

(19)



Europäisches Patentamt  
European Patent Office  
Office européen des brevets



(11)

**EP 0 977 322 B1**

(12)

## EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention  
of the grant of the patent:  
**08.12.2004 Bulletin 2004/50**

(51) Int Cl.7: **H01R 13/627**, H01R 13/629

(21) Application number: **99114972.5**

(22) Date of filing: **30.07.1999**

(54) **Connector module**

Verbindermodul

Module de connexion

(84) Designated Contracting States:  
**BE DE ES FR GB IT NL**

(30) Priority: **30.07.1998 US 94616 P**  
**11.06.1999 US 330748**

(43) Date of publication of application:  
**02.02.2000 Bulletin 2000/05**

(73) Proprietor: **Tyco Electronics Logistics AG**  
**9323 Steinach / SG (CH)**

(72) Inventors:  
• **Pederson, Steven**  
**Peachtree City, Georgia 30269 (US)**

• **Miller, Timothy J.**  
**Warren, Pennsylvania 16365 (US)**

(74) Representative: **Grünecker, Kinkeldey,**  
**Stockmair & Schwanhäusser Anwaltssozietät**  
**Maximilianstrasse 58**  
**80538 München (DE)**

(56) References cited:  
**EP-A- 0 709 928 EP-A- 0 732 775**  
**EP-A- 0 788 193 EP-A- 0 848 456**  
**DE-A- 19 645 717 US-A- 4 370 013**  
**US-A- 4 634 204 US-A- 4 946 404**

**EP 0 977 322 B1**

Note: Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

## Description

**[0001]** The present invention relates to a connector module, that includes internal latch engagement members and comprises a first connector housing that mates with a second connector housing. A positive assurance member is attached to one of the connector housings in a pre-locked mode. The positive assurance member assures that the housings are fully mated, and contacts therein are fully engaged, in an engaged mode, and that the housings are locked together, in a locked mode.

**[0002]** From EP-0848456 which is considered to represent the closest prior art there is already known an electrical connector according to the generic clause of claim 1 comprising a first connector housing, a second connector housing and a resilient locking tongue having an engagement member and a positive assurance member.

**[0003]** It is occasionally desirable to provide electrical connectors that may be mechanically and electrically connected together but not readily disconnected. For example, the ability to easily disconnect an electrical connector module creates a potential safety hazard in high voltage applications. Such a concern exists in some electrical connections located under the hood of a motor vehicle. One known device to deter separation of electrical connectors involves the use of mating connector housings that are snap fit together, a lock disabler being provided to prevent unsnapping thereof. U.S. patent no. 5,370,550 is an example of such a device. However, a device of this type may be disconnected, if desired. Other known devices rely upon the use of connector position assurance (CPA) members such as described in U.S. patent no. 5,236,373. In structures of this type the CPA engages mating connector housings exterior thereof to lock such housings together. Such a CPA is not designed for use with connectors having internal latches that are not exposed to the outside of the connector. However, when internal latches are provided, use of a CPA is desirable to assure that the connector housings and contacts therein are mated, since there typically is no visual indication of such mating. This may be a particular concern in view of the tendency towards smaller connector bodies that house smaller connector contacts that make visual indication less likely. Another concern in view of this tendency is the requirement that such smaller connector bodies meet the same performance requirements as larger conventional embodiments. In order to enhance the performance of such smaller connector bodies, it has been determined that a preferred material is LCP (liquid crystal polymer) or a material having the same characteristics. Hereinafter, the material will be referred to as LCP. Connector bodies fabricated from this material must satisfy performance requirements of the finished product. The performance characteristics of LCP material must also be taken into consideration. Another concern is that during fabrication of LCP connector housings by, for example, a conven-

tional molding operation, the LCP material presents problems regarding weld line strength and filling characteristics of the material. Further, the flexible yet stiff nature of the LCP material presents concerns regarding the ability to fabricate a practical smaller connector module having a CPA and an internal latch.

**[0004]** It is an object of the present invention to provide a connector module that obviates the disadvantages of the prior art.

**[0005]** It is yet another object of the present invention to provide a connector module having a connector positive assurance member that can only be actuated when the connector module is fully engaged in an engaged mode.

**[0006]** It is another object of the present invention to provide a connector module having a connector positive assurance member that is preinstalled in a pre-locked mode to one of the connector housings of the connector module.

**[0007]** A further object of the present invention is to provide a connector module having a connector positive assurance member and including a latch engagement member that is hidden from view when fully engaged in an engaged mode.

**[0008]** Yet a further object of the present invention is to provide a connector module fabricated from LCP that meets all of the foregoing objectives.

**[0009]** Another object of the present invention is to provide a connector module that may be fabricated from LCP having the required weld line strength.

**[0010]** A further object of the present invention is to provide a relatively small connector module fabricated from LCP and having a CPA that has satisfactory rigidity and resistance characteristics.

**[0011]** This invention achieves these and other objects by providing a connector module according to claim 1.

**[0012]** This invention may be clearly understood by reference to the attached drawings in that like reference numerals designate like parts and in that:

FIG. 1 is an exploded perspective view of one embodiment of the connector module of the present invention;

FIG. 2 is an end view of the connector housing 14 of FIG. 1;

FIG. 3 is a perspective view of the connector housing 14 of FIG. 1 viewed from the bottom;

FIG. 4 is a cross-sectional view of the connector housing 14 of FIG. 1 illustrating the positive assurance member of one embodiment of the present invention in a pre-locked mode;

FIG. 5 is a cross-sectional view similar to FIG. 4 but illustrating the positive assurance member in a

locked mode without the connector housing 12 attached to the connector housing 14;

FIG. 6 is a bottom perspective view of the positive assurance member of FIG. 1;

FIG. 7 is a top perspective view of the positive assurance member illustrated in FIG. 6;

FIG. 8 is a plan view of the positive assurance member of FIG. 7 illustrated within the connector housing 14 of FIG. 1 in a pre-locked mode;

FIG. 9 is an enlarged view of the detents of the positive assurance member of FIG. 8; and

FIGS. 10a to 10d illustrate the operation of the connector module of FIG. 1.

#### BEST MODE FOR CARRYING OUT THE INVENTION

**[0013]** For a better understanding of the present invention, together with other and further objects, advantages and capabilities thereof, reference is made to the following disclosure and appended claims taken in conjunction with the above-described drawings.

**[0014]** The embodiment of this invention that is illustrated in the drawings is particularly suited for achieving the objects of this invention. FIGS. 1 to 3 illustrate a connector module comprising a first connector housing 12 and a second connector housing 14. Housings 12 and 14 are slidably engagable with each other as explained herein. The connector module illustrated in FIGS. 1 to 3 also comprises a connector positive assurance member 16.

**[0015]** The connector housing 12 extends in direction 18 of an axis 20 from an end portion 22 to an opposite end portion 24. Housing 12 comprises a cavity 26 therein and a housing base 28 having holes 30 through that mounting members such as screws (not shown) may be inserted for mounting the housing 12 to a support surface such as an automobile panel. Housing 12 comprises a plurality of contacts therein (not shown) each of that extends through a respective bore 32 in the base 28 and into cavity 26. The end of each contact extending out of cavity 26 from the surface 34 of the base 28 may be connected to a suitable conductor in a conventional manner. The contacts within housing 12 may be conventional male or female contacts. In the embodiment illustrated in FIGS. 1 to 3, the contacts within cavity 26 are male contacts. End portion 24 is structured and arranged to mate with the housing 14. To facilitate such mating, the housing 12 comprises a key member. In particular, housing 12 comprises an elongated key 36 that extends from surface 38. Key 36 is directed in the direction 18 of axis 20. The housing 12 comprises a lug 40 extending from a surface 42. Lug 40 comprises an angular lug camming surface 44 and a lug abutment sur-

face 46.

**[0016]** The connector housing 14 extends in the direction 48 of an axis 50 from an end portion 52 to an opposite end portion 54. Housing 14 comprises a cavity 56 therein and a cover 58 that encloses the end portion 52. Housing 14 comprises a plurality of contacts therein (not shown). A plurality of conductors extend into housing 14, each conductor being connected to a respective contact. In particular, each conductor (not shown) extends through a respective bore 60 in cover 58 for conventional electrical and mechanical attachment to a respective contact. For example, each conductor may be soldered to a respective contact in the usual manner. The contacts within housing 14 may be conventional male or female contacts. In the embodiment illustrated in FIG. 1, the contacts within cavity 56 are female contacts. Housing 14 comprises a cover 62 within cavity 56, such cover having a plurality of bores 64 that are in alignment with the male contacts within the housing 12. End portion 54 is structured and arranged to mate with the end portion 24 of housing 12. To facilitate such mating, housing 14 comprises a key member. In particular, housing 14 comprises an elongated keyway 66 that extends adjacent wall 68 of cavity 56. Keyway 66 is directed in the direction 48 of axis 50. The key 36 and keyway 66 are structured and arranged to mate with one another to facilitate the slidable engagement of the housings 12 and 14. The male and female contacts in respective housings 12 and 14 are structured and arranged to mate with each other in a conventional manner during such slidable engagement to provide electrical and mechanical connection between each.

**[0017]** With reference to FIGS. 1 to 5, the connector housing 14 comprises a resilient locking tongue 70 comprising a first tongue portion 72 extending from a fixed end 74 attached to a wall 76 of the housing 14 towards the first end portion to 52. The first tongue portion 72 extends to a first free end 78. The locking tongue 70 comprises a second tongue portion 80 that extends from the free end 78 towards the second end portion 54. The second tongue portion 80 extends to a second free end 82. The free end 82 comprises an engagement member 84. Such structure provides a latch member in the form of the second tongue portion 80 that is connected to the connector housing 14 by a separate flex member in the form of the first tongue portion 72 that is located at a finger depression area. In this manner, extreme stress concentration is not built up at the pivot point of the locking tongue 70. Such structure also allows for satisfactory deflection of the latch member in a relatively small connector module. Further, such structure permits the desired deflection at the thumb pad provided by the first tongue portion 72 thereby creating the desired deflection of the second tongue portion 80. Molding of the housing 14 is easier due to the structured features of the tongue 70.

