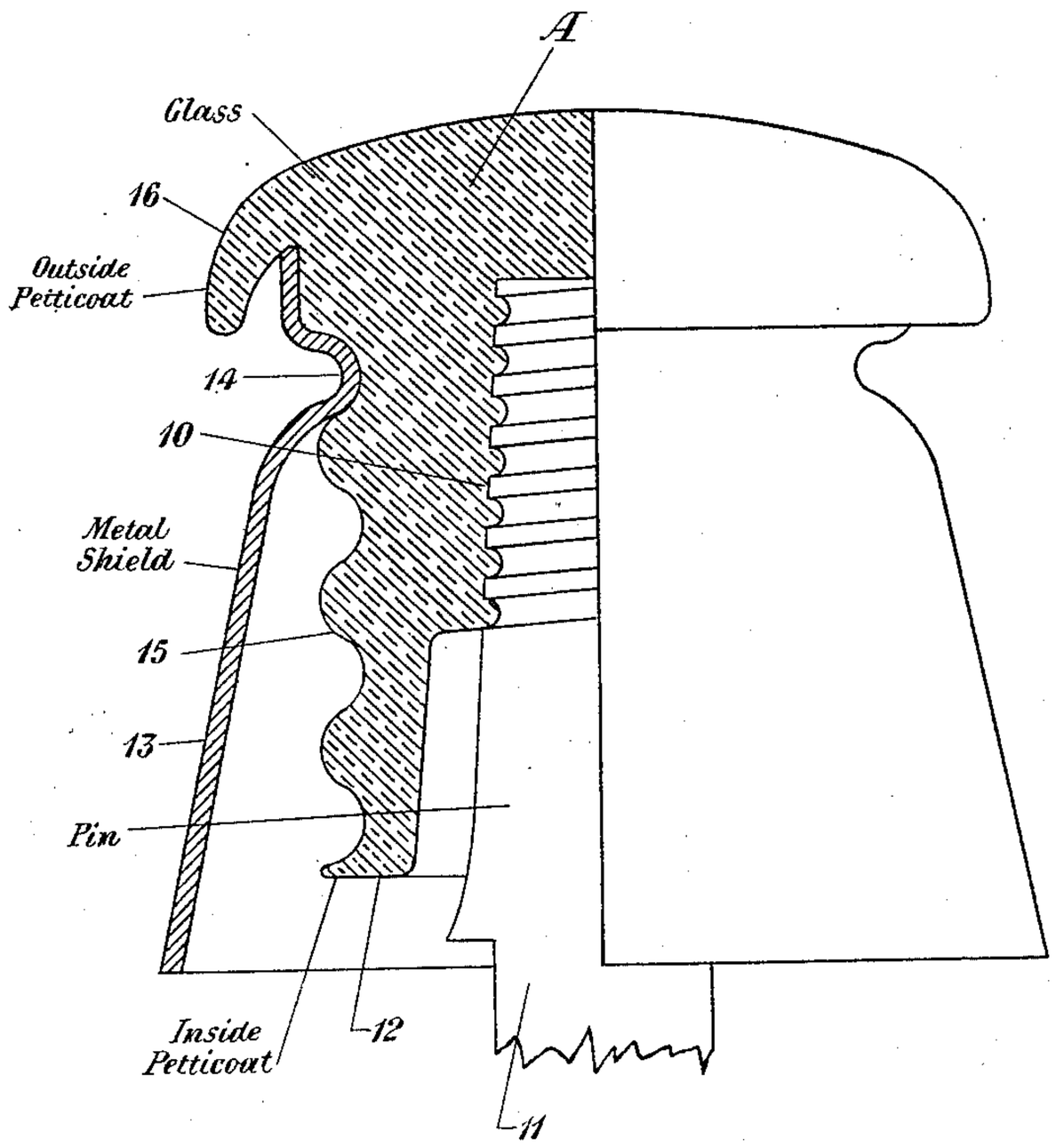
July 31, 1928. 1,678,663

L. T. WILSON

INSULATOR

Filed July 1, 1925



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UNITED STATES PATENT OFFICE.

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INSULATOR.

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This invention relates to improvements in insulators, and more particularly to a construction of insulator adapted to stabilize the leakage loss under different weather conditions.

With the development of methods of transmitting telephonic and telegraphic signals by means of carrier currents propagated along open wire lines, new transmission problems have been introduced. Owing to the fact that the carrier currents employed are relatively high in frequency as compared with the voice currents or Morse currents utilized in the ordinary methods of communication, it has been found that the attenuation is very markedly increased, so much so, in fact, that repeaters for amplifying the transmitted currents must be separated by much shorter distances, thereby adding to the expense of the plant outside the terminal stations at which the carrier apparatus is applied.

