

(No Model.)

2 Sheets—Sheet 1.

R. M. STRONG & C. F. REED.  
ELECTRIC RAILWAY SIGNAL.

No. 519,932.

Patented May 15, 1894.

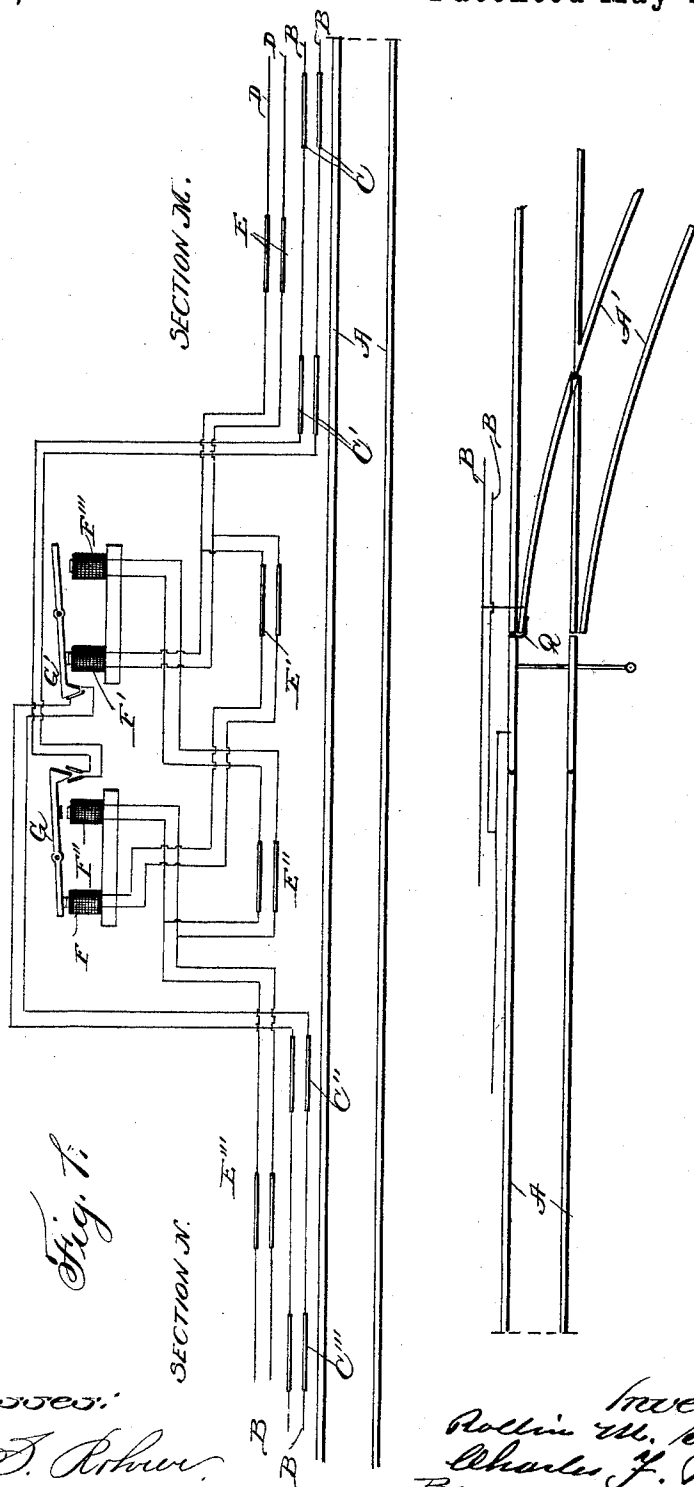


Fig. 1.

witnesses:  
Harry J. Kihue,  
Walter W. W. W.

Inventors:  
Rollin M. Strong,  
Charles F. Reed.  
By  
Charles D. Lincoln Atty.

