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LIGHTNING ARRESTER AND HOUSING

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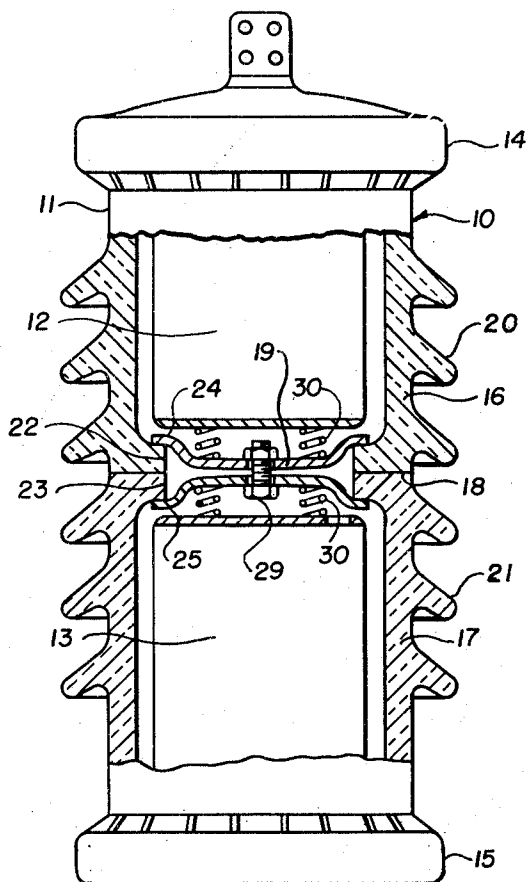


FIG. 1

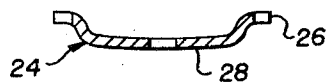


FIG. 2

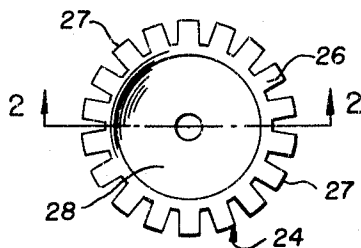


FIG. 3

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LIGHTNING ARRESTER AND HOUSING

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5 Claims. (Cl. 174—52)

This invention relates to lightning arresters and more generally to insulating housings for electrical apparatus.

The principal object of the invention is to provide an improved high voltage lightning arrester.

A more specific object of the invention is to manufacture a long tubular insulator suitable for use as a housing for electrical apparatus.

Certain forms of lightning arresters, particularly arresters for high voltages, require long tubular porcelain housings for enclosing the operative elements of the arrester. However, since the forming and firing of long tubular clay bodies is difficult or impossible, high voltage lightning arresters are usually manufactured as multiple sections in which each section constitutes a separate enclosure for operative arrester elements therein, or as unitary arresters embodying multiple part housings. In the unitary arrester, a composite housing is constituted by separate porcelain parts joined by epoxy or glaze bonds with exterior metal parts for insuring the electrical and mechanical strength of the housing, and the arrester elements are arranged in one or more stacks extending throughout the length of the housing.

According to the invention described herein, composite insulating housings are constituted by separate tubular porcelain parts joined together along the adjoining faces of the parts by a bond of electrically insulating material and connected by a clamp arranged on the interior of the parts. With such housings, the advantages of the multiple section arresters are provided in a unitary arrester, that is, the arrester elements are arranged and supported in separate groups, with the desirable insulating characteristics of a single housing part.

More specifically, the advantages of the improved arrester are that the insulating character of the exterior surfaces of the insulating parts extends throughout the entire length of the housing; that the arrester elements are protected against shock and vibration; and that the metallic parts of the clamp are protected from the corrosive influence of the exterior atmosphere. Accordingly, electrical apparatus constructed in accordance with the present invention has a greater electrical capability and mechanical durability than apparatus constructed in accordance with the teachings of the prior art.

The invention, together with the further objects, features, and advantages thereof, will be more readily understood by reference to the following detailed specification and claims, taken in connection with the drawing, in which:

FIG. 1 is an elevation view of a lightning arrester, partly in section, particularly showing the electrical apparatus housing of the invention;

FIG. 2 is a sectional view of a washer which forms a part of the interior connecting means of the invention; and

FIG. 3 is a top plan view of the washer of FIG. 2.

As shown in FIG. 1, the lightning arrester 10 comprises a housing 11, a plurality of arrester elements arranged in two vertical stacks 12 and 13 within the housing, and two metal end parts 14 and 15. The arrester elements are connected in series and the end parts 14 and 15 function as electrical terminals for the arrester elements as well as mechanical terminals and supports for the arrester.

