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2,135,353

ARCING ELECTRODE

Filed Dec. 31, 1936

2 Sheets-Sheet 1

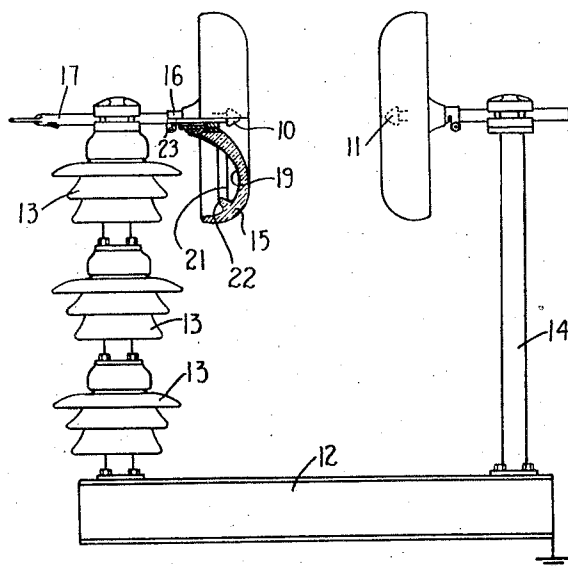


FIG. 1

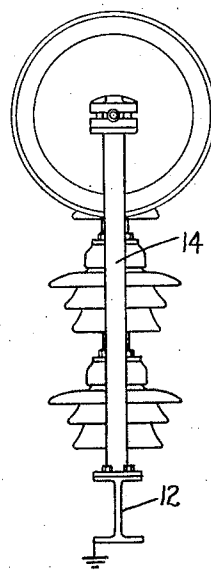


FIG. 2

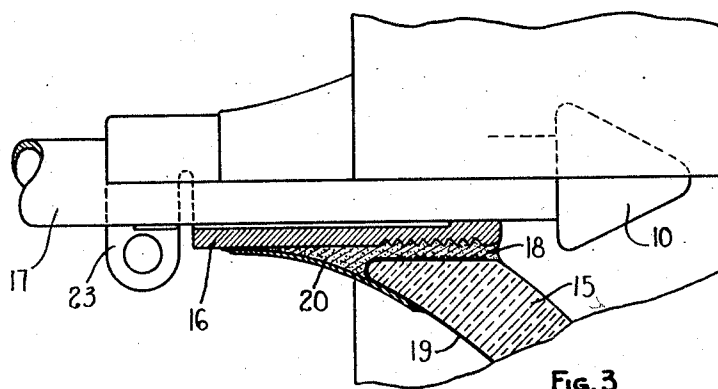


FIG. 3

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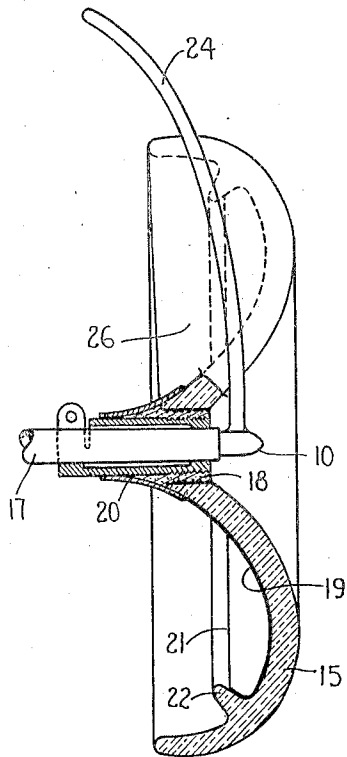


FIG. 4

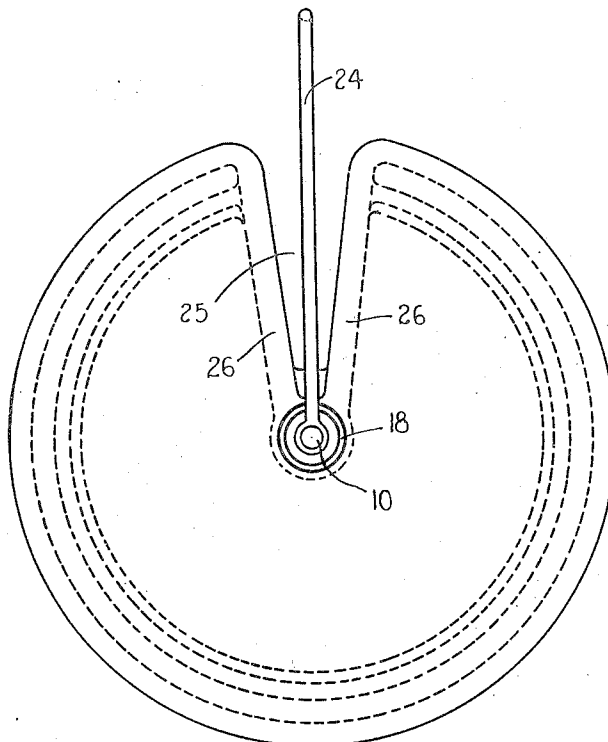


FIG. 5

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ARCING ELECTRODE

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Application December 31, 1936, Serial No. 118,530

