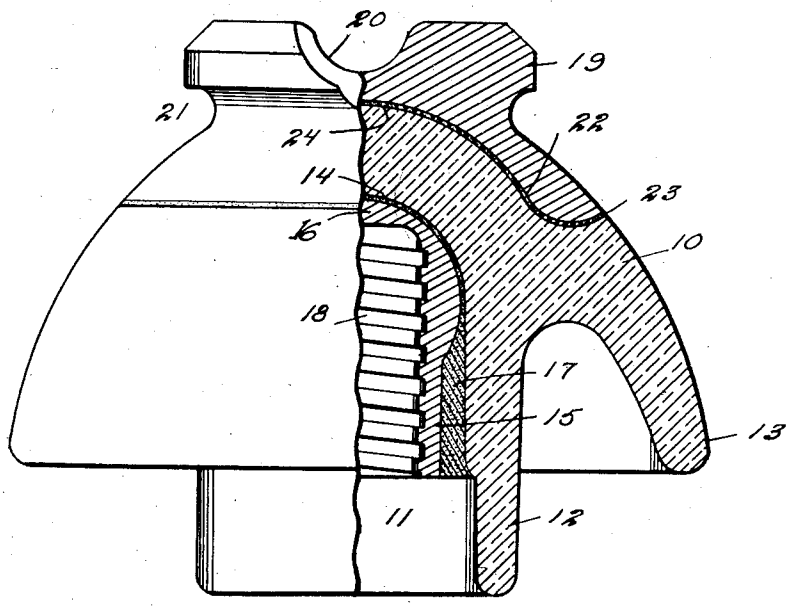
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RADIO INTERFERENCEPROOF INSULATOR

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RADIO INTERFERENCEPROOF INSULATOR

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The invention relates to insulators for supporting electrical transmission lines.

It is well known that present insulator units cause radio disturbances while operating at normal voltage by creating a noise which is audible directly by the human ear and which is quite noticeable and in fact extremely objectionable in radio receivers. The disturbances are not limited to any certain definite frequency but range from the low audible noise to the high radio frequencies. If an insulator known to be creating a disturbance is viewed in the dark a glow or corona formation is visible, the corona generally forming first between the tie wire and the porcelain as the flux through the air gap at this point is the largest contributing interference factor. Prior to the advent of radio and television such discharges were of no significance but have now assumed great importance.

It is with the above facts in view that I have devised the present invention which has for its general object the provision of a novel insulating unit which will not cause any disturbances which will interfere with radio reception.

An important object of the invention is to provide an insulator unit of such construction that the stresses in the electrical field about it will be balanced, or in which the electric stresses about the line conductor and the ground side of the insulator will be so distributed that the transmission of electric energy through urban and rural districts may be accomplished without any annoying disturbances to or in radio and television receivers located in the vicinity, that is to say near overhead electric circuits.

Another object of the invention is to provide a so-called radio-proof or non-interfering insulator which may be used in the same manner as ordinary equipment, that is to say of such design that the usual supporting pins can be used and the same method employed of securing the line conductor to the insulator, and moreover of such form that the electrical characteristics, such as dry and wet flash-over values, will be about the same as for present units, and the mechanical characteristics unimpaired.

My invention is based principally upon the discovery that substantially spherical opposed surfaces on the necessary metallic elements and the interposed dielectric material will avoid the concentration of electrical stresses and effect such distribution of the lines of force through the insulator and in the electro-static field about it that formation of corona, with the objectionable consequent disturbances, will be prevented until the flash-over voltage of the particular insulator is substantially reached.

A more specific object of the invention is to provide an insulator unit in which the same number of dielectric and metallic parts may be used as customarily and in which the external shape may likewise conform to generally accepted standards, the construction being moreover applicable to insulators of the pin, suspension, pedestal or other types and regardless of whether there be but one or several dielectric parts.

An additional object is to provide an insulator construction which will be simple and inexpensive to make and assemble, positive in action, efficient and durable in service, and a general improvement in the art.

