

(No Model.)

C. F. SCOTT & A. WURTS.
LIGHTNING ARRESTER.

No. 470,013.

Patented Mar. 1, 1892.

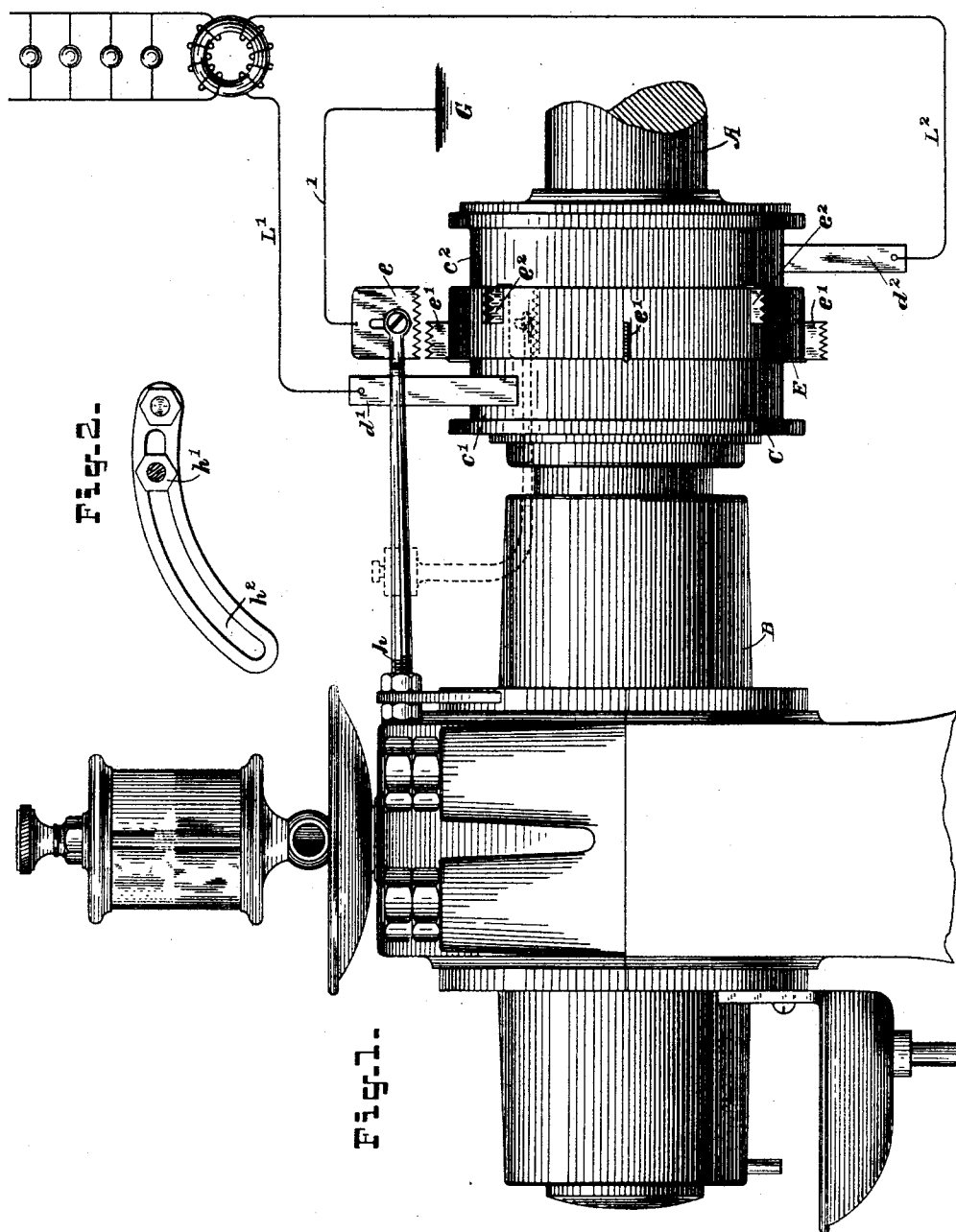


Fig. 2--

Fig. 1--

WITNESSES:

James W. Smith.
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Alexander Wurts,
by
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UNITED STATES PATENT OFFICE.

