June 17, 1947. L. MARTENET 2,422,644

APPARATUS FOR DETECTING DEFECTS IN ELECTRICAL SYSTEMS

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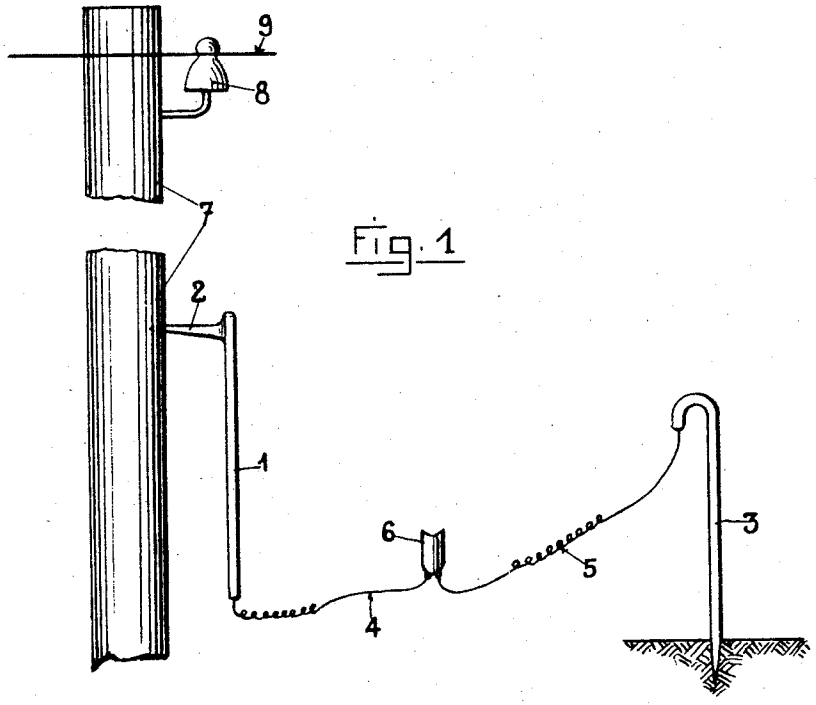

Fig. 1

Fig. 3

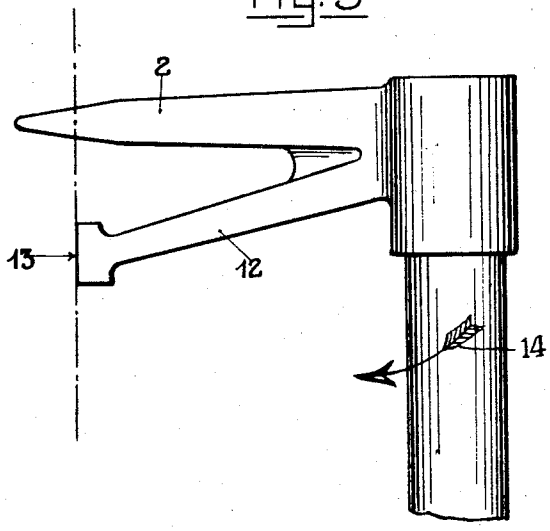

Fig. 2

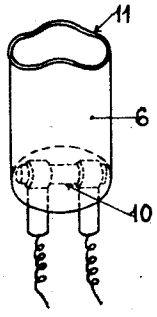

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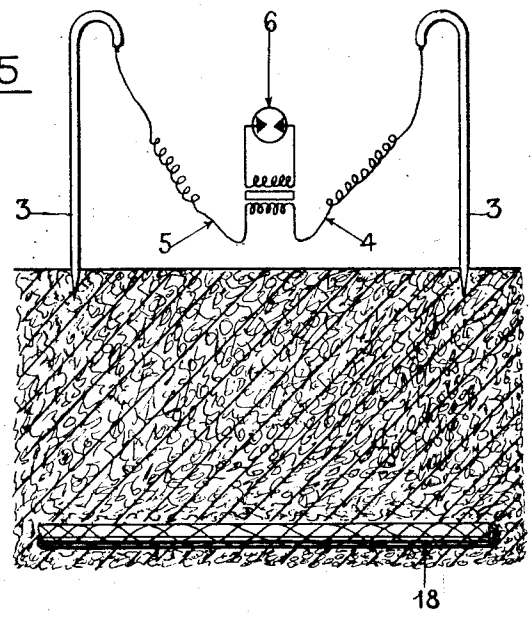
Fig. 5



