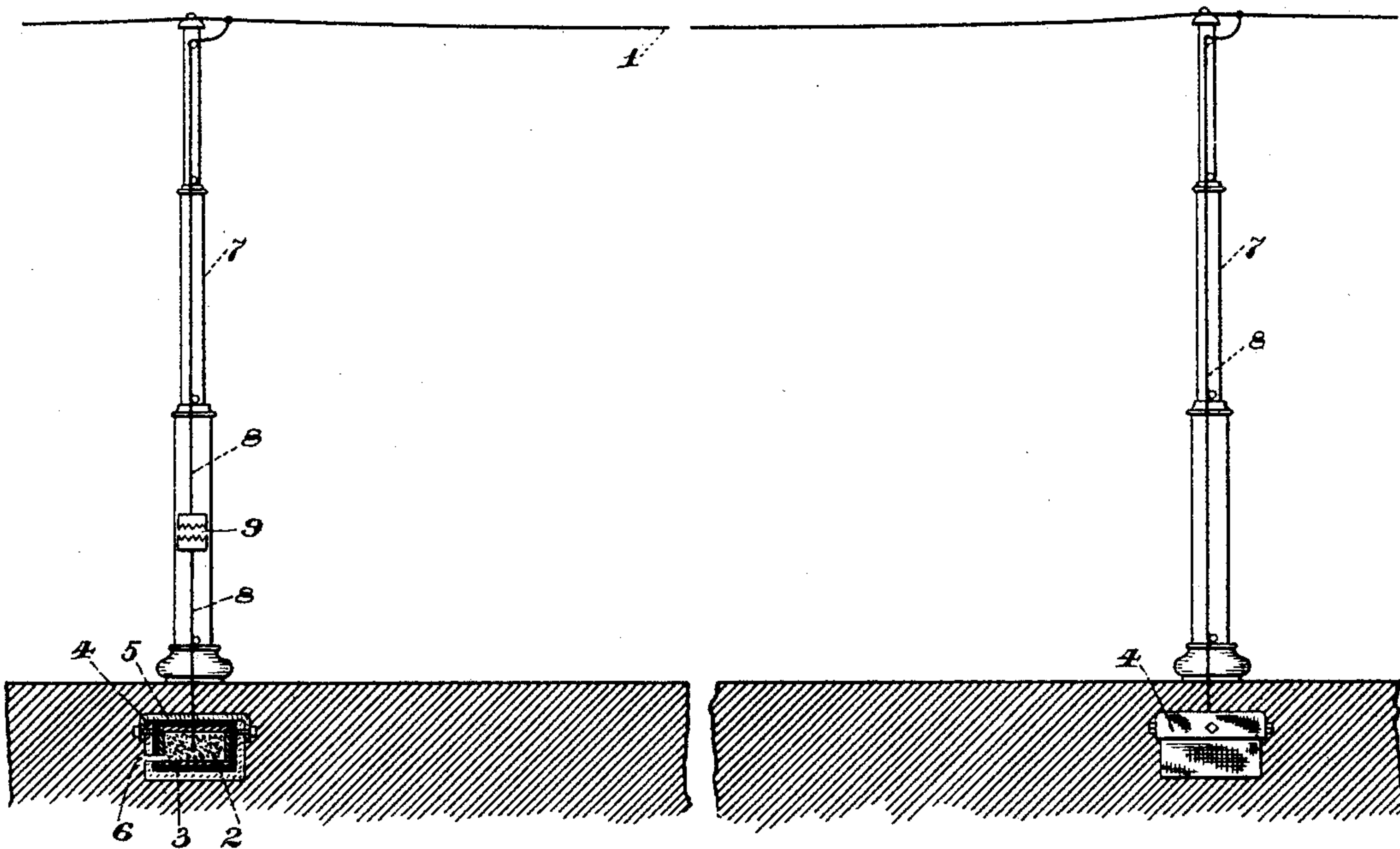


(No Model.)

A. WURTS.
LIGHTNING ARRESTER.

No. 497,507.

Patented May 16, 1893.



WITNESSES:

George Brown Jr.
H. C. Tener

INVENTOR

Alexander Wurts
BY *Ferry & Mackaye*
ATTORNEYS

UNITED STATES PATENT OFFICE.

ALEXANDER WURTS, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR TO THE WESTINGHOUSE ELECTRIC AND MANUFACTURING COMPANY, OF SAME PLACE.

LIGHTNING-ARRESTER.

SPECIFICATION forming part of Letters Patent No. 497,507, dated May 16, 1893.

Application filed December 22, 1892. Serial No. 456,074. (No model.)

To all whom it may concern:

Be it known that I, ALEXANDER WURTS, a citizen of the United States, residing at Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented a new and useful
5 Improvements in Lightning-Arresters, (Case No. 532, A,) of which the following is a specification.

My invention has relation to improved
10 means whereby dynamos, electric motors and other apparatus may be protected from the destructive effects of lightning.

