(No Model.) 2 Sheets—Sheet 1.

E. A. SPERRY.

LIGHTNING ARRESTER.

No. 418,824. Patented Jan. 7, 1890.

Fig. 2.

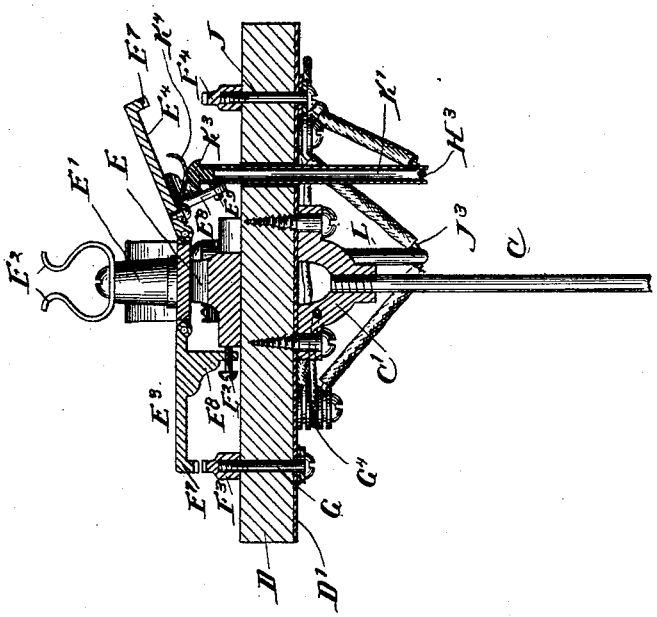
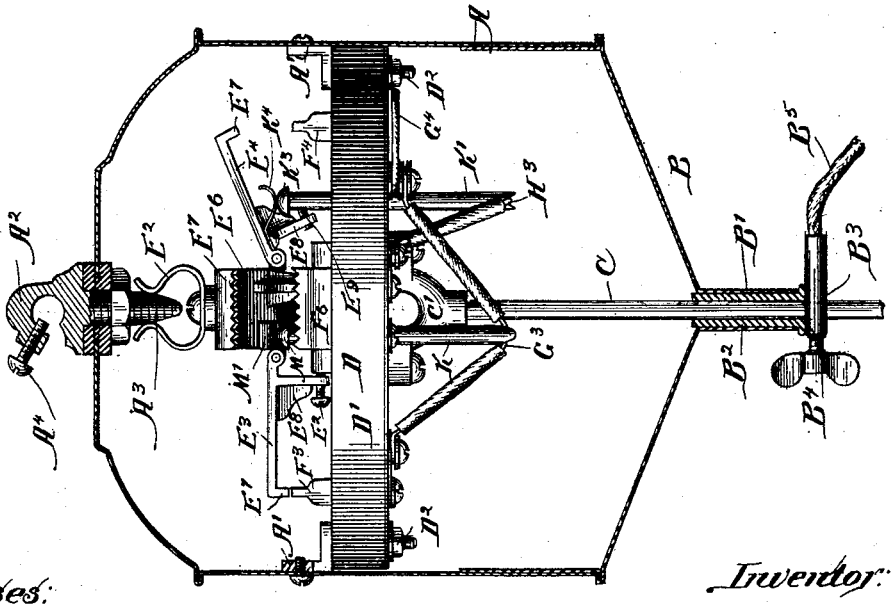


Fig. 1.



Witnesses:

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 4.

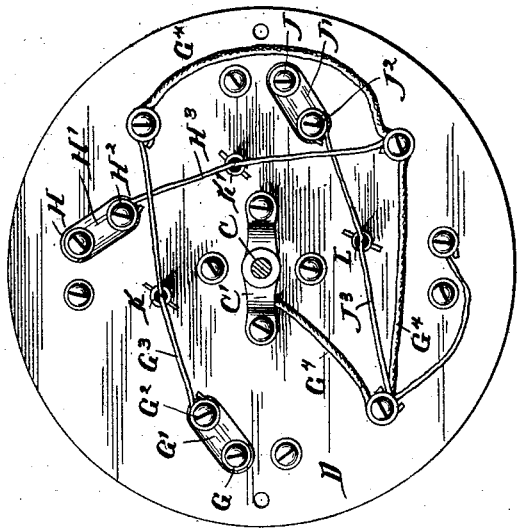
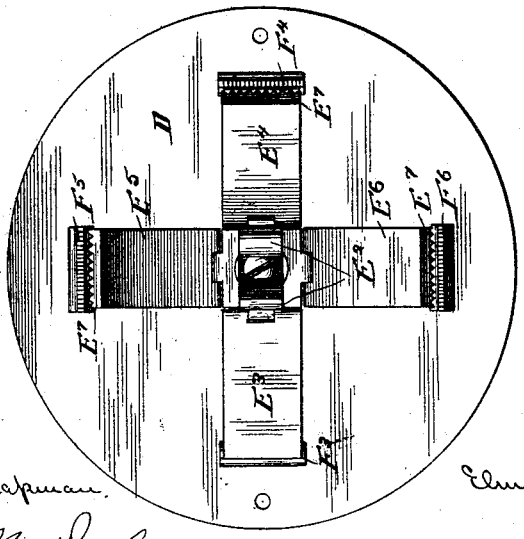


Fig. 3.



