

(No Model.)

3 Sheets—Sheet 1.

G. E. MILLER.
ELECTRIC SIGNALING APPARATUS.

No. 464,979.

Patented Dec. 15, 1891.

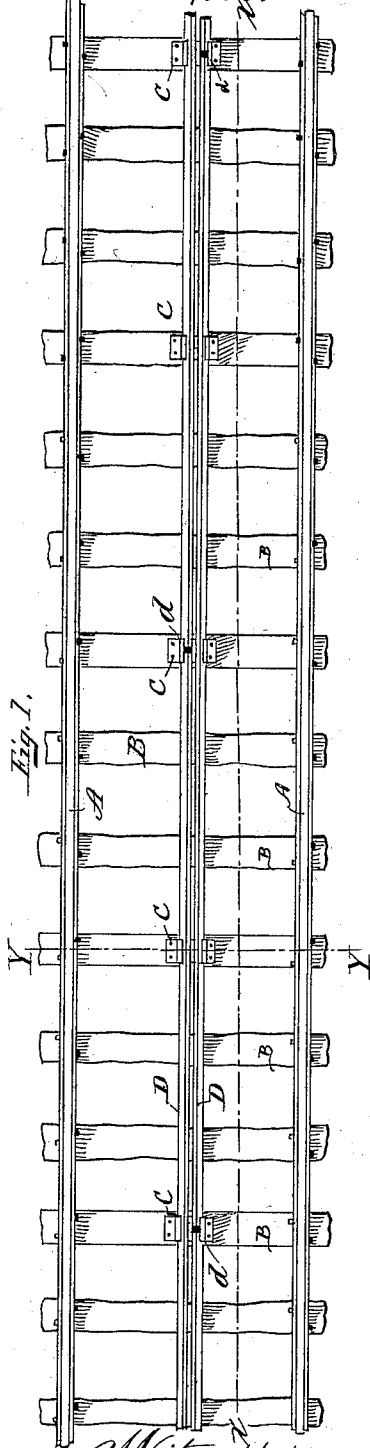


Fig. 1.

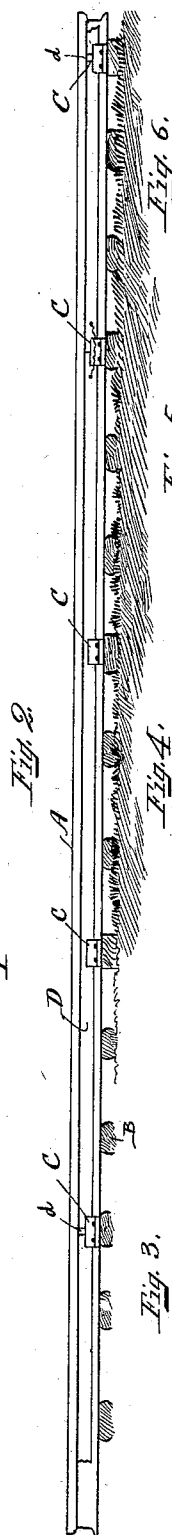


Fig. 2.

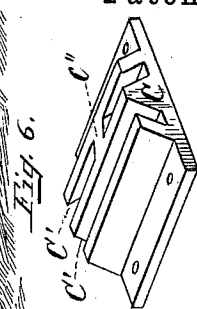


Fig. 3.

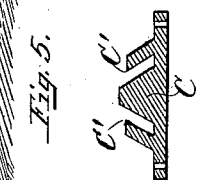


Fig. 4.

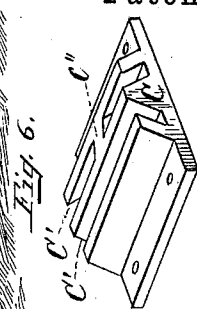


Fig. 5.

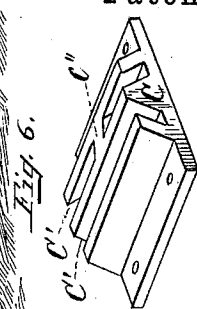


Fig. 6.

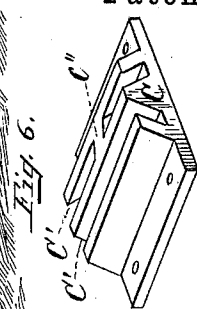


Fig. 7.

