(No Model.)

G. FARRELL.

THERMAL CUT OUT.

No. 420,444. Patented Feb. 4, 1890.

Fig. 1.

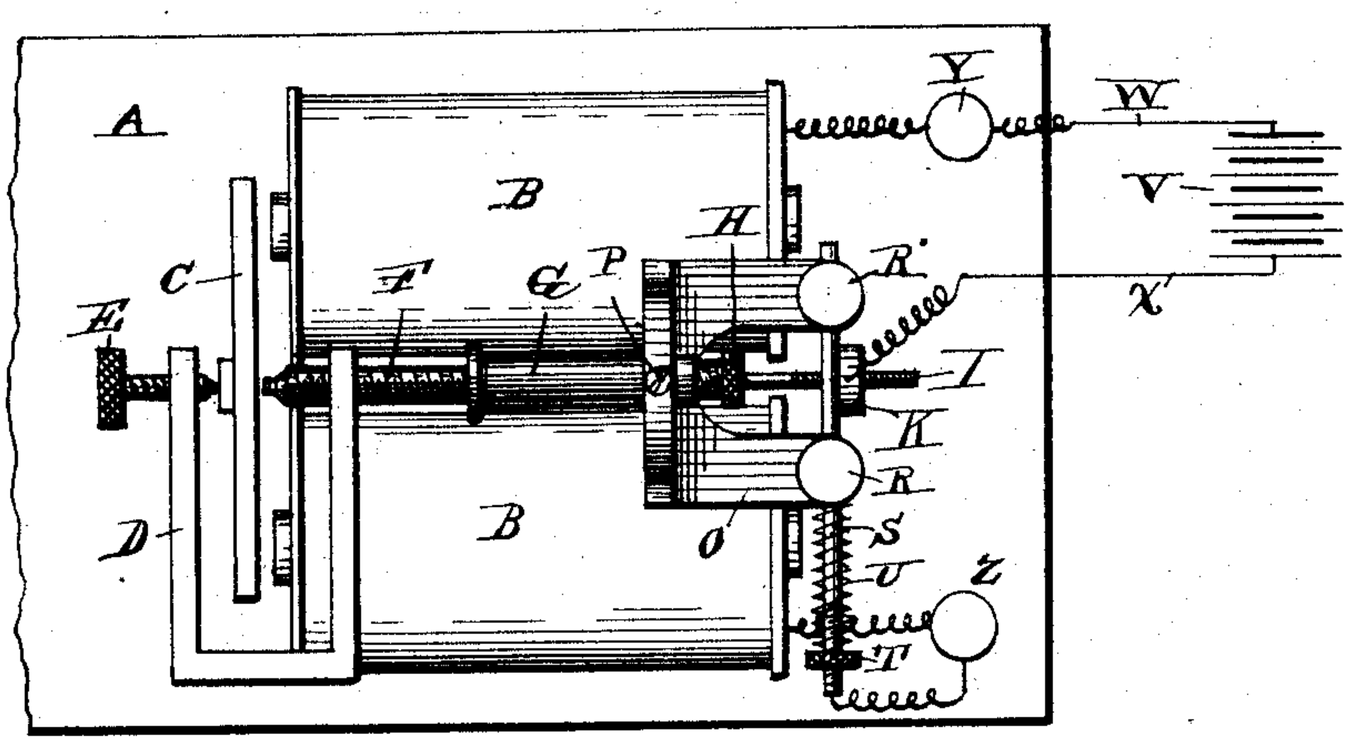


Fig. 2.

