A. F. ROSENBERGER.

LIGHTNING PROTECTOR.

APPLICATION FILED JAN. 2, 1908.

970,556. Patented Sept. 20, 1910.

Fig. 1.

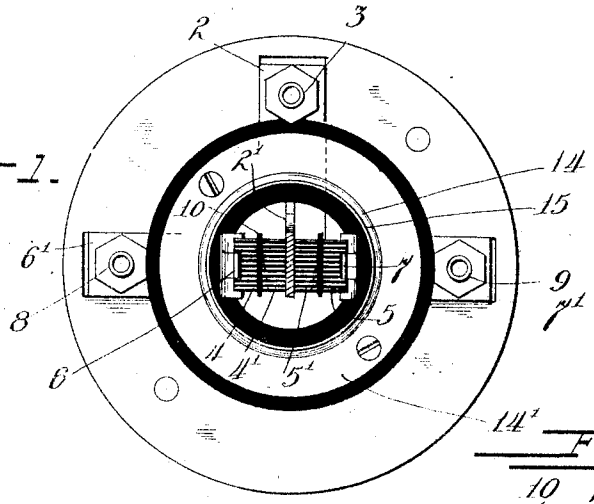


Fig. 3.

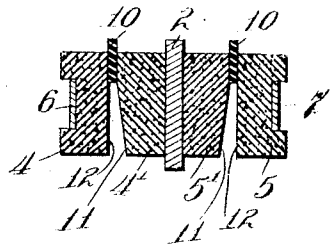


Fig. 2.

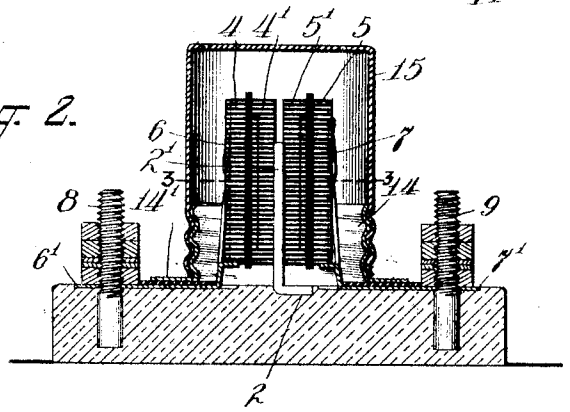
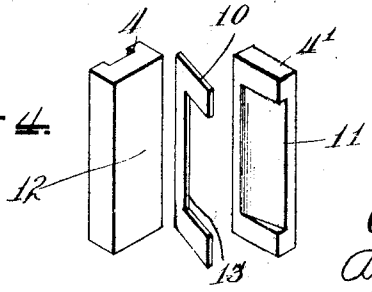


Fig. 4.



Witnesses
Milton Lenois
Emilie Rose

Inventor:
Andrew F. Rosenberger
By Albert N. Goode
Attorney.

UNITED STATES PATENT OFFICE.

ANDREW F. ROSENBERGER, OF CHICAGO, ILLINOIS

LIGHTNING-PROTECTOR.

970,556. Specification of Letters Patent. Patented Sept. 20, 1910.

Application filed January 2, 1908. Serial No. 408,895

To all whom it may concern:

Be it known that I, ANDREW F. ROSENBERGER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Lightning-Protectors, of which the following is a specification.

This invention relates to improvements in lightning protectors, and refers more specifically to improvements in that type of protector wherein the spark gap is provided for between carbon electrodes spaced apart by a dielectric.

Among the salient objects of the present invention are to provide a construction in which the spacing apart of the electrodes by the dielectric may be practically accomplished in a more accurate, reliable and less expensive manner than has heretofore been the case; to provide a construction in which the particles of carbon dust dislodged by the passage of current across the gap will be more certainly prevented from lodgment in the gap; to provide a construction in which the spark gap is provided for along a line of practically inappreciable thickness but of considerable length as distinguished from a spark gap in which the electrodes are spaced apart over a considerable area of approximately uniform distance of spacing, and to provide a construction which may be made rapidly and by the use of labor of only moderate skill and still secure reliable and accurate results.