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UNITED STATES PATENT OFFICE.

ELMER A. SPERRY, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE ELECTRICAL SUPPLY COMPANY, OF ANSONIA, CONNECTICUT.

LIGHTNING-ARRESTER.

SPECIFICATION forming part of Letters Patent No. 418,824, dated January 7, 1890.

Application filed April 1, 1889. Serial No. 305,581. (No model.)

To all whom it may concern:

Be it known that I, ELMER A. SPERRY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Automatic Pole Lightning-Arresters, of which the following is a specification.

My invention relates to pole lightning-arresters, or lightning-arresters to be attached to the line-wires and led thence to the ground at convenient intervals, and has for its object to provide a cheap, simple, and convenient lightning-arrester for electric wires.

My invention is illustrated in the accompanying drawings, wherein—

Figure 1 is a side view of the interior with parts shown in cross-section. Fig. 2 is a cross-section through the interior operative parts. Fig. 3 is a plan view of the inner disk, and Fig. 4 is a bottom view of the same.

Like parts are indicated by the same letter in all the figures.

A is the case containing the operative parts, and having within the lugs A′ A′, secured by screws to its sides, and above the line hook A^2, having the inner wedge-shaped portion A^3 and the securing-bolt A^4 above.

To the case A is secured the removable bottom B, having the cylindrical portion B′, through which projects the rod C. About this rod and within the cylindrical portion may be placed the insulation B^2, and on the rod C may be secured the clamp B^3, having on one end the thumb-screw B^4 and on the other the grounding-wire B^5. The rod C is screw-threaded into a yoke C′, which is secured by screws to the lower portion of the disk D, upon the lower surface of which is secured the insulation D′. The disk D should be of wood or of non-conducting material. It is secured by the bolts D^2 D^2 to the lugs A′ A′.

On the upper central portion of the disk D is secured the post E, from which rises the standard E′, carrying the spring-contacts E^2 E^2, adapted to engage the piece A^3, and thus to connect ths post E with the line-wire when the lightning-arrester is in position. Pivoted to the four sides of this post are the movable discharge-plates E^3 E^4 E^5 E^6, each provided with a downwardly-projecting outward serrated lip and the pendant E^8, having the set-screw E^9, to bear against the body of the post.

F^3 F^4 F^5 F^6 are fixed serrated discharge-plates in the path of the serrated lips on the respective movable discharge-plates. From this it will appear that all of the movable discharge-plates are in metallic contact with the post and with the springs thereon, and hence through the hook A^2 with the line-wire, and by the operation of the various set-screws they will be normally separated, and by operating the set-screws they will normally be set so as to bring the serrated lips of such movable discharge-plates at a proper distance from the fixed serrated discharge-plates opposed to such lips, so as to permit the passage of an extra strong current—as, for instance, that induced by lightning. Passing to the other or lower side of such disk, and referring to Fig. 4, we find G is a bolt leading from the fixed serrated discharge-plate F^3; thence connection is made through the plate G′ to bolt G^2, and thence to the fusible wire G^3, thence to the conductor G^4, and thence to the yoke C′, to the rod C, and thence to the ground-wire B^5.

H is the bolt which secures the fixed serrated discharge-plate F^6 to the disk D, and from such bolt leads the metallic connection H′ to the bolt H^2, thence to the fusible wire H^3, and thence to the conductor H^4.

J is the bolt which secures the fixed serrated discharge-plate E^4, and to such bolt is secured the metallic piece J′, leading to the bolt J^2, and thence to the fusible wire J^3, which in turn leads to the conductor G^4.

K is a reciprocating rod, notched at its lower end to engage and thus be supported by the fusible wire G^3. K′ is a similar rod or tube supported by the fusible wire H^3, and having at its upper end a button K^3, bearing against a spring K^4 on the bottom of the movable discharge-plate E^4. On the movable discharge-plate E^5 is a similar spring to engage a similar head on the top of the tube L. The

tube K, which rests upon the fusible wire G^3, has a head M to rest against the spring M′ on the movable discharge-plate E^6.

