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G. M. LITTLE

LIGHTNING ARRESTER

Filed July 13, 1922

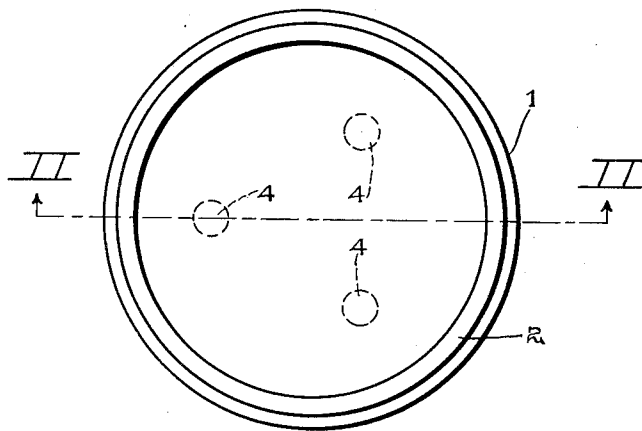


Fig. 1.

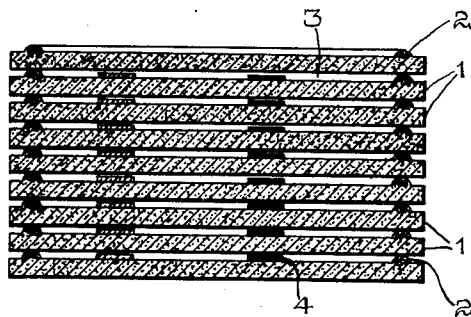


Fig. 2.

WITNESSES:

*C. M. Cochran*  
*H. C. Bierman*

INVENTOR

George M. Little

BY

*Wesley E. Carr*  
ATTORNEY

## UNITED STATES PATENT OFFICE.

GEORGE M. LITTLE, OF PITTSBURGH, PENNSYLVANIA, ASSIGNOR TO WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA.

## LIGHTNING ARRESTER.

Application filed July 13, 1922. Serial No. 574,763.

*To all whom it may concern:*

Be it known that I, GEORGE M. LITTLE, a citizen of the United States, and a resident of Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Lightning Arresters, of which the following is a specification.

This invention relates to lightning arresters, more particularly to lightning arresters comprising a series of disks of resistor material in superposed relation.

In the copending application of Joseph Slepian for lightning arresters, filed February 11, 1922, Serial No. 535,810 and assigned to the Westinghouse Electric & Manufacturing Company, is described a new type of lightning arrester comprising a series of plates or disks of high-resistance material placed in contact with each other. Suitable terminals secured to the end plates of the structure are utilized to connect the same in a suitable electrical circuit to be protected.

Owing to the high resistance of the material, substantially no current passes therethrough at the normal operating voltage of the circuit to be protected, but, upon the application thereto of a high abnormal voltage, such as a lightning discharge, the gaps between adjacent contacting plates break down, initiating a glow discharge which spreads uniformly over the surfaces of the plates, thus providing a discharge path for the abnormal voltage.

It has been found that, in some cases, the power current tends to flow through the lightning arrester after the abnormal voltage has been discharged. This, in a measure, occurs because of fine particles of material which tend to bridge the small gaps between the plates and to the resistance of the plates which must not be so high as to unduly limit the discharge capacity of the lightning arrester.

To obviate this disadvantage, the plates have been provided with integral ribs of high-resistance material in order that the plates may make contact at a relatively small number of points of high resistance and, therefore, prevent the power current from flowing after the lightning discharge has passed through the arrester. Generally,

the ribs have been made of higher-resistance material than the body, this being accomplished by oxidizing them by contact with a heated plate. This improvement is described and claimed in the copending application of Joseph Slepian for disk structure, filed February 16, 1922, Serial No. 536,910 and assigned to the Westinghouse Electric & Manufacturing Company.

It has been found desirable, in this type of lightning arrester, to have the plates of high-resistance material of large size in order that the discharge capacity of the lightning arrester may be increased.

It is, therefore, an object of this invention to provide a lightning arrester of the disk-pile type which shall be simple in construction, efficient in operation and particularly adapted to structures embodying plates or disks of relatively large size.

In such lightning arresters, it is desirable that the depressed portions of the disks or plates be made very shallow, preferably less than 10 mils in depth. This is difficult to accomplish in disks or plates of large diameter on account of the danger of warping of the plates in the molding, drying and baking operations. Because of such warping, the plates, when superposed in a pile, are likely to touch at various points on the depressed portions instead of only at the elevated or rib portions along the edge of the plates.

I propose, therefore, to insert in the depressed portions of the plates, spacers of suitable insulating material which will effectively prevent the disks or plates from touching at such intermediate depressed portions. Generally, the spacers are slightly thinner than the depth of the depressed portions of the plates or disks. I have found that small bits of mica are suitable for this purpose.

