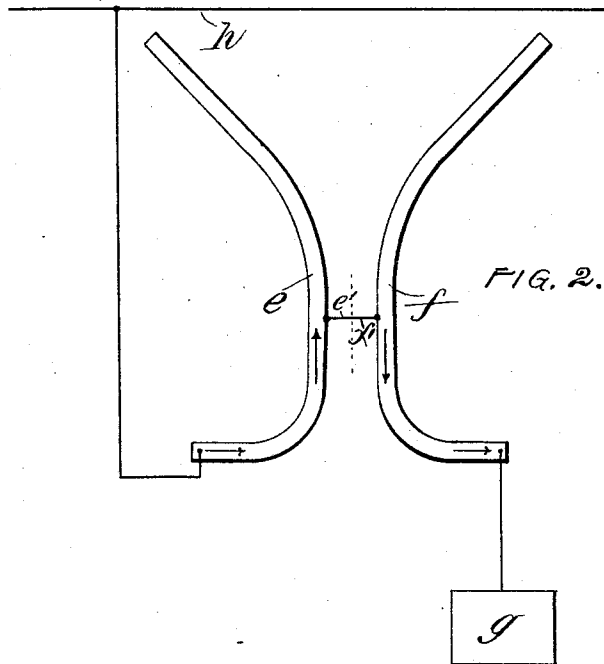
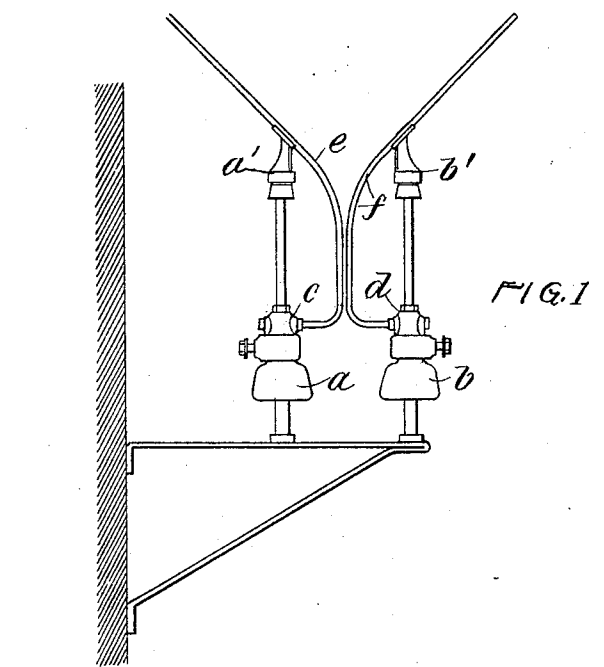


(No Model.)

E. G. P. OELSCHLÄGER & K. O. F. SCHROTTKE.
LIGHTNING ARRESTER.

No. 566,011.

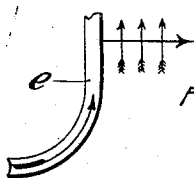
Patented Aug. 18, 1896.



Witnesses:

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FIG. 3

By *Barton Brown*
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UNITED STATES PATENT OFFICE.

ERNST GUSTAV PAUL OELSCHLÄGER, OF CHARLOTTENBURG, AND KARL OTTO FRANZ SCHROTTKE, OF BERLIN, GERMANY, ASSIGNORS TO THE SIEMENS & HALSKE ELECTRIC COMPANY OF AMERICA.

LIGHTNING-ARRESTER.

SPECIFICATION forming part of Letters Patent No. 566,011, dated August 18, 1896.

Application filed April 17, 1896. Serial No. 587,954. (No model.) Patented in Italy March 4, 1896, No. 40,698.

To all whom it may concern:

Be it known that we, ERNST GUSTAV PAUL OELSCHLÄGER, residing at Charlottenburg, and KARL OTTO FRANZ SCHROTTKE, residing at Berlin, Prussia, Germany, subjects of the Emperor of Germany, have invented certain new and useful Improvements in Lightning-Arresters; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

For this invention Letters Patent have been granted in Italy, No. 40,698, dated March 4, 1896.

Our invention relates to a lightning-arrester for electrical circuits.

The object of our invention is to provide effective means for protecting conductors of electricity, especially those carrying heavy currents, from the effects of electrical disturbances.

The device of our present invention consists of two stationary uprights, substantially parallel and within arcing distance for a portion of their length, having their upper ends widely diverging and their lower ends, which are insulated one from another, connected, respectively, with the circuit to be protected and ground.

We will explain our invention more particularly by reference to the accompanying drawings, in which—

Figure 1 is a front elevation of the device. Fig. 2 is a diagrammatic view of the same with the connections indicated therein. Fig. 3 is a view in detail illustrating the upward movement of the arc.

Like letters refer to like parts throughout the several figures.

