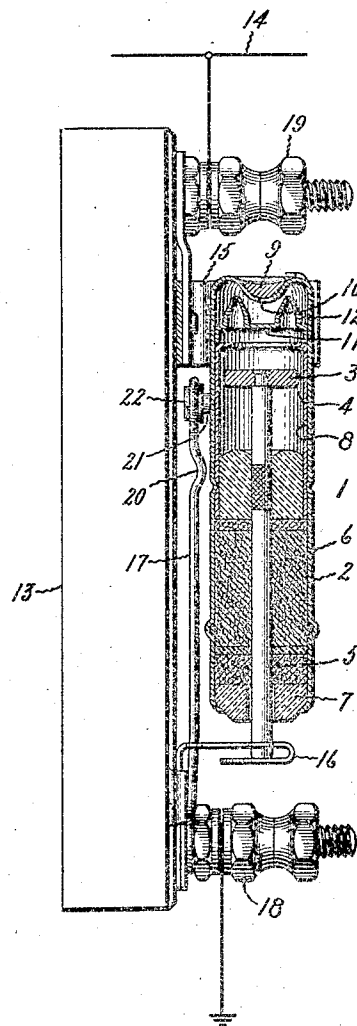


C. P. STEINMETZ.
 PROTECTIVE DEVICE.
 APPLICATION FILED APR. 21, 1916.

1,201,646.

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Inventor:
 Charles P Steinmetz,
 by *Alfred H. Davis*
 His Attorney

UNITED STATES PATENT OFFICE.

CHARLES P. STEINMETZ, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

PROTECTIVE DEVICE.

1,201,646.

Specification of Letters Patent.

Patented Oct. 17, 1916.

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To all whom it may concern:

Be it known that I, CHARLES P. STEINMETZ, a citizen of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Protective Devices, of which the following is a specification.

My invention relates to protective devices and more particularly to that class of protective devices known as lightning arresters.

In lightning arresters in which a discharge takes place across a spark gap between two electrodes, it has been found that when an accident occurs in which the low voltage circuit which is protected by lightning arresters becomes crossed with a high voltage power circuit or the like, the discharge across the spark gap of the arrester becomes practically continuous. Such a continuous discharge generates an excessive heating which if allowed to continue eventually destroys the arrester.

The object of my invention is to provide a protective device of the lightning arrester type with a novel and improved device for short circuiting the arrester when the heat generated by the discharge of the spark gap becomes excessive.

The novel features which I believe to be characteristic of my invention will be defined in the claims appended hereto; the features of construction and mode of operation will be understood by reference to the following description taken in connection with the accompanying drawing, in which the figure of the drawing shows a side elevation, partly in section, of a lightning arrester embodying the novel features of my invention.

In the figure, I have shown my novel short-circuiting device applied, by way of example, to a lightning arrester in which the spark gap between the electrodes takes place in an inert atmosphere. The lightning arrester unit itself forms no part of my invention, this arrester unit being covered in U. S. Patent 1,176,544, issued to George F. Gray. A brief description of the arrester will, therefore, be sufficient.

This protective device comprises a lightning arrester unit 1 which comprises a hollow or tubular electrode 2 preferably of metal which contains an inert atmosphere and a cooperating electrode 3 which I have

shown as a disk, preferably of non-arcing metal, mounted within the tubular electrode 2 and separated therefrom to form an annular spark gap 4. A rod 5 is secured to the electrode 3 and extends outside the electrode 2. The electrode 2 is closed at one end by a suitable air-tight seal 6 and a porcelain plug 7 through which rod 5 extends. Around the inside of the electrode 2, adjacent the spark gap 4, is placed a sleeve 8 of preferably non-arcing metal. The hollow electrode 2 has at its end opposite the seal, a depression containing a fusible material or solder 9. A small opening is made through the material 9 in alinement with a small perforation 10 in the end of the tube by means of which the hollow electrode 2 is evacuated or supplied with an inert gas. After evacuation, the material 9 is melted and closes the perforator 10 to maintain the hollow electrode gas-tight. Directly beneath the depressed end of the electrode and within the electrode is mounted a diaphragm 11 having protuberances 12 with openings at their apices and forming between the protuberances a pocket which is provided to catch and hold any fusible material which may get through the perforation 10 and prevent it from bridging the spark gap 4 between the electrodes. The two cooperating electrodes 2 and 3, constructed as described, form a unit construction.

An insulating support 13 is provided upon which is mounted a line connecting terminal adapted to be connected to the line or conductor 14 to be protected, and a ground connecting terminal adapted to be connected to ground. The line connecting terminal, I have shown as a spring clip member 15 for holding the hollow electrode 2 and the ground connecting terminal as a spring member 16 bent upon itself, one portion of which is perforated to hold the rod 5 which is connected to the disk electrode 3. The protective unit 1 is thereby adapted to be removably positioned between the two terminals 15 and 16 to connect, for instance, electrode 2 to the line to be protected as conductor 14 and electrode 3 to ground. For protecting this arrester from heavy and continuous discharge across the spark gap 4 between electrodes 2 and 3, I mount upon the insulating support 13 my novel short-circuiting device comprising a metal spring conducting member 17 yieldingly mounted

on the terminal post 18 and thereby electrically connected to the disk electrode 3. It will be understood that I may secure the spring member 17 in like manner to terminal post 19, if I so desire. In the construction shown, I secure the spring member 17 to the terminal post 18 in such a way as to be biased toward engagement with the hollow electrode 2, the member 17 extending along the electrode 2 to a point approximately adjacent the spark gap 4. The member 17 is shaped to provide an engaging or offset portion 20 which is nearer the electrode 2 than any other portion so that the spring member always engages the electrode 2 at the portion 20. The spring member 17 and its engaging portion 20 is held away from the electrode 2 in a non-short-circuiting position, by means of a piece or a pellet of a heat-responsive or fusible material 21 having a high melting point. This pellet is held in engagement with the hollow electrode 2 and in heat conducting or thermal relation therewith by the bias of the spring member 17 and is insulated from the member 17 by a disk of insulating material 22 secured on the end of member 17 upon which the pellet of fusible material 21 is mounted.

