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(54) **An insert for an electrical connector having removable contacts.**

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(73) Proprietor: **THE BENDIX CORPORATION**
Executive Offices Bendix Center
Southfield Michigan 48037 (US)

(72) Inventor: **DeSalvo, Peter John**
15, Bridge Street
Sidney New-York 13838 (US)
Inventor: **Goff, Gary Maurice**
2, Jeannette Drive
Otego New York 13825 (US)

(74) Representative: **Brullé, Jean et al**
Service Brevets Bendix 44, rue François 1er
F-75008 Paris (FR)

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Description

This invention relates to electrical connectors and more particularly to an insert within the connector that retains electrical contacts.

Electrical connectors generally include a plug and receptacle, each of which has an insert of dielectric material provided with multiple passages within which electrical contacts are retained. The insert is mounted within a metal shell of the connector. Some connectors provide for rearward insertion and front or rear release of the electrical contact for removal. Other types of connectors provide for front insertion and front or rear release of electrical contacts. These features are desirable and facilitate the assembly and servicing of the connectors. An example of a one piece molded insert for retaining contacts within a connector may be found in U.S. Patent 4,157,806 issued June 12, 1979 and entitled "Apparatus for Making Electrical Connector Insert." In the foregoing types of connectors, the electrical contacts in the connector have a mating end and a wire receiving end. Wires are attached to the wire receiving end of the contact by one of three methods, i.e., soldering, crimping or wrapping the wire around the rear end of the contact. To wrap the wire around the contact, wire wrapping tools are used to rotate a wire around the contact. The wire wrapping tool is similar to a drill in that a wire, attached to the forward portion of the tool, is placed against a contact so that when the tool rotates, the wire is wrapped around the contact. Unfortunately, in a connector having an insert of the type shown in 4,157,806 patent, the contact rotates when a wire is wrapped around the contact. This prevents the wire from wrapping tightly around the contact which results in a poor electrical connection. Examples of means for preventing rotation of a contact in a connector are the addition of a separate locking means for each contact, as disclosed in FR-A-2263615, or a separate locking plate mounted to the rear of the connector. The plate includes a plurality of apertures each having a configuration that keys to the configuration of a contact to prevent rotation of the contact. Accordingly, rotation of a contact during the process of attaching a wire to the contact by wrapping the wire around one end portion of the contact has been a problem to which practical and economical solutions are being sought.

DISCLOSURE OF THE INVENTION

This invention, as set out in the claim, provides an electrical connector insert for a connector that will prevent a contact from rotating once it is mounted within the connector insert. To this end the electrical connector insert includes a passage therein having a square shaped passage adapted to receive the wire receiving end of an electrical contact having the same configuration. The matching shapes of the passage and contact prevents rotation of the contact.

Accordingly, it is an advantage of this invention

to provide an electrical connector insert that will prevent rotation of a contact once the contact is mounted in the connector insert and hence, facilitate the wrapping of a wire around one end portion of the contact.

Another advantage of this invention is improved electrical contact between a wire wrapped around a contact and the contact.

DETAILED DESCRIPTION OF THE INVENTION

FIGURE 1 is a partial diagrammatic view of an electrical connector insert incorporating the principles of this invention.

FIGURE 2 is a partial end view of the insert shown in FIGURE 1.

FIGURE 3 is a partial cross sectional side view of an alternate embodiment of the invention.

FIGURE 4 is a cross sectional view of the insert shown in FIGURE 3 taken along the lines IV—IV.

FIGURE 5 is a cross sectional view of the insert shown in FIGURE 3 taken along the lines V—V.

FIGURE 6 is a cross sectional view of the insert shown in FIGURE 3 taken along lines VI—VI.

FIGURE 7 illustrates a portion of an electrical connector assembly incorporating the principles of this invention.

