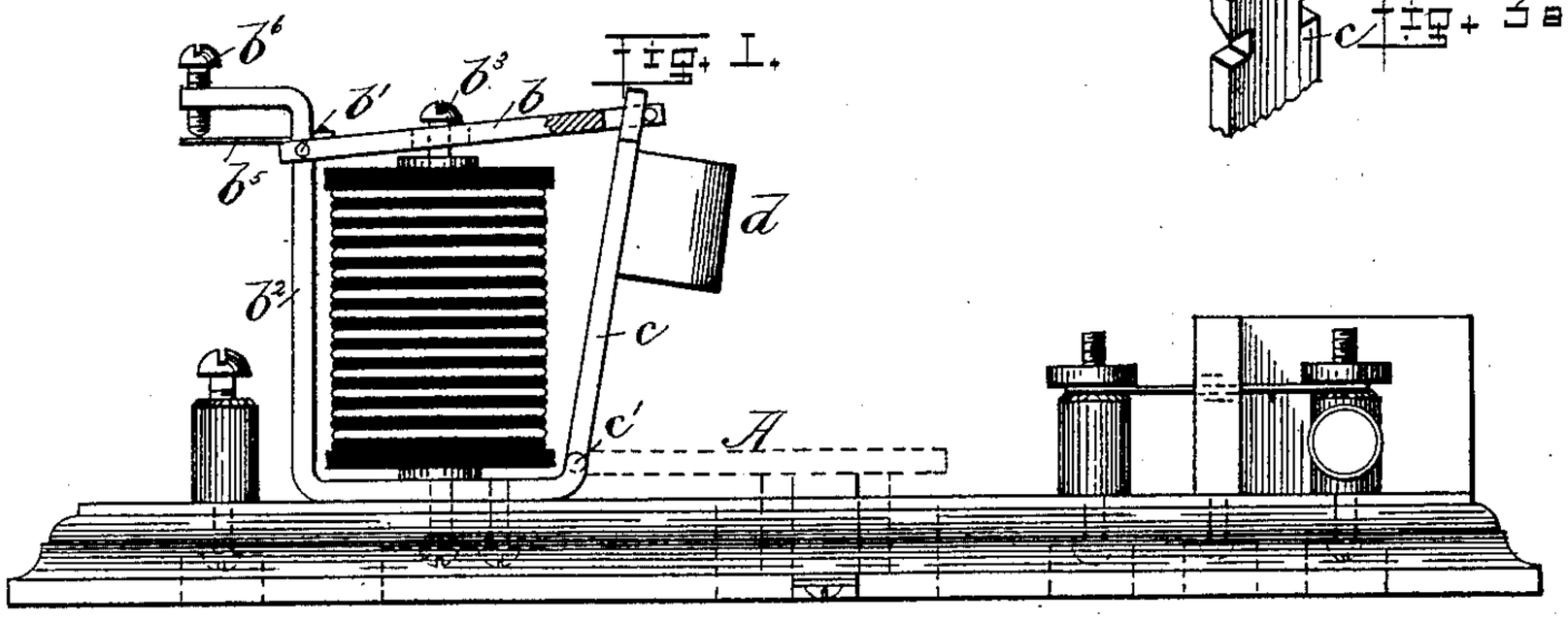
(No Model.) 2 Sheets—Sheet 1.

H. A. CHASE.

ELECTRIC CUT-OUT.

