

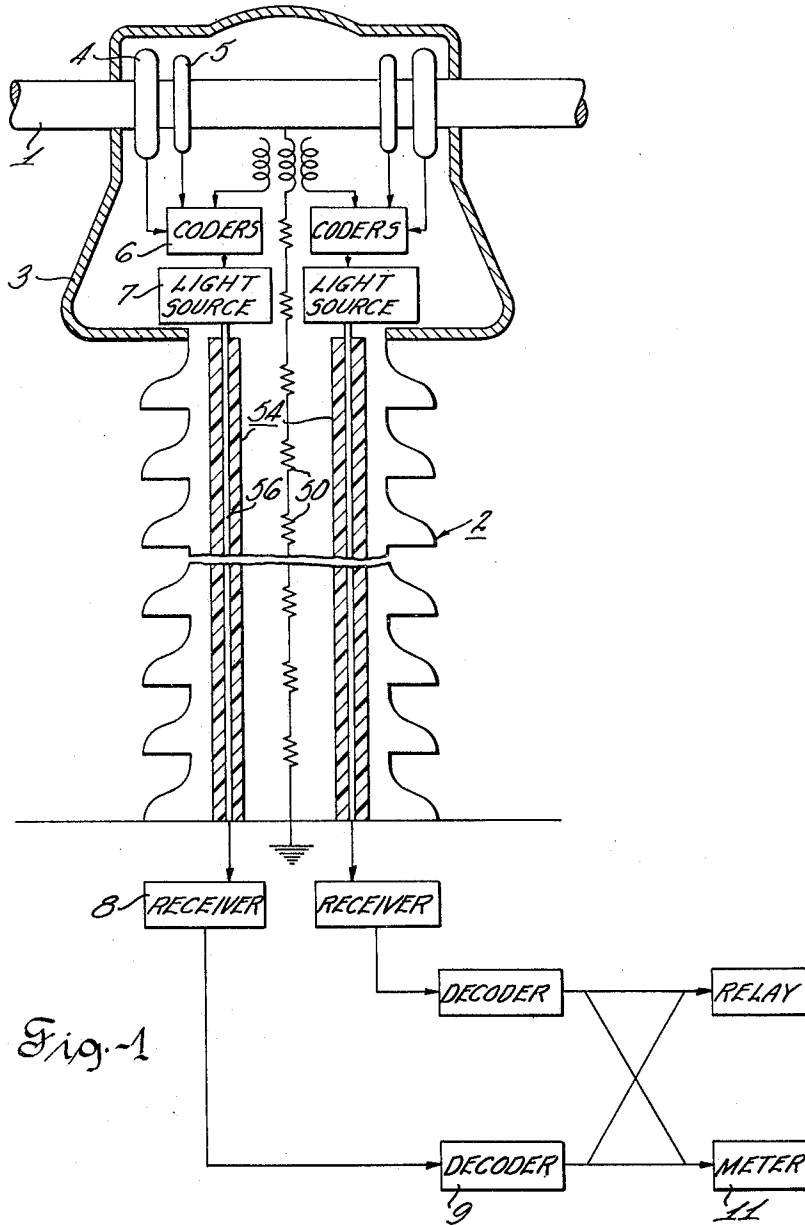
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E. R. PERRY ET AL
POST TYPE MODULAR INSULATOR CONTAINING OPTICAL
AND ELECTRICAL COMPONENTS

3,485,940

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2 Sheets-Sheet 1



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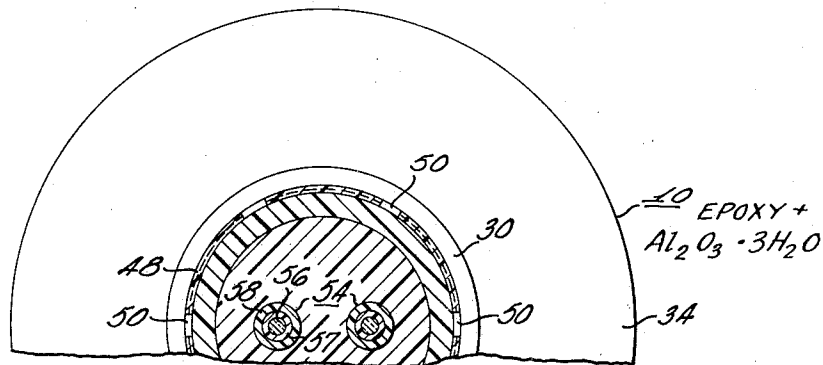


