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COATING FOR METAL TO REDUCE ELECTRICAL CONTACT RESISTANCE

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FIG. 1.

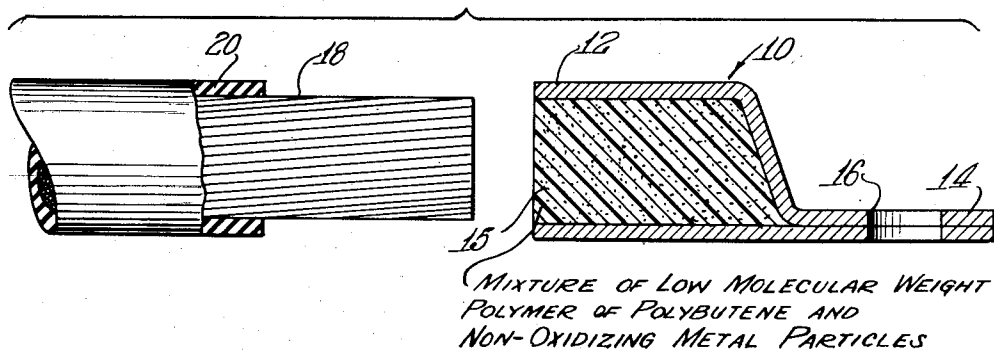
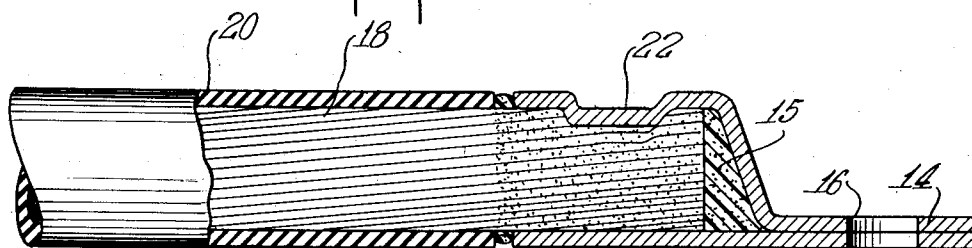


FIG. 2.



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1

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COATING FOR METAL TO REDUCE ELECTRICAL
CONTACT RESISTANCEWilliam Arnott, Jr., New Canaan, Conn., assignor to
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1 Claim. (Cl. 339—114)

My invention relates to the art of protecting metals from corrosion and oxidation. For example, aluminum to aluminum, and aluminum to copper electrical connections are subject to corrosion and oxidation. This causes the electrical resistance of the joint to increase rendering the connection unsatisfactory.

Hitherto the problem was resolved by the use of tapes, petroleum grease, or putty-like compounds which were applied manually over the joint. These methods were laborious and time consuming to insure complete coverage of the joint; moreover, they involved solid or semi-solid materials which are incapable of penetrating completely into cracks and interstices. Another disadvantage is the relatively high contact resistance when applied to an aluminum contacting face. Further, these prior coverings age and change their physical properties. A further objection is found in the disruption in the covering when the connection is subjected to mechanical motion causing a slight separation of the parts.

Non-oxidizing metal particles are sometimes placed in petroleum compounds. The theory is that the petroleum prevents oxidation and the metal particles mechanically break the aluminum oxide film and provide current paths through the film and across any voids between metal surfaces.

Accordingly, the various objects of my invention are to provide a new type of metal protection against corrosion and oxidation, a metal protection which is especially useful in electrical conductors, and particularly when used on aluminum to aluminum and aluminum to copper connections; to provide a metal protection which may be easily, quickly and conveniently applied to the connection, and which will possess other physical characteristics advantageous for solving the particular problems here involved.

These and other objects are accomplished and my new results obtained, as will be apparent from the device and methods described in the following specification and shown in the accompanying drawing, in which:

Fig. 1 is an exploded view of a connector shown in longitudinal cross-section, prepared in accordance with my invention, and a conductor ready for insertion therein.

Fig. 2 is an assembled view of the same.

Referring more in detail to the drawing, reference numeral 10 designates a terminal connector comprising a barrel 12 and a terminal tongue 14 containing a perforation 16 for bolted attachment to a supporting structure. Within the hollow portion of the barrel is shown a mixture 15 prepared in accordance with my invention.

The exposed end 18 of the conductor, insulated as at 20, is forced into the hollow barrel as is shown in Fig. 2, forcing the mixture 15 into intimate contact with all the interstices and crevices of the conductor and connector. An indentation 22 is then applied to the connection to secure the connector to the conductor. The mixture 15 may be applied to the finished connection, as is shown in Fig. 2.

I have found that zinc, tin, cadmium and the like rela-

2

tively non-oxidizing metal particles, when mixed with a low molecular weight polymer, such as a form of polybutene, satisfactorily accomplishes the various objects of my invention. This material is supplied as Vistac No. 1 by Advance Solvents & Chemicals Corp., New York, N.Y. Various tests established that this material, when used on electrical connections, was superior to other types of covering used for the same purpose. Joints covered with this material have a lower initial electrical resistance; they show smaller increases in electrical resistance after exposure in a salt spray corrosion chamber; and the material resists oven aging better than other types.

I also found that the material does not affect rubber insulation materials which are adversely hardened, swelled and deteriorated by some other joint covering materials; that when used on oil-filled electric cables it will not adversely affect the power factor of the cable oil; and that it makes no difference in dielectric breakdown strength when applied to joints on paper-insulated cables. I further found that the material will prevent oxidation on aluminum after the oxide is removed mechanically. The material is hydrophobic and water-repellent. Whereas other covering materials will dry and crack to expose the metal when the dimensions are changed, my material is non-drying and permanently wet. It will creep into crevices and interstices and exclude air and moisture therefrom.

In application the polybutene is mixed with the metal particles in any suitable proportion. I have tested satisfactorily one part of polybutene to four parts of zinc dust, by weight, as well as one to one ratio. The connectors may be supplied filled with the mixture and corked; or in cans, bottles or collapsible tubes.

Some specific properties of polybutene are:

Specific gravity	0.900.
Flash point, COC, ° F.	450 minutes.
Color	Water white.
Molecular weight	1100.
Viscosity, Saybolt, 210° F.	2800 sec.
Oxidation aging	Nil.
Dielectric constant	2.3.
Dielectric strength	23 kv./mm.
Resistivity	>10 ¹⁵ ohms/cm.

The material does not change its physical nature with age. Excess material will drip off a connection leaving a thin film.

Another tacky polybutene which will cling to metallic surfaces is polyisobutylene having the trade name Vistanex, supplied by Enjay Co., Inc.

I have thus described my invention, but I desire it understood that it is not confined to the particular forms or uses shown and described, the same being merely illustrative, and that the invention may be carried out in other ways without departing from the spirit of my invention, and, therefore, I claim broadly the right to employ all equivalent instrumentalities coming within the scope of the appended claim, and by means of which objects of my invention are attained and new results accomplished, as it is obvious that the particular embodiments here shown and described are only some of the many that can be employed to attain these objects and accomplish these results.

I claim:

An electrical connection comprising an electrical conductor, a connector for connecting said conductor to another conductor, said connector and conductor provided with contacting faces covered with a mixture of non-drying, permanently wet polymer of polybutene and zinc metal particles.

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