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US - A - 2 958 723
US - A - 3 356 987
US - A - 3 844 923**

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Electrical connector comprising a crimping ferrule

This invention relates to an electrical connector.

From U.S. Patent Specification No. 3,356,987 an electrical connector is known which comprises an electrical terminal having a contact end and a crimping ferrule for connection to an electrical conductor, the crimping ferrule being received in a metal sleeve which extends beyond the end of the crimping ferrule in the direction away from the contact end of the terminal, the metal sleeve in turn being received in an outer sleeve of electrically insulating material.

For use of such a connector, a bared end portion of the conductor of an insulated electrical conductor is inserted into the crimping ferrule of the terminal through the metal sleeve, with an insulated portion of the conductor positioned in the portion of the metal sleeve which extends beyond the crimping ferrule of the terminal.

The crimping ferrule is then crimped on to the conductor through the overlying outer insulating sleeve and the metal sleeve, both of which are also permanently deformed by such crimping, and the portion of the metal sleeve which extends beyond the crimping ferrule is crimped about the insulation of the conductor through the overlying outer insulating sleeve which is also permanently deformed by this crimping.

After such crimping the metal sleeve serves to protect the conductor from bending stresses which would otherwise occur at the position where the conductor enters the crimping ferrule of the terminal. Further, with such a connector the terminal can be made, for example by stamping and forming, from relatively thin stock material whereby the contact end thereof can be given desirable spring properties, the metal sleeve serving to increase the thickness of metal at the crimping ferrule of the terminal, thereby to ensure reliable crimping of the terminal to the conductor.

However, difficulties still arise with such connectors since if the metal sleeve is made sufficiently thick to ensure satisfactory crimping at the crimping ferrule, then it is often too thick for satisfactory crimping of the portion thereof overlying the conductor insulation to be easily carried out without damaging the conductor.

According to this invention an electrical connector comprising an electrical terminal having a contact end and a crimping ferrule for connection to an electrical conductor, the crimping ferrule being received in a metal sleeve which extends beyond the end of the crimping ferrule in the direction away from the contact end of the terminal, the metal sleeve in turn being received in an outer sleeve of electrically insulating material, is characterised in that the metal sleeve is a seamless member having a

relatively thick wall over the portion overlying the crimping ferrule, and a relatively thin wall over the portion extending beyond the end of the crimping ferrule.

The connector of this invention has the advantage that the two portions of this metal sleeve inherently have the necessary characteristics to enable the connector to be easily and reliably crimped to an insulated conductor, while allowing the terminal to be of any desired form, for example stamped and formed from resilient sheet metal.

An electrical terminal having an integrally formed sleeve comprising two axially aligned portions of mutually different wall thickness is disclosed in U.S. Patent Specification No. 3,844,923. However, this terminal is a machined member and is not a member stamped and formed from sheet metal. Further, this known terminal requires the use of a separate metal sleeve positioned inside the thicker wall portion of the integral sleeve of the terminal, and does not utilise an outer metal sleeve with an overlying insulating sleeve as found in the connector of this invention.

An electrical connector according to this invention will now be described by way of example with reference to the drawings, in which:—

Figure 1 is a side elevational view, partly in cross-section, of a metal sleeve of the connector;

Figure 2 is a sectional plan view of the sleeve of Figure 1 received in an outer insulating sleeve of the connector; and

Figure 3 is a plan view of the complete connector.

Figure 1 shows a seamless circular cross-section metal sleeve 1 having a relatively thick wall portion 2 and a relatively thin wall portion 3. Such a metal sleeve can be formed by conventional metal working techniques.

Between the portions 2 and 3 is an intermediate portion 4 providing a funnel entry 5 from the portion 3 into the portion 2. The intermediate portion 4 also provides a shoulder 6 facing into the portion 2.

The free end 7 of the portion 3 is flared outwardly to provide a funnel entry thereto.

Referring now to Figure 2, this shows the metal sleeve 1 received in an outer sleeve 8 of electrically insulating plastics material, which outer sleeve 8 extends beyond the free end 7 of the portion 3 of the sleeve 1.

