L. STEINBERGER.

DISK SUSPENSION INSULATOR.

APPLICATION FILED JAN. 24, 1917.

1,348,248.

Patented Aug. 3, 1920.

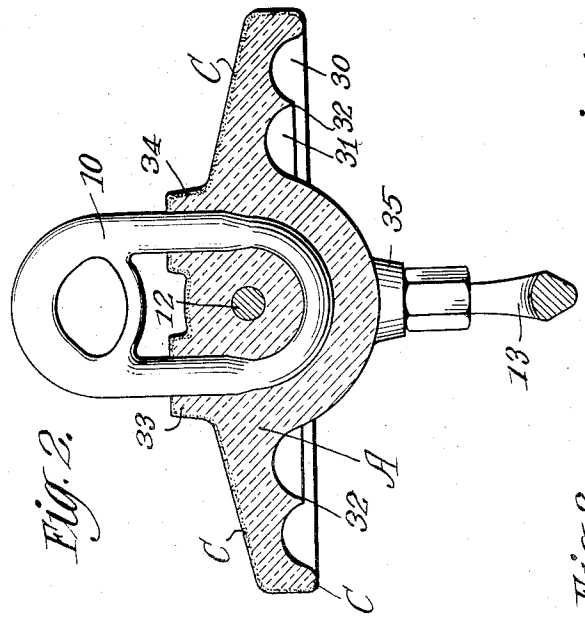


Fig. 2.

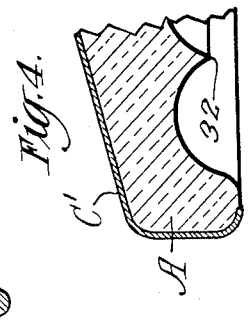


Fig. 4.

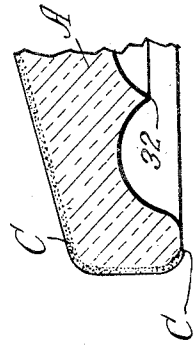


Fig. 3.

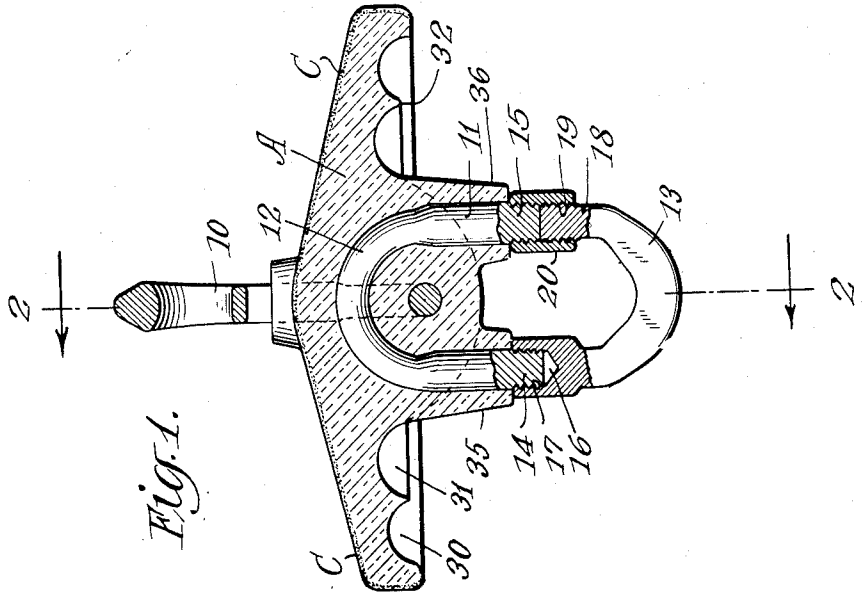


Fig. 1.

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DISK SUSPENSION-INSULATOR.

1,348,248. Specification of Letters Patent. Patented Aug. 3, 1920.

Application filed January 24, 1917. Serial No. 144,109.

