer to the pressing portion 73 is not in direct contact with the leg 71. Hence, the other beam 79 forms an elastically deflectable lever 87.

[0069] The tip 89 of the shortened beam 79 may form a stop member stopping the deflection of the lever 87 when the tip 89 abuts the legs 71. The tip 81 of the spring member 77 in the second embodiment may also serve as locking means of the module retainer 17.

[0070] It should further be noted for both embodiments of the module retainer 17 that the beam 79 that extends from the forward end 91 of its corresponding leg 71 may form a guide surface for facilitated insertion of the module retainer 17 into the remaining housing assembly 67. The forward end 91 is the end of the module retainer 17 that lies opposite to the pressing portion 73 in the retainer insertion direction 21.

[0071] Fig. 9 shows the module retainer 17 of Fig. 7 in a different perspective. Here, the support surfaces 85 of the legs 71 are shown. It can be seen that the support surfaces 84 are basically planar along the module insertion direction 21 and the width direction 35. The surfaces 85 are planar except for a latching protrusion 93 on each leg 71 that protrudes from the surface in the module insertion direction 9.

[0072] The latching protrusions 93 may be arranged in complementary recesses (not shown) which are arranged in the areas 55 in the terminal module 5. Hence, using the latching protrusions 93 and the locking means 83, each module retainer 17 may be locked with the outer housing 1 and the terminal module 5.

[0073] Fig. 9 shows the module retainer 17 in an uncompressed state.

[0074] A compressed state is shown in Fig. 10. As can be seen, the two beams 79 are arranged much closer to the remaining leg 71. Since the module retainer 17 is preferably made from an elastic material, the spring members 77 may exert a spring force parallel with the module insertion direction 9 in this compressed state.

[0075] A module retainer 17 in the fully assembled state 69 of the housing assembly 67 is shown in a close-up view in Fig. 11. The tip 83 or, in other words, the locking means 83 is arranged in the recess 49. Thus, the counter locking means 47 prevents the removal of the module retainer 17 against the module insertion direction 21. In this state, the support surface 85 is in abutment with the area 55 of the terminal module 5. Hence, the module retainer 17 is arranged between the outer housing 1 and the terminal module 5, spring-loading the terminal mod-

ule 5 towards the connector face 11.

[0076] In order to show the advantages of the housing assembly 67 according to the invention, reference is made to figures 12 and 13. Fig. 12 shows a housing assembly without the module retainer 17 that spring loads a terminal module in the module insertion direction. Hence, a gap 95 is present between a dielectric filling 97 of a terminal 7 in the terminal module 5 and a dielectric filling 99 of a counter terminal 101.

[0077] Such a gap 95 reduces the signal strength between the two terminals. This problem may also occur even when an electric contact 103 of the terminal 7 is in contact with a counter electrical contact 105 of the counter terminal 101. The counter terminal 101 may be part of a complementary connector 15.

[0078] In Fig. 13, a housing assembly 67 according to the invention is shown in the same situation as in Fig. 12. However, no gap is arranged between the dielectric filling of the terminal 7 and the counter terminal 101. This is due to the fact that the module retainer 17 spring loads the terminal module 5 towards the connector face 11. Hence, the inventive solution improves the signal transmission between the terminals 7 and 101.

REFERENCE NUMERALS

[0079]