Figure 3 shows the complete connector which includes an electrical terminal 9 having a receptacle contact end 10 for mating with a flat tab (not shown) and a crimping ferrule 11 of known form for connection to an electrical conductor, the crimping ferrule 11 being received in the portion 2 of the metal sleeve 1 with its insertion limited by the shoulder 6 therein.

For use of the connector, the insulation 12 is stripped from a portion at the end of an insulated electrical conductor 13, and the end portion is then inserted into the free end of the outer sleeve 8 with the end of the conductor 13 being guided into the crimping ferrule 11 by the funnel entry 5 of the metal sleeve 1, which funnel entry 5 also serves to limit insertion of the conductor by engagement of the insulation 12 on the conductor with the funnel entry 5. The crimping ferrule 11 is then crimped down on to the conductor 13 through the outer sleeve 8 and the portion 2 of the metal sleeve 1, and the portion 3 of the metal sleeve 1 can be crimped down on to the insulation 12 of the conductor through the outer sleeve 8, in known manner.

The relatively thick wall of the portion 2 of the metal sleeve 1 ensures reliable crimping of the connector 1 on to the conductor 13 even when the material from which the terminal 9 is made is relatively thin as may be necessary to ensure the necessary spring properties for the receptacle end 10 thereof, while the relatively thin wall of the portion 3 of the metal sleeve 1 allows for easy crimping of this portion on to the insulation 12 of the conductor. Further, the absence of a seam in the metal sleeve 1 ensures that the metal sleeve 1 will not relax after crimping as could occur if the metal sleeve 1 had a longitudinally extending open seam as found in some known connectors.

Claims

1. An electrical connector comprising an electrical terminal (9) having a contact end (10) and a crimping ferrule (11) for connection to an electrical conductor, the crimping ferrule (11) being received in a metal sleeve (1) which extends beyond the end of the crimping ferrule (11) in the direction away from the contact end (10) of the terminal (9), the metal sleeve (1) in turn being received in an outer sleeve (8) of electrically insulating material, characterised in that the metal sleeve (1) is a seamless member having a relatively thick wall over the portion (2) overlying the crimping ferrule (11), and a relatively thin wall over the portion (3) extending beyond the end of the crimping ferrule (11).

2. A connector as claimed in Claim 1, characterised in that the metal sleeve (1) has an intermediate portion (4) between the relatively thick wall and relatively thin wall portions (2 and 3), the intermediate portion (4) providing a funnel entry from the thin wall portion (3) into the thick wall portion (2).

3. A connector as claimed in Claim 2, characterised in that the intermediate portion (4) provides a shoulder (6) facing into the thick wall portion (2).

4. A connector as claimed in Claim 2 or Claim 3, characterised in that the free end (7) of the thin wall portion (3) of the metal sleeve (1)

is flared outwardly to provide a funnel entry thereto.

Révendications

1. Connecteur électrique comprenant une borne électrique (9) ayant une extrémité (10) de contact et une douille (11) de sertissage pour réaliser une connexion sur un conducteur électrique, la douille (11) de sertissage étant logée dans un manchon métallique (1) qui dépasse de l'extrémité de la douille (11) de sertissage, dans la direction s'éloignant de l'extrémité (10) de contact de la borne (9), le manchon métallique (1) étant lui-même logé dans un manchon extérieur (8) en matière électriquement isolante, caractérisé en ce que le manchon métallique (1) est un élément sans joint ayant une paroi relativement épaisse sur le tronçon (2) enveloppant la douille (11) de sertissage, et une paroi relativement mince sur le tronçon (3) dépassant de l'extrémité de la douille (11) de sertissage.

2. Connecteur selon la revendication 1, caractérisé en ce que le manchon métallique (1) comporte un tronçon intermédiaire (4) situé entre les tronçons (2 et 3) à paroi relativement épaisse et à paroi relativement mince, le tronçon intermédiaire (4) délimitant une entrée évasée du tronçon (3) à paroi mince vers le tronçon (2) à paroi épaisse.

