United States Patent [19]

Panek et al.

[11] **3,843,853**

[45] **Oct. 22, 1974**

[54] **ELECTRICAL CONNECTOR WITH SWITCH AND LATCH MEANS THEREFORE**

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[73] Assignee: **International Telephone and Telegraph Corporation,** New York, N.Y.

[22] Filed: **Nov. 15, 1973**

[21] Appl. No.: **416,108**

[52] **U.S. Cl.**..... **200/51.09,** 200/61.14, 200/321, 339/46 M

[51] **Int. Cl.** **H01h 13/50**

[58] **Field of Search** .. 200/51 R, 82 R, 51.07–51.09, 200/51.1, 51.12, 153 LB, 154, 291, 318, 321, 322, 61.13, 61.14, 61.19, 153 F; 339/45 R, 45 M, 46, 75 M

[56] **References Cited**

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2,938,976	5/1960	Wilson	200/51 R
3,043,925	7/1962	Wilson	200/51 R
3,344,249	9/1967	Thomas	200/82 R

Primary Examiner—Robert K. Schaefer
Assistant Examiner—Gerald P. Tolin
Attorney, Agent, or Firm—Thomas L. Peterson

[57] **ABSTRACT**

A switching electrical connector including a retractable body of electrical contacts for making and breaking a multiplicity of independent electrical circuits through the connector. The retractable body carries a locking ring which is held in an expanded condition within a groove in a connector shell by means of a pin. When the pin is released, springs in the connector contract the ring out of the groove and shift the retractable body so as to disengage the electrical contacts in the connector, thus breaking the electrical circuits through the connector. The pin can be either physically pulled or may be a low melting point alloy, such as solder, allowing the connector to automatically disconnect in an elevated temperature environment. The locking ring and release mechanism may also be used to couple a pair of mated cylindrical members together.

19 Claims, 9 Drawing Figures

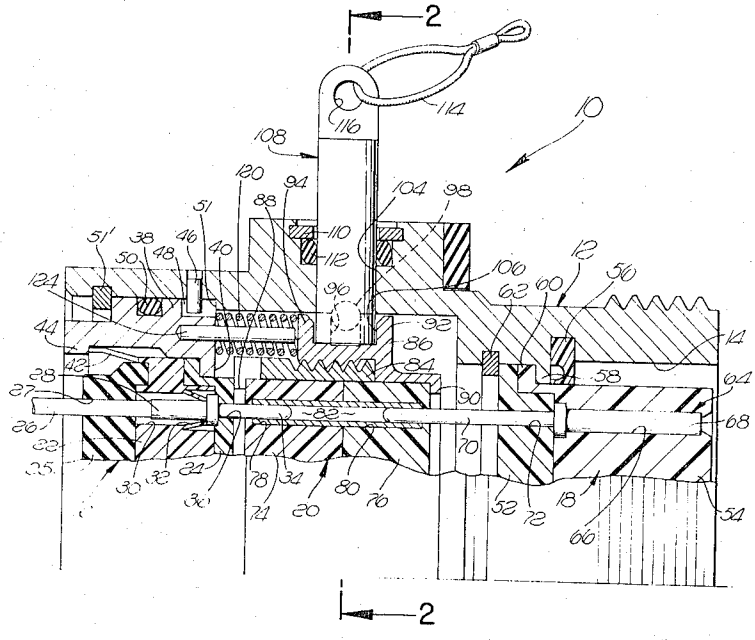


FIG. 1.

