

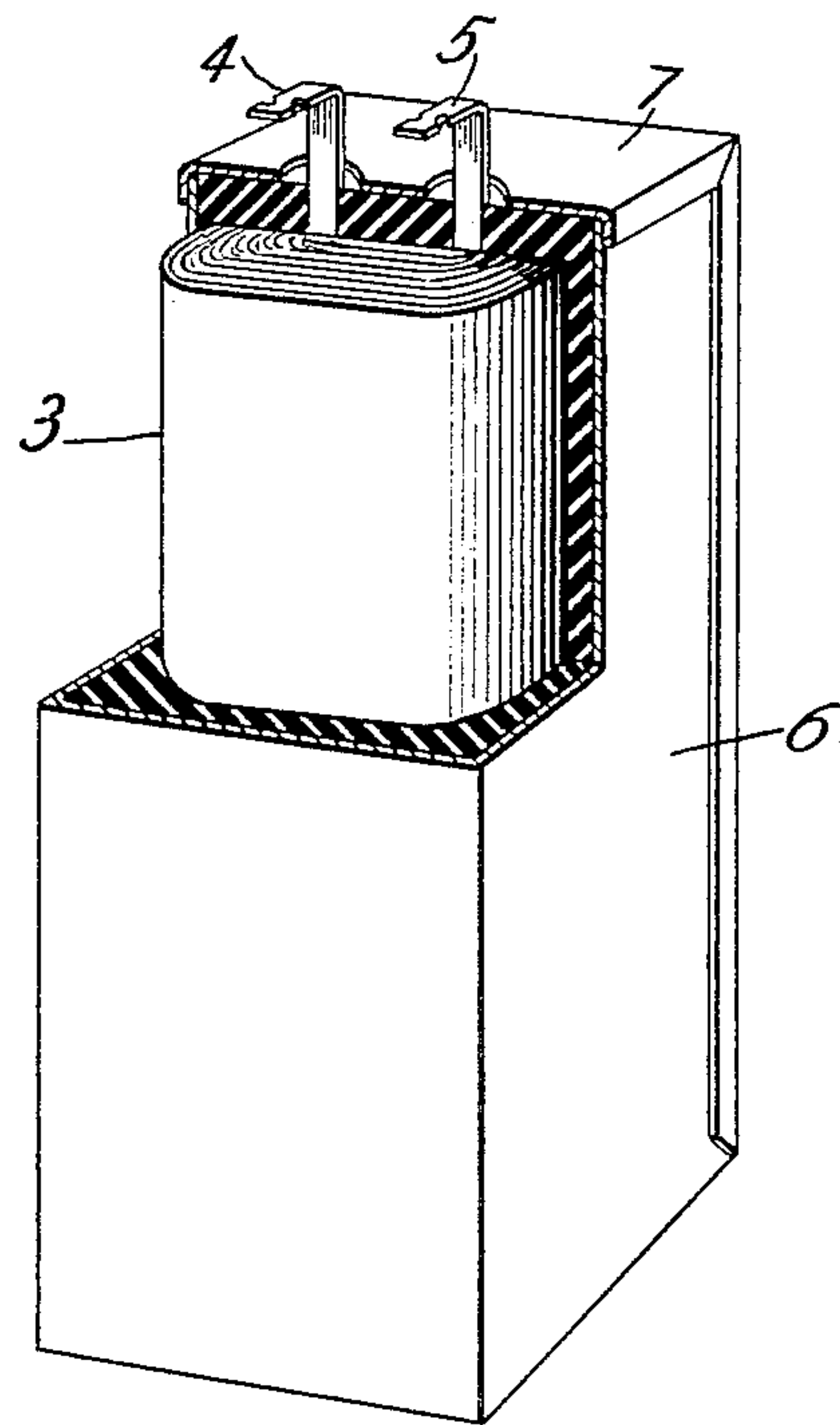
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ELECTRIC CONDENSER

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UNITED STATES PATENT OFFICE

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ELECTRIC CONDENSER

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This invention relates to condensers and more especially to what are commonly known as paper condensers.

The so-called paper condensers are made up of alternate sheets of paper and metal foil, or of paper on which a thin coating of metal has been deposited. The sheets may be either rolled or stacked.

In the higher grade condensers, especially those for use in telephone work, the sheets are either rolled or stacked and are then impregnated with a substance which is both an insulator and a moisture repellent. The resulting unit is then placed in a container, usually of metal, and the empty spaces in the container filled with a sealing compound. The condenser terminals are brought out through the sealing compound and prepared for connection to an external circuit.

Paraffin has been used as an impregnating compound in condensers, but when cold, it becomes crystalline and brittle, opening up cracks, and thereby permitting moisture to enter between the layers of the condenser. This diminishes the insulation resistance of the condensers and decreases its breakdown value. Furthermore in the case of condensers where a very high degree of precision is required the use of paraffin as an impregnating compound is sometimes unsatisfactory since condensers so impregnated may have as much as 3% lower capacity at 90° F. than at 70° F. and with increasing temperature rise the decrease is even more rapid.

An object of this invention is a condenser having a practically constant temperature-capacity characteristic, a high insulation resistance, and long life. A further object is a condenser having the above characteristics and which is small in size and inexpensive to manufacture.

