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ELECTRODE FOR CORRECTIVE ELECTROLYTIC ETCHING AND ANODIZING OF --ETC(U)
JAN 78 P CHROBAK

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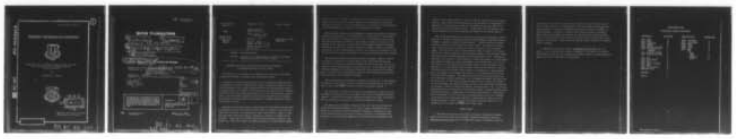

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ELECTRODE FOR CORRECTIVE ELECTROLYTIC ETCHING AND ANODIZING OF RESISTOR PATHS AND CAPACITOR PLATES

by

Przemyslaw Chrobak

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(6) ELECTRODE FOR CORRECTIVE ELECTROLYTIC ETCHING AND ANODIZING OF RESISTOR PATHS AND CAPACITOR PLATES,

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ELECTRODE FOR CORRECTIVE ELECTROLYTIC ETCHING AND ANODIZING OF RESISTOR PATHS AND CAPACITOR PLATES

The subject of this invention is an electrode for corrective electrolytic etching and anodizing of resistor paths and capacitor plates.

At present, the correction of resistor paths and capacitor plates involves such methods as scrubbing, sand-blasting, removal (scavenging) by means of electrical discharges, laser burning, chemical etching and anodizing which consist of applying drops of a solution to that portion of the resistor path or capacitor plate which must be etched by the solution, or (to that portion of the resistor path or capacitor plate) upon which a thin coating of oxides must be created, thus reducing the cross section of the resistor or reducing the active surface of the capacitor plate.

Resistors and capacitor plates in thin-layered or thick-layered microcircuits are manufactured from various metals, their alloys or ceramets. To correct resistors and capacitors it is necessary to remove that portion of metal or alloy that has become oxidized in order to increase the resistance or reduce the capacitance. Metals and their alloys used to manufacture passive (neutral) components can, among other things, be etched by chemical or electrochemical means,

and some of them, for example, aluminum, tantalum, niobium, can be coated with oxides which do not conduct current according to the principle of anodizing oxidation, while still others, for example, nickel, chromium, the alloy nichrome, can be electrochemically dissolved in the appropriate solutions.

The correction process can be programmed in advance and precisely controlled with continuous measurement of the resistance or capacitance of a given component when removing a specified portion of metal. The process for controlling the corrective treatment consists of the following consecutive operations: measurement of the resistance or capacitance of the component before the process, programming the system for automatic control of voltage, intensity, resistance, capacitance or time, treatment which corrects the cleaning of the surface in the corrected part and the area surrounding it, final measurements and final controls.

The correction methods given above do exhibit drawbacks, however. Mechanical removal of portions of resistor paths or capacitor plates disturbs the structure of the material in sections adjacent to those corrected. The use of laser correction methods requires a costly apparatus. In the chemical and electrochemical methods the difficulty involves use of the electrolyte in droplet form. A suitable type of electrode is needed to make automatic correction feasible by means of electrochemical treatment.

Such an electrode must perform two functions simultaneously: it must moisten the corrected spot with the solution of electrolyte proportioned in the proper amount, and it must ~~apply~~ supply an electric current of the proper voltage.

The aim of the invention is to produce an electrode which supplies the proper amount of electrolyte to a given spot of the corrected component and which supplies a current with the proper regulated voltage to this spot, thereby permitting correction on any part of the corrected component's surface.

The essence of the invention consists of the fact that the electrode for corrective electrolytic etching is made from a porous, absorbable material, pliant or rigid, which holds an electrolyte suitable for electrolytic action on the treated material of the path or plate, and which is proportioned onto the surface of the corrected component by contact-wetting with component. The

conductors which supply current to the electrode are inserted within the porous material, while supply of the electrolyte to the electrode is accomplished by moistening the porous material with it, for example, by dropwise addition of the electrolyte solution from a burette. At the same time, the amount of electrolyte supplied can be set by choosing the diameter of the burette opening.

The electrode according to the invention is made from an absorbable, porous material in the form of an agglomerate of suitably foamed or granulated plastic, a bundle of natural, plastic or glass fibers, fabrics from these same materials, and even the pith (roots) of certain plants. The material has structural features such that it can be cut, sawed, or ground to give the proper shape. The front surface of the porous material comes in contact with the surface of the corrected component, while the front surface of the electrode assumes the shape of the corrected component or the proper portion of it. Depending on the size of the electrode's front surface an appropriate number of current-supplying conductors needed for normal electrolysis are introduced into its interior. The terminals of the conductors which supply current to the electrode lie at a distance of a few millimeters from the front surface of the electrode. The holder containing the electrode's porous material is connected to a guiding mechanism, for example, a pantograph, which allows it to be moved along the surface of the corrected component. The capillary action of the electrode permits its total saturation with the electrolyte. By introducing the proper thickeners into the electrolyte, in the form of synthetic resins that are neutral with respect to the electrolyte, the proper viscosity and flow of the electrolyte is obtained. As thickeners, soluble cellulose derivatives, polyvinyl alcohol, etc. can be used. Proportioning the electrolyte onto the corrected element is accomplished by either spontaneous seepage or seepage that is forced by an overpressure. Introduction of the electrolyte into the electrode is accomplished by placing the electrode in the bottom of the electrolyte container or by wetting the other end of the electrode dropwise. Removal of spent electrolyte and excess amounts of it is accomplished, for example, by ~~rubbing~~ wiping with a small swab.

PATENT CLAIMS

1. Electrode for corrective electrolytic etching or anodizing of resistor paths and capacitor plates in electrolytic systems and separate components, characterized by the fact that it is made from a porous, absorbable, pliant or

rigid material which holds an electrolyte suitable for electrochemical action on the treated material of a path or plate, said electrolyte being proportioned onto the surface of the corrected component by trickling (dropwise addition) of the electrolyte at the point of contact of the electrode with the component, whereas the current-supplying conductors are inserted within the porous material, and the electrolyte supplied to the electrode using a conduit with a hole drilled to the suitable cross section so that the entire electrode is saturated with electrolyte.

2. Electrode according to Claim 1, characterized by the fact that the shape of the electrode's front surface corresponds to the shape of the corrected component's shape and a correspondingly suitable number of current-supplying conductors serve for the supply of electricity.

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