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(54) Control of field at high voltage

(57) The present invention relates to a device for controlling an electric field at, for example, a connection, a termination, or a joint (1) of a high-voltage cable (2).

The essential feature in the invention is a combination of capacitive field control (14), comprising a plurality of capacitive layers (15) arranged substantially concentrically between an inner live conductor (13) and an outer ground potential, and geometrical field control, comprising a stress cone (10) which is arranged in contact with said ground potential.

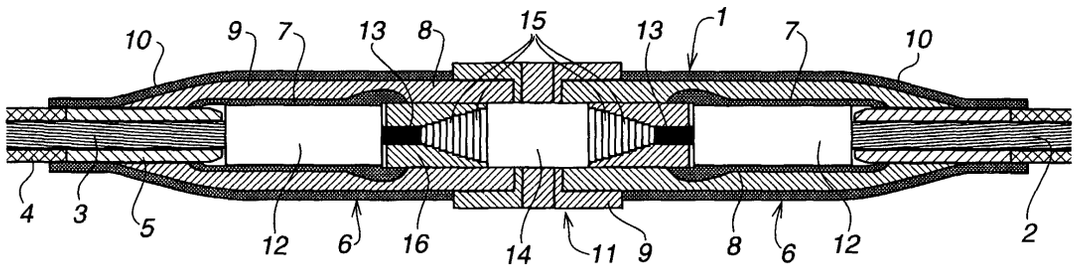

Fig. 1

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Description

TECHNICAL FIELD

[0001] The present invention relates to a device for controlling an electric field at, for example, a connection, a termination or a joint, of a high-voltage cable.

[0002] In conventional field control, there is usually used geometrical field control or resistive field control. The electric potential between the live part and ground is distributed with the aid of a material with a suitable resistance. The disadvantage of this known field control is that, at rapid voltage variations, the resistive material does not have time to control the field, which leads to high stresses in the material.

[0003] The object of the present invention is to improve the control of the electric field in order to reduce the risk of harmful charges building up and of high stresses arising upon rapid changes of the voltage.

[0004] This object is achieved according to the invention by a combination of capacitive field control, comprising a plurality of capacitive layers arranged substantially concentrically between an inner live conductor and an outer ground potential, and geometrical field control, comprising a stress cone, which is arranged in contact with the above-mentioned ground potential.

[0005] According to the prior art, the insulation screen of the cable is removed before mounting of a termination, a connection, a joint or the like cable device. The stress of the electric field is highest in regions where the cable has less resistance to electric breakdown than in other regions. One such region is, consequently, where the insulation screen of the cable is mechanically removed.

[0006] There are reasons to assume that the problems which jeopardize the mode of operation of the installation, in connection with a varying voltage, are caused, inter alia, by the build-up of space charges in those boundary layers which occur between the insulation and the accessories in cable junctions. To solve these problems, prior art cable junctions have been complicated and of unreliable design, since they have to handle the electrical stresses which may arise. The prior art cable junctions were expensive and also involved a long time of delivery, since they had to be adapted in situ to the geometry and electrical stresses of the cable.

[0007] The invention will now be described in greater detail with reference to the accompanying drawings, wherein

Figure 1 shows a schematic view of a cable joint according to the invention,

Figure 2 shows a connection sleeve included in the above-mentioned cable joint, and

Figure 3 shows a connection part for the above-mentioned cable joint.

[0008] In the drawings, Figures 1 to 3 show a cable joint 1 and a cable 2, with an inner conductor 3, an outer conductive layer 4 and an insulation 5. The cable joint 1 comprises a connection sleeve 6 for the respective cable 2.

[0009] Each connection sleeve 6 exhibits an inner electrode 7, an insulating layer 8 and an outer conductive layer 9. The outer conductive layer 9 is formed with a stress cone 10 for geometrical field control. The inner electrode 7 is electrically connected to a connection part 11, which is in contact with the inner live conductor 3 of the cable 2. The outer conductive layer 9 is electrically connected to ground potential. The stress cone 10 extends with increasing diameter from that end of the connection sleeve 6 which is nearest the ground potential, and at least partly towards that end of the connection sleeve 6 which is nearest the live conductor 3.

[0010] The connection part 11 comprises joint sleeves 12 for connection of the inner conductor 3 of the respective cable 2 to an inner live conductor 13, which extends through the connection part 11, a capacitive control 14, consisting of a plurality of wound capacitive layers 15, preferably of aluminium laminate, arranged substantially concentrically between the inner live conductor 13 and an outer ground potential. The capacitive layers 15 exhibit a limited extent along the conductor 13 and terminate successively at different distances from one another along the conductor 13, to thus control the difference in potential between the different layers 15 over a certain length. The capacitive layers 15 are enclosed in an epoxy body 16, but also other suitable materials may be used.

