Patented June 24, 1941

2,247,036

UNITED STATES PATENT OFFICE

2,247,036

ELECTRICALLY CONDUCTIVE BONDED OXIDE COMPOSITION

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No Drawing. Application November 21, 1939, Serial No. 305,486

7 Claims. (Cl. 106—39)

This invention relates to bonded dense non-metallic electrically conductive bodies and particularly to bonded oxide compositions.

For many applications it is of advantage to utilize electrically conductive oxide materials to form rods or other shaped bodies to be used as electrical contacts, brushes, etcetera. Heretofore, in order to produce dense rods or plates of conductive oxides such as cadmium oxide, magnetic oxide of iron, cuprous oxide, etc., it has been necessary to use as a binder a non-conductive material such as sodium silicate, lead borate or organic binders. The use of such binders has prevented the obtaining of the minimum electrical resistance or maximum conductivity of the oxide material, because by being limited in the amount of usable non-conductive binder by the necessity of avoiding inter-particle contact resistance, it has not been feasible or possible to include enough of the binder to obtain the desired mechanical strength and electrical stability.

I have found that these limitations can be overcome by the use of vanadium pentoxide as the conductive binder. By intimately grinding vanadium pentoxide with an electrically conductive oxide, such as cadmium oxide, magnetic oxide of iron, cuprous oxide, etc., pressing and heating the mixture to about 690° C. (the melting point of the vanadium pentoxide), dense rods or plates of low electrical resistance can be obtained which have properties rendering them useful as electrical contacts, commutator brushes, electrodes, bearings, etcetera. One of the most useful combinations is that of cadmium oxide and vanadium pentoxide. A composite material made by grinding particles of these two oxides together and thereafter pressing and sintering, has low electrical resistance and excellent arc suppression characteristics. In the preparation of electrical contacts from combinations of these two materials, I prefer to use 10% vanadium pentoxide with about 90% by weight of cadmium oxide, pressed under high pressure such as twenty tons, and heated to 690° C. to allow fusion of the vanadium pentoxide and strong binding of the oxide particles.

The percentage of vanadium pentoxide employed may vary through a wide range dependent upon the desired electrical and mechanical characteristics.

For most purposes I prefer to hold the amount of vanadium pentoxide used to lower than 50%, although for some application and where excess temperatures are not encountered, the vanadium pentoxide may be increased beyond this proportion.

Where it is desired to add a metallic component to the vanadium pentoxide-conductive oxide composition, this may be accomplished by adding the desired metal in finely divided form and grinding the various materials together. Such added metal may comprise copper, bronze, silver or other useful metals.

Where it is desired to raise the resistance, a non-conductive oxide, such as aluminnum oxide, may be added to the conductive oxides. Likewise, the resistance may be lowered by the addition of high conductivity carbon in finely divided form.

What is claimed is:

1. A composition of matter comprising finely divided conductive oxide particles bonded with vanadium pentoxide, said finely divided conductive particles being uniformly mixed and distributed with said vanadium pentoxide throughout the composition.

2. A composition of matter comprising vanadium pentoxide and another conductive oxide, said finely divided conductive particles being uniformly mixed and distributed with said vanadium pentoxide throughout the composition.

3. A composition of matter for electrical contacts, electrodes, brushes and the like, comprising finely divided conductive oxide particles and vanadium pentoxide, said finely divided conductive particles being uniformly mixed and distributed with said vanadium pentoxide throughout the composition.

4. A composition of matter as set out in claim 1 characterized by the addition of finely divided metal.

5. A composition of matter as set out in claim 1 characterized by the addition of a non-conductive oxide.

6. A composition of matter for electrical contacts, electrodes, brushes and the like, comprising finely divided cadmium oxide particles bonded with vanadium pentoxide, said cadmium oxide particles being uniformly mixed and distributed with said vanadium pentoxide throughout the composition.

7. The method of making a composition of matter for electrical contacts, electrodes, brushes and the like which comprises uniformly mixing finely divided conductive oxide particles with particles of vanadium pentoxide, and heating the mixture to about at least 690° C.

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