

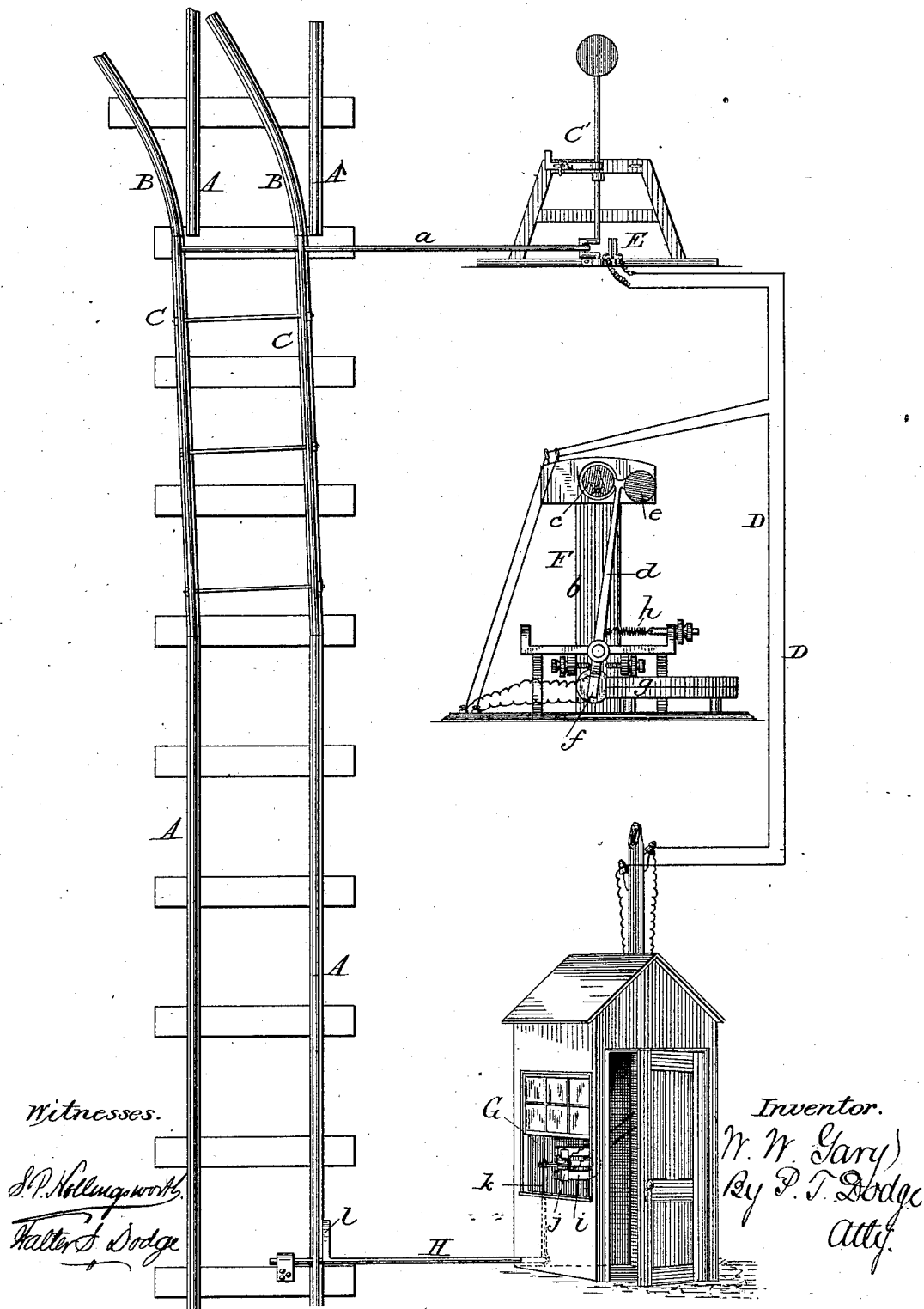
(No Model.)

W. W. GARY.

MAGNETO ELECTRIC RAILWAY SIGNAL.

No. 266,027.

Patented Oct. 17, 1882.



UNITED STATES PATENT OFFICE.

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MAGNETO-ELECTRIC RAILWAY-SIGNAL.

SPECIFICATION forming part of Letters Patent No. 266,027, dated October 17, 1882.

Application filed June 1, 1881. (No model.)