The arrangement of the tubes or rods K, K′, and L with reference to their respective discharge-plates, springs, heads, and fusible wires is the same in each case, and is indicated fully in Figs. 1 and 2 with reference to the rod K′.

The use and operation of my invention are as follows: All of the movable discharge-plates E^4 E^5 E^6 are normally in the elevated positions shown in Figs. 1, 2, and 3—that is to say, the serrated lips far from contact with the fixed serrated discharge-plates on the disk. Since the heads of the respective tubes or rods K K′ L are of non-conducting material, no contact is made, and hence no current can pass from such elevated discharge-plates to the rod C and thence to the ground. If now all these rods were lowered or made to descend, the set-screws in the inner lugs on such discharge-plates are so placed as to bring the two serrated edges in each case closely together—as, for example, to about the distance indicated as the distance between the lip E^7 and the contact F^3 in Fig. 1, or such a distance as would not permit of the passage of the ordinary current, but could be passed by an unusual or extraordinary current. The device being thus constructed is secured to the line-wire by means of the hook A^2 and the set-screw A^4. Contact is therefore made from such line-wire to the central post and all the movable discharge-plates, but not beyond them, as no ordinary current could leap from the lip E^7 to the contact F^3. If now an extraordinary charge be applied to the line-wire—as, for instance, from lightning—the strong current will leap across the space intervening between the serrated lip E^7 and the fixed serrated discharge-plate F^3 and pass through such contact, through bolt G, (referring to Fig. 1,) plate G′, bolt G^2, fusible wire G^3, conductor G^4, yoke C′, rod C, and (referring to Fig. 1) clamp B^3, grounding-wire B^5, which leads to the ground, and such extraordinary charge of electricity would thus be conducted to the earth, the fusible wire G^3 being, however, fused in the operation, so as to break the circuit and prevent any further current from passing through the circuit just described when the current is of such character as to short-circuit the dynamo by causing the dynamo-circuit to follow or otherwise. By reference to Fig. 1 it will be observed that as by this action the fusible wire G^3 is fused the solitary support of the tube or rod K is removed, and the same will fall until its head engages the upper surface of the disk; but this releases the movable discharge-plate E^6 and leaves its serrated lip at about the same distance from the fixed discharge-plate F^6 as is the lip E^7 from the movable discharge-plate F^3; hence the arrester is still in condition to receive and dispose of extraordinary charges. If now a charge is received, it will leap the space between the lip E^7 on the movable discharge-plate E^6 and the fixed discharge-plate F^6 and pass thence (referring to Fig. 4) to the bolt H, plate H′, nut H^2, fusible wire K′, conductor G^4, and thence in the same manner to the ground, and when such current again becomes too strong or of too long duration, or if the line be short-circuited, it will at the same time fuse the conductor H^3, as last above described, and thus permit the tube or bar K′ to drop and the discharge-plate E^4, with its lip E^7, to be brought into operative distance from the fixed discharge-plate F^4. This operation will be continued, each movable discharge-plate being cut out of circuit while the next adjacent movable discharge-plate is thrown into position, until all have been operated, and there might be any number of them, though I have shown but four. The first movable discharge-plate is normally in operative position and the others are normally out of operative position; but each is adapted to be thrown into operation by the operation of the next preceding one.

It will be apparent that many changes could be made without departing from the spirit of my invention.

The "word" circuit is thought preferable in connection with this case, inasmuch as it is always used to indicate the path of a current. It is herein used for this identical purpose and to indicate that path of the current which includes also the open space between the discharge-plates. It must be understood herein that such circuit is supposed to be established when the discharge-plates are brought near enough together to permit the passage of an abnormal electro-motive force.

I claim as new and desire to secure by Letters Patent—

1. In a lightning-arrester, the combination of a series of movable discharge-plates provided with serrated outer edges, a series of opposed fixed serrated discharge-plates, a series of circuits, each including one of such movable discharge-plates and fixed discharge-plates, a series of movable stops to normally hold all but the first of such movable discharge-plates out of position, a fusible conductor in each of such circuits supporting the stop for the next movable discharge-plate, so that when a destructive current passes through one circuit it breaks that circuit and establishes the next.

2. In a lightning-arrester, the combination of a series of movable discharge-plates provided with outer edges, a series of opposed fixed discharge-plates, a series of circuits, each including one of such movable discharge-plates and one of such fixed discharge-plates, a series of movable stops to normally hold all but the first of such movable discharge-plates out of position, a fusible conductor in each of said circuits supporting the stop for the

next movable discharge-plate, so that when a destructive current passes through one circuit it breaks that circuit and establishes the next.

