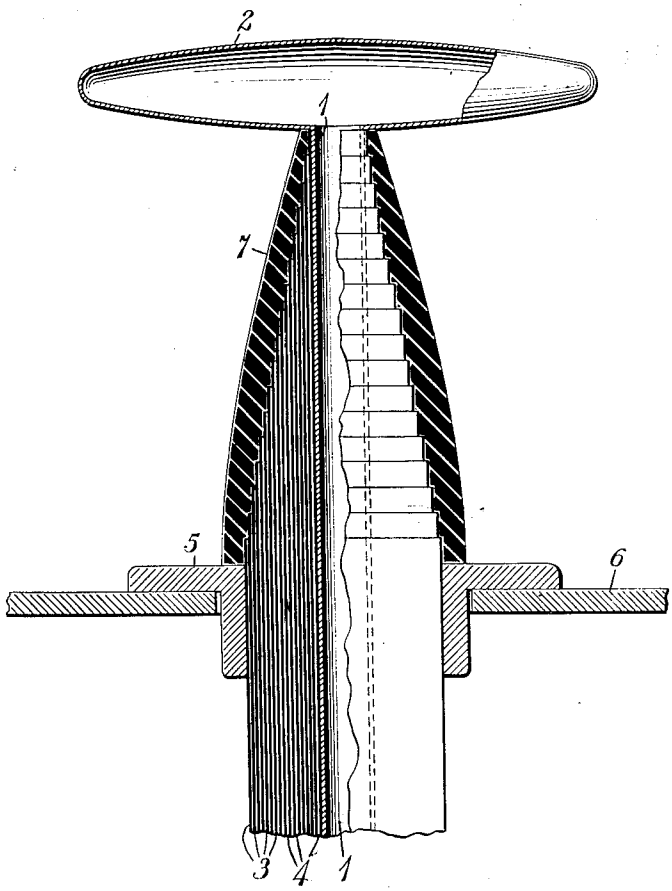
S. W. FARNSWORTH.

TERMINAL BUSHING.

APPLICATION FILED NOV. 24, 1911.

1,129,460. Patented Feb. 23, 1915.



WITNESSES:

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TERMINAL BUSHING.

1,129,460. Specification of Letters Patent. Patented Feb. 23, 1915.

Application filed November 24, 1911. Serial No. 662,185.

To all whom it may concern:

Be it known that I, SIDNEY W. FARNSWORTH, a citizen of the United States, and a resident of Edgewood Park, in the county of Allegheny, and State of Pennsylvania, have invented a new and useful Improvement in Terminal Bushings, of which the following is a specification.

My invention relates to terminal bushings for electrical apparatus and it has special reference to such bushings as are adapted for use with very high-voltage electrical apparatus and are liable to be subjected to adverse weather conditions.

The object of my invention is to provide a terminal bushing of the class above indicated that shall be particularly adapted for use with high-voltage transformers, circuit breakers or other devices which are inclosed in metal cases.

In Patent No. 952,513, granted March 22, 1910, to the Westinghouse Electric & Manufacturing Company, upon an application filed by J. C. Dow, is shown and described a high-voltage terminal bushing comprising alternate layers of insulating and conducting materials constituting so-called condenser-type insulation. When insulating structures of this character are subjected to moisture and adverse weather conditions, their voltage-sustaining power and insulating properties are diminished and depleted.

It has been my aim to provide a structure having the advantages of the condenser-type insulation and, at the same time, embodying means for preventing its rapid deterioration under adverse conditions and for materially increasing its voltage-sustaining power. In order to accomplish these results, I provide an insulating envelop which completely covers the exposed surface of the structure between the conducting members which it separates, the envelop itself being preferably so shaped as to conform to the electrostatic field of force in accordance with the principles set forth in co-pending application, Serial No. 558,744, filed April 30, 1910, by K. C. Randall, C. Le G. Fortescue and myself.

The single figure of the accompanying drawing is a partially sectional elevation of a terminal bushing constructed in accordance with my invention.

