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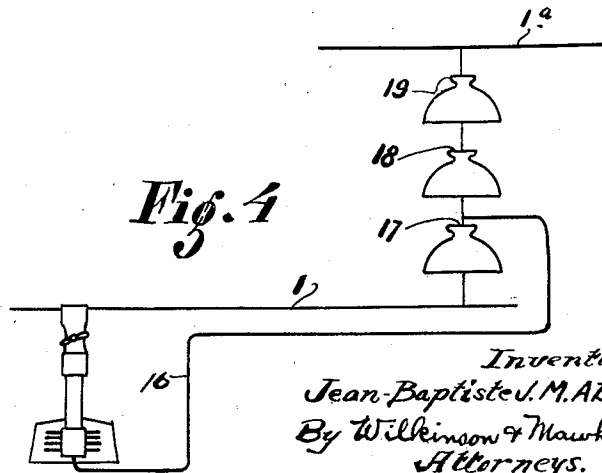
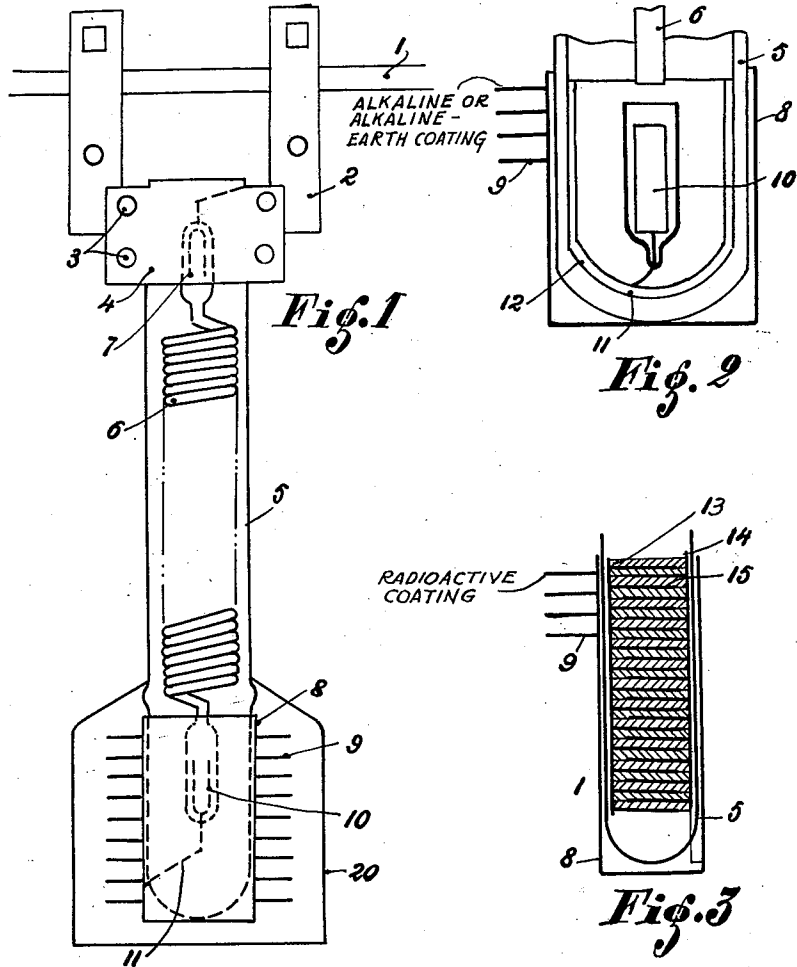
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2,030,491

