

E. E. F. CREIGHTON.
ELECTROLYTIC LIGHTNING ARRESTER.
APPLICATION FILED OCT. 11, 1907. RENEWED OCT. 5, 1910.

993,961.

Patented May 30, 1911.

Fig. 1.

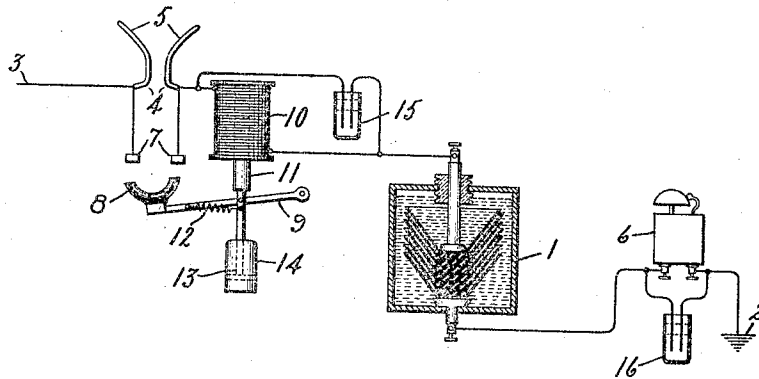
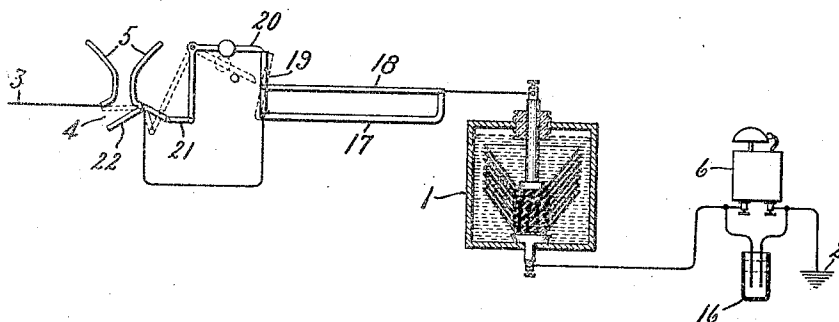


Fig. 2.



Witnesses:

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UNITED STATES PATENT OFFICE.

ELMER E. F. CREIGHTON, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

ELECTROLYTIC LIGHTNING-ARRESTER.

993,961.

Specification of Letters Patent. Patented May 30, 1911.

Application filed October 11, 1907, Serial No. 396,910. Renewed October 5, 1910. Serial No. 585,516.

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 Electrolytic Lightning-Arresters, of which the following is a specification.

This invention relates to devices for protecting high tension transmission lines from the destructive effects of abnormally high potential, especially that due to lightning. On a transmission line the lightning disturbances may be divided into two classes according to the duration of the disturbance *i. e.*, whether brief or sustained. They may be termed respectively transitory lightning and continuous lightning. A lightning arrester of the aluminum type wears out if subjected to a continuous flow of current, so that from the standpoint of economy it is advisable to place an aluminum arrester in a circuit containing a normally open spark gap. Under these conditions, if a lightning discharge is transitory it will spark across the gap, and if the gap is provided with arc-extinguishing horns, the dynamic arc following the lightning will rise thereon, break and open the circuit. But if the lightning is continuous the arc will be continually re-established as rapidly as it is extinguished. Inasmuch as the continual play of arcs up the horns is in many cases objectionable, it is desirable to provide means for closing the gap during such time as the continuous lightning is on the line.

The object of my invention is to provide a discharge path in which a current limiting device, such as an aluminum cell lightning arrester, has a spark-gap in series with it, and some current responsive means, such as a time limit switch, which closes said gap when the lightning is continuous. The time element may be secured by any suitable device, such for example, as a dash-pot or a thermostat, but in any event it is designed to be unaffected by a transitory discharge across the gap. In other words, it must not close the switch during the time that the first one or two arcs are traveling to the tips of the horns. If, however, several discharges follow in quick succession, the switch will close, and at the same time sound an alarm to notify the attendant.

In the accompanying drawing, Figure 1 is

a diagrammatic representation of my invention, the time element being a dash-pot; and Fig. 2 shows another embodiment in which the time element is thermostatic.