To all whom it may concern:

Be it known that I, WESLEY WAED GARY, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain Improvements in Magneto-Electric Switch-Signals, of which the following is a specification.

The object of my invention is to produce a simple switch-signaling system which may be operated without batteries for the purpose of indicating to those in charge of moving trains, and others, whether a distant switch is open or closed.

Hitherto electric signals of many kinds have been constructed for the purpose of indicating the position of railway-switches; but, so far as I am aware, all electric switch-signals hitherto devised have involved the use of a battery and of delicate and expensive instruments, whereby the signals were rendered uncertain in their action and a constant care and supervision rendered necessary.

My invention consists more particularly in a magneto-generator adapted and arranged to be operated by passing trains, mounted in circuit with an electric signal, and with a circuit-controlling device connected with a switch-operating mechanism in such manner that the circuit will open and close by the act of opening and closing the switch. The movement of the train past the generator causes the latter to develop a powerful current of electricity which acts upon and operates the signal, the latter assuming one or another position, according to the position of the circuit-closing device, which is determined by the position of the switch.

In carrying out my invention I prefer to make use of a signal which stands normally in a position indicating danger, and to mount this signal on a circuit which embraces the magneto-machine operated by the train and the circuit-controlling device operated by the switch. Under this arrangement the circuit remains in a closed condition whenever the switch is closed and the main track unbroken; but at the same time the signal stands normally in a position indicating danger. When the parts are in this position a train approaching the switch will, while still distant therefrom, actuate the generator, from which the current will be trans-

mitted through the circuit to the signaling-instrument, causing said instrument to move from the position indicating danger to that indicating safety, thus informing the engineer visually or audibly, or both, that the switch is closed. If, however, the switch is opened, it will effect the breaking of the circuit, and the result will be that although the approaching train may operate the magneto-generator, as before, the break in the circuit will prevent the current from operating the signal, which will consequently remain in its normal position, indicating danger, informing the engineer that the still distant switch is in an open position. This system is peculiarly advantageous, in that it serves not only to show when the switch is opened or when it is closed, but also in that it warns the engineer or other observer in the event of any break which may be caused accidentally or maliciously in the circuit. Under my system it is impossible for the switch to remain open or the line to remain broken without a warning to the engineer or other observer. In this connection the arrangement of the signal to stand normally in a position indicating danger, instead of compelling it to be moved by the current to such position, as usual in railway-signals, is a feature of great importance. The accompanying drawing represents my invention embodied in one of the various forms of which it is susceptible.

A represents the main track or railway; B, the siding or switch-track; and C, the movable switch-rails or switch proper, these rails being connected, as usual, by rod *a* to an upright crank-shaft, C', provided with a hand-lever, a half-rotation of the shaft by means of the hand-lever serving to open or close the switch, as usual.

D D represent the main-circuit wires, extending beside the railway-track from the switch-operating mechanism to a point at any desired distance therefrom, and connected with the signal-instrument F and the magneto-generator G, ordinarily near each other, but at a distance from the switch.

E represents the circuit-closing instruments, mounted in the main circuit in such position that they will be acted upon and forced together to close the circuit by means of the

switch-operating crank-shaft C', the arrangement being such that the circuit will be closed and will remain closed while the switch is closed, but will be opened and permitted to remain open whenever the switch is open.

The signal in the present instance consists of an upright vibrating arm operating by means of an electro-magnet at the lower end, and arranged to present different-colored glasses in front of a lantern as it is moved to and fro.

Referring to the drawing, *b* represents an upright post supporting a lamp, *c*.

d represents the upright vibratory arm, the upper end of which is provided with different-colored glasses *e*, one or the other of which will be presented in front of the light, according to the position in which the arm stands. At its lower end the arm *d* is provided with the electro-magnet *f*, mounted in the main circuit D. This electro-magnet is arranged in coils, and serves as an armature to a permanent magnet, *g*, the poles of which are reversed in relation to those of the electro-magnet. A spiral spring, *h*, connected with the lever *d*, serves to draw the electro-magnet away from the permanent magnet and to hold it in that position during the time that there is no current flowing through the circuit. While the arm is in this position, which is its normal position, the signal at the upper end is in the position indicating danger. Whenever a current passes through the main circuit D the electro-magnet *f* is excited and is attracted toward the permanent magnet *g*, thereby moving the lever *d* and causing the signal to leave the position indicating danger and resume a position indicating safety.

