

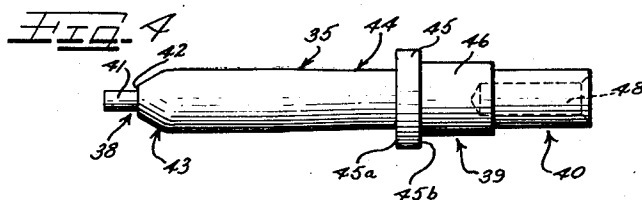
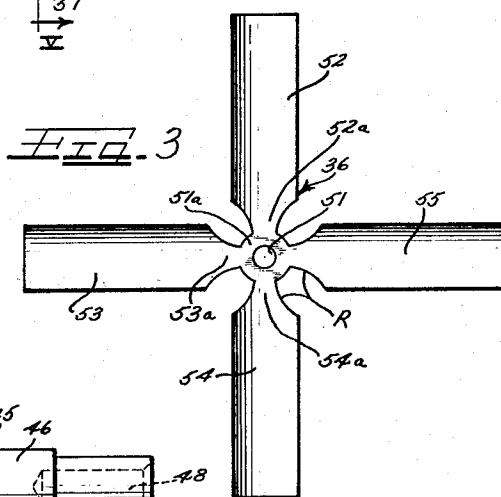
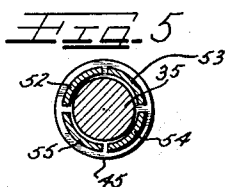
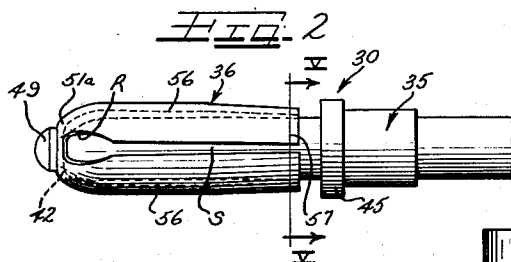
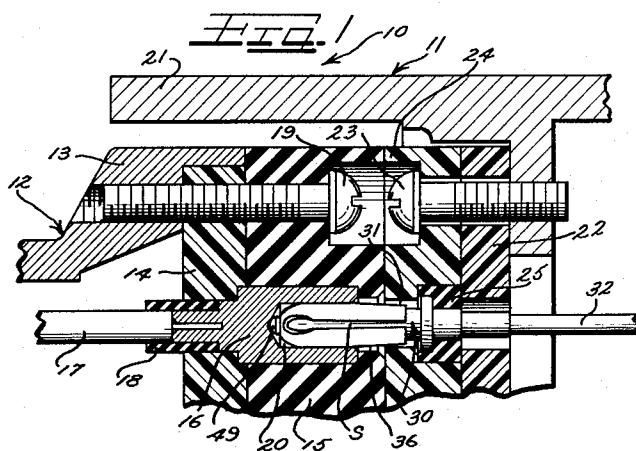
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CONTACT FOR ELECTRICAL CONNECTOR

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CONTACT FOR ELECTRICAL CONNECTOR

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This invention relates generally to separable electrical connectors, and more specifically to an improved male contact incorporated therein.

Although the principles of the present invention may be included in various connectors or plugs, a particularly useful application is made in connectors of the larger types that require a frequent connection and disconnection. In particular, when such connectors have a plurality of contacts, provision must be made for insuring electrical continuity through each of the mated contact pairs. In connector contacts having a plurality of segments extending in a common direction, a plurality of free ends must simultaneously enter a female contact and it is not uncommon for one of the plurality of segments to engage the insulation or outer portions of the female contact in such a manner so as to deform at least one such segment. Deformation of such a segment prevents proper engagement and may cause a malfunction in the associated circuit.

The present invention contemplates the utilization of a male contact pin having a solid distal end or entrant end, which pin is provided with a segmented outer sleeve which is secured to the distal end, and which is particularly characterized by a continuous lead in surface and segmented axially extending portion. Thus the free ends of the various segments cannot be caught by the edge of the lead-in hole in the insulation of the female connector nor can it be caught by the edge of the female contact when the plug is inserted. Thereby the inadvertent bending of the contact segments is precluded and efficient electrical contact is assured.

Accordingly, it is an object of the present invention to provide a male contact pin which is capable of being readily engaged with a female contact, and which provides a reliable continuous electrical connection.