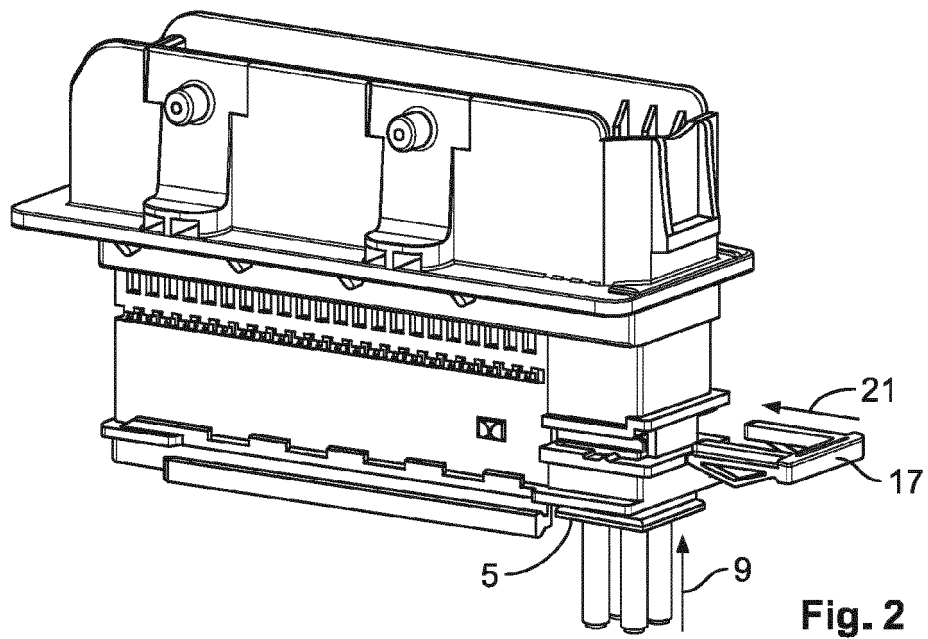
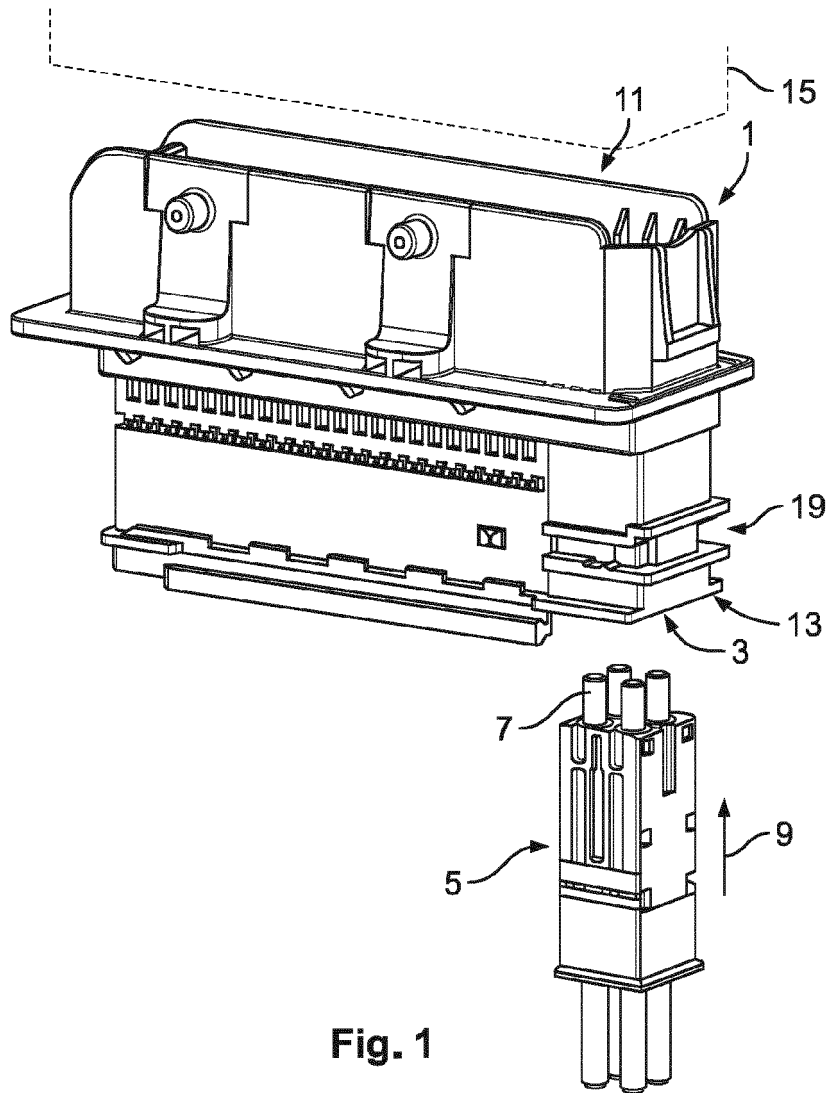
1	Outer housing
3	Module receptacle
5	Terminal module
7	Terminals
9	Module insertion direction
11	Connector face
13	Rear side
15	Complementary connector
17	Module retainer
19	Retainer receptacle
21	Retainer insertion direction
23	Openings
25	Slits
27	Longitudinal direction
29	Side walls
31	Open volume
33	Outside
35	Width direction
37	Recess
39	Front wall
41	Lower rim
43	Upper rim
45	Guide system
47	Counter locking means
49	Recess
51	Support element
53	Counter support elements
55	Areas
57	Longitudinal recess
59	Rail

61	Side wall
63	Stop surface
65	Stop means
67	Housing assembly
5 69	Fully assembled state
71	Leg
73	Pressing portion
75	Groove
77	Spring member
10 79	Beam
81	Tip
83	Locking means
85	Support surface
87	lever
15 89	Tip
91	Forward end
93	Latching protrusion
95	Gap
97	Dielectric filling
20 99	Dielectric filling
101	Counter terminal
103	Electric contact
105	Counter electric contact
F	Spring force
25	

Claims

1. Housing assembly (67), comprising an outer housing (1) with at least one module receptacle (3) for receiving at least one connector-like terminal module (5) and with a connector face (11) at which the outer housing (1) can be connected with a complementary part (15), and with at least one module retainer (17) for retaining at least one terminal module (5) in the module receptacle (3) in an assembled state (69), wherein the module retainer (17) is adapted to be at least partially insertable into a retainer receptacle (19) of the outer housing (1), **characterized in that** the at least one module retainer (17) is adapted to spring-load a terminal module (5) in the module receptacle (3) towards the connector face (11) in the assembled state (69).
2. Housing assembly (67) according to claim 1, **characterized in that** the at least one retainer receptacle (19) is connected with the at least one module receptacle (3).
3. Housing assembly (67) according to claim 1 or 2, **characterized in that** the at least one module retainer (17) is provided with at least one elastically deformable spring member (77) adapted to generate a spring-force (F).
4. Housing assembly (67) according to claim 3, **characterized in that** the at least one spring member (77) is formed as a elastically deflectable lever (87).

