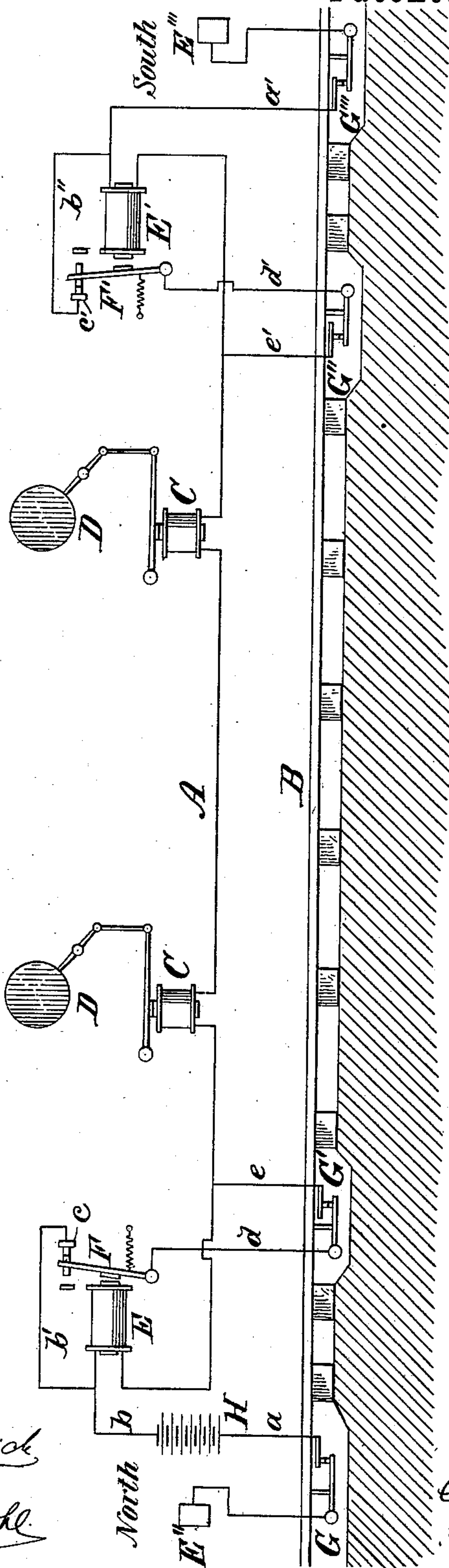


(No Model.)

W. HADDEN.  
RAILROAD SIGNAL.

No. 349,040.

Patented Sept. 14, 1886.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

WILLIAM HADDEN, OF BROOKLYN, NEW YORK.

## RAILROAD-SIGNAL.

SPECIFICATION forming part of Letters Patent No. 349,040, dated September 14, 1886.

Application filed April 6, 1885. Serial No. 161,375. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM HADDEN, of Brooklyn, in the county of Kings and State of New York, have invented a new and useful  
5 Improvement in Railroad-Signal Systems, of which the following is a specification, reference being had to the annexed drawing, forming a part thereof.

My invention relates to the class of railroad-  
10 signals in which a continuous electric current is employed for holding the signal-banners to indicate "safety;" and my invention consists in the inserting in the circuits and removing therefrom of the resistance of one or more re-  
15 lay-magnets by the action of the said magnet on its own armature-lever, as hereinafter more fully described.

For the sake of convenience in describing my improved signal, I have indicated the op-  
20 posite ends of the track-section to be protected as "north" and "south." The signal line-wire A, running parallel with the track-section B, includes one or more signal-magnets, C, adapted to operate signal-banners D in the usual way.  
25 At opposite ends of the line A are placed relay-magnets E E', provided with armature-levers F F', each having a retractile spring, and adapted to be moved by its magnet.

At the end of the track-section B which I  
30 have indicated as the "north" end I have placed two circuit-breaking track-instruments, G G', of the usual well-known construction, and at the opposite end of the track-section B, I have placed two circuit-breaking track-  
35 instruments, G'' G'''. The lever of the track-instrument G is connected with the earth-connection E'', and the contact-point of the said track-instrument is connected with one pole of the battery H by the wire a, and the oppo-  
40 site pole of the battery H is connected with one terminal of the relay E by the wire b, the remaining terminal of which is connected with the line A. A wire, b', connects the back contact-point, c, of the armature-lever F with  
45 the wire b, leading from the battery H to the relay-magnet E. The armature-lever F is connected by a wire, d, with the lever of the track-instrument G', and the contact-point of the said track-instrument is connected by a wire,  
50 e, with the line A between the first signal-magnet C and the relay-magnet E.