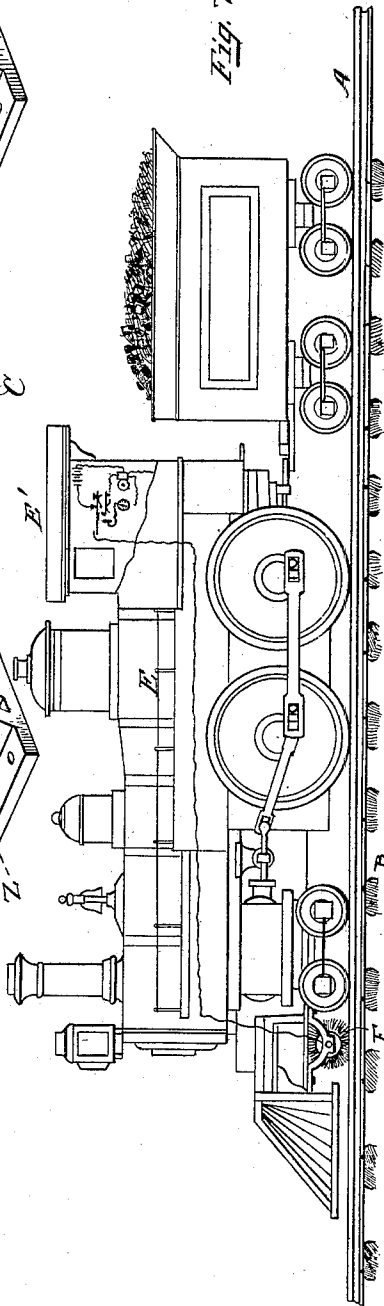


Fig. 8.

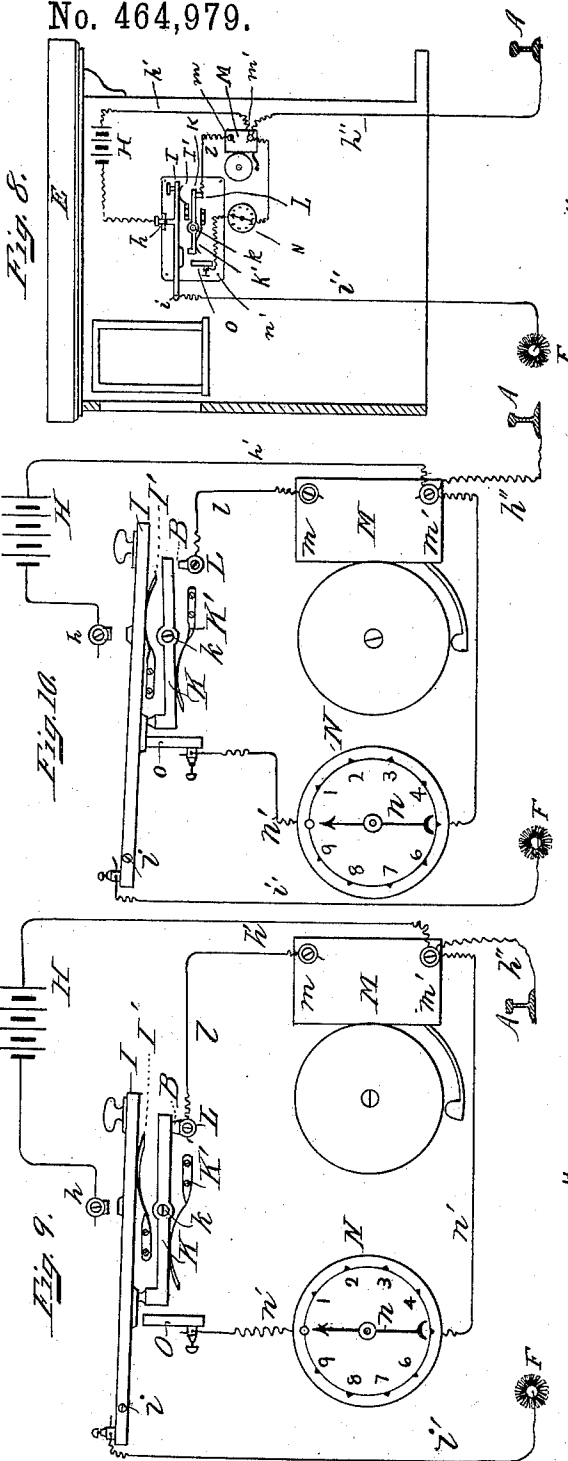
Witnesses:
Alvin A. Perkins.
J. S. Webb.

