

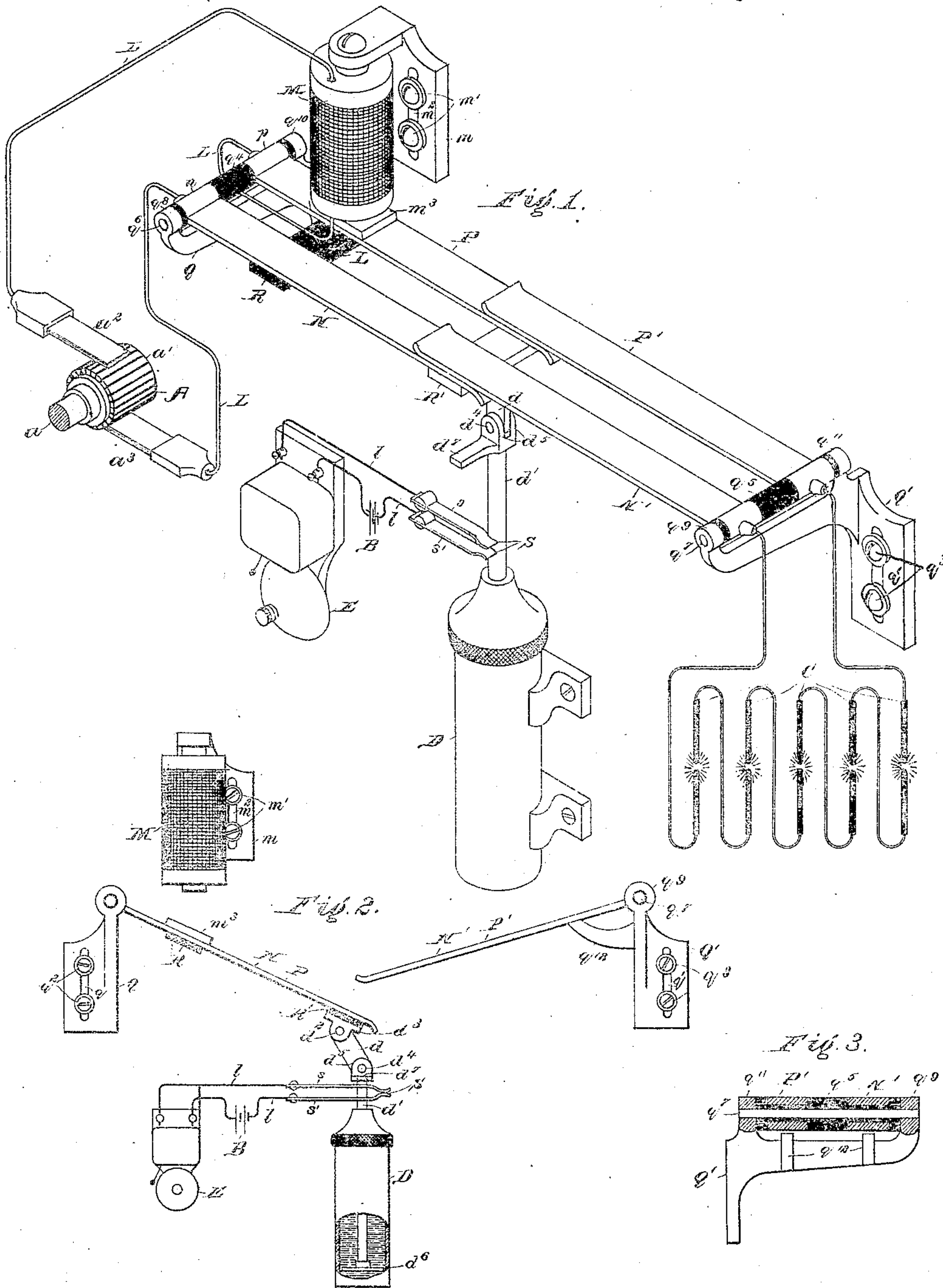
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(No Model.)

G. L. HALL.
ELECTRICAL SAFETY SWITCH.

No. 453,046.

Patented May 26, 1891.



Witnesses
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UNITED STATES PATENT OFFICE.

GEORGE L. HALL, OF LOWELL, MASSACHUSETTS.

ELECTRICAL SAFETY-SWITCH.

SPECIFICATION forming part of Letters Patent No. 453,046, dated May 26, 1891.

Application filed March 19, 1890. Serial No. 344,452. (No model.)

