

S. BARFOED.
HIGH TENSION SUSPENSION INSULATOR.
APPLICATION FILED JULY 26, 1915.

1,256,643.

Patented Feb. 19, 1918.

Fig. 1.

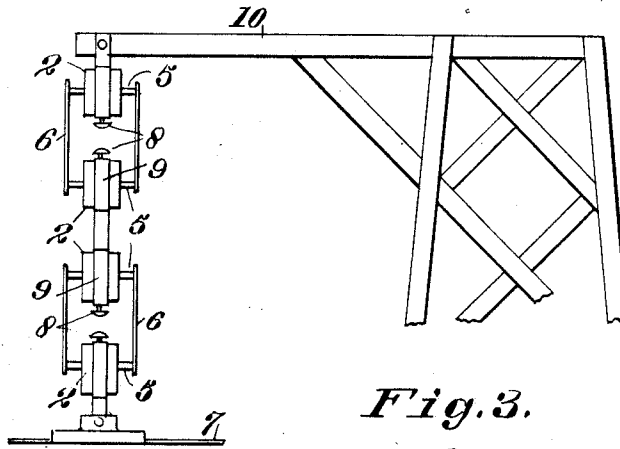


Fig. 2.

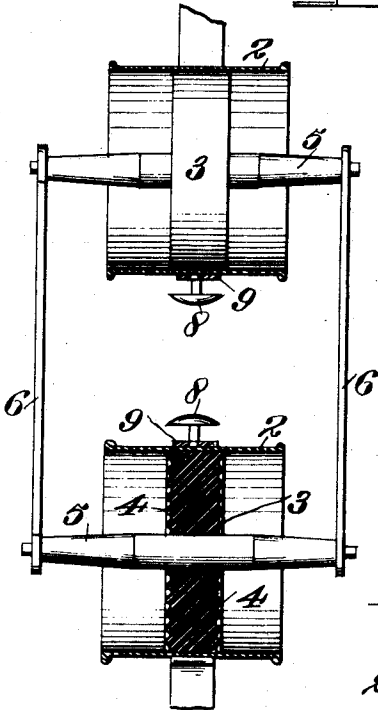


Fig. 3.

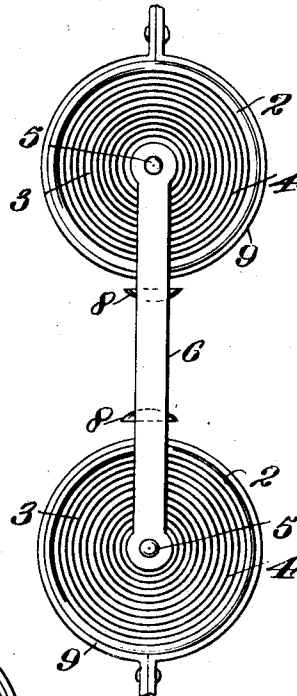
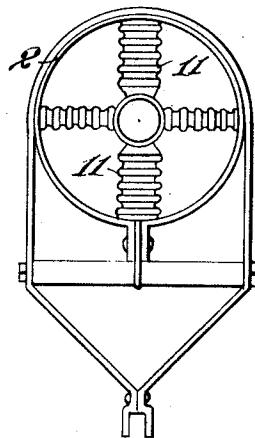


Fig. 4.



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HIGH-TENSION SUSPENSION-INSULATOR.

1,256,643.

Specification of Letters Patent.

Patented Feb. 19, 1918.

Application filed July 26, 1915. Serial No. 41,914.

To all whom it may concern:

Be known that I, SVEND BARFOED, a subject of the King of Denmark, residing at Oakland, in the county of Alameda and State of California, have invented new and useful Improvements in High-Tension Suspension-Insulators, of which the following is a specification.

This invention relates to a high tension suspension insulator.

One of the objects of the present invention is to provide a simple form of suspension insulator provided with means for creating an electrostatic field of uniform intensity about the insulator proper, and to design or shape the insulator in such a manner that it will present surfaces parallel to the lines of electrostatic force created in the field. Another object is to provide an insulator in which fracture from shearing strain is entirely eliminated. Another object is to provide means for safeguarding insulators against damage from arcing between units. Further objects will hereinafter appear.

The invention consists of the parts and the construction and combination of parts as hereinafter more fully described and claimed, having reference to the accompanying drawings, in which—

Figure 1 is a view of a tower and cross arm, showing the application of a string of insulators.

Fig. 2 is a cross section of a pair of connected insulators.

Fig. 3 is a side elevation of same.

Fig. 4 is a side elevation of a modified form of insulator.

Referring in detail to the drawings, A indicates in general a single insulator, which consists of a metal cylinder 2, interiorly of which is secured a disk-shaped insulating member 3, the surface of which may be corrugated, as at 4, to produce a creepage surface. Extending centrally through the insulator 3 and the cylinder 2 is a cross beam 5, on the outer ends of which are secured suspension links 6 forming a means for connecting a plurality of insulating units in string fashion, such as shown in Fig. 1.

Suspension insulators in general, where two or more are employed to support a high tension line, such as indicated at 7, are subjected to more or less weight, and the insulators proper are, therefore, subjected to more or less shearing strain, by reason of the weight carried by the cross beam 5. This is

overcome to a large extent in the present instance, as the insulator 3 is disk-shaped and comparatively thin. The cross arm can, therefore, spring or yield to a considerable extent without bending or fracturing the insulator proper in which it is supported. The cement by which the insulator is secured to the beam in some instances is similarly prevented from fracture and the life and efficiency of the device as a whole prolonged or increased.

