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(54) Connector for airbag igniter

(57) The connector comprises a plug (1) with socket contacts (2) with a wire connection side and a side receiving contact pins (6) extending from a socket (8) located on the airbag igniter. The connector is "non-serviceable", i.e., once it is mated with the ignition, it can only be unmated by use of a special tool. A snap-on cover (9) assures retention of the cable (4), and a downwardly projecting element (40) engages an aperture (50) in the igniter socket (8) to permit 360° positioning of the plug and the application of torque.

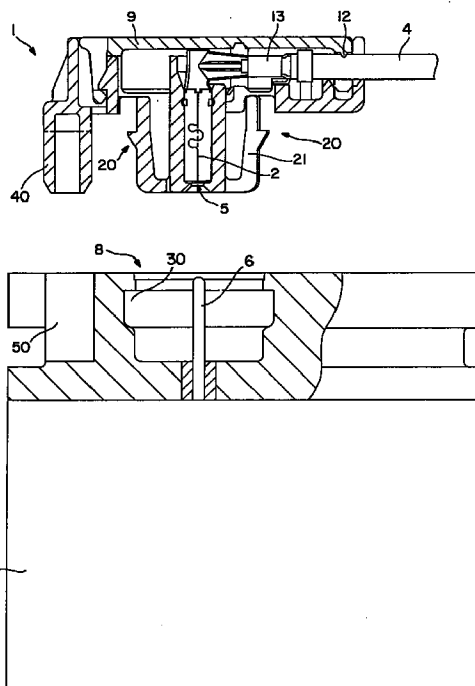


FIG. 1

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Description

Field of the Invention

The present invention relates to an electrical connector for use with igniters for vehicle occupant inflatable restraint systems, generally known as airbags, and in particular, to means for maintaining the connector plug in engagement with the socket.

Background of the Invention

The use of airbag systems in motor vehicles has become virtually universal in recent years, and is mandatory in many jurisdictions. Such systems normally include an airbag assembly mounted in a hidden compartment beneath the dashboard, and an electrical or electronic control system for activating the assembly upon the occurrence of a crash. The airbag assembly is generally connected to the control system by a wiring harness provided with a plug with socket contacts and a socket which receives pin contacts of the igniter.

A connector system of this type is shown, for example, in EP 0 591 947, in which the system is associated with an interlock including a locking element which is inserted into the connection to prevent separation of a pair of male connector elements carried by a first component from a pair of female connector elements carried by a second component and releasably mated therewith. A shorting element is associated with the first component and includes a pair of contact elements each biased into electrical contact with one of the pair of first connector elements for producing a short therebetween. The second component has a body comprising a portion contoured to enter between the pairs of connector elements so as to disconnect the short upon mating of the first and second components, which are mechanically latched together. The locking element prevents release of the latch and hence separation of the two components while in the lock position.

In EP 0 537 751, which relates to a switch connector assembly with a waterproof structure which prevents the admission of water, the female connector has a short-circuiting terminal extending into a connector fitting chamber thereof, as well as a temporary arresting projection and a flexible locking arm with a final arresting projection. The male connector has a connecting terminal, a flexible engaging pawl, and an engaging portion. When the temporary arresting projection is fitted with the pawl, the short-circuiting terminal is kept out of contact with the connecting terminal, but the two terminals enter into contact when the final arresting projection is fitted with the engaging portion.

Summary of the Invention

The connector according to the present invention comprises a plug part with socket contacts which have a wire connection side for attachment of wires and a pin

receiving side for receiving pin contacts projecting from the airbag igniter. The pin contacts extend from a socket part located on the igniter. Once the connector has been mated with the igniter, it can only be unmated with the aid of a special removal tool.

The plug part is provided with a snap on cover which assures retention of the cable and which is provided with lateral and front resilient locking lugs, as well as a downwardly projecting element which engages a complementary aperture in the socket part to permit 360° positioning of the plug in the igniter socket and the application of torque force. The cover maintains the socket contact in position. In addition, the downwardly facing side of the end of the cover opposite the downwardly projecting element is provided with nipples which bite into the wire-insulating cable in order to assure its retention on the U-shaped rear portion of the plug part.

It is an object of the present invention to improve the means for retaining the plug part in the socket part, specifically by means of resilient locking arms which extend from the base of the plug part, and which spread apart to self-lock in a locking slot in the socket part as a pull-out force is applied to the plug part.