The track-instruments, the relay-magnet, and its armature-lever at the opposite end of the track-section B, which I have indicated as "south," are oppositely arranged with re-  
55 spect to the line-wire and track-section, but connected up in a similar way—that is to say, the lever of the track-instrument G''' is connected with the ground E'''. The contact-point of the track-instrument G''' is connect-  
60 ed by the wire a' with one terminal of the relay-magnet E'', the other terminal of the said magnet being connected with the line-wire A. The back contact-point, c', of the armature-lever F' is connected by a wire, b'', with the  
65 wire a', and the armature-lever F' is connected with the lever of the track-instrument G'' by the wire d', the contact-point of the said track-instrument being connected with the line-wire A by a wire, e'. When the armature-levers F F'  
70 are released by their magnets, they are removed by their retractile springs so as to bring their free ends into contact with their respective back contact-points c c', as shown in the drawing. The relay-magnets E E' are then cut  
75 out of the circuit or shunt-circuited, so that the current from the battery H passes in one direction through the wire a and track-instrument G to the ground E'', and in the opposite  
80 direction through the wires b b', back contact c, armature-lever F, wire d, track-instrument G', wire e, to the line A, and through the signal-magnets C included in the line to the wire  
85 e', thence through the track-instrument G'', wire d', armature-lever F', back contact c', wire b'', wire a', track-instrument G''', to the ground E'''. With the line in this condition the signal-magnets C C are energized and the banners D D are thrown up and sustained in the po-  
90 sition shown in the drawing, indicating "safety." A train entering the section B first engages the lever of the track-instrument G, breaking the battery-circuit at that point and momentarily affecting the signal-magnets C C so that their armatures are released; but no  
95 permanent indication is secured unless the track-instrument G is held continually open until the track-instrument G' is reached, when the interruption of the circuit by the movement of the lever of the said track-instrument  
100 compels the current from the battery H to pass through the relay-magnet E, whose resistance



is so great as to reduce the current to such an extent as to allow the signal-magnets C C to release their armatures, allowing the banners D D to drop, indicating "danger." At the same time the core of the relay-magnet E, being energized, attracts the armature-lever F, withdrawing it from the back contact *c*, holding the said armature-lever in this position after the track-instrument G' has been passed by the train, causing the battery-current still to flow through the relay-magnet E, so long as the armature-lever F and its back contact *c* are separated. When the train on the track-section B reaches the track-instrument G'' and moves the lever of the said track-instrument, breaking the circuit between the lever and the contact-point, causing the current from the line A to momentarily flow through the relay E' and its connections to the ground E'', the core of the relay-magnet E', being by this means energized, attracts the armature-lever F' and breaks the circuit between the free end of the said armature-lever and the back contact-point *c'*, but produces no other effect. When the train reaches the track-instrument G''' and moves its lever so as to break the circuit at that point, the current ceases to flow through the line and magnets C C and E E'. The armature-levers F F', being released and drawn back by their retractile springs, complete the circuit around the relay-magnets E E' and permit the full flow of the current over the line and through the signal-magnets C, and the said magnets, being energized again, attract their armatures and raise the banners D, indicating "safety." When the train enters the track-section B from the south, the lever of the track-instrument G''' is moved so as to interrupt the circuit while the train is passing over it; but this produces no effect other than the momentary disturbance of the current passing over the line; but when a train passes over the track-instrument G'' it interrupts the branch of the circuit passing through the wire *b'*, back contact *c'*, armature-lever F', and wire *d'*, causing the entire current passing over the line to go through the relay-magnet E', the resistance of which reduces the strength of the current so that the signal-magnets C are unable to support the banners D, when the said banners drop, indicating "danger." When the current passes through the relay-magnet E', its core becomes energized and the armature F' is drawn forward toward the magnet, breaking the circuit in the branch *b' c'*, armature-lever F', and wire *d'*, and the armature-lever is held in this position until the circuit is again interrupted by the passage of the train over the track-instrument G, when the armature-lever F' will be released, the branch circuit around the relay-

magnet E' will be again established, and the full current flowing through the signal-magnets C will cause them to act on their armatures and return the banners D to the position of "safety."

The advantage secured by my invention is, that relays E E', (either of them,) when introduced into the line-circuit, will afford sufficient resistance to diminish the current so as to weaken the magnets C and release the banners D without the interposition of extra resistance and the complicated devices necessary to introduce it into the circuit and to remove it therefrom. Another advantage in utilizing the resistance of the relay-magnet, as here shown, is, that the resistance required to render the signal-magnets inoperative is removed from the circuit without the employment of the attractive force of a relay situated in a circuit of great resistance. Thus in my device much less battery-power is required to accomplish the same result.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination of the earth-terminals E'' E''', the battery H, and the resistance-coil E, with a line of wire running from one pole of the resistance-coil to the terminal E'', the line of wire running from the terminal E''' to the battery, the wire *b*, connecting the battery with the opposite pole of the resistance-coil to that from which the line to the terminal E''' runs, the wire *b'*, the contact-point *c*, the pivoted spring-controlled armature-lever F, arranged to come into contact with the magnet of the resistance-coil, and thereby break circuit with the contact-point *c*, the wire *d*, the circuit-breaker G', and wire *e*, the electro-magnet C, of low resistance, and the signal D, operated by said magnet, all constructed and arranged substantially as and for the purpose specified.

2. The combination of the earth-terminals E'' E''', the battery H, the resistance-coils E E', the electro-magnet C, operating the signal D, the circuit-breakers G G' G'' G''', the line of wire connecting the resistance-coils, the wire connecting the terminals with the circuit-breakers G and G'', the contact-points *c c'*, the lines of wire *a b d e* and *a' b' d' e'*, and the pivoted spring-controlled armature-levers F F', arranged to come into contact with the magnets of their respective resistance-coils, and thereby break circuit with the points *c c'*, respectively, all constructed and arranged substantially as and for the purpose specified.

WILLIAM HADDEN.

Witnesses:

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GEO. M. HOPKINS.