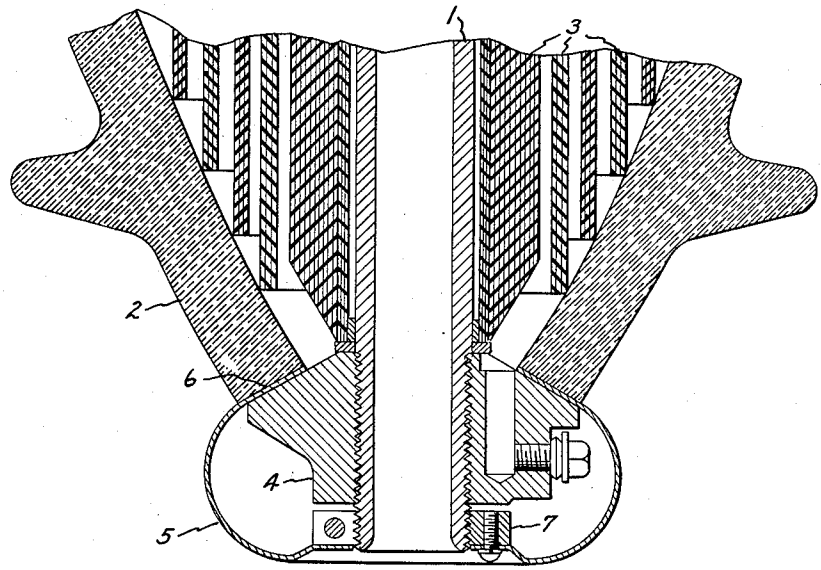
Jan. 26, 1954 P. A. EWER 2,667,532

HIGH-VOLTAGE ELECTRICAL INSULATING BUSHING

Filed April 26, 1950



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Patented Jan. 26, 1954 2,667,532

UNITED STATES PATENT OFFICE

2,667,532

HIGH-VOLTAGE ELECTRICAL INSULATING BUSHING

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Application April 26, 1950, Serial No. 158,238

Claims priority, application Great Britain May 17, 1949

1 Claim. (Cl. 174—142)

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This invention relates to high voltage electrical insulating bushings and more particularly to bushings in which the electrical stresses are sufficiently high to make desirable the rounding off or screening of projecting metal parts so as to avoid the formation of corona.

In order to provide suitable electrical connection between tank-enclosed electrical equipment and the external circuits to which such equipment is connected, it is standard practice to use an insulating bushing assembly which passes through the top or side of the tank or enclosure in which the electrical equipment is contained. Such a bushing assembly includes a center conducting member, an insulating structure concentric of the conductor, and a metal grounding sleeve which is substantially centrally located along the axis of the bushing structure and is the means by which the bushing assembly is maintained in position with respect to the tank casing. The outer portions of the insulating structure generally include tapered shell-like members, usually of a ceramic material, which extend from the centrally-located grounding sleeve to the opposite ends of the conducting member.

In the case of high voltage bushings, where the potential between the center conducting member and the grounded metal casing in which the electrical apparatus is contained is of a high magnitude, and particularly where the end of the bushing structure contained inside the tank is immersed in oil, it is common practice to provide the end of the conductor which projects axially beyond the insulating members of the bushing structure inside of the enclosing tank, with a smooth contour, such as that of a spheroid, so as to avoid the exposure of any sharp edges from which corona may spring. This smooth contour is frequently provided by an auxiliary metal conducting member which is attached in any suitable manner to the end of the conductor where it projects beyond the insulating portions of the bushing.

In prior constructions, the joint between the conducting member or the auxiliary metal housing providing the smooth contour and the insulating shell member has been in a flat plane normal to the axis of the conducting member.

It is an object of this invention to provide a new and improved joint structure between the insulating shell member and the conducting members at the tank-contained end of an electrical bushing.

It is a further object of my invention to provide a joint structure between the conducting members and the insulating shell at the tank-contained end of an electrical bushing which will facilitate the accurate concentric assembly of the conducting members and insulating shell.

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It is a further object of my invention to provide a joint between the conducting members and the insulating shell member of an electrical bushing which will result in lower electrical stress at the surface where the insulating shell member engages the conducting members.

It is a further object of this invention to provide a new and improved joint between the insulating member and conducting members of an electrical bushing which permits a reduction in the dimensions of the metal conducting parts in proximity to the joint.

In accordance with these objectives, this invention provides a frusto-conical joint between the insulating shell and the conducting members of an electrical bushing with the external surface of the end of the smooth-contoured electrical conducting member constituting an extension of the frusto-conical surface of the joint.