3. In a lightning-arrester, the combination of a series of movable discharge-plates, a series of circuits, each including one of such movable discharge-plates, a series of movable stops to normally hold all but the first of such movable discharge-plates out of position, a fusible conductor in each of said circuits supporting the stop for the next movable discharge-plate, so that when a destructive current passes through one circuit it breaks that circuit and establishes the next.

4. In a lightning-arrester, the combination of a series of movable discharge-plates, a series of circuits, each including one of such movable discharge-plates, a series of stops to normally hold all but the first of such movable discharge-plates out of position, a fusible conductor in each of said circuits supporting the stop for the next movable discharge-plate, so that when a destructive current passes through one circuit it breaks that circuit and establishes the next.

5. In a lightning-arrester, the combination of a series of movable discharge-plates, a series of circuits, each including one of such movable discharge-plates, a series of fusible conductors, one in each of said circuits and supporting the movable discharge-plate of the next circuit in a non-operative position, so that when a destructive current passes through one circuit it breaks its own circuit and establishes the next.

6. In a lightning-arrester, the combination of a series of movable discharge-plates provided with serrated outer edges, a series of opposed fixed serrated discharge-plates, a series of circuits, each including one of such movable discharge-plates and one fixed discharge-plate, a series of stops to normally hold all but the first of such movable discharge-plates out of position, a fusible conductor in each of said circuits supporting the stop for the next movable discharge-plate, so that when a destructive current passes through one circuit it breaks that circuit and establishes the next.

7. In a lightning-arrester, the combination of a series of movable discharge-plates provided with serrated outer edges, a series of opposed fixed serrated discharge-plates, a series of circuits, each including one of such movable discharge-plates and one fixed discharge-plate, a series of fusible conductors, one in each of said circuits, supporting a movable discharge-plate for the next circuit, so that when a destructive current passes through one circuit it breaks its own circuit and establishes the next.

8. In a lightning-arrester, the combination of a series of movable discharge-plates provided with outer edges, a series of opposed fixed discharge-plates, a series of circuits, each including one of such movable discharge-plates and one fixed discharge-plate, and a series of fusible conductors, one in each of such circuits, supporting a movable discharge-plate for the next circuit, so that when a destructive current passes through one circuit it breaks its own circuit and establishes the next.

9. In a lightning-arrester, the combination of a series of movable discharge-plates, a series of circuits, each including one of such movable discharge-plates, a series of fusible conductors, one in each of such circuits, supporting a movable discharge-plate for the next circuit, so that when a destructive current passes through one circuit it breaks its own circuit and establishes the next.

10. In a lightning-arrester, the combination of a series of movable discharge-plates, a series of circuits containing each a conductor from the line-wire, a conductor to ground, and one of such movable discharge-plates, a series of supports, whereby such movable discharge-plates, except the first, are normally held out of operative position, said supports controlled each by the preceding circuit in the series, so that when a destructive current passes through any circuit it brings the movable discharge-plate of the next succeeding circuit into operative position.

11. In a lightning-arrester, the combination of a series of movable discharge-plates, a series of circuits, each including one of such discharge-plates, a series of fusible conductors in each circuit, each of such fusible conductors serving to keep the movable discharge-plate in the next circuit out of operation, so that when a destructive current passes through one circuit it fuses such wire and breaks such circuit and at the same time establishes the next.

12. In a lightning-arrester, the combination of a pivoted movable discharge-plate with a piece which normally holds the same away from the fixed discharge-plate, a fusible conductor which engages such piece, and a series of circuits, one including such fusible conductor and another such pivoted discharge-plate.

13. In a lightning-arrester, the combination of a series of movable discharge-plates, a series of circuits containing each a conductor from the line-wire, a conductor to ground, and one of such movable discharge-plates, a series of supports, whereby such movable discharge-plates, except the first, are held normally out of operative position, and a series of fusible conductors, one in each circuit, and connected with such supports, said supports controlled each by the preceding circuit in the series, so that when a destructive current passes through any circuit it brings the movable discharge-plate of the next succeeding circuit into operative position.

14. In a lightning-arrester, the combination of a series of centrally-pivoted movable dis-

charge-plates having serrated outer lips, a series of fixed serrated discharge-plates opposed to such lips, and means for normally holding all but the first of said movable discharge-plates out of operative position.

15. In a lightning-arrester, the combination of a pivoted movable discharge-plate with a reciprocating rod which normally holds the same elevated, a fusible conductor which supports such rod, and a series of circuits, one including such discharge-plate and another such fusible conductor.

Signed this 30th day of March, 1889.

ELMER A. SPERRY.

In presence of—
FRANCIS N. PARKER,
FRANCIS M. IRELAND.