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AN IMPROVED ELECTRIC PLUG ASSEMBLY

This invention relates to an electric plug assembly of the kind in which the plug pins and associated conductor terminals are mounted in a preformed body of electrically insulating material, the conductors of a length of flexible insulated multi-conductor cable are electrically connected to appropriate terminals of the pins, and a moulded plug body of electrically insulating material wholly or partially encapsulates the preformed body and the plug pins and associated conductor terminals with an appropriate length of each pin protruding from the plug assembly and is bonded to the sheath of an adjacent part of the length of cable. Electric plug assemblies of this kind will hereinafter, for convenience, be referred to as "of the kind described".

Where in use, an electric plug assembly of the kind described is likely to be so treated that the cable sheath may be subjected to frequent substantial tensile forces, for example an electric plug assembly of the kind described electrically connected to an end of a spring loaded, retractible electrical lead of a vacuum cleaner, there is a risk that, in the course of time, the bond between the moulded plug body and the cable sheath will be broken and the cable sheath will eventually be withdrawn from the moulded plug body to expose the insulated cable conductors, although for the time being the electric plug assembly may still be electrically sound.

This risk is substantially increased when the cable sheath is of rubber or a rubber-like material and the moulded plug body is of polyvinyl chloride or other plastics material because it is substantially impossible to obtain a strong effective bond between a rubber material and a plastics material.

With a view to reducing this risk, it has been proposed to employ a separately formed, substantially tubular gripping device which is designed to grip tightly and bite into that part of the cable sheath to be encapsulated in the moulded plug body and which, when the plug body is moulded around the cable gripping device and that part of the cable sheath, keys with the moulded plug body to provide a positive resistance against withdrawal of the cable sheath from the plug body. Such a substantially tubular cable gripping device is preformed and a range of such cable gripping devices of different sizes from one another is required to cater for a range of cables of different diameters from one another.

It is an object of the present invention to provide an improved electric plug assembly of the kind described in which the risk that, when a tensile force is applied to the cable, the bond between the moulded plug body and the cable sheath will be broken and the cable sheath withdrawn from the moulded plug body is substantially reduced by means of a cable gripping device which is inexpensive and which can be readily applied to a cable of any diameter.

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According to the invention, in an electric plug assembly of the kind described, the part of the cable sheath adjacent the preformed body of the plug assembly carries at least one cable gripping device which is
5 separately formed with respect to the preformed body and which is wholly encapsulated within the moulded plug body, which cable gripping device comprises a flexible, elongate element which is wound in at least one complete turn around the cable and whose free ends are so knotted
10 as to cause the flexible elongate element to grip the cable sheath so tightly that, when a tensile force is applied to the cable sheath, the wound flexible elongate element resists any lengthwise movement of the sheath relative to the moulded plug body in a direction away
15 from the electric plug assembly.

Preferably, the flexible elongate element is wound so tightly around the cable sheath that it effects at least one substantially circumferential depression in the sheath. Preferably, also, the flexible elongate
20 element is wound in at least two complete turns around the cable. Any form of knot that will bind the wound flexible elongate element sufficiently tightly to the cable can be used but it is preferred to employ for this purpose the knot formed in a wound flexible elongate
25 element by tool sold by Richco International Company under the registered trade mark "Cablemat".

Preferably, the flexible elongate element is made of an electrically insulating material which has an appropriate tensile strength; it is preferred to employ a flexible elongate element made of polyvinyl chloride-coated nylon.

The moulded plug body preferably has an integral elongate part which protrudes outwardly from the moulded plug body and extends along and is bonded to the sheath of a part of the length of cable, the length of flexible elongate element being wound at at least one position around that part of the cable that is encapsulated within the integral part of the moulded plug body.

The invention is further illustrated by a description, by way of example, of a preferred three pin 13A plug assembly of the kind described with reference to the accompanying drawing which shows a fragmental pictorial view of the electric plug assembly.