No. 432,978. Patented July 29, 1890



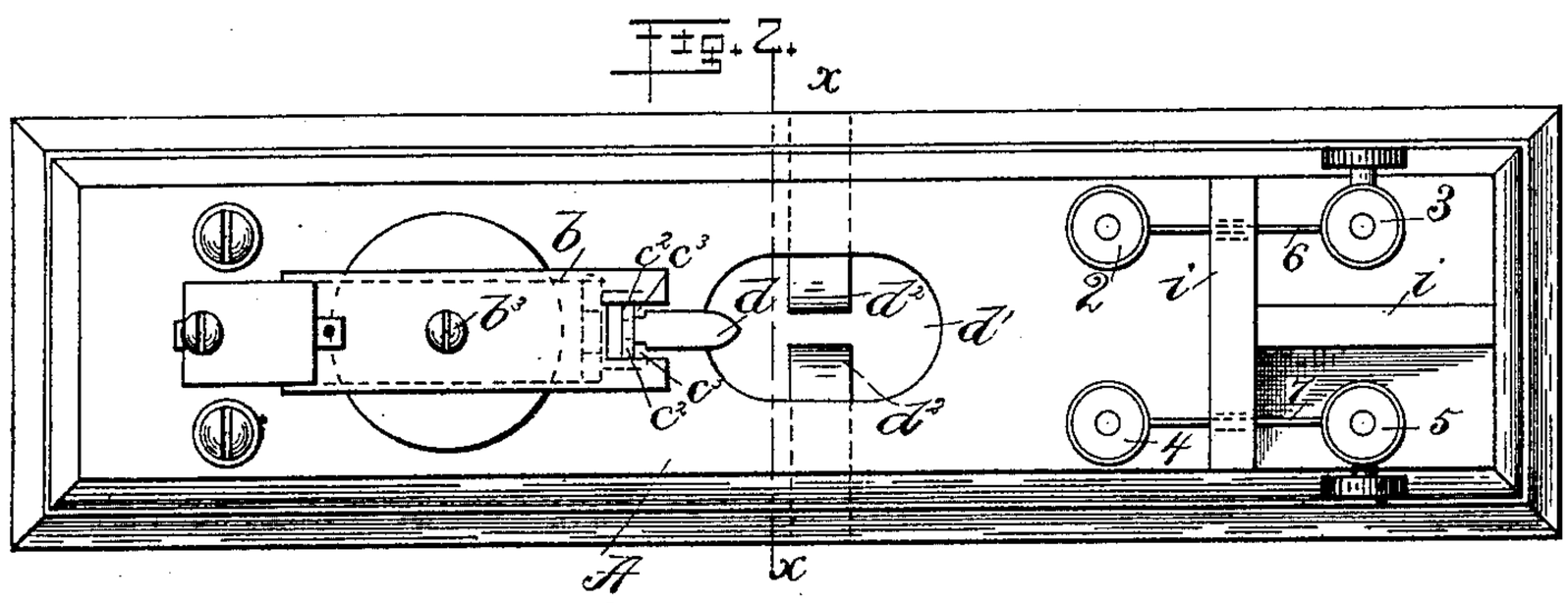


Fig. 3.

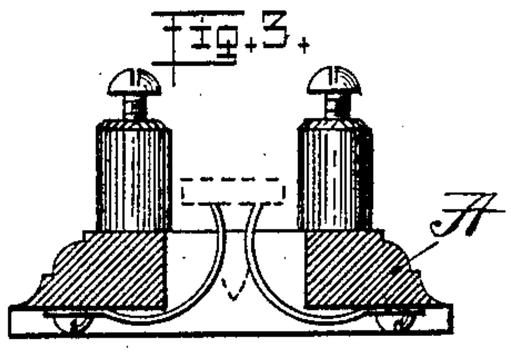
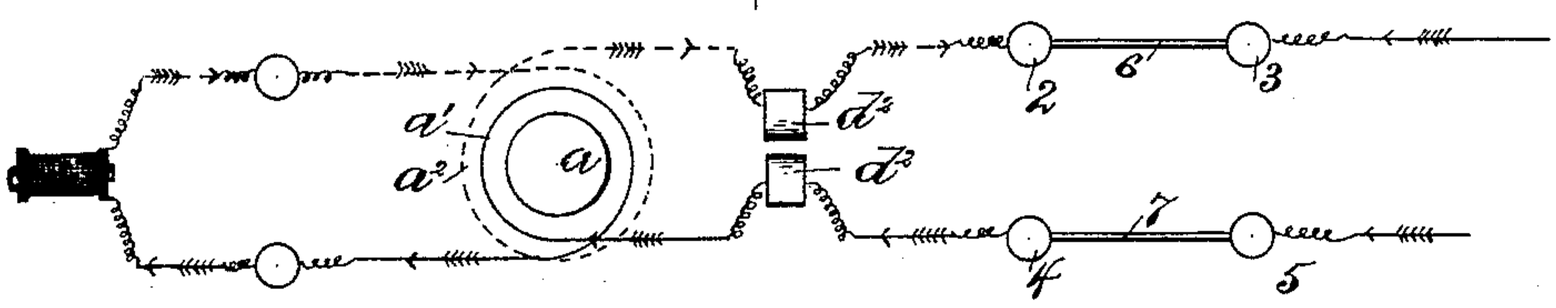


Fig. 4.



