

A. B. REYNDERS & J. E. MATEER.  
INSULATING STRUCTURE.  
APPLICATION FILED MAY 13, 1909.

984,156.

Patented Feb. 14, 1911.

Fig. 1.

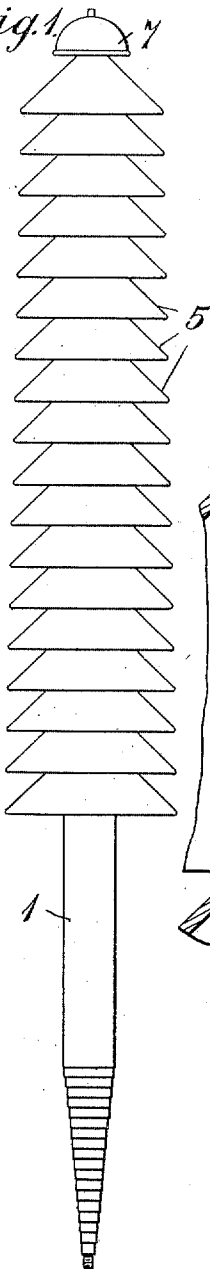
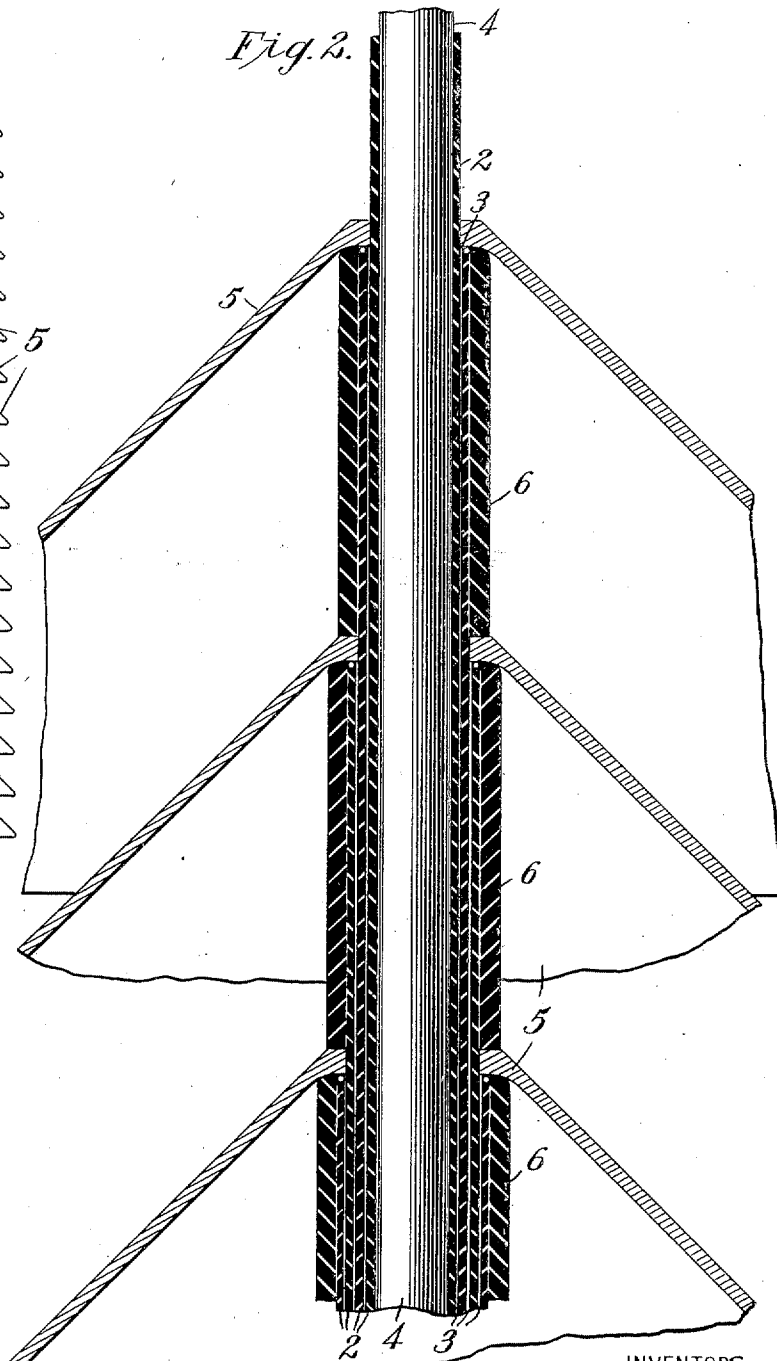


Fig. 2.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

ARTHUR B. REYNOLDERS AND JESSE E. MATEER, OF WILKINSBURG, PENNSYLVANIA,  
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## INSULATING STRUCTURE.

