Patented Mar. 1, 1949

2,463,231

UNITED STATES PATENT OFFICE

2,463,231

METHOD OF MAKING CABLE JOINTS

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Application April 24, 1945, Serial No. 590,062

4 Claims. (Cl. 154—2.22)

1

This invention relates to high tension electric cables, more particularly to joints for such cables in which the insulation is extruded upon the conductor and has for its object the production of a structure that will eliminate the voids that form within the insulation of the joint during the cooling period following the hot extrusion process and to suppress cavity formation and subsequent gaseous ionization.

The object of my invention is to produce a method of making a joint in plastic insulated cables either for electric power, or for communication purposes, in a simple quick manner, which will eliminate with certainty gas bubbles or voids, and which will insure completely satisfactory bonding of the joint insulation to the cable insulation. My method consists briefly in sliding over the joint an elastic radially distensible tubular mold, the insulation of the two cables to be joined having been pencilled and the connector applied to the conductor ends in the usual manner, and the temperature of the conductor raised to a value at which the resin flows under the pressure employed; extruding into the space between the mold and the conductor by means of a nipple in the mold wall a thermoplastic resin heated sufficiently high for it to flow readily under the jointing conditions and to soften the pencilled cable insulation so that a good bond is effected; the application of pressure, after the mold has been filled with a thermoplastic resin, to force more thermoplastic resin into the nipple so as to radially distend the mold elastically; the removal of the extrusion gun and the capping of the extrusion nipple to prevent the thermoplastic resin from leaking out of the distended mold; and the application of two metal strips on either side of the distended mold parallel with the cable axis, and the bringing toward one another of the two metal strips by means of clamps or otherwise so as to cause the distended mold to assume a shape elliptical in cross section immediately after removal of the extrusion gun and before appreciable cooling has taken place.

Plastic insulated electric cables are finding wider commercial use than heretofore owing to the introduction of new synthetic resin plastics which have desirable new properties and which are economically advantageous, both because they are of low cost themselves and because they may be applied very cheaply to the cable, usually by extrusion, sometimes by strip or tape methods. The advent of this type of cable on a wider scale makes necessary the improvements of joints for such cables.

2

Both in power and in communication cables it is of the greatest importance that no bubbles or gas films be present within the insulation wall of the cable or joint, or between the insulation and the metallic conductor. In the case of power cables the electric stress may cause ionization in such gas bubbles or films which in turn will lead to breakdown of the cable. In the case of certain types of radar cable the presence of such gas pockets results in variable velocity of propagation and an increase in attenuation.

It is also important in both types of cables that the joint insulation should bond properly to the cable insulation over the whole extent of its pencilled surface.

Unfortunately, joints, as usually made at the present time, do not fulfill the requirements stated of bubble-free or void-free insulation on the one hand, and of a complete union or bond between the joint insulation and the cable insulation on the other hand. Where such joints are made successfully, it is only by taking excessive pains and employing a long drawn-out process of making the joints. Even then some joints must be rejected, and it is still not practicable to make large numbers of joints with complete confidence that all of them will be satisfactory.

Plastic joints are usually made by placing a mold around the two cables whose ends have been joined by a connector and the insulation pencilled, heating the mold, and extruding in through a port in the mold a hot fluid thermoplastic resin and allowing to cool slowly. Another method has been to apply tape, made of the same synthetic resin as the cable insulation, over the connector and build up the insulation at the joint to a thickness as great as the cable insulation or more; then a mold is applied around this insulation and the mold heated, the two halves of the mold being pressed together so as to compress the tape insulation at the same time as heating it, thus forming it into a homogenous joint insulation.

The foregoing and other features of my invention will now be described in connection with the accompanying drawing forming part of this specification in which I have represented my cable joint in its preferred form, after which I shall point out in the claims those features which I believe to be new and of my own invention.

Figure 1 is a longitudinal view illustrating the method of making my joint with the mold before distention in section.