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CONNECTOR LOCKING MEANS

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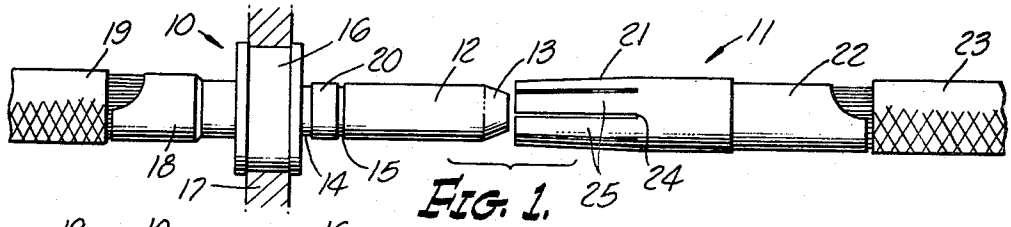

FIG. 1.

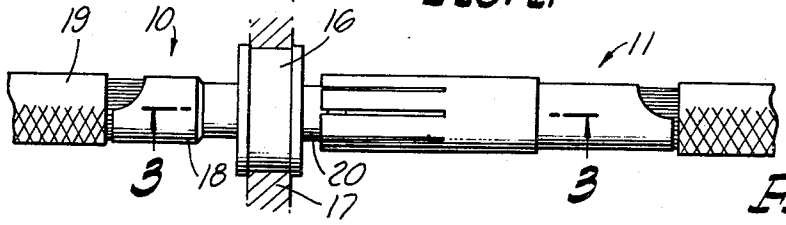

FIG. 2.

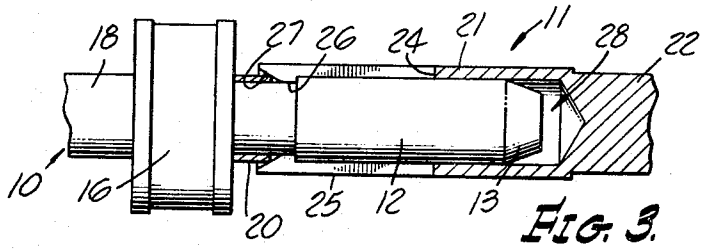

FIG. 3.

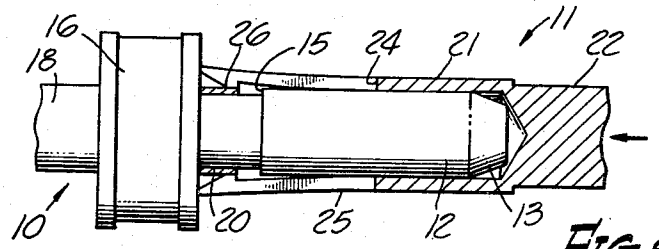

FIG. 4.

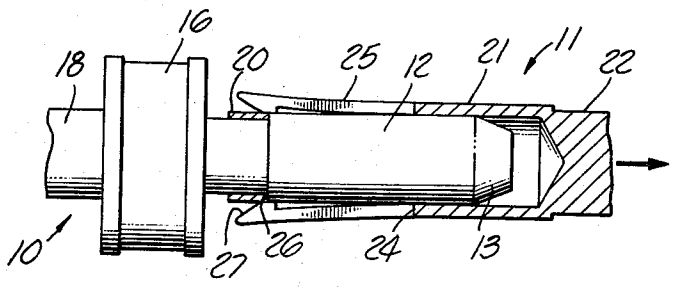

FIG. 5.

ANTHONY A. GLOWACZ
INVENTOR

KENDRICK, SUBKOW and STOLZY
BY
George J. Hatter
ATTORNEY

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CONNECTOR LOCKING MEANS

Anthony A. Glowacz, Northridge, Calif., assignor to Viking Industries, Inc., Chatsworth, Calif., a corporation of California

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ABSTRACT OF THE DISCLOSURE

The pin of a pin and socket connector has a cylindrical shaft end portion of uniform cross-section and a portion remote from the end of reduced cross-section. A sleeve is slidingly received onto the reduced cross-section portion of the pin. The socket includes a split-cylinder that is received onto the pin cylindrical shaft, the inner end surface of the split-cylinder being formed into a hook that lockingly engages a shoulder between the pin portions of different cross-sections. To disconnect, the socket is moved further onto the pin thereby camming the hook onto the sleeve and permitting the socket to be withdrawn.

The present invention pertains generally to electrical connectors, and more particularly to pin and socket connectors having individual locking means associated with pin and socket for retaining the connective attitude until affirmative disconnection is accomplished.

