

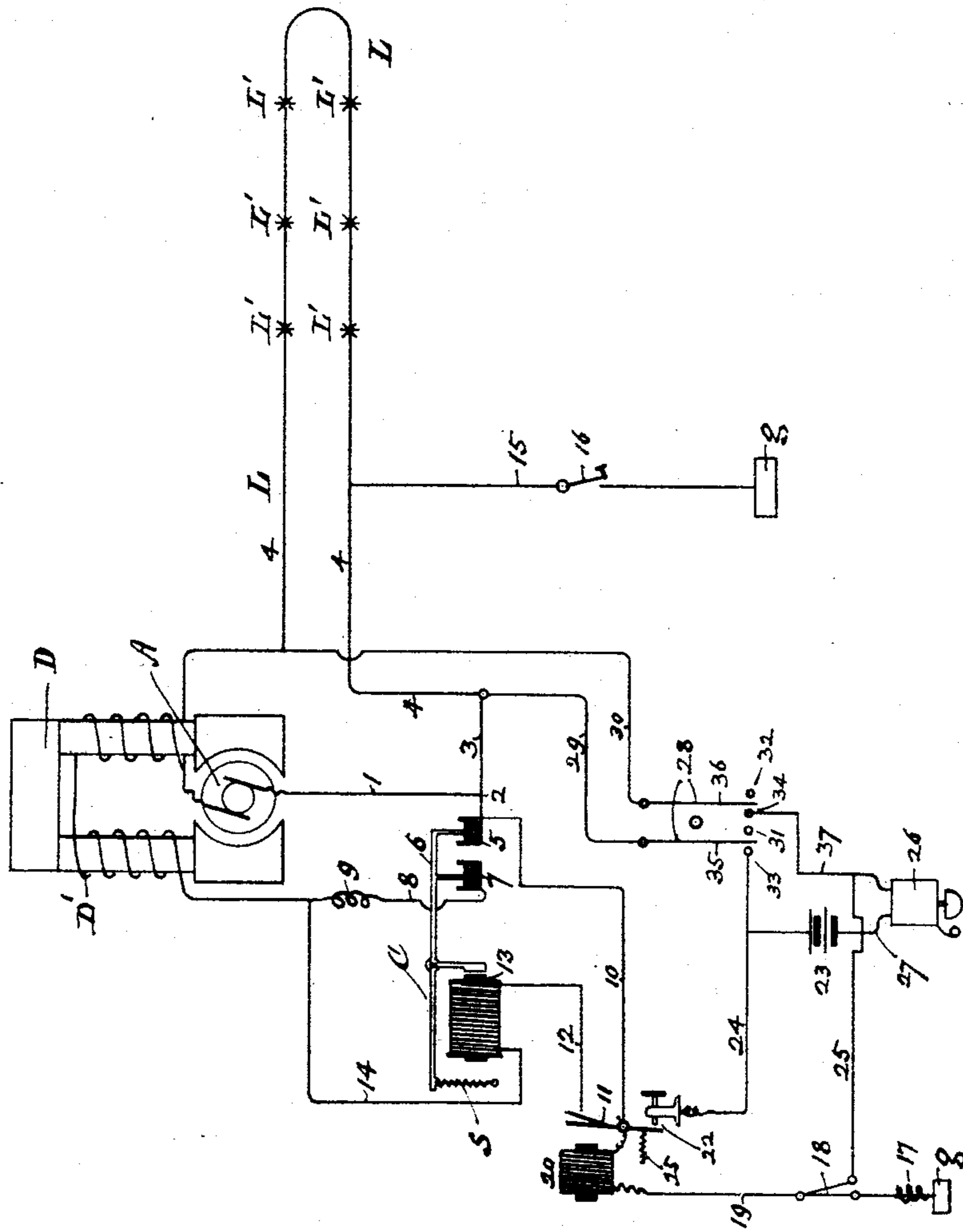
(No Model.)

G. T. WOODS.

AUTOMATIC SAFETY CUT-OUT FOR ELECTRIC CIRCUITS.

No. 438,590.

Patented Oct. 14, 1890.



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# UNITED STATES PATENT OFFICE.

GRANVILLE T. WOODS, OF CINCINNATI, OHIO, ASSIGNOR TO THE WOODS  
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## AUTOMATIC SAFETY CUT-OUT FOR ELECTRIC CIRCUITS.

SPECIFICATION forming part of Letters Patent No. 438,590, dated October 14, 1890.

Application filed April 8, 1890. Serial No. 347,048. (No model.)

*To all whom it may concern:*

Be it known that I, GRANVILLE T. WOODS, a citizen of the United States, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented new and useful Improvements in an Automatic Safety Cut-Out for Electric Circuits, of which the following is a specification.