Referring now to the drawings, FIGURE 1 illustrates an electrical connector insert 10 embodying the principles of this invention. The insert 10 is generally comprised of a dielectrical material and includes a plurality of passages 11 (only one shown) each containing therein a plurality of contact retaining fingers 15 and a plurality of contact retaining ribs 12. Each of the contact retaining fingers 15 is resiliently and radially expandable outwardly and terminates in a free end 16. In this embodiment, there are four contact fingers 15 and ribs 12, although more or less may be used. The free ends 16 of each contact retaining finger 15 in each passage 11 form an annular shoulder facing towards one end of the passage 11. Each rib 12 has one radial end integrally connected to the wall of the passage 11 in the insert body 10. Integrally connected to the other radial end of each of the ribs 12 is an annular ring 13 that includes a central bore 14 having a square shaped passage. Alternately, the passage 14 may take many shapes so long as it includes at least one flat surface and is configured or keyed to match the shape of the wire receiving end of a contact. Each of the ribs 12 terminate at one axial end in an internal shoulder 17 that faces the free ends 16 of the contact retaining fingers 15. To illustrate the features of the fingers 15 and ribs 12 they have been separated further apart. FIGURES 3 and 7 show that the ends 16 of the fingers 15 and the shoulders 17 of the ribs are spaced closely so as to closely retain the enlarged portion of a contact.

FIGURE 2 is a portion of the rear face 19 of the insert 10 and illustrates the symmetrical arrangement of the ribs 12 integrally connected together by the annular ring 13.

FIGURE 3 is a cross sectional view of a passage in an alternate embodiment of the insert 10 which

includes only three ribs 12 and three fingers 15. The contact retaining fingers 15 are resiliently and radially deflectable outwardly to allow the enlarged portion of a contact (not shown) to pass by the free ends 16 of the fingers 15 which then snap into place behind the enlarged portion of the contact. The enlarged portion of the contact is then retained between the free end 16 of the deflectable fingers 15 and the shoulders 17 of the ribs 12. The fingers 15 being substantially rigid in one axial direction.

FIGURE 4 is a cross sectional view taken along the lines IV—IV of FIGURE 3 and illustrates the symmetrical arrangement of the three ribs 12 in the rear portion of the insert 10 and the location of the square shaped bore 14 in the annular ring 13 connecting one radial end of each of the ribs 12 together.

FIGURE 5 is a cross sectional view taken along the lines V—V of FIGURE 3 and illustrates the three resiliently and radially deflectable fingers 15 which are arranged in a shape of a truncated cone.

FIGURE 6 is a cross sectional view taken along the lines VI—VI of FIGURE 3 and illustrates the configuration of the passage 11 in the forward portion of the insert 10.

FIGURE 7 illustrates the portion of an electrical connector having a contact retaining insert 10 that incorporates this invention. The upper portion of the connector illustrates how a contact 30 is mounted in the contact retaining insert by retention of the enlarged portion 35 of the contact between the free end 16 of the fingers 15 and the shoulders at one end of the ribs 12. The lower portion of the connector illustrates how a contact retaining tool 20 is inserted into the passage 11 through the forward face 18 of the insert 10 to deflect the contact retaining fingers 15 thereby disengaging the free ends 16 thereof from the forwardly facing shoulder 36 of the contact 30 to release the contact 30 for removal from the forward end of the insert 10.

The contact 30 includes a forward mating portion 31 and a rear wire receiving portion 32 having a configuration the same as that of passage 14 (FIGURE 4), except slightly smaller. A portion of the rear wire receiving end 32 of the contact 30 extends beyond the rear face 19 of the insert 10 to permit the wrapping of a wire 40 around the rear wire receiving end 32 of the contact 30.

While a preferred embodiment of the invention has been disclosed, it will be apparent to those skilled in the art that the advantage of this invention may still be obtained even though minor changes are made to the embodiment. For instance, the configuration of the bore 14 in the insert 10 may be rectangularly shaped or have any configuration that includes at least one flat surface and which matches the configuration of the rear wire receiving portion of a contact inserted into the bore (14) so that the engagement between the flat surface on the contact and the passage prevents rotation of the contact.