Witnesses.

Geo. C. Hunting.

Franck L. Emmy-

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Attys.

(No Model.) 2 Sheets—Sheet 2.

H. A. CHASE.

ELECTRIC CUT-OUT.

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Fig. 5.

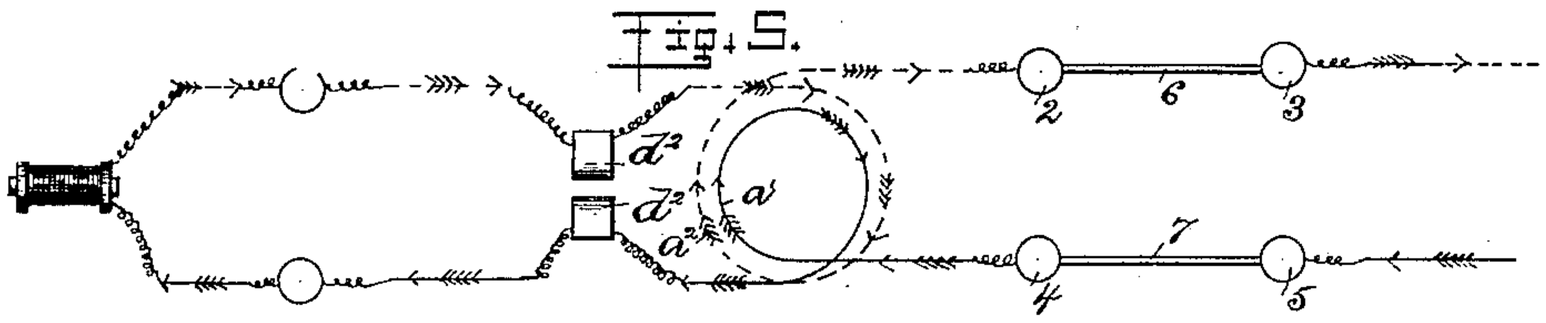


Fig. 6.

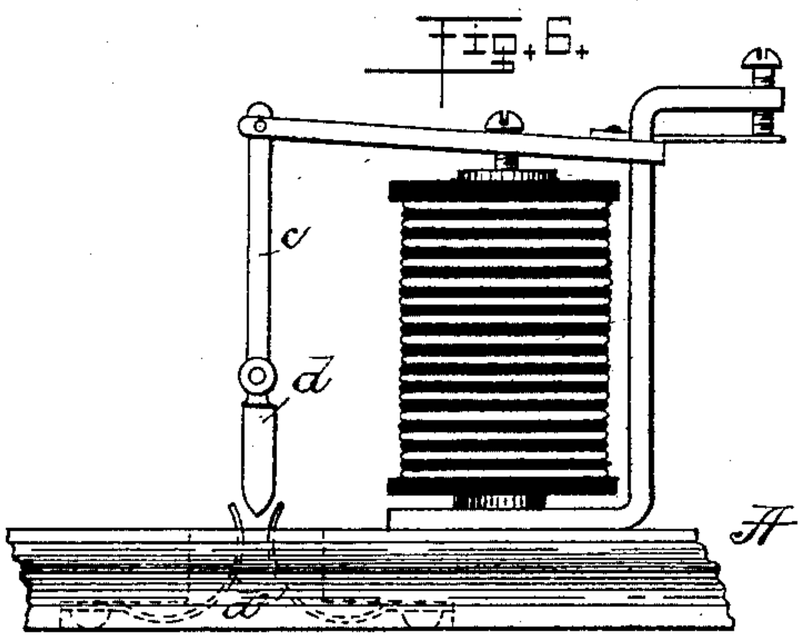


Fig. 7.

