

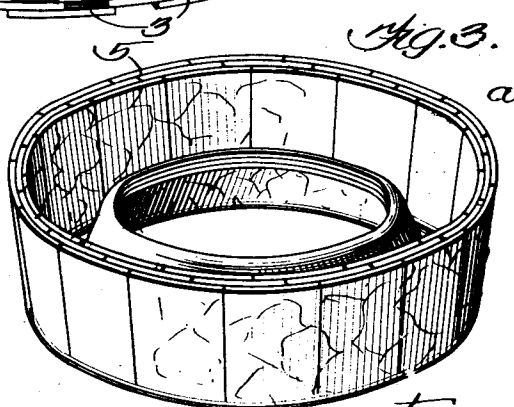
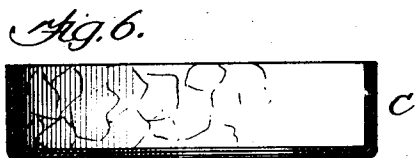
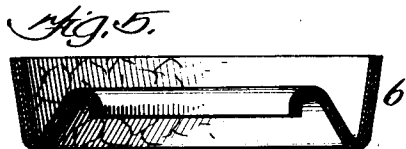
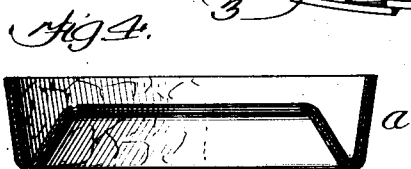
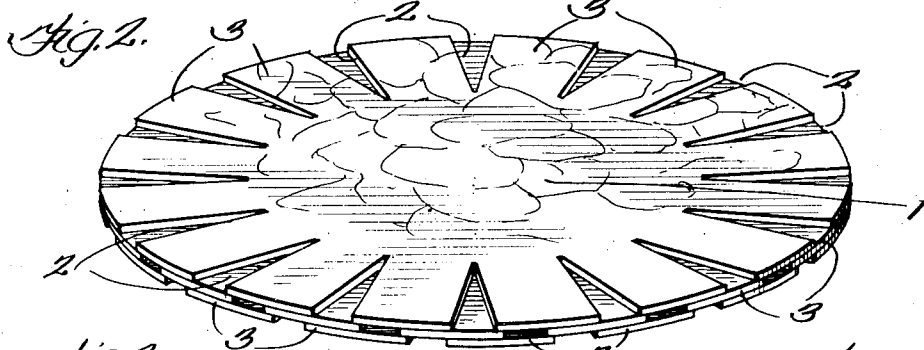
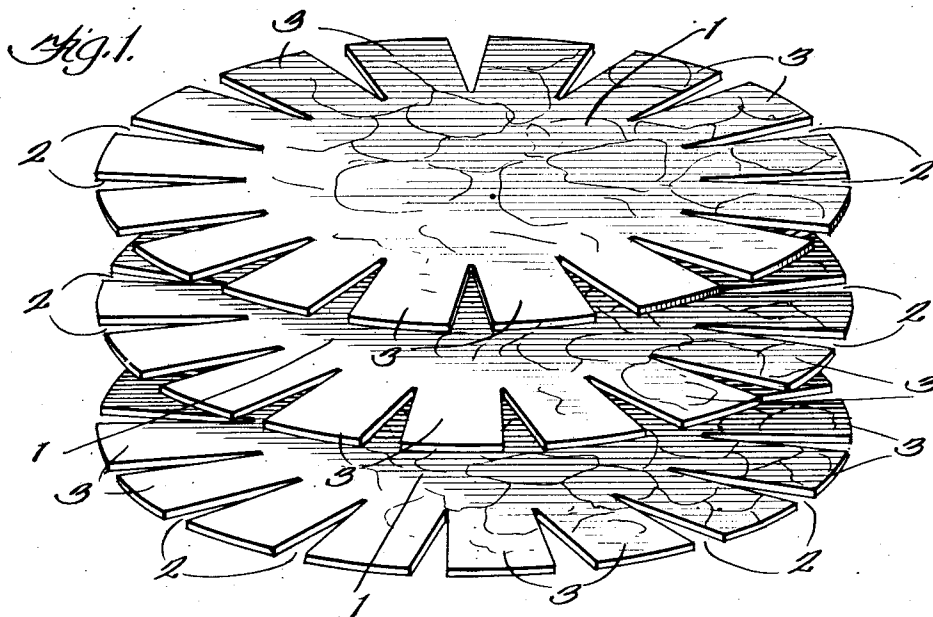
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INSULATING RING AND METHOD OF MAKING THE SAME

Filed June 7, 1924



Inventor:
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UNITED STATES PATENT OFFICE.