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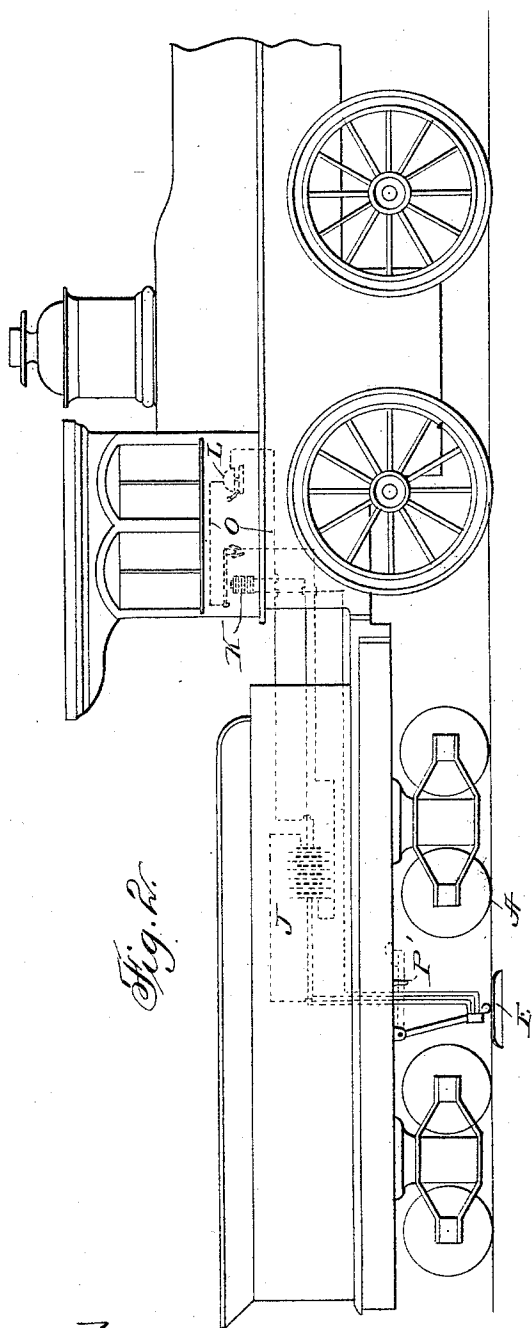


Fig. 2.

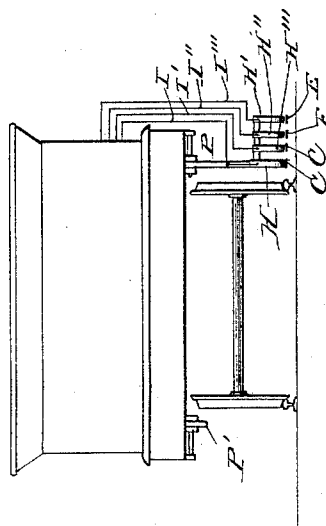


Fig. 3.

Witnesses:

Harry D. Arthur,  
Wallace Greene,

Inventors  
Rollin M. Strong  
Charles F. Reed

By

Charles Lincoln Atty.

# UNITED STATES PATENT OFFICE.

ROLLIN M. STRONG AND CHARLES F. REED, OF OMAHA, NEBRASKA.

## ELECTRIC RAILWAY-SIGNAL.

SPECIFICATION forming part of Letters Patent No. 519,932, dated May 15, 1894.

Application filed September 5, 1893. Serial No. 484,841. (No model.)

*To all whom it may concern:*

Be it known that we, ROLLIN M. STRONG and CHARLES F. REED, citizens of the United States, residing at Omaha, in the county of Douglas and State of Nebraska, have invented certain new and useful Improvements in Electric Railway-Signals; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates particularly to devices whereby each engineer may be warned if there be in his vicinity and upon his track another engine, and also if any switch which he is approaching is misplaced. For attaining these ends we simply add to the ordinary plant, without disturbing it, such auxiliary devices as are hereinafter set forth.

In the accompanying diagrammatic drawings,—Figure 1 represents in plan a single track railway and switch provided with novel additions. Figs. 2 and 3 represent in side and rear view, respectively, an engine and tender provided with devices in working connection with the novel devices of Fig. 1.

In general, it may be said that two pairs of conductors are carried along the whole length of the track and divided into sections, of perhaps a mile in length, each section being provided at intervals with contact pieces to be bridged, or connected, momentarily by brushes carried by all passing engines and thus complete a circuit through a battery on the locomotive and one of the sections. The outer pair simply operates circuit breakers at the end of the sections, and the inner pair forming a closed circuit only by the aid of two engines, serves then to give an alarm upon both. The misplacement of a switch serves the same purpose as the presence of a second engine in causing an alarm upon an approaching engine.

In the drawings A A' are the main and switch rails, respectively.

B B are the wires of the inner pair of conductors and C C', &c., contact strips continuous with said wires.

D D are the wires and E E', &c., the contact strips of the outer pair. The four wires are in approximately the plane of the rails, parallel thereto, and slightly separated there-

from and from each other. Between the sections M, N, &c., or at their junction, are placed circuit breakers consisting of electro magnets F, F', F'', F''', provided with centrally pivoted armatures G, G' and operated by the current through the wires D D to connect and disconnect the wires B B of each section.