3. Connecteur selon la revendication 2, caractérisé en ce que le tronçon intermédiaire (4) présente un épaulement (6) tourné vers l'intérieur du tronçon (2) à paroi épaisse.

4. Connecteur selon la revendication 2 ou la revendication 3, caractérisé en ce que l'extrémité libre (7) du tronçon (3) à paroi mince du manchon métallique (1) s'épanouit vers l'extérieur pour présenter une entrée évasée pour ce tronçon.

Patentansprüche

1. Elektrischer Verbinder mit einem elektrischen Anschluß (9), der ein Kontaktende (10) und eine Klemmhülse (11) zur Verbindung mit einem elektrischen Leiter aufweist, wobei die Klemmhülse (11) in einer Metallhülse (1) aufgenommen ist, die sich über das Ende der Klemmhülse (11) hinaus in einer Richtung weg von dem Kontaktende (10) des Anschlusses (9) erstreckt, wobei die Metallhülse (1) ihrerseits in einer äußeren Hülse (8) aus elektrisch isolierendem Material aufgenommen ist, dadurch gekennzeichnet, daß die Metallhülse (1) ein nahtloses Glied ist, das eine relativ dicke Wand über denjenigen Teil (2) hat, der die Klemmhülse (11) umgibt, und das eine relativ dünne Wand über denjenigen Teil (3) hat, der sich über das Ende der Klemmhülse (11) hinaus erstreckt.

2. Verbinder nach Anspruch 1, dadurch gekennzeichnet, daß die Metallhülse (1) einen

Zwischenteil (4) zwischen den relativ dickwandigen und den relativ dünnwandigen Teilen (2 und 3) hat, wobei der Zwischenteil (4) einen trichterförmigen Einlaß von dem dünnwandigen Teil (3) in den dickwandigen Teil (2) bietet.

3. Verbinder nach Anspruch 2, dadurch gekennzeichnet, daß der Zwischenteil (4) eine

Schulter (6) aufweist, die zu dem dickwandigen Teil (2) weist.

4. Verbinder nach Anspruch 2 oder 3, dadurch gekennzeichnet, daß das freie Ende (7) des dünnwandigen Teils (3) der Metallhülse (1) sich nach außen erweitert, um einen trichterförmigen Einlaß zu bieten.

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FIG.1.

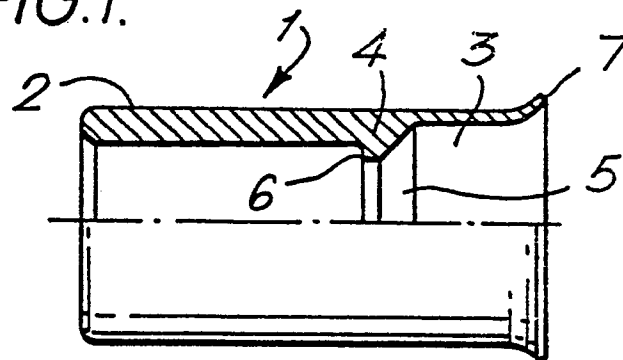


FIG.2.

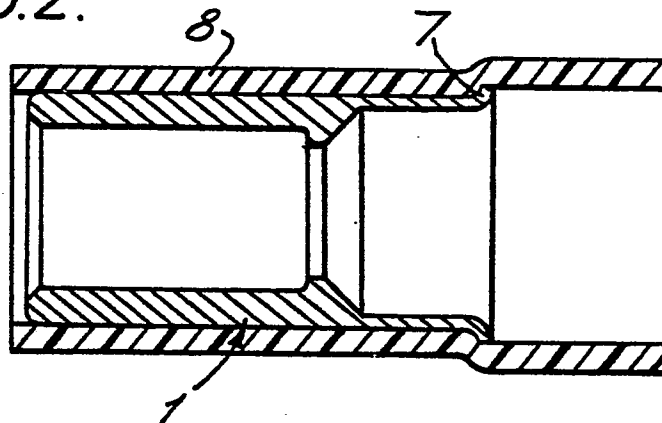


FIG.3.

