

UNITED STATES PATENT OFFICE.

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METHOD OF MAKING ELECTRIC CONDUCTORS.

No Drawing.

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To all whom it may concern:

Be it known that I, JACOB LIND, a citizen of Germany, residing at Kansas City, in the county of Jackson and State of Missouri, United States of America, have invented certain new and useful Improvements in Methods of Making Electric Conductors; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to the method of making an electric conductor.

The primary object of the invention is to provide a metallic electric conductor, the cross sectional area of which will have varying characteristics.

Ordinarily copper in the form of wire or bars is used for most electrical work where current is to be transmitted. While the conductivity of copper is excellent, its inductive qualities are often a detriment and for this reason insulation must be employed to cover the exterior thereof, particularly where there is an appreciable voltage. If the wires are used to form magnetic coils, the turns must be insulated one from the other. This is true when the coils are used as ordinary magnets, armature coils or the like.

I have found that aluminum can be treated in such a manner that it will inherently possess two qualities; that requisite to provide for the necessary conductivity to carry the current, and an inherent characteristic for the necessary inductive resistance so that it will provide its own insulation and in actual practice I have found that coils formed from such wire have greater capacity and better performance than coils formed by the present methods.

For example, if the insulation between the turns and the field magnet of an ordinary motor becomes moist or damp, its resistance is cut down and the insulation is readily consumed by the heat caused by the heat generated in the coil.

This is often the case in rail car motors, which not infrequently pass through moist zones where the insulation absorbs some of the moisture.

According to my invention the insulating or resistance constituting the exterior of the conductor is an integral, coherent part of

the conductor itself. Being itself metal, it constitutes the necessary resistance or insulator for the turns and is not affected by dampness.

Where magnet coils are provided, wire rectangular in cross section is preferably used and the turns are preferably wound one upon the other with slight spaces between the respective groups of turns so that air may circulate between them to assist in carrying off the generated heat. In this particular, the coils materially differ, from a practical standpoint, from those coils made of round wire where there is practically no means provided through the body of the coil for carrying off the generated heat.

In preparing the conductor I utilize ordinary aluminum drawn into bars or wire, preferably having a rectangular cross section. A conductor of appropriate cross section is placed in an oven or retort to raise its temperature to between 700° and 800° Fahrenheit. The heated conductor is then quenched in a bath made as follows:

To about two gallons of boiling water, I may add 18% (by weight) of sal soda. This solution or partial solution may be added to about twenty gallons of cold water.

Then the heated aluminum conductor is permitted to remain two hours in the bath thus provided.

The result is that an insulating or resistance skin is formed at the surface of the wire of greater density than that of the core. The envelope thus formed is sufficiently resistant to electric current flow so that it will serve as its own insulating covering for the main conductive core within it. Therefore, it lends itself admirably for the construction of magnetic coils and particularly for a field coil and for magnetic cranes.

There is unquestionably a hard insulating skin provided about the core or major portion of the conductor and I believe this to be due to the fact that oxygen is given up by the heated aluminum when it is plunged into the quenching bath and which combines with the soda to cause oxidation at the surface of the aluminum conductor so that the cross sectional area adjacent to the surface is denser than the cross sectional area in the center and, consequently, a resistance envelope is provided for the core.

I do not wish to be limited to any par-

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particular use for the conductor but in actual practice I have found that it lends itself admirably for use in the construction of magnetic coils, particularly field coils for electro-dynamic machinery and for electro-magnets in general.

What I claim and desire to secure by Letters-Patent is:

1. The process of insulating aluminum for carrying electric current which consists in

heating the aluminum conductor and then quenching the same in an oxidizing bath.

2. The method of insulating aluminum for carrying electric current which consists in heating the aluminum and then quenching the aluminum in a bath consisting of water, and soda.

In testimony whereof I affix my signature.

JACOB LIND.