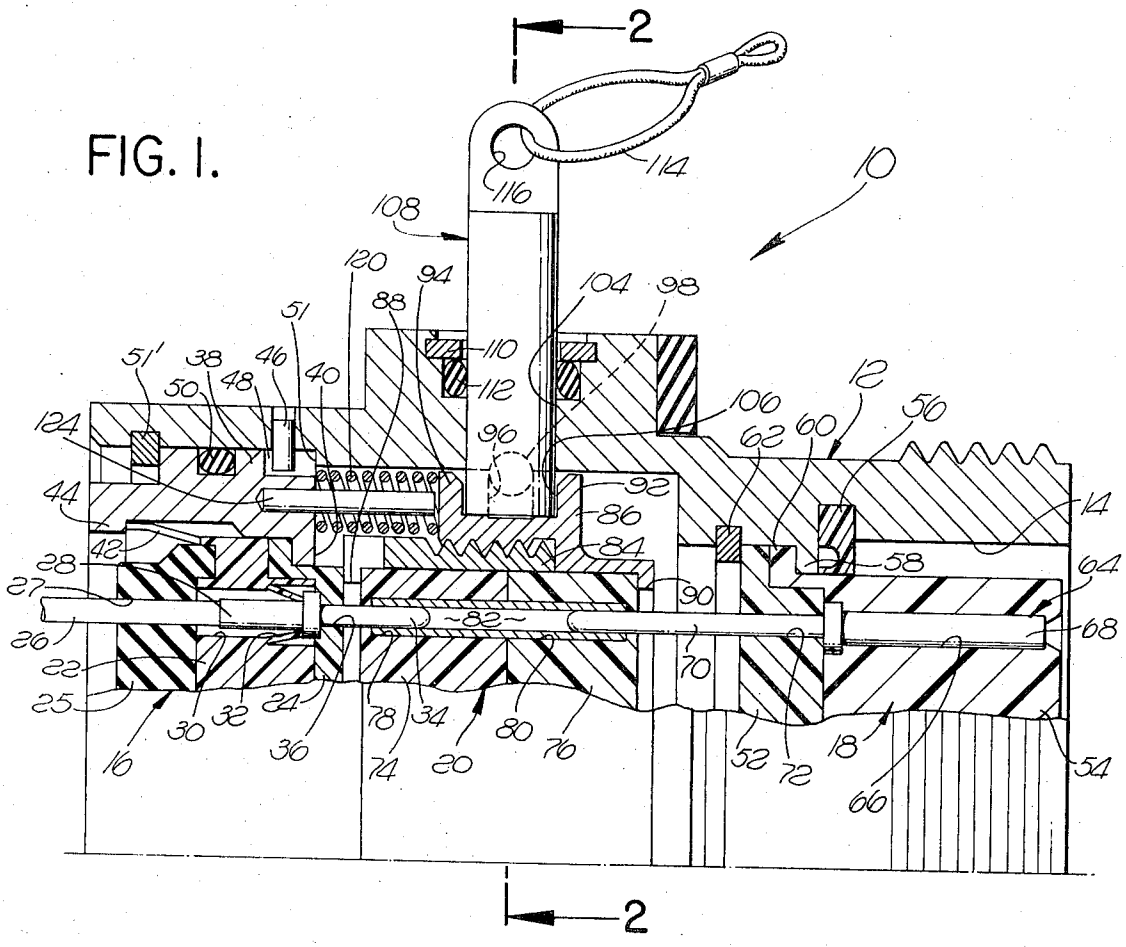

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FIG. 2.

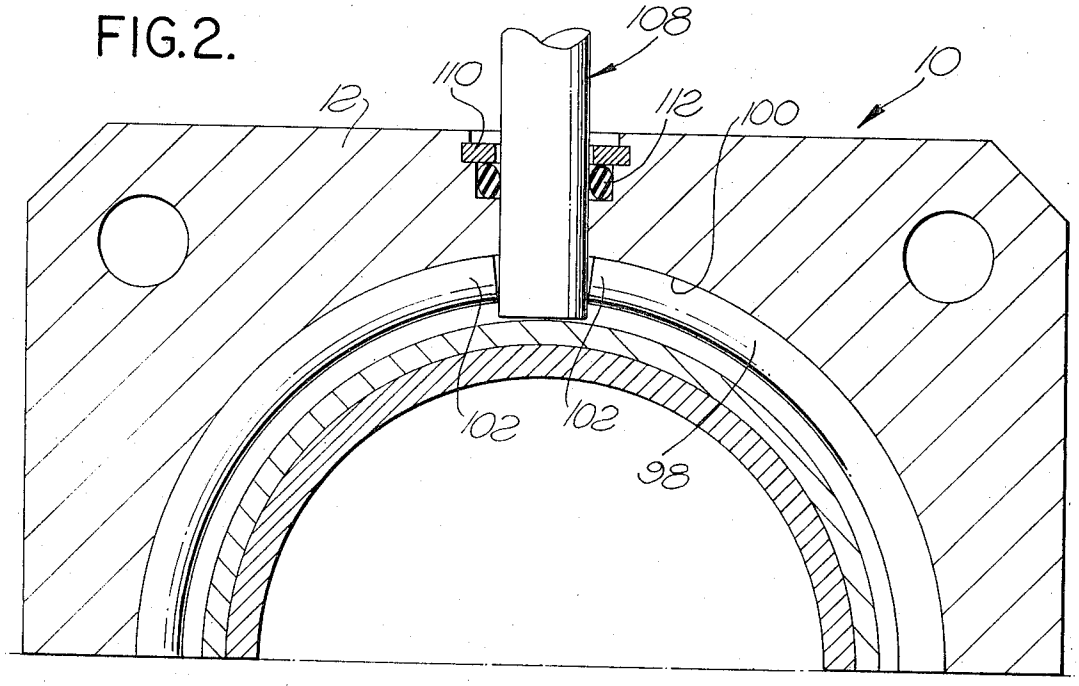

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FIG. 3.

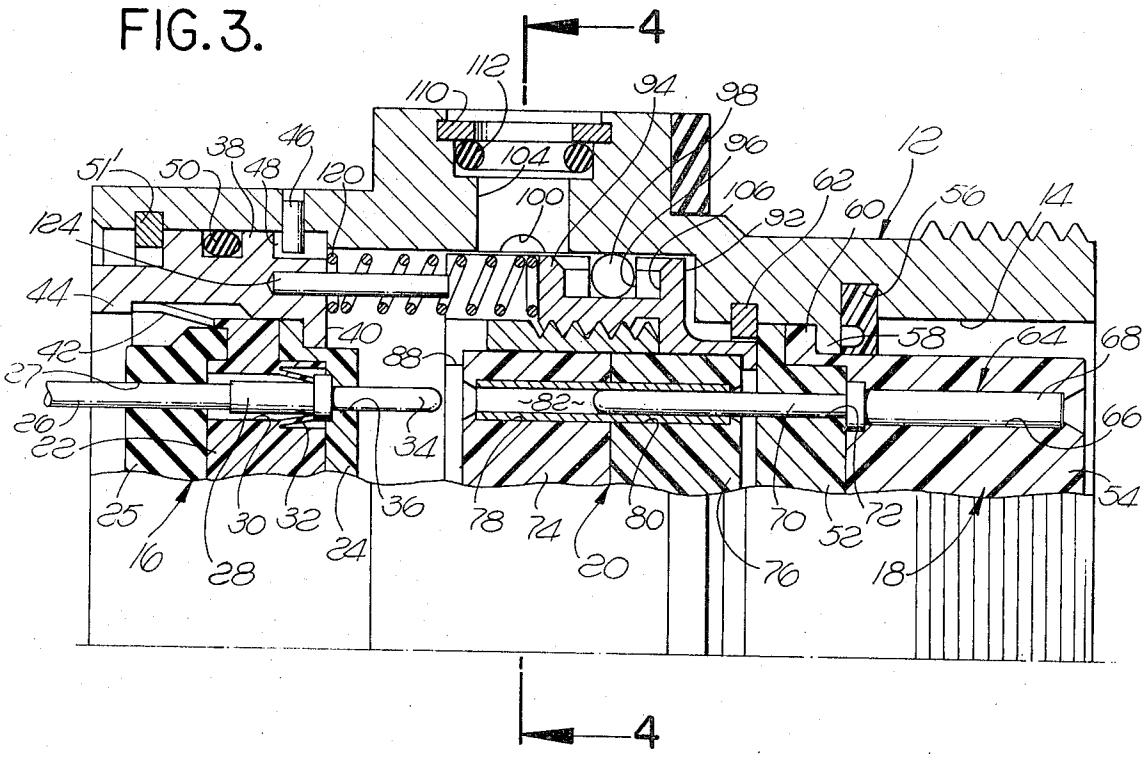

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FIG. 4.