In both figures an aluminum cell lightning arrester 1 is connected to ground at 2 and to line at 3 through a normally open spark gap 4 provided with arc-extinguishing horns 5. An electric alarm bell 6 is also included in the circuit. The aluminum cell arrester is the same as that disclosed in Patent No. 923,024, granted to me, May 25, 1909, and need not be described in detail.

The spark gap is provided with a time limit switch for closing it when the lightning becomes continuous. In Fig. 1 two contacts 7 are arranged in a shunt around the gap, and a bridging contact 8 is mounted on a lever 9. An electromagnet or solenoid 10 is placed in circuit with the aluminum cell, and its armature or movable core 11 is connected with said lever 9, preferably by means of a spring 12 at a point adapted to pass the fulcrum of the lever when the core is attracted by the coil 10. The core carries a piston 13 working in a dash-pot 14.

Inasmuch as the solenoid 10 and the magnet coils in the bell 6 introduce considerable inductance into the circuit which interferes with the free discharge of small static charges, an aluminum cell 15 is shunted around the electromagnet 10 and a second aluminum cell 16 is placed in shunt to the bell. These permit the high frequency static charges to pass freely to ground. Moreover, when the coil 10 becomes energized by the dynamic current following a lightning discharge it tends to move the core, and if the discharge is continuous for several seconds, the retardation of the dash-pot will finally be overcome. The instant the spring is carried past the fulcrum of the lever, the latter will be suddenly moved and the contact 8 will close the shunt around the gap. This stops the procession of arcs up the horns, and the discharge takes place through a closed circuit. The ringing of the alarm bell notifies the station attendant that there is a defective circuit which requires his attention. The aluminum cell arrester is designed to carry the current for such length of time as may be necessary for the attendant to locate and remedy the trouble; after which he can open the switch by hand.

In Fig. 2, the circuit includes two rods or

bars 17 18 of different materials having different coefficients of heat expansion. Thus the rod 17 may be of brass and the rod 18 of iron, or even of some non-conducting material like wood. The rods are pivoted together at one end, and their other ends are pivotally attached to a latch 19, at different points thereon. The latch upholds one end of a weighted lever 20 whose other arm is connected, as by the link 21, with a pivoted switch 22, adapted to close the spark gap when the lever 20 falls.

The passage of current for a given interval of time through the rod 17 will heat and expand it lengthwise sufficiently to push the latch out from under the lever 20 and let it drop, as shown in dotted lines, thereby closing the switch and ringing the alarm 6; which in this case, also, may have the aluminum cell shunt 16.

In accordance with the provisions of the patent statutes, I have described the principle of operation of my invention together with the apparatus which I now consider to represent the best embodiment thereof; but I desire to have it understood that the apparatus shown is only illustrative, and that the invention can be carried out by other means.

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

1. The combination with an aluminum cell lightning arrester, of a series spark gap, and means for closing said gap responsive only to a continuous discharge of current.

2. The combination with an aluminum cell lightning arrester, of a series spark gap, and a device for closing said gap comprising a time-limiting element.

3. The combination with an aluminum cell lightning arrester, of a series spark gap, a switch for closing said gap, and a device for operating said switch comprising time element means responsive only to a continuous discharge of current.

4. The combination with an aluminum cell lightning arrester, of a series spark-gap provided with a horn arc-extinguisher, a switch for closing said gap, and means for closing said switch only after the passage of current across said gap for several seconds.

5. The combination with an aluminum cell lightning arrester, of an alarm device in circuit therewith, a spark-gap, and means for closing said spark gap in case the lightning is continuous.

6. The combination with an electric emergency discharge device, of an alarm device in circuit therewith and an aluminum condenser cell in shunt with said alarm device.

7. A discharge path for abnormal potential comprising a current limiting device, a spark gap in series with said device, and automatic means for bridging said gap responsive only to sustained discharge through said path.

8. A discharge path for abnormal potential comprising a current limiting device, an indicator which obstructs a free discharge through said path and an electrolytic condenser connected in shunt to said indicator.

In witness whereof, I have hereunto set my hand this 10th day of October, 1907.

ELMER E. F. CREIGHTON.

Witnesses:

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MARGARET E. WOOLLEY.