Under normal conditions the short-circuiting device is inoperative as the heat generated by intermittent discharges of the arrester are insufficient to melt the fusible material 21, but upon a continuous and excessive discharge of the arrester due, for instance, to a cross of the lightning arrester circuit with a power line, the heat generated is sufficient to cause the fusible material 21 to melt and the biased spring member 17 then moved toward the hollow electrode 2 until its engaging portion 20 touches the electrode whereupon the arrester is short circuited and the heavy currents are conducted from the electrode 2 through the spring member 17 to ground, thus preventing the destruction of the arrester.

My invention may be embodied in other forms than that shown and described and I, therefore, do not wish to be restricted to the precise construction shown but intend to cover by the appended claims all changes and modifications within the spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States, is,—

1. A protective device comprising a hollow electrode and a cooperating electrode mounted within said hollow electrode and separated therefrom by a spark gap, means for short-circuiting said arrester comprising a conducting member electrically connected to said cooperating electrode and normally biased to engage said hollow electrode, and heat-responsive means held in heat conducting relation with said hollow electrode by the

bias of said conducting member to normally maintain said conducting member in non-short-circuiting position, insulating means between said heat-responsive means and said conducting member, said heat-responsive means adapted to melt by the heat generated by the excessive discharge of said spark gap to allow said conducting member to move into short-circuiting position.

2. A protective device comprising a hollow electrode and a cooperating electrode mounted within said hollow electrode and separated therefrom by a spark gap, means for short-circuiting said arrester comprising a yielding member mounted spring member electrically connected to said cooperating electrode and extending outside said hollow electrode to a point in proximity to said spark gap, said spring member having a portion thereof shaped to engage said hollow electrode, fusible means carried by said spring member insulated therefrom and engaging said hollow electrode in the proximity of said spark gap to normally hold the engaging portion of said spring member away from said hollow electrode, said fusible means being adapted to melt by the heat generated by the excessive discharge of said gap and allow the engaging portion of said spring member to engage said hollow electrode and short-circuit said gap.

3. In a protective device, the combination with a protective unit comprising a hollow electrode, and a cooperating electrode mounted within said hollow electrode and separated therefrom to form a spark gap, of a line connecting terminal, and a ground connecting terminal, said protective unit being removably positioned between said terminals to connect said electrodes between line and ground, and a spring member connected to one of said terminals and extending along said hollow electrode to a point in proximity to said spark gap, a pellet of fusible material carried by said spring member but insulated therefrom, said spring member being biased to hold said pellet in thermal engagement with said hollow electrode at a point in proximity to said spark gap, said spring member having a portion thereof adapted to engage said hollow electrode and short-circuit said arrester upon the melting of said fusible material.

4. The combination with a lightning arrester comprising a tubular metallic electrode containing an inert atmosphere and a cooperating disk electrode mounted within said tubular electrode and separated therefrom to form a spark gap, of a short-circuiting device for said arrester comprising a resiliently mounted conducting member in electrical connection with said disk electrode and biased to engage said tubular electrode, a pellet of fusible material in thermal engagement with said tubular electrode and

acting to normally hold said conducting member away from said tubular electrode, said fusible material being melted by the heat of excessive discharge across said spark gap to allow said conducting member to engage said tubular electrode and thereby short-circuit said arrester.

5 5. The combination with a lightning arrester comprising a tubular metallic electrode containing an inert atmosphere and a coöperating disk electrode mounted within said tubular electrode and separated therefrom to form a spark gap, of means for short-circuiting said arrester upon excessive discharge across said spark gap comprising a short-circuiting member yieldingly mounted outside said tubular electrode and in electrical connection with said disk electrode, said short-circuiting member being biased to engage said tubular electrode, a pellet of fusible material secured to said short-circuiting member and in thermal relation with said tubular electrode adapted when melted to allow short-circuiting member to engage said tubular electrode to short-circuit said arrester.

6. In a protective device, the combination

with a protective unit comprising two electrodes normally separated by a spark gap, one of said electrodes being a hollow member, the other of said electrodes being a disk member mounted within said hollow member, an insulating support, a line connecting terminal mounted on said support, a ground connecting terminal mounted on said support, said protective unit being removably positioned between said terminals to connect said electrodes between line and ground, and a spring conducting member secured to one of said terminals and having a portion thereof adapted to engage said hollow electrode, a pellet of high melting point material in thermal engagement with said hollow electrode and normally preventing the engagement therewith of said spring member, and means for insulating said pellet from said spring member, the melting of said pellet causing the engaging portion of said spring member to engage said hollow electrode and thereby short-circuit said arrester.

In witness whereof, I have hereunto set my hand this 20th day of April, 1916.

CHARLES P. STEINMETZ.