

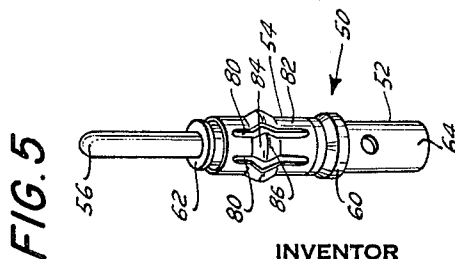
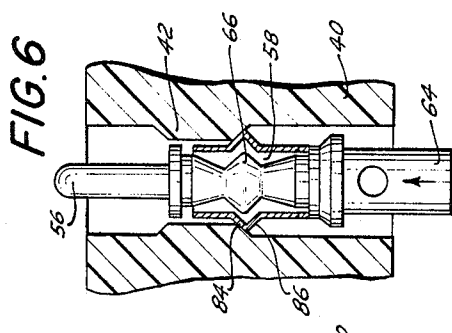
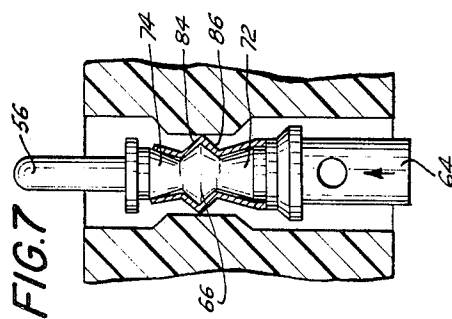
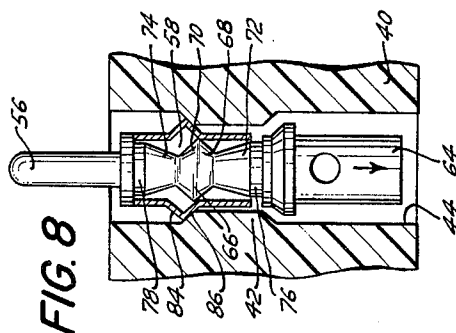
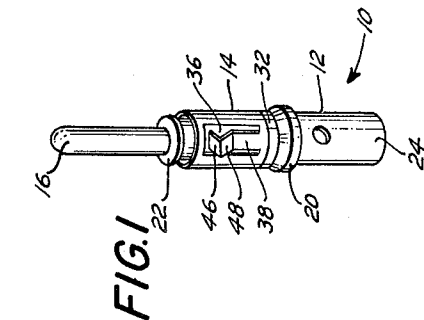
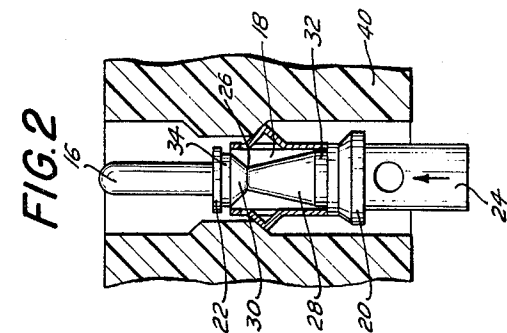
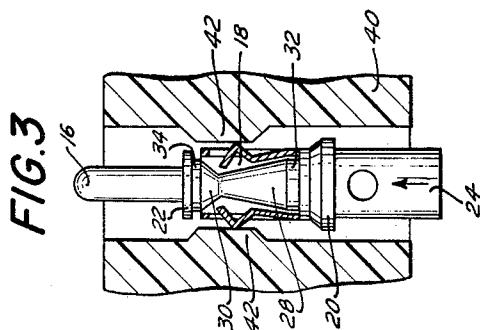
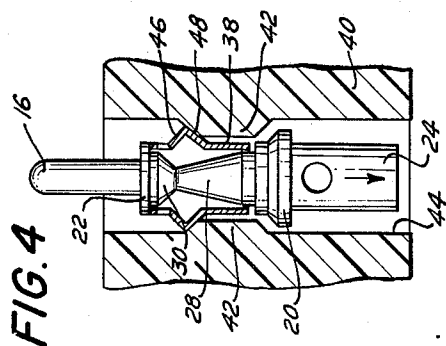
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3,474,398

RELEASABLE LOCKING CONNECTOR

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3,474,398

RELEASABLE LOCKING CONNECTOR

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2 Claims

ABSTRACT OF THE DISCLOSURE

A releasable locking connector of two parts including a body portion and an outer sleeve adapted to slide on the body portion. The outer sleeve has spring detents thereon adapted to latch with a member on the panel to which the connector is to be attached.

This invention relates to a self-locking connector of the type having at least one electrical connector element supported on and locked into a circuit connecting panel, and more particularly, to a connector of this type in which the connector element includes locking means which is resilient and which prevents separation of the connector element from the circuit connecting panel until the locking means is deflected into an unlocked position through the use of an external device.