The housing 11 comprises two unitary tubular ceramic parts 16 and 17, a bond 18 between the adjoining end faces of the parts, and a clamp 19 for compressively securing the parts 16 and 17. Each of the parts 16 and 17 is constituted as a unitary porcelain piece having insulating flanges, denoted at 20 and 21 respectively, extending circumferentially about the exterior to increase the electrical length of the part. Each of the parts 16 and 17 has a shoulder extending circumferentially about the interior of the part adjacent the end, denoted at 22 and 23 respectively, to provide an increased radial extent of the end face for the bond and for engagement by the clamp 19. The ceramic parts 20 and 21 are suitably glazed and finished for best electrical insulating characteristics.

The clamp 18 is constituted by two washers as, e.g., the washers 24 and 25, each in the form of a disc extending transversely across the housing for engagement with the axial extremities of the shoulders 22 and 23. As shown in FIG. 2 and FIG. 3, the washer 24 is formed with a crenelate peripheral part 26 having a plurality of radially extending lugs 27 for gripping the shoulder 22. The washer 24 has the center part 28 axially offset with respect to the peripheral part 26, in the direction of the associated shoulder, in order to minimize the axial distance required by the clamp. The washer 25 is similar to the washer 24, but arranged in inverted relation thereto, and the two washers are connected by a screw fastener 29 for drawing the washers together and compressively securing the washers to the adjacent end portions of the two ceramic parts 16 and 17.

The stacks of arrester elements 12 and 13 are supported from the washers 24 and 25 by means of springs 30 which extend between the end elements of the stack and the offset center part of the associated washer. The clamp serves as a supporting means for the arrester elements and the elements are constrained against excessive movement.

The bond 18 joins the two housing parts along the adjoining end faces of the parts and functions as an insulating barrier in the radial direction of the parts. The bond 18 is constituted as a rigid integral bond formed by an adhesive material such as synthetic resin, or by a ceramic glaze, according to known procedures. The adjoining faces of the two parts are fitted together before the bond is prepared, preferable by grinding each of the faces to form a smooth surface.

It will be apparent that the effective electrical creepage distance extends over the entire length of the housing 11. Further, it will be apparent that the clamp 19 is protected by the housing 11 and by the interior atmosphere of the arrester.

It is to be understood that the foregoing description is not intended to restrict the scope of the invention and that various rearrangements of the parts and modifications of the design may be resorted to. The following claims are directed to combinations of elements which embody the invention or inventions of this application.

In the claims:

1. In a lightning arrester embodying a tubular insulating housing and stacked arrester elements carried therein, a composite insulating housing comprising two tubular ceramic insulating parts having closely fitted adjoining end faces in alignment along the longitudinal axis of the housing, the said parts having integral inwardly extending shoulders at the adjacent ends thereof, a rigid bond of electrical insulating material between the adjoining end faces of the two parts, means engaged with the said shoulders compressively securing the two parts on the interior of the housing, and means supporting the arrester ele-

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ments in at least one of the tubular ceramic insulating parts from an inwardly extending shoulder thereof.

2. A lightning arrester comprising a tubular insulating housing constituted by two tubular porcelain parts having integral inwardly extending shoulders at the adjacent ends thereof and closely fitted adjoining end faces, a rigid bond of electrical insulating material between the adjoining end faces of the two parts, means extending transversely across the housing on the interior thereof engaged with the shoulders on the axial extremities thereof and compressively securing the two parts, arrester elements arranged in two stacks within the housing, one stack on one side of the said means and one on the remaining side of the said means, and means supporting the said stacks from the first named means.

3. A composite tubular insulator comprising two tubular parts of insulating material having inwardly extending shoulders at the adjacent ends thereof and closely fitted adjoining end faces, a rigid bond between the end faces of the parts, clamp means comprising two washers engaged with the said shoulders, and fastener means radially within the tubular parts and the shoulders thereof extending between the two washers for compressively securing the said two parts.

4. A composite tubular insulator comprising two tubular ceramic parts having integral inwardly extending shoulders at the adjacent ends thereof and closely fitted adjoining end faces in mutual alignment along the longitudinal axis of the housing, a rigid bond of electrical insulating material between the adjoining end faces of the

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two parts, and means extending transversely across the housing on the interior thereof engaged with the said shoulders and compressively securing the two parts, comprising generally circular disc washers having peripheral lugs engaged with the shoulders on the axially opposite extremities thereof, and fastener means extending between the washers radially within the tubular parts and the shoulders thereof and tensively holding the washers and ceramic parts in compressive relation.

5. A lightning arrester in accordance with claim 2, in which the first-named means comprises generally circular disc washers having peripheral lugs engaged with the shoulders on the axially outward extremities thereof, and fastener means extending between the washers radially within the tubular parts and the shoulders thereof and tensively holding the washers and porcelain parts in compressive relation, and in which the named means supporting the stacks comprises springs engaged with the arrester elements and the said disc washers.

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