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CONTACTING TERMINAL STRUCTURE FOR OXIDATION
PRODUCTS OF ELECTRICAL DEVICES
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Fig. 1.

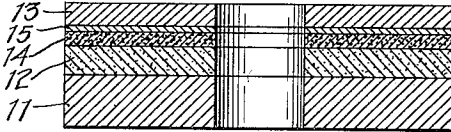
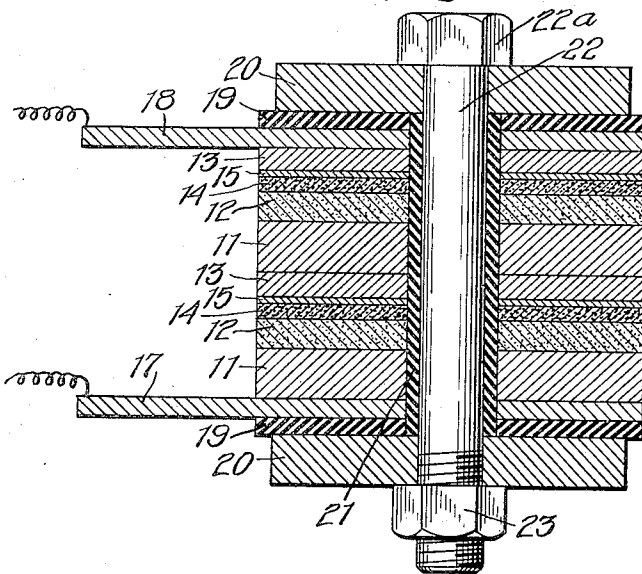


Fig. 2.



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CONTACTING TERMINAL STRUCTURE FOR
OXIDATION PRODUCTS OF ELECTRICAL
DEVICES

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5 Claims. (Cl. 175—366)

My invention relates to improvements in contacting terminal structures for oxidation products of electrical devices such as copper oxide rectifying elements and metal oxide thermo responsive elements of the resistance type; and it consists in the novel features which are hereinafter described.

One of the objects of my invention is to provide a relatively unchanging electrical contact applied to the oxide surface of an oxidized metal carrier of an electrical element, which may be either a rectifying element or a resistance element and the like, through an intermediately disposed coating deposited on the said oxide surface.

Another object is to reduce to a minimum the aging at the junction between the oxide surface and the contacting electrode or contact element.

A further object is to enable the electrode at said junction to be immune from oxidation by heat at operating temperatures.

Another object of my invention is to reduce the electrical resistance at the junction of the contact surfaces of the said devices and thereby reduce the contact drop.

A further object is to have the contacting electrode of the terminal structure electrolytically plated with a non-oxidizable rare metal, whereby to prevent an increase of resistance at the contact of the said electrode with the adjoining surface of the terminal structure, which surface may be either silver graphalloy, colloidal graphite or a mixture of graphite and silver, if desired.

A still further object is to establish a low resistance contact between the oxidized surface of the metal carrier and its contacting or adjoining conductor.

Other objects and advantages will hereinafter appear.

I attain these objects by the electrical devices and the contacting terminal structures thereof which are illustrated in the accompanying drawing or by any mechanical equivalents or obvious modifications of the same.

In the drawing Fig. 1 is a cross-section of an electrical device containing a single element of the preferred form of my contacting terminal structure.

Fig. 2 is a cross-section of a stack of rectifying elements such as shown in Fig. 1.

The thickness of each of the sundry plates and layers is exaggerated in all the figures of the drawing.

Similar numerals refer to similar parts throughout the several views.

In the modification of my invention, which is shown in Fig. 1, 11 designates a metal carrier of an electrical element which may be either a thermo responsive resistance element or a rectifying element, and 12 a layer of the oxide of the metal of the carrier 11 which is integral therewith.

The carrier 11 may be made of copper and the layer 12 of cuprous oxide.

Instead of an oxide alone an admixture of other oxides or chemical compounds with cuprous oxide may be used in some cases, if desired. One such compound may contain cuprous oxide and an oxychloride.

