Nov. 27, 1928.

1,693,381

G. I. GILCHREST

INSULATOR

Original Filed Jan. 20. 1920

Fig. 1.

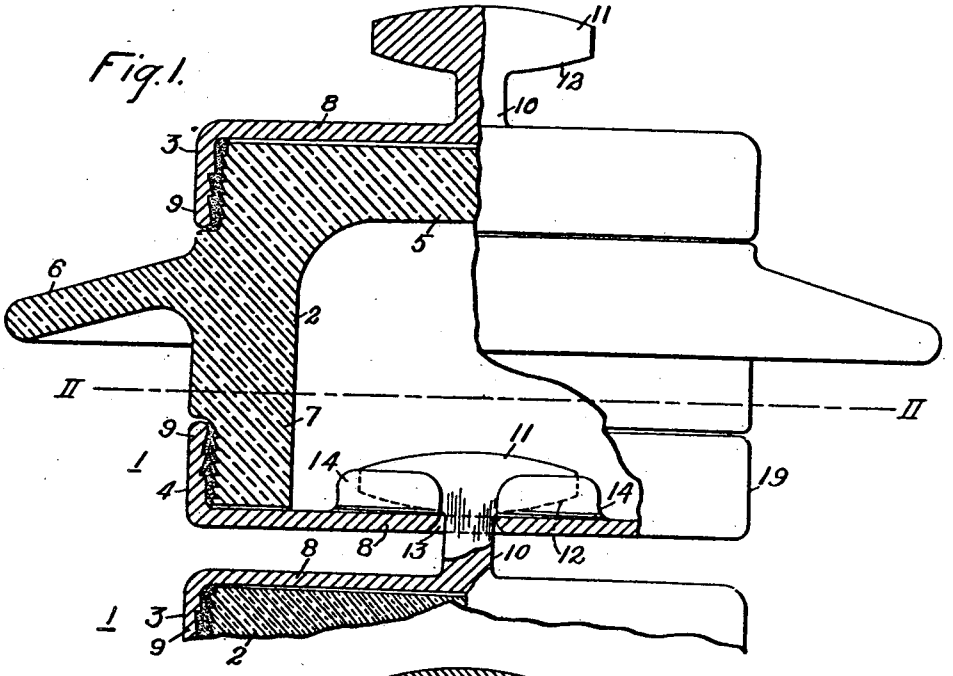


Fig. 2.

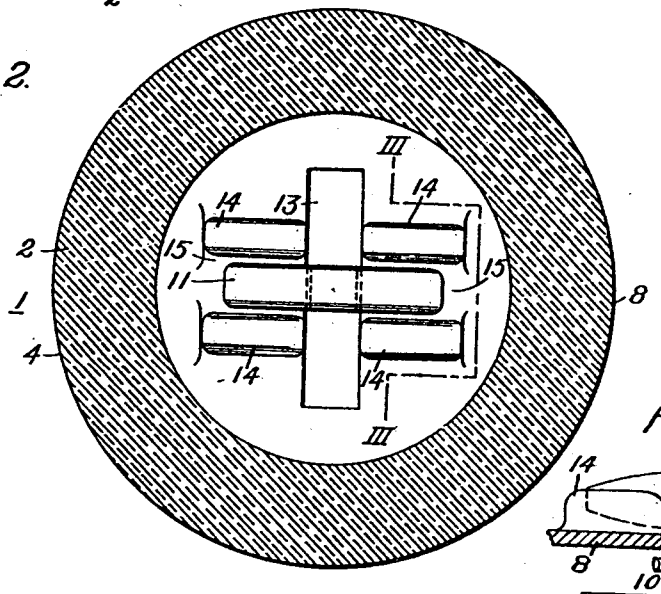


Fig. 4.

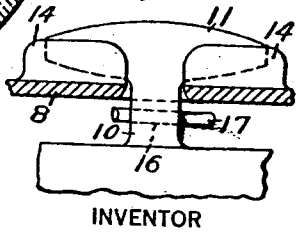
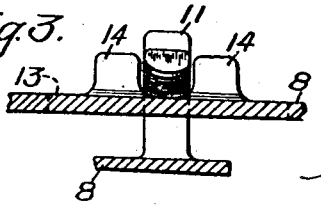


Fig. 3.



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UNITED STATES PATENT OFFICE.

GEORGE I. GILCHREST, OF WILKINSBURG, PENNSYLVANIA, ASSIGNOR TO WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA.

INSULATOR.

Application filed January 20, 1920, Serial No. 352,719. Renewed March 1, 1927.

My invention relates to insulators and particularly to suspension insulators.

One object of my invention is to provide a device of the above indicated character that shall have effective insulating and dielectric properties and be of relatively short overall dimension for a given capacity.

Another object of my invention is to provide a flexible suspension insulator that shall comprise a plurality of units of such shape and relation to each other as to closely resemble a continuous cylindrical insulator of the pillar type and that shall be so free, in the zone immediately adjacent to its substantially cylindrical body portion, of metal and other bodies and field-disturbing projections as to, not only, avoid disturbing the electrostatic field in the said zone but to maintain the capacity of the medium in the zone constant and of relatively low value.

