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NO DRAWINGS

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COMPLETE SPECIFICATION

Improvements in or relating to Telecommunication Cables

5 WE, BRITISH INSULATED CABLES LIMITED, a British Company, of 21 Bloomsbury Street, London, W.C.1., do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

10 This invention relates to telecommunication cables of the kind comprising a multiplicity of plastics insulated conductors enclosed within a waterproof sheath and, filling the interstices between the insulated conductors and between them and the waterproof sheath from end to 15 end of the cable length, a water-impervious medium which will not drain under the influence of gravity or such hydrostatic pressure as may arise in the event of damage to the cable sheath but which will permit relative 20 sliding movement of the plastics insulated conductors over one another during such bending of the cable as occurs during manufacture and installation of the cable.

25 The non-draining water-impermeable medium generally preferred is petroleum jelly. The material used for the sheath is generally polyethylene. However as polyethylene is pervious to petroleum jelly the possibility exists, especially when such fully-filled, plastics 30 sheathed telecommunication cables are laid in the vicinity of heavy current power cables, of filling material migrating into and under certain conditions through the polyethylene sheath, thus creating an incompletely filled 35 cable along which moisture may travel.

40 By the present invention there is provided an improved form of fully-filled plastics sheathed telecommunication cable in which the risk of migration of the filling medium through the cable sheath is substantially eliminated.

45 The improved form of cable comprises a core comprising a multiplicity of plastics insulated conductors enclosed within a sheath of plastics material pervious to petroleum jelly and like oil/wax mixtures at certain ambient

[Price 4s. 6d.]

temperatures, the interstices between the individual conductors of the core and between the core and the sheath being filled with petroleum jelly or a like oil/wax mixture, wherein there is present between the core and the sheath a separating layer which will serve both as a heat barrier and a barrier to the passage of the material with which the interstices are filled and which will bond to the sheath at or below the temperature at which the sheath is extruded on the core.

Where the cable sheath is of polyethylene the separating layer may consist of a layer or coating of polyvinyl diethylene copolymer on a carrier layer which will bond, or which carries a layer which will bond, to polyethylene at temperatures of about 200°C, which temperatures are the temperatures at which a polyethylene sheath is generally extruded on a cable core.

The separating layer is preferably a laminate consisting of a carrier layer of cellulose acetate carrying on one face a coating of polyvinyl diethylene copolymer and on the other face a coating of a low density polyethylene. Such material is sold under the Registered Trade Mark "Saran". The separating layer is preferably formed by longitudinally applying to, or helically lapping on, the cable core a tape of the laminate in such a way that the polyethylene layer is on the outside and continuous margins of the tape overlap one another to form a complete envelope on to which the polyethylene sheath is extruded preferably at a temperature and under conditions which ensure that the exposed parts of the surface of the polyethylene layer become bonded to the polyethylene sheath.

Preferably the coating of polyvinyl diethylene copolymer on one face of the laminate itself carries an outer coating of a low density polyethylene, thereby providing a laminate having an outer coating of polyethylene on each of its faces. Use of a tape of the laminate of this latter form as the separating layer en-

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ures that a bond is obtained between the overlapping margins of the tape when the polyethylene sheath is extruded on the core. Moreover, since the tape has a polyethylene coating on each of its faces, the tape can be applied to the cable core with either of its polyethylene layers on the outside and the necessity, present when employing "Saran" tape, of detecting which surface of the tape has the polyethylene coating is eliminated.

In both cases the tape of the laminate also serves as a thermal barrier enclosing the cable core and serving to prevent overheating of the conductor insulation during the operation of extruding the sheath.

The invention will now be further illustrated, by way of example, by a description of a preferred form of telecommunication cable constructed according to the present invention.

The cable comprises a multiplicity of copper conductors each having a dielectric of cellular polyethylene. Helically lapped about the multiplicity of conductors in such a way that its contiguous margins overlap one another to form a complete separating envelope is a tape of a laminate consisting of a carrier layer of cellulose acetate carrying on one face a coating of polyvinyl diethylene copolymer and carrying on its other face and on the coating of polyvinyl diethylene copolymer coatings of a low density polyethylene. A polyethylene sheath is extruded on and bonded to the outer polyethylene layer of the helically lapped tape, the over-lapping contiguous margins of the tape also being bonded together. The interstices between the individual conductors and between them and the separating envelope are filled with water-impermeable medium consisting of petroleum jelly. If required, the cable may be provided with armouring comprising galvanised steel wires laid helically over the sheathed cable and protected against corrosion by an extruded oversheath of polyvinyl chloride.