To the attainment of the foregoing and other objects and advantages, the invention preferably consists in the details of construction and the arrangement and combination of parts to be hereinafter more fully described and claimed, and illustrated in the accompanying drawing in which:

The figure is a view partly in side elevation and partly in section showing the invention.

At the very outset, it should be understood that while I have shown and will describe the invention as embodied in insulators of the type adapted to support line wires bound in place by a tie wire, clamp or the like, there is no limitation in this respect as the form disclosed is simply by way of illustration.

Referring more particularly to the drawing, I have shown the insulator as comprising a dielectric body 10, usually of porcelain, which may be plunged, cast or shaped in any other manner and which, if of porcelain, is glazed, fired and otherwise treated in the usual or any preferred manner, all of which steps are old and well known in the art. The body 10 is represented as having a central recess 11 surrounded by a depending petticoat 12 outwardly of which there may be provided any necessary or desirable number of skirts 13. Moreover there is no necessity of using a single dielectric body as use may be made of several secured together in a well known manner.

The recess 11 is disclosed as cylindrical throughout its major portion but formed with a spherically curved inner or upper end 14, and located within this recess is one of the electrodes here represented as a species of metallic or other conducting member of a more or less thimble-like form and including a cylindrical

shank portion 15 terminating in a spherically curved head 16, the latter being fairly closely accommodated within the spherically curved inner or upper end of the recess. This metallic or other conducting member is secured in place as for example by means of a mass of cement 17 which is a common expedient in insulator construction. The present invention is not concerned with whether the inner surface of the recess be sanded or otherwise roughened or be simply left unglazed or be positively treated in some manner to insure an adequate grip for the cement, but all of these possibilities are contemplated as being within the purview of the invention. In the present instance the metallic member is shown as having a threaded opening 18 therein for mounting upon a supporting pin or the like but whether or not this exact scheme is followed depends wholly on the type of insulator in which the invention is to be embodied.

Secured in opposed relation to the metallic member 15 is a conducting cap 19 here shown as having a line wire receiving groove 20 and a tie wire groove 21 though these features are not limitative. These two electrodes are of course separated by the interposed dielectric material. A feature of prime importance is that the undersurface 22 of the electrode 19 is spherical in shape and is secured, as by cement 23, or the like, within a recessed or sunken portion in the top of the body 10, this recess having a spherical surface 24 opposite to and preferably at least substantially concentric with the spherical surface 14. While the spacing between these opposed spherical surfaces may be varied there should be sufficient separation that corona will not occur until the flash-over or puncture values are almost reached.

It will be observed that the exterior surface of the insulator, or dielectric portion thereof, is smooth and unbroken, the exterior surface of the lower portion of the cap 19 constituting a continuation of the adjacent exterior surface of the dielectric body. It will also be noted that the tie wire is in intimate contact with the cap or upper electrode and consequently in good electrical contact with the spherically curved element.

From the above it will be apparent that my construction will permit or bring about the balanced distribution of stresses, by means of the spherical or ball-like electrode in conjunction with the concaved cap. This will be effective in reducing disturbances and will have the advantage of but little cantilever action on the pin and supporting arm therefor.

In the new scheme an equalization of stresses is provided so no corona and discharging occurs until excessive overstressed potentials are applied. For instance the corona point was increased from about 6 kv. in a present 20,000 volt design to about 25 kv. for the new arrangement. The interference factor of safety for this particular unit was over three.

Particular attention was given to the design for the flux distribution for the dielectric circuit. For the sphere design for both the pin portion and the cap portion of the new design, the equipotential surfaces between the two conducting substances are practically spheres. The metallic or conducting spheres in the porcelain are separated properly so corona will not occur until near the flash-over or puncture values.

