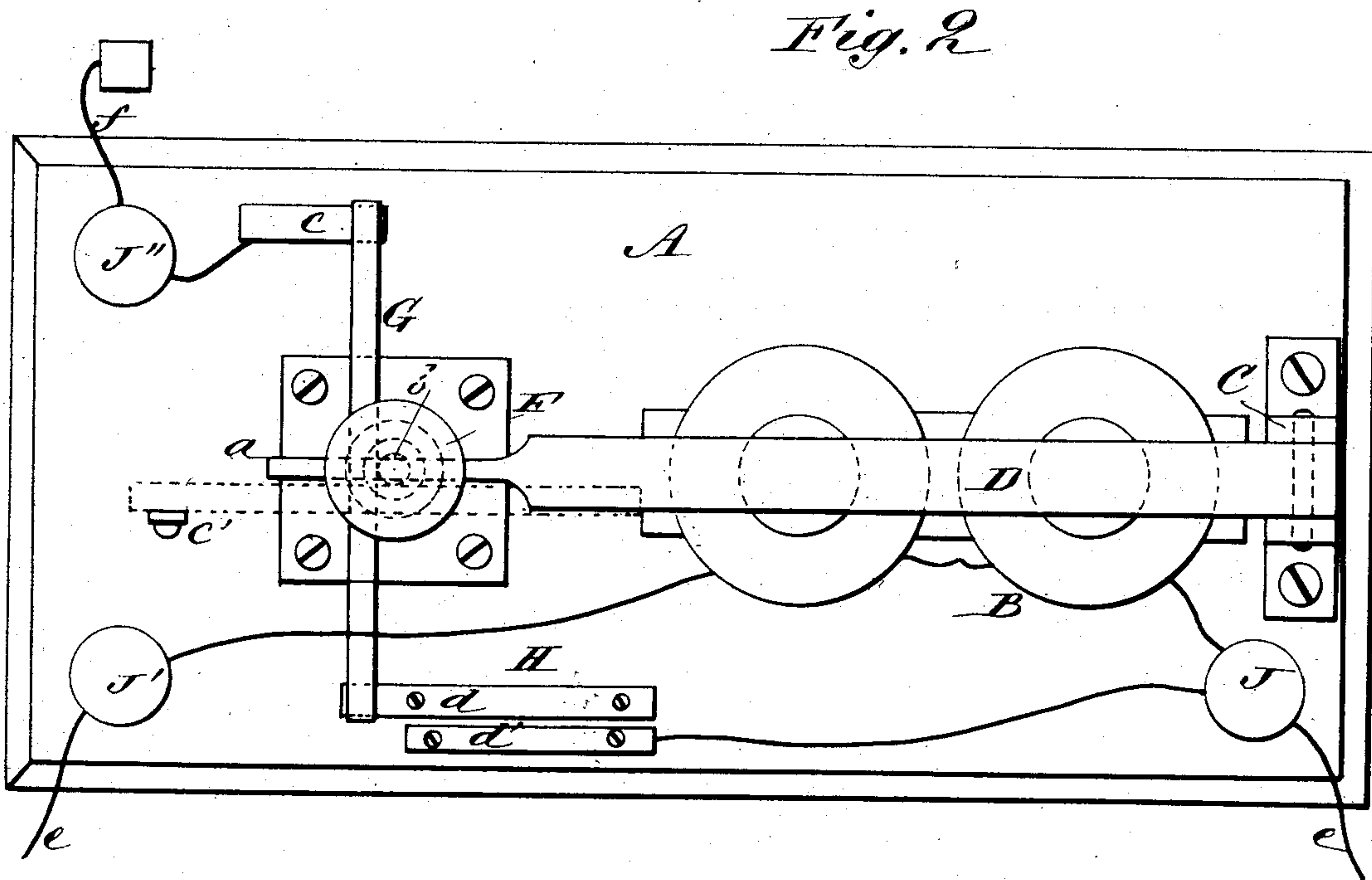
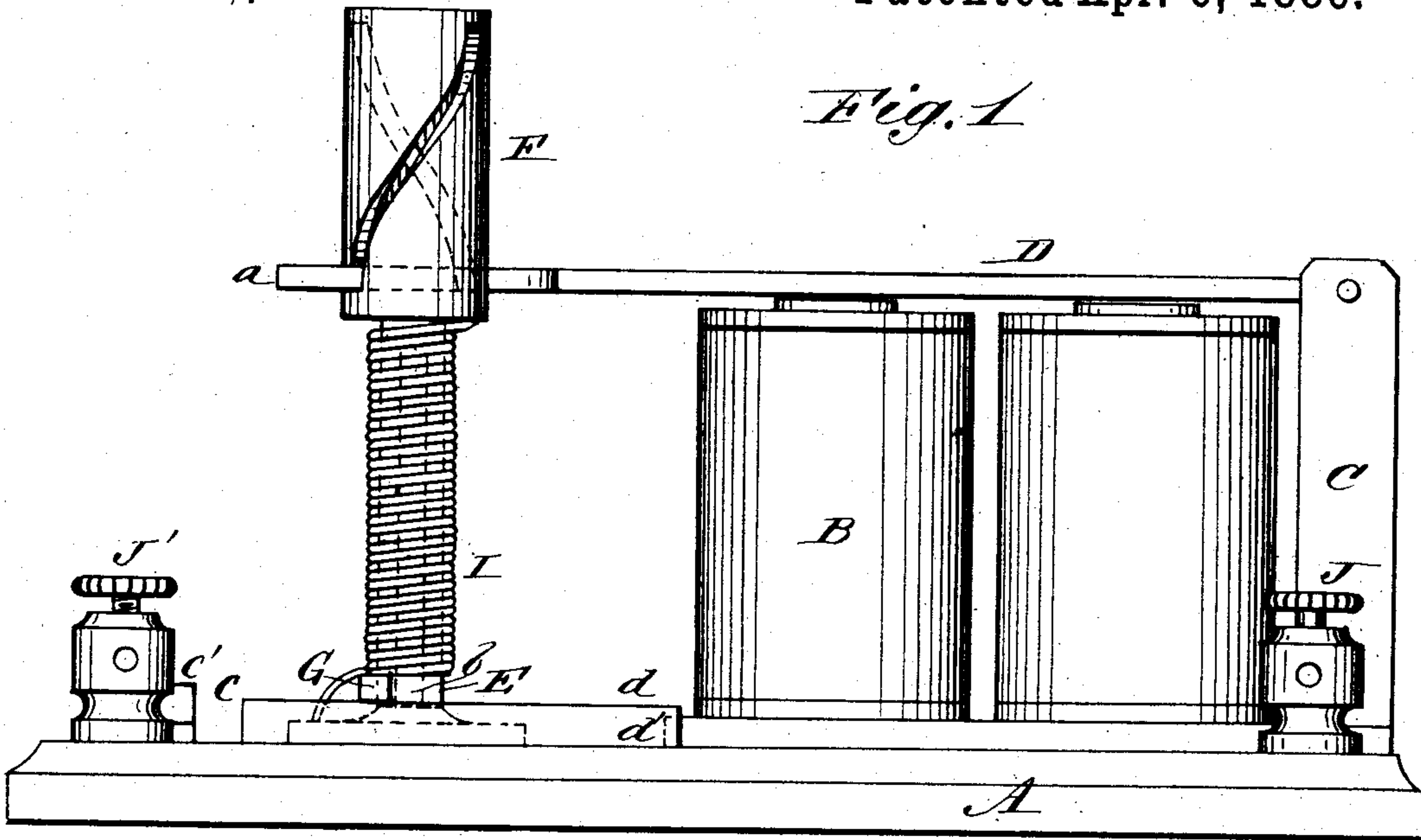