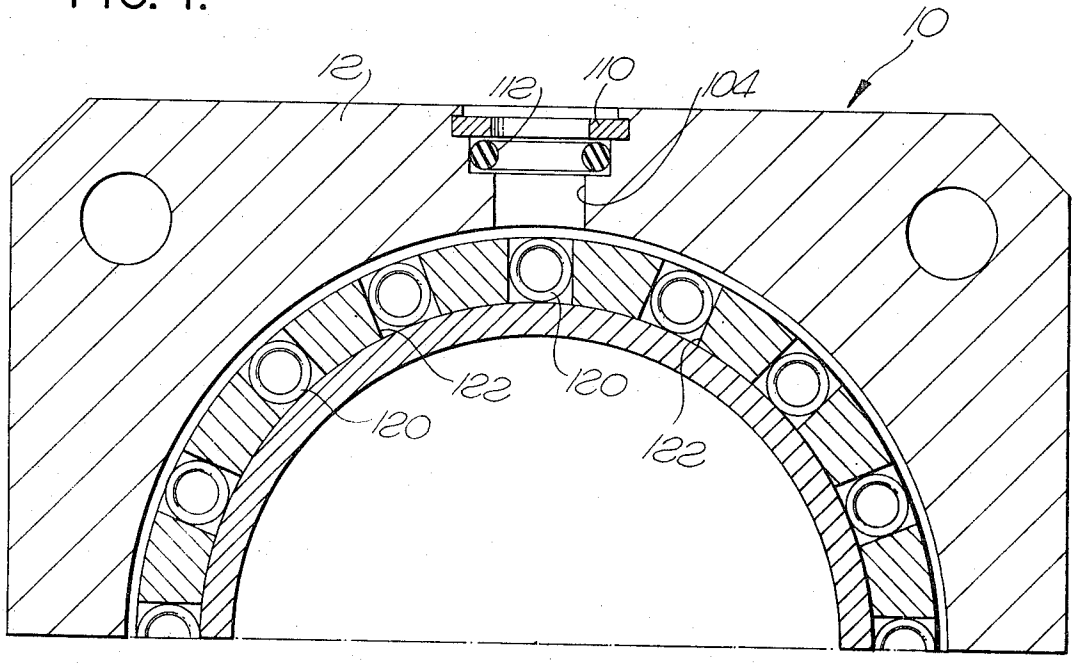

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FIG. 5.

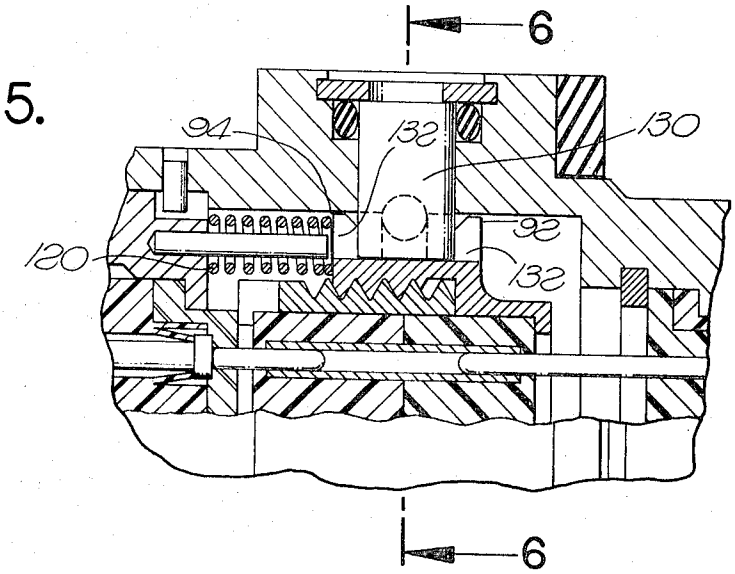


FIG. 6.

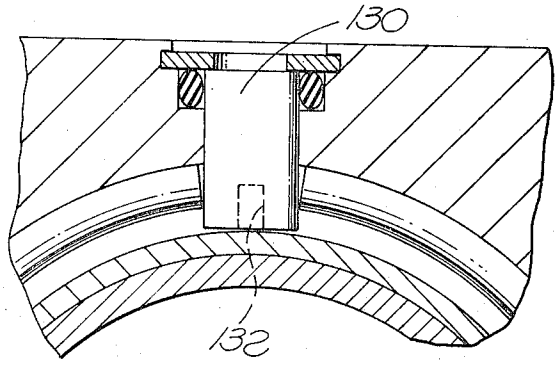


FIG. 9.

