

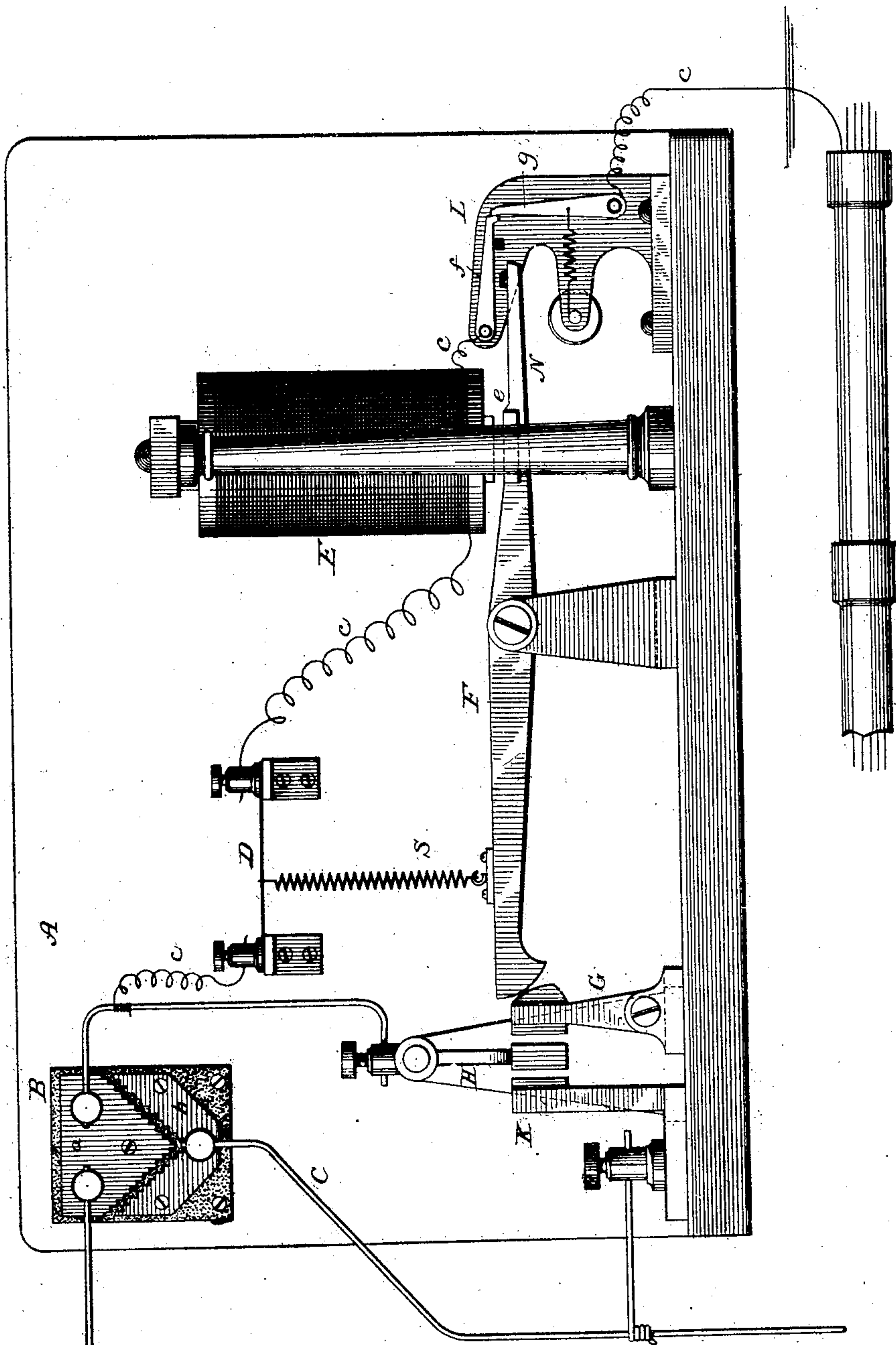
(No Model.)

H. C. SPALDING.

SAFETY DEVICE FOR ELECTRIC CIRCUITS.

No. 327,500.

Patented Sept. 29, 1885.



Attest:

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UNITED STATES PATENT OFFICE.

HENRY C. SPALDING, OF BOSTON, MASSACHUSETTS.

SAFETY DEVICE FOR ELECTRIC CIRCUITS.

SPECIFICATION forming part of Letters Patent No. 327,500, dated September 29, 1885.

Application filed April 17, 1882. Renewed February 21, 1884. Again renewed February 28, 1885. (No model.)

To all whom it may concern:

Be it known that I, HENRY C. SPALDING, of the city of Boston, county of Suffolk, and State of Massachusetts, have invented certain new and useful Improvements in Safety Devices for Electric Circuits, of which the following is a specification, reference being had to the drawing accompanying and forming a part of the same.

The object of my present invention is to protect in a more perfect manner than has heretofore been done electrical circuits the integrity of which is liable to be impaired or destroyed by excessive electrical changes. Among such circuits are those containing telephones, relays, or other delicate electrical instruments, or those which are partially subterranean or subaqueous, and in which the insulation of the buried portions of the line is often injured or entirely destroyed by the passage of abnormal electrical currents.