DEVICE FOR APPLYING LUMINESCENT TUBES TO POWER TRANSMISSION LINES

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2 Sheets-Sheet 1



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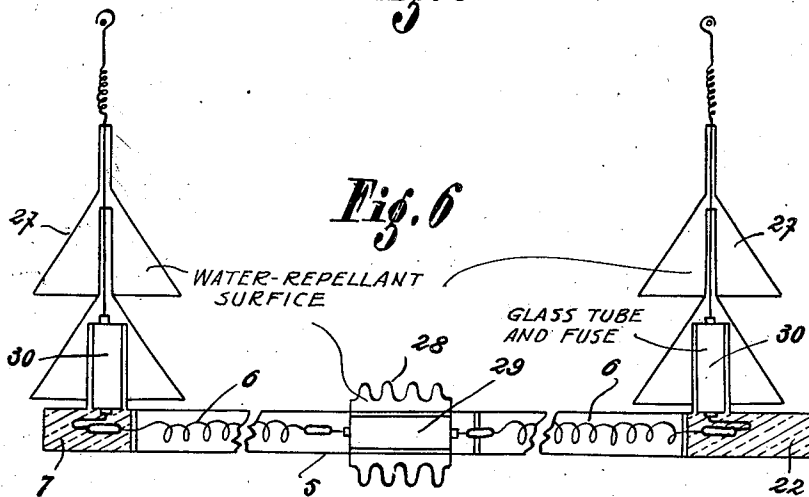
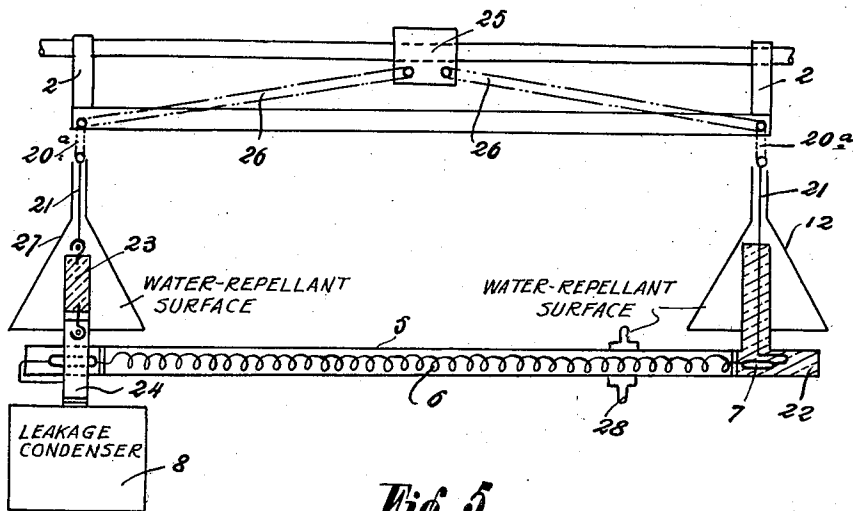
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UNITED STATES PATENT OFFICE

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DEVICE FOR APPLYING LUMINESCENT TUBES TO POWER TRANSMISSION LINES

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5 Claims. (Cl. 177—352)

The present invention has reference to the application of luminescent tubes filled with rare gas for marking out power transmission lines at night and also for indicating, in particular in the cubicles of transformer stations, whether or not the line is under pressure.

With this end in view, the invention relates to a lamp having a luminescent tube whose features of operation and the manner in which it is mounted will become apparent from the ensuing description taken in conjunction with the accompanying drawings wherein:

Fig. 1 is a sectional elevation of one embodiment of a lamp.

Figs. 2 and 3 illustrate two constructional modifications of the low tension electrode.

Fig. 4 illustrates the application of the invention to lines under medium pressure.

Fig. 5 illustrates a constructional modification of the lamp according to the invention.

Fig. 6 illustrates another application of the lamp to lines under medium pressure.

In Fig. 1 has been shown a power transmission cable 1 from which the lamp may be suspended by two jaws 2 which may be clamped to the line by two lugs 3 fitted with a locking bolt.

This hooking device is connected to a metallic cap 4 made of aluminum or preferably any inoxidizable metal, as are also the hooking jaws and clamping screws. This unit supports a glass sleeve 5 (hard glass), within which is located a luminescent tube 6 of small diameter twisted in a spiral, with a view to increasing the brightness of the source.

The electrode 7 of the luminescent tube 6 (neon tube for example) is connected to the upper hooking device. At the lower end of the glass sleeve 5 is located a metallic sleeve 8 fitted with a plurality of points 9. The points promote the leakage of the electric current into the atmosphere in accordance with the well-known electrostatic effect of a point surface.