Heretofore, it has been usual, in flexibly-connected suspension insulators, to employ porcelain members of the well-known petticoat type and connecting members of various kinds, such as the eye-and-clevis and many other devices that are more or less difficult to manipulate and that occupy an undue amount of space.

It is a well-known fact that the usual flexibly-connected suspension-type insulator does not have as good insulating and dielectric properties for a given length as an insulator of the pillar type. This has been caused by the varying diameters and masses of material employed, the relation and spacing of the metal parts with respect to the porcelain, and the otherwise open construction of suspension insulators.

In my copending application, Serial No. 331,548, filed Oct. 18, 1919, is disclosed a pillar-type insulator designed to improve the insulating and dielectric properties of an insulator of the pillar type and to facilitate the connection and disconnection of the component insulating units thereof.

In practicing my invention, I provide means whereby the insulating members, similar to the insulating members shown in the above mentioned application, may be effectively employed to constitute a flexibly-connected suspension insulator. The insulator is so constructed that all of its parts, both metal and insulating, substantially fill, and lie within, the boundaries of a cylindrical zone between its terminals. This arrangement of parts provides a region of relatively low capacitance around the insulator wherein no metal is disposed and wherein there are no field-disturbing projections. Insulating petticoat portions, which are provided to increase the creepage surface and to function as rain sheds, are disposed at substantially right angles to the field which is, therefore, not disturbed. The several members are connected to so facilitate their assembly and disassembly that they may be joined and taken apart by very simple relative turning movements.

Figure 1 of the accompanying drawings is a side view, partially in section and partially in elevation, of a portion of an insulator embodying my invention; Fig. 2 is a view taken along the line II—II of Fig. 1; Fig. 3 is a detail view taken along the line III—III of Fig. 2, and Fig. 4 is a detail view of another adaptation of an insulator embodying my invention.

In general, my improved insulator embodies a plurality of units 1, severally comprising an insulating member 2 of porcelain or other suitable material and end members 3 and 4.

Each insulating member 2 is preferably of substantially tubular or cup-shape having an interior transverse wall 5 and an outer petticoat portion 6. The members 2 may have end portions 7 of less outer diameter than the remainder of the insulator for the reception of the end members 3 and 4 that similarly comprise substantially discoidal body portions 8 and flanges 9 embracing, and cemented to, the ends 7. The member 3 is provided with a centrally-located outwardly-projecting portion 10 having a transverse portion or cross arm 11 curved at its under surface 12.

The end member 4 is provided with an elongated slot 13 substantially conforming to, and slightly larger than, the cross arm 11 for the admission of the latter to a position at the inner surface of the portion 8.

Lugs or raised portions 14 on the inner surface of the member 4, extend transversely with respect to the slot 13 and form channels 15 in which the cross arm 11 is adapted to be

positioned. In operative position, the surface 12 permits the arm 11 to have a rocking movement in the channels 15.

The operations of connecting and disconnecting two of the units 1 is comparatively simple, the cross arm 11 being placed through the slot 13 and turned substantially 90° to its position in the channels 15. In disconnecting two of the units, they are moved to lift the arm 11 out of the channels 15 and turned 90° to register with the slot 13 through which the arm 11 may then be readily withdrawn.

In Fig. 4, the portion 10 may be provided with a transverse opening 16 disposed at right angles to the slot 13 for the reception of a cotter pin 17, or other suitable means may be employed to prevent the arm 11 being raised above the portions 14 and thereby precluding accidental disengagement of the insulators.

The arrangement is such as to prevent the accidental separation of the units when they are assembled and in operative positions.

The several units, being of cylindrical shape having relatively-broad flat end surfaces, may be placed close together to form a uniform occupied zone between the insulator terminals. All of the metal parts are within this zone wherein, by reason of the higher specific inductive capacity of porcelain, as compared with air, they are most advantageously placed. The presence of metal in the exterior region surrounding the insulator, lowers the capacitance of this region and causes flashover at lower voltages than is possible with my improved form of insulator.

The absence of any kind of irregular or other field-disturbing projections in the exterior region prevents the concentration of electrostatic stresses and the consequent breakdown caused thereby. The petticoat portions 6 are arranged at substantially right angles to the exterior field and, therefore, disturb it to a minimum degree, these petticoats being provided to increase surface-creepage distances and to function as rain sheds.

The absence of metal and other members in the exterior field and the compactly arranged cylindrical units are features which together serve to ensure very good insulating and dielectric properties.

By employing the insulating members 2, or members of similar type ordinarily employed in pillar-type insulators, a suspension insulator, having substantially the same insulating and dielectric characteristics as a pillar-type insulator of the same length, is provided. In other words, a suspension insulator is provided having, to the best of my knowledge, much better operating characteristics than other suspension insulators of the same length heretofore used.

While I have shown and described particular forms 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 pair of insulating members having adjacent relatively broad flat discoidal end portions, one of said portions having a central recess therein, a discoidal member having a central portion extending into said recess and secured in position over said recessed end portion, said inwardly-extending portion embodying a connector seat portion inside said recess, and a second discoidal member having a central projecting connector portion for co-operation with said seat portion and secured in position over the adjacent end portion of the other insulating member.

