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PATENTED SEPT. 27, 1904.

L. B. STILLWELL & H. LATEY.

SIGNALING SYSTEM FOR ELECTRICALLY OPERATED RAILWAYS.

APPLICATION FILED MAY 18, 1904.

NO MODEL.

6 SHEETS—SHEET 1.

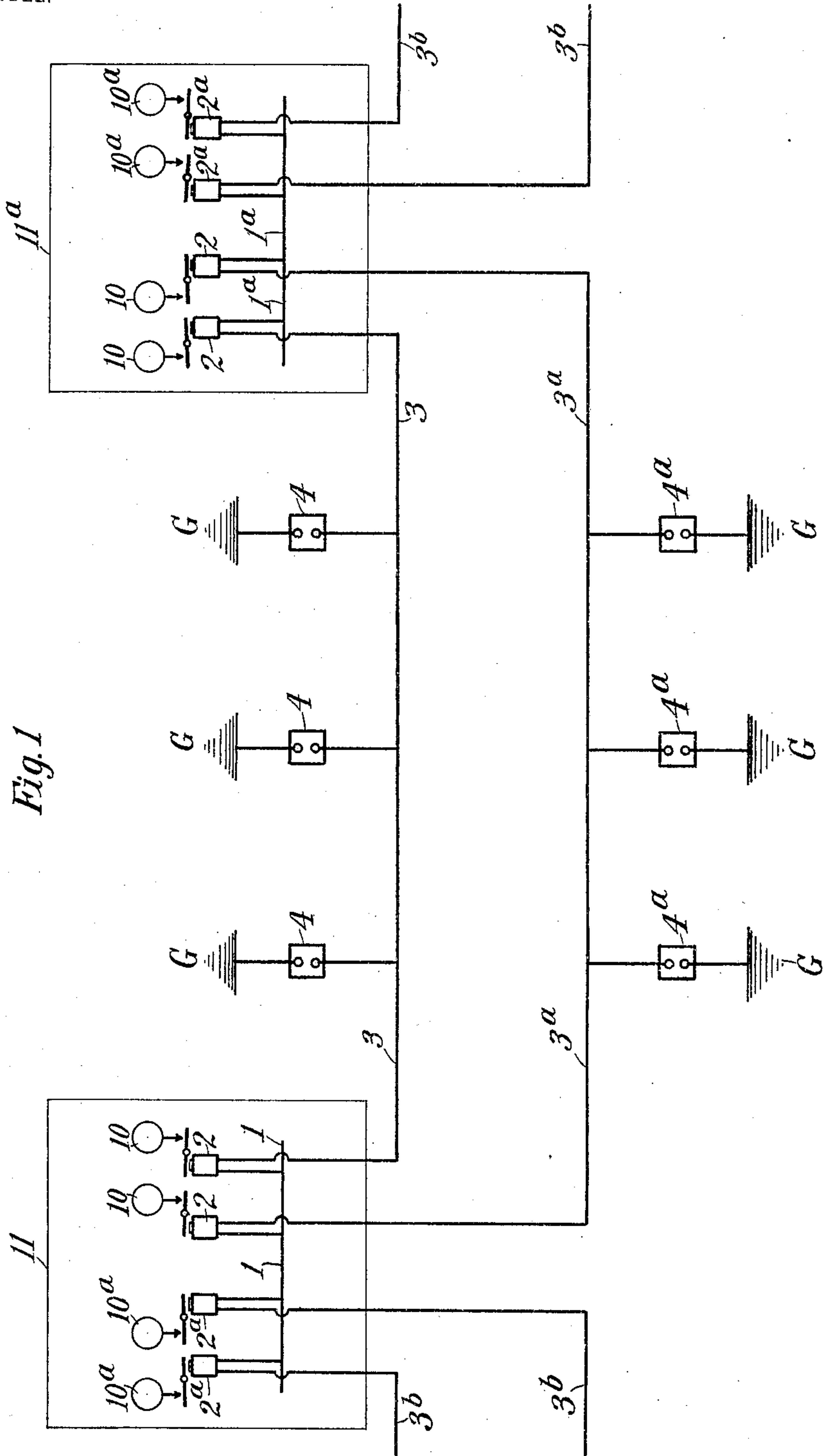


Fig. 1

Witnesses:  
W. A. Pauling  
G. J. Rathjens

Inventors  
Lewis B. Stillwell  
Henry Latey  
by Gifford & Price Attys.