15 A contacting soft metal electrode 13, which may be preferably a lead plate, is shown as having thereon an electrolytically deposited film of a nonoxidizable rare metal 15, which metal may be either chromium or bismuth, and is connected under pressure to the layer 12 on the side of the latter which is remote from the carrier 11, and a coating 14 of a substance which is known in the arts as silver graphalloy is shown as placed between the layer 12 and the plated surface 15 of the terminal electrode 13 in contact with the coating 15. The soft metal of the electrode 13 with the film 15 thereon conforms itself under pressure to the inequalities of the surface of the oxide 12 with the coating 14 thereon, thereby producing an intimate contact therebetween and thereby reducing the electrical contact resistance.

The object of the silver graphalloy is to reduce to a minimum the contact resistance at the junction of the oxide 12 and the coating 15.

35 As a result of diligent experimenting I found silver graphalloy to be superior to any other coating on the oxide surface 12 and to other forms of graphalloy.

40 Graphalloy is an imperfect alloy or conjunction of graphite and a soft metal produced by filling the interstices of porous graphite with the metal in a state of fusion.

The coating 14 may first be formed on the said layer 12 by rubbing the layer 12 or a part thereof with a piece of the silver graphalloy which may have a suitable shape.

I prefer to cover with the coating 14 only a portion of the surface of the layer 12 opposite the plate 13, to prevent any portion of the layer 14 from being brought into contact with the carrier 11 through cracks at the inner and outer peripheries of the layer 12, whereby to avoid short circuiting the element 11—14.

55 The operation of coating the layer 12 with sil-

ver graphalloy may be done either manually or by any suitable machine or contrivance.

Both the layer 12 and the film 15 on the plate 13 may be coated with silver graphalloy, if desired.

The film 15 of chromium or bismuth on the plate 13 at the surface of contact thereof under pressure with the coating 14 will maintain a substantially constant minimum contact resistance with the surface of the coating 14. This is due to the soft metal 13 causing the chromium of the film 15 to be brought into intimate contact with the coating 14.

The chromium or bismuth coated plate 13 is also adapted to withstand relatively high operating temperatures.

As a result of diligent experimenting, I found that the coating 15 of chromium or bismuth on the element or electrode 13 is superior to coatings of nickel or tin which have been used heretofore.

In the stack of elements which is shown in Fig. 2 the elements are connected and pressed to each other by means of a bolt 22 and nut 23; end pressure plates 20 are shown as placed under the head 22a of the bolt 22 and under the nut 23; insulating discs 19 are shown as placed under the pressure plates 20 to insulate the said plates from the terminals 17 and 18 which are shown as having electrical conductors attached thereto. The bolt 22 is shown as insulated by means of a sleeve 21.

Variations are possible and parts of my invention may be used without other parts.

I do not, therefore, restrict myself to the details as shown in the drawing.

I claim as my invention and desire to secure by Letters Patent:

1. In a terminal structure for an electrical device a copper carrier, a layer of a compound containing the oxide of said carrier on said carrier,

a soft metal electrode cooperating with said layer, a film of a nonoxidizable rare metal on the electrode and a coating of silver graphalloy on said layer firmly adhering thereto interposed between said layer and said electrode.

2. In a terminal structure for electrical devices a metal carrier, a layer of a compound containing the oxide of said carrier on said carrier, a soft metal electrode cooperating with said layer, a film of a relatively nonoxidizable rare metal other than gold or platinum on the electrode and a coating of silver graphalloy on said layer firmly adhering thereto interposed between said layer and said film.

3. In a terminal structure for electrical devices a copper carrier, a layer of a compound containing cuprous oxide on said carrier, a soft metal electrode cooperating with said layer, a film of electrolytically deposited chromium on the electrode, and a coating of silver graphalloy on said layer firmly adhering thereto interposed between said layer and said film.

4. In a terminal structure for electrical devices a copper carrier, a layer of a compound containing cuprous oxide on said carrier, a soft metal electrode cooperating with said layer, a film of bismuth on the electrode and coating of silver graphalloy on said layer firmly adhering thereto interposed between said layer and said film.

5. In a terminal structure for an electrical device a metal carrier, a layer of a compound containing the oxide of said carrier on said carrier, a soft metal electrode cooperating with said layer, a film of a nonoxidizable rare metal other than gold or platinum on the electrode and a coating of a mixture of graphite and silver on said layer adhering thereto, interposed between said layer and said film.

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