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GUY STRAIN INSULATOR

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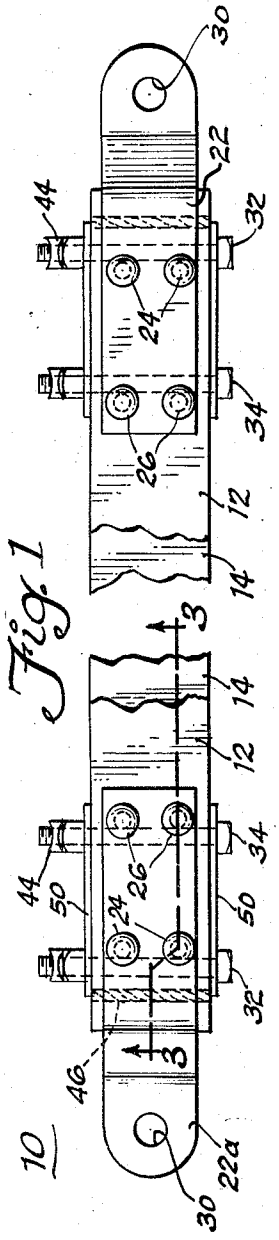


Fig. 1

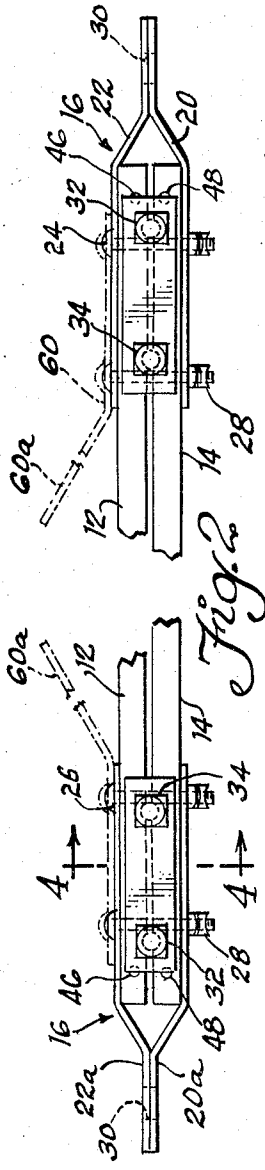


Fig. 2

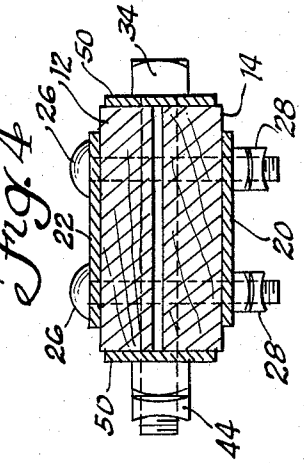


Fig. 4

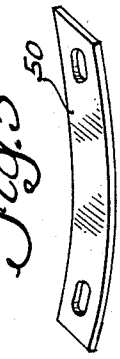


Fig. 5

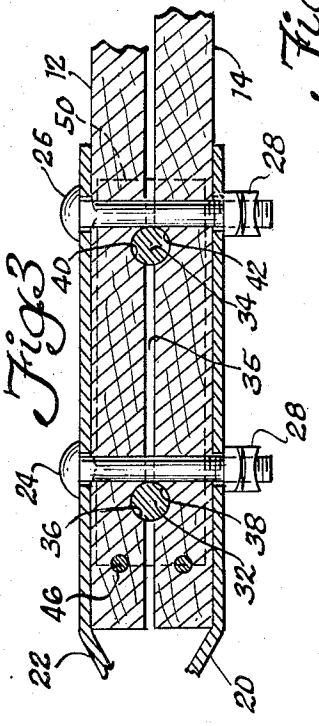


Fig. 3

INVENTOR.
Burton M. Smalley
BY
Mason, Kolehmainen, Rathburn & Wyss
Attorneys

United States Patent Office

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GUY STRAIN INSULATOR

Burton M. Smalley, Highland Park, Ill., assignor to Joslyn Mfg. & Supply Co., Chicago, Ill., a corporation of Illinois

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This invention relates to an insulating device and, more particularly, to a guy strain insulator having improved physical and dielectric characteristics.