5. Housing assembly (67) according to any one of claims 1 to 4, **characterized in that** the at least one module receptacle (3) is adapted for receiving the at least one terminal module (5) along a module insertion direction (9) and the at least one retainer receptacle (19) is opened to an outside (33) of the outer housing (1) along a retainer insertion direction (21), wherein the retainer insertion direction (21) differs from the module insertion direction (9). 5
6. Housing assembly (67) according to claim 5, **characterized in that** the at least one retainer receptacle (19) is provided with at least one opening (23) in a side wall (29) of the outer housing (1), a longitudinal direction (27) of the opening (23) being basically parallel with the retainer insertion direction (21). 10 15
7. Housing assembly (67) according to any one of claims 1 to 6, **characterized in that** the module retainer (17) is provided with at least one locking means (83) for locking the module retainer (17) against removal. 20
8. Housing assembly (67) according to claim 7, **characterized in that** the outer housing (1) is provided with at least one counter locking means (47) for locking the locking means (83) of the module retainer (17) in the assembled state (69). 25
9. Housing assembly (67) according to any one of claims 7 or 8, **characterized in that** the at least one locking means (83) is part of the at least one spring member (77) of the module retainer (17). 30
10. Housing assembly (67) according to any one of claims 1 to 9, **characterized in that** the housing assembly (67) is provided with at least one guide system (45) adapted to guide at least a part of the module retainer (17) into the retainer receptacle (19). 35 40
11. Housing assembly (67) according to any one of claims 1 to 10, **characterized in that** the at least one module retainer (17) is provided with at least one leg (71) for being inserted into the retainer receptacle (19). 45
12. Housing assembly (67) according to claim 11, **characterized in that** the at least one module retainer (17) is provided with at least two legs (71) which are spaced apart from each other. 50
13. Housing assembly (67) according to any one of claims 1 to 12, **characterized in that** the outer housing (1) is provided with at least one support element (51) for supporting the at least one module retainer (17) in the assembled state (69). 55
14. Housing assembly (67) according to any one of claims 1 to 13, **characterized in that** the housing assembly (67) further comprises at least one terminal module (5) that is insertable into the module receptacle (3), wherein the at least one module retainer (17) is arranged between the outer housing (1) and the terminal module (5) in the assembled state (69) of the housing assembly (67).
15. Housing assembly (67) according to any one of claims 1 to 14, **characterized in that** the at least one module retainer (17) is made from a plastic material and/or from metal.



