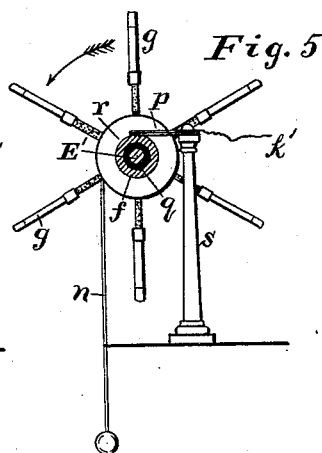
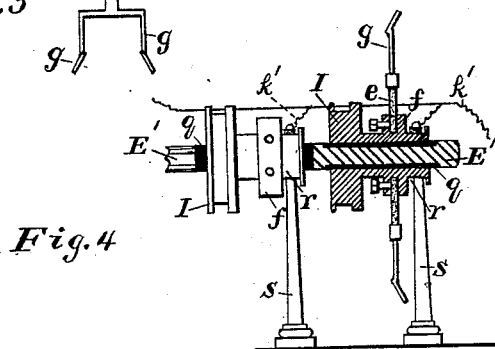
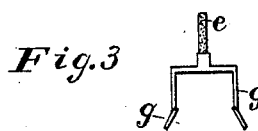
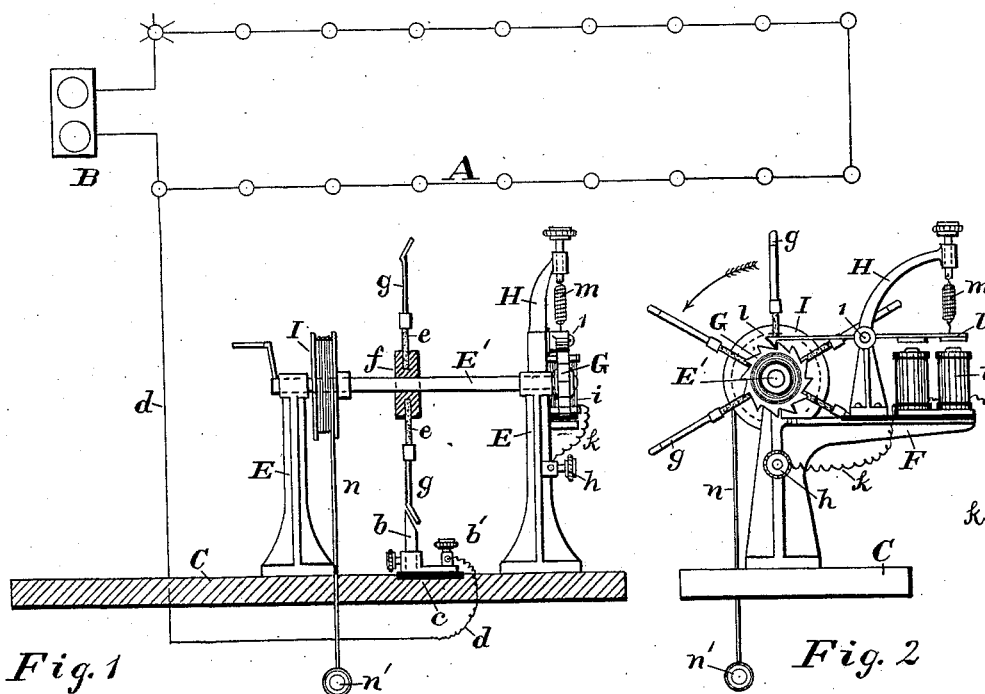


(No Model.)

M. J. O'SULLIVAN & T. J. HOUCK.

LIGHTNING ARRESTER.

Patented Oct. 14, 1884.



Witnesses:
A. C. Eader.
Jno. C. Morris.

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UNITED STATES PATENT OFFICE.

MICHAEL J. O'SULLIVAN AND THOMAS J. HOUCK, OF BALTIMORE, MD.

LIGHTNING-ARRESTER.

SPECIFICATION forming part of Letters Patent No. 306,697, dated October 14, 1884.

Application filed October 10, 1883. (No model.)

To all whom it may concern:

Be it known that we, MICHAEL J. O'SULLIVAN and THOMAS J. HOUCK, citizens of the United States, residing at Baltimore, in the State of Maryland, have invented certain new and useful Improvements in Lightning-Arresters for Electric Circuits, of which the following is a specification.

Our invention relates to lightning-arresters for use in electric circuits, and the same may be applied to electric lights, telephone, telegraph, and other electric apparatus placed in circuit with a generator or source of electricity; and it consists in certain means, which are hereinafter fully described, and indicated in the claims.

In the drawings hereto annexed, Figure 1 is an elevation of the apparatus accompanied with a diagram illustrating a circuit of electric lights. Fig. 2 is an elevation showing the apparatus as seen from a side transverse to that seen in Fig. 1. Fig. 3 illustrates two lead points attached to one carbon. Fig. 4 is a sectional elevation giving a similar view to that shown in Fig. 1, illustrating a modification of the apparatus. Fig. 5 is another elevation and part section of the modification.

