July 8, 1930. R. P. DUNMIRE 1,770,130

INSULATOR

Filed May 27, 1926

Fig. 1.

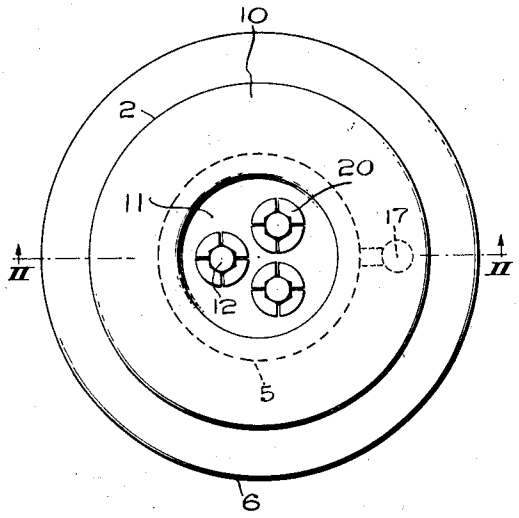


Fig. 2.

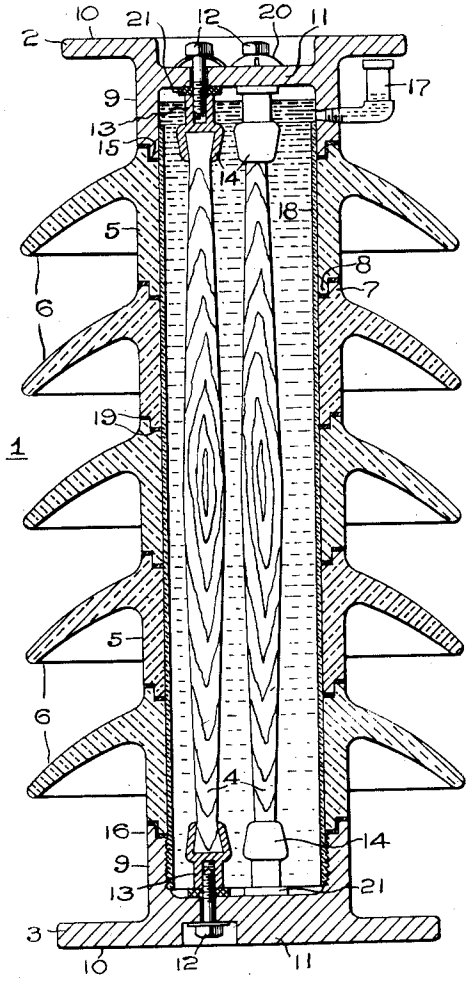
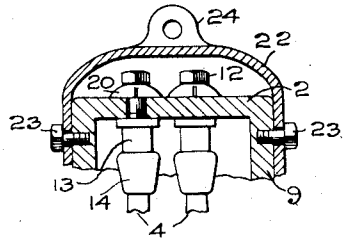


Fig. 3.



WITNESSES:

R. S. Harrison

F. H. Miller

INVENTOR

Russell P. Dunmire

BY

Wesley G. Carr

ATTORNEY

Patented July 8, 1930

1,770,130

UNITED STATES PATENT OFFICE

RUSSELL P. DUNMIRE, OF PHILADELPHIA, PENNSYLVANIA

INSULATOR

Application filed May 27, 1926. Serial No. 111,918.

My invention relates to insulators and particularly to insulators for use in connection with high-voltage service.

One object of my invention is to provide an insulator of the above indicated character, that shall be simple and durable in construction, economical to manufacture and effective in its operation.

Another object of my invention is to provide an elongated insulating structure that shall be so reinforced by members extending longitudinally therethrough as to resolve various forces, such as lateral or bending forces that affect the insulator in service, into components, thereby materially increasing the strength of the insulator and adapting it for the support of greater mechanical loads.

Heretofore, it has been usual, in certain types of insulators, to depend upon the strength of refractory insulating members for supporting the mechanical loads.

In insulators of the pillar type, while refractory material alone is very good for supporting a vertical load, or a load in the direction of the longitudinal axis of the insulator, this material is not adapted to withstand any considerable lateral or bending stress.

Also, in suspension insulators, while refractory material under tension is very satisfactory up to certain limits of tension, there are values of tension beyond which it cannot be employed.

While attempts have been made to strengthen elongated tubular insulators by the use of single members, such as ropes, tubes and the like, I am not aware that any such insulator has been provided with a plurality of members for resolving the bending and longitudinal stresses into components.

In practicing my invention, I provide a main tubular insulating body structure that is so reinforced by elongated members therein as to relieve the body structure of longitudinal stresses and to brace it against lateral stresses when it is employed as an insulator of either the suspension or the pillar type.

The reinforcing members are arranged to divide a main longitudinal load into component forces equally between them and to function, similar to a tripod, as a multi-point brace against lateral forces. Thus, all of the usual main fracturing stresses are divided into components to permit the insulator to be employed in connection with mechanical loads that are greatly in excess of those in connection with which the tubular body portion alone could be employed.

Figure 1 of the accompanying drawing is a plan view of an insulator of the pillar type embodying my invention,

Fig. 2 is a longitudinal side sectional view of the insulator shown in Fig. 1, and

Fig. 3 is a fragmentary sectional view of a modified form of my invention, showing a means for adapting the structure as a suspension insulator.

