

UNITED STATES PATENT OFFICE

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COMPOSITION FOR THE IMPREGNATION OF
CABLE INSULATIONGeorge F. Kennedy, Wilmington, Del., assignor to
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a corporation of DelawareNo Drawing. Application December 24, 1928
Serial No. 328,318

7 Claims. (Cl. 134—78.6)

My invention relates to an improvement in electrical cable insulation and more particularly to an improved composition including substantially pure and substantially unoxidized abietic acid or its isomers, or such which is only slightly oxidized, and hydrocarbon oil, for use in impregnating paper taping in cable insulation.

As is well known, the manufacture of insulated electric cable of a certain type includes wire-drawing, stranding, taping with paper, cabling, drying, impregnating and leading (lead sheathing).

Heretofore it has been customary to impregnate the paper taping with a hydrocarbon oil, such as petrolatum, cylinder oil, or the like, with or without the addition of rosin. To these hydrocarbon oils rosin may be added in proportion to obtain a desired set-point of the impregnating compound, that is, as the percentage of rosin is increased the temperature at which the impregnating compound sets is higher. The rosin, when used, has been ordinary commercial rosin containing about 92% of abietic acid or its isomers, oxidized and unoxidized, and about 8% of resenes, or unsaponifiable matter consisting mainly of high boiling essential oils and rosin oil, and in certain cases a small proportion of unsaponifiable solids.

When hydrocarbon oils are used alone for impregnating the paper taping, such are disadvantageous since the oils become oxidized and though they may have initially low dielectric loss, this dielectric loss will increase considerably as the oils are oxidized. When cables are impregnated with hydrocarbon oils compounded with either wood or gum rosin this objection is partially overcome. The dielectric loss remains fairly constant throughout the life of the cable although initially the dielectric loss of the compound of rosin and hydrocarbon oils may be greater than hydrocarbon oils alone.

Now in accordance with my invention, I have discovered that if substantially pure abietic acid, alone or admixed with its isomers, i. e. abietic acid substantially free from resenes, and substantially unoxidized, be compounded with hydrocarbon oils, the disadvantages of hydrocarbon oils with or without the addition of rosin will be avoided, since the abietic acid will act as an anti-oxidant to retard the oxidation of the hydrocarbon oils which oxidation of hydrocarbon oils, if allowed to proceed, would result in greater dielectric loss.

I have also discovered that substantially unoxidized abietic acid or its isomers have a lower viscosity than oxidized abietic acid and that this is

true of impregnating compounds in which abietic acid is incorporated. For this reason substantially pure and substantially unoxidized abietic acid can be used in greater proportion in impregnating compounds and still maintain a desired set point.

I have discovered that impregnating compounds made from substantially pure and substantially unoxidized abietic acid and hydrocarbon oils do not sludge. Impregnating compounds made from commercial wood or gum rosins do sludge. The sludging of impregnating compounds is objectionable.

The electrical measurements of a substantially pure and substantially unoxidized abietic acid are as follows:

Temperature in degrees centigrade	Resistivity megohms centimeters $\times 10^6$	Power factor percent	Specific inductive capacity	Dielectric strength kilovolts
120	0.18×10^6	8.8	3.0	-----
110	0.36×10^6	4.0	3.0	-----
100	1.00×10^6	1.5	3.0	42
90	4.3×10^6	0.5	3.0	-----
80	20.5×10^6	0.2	3.0	64
70	92	0.4	3.1	-----
60	150	1.7	3.1	90
50	170	4.6	2.9	-----
40	180	1.5	2.6	137
30	120	0.3	2.6	-----

The dielectric strength measurements are made with $\frac{1}{2}$ inch sphere electrodes using a 100 mil. gap.

The substantially pure and substantially unoxidized abietic acid may be obtained in any known manner, and for example, may be obtained by fractional distillation of rosin under vacuum. It is, however, preferably obtained by selective solvent separation of substantially unoxidized rosin from commercial rosin and subsequent fractional distillation of this substantially unoxidized rosin under vacuum, to avoid decomposition.

The substantially pure abietic acid may be used with a hydrocarbon oil in amounts from 5 to 50%.

It will be understood that in accordance with my invention the substantially pure abietic acid may be compounded with any hydrocarbon oil heretofore used for impregnating cable insulation, as cylinder oil, petrolatum, etc. and it will be understood that I intend the isomers of abietic acid or mixtures of abietic acid and its isomers substantially free from resenes, and slightly oxidized abietic acid as equivalents of substantially pure abietic acid.

What I claim and desire to protect by Letters Patent is:

1. A composition for the impregnation of cable insulation which contains as ingredients a hydrocarbon oil and rosin substantially free from oxidized components in amount from about 5% to about 50%.
2. A composition for the impregnation of cable insulation which contains cylinder oil and rosin substantially free from oxidized components.
3. A composition for the impregnation of cable insulation which contains cylinder oil and rosin substantially free from oxidized abietic acid.
4. A cable insulation comprising in combination a fibrous material impregnated with rosin substantially free from oxidized components and a high boiling hydrocarbon oil.
5. A cable insulation comprising in combination a fibrous material impregnated with a hydrocarbon oil and rosin substantially free from oxidized components.
6. A composition for the impregnation of cable insulation which contains a high boiling hydrocarbon oil and rosin substantially free from oxidized components.
7. In combination a fibrous material impregnated with a high boiling hydrocarbon oil and rosin substantially free from oxidized components.

GEORGE F. KENNEDY.

15	90
20	95
25	100
30	105
35	110
40	115
45	120
50	125
55	130
60	135
65	140
70	145
75	150