In general, lightning arresters consist essentially in safe means whereby the electric
15 charge may find its way to earth, supplemented by means for interrupting the dynamo current which tends to follow the discharge. Hitherto the usual form of the discharging device has been a pair of terminals connected
20 to the line and to earth respectively separated by an air-gap and presenting confronting serrations to facilitate static discharge. It has been found in practice that in such devices there is no sooner a discharge between
25 the points across the intervening air-gap, than an arc is formed and a path is provided between the line and ground, whereby the generator is put on short circuit with great danger of destruction of the armature. In order
30 to prevent the establishment of permanence of such an arc, various auxiliary devices have been invented which cause more or less complexity and expense.

It is my object to secure the complete avoidance of short-circuit by means involving no
35 complex apparatus or moving parts, and not permitting even a temporary dynamo current.

My invention is illustrated in the accompanying drawing which shows two forms of my
40 invention as applied at intervals to a suspended wire, for instance, the trolley wire of an electric railway.

I have found that in the ordinary air-gap arrester, the pointed member on the ground
45 side, instead of being grounded may be connected electrically with an artificial ground of large surface. If this artificial ground be connected with the earth by a leak capable of allowing comparatively slow discharge of

static electricity while otherwise insulated 50 from the earth, all destructive effects of lightning upon the generator may be prevented.

I shall use the term "insulated" in my claims as meaning insulated with regard to
55 currents of such potentials as are produced by dynamos, but uninsulated with regard to the currents of vastly greater potential present in atmospheric discharges.

In the drawing, the line to be protected is shown at 1, and the artificial ground is shown
60 at 2. This latter is composed of a mass of preferably conducting material, having a large surface in proportion to its mass, such, for instance, as metal scraps or filings. By this means I accomplish safe and quiet removal
65 of all static charge from the line without permitting the same to reach such a potential as to cause disruptive discharge. This is accomplished without any loss of current generated by the dynamo. The principle of my
70 invention is, therefore, the diminution of static potential, by the provision of such a considerable capacity in a mass or masses connected to the line as to greatly lessen the effect of any sudden static charge which may
75 occur on the line through any cause. These filings are insulated from the earth by means not prohibiting the pass of static charge, but possessing a sufficiently high insulating power to prevent passage of the dynamo current. 80
In other words this artificial ground is insulated from the earth in the sense of the term above explained. A preferred form of such insulation is provided in a box 3 of wood or
85 other non-conducting material, which may be protected from moisture by a metal inclosing box 4. As a further protection, a coating of rubber or other moisture excluding material
5, may be introduced between the inner and
90 outer boxes. Where highly insulating material is employed, it will be necessary to provide a special leak of high resistance as at 6. These artificial grounds may be situated at any convenient point or points; but in the drawing I have shown them placed along the
95 line at intervals, and as shown at the foot of the supporting poles 7.

It is one of the advantages of my arrester

that in view of its cheapness large numbers may be used at close intervals on a given line, thus preventing any but the very smallest accumulation of static charge thereon, and producing by these means the maximum of safety.

Preferably supported on the poles 7, is the connecting wire 8, divided into two parts by the air-gap 9, which should be made very small in practice, to permit discharge of the line before very high charges are permitted to collect thereon. There is no danger in this course in the case of my invention, as the dynamo current has no tendency to leap this gap. The lower section of the wire 8 is in electrical connection with the ground 2 as shown.

As above stated, the air-gap 9 may be very small indeed, and it may even be dispensed with altogether as in the form shown on the right hand side of the accompanying drawings. I desire it to be understood that my invention covers this simple connection with an artificial ground whether there is an air-gap or not.

The mode of operation of my lightning arrester is as follows:—When a sufficient difference of static potential is developed by atmospheric induction between the line 1 and the artificial ground 2, a disruptive discharge will take place across the air gap and cause an accumulation of electricity on the metal filings or other large surface. This charge will almost immediately leak away from the containing box to earth, leaving the artificial ground ready for a new discharge. This form of arrester when supplied with a special leak 6 may be constructed with said leak in any position whereby it may serve to permit slow escape of the accumulated electricity to the ground. For instance, any high resistance connection may be established between the lower plate of the spark gap and the ground in the form shown at the left of the figure or

between the line itself and the ground at the point shown at the right of the figure. Or if desired such high resistance connection may be made between the two plates of the spark gap so that the charge accumulating on the artificial ground may escape through the line and generators or translating devices.

I have found this form of arrester particularly adapted to direct current systems.

What I claim is—

1. As a means for protecting electric lines from disruptive discharges, an artificial ground insulated from the earth and an electric connection between said ground and the line.

2. As a means for protecting electric lines from disruptive discharges, an artificial ground insulated from the earth and a connection between said ground and the line through a conductor and air gap, substantially as described.

3. As a means for protecting electric lines from disruptive discharges, a mass of uninsulated comminuted metal and means for making good electric connection between the mass of such metal and the line.

4. As a means for protecting electric lines from disruptive discharges, a mass of comminuted metal, an insulating box containing the same, and a connection between said mass and the line, substantially as described.

5. As a means for protecting electric lines from disruptive discharges, a mass of comminuted metal, an insulating box containing the same, and a connection consisting of a wire and an air gap between said mass and the line, substantially as described.

In testimony whereof I have hereunto subscribed my name this 20th day of December, A. D. 1892.

ALEXANDER WURTS.

Witnesses:

JAMES W. SMITH,
HAROLD S. MACKAYE.