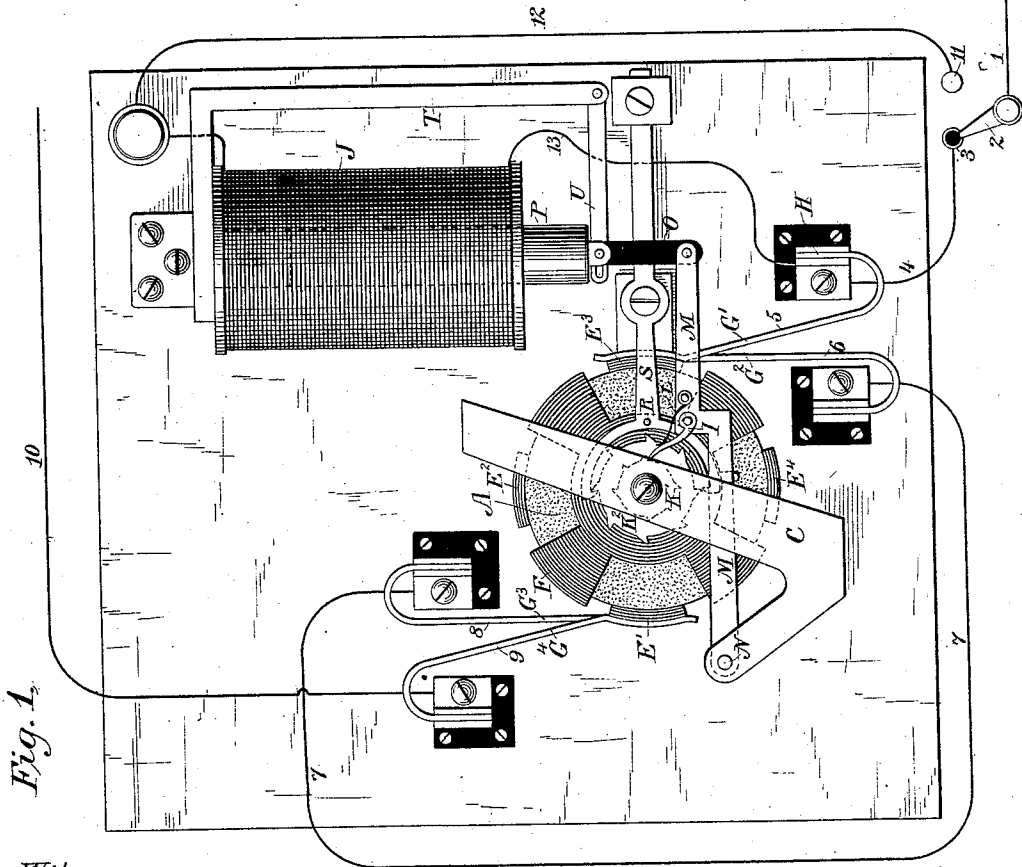
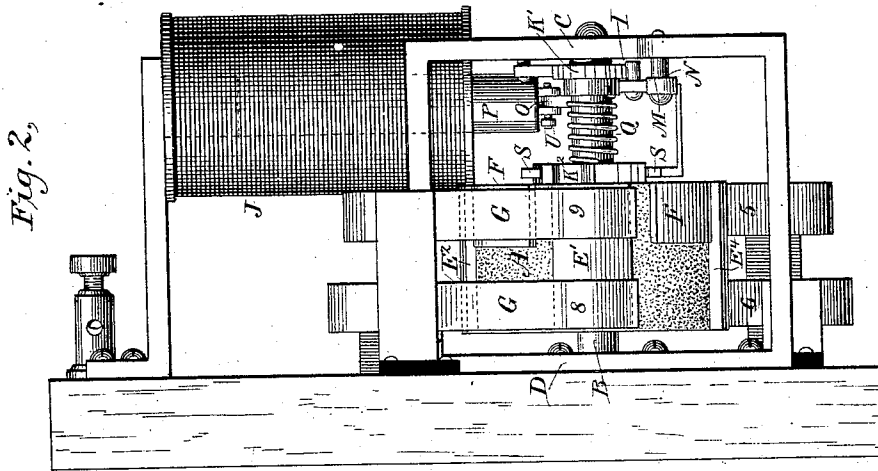


(No Model.)

R. J. SHEEHY.  
AUTOMATIC CUT-OUT FOR ELECTRIC CIRCUITS.

No. 281,799.

Patented July 24, 1883.



Witnesses.

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# UNITED STATES PATENT OFFICE.

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## AUTOMATIC CUT-OUT FOR ELECTRIC CIRCUITS.

SPECIFICATION forming part of Letters Patent No. 281,799, dated July 24, 1883.

