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54 **End terminated, flat-cable assembly.**

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Description

The invention relates to an end terminated flat cable assembly particularly for undercarpet use.

A known flat cable assembly, particularly for undercarpet use, comprises a strip of insulated conductors located under a stiffly flexible shield strip. The conductors are terminated with outlets by mounting the cable ends in rigid insulating outlet supporting housings with the strips in fixed longitudinal relation.

It is often desirable to store predetermined lengths of flat cable in reeled condition for use as extension cords. However, in the known terminated cable the shield strip and the conductor strip are mounted in the outlet supporting housings in fixed longitudinal relation with the consequential disadvantage that, if the cable were so terminated when in flat condition, subsequent reeling would cause relative longitudinal movement between the shield strip and the conductor strip arising from their different wound radii, resulting in strain or destruction of the termination. Alternatively, if the cable were so terminated when in reeled condition, the relative longitudinal movement between the shield strip and the conductor strip would also arise on subsequently unreeling the cable to flat condition, as the strips would be of different lengths, again resulting in strain or destruction of the termination or unacceptable buckling of the cable.

It is an object of the invention to provide an end terminated flat cable assembly that can both be stored in reeled condition and will lie flat when in unreeling condition without loss of electrical performance.

DE—B—623 765 discloses a connector terminating a flexible electrical cord or twin cord conductor, the conductors of which are terminated on an insulator to springs connecting the conductors to terminals of the connector and supporting the insulator relative to the terminal. The insulator is also supported in relation to the connector body by a further spring whereby the insulator is flexibly supported in relation to the connector for relative movement between the cord and the connector terminals.

US—A—3 524 921 discloses a flat cable in which flat conductors are adhesively bonded to an insulating strip which at ends is connected to spaced conductors of twin core flexible conductors by means of a contact board and a rigid support board, the contact board being releasably inserted into a pocket formed between the flat conductor and the support board.

According to the invention an end terminated flat cable assembly comprises a strip form cable having a plurality of insulated conductors, and a stiffly flexible shield strip, and having outlet housings at each end thereof, characterised in that the cable is disposed and arranged for relative longitudinal sliding movement within a stiffly flexible sleeve comprising the stiffly flexible shield strip, one of the shield strips and the cable is mounted at one end for relative longitudinal movement

relative to the other and to the housing at that end.

As a result of the accommodation of relative longitudinal movement between the shield strip and the conductor strip, the extension cord according to the invention can both be stored in reeled condition and be unreeling to flat condition without buckling of the cable due to relative movement between the shield strip and the conductor strip and without strain of the termination.

A further object of the invention is to provide an end terminated flat cable assembly in which the conductor strip and terminations remain protected both in reeled and unreeling conditions of the cable.

In one example of the invention, the shield strip is fixed in the one housing and the conductors are terminated at that end to the supported outlet by flexible metal bands bowed perpendicularly to the plane of the conductor strip to accommodate relative longitudinal movement of the conductor strip and the one housing.

In an alternative example of the invention, the conductor strip is fixed in the one housing and the shield strip is mounted in the one housing as a longitudinal sliding fit relative to the conductor strip and the one housing.

In a preferred construction, the sleeve-form shield strip comprises metal and plastics strips bonded together along adjacent longitudinal edges to extend above and below the conductor strip, respectively, a further metal shield strip being located in the sleeve between the plastics strip and the conductor strip. Both strips are fixed at their other ends in the other housing with conductors terminated to leads of a plug outlet, the one housing receiving a socket outlet facing away from the plane of the cable.

Example of extension cords of undercarpet flat cable according to the invention will now be described with reference to the accompanying drawings in which:

Figure 1 is a perspective view of a first example of extension cord according to the invention with part of the undercarpet flat cable cut away;

Figure 2 is a fragmentary perspective view of one end of the first example of extension cord with part of one outlet supporting housing cut away;

Figure 3 is a fragmentary perspective view of the other end of the extension cord with part of the other outlet supporting housing cut away;

Figures 4 and 5 are fragmentary perspective views of one end of a second example of extension cord with a cover of an outlet supporting housing omitted for clarity, showing the relative longitudinal positions of the shield and conductor strips in reeled and flat conditions of the cable, respectively.

As shown particularly in Figures 1 to 3, the first example of extension cord comprises a predetermined length of undercarpet flat cable 11 mounted at opposite ends in rigid insulating housings 12 and 13, respectively, supporting con-

ventional socket and plug outlets 14 and 15, respectively.

The undercarpet flat cable 11 comprises a strip 16 of insulated flat conductors 17 located in a stiffly flexible sleeve-form shield strip 18 comprising metal and plastics strips 19 and 20, respectively, bonded together along adjacent longitudinal edges to extend above and below the conductor strip, respectively. A further metal shield strip 21 is located in the sleeve 18 between the conductor strip 16 and the plastics strip 20. It should be noted that, the strips 17, 21 and the sleeve 18 are free to move longitudinally relative to each other prior to termination of the cable.

