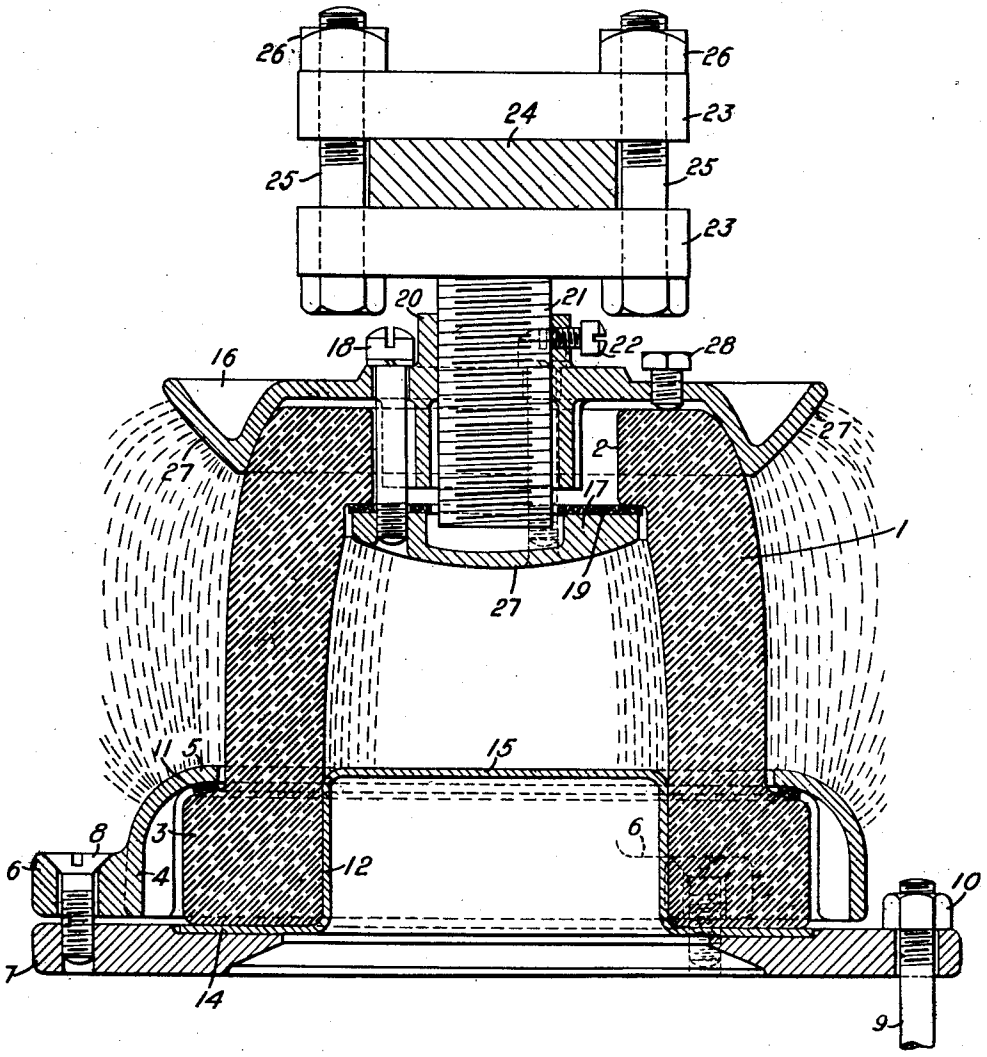
Sept. 9, 1924. 1,508,250

K. C. RANDALL

INSULATOR

Filed Dec. 14, 1918



WITNESSES:

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Patented Sept. 9, 1924. 1,508,250

UNITED STATES PATENT OFFICE.

KARL C. RANDALL, OF EDGEWOOD PARK, PENNSYLVANIA, ASSIGNOR TO WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA.

INSULATOR.

Application filed December 14, 1918. Serial No. 266,720.

To all whom it may concern:

Be it known that I, KARL C. RANDALL, a citizen of the United States, and a resident of Edgewood Park, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Insulators, of which the following is a specification.

My invention relates to insulators for the support of bus-bars or other conductors and has for its object to provide a hollow insulator that, by reason of having both its inner and outer surfaces conforming to the dielectric field or fields in which the surfaces are disposed, shall combine the features of maximum electrical and mechanical strength, simplicity of construction and economy in manufacture.

As disclosed in Patent No. 1,129,520, granted to the Westinghouse Electric & Mfg. Company, February 23, 1915, upon an application filed by K. C. Randall, S. W. Farnsworth and C. LeG. Fortescue, the concentration of potential stresses, in the vicinity of an insulator, may be avoided by shaping the insulator surfaces to conform to the dielectric field in which it is disposed.

Various devices embodying applications of the principles disclosed in the above patent have subsequently been proposed, principally among which have been suspension and pin-type insulators for high-potential transmission lines. These have usually comprised solid bodies or bodies so formed or related to each other that the necessity of having interior surfaces also conforming to the dielectric field has not heretofore existed. Certain protective barriers of uniform and minimum thickness have been formed to simulate the surface of a single tube of force.

In practicing my invention, I provide a hollow pillar-type insulator, preferably of porcelain, for the support of bus-bars or other conductors and having relatively great mechanical strength, that conforms, at both its inner and outer surfaces, to the dielectric field in which it is disposed. To permit the insulator to be secured to a switchboard, or other support, and, in order that it may support a bus-bar or bars, relatively rugged and extensive metal members are secured to its ends. This construction, in consideration of the mechanical requirements, may or may not be conducive to the production of a uniformly diverging or converging dielectric field, and in providing a hollow insulating structure having both its inner and outer surfaces conforming to separate and distinct tubes of force, the combined advantages of maximum electrical and mechanical strength, simplicity of construction, economy of manufacture, effectiveness in operation, and convenience in assembling, handling and shipping with lessened liability of damage thereto are obtained.