A very material part of this attenuation is due to leakage loss through the insulators which are customarily employed upon open wire lines, and this loss varies through a very wide range under different weather conditions. The insulator acts like a condenser, the glass of the insulator constituting the dielectric, the line wire and tie wire on the outside of the insulator comprising one plate, and the wooden pin upon which the insulator is supported comprising the other plate. The condenser thus formed introduces a leakage loss due to so-called dielectric hysteresis and this loss varies with the capacity of the condenser.

In dry weather, the outer plate of the condenser, that is, the portion of the line wire adjacent to the insulator and its associated tie wire, constitutes a plate of relatively small area so that the capacity is relatively small and hence the leakage loss, even at carrier frequencies, is small as compared with the total attenuation of the circuit. During wet weather, however, the entire outer surface of the insulator becomes wet, with the result that the conductive area external to the insulator is very much increased. As a result, the capacity, and consequently the leakage loss, is very much increased. During the extremes of wet and dry weather, the attenuation of the system varies through a wide range due to this cause alone, and this necessitates the provision of special regulating apparatus for maintaining the transmission equivalent of the circuit constant under all weather conditions.

In order to avoid the expense of the regulating arrangements, it becomes desirable to devise some method for stabilizing the capacity of the insulator, and hence its dielectric loss, at some constant value. In accordance with the present invention, it is proposed to accomplish this result by providing an external conductive sheath to form the outer surface of the insulator to which the line conductor and tie wire are attached so that the capacity of the insulator will be determined by the area of the conductive sheath and will not be increased when the insulator becomes wet.

The invention may now be more fully understood from the following detailed description when read in connection with the accompanying drawing, in which the figure represents a preferred embodiment of the invention.

Referring to the drawing, A designates a body of dielectric material which is provided with an internal, screw-threaded opening 10 adapted to engage with a supporting pin 11. The body A is provided with the usual petticoat 12 extending downwardly from the main body and surrounding the pin 11 to provide an inner dry path from the lower rim of the petticoat to the junction of the petticoat with the pin. A bell-shaped metal shield 13 is provided with a constricted portion 14 adapted to engage with screw threads 15 so that it may be screwed into position with its upper rim resting in a recess formed by an outside petticoat 16. The line conductor and tie wire are adapted to be secured in the grooved or constricted portion 14 of the metallic shield. The small petticoat 16 prevents the moisture from working in behind the metallic covering and spreading down over the screw-threaded surface 15 of the insulating material A. As a consequence, this portion of the insulator is maintained dry and by reason of the corrugations produced by the screw thread, the dry path extends down over the screw threads 15 and up under the inner portion of the petticoat 12, thereby affording a dry path of considerable length without requiring the petticoat 12 to be as long as is ordinarily the case. It will be understood that the lower part of the metal

shield 13 acts as an external petticoat to protect the inner petticoats from moisture. At the same time the metal shield fixes the effective conductive area of the external portion of the insulator and thereby determines its capacity.

As the leakage loss of the insulator is proportionate to its capacity and as its capacity is fixed for both dry and wet weather conditions, it will be seen that by means of this arrangement the alternating current leakage of the insulator is stabilized at a condition corresponding to wet weather conditions; also the direct current leakage is stabilized at the wet weather value, which is kept low by the provision of the long dry path over the outer and inner surfaces of the inner petticoat. It is unnecessary to provide any additional repeaters for the system by reason of the use of the outer metallic shell as repeaters must be provided even with existing insulators to give sufficient gain for the worst transmission conditions. By stabilizing the insulator at this condition, however, all equipment for maintaining transmission constant may be eliminated and the expense proportionately cut down.

It will be obvious that the principles herein disclosed may be embodied in many other organizations widely different from those illustrated without departing from the spirit of the invention as defined in the following claims.

What is claimed is:

1. An insulator comprising a body of dielectric material having an inner opening into which a supporting pin may be inserted, a petticoat extending downwardly from said body and surrounding the supporting pin, the outer surfaces of said dielectric body and petticoat being screw-threaded, an outer conductive shell constricted at its upper portion so that it may be screwed into place over said screw threads, said shell having its lower part extending outwardly from the surface of said dielectric body and petticoat so that said outer surface will form a dry path.

2. An insulator comprising a body of dielectric material having an inner opening into which a supporting pin may be inserted, a petticoat extending downwardly from said body and surrounding the supporting pin, the outer surfaces of said dielectric body and petticoat being screw-threaded, an outer conductive shell constricted at its upper portion so that it may be screwed into place over said screw threads, said shell having its lower part extending outwardly from the surface of said dielectric body and petticoat so that said outer surface will form a dry path, and an auxiliary petticoat extending from the upper part of said dielectric body over the upper rim of said outer shell to prevent moisture from working in behind the shell.

In testimony whereof, I have signed my name to this specification this 30th day of June, 1925.

LEON T. WILSON.