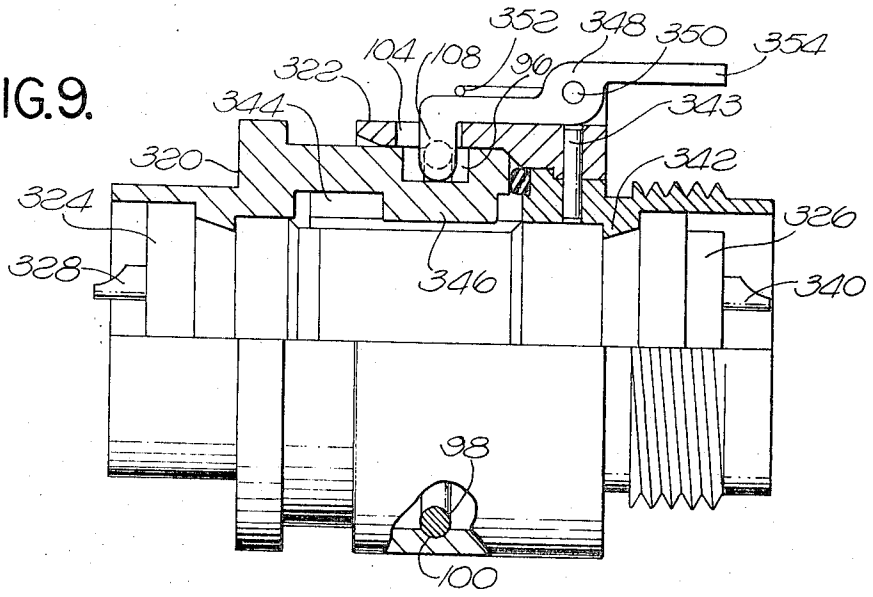


FIG. 7.

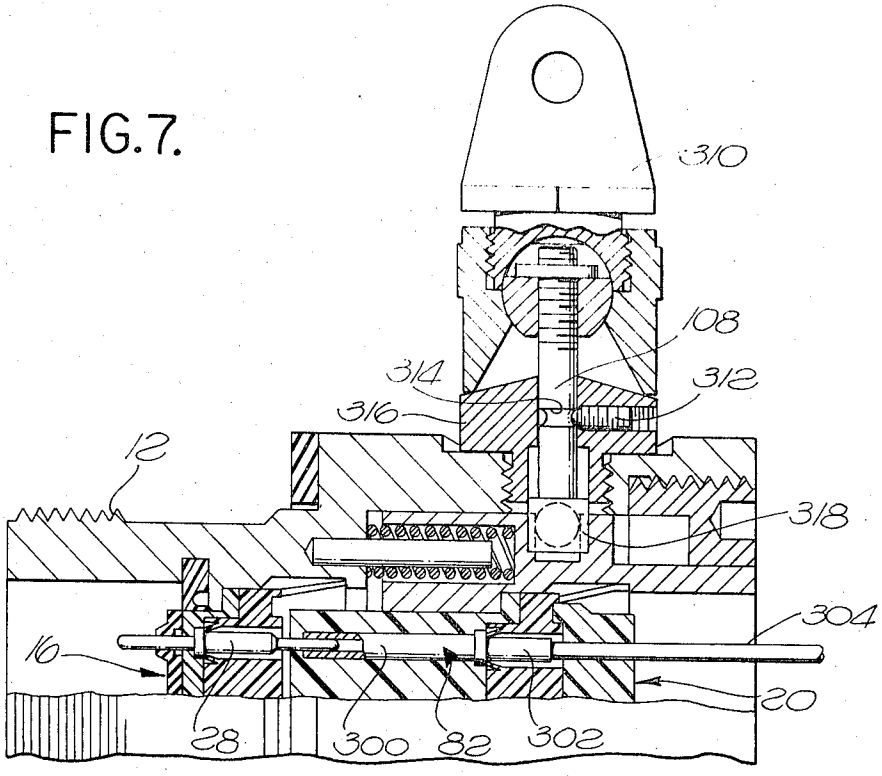
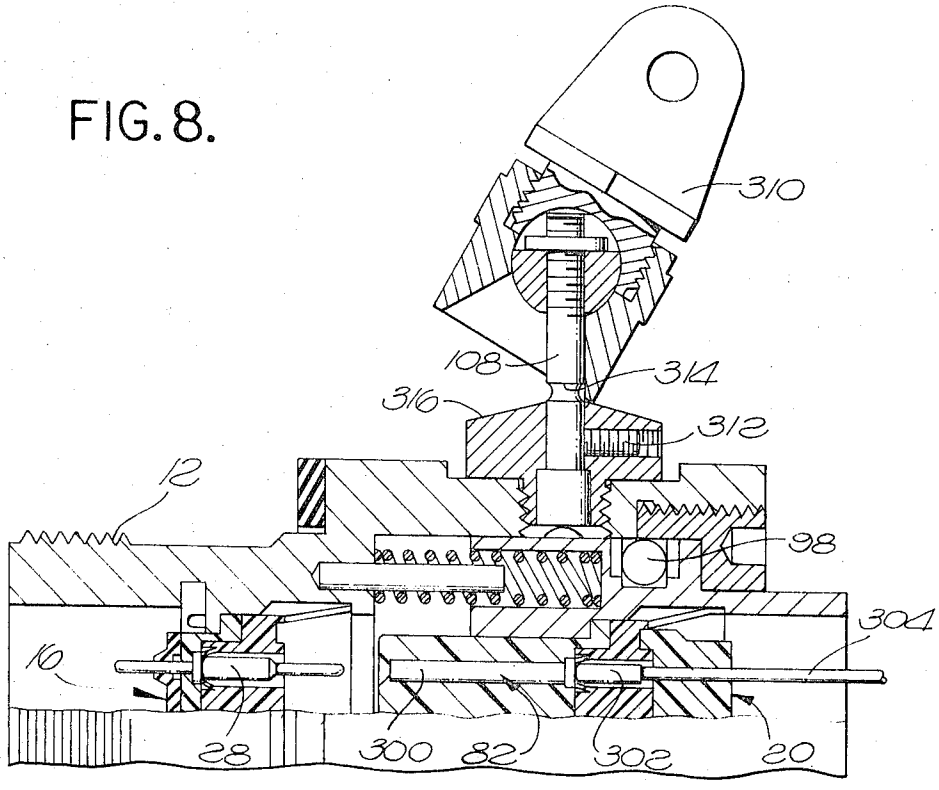

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FIG. 8.