Another object of the present invention is to provide an improved contact pin which is not subject to accidental bending upon engagement thereof with a female contact.

Yet another object of the present invention is to provide a connector assembly employing resilient means in the male contact for insuring proper connection between the male contact and the female contact.

Many other advantages, features and additional objects of the present invention will become manifest to those versed in the art upon making reference to the detailed description and the accompanying sheet of drawings in which a preferred structural embodiment incorporating the principles of the present invention is shown by way of illustrative example.

On the drawings:

Figure 1 is a fragmentary cross-sectional view of an electrical connector assembly equipped with a male contact provided in accordance with the principles of the present invention;

Figure 2 is an enlarged elevational view of the male contact as shown in Figure 1;

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Figures 3 and 4 each represent component parts of the structure shown in Figure 2, prior to assembly; and

Figure 5 is a cross-sectional view taken along line V—V of Figure 2.

As shown on the drawings:

The principles of this invention are particularly useful when embodied in an electrical connector assembly such as illustrated in Figure 1, generally indicated by the numeral 10. The connector assembly includes a plug assembly portion 11 and a receptacle assembly portion 12. The receptacle assembly 12 includes a casing 13, insulative plate 14, and an insulative clamping block 15. Between the plate 14 and the block 15, there is clamped a female contact 16 to which is attached a lead wire 17. If desired an insulating sleeve 18 may also be included to cover the end of the wire 17 and the end of the female contact 16 as shown. The clamping block 15 secures the female contact 16 against withdrawal and is held rigidly against the casing 13 by any convenient means such as screw 19. The female contact 16 includes an opening forming a cylindrical recess or socket 20 in which is received a male contact indicated generally at 30. The casing 13 and the clamping block 15 extend into the casing 21 of the plug assembly 11.

The plug assembly 11 has a perforated insulative plate 22 which is clamped against the casing 21 by screw 23 and a supporting member or clamping block 24. Between the plate 22 and the supporting member 24, there is clamped an insulative bushing 25, preferably of rubber. The male contact assembly 30 is insulated and resiliently supported by the supporting means 24 and the bushing 25 in an opening 31 extending through supporting means 24, the bushing 25, and the plate 22. A wire 32 is secured to one end of the male contact 30. The wires 17 and 32 may be secured by any convenient means to their respective contacts, the means illustrated herein being susceptible to either crimping or soldering.

Referring to Figure 2, the male contact assembly 30 comprises a conducting pin 35 and a sleeve or shroud 36 which are secured together. In Figure 4, the conducting pin 35 is shown before its assembly with the shroud 36. The pin 35 is longitudinally elongated and of generally cylindrical configuration and includes a distal end or contact end 38, an intermediate portion 39 and a wire end portion 40. The distal end 38 has a reduced diameter portion forming an integral rivet 41 which joins with the body of the pin at a transverse shoulder 42. The distal end 38 has a generally snub shaped nose 43, and is tapered along its body as at 44 terminating at the point where the body portion joins with the intermediate portion 39.

The intermediate portion 39 includes a circumferentially extending radially projecting annular rib 45 which provides shoulders 45a, 45b on opposite sides thereof directed toward the ends of the pin and which engage with the insulative supporting means of the plug assembly to prevent longitudinal movement of the pin. The intermediate portion 39 also has a generally cylindrical body portion 46 which forms an annular support surface for engaging the adjoining surfaces of the bushing 25 to limit lateral and rocking movement of the pin 35.

Thus the pin 35 is insulatedly carried and restrained within the plug assembly 11. The wire end portion 40 has an opening or recess 48 into which is received the lead wire 32 for attachment thereto.

The conducting shroud 36 is suitably apertured and is received over the distal portion 38 whereupon the rivet portion 41 extending through the shroud 36 is swaged or upset as shown at 49 on Figure 2 to securely clamp the shroud 36 against the shoulder 42 and to effect a good electrical connection between the shroud 36 and the pin 35. The shroud extends from the shoulder 42 toward the wire end of the pin for a distance which exceeds the

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length of engagement within the hole or recess 20 of the female contact 16. Preferably, the shroud 36 extends into the opening 31 of the supporting means 24 and is spaced from the wall defining the opening 31. By this arrangement, the free ends thereof are protected from becoming bent or otherwise damaged during various handling thereof. The shroud terminates short of the transverse portion 45. The shroud or skirt 36 engages the nose portion 43 of the pin and thereafter is slightly spaced or bowed from the distal portion of the pin.

