

(No Model.)

H. C. SPALDING.

SAFETY DEVICE FOR ELECTRIC CIRCUITS.

No. 327,498.

Patented Sept. 29, 1885.

Fig 1

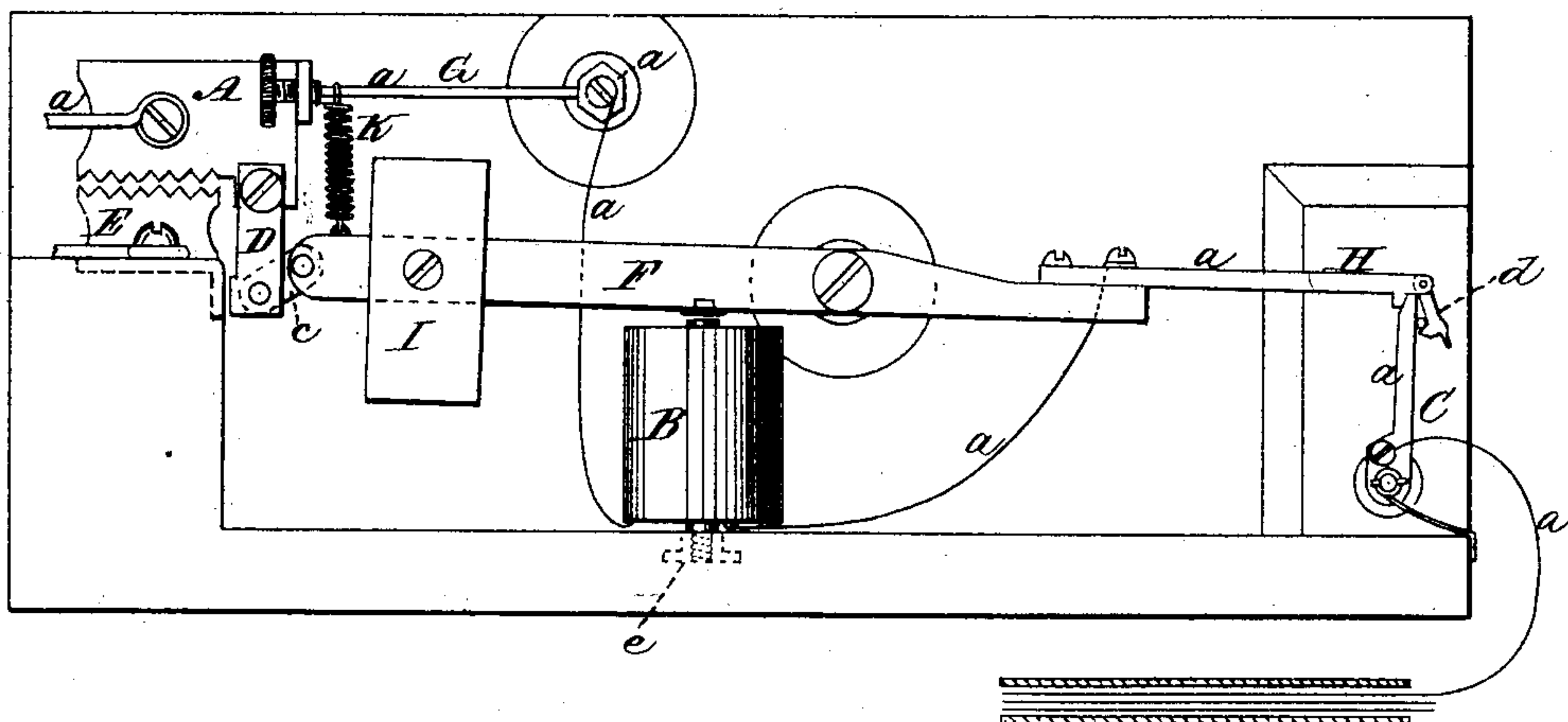


Fig 2

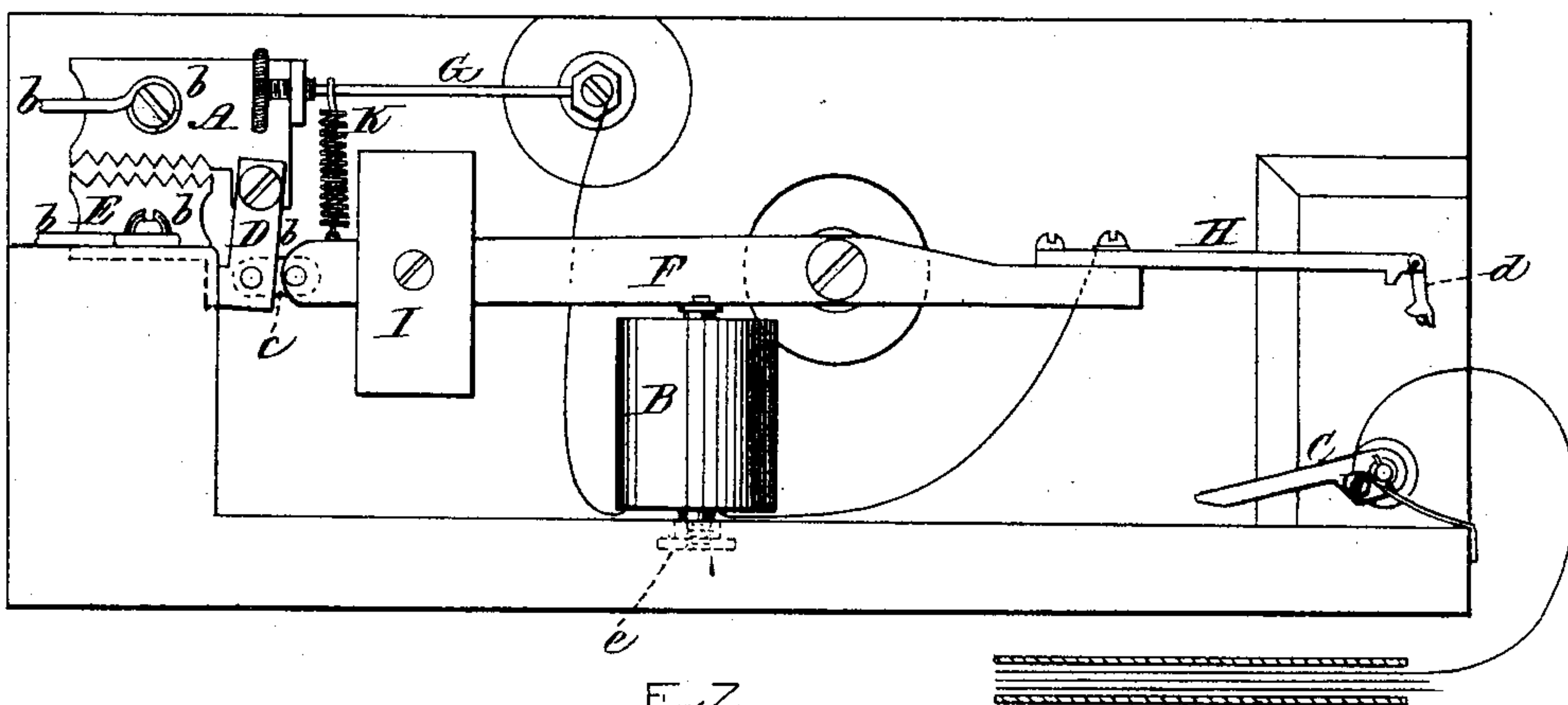
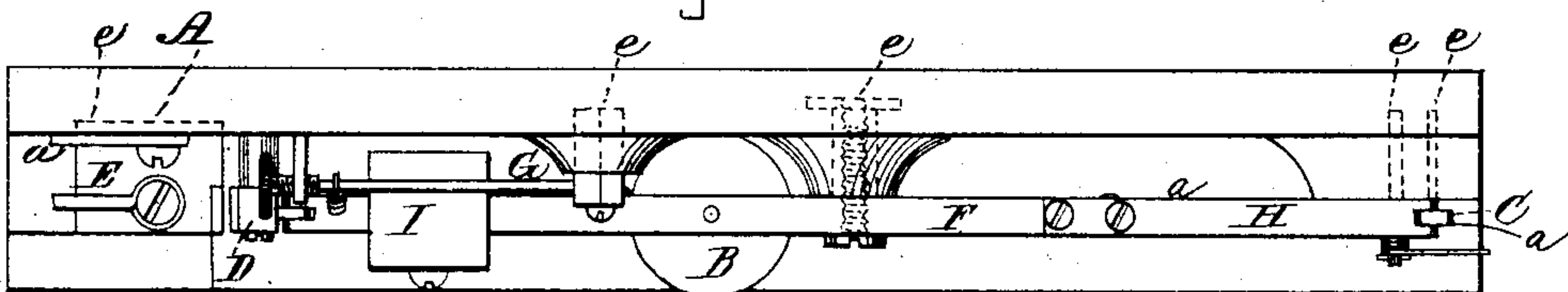


Fig 3



WITNESSES

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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. 327,498, dated September 29, 1885.

Application filed February 21, 1884. Renewed May 21, 1885. (No model.)

*To all whom it may concern:*

Be it known that I, HENRY C. SPALDING, a citizen of the United States, residing at Boston, in the 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 drawings accompanying and forming a part of the same.

In other applications I have shown and described instruments for protecting electric circuits, and devices connected therewith, against the effects of excessive or abnormal currents, such as are liable to be caused by atmospheric discharges or the contact of the line-wires with those of other circuits. Such devices consist, in general, of an electro-magnet and a pivoted armature-lever, in combination with a circuit-breaker and a shunting device arranged for simultaneous operation upon a certain increase in the attractive force of the magnet; secondly, the combination, with these parts, of a fusible safety-strip to which the armature-lever is connected by a spring.