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ELECTRICAL CONNECTOR WITH SWITCH AND LATCH MEANS THEREFORE

BACKGROUND OF THE INVENTION

This invention relates generally to an electrical connector and, more specifically, to a switching electrical connector having a retractable body therein for making and breaking a multiplicity of independent electrical circuits through the connector without disengaging the connector from a mating connector member. The invention is also broadly applicable to a latching mechanism for coupling a pair of mated cylindrical members.

Several forms of switching electrical connectors of the type to which the present invention pertains are known in the art. For example, U.S. Pat. No. 3,043,925 to Wilson discloses a switching electrical connector utilizing a central spring-loaded piston carrying a detent arrangement which is actuated by axially shifting a cylinder by means of a lanyard. U.S. Pat. No 3,344,249 to Thomas et al. discloses another form of switching electrical connector which employs fluid pressure for shifting the retractable switching contacts in the connector.

It is desired that switching electrical connectors be suitable for heavy duty purposes and adapted for quick and positive release of interengaged contacts thereof and be reliable in operation and withstand rugged field service usually associated with such connectors. While the foregoing prior art connectors are generally satisfactory from the standpoint of these characteristics, they are some what complex in construction, requiring numerous parts, thus adding to their expense. In addition, the mechanical actuating connector disclosed in the afore-mentioned Wilson patent requires an axially directed force to be applied to the release mechanism to effect actuation of the switching assembly in the connector. For some applications it is desirable that this force be applied in a radial direction rather than axially. Also, it would be desirable for use of the connector in a possible fire environment that the release mechanism be responsive to elevated temperatures. The purpose of the present invention is to provide switching connectors havin either of these features, as well as the other characteristics discussed hereinabove. Another object of the invention is to provide an inexpensive and simple, yet effective coupling arrangement for a pair of cylindrical members such as mating electrical connector shells.

SUMMARY OF THE INVENTION

According to the principal aspect of the present invention, there is provided a switching electrical connector comprising a shell having a bore therein. Fixed and axially movable insulators are positioned in the bore. The insulators carry complementary axially aligned contacts which complete an electrical circuit through the connector when the insulators are in juxtaposition with the contacts engaged with each other. Biasing means is provided for urging the movable insulator in a direction away from the fixed insulator for breaking engagement between the mated contacts. An annular groove is formed in the wall of the bore and a radially contractible locking ring carried by the movable insulator is engaged with the groove to retain the movable insulator in juxtaposition with the fixed insulator. Releasable means are provided for retaining the

locking ring expanded and thus engaged with the groove. When the releasable means is released, the biasing means together with cam surfaces between the locking ring and the groove cooperate to contract the locking ring out of the groove whereby the biasing means can shift the movable insulator away from the fixed insulator to break electrical engagement between the contacts in the two insulators. In the preferred embodiment of the invention the locking ring is a split ring which normally has its free ends spaced apart when in engagement with the groove in the shell. In one embodiment, the releasable means comprises a slidable pin which is interposed between the ends of the ring to retain the ring in its expanded condtion. Upon pulling the pin radially, the switching connector is actuated. In an automatic, temperature responsive version of the invention, the releasable means is a plug formed of solder or other relatively low melting temperature alloy which is interposed between the ends of the locking ring. When the connector is subjected to a predetermined elevated temperature, as may occur in a fire environment, the plug will melt thereby permitting the switching connector to be automaticallly actuated to break the electrical circuits through the connector.

According to another and broader aspect of the invention, the split ring and release mechanism discussed above may be applied to a coupling assembly for releasable holding two mated cylindrical members together. Such members may be mated halves of an electrical connector or, broadly, two halves of a coupling, such as for a fluid conduit.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a partial longitudinal sectional view through a switching connector in accordance with the present invention with the switching contacts therein shown in their engaged position, and the release mechanism being shown as a mechanical pin located in its active position;

FIG. 2 is a transverse sectional view taken along line 2—2 of FIG. 1 with the contact insulators removed;

FIG. 3 is a partial longitudinal sectional view similar to that shown in FIG. 1 but showing the switching contacts in their disengaged position after the release mechanism has been actuated;

FIG. 4 is a transverse sectional view taken along line 4—4 of FIG. 3 with the contact insulators removed;

FIG. 5 is a fragmentary longitudinal sectional view through a second form of the connector of the present invention, wherein the switching contacts are shown engaged and the release mechaanism is in the form of a solder plug;

FIG. 6 is a transverse sectional view taken along line 6—6 of FIG. 5;

FIG. 7 is a partial longitudinal sectional view through another embodiment of the invention utilizing a swivel mechanism, such mechanism shown in its active position;

FIG. 8 is a partial longitudinal sectional view similar to FIG. 7 but showing the release mechanism in its inactive position; and

FIG. 9 is a partial lonitudinal sectional view of a coupling assembly embodying the novel features of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawings in detail, wherein like reference characters designate like or corresponding parts throughout the various views, one embodiment of the connector of the present invention, generally designated **10,** is illustrated in FIGS. **1–4.** The connector **10** is one-half of a pair of mating connector members, the other connector member not being shown. The connector half **10** is illustrated as being a receptacle member although it could be a plug member if desired. Normally, however, it is desired that the switching function be performed in the receptacle half. The connector comprises a shell **12** having an axially extending bore **14** therethrough. A pair of fixed insulators, generally designated **16** and **18** respectively, are mounted in the bore **14** adjacent to its opposite ends and an intermediate movable or switching insulator, generallly designated, **20** is axially movable between the two fixed insulators.

