

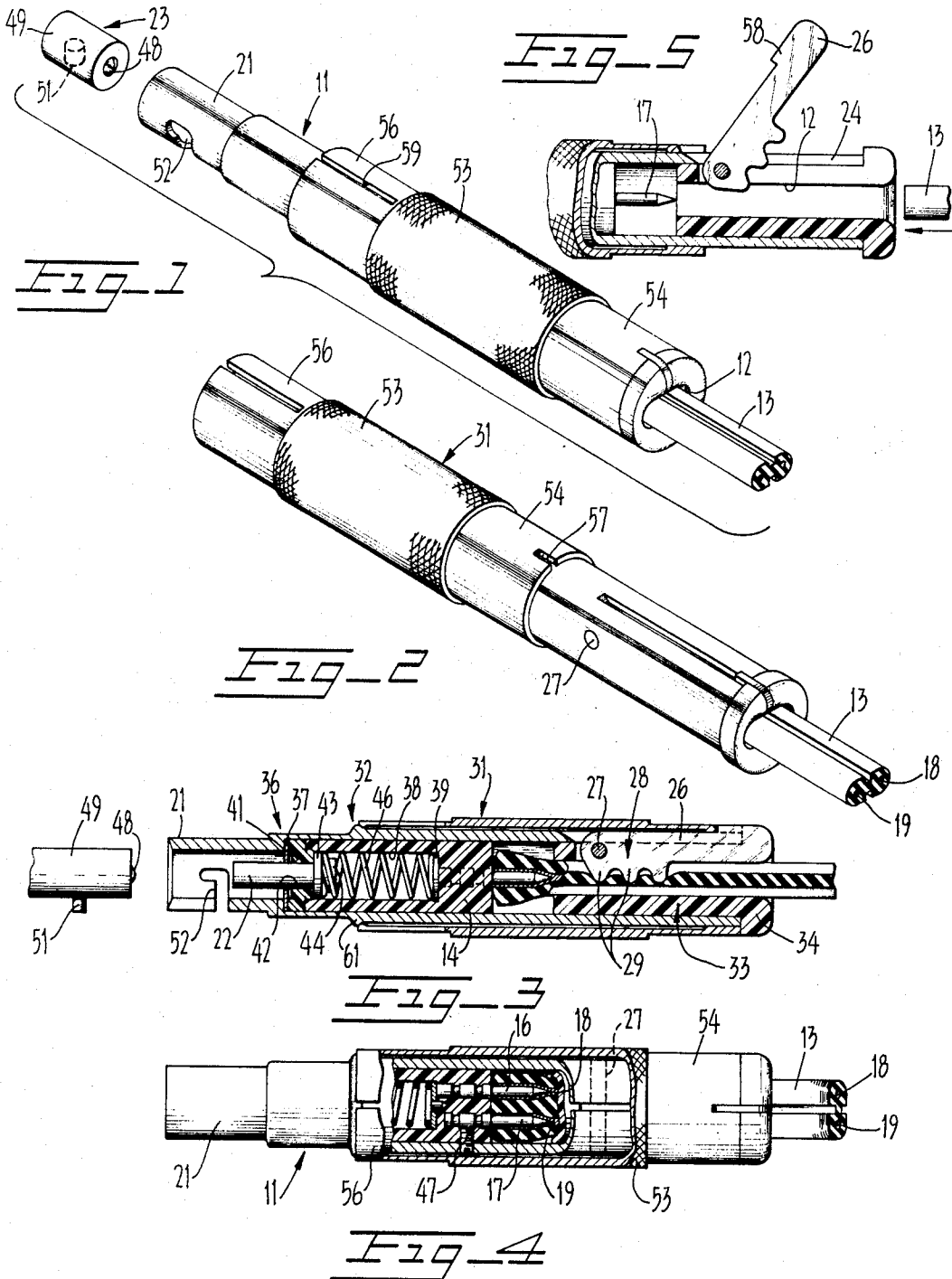
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QUICK COUPLING CONNECTOR

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QUICK COUPLING CONNECTOR
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ABSTRACT OF THE DISCLOSURE

An electrical connector arranged for quick solderless coupling of the conductors of a power cord to contact elements of the connector. A mechanical connective joint is established between prongs connected to the contact elements and the ends of the power cord conductors such that the power cord insulation is not severed by the prongs in the process.