In some cases I have found it desirable to maintain the operative parts of the instrument in the positions to which they are brought by the action of the magnet or the fusing of the safety-strip; and I have therefore produced an instrument in which is combined, with the shunting and circuit-breaking devices, means for preventing the reaction of either--that is to say, for holding the circuit open and the shunt closed until they are readjusted by hand. This device or combination forms the first part of my present invention.

The second part of my invention consists in improved construction of the device, which makes it cheaper and more durable.

In practice I form a support consisting, mainly, of a base and a part at right angles thereto, which, for convenience, I designate a side, and in these the stationary parts of the instrument are set or embedded in proper relative positions.

The apparatus is illustrated in the accompanying drawings.

Figure 1 is a side elevation of the device with its parts in one position, Fig. 2 a similar view with the parts in another position. Fig. 3 is a top view of the device.

Similar letters of reference indicate corresponding parts in the several figures.

A E are plates of metal set in or secured to the side of the support and having their contiguous edges corrugated.

G is a strip or wire of a metal having a higher specific resistance than the remainder of the conductors, and constituting a fusible safety-strip, such as has been commonly employed heretofore. It extends from the plate A to a standard, A', set in or secured to the side of the support of the instrument.

B is an electro-magnet. Its coils are in a circuit indicated by the letters *a a*, and running from the plate A, to which one terminal of the line is connected through the safety-strip G, and then through wire forming or connected with the coils of the magnet B and carried to a metal arm, H, attached to a lever, F, of insulating material carrying an armature in face of the pole or poles of magnet B, and pivoted to a support or standard set in the support L.

Lever F is connected by a spiral spring, K, with the safety-strip G, the tendency of the spring being to draw the armature away from the poles of magnet B. The end of lever F is connected by a link, *c*, with a contact-arm, *a*, plate D, pivoted to plate A, and adapted to be brought into contact with the plate E by the lowering of the lever.

I is a sliding weight placed on the long arm of lever F.

C is a swinging arm to which is connected a spring acting to hold it in position. (Shown in Fig. 2.) When the device is used in a circuit, the arm C is turned back until it engages with a lug on the under side of arm H that holds it in a vertical position. Its movement beyond this point is prevented by a pin or stop. To the end of arm H is pivoted a catch, *d*, that falls into contact with the pin when the arm H is raised and arm C released. By this means the arm H is held in an elevated position until released by hand.

The action of this device is as follows: Normally the current follows the path indicated by the letters *a a*, &c., and will continue to do so until from any cause the line receives an abnormal charge. In this event the instruments and the line may be saved from dam-



age by the current leaping across from the plate A to plate E and going direct to earth. If this does not take place, the strip G will either be fused or the magnet B energized sufficiently to draw down the armature opposed to its poles. In either of the latter events the movement of the armature-lever brings the plate or lever D into contact with plate E, thus establishing a shunt to earth, as indicated by the letters *b b*, releases the arm C, and lets fall the catch *d*, which locks the lever and keeps the shunt *b* closed and the circuit *a* open. No injury can then be caused by the excess of current to the line or the instruments therein.

The apparatus which I have now described is constructed in the following manner: Such portions of the apparatus as are used for the supports or connections for the operative parts are inserted in recesses or receptacles in one part of a mold. These portions may be simple pins or screws, such as *e e*, and may be provided with heads or not. The matrix of the mold is then supplied with some plastic material—such as hard rubber, artificial stone compounds, or the like—which is compressed by bringing the two parts together and allowed to harden. The supports and the like are by this means embedded in the block thus formed, and are securely held in place and insulated. To them any parts required for the ornamentation or proper working of the instrument are then secured.

I am aware that in certain electro-magnetic apparatus the armature of an electro-magnet has been caused, when attracted by the influence of the magnet, to close a shunt-circuit around said magnet, and that means have been employed for locking the armature in

the position in which it effects this. In safety devices of the kind described, however, it is essential not only that a circuit be closed, by which the current is shunted from the magnet, but that the portion of the circuit in which the magnet is included be completely interrupted, otherwise an abnormal current might produce the very effects which the present device is designed to guard against.

I do not claim the special manner of manufacturing the instrument which I have here set forth, but this I reserve as subject for another application.

Having now described my invention, what I claim is—

1. In a safety device for electric circuits, the combination, with a fusible safety-strip, an electro-magnet, and a pivoted armature-lever connected by a spring with the safety-strip, of a circuit-breaker and a shunting device operated by the lever and a locking device for preventing the reaction of the same, as set forth.

2. The combination, with the plate A, safety-strip G, and electro-magnet B, of the pivoted and weighted armature-lever F, connected to the safety-strip by a spring, the pivoted shunting-lever D, and the circuit-breaking lever C, both arranged to be operated by the movement of the lever, and the locking lever or catch *d*, all substantially as set forth.

In testimony whereof I have hereunto set my hand this 8th day of January, 1884.

HENRY C. SPALDING.

Witnesses:

SANFORD H. DUDLEY,  
WARREN P. DUDLEY.