The fixed insulator **16** comprises an insulator **22** having bonded to it an insulator member **24** on its inner face and a rubber grommet **25** on its outer face. An insulated wire **26** extending through an axially extending passage **27** in the grommet **25** terminates in a pin contact **28** mounted in a bore **30** in the insulator member **22.** Resilient retention fingers **32** integrally formed with the insulator member **22** retain the contact within the bore **30.** The forward pin portion **34** of the contact **28** extends outwardly through a hole **36** in the insulator member **24** toward the movable insulator **20.** A metal ring **38** surrounds the fixed insulator **16.** The ring embodies a radially inwardly extending flange **40** which engages the front of the fixed insulator **16.** An annular spring element **42** is interposed between a rear flange **44** on the ring and the rear face of the insulator member **22** holding the insulator assembly **16** against the flange **40.** Polarizing pins **46** in the shell **12** are slidably received in axially extending slots **48** formed in the outer surface of the ring **38.** An O-ring **50** provides a seal between the outer surface of the ring **38** and the wall of the bore **14.** The inner face of the ring **38** engages an outwardly facing annular shoulder **51** formed in the wall of the shell bore **14.** A retaining ring **51'** fixes the ring **38** in the shell.

The fixed insulator **18** includes a rear insulator member **52** and front insulator member **54.** An elastomeric ring **56** behind an inwardly extending annular flange **58** on the shell **12** provides a seal between the mating connector not shown. The front insulator member **54** embodies a forwardly and radially outwardly extending portion **60** which engages the side of the flange **58** opposite the sealing ring **56.** A retaining ring **62** holds the front and rear insulator members **54** and **52,** respectively, against the flange **58** thus fixing the insulator **18** in the shell **12.** A contact **64** is mounted in a bore **66** aligned with the bore **30** in the fixed insulator **16.** The contact embodies a front socket portion **68** and a rear pin portion **70** which extends through an opening **72** in the rear insulator member **52** and beyond the rear thereof in the direction of the movable insulator assembly **20.** The right-hand end of the connector **10** illustrated in FIG. **3** is adapted to mate with a plug connector member, not shown, having a pin contact that will engage with the socket portion **68** of the contact **64.** While only single contacts **28** and **64** are shown in the fixed insulators in the drawings, it will be appreciated that in practice the connector member of the invention will employ a plurality of these contacts.

The movable insulator assembly or switching insulator **20** comprises a pair of insulator members **74** and **76** formed with aligned bores **78** and **80,** respectively, which are coaxial with the bore **30** in the insulator **16** and the bore **66** in the insulator **18.** A sleeve or socket contact **82** is mounted in the bores **78** and **80.** As seen in FIG. **1,** when the movable insulator **20** is in juxtaposition to the fixed insulator **16,** both the forward pin portions of contacts **28** and **64** slidably engage within the socket contact **82.** However, as seen in FIG. **3,** when the movable insulator **20** is shifted in the rightward direction adjacent to the fixed insulator **18,** the forward pin portion **34** of the pin contact **28** is disengaged from the socket **82** in the movable insulator, yet the forward pin portion **70** of contact **64** remains engaged with the socket contact.

Inner and outer threadably engaged ring-like support members **84** and **86** surround the insulator members **74** and **76** of the movable insulator assembly **20.** The support member **84** has a radially inwardly extending flange **88** engaging the exposed surface of the insulator member **74** and the support member **86** is formed with a similar flange **90** which engages the exposed face of the insulator member **76** so that the insulator members **74** and **76** are tightly held together as a unit when the support members **84** and **86** are threadably engaged together. The outer support member **86** is formed with radially outwardly extending axially spaced flanges **92** and **94.** The outer surfaces of the flanges are in sliding engagement with the bore **14.** The flanges define an annular recess **96** therebetween which receives a radially contractible locking ring **98.** The outer surface of the ring engages an annular groove **100** formed in the wall of the bore **14** surrounding the movable insulator **20** so as to retain the insulator in the position illustrated in FIG. **1** wherein the contacts **28** and **64** engage the socket contact **82.**

As best seen in FIG. **2,** the locking ring is in the form of a split ring, with the free ends **102** of the ring spaced apart when the ring is in its normal unstressed condition. The ring is circular in longitudinal cross-section and has a cross-section less than the depth of the recess **96.** The distance between the free ends **102** of the ring is such that when the ring is contracted, in the manner which will be described later, the ring will disengage completely from the groove **100** in the shell and become fully seated within the recess **96** in the movable insulator assembly **20.**

A bore **104** extends radially outwardly from the bore **14** in the shell to the outer surface thereof. This bore is in radial alignment with the groove **100** and has a greater cross-section than the groove. An enlarged circular recess **106** is formed in the outer support member **86** in alignment with the bore **104.** A circular pin **108** is mounted in the bore **104,** with its inner end received within the recess **106.** When the locking ring is mounted in the recess **96,** it is arranged with its free ends **102** on opposite sides of the circular recess **106.** Thus, the pin **108** may extend through the bore **104** into the space between the free ends **102** of the split ring to retain the ring in its normal expanded condition wherein the ring engages the annular groove **100** to retain the movable insulator assembly **20** in the position illustrated in FIG. **1.** A retaining ring **110** holds an O-

ring 112 in engagement with the pin 108 to prevent the intrusion of dust or moisture into the interior of the connector shell. A lanyard 114 is looped through a hole 116 in the outer end of the pin 108 so that upon applying a radially outwardly directed force on the lanyard the pin 108 will be withdrawn from the shell thereby providing a space between the ends 102 of the ring, whereby the ring is free to be contracted as will now be explained.

