(No Model.)

M. D. LAW.

LIGHTNING ARRESTER.

No. 400,463. Patented Apr. 2, 1889.

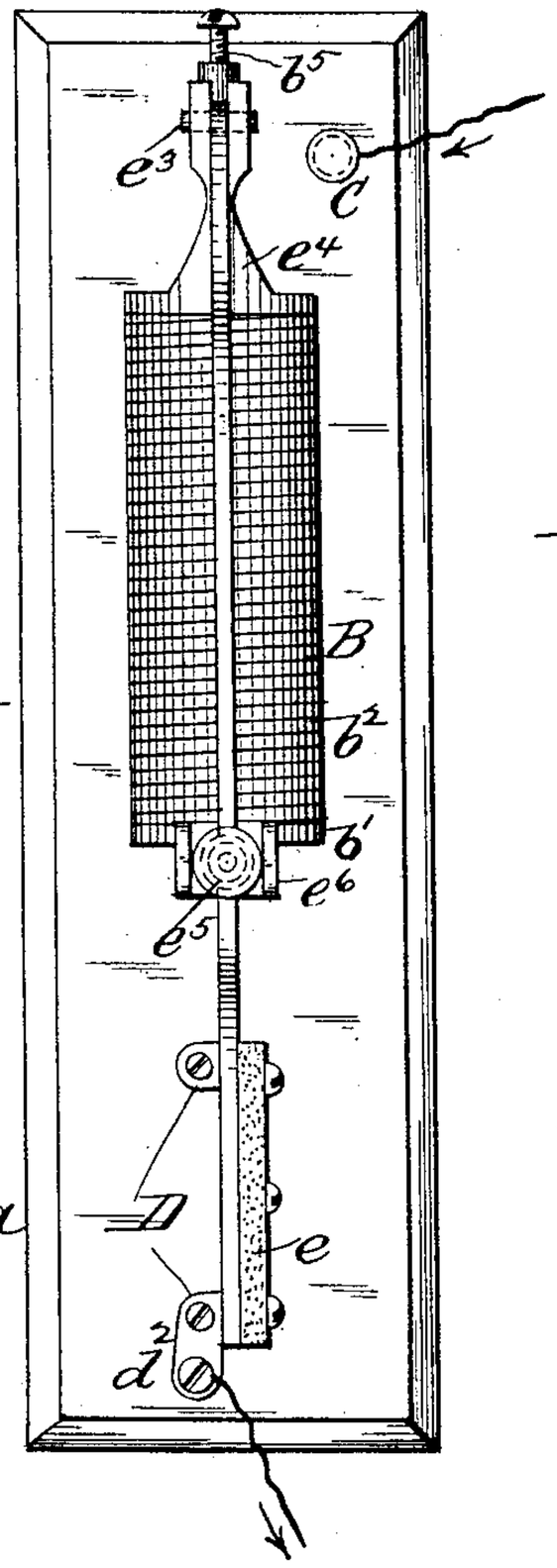

Fig. 1

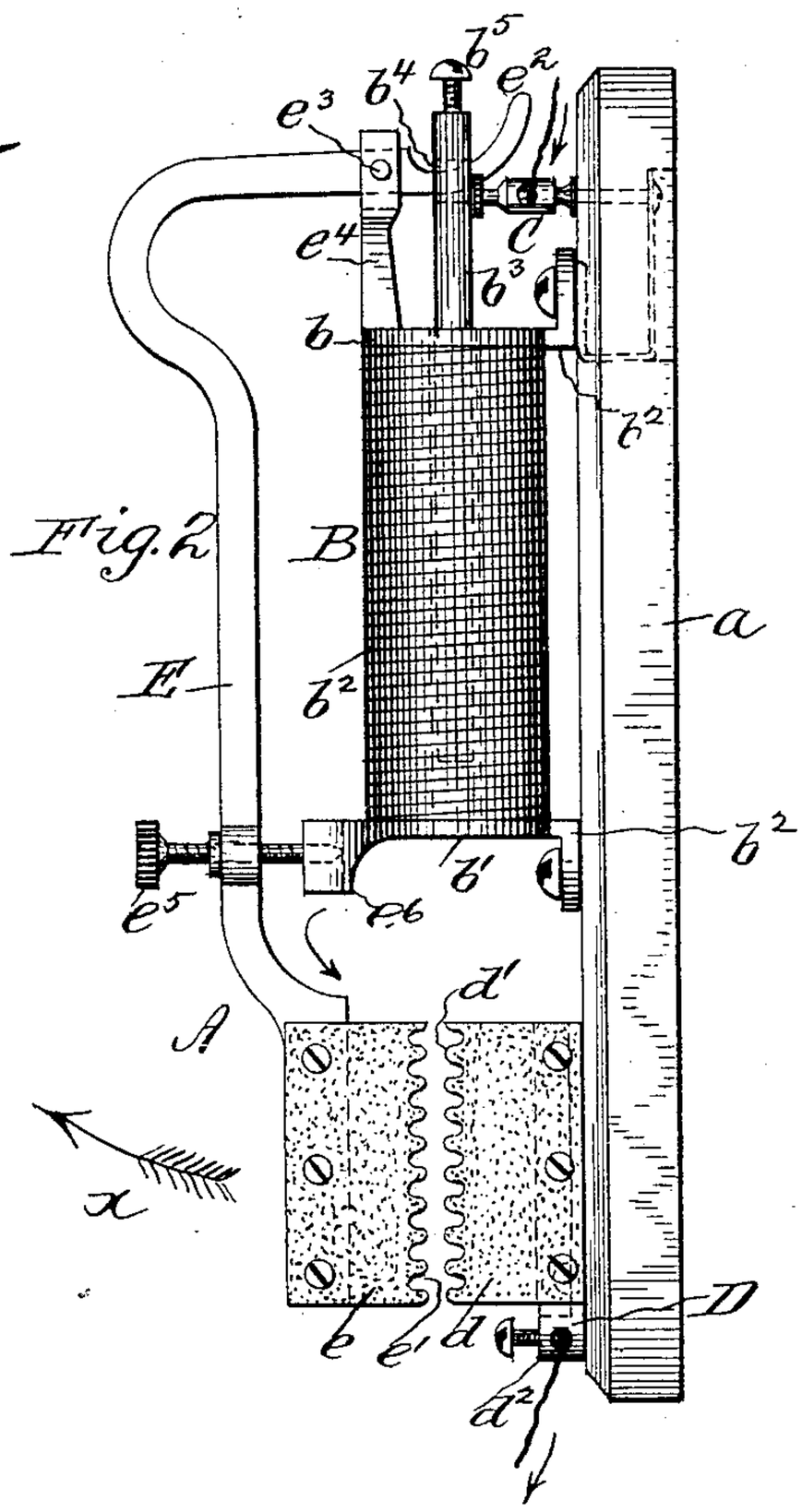

Fig. 2

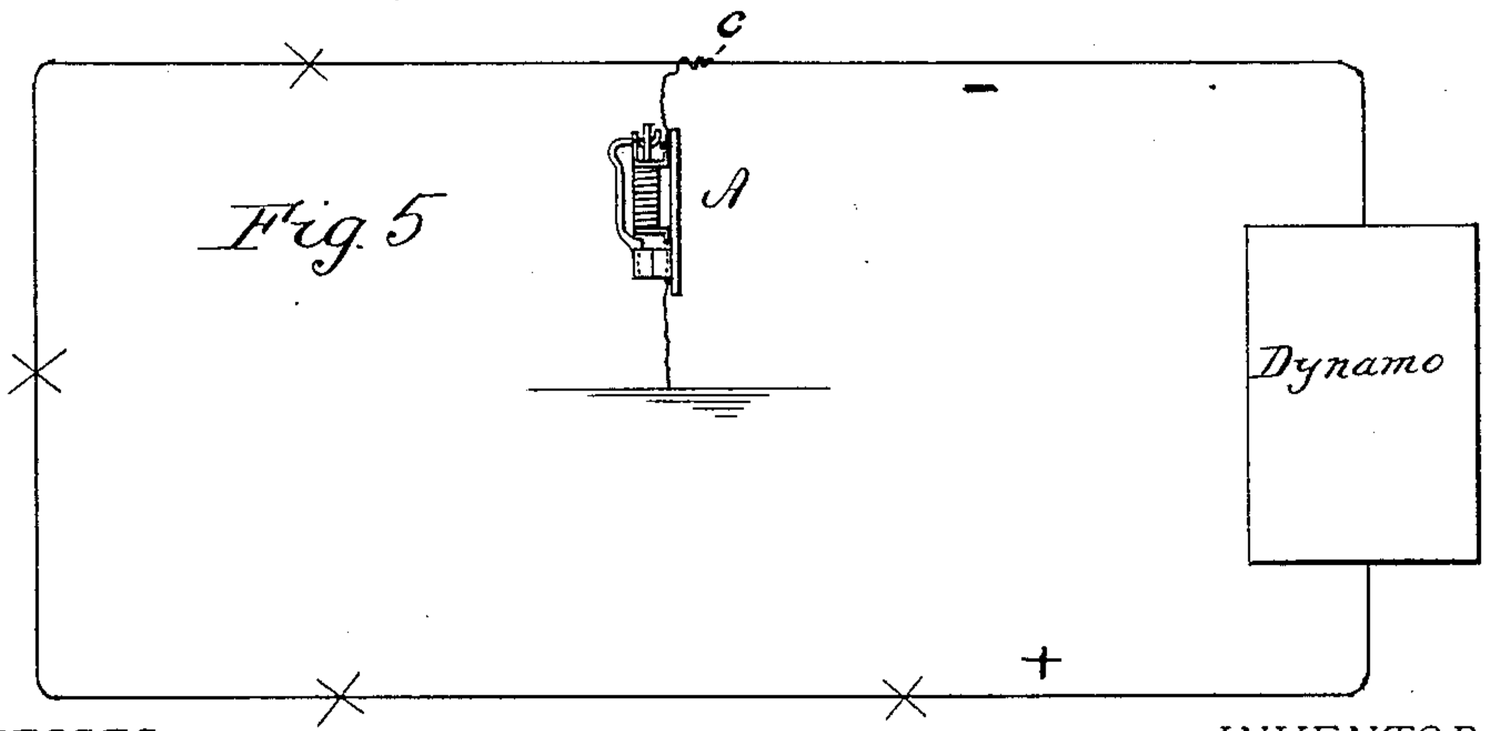

Fig. 5

WITNESSES:

Wm. H. Baustom

M. W. Walker

Fig. 3

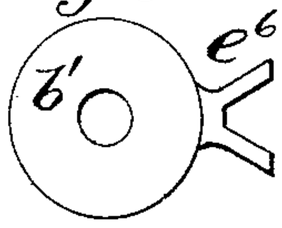

Fig. 4

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LIGHTNING-ARRESTER.

SPECIFICATION forming part of Letters Patent No. 400,463, dated April 2, 1889.

Application filed October 2, 1888. Serial No. 286,962. (No model.)

To all whom it may concern:

Be it known that I, MYRON D. LAW, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Lightning-Arresters for Electric or Dynamo Circuits, of which the following is a specification.