Brief Description of the Drawings

In order that the invention may be more clearly understood, reference will now be made to the accompanying drawings, in which an embodiment of the invention is shown for purposes of illustration, and in which:

Figure 1 is a front elevation view of the plug part and the igniter socket part in unassembled position;

Figure 2 is a front elevation view of the plug part and the igniter socket part in assembled position;

Figure 3 is a top plan view of the plug part with its cover along line A--A of Figure 1;

Figure 4 is a plan view of the cover showing the locations of the lateral and front resilient locking lugs;

Figure 5 is a front elevational view of the cover;

Figure 6 is a partly-sectional front elevation view of the cover;

Figure 7 is a rear end view of the plug and the cover in unassembled position;

Figure 8 is a detail view of the resilient locking arms; and

Figure 9 is a view similar to Figure 8, showing locking arms according to the prior art.

Detailed Description

Figs. 1 to 7 illustrate a connector plug 1 with downwardly extending socket contacts 2 with a wire connection side 3 for the attachment of cable-clad wires 4 and a pin-receiving side 5 beneath the socket contacts.

In order to assure the retention of the cables 4 containing the conductor wires, plug 1 is surmounted by a cover 9 with lateral locking lugs 10 and resilient front locking lugs 11. The underside of the rear end of cover 9 is further provided with nipples 12 which bite into the cables to prevent them from shifting longitudinally in the U-shaped rear portion of the plug.

Plug 1 is designed to mate with a socket part 8 located on the airbag igniter 7 and comprising pin contacts 6 which mate with sockets 2.

To permit 360° positioning and the application of torque force, the forward part of plug 1 is provided with a downwardly projecting arm 40 which engages in a complementary aperture 50 extending downward from the top surface of the socket part 8.

To assure retention of plug 1 in socket 8, the plug is provided with a pair of downwardly extending, substantially vertical resilient locking arms 21 provided with lateral, outwardly facing detent projections 17, each comprising an upwardly divergent outer surface 17a and a horizontal upper surface 17b which abuts against a corresponding downwardly facing surface of a locking slot 30 provided in socket 8. When an upward pull-out force is applied to plug 8, resilient arms 21 spread apart and self-lock in locking slot 30.

The locking arm arrangement of the present invention, as shown schematically in Fig. 8, is a significant improvement over that of EP 0 537 751, as shown in Fig. 9, in which locking arms 27, while also provided with detent projections 26, do not flex outwardly and hence cannot perform the self-locking function of applicants' locking arms 21. The invention hence results in a more secure interengagement of the plug and socket, this being critical in the case of airbag igniter connectors.

Claims

1. An electrical connector assembly comprising a plug member (1) having first contact means (2) adapted to mate with a socket member (8) having second contact means (6), one of said plug member (1) and said socket member (6) comprising resilient locking means (20) adapted to engage in an aperture (30) in the other of said plug member (1) and said socket member (8), said resilient locking means (20) comprising at least two arms (21) which, upon application of a force to effect separation of said plug member (1) from said socket member (8), spread apart so as to self-lock and to prevent said separation.

2. An electrical connector assembly according to claim 1, wherein said resilient locking means (20) project vertically from a bottom of said plug member and engage in a locking slot (30) in said socket member (8).
3. An electrical connector assembly according to claim 2, wherein said arms (21) comprise detent means including upwardly divergent portions joining horizontal portions which abut under a shoulder of said locking slot (30) and prevent disengagement of said plug member (1) from said socket member (8) upon spreading of said arms (21) when said force is applied.
4. An electrical connector assembly according to claim 1, wherein said plug member (1) comprises socket contacts (2) having a first side (3) for attachment of a wire connection and a second side for receiving pin contacts (6) projecting from an airbag igniter.
5. An electrical connector assembly according to claim 1, wherein said plug member (1) is surmounted by a cover (9) with lateral locking lugs and resilient front locking lugs for retaining in position a cable enclosing conductor wires.
6. An electrical connector assembly according to claim 5, wherein said cover (9) has an underside provided with downwardly extending nipples (1) adapted to bite into said cable (4) to assist in retention of said cable (4).
7. An electrical connector assembly according to claim 1, including an element (40) projecting downwardly from said plug member (1) and engaging in an aperture (50) in said contact member for the purpose of assuring 360° positioning and permitting the application of torque force to said members (1, 8).