Application filed October 13, 1882. (No model.)

*To all whom it may concern:*

Be it known that I, ROBERT J. SHEEHY, a citizen of the United States, residing in the city, county, and State of New York, have invented a new and useful Improvement in Automatic Cut-Outs for Electric Circuits, of which the following is a specification.

My invention relates to that class of electrical devices or appliances commonly denominated "cut-outs" or "switches," especially such as are designed to be employed in connection with electric lighting or other circuits in which currents of high electro-motive force and great quantity are employed.

In establishing electric lights within dwellings, warehouses, factories, and other structures for illuminating purposes, it has been found impracticable to so arrange and connect the conductors as to absolutely preclude the possibility of a person within the building accidentally coming into contact with both wires simultaneously, or with one of the wires and a conductor connected with the earth, and thereby receiving a severe and even dangerous electric shock. Moreover, secondary or false arcs are sometimes established by the accidental contact of the conductors with each other or with some more or less perfectly-conducting medium. Especially are firemen exposed to danger while engaged in extinguishing conflagrations in buildings in which electric lights are employed, for the reason that the insulating material with which the conductors are protected becomes melted by the heat, and the conductors themselves are liable to become severed. In such cases an accidental contact with the heavily-charged conductors, or with a detached end of one of the conductors, exposes the firemen to the liability of receiving through his body a severe and perhaps fatal electric shock. The firemen are consequently greatly impeded in the prosecution of their work by exposure to this additional danger.

The object of my invention is to provide a simple and efficient automatic device whereby the loop-circuit, in which is included either an electric light, rheostat, or other device, may be introduced into the main circuit or absolutely disconnected therefrom, at the same time leaving the main line complete and uninterrupted.

My invention may be in general described as a cut-out or switch mechanism automatically operated by a predetermined increase in the strength of the current traversing the main line of conductors, such augmented current developing a corresponding increase in the electro-magnetism, which acts in such manner as to cause the step-by-step advancement of a non-conducting drum or cylinder. The metallic strips or bridge-pieces employed to make the desired connections between the electrodes of the main line and loop-circuit are affixed to this cylinder. The electrodes may be thus united through the said strips or bridges by the rotation of the drum in the manner required. Thus the parts are preferably so arranged that at every alternate step the loop is withdrawn entirely from the main line, the latter being completed through one of said metallic bridges. At the intermediate positions of the drum the arrangement of circuits is so changed as to include the loop in the main line. If when the loop-circuit is disconnected it is desired to reconnect it, it is only necessary to advance the drum through the distance of one step. To withdraw said loop thereafter the drum must be again revolved through a second step. The advance movement of the drum is effected by an increase in the electro-magnetism which is developed whenever the main current exceeds a predetermined strength. The abnormal current develops sufficient magnetic force to propel its armature through a distance which will effect the winding of a spring during its progressive movement and the liberation of the said spring at a point near the close of said movement, so as to transmit the power of said spring to the drum, thereby causing the latter to turn through a predetermined fraction of its revolution. The retrograde movement of said armature restores the mechanism to a position in which it is prepared to effect a second step movement.

In conjunction with the above-described cut-out mechanism I may employ a two-point switch, which in one position will introduce the electro-magnet into the main line and in the other position will cause it to be withdrawn. In this manner, by merely directing the current through the agency of the two-point

switch, the step-by-step movement of the drum and the consequent introduction and withdrawal of the loop into and from the main-line circuit may be effected with precision.

5 My invention is set forth in the accompanying drawings, in which Figure 1 is a front view, and Fig. 2 an elevation, of my improved cut-out.

To parts appearing in both figures I have applied similar reference-letters in each.

A is a drum or cylinder of suitable non-conducting material, preferably compressed paper-pulp, mounted upon a shaft, B, turning in bearings at C and D. This drum is provided with four longitudinal metallic strips or bridge-pieces, E<sup>1</sup> E<sup>2</sup> E<sup>3</sup> E<sup>4</sup>, arranged parallel to its axis and placed at equal apart intervals upon its convex surface. The upper face or end of said drum is also provided with the cross-shaped bridge-piece F, the arms of which extend over the edges of the face and project downward, as shown in Fig. 2, to a point not quite half the distance to the lower face.

The electrodes, which are to be united by means of the bridge-pieces, are shown at G<sup>1</sup> G<sup>2</sup> G<sup>3</sup> G<sup>4</sup>. Each consists of a metallic spring, one end of which is rigidly connected to a binding-post, as at H, for uniting it to the conductor of the circuit of which it forms an electrode, while its other end is free to press against the metallic bridge-pieces upon the convex surface of the drum A.

