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R. E. MARBURY

1,626,684

CONDENSER

Filed Oct. 1, 1923

Fig. 1.

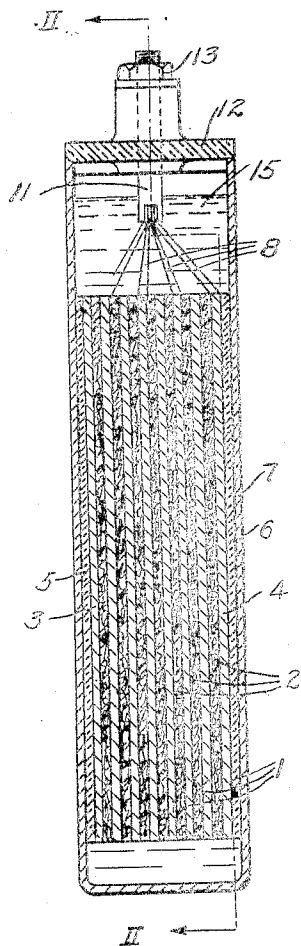
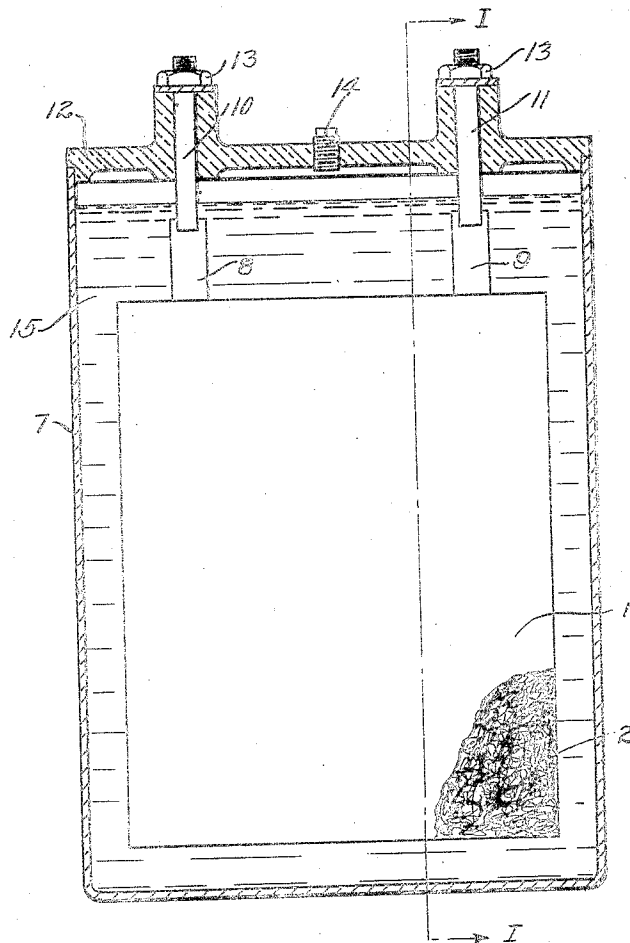


Fig. 2.



WITNESSES:

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CONDENSER.

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My invention relates to static electric condensers and more particularly to an improved dielectric for use therein.

An object of my invention is to provide an efficient and inexpensive dielectric for condensers adaptable for high frequency use, which shall result in extremely low losses under conditions in which such a dielectric can be suitably employed.

Hitherto, various types of dielectrics have been proposed for condensers of the rolled or stacked types. It has been common practice to utilize thin sheets of paper of vegetable fiber as a dielectric between sheets of metal foil. This material is inexpensive but has a high power factor or loss, especially at high frequencies. In order to obtain a low loss material, sheets of mica have been used. However, mica is expensive and is difficult to obtain free from blemishes which cause breakdown thereof at high voltages and frequencies.

My invention consists substantially in providing asbestos as a dielectric in condensers especially adapted for high frequency applications.

My new dielectric is composed of pure asbestos, preferably in the form of sheets, which, in a condenser of the so-called stacked or rolled type, are interposed between the superimposed layers of foil. The sheets of dielectric may be saturated with oil and the condenser immersed in oil. The asbestos dielectric is very efficient in operation and is of exceeding cheapness.

Referring to the accompanying drawings, in which like numerals of reference indicate corresponding parts,

Figure 1 is a vertical cross-sectional view of a condenser embodying my asbestos dielectric, taken along line 1—1 of Fig. 2, and

Fig. 2 is a cross-sectional view of the condenser taken along line 2—2 of Fig. 1.

