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(54) Improvements in or relating to electrical connectors

Verbesserungen in oder bezüglich elektrischer Steckverbinder

Améliorations dans et relatives aux connecteurs électriques

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Description

[0001] This invention concerns improvements in electrical connectors, and relates more especially, but not exclusively, to co-axial connectors of the kind utilised for connecting the cables of television antennas to associated equipment.

[0002] Hitherto known co-axial connectors of this kind generally comprise an outer cylindrical sleeve within which is supported a hollow centre pin via an insulating spacer. The outer cylindrical sleeve is secured within, or is integral with, a male threaded housing member that engages with a female threaded housing cap having a central aperture through which the co-axial cable can pass. Between the threaded portions of the housing is arranged a collapsible contact element that is placed around the braided conductor of the co-axial cable in order to provide an electrical connection between the latter and the outer cylindrical sleeve. The electrically insulated centre core of the cable is stripped to expose the centre conductor of the co-axial cable, which is normally a single strand of copper wire, and the latter is inserted within the hollow centre pin of the electrical connector.

[0003] Various means have hitherto been proposed for establishing electrical connect between the hollow centre pin and the wire conductor inserted therein, including the use of clamping screws or a soldered connection. These are, however, labour intensive, and in many cases an operative will simply leave the single strand of copper wire loosely inserted within the centre pin, an electrical contact being promoted by slightly kinking the wire conductor. Whilst the latter form of connection may well serve sufficiently to enable conduction of an analogue television signal from an antenna, an improved electrical connection is required where the transmission of digital television signals is concerned. Since the same antenna may be used for the receipt of both analogue and digital television signals, reception problems may thus occur with digital signals when a co-axial connector is assembled to the antenna cable in the conventional manner.

[0004] Accordingly it is an object of the invention to provide an electrical connector that can be connected to an electrical cable in a simple manner whilst ensuring a reliable electrical contact between a wire conductor of the cable and a hollow pin contact of the connector.

[0005] There is known, see US-5,865,654, a contact pin assembly for an electrical connector having the features of the preamble of Claim 1. In such a connector, however, contact between the conductor of the electrical cable and the spring finger of the contact pin assembly is achieved solely by the inherent resilience of the inwardly angled portion of the spring finger, and pressure contact between the cable conductor and the spring finger is limited by the inherent resilience of the spring finger at the point where it joins the cylindrical sleeve.

[0006] It is an object of the present invention to provide an arrangement allowing greater pressure contact to be applied by the spring finger and thus a more reliable electrical connection.

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[0007] This object is achieved by the features of the characterising clause of Claim 1.

[0008] Further preferred features and advantages of the invention will become apparent from the following description taken in conjunction with the subordinate claims.

[0009] The invention is illustrated by way of example in the accompanying drawings, in which,

Figure 1 is a longitudinal sectional view of one embodiment of pin contact in accordance with the invention, taken on the line A-A of Fig. 2,

Figure 2 is a plan view of the pin contact shown in Fig. 1,

Figure 3 is a perspective view of the pin contact of Figs. 1 and 2,

Figure 4 is an axial cross section of an assembled co-axial connector incorporating the contact pin of Figs. 1 to 3, and

Figure 5 is an enlarged fragmentary view showing a portion of the connector shown in Fig. 4.

[0010] Referring to Figs. 1 to 3 of the drawings, a generally cylindrical contact pin is formed by rolling from sheet metal to the shape illustrated and is composed of suitable electrical contact material such as nickel plated brass or phosphor bronze.

[0011] The dimensions of the pin correspond to those of a standard co-axial television cable connector and, typically, the pin would be of approximately 17.5mm in length and 2.4mm in external diameter. The cylindrical wall 1 of the contact is tapered inwardly at one end 2, in a conventional manner, and has a longitudinal slit 3 formed by the abutting edges of the rolled sheet from which the contact is formed. An opposite end of the contact has a trumpet shaped mouth 4 to facilitate insertion an electrical conductor and to retain the pin within an outer insulator as described below.

