(No Model.)

L. D. HAMILTON.

DOUBLE ACTING RELAY FOR ELECTRIC CIRCUITS.

No. 303,570. Patented Aug. 12, 1884.

Fig. 1

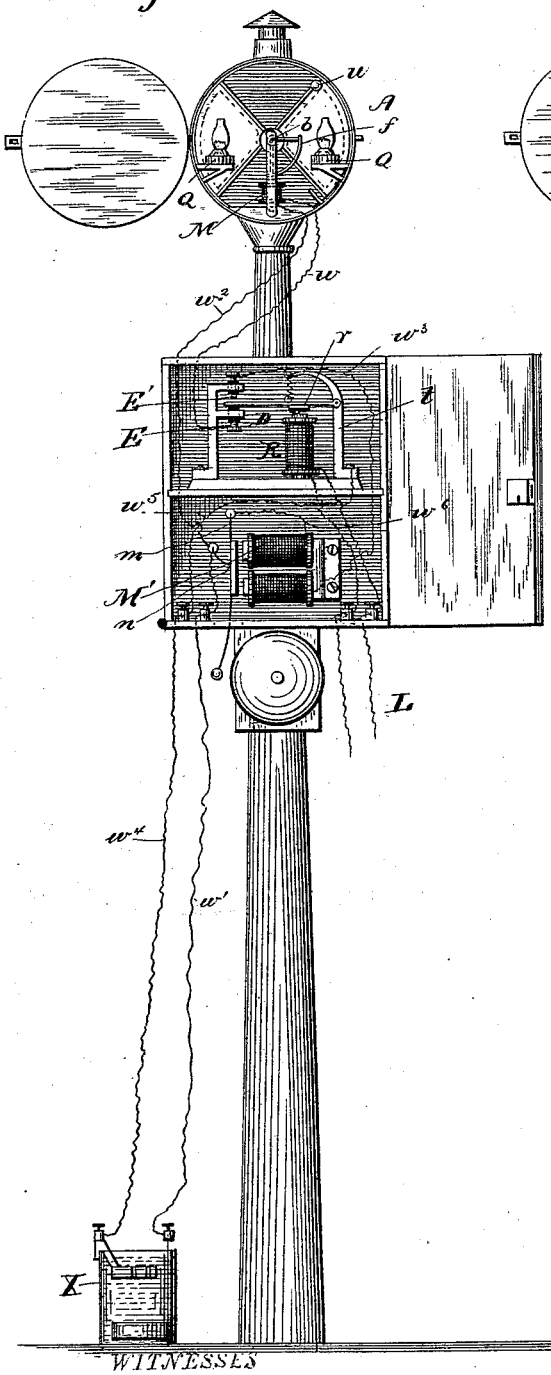
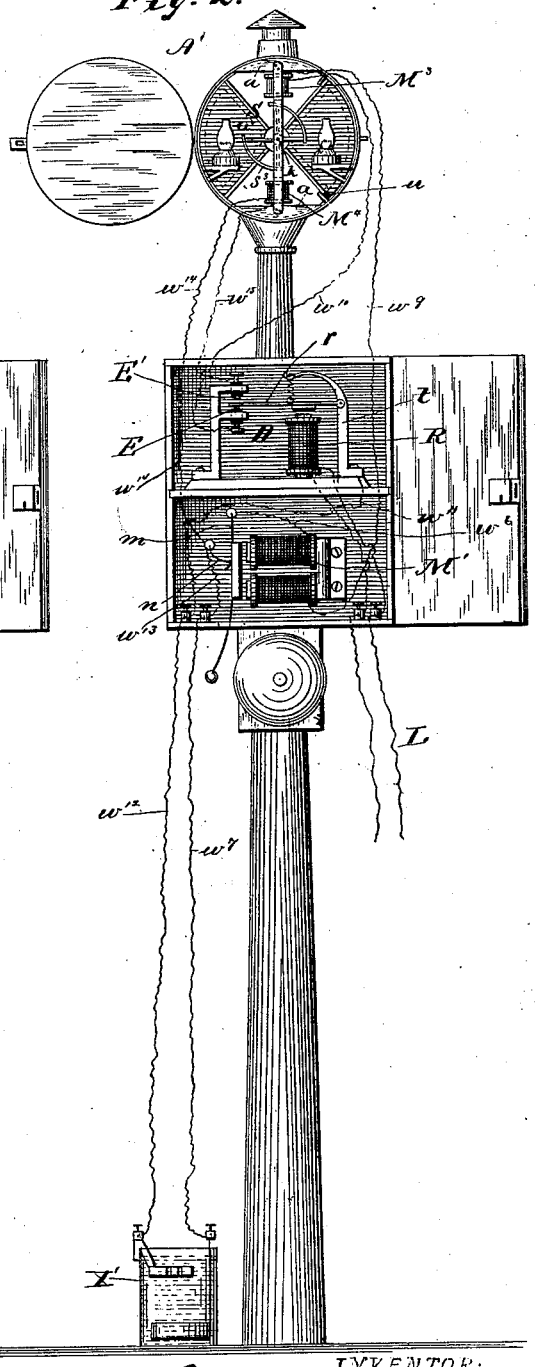


Fig. 2.