In some cases it may be necessary to lay telecommunication cables, such as pilot and telephone cables, underground alongside heavy current power cables designed for a continuous maximum conductor temperature of 85°C. In such cases there is a tendency for moisture in the soil to be driven away from the vicinity of the feeder cables. This in itself may be conducive to the "bleeding" of petroleum jelly or other similar filling medium from the neighbouring fully filled pilot and telephone cable if of normal construction. This risk is avoided by constructing the pilot and telephone cable or cables in accordance with the invention.

WHAT WE CLAIM IS:—

1. A telecommunication cable comprising a multiplicity of plastics insulated conductors forming a core enclosed within a sheath of plastics material pervious to petroleum jelly

and like oil/wax mixtures at certain ambient temperatures, the interstices between the individual conductors of the core and between the core and the sheath being filled with petroleum jelly or a like oil/wax mixture, wherein there is present between the core and the sheath a separating layer which will serve both as a heat barrier and a barrier to the passage of the material with which the interstices are filled and which will bond to the sheath at or below the temperature at which the sheath is extruded on the core.

2. A telecommunication cable comprising a multiplicity of plastics insulated conductors forming a core enclosed within a sheath of plastics material pervious to petroleum jelly and like oil/wax mixtures at certain ambient temperatures, the interstices between the individual conductors of the core and between the core and the sheath being filled with petroleum jelly or a like oil/wax mixture, wherein there is present between the core and the sheath a separating layer consisting of a layer or coating of polyvinyl diethylene copolymer on a carrier layer which will bond, or which carries a layer which will bond, to the sheath at or below the temperature at which the sheath is extruded on the core, which separating layer will serve both as a heat barrier and a barrier to the passage of the material with which the interstices are filled.

3. A telecommunication cable as claimed in Claim 2, in which the sheath is of polyethylene, wherein the carrier layer of the separating layer will bond, or carries a layer which will bond, to polyethylene at temperatures of about 200°C.

4. A telecommunication cable comprising a multiplicity of plastics insulated conductors forming a core enclosed within a sheath of polyethylene pervious to petroleum jelly and like oil/wax mixtures at certain ambient temperatures, the interstices between the individual conductors of the core and between the core and the sheath being filled with petroleum jelly or a like oil/wax mixture, wherein there is present between the core and the sheath a separating layer comprising a laminate consisting of a carrier layer of cellulose acetate carrying on its inner face a coating of polyvinyl diethylene copolymer and on its outer face a coating of a low density polyethylene which will bond to the polyethylene sheath at or below the temperature at which the polyethylene sheath is extruded on the core, which separating layer will serve both as a heat barrier and a barrier to the passage of the material with which the interstices are filled.

5. A telecommunication cable as claimed in Claim 4, wherein the separating layer is formed by longitudinally applying to, or helically lapping on, the cable core a tape of the laminate in such a way that the polyethylene layer is on the outside and contiguous margins

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sure that a bond is obtained between the overlapping margins of the tape when the polyethylene sheath is extruded on the core. Moreover, since the tape has a polyethylene coating on each of its faces, the tape can be applied to the cable core with either of its polyethylene layers on the outside and the necessity, present when employing "Saran" tape, of detecting which surface of the tape has the polyethylene coating is eliminated.

In both cases the tape of the laminate also serves as a thermal barrier enclosing the cable core and serving to prevent overheating of the conductor insulation during the operation of extruding the sheath.

The invention will now be further illustrated, by way of example, by a description of a preferred form of telecommunication cable constructed according to the present invention.

The cable comprises a multiplicity of copper conductors each having a dielectric of cellular polyethylene. Helically lapped about the multiplicity of conductors in such a way that its contiguous margins overlap one another to form a complete separating envelope is a tape of a laminate consisting of a carrier layer of cellulose acetate carrying on one face a coating of polyvinyl diethylene copolymer and carrying on its other face and on the coating of polyvinyl diethylene copolymer coatings of a low density polyethylene. A polyethylene sheath is extruded on and bonded to the outer polyethylene layer of the helically lapped tape, the overlapping contiguous margins of the tape also being bonded together. The interstices between the individual conductors and between them and the separating envelope are filled with water-impermeable medium consisting of petroleum jelly. If required, the cable may be provided with armouring comprising galvanised steel wires laid helically over the sheathed cable and protected against corrosion by an extruded oversheath of polyvinyl chloride.