CHARLES F. SCOTT AND ALEXANDER WURTS, OF PITTSBURG, PENNSYLVANIA,
ASSIGNORS TO THE WESTINGHOUSE ELECTRIC AND MANUFACTURING
COMPANY, OF SAME PLACE.

LIGHTNING-ARRESTER.

SPECIFICATION forming part of Letters Patent No. 470,013, dated March 1, 1892.

Application filed July 17, 1891. Serial No. 399,875. (No model.)

To all whom it may concern:

Be it known that we, CHARLES F. SCOTT and ALEXANDER WURTS, citizens of the United States, residing in Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Lightning-Arresters, (Case No. 466,) of which the following is a specification.

The invention relates to the class of apparatus employed for protecting electric circuits and machines from injury by reason of the disruptive electrical discharges which are especially liable to occur during the presence of thunder-storms.

Heretofore apparatus of various forms have been employed for relieving the lines comprised in an electric circuit from static charges when such charges become exceedingly great—that is to say, when the difference of potential between the lines and the earth becomes excessive. This is usually accomplished by providing an earth or ground circuit for such discharges, in which circuit there is interposed an air gap or space across which the disruptive discharges take place. The length of the air-gap must, however, be such that the normal electric currents used upon the circuit shall not be of sufficient potential to overcome the resistance of the air; otherwise these might themselves strike an arc and thus pass to the earth and short-circuit the generator. On the other hand, the distance must not be so great as to cause the discharges to take place through the insulation of the armature of the machine or through some other portion of the circuit, rather than across the air-gap. In other words, the resistance offered by the air-gap must not be greater than the resistance offered by the insulation of the circuit. It is practicable to increase the air-gap by at the same increasing the insulation of the entire system within certain limits; but it is evident that these limits in this direction are soon reached. Various devices are also employed for destroying the arc formed across the air-gap by the arc, so as to prevent the generated current from following through the circuit thus momentarily established. The object of our invention is to provide means

for effecting the equalization of the potential of the circuit with that of the earth continuously and without the occurrences of heavy discharges and also without increasing the risk of short-circuiting the machines.

In an application filed by one of us (Alexander Wurts) on the 6th day of July, 1891, Serial No. 398,503, there is described a method of drawing off the static charge of a circuit at rapidly-recurring intervals, thus preventing an accumulation of any undue amount and keeping the circuit in an approximately neutral condition with reference to the earth. The present invention relates to the same general method and involves certain details in the construction of the apparatus and the means for carrying the method into operation.

The present invention consists in placing a discharge-plate in connection with one side of an electric circuit and a second plate in connection with the earth and in rapidly moving one of the plates toward and from the other, so that the discharges may take place from that side of the circuit at frequent intervals. The other side of the circuit is similarly organized; but the approach and separation of the plates of the two sides do not occur at the same time. The two sides of the circuit are thus alternately discharged, and a temporary arc formed from one side to the earth would not result in a short-circuiting of the machine.

A convenient plan for carrying out the invention is to mount upon the armature-shaft of the generator one or more discharge plates or combs, which may be connected with the earth or with the line, and in placing one or more corresponding plates or combs connected with the line or the earth, as required, in such position with reference to the armature-shaft that those mounted on the latter will be alternately brought by the revolution of the shaft into proximity to the stationary plates, thus allowing the discharges to take place from the different sides of the circuits at rapidly-recurring intervals. As already stated, it is desirable that the discharge should be allowed from only one side of a circuit at a time, so that the danger of short-circuiting the machine is lessened.

In the accompanying drawings, Figure 1 is a side view of a portion of a machine equipped with the discharging apparatus and showing circuits in diagram. Fig. 2 is a detail.

