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INSULATING MATERIAL (DUPLIX MICA)

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Fig. 1.

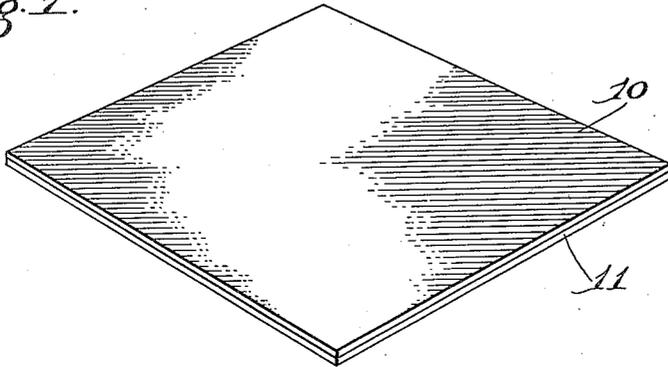


Fig. 2.

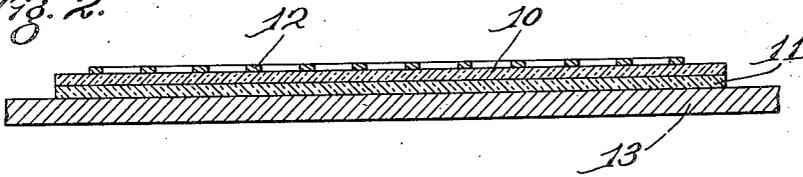
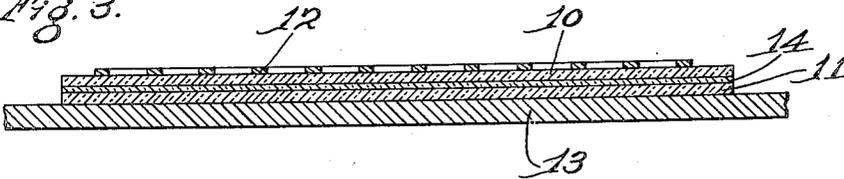


Fig. 3.



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# UNITED STATES PATENT OFFICE

1,925,341

## INSULATING MATERIAL (DUPLEX MICA)

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2 Claims. (Cl. 154—2.6)

This invention relates to improvements in insulating material or insulators and, more especially, such material or insulators in sheet form.

5 Among the features of my invention is the provision of insulating material in sheet form possessing beneficial characteristics or properties not heretofore obtained. The principal feature of my invention is the formation of such  
10 insulating material of two different kinds of mica fastened together, using in such material one sheet, at least, of each kind of mica, making, in effect, a duplex sheet of mica.

It is well known that mica possesses excellent  
15 properties as a dielectric at high temperatures but that there is a certain temperature at which it fails. This temperature at which it fails or decomposes is called its calcining point. This failure is very detrimental to a heating element because the decomposition products of mica are  
20 extremely corrosive to metals. When the resistor of a heating element reaches the calcining point, it reacts with the decomposition products of the mica and is thereby destroyed.

25 There are two distinct varieties of mica, namely, muscovite, sometimes called white mica, and phlogopite, sometimes called amber mica. These two varieties differ in composition and properties. Muscovite mica possesses higher dielectric strength and greater hardness. It also  
30 possesses greater insulating resistance than phlogopite. In fact, at high temperatures, the insulation resistance of phlogopite is so low that a very considerable leakage current will flow  
35 through it and thereby cause its failure by puncturing. There is also considerable lack of uniformity in the electrical properties of phlogopite mica. In other words, muscovite mica is a very good electrical insulator for electric heating elements, except for the fact that it calcines at a  
40 relatively low temperature, substantially somewhere between 1100° F. and 1200° F. Phlogopite mica, however, has a relatively high calcining point. Some varieties will stand temperatures ranging  
45 from 1800° to 2200° F. This form of mica, however, has a relatively low insulation resistance and high negative temperature co-efficient at elevated temperatures. When leakage occurs, the heating effect of the leakage current tends  
50 to accelerate the decrease of resistance and as soon as this becomes low enough, rupture of the dielectric occurs.

It is difficult to cover the whole surface of a heating plane with a resistor. Because of this,  
55 the energy density or temperature of the re-

sistor is considerably higher than the energy density or temperature of the heating plane. This means that in the ordinary heating unit, the temperature of the resistor is higher than the temperature of the dielectric at points re-  
60 moved a short distance from the resistor.

In the practice of my invention, I make use of the properties of the different kinds of mica above referred to and construct a heating element of two layers of mica fastened together,  
65 one layer being muscovite mica and the other, phlogopite mica. In the use of the insulator, the phlogopite mica is placed in contact with the resistor and the muscovite mica is placed in contact with the sheath or surface to be heated.  
70 For example, the phlogopite mica may consist of a single sheet or multiplicity of films aggregating a total thickness of from .002 to .005 inch and the muscovite mica may consist of a  
75 single sheet or multiplicity of films having a total thickness of from .007 to .010 inch.

The invention is illustrated in the accompanying drawing, in which—

Figure 1 is a view in perspective of a sheet of insulating material embodying my invention; 80  
Fig. 2 is a view showing the same as used in a heating appliance; and Fig. 3 is a similar view showing a modified form of insulating material.

As shown in the drawing, the insulating material consists of a duplex of double sheet of mica  
85 including an upper layer 10 of phlogopite mica and a lower layer 11 of muscovite mica, the two layers being fastened together.

When the insulating material is used, as shown in Fig. 2, the phlogopite mica is placed  
90 next to or in contact with the resistor 12 and the muscovite mica is placed next to or in contact with the sheath or wall 13 of the appliance to be heated.

The insulator shown in Fig. 3 is substantially  
95 the same as illustrated in Fig. 2, except that the two sheets of mica 10 and 11 are fastened together by a layer of cement 14.

I have also found that a double sheet of mica or duplex mica has higher dielectric strength  
100 per unit of thickness than either of the two kinds of mica alone.

While I have shown and described certain embodiments of my invention, it is to be understood that it is capable of many modifications.  
105 Changes, therefore, in the construction and arrangement may be made without departing from the spirit and scope of the invention as disclosed in the appended claims, in which it is my intention to claim all novelty inherent in my inven-  
110

tion as broadly as permissible, in view of the prior art.

to a sheet of muscovite mica.

What I regard as new, and desire to secure by Letters Patent, is:

2. Insulating material including a sheet of phlogopite mica superimposed upon a sheet of muscovite mica, the two sheets being fastened together by cement.

5 1. Insulating material including a sheet of phlogopite mica superimposed upon and fastened

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