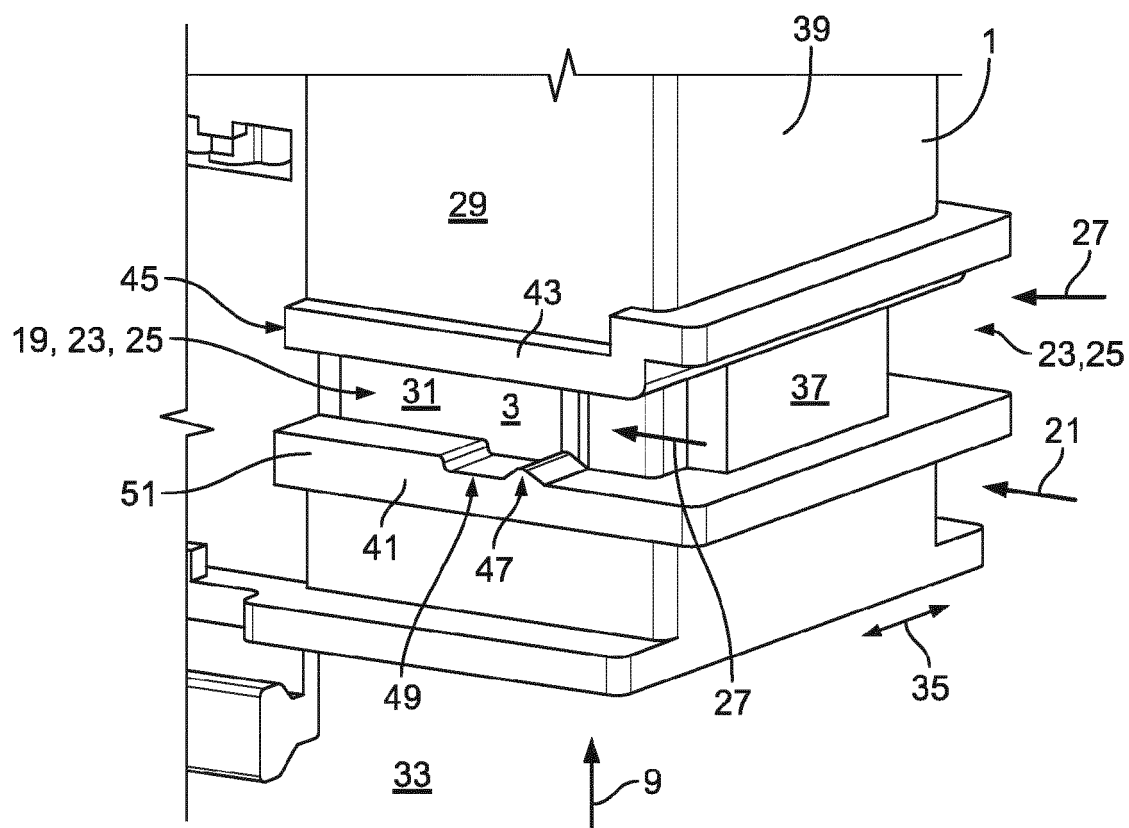


Fig. 3

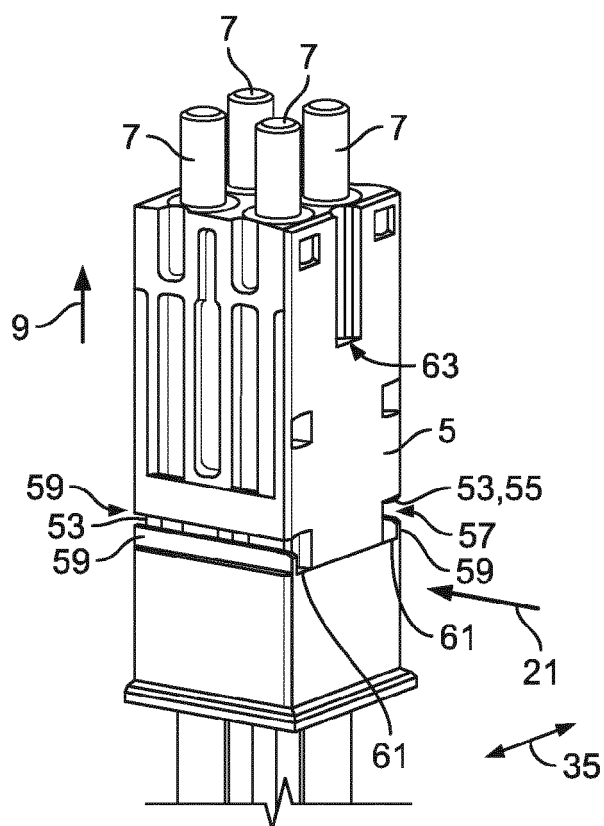


Fig. 4

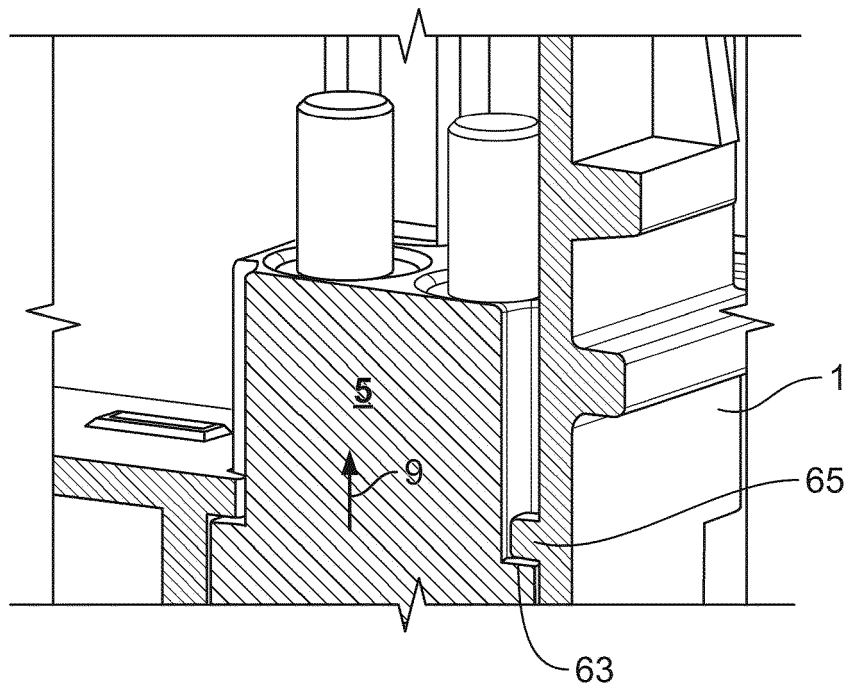


FIG. 5

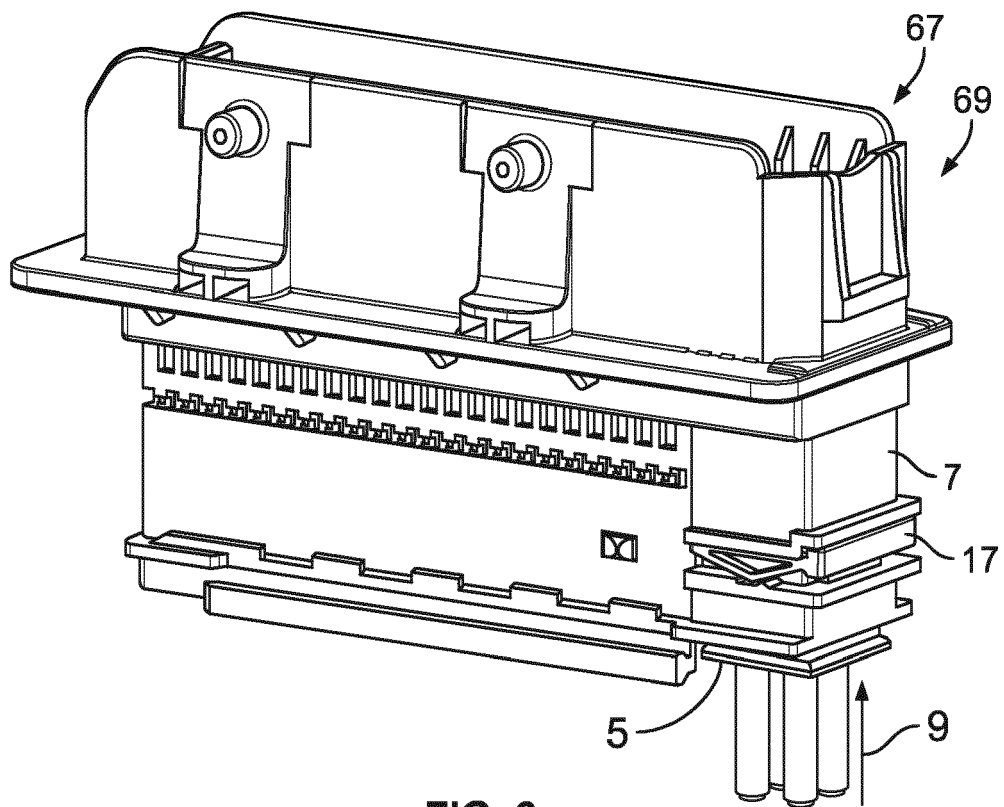


FIG. 6

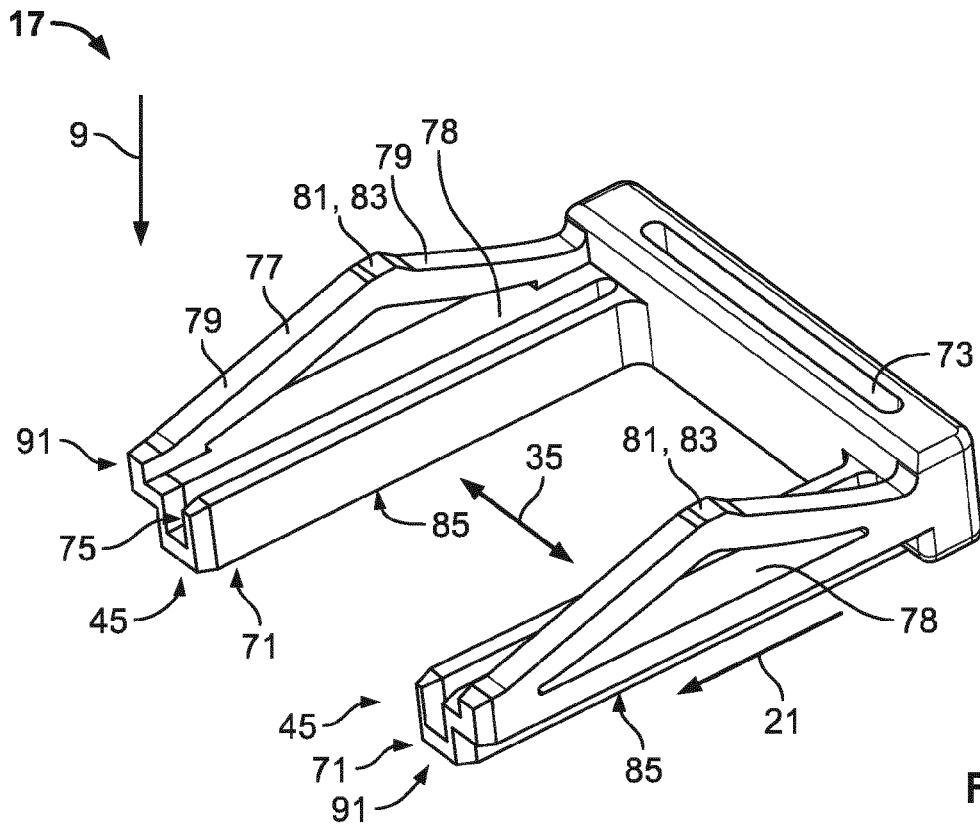


Fig. 7

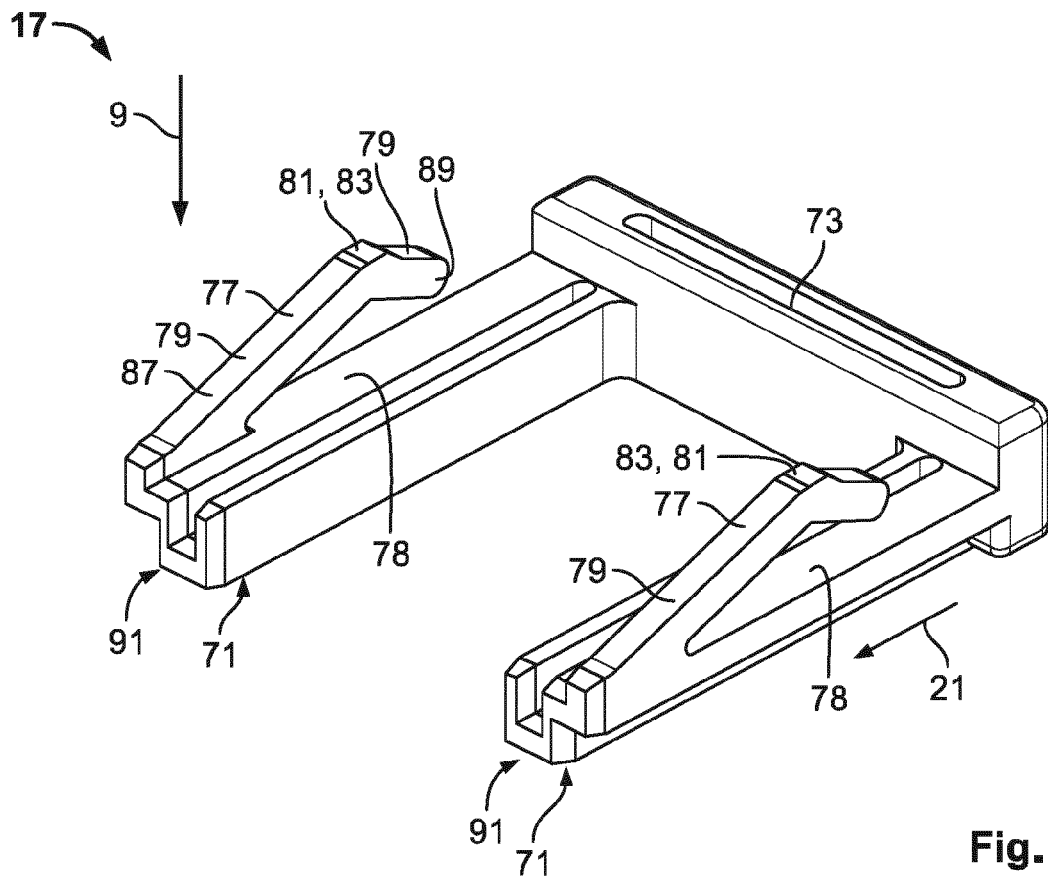


Fig. 8

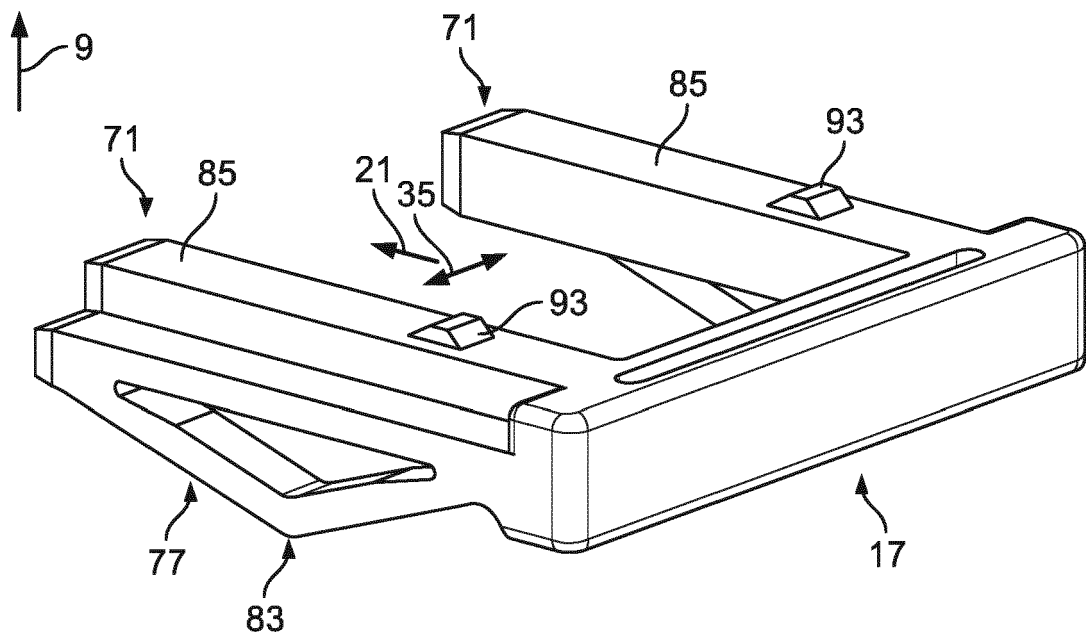


Fig. 9

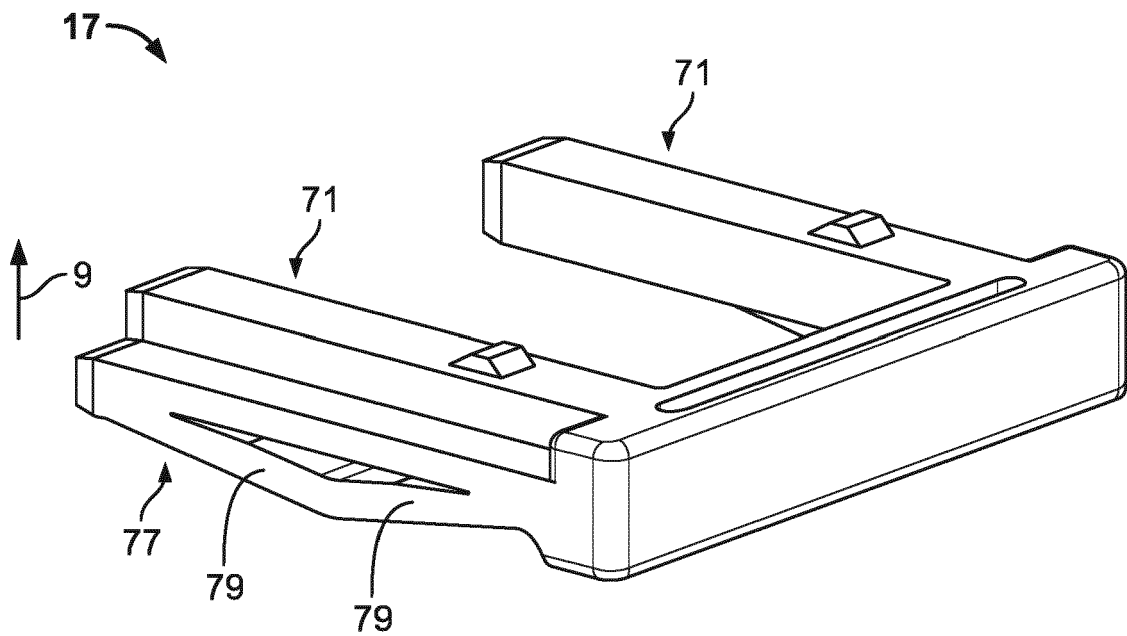


Fig. 10

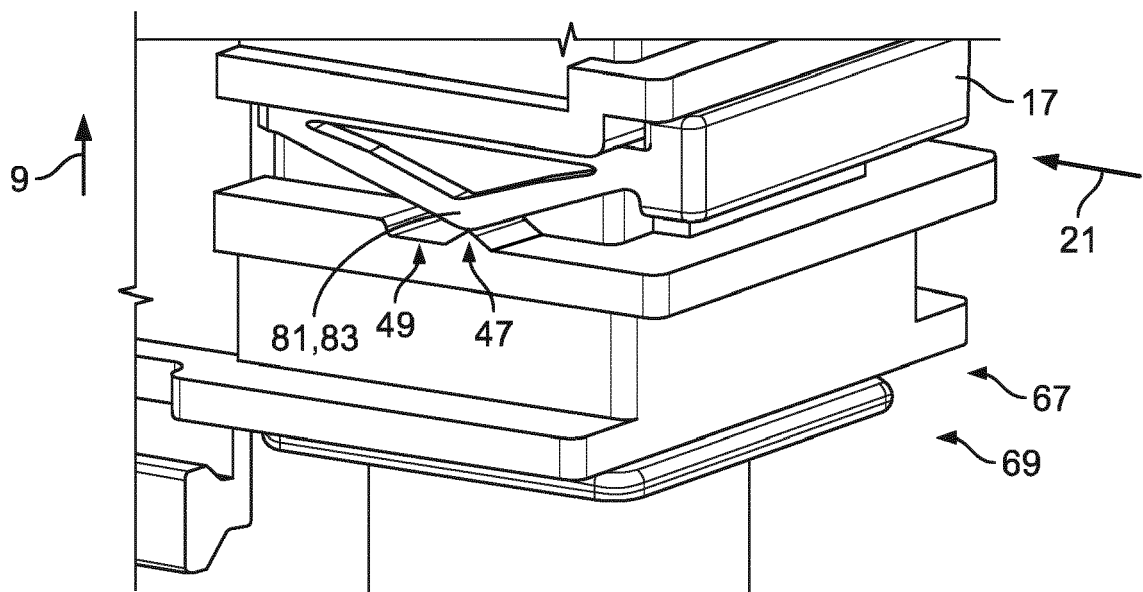


Fig. 11

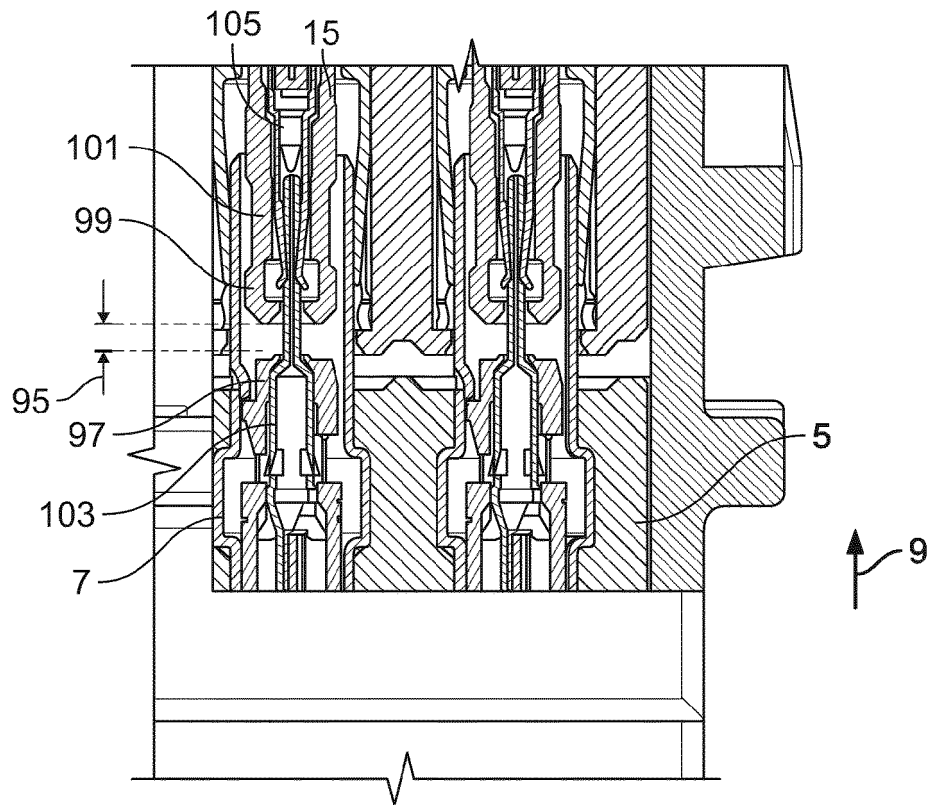