**[0018]** The connector housing 12 and its lug 40 are slidably engagable with the connector housing 14 and

engagement member 84, in the directions 86 and 86', of a connector module longitudinal axis 88 to fully engage the lug and the engagement member in an engaged mode, and disengage the lug and the engagement member in a disengaged mode, respectively, as described herein. When the housings 12 and 14 are in the engaged mode, the axis 88 will be coincident with axes 20 and 50.

**[0019]** With reference to FIG. 4, the resilient locking tongue 70 is structured and arranged such that depression of the first tongue portion 72 in the direction 90 towards axis 50 will urge the engagement member 84 in the direction 92 away from the axis 50. When the housings 12 and 14 are attached to each other, such depression permits detachment thereof in the disengaged mode as described herein.

**[0020]** The positive assurance member 16 is movably attached to the connector housing 14. The positive assurance member 16 is structured and arranged such that in the engaged mode, movement of the positive assurance member towards end portion 54 serves to position the positive assurance member in a locking mode wherein the positive assurance member will sufficiently resist movement of (a) the first tongue portion 72 in direction 90 towards axis 88 and (b) the engagement member 84 in direction 92 away from axis 88, to lock engagement of the lug 40 and engagement member 84 in the engaged mode; that is, to prevent disengagement of the lug and the engagement member. To this end, the positive assurance member of the present invention may comprise at least one first abutment member and at least one second abutment member. The first and second abutment members may be structured and arranged such that when in the locking mode, (a) at least one first abutment member surface is positioned relative to the locking tongue 70 to resist movement of the tongue portion 72 towards the axis 88, and (b) at least one second abutment member surface is positioned relative to the locking tongue to resist movement of the engagement member 84 away from axis 88. For example, in the embodiment illustrated in FIGS. 1, 4 and 5, the second tongue portion 80 of locking tongue 70 comprises a first leg 94 and a second leg 96 each of that extends in the direction 48 of axis 50 from the free end 78 to the engagement member 84. The legs 94 and 96 are spaced from each other to provide an opening 98 therebetween. The positive assurance member 16 comprises a base 100 and a first abutment member in the form of a resilient first arm 102 extending from the base in the direction 48 of axis 50 into the opening 98. The first arm 102 is structured and arranged such that in the engaged mode, movement of the positive assurance member 16 in a locking direction 104 relative to axis 88 serves to position a surface of the first arm adjacent the engagement member 84 so as to sufficiently resist movement of the engagement member in direction 92 and out of engagement with the lug 40 as described in more detail hereinafter.

**[0021]** In the embodiment illustrated in FIGS. 1 and 5-7, the positive assurance member 16 comprises two second abutment members in the form of a first region 106 and a second region 108. Only region 108 is visible in FIG. 5. The first and second regions 106, 108 are structured and arranged such that in the engaged mode, movement of the positive assurance member 16 in the direction 104 serves to position the regions 106 and 108 relative to the first and second legs 94, 96 of the locking tongue 70 so as to sufficiently resist movement of the first tongue portion 72 in direction 90 thereby further resisting the urging of the engagement member 84 in direction 92.

**[0022]** If desired, the positive assurance member of the present invention may be structured and arranged such that in the locking mode a first distal end surface of the first abutment member engages a first surface of the engagement member so as to prevent unlocking of the positive assurance member. For example, in the embodiment illustrated in FIG. 5, the first arm 102 comprises a hook-like distal end segment 110 that comprises a first distal end surface 112. The resilient first arm 102 is structured and arranged such that in the locking mode the surface 112 engages a surface 114 of the engagement member 84 so as to prevent movement of the positive assurance member in the direction 104' thereby preventing unlocking of the engaged lug 40 and engagement member 84.

**[0023]** If desired, the positive assurance member of the present invention may comprise at least one detent, and the second connector housing may comprise at least one detent abutment member, the detent being structured and arranged to engage the detent abutment member to attach the positive assurance member to the second connector housing in a pre-locked mode. For example, in the embodiment illustrated in FIGS. 6 to 8, the positive assurance member 16 comprises a resilient second arm 116 and an opposite resilient third arm 118 extending from the base 100 in the direction 48 of axis 50. Arms 116 and 118 provide resistance and rigidity useful in a relatively small connector module. The arms 116 and 118 are spaced from each other to provide an opening 120 therebetween. The first arm 102 extends into opening 120 between the second arm 116 and third arm 118. With reference to FIG. 8, the arm 116 comprises a detent 122 and the arm 118 comprises a detent 124. The second connector housing 14 comprises a first detent abutment member 126 and an opposite second detent abutment member 128 extending from respective walls 68 and 130 of cavity 56. The detents 122 and 124 are structured and arranged to engage the detent abutment members 126 and 128, respectively, to attach the positive assurance member 16 to the housing 14 in the pre-locking mode. Such arrangement prevents movement of the positive assurance member in directions 104 and 104'.

**[0024]** If desired, the first abutment member of the positive assurance member may comprise a second

distal end surface that engages a second surface of the engagement member in the pre-locking mode. In such embodiment, such second distal end surface and second surface of the engagement member, and the detents and the detent abutment members, may be structured and arranged to resist movement of the positive assurance member in the directions 104 and 104' except in the engaged mode. For example, in the embodiment illustrated in FIG. 4, the distal end segment 110 may comprise a second distal end surface 132 that is opposite the first distal end surface 112. The resilient first arm 102 is structured and arranged such that in the pre-locked mode, the surface 132 engages a surface 134 of the engagement member 84. Surface 134 is opposite surface 114. In this embodiment, surface 132 is structured and arranged relative to the surface 134, and the detent 122 and 124 are structured and arranged relative to respective detent abutment members 126 and 128, to provide resistance to movement of the positive assurance member 16 in the directions 104 and 104' except when the housings 12 and 14 are being slidably engaged as described hereinafter.

**[0025]** The embodiment illustrated in the drawings may be fabricated from LCP by molding. Heretofore, filling of the mold to form an LCP connector housing 14 created a weak weld line that tended to cause the connector housing to split in the direction 48 of axis 50 along the wall portion 136 and the wall portion 138 that extends therefrom and forms the first tongue portion 72. To overcome this problem, the housing 14 may be molded from LCP in such a manner that the wall portions 136 and 138 comprise a rib 140 that extends from end portion 54 towards end portion 52 in the direction 48 of axis 50. Rib 140 eliminates the tendency for the housing 14 to split at the surface portions 136 and 138 and also provides reinforcement at the first tongue portion 72 that is flexed during use of the connector module.

**[0026]** In the embodiment illustrated in FIGS. 6 to 8, the positive assurance member 16 comprises a bridging member 142 that extends between the first arm 102 and the second arm 116, and the first arm 102 and the third arm 118.

**[0027]** The positive assurance member of the present invention may be structured and arranged to assure that in the pre-locked mode the positive assurance member remains in a fixed position relative to the second connector housing, and in the engaged mode the positive assurance member is moveable to a locked mode. For example, with reference to FIGS. 6 to 9, the detents 122 and 124 may each comprise a first detent surface 144, and an opposite second detent surface 146, extending from a detent base 148. In such embodiment, the first and second detent abutment members 126 and 128 extend between respective detent surfaces 144 and 146 in the pre-locked mode. With reference to FIG. 9, each first detent surface 144 extends from the detent base 148 a first length 150 and at a first angle 152 that are sufficient to substantially permanently attach the posi-

tive assurance member to the connector housing 14 in the pre-locked mode. Each second detent surface 146 extends from the detent base 148 a second length 154 and at a second angle 156 that are sufficient to permit movement of the positive assurance member 16 in the direction 104 relative to the longitudinal axis 88 when the connector module is in the engaged mode, as described hereinafter. In the embodiment illustrated in FIGS. 6 to 9, angle 152 is 90° and the length 150 is such that in combination with the 90° orientation of the detent surface 144, once in the pre-locked position illustrated in FIG. 8, movement of the positive assurance member 16 in direction 104' is not possible. The angle 156 is an acute angle and the length 154 is such that in combination with the acute angular orientation of the detent surface 146, movement of the positive assurance member 16 in direction 104 is possible when the housings 12 and 14 are in the engaged mode.

**[0028]** The use of the connector module illustrated in the drawings is described hereinafter. The connector housing 14 and positive assurance member 16 are first assembled in a pre-locked mode. To this end, the positive assurance member 16 is inserted into opening 56 of housing 14 from end portion 52 in direction 104 as best illustrated in FIGS 3 and 8. In particular, the ends 82, 158 and 160 of arms 102, 116 and 118, respectively, are inserted into the opening 56 such that legs 116 and 118 slide along channel surfaces 162 and 164 of housing 14, and leg 102 slides within opening 98 between legs 94 and 96 of the locking tongue 70. Sliding continues until the surface 132 of the end 82 of the arm 102 is adjacent the surface 134 of the engagement member 84, and the detent abutment members 126 and 128 engage respective detents 122 and 124, in the pre-locked mode illustrated in FIG. 8. In such position, the positive assurance member 16 is locked to the connector housing 14. In particular, movement of the positive assurance member 16 in direction 104 will be prevented by engagement of surfaces 132 and 134, and movement in the direction 104' will be prevented by engagement of the detent abutment members 126 and 128 with respective detent surfaces 144 of respective detents 122 and 124.

