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SELF-CLEANING ELECTRICAL CONNECTOR

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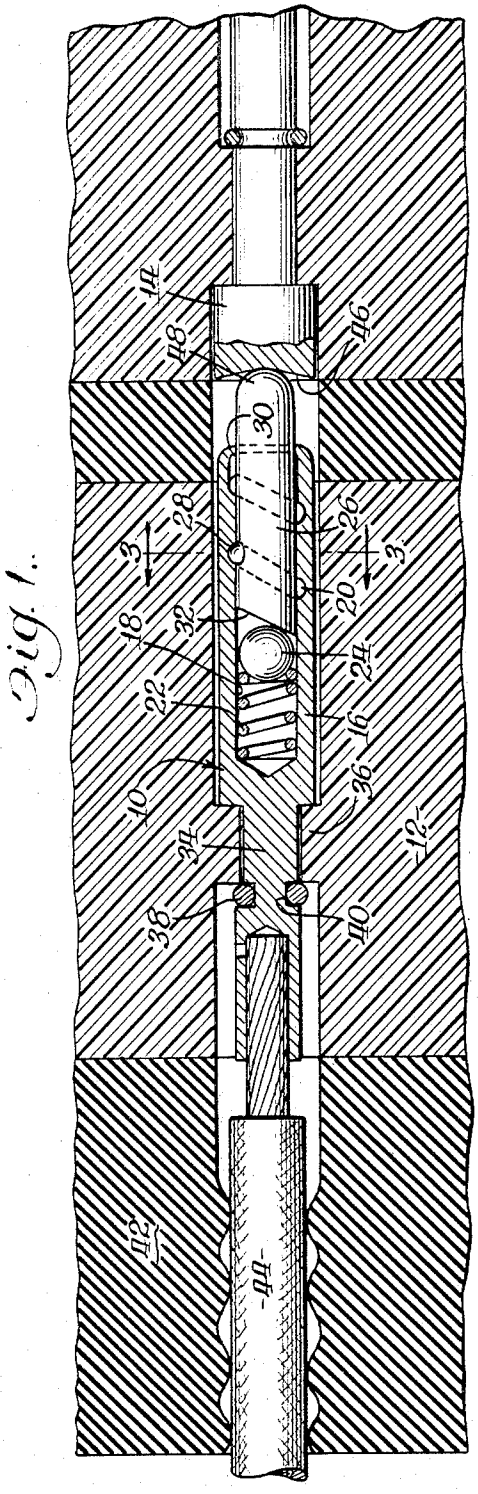

Fig. 1.

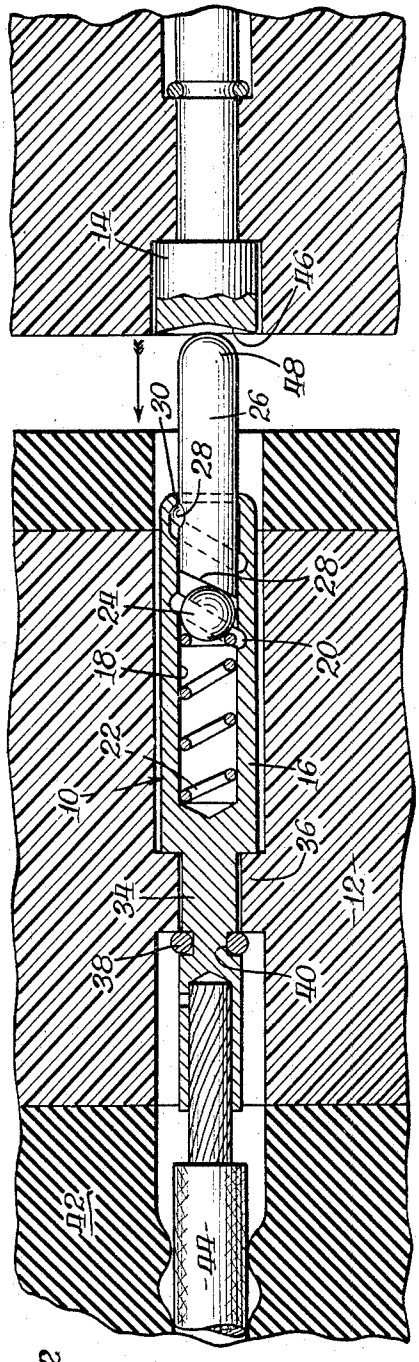

Fig. 2.

