

Description

The invention relates to a cover for a series of tubular terminals having respective axially extending wire receiving slots and to an electrical connector assembly including such cover.

Tubular terminals having respective axially extending wire receiving slots are being used with increasing frequency in electrical equipment in view of advantageous wire terminating characteristics, particularly in board mounted applications. In order speedily to terminate a wire in the terminal and to provide both insulation and strain relief in a single step, a cover which provides a wire stuffing function for a single wire is described in U.S. Patent No. 4,186,984 (EP-A-5 350).

This prior art discloses a molded one-piece resilient plastic cover for a tubular terminal having an axially extending wire receiving slot comprising a tubular socket profiled to closely receive the terminal, the socket having a blind end adjacent a first face of the cover and an opposed end opening to a terminal receiving face of the cover, the cover having opposed front and rear faces extending between the first and terminal receiving faces, a blind ended axially extending wire gripping slot formed in a socket wall at the front face and opening on the terminal receiving face, and a stuffer extending axially from the blind end for engagement with a wire received in the slot when the cover is applied to a terminal. In use, a wire can be loaded into the cover to extend across the free end of the stuffer and the cover then applied to the terminal both to drive the wire into the terminal slot and to insulate the terminal.

In the prior cover, the stuffer comprises a cylindrical block substantially filling the terminal interior preventing excess wire lead-out from the terminal after termination. In consequence, either the wire must be accurately located in the cover adjacent its free end or the end of the wire must be severed during termination by the cover against a free rear edge of the terminal.

Manipulating the free end of a small wire for precise location in the cover can be a relatively laborious and time-consuming operation, not facilitating economic mass production and, furthermore, a possibility of tapping a wire intermediate its ends is obviated. The alternative of severing the wire against the free rear edge of the terminal imposes an undesirable stress on a terminal supporting structure which may be relatively fragile, and is particularly unsuitable for simultaneous mass termination where the total severing forces would be very high.

It is an object to provide an improved cover of the kind disclosed in US-A-4 186 984.

According to the invention a molded one-piece resilient plastic cover for a tubular terminal having an axially extending wire receiving slot comprises a tubular socket profiled to closely receive the terminal, the socket having a blind end adjacent a first face of the cover and an opposed end opening to a terminal receiving face of the

cover, the cover having opposed front and rear faces extending between the first and terminal receiving faces, a blind-ended axially extending wire gripping slot formed in a socket wall at the front face and opening into the terminal receiving face, and a stuffer extending longitudinally from the blind end for engagement with a wire received in the slot when the cover is applied to a terminal, is characterised by a second longitudinally extending wire gripping slot formed in a socket wall at the rear face of the cover and opening into the terminal receiving face, the slot extending above the socket and thereby above the terminal when the cover is fully applied thereto, the stuffer being spaced from the rear face to define a wire lead-out opening above the socket and communicating between the blind end of the socket behind the stuffer and the second axially extending wire gripping slot where it extends above the terminal when the cover is fully applied, the stuffer being profiled on a rear face in relation to the terminal receiving space of the socket to permit the wire to be drawn into the terminal behind the stuffer and between the stuffer rear wall and a wall of the terminal as the cover is applied to the terminal to force the wire into the wire receiving slot thereof, whereby the wire will extend through the lead-out opening and out of the second wire gripping slot when the cover is fully applied.

This permits wire quickly to be loaded into the cover while avoiding the time-consuming manipulation of the wire ends. The exposed ends of the wires can readily be severed after termination and taps are also accommodated.

More particularly, a portion of the blind end of each socket located rearwardly of each stuffer is recessed to define each lead-out opening. The lead-out opening communicates with the second wire gripping slot extending through the opening between the rear surface of the stuffer and the terminal. The wire then extends over the top edge of the terminal through the top of the second wire gripping slot.

Preferably, the recessed portion provides a wire engaging shoulder located to extend across a rear edge of the terminal. The wire may be gripped between the rear edge of the terminal and the shoulder to provide strain relief.

The slots formed at the rear face open at their other ends to the first face of the cover. Engagement of a wire with a rear wall portion of a terminal during movement of a stuffer into the terminal causes a free end of the wire to be bent so that an end portion upstands from the first face of the housing. This is facilitated by the wire gripping slots formed at the rear face of the cover increasing in width as they extend towards the first face, progressively releasing the wire as the cover is pressed home on the terminals.