**[0029]** With reference to FIGS. 1 and 10a to 10c, when it is desired to connect together the connector housings 12 and 14, the key 36 is mated with the keyway 66, and the end portion 26 of housing 12 is then inserted into opening 56 of housing 14 at end portion 54. As the housing 12 is inserted into opening 56, the surface 44 of lug 40 engages the surface 114 of the engagement member 84 of the locking tongue 70 as illustrated in FIG. 10a. Continued movement of the housing 12 into the opening 56 causes the surface 44 to cam the engagement member 84 in direction 92 until the engagement member rests upon the upper surface 166 of the lug 40 as illustrated in FIG. 10b. Continued movement of the housing 12 into the opening 56 causes (a) the engagement member 84 to resile in direction 92' such that sur-

face 134 of the engagement member 84 is adjacent surface 46 of the lug, and (b) the surface 44 to cam the distal end segment 110 of the arm 102 in direction 92 until the segment 110 rests upon the upper surface 166 of the lug 40 as illustrated in FIG. 10c. When in the position illustrated in FIG. 10c, the connector housings 12 and 14 are fully attached to one another in the engaged mode.

**[0030]** When in the position illustrated in FIG. 10c, the housings 12 and 14 may be disengaged from each other by placing the locking tongue 70 in a disengaged mode by depressing the first tongue portion 72 of the locking tongue 70 in direction 90 sufficiently to cause the engagement member 84 to move in direction 92 to thereby move surface 134 out of the path of the surface 46 of the lug 40. In such position, the lug 40 will no longer engage the engagement member 84 when the housings are moved in direction 86' and therefore will no longer prevent disengagement of the housings 12 and 14.

**[0031]** With reference to FIGS. 8, 9 and 10d, when it is desired to lock the connector housings 12 and 14 together after they are in the engaged mode, the positive assurance member 16 is urged in direction 104 with sufficient force that the resilient legs 116 and 118 flex sufficiently to overcome the resistance to movement in direction 104 provided by the engagement of the detent surfaces 146 with respective detent abutment members 126 and 128. Continued movement of the positive assurance member 16 in direction 104 causes the distal end segment 110 of the arm 102 to resile in direction 92' such that lug 40 enters opening 98 between legs 94 and 96, and surface 112 is adjacent surface 114 as illustrated in FIG. 10d. When in this position the surface 168 of the arm 102 is adjacent a surface 170 of the engagement member 84 of the locking tongue 70, and the regions 106 and 108 of the positive assurance member 16 are adjacent surfaces 172 of respective legs 94 and 96 of the locking tongue. In this locked mode illustrated in FIG. 10d, the connector housings 12 and 14 can not be disconnected because the surface 134 of the engagement member of the locking tongue 70 of housing 14 can not be removed from engagement with the surface 46 of the lug 40 of housing 12. Such removal is prevented because the engagement of the regions 106 and 108 with the surfaces 172 prevents depression of the first tongue portion 72 in direction 90, and engagement of the surface 168 with the surface 170 will prevent movement of the engagement member 84 in the direction 92.

## Claims

### 1. A connector module, comprising:

a first connector housing (12) extending from a first end portion (22) to an opposite second end portion (24) and comprising a lug (40) extend-

ing from a first connector housing wall (42);

a second connector housing (14) extending from one end portion (52) to an opposite another end portion (54) and comprising a resilient locking tongue (70), said locking tongue (70) comprising a first tongue portion (72) extending from a fixed end (74) attached to a second connector housing wall (76) to a first free end (52) and a second tongue portion (80) extending from said first free end (78) to an opposite second free end (82), said second free end (82) comprising an engagement member (84), said second connector housing (14) being slidably engagable with said first connector housing (12) in the direction of a longitudinal axis, to fully engage and disengage said lug (40) and said engagement member (84) in an engaged and disengaged mode, respectively, wherein engaging said first housing (12) with said second housing (14) causes said engagement member (84) to ride over a camming surface (44) of said lug (40) and to resile toward said longitudinal axis, said resilient locking tongue (70) being structured and arranged such that movement of said first tongue portion (72) towards said longitudinal axis causes movement of said engagement member (84) away from said longitudinal axis in a disengaged mode, and release of said first tongue portion (72) permits said engagement member (84) to resile towards said longitudinal axis, in an engaged mode; and

a positive assurance member (16) is movably attached to said second connector housing (14)

### characterized in that

said positive assurance member is structured and arranged such that in said engaged mode, where said engagement member (84) rides over the camming surface (44) of said lug (40) and resiles toward said longitudinal axis movement of said positive assurance member (16) in a locking direction (104) causes an arm (102) of said positive assurance member (16) to ride over said engagement member (84) and to resile toward said longitudinal axis so as to position said positive assurance member (16) in relation to said locking tongue (70) to sufficiently resist said movement of said first tongue portion (72) towards, and said engagement member (84) away from, said longitudinal axis to lock engagement of said lug (40) and said engagement member (84) in a locked mode.

### 2. The connector module of claim 1 wherein said positive assurance member comprises at least one first abutment member (102,110) and at least one second abutment member (126,128), said first and sec-

ond abutment members being structured and arranged such that (a) at least one first abutment member surface is positioned relative to said locking tongue (70) to resist said movement of said engagement member (84) away from said longitudinal axis in said locked mode, and (b) at least one second abutment member (106,108) surface is positioned relative to said locking tongue (70) to resist said movement of said first tongue portion (72) towards said longitudinal axis in said locked mode.

3. The connector module of claim 2 wherein said at least one first abutment member (102) comprises a first distal end surface (112) engagable with a first surface (114) of said engagement member (84) in said locked mode so as to prevent movement of said positive assurance member (16) in a direction opposite to said locking direction.

4. The connector module of claim 3 wherein said positive assurance member (16) comprises at least one detent (122,124), and said second connector housing comprises at least one detent abutment member (126,128), said detent (122,124) being structured and arranged to engage said detent abutment member (126,128) to attach said positive assurance member (16) to said second connector housing (14) in a pre-locked mode.

5. The connector module of claim 4 wherein said at least one first abutment member (16) comprises a second distal end surface (132) engagable with a second surface (134) of said engagement member (84) in said pre-locked mode, said second distal end surface (132) and said second surface (134) of said engagement member (84), and said detent (122,124) and said detent abutment member (126,128), being structured and arranged to resist movement of said positive assurance member (16) in the direction of said longitudinal axis except in said engaged mode.

6. The connector module of claim 1 wherein said second connector housing wall (136,138) comprises an outer surface comprising a rib (140) that extends from said one end portion (52) towards said another end portion (54), said rib (140) extending along an outer surface of said first tongue portion (72).

7. The connector module of claim 1 wherein said second tongue portion (80) comprises a first leg (84) and a second leg (96) each extending from said first free end (78) to said engagement member (84), said first and second legs (94,96) being spaced from each other to provide an opening (98) therebetween, and further wherein said positive assurance member (16) comprises a base (100) and a resilient first arm (102) extending from said base

(100) into said opening (98), said first arm (102) structured and arranged such that in said engaged mode, movement of said positive assurance member (106) in said locking direction serves to position said first arm (102) adjacent said engagement member (84) so that said first arm (102) resists said movement of said engagement member (84) in said locked mode.

8. The connector module of claim 7 wherein said positive resistance member (16) comprises a first region (106) aligned with said first leg (94) and a second region (108) aligned with said second leg (96), said first and second regions (106, 108) being structured and arranged such that in said engaged mode, movement of said positive assurance member (16) in said locking direction serves to position said first and second regions (106,108) adjacent said first and second legs (94,96), respectively, so that said first and second regions (106,108) resist said movement of said first tongue portion (72), in said locked mode.

9. The connector module of claim 8 wherein said positive assurance member (16) further comprises a resilient second arm (116) and an opposite resilient third arm (118) spaced from said second arm (116), said second and third arms (116,118) extending from said base (100), said first arm (102) extending between said second (116) and third (118) arms, said second arm (116) comprising a first detent (122) and said third arm comprising an opposite second detent (124), and further wherein said second connector housing (14) comprises a first detent abutment member (126) and an opposite second detent abutment member (128), said first and second detents (122,124) being structured and arranged to engage said first and second detent abutment members (126,128), respectively, to attach said positive assurance member to said second connector housing (14) in a pre-locked mode.

10. The connector module of claim 9 wherein said first arm (102) comprises a first distal end surface (112) and an opposite second distal end surface (132), said first distal end surface (112) being engagable with a first surface (170) of said engagement member (84) in said locked mode so as to prevent movement of said positive assurance member (16) in a direction opposite to said locking direction, and said second distal end surface (132) being engagable with an opposite second surface (134) of said engagement member in a pre-locked mode, said second distal end surface (132) and said second surface (134) of said engagement member (84), and said first and second detents (122,124) and respective first and second detent abutment members (126, 128), being structured and arranged to resist

movement of said positive assurance member (16) in the direction of said longitudinal axis except in said engaged mode.

