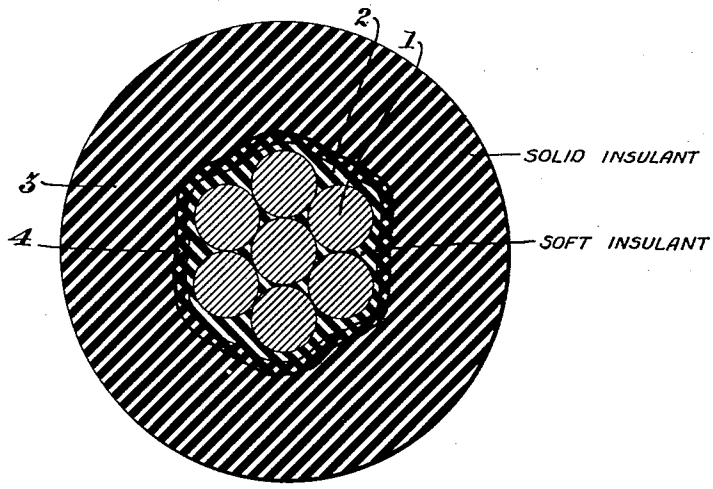
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HIGH-FREQUENCY CABLE

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HIGH-FREQUENCY CABLE

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1 Claim. (Cl. 174—114)

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This invention relates to improvements in high frequency cables, and more particularly to a high frequency, high power cable which is free from internal corona.

In the case of high power, low frequency cables, the problem of preventing internal corona has been the subject of many experiments, and solutions of the problem have been proposed in several patents. These solutions in many instances involve impregnating the cable core and surrounding the core with one or more layers of so-called "conductive rubber." These and other solutions, however, are not adapted for use in connection with high frequency, high power cables, where low electrical losses are of the utmost importance.

It is an object of the present invention to provide a cable which is particularly adapted to carry high power, high frequency currents.

It is a further object of the invention to provide a high power, high frequency cable which embodies means for preventing internal corona and which at the same time has good dielectric properties.

More specifically, the invention contemplates the use of a low-loss filler between the various conductors of a stranded core, this filler also forming a thin coating about the conductors which may be bonded to an insulating covering extruded over the core. In this manner no air spaces are permitted between and about the conductors and corona discharge is prevented.

The invention is illustrated in the accompanying drawing in which the single figure is a cross-sectional view of a preferred form of conductor made in accordance with the present invention.

As previously stated, the invention first contemplates filling the interstices between the conductor strands and forming a coating about the individual conductors and the core as a whole with a soft dielectric of relatively low molecular weight. This material may be applied to the core in any desired manner, as for example, by passing the stranded core through a bath containing the material to be applied. The core is impregnated sufficiently so that the air pockets which occur in the core are completely filled.

After the core has been thus treated, a solid insulator is applied about the core in the usual manner, as by extrusion.

The material with which the core is coated and filled must be one which has good dielectric properties and is chosen so that the solid insulant extruded thereover will become bonded therewith. As examples of suitable fillers, I propose to use either low molecular weight, polymerized

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aliphatic mono-olefins, such as low molecular weight polyisobutylene, or a low molecular weight polymerized aromatic vinyl hydrocarbon, such as polystyrene, provided with a suitable low-loss plasticizer. Suitable plasticizers are known to the art. They may include, for example, phenanthrene, α-n-propylnaphthalene, α-isoamylnaphthalene, β-methylnaphthalene, fluorene, and other hydrocarbon substitution compounds of naphthalene having no more than five carbon atoms in any side chain, as disclosed, for example, in the co-pending U. S. application of A. J. Warner and A. A. New, S. N. 404,198, filed July 26, 1941, which has become Patent No. 2,414,497, dated January 21, 1947, or other plasticizers disclosed in U. S. Patent 2,272,996. By the recitation of the above examples of plasticizers it is not intended, however, that the invention be limited to these, as they have only been given by way of example.

The type of insulant which is extruded about the coated core is preferably a relatively high molecular weight hydrocarbon dielectric which will become bonded to the coating. A preferred form of such an insulant is one containing a polymerized aromatic vinyl hydrocarbon, such as polystyrene. Such an insulant will become bonded to the preferred types of coatings listed above, when the same is extruded over the coated core. It will be obvious, of course, that if a bonding between the inner coating and filler and the outer solid insulant is to be secured, the two materials must be properly chosen.

The resultant cable will have a form such as that illustrated in the drawing in which the stranded core 1 is filled with and coated by a relatively soft insulant 2. The latter in turn is surrounded by a solid insulant 3, which will be bonded to the insulant 2, as at 4.

The cable as a whole will present a solid structure comprising a stranded core surrounded by a soft insulant which, in turn, is surrounded by a solid insulant and there will be no air spaces either between the strands of the core or between the core and the solid insulant, which will permit a corona discharge. The use of a relatively soft inner insulant is important if the cable is to be bent. If a relatively solid material were used as a coating for the core conductors, whenever the cable is bent such solid insulant might separate from the wires or from the surrounding outer insulation, thus creating air spaces, even though none were previously present. The use of a soft insulant prevents such a creation of air pockets since the insulant will

give when the cable is bent and thus cling to the wires and press against the outer insulation at all times.

It is proposed that the soft insulant be applied to the core conductors in a very thin coating, which has been exaggerated for purposes of illustration in the drawings. The reason this coating is maintained as thin as possible is to maintain the center conductor in position without the possibility of wandering as might conceivably happen if the amount of soft insulant were excessive.

While I have illustrated and described the invention in connection with a cable having a single conductor core, it will be obvious to those skilled in this art that the invention is equally applicable to multi-core cables. Additionally, while the principles of my invention have been described in connection with certain specific materials, it is to be clearly understood that this description is made only by way of example and not as a limitation on the scope of my invention as set forth in the objects and the accompanying claim.

What is claimed is:

A high frequency cable comprising a stranded core, the conductors of which are thinly coated and the interstices of which are filled with a soft flexible but solid low molecular weight polystyrene containing a low-loss plasticizer whereby no air spaces are permitted between and about the conductors and corona discharge is prevented, and a relatively high molecular weight hydrocarbon dielectric which is predominantly relatively high molecular weight polystyrene surrounding the coated core and bonded to the coating.

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