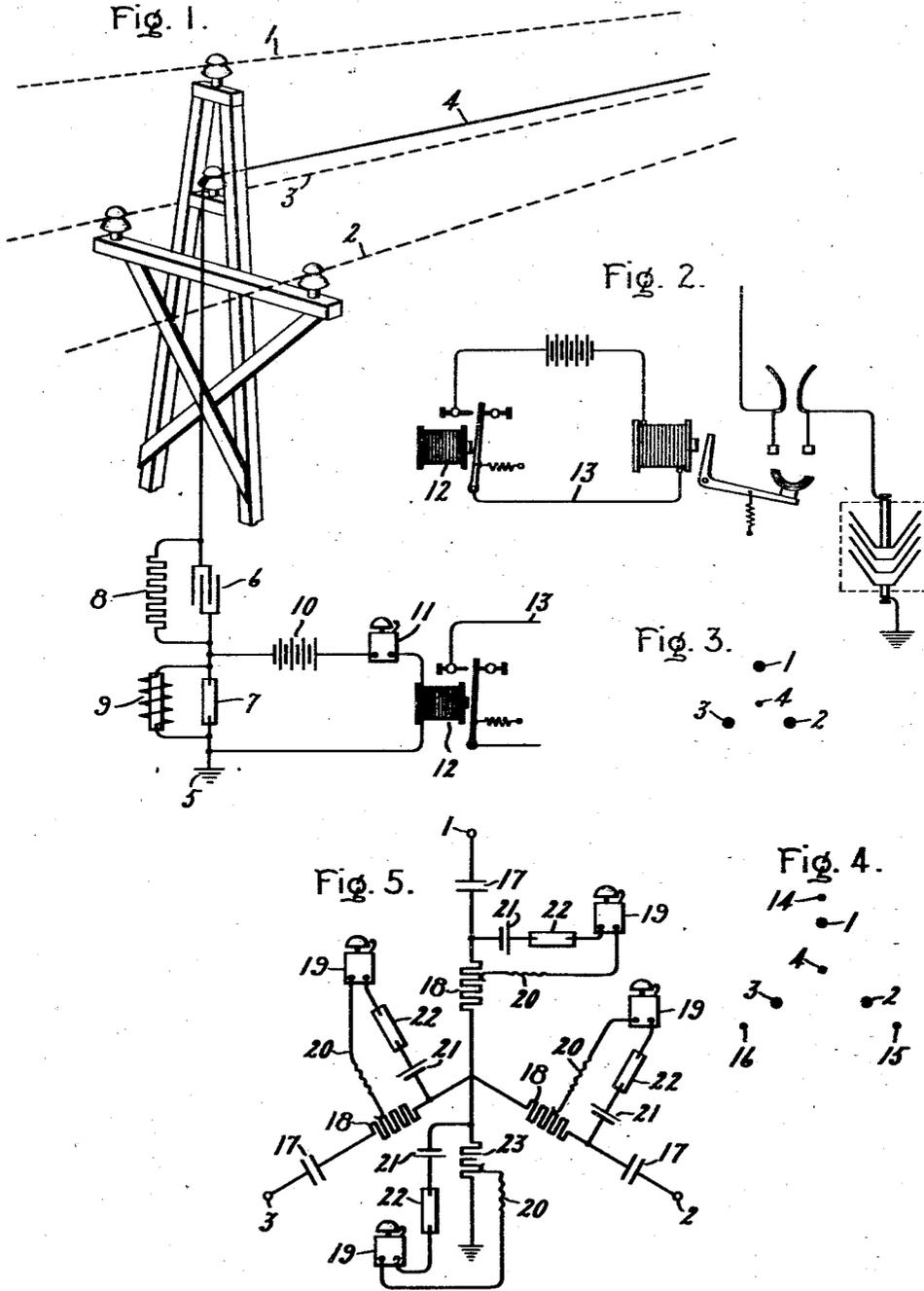


E. E. F. CREIGHTON.
STORM AND SURGE ALARM FOR TRANSMISSION LINES.
 APPLICATION FILED SEPT. 2, 1908.

1,062,083.

Patented May 20, 1913.



Witnesses:

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 Att'y.

UNITED STATES PATENT OFFICE.

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STORM AND SURGE ALARM FOR TRANSMISSION-LINES.

1,062,083.

Specification of Letters Patent.

Patented May 20, 1913.

Application filed September 2, 1908. Serial No. 451,299.

To all whom it may concern:

Be it known that I, ELMER E. F. CREIGHTON, a citizen of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Storm and Surge Alarms for Transmission-Lines, of which the following is a specification.

This invention relates to devices for protecting high tension transmission lines from the injurious effects of surges of abnormal potential, due either to lightning, short circuits, improper handling of switches, or to other causes. In case of a disturbance from any reason, it is desirable that an attendant be notified, even though the trouble may not have reached a value that will operate the lightning arresters. If the disturbance is known to exist, a search can be made to locate the defective circuit and disconnect it whenever desirable. In this way a general interruption of service can be avoided. For instance, when a thunder storm approaches a transmission line, the disturbance on the line becomes more and more severe as the storm draws nearer. If an alarm notifies the attendant that somewhere out on the line a storm is approaching he will be more actively ready to operate his switches and observe the action of the lightning arresters.

