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ARRANGEMENT FOR PREVENTING MARGINAL DISCHARGES

Filed April 7, 1923
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Application filed April 7, 1923. Serial No. 380,362.

To all whom it may concern:

Be it known that I, Emil Pfiffner, a citizen of the Republic of Switzerland, residing at Fribourg, Switzerland, have invented certain new and useful Improvements in Arrangements for Preventing Marginal Discharges (for which I have filed application in Germany Feb. 11, 1923), of which the following is a specification.

The practical stress of a condenser is limited by the voltage at which the marginal discharges will commence in the coatings. These marginal discharges will heat and destroy the insulating material after a shorter or longer period of working and therefore have to be prevented.

A more or less satisfactory means for increasing the limit of voltage of the marginal discharges is formed by an insulating filling of great insulating strength, which will properly fill-up all spaces and will oppose to the concentrated electric field at the margin of the coating a greater disruptive strength than air.

Generally liquid insulating means possess a smaller insulating strength than solid insulating means and further possess or produce other drawbacks, while solid insulating filling possess the drawback, that owing to a temporary overloading and momentary marginal discharges, which do not destroy the dielectric of the condenser, the filling material is pierced or punctured and thus reduce the limit of the marginal discharge.

The arrangement according to the present invention has for its object to prevent the marginal discharges by reducing the potential difference at the coating-margin and by providing margins of a great electric resistance and by making the condenser independent from the marginal discharges, at least as far as the quality of the filling material is concerned.

In the accompanying drawing:

Figure 1 is a view of a known type of condenser.

Figure 2 is a view of the improved condenser.

Fig. 1 shows the field development on the margin of the known type of plate condenser, \( i \) designating the dielectric and \( a^1 \) and \( a^2 \) the coatings of the condenser. The lines \( j \) illustrate the electric field-lines. Directly at the margin of the coatings \( a^1 \) and \( a^2 \) the electric displacement outside the dielectric \( i \) is of the same value as in the dielectric \( i \). However as the medium around the condenser generally is of a smaller dielectric constant than the dielectric \( i \), the electric strength of field will be increased in the same proportion, and further as the disruptive strength of the insulating filling generally is smaller than that of the dielectric \( i \), a partial disruption and formation of sparks will arise at the margin.

In the arrangement illustrated in Fig. 2 constructed according to the present invention, the coatings \( a^1 \) and \( a^2 \) are furnished resistance-margins \( \omega^1 \) and \( \omega^2 \). The charging current will produce a voltage-drop in the resistance-margins \( \omega^1 \) and \( \omega^2 \), so that with an increasing distance of the coatings \( a^1 \) and \( a^2 \) respectively the potential difference will decrease between the resistance-margins \( \omega^1 \) and \( \omega^2 \).

Thus the field development is as shown in Fig. 2, e. g. at the margin of \( \omega^1 \) and \( \omega^2 \) the strength of field is already so small, that the discharges explained with reference to Fig. 1 cannot occur.

The resistance-margins may be produced by applying a resistance material in a pulverized form, for instance graphite powder and so forth, whereby the said material is mixed with a binding means or paste, or the coatings may be made thin at the margin to permit the arising of the high resistance. This last mentioned mode of manufacture may be chosen preferably in such cases in which the coatings are produced by chemical precipitation or if they are applied by heat or in any other convenient manner.

The application of the process is not limited to plate-condensers, as it is applicable to condensers of any kind and for any desired dielectric, and further also as marginal fittings for any other apparatus than condensers.

1. An arrangement for preventing marginal discharge particularly in condensers, comprising an insulating material, a conducting material the margin of which rests on the insulating material, and a margin of resistance-material enveloping the margin of the conducting material in order to gradually decrease the potential difference at the edges of the latter acting on the insulating material.

2. An arrangement for preventing marginal discharges particularly in condensers, comprising an insulating material, a con-
ducting material the margin of which rests on the insulating material, and a margin of resistance-material enveloping the margin of the conducting material in order to gradually decrease the potential difference at the edges of the latter acting on the insulating material, the said resistance margin being formed by chemical precipitation of the same material as the coating.

3. An arrangement for preventing marginal discharge particularly in condensers, comprising an insulating material, a conducting material the margin of which rests on the insulating material, and a margin of resistance-material enveloping the margin of the conducting material in order to gradually decrease the potential difference at the edges of the latter acting on the insulating material, the said resistance margin being formed by another conducting material than the other part of the said coated conducting material is composed of.

In testimony whereof I hereunto affix my signature.

EMIL PFIFFNER.