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METHOD FOR PRODUCING METALLIZED DIELECTRIC SHEETS

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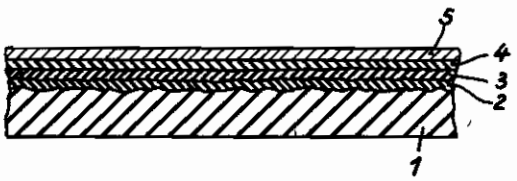

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METHOD FOR PRODUCING METALLIZED DIELECTRIC SHEETS

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This invention relates to a novel dielectric material for condensers and to a method of producing such dielectric material.

It has been heretofore suggested to produce a dielectric for condensers by first applying an insulating coating on one side of a dielectric sheet material which fills up the pores and depressions on the surface of the dielectric material, and then to deposit thereon the metal layer forming the condenser electrode according to a vacuum method. This process has the object of filling up the depressions and recesses on the surface of the dielectric which is to be metallized, by means of an insulating substance in order that the metal layer is applied on an absolutely plane surface and does not form points by penetration into the depressions of the dielectric which points would interfere with the operation of the condenser.

It has now been found that the resulting dielectric layer can be considerably improved and the disruptive strength increased by applying on the supporting sheet a plurality of layers of the insulating coating substance in a plurality of successive operations, to obtain a structure as indicated purely schematically in the figure, showing a cross sectional view, on an enlarged scale, of a metallized paper for the production of condensers, having the invention applied thereto.

The favourable effect of this procedure is probably due to the following phenomenons: The lacquers or varnishes which are preferably used for the production of the coating, or in fact any varnishes and lacquers now known have a relatively low percentage of constituents capable of forming a film, but a high percentage of solvents. Almost all these varnishes and lacquers contain more than 75 percent of solvents. On drying of the varnish or lacquer the solvents evaporate so that the thin spots and depressions will be formed again in the remaining film-forming substances. Therefore, a coating 2 consisting of one layer of varnish or lacquer on the paper 1 would not be reliable with regard to its disruptive strength. By application of a further coating 3, on the other hand, in accordance with the present invention, the depressions of the lower varnish layer are also filled up and smoothened. Of course, thin spots will also be formed in the second layer 3, but these will not be exactly above the thin spots of the first layer, but on other points. In this manner, it is ensured that a varnish layer of sufficient strength is provided everywhere between the paper or like support and the metal layer or condenser plating. The chance that any weak points exist in the dielectric layer may be further reduced by a third coating 4. It is extremely improbable that weak points of all the three layers coincide with each other on a single point of the dielectric and, therefore, the risk of disrupture is further reduced. Tests have shown that where 90 punctures occur per one meter, for example, at a tension of about 950 volts, with a paper having one coating layer, this figure is reduced to about 50 punctures with a paper on which two varnish or lacquer coatings are applied while with 3 coatings not more than 2,5 punctures have been measured. This will show conclusively that the chance for weak spots in all three varnish coatings coinciding on one point is extremely small. The metal coating 5 is applied after drying of the last insulating coating 3 or 4, in any suitable manner.

In the above mentioned example a paper of a thickness of 9,7 microns has been used. The thickness of the first varnish layer was 0,8 microns, while the thickness of two further varnish layers was 0,7 microns each. Accordingly the paper including its three coatings had a thickness of 11,9 microns. A paper of this thickness without a varnish or lacquer coating would by no means show these favourable values. For example a paper of 9,7 microns thickness, without a coating, for example, was found to have 660 punctures per meter already at a tension of 680 volts.

The successive coatings may be all approximately of the same thickness, but it is also possible to provide a second and third layer of less thickness, to keep the total thickness of the varnish coatings at a low figure. For the same reason, a two-fold coating is in general satisfactory for practical requirements, since the properties of a paper having a double coating meet absolutely the technical conditions. At least for the last coating a heat-resistant coating substance should be used which does not decompose on the subsequent metallising operation and does not yield any gas. The successive coating layers may be all applied in one operation or in a series of operations, immediately following each other, respectively, provided that provision is made for the preceding layer to be dried, by suitable drying apparatus, before the next coating station is reached.

A condenser made of metallized paper in accordance with the present invention has considerably higher values of insulating power and disruptive strength compared to condensers produced of paper to which one varnish coating only has been applied.

The method and apparatus of the present invention have been described in detail with reference to specific embodiments. It is to be understood, however, that the invention is not limited by such specific reference but is broader in scope and capable of other embodiments than those specifically described and illustrated in the drawing.

By way of example a solution of cellulose in an ether may be used as a coating material for the first coatings and a solution of nitrocellulose in an ester may be used for the last coating, since this material meets with the above specified conditions regarding heat-resistant properties.

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