The invention consists in the matters hereinafter described and particularly defined in the claims.

In the accompanying drawing—Figure 1 is a plan view of one practical and preferred embodiment of the invention; Fig. 2 is an edge elevation of the device shown in position set at ninety degrees out of the angular position in which it is ordinarily used (the device as shown in Fig. 1 being in correct position); Fig. 3 is a cross sectional view taken on line 3—3 of Fig. 2; Fig. 4 is an exploded view showing the relative arrangement of the discharge electrodes.

Referring to the drawing, 1 designates a suitable base which is made of porcelain or other suitable insulating material. Upon the base is mounted a conductor plate 2, preferably of L-shape, one end thereof being arranged to rest flat upon the base, being extended radially outward and connected with a binding stud 3, and the other end being arranged to extend at right angles to the base and constituting a support against which two pairs of carbon electrodes, as 4, 4′, and 5, 5′, are arranged to rest. That is to say, the outstanding portion 2′ of the conductor plate 2 is common to both pairs of electrodes.

The two members of each pair of carbon electrodes are placed face to face against each other, and each pair is held yieldingly against the supporting plate 2 by means of a corresponding plate spring, as 6 and 7; these plate springs being provided with base portions 6′ and 7′, respectively, bent to lie flatwise upon the porcelain base and severally connected at their outer ends with terminal posts 8 and 9. The outermost members 4 and 5 of the pairs of electrodes are longitudinally grooved to receive the corresponding spring fingers 6 and 7, so that the springs serve to hold these electrodes against lateral displacement, but, as usual in protectors of this general type, the pairs of electrodes may be slipped out endwise from between the springs and opposed supporting plate.

Describing now the essentially novel features of the device, it will be noted that each pair of electrodes is separated by a dielectric sheet, as 10, preferably a thin sheet of mica. The dielectric, instead of covering the meeting surfaces of the electrodes, is cut away between its ends and from one edge inwardly, as best indicated in Fig. 4, so as to leave two opposed surfaces, 11 and 12, between the electrodes uncovered and constituting the spark gap between the two. These opposed surfaces which constitute the spark gap are divergent over the entire area of the gap, and, as best seen in Fig. 3, the edge 13 of the dielectric 10 is arranged coincident with the angle of intersection of said gap surfaces. It follows that since the current will leap the gap some place along the line of closest approach between the two electrodes, where the latter are not covered by the dielectric, therefore the spark is bound to leap across

or within the divergent gap and is most likely to occur along the exposed edge 13 of the dielectric.

In practice I have found it most practical to first glue or otherwise secure the sheet of dielectric to the face of one of the electrodes so that it completely covers the latter and projects somewhat beyond the edges of the electrode all around, and I then grind away the dielectric and underlying surface of the carbon to produce the inclined spark gap surface 11. When the two electrodes are thereafter assembled, the unrecessed or unground end portions of the recessed electrode fit flatwise against the flat face of the opposed electrode and so determine the angle of divergence between the two opposed surfaces which constitute the spark gap. With the parts thus constructed and assembled it is obvious that whenever current passes from one electrode to the other it is bound to jump across some part of the divergent gap, and accordingly if the protector be arranged with the gaps opening downwardly, as it should be in practice, the particles of carbon dislodged by the discharge fall out of the gap and leave the gap-insulation unimpaired when the discharge ceases. The construction is such that the effective separation of the electrodes in the gap is equal to the thickness of the sheet of dielectric, and this distance of separation is very uniform throughout the whole length of the spark gap along the edge of the dielectric. This is of importance in securing a protector which is certain to transmit the current at an approximately uniform predetermined voltage, and the construction is also important in that it insures an ample area of opposed surfaces to take care of very heavy discharges without impairing the protector.

The electrodes are preferably and usually covered by a casing to protect them against the weather. In the preferred construction shown, a threaded thimble 14 provided with an out-turned or radial flange 14′ is suitably secured to the base so as to surround the base portions of the electrodes; this member being separated from the underlying portions of the springs 7 by an insulating washer 8 of mica or the like. A sheet metal tubular cap 15 is fitted to screw upon the thimble 14, as shown clearly in the drawing; this cap being provided with vent apertures in its upper end to permit gases formed by discharges to escape.