6 Claims. (Cl. 175-30)

This invention relates to arcing gaps for protecting electrical apparatus from high voltage surges and is in the nature of an improvement over the gap shown in Patent No. 2,011,136, granted Aug. 13, 1935 to Arthur O. Austin and assigned to The Ohio Brass Company, of Mansfield, Ohio.

One object of the invention is to provide an arcing gap having a very low time lag substantially unaffected by weather conditions.

A further object is to provide means for interrupting a power arc following a discharge and for preventing the power arc from injuring the flux control surrounding the discharge terminal.

A further object of the invention is to provide an arcing gap which shall be of simple construction and economical to manufacture.

Other objects and advantages will appear from the following description.

The invention is exemplified by the combination and arrangement of parts shown in the accompanying drawings and described in the following specification, and it is more particularly pointed out in the appended claims.

In the drawings:

Fig. 1 is a side elevation with parts in section showing one embodiment of the present invention.

Fig. 2 is an end elevation of the device shown in Fig. 1.

Fig. 3 is a fragmentary elevation partly in section of the portion of the arcing electrode, showing details of construction.

Fig. 4 is a vertical sectional view of a modified form of arcing electrode.

Fig. 5 is a front elevation of the electrode shown in Fig. 4.

In the form of the invention shown in Fig. 1, a pair of discharge electrodes 10 and 11 are mounted on a base 12, the electrode 10 being insulated from the base by a stack of insulators 13 while the electrode 11 is carried by a post 14 which electrically connects the electrode with the base. In operation the base 12 is grounded and the electrode 10 is connected to an overhead conductor or any other electrical apparatus to be protected from the effect of abnormal charges resulting from lightning or other disturbances.

In order to control the electrostatic field between the discharge terminals 10 and 11 to impart a short time lag characteristic to the gap, each terminal is provided with a flux control comprising a dielectric member 15 mounted on a collar 16 which is slidably carried by the rod 17 having the terminal 10 at the end thereof. As

shown more clearly in Fig. 3, the dielectric member 15 is secured to the collar 16 by cement 18 and the rear face of the dielectric member 15 is covered with a metallic coating 19. This coating may be applied in a manner disclosed in the patent of Arthur O. Austin No. 1,536,749, dated May 5, 1925 or as disclosed in the application of Ray Higgins Serial No. 107,901, filed Oct. 27, 1936. The conducting surface 19 is preferably continued to the sleeve 16 by means of a bell 20 of thin sheet metal which bridges the space between the rear surface of the member 15 and the outer surface of the collar 16. The edges of the bell 20 are preferably soldered to the conducting coating 19 and the outer surface of the sleeve 16 respectively. The bell 20 is continuous circumferentially about the sleeve 16 so that the conducting surface formed by the coating 19 and the bell 20 is unbroken.

Since the collar 16 is mounted directly on the rod 17 which carries the terminal 10, it will be apparent that the conducting surface 19 is substantially continuous from the rod 17 to its terminal edge 21. The terminal edge 21 is protected by a bead 22 formed on the rear surface of the insulating member 15 so as to prevent the formation of corona on the outer edge of the conducting surface 19 or discharge from this surface about the rear edge of the member 15. The collar 16 with its flux control member is longitudinally adjustable on the rod 17 and may be clamped in its various adjusted positions by a bolt engaging tongues 23 on the rear end of the collar. Porcelain or other suitable dielectric material may be used for the member 15. The conducting surface 19 provides a widely extending flux control which distributes the electrostatic flux over a wide field between the two electrodes and prevents concentration on the discharge terminals 10 and 11. It will be noted that the most advanced portion of the surface 19 is formed in a wide curve so as to give a substantially uniform distribution of flux and prevent concentration on any portion of this surface and that the outer edge of the surface is protected in the rear by the bead 22. The electrostatic field thus produced gives the gap the short time lag characteristics of a sphere gap, while the discharge terminals 10 and 11 and the protection for the control surface 19 relieves the gap of the erratic features produced by weather conditions on a gap between two conducting spheres.