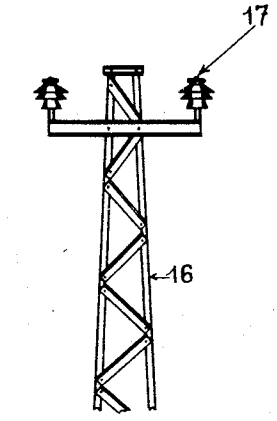
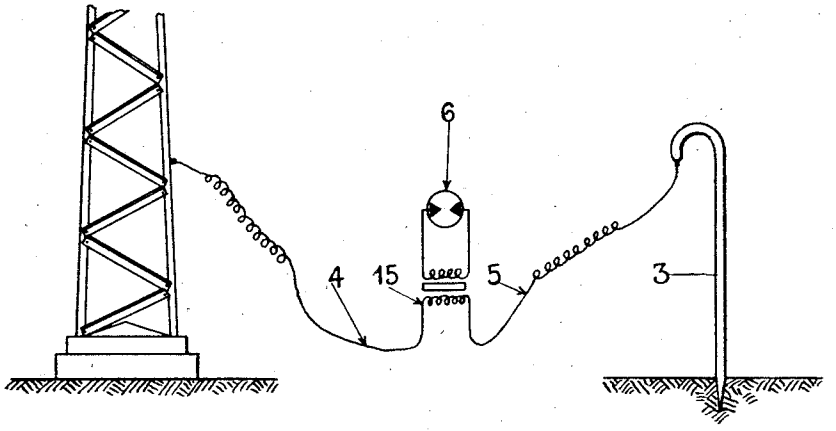


Fig. 4



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Patented June 17, 1947

2,422,644

UNITED STATES PATENT OFFICE

2,422,644

APPARATUS FOR DETECTING DEFECTS IN ELECTRICAL SYSTEMS

Louis Martenet, Neuchatel, Switzerland; vested in the Attorney General of the United States

Application June 6, 1939, Serial No. 277,649
In Switzerland June 11, 1938

Sections 3 and 14, Public Law 690, August 8, 1946.
Patent expires June 11, 1958

2 Claims. (Cl. 175—183)

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This invention relates to apparatus for detecting defects, and more particularly defects in insulation, in electrical systems and lines.

The invention and its aims and objects will be readily understood from the following description, taken in connection with the accompanying drawing of embodiments of the invention herein given for illustrative purposes, the true scope of the invention being more particularly pointed out in the appended claims.

In the drawing:

Fig. 1 shows diagrammatically one illustrative embodiment of the invention as applied more particularly to an aerial line with wooden posts;

Fig. 2 is a perspective view on an enlarged scale of a neon lamp and its casing;

Fig. 3 shows on an enlarged scale a variation in one of the elements of the apparatus;

Fig. 4 shows diagrammatically a part of an aerial line on girder poles, with an illustrative embodiment of the invention;

Fig. 5 shows an illustrative embodiment of the invention as applied to underground lines.

Referring to Fig. 1, a detector, herein a neon lamp for example, is used, only the casing 6 of said lamp being shown in this figure, a more detailed view being given in Fig. 2.

Leads 4 and 5 connect said lamp on the one hand with means for connecting said lamp with a post of said aerial line, and on the other hand with conductive means for connecting said lamp with the earth. In this illustrative embodiment of the invention the means for connecting said lamp with said post 7 illustratively consists of a device having a handle 1 of insulating material, wood for example, and a pointed metal member 2 which may be driven into said post. The means for connecting said detector with the earth herein illustratively consists of a metallic cane 3 having a pointed end for insertion into the earth. The wooden post 7 is provided with an insulator 8 carrying a line 9 to be tested for defects by the present apparatus.

In using the illustrative embodiment of the invention the metal cane 3 is inserted in the earth and the sharp member 2 is driven into the post 7. If said insulator 8 has a defect in insulation a difference in voltage will occur between the point on the post 7 with which the point 2 carried by the handle 1 is in contact, on the one

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hand, and the earth represented by the cane 3 on the other hand. The neon lamp will thus be energized and will show a light, which indicates that the insulator 8 or one of such insulators should there be several on said post has a defect of insulation.