Referring to the figures, A represents the armature-shaft of an electric generator of any suitable character. It is mounted in suitable bearings B. A commutator or collector C is mounted upon the armature-shaft. The collector shown in the drawings comprises two insulated rings c' c^2 , separated by an insulating-ring E. The collector-brushes d' d^2 are respectively connected with the main lines L' L^2 . At suitable places—as, for instance, upon the ring E—there are mounted two sets of serrated plates or combs e' e^2 , each set being designed to constitute one side of a lightning arrester or discharge device, the other side of which consists of one or more plates e , connected with the earth at G through a conductor h . The plates e' are placed in connection with the collecting-ring c' and the plates e^2 with the ring c^2 , and they alternate in position around the armature-shaft. The plate e is placed in such position that the rotation of the armature-shaft will cause the plates e' e^2 to be alternately brought into proximity with the stationary ground-plate in rapid succession. The nearness with which the plates are allowed to approach is governed in any instance by the insulation of the system or the electro-motive force which it is designed to normally employ upon the system, or by the amount of static charge which it is deemed permissible to allow to accumulate on the circuit before discharging.

It will be understood that as any given plate e' or e^2 is, by the revolution of the armature, brought opposite the plate e a discharge may take place from the corresponding line L' or L^2 through the corresponding brush and collector-ring and thence to earth across the intervening space. The positions of the plates are such with reference to each other as to permit the revolving plates to come opposite the earth-plate in alternation. The position of the plate e may be made adjustable toward and from the center of revolution of the plates e' e^2 in any suitable manner—as, for instance, by a screw h —and its circumferential position may be adjusted by a screw h' , passing through a slot h^2 , Fig. 2, in its support, or in any other suitable manner. Additional ground-plates e may be employed, as indicated by dotted lines, if desired.

It is evident that various different forms of devices and arrangements of apparatus may be employed for carrying out this invention; but that already described will serve to clearly disclose the invention.

It is evident that the revolving or moving serrated combs or discharge-plates may be carried upon some other piece of apparatus than the armature-shaft and not connected directly with the collecting-plates or commutator-rings.

We claim as our invention—

1. The combination, with an electric circuit, of one or more discharge-plates connected with the conductors of said circuit and one or more movable discharge-plates brought into proximity with the first-named plate or plates in rapidly-recurring succession, substantially as described.

2. The combination, with an electric circuit, of a discharge-plate connected with one side of said circuit and a second discharge-plate connected with the earth and apparatus bringing said plates into proximity at rapidly-recurring intervals.

3. The combination, with an electric machine having a revolving armature, of a discharge-plate carried upon or moving with the shaft of said machine and a second discharge-plate placed near the path of the first-named discharge-plate, substantially as described.

4. The combination, with an electric machine having a revolving armature, of a discharge-plate carried upon or moving with the shaft of said machine, a second discharge-plate placed near the path of the first-named discharge-plate, a connection from one of the plates with the earth, and a connection from the other plate with one terminal of the machine.

5. The combination, with an electric machine having a revolving armature, of one or more discharge-plates carried upon or moving with the shaft of said machine, a discharge-plate placed near the path of the first-named discharge-plates, a connection from the last-named plate with the earth, and a connection from the first plate with one terminal of the machine, said plates being adjustable with reference to each other.

6. The combination, with a dynamo-electric generator, of one or more grounded discharge-plates, discharge-plates carried upon the shaft of the generator and revolving therewith and brought into proximity with the first-named plates by the revolution of the armature-shaft, and connections from said second plates with the respective terminals of the machine, substantially as described.

7. The combination, with the plates of a commutator or collector, of two discharge-plates or series thereof carried by the armature-shaft, said plates or series of plates being respectively connected with the respective commutator or collector plates, and one or more corresponding discharge-plates placed in proximity to the path of revolution of the first-named discharge-plates and electrically connected with the earth.

In testimony whereof we have hereunto subscribed our names this 14th day of July, A. D. 1891.

CHAS. F. SCOTT.
ALEXANDER WURTS.

Witnesses:

F. E. J. LITOT,
J. W. SMITH.