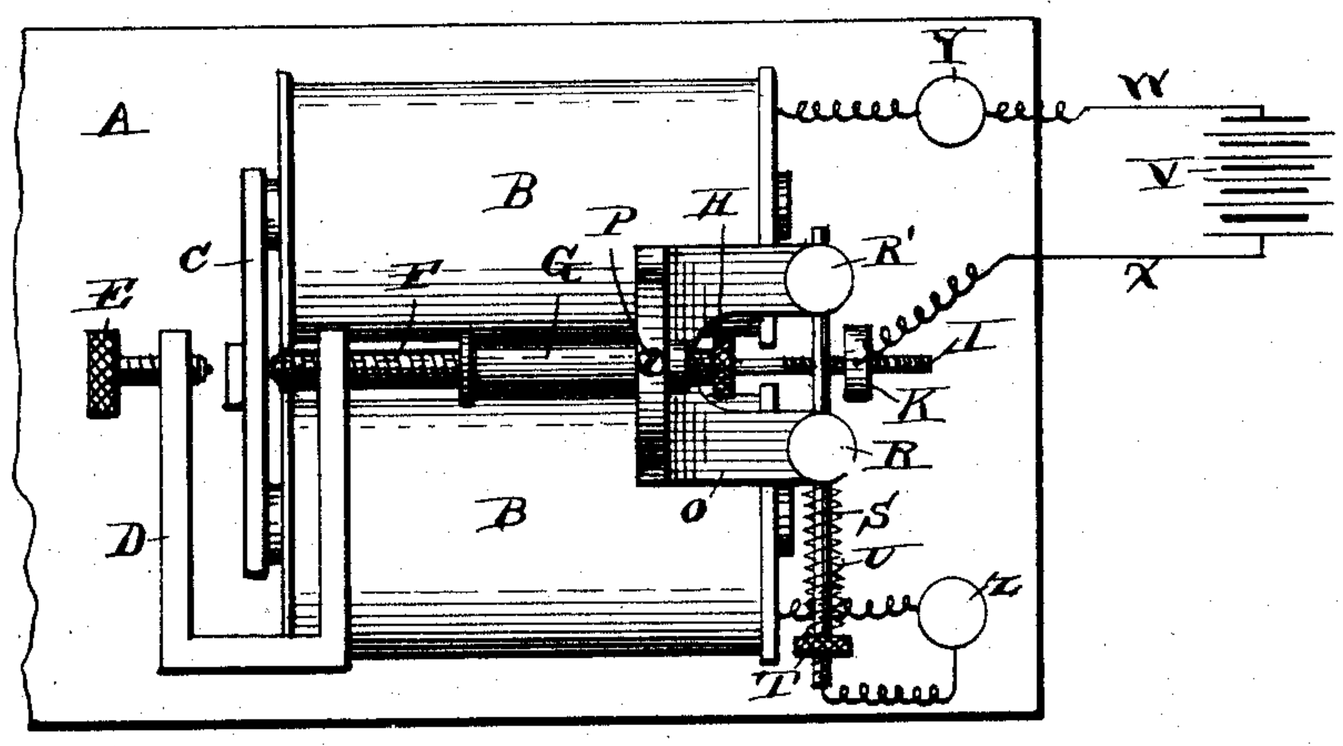


Fig. 3.

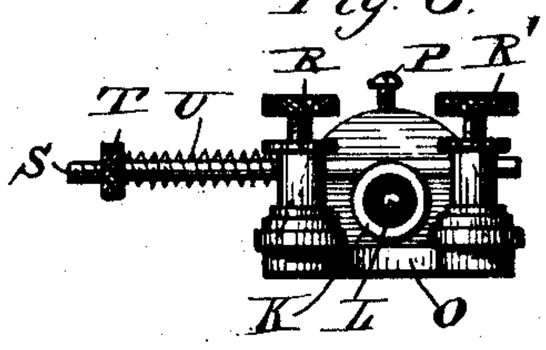


Fig. 4.

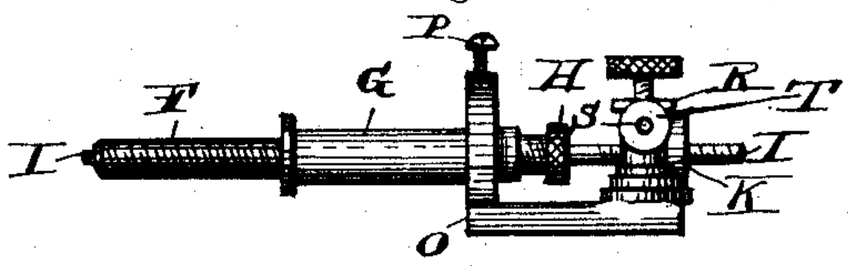
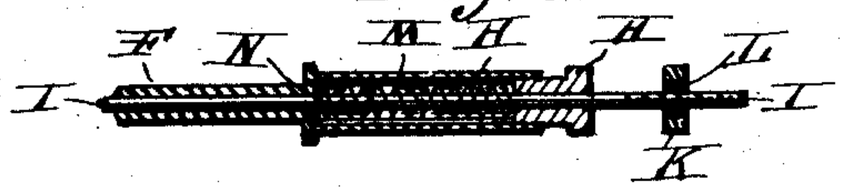


Fig. 5.



Witnesses
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UNITED STATES PATENT OFFICE.

GEORGE FARRELL, OF NEW YORK, N. Y.

THERMAL CUT-OUT.

SPECIFICATION forming part of Letters Patent No. 420,444, dated February 4, 1890.

Application filed April 26, 1889. Serial No. 308,691. (No model.)

To all whom it may concern:

Be it known that I, GEORGE FARRELL, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Electrical-Apparatus Protectors; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention has reference to devices for protecting the magnets and coils of telegraph and other instruments or machines from injury when subjected to unusual and excessive electrical currents.

In devices of this character as heretofore constructed it was common to direct the heavy current through a fusible wire until sufficient heat was developed to melt the wire and so break the circuit. In such devices, however, a large amount of current, often sufficient to do injury to the instrument, would pass before the wire was melted.

It is the object of my invention to prevent the passage of such current, and this I do by utilizing the current to energize the magnet to attract an armature, and thus break the circuit, causing at such break a spark that will develop enough heat to melt the fusible wire.

