April 10, 1956 H. MAYLANDT ET AL 2,741,730

ELECTRIC CONDENSER

Filed Dec. 11, 1951

FIG.1

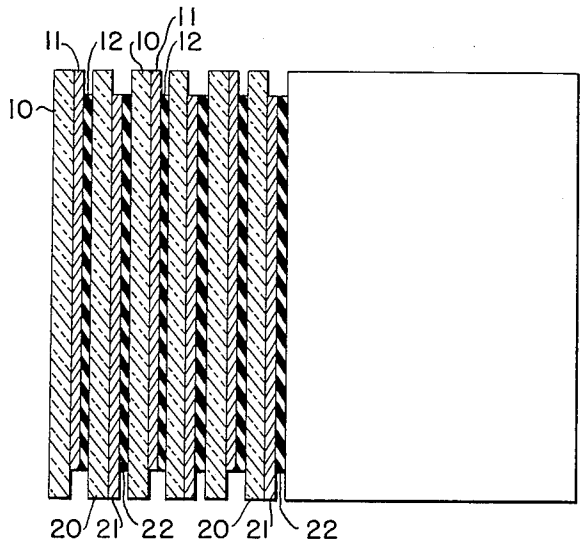
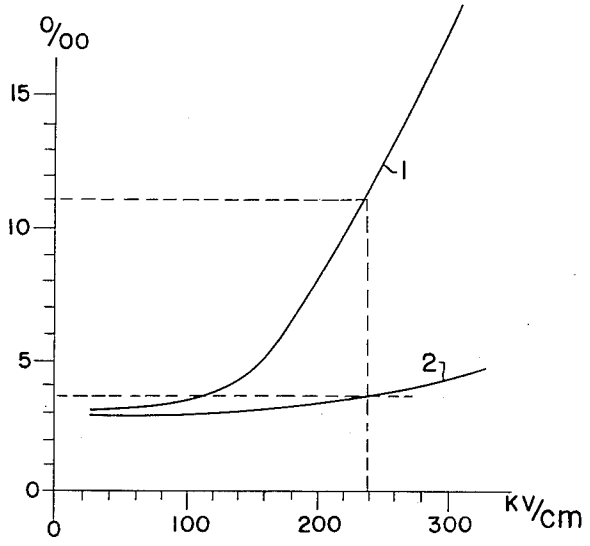


FIG.2



INVENTORS

HELMUT MAYLANDT
HERMANN STRAB

BY Stevens, Davis, Miller & Mosher

ATTORNEYS

United States Patent Office 2,741,730
Patented Apr. 10, 1956

2,741,730

ELECTRIC CONDENSER

Helmut Maylandt, Plochingen, and Hermann Sträb, Boll, Germany, assignors to Robert Bosch G. m. b. H., Stuttgart-W, Germany

Application December 11, 1951, Serial No. 261,052

Claims priority, application Germany December 13, 1950

1 Claim. (Cl. 317—258)

The present invention relates to electric condensers with at least one metal coating which is deposited onto a strip-like dielectric material and which is so thin that in the event of a puncture or breakdown occurring, the metal layer burns away around the point of puncture.

When using paper as the dielectric material for such condensers, the considerable porosity of this material has proved to be a great disadvantage, because the metal layer deposited onto the paper, for example with a thickness of 0.1μ, also enters the pores of the paper and thus forms needle-like projections which result in considerable ionisation and thereby tends to shorten the life of the condensers. This disadvantage has in fact been successfully and effectively combatted by applying a smoothing coating of lacquer to the uneven paper surface before metallizing. In this manner a metal layer somewhat free of needle-like projections was obtained resulting in metallized paper condensers substantially free of ionisation. The present invention envisages a way by which the same object can be achieved in a different manner.

According to the present invention the metallizing is applied directly onto the carrier dielectric material without an intermediate smoothing layer, and is then provided with an insulating coating.