Background of the invention

In the field of electrical connectors various mechanical arrangements have been devised to quickly establish an electrical connection between power cord conductors and contact elements of the connector without requirement of the soldering. Typically, the connection is facilitated mechanically by a pair of conductive prongs which are integral with, or otherwise electrically connected to the contact elements, and arranged to penetrate the power cord insulation to engaged the conductors thereof. A cam lever is usually provided to compress the side of the cord and prongs together to effect the penetration of the insulation. In some applications it is undesirable that the insulation be penetrated because this may result in electrical breakdown thereof. Moreover, the prongs do not necessarily penetrate through the insulation into the conductors sufficiently to establish a positive connection.

Summary of the invention

The present invention provides an improved quick coupling connector in which a positive connection between prongs connected to contact elements of the conductor and the power cord conductors is established mechanically and the power cord insulation is not severed. In this regard, a pair of prongs are provided within a connector body to project longitudinally into a cord guide passage defined therein. A locking lever is pivotally mounted between the sides of a slot extending through the body into the guide passage. The lever is provided with a cam surface projecting into the guide passage which, upon pivotal movement of the lever between a release position inclined upwardly from the body periphery and a lock position flush with the body periphery, engages a cord inserted in the passage to urge same into intimate end engagement with the prongs. The ends of the conductors of the cord are impaled on the prongs to thereby establish a positive electrical connection therebetween. Such connection is, of course, effected without penetration or severance of the cord insulation. A sleeve encompasses the periphery of the body and is slidable thereon to a retained position covering the slot and thereby holding the lever in lock position. The cam surface, in engaging the cord, retains same in position within the guide passage.

The basic concept of the invention may be employed in a variety of connectors having different type contact elements suited to different applications merely by providing conductive paths between the prongs and contact elements. For example in one embodiment of the connector, the contact elements may be coaxial in nature including an outer annular extension of the body as one element, and a central plunger projecting coaxially into the extension as the other element. The extension and plunger are respectively connected to the prongs and de-

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fine a coaxial receptacle for receiving a coaxial plug. A bayonet slot is advantageously provided in the annular extension for receiving a pin projecting radially from the plug to lock same in the coaxial receptacle.

Brief description of the drawing

FIGURE 1 is a perspective view of a quick coupling connector in accordance with the present invention, the connector being depicted in lock position.

FIGURE 2 is a view similar to FIGURE 1, but illustrating the connector in release position.

FIGURE 3 is a sectional view taken at a diameter plane through the connector.

FIGURE 4 is a view rotated 90° relative to the plane of FIGURE 3 with portions broken-away and shown in section.

FIGURE 5 is a fragmentary sectional view similar to FIGURE 3, but illustrating the connector in release position for receiving a power cord to be electrically coupled thereto.

Description of the preferred embodiment

Referring now to the drawing in detail, a quick coupling connector in accordance with the present invention will be seen to include a tubular body 11 having a substantially rectangular guide passage 12 defined within one end thereof for receiving a conventional flat, insulated, two conductor power cord 13 of substantially rectangular cross section. Within the opposite end of the body there is provided a mounting plug 14 of insulating material, such as plastic, from which a pair of parallel spaced conductive prongs 16, 17 project into close adjacency with the inner end of the guide passage 12. The prongs are so positioned that when the cord is inserted into the guide passage to its inner end, the ends of the conductors 18, 19 of the cord engage the prongs. The prongs are electrically connected to a pair of contact elements, which in the illustrated case are provided as an annular extension 21 of the body, and a central plunger 22 coaxially disposed therein. The extension and plunger define a coaxial receptacle for receiving a coaxial plug 23 in electrically conducting relationship.