2. An insulator comprising a pair of insulating members having adjacent end portions, one of which has a central recess therein, a terminal member having a central portion extending into said recess and secured in position over said recessed end portion, said inwardly-extending portion embodying a connector seat portion inside said recess, and a second terminal member having a central projecting connector portion for co-operation with said seat portion and secured in position over the adjacent end portion of the other insulating member, said terminal members having adjacent surfaces of relatively great areas spaced in substantially equi-distant relation to each other throughout when the axes of said insulating members are in alinement.

3. An insulator comprising a pair of insulating members having adjacent end portions, one of which has a central recess therein, a terminal member having a central portion extending into said recess and secured in position over said recessed end portion, said inwardly-extending portion embodying a connector seat portion inside said recess, a second terminal member secured in position over the adjacent end portion of the other insulating member, said terminal members having adjacent surfaces of relatively great areas spaced in substantially equi-distant relation to each other throughout when the axes of said insulating members are in alinement, and means projecting from the central portion of said second terminal member and co-operating with said seat portion to connect said insulating members.

4. An insulator comprising a pair of insulating members having adjacent relatively broad flat discoidal end portions, one of said portions having a central recess therein, a discoidal member having a central opening therethrough and secured in position over said recessed end portion, said discoidal member having a connector seat portion inside said recess, and a second discoidal member

having a central projecting portion for cooperation with said seat portion and secured in position over the adjacent end portion of the other insulating member.

5. In an insulator, the combination with an insulating member having a recessed end portion, of a connector therefor comprising two members one of which has a portion of discoidal shape attached to said insulating member over said recessed end portion, said discoidal member having an elongated central slot and a channel portion inside said recessed end portion of the insulating member extending transversely with respect to the slot, and the other member of the connector having a projection and a transverse elongated head on the projection for insertion through said slot and for positioning in said channel.

6. In an insulator, the combination with an insulating member having an opening therein, of a connector therefor comprising two members one of which has an elongated slot and a channel portion extending transversely with respect to the slot and the other of which has a projection and a transverse elongated head on the projection for insertion through said slot and for positioning in said channel, said head and said channel being operatively positioned inside the opening in said insulating member.

7. In an insulator, the combination with a hollow insulating member, of a connector therefor comprising two members, one of said members having an elongated slot and a channel portion on one side extending transversely with respect to the slot, and the other of said members having a projection and a transverse elongated head on the projection for insertion through said slot and for positioning in said channel, said head and said channel being operatively positioned inside said hollow insulating member.

8. An insulator connector comprising two relatively-thin discoidal members disposed in proximate substantially parallel planes, one of said members having an elongated slot and a channel portion on one side extending transversely with respect to the slot, and the other of said members having a projection and a transverse elongated head on the projection curved at its under side for insertion through said slot and for rocking positioning in said channel.

9. An insulator connector comprising two oppositely facing metal members of relatively-shallow substantially cup-shape, one of said members having an elongated slot in its bottom wall and a channel portion extending transversely with respect to the slot, and the other of said members having a projection and a transverse elongated head on the projection curved at its under side for insertion through said slot and for rocking positioning in said channel.

10. In a suspension insulator, the combination with a plurality of juxtaposed hollow insulating members, of a metal connecting member, covering an entrance to one of said insulating members, having an elongated slot and portions on its interior surface substantially constituting a channel extending transversely with respect to said slot, and a connecting member having a projection and a transverse elongated head curved on its under side on the projection to be inserted through said slot and turned to rocking position on the inner surface of said metal member in said channel.

11. In a suspension insulator, the combination with a plurality of juxtaposed insulating members of substantially cylindrical inverted cup-shape, having petticoat portions, of a relatively-shallow metal member of substantially cup-shape, embracing the closed end of one of said insulating members, having a centrally-disposed projection, said projection having an elongated transverse head curved at its under side, and a similar metal member, embracing the open end of one of said insulating members, having a slot slightly larger than, and substantially conforming to, said head, and interior spaced lugs extending transversely of said slot, the said head to be inserted through said slot and turned to rocking position between said lugs.

12. An insulator comprising a pair of relatively broad flat discoidal terminal members normally disposed in adjacent substantially parallel-plane relation for the reception of dielectric bodies opposite the outer surfaces thereof, one of said dielectric bodies having a central recess, one of said terminal members having an opening and a connector seat portion inside said recess, and the other of said members having a central projecting connector portion cooperating with said seat portion to connect said members flexibly.

13. An insulator comprising a pair of relatively broad flat discoidal terminal members normally disposed in adjacent substantially parallel-plane relation for the reception of a dielectric body therebetween, said dielectric body having a central recess, one of said members having an opening and a connector seat portion inside said recess, and the other of said members having a central projecting connector portion for relatively movable cooperation with a seat portion similar to said connector seat portion.

In testimony whereof, I have hereunto subscribed my name this 15th day of January, 1920.

GEORGE IRVING GILCHREST.