Claim:

1. An insert (10) for an electrical connector having removable contacts (30), each contact (30) having a forward mating portion (31), a rear wire receiving portion (32), and an enlarged medial section (35) having a forwardly facing shoulder (36) and a rearwardly facing shoulder (37), said insert (10) of the type having: a single piece unitary body of molded dielectric material having a plurality of passages (11) therethrough from a front face (18) to a rear face (19), each passage (11) adapted to receive a respective electrical contact (30) therein; a plurality of ribs (12) integral at one radial end with a wall of each of said passages (11), each of said ribs (12) terminating in one axial direction in a shoulder (17) adapted to engage one of said contact shoulders (37) when a contact (30) is inserted into said body (10) from the front face (18); and a plurality of contact retention fingers (15) integral with said body (10) and located within each of said passages (11), each of said fingers (15) extending inclined inwardly from the wall of said passage (11) to a forward free end (16) which terminates a predetermined distance from said rib shoulders (17), said free end (16) adapted to engage the other of said contact shoulders (36) when said contact (30) is inserted into said body (10), said fingers (15) being resiliently deflectable radially to permit the enlarged section (35) of a contact (30) to pass the free ends (16) thereof upon insertion of the contact (30) into the passage (11) from said front face (18), said fingers (15) returning to their original position behind the other of said contact shoulders (36) to limit forward movement of the contact in the passage (11), said fingers (15) being substantially rigid in one axial direction when in their original position so as to provide a positive stop against forward movement of said electrical contact (30), the passage (11) in the insert (10), there being an annular ring (13) in each of said passages (11), said ring (13) integral with the other radial end of said ribs (12) and having a central bore (14), characterised by the said contact being insertable from the front face (18) of said body, each passage (11) dimensioned so that a portion of the rear wire receiving end (32) of the contact (30) extends out of the rear face (19) of said body (10), a rear wire receiving portion (32) of said contact having at least one flat surface thereon, the said central bore (14) having a configuration that includes at least one flat surface and is adapted to receive the rear wire receiving end (32) of said contact (30) inserted into a passage (11) whereby, when a contact is inserted into said passage (11) from the front face (18) of said body (10), the enlarged medial section (35) of said contact (30) is retained between the free ends (16) of said fingers (15) and the shoulders (17) of said ribs (12) and the rear wire receiving portion (32) of said contact (35) extends through said bore (14) in the annular ring (13) and beyond the rear face (19) of said body (10) whereby the contact (30) is prevented from rotat-

ing when a wire is wrapped around the wire receiving end of the contact (30).

Patentanspruch

1. Einsatzstück für einen elektrischen Verbinder mit herausnehmbaren Kontakten (30), von denen jeder einen vorderen Paßabschnitt (31); einen hinteren Drahtaufnahmeabschnitt (32) und einen vergrößerten Mittelabschnitt (35) aufweist, wobei letzterer mit einer nach vorne weisenden Schulter (36) und einer nach hinten weisenden Schulter (37) versehen ist, wobei das Einsatzstück (10) der nachstehenden Bauart ist: Ein einstückiger Körper aus geformtem dielektrischem Material hat eine Mehrzahl von Kanälen (11), die durch ihn hindurch von einer Vorderseite (18) zu einer Hinterseite (19) verlaufen, wobei in einem jeden dieser Kanäle (11) ein zugeordneter elektrischer Kontakt (30) Aufnahme finden kann; eine Mehrzahl von Rippen (12) ist jeweils mit einem radialen Ende an eine Wand eines jeden dieser Kanäle (11) angeformt, wobei jede dieser Rippen (12) in axialer Richtung in einer Schulter (17) endet, welche in Anlage an eine der Kontaktschultern (37) kommt, wenn ein Kontakt (30) von der Vorderseite (18) in den Körper (10) eingeführt wird; und eine Mehrzahl von Kontakt-Haltefingern (15) ist an den Körper (10) angeformt und liegt im Inneren eines jeden der Kanäle (11), wobei ein jeder dieser Finger (15) von der Wand des Kanals (11) nach innen geneigt zu einem vorderen freien Ende (16) verläuft, welches um eine vorgegebene Strecke von den Rippenschultern (17) entfernt endet, wobei das freie Ende (16) in Anlage an die andere der Kontaktschultern (36) kommt, wenn der Kontakt (30) in den Körper (10) eingesetzt ist, wobei die Finger (15) in radialer Richtung federnd auslenkbar sind, um den vergrößerten Abschnitt (35) eines Kontaktes (30) an den freien Enden (16) der Finger vorbeilaufen zu lassen, wenn der Kontakt (30) von der Vorderseite (18) her in den Kanal (11) eingeführt wird, wobei die Finger (15) in ihrer Ausgangsstellung hinter die Enden der Kontaktschultern (36) zurückkehren, um die Vorwärtsbewegung der Kontakte im Durchgang (11) zu begrenzen, wobei die Finger in einer axialen Richtung im wesentlichen starr sind, wenn sie sich in ihrer Ausgangsstellung befinden, so daß sie einen die Vorwärtsbewegung des elektrischen Kontaktes (30) begrenzenden Zwangsanschlag bilden, und wobei in jedem der Kanäle (11) ein kreisförmiger Ring (13) vorgesehen ist, welcher einstückig mit den anderen radialen Enden der Rippen (12) ausgebildet ist und eine mittige Bohrung (14) aufweist; dadurch gekennzeichnet, daß die Kontakte von der Vorderseite (18) des Körpers her einführbar sind; daß jeder der Kanäle (11) so dimensioniert ist, daß ein Teil des Drahtaufnahmeabschnittes (32) des Kontaktes (30) sich aus der Rückseite (19) des Körpers (10) heraus erstreckt; daß auf dem Drahtaufnahmeabschnitt (32) des Kontaktes mindestens eine ebene Oberfläche vorgesehen ist; daß die Bohrung (14) jeweils so geformt ist, daß sie mindestens eine