Background of the invention

Pin and socket connectors are commonly used with electric equipment of all kinds because of their rapid connect-disconnect capability. However, it is highly desirable that such connectors do not disconnect inadvertently since this not only terminates operation of the associated equipment, but also if high current is being carried by the connector at the time of the disconnection, destruction of the connector itself and/or associated electrical components can result. Of course, the attendant danger of destruction to apparatus on such disconnection increases as the current load being handled by the connector increases. For this reason, it is advisable particularly in the case of individual high current carrying pin and socket connectors to provide means of locking the connector in the connection attitude and which also require affirmative steps to produce disconnection.

It is therefore a primary object and feature of the present invention to provide a pin and socket connector having a selectively actuatable locking means of improved character.

A further object of the invention is the provision of a pin and socket connector having a unitarily related locking means.

A still further object of the invention is the provision of a locking means associated with a pin and socket connector which is manually manipulated to the locking and unlocking condition and without requirement of special locking and/or unlocking tools.

Yet another object of the invention is the provision of a pin and socket connector having locking means which are rapidly and easily operated, and yet fully reliable in preventing inadvertent disconnection of the connector.

Summary of the invention

Briefly, the present invention includes a pin of a pin and socket connector having a first elongated surface of uniform cross-section dimension and an area of reduced cross-section dimension remotely from the end. An annular sleeve is received on the area of reduced dimension in sliding, the outer dimensions of which are the same as

those of the larger cross-section dimension of the pin. A split-sleeve socket is adapted for being received onto the larger cross-section area of the pin connector for establishing electrical contact therewith. The inner end surface of the split-sleeve socket is formed into a clasplike shoulder such that when the socket is received fully onto the pin the shoulder is lockingly received on an accommodating shoulder formed between the areas of different cross-sectional dimensions of the pin. During connection, the forward portions of the socket move the sleeve beyond the end of the socket.

Removal of the socket from the pin is accomplished by further advancing the socket on the pin which cams the the end of the socket onto the outer surface of the annular sleeve. The socket can now be withdrawn from the pin.

Other objects, advantages and features of the invention will be apparent to those skilled in the art on reference to the following description when taken with the accompanying claims.

Brief description of the drawing

FIG. 1 is a perspective elevational view, partially in section, showing the pin and socket connector with locking mechanism of the invention disconnected.

FIG. 2 is an elevation view of the connector of FIG. 1 shown connected.

FIG. 3 is a sectional view taken along the line 3—3 of FIG. 2 showing the connector in locked connected relation.

FIG. 4 is a sectional view similar to FIG. 3 showing the connector in the first stage of disconnection.

FIG. 5 is a sectional view similar to FIGS. 3 and 5 showing the socket being withdrawn from the pin.

Brief description of a preferred embodiment

Reference is now made particularly to FIG. 1 in which there is shown the connector and locking means of the invention with the connector illustrated in disconnected condition. The connector includes generally a pin end **10** and a socket **11**, which are electrically joined by the pin being received within the appropriate hollow portions of the socket.

More particularly, the pin end includes an elongated cylindrical contact portion **12** having a smooth peripheral surface, the terminus of which is tapered as at **13** to provide a tip of reduced dimensions. Inwardly, a substantial distance from the terminus, the pin is provided with a cylindrical region **14** of reduced dimensions, the juncture of the two portions of different cross-sections being defined by a shoulder **15**. The reduced diameter region is affixed to a disc-like mounting hub **16**, which is illustrated as anchored to a wall member **17**.

A connecting sleeve **18** is secured to the hub **16** on the other side of the wall member and electrically related to the pin end parts on the first side of the wall. A wire or cable **19** is secured within the sleeve **18** by any suitable conventional technique, such as soldering for example.

For use in locking and unlocking of the pin and socket in a manner that will be described later herein, a band-like release sleeve **20** is received onto the reduced diameter region **14**. The bore of the sleeve **20** is such as to permit it to slide freely longitudinally on the pin region **14**, while the outer diameter of the sleeve is the same as that of the contact portion **12**. Moreover, the axial dimension of the sleeve relative to that of the region is such that when the inner end of the sleeve abuts against the hub **16** a gap exists between the outer sleeve end and the shoulder **15**. On the other hand, when the sleeve is moved to abut against the shoulder **15**, the peripheral surface area of the sleeve is co-extensive with the outer surface of the pin contact **12**.

The socket **11** includes a hollow, split-cylinder **21** integrally constructed with a shank portion **22** having a cavity within which a cable or wire **23** is secured by soldering, crimping, or the like. More particularly, the split-cylinder has a plurality of longitudinal slots **24** separating wall portions of the cylinder into a corresponding plurality of tines **25**. The relative dimensions of the pin **12** and opening of the split-cylinder are such that when mated the tines are extended radially outwardly thereby insuring through the inherent resiliency of the cylinder material of good bearing contact between the pin and socket.