The outlet supporting housings 12 and 13 are of generally similar construction including covers 23 and 24, respectively, adhered or welded to planar base portions 25 and 26, respectively, so that rebated lip portions 29 and 30 on the covers cooperate with rebated lip portions 31 and 32 on the respective bases to define cable receiving mouths 33 and 34.

As shown more particularly in Figure 3, one end of the undercarpet flat cable 11 is mounted in the housing 13 by rivets or other fasteners 36 such as projections with heat deformed heads integral with the base portion 26 and which pass through both shield strips 19 and 21 and the insulation of the conductor strip 16 at locations between the conductors 17, fixing the cable strips relative to each other and to the housing base 26. The individual conductors 17 are crimped to respective live and neutral leads of the plug outlet 15 by conventional terminals 37 having insulation-piercing arms which are curled back under the conductor strip into electrical engagement with the conductors. A tab terminal 38 held by a metal rivet passing through top and bottom shield strips 36 is connected by leads to the ground conductor of the cable 11 and plug outlet 15. A bush 39 secures the leads of the plug outlet 15 extending through an aperture in the top of the cover 24.

As shown more particularly in Figure 2, the other end of the undercarpet flat cable 11 is mounted in the duplex socket supporting housing 12 by rivets 41 or other fasteners which pass through insulation 16 of the exposed conductor strip between the individual conductors 17 thereby fixing the strip to the housing base 25, whilst the sleeve-form shield 18 is received as a longitudinal sliding fit in the mouth 33. The individual conductors 17 are also terminated by crimping to conventional terminals connected to leads extending to terminals of the conventional duplex socket outlet 14.

Movement of the cable from the flat condition shown to a wound or reeled condition, indicated by broken lines, will cause the sleeve-form shield strip 18 to slide longitudinally further into the housing to the position shown in broken lines. As the conductor strip 16 is fixed, no stress is imposed on the terminations whilst such sliding movement will permit the cable to lie flat when unwound or unreel. Longitudinal movement of

the shield strip 21 will also be accommodated.

In a second example of the invention, shown particularly in Figures 4 and 5, the cable 11 is terminated at one end as shown in Figure 3 and the sleeve-form shield strip 18 is fixed at the other end to the base 31 by rivets 46 or other fasteners. Flexible metal bands 47 which bow perpendicularly to the plane of the conductor strip 16 are clamped at one of the ends to respective flat conductors 17 by conventional terminals 48 which embrace the strip ends and are crimped around the conductors in a similar fashion to terminal 37, the other ends of the bands being crimped to respective socket outlet leads by conventional terminals 37 also crimped to an insulating termination strip 48.

Movement of the cable from the wound or reeled condition of Figure 4 to the flat condition of Figure 5 will be conductor strip 16 to slide longitudinally into the housing from the position shown in Figure 4 to the position shown in Figure 5, such movement being accommodated by increased bowing of the bands 47 without undue strain being imposed on the terminations. Unbowing of the bands 47 will also permit the cable to be lie flat when unwound or unreel.

It should be noted that any tendency for relative movement between the metal strip 19 and the plastics strip 20 when changing the cable between wound and unwound conditions will be accommodated by longitudinal resilient compliance of the plastics strip without causing buckling of the cable.

Claims

1. An end terminated flat cable (11) assembly comprising a strip form cable (16) having a plurality of insulated conductors (17), and a stiffly flexible shield strip (19), and having outlet housings (12 and 13) at each end thereof, characterised in that the cable (16) is disposed and arranged for relative longitudinal sliding movement within a stiffly flexible sleeve (18) comprising the stiffly flexible shield strip (19), one of the shield strip (19) and the cable (16) is mounted at one end for relative longitudinal sliding movement relative to the other and to the housing (12 or 13) at that end.

2. A cable assembly according to claim 1 characterised in that the shield strip (19) is fixed in the one housing (12) and the conductors (17) are terminated at the end to the supported outlet (14) by flexible metal bands (47) bowed perpendicularly to the plane of the cable (16) to accommodate relative longitudinal movement of the cable (16) and the one housing (12).

3. A cable assembly according to claim 1 characterised in the cable strip (16) is fixed in the one housing (12) and the sleeve (18) is mounted in the one housing (12) as a longitudinal sliding fit relative to the cable (16) and the one housing (12).

4. A cable assembly according to any one of claims 1 to 3 characterised in that the sleeve (18) comprises metal and plastics strips (19, 20) bonded together along adjacent longitudinal edges to extend respectively above and below the

cable (16), a further metal shield strip being located in the sleeve (18) between the plastics strip (20) and the cable (16).

5. A cable assembly according to claim 2 or claim 3 characterised in that both of the sleeves (18) and the cable (16) are fixed at their other ends in the other housing (13) with conductors (17) terminated to leads of a plug outlet (15), the one housing (12) receiving a socket outlet (14) facing away from the plane of the cable (11).