WITNESSES

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LUCIUS D. HAMILTON, OF LOUISVILLE, KY., ASSIGNOR TO THE NATIONAL ELECTRIC RAILWAY SIGNAL COMPANY, OF SAME PLACE.

DOUBLE-ACTING RELAY FOR ELECTRIC CIRCUITS.

SPECIFICATION forming part of Letters Patent No. 303,570, dated August 12, 1884.

Application filed March 3, 1884. (No model.)

To all whom it may concern:

Be it known that I, LUCIUS D. HAMILTON, a citizen of the United States, residing at Louisville, in the county of Jefferson and State of Kentucky, have invented certain new and useful Improvements in Electric Railway-Signals, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to improved means for operating simultaneously audible and visual railway-signals and controlling the same by a single main circuit.

It is the object of my invention to utilize a single local battery upon two local circuits alternately, one of said circuits being normally closed for energizing an electro-magnet for holding a visual signal in position to indicate "safety," and the other circuit being closed to operate a vibratory bell only when that controlling the visual signal is broken, and allows said signal to be brought into position by any suitable retracting-power to indicate "danger." I use for operating the signals the form of voltaic battery commonly known as the "gravity" battery, which, as is well known, is kept in its most efficient condition by having its circuit constantly closed, and is liable to become inoperative if its poles are allowed to remain long disconnected.

The invention consists in the combination, with two local circuits, including, respectively, an electro-magnetic visual signal and a vibratory electro-magnetic bell, of an automatic electro-magnetic relay included in a main circuit, and having its armature arranged to by one movement close the local circuit for holding the visual signal to "safety," and to on its opposite movement close the local circuit through the vibratory bell, and simultaneously break the local circuit through the visual-signal magnet, and allow said signal to be set for "danger" by any suitable automatic means.

In the accompanying drawings, Figure 1 is a view in elevation of an electro-magnetic visual signal and a vibratory electro-magnetic bell arranged to be controlled by a double-acting electro-magnetic relay in a main circuit in accordance with my invention. Fig. 2 is a similar view with a modified construction of visual signal.

Referring to Fig. 1, the visual signal A is of the kind shown and described in the Patent No. 287,446, granted to W. W. Le Grande, October 30, 1882, and is mounted upon a signal-post, B, in order that it may be seen at a distance. The bell C is of the usual "vibratory" type using a quantity-magnet, and is mounted upon the same post. The relay D is mainly constructed according to the well-known pattern provided with a neutral armature; but, instead of having an isolated or non-circuit-closing back stop, its back stop is the terminal of a conductor leading from one pole of a local battery through the bell-magnet.

E is the front stop, which is connected by a wire, w, to the magnet M for operating the visual signal, and through said magnet to one pole of the local battery X by wires w' and w^2, both of which are connected with the spring back stop, n, of the bell-magnet armature. The other pole of the battery is connected with the armature r of the relay D, in the usual manner, by wires w^4 and w^5.

E′ is the back stop, which is connected by a wire, w^3, with one terminal of the bell-magnet M′, the other terminal of which is connected by a wire, w^6, with the bell-magnet armature-lever m.

When the main circuit is closed through the coils of the relay-magnet R, said magnet attracts its armature against its front stop, and thus closes the local circuit which controls the electro-magnet M, and said electro-magnet swings the segmental armature s to set the signal-disk at "safety," or showing white through the openings of the casing, and will hold the signal in this position as long as the main circuit is closed and not short-circuited from the relay. As soon, however, as the main circuit is broken or short-circuited from the relay, the relay-magnet will lose its energy and release its armature, which, by its retractile spring, will be drawn against its back stop, and thus close the local circuit through the bell-magnet M, and the bell being of the kind provided with a rapidly-vibratory armature carrying the bell-hammer, will continue to ring as long as the main-line current is cut

off from the relay. As soon as the magnet M of the visual signal releases its armature, as described, said signal is, by the weight *w*, caused to swing round to a position indicating "danger," and will so remain while the main-line current is withdrawn from the relay. Thus we have a visual danger-signal displayed by gravity and an audible danger-signal continuously sounded by electricity as the result of the action of the relay on the main line being broken or otherwise rendered inoperative through the relay-magnet; and, furthermore, we have the local gravity-battery practically on a constantly-closed circuit, which is necessary to keep it in good working order.