Passing next to the magneto-electric generator G, it will be seen to consist in the present instance of a permanent magnet, *i*, and of an electro-magnet or induction-coil, *j*, the latter mounted in the main circuit and arranged to vibrate or reciprocate in relation to the permanent magnet. The electro-magnet is mounted upon a horizontally-swinging arm, and is connected by means of an upright arm, *k*, on one end of a horizontal rock-shaft, H, the opposite end of which carries an arm or treadle, *l*, arranged by the side of the railway-track in position to be depressed by the wheels of the passing cars.

The operation is as follows: The switch being open, as represented in the drawing, the circuit-breaking device E is released from the switch-operating crank-shaft and the circuit remains open. If, now, a train approaches the switch while still distant therefrom, it acts upon the lever *l* and causes the operation of the magneto-generator G, producing an electric current; but as the circuit is broken this current will have no effect, and the signal will remain in its normal position, indicating danger, thus warning the engineer that the switch stands in an open position, or that the circuit has been otherwise broken, in either of which cases he will immediately arrest the motion of the train. If, however, the switch be closed,

the switch-operating crank-shaft C' will hold the circuit-closing device E in a closed position, maintaining the continuity of the circuit. A train approaching the switch while the parts are in this condition will operate the magneto-generator, as before, and transmit an electric current through the circuit to the signal-instrument F, where the effect of the current will be to excite the electro-magnet and cause the same to operate the lever *d* and move the signal from a position indicating danger to that indicating safety, thus informing the engineer that the switch is in a closed position, and also that the signal is in an operative condition.

It will of course be understood that in order to have the signal remain in the position indicating safety the generator will be provided with an ordinary commutator or "current-straightener," whereby the current is given an unchanging polarity to hold the signal in position. The apparatus may be operated without the commutator; but as there would be a repeated vibration of the signal arm or lever the use of the commutator is preferred. As soon as the train has passed the generator, or shortly after, the electric current will cease and the signal will at once resume its normal position, indicating danger. While the vibratory generator, as represented in the drawing, answers a good purpose, it is preferred to make use, in ordinary cases, of a rotary magneto-generator constructed in any of the ordinary known forms, and provided preferably with a commutator.

The rotary generator may receive motion through any suitable device arranged to be actuated by passing trains. The device represented in Letters Patent Nos. 240,694, 240,695, and 240,696, or that represented in my application of April 21, 1881, or either of them, answer a good purpose in this connection.

In place of the signal represented in the drawing, any other suitable electro-magnetic signal, either audible or visual, may be used.

In place of the switch-operating crank and the fingers for effecting the opening and closing of the circuit, any other suitable devices having a similar mode of operation may be used, the only essential requirement being that the opening and closing of the switch shall effect the corresponding opening and closing of the circuit.

By the expression "open" switch, as herein employed, is meant that adjustment of the switch in which the switch-rails are set to the siding or switch-track, and by the expression "closed" switch is meant that adjustment of the same under which the switch-rails are set to the main line, the expressions "opened" and "closed" being used in the sense in which they are commonly employed in the art. The expression "magneto-electric generator," as herein employed, is intended to include any and all of the numerous machines known in the art wherein a current of electricity is devel-

oped by the movement of an armature in the field of a magnet, or vice versa, such machines being known also by the various names of "electrical generators" and "dynamo-machines."

5 Having thus described my invention, what I claim is—

1. In a switch-signal for railways, the combination of the following elements: the magneto-generator and appliances for operating
10 the same from passing railway-trains, a magneto-electric signal, electric conductors connecting said signal and generator, and a circuit opening and closing device connected with and operated by a switch mechanism, substantially as described and shown.

15 2. In an automatic switch-signal, the combination of the magneto-electric generator and appliances for operating the same from passing railway-trains, the magneto-electric signal
20 arranged to stand normally in a position indicating danger, electric conductors connecting

said signal and generator, and circuit-closing devices connected with and operated by the switch mechanism, said device arranged to close the circuit when the switch is closed, and
25 vice versa.

3. In an automatic switch-signal, the combination of a circuit-closing device operated by the switch mechanism, the magneto-electric
30 signal in circuit with said device, a magneto-electric generator in circuit with the signal, and appliances, substantially as described, whereby the generator may be operated by passing railway-trains, whereby the moving
35 train is caused to determine the position of the signal, dependent upon the position of the switch.

WESLEY WARD GARY.

Witnesses:

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