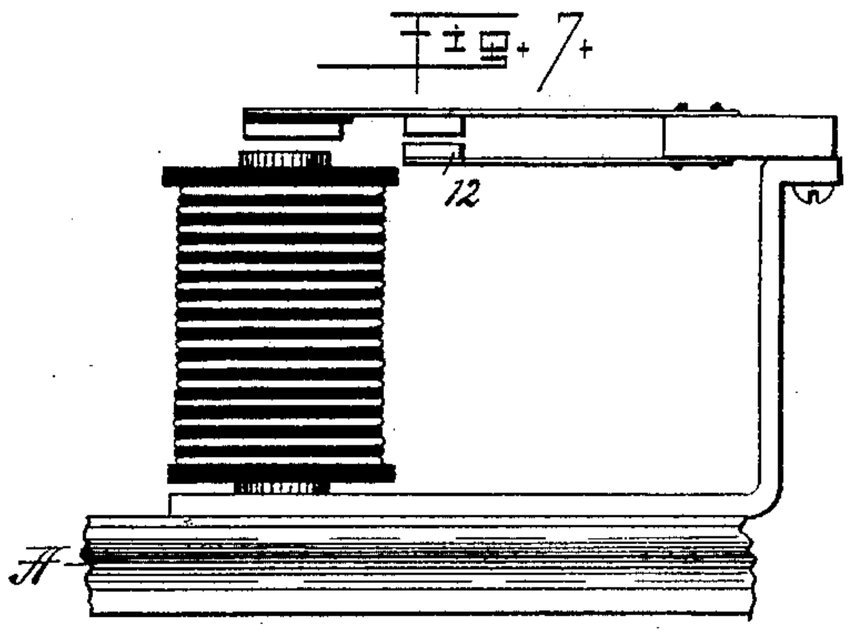
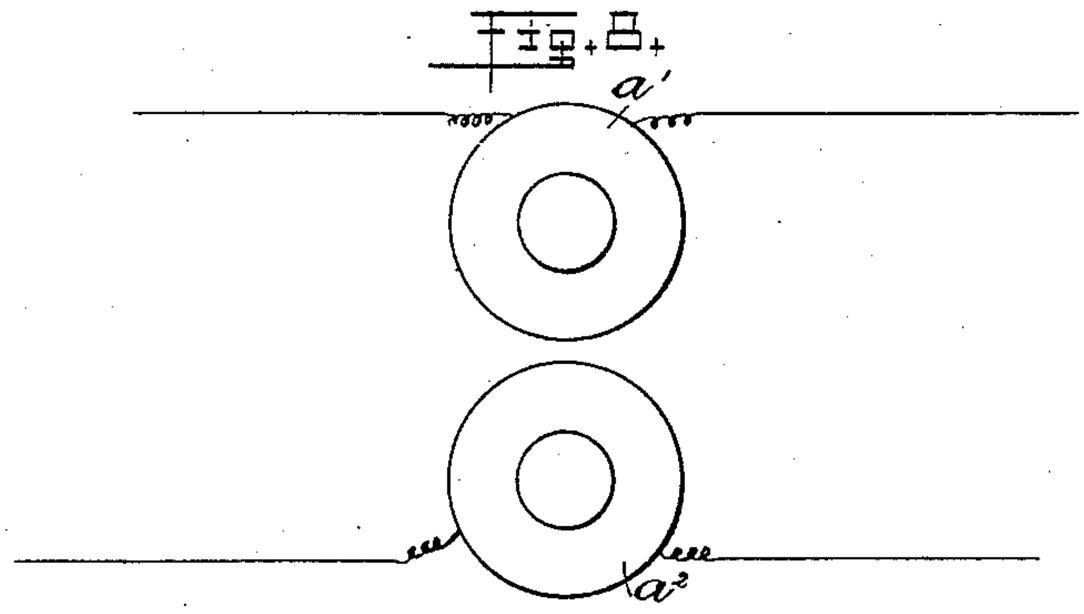


Fig. 8.



Witnesses.
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Frederick L. Emmy-

Inventor.
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UNITED STATES PATENT OFFICE.

HENRY A. CHASE, OF BOSTON, MASSACHUSETTS.

ELECTRIC CUT-OUT.

SPECIFICATION forming part of Letters Patent No. 432,978, dated July 29, 1890.

Application filed March 27, 1890. Serial No. 345,567. (No model.)

To all whom it may concern:

Be it known that I, HENRY A. CHASE, of Boston, county of Suffolk, State of Massachusetts, have invented an Improvement in Electric Cut-Outs, of which the following description, in connection with the accompanying drawings, is a specification, like letters and figures on the drawings representing like parts.

This invention has for its object to construct a protector for electrical instruments which shall operate upon the presence of an abnormal current to shunt out and immediately thereafter cut out the instrument, although in some instances it may only shunt out the instrument and in others it may only cut out the instrument; but in any event the direction of the current is to be diverted from passing through the instrument.