984,156.

Specification of Letters Patent.

Patented Feb. 14, 1911.

Application filed May 13, 1909. Serial No. 495,770.

*To all whom it may concern:*

Be it known that we, ARTHUR B. REYNOLDERS and JESSE E. MATEER, both citizens of the United States, and residents of Wilkinsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Insulating Structures, of which the following is a specification.

Our invention relates to insulating structures, and it has special reference to insulating bushings which are adapted to separate the leads of transformers and other high-voltage electric apparatus from the metal tanks or casings through which they project.

The object of our invention is to provide bushings of the class above indicated that shall be durable in construction and adequate for outdoor service, in connection with very high-potential circuit conductors.

For very high-voltage service, bushings of the so-called condenser type have been successfully utilized for insulating the leads of transformers, circuit-breakers and other devices from the metal cases in which the devices are contained.

According to our present invention, we have modified this type of insulation for the purpose of adapting it to outdoor service. In our copending application, Serial No. 495,771, filed of even date herewith, we have illustrated and described means for equalizing the potential strains throughout the insulating body by impressing suitably graded voltages on the several conducting layers of the insulation. This same means may be found desirable for use in connection with the bushing of our present invention, but its scope is not limited in this regard.

Figure 1 of the accompanying drawings is an elevation of a bushing constructed in accordance with our invention and Fig. 2 is a sectional view, on a larger scale, of a portion of the bushing shown in Fig. 1.

Referring to the drawings, with special reference to Figs. 1 and 2, the bushing here illustrated comprises a cylinder 1 composed of alternate layers 2 and 3 of insulating and conducting materials and mounted upon a rod or tube 4 of conducting material that may be connected in an electric circuit and may constitute the lead of a transformer or other electrical device. The

innermost layers of the cylinder are relatively long and outermost layers are relatively short, so that a stepped structure is provided in which the extremities of adjacent conducting layers are separated by a material length of insulation.

At the inner end of the bushing, the steps are comparatively short, since this end projects into the tank or casing of the apparatus with which it is employed and is, consequently, protected from the weather. If the transformer or other device is immersed in oil, according to the usual practice for very high-voltage service, the inner end of the bushing is usually oil-immersed. The outer end of the bushing is provided with a series of bells or skirts 5 of sheet metal or other suitable conducting material, which are electrically connected to the several conducting layers of the bushing and are supported in position by the ends of the insulating layers. The bells or skirts are spaced apart by porcelain sleeves 6 which are mounted upon the exposed ends of the respective insulating layers and which more fully protect the bushing from the weather.

The extreme end of the terminal is provided with a cap 7 which is fastened to the end of the tube or rod 4 and is so constructed, of metal or other conducting material, as to form an electrical connection to a terminal member without exposing any joints through which moisture might pass. The edges of the cap 7 overhang the outermost bell or skirt 5 and these parts overhang each other so that the bushing, and particularly the ends of the layers, are thoroughly protected from the weather. The use of metal skirts rather than skirts of porcelain or like substance avoids breakage and renders the terminal lighter in weight.

While the structure illustrated is considered preferable, our invention is not restricted to any specific arrangement of details, and we desire that only such limitations shall be imposed as are indicated in the appended claims.

We claim as our invention:

1. An insulating bushing, comprising a plurality of concentric cylinders of conducting material, separating cylinders of insulating material and overhanging bells or skirts of conducting material mounted upon

the exposed ends of the cylinders in electrical contact with the conducting cylinders, said cylinders being graded in length between the inner and the outer surfaces of the bushing.

2. An insulating bushing, comprising a plurality of concentric layers of insulating and conducting materials of graded lengths to provide a series of steps, and overhanging skirts of conducting material fitted upon the steps and electrically connected to the conducting layers.

3. An insulating bushing, comprising a plurality of concentric layers of insulating and conducting materials of graded lengths to provide a series of steps, overhanging metal skirts which are fitted upon the respective steps and are electrically connected

to the conducting layers, and a bell-shaped metal cap or crown.

4. An insulated lead structure for electrical apparatus, comprising concentric conductors, separating insulating tubes of graded lengths to form a series of steps, and overhanging skirts of conducting material severally supported upon the steps and connected electrically to the ends of the concentric conductors.

In testimony whereof, we have hereunto subscribed our names this 4th day of May, 1909.

ARTHUR B. REYNDERS.  
JESSE E. MATEER.

Witnesses:

F. CREEDY,  
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