To all whom it may concern:

Be it known that I, GEORGE L. HALL, a citizen of the United States, residing at Lowell, in the county of Middlesex and Commonwealth of Massachusetts, have invented a certain new and useful Improvement in Electrical Safety-Switches, of which the following is a specification.

My invention relates to electrical safety-switches; and it consists in the devices and combinations hereinafter described and claimed, the object of the same being to open the line in one or more places, preferably two, upon a failure of the current, as by the breakage of the line-wire, and to prevent accidents which might be caused by the falling of a broken end of the line-wire upon a person or animal, or upon other conducting material electrically connected with the earth.

In the accompanying drawings, Figure 1 is an isometric perspective view of my improved safety-switch arranged in a line containing a dynamo and electric arc lights, showing also an alarm-bell circuit normally open and adapted to be closed by the operation of the switch to give an alarm to an attendant in the dynamo-room; the safety-switch being closed; Fig. 2, a front elevation of said safety-switch open, the alarm devices, the main line, dynamo, and lights being omitted and the alarm-circuit being closed; Fig. 3, a side elevation of one of the switch-supporting brackets, the upper portion of the same being in central vertical section to show the levers of a pair insulated from each other.

A represents so much of a dynamo as is necessary for the understanding of my invention, a being the commutator-shaft, a' the commutator, and a^2 and a^3 the brushes of said dynamo, the parts being of any usual construction.

L represents the line connecting the opposite brushes of the dynamo, and C are lights arranged in the circuit in the usual manner.

The safety-switch hereinafter described is arranged in the circuit, and consists of an electro-magnet M, through which the current passes from the dynamo into a lever P of metal, thence into a lever P', normally in contact with the lever P, thence through the light C, thence through a lever N', and thence through

the lever N to the brush a^3 of the dynamo. The electro-magnet M is of the usual construction and is supported in an obvious manner upon a bracket m , adapted to be secured to the wall of the dynamo-room or other suitable vertical support by screws m' , passing through a vertical slot m^2 in said bracket m into said wall or other support to enable the distance of the magnet from its armature m^3 to be varied as may be desirable. The levers P N are connected to opposite brushes of the circuit, as shown in Fig. 1, and are of conducting material, as brass or copper, and are both pivoted upon a bracket Q, having a vertical slot q , through which screws q^2 are driven into the wall of the dynamo-room, the slot enabling the bracket Q to be adjusted vertically to vary the distance between the electro-magnet and its armature, as above stated. The armature n^3 of the electro-magnet M is rigidly secured to one of the levers P N, to which one of them is immaterial, and said levers are rigidly connected to each other by cross-bars R R' of insulating material, as vulcanite, so that said levers move as one. The bearings of the levers P N are insulated from each other, each of said levers being provided with a sleeve p and n , which turns upon a sleeve of insulating material, as hard rubber q^4 , supported upon a rod q^6 , held in ears q^8 q^{10} , which project upward from the bracket Q, as shown in Figs. 1 and 3. When a current is in the line, the levers N P are held up in a horizontal position by the attraction of the electro-magnet M. The levers P' N', also of conducting material, are supported upon the bracket Q', just as the levers P N are supported upon the bracket Q, their bearings being insulated from each other by an insulating-sleeve q^5 , supported upon a rod q^7 , held in ears q^9 q^{11} on said bracket Q', and said last-named bracket is also adjustable upon the wall of a dynamo-room or other support by means of a vertical slot q' and screws q^3 , corresponding to the parts of the same name above described in referring to the bracket Q. The levers N' P' are not connected to each other mechanically, but each is allowed to move independently of the other, in order to insure a better contact of these levers and the levers P N, the free end of the lever P' normally resting upon the free end of the lever P and the free end of the le-

ver N' upon the free end of the lever N when the switch is closed. The levers P' N' are connected by the line L through the arc-light system, as shown in Fig. 1.

