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METHOD OF PREPARING RESISTANCE UNITS

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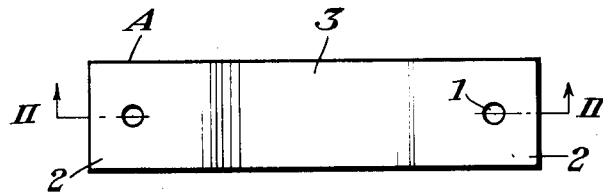


Fig. 1.

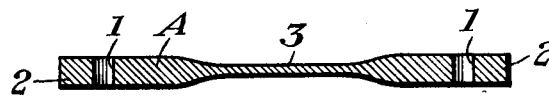


Fig. 2.

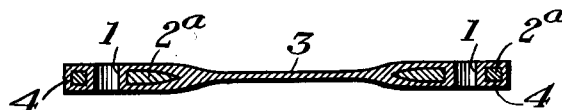


Fig. 3.

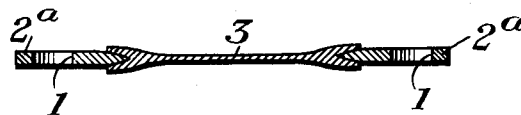


Fig. 4.

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METHOD OF PREPARING RESISTANCE UNITS

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My invention relates to resistance units and to methods of preparing the same.

I will describe one form of resistance unit, and one method of preparing such unit, and will then point out the novel features thereof in claims.

In the accompanying drawing, Fig. 1 is a top plan view showing a blank suitable for preparing one form of resistance unit according to my invention. Fig. 2 is a sectional view along the line II—II of Fig. 1. Fig. 3 is a view similar to Fig. 2, showing the resistance unit at one stage in the process. Fig. 4 is a view showing, in vertical section, a completed resistance unit prepared in accordance with my invention.

Similar reference characters refer to similar parts in each of the views.

It is well known that certain substances, such as oxides of copper or iron, have the characteristic of thermal sensitivity, that is of varying their electrical resistance in accordance with variations in the temperature of such substances. In order to take advantage of this characteristic in electrical circuits, however, it is necessary to prepare resistance units of these substances, which units may be inserted in electrical circuits in any desired manner. Due to the mechanical characteristics of these substances it has been difficult or impossible, with the processes hitherto available, to prepare such units with a sufficient degree of mechanical strength and electrical uniformity to be commercially practical.

In resistance units prepared in accordance with my invention however, these disadvantages have been completely overcome.

Referring now to Figs. 1, and 2, the reference character A designates a flat blank of the metal which forms the base of the thermo-sensitive substance. For example the blank may be of copper or iron. As best shown in Fig. 2, this blank is formed with comparatively thick end portions 2, and a comparatively thin bridge portion 3 intermediate the ends of the blank. Each of the end portions 2 may be provided with a hole 1, the purpose of which will appear hereinafter.

The blank A is first treated chemically to

form the thermo-sensitive substance directly on the metal. For example when the blank is copper, it may be heated in the presence of air to form copper oxide. This chemical treatment is continued until the bridge portion 3 of the blank is changed entirely to the oxide. The blank will then appear as in Fig. 3. It will be seen that the comparatively thin bridge portion 3 now consists entirely of copper oxide but that the comparatively thick end portions of the blank have not been completely oxidized. The unit now comprises therefore, two spaced metallic plates 2^a covered with a coating 4 of oxide and connected by the bridge 3 of oxide.

In order to complete the unit, the oxide coating 4 is removed from the plates 2^a over a portion of their surfaces, leaving the plates connected with the bridge 3 as shown in Fig. 4. The oxide may be removed by any suitable means such as a sand blast or nitric acid. The base plates 2^a provide convenient terminals to which binding posts may be attached for connecting the unit with an outside electrical circuit. These binding posts may be inserted in the holes 1 in the plates 2^a.

Since the thermo-sensitive material is formed directly in contact with the terminal plates a perfect electrical contact is assured, and copper oxide, prepared in the manner I have described, has sufficient mechanical strength to withstand severe jars, vibration and rough handling.

Although I have herein shown and described only one form of resistance unit embodying my invention and only one process of preparing the same, it is understood that various changes and modifications may be made therein within the scope of the appended claims without departing from the spirit and scope of my invention.

Having thus described my invention what I claim is:

1. The method of preparing a resistance unit from a blank of metal having a comparatively thin bridge-portion and two comparatively thick end portions which consists in chemically treating said blank to form a compound of the metal until said bridge portion is changed entirely to the compound but

stopping the chemical treatment before the end portions are entirely changed to such compound, and removing a portion of the compound from the end portions.

5 2. The process of preparing a resistance unit which consists in forming a substantially flat metallic blank with a bridge portion of reduced thickness, chemically treating the blank to change said bridge portion
10 entirely to a compound of the metal but stopping the chemical treatment before the other portions are entirely changed to such compound, and removing the compound from the said other portions of the blank.

15 3. The process of preparing a resistance unit which consists in forming a substantially flat metallic blank with a bridge portion of reduced thickness, oxidizing the blank to change said bridge portion entirely to
20 oxide of the metal but stopping the oxidation before the other portions are entirely changed to oxide, and removing the oxide from the said other portions of the metal.

25 4. The process of preparing a resistance unit which consists in forming a substantially flat copper blank with a bridge portion of reduced thickness, oxidizing the blank to entirely change said bridge portion to copper
30 oxide but stopping the oxidation before the other portions are entirely changed to such oxide, and removing the oxide from the said other portions of the blank.

35 5. The process of preparing a thermo-sensitive resistance unit which consists in forming a substantially flat copper blank with a bridge portion of reduced thickness intermediate its ends, heating the blank in the presence of air to change said bridge portion
40 entirely to copper oxide but stopping the heat treatment before the end portions are entirely changed to copper oxides, and removing the oxide from the end portions of said blank.

In testimony whereof I affix my signature.
LARS O. GRONDAHL.

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