In accordance with the particularly salient aspects of the invention, a slot 24 is provided in the body 11 to extend into the guide passage 12 inwardly from its outer end. A locking lever 25 is pivotally connected within the slot adjacent its inner end for movement about a transverse axis, as by means of a pivot pin 27 extending through the sides of the slot and an end of the lever. The inner side edge of the lever adjacent the pivoted end thereof is formed with a cam surface 28 preferably having a plurality of serrated blunt teeth 29. The lever is pivotal in the slot between a release position inclined from the body, as shown in FIGURE 5, and a lock position flush with the body periphery, as shown in FIGURE 3. In the release position of the lever, the cam surface 28 is substantially withdrawn from the passage 12 such that the passage is unobstructed for insertion of the cord 13 to the inner end thereof for engagement of the ends of the conductors 18, 19 with the prongs 16, 17. In the lock position of the lever, the teeth 29 of the cam surface project downwardly well into the passage. It will be thus appreciated that as the lever is pivoted between its release and lock position, the teeth engage the insulating sheath of the cord and during the pivotal movement frictionally urge the cord towards the prongs 16, 17. As a result the ends of the conductors 18, 19 are impaled on the prongs, as shown in FIGURES 3 and 4, to provide a positive electrical connection therebetween. In addition, the teeth are depressed into the insulating sheath of the cable to retain same in position within the passage. Since the teeth are

blunt, they do not penetrate or sever the insulation, and thus the connection is accomplished without detrimenting same.

In order to retain the lever in its lock position, a sleeve 31 is coaxially slidably disposed upon the body 11 for movement from a release position spaced from the slot, as shown in FIGURE 2, to a lock position overlying the slot and engaging the lever, as shown in FIGURE 1. In the lock position of the sleeve, the lever is thus retained in its lock position within the slot 24 in flush relation to the body periphery. Releasable retaining means are provided as indicated at 32 to releasably retain the sleeve in its lock position. Thus, to install the cord 13 in the connector, the sleeve 31 is first moved to its release position and the lever 26 is then pivoted upwardly to its release position. The cord is inserted into the guide passage 12 and the lever is pivoted downward to its lock position, the cord being thereby urged further through the guide passage to impale the ends of the cord conductors 18, 19 upon the prongs 16, 17 and lock the cord in position in the passage in the manner previously described. The sleeve is then moved to its lock position to retain the lever in lock position, whereupon the coupling between the cord and connector is complete.

Considering now the connector in more detail as to the structure of the illustrated embodiment, it is first to be noted that the guide passage 22 is defined by a cylindrical plug 33 of insulating material, such as plastic, having an outwardly flared annular flange 34 at one end. The plug is inserted into an end of the tubular body 11 to a position wherein the flange engages the end rim thereof. The plug is formed with a bore of substantially rectangular cross-section which defines the guide passage 12. The slot 24 of course extends through the plug 33, as well as the body. The pivot pin 27 which transversely bridges the slot, extends through both the plug and walls of the body so as to secure the plug therein.

The body 11 is inwardly stepped, as indicated at 36, to define the contact extension 21 at the opposite end of the body from the plug 33 as well as to provide an intermediate stepped internal stop shoulder 37. The insulated mounting plug 14 is of cylindrical configuration and arranged to be inserted into the body to a position of abutment with the stop shoulder 37 prior to installation of the plug 33 in the end of the body. The prongs 16, 17 project from one end of the plug 14 while the other end serves to mount the contact plunger 22 which cooperates with extension 21 to provide the coaxial receptacle. In this latter regard, the second end of plug 14 is formed with a cylindrical recess 38 and a contact disc 39 of conducting material is disposed at the base of the recess. A cap 41 of insulating material is secured in the end of the recess in closing relation thereto. The plunger 22, which is of conductive material, traverses a central aperture 42 provided in the cap and has an enlarged end portion 43 within the recess in slidable relation to the wall thereof. The end portion 43 is formed with a central boss 44 which is engaged in an end of a spring 46, the other end of which engages the base of the recess. The spring thus resiliently urges the plunger outwardly to a normal extended position coaxially within the extension 21. Upon depression of the plunger, it engages the contact disc 39. It is of importance to note that the prongs 16, 17 are imbedded in the plug 14, with one prong 16 longitudinally extending completely therethrough into contact with disc 39 and the other prong 17 extending into the plug to a position short of the disc. A set screw 47 of conducting material, or equivalent means, extends radially through the plug into contact with the prong 17, as shown in FIGURE 4. The outer end of the screw contacts the inner wall of the body 11. In this manner, prong 16 is electrically connected to contact disc 39, and thus to plunger 22 upon depression of same, while prong 17 is electrically connected to extension 21. Thus, a circuit is completed between the cord conductors 18, 19 and the inner and

outer conductors 48, 49 of coaxial plug 23 upon insertion of same into the extension 21, the inner conductor 48 engaging the plunger 22 and depressing same, and the outer conductor 49 engaging the extension. In order that the plug 23 may be locked in position in the extension, the plug is advantageously provided with a radially projecting pin 51 and the extension with a bayonet slot 52 for receiving the pin in a conventional manner to provide a locked joint.

