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E. C. DOMM

RUBBER COATED ARTICLE

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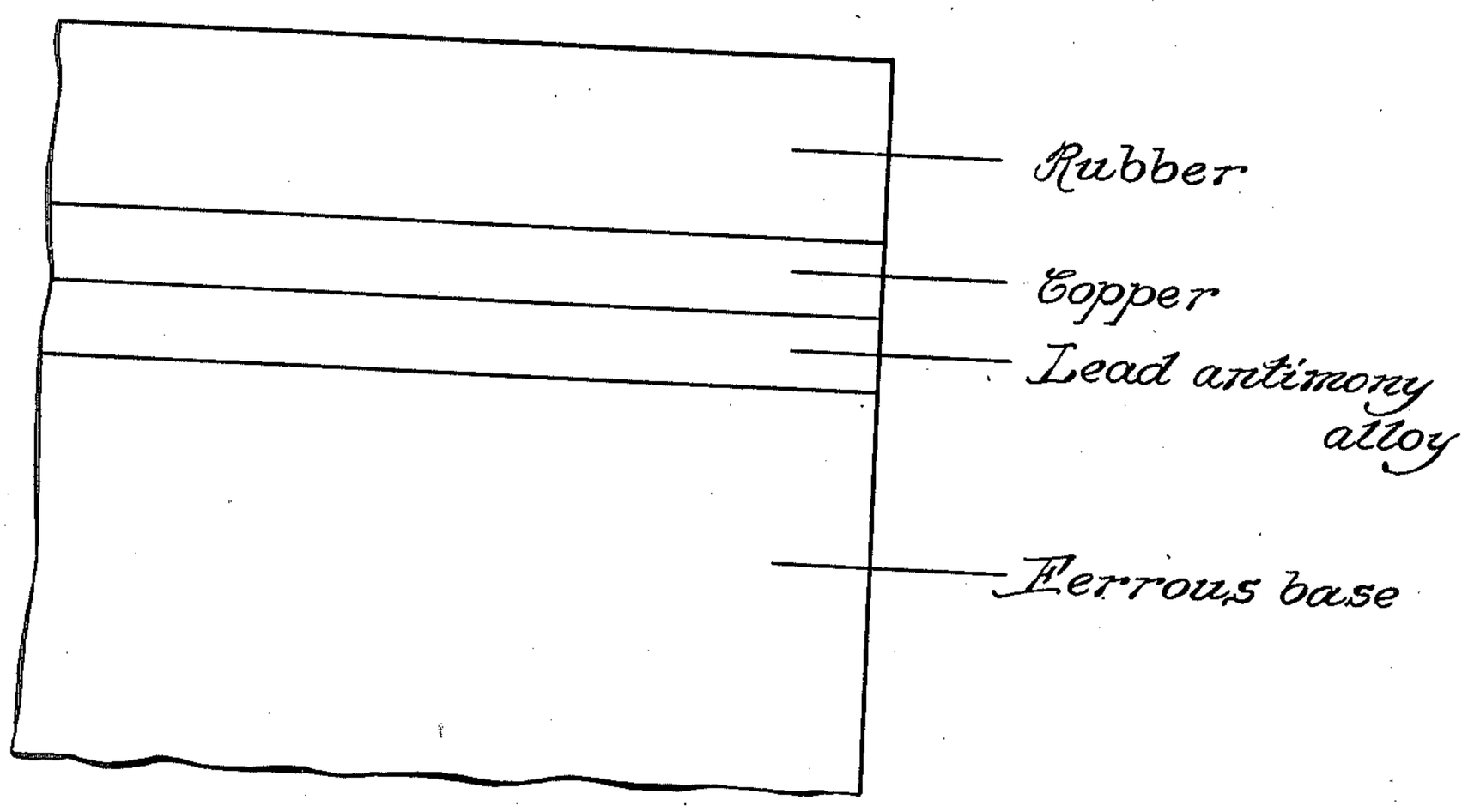

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RUBBER COATED ARTICLE

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2 Claims. (Cl. 154—40)

This invention relates to metal-coated objects and more particularly to rubber-coated objects such as tire bead wires.