[0012] As can be seen from Figs. 1 and 3, an internally angled spring finger 5 is formed by severing a portion of the cylindrical wall 1 of the contact pin and folding this inwardly to the shape illustrated. Thus, the internally directed spring finger 5 has a shoulder portion 6 forming a transition between the cylindrical wall 1 of the contact pin and a flattened portion 7 that is angled inwardly relatively to the axis of the contact pin, for example at an angle of approximately 155°. A flattened end portion 7A of the spring finger 5 is angled away from the longitudinal axis of the contact, at an angle of, for example, 25°, to form an elbow in the contact finger 5 as shown in Fig. 1. The residual aperture left in the wall of the cylindrical

contact terminates at a free edge in an outwardly angled lip 8, as can be seen from Figs. 1 and 3.

[0013] Referring to Figs. 4 and 5, a complete electrical connector incorporating the contact of Figs. 1 and 3 comprises a generally cylindrical metal sleeve 9 secured within a male screw threaded housing member 10 and having a portion 9A of wider diameter and a narrow portion 9B.

[0014] An annular member 11 of electrically insulating material is located within the sleeve 9 and has a wider portion 11A fitting within the wider portion 9A of the conductor sleeve 9, and a narrow portion 11B fitting within the narrow portion 9B of the sleeve 9. The insulator 11 is located axially by means of a shoulder of the sleeve 9 between the wider and narrower portions 9A and 9B.

[0015] As illustrated more clearly in Fig. 5, the contact pin 1 is a push fit within a central aperture of the annular insulator 11, the lip 8 of the contact 1 serving as an abutment to snap engage with one end of the insulator 11 and the widened trumpet mouth 4 abutting against the other end. The contact pin 1 is thus retained therein against relative displacement, in use.

[0016] As can also be seen from Fig. 5, the internal wall of the insulator 11 overlies the aperture in the wall of the contact pin 1, and thus presents the end 7A of the spring finger 5 from being displaced outwardly through the aperture in the wall 1 of the contact. Thus, upon insertion of a central wire conductor into the contact pin, the portion 7 of the spring finger 5 is firstly engaged by the wire conductor and displaced outwardly until the free end 7A contacts the internal surface of the insulator 11. Thereafter, upon further insertion of the conductor wire, the two angled portions 7, 7A of the finger 5 are flexed relatively to one another in order to ensure firm contact between the spring finger 5 and the conductor wire.

[0017] After insertion of a central conductor of a co-axial cable into the contact pin, the cable is retained in place in conventional manner by securing a female threaded cap 12 on to the male threaded housing member 10, a collapsible contact member 13 providing an electrical connection between the outer conductor of the co-axial cable and the cylindrical sleeve 9 in a conventional manner that is well known to those skilled in the art.

[0018] Although the above described arrangement comprises one exemplary embodiment of the invention, it will be appreciated that various modifications and alternations may be made thereto without departing from the scope of the invention as defined in the appended Claims.

Claims

1. A contact pin assembly for an electrical connector to be attached to an electrical cable, comprising a generally cylindrical metal sleeve (1) for receiving a central conductor of an electrical cable and an an-

nular insulator (11) arranged coaxially with said metal sleeve for spacing said sleeve (1) from an outer conductor (9) to be arranged coaxially therewith, wherein a longitudinally extending portion of the wall of said metal sleeve (1) is partially severed therefrom to form a spring finger (5) having a portion (7) angled inwardly and a portion (7A) angled outwardly to form an elbow for contact with a central conductor of an electrical cable, **characterised in that** said annular insulator (11) is located around said metal sleeve (1) to form an abutment for engagement by said outwardly angled portion (7A) of said spring finger upon insertion of a cable conductor within said cylindrical metal sleeve (1), whereby said spring finger (5) is held in firm contact with the cable conductor.