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INSULATING RING AND METHOD OF MAKING THE SAME

Application filed June 7, 1924. Serial No. 718,481.

My invention relates to insulating bodies of the class used, for example, in electric motors and generators to insulate various parts of the apparatus from each other. My invention relates particularly to insulating bodies having annular flanges of various shapes and the object of the invention is to produce a body of this character which shall be efficient as an insulator and at the same time possessed of a high degree of strength and uniformity of structure. My invention is especially useful in connection with the formation of insulating bodies or "rings" formed of mica plate. Mica plate is a known article and consists of mica flakes held together by shellac or other suitable binder. It is plastic when hot and may be configured by subjection to heat and pressure. It is known to form rings from mica plate, but according to methods heretofore employed the flanges have not been of uniform strength or consistency throughout their periphery. The flanging process has caused a distortion in the material and frequently the mica has been crushed to a perceptible degree, thus weakening both its structural and its di-electric properties. My purpose is to obtain a simple and reliable method by which these imperfections may be avoided and a ring of uniform strength produced free from internal stresses and strains and of uniform consistency.

I accomplish my object in the manner illustrated in the accompanying drawings in which

Figure 1 shows three discs of mica plate or similar sheet material from which a ring may be produced. These are shown with slots in their periphery and are separated for the purpose of showing their outline.

Figure 2 is a view similar to Figure 1 but showing the sheets superposed in contact with each other.

Figure 3 is a perspective view of a completed ring.

Figures 4, 5 and 6 are diametral sectional views of different configuration.

Like numerals denote like parts throughout the several views.

In practicing my process I first produce the sheet material, preferably mica plate composed of flakes of mica held together by shellac or other suitable binder. This sheet material is plastic in the sense that it can

be configured when hot. From this sheet material I produce a number of blanks, typical ones of which are shown in Figure 1 and indicated by the reference numeral 1. In the case illustrated they are circular in outline and have radial slots 2 cut in their peripheries at spaced intervals. Usually these slots are in the form of sectors arranged radially although their sides may or may not be exactly radial, this depending upon the shape of the flange ultimately desired. Ordinarily the angle will be such that when the flange is finally formed the tongues or "dovetails" will come edge to edge or approximately so. The sheets thus prepared may be referred to as the "blanks".

After they are formed, the blanks to a predetermined number are laid one upon another in staggered relation as shown in Figure 2, that is, they are superposed in such a manner that the slots are out of register and the slots of one sheet will come opposite to the blank portions or tongues 3 of the adjacent sheet.

The pile of blanks thus arranged is then subjected to the action of a drawing die. Mica plate is plastic when hot and the die may be heated if desired, but I have found that by preparing and arranging the blanks in the manner described, excellent results may be obtained by heating the blanks beforehand and inserting them while hot into a cold die. By this method the material is already plastic before reaching the die and the die, being cool, will rapidly configure the material and promptly cool it. This greatly increases the output over the amount that could be obtained by employing a heated die. In either case the pressure of the die not only configures the material but also binds the laminations into a single unitary structure. Apparently the binder is forced from the body of the mica sheets partly onto the surface of the sheets and being hot thus cements the sheets together. In the finished article the laminations are not apparent and the article has the appearance of a solid close knit structure.

A suitable die may be made in different ways and its configuration will depend upon the configuration desired in the ultimate product. In Figures 4, 5 and 6 I have shown finished products of different form. The form *a* shown in Figure 4 is frequently denominated in the trade a "V ring", that

shown in Figure 5 a "Z ring" and that shown in Figure 6 an "L ring". While electric motors and generators usually require rings in which the central portion is cut away, it will be evident that the same method may be applied to the production of cup shaped or plain dished bodies, the central portion whereof is imperforate. If rings having their central portion removed are to be produced, the central portion of the material may be punched out prior to the insertion into the die or it may be removed by the die itself during the forming process. In producing rings for motors and generators of the larger sizes it is preferable, for economy's sake, to remove the central portion first, as the portion removed can then be used for producing rings of smaller sizes.