(No Model.)

J. HOREN.
LIGHTNING ARRESTER.

No. 339,417.

Patented Apr. 6, 1886.



WITNESSES:

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ATTORNEYS.

UNITED STATES PATENT OFFICE.

JOHN HOREN, OF OMAHA, NEBRASKA.

LIGHTNING-ARRESTER.

SPECIFICATION forming part of Letters Patent No. 339,417, dated April 6, 1886.

Application filed February 9, 1886. Serial No. 191,355. (No model.)

To all whom it may concern:

Be it known that I, JOHN HOREN, of Omaha, in the county of Douglas and State of Nebraska, have invented a new and useful Improvement in Lightning-Arresters for Dynamo-Circuits, of which the following is a specification, reference being had to the annexed drawings, forming a part thereof, in which—

Figure 1 is a side view of my improved lightning-arrester. Fig. 2 is a plan view.

Similar letters of reference indicate corresponding parts in both figures of the drawings.

The object of my invention is to provide a lightning-arrester and automatic cut-out for the circuits of dynamo-electric machines.

My invention consists in an electro-magnet connected with the main-line circuit and provided with a pivoted armature and a pivoted bar connecting the ground-wire with one part of the lightning-arrester and arranged to be moved by the armature of the electro-magnet, as hereinafter more fully described.

To the base A is secured an electro-magnet, B, of the usual form, and in a post, C, secured to the base A near the magnet B, is pivoted an armature, D, which extends over the poles of the magnet B, and is prolonged beyond the sides of the magnet and reduced in width to form the arm *a*.