With reference now particularly to FIGURE 3, it is seen that the inner surface of the split-cylinder bore adjacent the open end thereof is formed into a hook-like clasp **26** that engages the shoulder **15** of the pin when the pin and socket are mated. Outwardly of the clasp, the inner end surface of the split-cylinder is chamfered as at **27**. Accordingly, as the pin and socket are mated, the clasp **26** of the split-cylinder rides along the peripheral surface of the pin **12** until it reaches the reduced cross-section region **14**, at which time it snaps into locking attitude behind the shoulder **15**. Simultaneously, the chamfered surface **27** cams the release sleeve **20** forwardly toward the hub **16** until it abuts thereagainst. At this time the connector parts are locked to one another and reside in the condition illustrated in FIGURE 3.

Attention is directed to the additional space **28** between the tip **13** of the pin and the internal end wall of the cylinder **21**, which space is important for unlocking of the connector as will be described.

To disconnect, the socket **11** is moved further in a direction toward the hub until the clasp **26** rides up onto the outer periphery of the release sleeve as depicted in FIGURE 4. At this time, the termina of the split-cylinder tines abut against the hub outer wall **16**. The socket can now be withdrawn in the direction of the arrow in FIGURE 5, which, due to the sliding relation of the release sleeve **20** on the portion **14** moves the sleeve against the shoulder **15**. Further withdrawing motion of the socket is possible due to the fact that the outer surface of the pin **12** and the sleeve **20** form a smooth co-extensive surface. Full disconnection can now be effected.

Although but one specific embodiment of the present invention has been described and illustrated herein, many changes and modifications will suggest themselves to those skilled in the art. This single embodiment has been selected for the purpose of illustration only and, therefore, the invention should not be limited to the embodiment so selected.

I claim:

1. A pin and socket connector, comprising:

a pin contact including an elongated portion of first constant cross-sectional dimension and a second portion remote from the free end thereof of a second lesser cross-sectional dimension;

a hollow sleeve received onto the reduced cross-section portion in free sliding relationship, the outer dimensions of said sleeve being substantially the same as that of the elongated portion of constant cross-sectional dimension;

the juncture of the first and second cross-section dimensioned portions of the pin defining a shoulder;

the socket including a resilient hollow split-cylinder for receiving the pin contact therein, the inner end surface of the split-cylinder comprising a hook-like clasp the internal portions of which engage the shoulder and the external portions of which simultaneously engage the sleeve when the pin contact is received within the cylinder a first extent thereby locking the pin and socket to one another;

the internal wall surfaces of the hollow split-cylinder contacting the constant cross-sectional dimension portion of said pin contact during locking engagement of the pin and connector;

the internal reaches of the split-cylinder and the extent of the second cross-section dimension portion of the pin contact being such as to permit the split-cylinder to be forced further onto the pin contact camming the clasp onto the outer surface of the sleeve member and withdrawal of the pin from the socket.

2. A pin and socket connector as in claim **1**, in which

the pin contact is mounted on an enlarged hub, the pin contact portion of lesser cross-section dimension extending from the hub to the shoulder; and

the hollow sleeve having an axial length such that when the clasp lockingly engages the shoulder, the sleeve is disposed outwardly of the socket terminus and abutting against both the terminus and the hub.

3. A pin and socket connector as in claim **1**, in which the inner surface of the split-cylinder outwardly of the clasp is chamfered and said chamfered surface contacts the sleeve during locking engagement of the connector parts.

4. A pin and socket connector, comprising:

an elongated pin contact having a first portion of uniform circular cross-sectional area and a second portion of a lesser cross-sectional area;

an enlarged hub secured to the end of the pin contact of lesser cross-sectional area;

a sleeve slidingly received on the pin contact second portion of longitudinal extent less than the longitudinal extent of said second portion;

a hollow socket having resilient inner end members for being received onto the pin contact, the inner surface of the end members having backwardly directed shoulders for being lockingly received onto the shoulder of the pin contact formed between the first and second portions, at which time the sleeve is disposed outwardly of the socket and contacting end portions of the socket and the hub;

the inner surface of the hollow socket inwardly of the shoulders contacting a major surface area of said pin contact first portion; and

the internal cavity of the socket at the time of locking engagement with the pin contact including an additional space beyond the pin contact terminus whereby the connector is movable further onto the pin contact camming the socket onto the outer surface of the sleeve and moving the internal shoulder of the socket beyond the reaches of the shoulder on the pin contact to produce disconnection.

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MARVIN A. CHAMPION, Primary Examiner

J. H. McGLYNN, Assistant Examiner