Referring to the drawing, the preferred electric plug assembly comprises a preformed base insert 1 of electrically insulating plastics material in holes in which three plug pins 2 are mounted and protrude from the insert. The conductors 4 of a length of flexible multi-conductor rubber sheathed cable 3 are electrically connected to appropriate terminals of the plug pins 2 which are retained in the holes in the base insert 1 with an appropriate length of each pin protruding from the insert by a separately formed plastics spider 5

which is a snap fit in apertures in the base insert and which bears against the inner ends of the plug pins.

A flexible polyvinyl chloride-coated nylon tie 6 is wound in at least two complete turns around the rubber sheathed cable 3 at a position adjacent to the base insert 1 and its free ends are so knotted as to cause the tie to effect circumferential depressions in the sheath and to grip the sheath tightly to form a cable gripping device 7. An inner moulded body of plastics material (not shown) wholly encapsulates the pin terminals to which the cable conductors 4 are connected and partially encapsulates the base insert 1 and spider 5, the inner moulded body preventing stray wires from the conductor connections from protruding through an outer moulded body 8 of plastics insulating material whose outline is indicated by the chain dotted line and which wholly encapsulates the inner moulded body. The outer moulded plug body 8 has an integral elongate part 9 which protrudes outwardly from the outer moulded body in a direction transverse to the axes of the plug pins 2 and extends along and is bonded to that part of the rubber sheath of the cable 3 to which the knotted polyvinyl chloride-coated nylon tie 6 has been applied, thereby to encapsulate the cable gripping device 7.

In the event of a tensile force being applied to the sheath of the cable 3, the knotted polyvinyl chloride-coated nylon tie 6 constituting the cable gripping device 7 resists any lengthwise movement of the

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sheath relative to the outer moulded plug body 8 in a direction away from the electric plug assembly.

In a modified form of the electric plug assembly illustrated in the drawing, the spider 5 and inner 5 moulded body may be replaced by a preformed cover of plastics material which is a snap fit in apertures in the base insert, which bears against the inner ends of the plug pins to retain them in position and which prevents stray wires from the conductor connections from 10 protruding through a single surrounding moulded plug body.

CLAIMS

1. An electric plug assembly of the kind in which the plug pins and associated conductor terminals are mounted in a preformed body of electrically insulating material, the conductors of a length of flexible insulated multi-conductor cable are electrically connected to appropriate terminals of the plug pins, and a moulded plug body of electrically insulating material wholly or partially encapsulates the preformed body and the plug pins and associated conductor terminals with an appropriate length of each pin protruding from the plug assembly and is bonded to the sheath of an adjacent part of the length of cable, wherein the part of the cable sheath adjacent to the preformed body of the plug assembly carries at least one cable gripping device which is separately formed with respect to the preformed body and which is wholly encapsulated within the moulded plug body, which cable gripping device comprises a flexible elongate element which is wound in at least one complete turn around the cable and whose free ends are so knotted as to cause the flexible elongate element to grip the cable sheath so tightly that, when a tensile force is applied to the cable sheath, the wound flexible elongate element resists any lengthwise movement of the sheath relative to the moulded plug body in a direction away from the electric plug assembly.

2. An electric plug assembly as claimed in Claim 1, wherein the flexible elongate element is wound so tightly around the cable sheath that it effects at least one substantially circumferential depression in the sheath.

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3. An electric plug assembly as claimed in Claim 1 or 2, wherein the flexible elongate element is wound in at least two complete turns around the cable.
 4. An electric plug assembly as claimed in any one of the preceding Claims, wherein the flexible elongate element is made of polyvinyl chloride-coated nylon.
 5. An electric plug assembly as claimed in any one of the preceding Claims, wherein the moulded plug body has an integral elongate part which protrudes outwardly from the moulded plug body and extends along and is bonded to the sheath of a part of the length of cable, the length of flexible elongate element being wound at at least one position around that part of the cable that is encapsulated within the integral elongate part of the moulded plug body.
 6. A three pin electric plug assembly substantially as hereinbefore described with reference to and as shown in the accompanying drawing.
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