In the accompanying drawings constituting a part hereof and in which like reference characters indicate like parts,

Figure 1 is a plan view of a pile or stack of plates or disks comprising the lightning arrester, and

Fig. 2 is a sectional view along line II—II of Fig. 1.

A series of plates 1 of high-resistance ma-

terial consisting of kaolin, carborundum and graphite molded and baked to harden the same are provided with integral elevated portions or ribs 2 along the peripheries thereof. The ribs 2 may be made of higher resistance than the body portions, said result being accomplished in any suitable manner. The assembled plates or disks provide gaps 3 therebetween through which the discharge of an abnormal voltage takes place.

On account of the large surface of the plates relative to the thickness, there is danger of the plates warping and bending slightly out of true planes and, therefore, of making contact at various points along the depressed portions thereof. Said portions are very shallow, being generally less than 10 mils in depth, and a slight amount of warping is sufficient to cause contact between adjacent plates. Since the resistance of the body portions of the plates is low, as compared with that of the ribs 2, the leakage current of the arrester will, in such case, be considerable, and the danger of burning the plates at such points, owing to a discharge of abnormal voltage through the lightning arrester, is greatly increased. I, therefore, provide spacers 4 of any suitable material preferably of mica.

These spacers may be of any suitable size and form but I have found that comparatively small pieces placed at a few points on the depressed portions of the plates suffice to prevent contact between adjacent plates. I usually make the thickness of the mica spacers 4 slightly less than the height of the ribs 2 in order that said spacers may make contact with only one of the plates and be separated from the adjacent plate by a small distance. To hold the spacers in place, I cement the same to their respective plates.

I have found that the above-described structure constitutes ample protection against the danger of warped plates making contact at the intermediate portions thereof, and the mica spacers, even though contact is made between the same and two plates, do not allow an appreciable leakage current to pass through the arrester.

Although I have described a specific embodiment of my invention, it will be obvious to those skilled in the art that various modifications may be made in the details of construction thereof within the scope of my invention. For instance, instead of a single rib, the plates may be provided with a plurality of ribs, and the spacers may be of different size and shape than shown and of other materials than mica. These and other changes in the construction of my lightning arrester may be made without departing from the spirit of my invention.

I claim as my invention:

1. A lightning arrester comprising a plu-

rality of plates of high-resistance material, elevated portions thereon to keep the major parts thereof separated and a thin spacer of insulating material therebetween.

2. A lightning arrester comprising a plurality of plates of high-resistance material, elevated portions thereon to keep the major parts thereof separated and a thin spacer of insulating material therebetween, the thickness thereof being less than the normal distance between adjacent plates.

3. A lightning arrester comprising a plurality of plates of high-resistance material, elevated portions thereon to keep the major parts thereof separated and a thin spacer of mica therebetween.

4. A lightning arrester comprising a plurality of plates of high-resistance material, elevated portions thereon to keep the major parts thereof separated and a thin spacer of mica therebetween, the thickness thereof being less than the normal distance between adjacent plates.

5. A lightning arrester comprising a plurality of plates of high-resistance material, elevated portions thereon to keep the major parts thereof separated, a thin spacer of insulating material therebetween and means for cementing said spacer in position.

6. A lightning arrester comprising a plurality of plates of high-resistance material, elevated portions thereon to keep the major parts thereof separated and a thin spacer of insulating material therebetween making contact with one of said plates and separated from the adjacent plate.

7. A lightning arrester comprising a plurality of plates of high-resistance material, elevated portions thereon to keep the major parts thereof separated and a thin spacer of insulating material therebetween, said spacer covering only a small portion of the separated surfaces.

8. A lightning arrester comprising a plurality of plates of high-resistance material, elevated portions thereon to keep the major parts thereof separated and a thin spacer of insulating material therebetween, the elevated portions being less than 10 mils in height above the planes of the depressed portions.

9. A lightning arrester comprising a plurality of plates of high-resistance material, elevated portions thereon to keep the major parts thereof separated and a thin spacer of mica therebetween, the thickness of said spacer being of the order of 1 mil.

10. A lightning arrester comprising a plurality of plates of high-resistance material, elevated portions thereon to keep the major parts thereof separated, a thin spacer of insulating material therebetween and means for cementing said spacer in position in spaced relation to said elevated portions.

11. A lightning arrester comprising a

plurality of contacting plates, at least one of said plates being of high-resistance material and having elevated portions thereon to keep the major parts thereof separated, and a thin spacer of insulating material therebetween, said spacer covering only a small portion of the separated surfaces, the spacing and resistance being such that the space-current flow always takes the form of a glow-discharge. 10

In testimony whereof, I have hereunto subscribed my name this 11th day of July, 1922.

GEORGE M. LITTLE.