Secured to the insulators *ab* are the metallic caps *c d*, which support the lower ends of the metallic uprights *e f*, and are adapted to be connected, respectively, with the conductor *h* of the circuit to be protected and ground *g*. Within these caps the uprights are horizontally adjustable in the same plane, whereby the distance between them may be varied according to the voltage of the circuit which

the arrester is designed to protect. For a portion of their length the uprights are maintained substantially parallel and within a few millimeters of one another, but their ends are widely divergent, the upper portions being supported by additional insulators *a' b'*. The uprights are identical in form and construction, and are preferably made of copper wire or rods of round or square cross-section.

When the device is connected for the protection of a circuit, a discharge of lightning will arc across the narrow space separating the uprights and be conducted to ground. Should the arc persist, it will quickly travel upward between the diverging uprights *e f* until lengthened sufficiently to destroy it. This extinguishment of the arc is the result of thermal and electrodynamic actions. When the arc is established, as at *e' f'*, the surrounding air is rapidly heated, causing an upward current of air at that point, which tends to carry the arc with it. In addition to this cause it is well known that conductors under the influence of an electric current tend to arrange themselves in parallel positions. The arc *e' f'* being practically at right angles with the uprights, the portion *e'* tends to assume the position of the upright *e* and coacts with the upward current of air in lifting the arc, as indicated by the arrows in Fig. 3. Similarly the portion *f'* tends to assume the position of upright *f*. Thus any arc which may be formed between the uprights is quickly raised to the divergent portions of the said uprights and thereby becomes self-extinguishing, both the above-mentioned causes, the thermodynamic and the electrodynamic, coacting to drive the arc upward and extinguish it.

It is evident that the maximum effect is secured when the thermodynamic influence acts with the electrodynamic to drive the arc upward. This, however, can only be accomplished when the uprights are electrically connected with the circuit and ground, so that the arc is the uppermost part of the path of the current which is flowing. The connections should therefore be made at the lower ends of the uprights, for, if the connec-

tion be made above the arc, the electrodynamic force would act in opposition to the thermodynamic force.

The lightning-arrester above described has been found to be particularly efficient and certain in its action when connected for the protection of circuits of high voltage. Its parts are stationary. Hence there is absolutely no liability of the device to get out of order. It is easily adapted for out-of-door service merely by protecting the device with a hood, and, when once put into position, it requires absolutely no attention.

We are aware that lightning-arresters have heretofore been constructed with flat diverging discharge-terminals, between which the arc is adapted to be formed, the arc being repelled along the edges of the terminals toward the divergent ends by an electromagnet energized by the passage of the discharge-current. In the present invention the arc is moved toward the divergent ends of the discharge-terminals by the dynamic action upon the arc of currents traveling in paths lying at an angle to the path of the arc. By this construction electromagnets and coils of wire offering high impedance to the passage of the discharge may be dispensed with and in their place straight conductors may be employed, which, as is well known, offer a minimum impedance to the passage of the discharge.

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. The herein-described method of extinguishing an arc formed between discharge-terminals, which consists in conducting the current to and from the path of an arc formed therebetween approximately at right angles to said arc, and thereby subject the arc to electrodynamic influence tending to disrupt the same; substantially as described.

2. The herein-described method of extinguishing an arc formed between discharge-terminals, which consists in conducting the current to and from an arc formed therebetween approximately at right angles to and beneath the said arc, and thereby subject the arc to electrodynamic and thermal influences tending to disrupt the same; substantially as described.

3. The herein-described lightning-arrester, which consists of linear discharge-terminals connected respectively with the circuit to be

protected and ground, and provided with divergent ends, the said terminals being insulated one from another and maintained approximately parallel and within arcing distance for a portion of their length; substantially as described.

4. In a lightning-arrester, the combination with discharge-terminals formed of conducting-rods maintained within arcing distance, one of another, for a portion of their length and provided with divergent ends, of connections for said rods respectively with the protected circuit and ground, whereby the path of an arc formed between the said terminals will at all times be approximately at right angles to the current flowing in said terminals and subject the arc to electrodynamic influence tending to disrupt the same; substantially as described.

5. In a lightning-arrester, the combination with two conductors approximately of round or square cross-section maintained within arcing distance for a portion of their length but diverging upwardly, of a connection between the lower part of one of said conductors and the circuit to be protected, and a connection between the lower part of the other of the said conductors and earth, whereby the thermal and electrodynamic influences upon an arc formed between said conductors cooperate to drive said arc upward along the diverging conductors and extinguish it; substantially as described.

6. In a lightning-arrester, the combination with the insulating-supports *a b* of metallic caps *c d* mounted thereon and respectively connected with the protected circuit and ground, the conducting rods or uprights *e f* forming discharge-terminals, the lower ends thereof being mounted in caps *c d*, the said uprights being maintained for a portion of their length substantially parallel and within arcing distance of each other and the ends thereof in a position of wide divergence, and means for adjusting the said terminals in the same vertical plane with respect to each other; substantially as described.

In testimony whereof we affix our signatures in the presence of two witnesses.

ERNST GUSTAV PAUL OELSCHLÄGER.
KARL OTTO FRANZ SCHROTTKE.

Witnesses:

PAUL ROEDIGER,
JULIUS ZINGLER.