In order to maintain high levels of resistance between ground and conductors carried by wooden pole structures in applications in which auxiliary supporting guy lines are utilized, it is necessary to interpose insulating means in the metallic ground paths provided by the guy wires for the purpose of avoiding a low resistance shunt around the resistance provided by the wooden poles. These insulating means, which are commonly called guy breakers or guy strain insulators, must possess good dielectric characteristics in addition to being capable of transmitting the tensional forces applied to the guy lines for supporting the pole structure.

Present devices of this type normally utilize wood as the dielectric material inasmuch as wood is strong, cheap and relatively easy to fabricate. Since the guy strain insulators are utilized to maintain the effectiveness of the ground path resistance inherent in wooden pole structures, it is desirable that the resistance of the wood be both raised to its greatest value and maintained at that level. The physical strength and resistance of the wood is increased by kiln drying the wood to remove the water which lowers the specific resistance of the wood. Further, the guy strain insulators are exposed to rain and snow which tends to result in the addition of water to the wood with a consequent reduction in its resistance. The addition of water to the dried wood is prevented by impregnating the wood with a protective medium which prevents the absorption of water by the wood. Accordingly, the design of the dielectric portion of a guy strain insulator must be such that the wooden portion thereof can be completely dried and thoroughly impregnated with a protective medium. Also, since the guy strain insulator is interposed in the guy lines provided for supporting wooden pole structures, a large amount of tensional force is applied to the insulator, and it is necessary, therefore, that means be provided for transmitting the force from the guy lines through the wooden dielectric member.

Accordingly, one object of this invention is to provide a new and improved insulating device.

Another object is to provide a guy strain insulator utilizing a multipart dielectric portion having improved dielectric characteristics.

Another object is to provide a guy strain insulator in which the dielectric portion thereof is capable of being completely dried and impregnated with a protective medium.

A still further object resides in the provision of an insulating device including new and improved means for transmitting tensional forces to the insulating device.

Another object is to provide means for transmitting force from a guy line to a guy strain insulator including a multipart dielectric portion.

In accordance with these and many other objects, an embodiment of the invention comprises a guy strain insulator having a dielectric portion including a plurality

of spaced and superimposed wooden members. Each end of the dielectric portion including the wooden members is provided with an end fitting for interconnecting the guy strain insulator with guy lines. The end fittings are secured to the wooden members by a plurality of spaced and vertically extending bolts which bear directly against spaced, transversely extending pins or bolts positioned at the interface between the wooden members forming the dielectric portion of the insulator. Since the bolts securing the fittings to the wooden members bear directly against transversely extending bolts positioned at the interface between these members, the force applied to the insulator is distributed through the transversely extending pins to substantially the entire effective cross sectional area of the wooden members.

Inasmuch as the guy strain insulator of the present invention is formed with a plurality of spaced wooden members which are smaller in size than those utilized in the present devices, it is possible to more completely dry and impregnate the wooden members so as to prevent the introduction of moisture into the wooden members, thereby lowering the resultant resistance thereof. Further, the provision of separate wooden members reduces the possibility that the guy strain insulator may be destroyed by the high transient voltages due to lightning inasmuch as two separate dielectric members are provided.

Many other objects and advantages of the present invention will become apparent from a consideration of the following specification in conjunction with the drawings in which:

Fig. 1 is a fragmentary top plan view of a guy strain insulator forming an embodiment of the present invention;

Fig. 2 is a fragmentary side elevational view of the device shown in Fig. 1;

Fig. 3 is an enlarged fragmentary sectional view taken along line 3—3 in Fig. 1 showing the details of a means for transferring tensional forces to the insulator;

Fig. 4 is an enlarged cross sectional view taken along line 4—4 in Fig. 2 of the drawings showing additional details of the force transmitting structure; and

Fig. 5 is an enlarged perspective view of a spring washer utilized in the guy strain insulator.