Fig. 12

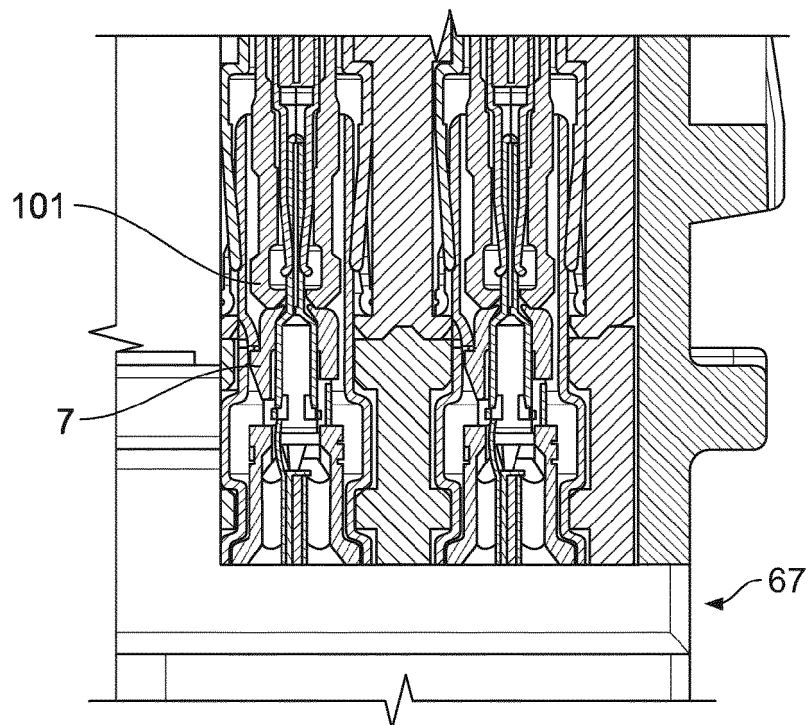


Fig. 13



EUROPEAN SEARCH REPORT

Application Number
EP 21 17 1315

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 4 764 130 A (DICLEMENTE THOMAS J [US]) 16 August 1988 (1988-08-16) * column 1, lines 22-44, column 2, lines 21-44, column 3, lines 6-16, 21-60, column 4, lines 43-47, figures 1-6 *	1-15	INV. H01R13/514 H01R13/518
X	US 3 562 696 A (BARNHART HARRY EDWARD ET AL) 9 February 1971 (1971-02-09) * *	1-4, 13-15 5-12	