The second electrode 10 of the luminescent tube may be connected to the metallic sleeve 8 by a wire 11 (Fig. 1) or may be connected to a metallic coating 12 (Fig. 2). In the latter case, a condenser is formed with the terminal of the dielectric glass sleeve 5, the two coatings of which are the point leak 8 and the metallic coating 12. According to Fig. 3, the capacity of said condenser can be raised by locating in the terminal portion of the sleeve 5 a condenser of which 13 and 14 are the two coatings, one of the coatings 14 being connected to the point leak 8,

and the other coating 13 to the lower electrode 10 of the luminescent tube.

Insulating washers 15, made of mica for example, form the dielectric of the condenser.

With this arrangement, the lamp operates as follows: The electricity which tends to escape through the points along the equi-potential atmospheric lines set up by the power transmission line, will pass through the sleeve, then through the luminescent tube which it will cause to light up, and then either directly through the points according to the first circuit arrangement, or to charge the condenser according to the second circuit arrangement, said condenser discharging through the point leak 8. The leak, depending on its metallic mass and the nature of the points, considerably influences the luminous power of the tube, for it modifies the current that flows through said tube. It is therefore useful to increase the effect of the leak.

The leak may likewise be covered over with substances which ionize the air surrounding the leak, such as radio-active substances as shown in Figure 3. Finally the ionizing potential of the air may be lowered, the effect of which will be to lower the lighting up potential and to facilitate the flow of current, by covering over the leak with substances such as alkaline or alkaline-earth oxides as shown in Figure 2.

Such a lamp readily operates as soon as the voltage with respect to the earth reaches 6,000 volts.

It may be of interest in certain cases to design lamps to operate at 2,000 and 3,000 volts, or to be able to increase at will the luminosity of the lamps on power transmission lines at higher voltage.

Use will then be made of the device illustrated in Fig. 4 where the electric cable 1 is suspended from a suspension cable 1a, the insulation chain between them being designated by 17, 18, 19. The leak which in this case need not be provided with points, may be connected by a suitable insulated wire 16 to a fastening point of one of the line insulators. The insulators then act as dielectrics and according to which of the points 17, 18, 19 contact is made with, the luminous intensity of the lamp will be increased.

In this case, in order to avoid the risks of an arc being set up, the circuit arrangement illustrated in Fig. 2 will be used for the lower electrode, and the glass sleeve 5 will be made sufficiently thick so that the dielectric rigidity corresponding to the thickness chosen shall compen-

sate for the insulation of the short-circuited insulator.

In wet weather, the water which streams along the sleeve tends to destroy the potential difference required to light up the lamp and which exists under dry atmospheric conditions between the cable and the leak fitted with points.

Hence a glass or porcelain jar 20, see Fig. 1, will be placed around the leak with its points in order thus to avoid the luminescent tube becoming extinguished. The jar 20 may be formed as a part of the sleeve 5 or may be connected thereto by slipping over the sleeve and resting on a shoulder or other projection formed near the lower end of the sleeve.

The horizontal lamp illustrated in Fig. 5 is characterized by:

1. A worm tube 6 filled with neon gas.
2. A leak 8, formed by a cylinder made of sheet zinc for example, stopped up at both ends, said cylinder having a greater outer surface, for a predetermined resistance to the wind, than that of any other leak which is practically utilizable.
3. A completely flexible suspension system formed for example by two hooks 2 formed by aluminum strips which are clamped to the cable by hand during erection.
4. Inoxidizable damping springs 20a and two brass chains 21, the end of one of the chains being connected to the high tension electrode 7 and embedded in pitch 22.

The other chain is hooked to an insulating knob 23 made of cast material, said knob being held in a metallic ring 24 which supports the leak 8.

In order to prevent the vibrations of the power transmission cable from causing the tube to slide along it, a clamp 25 mounted on said cable is connected to the two supporting hooks 2 through the medium of two springs 26.

This lamp includes in addition a device for protecting it from the rain.

The sheet of water which streams over the lamps during a heavy rainfall forms about the leak a conducting sheath charged to the potential of the cable. It creates in the vicinity of the leak a Faraday cage which prevents said leak from discharging.

