Feb. 12, 1929. 1,701,562

C. S. GORDON

INSULATOR

Filed July 1, 1925

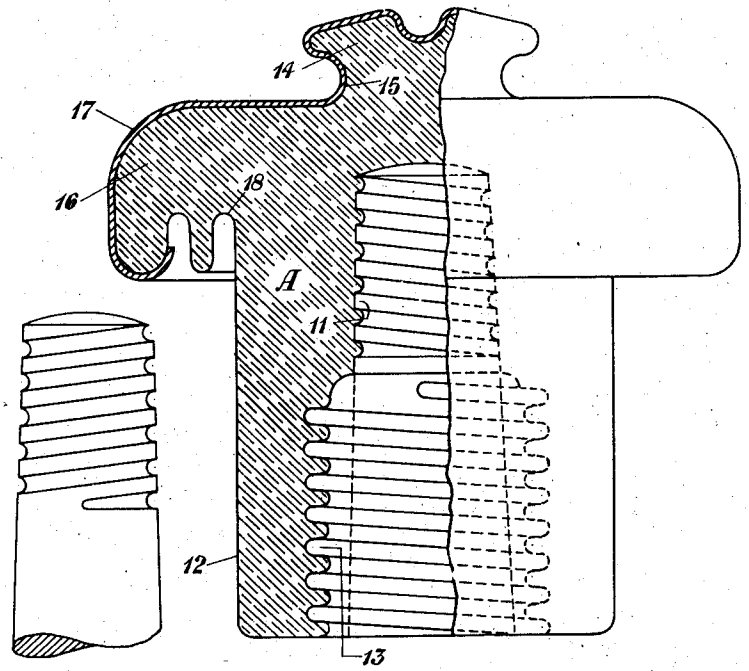


Fig. 1a

Fig. 1

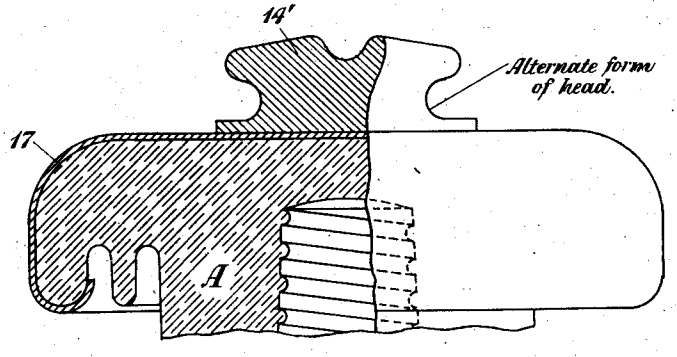


Fig. 2

INVENTOR
C. S. Gordon
BY
ATTORNEY

Patented Feb. 12, 1929. 1,701,562

UNITED STATES PATENT OFFICE.

CHESTER S. GORDON, OF NEW YORK, N. Y., ASSIGNOR TO AMERICAN TELEPHONE AND TELEGRAPH COMPANY, A CORPORATION OF NEW YORK.

INSULATOR.

Application filed July 1, 1925. Serial No. 40,893.

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 coating or covering the outer surface of the insulator with a conductive material so that the capacity will not be increased when the outer surface of 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 Figures 1 and 2 represent two embodiments of the invention, and Fig. 1ª represents the supporting pin to be used in connection with the insulators of Figs. 1 and 2.

Referring to Fig. 1, A designates a body of dielectric material having an internally screw-threaded opening 11 by means of which the body may be screwed upon a supporting pin. A petticoat 12 extends downwardly from the body A and surrounds the supporting pin some little distance away from its outer surface as shown by the dotted line representing the position of the pin in Figure 1. The inner surface of the petticoat is corrugated, as shown at 13, to increase the length of the dry path formed by said inner surface. Preferably, these corrugations will be made in the form of a screw thread of the same pitch as the internal threads of the opening 11 so that the mold or core which is used in forming the entire body may be screwed out after the plastic material has hardened.

Instead of securing the line conductor and tie wire about the outer margin of the dielectric body A, as in the usual type of insulator, a small knob 14 is formed on the top of the insulator so that the line conductor and tie wire may be seated in the peripheral groove 15 of the knob. A laterally extending, umbrella-like structure 16 is provided near the upper edge of the dielectric body A to maintain the outer surface of the dielectric body dry be-

neath the structure 16 down to a point substantially opposite the lower edge of the screw-threaded opening 11.