2. A contact pin assembly according to Claim 1 wherein a free edge of an aperture defined in the wall of said metal sleeve (1) by the severance of said spring finger (5) is angled outwardly (8) to retain the metal sleeve (1) within said annular insulator by snap engagement therein.
3. A contact pin assembly according to Claim 2, wherein said annular insulator is retained between said outwardly angled free edge (8) and a widened mouth of said cylindrical metal sleeve (1).
4. A contact pin assembly according to any of Claims 1 to 3, wherein said pin contact is incorporated within a co-axial cable connector to form the centre pin thereof.

Patentansprüche

1. Kontaktstiftenordnung für einen elektrischen Verbinder zur Verbindung mit einem elektrischen Kabel, umfassend eine im Wesentlichen zylindrische Metallhülse 1 zur Aufnahme eines zentralen Leiters eines elektrischen Kabels und einen ringförmigen Isolator 11, der coaxial zur genannten Metallhülse angeordnet ist, um diese Metallhülse (1) von einem äußeren Leiter (9), der coaxial mit ihr verläuft, zu beabstanden, wobei ein sich in Längsrichtung erstreckender Abschnitt der Wand der genannten Metallhülse (1) teilweise aufgetrennt ist, um eine Federlasche (5) zu bilden, mit einem Abschnitt 7, der nach innen gewinkelt und einem Abschnitt (7A), der nach außen gewinkelt ist, um einen Ellenbogen für einen Kontakt mit einem zentralen Leiter des elektrischen Kabels zu bilden, **dadurch gekennzeichnet, dass** der genannte ringförmige Isolator (11) so um die genannte Metallhülse (1) angeordnet ist, dass er einen Anschlag für einen Eingriff des genannten nach außen gerichteten gewinkelten Abschnitts (7A) der Federlasche beim Einsetzen eines

Kabelleiters in die zylindrische metallische Hülse (1) bildet, wodurch die genannte Federlasche (5) in festem Kontakt mit dem Kabelleiter gehalten wird.

2. Kontaktstiftanordnung nach Anspruch 1, wobei eine freie Kante (8) einer Ausnehmung in der Wand der genannten metallischen Hülse (1), die durch das Heraustrennen der genannten Federlasche (5) gebildet ist, mit einer nach außen gerichteten Abwinklung versehen ist, um die Metallhülse (1) durch eine Schnappverbindung innerhalb des genannten ringförmigen Isolators zu halten. 5 10
3. Kontaktstiftanordnung nach Anspruch 2, wobei der genannte ringförmige Isolator zwischen der genannten nach außen gewinkelten freien Kante (8) und einem erweiterten Mundstück der genannten zylindrischen Metallhülse (1) gehalten ist. 15
4. Kontaktstiftanordnung nach einem der Ansprüche 1 bis 3, wobei dieser Stiftkontakt in einem koaxialen Kabelverbinder zur Bildung des Zentraltifts angeordnet ist. 20

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Revendications

1. Ensemble de broche de contact pour connecteur électrique à fixer à un câble électrique, comprenant un manchon de métal sensiblement cylindrique (1) destiné à recevoir le conducteur central d'un câble électrique et un isolant annulaire (11) disposé coaxialement par rapport audit manchon de métal afin d'écarter ledit manchon (1) d'un conducteur externe (9) devant être disposé coaxialement par rapport à celui-ci, où une partie s'étendant longitudinalement de la paroi dudit manchon de métal (1) en est partiellement séparée de façon à former un doigt élastique (5) qui possède une partie (7) inclinée vers l'intérieur et une partie (7A) inclinée vers l'extérieur afin de former un coude assurant le contact avec le conducteur central d'un câble électrique, **caractérisé en ce que** ledit isolant annulaire (11) est placé autour dudit manchon de métal (1) afin de former un appui destiné au contact avec ladite partie inclinée vers l'extérieur (7A) dudit doigt élastique lors de l'insertion du conducteur d'un câble à l'intérieur dudit manchon de métal cylindrique (1), si bien que ledit doigt élastique (5) est maintenu en contact ferme avec le conducteur du câble. 30 35 40 45 50
2. Ensemble de broche de contact selon la revendication 1, où un bord libre de l'ouverture définie dans la paroi dudit manchon de métal (1) par la séparation dudit doigt élastique (5) est incliné vers l'extérieur (8) de façon à retenir le manchon de métal (1) à l'intérieur dudit isolant annulaire par une venue en prise du type enclenchement brusque. 55