Owing to the presence of insulating coatings, the field concentration causing ionisation particularly at needle-like projections of the metal layers projecting away from the carrier dielectric material, is rendered ineffective, whilst no harmful ionisation occurs at the needle-like projections of the metallization projecting into the dielectric material since these needle-like projections are covered by the dielectric material. In any case an equally good effect is obtained in a considerably more simple manner by the insulating coatings on the metallization, than by applying a coat of lacquer or varnish on the dielectric strips before metallization. The insulating coatings themselves may be considerably thinner than the aforementioned layers of lacquer used in the known types of condensers and consist, for example, of quartz, varnish or lacquer or any metal oxide. In the prior art, varnish or lacquer are used only to fill the pores of the paper base, as forementioned, and not, in accordance with this invention, used as a protective layer on the metal coatings. Thus we provide the lacquer or varnish as one means for providing an insulating coating upon the deposited metal layers of the condenser. After the depositing of the metal layer itself, the insulating coating is deposited on the metallization in the same vacuum vessel and in the same operation. Through this, considerable technical progress has been achieved in the method of construction of such condensers in contrast to those where the dielectric is varnished before metallizing.

At the same time one has merely to ensure that the edges of the metallized condenser strips which serve the purpose of making contact are not also covered by an insulating coating.

The persent invention will be further described with reference to the accompanying drawings in which:

Fig. 1 is a diagrammatic illustration by way of example of the construction of a condenser with coated plates and

Fig. 2 shows two curves which illustrate the effect of the insulating coating.

Acording to Fig. 1 a soda cellulose paper strip or band **10** of the glazing finish A is provided with a silvery zinc coating **11** about 5×10^{-5} mm. in thickness and with good burning out properties is applied by depositing. A permanent coating of magnesium oxide **12** is disposed on the zinc coating being deposited as metallic magnesium about 2×10^{-5} mm. in thickness, leaving uncoated the margin or edge of the coating **11** to serve for effecting contact with the zinc coating. A further strip or band of paper **20** with a zinc layer **21** and a magnesium oxide coating **22** is assembled with the band **10** to form a wound condenser in which the dielectric consists of the paper bands **10** and **20** and the metal layers are formed by the zinc layers **11** and **21** with magnesium oxide coatings **12** and **22.**

The curves reproduced in Fig. 2 show the relationship of the loss factor in percent and to the field strength in kv./cm. in an oil saturated condenser according to Fig. 1 (curve **2**) and in a condenser which is also saturated with oil, which differs only from the one according to Fig. 1 by the fact that its metal layers are not coated with magnesium oxide (curve **1**).

As will be apparent from the two curves, the loss factor of a condenser according to curve **1**, at a field strength for example of 240 kv./cm. is more than three times as great as that of a condenser according to curve **2** (the corresponding values being indicated in Fig. 2 by dotted lines). Thus the new condensers may be operated with a much greater field strength than under the otherwise similar conditions without the insulating coatings on the metal layers.

The improving effect of the coatings is obtained in condensers with metal layers deposited onto paper. The uneveness on the surface of other dielectric substances, such as synthetic foils such as polyethylene, are in fact less pronounced but nevertheless they are still present. Even in the case of an apparently perfectly even surface of dielectric the granulation alone of the metal layer deposited thereon causes a slight needle-like projection effect, which may be rendered ineffective by means of a permanent insulating coating.

In the appended claim, reference is made to "self-sealing" condensers, which are defined as condensers which contain at least one metal coating that is so thin that in the event of a breakdown or puncture said metal coating burns away around the point of puncture without damage or destruction of the condenser.

We claim:

An electric condenser built up from at least two bands or strips of dielectric material upon each of which is deposited a metallic coating, said metallic coatings being deposited directly on said bands or strips and being so thin that, in the event of a puncture, said metallic coatings burn away around the point of puncture, and a thin layer of insulating material deposited on each of said metallic coatings, said metallic coatings being of a thickness of 5×10^{-5} mm. and the layers of insulating material being of a thickness of 2×10^{-5} mm.

References Cited in the file of this patent

UNITED STATES PATENTS

1,784,611	Polanyi	Dec. 9, 1930
2,088,949	Fekete	Aug. 3, 1937
2,386,659	Clark	Oct. 9, 1945
2,399,313	Ballard	Apr. 30, 1946
2,614,524	Haynes	Oct. 21, 1952

FOREIGN PATENTS

453,939	Great Britain	Sept. 21, 1936
618,934	Great Britain	Mar. 1, 1949