[0011] The cable joint 1 is suitably cylindrical, although other geometrical shapes are feasible, and the connection sleeves 6 are substantially made of EPDM rubber, but also other plastics or elastomers are possible.

[0012] By means of the present invention, it is possible to manufacture the capacitive control 14 in one and the same size for several different dimensions of the connection sleeves 6. It is also possible to insert the capacitive control 14 as a body in, for example, a cable termination, a bushing, a branch joint, an apparatus connection, or similar equipment, and to utilize one and the same connection sleeve 6 for connection to the capacitive control 14.

Claims

1. A device for controlling an electric field at, for example, a connection, a termination, or a joint (1) of a high-voltage cable (2), **characterized** by a combination of capacitive field control (14), comprising a plurality of capacitive layers (15) arranged substantially concentrically between an inner live con-

ductor (13) and an outer ground potential, and geometrical field control, comprising a stress cone (10) which is arranged in contact with said ground potential.

2. A device according to claim 1, **characterized** in that the capacitive layers (15) exhibit a limited extent along the conductor (13) and are terminated successively at different distances from one another along the conductor (13), to thus control the difference in potential between the various layers (15) over a certain length.

3. A device according to claim 2, **characterized** in that the stress cone (10), for the geometrical field control, extends with increasing diameter from that end of a connection sleeve (6) which is located nearest the ground potential of the cable (2), and at least partially towards that the of the connection sleeve (6) which is located nearest the live conductor (3) of the cable (2).

Fig. 1

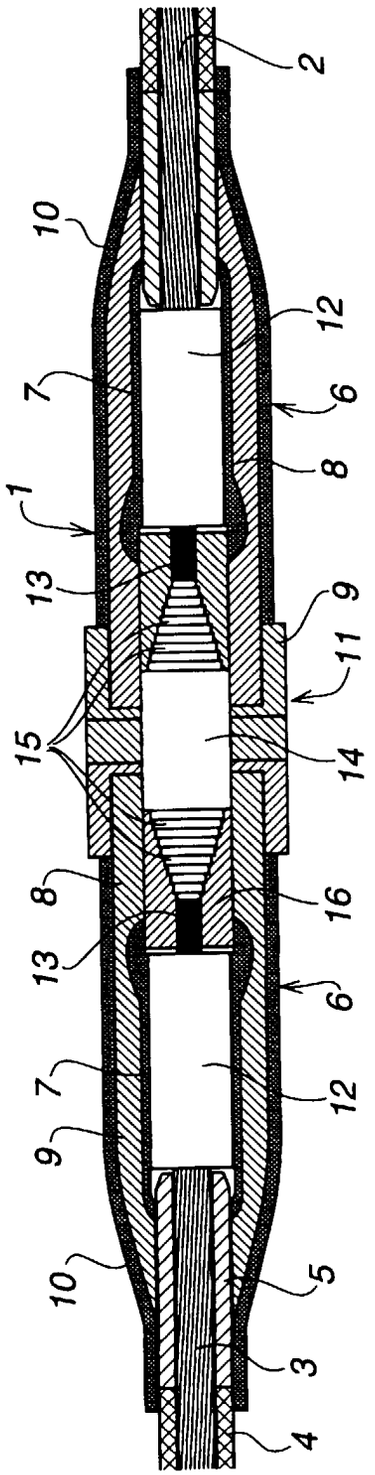

Fig. 2

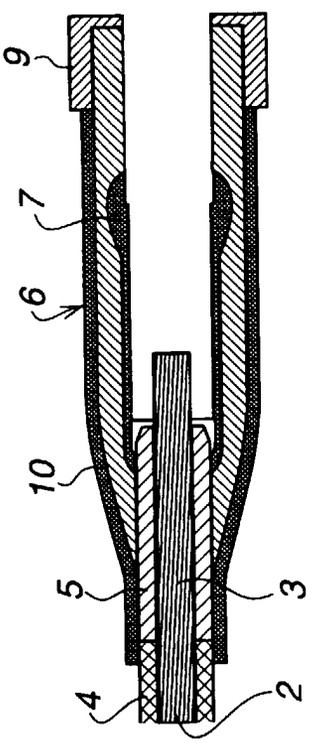

Fig. 3