11. The connector module of claim 6 wherein said first connector housing (12) comprises a first key member (36) and said second connector housing (14) comprising a second key member (66) matable with said first key member (36) to facilitate slidable engagement of said first connector housing (12) with said second connector housing (14). 5
12. The connector module of claim 9 wherein said positive assurance member (16) comprises a bridging member (142) extending between said first arm (102) and said second arm (116), and said first arm (102) and said third arm (118). 10
13. The connector module of claim 9 wherein said first detent (122) and said second detent (124) each comprise a first detent surface (144) and an opposite second detent surface (146) extending from a detent base (148), said first and second detent abutment members (126, 128) extending between respective first and second detent surfaces (144, 146) in said pre-locked mode, said first detent surface (144) extending from said detent base (148) a first distance and at a first angle that are sufficient to substantially permanently attach said positive assurance member (16) to said second connector housing (14) in said pre-locked mode, and said second detent surface (146) extending from said detent base (148) a second distance and at a second angle that are sufficient to permit movement of said positive assurance member (16) in said locking direction in said engaged mode. 20 25 30 35

#### Patentansprüche

##### 1. Verbindermodule, umfassend:

ein erstes Verbindergehäuse (12), das sich von einem ersten Endabschnitt (22) zu einem gegenüberliegenden zweiten Endabschnitt (24) erstreckt und eine sich von einer Wand (42) des ersten Verbindergehäuses weg erstreckende Nase (40) aufweist;

ein zweites Verbindergehäuse (14), das sich von einem Endabschnitt (52) zu einem gegenüberliegenden anderen Endabschnitt (54) erstreckt und eine elastische Arretierzunge (70) aufweist, wobei die Arretierzunge (70) einen ersten Zungenabschnitt (72), der sich von einem an einer Wand (76) des zweiten Verbindergehäuses angebrachten festen Ende (74) zu einem ersten freien Ende (52) erstreckt, und einen zweiten Zungenabschnitt (80), der sich

von dem ersten freien Ende (78) zu einem gegenüberliegenden zweiten freien Ende (82) erstreckt, umfasst, wobei das zweite freie Ende (82) ein Eingriffselement (84) aufweist, wobei das zweite Verbindergehäuse (14) mit dem ersten Verbindergehäuse (12) in Richtung einer Längsachse gleitend in Eingriff gebracht werden kann, sodass in einem Eingriffszustand ein vollständiger Eingriff der Nase (40) und des Eingriffselementes (84) beziehungsweise in einem Eingriffslösezustand eine vollständige Lösung des Eingriffes erfolgt, wobei der Eingriff des ersten Gehäuses (12) mit dem zweiten Gehäuse (14) bewirkt, dass das Eingriffselement (84) über eine Laufläche (44) der Nase (40) läuft und hin zu der Längsachse zurückschnellt, wobei die elastische Arretierzunge (70) derart aufgebaut und angeordnet ist, dass im Eingriffslösezustand eine Bewegung des ersten Zungenabschnittes (72) hin zu der Längsachse eine Bewegung des Eingriffselementes (84) weg von der Längsachse bewirkt, und eine Freigabe des ersten Zungenabschnittes (72) ermöglicht, dass im Eingriffszustand das Eingriffselement (84) hin zu der Längsachse zurückschnellt; und ein Positivsicherungselement (16), das beweglich an dem zweiten Verbindergehäuse (14) angebracht ist,

##### dadurch gekennzeichnet,

**dass** das Positivsicherungselement derart aufgebaut und angeordnet ist, dass im Eingriffszustand, in dem das Eingriffselement (84) über die Laufläche (44) der Nase (40) läuft und hin zu der Längsachse zurückschnellt, eine Bewegung des Positivsicherungselementes (16) in eine Arretierrichtung (104) bewirkt, dass ein Arm (102) des Positivsicherungselementes (16) über das Eingriffselement (84) läuft und hin zu der Längsachse zurückschnellt, um so das Positivsicherungselement (16) hinsichtlich der Arretierzunge (70) derart anzuordnen, dass der Bewegung des ersten Zungenabschnittes (72) hin zu der Längsachse und des Eingriffselementes (84) weg von dieser ein ausreichender Widerstand entgegengesetzt wird, um im Arretierzustand den Eingriff der Nase (40) und des Eingriffselementes (84) zu arretieren.

2. Verbindermodule nach Anspruch 1, bei dem das Positivsicherungselement wenigstens ein erstes Anschlagselement (102, 110) und wenigstens ein zweites Anschlagselement (126, 128) umfasst, wobei die ersten und zweiten Anschlagselemente derart aufgebaut und angeordnet sind, dass (a) wenigstens eine Fläche des ersten Anschlagselementes relativ zu der Arretierzunge (70) derart angeordnet ist, dass im Arretierzustand der Bewegung des Ein-



griffselementes (84) weg von der Längsachse ein Widerstand entgegengesetzt wird, und dass (b) wenigstens eine Fläche des zweiten Anschlagselementes (106, 108) relativ zu der Arretierzunge (70) derart angeordnet ist, dass im Arretierzustand der Bewegung des ersten Zungenabschnittes (72) hin zu der Längsachse ein Widerstand entgegengesetzt wird.

3. Verbindermodule nach Anspruch 2, bei dem das wenigstens eine erste Anschlagselement (102) eine erste Distalendfläche (112) aufweist, die im Arretierzustand mit einer ersten Fläche (114) des Eingriffselementes (84) derart in Eingriff gebracht werden kann, dass eine Bewegung des Positivsicherungselementes (16) in einer Richtung entgegengesetzt zu der Arretierrichtung verhindert wird. 5
4. Verbindermodule nach Anspruch 3, bei dem das Positivsicherungselement (16) wenigstens eine Vertiefung (122, 124) aufweist, und das zweite Verbindergehäuse wenigstens ein Vertiefungsanschlagselement (126, 128) aufweist, wobei die Vertiefung (122, 124) derart aufgebaut und angeordnet ist, dass ein Eingriff des Vertiefungsanschlagselementes (126, 128) erfolgt, um in einem Vorarretierzustand das Positivsicherungselement (16) an dem zweiten Verbindergehäuse (14) anzubringen. 10
5. Verbindermodule nach Anspruch 4, bei dem das wenigstens eine erste Anschlagselement (16) eine zweite Distalendfläche (132) aufweist, die im Vorarretierzustand mit einer zweiten Fläche (134) des Eingriffselementes (84) in Eingriff gebracht werden kann, wobei die zweite Distalendfläche (132) und die zweite Fläche (134) des Eingriffselementes (84) sowie die Vertiefung (122, 124) und das Vertiefungsanschlagselement (126, 128) derart aufgebaut und angeordnet sind, dass außer im Eingriffszustand einer Bewegung des Positivsicherungselementes (16) in Richtung der Längsachse ein Widerstand entgegengesetzt wird. 15
6. Verbindermodule nach Anspruch 1, bei dem die Wand (136, 138) des zweiten Verbindergehäuses eine Außenfläche mit einer Rippe (140) aufweist, die sich von dem einen Endabschnitt (52) zu dem anderen Endabschnitt (54) erstreckt, wobei sich die Rippe (140) entlang einer Außenfläche des ersten Zungenabschnittes (72) erstreckt. 20
7. Verbindermodule nach Anspruch 1, bei dem der zweite Zungenabschnitt (80) ein erstes Bein (84) und ein zweites Bein (96) aufweist, von denen sich jedes von dem ersten freien Ende (78) zu dem Eingriffselement (84) erstreckt, wobei die ersten und zweiten Beine (94, 96) derart voneinander beabstandet sind, dass eine Öffnung (98) zwischen bei- 25

den gebildet ist, und bei dem des Weiteren das Positivsicherungselement (16) eine Basis (100) und einen elastischen ersten Arm (102) mit einer Erstreckung von der Basis (100) weg in die Öffnung (98) hinein aufweist, wobei der erste Arm (102) derart aufgebaut und angeordnet ist, dass im Eingriffszustand eine Bewegung des Positivsicherungselementes (106) in Arretierrichtung dem Anordnen des ersten Armes (102) angrenzend an das Eingriffselement (84) dient, wodurch im Arretierzustand der erste Arm (102) der Bewegung des Eingriffselementes (84) einen Widerstand entgegengesetzt.

8. Verbindermodule nach Anspruch 7, bei dem das Positivsicherungselement (16) einen mit dem ersten Bein (94) in Ausrichtung befindlichen ersten Bereich (106) und einen mit dem zweiten Bein (96) in Ausrichtung befindlichen zweiten Bereich (108) aufweist, wobei die ersten und zweiten Bereiche (106, 108) derart aufgebaut und angeordnet sind, dass im Eingriffszustand eine Bewegung des Positivsicherungselementes (16) in Arretiereinrichtung dem Anordnen der ersten und zweiten Bereiche (106, 108) angrenzend an die ersten beziehungsweise zweiten Beine (94, 96) dient, wodurch im Arretierzustand die ersten und zweiten Bereiche (106, 108) der Bewegung des ersten Zungenabschnittes (72) einen Widerstand entgegengesetzen. 30
9. Verbindermodule nach Anspruch 8, bei dem das Positivsicherungselement (16) des Weiteren einen elastischen zweiten Arm (116) und einen von dem zweiten Arm (116) beabstandeten gegenüberliegenden elastischen dritten Arm (118) aufweist, wobei sich die zweiten und dritten Arme (116, 118) von der Basis (100) weg erstrecken, wobei sich der erste Arm (102) zwischen dem zweiten Arm (116) und dem dritten Arm (118) erstreckt, wobei der zweite Arm (116) eine erste Vertiefung (122) und der dritte Arm eine gegenüberliegende zweite Vertiefung (124) aufweisen, und bei dem des Weiteren das zweite Verbindergehäuse (114) ein erstes Vertiefungsanschlagselement (126) und ein gegenüberliegendes zweites Vertiefungsanschlagselement (128) aufweist, wobei die ersten und zweiten Vertiefungen (122, 124) derart aufgebaut und angeordnet sind, dass ein Eingriff der ersten beziehungsweise zweiten Vertiefungsanschlagselemente (126, 128) erfolgt, um im Vorarretierzustand das Positivsicherungselement an dem zweiten Verbindergehäuse (14) anzubringen. 35
10. Verbindermodule nach Anspruch 9, bei dem der erste Arm (102) eine erste Distalendfläche (112) und eine gegenüberliegende zweite Distalendfläche (132) umfasst, wobei im Arretierzustand die erste Distalendfläche (112) mit einer ersten Fläche (170) des Eingriffselementes (184) derart in Eingriff ge- 40

bracht werden kann, dass eine Bewegung des Positivsicherungselementes (16) in einer Richtung entgegengesetzt zur der Arretierrichtung verhindert werden kann, und wobei im Vorarretierzustand die zweite Distalendfläche (132) mit einer gegenüberliegenden zweiten Fläche (134) des Eingriffselementes in Eingriff gebracht werden kann, wobei die zweite Distalendfläche (132) und die zweite Fläche (134) des Eingriffselementes (84) sowie die ersten und zweiten Vertiefungen (122, 124) und die jeweiligen ersten und zweiten Vertiefungsanschlags-elemente (126, 128) derart aufgebaut und angeordnet sind, dass außer im Eingriffszustand einer Bewegung des Positivsicherungselementes (16) in Richtung der Längsachse ein Widerstand entgegengesetzt wird.

