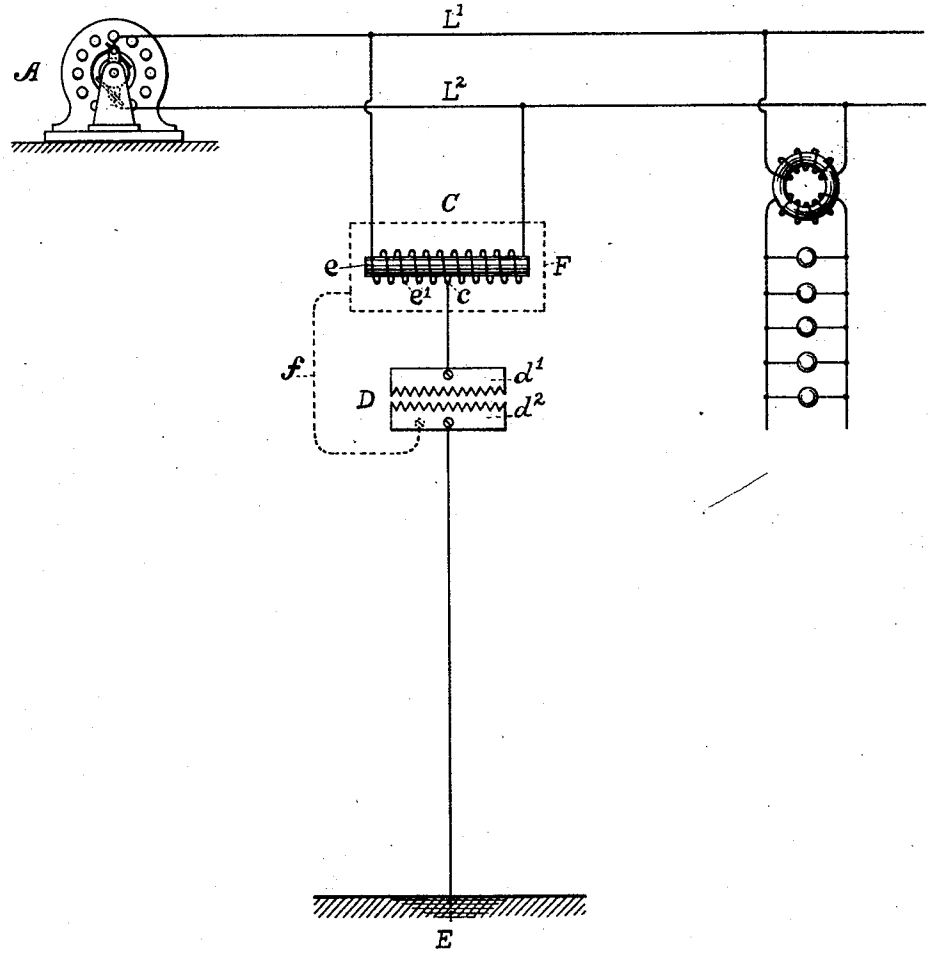
(No Model.)

C. I. YOUNG.

LIGHTNING ARRESTER.

No. 414,624. Patented Nov. 5, 1889.



Witnesses
George Brown Jr.
J. H. Smith.

Charles Ira Young Inventor
By his Attorney
Charles A. Terry.

N. PETERS. Photo-Lithographer. Washington, D. C.

UNITED STATES PATENT OFFICE.

CHARLES IRA YOUNG, OF PRINCETON, NEW JERSEY, ASSIGNOR TO THE WESTINGHOUSE ELECTRIC COMPANY, OF PITTSBURG, PENNSYLVANIA.

LIGHTNING-ARRESTER.

SPECIFICATION forming part of Letters Patent No. 414,624, dated November 5, 1889.

Application filed September 2, 1889. Serial No. 322,727. (No model.)

To all whom it may concern:

Be it known that I, CHARLES IRA YOUNG, a citizen of the United States, residing in Princeton, county of Mercer, and State of New Jersey, have invented a certain new and useful Improvement in Lightning-Arresters, (Case No. 339,) of which the following is a specification.

The invention relates to the construction of devices employed for protecting electric circuits and apparatus from injury by reason of lightning discharges and the generated currents of high potential, which tend to follow through the paths established by lightning discharge.

It is well known that when a discharge is caused to traverse a lightning-arrester of the usual construction the generated current is liable to follow in the path or across the arc established by the lightning discharge.

The object of the present invention is to especially provide a short path for the high potential of a lightning discharge to the earth, and also means for opposing a continuous flow of the current through the lightning-arrester after the discharge has taken place.

The invention consists, in general terms, in interposing in the earth's circuit, through which it is intended that the lightning discharge shall take place, a device for producing a counter electro-motive force under the influence of alternating currents tending to flow through this circuit from the generator to the earth.