This invention may be embodied in a variety of apparatus, and, while I have shown it applied to a relay, it is evident that it may be applied to other instruments and machines and in other ways than that shown, and I am therefore not confined to the precise instrumentalities and arrangements of parts shown.

In the drawings, Figure 1 is a plan view showing the invention applied to a relay, the latter being shown conventionally only. Fig. 2 is a similar view showing the position of parts during the initial break in the circuit. Figs. 3, 4, and 5 are detail views of the circuit-breaker.

Referring to the drawings, A is a suitable base supporting the magnets B, the armature C, and post D, which latter is forked, as shown, and is provided for carrying the usual armature-adjusting screws, one of which is shown at E.

Opposite the screw E and extending through one of the nuts formed in the fork of the post D is the reduced and externally-threaded end F of a cylinder G. The bore of the end F is also much smaller than that of the main cylinder. The end of the cylinder G opposite the reduced end F is closed by a screw-plug H, provided with a central perforation.

Through the bore of the end F of the cylinder passes a rod I, normally projecting a short distance beyond the part F, and also extending through the cylinder G and screw-plug H to a point beyond the latter, where it is threaded and carries a nut K. This nut is composed of a central portion L, of insulating material, and a rim of metal. Within the cylinder G the rod I is surrounded by a coiled spring M, which abuts against the plug H and also against a collar N on the said rod adjacent to the reduced end F of the cylinder. The cylinder G extends through the upright part of an L-shaped bracket O, and is held to said bracket by a set-screw P. The lower branch of the bracket O is forked, and at the extremity of said forked portions are binding-posts R R′. The usual perforations in these posts are arranged in line, and through them extends a fusible wire S, against which the nut K normally engages with the metal rim in contact with the said wire. One end of the wire S is clamped by the post R′ against longitudinal movement, and the other end of the wire extends freely through the other post R and for a distance beyond the same, where it is screw-threaded and carries a nut T, as shown. Between the nut T and the post R the wire is surrounded by a spring U, which abuts against the said post and nut. By moving the nut the tension of the spring U may be regulated.

The battery V and leading-in wires W and X are shown conventionally. The circuit is through the wire W to a binding-post Y, and from thence to the magnets, and from the wire X to the metal rim of the nut K, to the fusible wire S, and from the outer end of the latter by a wire connection to a binding-post Z in circuit with the magnets.

When the instrument is operating under normal currents, the armature C reciprocates between the screw E and the end of rod I projecting beyond the part F of the cylinder G

without affecting the relation of the nut K to the rod S, the spring M being of sufficient strength to resist the shock of the contact of the armature. Should an abnormal current—such as produced by contact with electric-light wires or by lightning—pass, the magnets are more strongly energized and the resistance of the spring M overcome by the movement of the armature, and the nut K is moved out of contact with the fusible wire S, thus breaking the circuit at this point and producing a spark which usually melts the said fusible wire. When the wire is melted, the end passing through the post R is thrown therefrom by the spring U, and the circuit is thus permanently broken. Should the wire S not melt, the spring M returns the parts to normal position, and the operation of breaking the circuit is repeated. It will now be seen that with an apparatus constructed according to my invention, the current does not pass through the fusible wire until it is heated to the melting-point, as in apparatus heretofore constructed; but an immediate break in the circuit is produced and the heat generated by the sudden introduction of high resistance in the circuit—to wit, the air-space at the break—will effect the melting of the fusible wire without permitting a large quantity of current to pass, as heretofore.

Having thus described my invention, what I claim is—

1. The combination, with a fusible wire in the circuit, of a circuit-breaker in normal contact with the fusible wire and in operative relation to the armature of a magnet in circuit with the wire and circuit-breaker, substantially as described.

2. The combination, with a fusible wire in the circuit, of a circuit-breaker in normal contact with the fusible wire and in operative relation to the armature of a magnet in circuit with the wire and circuit-breaker and a spring holding the circuit-breaker normally against the action of the armature, substantially as described.

3. The combination, with a fusible wire in the circuit, of a circuit-breaker in normal contact with the fusible wire, means, substantially as described, for operating said circuit-breaker, and a spring tending to separate the wire at the point of fusion, substantially as described.

4. The combination of a fusible wire in the circuit and a circuit-breaker in normal contact with said wire and breaking the circuit at said wire, whereby the breaking of the circuit produces a spark which fuses the wire, substantially as described.

5. In a cut-out for protecting electric apparatus, the combination, with a fusible wire in the working-circuit, including the said apparatus, of a circuit-breaker completing the said working-circuit at the fusible wire, and constructed to break the same at the wire on the passage of an abnormal current, and thereby produce a spark to melt the said wire, substantially as described.

6. The combination, with a magnet and its armature, of a circuit-breaker in the magnet-circuit and in operative relation to said armature to be moved thereby to break the circuit, and a fusible wire fixed at one end and under the tension of a spring at the other end and in contact with the circuit-breaker between said ends, substantially as described.

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

GEORGE FARRELL.

Witnesses:
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