Inventor:
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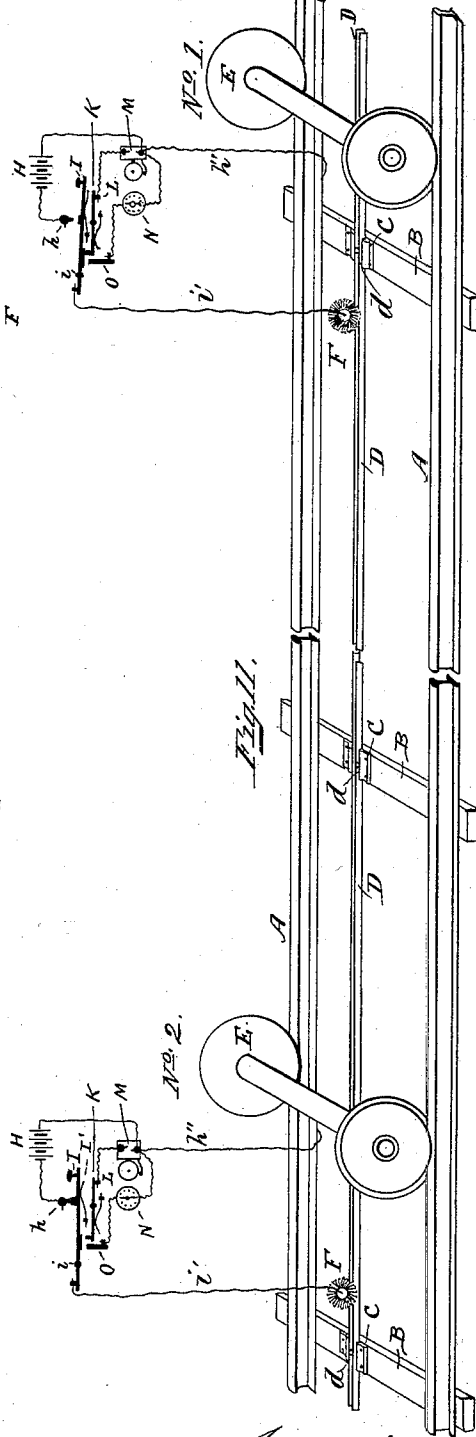
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