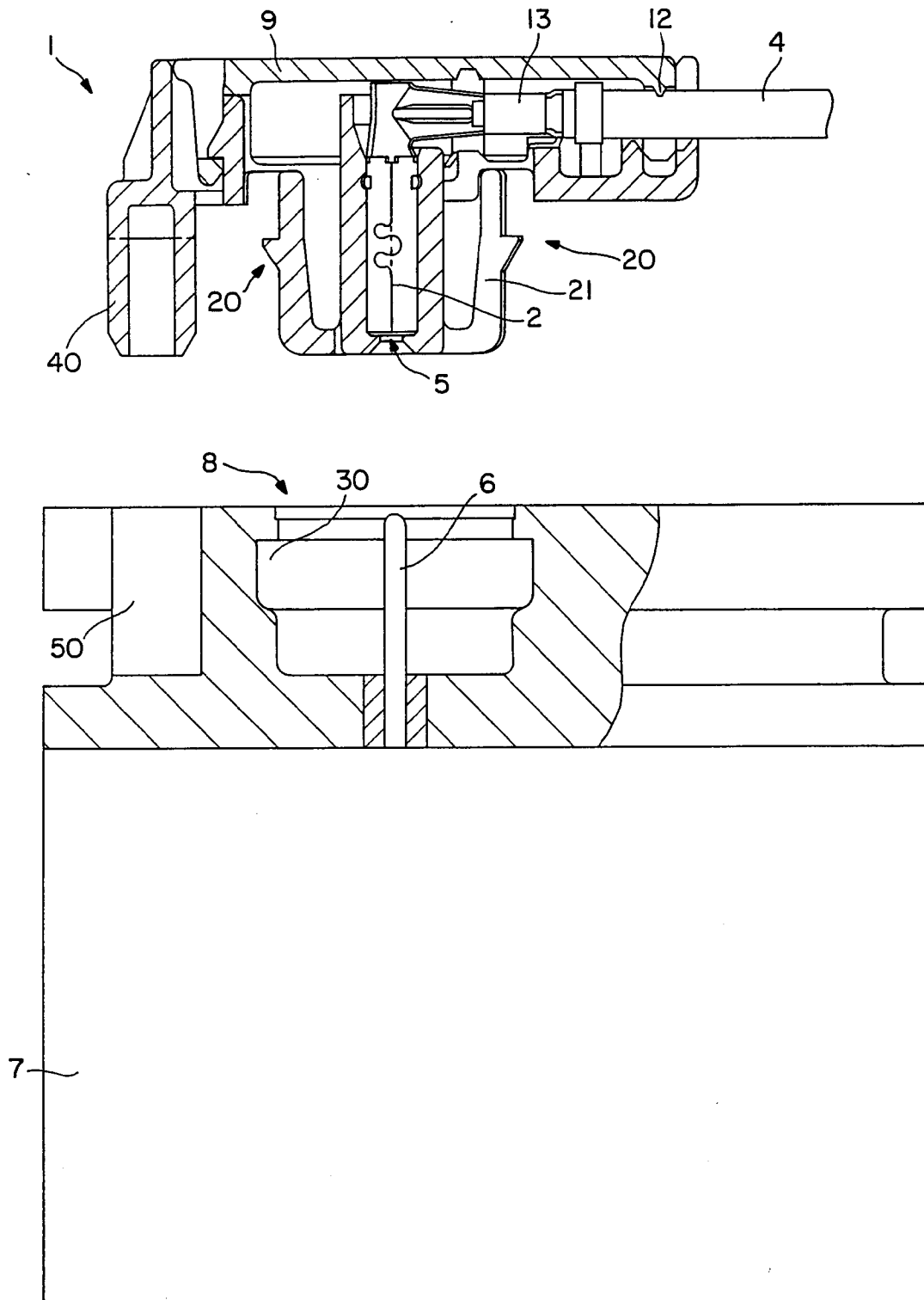


FIG. 1

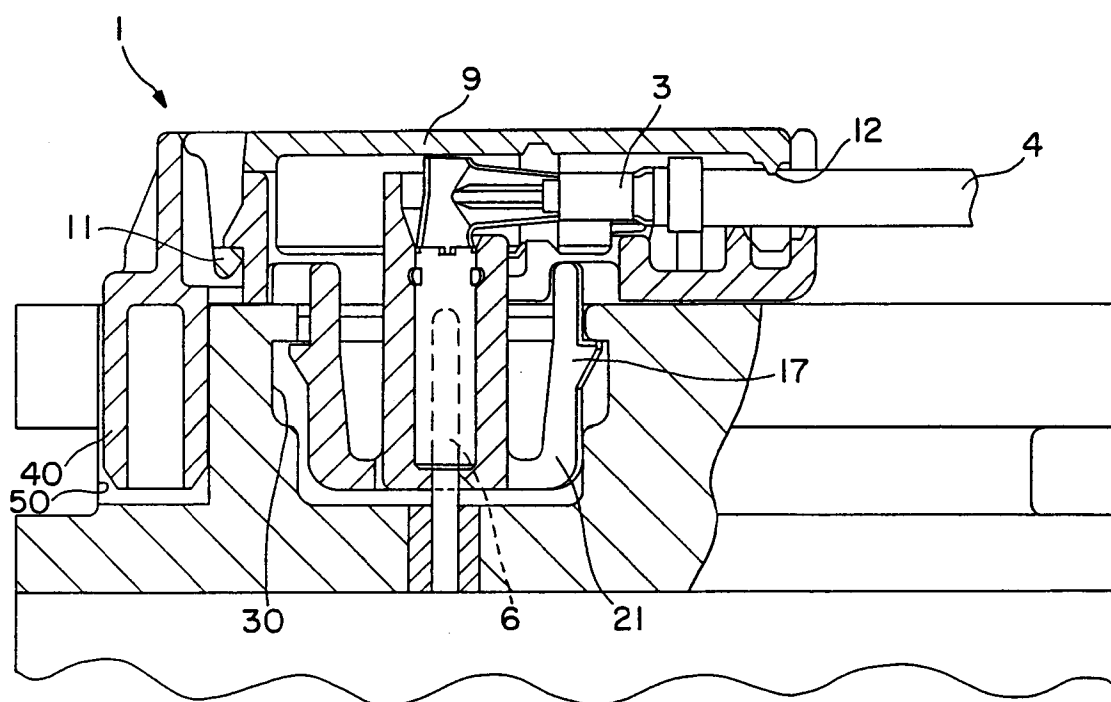


FIG. 2

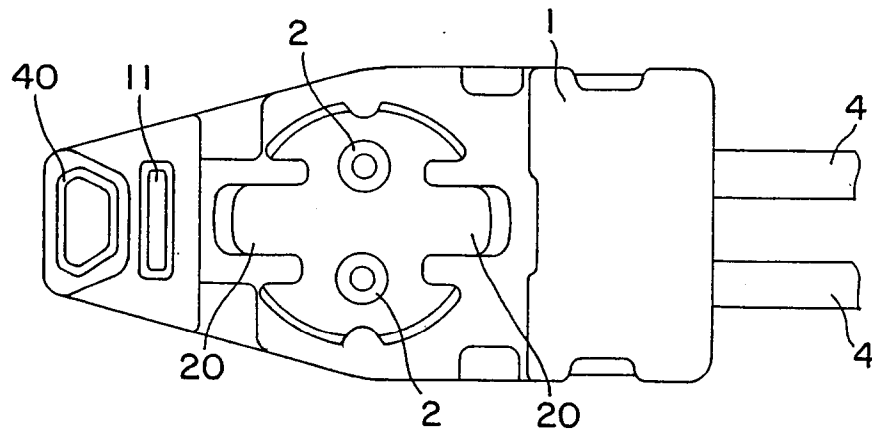


FIG. 3

