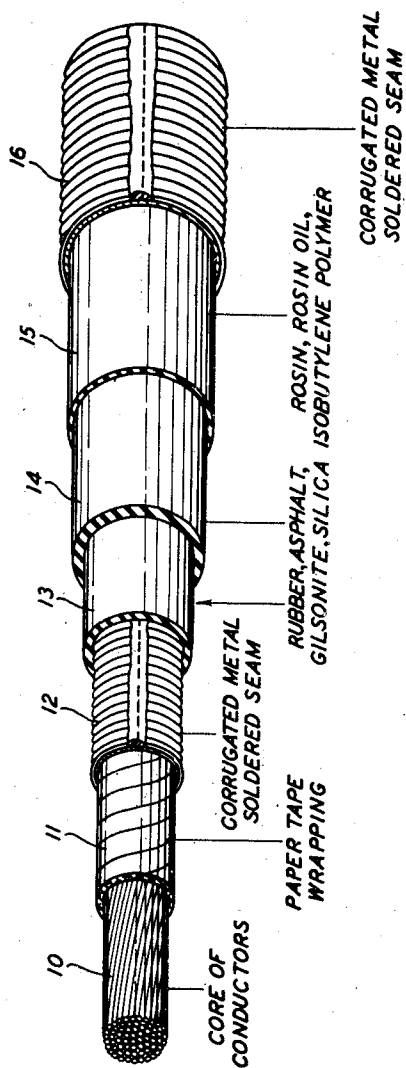


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COMPOSITION OF MATTER AND ELECTRICAL CONDUCTOR
CABLE CONTAINING THE SAME
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COMPOSITION OF MATTER AND ELECTRICAL CONDUCTOR CABLE CONTAINING THE SAME

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This invention relates to a composition of matter and electrical conductor cable containing the same and more particularly to a compounded mixture for use in the manufacture of insulated and metal sheathed electrical conductor cables.

Certain types of electrical conductor cables may comprise a core consisting of one or a plurality of conductor strands, a wrapping of fibrous material, a metal sheath thereover, a layer of thermoplastic insulating and moisture repellent material over the sheath, a second metal sheath over the thermoplastic layer and other external layers and sheathings of moisture proofing and armoring materials over the whole. In some instances the second metal sheath may be made of a transversely corrugated, relatively thin ribbon or strip of metal folded into a tube about the thermoplastic covered inner structure and having its edges soldered together to close the tube. In this case it may be desirable to interpose between the outer surface of the thermoplastic layer and the inner face of the metal sheath a layer or coating of some material which will effect a good adhesive bond between the thermoplastic layer and the metal sheath and which yet will not interfere with the process of soldering the edges of the metal strip to form the ensheathing tube.

An object of the present invention is to provide a composition of matter for use in electrical cables, which shall be adhesive to both metallic surfaces and surfaces of thermoplastic and the like non-metallic materials employed in the manufacture of electrical cables, and which shall not tend to interfere with but rather assist in the formation of a satisfactory soldered joint between metallic surfaces where the material may be present.

With the above and other objects in view, the invention may be embodied in a resinous composition of matter such as one comprising essentially a mixture of rosin, rosin oil and a polymer of an olefinic open chain carbon compound such as isobutylene compounded in such proportions as are required by the condition of temperature to be met and in an electrical cable comprising such material in its structure.

Other objects and features of the invention will appear from the following detailed description of one composition of matter compounded in accordance with the invention and of an illustrative example of an electrical cable in the construction of which the compound is employed, taken in connection with the accompanying drawing in which the single figure shows an elec-

trical cable constructed in accordance with the invention.

In the embodiment of the invention herein disclosed there is presented a composition of matter intended to be interposed as a combined adhesive and soldering flux between a thermoplastic compound layer of an electrical cable and a metal sheath thereon.

As an illustrative example there is shown in the drawing an electrical cable comprising a core, a paper tape wrapping thereon, a metal sheath over the wrapping, two consecutive layers of thermoplastic compound over the metal sheath, a coating of the composition of the invention over the outer layer of thermoplastic compound, and a second metal sheath over all.

For clarity, the thermoplastic layer may be thought of as consisting essentially of about 45% reclaimed rubber, 25% blown asphalt, 20% gilsonite and 10% silica, suitably compounded and formed into a substantially seamless ensheathing layer about a cable core. Over this is to be formed and soldered the transversely corrugated tinned copper or brass strip which forms the metal sheath.