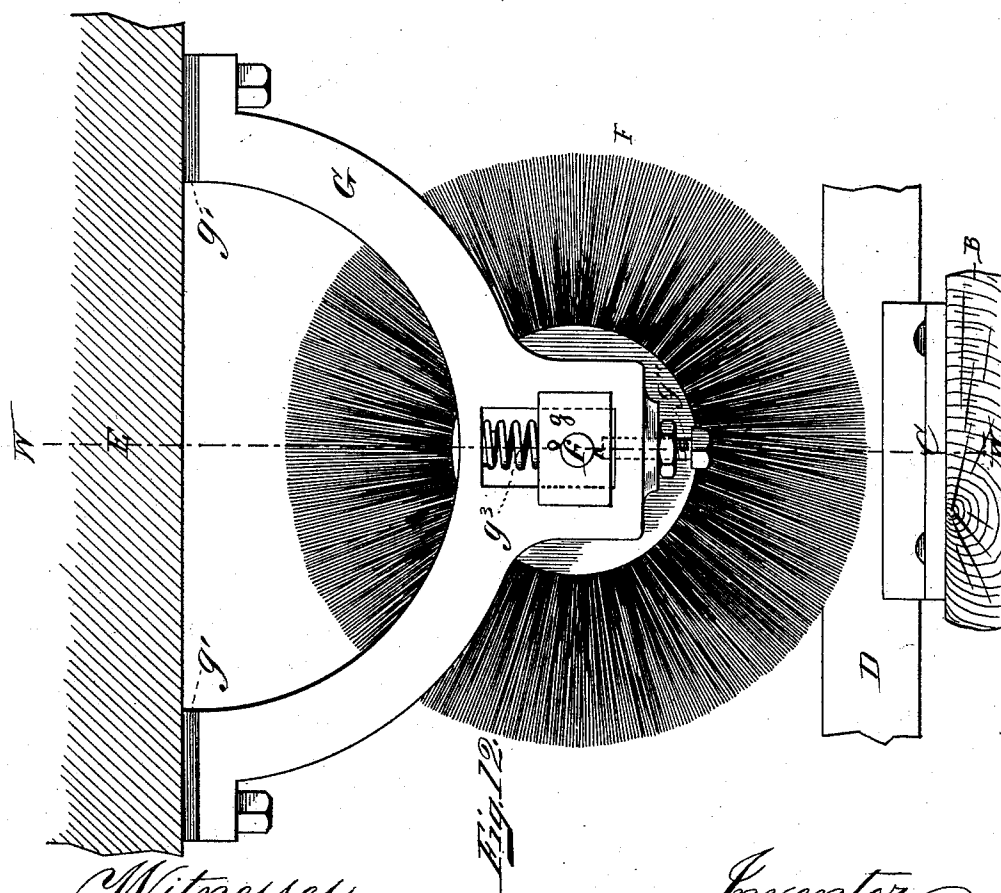
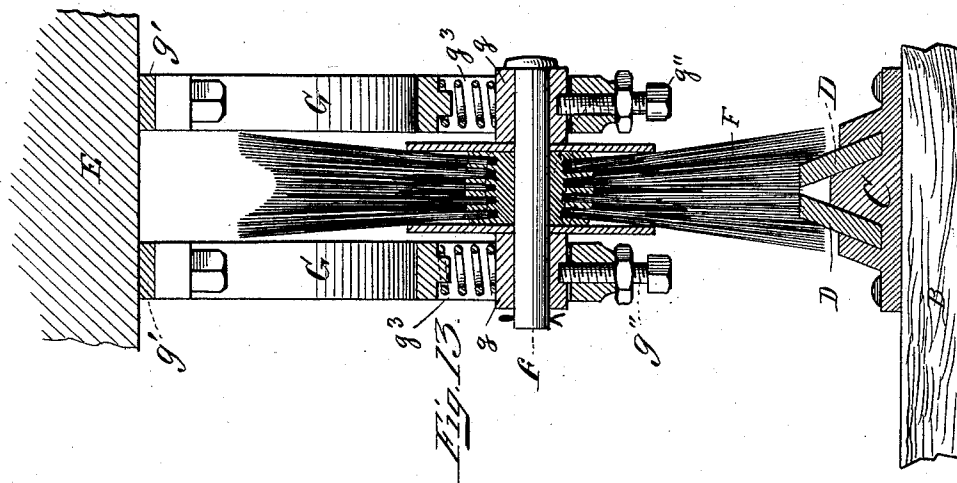
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UNITED STATES PATENT OFFICE.