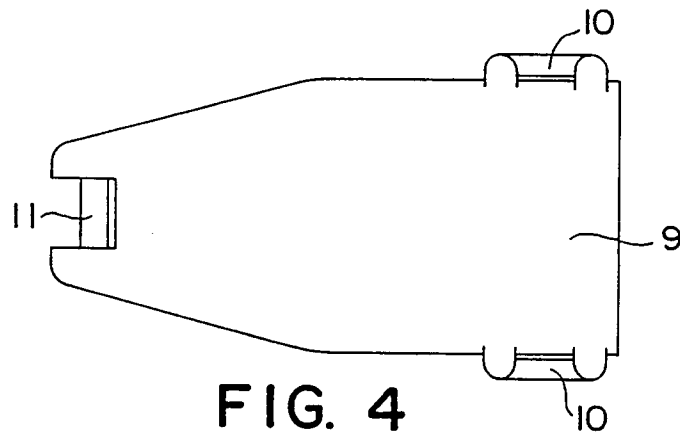


FIG. 4

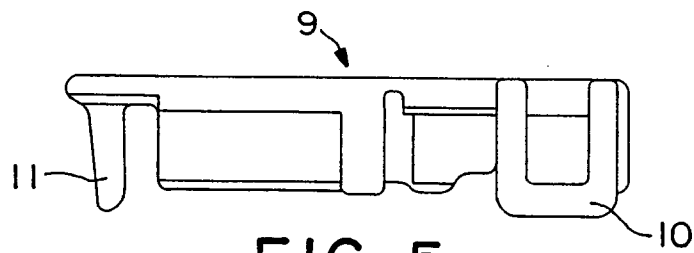


FIG. 5

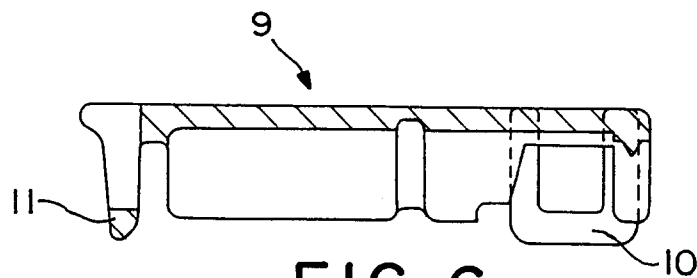


FIG. 6

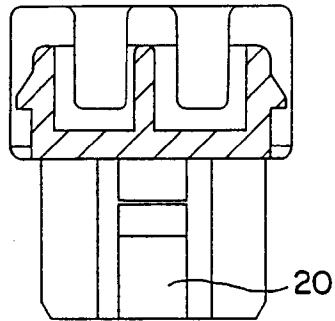