Referring now to Fig. 1 of the drawings, therein is disclosed a guy strain insulator **10** of the present invention including a pair of spaced wooden members **12** and **14** which are substantially rectangular in configuration. The wooden members are secured in a predetermined position spaced from each other by a pair of end fittings, indicated generally as **16**, which are also utilized for interconnecting the guy strain insulator **10** with guy lines (not shown). The end fittings **16** are so constructed as to provide a novel means for efficiently transferring forces applied thereto to the wooden members **12** and **14**.

In order to improve the dielectric characteristics of the guy strain insulator **10**, the dielectric portion thereof is formed by a pair of wooden members **12** and **14** in place of the conventional one-piece construction. The effective cross sectional area of the dielectric portion of the insulator **10** primarily is determined by the amount of tensional force which must be carried by the insulator **10** and the ultimate strength of a unit of cross sectional area of the wood. Normally, the physical strength required in a given installation is achieved by providing a unitary wooden member having the necessary cross sectional area.

However, this often results in a wooden dielectric member having relatively large dimensions. These large wooden blocks cannot be completely dried to improve the coefficient of resistance thereof without destroying a portion of the fibrous structure with a consequent re-

duction in the physical strength of the member. Also, the large size of the unitary wooden members impairs the impregnation thereof by the protective medium used to prevent the reabsorption of water by the member.

In the present invention, the pair of spaced wooden members **12** and **14** are utilized in place of a unitary dielectric structure, and, although the effective cross sectional area of the two members **12** and **14** is equal to that of a unitary member, the physical size of each of the wooden members **12** and **14** is decreased so that these members can easily be dried in a kiln and then thoroughly impregnated with a protective solution. The drying of the members **12** and **14** improves the physical strength of the insulator **10** and increases the resistance thereof. This resistance is maintained at approximately its kiln-dried value even during use in unprotected locations in view of the fact that the small size of the members permits them to be thoroughly impregnated with the protective medium.

However, the use of a multipart dielectric structure in the insulator **10** presents the problem of transmitting the tensional forces applied to the end fittings **16** to the entire effective cross section of the separated wooden members **12** and **14**, which problem is of little significance with unitary dielectric structure. Each of the end fittings **16** includes a pair of offset metal plates **20** and **22** which are secured to end portions of the members **12** and **14** by means of a plurality of vertically extending bolts **24** and **26**. Lock nuts **28** are threadedly engaged by the ends of the bolts **24** and **26** to maintain the plates **20** and **22** in firm engagement with the outer surfaces of the wooden members **12** and **14**. End portions **20***a* and **22***a* of the plates **20** and **22** which are in engagement when the plates are secured to the ends of the wooden members **12** and **14**, include aligned openings which form an aperture **30** for receiving securing means carried by the guy lines.

In order to transmit the forces applied to the end fittings **16** to the wooden members **12** and **14**, a pair of bolts **32** and **34** are positioned at the interface **35** formed between the members **12** and **14** so as to be received within oppositely positioned semicircular grooves **36**, **38**, **40**, and **42**. The size of these grooves and the diameter of the bolts **32** and **34** determine the spacing between the inner surfaces of the members **12** and **14**. The grooves **36**, **38**, **40**, and **42** are so formed in the members **12** and **14** that the bolts **32** and **34** are positioned in engagement with intermediate portions of the bolts **24** and **26**, respectively. Therefore, when tension is applied to the plates **20** and **22** forming the end fittings **16**, the force is transmitted through the bolts **24** and **26** to the transversely extending bolts **32** and **34** and thence outwardly therefrom to the entire transverse cross sectional area of the wooden members **12** and **14**.

The wooden members **12** and **14** are each provided with a pair of spiral dowels **46** and **48**, respectively, which extend laterally through the ends of these members at a position spaced from the bolts **24**. The dowels **46** and **48**, which are provided with an outer surface having a spiral configuration, are located approximately midway along the width of the members **12** and **14** and serve to prevent splitting of these members due to the tensional forces applied thereto by the bolts **24** and **26**.

