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ELECTRICAL CONTACT

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1

This invention relates to electrical contacts and methods of making such contacts and more particularly to composite metal electrical contacts.

Among the several objects of the invention may be noted the provision of composite electrical contacts that have high current carrying capacity and great mechanically strength, the provision of composite electrical contacts that have high melting points and are non-sticking, the provision of contacts of the class to be described which may be inexpensively manufactured, and the provision of a method for manufacturing contacts of the class indicated which is simple, efficient and economical. Other objects will be in part apparent and in part pointed out hereinafter.

The invention accordingly comprises the ingredients and combinations of ingredients, the proportions thereof, steps and sequence of steps, and features of composition and manipulation, which will be exemplified in the products and methods hereinafter described, and the scope of the application of which will be indicated in the following claims.

Electrical contacts for breaking high current circuits must be mechanically strong, good electrical conductors, able to withstand high intensity arcs without sticking and pitting, relatively non-oxidizable, and have a high melting point and long life. Electrical contacts with a contacting layer of ruthenium on a highly conductive metal base have all of these valuable qualities and in addition can be advantageously used to make and break alternating current circuits of high frequency.

Although ruthenium is an excellent material for electrical contact surfaces it is extremely expensive. In accordance with the present invention it has been found that an inexpensive contact may be made if ruthenium is used as a thin layer on a highly conductive, and less expensive metal. A surface of ruthenium may be conveniently formed on such a conductive metal by electrolysis. Although the contacting surface of such an electrical contact is relatively pure ruthenium which is expensive, in an ordinary contact, an extremely small amount is used. For example, the surface is most conveniently secured by electroplating ruthenium on the conductive metal to a thickness of .0001 inch.

A process of electroplating ruthenium on a less expensive and conductive metal such as silver can be generally described as follows. Ruthenium is fused with an alkali peroxide and

2

the resulting melt is then dissolved in dilute hydrochloric acid. This solution upon treatment with an alkali bicarbonate will precipitate ruthenium hydroxide. The ruthenium hydroxide is then separated from the supernatant liquid and heated with sulfamic acid. The resulting product which is probably ruthenium sulfamate, is diluted with water and is used as the electrolyte. An unplated silver contact is used as the cathode and is immersed in this electrolyte and current passed thru the solution. It has been found that at a potential of 2.5 volts a current density of 15 amperes per square foot can be used without any excessive development of hydrogen. The anode used in the process may be made of any desired material.

The following specific example is illustrative of the invention:

Example 1

Two grams of metallic ruthenium were fused in a crucible with 5 grams of sodium peroxide. The melt was dissolved in 50 ml. of water and 100 ml. of hydrochloric acid. A deep orange solution was obtained which when heated with sodium bicarbonate gave a precipitate of ruthenium hydroxide. The ruthenium hydroxide was heated with 5 grams of sulfamic acid on a steam bath. This solution was then diluted to 500 ml. and was used as the electrolyte. The ruthenium was plated on the silver metal contact base at an E. M. F. of 2 volts and a current density of 15 amperes per square foot.

As a further economy measure ruthenium may be plated only on the contacting surface or on the contacting surface and all or part of the side surfaces of the contacts.

The ruthenium plated contacts of the present invention can be advantageously used to make and break alternating current circuits of high frequency and are mechanically strong, good electrical conductors, can withstand high intensity arcs without sticking and pitting, are relatively non-oxidizable, and have a high melting point and long life.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

As many changes could be made in the above methods and products without departing from the scope of the invention, it is intended that all matter contained in the above description shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. In combination with an electrical device for making and breaking high current carrying circuits, a high melting point non-sticking composite electrical contact of a highly conductive metal with a relatively thin contacting surface of ruthenium.

2. In combination with an electrical device for making and breaking high current carrying circuits, a high melting point non-sticking composite electrical contact of silver with a relatively thin contacting surface of ruthenium.

3. In combination with an electrical device for making and breaking high current carrying circuits, a high melting point non-sticking composite electrical contact of a highly conductive metal with a relatively thin contacting surface of ruthenium, the thickness of the ruthenium layer being approximately .0001 inch.

4. In combination with an electrical device for making and breaking high current carrying circuits, a high melting point non-sticking composite electrical contact of silver with a relatively thin contacting surface of ruthenium, the thickness of the ruthenium layer being approximately .0001 inch.

5. In combination with an electrical device for making and breaking high current carrying circuits, a high melting point non-sticking composite electrical contact comprising a relatively thin contacting layer of electroplated ruthenium on a highly conductive and less expansive metal.

6. In combination with an electrical device for making and breaking high current carrying circuits, a high melting point non-sticking composite electrical contact comprising a relatively thin contacting layer of electroplated ruthenium on silver.

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