Since the air is one dielectric between the upper electrode (cap of the insulator) and the lower electrode (the sphere with the threads) and the porcelain is another dielectric the two are combined in multiple. The design of the contour of the insulator is so arranged that the division between the dielectrics is normal to the lines of force, as near as practical, and the stress on either side is about the same as it would be were the other not present.

The electrodes are also so proportioned and shaped and also the porcelain is so shaped that one dielectric does not overstress another. This is especially important in these insulator designs where dielectrically weak air of low permittivity is necessarily in combination with dielectrically strong insulation of high permittivity.

The differences of permittivity of the air and porcelain is taken care of so that each part is stressed in proportion to its respective strength. The insulation of the highest permittivity is placed where the field is the densest.

Slight alterations from the above mentioned incorporated ideas must by necessity be modified in order to provide proper leakage and flash-over conditions by the addition of skirts. Larger size porcelain insulators necessitate multipiece designs. Mechanical strength requirements alter the smooth electrode surfaces which of course would otherwise be better for even flux distribution.

Something further is gained by using more porcelain in the dense fields such as near the conducting cap at the surface and cutting away, as it appears, in the middle of the surface perimeter so as to provide in series, between some of the flux lines the insulation of high permittivity and air of low permittivity.

From the foregoing description and a study of the drawing it will be apparent that I have thus provided a simply constructed and easily assembled insulator which by virtue of the relative character and cooperation of the opposed electrodes or metallic inserts will effectually balance and distribute the stresses in the electrical field about an insulator and make the flux of the lines of force through the dielectric uniform, thereby avoiding any concentration of stresses and preventing the formation of corona with the consequent generation of disturbances of different frequencies. It is thought that the construction, operation and advantages should be readily apparent to one skilled in the art without further explanation.

While I have shown and described the preferred embodiment of the invention, it should be understood that the disclosure is merely an exemplification of the principles involved as the right is reserved to make all such changes in the details of construction as will widen the field of utility and increase the adaptability of the device provided such changes constitute no departure from the spirit of the invention or the scope of the claims hereunto appended.

Having thus described the invention, I claim:

1. An insulator of the non-strain type comprising a preformed dielectric body provided at its underside with an inwardly extending cavity having a substantially spherically curved bottom, said body having its top formed with a recess having a wall substantially concentric with the bottom of the cavity, a metallic thimble secured within the cavity and having a substantially spherical head, said thimble having means for engagement upon a pin, and a metallic cap

secured within said recess with its exterior surface flush with the body.

2. An insulator of the non-strain type comprising a dielectric body including a central stem portion and an outwardly extending skirt, said stem portion being formed at its bottom with an inwardly extending cavity having cylindrical sides and a spherical bottom, a metal thimble cemented within said cavity and having a substantially spherical head located within the bottom thereof, said thimble having means for engagement upon a pin, the top of the body being formed with a recess having the major portion of its bottom spherical and concentric with the bottom of the cavity and having the outer edge portion of its bottom located above the juncture of said skirt with the stem and reversely curved, and a metallic cap cemented within the recess and having its outer surface flush with the adjacent outer surface of the body.

3. A porcelain insulator of the cap and pin type, comprising a porcelain body having an outstanding skirt and a cylindrical central portion formed with an inwardly extending cavity having a substantially spherical bottom, a metallic member having a spherical head located and secured within the bottom of the cavity and adapted for engagement upon a pin, the top of the body being formed with a recess of greater diameter than the cavity and having a convexly curved spherical bottom extending to a point above the innermost portion of said skirt, the remaining or outer portion of the bottom of said recess being reversely curved, and a metallic cap seated and secured within said recess for electro-static cooperation with said head.

4. An insulator comprising a preformed dielectric body provided at its underside with an inwardly extending cavity having a substantially spherically curved bottom, said body having its top formed with a recess having a wall substantially concentric with the bottom of the cavity, a metallic member secured within the cavity and having a substantially spherical head fitting within the bottom of the cavity, and a metallic member secured within said recess and having its exterior surface flush with the body.

HAROLD H. BROWN.