From the above description it is evident that a total failure of the current will render the electro-magnet M inert and allow the united levers P N to fall away from the levers P' N', and thus break the line in two places. It frequently happens that the current, although not totally failing, is partially interrupted, producing what is called "flashing" of the lights, and it would be undesirable to open the circuit, because of such partial or momentary interruption. The cross-bar R', which connects the levers P N near their free ends, is therefore connected by a link d to the piston-rod d' of a dash-pot D, the upper end of said link being pivoted at d^2 to a bracket d^3 , secured on said cross-bar R', as shown in Fig. 2, and the lower end of said link being pivoted at d^4 between ears d^5 , with which the upper end of said piston-rod is provided, said dash-pot D being constructed in the usual manner and partially filled with any suitable liquid, as glycerine, which resists the movement of the piston d^6 , secured to the lower end of said piston-rod, and partially filling said dash-pot in a well-known manner. The dash-pot D, connected as above described to said levers P N, prevents their falling suddenly during a partial or momentary interruption of the current, and thus putting out all the lights unnecessarily, and for the same reason the levers P' N' overlie the levers P N, respectively, for a considerable distance. The use of the dash-pot allows the current to circulate for a short time, perhaps about a second or less, and enables the electro-magnet M to restore the levers to their proper position if the current be immediately re-established in full force.

The alarm devices consist of an electric bell E of the usual construction (either a tap-bell or a buzz-bell) arranged in a short line l , containing a battery B and a spring-switch S, consisting of two spring-terminals s s' , normally held apart by their own elasticity, but forced together by an arm d^7 , projecting horizontally from the piston-rod of the dash-pot, striking the upper terminal s and forcing it downward into contact with the terminal s' when the levers P N fall to open the electric-light circuit, as above described. The signal-bell will call the attention of an attendant in the dynamo-room to the fact that the line is opened and enable immediate attention to be given to repairing the line. After the line is restored to proper condition the switch P' N' N P is closed by raising the dash-pot rod by means of the arm d^7 , thus lifting the lever P' N against the under sides of the levers P' N', the latter being prevented by a projection q^{12} , extending into the path of said last-named levers from the bracket Q', from falling out of the arc described by said levers P N when the latter are raised.

I claim as my invention—

1. The combination, in a closed electric circuit, of a movable double switch consisting of two movable switches, one arranged in the line out and the other in the line in, said switches being insulated from each other but mechanically connected to each other, an electro-magnet arranged in the same circuit, and its armature secured to one of said switches, said magnet being arranged to hold said switches closed when the current is uninterrupted and at other times to allow said switches to be opened and the circuit to be broken in two places, as and for the purpose specified.

2. The combination, in a closed circuit, of a switch consisting of two levers, the free end of one of said levers overlapping and resting upon the free end of the other of said levers, an electro-magnet in said circuit, and its armature secured to the last-named lever to hold said levers in contact while the current is uninterrupted, said levers upon an interruption of the current being adapted to fall and separate from each other, as and for the purpose specified.

3. The combination, in a closed electric circuit, of a switch consisting of two levers, the free end of one of said levers overlapping and resting upon the free end of the other of said levers, an electro-magnet in said circuit, its armature secured to the last-named lever to hold said levers in contact while the current is uninterrupted, said levers upon an interruption of the current being adapted to fall and separate from each other, and means, substantially as described, for retarding the falling of said levers in order that said switch-levers may not be separated by a momentary failure of the current and may be restored to position by the attraction of said magnet, as and for the purpose specified.

4. The combination, in a closed electric circuit, of a switch consisting of two levers, the free end of one of said levers overlapping and resting upon the free end of the other of said levers, an electro-magnet in said circuit, its armature secured to the supporting-lever, a dash-pot cylinder, its piston and piston-rod, said piston-rod being jointed to said supporting-lever to retard the falling of said levers and to prevent the instantaneous opening of said switch upon a momentary failure of the current and to enable said levers to be restored to position by the attraction of said magnet, as and for the purpose specified.

5. The combination, in a closed electric circuit, of a movable switch, an armature secured thereto, an electro-magnet in said circuit arranged to attract said armature and to hold said switch closed when the current is uninterrupted and at other times to allow said switch to be opened, another circuit arranged to be closed by the opening of said switch, and alarm devices arranged in said last-named circuit and operated upon the closing thereof, as and for the purpose specified.

6. The combination, in a closed electric cir-

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cuit, of a switch consisting of two levers, the free end of one of said levers overlapping and resting upon the free end of the other of said levers, an electro-magnet in said circuit, its armature secured to the supporting-lever to hold said levers in contact while the current is uninterrupted, said levers upon an interruption of the current being adapted to fall and separate from each other, and a stop to prevent said overlapping lever from falling out of the arc of its supporting-lever,

whereby restoring said supporting-lever to position will also restore said overlapping lever to position, as and for the purpose specified.

In witness whereof I have signed this specification, in the presence of two attesting witnesses, this 25th day of February, A. D. 1890.

GEORGE L. HALL.

Witnesses:

ALBERT M. MOORE,
MYRTIE C. BEALS.