On a post, *b*, projecting from the base A, is journaled a sleeve, E, of insulating material, carrying at its upper end a spirally-slotted cam, F. The cam F consists of a piece of tubing having similar but oppositely-arranged spiral slots in diametrically-opposite sides for receiving the arm *a* of the armature D.

To the lower end of the sleeve E is secured a metallic bar, G, which is capable of forming an electrical contact simultaneously with the metallic block *c*, secured to the base A, and the bar *d* of the lightning-arrester H. A spring, I, surrounds the sleeve E and is secured at one end to the cam F and at the opposite end to the base A. When the armature D is attracted by the magnet B, the arm *a* of the armature is forced to the bottom of the cam F, turning the sleeve E in opposition to the tension of the spring I and bringing the bar G into contact with the block *c* and the bar *d* of the lightning-arrester, and when the armature D is released by the magnet in the manner presently to be

described the retraction of the spring I turns the sleeve E and cam F, thereby raising the armature D by the engagement of the spiral slots of the cam with the arm *a*, and at the same time turning the bar G through a quarter of a revolution, bringing it into contact with a stop, *c'*, secured to the base A. The line-wire *e* is connected with the binding-posts J J', and the posts are connected with the terminals of the magnet B. The post J is connected with the bar *d'* of the lightning-arrester H, which bar is arranged on the base A parallel with the bar *d*. The block *c* is connected with the binding-post J'', which receives the ground-wire *f*. When the current is working normally on the circuit, the armature D is drawn down into the position shown in Fig. 1, and the bar G is held in contact with the block *c* and the bar *d* of the lightning-arrester H by the engagement of the arm *a* with the cam F. When the line-wire is struck by lightning, the lightning in passing from the bar *d'* of the lightning-arrester to the bar *d* over the space between the bars *d'* *d* to reach the ground through the bar G, block *c*, and ground-wire, forms an arc between the bars *d'* *d*, when the dynamo-current will continue to pass the space between the bars of the lightning-arrester to the ground for an instant, and the diversion of the current from the magnet B allows the magnet to become demagnetized, when the armature D will be released and the spring I will turn the sleeve E, so as to remove the bar G from the bar *d* of the lightning-arrester and the block *c*, when the arc will be broken and the dynamo-current will follow its original path through the electro-magnet, the armature D will be again attracted, and the bar G will again be turned, forming an electrical communication between the lightning-arrester and the ground-conductor, thus restoring the instrument to its normal condition. Each dynamo-circuit will be provided with two such lightning-arresters—one in each conductor—so as to prevent the possibility of the lightning reaching the armature of the dynamo-electric machine and destroying it; also, to guard the lamps, motors, and other machines placed in the circuit of the dynamo against injury by lightning.

My improved device also indicates by its

momentary action if the lightning-arrester is clogged with dust or any conductive material, so as to short-circuit the dynamo and send the current to the ground instead of over the line.

5 Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with the bars *d d'* of a lightning-arrester, of the bar *G*, the ground-connections, the electro-magnet *B*, placed in the dynamo-circuit, and devices intermediate between the magnet and the bar *G*, for causing the bar *G* to turn on its pivot when the electro-magnet ceases to become active, substantially as herein shown and described.

2. The combination of the electro-magnet *B*, placed in the main dynamo-circuit, the lightning-arrester bar *d'*, connected with the line-wire *e*, the bar *d*, arranged parallel with the bar *d'*, the spiral cam *F*, the bar *G*, arranged to be moved thereby, the metallic block *c* and ground-connections, and the pivoted armature *D*, placed above the magnet *B* and provided with the arm *a*, extending through the cam *F*, substantially as herein shown and described.

3. The combination, in a lightning-arrester for the circuits of dynamo-electric machines, of the electro-magnet *B*, placed in the circuit, the lightning-arrester *H*, formed of the bars *d d'*, the bar *d'* being connected with the line-wire, the armature *D*, pivoted in the post *C*, held within the field of the magnet *B* and provided with the arm *a*, the sleeve *E*, turning on the vertical post *b*, the cam *F*, secured to the sleeve and receiving in its slots the arm *a*, the spiral spring *I*, surrounding the sleeve and arranged to turn the sleeve and cam in opposition to the armature *D*, the bar *G*, secured to the sleeve *E*, and the metallic block *c*, provided with ground-connections, the bar *G* being arranged to be swung by the turning of the sleeve *E* into and out of contact with the bar *d* and the block *c*, substantially as herein shown and described.

JOHN HOREN.

Witnesses:

LOUIS WIRTH,
M. G. FROST.