ebene Oberfläche aufweist, welche den hinteren Drahtaufnahmeabschnitt (32) eines in den Kanal (11) eingesetzten Kontaktes (30) aufnehmen kann, so daß nach Einsetzen eines Kontaktes in den Kanal (11) von der Vorderseite (18) des Körpers (10) her der vergrößerte Mittelabschnitt (35) des Kontaktes (30) zwischen den freien Enden (16) der Finger (15) und den Schultern (17) der Rippen (12) festgelegt ist und sich der hintere Drahtaufnahmeabschnitt (32) des Kontaktes (30) durch die Bohrung (14) im kreisförmigen Ring (13) hindurch und über die Hinterseite (19) des Körpers (10) hinaus erstreckt, so daß sich der Kontakt (30) nicht drehen kann, wenn ein Draht um den Drahtaufnahmeabschnitt des Kontaktes (30) herumgewickelt wird.

Revendication

1. Une pièce d'insertion (10) pour un connecteur électrique comportant des contacts amovibles (30), chaque contact (30) ayant une partie d'accouplement avant (31), une partie arrière (32) de réception de fil et une partie intermédiaire élargie (35) qui comporte un épaulement (36) orienté vers l'avant et un épaulement (37) orienté vers l'arrière, ladite pièce d'insertion (10) étant du type qui comporte: un corps unitaire monobloc en matière diélectrique moulée traversé par une série de passage (11) qui s'étendent depuis une face avant (18) jusqu'à une face arrière (19), chaque passage (11) étant conçu pour recevoir un contact électrique respectif (30); une série de nervures (12) solidaires, à une extrémité radiale, d'une paroi de chacun desdits passages (11), chacune desdites nervures (12) se terminant dans une direction axiale par un épaulement (17) conçu pour venir en appui contre un (37) desdits épaulements du contact, lorsqu'un contact (30) est introduit dans ledit corps (10) à partir de la face avant (18); et une série de doigts (15) de retenue de contact venus de moulage avec ledit corps (10) et disposés à l'intérieur de chacun desdits passages (11), chacun desdits doigts s'étendant, incliné vers l'intérieur, à partir de la paroi dudit passage (11) jusqu'à une extrémité libre avant (16) qui se termine à une distance prédéterminée desdits épaulements (17) des nervures, ladite extrémité libre (16) étant conçue pour venir en butée contre l'autre (36) desdits épaulements du contact, lorsque ledit contact (30) est introduit dans ledit corps (10), lesdits doigts (15) étant élastiquement déformables radialement pour permettre à la partie élargie (35) d'un contact (30) de franchir leur extrémité libre (16) lors de l'introduction d'un contact (30) dans le passage (11) à partir de ladite face avant (18), lesdits doigts (15) reprenant leur position d'origine derrière l'autre (36) desdits épaulements du contact pour limiter le déplacement vers l'avant du contact dans le passage (11), lesdits doigts (15) étant sensiblement rigides dans une direction axiale lorsqu'ils sont dans leur position d'origine de façon à fournir une butée certaine à l'encontre d'un déplacement vers l'avant dudit contact (30), dans le passage (11) formé