3. Ensemble de broche de contact selon la revendication 2, où ledit isolant annulaire est retenu entre ledit bord libre incliné vers l'extérieur (8) et une embouchure élargie dudit manchon de métal cylindrique (1).
4. Ensemble de broche de contact selon l'une quelconque des revendications 1 à 3, où ledit contact de broche est incorporé à un connecteur de câble coaxial afin de former la broche centrale de celui-ci.

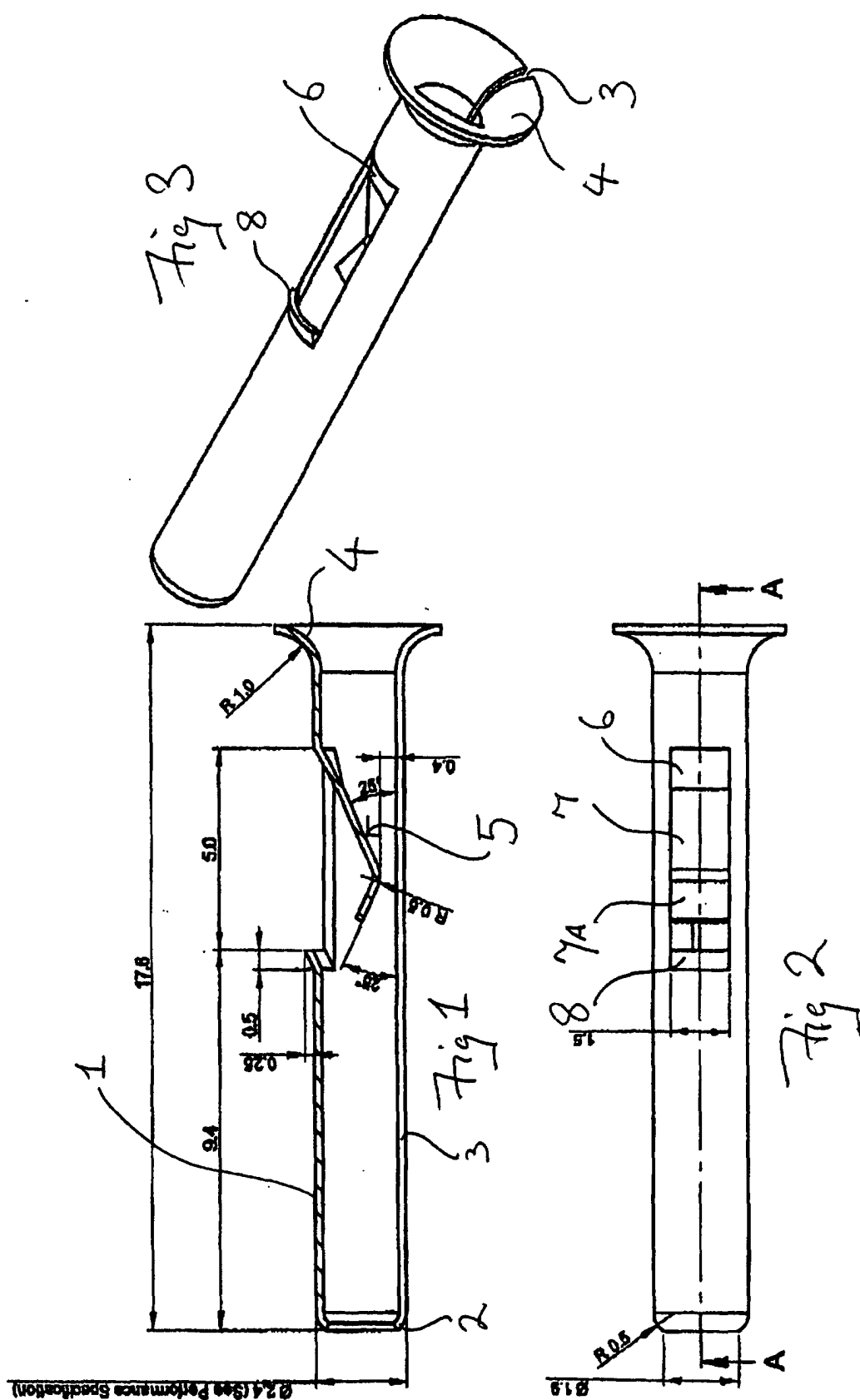


Fig 5

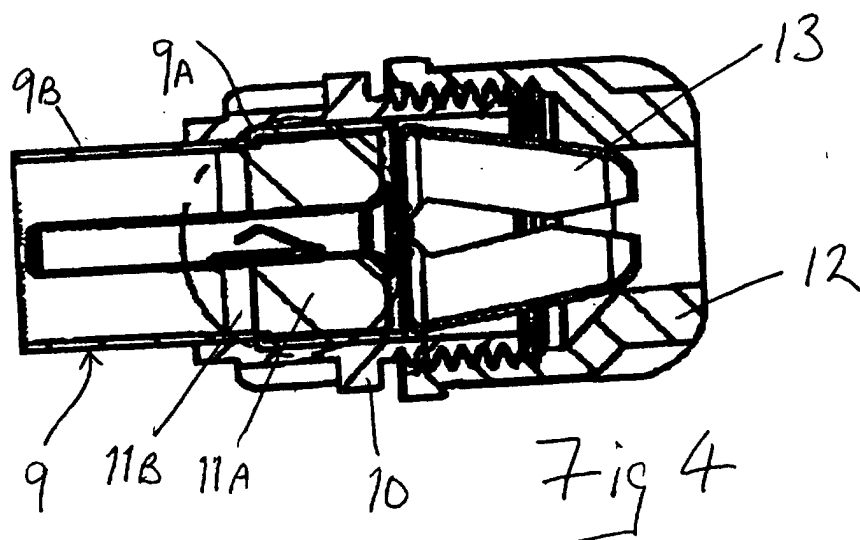
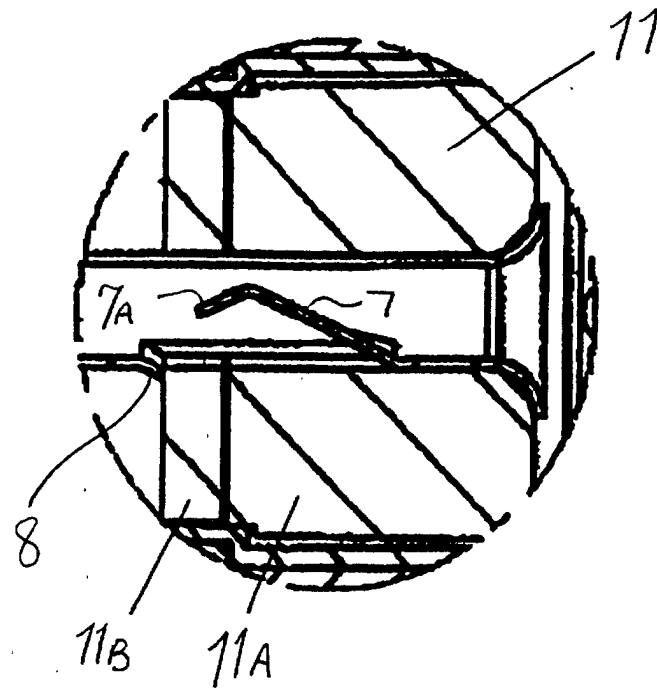


Fig 4