The blind-ended wire gripping slots formed at the front face of the cover may decrease in width as they extend towards the first face. Further strain relief may be provided by the wire gripping slots formed at the front face of the cover decreasing

ing in width as they extend towards the first face and by providing a hemispherical stuffer which provides wire clearance between the stuffer and the rear wall of the terminal during insertion to prevent wire being drawn through the first wire gripping slot.

A known wire stuffing tool disclosed in our publication COM 0499 of 1980 entitled INSTALLATION INSTRUCTIONS AMP-BARREL INTERCONNECT BLOCK includes a cylindrical terminal receiving head with a single wire stuffer adapted to enter a tubular terminal formed with an axial wire-receiving slot. During insertion, the wire extends through a lead-out opening defined between the stuffer and the rear wall of the terminal and through a passageway in the tool shank. However, the tool head is made from rigid material and a wire must be preloaded into the head by threading into the passageway which is a time-consuming step requiring that an end of the wire be free for the threading step. Clearly, the wire threading technique used in such tool would not be suitable for mass termination.

An example of a cover according to the invention will now be described with reference to the accompanying drawings in which:

Figure 1 is a perspective view of the cover loaded with wires and aligned for application to a series of terminals mounted in a board;

Figure 2 is a transverse cross-sectional view of the cover of Figure 1;

Figure 3 is a transverse cross-sectional view of the cover after wire termination;

Figure 4 is a longitudinal cross-sectional view taken along line 4—4 of Figure 2;

Figure 5 is a fragmentary front elevational view taken along line 5—5 of Figure 4; and

Figure 6 is a fragmentary perspective view partly in cross section taken along a socket axis.

The cover 11 is molded in one piece from resilient plastic material with a series of tubular sockets 12 having blind ends 13 adjacent a first face 14 of the cover and terminal receiving ends opening to an opposite, terminal receiving face 15 of the cover. Pairs of aligned first and second wire gripping slots 16 and 17 respectively extend axially along respective opposite socket wall portions at front and rear faces 18 and 19 respectively of the cover and each open at one of their longitudinal ends to the terminal receiving face 15.

The second slot 17 opens at its other longitudinal end 23 to the first face 14 of the cover. The first slot 16 decreases in width as it extends away from the face and the slot 17 is formed with lips 25 which progressively diverge as they extend towards the first face 14 so that slot 17 progressively increases in width as it extends towards first face 14, which progressively diminishes its wire gripping function in that direction.

Wire stuffers 20 project axially from blind ends 13 of respective sockets. Wire lead-out openings 21 are provided rearward of respective stuffers 20 and are defined by a wire-engaging shoulder 22

recessed from blind ends 13 and located to extend across a rear edge of a terminal 30 on termination.

The stuffers 20 are hemicylindrical having curved front faces and flat rear faces 24 extending to the shoulder 22. A first tool receiving slot 27 is formed in the cover 11 to extend longitudinally of the first face 14 and a second longitudinally extending slot 28 is formed adjacent the first slot 27 to provide a resilient wall portion 29 between the slots 27, 28 which flexes to receive and grip a tool 34 inserted in the tool receiving slot 27.

In this particular example, the cover 11 is used to insert wires 33 in tubular terminals 30 having axially extending slots 31, which terminals are mounted on a printed circuit board 32 of an electrical connector. The connector comprises a base member 35 in which the circuit board is secured by latches 36 and a lid member 37 adapted to be secured to the base member 35 to clamp a cable therebetween subsequent to wire termination by the cover 11.

In use of the cover 11, as shown in Figures 2 and 3, individual wires 33 are drawn intermediate their ends through the terminal receiving face 15 into respective wire gripping slots 16, 17 so that they extend across the free ends of respective stuffers 20. A suitable tool 34 is then inserted into the slot 27 and the cover is applied to all of the terminals 30 so that the wires 33 are forced progressively into the terminal slots 31 by the stuffers 20 and rear end portions of the wires 33 are drawn progressively upward along respective slots 17 until released therefrom, facilitating their being drawn into the barrel of terminals 30 and permitting the wires to spring up and extend through end 23 upstanding from the face 14. Strain relief is provided, particularly needed during subsequent severing of the wire ends, by the wire being clamped between the shoulder 22 and the rear edge of the terminal 30 and between the face 24 of the stuffer 20 and the rear wall of the terminal.

After termination, the upstanding end portions of the wires may readily be severed to minimum acceptable length. As the ends of the wires face upwardly, conductors are exposed to facilitate testing.