The engine, or its tender, bears four brushes H, H', H'', H''', to sweep over the contact strips of the four conductors, and these brushes are all connected, by wires I, I', I'', I''', with a battery J, the wires from the brushes of the conductors C, C' including an electro magnet K to operate an alarm bell L by closing a minor circuit through wires O. The brushes are carried upon a swinging arm P depending from the tender, and this arm and connections are duplicated upon the other side of the tender, the duplicate being used when the engine is going in a contrary direction, and being swung up and secured at P' when not in use.

Now suppose that there is but one engine upon the sections M N and that this moves from M toward N. When its brushes strike the first contact strips E a circuit is completed through the battery, and the magnets F, F' and the left ends of both armatures are drawn down disconnecting the wires B B of the section M and connecting the wires B B of the section N; thereafter no change is made until the brushes reach the strips E'' where circuit is completed through the other two magnets F'', F''' and the wires B B, section M, are connected while the wires B B of section N are disconnected, and so on from section to section. If the engine pass in a reverse direction, the action is precisely analogous. In other words, an engine in entering a section disconnects its wires B B of that section and connects the wires B B of the section just passed and of the section next in advance. So long as they are disconnected the brushes passing over the strip C, C', &c., complete no circuit, but if they are connected a circuit is completed and by the energizing of the magnet K the minor circuit O is made and the bell L is sounded. Now an engine in passing the strips E of the section in front or in rear of the section upon which the first engine is found will in the manner already described strike the strips C C which have been con-

connected by the first engine and thus receive an alarm signal, and in passing the strips E of its own section will disconnect the wires B of its own section and connect the wires B B of the section upon which the first engine is running. The first engine receives an alarm then whenever it passes over strips C; that is, an engine on entering any section disconnects the wires B of that section and normally gets no alarm in passing over the strips C; but if another engine runs over any strips E upon the section in front or the one in the rear the first engine gets an alarm in passing over any strips C and the second engine is also warned in passing over the first strips C of its section.

Where there is a switch, as in Fig. 1, the wires B B run respectively to a shifting rail and to the corresponding branch rail and when the switch is opened the ends of these rails make contact and the two wires are thus connected; hence an engine passing over strips C of that section completes the circuit and causes an alarm in the same way as though contact had been made at the junction of the section, in the manner already described. To insure contact at the rail ends, one of the rails is provided with a spring Q that rubs against the end of the other rail when the switch is shifted.

What we claim is—

1. The combination, with a railway, of two pairs of conductors independent of the rails but running alongside thereof, the first pair being arranged in a series of closed sections, and the second pair in a corresponding series of sections each having a circuit breaker at each end, and means whereby a current in any section of the first pair shall open both circuit breakers in the corresponding section of the second pair and close the circuit breakers in adjacent ends of the adjacent sections.

2. The combination with a railway and a railway vehicle thereon, of two pairs of conductors running alongside the track each pair forming a series of sections having at intervals contact pieces in both branches, circuit breakers interposed in the sections of one series and operated oppositely, in pairs, when a circuit is completed through a section of the other series, to break connection in one section of the first series and make connection in the next, a battery upon said vehicle, pairs of brushes borne by the vehicle in position

to put each pair of contact pieces passed over in circuit with the battery, a signaling device upon the vehicle, and means whereby the passage of a current through the circuit containing one pair of the brushes actuates said signaling device.

3. The combination with a railway and a vehicle thereon, of pairs of conductors lying upon one side of the track and each provided at intervals with contact pieces and divided into series of corresponding sections, a battery carried upon the vehicle, brushes carried by the vehicle and arranged to pass over said contact pieces and to thereby include the battery in the sections to which the pairs of contact pieces belong, circuit breakers in the sections of one series of conductors, and magnets, energized by the current from the battery through a section of the other set, to break contact in the corresponding section of the first set and to make contact in the adjacent circuits of that series, and a signal, upon the vehicle, arranged to be operated by a current through said corresponding series.

4. The combination with a railway and a vehicle thereon, of two pairs of conductors in general direction parallel to the rails and each pair having at intervals contact pieces in each branch, the first pair being divided into sections each having at each end a circuit breaker and the second pair being divided into sections each having at each end magnets arranged for oppositely actuating the circuit breakers in two consecutive sections of said first pair, a battery upon the vehicle, pairs of brushes borne by the vehicle in electrical connection with the battery and in position to sweep over the respective pairs of contact pieces, and a signal arranged, upon the vehicle, to be operated by a current passing through the sections of the first pair of conductors.

In testimony whereof we affix our signatures in presence of two witnesses.

ROLLIN M. STRONG.  
CHARLES F. REED.

Witnesses for Strong:

W. G. DE CELLE,  
ROBT. F. MILNE.

Witnesses for Reed:

JULE ALTHAUS,  
B. H. WHITNEY.