My invention has relation to electro-magnetic lightning-arresters for electric circuits generally, and particularly for arc-light or other dynamo-electric circuits of the form having a ground connection or branch from either one or both sides of the dynamo-circuit, a magnet or solenoid and a fixed contact-plate included in said branch, a shunt around the magnet or solenoid, including a movable contact-plate controlled by the magnet or solenoid; and it has for its object a simple, inexpensive, and durable form of arrester, which, as the static discharge occurs, is electrically actuated to open the ground-circuit in which it is included without opening the dynamo-circuit, and thereby prevent the static discharge from drawing or conducting with it the dynamo-current, and when the static discharge is effected the arrester immediately and automatically assumes or returns to its normal state, so as to be in condition for successively discharging from the dynamo-circuit any number of static charges or currents imposing themselves thereon without injuring or impairing the operativeness of the arrester, and without necessitating manual adjustment of the arrester or any of its parts.

My invention, accordingly, consists of the combinations, constructions, and arrangements as hereinafter more particularly described in the specification, and pointed out in the claims.

Reference is to be had to the accompanying drawings, wherein—

Figure 1 is a front elevation of a lightning-arrester for electric circuits embodying my improvements. Fig. 2 is a side elevation of same, showing the movable and fixed electrodes in open contact. Figs. 3 and 4 are respectively a plan and side elevation of a detail part, and Fig. 5 is a diagrammatic view indicating a simple dynamo-circuit and lightning-arrester thereon in ground-circuit from the negative side of the same.

A represents the arrester, comprising, preferably, a base-plate, *a*, to which is affixed an electro-magnet or solenoid, B, preferably the latter, as shown. The ends of the spool for the solenoid are preferably metal disks or plates *b b'*, having feet or lugs b^2, by means of which the solenoid is secured to plate A. The end disks or plates, *b b'*, are electrically connected to the ends of the coil or helix *b*, so as to include the disks *b b'* in circuit with the helix *b*, and for economy of construction, as hereinafter set forth; but, if desired, any other suitable construction of solenoid-spool and circuit-connections for the helix thereof may be employed. The solenoid end, *b*, is in circuit with a binding-post, C, on plate A, which post C is in circuit with one side, preferably the negative side, of the dynamo-circuit, as indicated at *c*, Fig. 5.

D represents a bracket or plate suitably secured to base-plate A. In the drawings I have shown it located below the solenoid B, and to plate D is preferably screwed or otherwise affixed thereto, so as to be removable therefrom, an electrode or terminal-contact, *d*, which is preferably a carbon plate having corrugated or saw-teeth contact side *d'*. On plate D is preferably located a binding-post, d^2, for a ground-connection, as shown in Fig. 5. One end of the sliding core b^3 of solenoid B is in engagement with a pivoted gravity-lever, E, which carries at one end an electrode or terminal-contact, *e*, having corrugated or saw-teeth side *e'*, similar to fixed electrode *d*. The lever E may be of any suitable configuration, and is preferably pivoted near the upper end, as desired, and above the solenoid, so as to have a suitable engagement with the core b^3; but for economy of construction and compactness of parts I have indicated an elongated opening, b^4, in the upper end of the core b^3, the length of which is adjusted by means of an end set-screw, b^5, through which opening loosely passes the curved end e^2 of lever E, which is pivoted at e^3 to a standard or arm, e^4, secured to or forming an integral part of the solenoid end plate *b*. The lever E is provided with a set-screw, e^5, which contacts with, preferably, a bifurcated bracket, e^6, secured to or formed integral with the solenoid end plate *b'*. The set-screw e^5, as indicated in the drawings, subserves two objects—first, to complete circuit

from solenoid B to electrode or terminal *e*, and in turn by electrode or terminal *d* to ground, and, secondly, to vary the degree or extent of contact between the electrodes, and also to compensate for or take up wear of the same. The bifurcated bracket e^6 prevents lateral movement of the lever E when in its normal position, and the two sides of said bracket preferably diverge from one another, so as to be farther apart at their outer than at their inner ends, in order to admit of the set-screw e^5 positively returning to its position in said bracket after being thrown or moved out of the same by the oscillations of lever E, as hereinafter described.