In accordance with this invention, two helices are included in the circuit—one at each side of the instrument to be protected—and I have preferably wound them on the same core, and hence in the same direction, although an independent core might be used for each helix. The core is made quite long, and the helices each comprise a good many turns, to thereby form a magnet of high self-induction.

An armature is provided for the electro-magnet, which controls a shunt-circuit closer of any suitable construction, although for practical use I prefer a special form, which I herein denominate a "gravity-shunt," it consisting of a pivoted arm adapted when released or moved by the armature of the electro-magnet to close a shunt-circuit around the instrument to be protected, and by its great range of movement a perfect contact can be insured. Fuse-wires, preferably of high resistance, as German-silver wire, are also employed, preferably two in number, one being included in circuit at each side of the instrument to be protected, and bridge-walls are placed between the posts or supports of said fuse-wires, which serve to prevent the formation or cause the immediate destruction of any arc caused or which might be caused by rupture of the fuse-wires. The fuse wire or wires are located near the shunt, so as to be influenced by the counter-electro-motive force produced by shunting the instrument, and to decrease the resistance as much as possible between the shunt and fuse-wires I prefer to place the electro-magnet between the shunt formed and the instrument to be protected.

Figure 1 shows in side elevation an electric switch or cut-out embodying this invention; Fig. 2, a plan view of the cut-out shown in Fig. 1; Fig. 3, a cross-section of the cut-out shown in Fig. 2, taken on the dotted line $x\,x$, looking toward the right. Fig. 3^a is a view of the upper end of plate c; Fig. 4, a diagram showing the circuits of the device shown in Fig. 2; Fig. 5, a similar diagram showing the electro-magnet placed between the shunt and fuse-wires; and Figs. 6, 7, and 8, modifications to be referred to.

The base-plate A has arranged on it an electro-magnet, which for the accomplishment of the best results consists of a core a, having two helices a' a^2 wound thereon in the same direction. (See Fig. 4.) The core a is made quite long and quite large in diameter, and the helices a' a^2 each comprise a good many turns. The armature b of the said electro-magnet is pivoted at b' to a stand b^2, said armature having a hole through it, which receives loosely a guide-pin b^3. The outer end of the armature b is forked (see Fig. 2) to receive the upper end of a plate c, pivoted at c', and having at its upper or outer end two laterally-extended projections c^2 c^2—one at each side—which when the plate is raised passes by pins or projections c^3 on the inside of the forked end of the armature. A block d, of conducting material, is secured to or formed integral with the plate c. This plate c and block d, I herein term a "gravity" shunt or drop.

A hole d' is made on the base-plate, and two pens or yielding arms d^2 d^2 extend up through said hole d', terminating a short distance apart. When the gravity shunt or drop falls, the block d, which preferably has a V-shaped edge, enters between the two pens d^2 d^2, and, being made of metal, makes metallic contact therewith. While I prefer to employ a gravity-shunt of this kind, yet any other form may be made very effective.

The armature b has a spring b^5 at its rear end, which bears against an adjusting-screw b^6, by which the tension on the armature can be adjusted.

The wire which is used in the electro-mag-

net is of large size or gage, so that the armature *b* is normally retracted, even though the circuit in which the helices are included is closed; but when an abnormal current passes over the line the armature will ordinarily be attracted and the gravity shunt or drop will fall. I have also arranged on the same base-plate four posts 2 3 4 5, and have connected the posts 2 3 and the posts 4 5 with fuse-wires 6 7, of any usual or suitable material or composition of high resistance—such, for instance, as German-silver wire of fine gage. I have also placed a wall *i* between the posts 3 5, and another wall *i'* at right angles to it between the posts 2 3 and 4 5, and have provided said wall *i'* with small holes, through which the fuse-wires pass.

When an abnormal current passes over the line and the fuse-wire melts or ruptures, the arc which forms will be blown or ruptured by the said wall.

The wall *i* is for the purpose of preventing the formation of an arc between the posts 3 5.

The protector herein described is connected in circuit, as best shown in Fig. 4, the line-wire at one side of the instrument to be protected including the post 3, fuse-wire 6, post 2, pen d^2, and helix a^2, and at the other side of the instrument to be protected including the post 5, fuse-wire 7, post 4, pen d^2, and helix a'. Upon the passage of an abnormal current over the line, the armature being attracted, the gravity-shunt falls, shunting out the instrument, as well as the electro-magnet, and thereby decreasing the resistance between the fuse-wires 6 7 and forming a new path for the current when, by the counter-electro-motive force, or "kick," as it is commonly called, the fuse-wires will be instantly ruptured. If the current shall be one which for any reason will not affect the electro-magnet, then the fuse-wires may melt and open the circuit, and if the current be one that will not rupture the fuse-wires, even when short-circuited, the instrument will be shunted out in that event.