A	US 3 002 175 A (BERTRAM JOSEPH J ET AL) 26 September 1961 (1961-09-26) * the whole document *	1-15	
A	US 5 217 386 A (OHSUMI HIDEKI [JP] ET AL) 8 June 1993 (1993-06-08) * the whole document *	1-15	
A	KR 2011 0006766 U (UNKNOWN) 6 July 2011 (2011-07-06) * the whole document *	1-15	
A	FR 3 016 482 A1 (DAI ICHI SEIKO CO LTD [JP]) 17 July 2015 (2015-07-17) * the whole document *	1-15	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC) H01R
Place of search The Hague		Date of completion of the search 24 September 2021	Examiner López García, Raquel
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p>			

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.

EP 21 17 1315

5

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4764130 A	16-08-1988	FR 2540679 A1 GB 2134724 A US 4764130 A	10-08-1984 15-08-1984 16-08-1988
US 3562696 A	09-02-1971	NONE	
US 3002175 A	26-09-1961	BE 582910 A CH 357776 A DE 1135069 B FR 1235834 A GB 879344 A US 3002175 A	18-01-1960 31-10-1961 23-08-1962 08-07-1960 11-10-1961 26-09-1961
US 5217386 A	08-06-1993	DE 69212896 T2 EP 0514836 A1 JP 2527302 Y2 JP H04129477 U US 5217386 A	02-01-1997 25-11-1992 26-02-1997 26-11-1992 08-06-1993
KR 20110006766 U	06-07-2011	NONE	
FR 3016482 A1	17-07-2015	CN 104779468 A DE 102015200051 A1 FR 3016482 A1 JP 5692421 B1 JP 2015133216 A KR 20150083804 A US 2015200492 A1	15-07-2015 16-07-2015 17-07-2015 01-04-2015 23-07-2015 20-07-2015 16-07-2015