When the arrester is included in the branch or ground, as indicated in Fig. 5, the branch or ground includes binding-post C, solenoid B, bifurcated lug e^6, set-screw e^5, the contact end *e* of lever E, and fixed contact *d*. The upper part of lever E, standard e^4, and top plate, *b*, of solenoid forms a shunt around the magnet or solenoid B, and the operation is as follows: Said parts being arranged as indicated in Fig. 1, and the set-screw e^5 adjusted to vary the distance apart of the electrodes *e d*, any static or foreign charges or currents on the line or circuit are discharged to ground by way of the branch and its shunt through the electrodes *e* and *d*. As the discharge occurs, the solenoid B is energized, which then draws or moves its core b^3 inwardly to oscillate lever E in the direction of arrow *x*, which movement opens or breaks the ground-circuit for the arrester, and prevents the dynamo-current accompanying the static currents as they are discharged, and hence the electro-magnetic devices of the arrester are not destroyed or injured by the dynamo-current. As the dynamo-circuit is not opened nor its current affected when the static discharges occur, the translating devices in the dynamo-circuit are not affected momentarily or otherwise when the static discharges are made. As soon as the ground-circuit is broken or opened by a discharge the solenoid B ceases to be active, and the lever E returns by gravity to close the ground-circuit or restore it to normal condition.

From the foregoing it will be noted that as the arrester when active does not open or affect the dynamo-circuit, and when inactive automatically places itself in normal condition, the static discharges are successively made, and no personal attention is required to be given to the arrester, nor manual adjustment of it or its parts are required, except to keep the contact edges of the electrodes *e d* in proper condition, and this inspection is only periodically required. As the electrodes *e d* wear, the contact edges are repaired and set-screws e^5 and b^5 adjusted to take up or compensate for such wear, and when worn out are replaced by new ones.

In practice one of the arresters may be in circuit with one side of the dynamo-circuit, or each side thereof may be provided with an arrester, or as many may be applied as desired, depending on the extent and complexity of the circuit.

From the foregoing it is obvious that if standard e^4 is insulated or composed of non-conducting material, there will be no shunt around the magnet or solenoid B, in which case the discharge will be through the solenoid; but when the shunt is used part of the discharge will pass to ground through the shunt and part through the solenoid, the latter being of such a low resistance that it will always act when either a heavy or light discharge occurs to move electrode *e* from electrode *d*, and prevent the static discharge drawing or conducting with it the dynamo-current.

What I claim is—

1. A lightning-arrester comprisinga solenoid and sliding core having in its upper end an elongated slot, a fixed conductor or contact-plate located below the solenoid, a gravity-lever pivoted above the solenoid and having its upper end in engagement with said core-slot and at its lower end a companion contact-plate for said fixed plate, and circuit-connections, substantially as set forth.

2. In a lightning-arrester, the combination of a solenoid and its core, a bifurcated lug, e^6, on the end b' of the solenoid, fixed contact-plate *d*, gravity-lever E, pivoted to the upper end of the solenoid, and having an upper end engagement with the solenoid-core, a set or adjusting screw, e^5, on lever E, in contact with lug e^6, and a contact-plate, *e*, and circuit-connections, substantially as set forth.

3. A lightning-arrester comprising a low-resistance solenoid in a branch circuit having a fixed contact-plate, *d*, and a ground-connection, a pivoted gravity-lever, E, having an end engagement with the solenoid-core, and a contact-plate, *e*, and circuit-connections, substantially as set forth, whereby said lever E is moved by the solenoid to separate said contact-plates, and returns by gravity to its normal position to restore said contact-plates, as set forth.

4. The combination of solenoid B, having end plates, *b b'*, standard or arm e^4 on plate *b*, bifurcated bracket e^6 on plate b', lever E, pivoted to arm e^4 and having set-screw e^5, engaging with bracket e^6, electrode *e* on said lever, fixed electrode *d*, solenoid-core b^3, engaging with said lever, and circuit-connections, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

MYRON D. LAW.

Witnesses:
S. J. VAN STAVOREN,
CHAS. F. VAN HORN.