D. T. MAY.

LIGHTNING ARRESTER.

APPLICATION FILED MAR. 1, 1913.

1,101,752. Patented June 30, 1914.

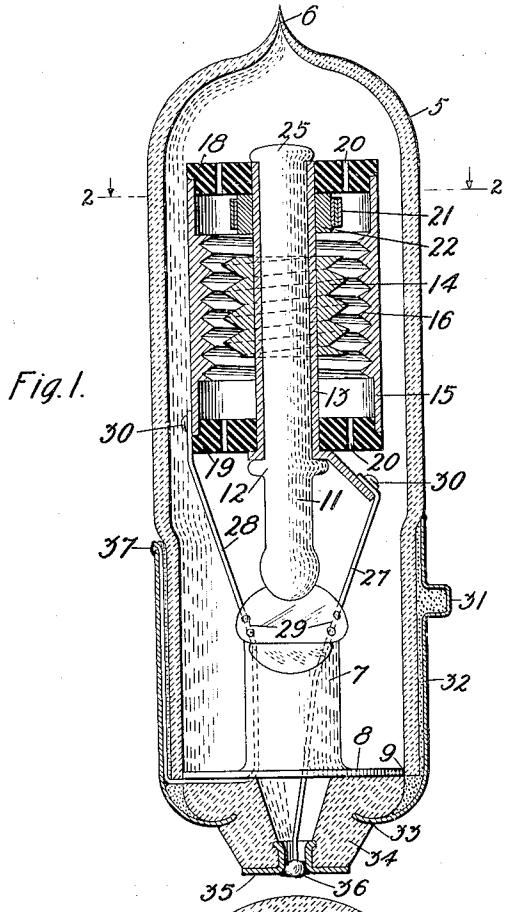

Fig. 1.

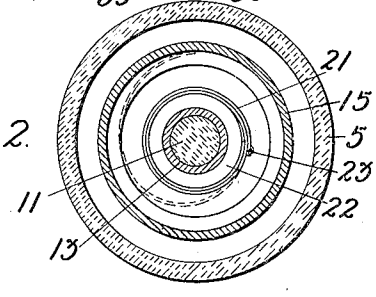

Fig. 2.

Witnesses:

W. W. Hoffman

O. M. Guthe

Inventor:
David T. May.
by John G. Roberts
Atty.

UNITED STATES PATENT OFFICE.

DAVID T. MAY, OF NEW YORK, N. Y., ASSIGNOR TO WESTERN ELECTRIC COMPANY, OF NEW YORK, N. Y., A CORPORATION OF ILLINOIS.

LIGHTNING-ARRESTER.

1,101,752. Specification of Letters Patent. Patented June 30, 1914.

Application filed March 1, 1913. Serial No. 751,546.

To all whom it may concern:

Be it known that I, DAVID T. MAY, a citizen of the United States, residing at 111 West Twelfth street, in the city of New York, county of New York, and State of New York, have invented certain new and useful Improvements in Lightning-Arresters, of which the following is a full, clear, concise, and exact description.

My invention relates to lightning arresters, and is particularly adapted for embodiment in arresters of the vacuum type.

As herein described and shown, my invention may be regarded as effecting improvements in the vacuum lightning arrester forming the subject of an application for patent filed in the name of Edward B. Craft, Serial No. 751,568, filed March 1, 1913, and assigned to the same assignee as the present case. It is, however, to be understood that the said improvements may be used with lightning arresters of other types.

One of the objects of my invention is the improvement of the arrester electrodes to the ends that the voltage at which the arc occurs may be substantially constant, and that the location of the arc may be retained at a definite point or points on the electrodes.

Another object of my invention is to provide new and improved means for establishing a conducting path of low resistance in parallel to the arc, if an arc injurious to the arrester persists for more than a certain period of time.

My invention will be readily understood from the following description taken in connection with the accompanying drawings in which a lightning arrester embodying said invention is described and illustrated.

In the drawings, Figure 1 is an elevation of the arrester, the container, base and electrode structure being shown in cross-section; and Fig. 2 is a sectional view on the line 2—2 of Fig. 1 showing particularly the short circuiting coil forming part of the arrester.

The evacuated container 5 within which the electrodes of the arrester are mounted, may be of glass formed and evacuated in the same well-known manner as are incandescent lamp bulbs.

The point 6 indicates the place at which the bulb or container is sealed after evacuation. Within the container 5 is an electrode support which has a hollow portion 7 resembling the well-known form of stem used in the filament support of an incandescent lamp, said stem having a flared bottom 8, the edges of which are welded at 9 to the edges of the container 5. Extending inwardly from the stem 7 is a solid or hollow rod 11, preferably of glass, upon which the electrodes of the arrester are supported. The stem 7 and rod 11 comprise the electrode support.

As shown in the drawing, the rod 11 is provided with a boss 12 upon which rests the inner electrode which surrounds the rod 11. In its preferred form, said inner electrode comprises a shell 13 upon which is shrunk or otherwise secured an exteriorly threaded shell 14. The outer electrode 15 is also in the form of a hollow cylinder or shell, and a portion of its inner surface is threaded as shown at 16. The outer surface of the inner electrode and the inner surface of the outer electrode are preferably oppositely threaded at different pitches, with the result that these coöperating arcing surfaces furnish what is the equivalent of a large number of points between which the arc may spring. Preferably both electrodes are made of aluminum, although they may be made of copper, brass or other suitable metal. The outer electrode 15 is held in proper relation to the inner electrode by washers 18 and 19 of insulating material such as "lavite." These washers or disks 18 and 19 are perforated as shown at 20 in order to permit the ready evacuation of the space within the outer electrode 15, and to afford vents for the relief of any pressure created in said space by an excessive arc. The form of the washers 18 and 19 and the manner in which they coöperate with the electrodes 14 and 15 are apparent from the drawing.