Fig. 3

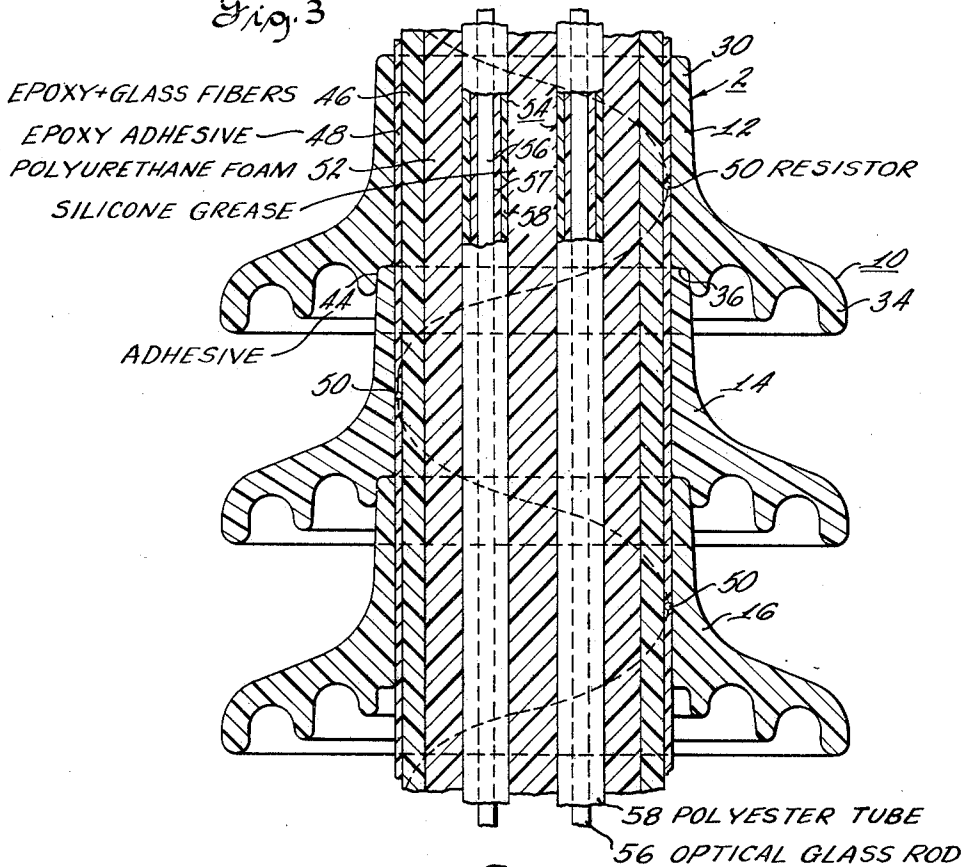


Fig. 2

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POST TYPE MODULAR INSULATOR CONTAINING OPTICAL AND ELECTRICAL COMPONENTS

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3 Claims

ABSTRACT OF THE DISCLOSURE

A post type modular, high voltage insulator comprises a plurality of skirted insulator modules made of epoxy resin and hydrated alumina which are stacked one upon another to define a hollow column. A rigid fiber glass reinforced polyester tube extends through the column. Polyurethane closed cell foam fills the glass reinforced epoxy tube. The space between the outside of the epoxy tube and the inside of the hollow column is filled with flexible epoxy and series connected resistors are embedded in the flexible epoxy. A rigid glass optical rod for light transmission purposes is disposed within a polyester tube which is filled with silicone grease and which is disposed within the foam.

SUMMARY OF THE INVENTION

This invention relates generally to post type modular insulators. More particularly, it relates to such an insulator having a column made up of a plurality of stacked modular units which have a device, such as an optical rod, extending therethrough, and which has electrical insulating material completely filling the space between the outer surface of the rod and the inner surface of the column.

It is desirable to provide a post type insulator for use in EHV systems through which a device, such as an optical rod or light transmitting means, can extend. Use of a conventional one piece porcelain insulator for such purposes is awkward and inconvenient because of the need to prefabricate and then ship a rather large and heavy but delicate component in one piece. It is preferable, therefore, to provide a lightweight, high strength, easily fabricated insulator which can withstand rough handling during shipment and yet has superior electrical characteristics in an EHV system.

In accordance with the present invention, there is provided a post type high voltage insulator comprising a plurality of skirted insulator modules made of organic insulating material and suitable filler which are stacked one upon another to define a hollow column. A high strength tube made of organic insulating material for centering and strengthening the tube is disposed within the stack of modules. The void between the tube and column is filled with a suitable insulating adhesive. The tube is filled with closed cell foam insulating material. A device, such as an optical rod, is embedded in the foam and extends through the insulator. If preferred, for voltage grading purposes, a plurality of series connected impedance devices such as resistors, may be wound around the tube and embedded in the insulating adhesive.

OBJECTS OF THE INVENTION

It is an object of the present invention to provide improved lightweight post type modular insulators.

Another object is to provide insulators of the aforesaid character which have good dielectric strength, low electrical losses, good mechanical strength, resist thermal shock caused by temperature changes, and do not become brittle or hard at low temperatures or after a long passage of time.

Another object is to provide insulators of the aforesaid character which absorb little moisture, resist the accumulation of contaminants, are inert to reaction with industrial contaminants, and resist degradation from solar radiation.