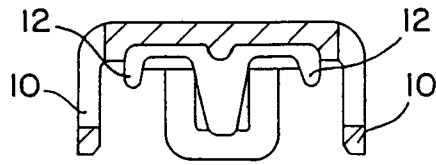


FIG. 7

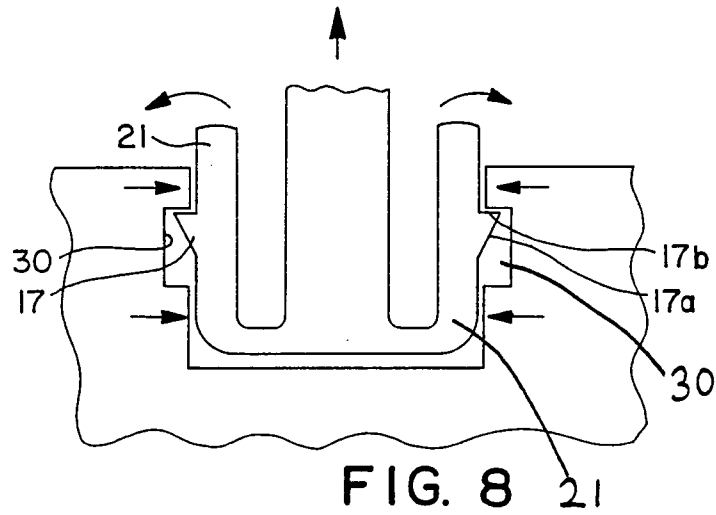


FIG. 8

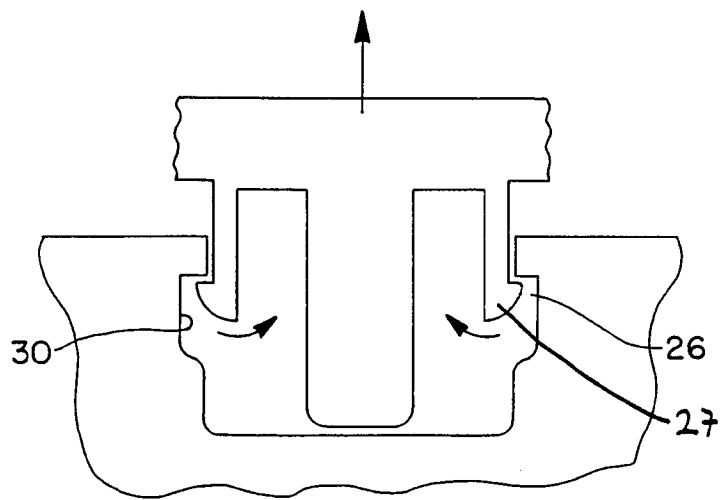


FIG. 9

Prior Art

