

UNITED STATES PATENT OFFICE

WILLIAM C. GEER, OF AKRON, OHIO, ASSIGNOR TO THE B. F. GOODRICH COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK

ELECTRICAL ELEMENT AND METHOD OF PRODUCING THE SAME

No Drawing.

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This invention relates primarily to electric conductive and resistance elements, and its main object is to provide a composition of matter having certain characteristics of adapting it for use in providing a high, low or intermediate resistance, or a conductive element, in electrical systems, the conductivity of the composition being determined by suitably selecting and relating the component materials and their proportions. My invention includes a composition of matter and a method of producing the same and it may be employed in any situation where the novel properties of the composition prove useful.

My invention comprises associating a dielectric material, preferably a plastic such as a rubber compound, in intimate mixture with an electrically conductive material such as a finely divided metal, or graphite or other form of carbon, and thereby producing a mixture in the form of a solid mass, the materials being mixed in such proportions as to render the mass more or less conductive according to the use for which it is intended.

By way of example, in practicing a preferred form of my invention, I mill the finely divided conductive material into a vulcanizable hard rubber compound, and vulcanize the mixture in a heated mold or between hot plates.

Where rubber is used as the binder for the finely divided conductive material, twenty parts by weight of graphite or of comminuted metal to eighty parts of a hard rubber compound give appreciable conductive properties to the mass. The conductivity of the mass may be accurately determined, over a wide range, by the proportion of graphite, metal or other conductive substances used, and different conductive properties also may be had according to the fineness of the particles of conductive material used and the thoroughness of the mixing. Deflocculated graphite, and carbon black, as examples, give greater conductivity than coarser forms of carbon.

By thoroughly mixing the dielectric plastic with the comminuted conductive material, the particles of the latter are caused to

distribute themselves quite uniformly throughout the mass, with at least a part of them in conductive relation to each other, and, the number of particles being very great, either the law of averages so far applies as to produce substantially the same degree of conductivity in successive masses prepared in the same way and equally mixed, or the properties of the plastic and particles result in such substantially uniform distribution and arrangement of the latter, as to provide dependable uniformity of conductivity throughout a given mass or in respective masses similarly prepared.

Whatever the true theory may be, my invention provides a class of compositions, and a method of producing the same, wherein determinate degrees of conductivity may be readily obtained throughout a wide range without resort to a wide selection of materials, and conductive or resistance elements may conveniently be provided of various sizes and shapes, as by the remolding or the reshaping of the hardened conductive composition under the influence of heat. The fixation of the properties of dielectric plastic, together with such remolding or reshaping is herein referred to as vulcanization, since at least a partial vulcanizing operation is performed for this purpose.

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As my invention is subject to modification within its scope, I do not wholly limit my claims to the specific form of material and exact proportions mentioned.

I claim:

An electrical element comprising a vulcanized intimate mixture of 80 parts of a hard rubber compound and 20 parts by weight of graphite.

In witness whereof I have hereunto set my hand this 26 day of March, 1923.

WILLIAM C. GEER.