The features of this invention which I believe to be novel are set forth with particularity in the appended claim. My invention itself, however, both as to its organization and use, together with further objects and advantages thereof, may best be understood by reference to the following description taken in connection with the accompanying drawing which shows a partially cutaway sectional view of the portion of an electrical bushing assembly embodying the frusto-conical joint of my invention.

Referring now to the drawing, there is shown a center conducting member 1, which may be in the form of a metal tube, surrounded by an outer insulating shell of any suitable material and configuration, such as a porcelain petticoated shell 2. The space between the conducting member 1 and the outer insulating shell 2 may be filled with any suitable dielectric medium or may, as shown in the drawing, be provided with concentric insulating cylinders 3 of any suitable material, the lower ends of which abut against the interior surface of the outer insulating shell member 2. The use of such insulating cylinders is conventional in the electrical insulating bushing art, and forms no part of this invention.

In order to provide a suitable support member for insulating shell 2, the lower end of conducting member 1 is provided with a concentric conducting member 4 which acts as a bearing or support for insulating shell 2. In accordance with

my invention, the surface of support member 4 which is adjacent shell member 2 is of a frusto-conical shape or contour.

The insulating shell member 2 is constructed with a taper as it approaches the joint, the bottom surface of shell member 2 being parallel to the surface of support member 4 to which it is adjacent. The frusto-conical surface at the joint is made approximately normal to the external and internal wall surfaces of the insulating shell 2. The concentric conducting member 4 may be screwed onto the lower end of conducting member 1, or may be secured to conducting member 1 in any other suitable manner.

In order to minimize the electrical stress between the conductor 1 and grounded metal surfaces to which it may be adjacent, a member having a smooth outer contour is provided at the end of conductor member 1. This member with the smooth external contour is preferably in the form of a hollow metal bell-shaped member 5, the rim 6 of which forms an abutment against which the end of insulating member 2 is seated. The outer end of member 5 is rigidly attached to the outer end of conductor 1 by any suitable method. It may be connected directly to abutment member 4 or it may be connected to a separate collar or sleeve member 7 as shown in the drawing.

The frusto-conical surface at the joint between members 2 and 4 is made approximately normal to the walls of the tapered insulating shell, as mentioned hereinbefore, and the rim 6 of the rounded metal member 5 is substantially tangential to the frusto-conical surface of the joint at the point of departure of member 5 from the external wall of the insulating shell 2.

Due to my invention, the conical form given to the engaging surfaces at the joint between the abutment member 4 and the insulating shell 2 will assist in the accurate concentric assembly of abutment member 4 and insulating shell 2. Also, with my construction, it is possible to provide a smooth-contoured member 5 having a smaller overall diameter for a given radius of curvature than is possible with the flat joints heretofore known in the art. Furthermore, the conical form of the joint also insures that the electrical stress at the outside surface of the insulating shell where it engages with the conducting members is less than in the case of joints heretofore constructed.

While there has been shown and described a particular embodiment of my invention, it will be obvious to those skilled in the art that various changes and modifications can be made therein without departing from the invention and, therefore, it is aimed in the appended claim to cover all such changes and modifications as fall within the true spirit and scope of the invention.

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

An electrical insulating bushing comprising a conducting member, a hollow insulating member concentrically surrounding said conducting member in spaced relationship, a metal support member for said insulating member positioned concentrically about said conducting member adjacent an end thereof, said support member being rigidly attached to said conducting member and forming a continuation of a conducting surface of said conducting member, said support member having a frusto-conical exterior surface, the apex of said frusto-conical surface pointing away from said end of said conducting member, a transverse end surface of said insulating member being frusto-conical and parallel to the frusto-conical surface of said support member, a hollow metal member having a rounded surface substantially surrounding said end of said conducting member and said support member for reducing electrical stress in the vicinity thereof, said hollow member having a rim portion interposed between said frusto-conical surfaces of said insulating and support members, opposite surfaces of said rim portion abutting said frusto-conical surfaces of said insulating and support members, adjacent surfaces of said insulating member, rim portion, and support member forming a frusto-conical joint.

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References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
1,129,468	Fortescue	Feb. 23, 1915
1,350,925	Faccioli	Aug. 24, 1920
1,522,215	Wagner	Jan. 6, 1925
1,749,419	Rump	May 20, 1930
1,957,982	Smith	May 8, 1934
2,396,871	Meyerhans	Mar. 19, 1946