In some cases it may be necessary to lay telecommunication cables, such as pilot and telephone cables, underground alongside heavy current power cables designed for a continuous maximum conductor temperature of 85°C. In such cases there is a tendency for moisture in the soil to be driven away from the vicinity of the feeder cables. This in itself may be conducive to the "bleeding" of petroleum jelly or other similar filling medium from the neighbouring fully filled pilot and telephone cable if of normal construction. This risk is avoided by constructing the pilot and telephone cable or cables in accordance with the invention.

WHAT WE CLAIM IS:—

1. A telecommunication cable comprising a multiplicity of plastics insulated conductors forming a core enclosed within a sheath of plastics material pervious to petroleum jelly

and like oil/wax mixtures at certain ambient temperatures, the interstices between the individual conductors of the core and between the core and the sheath being filled with petroleum jelly or a like oil/wax mixture, wherein there is present between the core and the sheath a separating layer which will serve both as a heat barrier and a barrier to the passage of the material with which the interstices are filled and which will bond to the sheath at or below the temperature at which the sheath is extruded on the core.

2. A telecommunication cable comprising a multiplicity of plastics insulated conductors forming a core enclosed within a sheath of plastics material pervious to petroleum jelly and like oil/wax mixtures at certain ambient temperatures, the interstices between the individual conductors of the core and between the core and the sheath being filled with petroleum jelly or a like oil/wax mixture, wherein there is present between the core and the sheath a separating layer consisting of a layer or coating of polyvinyl diethylene copolymer on a carrier layer which will bond, or which carries a layer which will bond, to the sheath at or below the temperature at which the sheath is extruded on the core, which separating layer will serve both as a heat barrier and a barrier to the passage of the material with which the interstices are filled.

3. A telecommunication cable as claimed in Claim 2, in which the sheath is of polyethylene, wherein the carrier layer of the separating layer will bond, or carries a layer which will bond, to polyethylene at temperatures of about 200°C.

4. A telecommunication cable comprising a multiplicity of plastics insulated conductors forming a core enclosed within a sheath of polyethylene pervious to petroleum jelly and like oil/wax mixtures at certain ambient temperatures, the interstices between the individual conductors of the core and between the core and the sheath being filled with petroleum jelly or a like oil/wax mixture, wherein there is present between the core and the sheath a separating layer comprising a laminate consisting of a carrier layer of cellulose acetate carrying on its inner face a coating of polyvinyl diethylene copolymer and on its outer face a coating of a low density polyethylene which will bond to the polyethylene sheath at or below the temperature at which the polyethylene sheath is extruded on the core, which separating layer will serve both as a heat barrier and a barrier to the passage of the material with which the interstices are filled.

5. A telecommunication cable as claimed in Claim 4, wherein the separating layer is formed by longitudinally applying to, or helically lapping on, the cable core a tape of the laminate in such a way that the polyethylene layer is on the outside and contiguous margins

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of the tape overlap one another to form a complete envelope on to which the polyethylene sheath is extruded.

- 5 6. A telecommunication cable comprising a multiplicity of plastics insulated conductors forming a core enclosed within a sheath of polyethylene pervious to petroleum jelly and like oil/wax mixtures at certain ambient temperatures, the interstices between the individual
10 conductors of the core and between the core and the sheath being filled with petroleum jelly or a like oil/wax mixture, wherein there is present between the core and the sheath a separating layer comprising a laminate consisting
15 of a carrier layer of cellulose acetate carrying on one face a coating of polyvinyl diethylene copolymer and carrying on its other face and on the coating of polyvinyl diethylene copolymer coatings of a low density polyethylene, the outermost of which polyethylene coatings will bond to the polyethylene sheath at
20 or below the temperature at which the poly-

ethylene sheath is extruded on the core, which separating layer will serve both as a heat barrier and a barrier to the passage of the material with which the interstices are filled. 25

7. A telecommunication cable as claimed in Claim 6, wherein the separating layer is formed by longitudinally applying to, or helically lapping on, the cable core a tape of the laminate in such a way that contiguous margins of the tape overlap one another to form a complete envelope on to which the polyethylene sheath is extruded. 30

8. A telecommunication cable substantially as hereinbefore described with reference to the Example. 35

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Reference has been directed in pursuance of Section 9, sub-section (1) of the Patents Act, 1949, to patent No. 995,582.

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