Claims

1. A molded one-piece resilient plastic cover (11) for a tubular terminal (30) having an axially extending wire receiving slot (31) comprises a tubular socket (12) profiled to closely receive the terminal (30), the socket (12) having a blind end (13) adjacent a first face (14) of the cover (11) and an opposed end opening to a terminal receiving face (15) of the cover (11), the cover having opposed front and rear faces (18, 19) extending between the first and terminal receiving faces (14, 15), a blind-ended longitudinally extending wire gripping slot (16) formed in a socket wall at the front face (18) and opening into the terminal receiving face (15), and a stuffer (20) extending

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axially from the blind end (13) for engagement with a wire (33) received in the slot (31) when the cover (11) is applied to a terminal (30), characterised by a second longitudinally extending wire gripping slot (17) formed in a socket wall at the rear face (19) of the cover (11) and opening into the terminal receiving face (15), the slot (17) extending above the socket (12) and thereby above the terminal (30) when the cover (11) is fully applied thereto, the stuffer (20) being spaced from the rear face (19) to define a wire lead-out opening (21) above the socket (12) and communicating between the blind end of the socket behind the stuffer (20) and the second axially extending wire gripping slot (17) where it extends above the terminal (30) when the cover (11) is fully applied, the stuffer (20) being profiled on a rear face in relation to the terminal receiving space of the socket (12) to permit the wire (33) to be drawn into the terminal (30) behind the stuffer (20) and between the stuffer (20) rear wall and a wall of the terminal (30) as the cover (11) is applied to the terminal (30) to force the wire (33) into the wire receiving slot (31) thereof, whereby the wire (33) will extend through the lead-out opening (21) and out of the second wire gripping slot (17) when the cover (11) is fully applied.

2. A cover (11) according to claim 1 characterised in that a portion of the blind end (13) of each socket located rearwardly of each stuffer (20) is recessed to define each lead-out opening (21).

3. A cover (11) according to claim 2 characterised in that the recessed portion provides a wire engaging shoulder (22) located to extend across a rear edge of the terminal (30).

4. A cover (11) according to claim 1 characterised in that the slot (17) formed at the rear face (19) extends to the first face (14) of the cover (11).

Patentansprüche

1. Geformter, einstückiger, elastischer Kunststoffdeckel (11) für einen rohrförmigen Anschluß (30) mit einem sich axial erstreckenden Drahtaufnahmeschlitz (31), wobei der Deckel einen rohrförmigen Sockel (12) umfaßt, der derart profiliert ist, daß er den Anschluß (30) knapp aufnimmt, und wobei der Sockel (12) ein blindes Ende (13) angrenzend an eine erste Fläche (14) des Deckels (11) besitzt, sowie ein entgegengesetztes Ende, das sich zu einer Anschlußaufnahme- fläche (15) des Deckels (11) erstreckt, wobei ferner der Deckel entgegengesetzte Vorder- und Hinterflächen (18, 19) aufweist, die sich zwischen den ersten und den Anschlußaufnahme- flächen (14, 15) erstrecken, wobei ein blind endender, sich in Längsrichtung erstreckender Drahtgreifschlitz (16) in einer Sockelwand an der Vorderfläche (18) geformt ist und sich in die Anschlußaufnahme- fläche (15) hinein öffnet, und mit einem Einschiebelement (20), das sich axial von dem blinden Ende (13) zum Eingriff mit einem in dem Schlitz (31) aufgenommenen Draht (33) erstreckt, wenn der Deckel (11) an einem Anschluß (30) angebracht wird, dadurch gekennzeichnet, daß ein zweiter, sich in

Längsrichtung erstreckender Drahtgreifschlitz (17) in einer Sockelwand an der Hinterfläche (19) des Deckels (11) geformt ist und sich in die Anschlußaufnahme- fläche (15) öffnet, daß der Schlitz (17) sich über dem Sockel (12) und dadurch über dem Anschluß (30) erstreckt, wenn der Deckel (11) völlig angebracht ist, daß das Einschiebelement (20) im Abstand zur Hinterfläche (19) angeordnet ist, um eine Drahtausführungs- öffnung (21) über dem Sockel (12) zu bilden, die das Blindende des Sockels hinter dem Einschiebe- element (20) mit dem zweiten, sich axial erstrek- kenden Drahtgreifschlitz (17) an der Stelle verbind- et, an der er sich über dem Anschluß (30) erstreckt, wenn der Deckel (11) völlig angebracht ist, und daß das Einschiebelement (20) auf einer Hinterfläche in bezug zum Anschlußaufnahme- raum des Sockels (12) derart profiliert ist, daß der Draht (33) in den Anschluß (30) hinter dem Ein- schiebelement (20) und zwischen der Hinterwand des Anschlusses (30) hineingezogen werden kann, wenn der Deckel (11) auf den Anschluß (30) aufgebracht wird, um den Draht (33) in dessen Drahtaufnahmeschlitz (31) hineinzudrücken, wodurch der Draht (33) sich durch die Aus- führungsöffnung (21) und aus dem zweiten Draht- greifschlitz (17) heraus erstreckt, wenn der Deckel (11) vollständig angebracht ist.