To all whom it may concern:

Be it known that I, LOUIS STEINBERGER, a citizen of the United States, and a resident of the borough of Brooklyn, county of Kings, city and State of New York, have invented certain new and useful Improvements in Disk Suspension-Insulators, of which the following is a specification.

My invention relates to insulators either of the strain or suspension type, for use in various relations, and for various purposes, such as power transmission in wireless telegraphy and telephony, as well as for ordinary commercial service of various kinds and more especially for use in connection with currents of very high voltages and very high frequencies.

One of the principal objects of this invention is to construct an insulator which will have a uniform arc over value both in dry and in wet weather.

Another object is to so construct and form an insulator that the voltage will at all times in dry as well as in wet weather arc over either to or from the peripheral edge of the insulator, depending upon the position of line and ground with respect to the insulator, to the end that the internal puncture value of the insulator can be definitely predetermined.

Another object is to so construct an insulator that its puncture value will be much greater than its arc over value.

To accomplish these objects, it is my purpose to provide one side thereof with a metallic covering, or more particularly, to intimately attach to one surface of an insulator, a sheet or layer of electrical conducting material impervious to moisture, said conducting material extending over the entire area of one side from the strain member protruding from that side and over the outer or peripheral edge thereof to a point on the opposite side just a short distance from the edge, as will hereinafter more particularly appear.

Other objects will appear from the following description and claims;

Referring to the drawings, in which like characters refer to like parts throughout the several views;

Figure 1 is a vertical longitudinal section upon a plane passing through the insulator and one of the strain members, the other strain member being shown in elevation, a portion of which is broken away.

Fig. 2 is a section on line 2—2 of Fig. 1, a portion of one of the strain members being in elevation.

Fig. 3 is an enlarged detail in section of a portion of the insulator shown broken away.

Fig. 4 is a similar view of a modified construction.

It is to be clearly understood that the insulator A embodying my invention is not necessarily limited to any particular form of disk construction, nor to the utilization of any particular form of strain members. While I have chosen a particular form of disk of improved construction to be hereinafter pointed out, and a particular construction of strain members to be shown in the drawing, it is to be understood that the forms shown in the drawings are for illustrative purposes, and the invention is not confined thereto.

It is essential of course that the strain members be interlocked, as shown, in the center of the insulating disk, and that at least one of the strain members be made of separable parts so that it may be easily attached to and detached from the strain member of the adjacent disk insulator.

In my Patent No. 1,205,812 granted November 21st, 1916, I have fully described and claimed the structure and arrangement of strain members similar to those shown in the drawing, and it is therefore only necessary to note that the strain member 10 is an integral structure, having in main the general form of the link of a chain, about one-half of which is embedded or molded into the central body portion of an insulator. The strain member 11 is made in two parts, one part 12 being substantially U-shaped and embedded in the center of the insulator in an interlocked position relative to the strain member 10, the free ends of the U-shaped portion projecting out from the body of the insulator. The other part 13 of the strain member 11 is detachably secured to the projecting threaded ends 14 and 15 of the embedded member 12 by means of suitable screw-threaded connections as follows:

One end of the detachable portion 13 of the strain member 11 is provided with a cavity 16 having a screw-thread 17 formed in its inner surface, and the other end 18 is provided with screw-threads 19 of the same pitch as the screw-threads on the projecting ends of the embedded portion 12. A screw-threaded coupling sleeve 20 engages with the

respective screw-threaded projecting ends 15 and 18 of the strain member portions, and by turning the sleeve or coupling in opposite directions, the parts of the strain member will be either secured to or detached from each other as described. The other end of the detachable strain member which is provided with a cavity 16 is first secured to the screw-threaded end 14 of the portion 13 by engaging the screw-threads and turning the portion around, the sleeve or coupling on the other member being of course first put into its uncoupled position upon the end 18 of the strain member.