A convenient way of carrying the invention into practice is to connect between the two sides of a circuit a reactive coil of such capacity that under the influence of the normal difference of potential it will develop a counter electro-motive force approximately equal to the applied electro-motive force, and to connect the central point of the conductor of this coil with the earth through a lightning-arrester of the usual construction. If, now, lightning should strike either of the main-line conductors, it would find a path to the earth through one-half of the reactive coil and the lightning-arrester. The tendency of the generated alternating current to flow through the lightning-arrester after the arc has been established by the lightning discharge will be opposed by the counter electro-motive force developed in the portion of the reactive coil between that side of the main line and the earth, and this, (the counter electro-motive force,) added to the resistance opposed by the arc at the lightning-arrester, will be sufficient to greatly reduce or interrupt the flow of current.

It is sometimes desirable to provide against an undue difference of potential between the coils of a converter or of a reactive device of the character described and the box or case in which it is usually contained. For this reason the box may be connected by a conductor with the plate of the arrester which is connected with the earth. Any undue difference of potential existing between the two will find opportunity for neutralizing itself through the lightning-arrester without injury to the reactive coil or converter.

In the accompanying drawing there is shown in diagram an organization of circuits and apparatus for carrying out the invention.

Referring to the figure, A represents a generator of alternating electric currents of any suitable character. From this generator main lines L' L^2 are derived.

A lightning-arrester is illustrated at D. This consists of two discharge-plates d' d^2, of the usual character, having their faces presented to each other, one plate d^2 being connected with the earth at E, while the other plate d' is connected with the central point c of a reactive coil or self-induction device C. This coil is provided with a core e, surrounded by the coil e'. The respective terminals of the coil e' are connected with the respective main lines L' L^2 at any desired points. The coil is so constructed with reference to the mass of its core and the amount of wire wound thereon that the counter electro-motive force developed therein under the influence of the difference of potential normally existing between the lines L' and L^2 will permit practically no current to flow through the coil. If, however, the lightning should strike either or both lines L' L^2, it will find a path to the earth through one-half or both sides of the reactive coil and the lightning-discharge device D, the lightning form-

ing an arc from one plate to the other of the discharge device. A path will be established for the generated current to flow through the discharge device to the earth. The alternating current, however, will immediately develop in the reactive coil a counter electro-motive force sufficient to cut down the strength of the current flowing, and thus reduce the difference of potential between the plates of the discharge device and then interrupt the arc.

It is customary to run both the outgoing and return conductors of a circuit at no great distance from each other. Therefore the lightning is exceedingly liable to strike both conductors at the same time. In this event the lightning may escape to the earth through both sides of the reactive device, and thus its inductive resistance will be reduced to approximately nothing.

For the purpose of protecting the reactive device from accident by reason of a discharge from the coils e' to the box F, in which the coil may be contained, a conductor f may be employed to connect the box with the plate d^2, so that a high difference of potential may be neutralized through the lightning-arrester interposed between the coils and the box.

I claim as my invention—

1. The combination, with a source of alternating electric currents and conductors leading therefrom, of a reactive coil connected between said conductors, and a lightning-arrester connected between the earth and an intermediate point in the length of the conductor of the reactive coil.

2. The combination, with a source of alternating electric currents and its circuit, of a reactive coil connected across said circuit, and a lightning-discharge device consisting of two confronting plates, one of which is connected with the earth and the other with the main-line conductor through portions of said coil.

3. The combination, with a source of alternating electric currents and its circuit, of a reactive coil connected across said circuit, and a lightning-discharge device consisting of two confronting plates, one of which is connected with the earth and the other with the main-line conductor through portions of said coil, and a metallic case containing the reactive coil electrically connected with the discharge-plate which is connected with the earth.

4. The combination, with an alternating-current circuit, of a core of soft iron, and a coil or conductor surrounding the same connected in said circuit, a box for containing the same, a conductor connected with said coil at an intermediate point, and a lightning-discharge device connected between said conductor and said box.

5. The hereinbefore-described method of protecting electric circuits, which consists in normally developing between the two sides thereof a counter electro-motive force of sufficient value to practically obstruct the flow of current of normal electro-motive force from one side of the circuit to the other and in causing an abnormal electro-motive force of a given character when present on both sides of the circuit, at the same time to tend to develop equal and opposing counter electro-motive forces between the two sides of the circuit, which tend to neutralize each other and allow the current developing such opposing electro-motive forces to escape to the earth.

In testimony whereof I have hereunto subscribed my name this 5th day of August, A. D. 1889.

CHAS. IRA YOUNG.

Witnesses:
CHARLES AUGUSTUS YOUNG,
EDWIN C. OSBORN.