11. Verbindermodule nach Anspruch 6, bei dem das erste Verbindergehäuse (12) ein erstes Keilelement (36) und das zweite Verbindergehäuse (14) ein zweites Keilelement (66) aufweisen, das in das erste Keilelement (36) einpassbar ist, um einen gleitenden Eingriff des ersten Verbindergehäuses (12) mit dem zweiten Verbindergehäuse (14) zu ermöglichen.
12. Verbindermodule nach Anspruch 9, bei dem das Positivsicherungselement (60) ein Brückenelement (142) aufweist, das sich zwischen dem ersten Arm (102) und dem zweiten Arm (116) sowie dem ersten Arm (102) und dem dritten Arm (118) erstreckt.
13. Verbindermodule nach Anspruch 9, bei dem die erste Vertiefung (122) und die zweite Vertiefung (124) jeweils eine erste Vertiefungsfläche (144) und eine gegenüberliegende zweite Vertiefungsfläche (146) mit einer Erstreckung von einer Vertiefungsbasis (148) weg aufweisen, wobei sich im Vorarretierzustand die ersten und zweiten Vertiefungsanschlagsflächen (126, 128) zwischen den jeweiligen ersten und zweiten Vertiefungsflächen (144, 146) erstrecken, wobei sich die erste Vertiefungsfläche (144) von der Vertiefungsbasis (148) um einen ersten Abstand und unter einem ersten Winkel weg erstreckt, die ausreichend sind, um im Vorarretierzustand eine im Wesentlichen dauerhafte Anbringung des Positivsicherungselementes (16) an dem zweiten Verbindergehäuse (14) zu ermöglichen, und wobei sich die zweite Vertiefungsfläche (146) von der Vertiefungsbasis (148) um einen zweiten Abstand und unter einem zweiten Winkel weg erstreckt, die ausreichend sind, um im Arretierzustand eine Bewegung des Positivsicherungselementes (16) in Arretierrichtung zu ermöglichen.

## Revendications

### 1. Module de connexion, comprenant :

un premier logement de connecteur (12) s'étendant à partir d'une première partie d'extrémité (22) jusqu'à une seconde partie d'extrémité opposée (24) et comprenant une oreille (40) s'étendant à partir d'une paroi de premier logement de connecteur (42) ;  
un second logement de connecteur (14) s'étendant à partir d'une partie d'extrémité (52) jusqu'à une autre partie d'extrémité opposée (54) et comprenant une languette de verrouillage élastique (70), ladite languette de verrouillage (70) comprenant une première partie de languette (72) s'étendant à partir d'une extrémité fixe (74) attachée à une paroi de second logement de connecteur (76) jusqu'à une première extrémité libre (52) et une seconde partie de languette (80) s'étendant à partir de ladite première extrémité libre (78) jusqu'à une seconde extrémité libre opposée (82), ladite seconde extrémité libre (82) comprenant un élément de mise en prise (84), ledit second logement de connecteur (14) pouvant être mis en prise de manière coulissante avec ledit premier logement de connecteur (12) dans la direction d'un axe longitudinal, pour entièrement mettre en prise et dégager ladite oreille (40) et ledit élément de mise en prise (84) respectivement dans un mode en prise et dans un mode dégagé, dans lequel la mise en prise dudit premier logement (12) avec ledit second logement (14) amène ledit élément de mise en prise (84) à parcourir une surface servant de came (44) de ladite oreille (40) et à reculer vers ledit axe longitudinal, ladite languette de verrouillage élastique (70) étant structurée et agencée de sorte que le mouvement de ladite première partie de languette (72) vers ledit axe longitudinal provoque un mouvement dudit élément de mise en prise (84) à l'écart dudit axe longitudinal dans un mode dégagé, et la libération de ladite première partie de languette (72) permet audit élément de mise en prise (84) de reculer vers ledit axe longitudinal, dans un mode en prise ; et un élément d'assurance positive (16) est attaché de façon mobile audit second logement de connecteur (14)

#### caractérisé en ce que

ledit élément d'assurance positive est structuré et agencé de sorte que dans ledit mode en prise, dans lequel ledit élément de mise en prise (84) parcourt la surface servant de came (44) de ladite oreille (40) et recule vers ledit axe longitudinal, le mouvement dudit élément d'assurance positive

- (16) dans un sens de verrouillage (104) amène un bras (102) dudit élément d'assurance positive (16) à parcourir ledit élément de mise en prise (84) et à reculer vers ledit axe longitudinal de façon à positionner ledit élément d'assurance positive (16) par rapport à ladite languette de verrouillage (70) pour suffisamment résister audit mouvement de ladite première partie de languette (72) vers, et dudit élément de mise en prise (84) à l'écart, dudit axe longitudinal pour verrouiller la mise en prise de ladite oreille (40) et dudit élément de mise en prise (84) dans un mode verrouillé.
2. Module de connexion selon la revendication 1, dans lequel ledit élément d'assurance positive comprend au moins un premier élément de butée (102, 110) et au moins un second élément de butée (126, 128), lesdits premier et second éléments de butée étant structurés et agencés de sorte que (a) au moins une première surface d'élément de butée est positionnée par rapport à ladite languette de verrouillage (70) pour résister audit mouvement dudit élément de mise en prise (84) à l'écart dudit axe longitudinal dans ledit mode verrouillé, et (b) au moins une seconde surface d'élément de butée (106, 108) est positionnée par rapport à ladite languette de verrouillage (70) pour résister audit mouvement de ladite première partie de languette (72) vers ledit axe longitudinal dans ledit mode verrouillé.
3. Module de connexion selon la revendication 2, dans lequel ledit au moins premier élément de butée (102) comprend une première surface d'extrémité distale (112) pouvant être mise en prise avec une première surface (114) dudit élément de mise en prise (84) dans ledit mode verrouillé afin d'empêcher le mouvement dudit élément d'assurance positive (16) dans un sens opposé audit sens de verrouillage.
4. Module de connexion selon la revendication 3, dans lequel ledit élément d'assurance positive (16) comprend au moins un positionneur (122, 124), et ledit second logement de connecteur comprend au moins un élément de butée de positionneur (126, 128), ledit positionneur (122, 124) étant structuré et agencé pour mettre en prise ledit élément de butée de positionneur (126, 128) pour attacher ledit élément d'assurance positive (16) audit second logement de connecteur (14) dans un mode préverrouillé.
5. Module de connexion selon la revendication 4, dans lequel ledit au moins un premier élément de butée (16) comprend une seconde surface d'extrémité distale (132) pouvant être mise en prise avec une seconde surface (134) dudit élément de mise en prise (84) dans ledit mode préverrouillé, ladite seconde surface d'extrémité distale (132) et ladite seconde surface (134) dudit élément de mise en prise (84), et ledit positionneur (122, 124) et ledit élément de butée de positionneur (126, 128), étant structurés et agencés pour résister au mouvement dudit élément d'assurance positive (16) dans la direction dudit axe longitudinal sauf dans ledit mode en prise.
6. Module de connexion selon la revendication 1, dans lequel ladite paroi de second logement de connecteur (136, 138) comprend une surface extérieure comprenant une nervure (140) qui s'étend à partir de ladite partie d'extrémité particulière (52) vers ladite autre partie d'extrémité (54), ladite nervure (140) s'étendant le long d'une surface extérieure de ladite première partie de languette (72).
7. Module de connexion selon la revendication 1, dans lequel ladite seconde partie de languette (80) comprend une première patte (84) et une seconde patte (96), chacune s'étendant à partir de ladite première extrémité libre (78) jusqu'audit élément de mise en prise (84), lesdites première et seconde pattes (94, 96) étant espacées l'une de l'autre pour définir une ouverture (98) entre elles, et de plus dans lequel ledit élément d'assurance positive (16) comprend une base (100) et un premier bras élastique (102) s'étendant à partir de ladite base (100) dans ladite ouverture (98), ledit premier bras (102) étant structuré et agencé de sorte que dans ledit mode engagé, le mouvement dudit élément d'assurance positive (106) dans ledit sens de verrouillage sert à positionner ledit premier bras (102) adjacent audit élément de mise en prise (84) de sorte que ledit premier bras (102) résiste audit mouvement dudit élément de mise en prise (84) dans ledit mode verrouillé.
8. Module de connexion selon la revendication 7, dans lequel ledit élément de résistance positive (16) comprend une première zone (106) alignée sur ladite première patte (94) et une seconde zone (108) alignée sur ladite seconde patte (96), lesdites première et seconde zones (106, 108) étant structurées et agencées de sorte que dans ledit mode en prise, le mouvement dudit élément d'assurance positive (16) dans ledit sens de verrouillage sert à positionner lesdites première et seconde zones (106, 108) respectivement adjacentes auxdites première et seconde pattes (94, 96), de sorte que lesdites première et seconde zones (106, 108) résistent audit mouvement de ladite première partie de languette (72), dans ledit mode verrouillé.
9. Module de connexion selon la revendication 8, dans lequel ledit élément d'assurance positive (16) comprend de plus un deuxième bras élastique (116) et un troisième bras élastique opposé (118) espacé

