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ELECTRIC APPARATUS CONSISTING OF A SUPPORT PROVIDED
WITH A COVERING LAYER OF POOR CONDUCTIVITY
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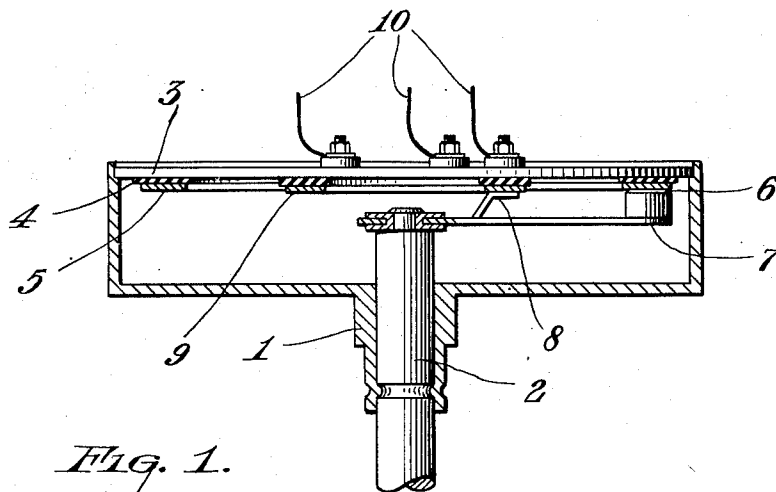


Fig. 1.

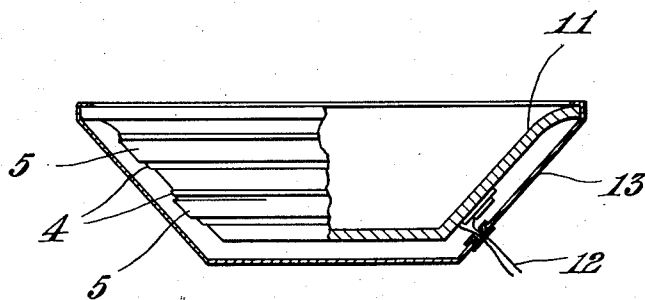


Fig. 2.

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AGENT

UNITED STATES PATENT OFFICE

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ELECTRIC APPARATUS CONSISTING OF A
SUPPORT PROVIDED WITH A COVERING
LAYER OF POOR CONDUCTIVITYJan Kramer, Eindhoven, Netherlands, assignor to
Hartford National Bank and Trust Company,
Hartford, Conn., as trusteeApplication July 20, 1946, Serial No. 685,178
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3 Claims. (Cl. 201—55)

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This invention relates to an electric apparatus, for example, a resistance, which consists of a support provided with a covering layer of poor conductivity. It is customary to make the support of insulating material, for example of paper impregnated with artificial resin or of ceramic material, whilst the covering layer, generally consists of a mixture of a conductive filler, for example graphite, and an insulating binder, for example, artificial resin. The adherence of the covering layer to the support is hampered by the conductive filler present in the layer. This applies more particularly to the usual conductive fillers such as graphite; with the usually employed insulating fillers such, for example, as barium sulphate and titanium-di-oxide this drawback is experienced to a much smaller extent.

The invention relates to a form of construction wherein the adherence of the covering layer to the support is materially improved.

According to the invention, an intermediate layer is located between the covering layer and the support; this layer is composed on the same base as the binder of the covering layer and contains an insulating filler at the most. When carrying out the invention it is even very well possible to utilize an insulating underlayer which is composed on a base different from that of the binder. In general it will be preferred to compose the support and the binder on the same base and to use, for example, a support made of paper with a phenolformaldehyde binder and a covering layer of a phenolformaldehyde lacquer mixed with graphite. When carrying out the invention we are relieved from this restriction in the choice.

Since the intermediate layer is naturally insulating, it is, when taking this step, even possible to constitute the support by a metal plate which, at least under the conductive covering layer, is provided with an intermediate layer. It has been found that, in order to obtain resistances which remain constant during their use, it is necessary to heat them during manufacture to a comparatively high temperature, i. e. a temperature of the order of 200° C. The use of a metal support offers the advantage that it allows the covering layer to be strongly heated during manufacture, which makes it possible to obtain very constant resistances. If the invention is applied to a variable resistance, the support is preferably constructed so as to form part of the casing which encloses the covering layer and a current collector. This casing may consist of insulating material, for example artificial resin. A quite satisfactory cooling and a compact construction are

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obtained if the casing consists of metal. The support may consist of aluminium which is artificially provided with a film of oxide, more particularly of so called eloxated aluminium; the binder adheres satisfactorily thereto. The latter forms jointly with the oxide film a quite satisfactory insulating base.

The invention may also be advantageously applied to the manufacture of heating apparatus, for example liquid containers, wherein a conductive covering layer acting as a heating element is applied to the container, which acts as the support.

In order that the invention may be clearly understood and readily carried into effect, it will now be explained more fully with reference to two practical examples which are illustrated by figures.

Figure 1 is a section of a potentiometer housed in a metal casing.

Figure 2 shows a section of an electric hot water-basin.

The casing of the potentiometer consists of a lower part 1 squirted of metal and comprising the bearing for a spindle 2 and of an upper part 3. This upper part, which is constituted by a plate of aluminium provided with an oxide film by electrolytic oxidation, has applied to it on the inside a horseshoe-shaped layer 4 of insulating lacquer, for example of phenol-aldehyde lacquer. After being dried, this lacquer is coated with a conductive layer 5 which consists of a mixture of the same lacquer and powdered graphite. Jointly the two layers are thoroughly hardened, a very intimate connection of the layer 4 both with the metal underlayer and with the conductive covering layer being thus obtained. The latter is covered by a carbon brush 6 supported by an arm 7 which is secured to the spindle 2 so as to be insulated therefrom. This arm 7 has, moreover, a projection 8 which covers a contact track 9 which is secured to the inside of the upper part 3 so as to be insulated therefrom. Soldering tags 10, which are connected with this contact track and with the ends of the horseshoe-shaped covering layer are secured to this upper part so as to be insulated therefrom.

The construction may, of course, also be such that the layers 4 and 5 are provided in the lower bottom part 1 and that the brush 6 is arranged on the other side of the arm 7.

The hot water-basin consists of the basin proper 11 which is pressed from artificial resin. On the outside it is covered with a strip 4 of insulating lacquer to which is applied a strip 5

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of conductive lacquer which is connected to a conductor 12 in a manner which is not shown. In order to prevent contact with the parts under tension, the whole of it is enclosed in a tin envelope 13.

What I claim is:

1. An electrical resistance comprising a metallic support member provided with an oxidized coating on one side thereof, a layer of resistance material containing a conductive filler and an insulating binder over the oxidized coating, and a thin insulating layer containing the insulating binder of the resistance material and an insulating filler interposed between the layer of resistance material and the oxidized coating for increasing the insulation between the support and the layer of resistance material.

2. An electrical resistance comprising an aluminum support provided with an electrolytically oxidized coating on one side thereof, a layer of resistance material containing a conductive filler and an insulating binder over the oxidized coating, and a thin insulating binder of the resistance material and an insulating filler interposed between the layer of resistance material and the oxidized coating for increasing the in-

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sulation between the support and the layer of resistance material.

3. An electrical resistance element comprising an aluminum support, a layer of aluminum oxide thereon, a layer of resistance material over the aluminum oxide layer comprising a mixture of graphite and phenolformaldehyde lacquer, and a layer of phenolformaldehyde lacquer between the aluminum oxide layer and the resistance layer.

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