GEORGE E. MILLER, OF LYNN, MASSACHUSETTS.

ELECTRIC SIGNALING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 464,979, dated December 15, 1891.

Application filed April 3, 1891. Serial No. 387,552. (No model.)

To all whom it may concern:

Be it known that I, GEORGE E. MILLER, a citizen of the United States, and a resident of Lynn, in the county of Essex and State of Massachusetts, have invented new and useful Improvements in Electric Signaling Apparatus, of which the following, taken in connection with the accompanying drawings, is a specification.

This invention relates to improvements in electric signaling devices for railroads; and it has for its object to prevent one train from running too close onto another on the same track, and thus to prevent accidents and collisions, particularly in tunnels and on curves or in places where the track in front or rear is concealed by buildings, natural objects, &c.

By means of my invention the distance of one train from another when in the danger limit may readily be ascertained and telegraphic communications established between two trains as long as they are within danger distance controlled by the intermittently-insulated conductor located between the rails, as will hereinafter be more fully shown and described, reference being had to the accompanying drawings, wherein—

Figure 1 represents a plan view of the railroad-track and the insulated and intermittently-broken duplex conductor. Fig. 2 represents a cross-section on the line X X, shown in Fig. 1. Fig. 3 represents a section on the line Y Y, shown in Fig. 1. Fig. 4 represents a detail perspective view of one of the insulators on which the duplex conductor is supported. Fig. 5 represents a cross-section on the line Z Z, shown in Fig. 4. Fig. 6 represents a detail perspective view of one of the insulators for the duplex conductor, showing an insulating bridge or division for breaking the circuit of one of the duplex conductors. Fig. 7 represents a side elevation of a locomotive equipped with my improved electric danger-signaling apparatus. Fig. 8 represents a detail side elevation of the said signaling apparatus, showing the parts thereof in their normal positions. Fig. 9 represents a similar view showing the key depressed for ascertaining on one train whether or not another train on the same track is within the danger distance. Fig. 10 represents also a similar view showing the key still further de-

pressed to indicate on a galvanometer the distance one train is from another after it has been ascertained that the trains are within danger distance from another. Fig. 11 represents a diagram of the invention, showing two trains and the electrical connections between the same. Fig. 12 represents a detail side elevation of the wheel, brush, or sweeper by which the circuit is carried from the apparatus on the train to the insulated conductor on the track to another train on the same track; and Fig. 13 represents a vertical section on the line W W, shown in Fig. 12.

Similar letters refer to similar parts wherever they occur on the different parts of the drawings.

In Figs. 1, 2, 3, 7, and 11, A A represent the rails, and B B the sleepers or ties, of a railroad-track, as usual. Between the said rails, preferably midway thereon, I secure, in a suitable manner, chairs C C, made of glass or other suitable insulating material, each such insulator having a pair of parallel longitudinal grooves C' C', in which the metallic conductors D D are held and secured in any desired manner. The said conductors are preferably held inclined toward each other without touching for the purpose of more readily establishing electrical and metallic connection with the brush, wheel, or sweeper carried on the train, as will hereinafter be described. Each of the conductors D D is alternately broken, as shown at d d in Figs. 1, 2, and 11, and insulated from the part in the same line with it, and for this purpose I prefer to provide the insulating-chairs C where such break occurs with a bridge or cross-bar C'', (shown in detail in Fig. 6,) by which arrangement the circuit of each conductor D is broken at distances apart of a mile, or more or less each, as may be desired, for safely running the trains.

It will be noticed by reference to Fig. 1 that I make the breaks on one conductor about midway between the breaks on the opposite conductor, by which arrangement it will be impossible for two trains to approach each other at a less distance than the distance between the break on one conductor to that of the break of its parallel mate, as at such a distance the brushes or sweepers on the two trains will be electrically connected

by both the parallel conductors D D, and an alarm on either of the trains will be sounded as soon as the person in charge manipulates the electric signaling apparatus. It will also be impossible for two trains to approach each other at a less distance than the length of each unbroken conductor, in contact with which the sweepers on the trains are metallically connected, and as the breaks on one conductor are arranged between corresponding breaks on the opposite one it will be seen that greater efficacy and security are obtained by thus using a pair of parallel conductors alternately broken, as compared with a single and alternately-broken conductor, as in the latter two trains may approach each other within a few feet of the break without establishing an electric circuit between such trains. In connection with such duplex and alternately broken and insulated conductors I use upon each train, preferably in the cab of the locomotive, my improved electric signaling apparatus, which is constructed and operated as follows:

E in Fig. 7 represents a locomotive, and E' in Figs. 7 and 8 represents the cab thereof, as usual. In Fig. 11 the letters E E are also made to represent a pair of engines on the same track, between which the improved electric danger-signal is to be established.

On each train, preferably on its locomotive or tender, is arranged a sweeper adapted to be at all times in metallic connection with the duplex conductors D D. In practice I prefer to make such sweeper in the form of a loosely-journaled brush-wheel F, the bristles of which are held in metallic connection with the duplex conductors D D, as shown in Figs. 12 and 13, said wheel having its spindle *f* loosely journaled in bearings *g g*, vertically adjustable in brackets G G, secured to the frame-work or other part of the locomotive or its tender, such brackets being insulated from the engine or other part of the train by means of suitable insulators *g' g'*. (Shown in Figs. 12 and 13.) In practice I prefer to limit the downward adjustment of said wheel F by means of set-screws *g'' g''*, going through the lower parts of the brackets G G and supporting the bearings *g g* on their upper ends, as shown in Figs. 12 and 13. The wheel F is held downward with a yielding pressure against the duplex conductors D D, preferably by means of springs *g³ g³* interposed between the upper parts of the bearings *g g* and the brackets G G, for the purpose of allowing said wheel to be held at all times in metallic connection with the conductors D D and to automatically adjust itself to inequalities in the height of the latter, if such should occur.