In order that the least glow or light manifested by said lamp may be detected, said lamp will preferably be located at the bottom of said casing 6. The upper edge of said casing, shown at 11, is so shaped that it can be applied closely around the eye of the observer to exclude all light from without and the interior of said casing will preferably be painted black. Thus by applying said upper edge 11 of said casing 6 about the eye as indicated, all light from the outside is excluded and the least glow of said lamp 10 will be readily discerned in the black chamber formed by said casing 6.

In accordance with the invention means may be provided to facilitate the removal of the pointed member 2 from the post 7. In the illustrative embodiment of the invention said means conveniently comprises an arm 12 connected to the upper end of said handle 1 the free end of which is adapted to engage said post below the member 2, at 13 for example. By swinging the handle 1 in the direction of the arrow 14 (see Fig. 3) about the point 13, said member 2 will be easily extracted from the post 7.

In the case of a line carried by girder poles or other conductive poles of metal or cement the neon lamp, if used as in the case of wooden posts would only show a visible light if the current escaping to earth were quite strong. If said current should be weak it would be necessary to disconnect the earth connection of the girder pole being tested. This might be dangerous. The present invention, therefore, contemplates the provision of means for increasing the sensitiveness of said detector, herein the lamp 10 for use in the particular case referred to. Herein said means illustratively comprises a step-up transformer having a high ratio of transformation, and which is inserted in the circuit between the points of which the difference in potential is used and said detector herein said lamp 10.

This feature of the invention is illustrated in Fig. 4, the auxiliary step-up transformer being indicated at 15.

In using this embodiment of the invention as illustrated in Fig. 4 the metal cane 3 is inserted in the earth and the lead 4 is connected to the girder pole 16. If the insulator 17 on said girder pole has a defect in insulation a difference in voltage will manifest itself between the points to which said leads 4 and 5, respectively, have their free ends connected, and due to said transformer said difference in voltage will be sufficiently strong to energize the lamp 6 so that the latter will show a light if there is in fact a defect of insulation in the insulator 17.

If the magnetic circuit of the transformer 15 be made with plates of great initial permeability (such as those used in radio telephony for the transformers of the electrodynamic microphones, for example), the voltage required by said neon lamp may be reduced to a few tenths of a volt, while still maintaining in the primary winding of the transformer a sufficient impedance compared to the resistance in the earth connection made by the cane 3.

Apparatus embodying the present invention is also useful in locating defects, such as defects of insulation, in underground cables, as illustrated in Fig. 5. In this case also a cane and the device 1, 2 may be used but it is preferable to use two canes 3, as shown in Fig. 5, connected to the primary windings of the transformer 16 of the lamp 6 by the leads 4 and 5 respectively; the two canes are inserted in the ground longitudinally of the cable 18 and spaced from each other. First one and then the other cane is then moved longitudinally of the cable until the zone is found in which the lamp shows brightest.

Leads 4 and 5 will preferably be removably connected to the device 1, 2 and the cane 3, or to both canes, by plugs for example. The operator may thus carry the lamp and leads 4, 5 in his pocket and the cane and device 1, 2 in his hands.

I am aware that the present invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof,

and I therefore desire the present embodiments to be considered in all respects as illustrative and not restrictive, reference being had to the appended claims rather than to the foregoing description to indicate the scope of the invention.

I claim:

1. Apparatus for detecting defects in insulation in electric lines strung on wooden posts, comprising a neon lamp responsive to very low intensity values; means for observing the luminosity of said lamp; means for connecting the two electrodes of said lamp to two dead points, respectively, of the line to be verified, between which points a defect in insulation of the line would produce a slight difference of potential; and a resistance, formed by a part of one of the wooden posts, inserted in the measuring circuit.

2. Apparatus for detecting defects in insulation in electric lines strung on wooden posts, comprising a neon lamp responsive to very low intensity values; a pick to be inserted in a post and connected to one of the electrodes of said lamp; a cane to be inserted in the ground and connected to the other electrode of said lamp; and an eyepiece for observing the luminosity of said lamp.

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