An insulator embodying my invention comprises, in general, a main tubular insulating body structure 1, metal terminal members 2 and 3 therefor and a plurality of reinforcing members 4 extending through the body structure 1 and secured, at the ends thereof, to the terminal members 2 and 3.

The body structure 1 is preferably constructed of a plurality of tubular porcelain sections 5, each having a petticoat portion 6, an outer upper flange 7 and an inner lower flange 8. The flanges 7 and 8 permit the sections 5 to telescope with each other.

The terminal members 2 and 3, preferably of metal, severally comprise a tubular body portion 9, main end flange 10 and a transverse wall portion 11 that is provided with longitudinal openings for the reception of bolts 12. The latter extend loosely through the wall portions 11 and are screw-threaded, at their inner ends, to fit into interiorly threaded bosses 13 that may constitute in-

tegral parts of terminal members 14, at the ends of the elongated members 4. The latter are preferably constructed similar to a usual form of wood-strain insulator, in which the ends of the wood or insulating body members are flared outwardly in frusto-conical form and the terminal members 14, initially of hollow cup-shape, are swaged over the frusto-conical ends.

The terminal members 2 and 3 are further provided with flanges 15 and 16, respectively, that fit the upper end of the upper section 5 and the lower end of the lower section 5, thus completing, with the other parts, a substantially enclosed tubular chamber having side walls consisting of the tubular portions of the insulating members and the end walls 11.

The chamber may be filled with oil, and an oil gauge 17 be provided in the terminal member 2 for indicating the oil level. The chamber may also be lined with a tubular insulating shell or member 18, preferably of fibrous insulating material, that is screw-threaded, or otherwise secured in position with respect to the bottom metal tubular portion 9 and relatively movably related to the other parts. This construction assists in preventing the escape of oil and permits relative movement of the parts under load stresses and temperature changes. The tubular insulating sections 5 are provided with yieldable members or packing gaskets 19, between the flanges 7 and 8, to further prevent the escape of oil and also to permit a slight longitudinal telescoping movement of the tubular insulating body portion in either direction.

The members 4 are rigidly secured to the terminal member 3 but are yieldably secured to the terminal member 2 by means of resilient metal washers 20. Resilient packing washers or gaskets 21, of felt or other suitable material, surround the bolts 12 between the terminal members 14 and the end walls 11 to prevent the escape of oil through the ends of the insulator and to permit the compensating movements of the parts which occur under load stresses and temperature changes.

The telescoping sections 5 are preferably so arranged, relative to the members 4, that the latter will assume the main longitudinal load, whether that load be of compression, as in insulators of the pillar type, or of tension, as in insulators of the suspension type.

When employed as an insulator of the pillar type, as shown in Figs. 1 and 2, the members 4 will assume the initial pressure of any load, and, thereafter and depending upon the magnitude of the load, may divide the stresses with the sections 5. This division of the load may be caused by the compression or slight bowing of the members 4 and, depending upon temperature and load conditions, the main stresses may be periodically changed between a condition wherein they are all transmitted to the members 4 and a condition wherein they are divided between the members 4 and 5.

When employed as a suspension insulator, the main flanges 10 may be omitted and a cap member 22 fitted over the tubular portions 9 of each of the terminal members 2 and 3, as indicated in Fig. 3. The cap member 22 is secured to the terminal member by screws 23 and is provided with a connecting clevis or eye member 24.

By reason of the above described telescoping or lost-motion relation between the sections 5, lateral bending stresses will be assumed by the members 4 in a manner resulting in the tensioning of one or more of the latter simultaneously with the longitudinal compressing of the other or others. This action reduces the values of the lateral fracturing stresses imposed upon the sections 5 to a much greater degree than in a similar insulator in which only one member, corresponding to one of the members 4 is employed.

While I have shown and described particular forms of my invention, changes may be effected therein without departing from the spirit and scope thereof, as set forth in the appended claims.

I claim as my invention:

1. In an insulator the combination with a tubular member of a plurality of insulator rods disposed therein, terminals joining said tubular member and rods, and a plurality of tubular insulator units yieldingly mounted in longitudinally superposed relation on said tubular member and adapted to be set to a tension value so that as the load on the insulator increases, the stress on the tubular units decreases.

2. An insulator as set forth in claim 1 in which yieldable spacing members are disposed between the respective tubular units.

3. An insulator as set forth in claim 1 in which the insulator rods are yieldingly secured to the terminals.

4. An insulator as set forth in claim 1 in which the rods are rigidly secured at one end to one of the terminals and yieldingly secured at their other ends to the other of said terminals.

5. In an insulator the combination with a tubular structure comprising a plurality of insulator units yieldingly mounted in longitudinally superposed relation, of a strain insulator disposed therein, terminals joining said tubular structure and strain insulator and a tube disposed interiorly of said tubular structure and sealed at its ends to constitute an oil chamber, said insulator being adapted to be set to a tension value so that when the load on the insulator increases, the stress on the insulator units decreases.

6. In an insulator the combination with a tubular member of a plurality of insulator rods disposed therein, a plurality of insulator units yieldingly mounted in longitudinally superposed relation on said tubular member and terminals engaging said tubular member and insulating units, said rods being joined to the terminals at their respective ends.

In testimony whereof, I have hereunto subscribed my name this 5th day of May, 1926.

RUSSELL P. DUNMIRE.