The composition of the invention is to be interposed as a coating between this metal sheath and the underlying thermoplastic layer to effect a good mechanical bond between these two. It may most conveniently be applied in a heated and molten state. This may be done by applying it to the thermoplastic layer or to the metal strip or to both as may be found most convenient and preferably during the process of forming and molding the metal strip about the thermoplastic sheathed core.

A suitable composition for this purpose may be made by compounding a resinous mixture such as one of about the following proportions and materials:

	Per cent
Rosin	25 to 75
Rosin oil	20 to 50
Polymerized olefine	5 to 25

A preferred specific composition for use in a cable for use in a temperate zone climate will have the following components and proportions:

	Per cent
Rosin	50
Rosin oil	35
Polymerized isobutylene	15

Polymerized isobutylene is to be found on the

commercial market, under the trade name Vistanex, with a considerable range of physical character according to the molecular weight of the compound, which latter is said to depend upon the manner of its preparation. The particular polymerized isobutylene preferred for the specific compound just described is, at ordinary temperatures, a soft, sticky, clear, solid substance which flows slowly. It has a specific gravity of about 0.90. It is believed to have a molecular weight of about the order of 12000 to 13000. Isobutylene itself, of which the substance in question is a polymer, is the olefine hydrocarbon whose formula is $\text{CH}_2=\text{C}(\text{CH}_3)_2$.

An important characteristic of this isobutylene polymer is that it may be heated alone or in mixtures with inert substances to temperatures in the neighborhood of 250° F., for not too long a time but sufficiently long to accomplish present purposes, without depolymerization or decomposition. On the other hand, when heated to much higher temperatures it decomposes substantially entirely into gaseous decomposition products and leaves no gritty or sticky charred residues. Hence where the mixture of the invention is present on metallic surfaces to be soldered together, the polymerized isobutylene will not interfere with the soldering operation but appears to be substantially completely eliminated by the heat of the process. In fact, it appears even to act somewhat as a flux and so to assist in effecting a good soldered joint.

In the case of the specific mixture described above, the compound of about 50% rosin, 35% rosin oil and 15% polymerized isobutylene may be melted and held at a temperature of 225° F. to 250° F. for reasonable lengths of time without any detectable decomposition or depolymerization appearing. The fluidity at these temperatures is eminently satisfactory for application of material. Excess material applied to or squeezed out upon the overlapped parts of the metal sheath to be soldered together forms an excellent flux for the soldering operation. The fluxing action of the rosin and rosin oil is not at all diminished by the presence of the polymerized isobutylene, but on the contrary appears to be enhanced. The polymerized isobutylene may thus be considered as an auxiliary fluxing element in the compound.

Another feature of the invention is the fact that compositions of this type and particularly the specific composition described above, have a decidedly enhanced power of adhesion to both the metal on the one side and the rubber-asphalt thermoplastic on the other. Materials adhesive to metals may be frequently almost non-wetting or non-adhesive to compositions containing rubber or asphalt or both. In the present case it is found that the natural adhesiveness of a rosin-rosin oil mixture is not only not diminished, but is notably enhanced toward both metal and thermoplastic by admixture with polymerized isobutylene as described.

Furthermore, it has long been known that rosin-rosin oil mixtures may be made suitable for such use as described at a given temperature, but that such a compound of given proportions will become unsatisfactorily brittle at temperatures somewhat lower and unsatisfactorily fluid or soft at temperatures somewhat higher. It is now found that polymerized isobutylene added to these rosin-rosin oil mixtures, besides having the peculiar advantages enumerated above, also is a satisfactory plasticizer for such material, so

that the temperature-viscosity curve of rosin-rosin oil when the isobutylene polymer is added flattens down notably, and the resultant compound retains its desired plasticity over a much wider range of temperatures.

Thus the addition of polymerized olefines and particularly of polymerized isobutylene to resinous compounds such as rosin-rosin oil compositions tends markedly to enhance their usefulness by notably increasing their adhesiveness, fluxing power in soldering operations, and temperature range of constant plasticity.