A plurality of helical springs 120 are mounted axially within spring cavities 122 arranged in a circular array in the outer support member 86 of the movable insulator assembly. These cavities open in the direction of the fixed insulator 16. The fixed insulator carries a plurality of pins 124 aligned with the spring cavities 122. The pins function as guides for the helical springs 120. As will be appreciated, the springs exert a biasing force upon the movable insulator 20 urging it in the rightward direction as viewed in FIG. 1. Thus, when the pin 108 is removed from the bore 104, the force of the springs 120 will act upon the split ring 98. Because the outer surface of the ring is curved as is the surface of the annular groove 100 with which it is engaged, there is provided a camming surface between the ring and the shell which causes the ring to contract under the force of the springs 120. Thus, in summary, after the pin 108 is removed, the springs together with the camming surfaces between the locking ring 98 and the groove 100 contact the ring to withdraw the same from the groove 100. The springs then shift the movable insulator 20 in the rightward direction to disengage the contacts 28 and 82 in the fixed insulator 16 and movable insulator, respectively.

In order to reset the movable insulator latching assembly, the retaining ring 51' must be withdrawn in order to remove the fixed insulator 16 and ring 38 from the shell 12. The movable insulator 20 is then positioned so that the locking ring 98 registers with the groove 100 in the shell. The pin 108 is then inserted into the bore 104 into the space between the free ends 102 of the locking ring. Thereafter, the insulator 16 is remounted in the shell and held therein by the retaining ring 52.

While the pin 108 is described as being withdrawn by mechanical force applied to the lanyard 114, it will be appreciated that the pin may be shifted or withdrawn by fluid pressure such as hydraulic, pneumatic, or explosive pressure if desired. In addition, a solenoid mounted in the shell could be used to activate the pin 108.

Reference is now made to FIGS. 5 and 6 of the drawings which show a modified form of the invention which is suitable for use in a possible fire environment and would be useful in aircraft, computers, etc. This embodiment of the invention may be identical to that illustrated in FIGS. 1–4, and differs basically in that the pin 108 is replaced by a relatively low melting temperature plug 130. The plug should have a melting temperature substantially less than that of the shell 12. For example, the plug could be formed of solder, which is a lead-tin alloy which melts below 800°F. Thus, if the connector is employed in an environment in which a fire is encountered, the plug 130 will melt at a predetermined temperature thus automatically disengaging the contacts within the connector. In this embodiment, it may be necessary to provide slots 132 in the flanges 92 and 94 to allow for the melted solder to escape from between the ends of the split ring so that the ring may be contracted under the force of the springs 120.

FIGS. 7 and 8 show an arrangement similar to that illustrated in FIGS. 1–4 except that only one fixed insulator 16 is provided together with the movable insulator 20. The contact 28 in the fixed insulator 16 is a double-ended pin contact. In this embodiment, the left-hand end of the shell 12 of the connector is adapted to be interconnected with a mating plug connector member, now shown. The movable insulator 20 differs from the movable insulator in FIGS. 1–4 in that the contact 82 therein has a forward socket portion 300 and a rear body portion 302 crimped to an insulated wire 304. Thus, in this embodiment the wire 304 moves together with the movable insulator 20 whereas in the connector illustrated in FIGS. 1–4 the wires connected to the connector do not move when the movable insulator is shifted.

The release pin 108 differs from the release pin in FIGS. 1–4 in that a swivel mechanism 310 is provided at its outer end so that the pin 108 may be shifted radially outwardly in response to a force which is directed at an angle with respect to the longitudinal axis of the pin. A spring loaded detent 312 is also provided in the shell 12 which engages a groove 314 in the pin 108. The pin 108 is radially slidable in a boss 316 fixed to the shell 12. The inner end 318 of the pin is enlarged so that the pin will remain in the boss 316 after it has been withdrawn from between the free ends of the split ring 98. Otherwise, the connector illustrated in FIGS. 7 and 8 functions in the same manner as that illustrated in FIGS. 1–4.

Referring now to FIG. 9 of the drawings, there is shown a coupling assembly comprising a first cylindrical member 320 telescopically mounted within a second cylindrical member 322. These members may be mating parts of any coupling assembly, such as a hose coupling. However, as shown, the member 320 is the shell of a plug connector member containing an insulator 324 and the member 322 is a part of a mating receptacle connector member containing an insulator 326. Complementary axially aligned contacts 328 and 340 are mounted in the members 324 and 326, respectively. The receptable connector member also includes an inner body 342 fixed to the member 322 by a plurality of pins 343 (only one being visible in FIG. 9). A sealing ring is mounted in the bottom of the recess defined by the member 322 and the body 342. The inner body surrounds the insulator 326, and is formed with a plurality of keyways 344 for receiving correspondingly aligned keys 346 on the plug connector member for properly orienting the mating contacts in the connector members, as well as the respective parts of the latching mechanism, to be described now. Such latching mechanism includes a split ring 98 mounted in a recess 96 in the shell 320 and engaged with an annular groove 100 in the member 322, as in the previous embodiments described herein. The release pin 108 in this embodiment, which is positioned between the free ends of the split ring, is integrally formed on the end of an element 348 pivotally mounted on the outside of shell 322 intermediate its ends by a pivot pin 350. A spring 352 biases the end of the element 348 radially inwardly so that the pin portion 108 extends through bore 104 in shell 322 into the space between the free ends of the split ring. Unlike the other embodiments disclosed herein, in this version of the invention no springs are required, al-

though they could be used, if desired. To uncouple the members **320** and **322,** and thus disengage contacts **326** and **328,** the end **354** of element **348** is depressed to shift the pin portion **108** out of the space between the ends of the split ring and simultaneously, said members are pulled apart thereby camming the locking ring out of groove **100** as in FIGS. **1–4, 7** and **8,** thus allowing the two members to be separated.

While the locking ring illustrated in each of the embodiments disclosed herein has been described as having a circular cross-section, as the groove **100** with which it engages in the connector shell, it will be appreciated that the ring and groove may have different configurations if an appropriate camming surface is provided therebetween which will cause the locking ring to contract after the release mechanism is actuated. For example, the outer surface of the ring and the groove may have mating beveled edges which will cause the ring to be cammed inwardly under the force of the springs **120.** Other modifications within the scope of the invention will be apparent to those skilled in the art.