As will be well understood by those familiar with this art, the particular device illustrated is adapted to protect two lines by providing a spark gap between each and a common return or ground; the terminals 8 and 9 being for two-line wires and the terminal 3 for the common return or ground.

While I have herein shown a preferred construction of the electrodes, yet it is to be understood that the invention may be otherwise embodied.

I claim as my invention:

1. In a protector, the combination with suitable electrical connections, of a pair of electrodes provided with opposed spark gap surfaces which converge, and a solid dielectric interposed between the most contiguous portions of said electrodes and arranged to divert passing discharges across the gap between said convergent surfaces.

2. In a protector, the combination with suitable supports and terminal connections, of a pair of electrodes having opposed uncovered convergent surfaces and a dielectric of greater insulating resistance than air separating said electrodes at their place of nearest approach.

3. In a protector, a pair of electrodes having parallel contacting portions and divergent gap surfaces and a sheet of insulating material interposed between and covering said contacting portions of the electrodes and arranged with its edge coincident with the intersecting angle of the gap.

4. In a protector, an electrode block one side of which has the form of a plane surface except for a recess extending from one edge inwardly, said recess having an inclined bottom and being of decreasing depth from said edge inwardly and terminating short of the opposite edge, a sheet of insulating material entirely covering the unrecessed portion of said plane surface of the electrode and cut out to register with the said recess, and a second electrode block provided with a plane surface arranged in bearing with said insulating sheet, whereby a divergent air gap is formed between said electrodes.

5. In a protector, an electrode block, one side of which has the form of a plane surface except for a recess extending from one edge inwardly, said recess having an inclined bottom and being of decreasing depth from said edge inwardly and terminating short of the opposite edge, a sheet of insulating material adherent to and entirely covering the unrecessed portion of said plane surface of the electrode and cut out to register with the said recess, and a second electrode block provided with a plane surface arranged in bearing with said insulating sheet, whereby a divergent air gap is formed between said electrodes.

6. In a protector, an electrode block, one side of which has the form of a plane surface except for a recess extending from one edge inwardly, said recess having an inclined bottom and being of decreasing depth from said edge inwardly and terminating short of the opposite edge, a sheet of insulating material adherent to and entirely covering the unrecessed portion of said

plane surface of the electrode and cut out to register with said recess, a second electrode block provided with a plane surface arranged in bearing with said insulating sheet, whereby a divergent air gap is formed between said electrodes, a conductor support engaging one side of the pair of electrodes and a spring bearing yieldingly against the opposite side of said pair.

7. A spark gap device for lightning arresters, comprising a plurality of carbon plates spaced apart by an insulating washer and having cut away portions to form an arc expanding chute.

ANDREW F. ROSENBERGER.

Witnesses:
EMILIE ROSE,
E. L. BELKNAP.

Disclaimer in Letters Patent No. 970,556.

DISCLAIMER.

970,556.—*Andrew F. Rosenberger*, Chicago, Ill. LIGHTNING-PROTECTOR. Patent dated September 20, 1910. Disclaimer filed February 5 1912, by the trustee. *Charles J. Schmidt.*

Enters this disclaimer—

"To claims 1, 2, and, 7, which are as follows:

"1. In a protector, the combination with suitable electrical connections, of a pair of electrodes provided with opposed spark gap surfaces which converge, and a solid dielectric interposed between the most contiguous portions of said electrodes and arranged to divert passing discharges across the gap between said convergent surfaces.

"2. In a protector, the combination with suitable supports and terminal connections, of a pair of electrodes having opposed uncovered convergent surfaces and a dielectric of greater insulating resistance than air separating said electrodes at their place of nearest approach.

"7. A spark gap device for lightning arresters, comprising a plurality of carbon plates spaced apart by an insulating washer and having cut-away portions to form an arc expanding chute."

[*Official Gazette, February 13, 1912.*]