It will be evident by referring to Figure 3 that the finished ring when made in accordance with the preferred proportions will have a flange 5 in which the tongues 3 are closed up in the sense of having their edges substantially in contact with each other and the flanges will be composed of a plurality of layers of tongues which overlap each other. Thus the ring may be said to have a composite "butt and lapped" flange.

Rings produced in this manner possess remarkable strength and uniformity structurally and uniform insulating properties. It will be evident that the mica in the flanges is configured without being crushed or distorted. Mica has a crystalline structure and if subjected to undue pressure or stress of any kind will tend to crush. Such crushing occurs where the flanges are not notched and are configured by a mere drawing, and the ring is formed of a single sheet instead of a plurality of thin superposed sheets. In bodies produced by my process and having laminations of mica sheets with "butt and lapped" flanges there is no distortion nor crushing and the finished article is strong and of uniform properties throughout.

While my invention is especially applicable to mica plate it is not necessarily confined thereto for other plastic sheet material may be employed. For example, the sheet material may consist of canvas or other woven fabric impregnated with a binder other than shellac, for example, "condensation product" sometimes called "synthetic resin" and produced by reacting formaldehyde and phenol in the presence of a reagent. It is known to produce hard bodies by subjecting to the action of heat and pressure layers of woven fabric saturated in such condensation product and I may apply the principle of my invention either to mica sheets or to woven fabric saturated in such condensation product. In using condensation product as a binder, however, a subse-

quent baking process will be performed for curing the ring and rendering it infusible and insoluble.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. A laminated insulating body of plastic sheet material in the form of concentric discs, said body having an annular flange with spaced sectors removed from the sheet material to permit configuration of the sheet without distortion.

2. An insulating body having an annular flange and composed of a plurality of laminations of plastic sheet material, each sheet having sector shaped slots to permit the flange to be formed without distortion and the slots being staggered to produce a lapped flange.

3. An insulating ring having a central opening and an integral flange, the ring being composed of circular, concentric laminations of mica plate and the flanged portion being of butt and lapped construction.

4. The method of making insulating bodies consisting in taking a plurality of layers of circular mica sheets piling them concentrically and subjecting them while hot to the action of a drawing die.

5. The method of making flanged insulating bodies consisting of preparing a plurality of sheets of plastic insulating material having radial slots in the periphery, staggering the sheets so that the slots shall be out of register, and subjecting the pile of sheets while hot to the action of a drawing die to produce a flange from the slotted portion of the sheets.

6. The method of producing flanged insulating bodies consisting in preparing a plurality of blanks of plastic insulating material, cutting notches in the periphery of the blanks, arranging the blanks in a pile with the notches out of register, heating the blanks to render them plastic, and subjecting the pile of blanks while in plastic condition to the pressing action of a drawing die to thereby produce a lapped flange and simultaneously unite the blanks to each other.

7. The method of producing flanged insulating bodies consisting in preparing a plurality of circular blanks of mica plate, cutting sector shaped slots at spaced intervals in the periphery of the blanks, arranging the blanks in a pile with the sectors out of register, heating the material to render it plastic, and while the material is plastic forming an annular flange in the pile of blanks to an extent which will cause the dovetails between sectors to meet edge to edge.

8. The method of producing insulating rings consisting in preparing a plurality of circular blanks of mica plate, cutting sector

shaped slots at spaced intervals in the periphery of the blank, arranging the blanks in a pile with the tongues between sectors overlapping each other, heating the material to render it plastic, and while the material is plastic forming an annular flange in the pile of blanks to an extent which will cause the tongues to close up, substantially edge to edge, and chilling the material simultaneously with the forming operation.

9. The method of producing insulating rings and the like consisting in making thin sheets composed of mica flakes and a binder capable of becoming plastic when heated, preparing circular blanks from said sheets,

forming radial tongues at the periphery of the blanks, said tongues having spaces between them, arranging the blanks in a pile with the tongues overlapping each other, heating the sheets to render them plastic, forming a flange of tongued portion of the pile while the material is plastic, and simultaneously exerting pressure upon the formed sheets to cause the binder to exude from the body of the sheets into the spaces between sheets, and compressing the whole into a unitary structure.

In witness whereof, I have hereunto subscribed my name.

LOUIS T. FREDERICK.