What is claimed is:

1. A switching electrical connector comprising:
a shell having a bore therein;
fixed and axially movable insulators positioned in said bore, said movable insulator being movable between a first position adjacent to said fixed insulator and a second position spaced from said fixed insulator;
a pair of complementary axially aligned contacts mounted in said insulators, respectively, and adapted to complete an electrical circuit through the connector when one contact is engaged with the other, said contacts being engaged when said movable insulator is in said first position and being disengaged when said movable insulator is in said second position;
an annular groove in the wall of said bore;
a radially contractible locking ring carried by said movable insulator and being engaged with said groove when said movable insulator is positioned in said first position, whereby said locking ring retains said movable insulator in said first position;
means biasing said movable insulator toward said second position thereof;
cam surface means between said locking ring and said groove for causing said locking ring to contract, under the force of said biasing means, out of said groove; and
releasable means for retaining said locking ring engaged with said groove, release of said releasable means allowing said biasing means and cam surface means to cooperate to contract said locking ring out of said groove, whereby said movable insulator will shift to said second position causing said contacts to become engaged.

2. A connector as set forth in claim **1** wherein:
at least the outer surface of said locking ring is curved in longitudinal cross-section defining said cam surface means.

3. A connector as set forth in claim **1** wherein:
said locking ring is circular in longitudinal cross-section; and
said groove is curved in longitudinal cross-section, the outer surface of said ring and said curved groove defining said cam surface means.

4. A connector as set forth in claim **1** wherein:
said locking ring comprises a split ring defining a pair of free ends; and
said releasable means is interposed between said free ends to retain said split ring in engagement with said groove when said movable insulator is in said first position.

5. A connector as set forth in claim **1** wherein:
an annular recess is formed in the outer surface of said movable insulator; and
said locking ring is positioned entirely within said recess when said movable insulator is in said second position thereof.

6. A connector as set forth in claim **1** wherein:
said biasing means comprises a plurality of longitudinally extending helical springs arranged in a circular pattern adjacent to the periphery of said insulators and disposed therebetween.

7. A connector as set forth in claim **1** wherein:
a second fixed insulator is mounted in said shell on the side of said movable insulator opposite to said first-mentioned insulator;
a contact is provided in said second fixed insulator axially aligned and complementary with said contact in said movable insulator; and
said contacts in said movable insulator and said second fixed insulator are engaged when said movable insulator is in both first and second position thereof.

8. A connector as set forth in claim **7** wherein;
said contacts in said fixed insulators are pin contacts and said contact in said movable insulator is a socket contact slidably receiving said pin contacts in the opposite ends thereof.

9. A connector as set forth in claim **1** wherein:
said locking ring comprises a split ring defining a pair of free ends; and
said releasable means comprises a relatively low melting temperature plug interposed between said free ends to retain said split ring in engagement with said groove when said movable insulator is in said first position.

10. A connector as set forth in claim **9** wherein:
the melting temperature of said plug is substantially less then that of said shell.

11. A connector as set forth in claim **9** wherein:
said plug is formed of solder.

12. A connector as set forth in claim **1** wherein:
said locking ring comprises a split ring defining a pair of free ends; and
said releasable means comprises a pin mounted for radial sliding movement in said shell, the inner end of said pin being positioned between said free ends to retain said split ring in engagement with said groove when said movable insulator is in said first position.

13. A connector as set forth in claim **12** wherein;
means are provided on the outer end of said pin for shifting said pin radially outwardly.

14. In an electrical connector including a shell having a bore therein, fixed and axially movable insulators in said bore, a pair of complementary axially aligned contacts mounted in said insulators, respectively, adapted to complete an electrical circuit through the connector when one contact is engaged with the other, first means operable to hold said movable insulator in juxtaposition to said fixed insulator to bring said

contacts into engagement, second means for shifting said movable insulator away from said fixed insulator to disengage said contacts, said third means for controlling said first and second means, respectively, the improvement which comprises:

said first means including an annular groove in the wall of said bore and a radially contractible locking ring carried by said movable insulator engaged with said groove when said movable insulator is in juxtaposition to said fixed insulator;

said second means comprising means biasing said movable insulator away from said fixed insulator; and

said third means including releasable means for retaining said locking ring engaged with said groove, cam surface means between said locking ring and said groove for causing said locking ring to contract out of said groove under the force of said biasing means, release of said releasable means allowing said biasing means and cam surface means to cooperate to contract said locking ring out of said groove.

15. A connector as set forth in claim **14** wherein:

said locking ring comprises a split ring defining a pair of free ends; and

said releasable means is interposed between said free ends to retain said split ring in an expanded condition when said movable insulator is in juxtaposition to said fixed insulator.

16. A connector as set forth in claim **15** wherein:

said releasable means comprises a plug having a melting temperature substantially less than that of said shell.

17. A connector as set forth in claim **16** wherein:

said plug is formed of solder.

18. A coupling assembly comprising:

a first cylindrical member telescopically mounted within a second cylindrical member;

an annular groove formed on the inside wall of said second cylindrical member;

a split ring carried by said first cylindrical member engaged with said groove, said split ring defining a pair of free ends, said free ends being spaced from each other when said split ring is engaged with said groove;

cam surface means between said split ring and said groove for causing said ring to contract out of said groove upon application of an axially directed force to one of said members relative to the other of said members; and

releasable means interposed between said free ends of said ring for maintaining said ring engaged with said groove, release of said releasable means allowing said cam surface means to contact said ring out of said groove upon application of said axially directed force.

19. A coupling assembly as set forth in claim **18** wherein:

said releasable means includes an element pivotally mounted on said second cylindrical member, said element having a generally radially disposed end portion positioned between said free ends of said ring whereby pivoting of said element shifts said end portion into or out of the space between said free ends.

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