While the invention has been described as embodied in the admixture of isobutylene in polymerized form to a rosin-rosin oil compound, obviously other comparable resins and gums may be included with or substituted for the rosin-rosin oil mixture, and other polymerized olefines may replace the isobutylene wholly or in part. Such resins, e. g. kauri gum, gum copal, etc., are well known in the art for the present purposes.

What is claimed is:

1. A composition of matter comprising 25% to 75% of rosin, 20% to 50% of rosin oil and 5% to 25% of polymerized isobutylene to increase adhesiveness, fluxing power and temperature plasticity character.

2. A composition of matter comprising about 50% of rosin, about 35% of rosin oil and about 15% of polymerized isobutylene to increase adhesiveness, fluxing power and temperature plasticity character.

3. A composition of matter comprising about 50% of rosin, about 35% of rosin oil and about 15% of a polymer of isobutylene having a molecular weight of the order of 12000 to 13000 to increase adhesiveness, fluxing power and temperature fluxing character.

4. An electrical conductor cable including a core, a layer of thermoplastic insulating and moisture repellant material over the core, a metal sheath over the layer and consisting of a strip of metal folded into a tube and having its edges soldered together to close the tube, and a coating of material interposed between the layer of thermoplastic material and the metal sheath and adherent to both and of a nature to be an effective soldering flux, the said coating material comprising rosin and rosin oil with an admixture of polymerized isobutylene to improve the adhesiveness, fluxing power and temperature plasticity of the coating material.

5. An electrical conductor cable including a core, a layer of thermoplastic insulating and moisture repellant material over the core, a metal sheath over the layer and consisting of a strip of metal folded into a tube and having its edges soldered together to close the tube, and a coating of material interposed between the layer of thermoplastic material and the metal sheath and adherent to both and of a nature to be an effective soldering flux, the said coating material comprising rosin and rosin oil with an admixture of about 15% of polymerized isobutylene to improve the adhesiveness, fluxing power and temperature plasticity of the coating material.

6. An electrical conductor cable including a core, a layer of thermoplastic insulating and moisture repellant material over the core, a metal sheath over the layer and consisting of a strip of metal folded into a tube and having its edges soldered together to close the tube, and a coating of material interposed between the layer of thermoplastic material and the metal sheath and adherent to both and of a nature to be an effective

soldering flux, the said coating material comprising about 50% of rosin and about 35% of rosin oil with an admixture of about 15% of polymerized isobutylene to improve the adhesiveness, fluxing power and temperature plasticity of the coating material.

5 7. An electrical conductor cable including a core, a layer of thermoplastic insulating and moisture repellant material over the core, and a
10 metal sheath over the layer and consisting of a strip of metal folded into a tube and having its edges soldered together to close the tube, in combination with means to assist in effecting continuity of closure of the soldered edges of the
15 metal sheath, the said means being a coating of material interposed between the layer of thermoplastic material and the metal sheath and adherent to both and of a nature to be an effective soldering flux, the said coating material comprising
20 rosin and rosin oil with an admixture of polymerized isobutylene to improve the adhesiveness, fluxing power and temperature plasticity of the coating material.

25 8. An electrical conductor cable including a core, a layer of thermoplastic insulating and moisture repellant material over the core, and a metal sheath over the layer and consisting of a strip of metal folded into a tube and having its edges soldered together to close the tube, in combination with means to assist in effecting con-
30

tinuity of closure of the soldered edges of the metal sheath, the said means being a coating of material interposed between the layer of thermoplastic material and the metal sheath and adherent to both and of a nature to be an effective soldering flux, the said coating material comprising rosin and rosin oil with an admixture of about 15% of polymerized isobutylene to improve the adhesiveness, fluxing power and temperature plasticity of the coating material.

10 9. An electrical conductor cable including a core, a layer of thermoplastic insulating and moisture repellant material over the core, and a metal sheath over the layer and consisting of a
15 strip of metal folded into a tube and having its edges soldered together to close the tube, in combination with means to assist in effecting continuity of closure of the soldered edges of the metal sheath, the said means being a coating of
20 material interposed between the layer of thermoplastic material and the metal sheath and adherent to both and of a nature to be an effective soldering flux, the said coating material comprising about 50% of rosin and about 35%
25 of rosin oil with an admixture of about 15% of polymerized isobutylene to improve the adhesiveness, fluxing power and temperature plasticity of the coating material.

JOHN F. ECKEL. 30