The arrangement of the circuits is as follows: If the two-point switch be used, the current, entering by the binding-post 1, will pass by said switch 2, contact-button 3, (if the switch is placed as shown in the figure,) conductor 4, electrode 5, bridge E<sup>1</sup>, electrode 6, loop-circuit 7, electrode 8, bridge E<sup>2</sup>, electrode 9, and main-line circuit 10. Thus both line and loop are included in a continuous circuit. If, now, it be desired to withdraw the loop from the circuit, the switch 2 is turned upon the binding-post 11, and the current passes, by conductor 12, coils of electro-magnet J, and conductor 13, to the electrode 5, and thereafter by the course already traced. This immediately actuates the electro-magnet J and withdraws the loop by causing the drum to advance through one-eighth of a complete revolution, in the manner to be hereinafter described. The switch is then replaced. To reintroduce said loop it is only necessary to repeat this movement of the switch, whereupon the electro-magnet J will be again magnetized and the drum again turned in the same manner.

It is not essential that a manually-operated switch—such as shown in the figure—should be employed in all cases. A clock-work mechanism or time-train for actuating a two-point switch at any predetermined time may be substituted, or said switch may be operated by electro-magnetism transmitted through a second circuit.

The shaft B also carries a ratchet-wheel, K<sup>1</sup>, mounted loosely thereupon, with the teeth of

which a dog, I, engages, the latter being held in position by a spring, L, and both being carried by a lever, M, pivoted to the frame-work of the instrument at N, and connected by a link, O, to the axial armature-core P of the solenoid or electro-magnet J. The several parts of this system are so proportioned that under the influence of a current exceeding a predetermined maximum or normal strength the augmented attraction of the electro-magnet J will cause the movement of the armature-core a sufficient distance to move the ratchet-wheel K<sup>1</sup> through a determinate fraction of one complete revolution—as, for example, one-eighth—as shown in the figure. This movement effects the winding of the spring Q, the ends of which are respectively attached to the ratchet-wheels K<sup>1</sup> and K<sup>2</sup>, and at the end of the stroke contact is made with the pin R, carried by the escapement S, whereby said escapement is released from the teeth of another ratchet-wheel, K<sup>2</sup>, loosely carried by and rigidly attached to said shaft or to the upper face of the drum, thereby communicating the power of said spring to the drum, and causing the advance of the latter through the same angular distance. The retrograde movement of the lever M is again utilized at the end of its downward movement to return the escapement mechanism to the position necessary for repeating the operation, as hereinbefore described. A too rapid motion of the drum is prevented in the usual manner by the action of the pallets of the escapement.

In place of the usual electro-magnet, I prefer to employ the system shown in Fig. 1, in which a check-piece, T, provided with a feed-link, U, serves to connect the movable core P with a separate portion of the core of the electro-magnet J, which is stationary and contained within the coils. The sensitiveness of the magnet is materially increased by this arrangement.

Having thus described my invention, I claim—

1. The combination, substantially as hereinbefore set forth, of an electro-magnet, a system of circuit-closing devices, a spring first wound up by the action of said electro-magnet, and subsequently liberated by the action of said electro-magnet, to cause the actuation of said system of circuit-closing devices.

2. The combination, substantially as hereinbefore set forth, of a drum carrying a system of circuit-closing bridges, a spring, an electro-magnet which, as its strength increases, winds up said spring, and which, when said strength exceeds a predetermined degree, actuates mechanism to release said spring, to expend its energy in revolving said drum.

3. The combination, substantially as hereinbefore set forth, of a drum, circuit-closing bridges upon the convex exterior surface thereof, and bridges upon one of the transverse faces thereof, extending also upon said convex surface.

4. The combination, substantially as here-

inbefore set forth, of a revolving drum provided with circuit-closing or circuit-connecting bridges, a spring for causing the advance of said drum, mechanism actuated by electromagnetism for causing the winding of said spring, and an escapement mechanism for controlling the operation of said spring.

5 5. The combination, substantially as here-  
inbefore set forth, of a main circuit, a loop-  
10 circuit, metallic electrodes for each of said  
circuits, a drum capable of being revolved  
step by step in one direction, and metallic  
bridges upon said drum, which, by engaging  
with said electrodes, introduce said loop into  
15 said main circuit with each alternate step  
movement of said drum.

6. The combination, substantially as here-

inbefore set forth, of a main circuit, a loop-circuit, metallic electrodes for each of said circuits, a drum capable of being revolved step 20  
by step in one direction, metallic bridges upon said drum engaging with said electrodes, and thereby introducing said loop into said main circuit with each alternate step in said revolution, and means, substantially such as 25  
described, whereby said drum is revolved step by step.

In testimony whereof I have hereunto subscribed my name this 5th day of October, A. D. 1882.

ROBERT J. SHEEHY.

Witnesses:

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