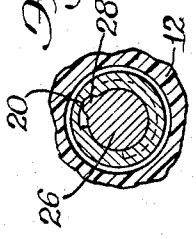

Fig. 3.

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SELF-CLEANING ELECTRICAL CONNECTOR

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ABSTRACT OF THE DISCLOSURE

An electrical connector wherein at least one contact is mounted in a cavity in a contact body and extends longitudinally therefrom into mating engagement with another contact. Means are provided to urge the contact longitudinally outward from the cavity while causing lateral engagement between the contact and the contact body, and helical guide means are disposed along the cavity and the contact to impart rotative motion to the contact upon relative longitudinal motion between the contact and he conact body thereby resulting in a wiping or cleaning action on the contact surface.

This invention relates to electrical connectors and more particularly to electrical connectors wherein the contacts mate in abutting relationship rather than in a telescoping pin and socket arrangement.

In connectors having abutting type contacts there exists the problem of reliable electrical contact between the mating contacts. Contaminating films build up on the mating portions of the contacts to impair electrical conductivity therebetween. Further, in connectors having an abutting contact relationship, the contacts move relative to each other under mechanical shock or vibration. This motion disturbs the contact point and possibly the contact resistance if reliable electrical contact is not made between the contacts.

It is the principal object of the present invention to provide a connector having contacts which mate in abutting relationship and have reliable electrical contact therebetween.

It is another object of the present invention to provide a connector having a contact which spins upon engagement with a mating contact to effect a wiping motion therebetween.

It is another object of the present invention to provide a connector wherein the contact resistance between mating contacts is not adversely affected by vibration or mechanical shock.

Other objects of the present invention will become more apparent as the detailed description proceeds.

In general the present invention comprises in an electrical connector, a contact body having a cavity extending longitudinally inward from one end thereof. A contact member is movably mounted within the cavity and extends outwardly therefrom. Means are provided for urging said contact member longitudinally outward from said cavity while providing lateral engagement between said contact member and said contact body. Helical guide means are provided disposed along said cavity and said contact member in contact therewith to impart rotative motion to said contact member upon relative longitudinal motion between said contact member and said contact body.

Further understanding of the present invention may best be obtained from the accompanying drawing wherein:

FIGURE 1 is a cross sectional view of a connector showing a contact assembly therein in mated condition and constructed according to the present invention.

FIGURE 2 is a cross section of the connector of FIGURE 1 showing the contact assembly in an unmated condition.

FIGURE 3 is a section of the contact assembly of FIGURE 1 taken along lines 3—3.

Reference is made to FIGURES 1 and 2 wherein is shown a contact assembly **10** according to the present invention mounted within a dielectric body **12** of a connector. In FIGURE 2 the contact assembly **10** is shown disengaged from its mating contact **14** and in FIGURE 1 in abutting engagement therewith.

The contact assembly **10** comprises a contact body **16** having a passage **18** formed therein. A helical groove **20** is cut in the walls of the passage **18**. A spring **22** is mounted within passage **18** and a ball **24** is disposed on top of the spring **22**. A contact **26** having an embossment **28** on the surface thereof is slidably disposed within the passage **18** of contact body **16**. The embossment **28** of contact **26** is sized to engage and ride within the groove **20** as shown in FIGURE 3. The end **30** of contact body **16** is crimped over so as to restrain escape of the embossment **28** from the helical groove **20** of passage **18**. The contact **26** has an inclined rear surface **32** that engages the ball **24**. The spring **22** and ball **24** are sized to exert an axial force on the contact **26** forcing it outwardly from the contact body **16**. The inclined surface **32** of contact **26** translates the axial force from the spring **22** into a lateral force wherefrom constant electrical contact is maintained between the contact **26** and the contact body **16**.

The contact body **16** has a reduced portion **34** which engages a shoulder portion **36** of dielectric body **12** to restrain axial motion of the contact body **16**. Axial motion restriction is further aided by a snap ring **38** disposed about the contact body **16** in a groove **40** cut therein. A soft grommet **42**, bonded to the dielectric body **12**, effects a waterproof seal about a conductor **44** connected to the contact body **16**.