There are numerous types of releasable locking connectors for use in a circuit connecting panel, and one of the primary design considerations is to provide a locking member on the connectors which will not release itself due to accidental external forces upon the panel or connector during use of the circuit panel. The use of spring detents is a common means of providing a locking member which will latch upon insertion of the connector into the panel, and yet will have sufficient resilience to withstand a certain amount of external force. However, in many instances, a sufficient force on the connector will cause undesired releasing, primarily because the resilient spring detents are held in place by only a single means in the panel opening.

An object of the present invention, therefore, is to provide a connector which will automatically lock when the connector is completely inserted into its seated position and which cannot be inadvertently released without the use of a specific external device.

Another object is to provide a connector wherein a resilient locking member on the connector body will not be accidentally released after the connector is properly seated in the circuit connecting panel.

Another object is to provide a connector having a locking member thereon which cannot be released without a specific initial movement of the connector.

Another object is to provide such a connector which can be manufactured either as a pin connector, or as a socket connector.

These and other objects and features of the invention will be more readily apparent when taken in conjunction with the accompanying specification and in light of the following drawings in which:

FIGURE 1 is a perspective view of a pin type connector constructed in accordance with the present invention;

FIGURE 2 is a longitudinal sectional view through the pin type connector as it is being inserted into a supporting panel;

FIGURE 3 is a similar view showing the connector further inserted into the panel at a point where the spring detents are being depressed;

FIGURE 4 is a similar view showing the connector fully inserted and locked in the supporting panel;

FIGURE 5 is a perspective view of a modified form of pin type connector;

FIGURES 6-8 are views similar to FIGURES 2-4 showing the connector of FIGURE 5 in various positions in the supporting panel.

The connector of the present invention may be of the pin or socket type, although for purposes of illustration a pin connector will be described. There is shown in FIGURE 1 a two-part pin connector 10 including a body portion 12 and an outer sleeve 14 slidable on the body portion 12.

The body portion 12 includes a pin member 16, a detent locking section 18 located between a first shoulder 20 and a second shoulder 22, and a wire receiving ferrule 24 for receiving a bared wire or cable. The detent operating section 18 comprises a reduced portion 26 from which extend tapered or frusto-conical portions 28, 30 toward shoulders 20, 22, respectively. Tapered or frusto-conical portions 28, 30 terminate in cylindrical surfaces 32, 34 respectively, which constitute bearing surfaces for the outer sleeve 14.

The outer sleeve 14 has preferably a pair of openings 36 and a pair of spring detents 38 adapted to engage the panel 40 at a selected point; for example, at the tapered shoulder 42 formed in the opening 44 of the panel 40. Although two spring detents 38 are shown, any greater number may be used. The spring detents 38 are integral with and extend inwardly from the outer end of outer sleeve 14, with the remote end of the spring detents 38 being unattached to order to permit flexure of the spring detents for locking and releasing operation. The spring detents 38 include a cam surface 46 and an abutment surface 48 which are adapted to engage the tapered sides of shoulder 42.

As shown in FIGURES 1-4, the length of outer sleeve 14 is less than the distance between shoulders 20 and 22 but yet is of sufficient length so that the ends of the outer sleeve 14 are at all times on a portion of the cylindrical bearing surfaces 32, 34.

The connector is secured to the bared wire or cable by crimping the ferrule 24 or by some other conventional method. As shown in FIGURES 2-4, the connector is then inserted into the opening 44 of the panel until the shoulder 42 engages the cam surface 46 on each spring detent 38 depressing each spring detent 38 through openings 36 into detent locking section 18 of connector body portion 12 until the cam surface 46 passes the shoulder 42. The spring detent 38 will then flex back into normal position behind shoulder 42, with abutment surface 48 against shoulder 42, thereby locking the connector to the panel.

The relationship of the outer sleeve 14 to the detent locking section 18 is an important feature of this invention in preventing inadvertent removal of the connector. As shown in FIGURES 2 and 3, the outer sleeve 14 is located against shoulder 20 during initial insertion and detent depression. This positioning is insured, since the initial contact of the spring detents 38 and panel shoulder 42 will initially slide the outer sleeve 14 against shoulder 20. In the latched position of FIGURE 4, the outer sleeve 14 will tend to be positioned at the front of the connector against shoulder 22 especially during insertion of the connector into its mating socket connector. Also, any force tending to pull the connector from the panel in the direction of the arrow in FIGURE 4 will shift the outer sleeve 14 against shoulder 22. As will be apparent, the connector cannot be removed in the opposite direction since the shoulder 20 will abut against panel shoulder 42. The positioning of the outer sleeve 14 against shoulder 22 positively locks the connector in position, since the leading edge of cam surface 46 abuts against tapered or frusto-conical portion 30

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in the detent locking section 18. This abutting relationship will prevent any possibility of detent depression as long as outer sleeve 14 is against shoulder 22.