The present invention consists of an apparatus responsive to surges of high tension and operating an alarm at the station to give warning of dangerous conditions along the line. It comprises a small wire running parallel with the line and having one end grounded through a coherer which controls a local circuit containing an alarm, and, if desired, a relay for operating an electromagnetic switch in the lightning arrester circuit.

In the accompanying drawing, Figure 1 is a view partly in perspective and partly in diagram, illustrating an embodiment of my invention; Fig. 2 shows a control circuit which may be connected with the apparatus shown in Fig. 1; Fig. 3 shows the relative position of the line conductors and the alarm wire; Fig. 4 is a similar diagram showing four alarm wires; and Fig. 5 shows a modified alarm system.

The transmission line illustrated is a three-phase line, having the three conductors 1 2 3 arranged at equal distances apart. In Figs. 1 and 3 a single alarm wire 4 is

shown, located in the center of the triangle formed by the line conductors so as to be equidistant from all of them. The alarm wire runs for any desired distance and terminates at one end in mid air. The other end is led down to ground at 5, through a condenser 6 and a coherer 7, and is also permanently grounded through a high resistance path consisting of a non-inductive shunt 8 of high resistance, placed around the condenser, and a shunt 9 containing inductance and resistance and connected around the coherer. By means of this high resistance shunt path the accumulation on the alarm wire of unidirectional static charges due to wind and similar causes, is prevented. If such charges were not removed they would accumulate and strain the condenser 6, and might cause sparks which would affect the coherer and cause false indications. In another circuit in shunt to the coherer is a battery 10 and an electric alarm, such as the bell 11. If desired, a relay magnet 12 may be included in this circuit, to open and close a circuit 13 which may contain any suitable control apparatus, such as an electromagnetic switch in circuit with a gap aluminum lightning arrester, as shown in Fig. 2.

The operation is as follows: Under ordinary conditions the inductance on the alarm wire, due to line-to-line potentials, is zero. But if a surge passes along the three phases relatively to the ground, then a high frequency oscillatory current is induced in the alarm wire and easily passes through the condenser 6 to the coherer. The effect of this current upon the coherer permits the battery to ring the alarm and operate the relay. The object of shunting a reactance across the coherer is to render it insensible to generator frequency but responsive to higher frequencies. The single alarm wire shows only line-to-ground disturbances, so long as the phases are balanced, and shows the effect equally well for all three phases. When the insulation of one phase becomes defective, then it is important to locate the phase on which the trouble exists. This can be done by providing each line conductor with an individual alarm wire 14 15 16, as shown in Fig. 4, each connected with its own alarm circuit, which must be so designed as not to respond to normal potential. Instead of running one or more wires

parallel to the line conductors, the arrangement shown in Fig. 5 may be adopted, in which each line conductor is connected to a neutral point through a capacity 17 and a resistance 18. An alarm 19 is placed in a local circuit in shunt to said resistance, and a movable contact 20 enables more or less of said resistance to be shunted. A battery 21 and a coherer 22 are included in each alarm circuit. The neutral point is grounded through a resistance 23 which is shunted by an alarm circuit like those connected with the line conductors.

When a short circuit occurs between two line conductors, or between one line conductor and ground, a surge of high frequency occurs which is shunted through the alarm circuit and breaks down the coherer resistance and permits the battery to sound the alarm.

What I claim as new and desire to secure by Letters Patent of the United States, is,—

1. In a surge alarm for an electric conductor, the combination of a coherer, means connected in shunt to said coherer to render it insensible to oscillations of the normal frequency of the current in said conductor but responsive to oscillations of abnormally high frequency, means for impressing upon said coherer oscillations of a frequency dependent upon the oscillations on said conductor, and an indicating device responsive to current flow on said coherer.

2. In a surge alarm for an electric conductor, the combination of a coherer, an indicating device responsive to flow of current through said coherer, and a wire in inductive relation to said conductor and in operative relation to said coherer for impressing upon said coherer the potential induced in said wire by potential variations on said conductor.

3. In a surge alarm for transmission lines, the combination of a coherer, indicating means responsive to flow of current through said coherer, a condenser connected in se-

ries with said coherer, and an alarm wire mounted in inductive relation to said transmission line and connected to said condenser to impress upon said condenser and said coherer the potential induced in said alarm wire by variations of potential on said transmission line.

4. In a surge alarm for an electric conductor, the combination with a coherer responsive to oscillations on said conductor, indicating means responsive to flow of current through said coherer, and means for rendering said coherer insensible to oscillations of normal frequency on said conductor and responsive to oscillations of abnormally high frequency.

5. In a surge alarm for an electric conductor, the combination with a coherer, means for subjecting said coherer to oscillations dependent upon the oscillations on said conductor, an indicating device responsive to flow of current through said coherer, and an inductance in shunt to said coherer proportioned to render said coherer insensible to oscillations of the normal frequency derived from the conductor but responsive to oscillations of abnormally high frequency.

6. A storm and surge alarm for high tension transmission lines, comprising a wire parallel with a line and grounded at one end, a condenser and a coherer in series with said wire, and an alarm circuit in shunt to said coherer.

7. A storm and surge alarm for a high tension transmission line, comprising a wire arranged equidistant from the conductors of said line and grounded at one end, a condenser and a coherer in series with said wire, an inductance in shunt to said coherer, and an alarm circuit controlled by said coherer.

In witness whereof, I have hereunto set my hand this 31st day of August, 1908.

ELMER E. F. CREIGHTON.

Witnesses:

BENJAMIN B. HULL,
MARGARET E. WOOLLEY.