In a disengaged relationship, the contact **26** extends outwardly from the contact body **16** as shown in FIGURE 2. Upon advancement of either contact **26** or contact **14** into mated engagement, the contact **26** will retract within the contact body **16** thereby compressing spring **22**. This axial movement of the contact **26** relative to the dielectric body **12** causes rotation of the contact **26** as the embossment **28** rides in the helical groove **20**. Thus, mating engagement between contact **26** and contact **14** is effected with a wiping motion by contact **26**. This wiping motion destroys any films that exist between the contacts **26** and **14** to provide reliable electrical contact therebetween.

It is to be noted that in FIGURES 1 and 2 the contact **14** is shown as having a concave mating surface **46** with the contact **26** and that the contact **26** has a rounded end portion **48** to further seating with the contact **14**. It has been found that this concave seating arrangement is preferred for the practice of the present invention. However, the present invention is not to be limited thereto and may be applied to other abutting contact configurations.

Persons skilled in the art will, of course, readily adapt the teachings of the present invention to embodiments far different than the embodiment illustrated and described above. Accordingly, the scope of protection afforded the present invention should not be limited thereto but should be determined only in accordance with the appended claims.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows—

I claim:

1. A contact assembly for an electrical connector comprising a contact body having a cavity extending longitudinally inward from one end thereof, a contact member movably mounted within said cavity and extending outwardly therefrom, means for urging said contact mem-

ber longitudinally outward from said cavity and into lateral engagement with said contact body, and helical guide means disposed along said cavity and said contact member in contact therewith to impart rotative motion to said contact member upon relative longitudinal motion between said contact member and said contact body.

2. A contact assembly for an electrical connector comprising a contact body having a cavity extending longitudinally inward from one end thereof, said contact body further having a groove helically cut in the interior surface of said cavity, a contact member movably mounted within said cavity and extending outwardly therefrom, means for urging said contact member longitudinally outward from said cavity and into lateral engagement with said contact body, and means connected to said contact member engageable with said helical groove to cause rotation of said contact member upon relative longitudinal motion between said contact member and said contact body.

3. A contact assembly for an electrical connector comprising a contact body having a cavity extending inwardly from one end of said contact body along a portion of the length thereof, said contact body further having a groove helically cut in the interior surface of said cavity along a portion adjacent said end of said contact body, a contact member movably mounted within said cavity and extending outwardly therefrom, an embossment on the portion of said contact member within said cavity and sized to engage and ride within said helical groove, and means for urging said contact member longitudinally outward from said cavity and into lateral engagement with said contact body, said embossment in said groove effecting rotation of said contact member upon relative longitudinal motion between said contact body and said contact member.

4. In an electrical connector having in line abutting contacts, a contact body, one of said contacts being movably mounted within said contact body and extending outwardly therefrom, said body mounted contact being terminated outside of said contact body in a rounded end portion and within said contact body in an inclined-surface end portion, the other of said contacts being terminated in a concave end portion to receive the end portion of said body mounted contact in abutting relationship, means for urging said body mounted contact longitudinally outward of said contact body and laterally into engagement with the contact body including a spring means mounted within said contact body and a ball

means positioned within said contact body between the spring means and the inclined-surface of the body mounted contact, said contact body having a groove helically cut therein about said contact, and means for engaging said body mounted contact with said helical groove to effect rotation of said body mounted contact upon relative longitudinal motion between said body mounted contact and said contact body.

5. In an electrical connector having in line abutting contacts, a contact body, one of said contacts being movably mounted within said body and extending outwardly therefrom, said body mounted contact being terminated without said contact body in a rounded end portion and within said contact body in an inclined-surface end portion, the other of said contacts being terminated in a concave mating end portion, said contact body having a groove helically cut therein about said contact, an embossment on the portion of said contact mounted within said contact body and sized to engage and ride within said helical groove and means for urging said body mounted contact longitudinally outward of said contact body and laterally into engagement with the contact body including a spring mounted within the contact body and a spherical ball positioned within the contact body between the spring and the inclined-surface end of the body mounted contact which urges the contact into lateral engagement with the contact body, said embossment in said groove effecting rotation of said body mounted contact upon relative longitudinal motion between said contact body and said body mounted contact.

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