My invention relates to automatic cut-out devices for electric light and power circuits, and is in the nature of an improvement upon that for which Letters Patent No. 395,533 were granted to me on January 1, 1889. In said patent I described and illustrated an apparatus to be attached and interposed in the circuit at or near the generator, whereby a breakage of the outer circuit would also cut out the generator, so that no current could pass to the outer line. Said device was of great utility for the purpose and a perfect protection to the public from injuries from contact with severed line-circuits. Many accidents of a different nature happen, however, from the accidental contact of the line-conductors of light or power circuits with telephone or telgraph wires, parts of buildings, &c., where telephone or telegraph instruments are injured or destroyed, and buildings fired. My present improvement is designed to meet these extra conditions and provide for a similar cutting out of the generator whenever a grounding-contact of the line-conductor occurs from any cause, whether by swaying against a telephone-wire or imperfect insulation in buildings, and incidentally it is useful in discovering the condition of any of such electric circuits and compelling a correction of any imperfections. The improvement is thus a benefit to the public in preventing accidental injuries to persons and property, and to the owners of electric plants in pointing out defects in the outer circuits, whereby a leakage may occur. To the accomplishment of these ends I provide apparatus and arrange the circuits, as more fully described hereinafter.

My invention is illustrated in the accompanying drawing, showing the apparatus and circuits diagrammatically in conventional form.

Referring now to the drawings, A designates

the armature, and D the field-magnet, of a generator for supplying, for example, an arc-light circuit L L, in which the outgoing current passes by conductors 1 3 4 through the lights L L L L and back to the armature A. The outgoing current divides at 2, a portion passing through the contact-cups 5 7 by means of the bridge 6, presently to be described, and by conductor 8, through resistance 9, and the field-coil D I constituting the loop for energizing the field. The bridge 6 is a portion of a two-pronged lever-switch C, controlled by magnet 13 in opposition to a spring s, and interposed in a loop carried from the field-coil D I of the dynamo through conductors 14 12, switch 11, conductor 10, back through resistance-coil 8 and line 9 to mercury-cup 5.

The apparatus and circuits thus far described are substantially in effect the same as those in my former said Letters Patent, excepting as to the switch 11, which constitutes part of my present improvement. Switch 11 is normally controlled by a spring 25, to form the connection between the conductors 10 and 12. It is provided, however, with a magnet 20, which when energized attracts it against the force of its spring and breaks the described connection. The magnet 20 is placed in a ground-line 19 g, connecting with the conductor 10 through the coil of magnet 20, whereby any accidental grounding of the line 4 in the outer circuit L completes the circuit and energizes the magnet 20. The result of this, as will be readily observed, is also to de-energize magnet 13 and allow the bridge 6 to be raised by its counter-springs, thus severing the connection between the mercury-cups 7 5 and completely breaking the field-magnet circuit.

I have shown a ground-connection 15 g in the outer circuit 4, provided with a hand-switch 16, which normally stands open. I provide a number of these at various points on the outer circuit for use more particularly by firemen or the police in case of need, whereby upon closing the switch 16 the outer circuit may at any time be grounded.

I further provide a back-stop contact 22 for the switch-lever 11, having a conductor 24, local battery 23, connected thence by conductor

27, bell-signal 26, conductor 25, back to a normally-closed hand-switch 18 in the ground-line 19 *g*, whereby a grounding of the outer line is at once indicated by the signal 26, which  
 5 will continue to ring until the switch 18 is opened. A resistance 17 is placed between the switch 18 and the ground to insure the due operation of the signal.

In addition to these features I provide a  
 10 double-point switch 28, connected by wires 29 and 30 to opposite sides of line 4 of the outer circuit. Its levers 35 and 36 are normally upon the stops 31 and 32; but it may be moved over to points 33 34, thus connecting wire 29  
 15 with wire 24, and wire 30 with wire 37, extending to the signal, and by wire 27 to local battery 23. This portion of the apparatus furnishes the means upon opening switch 18 and  
 20 manipulating switch 28, as indicated, of sending and receiving any predetermined code of signals over the outer circuit *L*, whereby the lineman on the outer circuit, by making and breaking contact at the severed portion of the outer circuit, may operate the signal-bell at  
 25 the generating-station, or by interposing a signal-bell of his own between the severed ends may receive similar signals sent by the station attendant by manipulating switch 28, the local battery in both cases furnishing the  
 30 power.

I claim as my invention and desire to secure by Letters Patent of the United States—

1. In combination with a generator, an outer circuit and an automatic cut-out device, a loop  
 35 from the outer circuit around the cut-out but through a magnet controlling said cut-out, an armature make-and-break switch in said loop, and an extension of the main-line wire through  
 40 a magnet controlling said make-and-break switch to ground, substantially as set forth.

2. In combination with the main generator, outer circuit cut-out device, and an auxiliary grounded cut-out switch, a local-battery circuit including a signal device and connected  
 45 at one end with the back stop of the auxiliary switch-lever and at the other with the ground-wire, substantially as set forth.

3. The combination, with the main generator, outer circuit, and cut-out device, of a local battery and signal-circuit connected at  
 50 opposite sides of the outer line-conductor by a two-point switch, substantially as set forth.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

GRANVILLE T. WOODS.

Witnesses:

ELLA HOSEA,  
 R. M. HOSEA.