In the preferred structure of the sleeve 31, same is of uniform inside diameter and provided with a thickened knurled central portion 53 intermediate reduced end portions 54, 56. The knurled portion facilitates ready translation of the sleeve over the body. The forward end portion 54 is provided with a slot 57 extending inwardly from its end face to receive an outwardly projecting tab 58 formed at the free end of the lever when the sleeve is in its lock position with portion 54 engaging the flange 34 of plug 33. The rear end portion 56 has diametrically opposed slots 59 extending inwardly from its end face to render this end portion somewhat resilient. The releasable sleeve retaining means 32 then comprises a slightly raised collar portion 61 of the body positioned to engage the end face of sleeve portion 56 when the sleeve is in lock position. In this regard, the portion 56, by virtue of its resiliency, is able to override the collar portion 61 and yet engage same in a snap fit.

What is claimed is:

1. A quick coupling connector comprising a body having a guide passage defined therein for receiving a power cord, said body having a slot extending into said passage, a pair of electrically conducting prongs mounted within said body to project longitudinally towards the outer end of the body to engage the ends of the conductors of said cord, a pair of contact elements carried by said body respectively electrically connected to said prongs, a locking lever having one end pivotally connected in said slot for movement about a transverse axis between the sides thereof, said lever having a cam surface adjacent its pivoted end depending into said passage, said lever movable between a release position inclined from the periphery of said body wherein said cam surface is substantially withdrawn from said passage and a lock position within said slot and flush with the periphery of said body wherein said cam surface projects into said passage for engagement with said cord, and a sleeve slidably disposed on said body for movement coaxially thereof between a release position spaced from said slot and a lock position overlying same.

2. A quick coupling connector according to claim 1, further defined by said cam surface having a plurality of serrated blunt teeth.

3. A quick coupling connector according to claim 1, further defined by releasable retaining means carried by said body for releasably retaining said sleeve in its lock position.

4. A quick coupling connector according to claim 1, further defined by said body being tubular, a plug of insulating material coaxially disposed in one end of said body and having a bore longitudinally therethrough defining said guide passage, said slot extending through said body and plug into said bore, a second plug of insulating material coaxially disposed at an intermediate position of said body spaced from said first plug, said prongs projecting longitudinally from said second plug toward said first plug, a conducting plunger projecting coaxially from said second plug towards the second end of said body, said plunger and coaxial outwardly spaced end portion of the said body being said contact elements, and means respectively electrically connecting said prongs to said body and said plunger.

5. A quick coupling connector according to claim 4, further defined by said cam surface having a plurality of serrated blunt teeth.

6. A quick coupling connector according to claim 5, further defined by releasable retaining means carried by

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said body for releasably retaining said sleeve in its lock position.

7. A quick coupling connector according to claim 6, further defined by the releasable retaining means including a slightly raised collar at an intermediate position of said body, said sleeve having a forward end engageable with an outwardly flared flange of said first plug and a rearward end having opposed slots extending longitudinally thereinto to render same resilient for overriding of said collar, said rear end of said sleeve engaging said collar when said forward end of said sleeve is engaging said flange.

8. A quick coupling connector according to claim 7, further defined by said lever having an outwardly projecting tab at its free end and said forward end of said sleeve having a slot extending longitudinally thereinto for engaging said tab.

9. A quick coupling connector according to claim 8, further defined by said second plug having a recess in its end opposite that from which said prongs project, a cap of insulating material secured in closing relation to the end of said recess and having a central aperture traversed by said plunger, said plunger having an enlarged end portion within said recess slidably engaging the wall thereof, and a spring within said recess acting between the base thereof and the enlarged end portion of said plunger.

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10. A quick coupling connector according to claim 9, further defined by a conducting contact disc disposed at the base of said recess, one of said prongs extending through said second plug into contact with said disc, the second of said prongs extending into said second plug short of said recess, and a conductive element extending radially into said second plug into contact with said second prong and having its outer end in contact with the inner wall of said body.

11. A quick coupling connector according to claim 10, further defined by said second end of said body having a bayonet slot extending thereinto.

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