Aug. 19, 1930. A. O. AUSTIN 1,773,659

TRANSMISSION LINE

Filed April 2, 1928

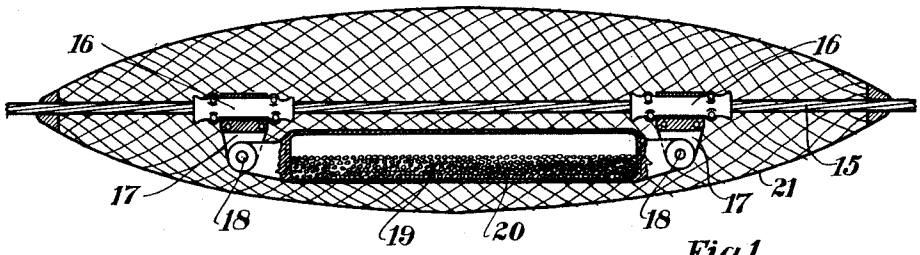


Fig.1

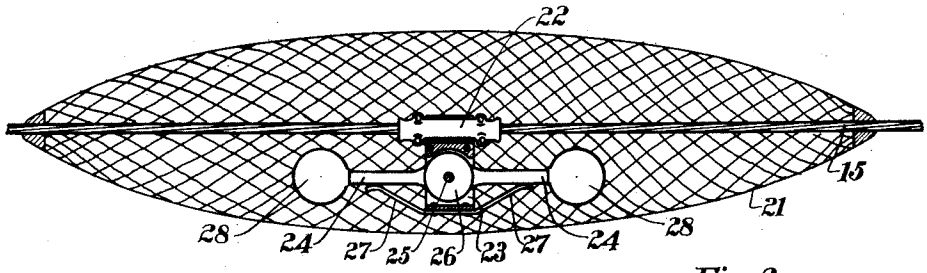


Fig.2

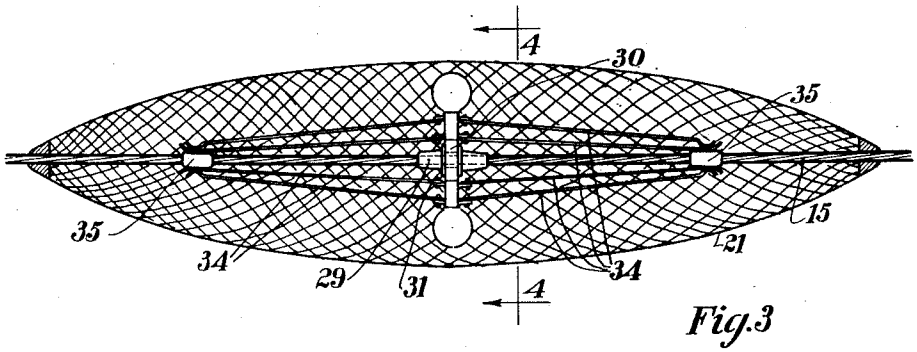


Fig.3

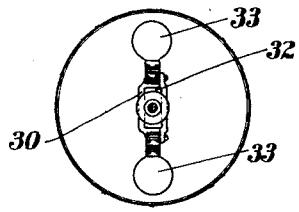


Fig.4

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UNITED STATES PATENT OFFICE

ARTHUR O. AUSTIN, OF NEAR BARBERTON, OHIO, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE OHIO BRASS COMPANY, OF MANSFIELD, OHIO, A CORPORATION OF NEW JERSEY

TRANSMISSION LINE

Application filed April 2, 1928. Serial No. 266,584.

This invention relates to electrical transmission lines and has for one of its objects the provision of means for reducing vibrations in supported strands or conductors. A further object is to provide a combined damping device and flux cage to damp vibrations in the line without increasing the tendency toward electrical discharge from the line. A further object is to provide an apparatus of the class named which shall be of improved construction and operation. Other objects and advantages are apparent from the following description.

The invention is exemplified in the combination and arrangement of parts shown in the accompanying drawings and described in the following specification, and is more particularly pointed out in the appended claims.

In the drawings:

Fig. 1 is a vertical sectional view of one form of the present invention applied to a transmission line.

Fig. 2 is a view similar to Fig. 1 showing a modified form of the invention.

Fig. 3 is a view similar to Figs. 1 and 2 showing another form of the invention.

Fig. 4 is a transverse section on line 4—4 of Fig. 3.

In building high voltage transmission lines, it is desirable to string the conductors at a high tension so that the number of supports may be reduced or ample ground clearance be provided. It is also desirable to maintain sufficient tension in the conductor so that danger of the conductors swinging together will be less for a given spacing or separation. As the tension increases, trouble from vibration, which tends to destroy the conductor or attachments, seems to increase. The tension, mass and size of the conductor are apparently factors in setting up this vibration. In some cases, the conductor has been seriously damaged in a comparatively short time due to this vibration. The vibration, in general, is in a vertical direction and is apparently caused by the action of wind upon the conductor.

The amount of energy maintaining the vibration is usually very small. Therefore, any slight absorption of energy produced by the oscillation or vibration of the conductor will suffice to dampen it out or maintain it within safe bounds. While it is possible that a change of mass in the conductor may change the oscillation materially, the only sure means of limiting an oscillation is through an absorption of energy. If, therefore, any attachment having suitable mass is applied to the conductor so that the oscillation of the conductor will tend to cause a movement with respect to this mass so that energy will be dissipated, the oscillation may be kept within safe bounds or eliminated. In general, it is advisable to apply the oscillation or vibration absorber in the vicinity of the insulator or tower. Where this is done, however, any change in the size of the conductor usually results in a much lower flash-over voltage due to concentration of electrostatic stress upon the projecting parts. In my present invention, it is desired not only to absorb energy due to vibration but also to prevent the vibration damper or absorber from lowering the flash-over voltage.