Though applicable generally to electric circuits, the device forming the subject of the invention is designed particularly for the protection of subterranean or subaqueous lines, and I will therefore describe it as applied to this purpose.

In the drawing annexed I have illustrated a device embodying my invention. Said device is composed mainly of a lightning-arrester with separated corrugated plates, a fusible safety-conductor, and an electro-magnetic cut-out, combined and arranged in certain relation, as will be more fully hereinafter explained.

The several parts of the apparatus are secured to a frame-work or support of suitable construction, designated by the letter A. To one part of this support is fixed a lightning-arrester, B, of ordinary construction, having corrugated plates, one of which, as *a*, forms part of the circuit to be protected, while the other, *b*, is in good electrical connection with the ground by a wire, C.

D is a wire or strip of metal having a higher relative resistance than the conductors of the circuit with which it is connected. It constitutes a fusible safety device similar to those generally employed. E is an electro-magnet, the coils of which are included in the circuit with the devices described above. It is sup-

ported in a frame, poles down and in position to exert an attraction upon an armature, *e*. This armature is carried by the short arm of a pivoted lever, F, the long arm of which is weighted and held up by a spring, S, connected to the fusible wire D.

The long arm of the lever F is rounded off to operate on a cam on the end of a pivoted arm, G, which it forces forward against the force of gravity, or of a light spring, when, by the attraction of the magnet E or release of spring S, the long arm lowers.

In the path of movement of the post G is a pivoted or flexible contact arm, H, connected to a metallic standard in electrical connection with the upper line-plate of the lightning-arrester B. On the opposite side is a post, K, connected to earth. The post G, arm H, and post K are to be normally in such close proximity that a slight movement only of the first will effect contact between the arm and the post K.

On a standard, L, is a device for interrupting the circuit. That shown consists of two pivoted arms, *f g*, the former limited in its downward movement by an insulating-stop, the latter provided with a retractile spring. The arms are connected to the line-conductors, as shown, so that when set or in contact the circuit will be completed through them. An extension, N, from the lever F, carrying an insulating-stop, raises the arm *f* and interrupts the circuit when the lever F is tilted.

It will be observed that this apparatus is to be included in the circuit to be protected by connecting one end of the severed circuit to the line-plate of the lightning-arrester B; the other to the arm *g*, or a binding-post in contact therewith. Currents will therefore pass through the wires *c c*, the safety-wire D, and coils of magnet E. The attractive force of this magnet, or the tension of spring S, should be so adjusted that the armature will not be moved by currents of ordinary strength. Under these conditions the operation of the apparatus will be as follows: Should a charge of static electricity enter the line, it will generally leap across the space intervening between the corrugated plates of the lightning-arrester B. In practice, however, it is found that this is not invariably the case, and as a further precaution

I add the wire D, which being of relatively high resistance, is the first part of the line to fuse on the passage of an abnormal charge. To prevent the current from bridging the space
 5 between the devices which hold the wire after it has been fused, I connect to it one end of the retractile spring S, so that simultaneously with the fusion of wire D a circuit is formed to ground by the lowering of the long arm of
 10 lever F, which brings arm H in contact with post K.

To prevent the injurious consequences to an underground line, or one containing delicate instruments, from the passage of strong currents—such as might be caused by the acci-
 15 dental contact of the line with an electric-light circuit—I employ the magnet E. The passage of such a current would actuate the magnet before destroying the safety-wire D,
 20 so that the lever being tilted the circuit is disrupted by the separation of the contact-arms *f* and *g*. By this means a line may be protected against all possible dangers from excessive charges.

25 I do not limit myself to the specific details of mechanism which I have described for the accomplishment of this result, as these may be considerably varied. I do, however, consider it essential to the successful operation of
 30 the apparatus that its several parts be combined and arranged relatively to one another in substantially the manner specified.

What I claim as my invention is—

1. In an apparatus for the protection of

electric circuits, the combination of the light- 35
 ning-arrester composed of the separated cor-
 rugated plates, one of which is in permanent
 connection with the earth with the fusible wire
 and devices, as described, connected there-
 with and adapted to operate, on the fusion of 40
 the wire, to establish an earth-connection, by
 means of which the current may be diverted
 from the line in the manner set forth.

2. The combination, with a main electric
 circuit, of a fusible safety-wire included in 45
 said circuit, a normally-open branch circuit
 to earth, and a mechanical circuit-closer con-
 nected with the fusible wire by a distensible
 spring, and constructed and arranged to op-
 erate on the fusion of the safety-wire, and 50
 thereby close the said branch circuit, as and
 for the purpose set forth.

3. The combination, with a main electric
 circuit, of an electro-magnet, a pivoted arma-
 ture-lever and circuit-breaker, a normally- 55
 open branch circuit to earth, and a circuit-
 closer connected therewith, a fusible safety-
 wire included in the main circuit, and a spring
 sustaining the pivoted armature-lever con-
 nected therewith, these parts being constructed 60
 and arranged for operation, substantially in
 the manner set forth.

In testimony whereof I have hereunto set
 my hand this 14th day of April, 1882.

H. C. SPALDING.

Witnesses:

CHAS. E. BAGLEY,
 RUFUS COFFIN.