May 1, 1928. 1,668,310

G. R. FOLDS

LIGHTNING ARRESTER

Filed May 28, 1923

Fig. 2

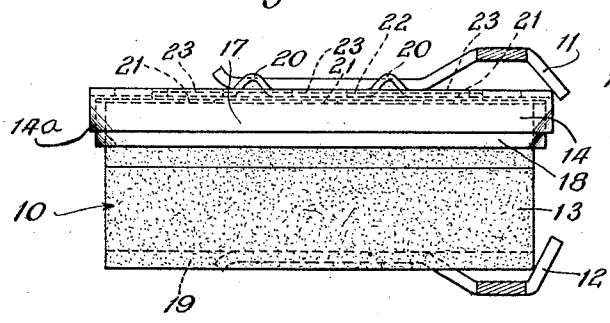


Fig. 3

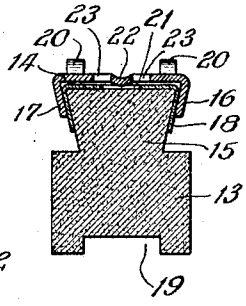


Fig. 4

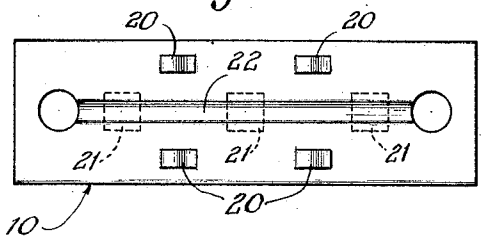
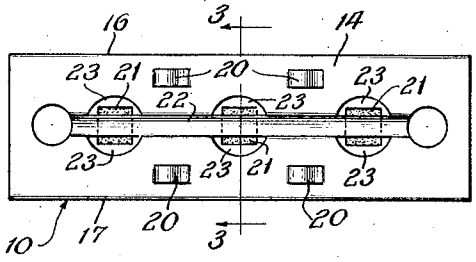


Fig. 1



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UNITED STATES PATENT OFFICE.

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LIGHTNING ARRESTER.

Application filed May 28, 1923. Serial No. 642,023.

This invention relates to lightning arresters or gap dischargers and more particularly to improved lightning arresters or discharge gap units designed for use in connection with comparatively low voltage electric circuits, such as telephone, telegraph and signal systems to provide for high potential discharges.

One object of this invention is to provide a gap discharger of the character indicated wherein the spacing of the conducting members comprising the discharge gap is very accurately and uniformly maintained.

A further object of this invention is to provide in a device of the character indicated a unitary construction which is susceptible to rapid commercial production and assembly in large quantities and which is at the same time provided with very accurately spaced discharge electrodes, such accurately spaced members insuring the uniform and dependable electrical operation of the device.

A further particular aim of this invention is to provide conducting members forming the discharge gap that are constructed in a manner to readily permit the removal or escape of the products of deterioration resulting from arcing between the conducting members.

Other objects of the invention will become apparent from the following description and accompanying drawings and the appended claims.

For purposes of description and illustration, a specific embodiment of this invention is shown in the accompanying drawings, in which—

Figure 1 is a side view of a device embodying the invention;

Fig. 2 is a view taken at right angles to that of Fig. 1, showing the device embodying the invention as retained between a pair of spring supporting and connecting clips;

Fig. 3 is an end view of a device as shown in Fig. 2;

Fig. 4 is a view similar to that of Fig. 1, but showing a slightly modified form of structure.

The device forming the subject matter of this invention may comprise a unitary structure or assembly 10 in the form of a discharge gap which provides a path for high potential discharges between the terminals of any device which it is desired to protect against the effects of such high potentials. In the modification shown in the illustrations, the assembly 10 may be supported, retained and electrically connected to the desired electrical terminals by means of a pair of spring clips 11 and 12, between which the unit 10 forms a high potential discharge path.

The unit 10 briefly may comprise a block 13 of carbon, or other suitable conducting material, and a conducting strip or electrode plate 14 which may be crimped around a portion of the carbon block 13 in a manner to form a dove-tail joint between a tenon portion 15 formed upon the block 13 and a mortise portion comprising a pair of flanges 16 and 17 formed upon the electrode plate 14. The plate 14 may be conveniently electrically and mechanically spaced from the carbon block 13 by means of a layer of dielectric 18 composed of any suitable insulating material preferably pliable and such as celluloid. The dielectric 18 may be preferably composed of material which will melt or be destroyed under severe heat and thus permit the arrester to ground under continued arc.

After the electrode plate 14 and the dielectric 18 are properly assembled upon the carbon block, the corners of the flanges 16 and 17 may be bent over as indicated at 14^a, thus effectively and permanently retaining these parts in their proper relative positions.

A groove 19 at one edge of the carbon block 13 provides means for slidably receiving the spring contact and support 12. The electrode plate 14 may also be provided with a number of struck-up portions or detents 20, spaced in a manner to serve a purpose similar to that of the groove 19 by slidably receiving the spring contact or support 11. It will be understood that the spring contacts 11 and 12 as here shown partly in section may be extended in any desired manner for connection with switchboards or other electrical apparatus.