Mounted between the unthreaded portions of the inner and outer electrodes and adjacent the arc path, is the coiled spring 21. This spring 21 is shown as surrounding a bushing 22 shrunk on or otherwise secured to the shell 13. The coil 21 is preferably made of phospor bronze. In manufacture, the strip out of which the coil 21 is formed is first wound into a single coil of slightly smaller diameter than the exterior diameter of the bushing 22, the outer end of said strip being free. The coil is then

forced on to the bushing 22, and the free portion of the coil is wound up upon the secured portion and the end is fastened by suitable solder as shown at 23. The melting point of the solder 23 and the location thereof with reference to the arc are such that if an arc injurious to the arrester persists between the discharge surfaces of the inner and outer electrodes for longer than a certain period of time, the solder will melt and will allow the coil 21 to unwind and assume the position shown in dotted lines in Fig. 2, in which position the end of said coil is in engagement with the inner surface of the unthreaded portion of the outer electrode 15. In this position, the coil 21 completes a metallic path between the electrodes in parallel with the arc.

It is evident that the electrode structure can easily be assembled by putting the washer 19, the threaded shell 14, and the bushing 22 with its coil 21, in place on the shell 13; then dropping on the outside electrode 15; then applying the washer 18; and finally by spinning over the end of the rod 11 as shown at 25. It is understood, of course, that such assembling is preferably done before the electrode support is placed within the container 5.

Electrical connection with the electrodes 14 and 15 is obtained through leading-in wires 27 and 28 which pass through the top of the stem 7 and are sealed therein. The necessary air-tight seal may be obtained in the well-known manner by interposing pieces of platinum 29 in said leading-in wires within the glass seal. The inner ends of the leading-in wires 27 and 28 are connected to the inner and outer electrodes respectively in any suitable manner as by welding or soldering or by the screws 30 as shown. The outer ends of said leading-in wires are connected to any suitable form of base which may be cemented to the outside of the container 5. The base shown in the drawing resembles an incandescent lamp base of well-known form, but instead of being threaded on its outer surface is provided with a projection 31 which is adapted to coöperate with a slot or groove in a supporting socket so as to provide a so-called "bayonet connection." The projection 31 is stamped up in the shell 32 which is of brass or other suitable material. At its bottom, said shell is spun in as shown at 33, and is embedded in molded insulating material 34, in which is also embedded a brass button 35 of the form shown. In manufacture, the base consisting of the shell 32, the molded material 34 and the button 35 is cemented to the end of the container 5 to which the electrode support has been welded. The leading-in wire 27 is brought out through the hole in the button 35 and is soldered to said button as shown at 36. The other leading-in wire 28 is brought out between the container 5 and the shell 32 and is soldered to the edge of the shell as shown as 37.

From the foregoing description, it will be apparent that the outer surface of the inner electrode, and the inner surface of the outer electrode can be so proportioned as to diameter that a discharge through the arrester will take place at a given voltage; and that, owing to the large number of discharge points furnished by the coöperating oppositely threaded surfaces of the electrodes, the arc between said surfaces will readily start at the voltage for which the arrester is designed and will be confined to the area between the threaded portions of said electrodes and will be kept away from the washers 18 and 19. Momentary discharges between the electrodes will not affect the short circuiting coil 21 located below the washer 18 and adjacent the arc path. If, however, conditions are such that an arc injurious to the arrester is maintained longer than a certain period of time, the heat therefrom will melt the solder 23 which holds the short circuiting coil 21 and will release said coil, thereby allowing it to connect the inner and outer electrodes and form a metallic path of low resistance in parallel with the arc. This occurrence is, of course, unusual and the result of exceptional and destructive conditions in the circuit. When a short circuiting device is released in this manner, the arrester must of course be removed from the circuit and a new one substituted. Short circuited arresters may be repaired if desired.

I claim:

1. In a lightning arrester, an inner cylindrical electrode, an outer cylindrical electrode surrounding said inner electrode, disks of insulating material engaging with the edges of said outer electrode and supporting said outer electrode in operative relation to said inner electrode, and means located between said electrodes and between said insulating disks actuated by the heat of the arc between said electrodes for connecting said electrodes if a destructive arc persists longer than a certain period of time.

2. In a lightning arrester, an inner cylindrical electrode, an outer cylindrical electrode surrounding said inner electrode, disks of insulating material engaging with the edges of said outer electrode and supporting said outer electrode in operative relation to said inner electrode, a coil surrounding a portion of said inner electrode and tending to expand so as to connect said electrodes, and means normally holding said coil in contracted position out of engagement with said outer electrode and so affected by the heat of the arc between said electrodes that it releases said coil if a destructive arc persists longer than a certain period of time.

3. In a lightning arrester, an inner cylindrical electrode having a portion of its outer surface threaded, and an outer cylindrical electrode surrounding said inner electrode and having a portion of its inner surface threaded oppositely to the threading on the outer surface of the inner electrode.

In witness whereof, I hereunto subscribe my name this 26th day of February, A. D. 1913.

DAVID T. MAY.

Witnesses:
WALTER F. HOFFMAN,
O. D. M. GUTHE.