With a view to protection against rain, the invention is characterized by:

1. The breaking-up of the sheet of water for example by means of insulating jars 27.
 2. The application of a special anti-clouding material (paraffin for example), the purpose of which is to break up the continuity of a superficial water vapour layer which may settle on the lamp, which continuous layer would produce substantially the same potential in the leak as in the cable and would therefore prevent the lamp from operating.
 3. The high tension electrode is completely insulated in order to prevent it from charging by induction the water streaming down in proximity thereto. The means employed consists in immersing said electrode in insulated pitch.
 4. The use of one or several shielding rings 28, the purpose of which is to prevent a continuous conducting sheet of water from being formed over the whole length of the tube. This sheet of water would be raised by induction to a high potential and on this account, owing to its being continuous with the leak, would break down the potential difference between the latter and the cable without which the lamp cannot operate.
- Said rings serve after all the same purpose as

the jar provided under I° the purpose of which is to break up the sheet of water streaming down from the cable.

The tube just described provides good luminosity in the case of a cable the potential of which is greater than 20,000 volts with respect to the earth.

For lower pressures it would be necessary to increase the dimensions of the leak to an extent which would be incompatible with the conditions of manipulation and utilization.

The leak may then be advantageously replaced by a capacity, the other terminal of the capacity being connected either to the earth or to another phase (see Fig. 6). The capacity may be placed to advantage in the glass tube of large diameter containing the luminescent tube 5 itself after having carefully and thoroughly dried the glass tube housing the luminescent tube and the capacity 29.

The tube illustrated in Fig. 6 is characterized by the application of a luminescent tube, the pressure required for its operation being a third of the total feed pressure of the unit.

Tests and calculations have shown that with this distribution of pressure the unit works with the greatest efficiency.

In order to protect the lamp against possible short circuits, special fuses are used which are immersed in oil and placed in glass tubes 30, the latter being immersed in the pitch 7 which keeps the two ends of the lamp fluid-tight.

The lamp is supported by jars made of cast material which have the same characteristics as in the lamp disclosed in Fig. 1 of being covered over with anti-clouding materials or of being formed of anti-clouding materials themselves.

I claim:

1. A beacon light comprising a gaseous discharge tube element, an electrical connecting element between said tube and a power line, a circuit completing element, and a water repellent member making water tight contact with one of said elements for preventing the accumulation of a short-circuiting water film, said member comprising a body portion provided with a water repellent exterior surface.

2. A beacon light comprising a gaseous discharge tube element, an electrical connecting element between said tube and a power line, a circuit completing element, and a water repellent member disposed at a point intermediate the ends of said tube and making water tight connection therewith to prevent the accumulation of a short-circuiting water film, said member comprising a collar provided with a water repellent surface.

3. A beacon light comprising a gaseous discharge tube element, an electrical connecting element between said tube and a power line, a circuit completing element, and a water repellent member disposed at a point intermediate the ends of said tube and making water tight connection therewith to prevent the accumulation of a short circuiting water film, said discharge tube element comprising a transparent sleeve, a pair of discharge tubes in said sleeve, a capacitance in said sleeve, one electrode of one tube connected to the said connecting element and the other electrode connected to one side of the capacitance, one electrode of the other tube connected to the other side of the said capacitance and the second electrode connected to the circuit completing element.

4. A beacon light comprising a gaseous discharge tube element, an electrical connecting ele-

ment between said tube and a power line, a circuit completing element, and a water repellent member making water tight connection with said connecting element to prevent accumulation of a short-circuiting water film, said water repellent member comprising a long hollow sleeve portion and a downwardly flaring shielding portion, said member provided with an exterior water repellent surface.

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10 5. A beacon light comprising a gaseous discharge tube element, an electrical connecting ele-

ment between said tube and a power line, a leakage condenser completing the circuit, and a water repellent member making water tight connection with said condenser to prevent accumulation of a short-circuiting water film, said member comprising a bell-shaped member about the condenser, said member being open at the bottom and provided with a water repellent surface. 5

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