The instrument used on the engine is fully shown in Figs. 7, 8, 9, 10, and 11, and is constructed as follows: It consists of a battery H, one pole of which is connected to a stationary insulated electrode *h*. I is a key pivoted in a suitable manner at *i*, and connected metallically by means of a wire *i'* to the

brush or sweeper F. The key I is normally held in metallic contact with the electrode *h* by means of a suitable spring I'. Below the key I is located a metal lever K, hung at *k*, and normally held by the influence of a suitable spring K' so as to be metallically connected to a stationary insulated electrode L.

M is a suitable electric bell alarm or sounder, and N is a galvanometer of any well-known construction having an index-finger *n*, as shown.

O is an insulated stationary electrode arranged below the key I and having its upper end projecting a little below the normal position of the upper end of the lever K, as shown in Fig. 8.

m and *m'* are the usual screw-cups on the alarm M, as shown in Figs. 8, 9, and 10.

The device is electrically connected as follows: 1 is a wire connecting the stationary electrode L to the alarm-cup *m*. *n'* is a wire connecting the stationary electrode O to the galvanometer N and alarm-cup *m'*. *h'* is a wire leading from the battery H to the alarm-cup *m'*, and *h''* is a ground-wire leading from the battery and alarm-cup *m'* to any metallic part of the engine that is in metallic connection with the rails.

The improved signaling apparatus is operated as follows: The person in charge of the instrument in the cab of engine No. 1 depresses the key I from time to time, causing said key to be metallically connected to the lever K and disconnected from the battery-electrode *h*, as shown in Fig. 9, thereby establishing metallic connection from the brush F, through wire *i'*, key I, lever K, electrode L, wire 1, alarm M, and wire *h''*, to the rail and ground, the battery H being during such position of the key I cut out from the circuit, as shown in said Fig. 9. If during such depression of the key I another train or engine No. 2 equally equipped should be near enough to establish metallic connection between the sweepers on both engines Nos. 1 and 2 and the duplex conductors D D, the alarm M will be sounded on engine No. 1 by the battery on No. 2, one pole of which is connected to its sweeper and the other pole being grounded, as represented in Fig. 11. In a like manner the operator on engine No. 2 by occasionally depressing his key I will cause the alarm to be sounded on his engine in case the brushes on engines Nos. 1 and 2 are metallically connected by the duplex conductors. Should the person in charge of the device on engine No. 1 after hearing the alarm desire to know the distance from engine or train No. 2, this can be done instantly by depressing the key I still farther, causing it to be metallically connected to the electrode O, establishing a ground connection through the galvanometer N and cutting out the alarm M from the circuit, as shown in Fig. 10, when the index-pointer *n* will show upon the graduated disk of the galvanometer N the number of miles, or fractional part thereof, that separate the

two engines or trains. In a like manner the same result will be obtained on engine or train No. 2 if the key I thereon is depressed sufficiently to cut out its alarm from the circuit and putting the galvanometer in it. If while depressing the key I on either train or engine no alarm is sounded, it is a sign that they are at a safe distance from each other.

Having thus fully described the nature, construction, and operation of my invention, I wish to secure by Letters Patent, and claim—

1. The improved electric railway signaling device, consisting of an insulated duplex and alternately-broken conductor, combined with an engine or train having a battery or electric-current generator, a sweeper electrically connected to said battery and conductors, a galvanometer connected to the ground, and a key for cutting out the battery and establishing a connection from the conductors through the galvanometer and to the ground, substantially as and for the purpose set forth.

2. The improved electric railway signaling device, consisting of an insulated duplex and alternately-broken conductor, combined with an engine or train having a battery or electric-current generator, a sweeper electrically

connected to said battery and conductors, an alarm electrically connected to said battery and ground, a galvanometer normally grounded out of circuit, and a key and lever for metal-
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lically connecting at will either the alarm or galvanometer with the sweeper and conductors, substantially as and for the purpose set forth.

3. In an electric railway signaling device, a battery or electric-current generator on the train or engine, a key normally connected to one of the poles of said battery, a pair of electrodes, and an alarm and galvanometer
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connected, respectively, thereto, and an intermediate current-changer for metal-
lically connecting the said key to the alarm or galvanometer, substantially as and for the purpose set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 21st day of March, A. D. 1891.

GEORGE E. MILLER.

Witnesses:

ALBAN ANDRÉN,
ALICE A. PERKINS.