2. Deckel (11) nach Anspruch 1, dadurch ge- kennzeichnet, daß ein Abschnitt des blinden Endes (13) jedes Sockels, das hinter jedem Ein- schiebelement (20) gelegen ist, derart zurückge- setzt ist, daß es jede Ausführungsöffnung (21) bildet.

3. Deckel (11) nach Anspruch 2, dadurch gekennzeichnet, daß der zurückgesetzte Abschnitt eine Drahteingriffsschulter (22) bildet, welche derart gelegen ist, daß sie sich über eine Hinter- kante des Anschlusses (30) erstreckt.

4. Deckel (11) nach Anspruch 1, dadurch gekennzeichnet, daß der an der Hinterfläche (19) geformte Schlitz (17) sich zur ersten Fläche (14) des Deckels (11) hin erstreckt.

Revendications

1. Couvercle (11) moulé d'une seule pièce en matière plastique élastique pour une borne tubu- laire (30) présentant une fente axiale (31) de réception de fil, comprenant une douille tubulaire (12) profilée pour recevoir étroitement la borne (30), la douille (12) présentant une extrémité borgne (13) adjacente à une première face (14) du couvercle (11) et une extrémité opposée s'ouvrant vers une face (15) de réception de bornes de couvercle (11), le couvercle présentant des faces opposées avant et arrière (18, 19) s'étendant entre la première face (14) et la face (15) de réception de bornes, une fente longitudinale (16) de serrage de fil, à extrémités borgnes, formée dans une paroi de la douille à la face avant (18) et s'ouvrant dans la face (15) de réception de bornes et un organe d'enfoncement (20) s'étendant axialement à partir de l'extrémité borgne (13) pour porter contre un



fil (33) reçu dans la fente (31) lorsque le couvercle (11) est appliqué sur une borne (30), caractérisé par une seconde fente longitudinale (17) de serrage de fil formée dans une paroi de la douille, à la face arrière (19) du couvercle (11) et s'ouvrant dans la face (15) de réception de bornes, la fente (17) s'étendant au-dessus de la douille (12) et donc au-dessus de la borne (30) lorsque le couvercle (11) est totalement appliqué sur cette dernière, l'organe d'enfoncement (20) étant espacé de la face arrière (19) afin de définir une ouverture (21) de sortie de fil au-dessus de la douille (12) et communiquant entre l'extrémité borgne de la douille, en arrière de l'organe d'enfoncement (20), et la seconde fente axiale (17) de serrage de fil où elle s'étend au-dessus de la borne (30) lorsque le couvercle (11) est totalement appliqué, l'organe (20) d'enfoncement étant profilé sur une face arrière par rapport à l'espace de réception de bornes de la douille (12) afin de permettre au fil (33) d'être tiré à l'intérieur de la borne (30) en arrière de l'organe d'enfoncement (20) et entre la

paroi arrière de l'organe d'enfoncement (20) et une paroi de la borne (30) pendant que le couvercle (11) est appliqué sur la borne (30) pour introduire à force le fil (33) dans sa fente (31) de réception de fil, de façon que le fil (33) passe dans l'ouverture (21) de sortie et sorte de la seconde fente (17) de serrage de fil lorsque le couvercle (11) est totalement appliqué.

2. Couvercle (11) selon la revendication 1, caractérisé en ce qu'une partie de l'extrémité borgne (13) de chaque douille située en arrière de chaque organe d'enfoncement (20) est évidée afin de définir chaque ouverture de sortie (21).

3. Couvercle (11) selon la revendication 2, caractérisé en ce que la partie évidée forme un épaulement (22) de prise de fil disposé de façon à s'étendre en travers d'un bord arrière de la borne (30).

4. Couvercle (11) selon la revendication 1, caractérisé en ce que la fente (17) formée à la face arrière (19) s'étend jusqu'à la première face (14) du couvercle (11).

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