In my Patent No. 2,002,263, issued May 21, 1935, is described a ferrous base article having thereon a lead coating followed by a thin coating of copper for adherence to rubber. It has been discovered that when a wire such as a tire bead wire is coated with a lead-antimony alloy, the drawing of the wire is greatly facilitated. At the same time it has been found that this coating is particularly valuable with respect to the corrosion produced by the rubber bead stock which is used to coat the wires. For example, when subjected to boiling aqueous solutions of bead compounds, a lead-antimony finish will scarcely be affected, whereas other finishes were almost completely removed.

The invention is illustrated diagrammatically in the drawing. As there shown, a ferrous base is coated with a coating of lead antimony alloy upon which is a copper coating. The copper coating as shown in the drawing is magnified in thickness for the purpose of indicating a coating. Its actual thickness is too thin to show. A rubber coating is then vulcanized upon the copper.

In accordance with this invention, a tire bead wire, normally of .037 to .043 inch in diameter, and typically of a steel of high tensile strength, for example one having a typical composition as follows,

	Percent
Carbon	.65
Manganese	.80
Phosphorous	.015
Sulphur	.025
Silicon	.095

is immersed in a bath containing a lead-antimony alloy. It is preferred that the temperature of the bath be maintained at a point where it will not injure the physical characteristics of the wire and at the same time will not adversely affect the bath itself. With respect to tire bead wires, it is important to have a rather high limit of elongation and elasticity. As ordinarily produced, such wire has an elongation limit of ¼ to 1½%. By maintaining the lead bath at a temperature of the order of 820 to 840° F., it is possible to cause an increase in elongation to as much as 2¾ to 5% and at the same time the elastic limit of the wire may be increased from 65 to 85%. Normally, the wire will be immersed in the bath for a period of one to five seconds.

When so immersed, and wiped with asbestos after leaving the bath, the ferrous base article acquires a thickness of the order of 1/6,000 to 1/20,000 of an inch, for example, with wire .043 inch diameter weighing 4.88 pounds per thousand feet of wire, the weight of the lead antimony is about 4.5 to 12 grams per kilogram of wire. With .037 inch diameter wire weighing 3.61 pounds per thousand feet, the weight of the lead antimony alloy is about 6 to 14 grams per kilogram.

In order to attach the wires to rubber, it is preferred to plate them with a rubber adherent material which is preferably a very thin layer of copper disclosed in my Patent 2,002,361. However, brass may be used if desired. The plating is preferably carried out by the cyanide process, using a solution containing 4½ ounces of sodium cyanide, three ounces of copper cyanide, two ounces of sodium carbonate and one-fourth ounce of sodium hyposulphite per gallon. Generally several consecutive plating baths are used. A normal current density is 30 amperes per square foot.

Copper is applied at the rate of 0.5 to 2 grams per kilogram of wire, and preferably between 0.5 and 1.3 grams per kilogram, producing a coating thin enough to alloy throughout with the lead antimony alloy.

It has been discovered that the use of a lead antimony alloy as a base for the copper produces a brighter copper finish than is the case for lead alone, or even with zinc alone.

After leaving the plating bath the ferrous base articles are washed with water, first cold and then hot, and are then air-dried.

After the steel articles have been coated with the lead-antimony alloy and copper plated, they may be coated with rubber suitable for tire bead stock and the rubber vulcanized directly thereto in accordance with known practice.

The lead preferably contains from 2.5 to 30% of antimony. An alloy containing 95% lead and 5% antimony has proved of particular value for these purposes. Small amounts of other metals may be included with the lead where desired, but ordinarily the alloy will contain not over 10% of metals other than lead and antimony.

While the invention has been described particularly with reference to tire bead wires, other ferrous base objects which are to be rubber-coated may likewise be treated in the same manner.

The foregoing detailed description has been given for clearness of understanding only, and no unnecessary limitations should be understood

therefrom, but the appended claims should be construed as broadly as permissible, in view of the prior art.

I claim:

1. The method of preparing corrosion-resistant steel wire, which comprises coating the wire with a lead antimony alloy, drawing the wire substantially to reduce its cross section while leaving a continuous coating of lead antimony alloy thereon, electrodepositing upon the lead antimony alloy a layer of copper thin enough to alloy throughout with the lead antimony alloy under atmospheric temperature or the heat of vulcanization, and vulcanizing a coating of rubber thereon.

2. A steel wire having high tensile strength and high elongation limits, produced by the process of claim 1 and having the increased corrosion-resistance resulting from having been drawn after application of said lead antimony coating.

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