Another object is to produce insulators of the aforesaid character which are easily and economically fabricated into complex shapes and which are easily handled and installed.

Other objects and advantages of the invention will hereinafter appear.

DRAWING

The accompanying drawing illustrates a preferred embodiment of the invention but it is to be understood that the embodiment illustrated is susceptible of modification with respect to detail without departing from the scope of the appended claims.

In the drawing:

FIG. 1 is a side elevational view of electrical apparatus using an insulator in accordance with the present invention.

FIG. 2 is an enlarged cross sectional view of a portion of an insulator in accordance with the invention; and

FIG. 3 is a top plan view of the insulator shown in FIGS. 1 and 2.

DESCRIPTION OF THE INVENTION

Referring to FIG. 1, the numeral 1 designates a high voltage, electrical conductor in which current flow conditions are to be measured and about which there exists a high voltage, electrical field with respect to ground. Means are provided for monitoring current flow conditions in conductor 1 and comprises a post type insulator 2, hereinafter described in detail, upon which a housing 3 is supported. A current transformer 4 for sensing current conditions and a power transformer 5 are located in housing 3 in association with line 1 and are connected to means, such as a coder 6 and a light source 7, which ultimately produce a light signal which is representative of current conditions in conductor 1. A device 54, such as a light transmitting glass rod 56, is located within insulator 2, as hereinafter described, and transmits the light signal from light source 7 to a receiver 8 which is associated with a decoder 9 and a read-out meter 11. In practice, and as a fail-safe measure, it is preferable to duplicate the system as regards components 4, 5, 6, 7, 8, 9, 11 and 54. Impedance means, such as a plurality of series connected, voltage grading impedance devices 50 are connected between line 1 and ground in a suitable arrangement and are disposed as hereinafter described.

Referring to FIG. 2, there is shown an enlarged view of a post type insulator 2 in accordance with the present invention. The insulator comprises a body 10 made up of a plurality of insulator modules 12, 14 and 16 which are disposed along an axis. In practice, body 10 could be provided at its opposite ends with electrically conductive end pieces (not shown) to adapt it for mounting in a system. It is to be understood that in operation, a substantial potential difference (on the order of tens to hundreds of thousands of volts) would exist between the opposite ends of the insulator.

The insulator modules 12, 14 and 16 are identical to each other and therefore only module 12 will be described in detail. Each module is fabricated of insulating material such, for example, as an epoxy resin containing a filler such as hydrated alumina or silica flour. As FIG. 2 shows, module 12 comprises a cylindrical top flange 30 and a heavily undercut radially disposed skirt 34, both of which are concentric with the axis of insulator body 10. The bottom of module 12 is provided with a shoulder 36 which enables it to nest upon the top flange of a lower

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adjacent module. Individual modules such as 12, 14 and 16 are stacked and bonded together by a suitable electrically nonconductive adhesive provided at the joints 44. Insulator body 10 has the external appearance and rigidity of a post type insulator but has the deep undercut skirts of a conventional cap and pin type insulator.

The modules 12, 14 and 16 are stacked upon a cylindrical tube 46 which serves to align and strengthen the assembly. Preferably, tube 46 is made of glass reinforced epoxy tubing.

The void between the exterior of tube 46 and the interior of the column formed by the nested modules 12, 14 and 16 is filled with a suitable insulating adhesive 48, such as liquid epoxy resin, which is allowed to harden when in place.

The plurality of series connected impedance devices 50, such as resistors, may be wound spirally around tube 46 and embedded in adhesive 48.

Tube 46 is filled with closed cell foam electrical insulating material 52, such as polyurethane foam.

The device 54, such as light transmitting electrically insulating glass rod 56 embedded in shock resistant insulating material 57 such as silicone grease, is disposed within an insulating housing 58, such as a polyester tube.

If preferred, another device similar to 54 could be included in the assembly if it was required.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. In an electrical insulator, a plurality of insulator modules stacked to provide a column having a passage therethrough, a tube of insulating material around which said modules are stacked, an insulating adhesive filling the void between the inside of said column and the outside of said tube, impedance means embedded in said insulating adhesive,

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said impedance means comprising a plurality of series connected impedance devices spirally wound around said tube,

and insulating material disposed within said tube.

2. In an electrical insulator, a plurality of insulator modules stacked to provide a column having a passage therethrough, a tube of glass reinforced epoxy around which said modules are stacked,

an insulating adhesive comprising solidified liquid epoxy filling the void between the inside of said column and the outside of said tube,

impedance means embedded in said insulating adhesive, insulating material comprising solidified polyurethane foam disposed within said tube,

and at least one optical device embedded in said insulating material,

said optical device comprising a tubular insulating housing having a glass rod disposed therein.

3. An insulator according to claim 2 wherein said insulating housing is filled with silicone grease in which said glass rod is disposed.

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