The letter A designates the line which constitutes an electric-light circuit for which protection is desired, and B the generator or source of electric supply for said circuit. A base, C, supports the apparatus, and a metallic non-fusible, preferably an iridium, point, *b*, with a connected clamping-post, *b'*, rests upon a substratum of insulating material, *c*, while a wire, *d*, makes connection between the circuit and the clamping-post. The end of the iridium point *b* is beveled off, thereby to present a greater surface, for a purpose hereinafter named. Two standards, E, support a rotatable shaft, E', which carries one or more hubs, *f*, provided on its rim with sockets, into each of which a stick, *e*, of carbon is inserted. To the end of each stick of carbon a lead point, *g*, is attached, and the end of said lead points are bent or beveled to correspond with the beveled end of the iridium, as shown in Fig. 1. It will be seen the lead and iridium points are not in actual contact, but are separated by a space, and it will be understood that in the usual working of the apparatus an ordinary current of electricity will not pass these points.

The connecting-wire *d* and the iridium point are, however, always charged. To one of the standards a clamp, *h*, is attached, and upon a bracket, F, or other support is an electro-magnet, *i*. A wire, *k*, is made fast to the clamp *h*, passes to the magnet, and thence to the ground. A ratchet-wheel, G, is on the shaft, and a bar pivoted at 1 on a standard, H, has at one end a hook, *l*, which engages, like a pawl, with a tooth on the ratchet-wheel, and the other end of the bar extends across the magnet and serves as the armature *l'*. A spiral spring, *m*, having one end attached to the armature and the other end to the standard above it, serves to keep the armature normally withdrawn and the hook in engagement with the ratchet. A drum, I, is mounted on and secured fast to the shaft. A cord, *n*, is wound about the drum, and a weight, *n'*, is suspended at the end of the cord. This weight will, when the hook *l* is disengaged from one tooth on the ratchet, cause the shaft to partly rotate and until stopped by the engagement of another tooth with the hook. The effect of this partial rotation is to bring another lead point *g* in juxtaposition with the iridium point, for a purpose soon to appear.

By the foregoing-described construction, whenever the line of the electric circuit becomes heavily or abnormally charged—as during a thunder-storm—the electric charge will pass from the iridium or non-fusible point *b* across the separating-space to the lead point *g*, and from thence, through the carbon *e*, shaft E', clamp *h*, and wire *k*, to the electro-magnet, whereupon the armature *l'* is attracted, thereby causing the hook *l* to be released from the ratchet-tooth and allowing the weight *n'* to partly turn the shaft, as before described. From the magnet the abnormal charge passes to the ground. Thus the shaft E' becomes a medium for the passage of the abnormal electric charge to relieve the main-line circuit. Whenever a heavy charge of electricity from the non-fusible point crosses the separating-space and reaches the lead or other readily-fusible point, the latter is instantly melted, while the carbon, not being readily destructible, remains intact. Thus the main line is relieved, and then the melting of the lead so widens the space which separates the carbon and iridium point as to break the ground-connection. Thus the flow of the abnormal charge

is cut off or interrupted. As the lead point fuses, the shaft E' turns, carrying the fusing-lead and its carbon-holder away from the non-fusible point, thereby widening still more the separating-space.

Instead of a weight to turn the shaft when the hook is released from the ratchet, a coil-spring may be employed for the same purpose.

An apparatus with one drum may be employed for two main circuits by simply providing each stick of carbon with a double lead point, like that shown in Fig. 3.

It will be understood that when only the ordinary electric current is on the line no effect will be produced on the grounding device, because such current will not pass the separating-space.

In the apparatus constructed as heretofore described the rotatable shaft E' serves, in part, as a medium for passing the abnormal electric charge to the ground. It will be seen by the modification illustrated in Figs. 4 and 5 that the said shaft need not be so employed. In this modification the abnormal electric charge passes from the iridium point *b* across the space to the lead point *g*, and from thence, through the carbon *c*, hub *f*, metal finger *p*, and electro-magnet *i*, as in Fig. 2, to the ground through wire *k*. This is effected by interposing insulating material *q* between the hub *f* and the rotatable shaft E', and providing the said hub with a face, *r*, on which the metal finger *p* bears. The finger may be supported on a wood post, *s*, and the wire *k* leads from the finger to the clamp *h*, and thence to the

electro-magnet. By this modification two or more hubs, each serving for a separate circuit, may be employed on the same rotatable shaft. In other respects the apparatus shown in Figs. 4 and 5 would be constructed as hereinbefore described. After a readily-fusible point *g* has been melted by serving as an arrester, the same carbon stick will remain intact to receive another point.

Having described our invention, we claim—

1. In a lightning-arrester for electric wires, the combination, with the main circuit, of a non-fusible metal point, *b*, a wire connecting the main circuit and non-fusible point, and a readily-fusible metal point, *g*, attached to a ground-connected stick of carbon and in close proximity to the non-fusible point, but not in contact, as and for the purpose set forth.

2. In a lightning-arrester for electric wires, the combination, with a non-fusible metal point, *b*, in electrical connection with a main circuit, of a shaft, E', adapted to rotate, and provided with a number of ground-connected readily-fusible points, *g*, and a ratchet-wheel, G, an electro-magnet, an armature, *l*, pivoted and having at its end a hook, *l*, and means to rotate the shaft, as and for the purpose set forth.

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

MICHAEL J. O'SULLIVAN.

THOMAS J. HOUCK.

Witnesses:

JNO. E. MORRIS,

JNO. T. MADDOX.