In order to fix or stabilize the leakage loss, which is proportionate to the capacity, a coating of conductive material 17 is applied to the outer surface of the dielectric over the knob 14 and over the parts of the umbrella-like structure 16 which are exposed to the weather. Owing to the shape of the structure 16, the main portion of the conductor 17 extends outwardly and away from what effectively constitutes the inner plate of the condenser, viz, the supporting pin. Therefore, the principal existing capacity is between the conductive elements in the neighborhood of the knob 14 and the pin, the capacity between the conductive elements near the outer edge of the structure 16 and the pin being much smaller. Furthermore, any wetting of the outer surface of the petticoat 12 will not materially increase the capacity as this conductive area is isolated from the line conductor and tie wire and the associated conductive material 17 by a dry path due to the corrugations 18 on the under side of the umbrella-like structure 18, and is likewise isolated from the supporting pin by the dry path due to the corrugations 13.

Obviously, therefore, the capacity of the insulator and hence the dielectric loss (which is proportionate to the capacity) is fixed and stabilized at a value somewhat greater than the dry weather value which would exist if there were no conductive layer 17, but yet materially smaller than the value that would exist during wet weather if it were possible for the whole external surface of the insulator to become wet. Also, the direct current leakage is stabilized at a low value condition by the provision of the long dry path under the petticoat of the insulator. It is unnecessary to provide any additional repeaters 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 an intermediate condition, however, some saving in the number of repeaters may be possible, but, what is more important, the equipment for maintaining the transmission constant may be eliminated and the expense proportionately cut down.

Fig. 2 shows a slight modification of the arrangement of Fig. 1. In this instance the knob or button 14′, instead of being coated or covered with a conductive material, is itself formed of conductive material which may be welded, soldered, riveted or otherwise secured to the conductive layer 17. The underlying principles of this structure are, however, the same as in the case of Fig. 1 and no further discussion is necessary.

It will be obvious that the general 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 appended claims.

What is claimed is:

1. An insulator comprising a body of dielectric material having an inner opening to receive a supporting pin, a relatively small button-like structure on the top of said body having a grooved portion to which the line conductor and tie wire may be secured, said grooved portion being of a diameter not materially greater than the supporting pin, an umbrella-like structure at the upper side of said dielectric body for protecting a portion of the outer surface of said body from moisture, and a surface of conductive material extending from the outer edges of said umbrella-like structure to and over said button, the umbrella-like structure with its metallic surface extending horizontally outward and away from the supporting pin to reduce the capacity between the metallic surface and the pin.

2. An insulator comprising a body of dielectric material having an inner opening to receive a supporting pin, a relatively small button-like structure on the top of said body having a grooved portion to which the line conductor and tie wire may be secured, said grooved portion being of a diameter not materially greater than the supporting pin, an umbrella-like structure at the upper side of said dielectric body for protecting a portion of the outer surface of said body from moisture, and a surface of conductive material extending from the outer edges of said umbrella-like structure to and over said button, the umbrella-like structure with its metallic surface extending horizontally outward and away from the supporting pin to reduce the capacity between the metallic surface and the pin, and the under side of said umbrella-like structure being corrugated to lengthen the dry path formed thereby.

3. An insulator comprising a body of dielectric material having an inner opening to receive a supporting pin, a relatively small button-like structure on the top of said body having a grooved portion to which the line conductor and tie wire may be secured, said grooved portion being of a diameter not materially greater than the supporting pin, an umbrella-like structure at the upper side of said dielectric body for protecting a portion of the outer surface of said body from moisture, a surface of conductive material extending from the outer edges of said umbrella-like structure to and over said button, the umbrella-like structure with its metallic surface extending horizontally outward and away from the supporting pin to reduce the capacity between the metallic surface and the pin, and a petticoat extend-

ing downwardly from said dielectric body and surrounding but spaced away from the supporting pin to separate the conductive area due to moisture on the outer surface of the lower part of said dielectric body from the supporting pin.

4. An insulator comprising a body of dielectric material having an inner screw-threaded opening to receive a supporting pin, and a petticoat extending downwardly from said body and surrounding the pin, the inner surface of said petticoat having screw-threaded corrugations of the same pitch but of larger diameter than the threads of the pin, whereby an integral mold may be used to form the two sets of threads on the inner surface of the insulator and the mold may be unscrewed from the interior of the insulator.

In testimony whereof, I have signed my name to this specification this 25th day of June, 1925.

CHESTER S. GORDON.