I may use my improvement in connection with any kind of main railway-signal circuit, either normally closed or broken, but prefer to use it with a block-signal main circuit, so arranged that when a car or train is on a block the main battery will be short-circuited from the relay of all signals connected with the block. The relay and the bell-ringing devices should be inclosed in a suitable box.

In Fig. 2 the visual signal A′ is constructed to be moved in both directions by the operation of electro-magnets. The shaft *k* of the signal-disk S is provided with two segmental armatures, s^2 and s^3, arranged oppositely, and to be alternately attracted by the magnets M^3 and M^4. When the lever *r* of the relay-armature is drawn against its lower stop by the closing of the main circuit L through the relay-magnet, a circuit is closed from one pole of the local battery X′ over wire w^7, spring back stop, *n*, spring armature-lever *m*, bell-magnet M′, wire 9, signal-magnet M^3, wire w^{10}, front stop, E, of the relay, relay-armature lever *r*, post *t*, wires w^{11} and w^{12}, back to battery X. The bell will thus be set ringing and the signal set to "danger," as shown in Fig. 2, the quadrants *a′ a′* being the red or danger quadrants, and the apertures through which they are displayed being indicated by dotted lines within the outlines of said quadrants. The other part of the front wall of the casing is solid, and therefore the white or safety wings are concealed. When the main circuit L is broken, the armature-lever *r* of the relay is retracted against its back stop, E′, and then the circuit of the local battery is broken through the bell-magnet M′ and danger-signal magnet M^3, and closed through safety-signal magnet M^4, the circuit being over wires w^7 w^{13} w^{14}, magnet M^4, wire w^{15}, back stop, E′, armature-lever *r*, post *t*, wires w^{11} and w^{12}, back to the battery. The magnet M^4, being thus energized, will attract its segmental armature S^3 to to its closest position, swinging the disk S in the direction of the arrow until the white or safety quadrants *a a* of the disk are exhibited at the openings *m*, the casing and the red quadrants covered.

I lay no claim to the disk-signal moved in both directions by electro-magnets, as I believe it to be the invention of another.

I prefer to use this last-described apparatus in connection with the main block-circuit shown in the patent of W. W. Le Grande, No. 272,276, granted February 13, 1883. Such a main circuit is normally open, and thus allows the relay-armature lever to rest upon its back stop, and when closed by a passing train or car the relay-magnet is energized and draws its armature-lever against its first stop.

What I claim is—

1. The combination, with two local-battery circuits, a vibratory electro-magnetic bell in one of said circuits, an electro-magnet in the other of said circuits, a visual signal arranged to be moved by said magnet to give a predetermined indication, and automatic means for changing the signal when released by said magnet, of a double-acting relay in a main circuit, having its armature arranged to close the local circuit for operating the visual signal when moved in one direction, and to open said local circuit and close that of the bell when moved in the opposite direction, essentially as set forth.

2. The combination, with the double-acting relay having its front and back stops connected as terminals, of separate local circuits which have opposite terminals connected to the relay-armature lever of a disk-signal, a magnet connected in one of said local circuits and arranged to move said disk-signal in one direction, and a vibratory electro-magnetic bell-magnet and a magnet for moving said disk-signal in the other direction in the other local circuit, substantially as described.

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

LUCIUS D. HAMILTON.

Witnesses:

I. B. DABNEY,

W. L. LYONS.

Correction in Letters Patent No. 303,570.

It is hereby certified that in Letters Patent No. 303,570, granted August 12, 1884, upon the application of Lucius D. Hamilton, of Louisville, Kentucky, for an improvement in "Double-Acting Relays for Electric Circuits," errors in punctuation occur in the printed specification requiring correction, as follows: In line 94, page 2, the comma should be omitted after the word "terminals," and a comma inserted after the word "lever" in line 96, same page; and that the Letters Patent should be read with these corrections therein to make it conform to the record of the case in the Patent Office.

Signed, countersigned, and sealed this 19th day of August, A. D. 1884.

[SEAL.]

M. L. JOSLYN,
Acting Secretary of the Interior.

Countersigned:

BENJ. BUTTERWORTH,
Commissioner of Patents.