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ASYMMETRICAL CONDUCTOR

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FIG. 1

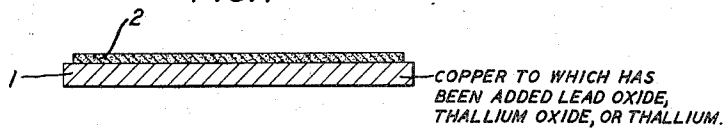
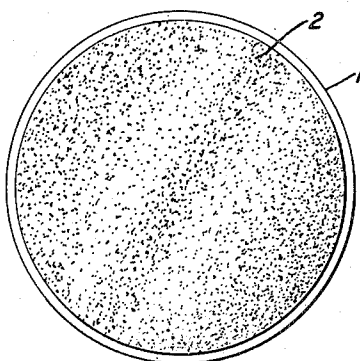


FIG. 2



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ASYMMETRICAL CONDUCTOR

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12 Claims. (Cl. 175—366)

This invention relates to electrical current conducting devices that offer a greater resistance to flow of current in one direction than in the opposite direction and more particularly to such devices of the copper-cuprous oxide type.

An object of this invention is to improve the current-voltage characteristics of copper-cuprous oxide rectifiers by increasing the resistance in both the high and low current directions, the increase in the high current direction being for voltages up to about 1 volt.

A feature of this invention comprises making copper-cuprous oxide type of conduction devices from commercial copper having a high degree of purity to which has been added a small amount of other material, more particularly, lead oxide, thallium oxide or thallium.

Other and further objects and features will be apparent from the following detailed description taken in conjunction with the drawing in which:

Fig. 1 is a cross-sectional view of a copper-cuprous oxide rectifier in accordance with this invention; and

Fig. 2 is a top plan view of the device of Fig. 1.

In the manufacture of copper-cuprous oxide rectifiers and the like, it is considered good practice to employ commercial copper having a high degree of purity. Such copper may have traces of metallic impurities totalling about 0.04 per cent.

In accordance with this invention, there is added to such copper, when in the molten state, a small amount of lead oxide, thallium oxide or thallium. The resulting material is formed into sheets of suitable thickness and blanks or washers formed therefrom. The blanks may then be treated by various methods to produce metal-metal oxide rectifier units. One such process comprises placing a blank 1 in a furnace having an oxidizing atmosphere at about 1000° centigrade for about ten minutes, then placing it in a second furnace maintained at about 500° centigrade for about three minutes and then quenching in cold water.

The outside layer 2 which has been formed on the blank is then suitably treated to provide a low ohmic electrical contact surface thereon.

It has been found that asymmetrical conductors made from copper to which has been added up to about 0.55 per cent by weight of lead oxide, thallium oxide or thallium, have better characteristics than those made from commercial copper. Such addition results in an increase in resistance in both the high and low current directions, the increase in the high current direc-

tion being for voltages below about 1 volt. Rectifiers having the above-noted characteristics have been made from copper melts to which have been added the following percentages of the indicated material:

Lead oxide 0.055 per cent, 0.108 per cent or 0.537 per cent; thallium oxide 0.056 per cent or 0.336 per cent; thallium 0.2 per cent, 0.3 per cent or 0.5 per cent.

It will be understood that this invention has been disclosed with reference to particular illustrative forms thereof, and it is to be considered as limited in scope by the appended claims only.

What is claimed is:

1. An asymmetrical conducting device comprising a metallic body having an integral layer of an oxide of said body thereon, said body comprising copper to which has been added one of the materials of the group comprising lead oxide, thallium oxide and thallium.
2. A copper-cuprous oxide rectifier formed from a copper body to which has been added up to 0.55 per cent of lead oxide.
3. A copper-cuprous oxide rectifier formed from a copper body to which has been added up to 0.55 per cent of thallium oxide.
4. A copper-cuprous oxide rectifier formed from a copper body to which has been added up to 0.55 per cent of thallium.
5. A copper-cuprous oxide rectifier formed from a copper body to which has been added up to 0.55 per cent of lead monoxide.
6. A copper-cuprous oxide rectifier formed from a copper body to which has been added up to 0.55 per cent of thallous oxide.
7. The method of making an asymmetrical conducting device comprising a body substantially of copper having a layer of oxide integral therewith, that comprises adding to molten copper a small amount, up to 0.55 per cent, of one of the materials from the group comprising lead oxide, thallium oxide and thallium, forming a body from the resulting melt and heat treating said body to form the oxide layer thereon.
8. The method of making an asymmetrical conducting device comprising a body substantially of copper having a layer of oxide integral therewith, that comprises adding to molten copper a small amount, up to 0.55 per cent, of lead oxide, forming a body from the resulting melt and heat treating said body to form the oxide layer thereon.
9. The method of making an asymmetrical conducting device comprising a body substantially of copper having a layer of oxide integral there-

with, that comprises adding to molten copper a small amount, up to 0.55 per cent, of thallium oxide, forming a body from the resulting melt and heat treating said body to form the oxide layer thereon.

10. The method of making an asymmetrical conducting device comprising a body substantially of copper having a layer of oxide integral therewith, that comprises adding to molten copper a small amount, up to 0.55 per cent, of thallium, forming a body from the resulting melt and heat treating said body to form the oxide layer thereon.

11. The method of making an asymmetrical conducting device comprising a body substantially-

ly of copper having a layer of oxide integral therewith, that comprises adding to molten copper a small amount, up to 0.55 per cent, of lead monoxide, forming a body from the resulting melt and heat treating said body to form the oxide layer thereon.

12. The method of making an asymmetrical conducting device comprising a body substantially of copper having a layer of oxide integral therewith, that comprises adding to molten copper a small amount, up to 0.55 per cent, of thallous oxide, forming a body from the resulting melt and heat treating said body to form the oxide layer thereon.

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