Patentansprüche

1. Flachkabelanordnung (11) mit Endanschlüssen, bestehend aus einem streifenförmigen Kabel (16) mit einer Vielzahl von isolierten Leitern (17) und einem steifen, flexiblen Schutzstreifen (19), wobei Anschlußgehäuse (12 und 13) an jedem Ende vorgesehen sind, dadurch gekennzeichnet, daß das Kabel (16) derart ausgebildet und angeordnet ist, daß es innerhalb einer steifen, flexiblen Hülse (18) in Längsrichtung relativ gleitend bewegbar ist, wobei die Hülse den steifen, flexiblen Schutzstreifen (19) darstellt, und daß der Schutzstreifen (19) und das Kabel (16) an einem Ende relativ zueinander und zum Gehäuse (12 oder 13) an diesem Ende in Längsrichtung gleitend bewegbar montiert sind.

2. Kabelanordnung nach Anspruch 1 dadurch gekennzeichnet, daß der Schutzstreifen (19) in dem einen Gehäuse (12) festgelegt ist und die Leiter (17) an diesem Ende an dem gehaltenen Ausgangsanschluß (14) durch flexible Metallbänder (47) angeschlossen sind, die senkrecht zur Ebene des Kabels (16) ausgebogen sind, um die relative Längsbewegung des Kabels (16) und des einen Gehäuses (12) aufzunehmen.

3. Kabelanordnung nach Anspruch 1 dadurch gekennzeichnet, daß der Kabelstreifen (16) in dem einen Gehäuse (12) festgelegt ist und die Hülse (18) in dem einen Gehäuse (12) mit Gleitsitz in Längsrichtung relativ zum Kabel (16) und dem einen Gehäuse (12) montiert ist.

4. Kabelanordnung nach einem Ansprüche 1 bis 3, dadurch gekennzeichnet, daß die Hülse (18) Metall- und Kunststoffstreifen (19, 20) umfaßt, die entlang aneinandergrenzender Längsränder miteinander verbunden sind, so daß sie sich jeweils oberhalb und unterhalb des Kabels (16) erstrecken, und daß ein weiterer Metallschutzstreifen in der Hülse (18) zwischen dem Kunststoffstreifen (20) und dem Kabel (16) gelegen ist.

5. Kabelanordnung nach Anspruch 2 oder 3, dadurch gekennzeichnet, daß sowohl die Hülse (18) als auch das Kabel (16) an ihren anderen Enden in dem anderen Gehäuse (13) festgelegt sind, wobei Leiter (17) an Leitungen eines Steck-

kerausgangs (15) angeschlossen sind, und daß das eine Gehäuse (12) einen Steckdosenauslaß (14) aufweist, der von der Ebene des Kabels (11) wegweist.

Revendications

1. Assemblage d'un câble plat (11) avec ses terminaisons, comprenant un câble (16) en forme de ruban comportant plusieurs conducteurs isolés (17), et un ruban protecteur (19) flexible, mais raide, et comportant des boîtiers (12 et 13) de sortie à chacune de ses extrémités, caractérisé en ce que le câble (16) est disposé et agencé de façon à pouvoir exécuter un mouvement longitudinal relatif de glissement à l'intérieur d'une gaine flexible mais raide (18) comprenant le ruban protecteur flexible mais raide (19), l'une des pièces constituées par le ruban protecteur (19) et le câble (16) étant montée, à une extrémité, afin de pouvoir exécuter un mouvement longitudinal relatif de glissement par rapport à l'autre pièce et au boîtier (12 ou 13) situé à cette extrémité.

2. Assemblage d'un câble selon la revendication 1, caractérisé en ce que le ruban protecteur (19) est fixé dans le premier boîtier (12) et les conducteurs (17) sont terminés, à cette extrémité, sur la sortie supportée (14) par des bandes métalliques flexibles (47) courbées perpendiculairement au plan du câble (16) afin de permettre un mouvement longitudinal relatif du câble (16) et du premier boîtier (12).

3. Assemblage d'un câble selon la revendication 1, caractérisé en ce que le ruban (16) du câble est fixé dans le premier boîtier (12) et la gaine (18) est montée dans le premier boîtier (12) par un ajustement à glissement longitudinal par rapport au câble (16) et au premier boîtier (12).

4. Assemblage d'un câble selon l'une quelconque des revendications 1 à 3, caractérisé en ce que la gaine (18) comprend des rubans (19, 20) en métal et en matière plastique liés entre eux le long de bords longitudinaux adjacents afin de s'étendre respectivement au-dessus et au-dessous du câble (16), un autre ruban protecteur en métal étant disposé dans la gaine (18) entre le ruban (20) de matière plastique et le câble (16).

5. Assemblage d'un câble selon la revendication 2 ou la revendication 3, caractérisé en ce que les gaines (18) et le câble (16) sont tous deux fixés à leurs autres extrémités dans l'autre boîtier (13), les conducteurs (17) étant terminés sur des fils de connexion d'une fiche (15) de sortie, le premier boîtier (12) recevant une douille (14) de sortie tournée dans une direction s'éloignant du plan du câble (11).