It is to be understood that the shroud 36 may be of any suitable configuration. In the form of the invention illustrated in Figure 3 a development of the shroud is shown. A blank of sheet form material is provided with an opening 51 which is centrally aligned and adapted for receiving the rivet portion 41 in the finished form of the shroud article. A plurality of radially extending spokes or segments 52-55, inclusive, for example four in number are formed in the blank at equal circumferential intervals and each arcuately formed in cross-section as most clearly shown in Figure 5.

Each of the segments 52-55 is relieved as at R thereby forming an annular ring 51a surrounding the opening 51 and a plurality reduced necks as at 52a-54a. The segments 52-55 are each offset at their corresponding reduced necks to form a generally tubular elongated article having a continuous apertured end surface and a plurality of longitudinally or axially extending contact fingers which alternate circumferentially with recesses or slots S extending between each adjoining pair of fingers. By suitable selection of material, for example, silver-plated brass, the shroud 36 is made of an electrically conductive material having good resilience thereby to form spring fingers which resiliently engage the walls of the recess 20 in the female contact 16. Each of the shroud segments or fingers 52-55 is slightly spaced radially outwardly from the adjoining surface of the pin 35. Each of the segments may be slightly convexly bowed as indicated at 56 in Figure 2 so as to collectively define a dimension slightly exceeding that of the hole or recess 20 in the female contact 16. Thus when the male contact assembly is received therein, the female contact 16 acts on the outer surfaces of one or more segments which yieldably deflect toward the pin. Because of the bow at 56 in each of the segments, the free ends 57 of each segment 52-55 will normally engage the pin 35, thereby forming an auxiliary current path from the resilient member or shroud 36 to the pin 35. Once the free ends have engaged the pin 35, the intermediate portions 56 of the various segments 52-55 remain slightly spaced from the pin 35 and biased against the female contact 16.

The block 15 and the bushing 25 are constructed from rubber so that when a plurality of pin assemblies such as shown herein are used in a given connector assembly, the respective parts will tend to be self-aligning.

Although various minor modifications might be suggested by those versed in the art, it should be understood that I wish to embody within the scope of the patent warranted hereon all such embodiments as reasonably and properly come within the scope of my contribution to the art.

I claim as my invention:

1. In an electrical connector having a male conducting pin carried near one end by a supporting member in an

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opening therein, said one end of said pin having means for attaching a conductor to said pin, the improvement comprising: a resilient shroud rigidly secured to the other end of said pin, said shroud comprising a plurality of segments each extending alongside said pin in slightly spaced relation thereto, and each segment terminating within said opening in spaced relation to said supporting member.

2. A male contact for an electrical connector assembly, comprising: a conductive pin adapted to be insulatedly carried in said assembly; means for attaching a conductor to said pin; said pin having an integral rivet portion of reduced diameter defining a transverse shoulder at its distal end; and a conducting shroud having an annular ring portion receiving said rivet portion and secured to said pin by said rivet portion, said shroud including a plurality of longitudinally bowed segments each extending alongside said pin in a direction away from said shoulder and each having a free position wherein its unsecured end is in a radially spaced relation from said pin, each of said segments being joined at one end thereof to said annular ring portion by a neck portion of sectional area smaller than that of said ring portion and smaller than that of the segment, whereby each of said bowed segments yields first at its neck portion to effect engagement between the unsecured end and said pin and thereafter along its length in response to a radial force applied thereto.

3. In a separable connector, a male contact member having inner and outer parts, said inner part comprising a generally cylindrical core having a retainer portion at one end, said outer part comprising a sheet form member secured in firm assembly with said cylindrical core at said retainer portion, thereby to form a solid lead in portion for the contact member, and further including as an integral part thereof a plurality of separate resilient bent fingers forming together with one another a split sleeve spaced concentrically outwardly of said cylindrical core, but having the free ends thereof resiliently engageable with the peripheral surface of said core, whereby said contact member will conduct current under all contact stresses while maintaining uniform contact pressure, a contact-carrying means including a resilient support means carrying said cylindrical core, and said contact-carrying means having a face recessed to form an opening sufficiently large to receive the end of the split sleeve with clearance, whereby said contact member will be movable axially against the resilience of said resilient support means when engaged with a mating female contact member.

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