I desire it to be understood that the walls herein shown—one or both of them—for preventing the formation of or for destroying an arc may be used in cut-outs wherein an electro-magnet is omitted, and also that the electro-magnet may be employed to operate a gravity shunt or drop, even though the fuse-wires are omitted, and, furthermore, in lieu of the particular form of shunt-circuit closer shown in Figs. 1 and 4, any other well-known or suitable form may be employed.

While I prefer to employ an electro-magnet of the kind herein shown—viz., comprising a core and two helices wound in the said direction to augment the magnetic effect—I desire it to be understood that two helices, each having its own core, may be employed and included in each side of the instrument; but for simplicity I prefer the form herein shown.

By referring to Fig. 6 another form of shunt-circuit closer is illustrated, it consisting of a block *d*, attached to a plate *c*, pivotally connected to the armature *b*. Contact-pens d^2 d^2 are arranged to receive between them the block *d*, and thereby close the circuit.

Referring to Fig. 7, two contacts 10 12 are placed on elastic arms, and the armature of the electro-magnet is arranged on one of the arms, so that when attracted it will effect closure of the circuit.

Referring to Fig. 8, two separate helices are employed wound on separate cores, one of which is included in the line at each side of the instrument to be protected.

In Fig. 5 I have placed the electro-magnet between the shunt and fuse-wires, by which arrangement I have produced very efficient results.

I claim—

1. In an electric cut-out, an electro-magnet and its armature combined with a gravity shunt-circuit closer comprising a movable member held in position to be released by said armature, and two pens d^2 d^2, included in circuit with the instrument to be protected, one at each side thereof, with which the said movable member co-operates, and fuse-wires included in the line near the pens d^2 d^2, substantially as described.

2. In an electric cut-out, an electro-magnet comprising a core and two helices, each included in circuit with the instrument to be protected, one helix at each side thereof, an armature for the said electro-magnet, and a gravity-shunt adapted to be released by the attraction of said armature, and contact-pens with which said gravity-shunt co-operates, substantially as described.

3. In an electric cut-out, an electro-magnet, an armature therefor, and a gravity-shunt consisting of a plate and a block of conducting material V-shaped in cross-section, combined with two pens d^2 d^2, between which the said block enters when it falls, said pens being included in the line, one at each side of the instrument to be protected, substantially as described.

4. In an electric cut-out, an electro-magnet, an armature therefor having a forked end provided with pins c^3 c^3, combined with a gravity-shunt consisting of a pivoted plate having lateral projections c^2 c^2, which co-operate with the pins c^3 c^3, a block, as *d*, and contact-pens d^2 d^2, substantially as described.

5. In an electric cut-out, an electro-magnet of high self-induction comprising two helices, one included in circuit at each side of the instrument to be protected, a shunt-circuit closer controlled by said electro-magnet, and two fuse-wires 6 7, which are located adjacent said shunt-circuit closer, and which are ruptured by the counter-electro-motive force caused by closing said shunt, substantially as described.

6. In an electric cut-out, an electro-magnet of high self-induction comprising two helices, one included in circuit at each side of the instrument to be protected, a single core upon

which the helices are wound, a shunt-circuit closer controlled by said electro-magnet, and two fuse-wires 6 7, which are ruptured by the counter electro-motive force caused by closing said shunt, substantially as described.

7. In an electric cut-out, an electro-magnet of high self-induction and a shunt-circuit-closer operated by it, combined with a fuse-wire placed near said shunt to receive the counter electro-motive force caused by closing said shunt and to be thereby ruptured, substantially as described.

8. In an electric cut-out, an electro-magnet of high self-induction and a shunt-circuit closer, said electro-magnet being included in the line between the said shunt-circuit closer and the instrument to be protected, and a fuse-wire included in the line at the opposite side of said shunt-circuit closer to be ruptured by the counter electro-motive force caused by closing said shunt, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HENRY A. CHASE.

Witnesses:
GEO. W. GREGORY,
EMMA J. BENNETT.