To prevent the heads of the bolts **32** and **34** and a plurality of lock nuts **44** secured thereto from distorting the fibrous structure of the wooden members **12** and **14**, a pair of spring washers **50** are interposed between the lock nuts **44** and one edge surface of the members **12** and **14**, and between the heads of the bolts **32** and **34** and the other edge surface of the members **12** and **14**. The unstressed configuration of the spring washers **50** is disclosed in Fig. 5 of the drawings as being slightly arcuate so that when the washers **50** are stressed during assembly of the end fittings **16**, the distortion of the washers **50** serves to prevent loosening of the lock nuts **44**.

In another embodiment of the present invention, a pair of arcing horns **60** are secured to the outer surface of either of the offset plates **20** or **22** so that outwardly inclined portions **60***a* thereof extend longitudinally along the insulator **10** spaced from the wooden members **12** or **14**. The arcing horns **60** are secured to the insulator **10** and the plates **20** or **22** by the bolts **24** and **26**. The size of the arcing horns **60** is so selected that the air gap between the ends of the inclined portions **60***a* thereof has a resistance approximately equal to fifty percent of the resistance provided by the wooden members **12** and **14** so that, when high currents due to lightning strokes are conducted by the metallic guy lines, the air between the inclined portions **60***a* becomes ionized due to the lower resistance thereof, and, accordingly, conducts the greater portion of the surge current. In this manner, the provision of the arcing horns **60** insures that high surge currents or transient voltages do not destroy the wooden resistance members **12** and **14**.

Accordingly, the guy strain insulator **10** of the present invention provides improved dielectric qualities by the use of a pair of wooden members **12** and **14** which are of such physical size as to enable both complete kiln drying and thorough impregnation thereof so that the resistance of the members **12** and **14** remains substantially constant and unaffected by the deleterious effects of absorbed moisture. Further, the use of a plurality of dielectric members reduces the possibility that a direct stroke of lightning will destroy both of the dielectric members, thereby rendering the guy line ineffective. The novel end fitting **16**, in which substantially mutual perpendicular force transmitting elements are utilized, provides a novel means for transmitting tensional forces applied to the end fittings **16** to substantially the entire cross sectional area of the wooden members **12** and **14** and thereby permits the improved dielectric characteristics of the insulator **10** to be achieved without a resultant decrease in the physical strength of the insulator **10**.

Although the present invention has been described by reference to illustrative embodiments thereof, it is to be understood that these embodiments are merely representative of the principles of the invention and that numerous other modifications may be devised by those skilled in the art which will fall within the spirit and scope of these principles.

What is claimed as new and desired to be secured by Letters Patent of the United States is:

1. A strain insulator comprising a plurality of superimposed dielectric laminae forming at least one interface, said laminae defining a plurality of grooves extending transverse to said laminae in the plane of said interface, an end fitting including a pair of plates in engagement with opposite outwardly facing surfaces of the ends of said laminae, first force transmitting means positioned in said grooves, and second force transmitting means interconnecting said plates and passing through said laminae, said second means being in engagement with the first force transmitting means to transmit a force applied to the plates through the first transmitting means and the second transmitting means to the laminae.

2. A guy strain insulator comprising a pair of dielectric members mounted in superimposed relation and forming an interface, said members defining a plurality of spaced grooves extending transversely to said members and positioned in the plane of said interface, a plurality of retaining plates positioned on opposite sides of the members and extending perpendicularly to said interface, fastening means mounted in said grooves for securing said plates to the insulator, and coupling means mounted on said insulator for directly transferring force to said fastening means.

3. A guy strain insulator comprising a pair of dielectric members mounted in superimposed relation and forming

an interface, said members defining a plurality of spaced grooves extending transversely to said members and positioned in the plane of said interface, a plurality of retaining plates positioned on opposite sides of the members and extending perpendicularly to said interface, retaining plate fastening means mounted in said grooves for securing said plates to the sides of said members, force coupling means mounted on the sides of said members substantially parallel to said interface, and means for securing said force coupling means to said members, said securing means extending into said members to engage said plate fastening means in a force transmitting relationship.

4. The guy strain insulator set forth in claim 3 in which the securing means extend through said members substantially perpendicular to said interface.

5. The guy strain insulator set forth in claim 1 in which the means extending through the members comprises at least one pin bearing directly against the fastening means.

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