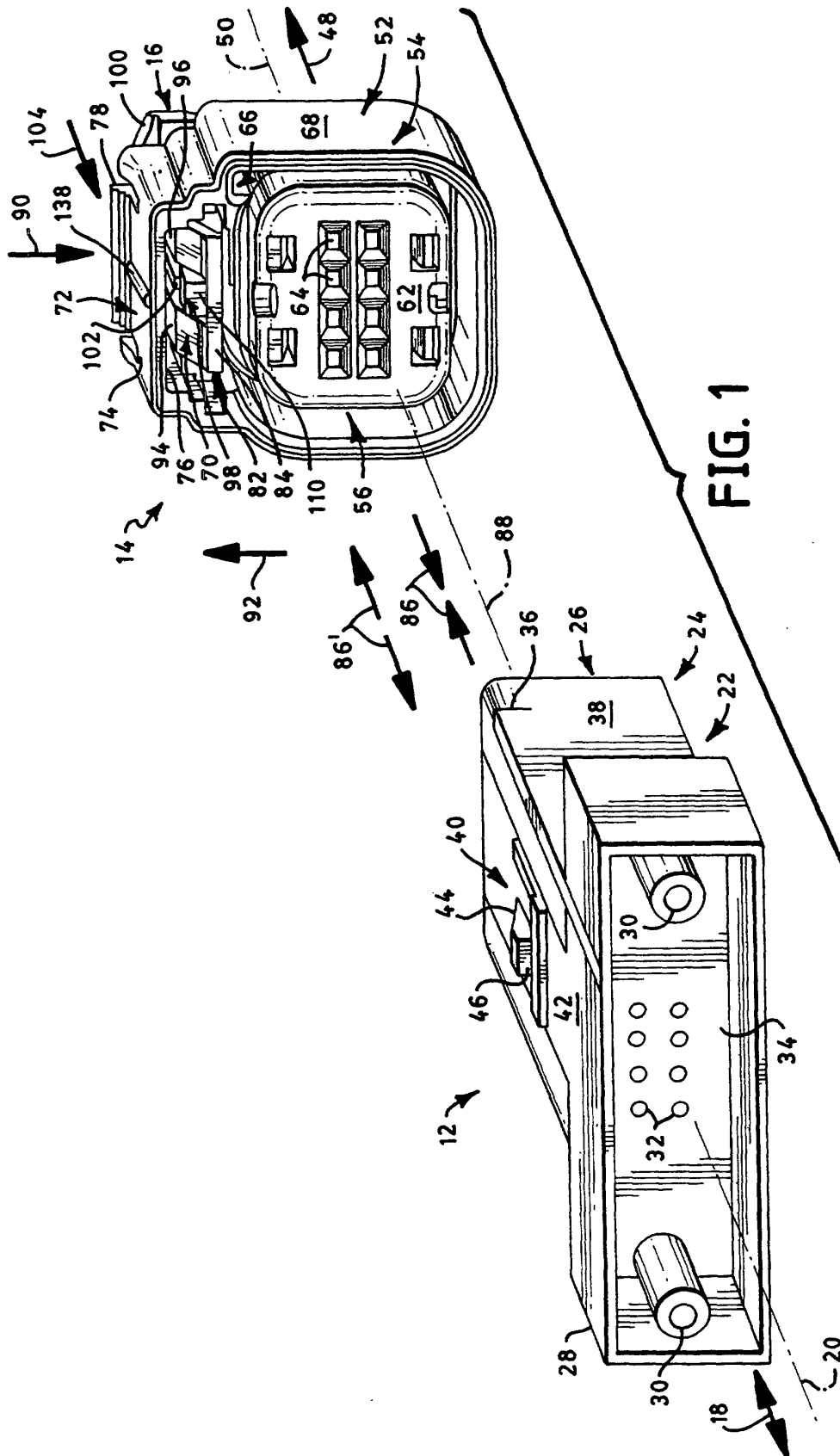
dudit deuxième bras (116), lesdits deuxième et troisième bras (116, 118) s'étendant à partir de ladite base (100), ledit premier bras (102) s'étendant entre lesdits deuxième (116) et troisième (118) bras, ledit deuxième bras (116) comprenant un premier positionneur (122) et ledit troisième bras comprenant un second positionneur opposé (124), et de plus dans lequel ledit second logement de connecteur (14) comprend un premier élément de butée de positionneur (126) et un second élément de butée de positionneur opposé (128), lesdits premier et second positionneurs (122, 124) étant structurés et agencés pour respectivement mettre en prise lesdits premier et second éléments de butée de positionneur (126, 128), pour attacher ledit élément d'assurance positive audit second logement de connecteur (14) dans un mode préverrouillé.

**10.** Module de connexion selon la revendication 9, dans lequel ledit premier bras (102) comprend une première surface d'extrémité distale (112) et une seconde surface d'extrémité distale opposée (132), ladite première surface d'extrémité distale (112) pouvant être mise en prise avec une première surface (170) dudit élément de mise en prise (84) dans ledit mode verrouillé afin d'empêcher le mouvement dudit élément d'assurance positive (16) dans un sens opposé audit sens de verrouillage, et ladite seconde surface d'extrémité distale (132) pouvant être mise en prise avec une seconde surface opposée (134) dudit élément de mise en prise dans un mode préverrouillé, ladite seconde surface d'extrémité distale (132) et ladite seconde surface (134) dudit élément de mise en prise (84), et lesdits premier et second positionneurs (122, 124) et les premier et second éléments respectifs de butée de positionneur (126, 128), étant structurés et agencés pour résister au mouvement dudit élément d'assurance positive (16) dans la direction dudit axe longitudinal sauf dans ledit mode en prise.

**11.** Module de connexion selon la revendication 6, dans lequel ledit premier logement de connecteur (12) comprend un premier élément formant clavette (36) et ledit second logement de connecteur (14) comprenant un second élément formant clavette (66) pouvant être accouplé avec ledit premier élément formant clavette (36) pour faciliter la mise en prise coulissante dudit premier logement de connecteur (12) avec ledit second logement de connecteur (14).

**12.** Module de connexion selon la revendication 9, dans lequel ledit élément d'assurance positive (16) comprend un élément de rapprochement (142) s'étendant entre ledit premier bras (102) et ledit deuxième bras (116), et ledit premier bras (102) et ledit troisième bras (118).

**13.** Module de connexion selon la revendication 9, dans lequel ledit premier positionneur (122) et ledit second positionneur (124) comprennent chacun une première surface de positionneur (144) et une seconde surface de positionneur opposée (146) s'étendant à partir d'une base de positionneur (148), lesdits premier et second éléments de butée de positionneur (126, 128) s'étendant entre les première et seconde surfaces de positionneur respectives (144, 146) dans ledit mode préverrouillé, ladite première surface de positionneur (144) s'étendant à partir de ladite base de positionneur (148) sur une première distance et à un premier angle qui sont suffisants pour attacher sensiblement de manière permanente ledit élément d'assurance positive (16) audit second logement de connecteur (14) dans ledit mode préverrouillé, et ladite seconde surface de positionneur (146) s'étendant à partir de ladite base de positionneur (148) sur une seconde distance et à un second angle qui sont suffisants pour permettre le mouvement dudit élément d'assurance positive (16) dans ledit sens de verrouillage dans ledit mode en prise.