While as has been said, the invention to be more particularly hereinafter described, is not dependent upon any particular form of insulator, yet I have chosen for illustration an insulator of special construction which has many advantages over other constructions. The insulator A is provided with integral projections 33, 34, 35 and 36 of insulating material upon the opposite faces thereof, said projections surrounding the embedded arms of the strain members as clearly shown in Figs. 1 and 2. The upper surface of the insulator is smooth and may be described generally as having a surface which is conical in shape, the cone having a relatively large base compared with its altitude. The opposite surface of the insulator is provided with a series of concentric grooves 30 and 31, the adjacent walls of contiguous grooves meeting each other to form a sharp annular edge 32, which is for the purpose of causing a quick drip of accumulated moisture, as moisture will necessarily form on all surfaces of the insulator, the bottom as well as the top during damp and foggy weather, as well as in severe storms where the rain does not fall perpendicularly to the earth.

The outer edges of the periphery of the insulator are curved to a degree for the mechanical advantage of guarding against chipping at the edges when the insulator is handled before being placed in position upon the line.

C represents the layer or sheet of conducting material intimately secured under pressure to the upper surface of the insulator and which extends completely over the top surface thereof from contact with the protruding legs of the strain member and around the peripheral edge of the insulator to a point or line just inside the periphery upon the opposite face. To form this conducting surface, I preferably provide a conducting material consisting of a waterproof medium or binding material in which is thoroughly mixed powdered metal, such for instance as powdered aluminium.

This mixture or paste of metallic powder and a water proof medium, such as liquid varnish, may be applied to the surface of the insulator in a layer of uniform thickness by means of a brush or it may be blown on the surface of the insulator under air pressure by the method commonly known as the air spray or air brush.

Another method of applying the conducting material to the surface of the insulator is by dipping the insulator in the mass of this metallic material, so that it will remain on the insulator in a layer of uniform thickness. When the insulator is used as a strain insulator, the disk is of course in a vertical position in relation to the metallic strain members, one side of said insulator and its periphery having a covering of conducting material. When the insulator is used as a suspension insulator, the top surface and outer edge or periphery, is provided with a layer of conducting material as shown.

It is within the scope of my invention to permanently secure a sheet metal covering C′, as shown in Fig. 4, to the upper surface of the insulator by pressing the sheet metal covering into the material of the insulator during the process of molding the insulator, thus affording a complete metallic covering from the protruding strain member to the edge of the insulator which will operate as a conductor from the outer edge of the insulator to the strain member, and vice versa, in both wet and dry weather as herein explained. The metal cover and strain member may also be positioned in a suitable mold of proper size and form, and the insulating material pressed into contact with the metal covering at the same time that it is pressed up into shape and pressed around the respective strain members.

It is essential to apply the layer of conducting material to the surface of the insulating material so that it will be secured thereto very firmly rigidly and intimately and in such a manner as to prevent either air or moisture from entering between the conducting material and the insulating material for the reason that the presence of air or moisture between the metal coating and the body of the insulator leads to deterioration at the edges of the insulator, the exact cause for which has not been determined and consequently is not known.

From the above description it is obvious that my invention permits an arc over to take place between the strain member adjacent the line and the lower edge of the metallic surface, and that this will result whether the insulator is used either in dry weather or in wet weather for the reason that in both cases it will be a true conducting surface from the strain members adjacent ground over the entire surface of the insulator down to its edge.

In the event that an insulator is used without my invention being applied thereto, this arc over will only take place in wet

weather for the reason that in such case there will be a film of moisture over the exposed surface of the insulator. When the exposed surface of the insulator is dry the arc over must take place between the two strain members which project from the opposite sides of the insulator.

In the manufacture of an insulator embodying my invention if designed so that it will under a difference of potential of one hundred volts puncture between the embedded portions of the strain members, then the insulator should be so constructed that an arc over between the exposed portion of the strain member and the metallic edge will occur at fifty volts. This will afford a factor of safety sufficient to prevent the destruction of the insulator.