dans la pièce d'insertion (10), une bague annulaire (13) étant formée dans chacun desdits passages (11), ladite bague (13) étant solidaire de l'autre extrémité radiale desdites nervures (12) et comportant un alésage central (14), caractérisée par le fait que ledit contact peut être introduit à partir de la face avant (18) dudit corps (10), chaque passage (11) étant dimensionné de telle sorte qu'une partie de l'extrémité arrière (32) de réception de fil du contact (30) s'étend au-delà de la face arrière (19) dudit corps (10), une partie arrière (32) de réception de fil dudit contact ayant au moins une surface plate, ledit alésage central (14) ayant une configuration qui comporte au moins une surface plate et est conçue pour

recevoir l'extrémité arrière (32) de réception de fil dudit contact introduit dans le passage (11) de telle sorte que, lorsqu'un contact est introduit dans ledit passage (11) à partir de la face avant (18) dudit corps (10), la partie intermédiaire élargie (35) dudit contact (30) est retenue entre les extrémités libres (16) desdits doigts (15) et les épaulements (17) desdites nervures (12) et la partie arrière (32) de réception de fil dudit contact (30) s'étend dans ledit alésage (14) formé dans la bague annulaire (13) et au-delà de la face arrière (19) dudit corps (10) de sorte que le contact (30) est empêché de tourner lorsqu'un fil est enroulé autour de l'extrémité de réception de fil du contact (30).

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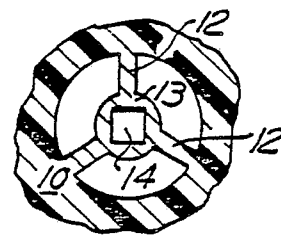
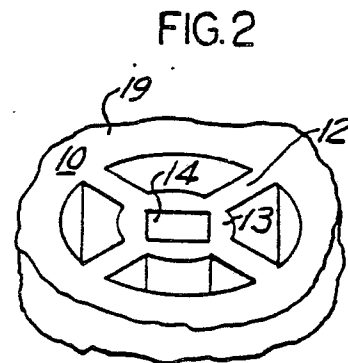
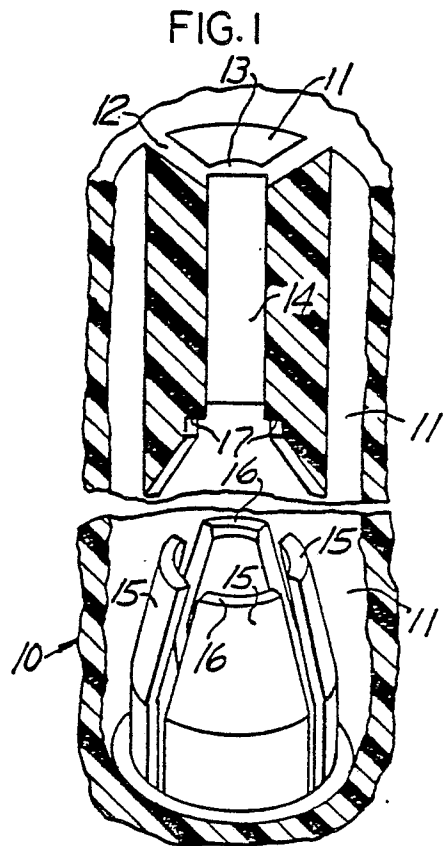


FIG. 4

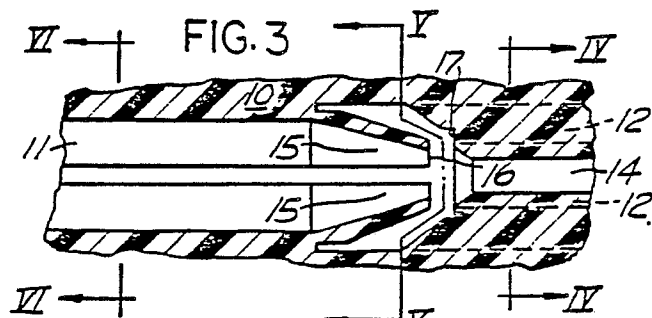


FIG. 5

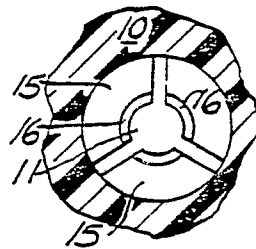


FIG. 6