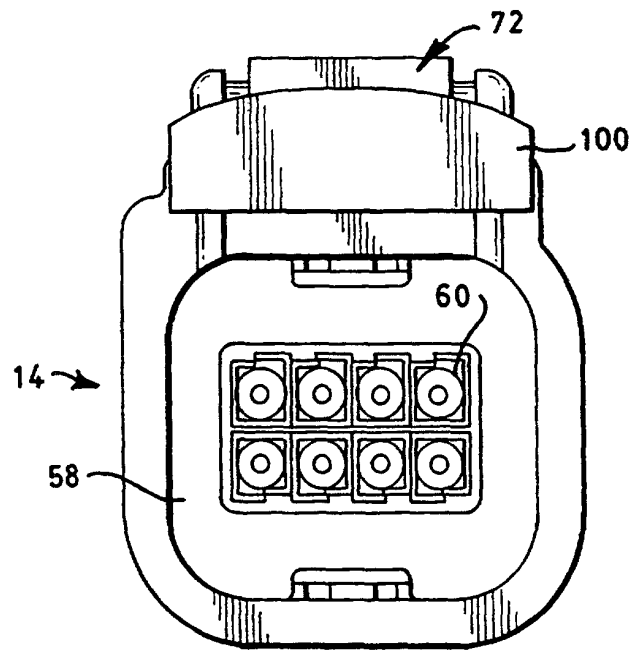


FIG. 2

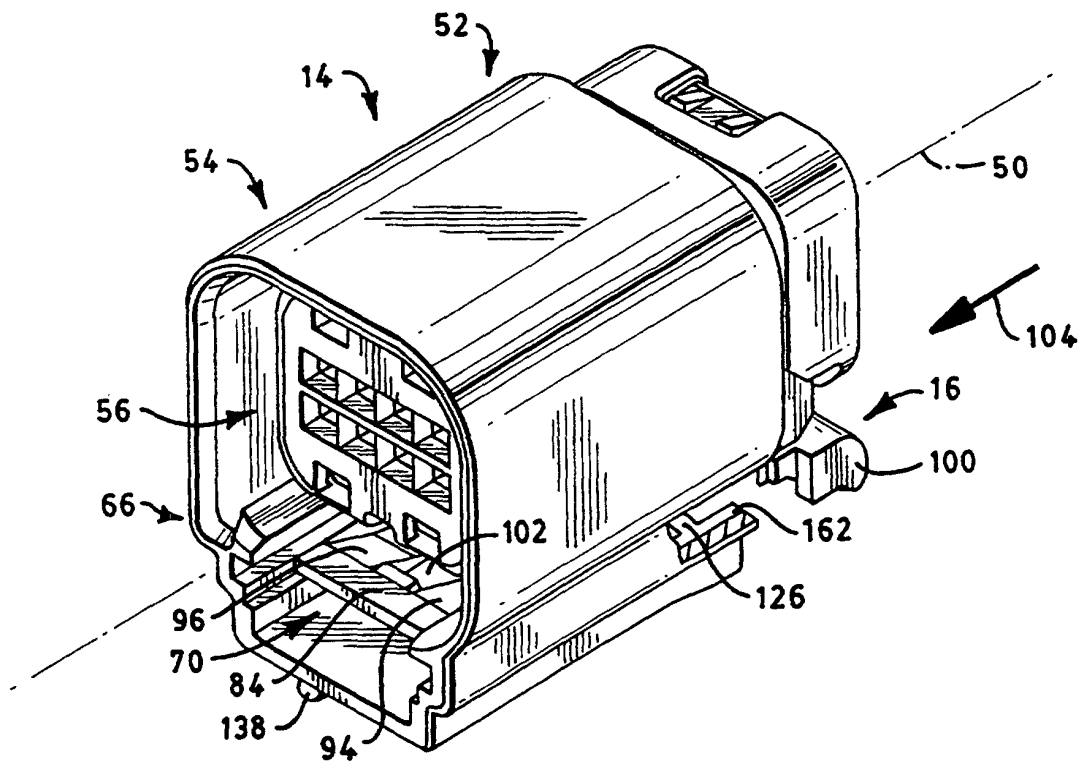


FIG. 3

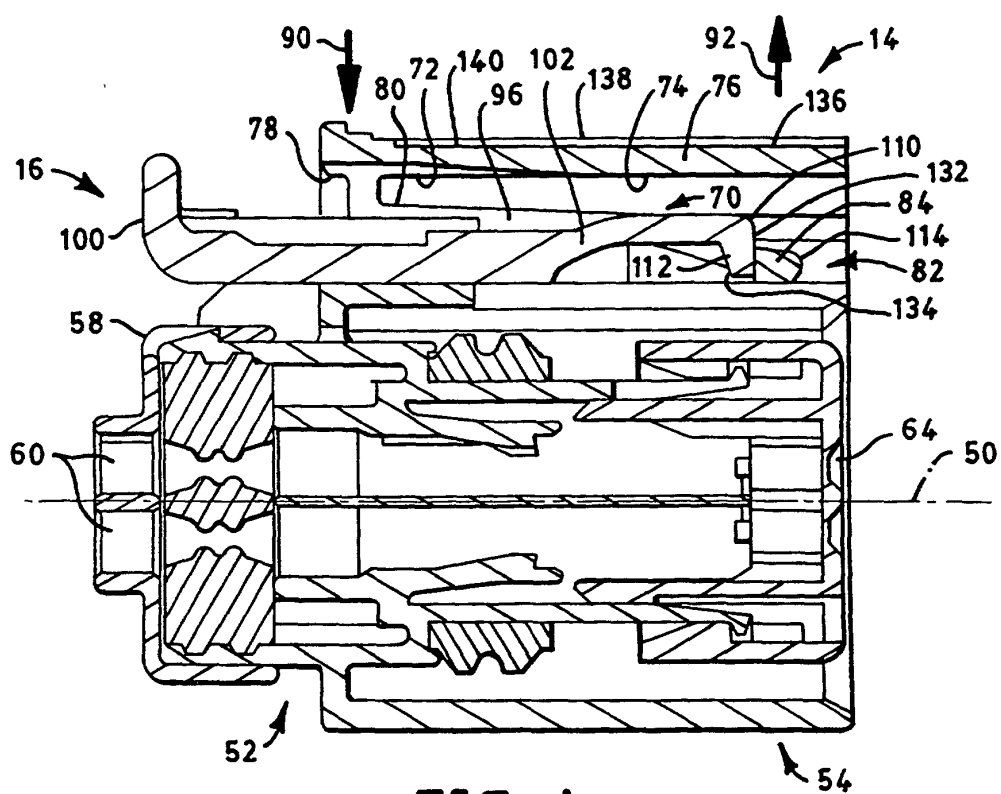


FIG. 4

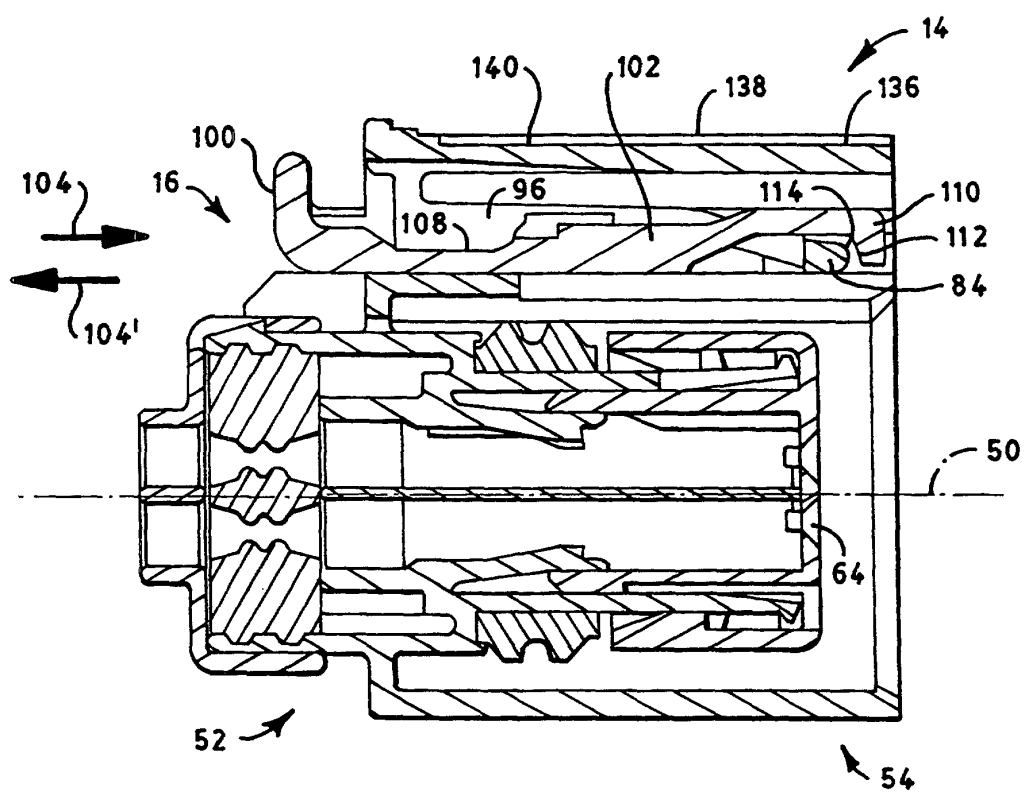


FIG. 5

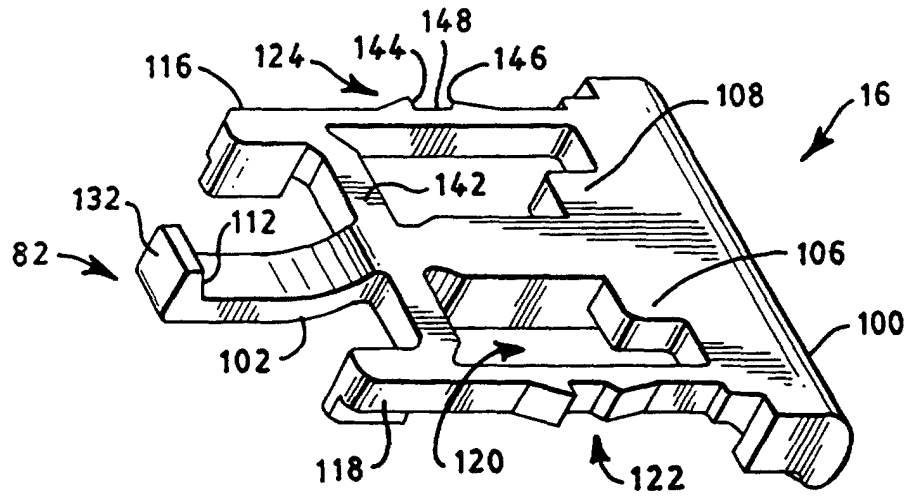


FIG. 6

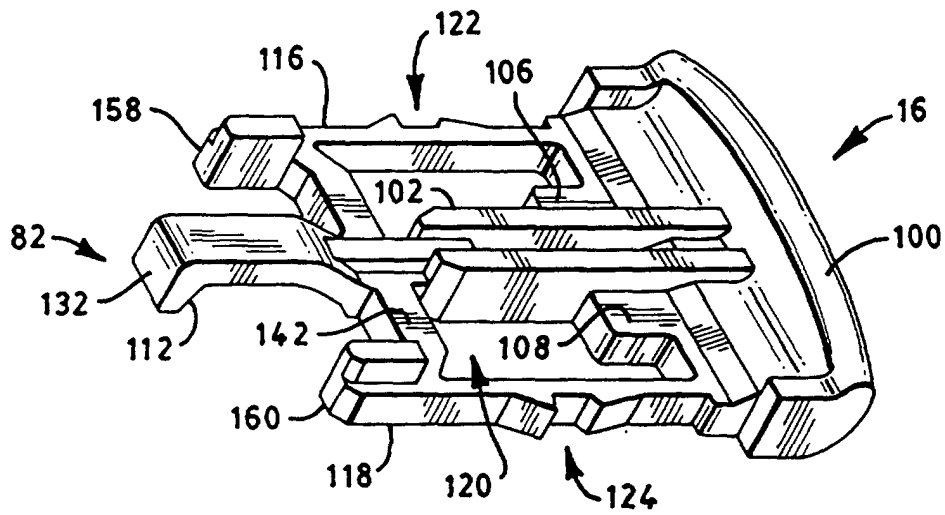


FIG. 7



