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(54) **Process for coating an oriented electronic component, the resulting component and means for performing the process**

(57) A process for coating an oriented electronic component with axial outlet connections by free deposition. It fundamentally comprises coating the component with a thermosetting or hardenable material, a first material hardening stage, the deformation of the coating about one of the outlet connections of the component and a second coating hardening stage.

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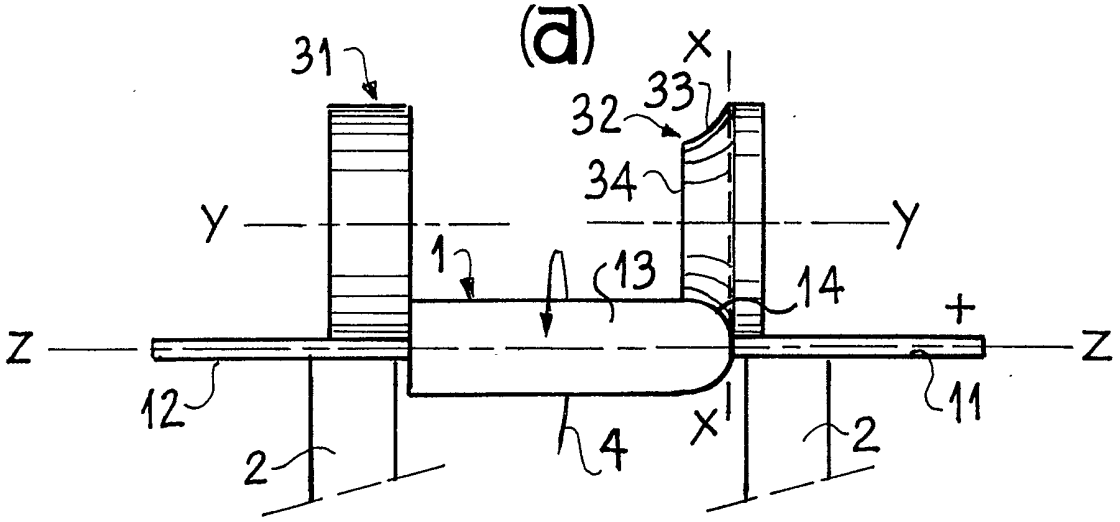
FIG_1

(a)



(b)

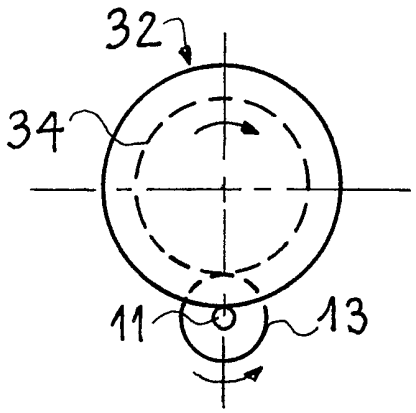
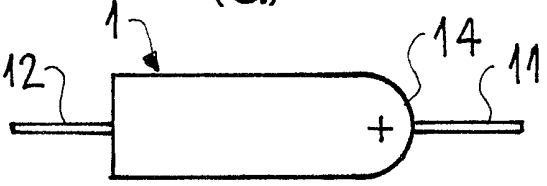
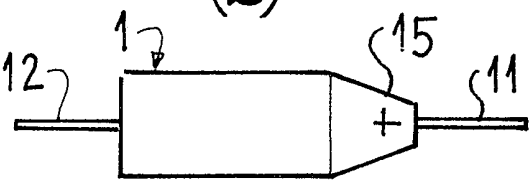


FIG_2

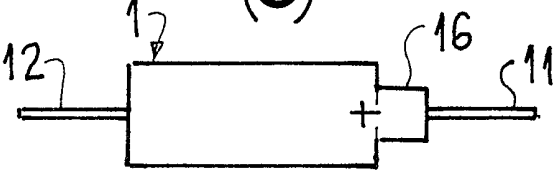
(a)



(b)



(c)



SPECIFICATION

Process for coating an oriented electronic component, the resulting component and means for performing the process

The present invention relates to oriented electronic components, i.e. components where the connection direction is not of a random nature, such as e.g. tantalum solid electrolytic capacitors. The invention more particularly relates to a process for coating such a component making it possible to fix its polarity, as well as to a component resulting from this process and the means for performing the latter.

In the case of oriented components, it is generally desirable to have information making it possible to fix their polarity. This applies both when these components are manually fitted and when they are inserted into a circuit in an automatic manner. In the latter case, the fixing is preferably brought about by a special shape feature of the component. In the case of solid electrolytic capacitors, e.g. of tantalum, whose generally parallelepipedic or cylindrical shape does not permit such fixing, it is known to carry out the latter at the insulating coating of the capacitor. Coating can be carried out by moulding a thermosetting or hardenable material around the capacitor, the mould having an asymmetrical shape permitting the fixing of the polarity. The disadvantage of this solution is the high cost of the moulds necessary for the moulding process. Coating can also be brought about by the free deposition of the coating material around the component, e.g. by dipping, spraying or fluidization. In this case, as the coating adapts to the shape of the component, the fixing of the polarity requires the connection of additional parts, which significantly increases the cost of the component.

Brief summary of the invention

It is an object of the invention to provide a simple and economic coating process, enabling the polarity fixing of a component having axial outlets without additional parts.

More specifically the process according to the invention involves the stages of coating the component with a hardenable material, a first hardening stage of the coating material, the deformation of the coating around at least one of the connections thereby providing different shapes level with each connection and a second hardening stage of the coating material.

The invention also relates to the means for performing this process, which comprise at least two rollers, each rotating about an axis parallel to the axis of the component, displacing the component in translation by means of its outlet connections, whereby at lest one of these rollers is machined and positioned in such a way that it also ensures the deformation of the coating.