In some instances it may be desirable to provide means for breaking a power arc which might follow a discharge and also for protecting the

porcelain from such an arc. Such provision is shown in the form of electrode illustrated in Figs. 4 and 5. In the form of the invention shown in these figures, the discharge terminals 10 and 11 are provided with a pair of arcing horns 24. In order to accommodate these horns, an opening or notch 25 is provided in the dielectric member 15 and the horns extend upwardly in these notches and are inclined rearwardly so that when discharge occurs between the terminals 10 and 11 the arc will tend to rise and be elongated as it follows upwardly along the horns 24, thus causing rupture of the arc in a manner well known in the art. The operation of arcing horns for interrupting a power arc has heretofore not been entirely reliable for all conditions, but its reliability is improved by the present invention because of the fact that the arc, in addition to its tendency to rise, due to its heat, has an additional tendency to move along the horns to a position outside of the electrostatic field controlled by the members 15, to a position on the horns where concentration of the electrostatic lines of force is not interfered with by the flux controls. This additional influence aids in moving the arc to a point on the horns where the elongation will produce interruption.

It is true that the upper ends of the horns 24 will be beyond the uniform field produced by the flux control members so that discharge between the upper portions of the horns will not have the short time lag characteristic of the discharge between the terminals but the increased distance between the upper portions of the horns will prevent discharge between these portions for voltages lower than those at which discharge will take place between the terminals, so that for the high voltages for which the gap is designed, discharge will take place between the electrodes 10 and 11 and will have the short time lag desired to protect the apparatus with which the gap is connected. At the same time any resulting power arc would be interrupted by the horns and will be prevented from striking into the porcelain. Webs 26 are arranged at each side of the notch 25 and separate the open notch from the conducting coating on the rear face of the dielectric member.

I claim:

1. An arcing electrode comprising a conductor rod having a discharge terminal at the forward end thereof, a sleeve slideably mounted on said conductor rod, a flux control for said terminal comprising a dielectric member having an opening therethrough surrounding said sleeve, cement securing said sleeve in said opening, the rear surface of said dielectric member extending outwardly and forwardly from said sleeve in the rear of said terminal and being curved to form a concave rear surface of said dielectric member, said surface being coated with conducting material, and a conducting sheet secured to said conducting coating and to said sleeve and forming a continuation of said coating bridging the cement between said sleeve and dielectric member.

2. An arcing electrode comprising a conductor rod having a discharge terminal at the forward end thereof, a sleeve slideably mounted on said rod in the rear of said terminal, a dielectric member cemented on said sleeve and having a bell shaped portion for receiving said discharge terminal, the rear surface of said dielectric member being flared outwardly and forwardly at the inner portion and curved rearwardly at its outer portion, a coating of conducting material on said rear surface, and a circumferentially continuous sheet metal cone bridging the space between the inner portion of said conducting coating and the outer periphery of said sleeve.

3. An arcing gap comprising a discharge terminal, flux control means for distributing the electrostatic field about said terminal and an arcing horn secured to said terminal and extending upwardly and rearwardly therefrom, said flux control means providing an open space above said terminal for receiving said arcing horn so that a power arc can travel upwardly along said arcing horn free from contact with said flux control means.

4. In combination a discharge terminal for an arcing gap, flux control means for distributing the electrostatic field about said terminal, said flux control means providing an open space above said terminal, and an arcing horn extending upwardly from said terminal within said open space to a point substantially free from the influence of said control means, said horn being inclined rearwardly to provide a striking distance which progressively increases outwardly along said horn.

5. An arcing electrode comprising a conductor having a discharge terminal, flux control means for distributing the electrostatic field about said terminal, said flux control means comprising a conducting member and a dielectric covering therefor, said flux control means having an opening therein above said terminal, and an arcing horn extending upwardly from said terminal into said open space for extinguishing the power arc following a discharge from said terminal and for directing said arc away from said flux control means.

6. An arcing electrode comprising a conductor having a discharge terminal at the forward end thereof, a dielectric disc mounted on said conductor and having a bell shaped opening for receiving said terminal, the rear surface of said disc being concave, a conducting coating on said concave surface electrically connected with said conductor, the upper portion of said disc having a slot formed therein, webs on said disc separating said slot from said conducting coating and an arcing horn extending upwardly from said terminal into said slot and serving to extinguish a power arc following a discharge from said terminal and to direct said arc away from said disc.

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