When it is desired to release the connector from the panel 40, the connector is shifted in a direction opposite that of the arrow in FIGURE 4 to permit movement of the outer sleeve 14 against shoulder 20, thereby moving tapered or frusto-conical position 30 away from the leading edge of cam surface 46. Following this shifting movement, a suitable extraction tool (not shown) is inserted around pin member 16 to initially move outer sleeve 14 against shoulder 20 and then to depress spring detents 38 into detent locking section 18, thereby removing abutment surface 48 from shoulder 42. At this point, the connector may then be pulled out from the panel 40.

In FIGURES 5-8, a modified pin connector 50 is shown comprising a body portion 52 and an outer sleeve 54 slidable on the body portion 52.

The body portion 52 includes a pin member 56, a detent locking section 58 located between a first shoulder 60 and a second shoulder 62, and a wire receiving ferrule 64 for receiving a bared wire or cable. The detent locking section 58 includes an enlarged portion 66 comprising tapered or frusto-conical portions 68, 70 to which are integrally formed tapered or frusto-conical portions 72, 74 respectively. Tapered or frusto-conical portions 72, 74 terminate in cylindrical surfaces 76, 78 respectively, which constitute bearing surfaces for the outer sleeve 54.

The outer sleeve 54 has a plurality of openings 80 formed therein and spring detents 82 are located between openings 80 to engage the panel 40 at the tapered shoulder 42. Although a greater number of spring detents 82 are shown, a minimum of two may be used. The spring detents 82 are integral with outer sleeve 54 and include a cam surface 84 and an abutment surface 86 which are adapted to engage the tapered sides of panel shoulder 42.

The connector is secured to the bared wire or cable by crimping the ferrule 64 or by some other conventional method. As shown in FIGURES 6-8, the connector is then inserted into the opening 44 of the panel 40 until the shoulder 42 engages the cam surface 84 on each spring detent 82, thereby depressing each spring detent 82 down into detent locking section 58 and onto enlarged portion 66 until the cam surface 84 passes the shoulder 42. At this point, the spring detents 82 will spring back into position with abutment surface 86 against shoulder 42, thereby locking the connector to the panel. The positioning of the outer sleeve 54 on the body portion 52 is the same as in the connector of FIGURES 1-4 and, therefore need not be discussed again. In the latched position of FIGURE 8, the innermost edge portion of abutment surface 86 will abut against the top of enlarged portion 66 to positively lock the connector in position.

To release the connector from the panel, the connector is shifted in a direction opposite that of the arrow in FIGURE 8 to permit movement of the outer sleeve 54 against shoulder 60, thereby moving enlarged portion 66 out of engagement with abutment surface 86. Following this shifting movement, a suitable extraction tool is inserted around pin 56 to completely move outer sleeve 54 against shoulder 60 and then to depress spring detents 82 into detent locking section 53, thereby removing abutment surface 86 from shoulder 42. At this point, the connector may then be pulled out from the panel.

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The invention has thus been described, but it is desired to be understood that it is not confined to the particular forms or usages shown and described, the same being merely illustrative, and that the invention may be carried out in other ways without departing from the spirit of the invention; therefore, it is desired to employ all equivalent instrumentalities coming within the scope of the invention, and by means of which objects of this invention are attained and new results accomplished, as it is obvious that the particular embodiments herein shown and described are only some of the many that can be employed to obtain these objects and accomplish these results.

What is claimed is:

1. A connector for mounting in a housing having a connector-receiving bore which includes a constriction forming two axially opposed shoulders therein, comprising:

a body member adapted to be inserted into said bore; a pair of spaced-apart stop means on said body member;

blocking means on said body member located between said pair of stop means;

an outer sleeve member slideably coupled to said body member between said pair of stop means;

an opening in said sleeve member; and

detent means disposed in said opening in the form of a longitudinally extending strip integrally formed to said sleeve member at the opposite ends of said strip;

said detent means having a cam surface adapted to engage one of opposed shoulders in a housing bore to drive said detent means radially inward toward said blocking means in a first slideable position of said outer sleeve member relative to said body member;

and said detent means further having an abutment surface to engage the other one of said opposed shoulders when said outer sleeve member occupies a second position relative to said body member in which said blocking means resists inward motion of said detent means.

2. The connector of claim 1, wherein said connector body member has a reduced portion on each side of said blocking means, said blocking means being an enlarged portion defined by a pair of frusto-conical surfaces integrally formed with the larger diameter portions together, said cam surface and said abutment surface being located coincident with said enlarged portion in a first slideable position of said outer sleeve member relative to said body member.

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