The insulating disk 3 may be secured on the beam in any suitable manner, either by cement, clips, clamps or by being pressed thereon, as the disk proper may be made of various materials, such as micarta, fiber, vulcanized rubber, glass, porcelain, or other material. Similarly, the links 6, forming a connection between the several insulators in a string, may be constructed of various materials; the insulating efficiency being greatly increased where the links are constructed of micarta.

The provision of the cylindrical-shaped, metal cylinder produces a uniform electrostatic field about the insulator proper and also causes the lines of electrostatic force created in the field to run parallel with the surfaces of the insulator. This is of great importance as an insulator is quickly broken down or punctured as soon as the electrostatic lines of force cross or intersect the insulating material.

In most forms of high tension suspension insulators now in use, the electrostatic field in and around the insulating body proper is poorly distributed, due to unfavorable proportion and shape of the metallic electrodes and of the dielectric or insulating body proper. The result is concentration of electrical stress giving rise to corona formation, arc over and puncture during voltage impulses with steep wave fronts, such as occur during lightning strokes, switching and arcing grounds. Failures also occur from mechanical defects, caused principally by the use of cement in assembling the insulator proper, with its iron parts, to produce a rigid bond between the materials of a different coefficient of expansion. This results in high internal stresses in the porcelain during temperature changes, causing fracture and other damage. Crystalline growths also take place in the cement under certain circumstances, adding further stress and fracture. Furthermore, in sustaining

the external load, by means of shearing stresses, surfaces between the iron parts and the porcelain parts must be of such length that the load may be properly supported.

5 This shearing strain tends to bend the insulator and consequently either fractures same or destroys the bond between the different parts.

In the present invention all these defects
10 have been entirely overcome as the bearing surface in the porcelain insulator is so small, when compared with the length of the beam, that any bending of the beam will have no effect on the porcelain insulator. The bond
15 between the beam and insulator may, therefore, be made by cement or any other suitable means without producing the failures heretofore described. Furthermore, the uniform field established by the metal cylinders surrounding the beam and insulator
20 produces a uniform electrostatic field in which the lines of electrostatic force run parallel with the surface of the insulator, thus preventing concentration of the lines
25 of force or intersection of the insulating body proper.

In the present invention means have also been provided for preventing the insulator from becoming damaged during arc-overs
30 between units caused by lightning strokes, or the like. This means consists of metallic disks 8, of circular shape, and in cross section similar to the segment of a sphere. These metallic disks are electrically and mechanically connected to an encircling band
35 9 on the metal cylinder 2; this band being provided both for the purpose of supporting the metallic shield 8 and the transmission wire 7. These disks may be renewed if destroyed by the power arc which often produces sufficient heat to practically consume
40 the shield before the current is cut off at the power house. The insulator proper, with surrounding cylinder 2 and center beam 5, together with connecting links 6 are thus
45 saved from destruction during arcing over between units which, as previously described, may take place during lightning strokes or grounding of one of the conductors, and as
50 the metal shields may be easily renewed, it has proven a great economical feature as far as cost or maintenance of power lines is concerned.

In Fig. 4 a modification of the type shown
55 in Figs. 1, 2 and 3 is shown. In this instance two or more cylindrical-shaped, corrugated insulators are employed, as indicated at 11, to support the beam concentric with relation to the cylinder 2, the insulating efficiency being practically the same in
60 either instance.

The materials and finish of the several parts of the mechanism are such as the experience and judgment of the manufacturer
65 may dictate.

I wish it understood that various changes in form, proportions and minor details of construction may be resorted to within the scope of the appended claims and that I do not wish to limit myself to the specific design and construction here shown.

Having thus described my invention, what I claim and desire to secure by Letters Patent is—

1. In a high tension suspension insulator, 75 a metal cylinder opened at both ends, a beam extending through the cylinder and concentrically positioned within same, and an insulating member mounted within the cylinder between its ends and interposed between the beam and cylinder to support the beam.

2. In a high tension suspension insulator, a metal cylinder opened throughout its length, a disk-shaped insulator secured 85 within the cylinder between its ends, and a beam extending through the insulator and cylinder and concentrically positioned with relation to same.

3. In a high tension suspension insulator, 90 a metal cylinder, a disk-shaped insulator secured within the cylinder, a beam extending through the insulator and cylinder and concentrically positioned with relation to same, a clamping band exteriorly of the 95 cylinder, and an arcing plate carried by the band.

4. The combination with a plurality of insulators, of an arcing plate arranged on each insulator in opposing relation to the plate 100 on the adjacent insulator.

5. In a high tension suspension insulator, a metal cylinder, a disk-shaped insulator secured within the cylinder, a beam extending through the insulator and cylinder and 105 concentrically positioned with relation to same, a link on each end of the beam, means from which said links are suspended, a clamping ring surrounding the metal cylinder, and means for suspending a transmission line from the clamping ring. 110

6. In a high tension suspension insulator, a cylinder opened at both ends, a disk-shaped insulator secured within the cylinder and having its opposite faces corrugated, 115 and a wire-suspension beam extending through the cylinder and insulator.

7. In a high tension suspension insulator, a pair of cylinders, an insulator in each, a beam extending through each cylinder and 120 its insulator, and means joining the respective ends of the beams together.

8. In a high tension suspension insulator, a pair of cylinders, an insulator in each, a beam extending through each cylinder and 125 its insulator, means joining the respective ends of the beams together, and an arcing plate carried by each cylinder in opposing relation to each other.

9. In a high tension suspension insulator, 130

a pair of cylinders, an insulator in each, a
beam extending through each cylinder and
its insulator, means joining the respective
ends of the beams together, a band encir-
5 cing each cylinder, and an arcing plate se-
cured to each cylinder by the band.

In testimony whereof I have hereunto set

my hand in the presence of two subscribing
witnesses.

SVEND BARFOED.

Witnesses:

JOHN H. HERRING,
W. W. HEALEY.