Such a condenser is attained through the use of a mixture of petrolatum and mineral beeswax. This mixture may be used for both impregnating and filling. Petrolatum, or vaseline, is well known and needs no description; the mineral beeswax may be described as a saturated non-crystalline petroleum product wax having a melting point between 150° F. and 160° F. Although, somewhat

similar in appearance to paraffin wax, mineral beeswax, differs from paraffin both in electrical and chemical characteristics and properties. It resembles bees-wax in appearance and consistency, and on this account is called mineral bees-wax.

Petrolatum may be added to mineral beeswax in any proportions, the amount being determined by the degree of fluidity permissible when subjected to severe hot weather. It has been found that a mixture of about 75 parts petrolatum and 25 parts mineral beeswax, (or a mixture of mineral beeswax containing small amounts of hardeners, such as carnauba wax) is very satisfactory. Condensers impregnated and filled with this compound do not develop fine cracks when subjected to low temperatures, and in certain cases after impregnation with the above substance, the filling or sealing compound may be omitted. This results in a saving not only of cost but what in some cases is more important, a saving in space.

It has been found that a container impregnated with 75% petrolatum and 25% mineral beeswax will have an insulation resistance of ten times that of a paraffin and carnauba wax impregnated condenser when both are used without the filling compound.

A rolled paper condenser of the type to which this invention relates is shown on the attached drawing. The sheets of foil and paper or other insulation are formed into a roll 3 and provided with terminals 4 and 5. This roll is impregnated with a mixture, for example of 75% petrolatum and 25% mineral beeswax and is then placed in a container 6 preferably of metal. The spaces remaining between the roll and container are filled with the impregnating mixture. The condenser illustrated is capped with the metal cover 7 and no additional sealing compound is required. In certain cases a small space may be left at the top and a special sealing compound used in place of the metal cover.

Since condensers of the type described may be subjected to comparatively high temperatures, it is of importance that the impregnating compound has a melting point not less than 125° F. The preferred proportions of

the compound to meet this condition may be arrived at by adding mineral beeswax or a substance of similar properties to petrolatum until the desired condition is attained. Not only is the insulation of a condenser so impregnated greatly improved, but the electric capacity of the condenser remains more nearly constant with change in temperature. This characteristic, i. e. the constancy of the capacity, is greater with increasing amounts of mineral beeswax. For the attainment of the highest degree of constancy of capacity with varying temperatures it has been found that the usual type of paper and tin foil condenser unit should be impregnated with a mixture of petrolatum and mineral beeswax or its equivalent, having about 5% carnauba wax added.

Exact proportions for the attainment of the most constant value of electric capacity may be determined by consideration of the details of the variation of the electrical capacity of a condenser. Thus, before impregnation, it is found that the electric capacity increases almost uniformly with rise in temperature. When mineral beeswax alone is used for impregnation, its effect is like that of paraffin, namely, to lower the capacity of the condenser with rise in temperature. This effect of the mineral beeswax more than counteracts the tendency of the paper to raise the capacity with rise in temperature over the usual temperature range found in telephone practice. Petrolatum has the same effect on the condenser capacity as mineral beeswax, namely, it lowers the capacity with increasing temperature. Carnauba wax on the other hand, is similar in effect to paper and when added to the mineral beeswax or a mixture of mineral beeswax and petrolatum, it increases the capacity of the condenser as the temperature is increased. In general the addition of only a small amount of carnauba wax, for example, about 5%, is sufficient to offset the excess capacity lowering effect of the mineral beeswax and petrolatum mixture. It is therefore possible to obtain a mixture of the proper proportions of petrolatum, mineral beeswax or its equivalent and carnauba wax, which when used as an impregnating compound will produce a condenser the capacity of which will remain substantially constant when subjected to temperature variations normally met in practice.

What is claimed is:

1. An electrical condenser comprising a container enclosing layers of metal foil and paper and an impregnating and filling mixture containing petrolatum and mineral beeswax.

2. An electrical condenser comprising alternate layers of metal foil and paper, said paper being impregnated with a mixture containing petrolatum and mineral beeswax.

3. An electrical condenser comprising a

container enclosing layers of metal foil and paper, and an impregnating and filling mixture containing petrolatum, mineral beeswax and a small amount of carnauba wax.

4. An electrical condenser comprising a container enclosing layers of metal foil and paper and an impregnating and filling mixture containing 70%-75% petrolatum, 20%-25% of mineral beeswax and 5%-10% carnauba wax.

5. In a paper-metal foil condenser, an impregnating mixture having as two of its constituents carnauba wax and mineral beeswax in such proportions that the temperature capacity characteristic is substantially constant.

6. In a paper-metal foil condenser, an impregnating mixture consisting of petrolatum, carnauba wax and mineral beeswax in such proportions that the temperature capacity characteristic of the condenser is substantially constant.

7. An electrical condenser comprising a container enclosing layers of metal foil and paper, and an impregnating and filling mixture containing petrolatum and a saturated non-crystalline petroleum product wax having a melting point between 150° F. and 160° F.

8. An electrical condenser comprising a container enclosing layers of metal foil and paper and an impregnating mixture containing petrolatum and a saturated, non-crystalline wax having a melting point of not less than 150° F.

In witness whereof, I hereunto subscribe my name this 25th day of May, A. D. 1926.

ELLERY T. HOCH.