Referring more particularly to the drawings, a plurality of sheets 1 of metal foil are assembled in superimposed relation to each other with sheets of asbestos 2 therebetween. End plates 3 and 4 are placed on the sides of the assembly and insulating boards 5 and 6 placed thereon. The whole is inserted in a case 7 of metal which clamps the condenser body in place. Leads 8 and

9, secured to respective sets of sheets 1, are connected to terminals 10 and 11, respectively, said terminals being secured to the cover 12 of casing 7 by nuts 13. A screw plug 14 in cover 12 provides means for impregnating the condenser body and filling the casing 7 with oil 15.

In the use of mica in condensers, of the character herein referred to, it has been found difficult to secure pure mica sheets in desired sizes and when secured it has been necessary to cut the same to the desired size. The cost of the mica ranges from \$6 to \$7 a pound. In contrast with this, by the use of sheet asbestos impregnated with oil, I am enabled to produce a dielectric which, under most conditions, has as great efficiency as mica and the cost of which, at the same time, is substantially one-fifth thereof. A determination of the loss in my new condenser showed .164 of 1% whereas, a mica condenser under the same conditions showed a loss of .276 of 1%. Its losses are lower than the average losses of mica condensers and since the material may be fabricated and its purity may be controlled, all condensers with this dielectric may be kept low in losses, whereas with mica it is necessary to select the material and the quality of the natural product cannot be controlled in any way.

One of the advantages in the use of asbestos is that it may be operated continuously at about 100 degrees centigrade or at the same temperature as the mica dielectric whereas cellulose material, such as used in power factor correction condensers, will not stand an operating temperature higher than 60 degrees centigrade.

Asbestos has other advantages in that the losses are as low as or lower than those in a mica dielectric condenser and also because the purity of the asbestos may be controlled and thereby the quality and efficiency of the dielectric controlled. In some instances, the asbestos may contain free iron but this may be eliminated by oxidizing the iron or otherwise removing the same and thereby destroying any harmful effect that it might have in the dielectric, it having been further found that oxide of iron in small quantities in an asbestos dielectric is harmless and results in no substantial losses.

Although I have specified the use of sheet asbestos, it is to be understood that I do not wish to be limited thereto and that asbestos pulp or any suitable form of this material may be used alone or in combination with a binder having low losses, within the scope of my invention.

I claim as my invention:

1. An electrical condenser having a dielectric comprising substantially pure asbestos.
2. An electrical condenser having a dielectric comprising substantially pure impregnated asbestos.
3. An electrical condenser having a dielectric comprising substantially pure oil impregnated asbestos.
4. An electrical condenser having a dielectric comprising oil and pure asbestos.
5. An electrical condenser having a dielectric comprising pure sheet asbestos having substantially no free iron therein.
6. A low-loss electrical condenser having a dielectric comprising oil-impregnated sheet asbestos having substantially no free iron therein.
7. A low-loss electrical condenser having a dielectric comprising substantially pure asbestos impregnated with a dielectric substance containing oil.
8. A low-loss electrical condenser unit including superimposed layers of conducting material having a dielectric comprising asbestos having substantially no free metal therein disposed between the adjacent layers.
9. A low-loss electrical condenser unit including superimposed layers of conducting material immersed in oil having a dielectric comprising sheet asbestos having sub-

stantially no free metal therein disposed between the adjacent layers.

10. An improved low-loss condenser dielectric material which is susceptible of being fabricated in sheets of any desired size, consisting of substantially pure asbestos.

11. An improved low-loss condenser dielectric material which is susceptible of being fabricated in sheets of any desired size, consisting of asbestos containing substantially no uncombined metallic particles or impurities.

12. A low-loss electrical condenser unit including one or more pairs of parallel, spaced plates, each pair including a spacer comprising a fabricated sheet of substantially pure asbestos.

13. An improved low-loss condenser dielectric material which is susceptible of being fabricated in sheets of any desired size, consisting of substantially pure asbestos and a binding material.

14. An improved low-loss condenser dielectric material which is susceptible of being fabricated in sheets of any desired size, consisting of asbestos containing substantially no uncombined metallic particles or impurities and a binding material.

15. A low-loss electrical condenser unit including one or more pairs of parallel, spaced plates, each pair including a spacer comprising a fabricated sheet of substantially pure asbestos and a binding material.

In testimony whereof, I have hereunto subscribed my name this 26th day of September, 1923.

RALPH E. MARBURY.