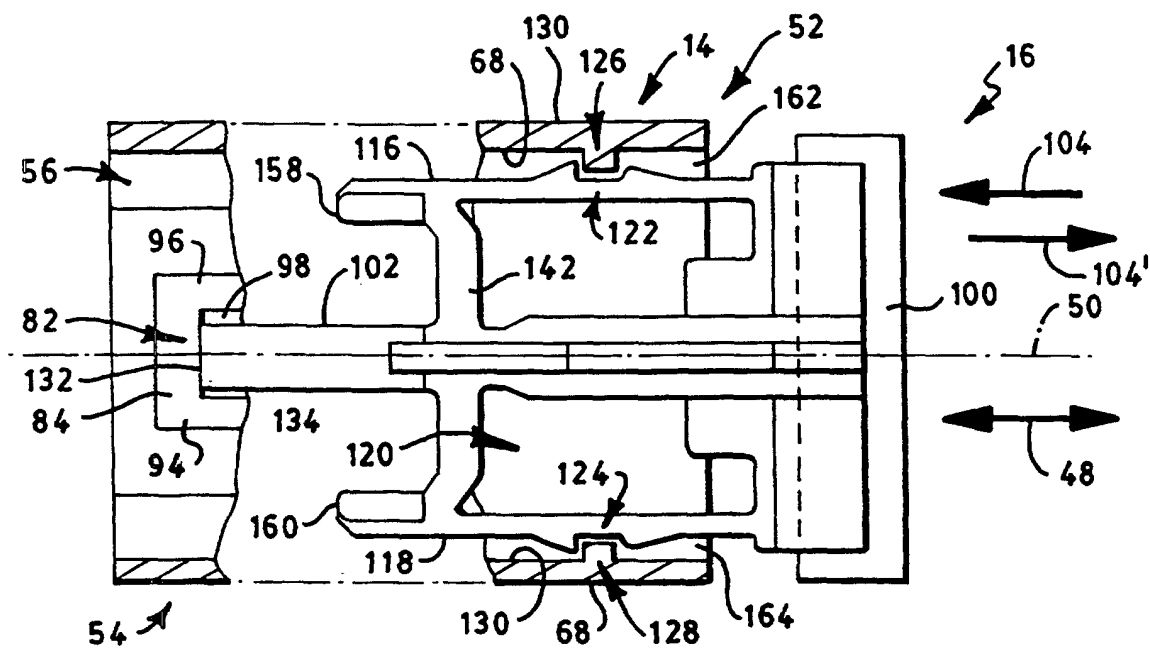


FIG. 8

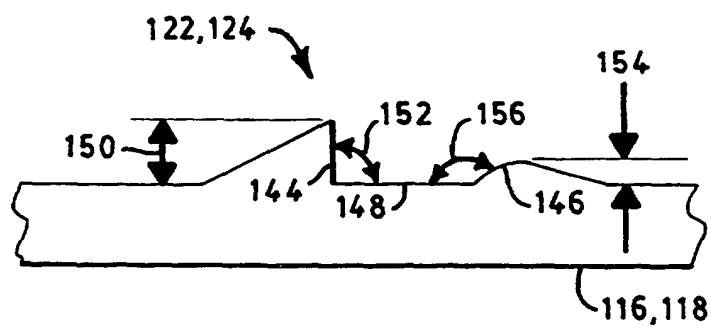


FIG. 9

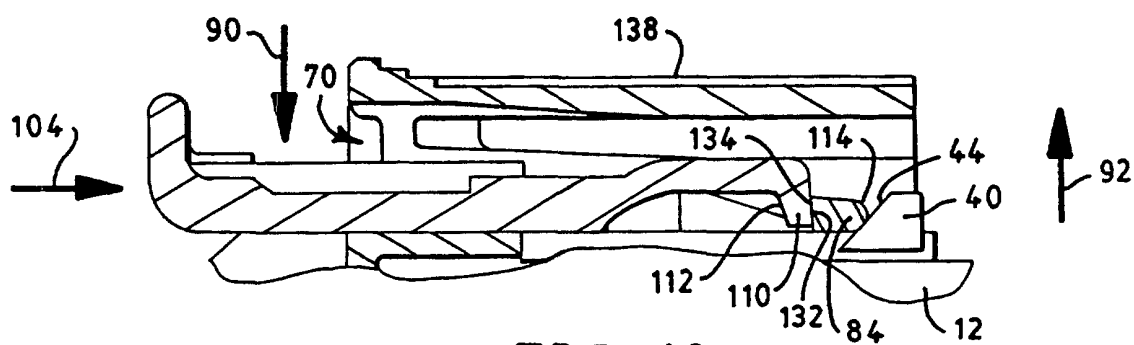


FIG. 10a

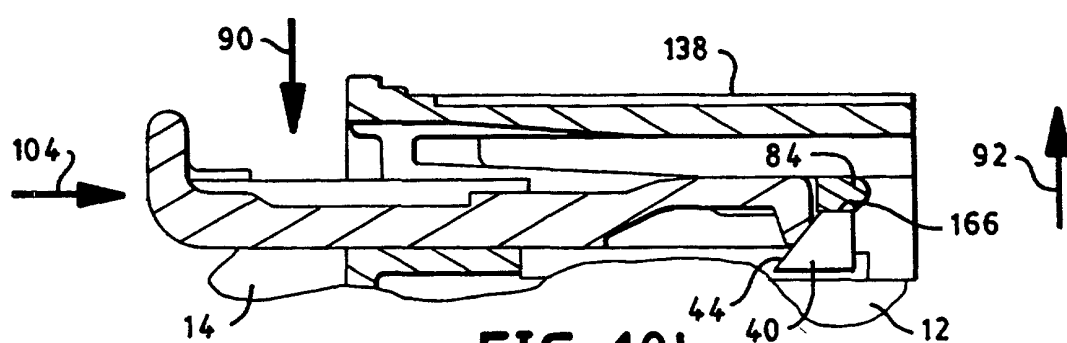


FIG. 10b

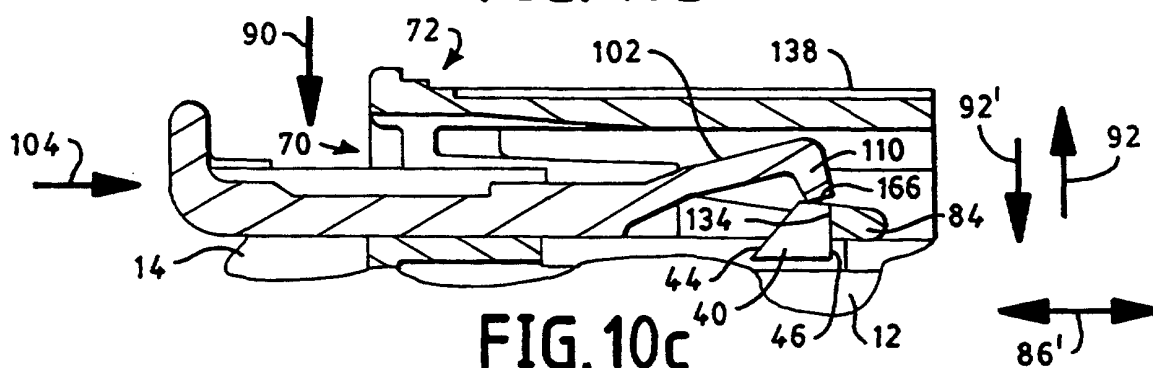


FIG. 10c

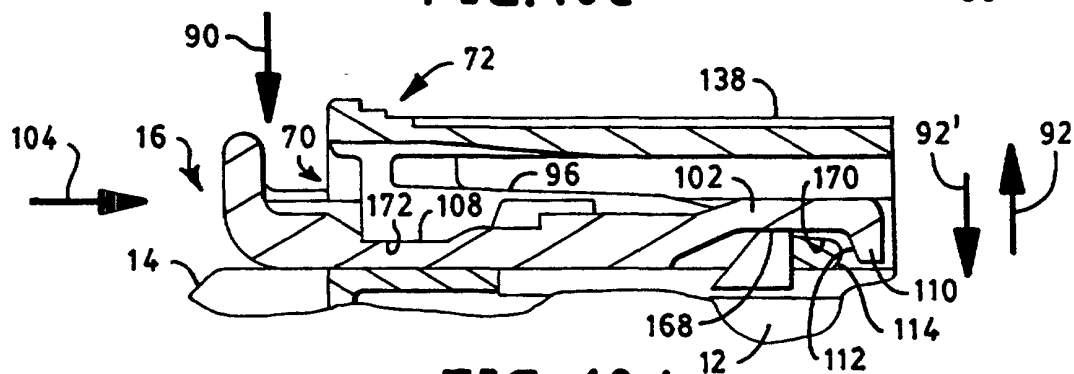


FIG. 10d