Referring to the drawing, the terminal structure here shown comprises an inner tube 1 of conducting material, which terminates at its upper end in an expanded conducting body 2, and a plurality of concentric cylindrical members 3 which are separated by relatively thin conducting cylinders 4. The otherwise exposed surface of the structure, which is stepped or tapered, (the cylinders being graduated in length with the longest next to the conducting tube 1 and the shortest fitting into a flanged collar 5 that constitutes a part of a transformer casing or tank 6) is provided with an envelop or sealing coating 7 of hard insulating material which closely engages the bushing and extends between the conducting members 2 and 5 and is so shaped as to conform to the electrostatic field of force produced by the difference of potential between the two conducting members.

As explained in co-pending application, Serial No. 642,877, filed August 7, 1911, by Charles Le G. Fortescue, and assigned to the Westinghouse Electric & Manufacturing Company, the disposition of the expanded conducting body 2 upon the upper end of the bushing substantially precludes undue and non-uniform concentrations of electrostatic lines upon the surfaces of the bushing. In other words, the conducting body 2 insures a substantially uniform distribution of the electrostatic stresses upon the surfaces of the bushing. By the use of the envelop 7, I provide an insulating medium which has very much higher insulating properties than air, and which prevents air from coming into immediate contact with the condenser-type bushing whereby the air may not be affected by the intensity of the electrostatic stresses.

To increase the efficiency of the air path over the surface of the insulating envelop 7 which is interposed between the high and low-potential bodies 2 and 6, respectively, the surface of the envelop is shaped to conform to the electrostatic flow lines existing between the said bodies and intercepting the conducting body 2. The insulating envelop not only enables the bushing to be subjected to much higher potential stresses without the attendant formation of corona discharges, but also utilizes the air to its full insulating value because the envelop is so formed that its surface is tangential to the electrostatic lines of force at every point, and, therefore, there is no normal compo-

nent of intensity to effect corona discharges. Moreover, the envelop serves to protect the condenser-type bushing by hermetically sealing the edges thereof which prevents rapid deterioration of the bushing when it is subjected to severe weather conditions.

I claim as my invention:—

1. An insulating structure composed of alternate layers of insulating and conducting materials and an insulating envelop therefor which closely engages the bushing and excludes moisture and air therefrom and is so shaped as to conform to the electrostatic field of force in which it is located.

2. The combination with conducting members of unlike potential, of an interposed insulating structure comprising insulation of the condenser type having an envelop of insulating material which closely engages the insulating structure and is so shaped as to conform to the field of force between the conducting members.

3. An insulating terminal bushing comprising a substantially cylindrical body having a tapered end and composed of alternate layers of insulating and conducting materials and an insulating envelop closely engaging the tapered end of the bushing to seal its exposed edges and being so shaped as to conform to the electrostatic field of force in which the bushing is located.

4. The combination with a conductor and an insulating bushing surrounding the conductor which comprises a body composed of alternate layers of insulating and conducting material and having a tapered end, an expanded conducting body disposed on said end and extending laterally from the conductor, and an insulating envelop engaging said end to seal the otherwise exposed edges of the bushing, the surface of the insulating jacket being so shaped as to conform to the electrostatic field surrounding the bushing.

5. The combination with a conductor and an insulating bushing surrounding the conductor which comprises a body composed of alternate layers of insulating and conducting material and having a tapered end, an expanded conducting body extending laterally from the conductor, and an insulating jacket engaging said tapered end to seal the edges of the bushing, the surfaces of the insulating jacket being so shaped as to conform to the electrostatic flow lines intercepting said conducting body.

6. The combination with a conductor and an insulating bushing surrounding the conductor which comprises a body composed of alternate layers of insulating and conducting material and having a tapered end, an expanded conducting body which is convexly curved adjacent to its edges with respect to the surfaces of the bushing and extends laterally from the conductor, and an insulating coating for sealing the edges of the bushing, the outer surfaces of the insulating coating being shaped to conform to the electrostatic flow lines surrounding the bushing.

In testimony whereof, I have hereunto subscribed my name this 21st day of Nov., 1911.

SIDNEY W. FARNSWORTH.

Witnesses:

L. H. TIPPINS,

B. B. HINES.