The layer of dielectric 18 may be provided with a plurality of perforations as at 21 arranged preferably along the center line of the tenon portion 15. A portion of the electrode plate 14 adjacent these perforations cooperates with the adjacent portions of the carbon block, thus forming the electrodes of the gap discharger. The path of the high potential discharge through the device in-

cludes the arcing space between these electrode members at the perforations.

In order to insure an arcuate and uniform spacing of the discharge portions of the electrodes, the electrode plate 14 may be formed with an embossed or struck-down ridge 22 extending across the various perforations 21 and firmly resting upon the dielectric material adjacent the perforations. The use of such a ridge insures an accurate spacing of the electrodes at points in proximity of the perforations by a distance equal to the thickness of the dielectric. In other words, in case of any irregularities or unevenness in the formation of the electrode plate, the area of contact between the plate and the dielectric will always include the ridge 22. Consequently, the ridge which forms a discharge portion will be positioned at a predetermined distance from the carbon block depending upon the thickness of the dielectric used.

After excessive or continued arcing, the discharge portions of the electrodes may become deteriorated to a certain degree. In order to prevent possible short circuiting of the arrester or an inaccurate spacing effect of the electrodes, it is desirable that the products of deterioration should be permitted to escape or should be removable. Accordingly, the electrode plate 14 may be provided adjacent to each of the discharge portions with perforations 23 at either side of the depressed ridge 22.

The modification of the device as shown in Fig. 4 is similar to that shown in Fig. 1, except that the perforations 23 in the electrode plate 14 are omitted. The use of such a structure may be preferable in certain instances, such for example, as where it is necessary to exclude all particles of dirt, dust or other foreign matter from the discharge portions. In this modification, pockets are provided between the members 13 and 14 at each side of the ridge 22 sufficiently large to allow the products of deterioration to accumulate for some time. They may be removed when necessary by sliding the electrode plate off the tenon portion of the carbon block.

It will be noted that by using structures of above described types, a large number of electrode members may be manufactured and assembled without the necessity of carefully fitting the various parts, since the length of the discharge gap will always be accurately determined by the thickness of the dielectric. Furthermore, the same type of parts may be used in producing gap dischargers having a variety of electrode spacings, each suitable for a particular purpose. To produce a lightning arrester having a different electrode spacing, it is merely necessary to select a dielectric layer of the proper thickness.

In the claims I use the words "conducting member in the form of a block" as indicative of any kind or character of mate to which the sheet metal electrode may be affixed.

It is not intended that this invention be limited to the specific embodiment herein illustrated and described, but it is capable of many variations and modifications which may come within the scope and spirit of the invention, as set forth in the following claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent in the United States, is:

1. A discharge gap comprising a conducting member in the form of a block, a second conducting member formed of sheet metal and clamped to a portion of said block, and a perforated layer of dielectric material separating said block and said second conducting member from electrical contact with each other, one of said conducting members having longitudinally extending means for cooperating at a perforation in the dielectric material to form a discharge portion which provides a discharge gap of a predetermined length determined by the thickness of the dielectric material.

2. A discharge gap comprising a conducting member in the form of a block, a second conducting member formed of sheet metal and clamped to a portion of said block, and a perforated layer of dielectric material separating said block and said second conducting member from electrical contact with each other, said conducting members cooperating at a perforation in the dielectric material to form a discharge gap of a predetermined length, said sheet metal conducting member being formed with a struck-down ridge extending across said perforation and forming a discharge portion resting firmly upon the dielectric material adjacent said perforation.

3. A discharge gap comprising a conducting member in the form of a block, a second conducting member formed of sheet metal and clamped to a portion of said block, and a perforated layer of dielectric material separating said block and said second conducting member from electrical contact with each other, said conducting members cooperating at a perforation in the dielectric material to form a discharge gap of a predetermined length, said second conducting member being formed with perforations adjacent the discharge gap for permitting the escape therethrough of the products of deterioration at the gap.

4. A lightning arrester comprising a block of conducting material, an electrode plate crimped upon a portion of said block, and a layer of dielectric material separating said plate and said block from electrical contact with each other, said dielectric being provided with a perforation beneath said plate,

and said plate being formed with an embossed ridge extending across said perforation and forming a discharge portion resting firmly upon the dielectric material adjacent said perforation.

5. A lightning arrester comprising a block of conducting material, an electrode plate fixed upon a portion of said block, and a layer of dielectric material separating said plate and said block from electrical contact with each other, said dielectric being provided with a perforation beneath said plate, and said plate being formed with an embossed ridge extending across said perforation and forming a discharge portion resting firmly upon the dielectric material adjacent said perforation, and perforations in said plate at either side of said ridge.

6. A discharge gap comprising a block of conducting material, an electrode plate crimped upon a portion of said block, a thin layer of flexible sheet dielectric material separating said plate and said block from electrical contact with each other, said dielectric being perforated to provide for a discharge gap beneath said plate, and means on said electrode plate resting firmly upon said dielectric material and forming a discharge portion across said perforation therein said sheet of dielectric material also being of a uniform and accurately predetermined thickness equal to the effective length of the discharge gap.

In witness whereof, I have hereunto subscribed my name.

GEORGE R. FOLDS.