In a co-pending application, Serial No. 266,704, filed Dec. 14, 1918, by James M. Brown and assigned to the Westinghouse Electric & Mfg. Company, is disclosed an insulator having a certain novel mechanical structure particularly adapted for use in co-operation with an insulator embodying the principles herein disclosed.

The single figure of the accompanying drawings is a longitudinal sectional view, partially in elevation and as viewed in the direction of the axis of a bus-bar, of an insulator embodying my invention.

A hollow insulating member 1, shown as substantially of bowl shape but that may be of other shapes and preferably formed of porcelain, is provided with inwardly and outwardly projecting flanges 2 and 3, respectively, at its ends. A metal ring or frame 4 having a flange 5, for co-operation with the flange 3, and apertured lugs 6, is secured to a base plate or ring 7 by screws 8 that extend through the lugs 6 and into the member 7. Bolts 9, only one of which is shown, extend through the member 7 and have co-operating nuts 10 to secure the member 7 to a suitable support, not shown. A cushioning ring 11 of felt or other suitable material is disposed between the flanges 3 and 5. A preferably relatively-thin-walled metal member 12, of substantially cup-shape has its main body portion extending into one end of the member 1 and an outwardly-projecting flange 14 nested between the members 1 and 7 in a recess in the outer face of the latter member. The member 12 assists in mechanically reinforcing the member 1 against lateral stresses, serves as a positioning means therefor and by having an end face 15 disposed in the plane of the outer face of the

flange 5, assists the latter in directing the dielectric field, in a manner to be hereinafter explained.

Members 16 and 17 engage the outer end of the member 1 on the outside and the inside, respectively, of the flange 2 and are joined together by bolts 18. A resilient cushioning washer 19, of felt or other suitable material, is interposed between the flange 2 and the member 17. An interiorly-threaded centrally-disposed tubular portion 20, of the member 16, supports an adjustable screw-threaded stud 21 that may be locked in adjusted position by a set screw 22 extending through the portion 20. A pair of complemental clamping members 23, between which a bus-bar 24 is rigidly clamped by bolts 25 and nuts 26, is secured to the outer end of the stud 21.

Adjusting screw-bolts 28, only one of which is shown, extend through the member 16 to the outer surface of the flange 2 and permit the rigid and accurate correlation of the insulator members, regardless of irregularities in the members and of any deviation from true parallel in the relation between the planes of the bus-bar 24 and the member 7.

The members 16 and 17 are formed to present a single spheroidal surface 27, except as it is intercepted by the walls of the member 1, toward the members 4 and 12 that, together, present the flat surface 15 bounded by rounded outer edges provided by the flange 5. This relation of the surfaces 27 and 15 tends to uniformly direct the dielectric field, as indicated by dotted lines, and as shown provides the substantially ideal distribution of the field for mechanical strength and compactness of the insulator and for the most efficient use of the insulating material.

Were the member 17 a smaller element, disposed at a point beneath the stud 21, or were the members 16 and 17 arranged at haphazard or as dictated by mechanical considerations only, it is obvious that violent and destructive electrical stresses might obtain. Further, as explained in the above mentioned patent, an insulator constructed in accordance with these principles utilizes the full insulating value of air in addition to effecting relatively great simplification and economy of construction therein.

While I have shown and described a particular form of my invention, changes may be effected therein, without departing from the spirit and scope thereof, as set forth in the appended claims.

I claim as my invention:

1. An insulator comprising a hollow insulating member having a perimetral transverse end flange, a metal terminal member having a portion disposed inside the insulating member and a metal terminal member disposed outside the insulating member, said terminal members being constructed to co-operatively clamp said flange between them and to co-operatively distribute the electrostatic field of the insulator.

2. An insulator comprising a hollow insulating member having substantially frusto-conical inner and outer surfaces, and terminal structures at each end thereof, one of said terminal structures comprising a plurality of metal members co-operating with each other to clamp a portion of the insulating member therebetween and each definitely directing the electric field of the insulator relative to said surfaces and to the other terminal member.

3. In an insulator, the combination with a hollow insulating member, of terminal structures therefor, one of which comprises metal members disposed on the inside and outside of said hollow insulating member, respectively, and co-operating with each other, to definitely direct the electric field of the insulator with respect to the other terminal structure and to mechanically clamp a portion of the insulator between them.

4. In an insulator, the combination with an insulating member, of terminal structures therefor, one of which comprises a pair of metal members co-operating with each other to readily removably mechanically clamp a portion of the insulating member between them and to definitely direct the electric field of the insulator with respect to the other terminal structure.

5. In combination, a pair of terminal structures, one of which comprises a pair of metal members co-operating with each other to readily-removably mechanically clamp a portion of an insulating member between them and to definitely direct an electric field relative to the other terminal structure, and a hollow insulating member having an open end portion clamped between said metal members and extending in conformity to said field to the other terminal structure.

6. An insulator comprising a hollow insulating member and terminal structures at each end thereof, one of said terminal structures embodying a pair of metal members disposed on the inside and outside, respectively, of the insulator co-operating to mechanically clamp a portion of the insulating member therebetween and to definitely direct the electrostatic field of the insulator relative to both the inner and outer longitudinal surfaces of the insulating member and to the other terminal member.

In testimony whereof, I have hereunto subscribed my name this 30th day of Nov., 1918.

KARL C. RANDALL.