In the manufacture of such an insulator as I have described above, the insulators are constructed and designed to provide for a fixed puncture value between the contiguous strain members and less arc-over value between the periphery of the insulator and the adjoining strain member. Inasmuch as the dry weather arc-over value is less than the puncture value and as the wet weather arc-over value is still less, it will be readily appreciated that the insulator so designed will always arc-over at all times before it will puncture thus preventing breakdown between the strain members. The puncture value being first provided for, the insulator can always be designed to have an appreciably less arc-over value so as to enable manufacturers to furnish insulators of the proper design for relative puncture and arc-over values as ordered.

The beneficial results arising out of my invention are due to the fact that an insulator to which my invention is applied may be so designed that its internal puncture value should be not less than 100 per cent. above its arc-over value, and as its arc-over value may be substantially determined for use during dry weather as well as during wet weather, a constant internal puncturing value of the insulator can be very definitely determined and thus provided.

The relation between the arcing value and the puncture value may, however, be predetermined so as to make the puncture value range from approximately one hundred per cent. to several hundred per cent. above that of the arcing value.

My invention as herein described consists in a new article of manufacture which is simple, light in weight, compact and constructed of a minimum number of parts, and which contains no pockets or crevices to gather foreign material, all the parts being integrally secured together and which may be very readily installed and is comparatively inexpensive of manufacture.

The strain members are constructed preferably of metal, and the insulating portion of my device may be made of any approved insulating material, but I prefer to use in this construction, a material known in the art as "Electrose."

It is to be understood that I do not limit myself to the particular shape or form of any part shown, neither do I limit myself to the precise arrangement of the parts with respect to each other, neither do I limit myself, as above stated, to any particular insulating material.

It is to be understood that the above description and drawings are merely illustrative, and that the invention is not to be limited in any respect, except as defined in the sub-joined claims.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is:—

1. As an article of manufacture, a unitary structure consisting of a disk insulator provided with strain members embedded therein and projecting from opposite sides thereof, one entire side of which from the projecting strain member to the periphery of the same is provided with a continuous layer of waterproof metallic paste, the juncture between the insulating material and the layer of metallic paste being close and intimate, the path between said metallic edge and the other strain member, requiring less voltage to break it down than the path between said strain members.

2. As an article of manufacture a unitary structure consisting of a disk insulator provided with strain members molded therein and projecting from opposite sides thereof, the said insulator having a layer consisting of a mixture of a waterproof binder and aluminum powder intimately secured thereto over one side from points in contact with the protruding strain member to the periphery of the disk to form a hermetical juncture therebetween, the path between said layer and the other strain member requiring less voltage to break it down than the path between said strain members.

3. As an article of manufacture, a disk insulator provided with strain members embedded therein and extending from opposite sides thereof having a layer consisting of a liquid varnish and aluminum powder intimately secured thereto in contact with the protruding strain member and extending over one side and the periphery thereof to form a hermetical juncture throughout therebetween, the path between said layer and the other strain member requiring less voltage to break it down than the path between said strain members.

4. As an article of manufacture, a unitary structure consisting of a disk insulator provided with strain members embedded therein and projecting from opposite sides there-

of, one entire side of said disk from the projecting strain member to the periphery thereof having a continuous metallic layer thereupon, the juncture between the insulating material and the metallic layer being close and intimate, the path between said layer and the other strain member requiring less voltage to break it down than the path between said strain members.

5. As an article of manufacture, a unitary structure consisting of a disk insulator provided with strain members molded therein and projecting from opposite sides thereof, the said insulator having a metal covering intimately secured thereto and extending entirely over one side thereof from points in contact with the protruding strain member to the periphery of the disk, to form a hermetical juncture between the metal covering and the insulating material, the path between said covering and the other strain member requiring less voltage to break it down than the path between said strain members.

Signed at the borough of Manhattan, city, county, and State of New York, this 23d day of January, 1917.

LOUIS STEINBERGER.

In presence of—
ISABEL R. RICHARDS,
ETHEL D. BARON.