Brief description of the drawings

The invention is described in greater detail hereinafter relative to non-limitative embodiments and the attached drawings, wherein show:

Figures 1a and *1b* two sectional views of an embodiment of the means for performing the process according to the invention.

Figures 2a, b and *c* variants of a component obtained by the process of the invention.

Detailed description of the preferred embodiments

In the drawings the same references designate the same components.

Figure 1a shows a component 1, whose body 13 is generally cylindrical and which has two outlet connections 11 and 12 positioned in accordance with the axis ZZ of body 13. For example, component 1 can be a tantalum capacitor, whose connection 11 is the anode connection and whose connection 12 is the cathode connection.

Component 1 is displaced in a direction perpendicular to the plane of the drawing (arrow 4) by a conveyor, whose ramp 2 is diagrammatically shown, e.g. by means of its connections 11 and 12.

In the embodiment of Figure 1, the means for performing the process according to the invention comprise two rollers 31 and 32, each rotating about an axis parallel to axis ZZ of component 1, whereby said two axes can coincide in the same azis ZZ, as shown in the drawing. One of the rollers 31 has a rectangular cross-section and is positioned on connection 12 substantially at the limit of component body 13. The second roller 32 has a generally rectangular cross-section, but one of its leading edges has been machined so that it has a non-right angled profile, such as the rounded profile 33 shown in Figure 1 and located on the left-hand side of the roller. This roller is placed level with both body 13 and connection 11 of the component, in such a way that the machined left-hand part 33 of the roller is located on body 13 and the right-hand part drives connection 11. In the drawing XX designates the line of the separation plane between the machined part 33 and the remainder of roller 34, whilst 34 is the face of the roller located on the side of component 1.

The process of the invention is performed as follows. Component 1 is preferentialy coated by the free deposition of a hardenable or thermosetting material, such as an epoxy resin. The component is, for example, a cylindrical tantalum capacitor. Free deposition can be brought about by dipping, the component then being kept e.g. horizontal and rotating in order to obtain a cylindrical coating. The free deposition can also be obtained by spraying or, according to a preferred embodiment, by fluidization. The hardenable material powder is transferred from the fluidized bath to the component by any known means, such as a pulley dipping in the bath and depositing the powder on the component. As is known, when the component is extracted from the fluidized bath, it undergoes a heating stage permitting a prepolymerization of the coating resin and leaving it in a plastic phase. The component is then placed on conveyor 22 (Figure 1a) and the passage beneath roller 32 brings about the deformation of the coating in accordance with profile 33 of the said roller. The coating then undergoes a final polymerization stage.

According to a not shown variant, prior to the

coating stage, an insulating material such as an epoxy resin is deposited around connection 11 in the case of Figure 1, its quantity being such that the diameter of the resulting deposit is smaller than the diameter of the component, so that the plastic material around the connection 11 is not excessive.

Figure 1b shows the device of Figure 1a in a sectional view at axis XX of roller 32. It is possible to see connection 11 and roller 32 on the latter, as well as body 13, whose upper part is level with face 34 of roller 32.

Rollers 31 and 32, as well as conveyor 2 are made from a material, which is able to withstand the polymerization temperatures and which does not adhere to the material forming the coating. They are advantageously made from teflon.

Figure 2 shows a number of variants (a, b and c) of the components obtained by the process of the invention.

Figure 2a shows a component 1, as described in Figure 1, with axial outlet connections 11 and 12, whose coating on the side of connection 11 is deformed in order to form a spherical cup 14.

Figure 2b shows a cylindrical capacitor 1 with axial outlet connections 11 and 12, whereof the part of the coating on the side of connection 11 is deformed in order to form a truncated cone 15.

Finally Figure 2c shows a cylindrical capacitor 1 with axial outlet connections 11 and 12, whose coating on the side of connection 11 is deformed in order to form a cylinder 16 having a smaller diameter than cylinder 1.

A number of different forms for the coating of the side of connection 11 have been described. It is obvious that other forms are possible for this part of the coating without passing beyond the scope of the invention. In the same way, it is also possible to deform that part of the coating located on the side of connection 12 by using a roller such as 32, replacing roller 31 of Figure 1. This deformation can be carried out in place of or at the same time as the deformation of the other side of the component.

CLAIMS

1. A process for coating an oriented electronic component with axial outlet connections, comprising the stages of coating said component with a hardenable or thermosetting material, a first hardening stage for said coating material, the deformation of said coating material around at least one of said connections, thereby giving to said coating different stages level with each connection, and a second hardening stage of said coating material.

2. A process according to claim 1, wherein said coating stage is performed by the free deposition of said hardenable material on said component.

3. A process according to claim 1, wherein said coating stage is performed by fluidization.

4. A process according to claim 1, wherein said hardenable material is a polymerizable resin.

5. A process according to claim 1, wherein said coating deformation stage is performed around each of said connections by giving them different shapes level with each connection.

6. A process according to claim 1, further comprising a preliminary stage of depositing an insulating material around at least that outlet connection at which the coating is deformed, said coating having a smaller diameter than said component.

7. An oriented electronic component, wherein its coating is formed by the process according to any one of the preceding claims.

8. A component according to claim 7, wherein it is constituted by a solid electrolytic capacitor, said coating being deformed on the anode connection.

9. A component according to claim 7, wherein the deformation formed is in the form of a spherical cup.

10. Means for performing the process according to any one of the claims 1 to 6, comprising at least two rollers means, each rotating about an axis parallel to the axis of said component, for displacing said component in translation by means of its outlet connections, whereby at least one of said rollers means is machined and positioned in such a way that it further ensures the deformation of said coating.

11. A process for coating an oriented electronic component substantially as hereinbefore described with reference to the accompanying drawings.

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