In the form of the invention shown in Fig. 1, the numeral 15 designates the conductor of a high voltage transmission line having bearing members or sleeves 16 fixed thereto in any suitable manner. The sleeve 16 may be parted longitudinally and clamped to the conductor by bolts or other suitable means. Suspension brackets 17 are hung upon the sleeves 16 and are free to rotate thereon so that the supporting ears of the bracket 17 will swing downwardly at all times.

Secured to the bracket 17 by pins 18, or other suitable fastening device, is a container 19. This container may be in the form of a hollow cylinder and within the cylinder are loose particles 20. The material within the container may vary widely without materially effecting the operation of the device. This material may be sand, shot, marbles, small stones or gravel, a viscous or other liquid, loose particles immersed in liquid or other loose material such that it will offer frictional resistance to vibration of the container. It will be seen that if the line 15 is vibrated the container 19 will be vibrated in unison therewith and the particles 20, be-

cause of their inertia, will tend to remain in their fixed position and will be rubbed together so that the friction produced in the particles by vibration of the container, will absorb the energy of such vibrations and thus damp out the vibrations.

Extending along the line 15 and enclosing the container 19 and its supports is a conductor or flux cage 21. This cage may be made of woven wire, expanded metal or other suitable material and serves to increase the effective diameter of the conductor 15 and prevents concentration of electrostatic flux which would otherwise be produced by the projections on the line formed by the vibration damper. The construction and operation of the flux cage is more completely described and claimed in my prior Patent Number 1,664,100 dated March 27, 1928.

In the form of the invention shown in Fig. 2 a single sleeve 22 is secured to the conductor 15 and a bracket 23 is suspended from the sleeve 22 and is free to rotate about the axis of the conductor. Arms 24 are pivotally mounted on a pin 25 carried by the bracket 23. The arms 24 are provided with friction discs 26 which resist pivotal movement thereof about the pin 25. Springs 27 support the arms so that they are poised in an extended position and free to move about the pin 25 except for the frictional resistance offered by the discs 26. Weights 28 are carried on the ends of the arms 24 and the inertia of these weights tends to hold the arms 24 stationary when the conductor 15 is vibrated vertically. This will cause relative movement of the arms 24 about their pivots so that the friction between the discs 26 will absorb the energy of vibration and thus damp out the vibrations of the conductor. The bracket 23, arms 24 and associated parts are enclosed in a conductor cage 21 in the same manner as the damping device of Fig. 1.

In the form of the invention shown in Figs. 3 and 4, a sleeve 29 is mounted on the conductor 15 and a yoke 30 is mounted on the sleeve 29. Flanges 31 prevent longitudinal movement of the yoke 30 but the yoke is provided with a rectangular opening 32 which permits the sleeve 29 and conductor 15 to move vertically relative to the yoke. Balls or other weights 33 are mounted on the upper and lower ends of the yoke to increase the inertia of the yoke. The lower ball is preferably made heavier than the upper ball or spaced further from the line 15 so that the yoke will remain in upright position. Secured to the yoke 30 and extending therefrom along the conductor 15 are springs 34. A pair of collars 35 is mounted on the conductor 15 at points spaced outwardly from the sleeve 29 and the ends of the springs 34 bear against the collars 35 and against one another so that any relative movement of the conductor and yoke will cause the ends of the springs to rub upon one another and upon the pair of collars 35 to damp out vibration of the conductor by absorbing the energy of such vibration.

The yoke 30 and the balls 33 are floated by the springs 34 upon the conductor so that the conductor moves readily relative to the yoke, except for the frictional resistance offered by the contact at the ends of the springs 34.

I claim:—

1. The combination with a transmission line, of means for damping vibrations of said line, and a cage enclosing said damping means to control the electrostatic field about said damping means.

2. The combination with a transmission line, of a member mounted on said line for absorbing energy of vibration of said line, and a conductor cage enclosing said member to control the electrostatic field about said member.

3. The combination with a transmission line, of a frictional device for absorbing energy of vibration of said line, and a conductor cage enclosing said friction device.

4. The combination with a transmission line, of a mass supported by said line and floated thereon to permit relative movement of said mass and line, means for absorbing energy when said mass and line are relatively moved, and a conductor cage electrically connected with said line and surrounding said mass.

5. The combination with a transmission line, of a mass suspended from said line and mounted to move about the axis of said line, said mass being floated to move relative to said line, frictional means for absorbing energy when said line and mass are moved relative to each other, and a conductor cage electrically connected with said line and enclosing said mass.

6. The combination with a transmission line, of a receptacle having rigid walls secured to said line, and a movable mass disposed within said receptacle and only partially filling the same for frictionally absorbing energy of vibration of said line.

7. The combination with a transmisssion line, of a receptacle having rigid walls suspended from said line and free to move about the axis thereof and loose particles disposed within said receptacle and only partially filling the same for frictionally absorbing energy of vibration of said line.

8. The combination with a transmission line, of an elongated receptacle mounted on said line and extending in the direction of the length thereof, and loose particles disposed within said receptacle for frictionally absorbing energy of vibration of said line.

9. The combination with a transmission line, of a receptacle mounted on said line,

loose material disposed within said receptacle for frictionally absorbing energy of vibration of said line, and a conductor cage enclosing said receptacle.

In testimony whereof I have signed my name to this specification this 31st day of March, A. D. 1928.

ARTHUR O. AUSTIN.