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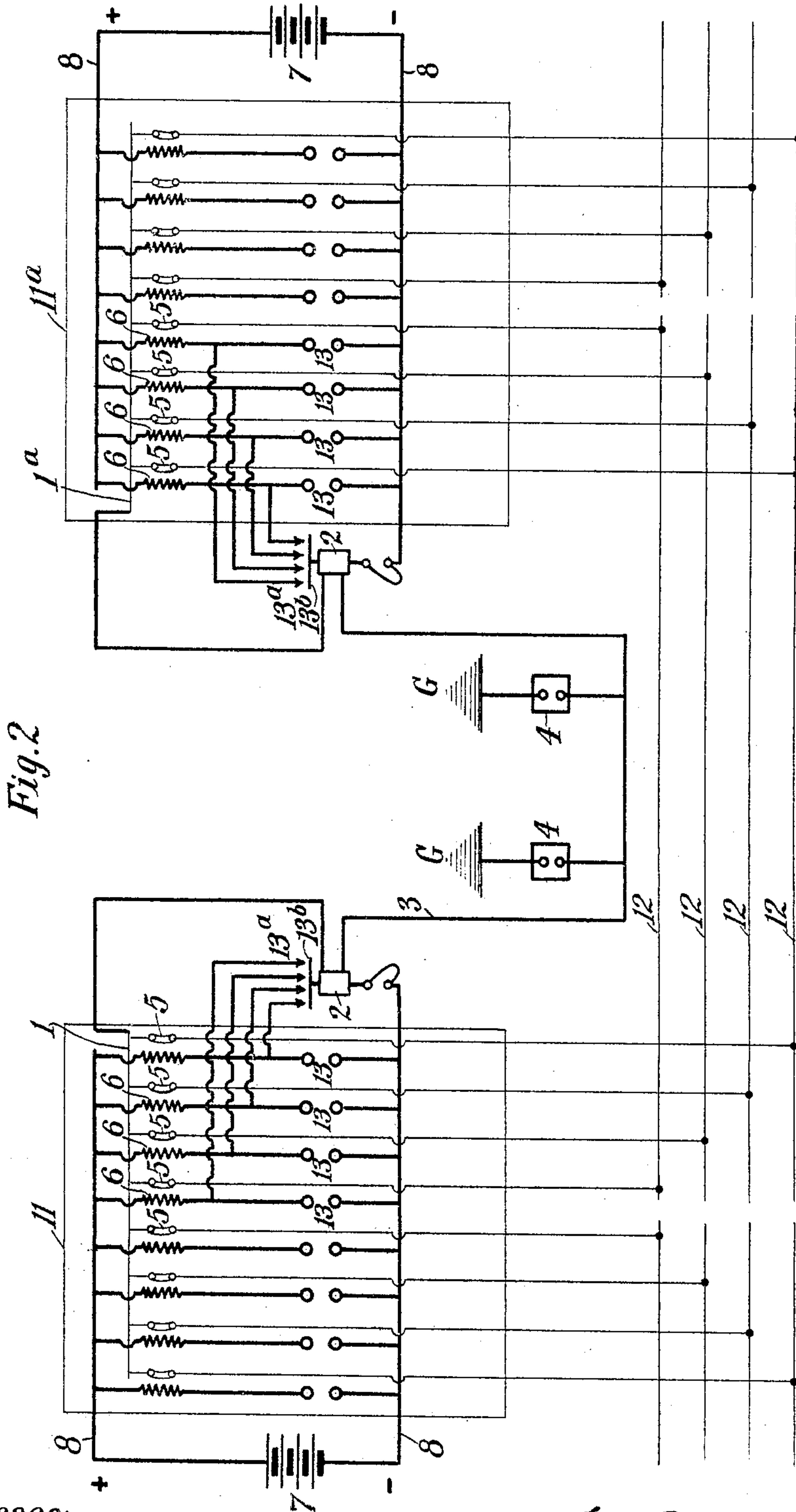
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5 SHEETS—SHEET 2.



Witnesses:  
W. A. Pauling  
C. J. Rathjen

Lewis B. Stillwell Inventors  
Henry Latay  
by Afford & Price Attys.

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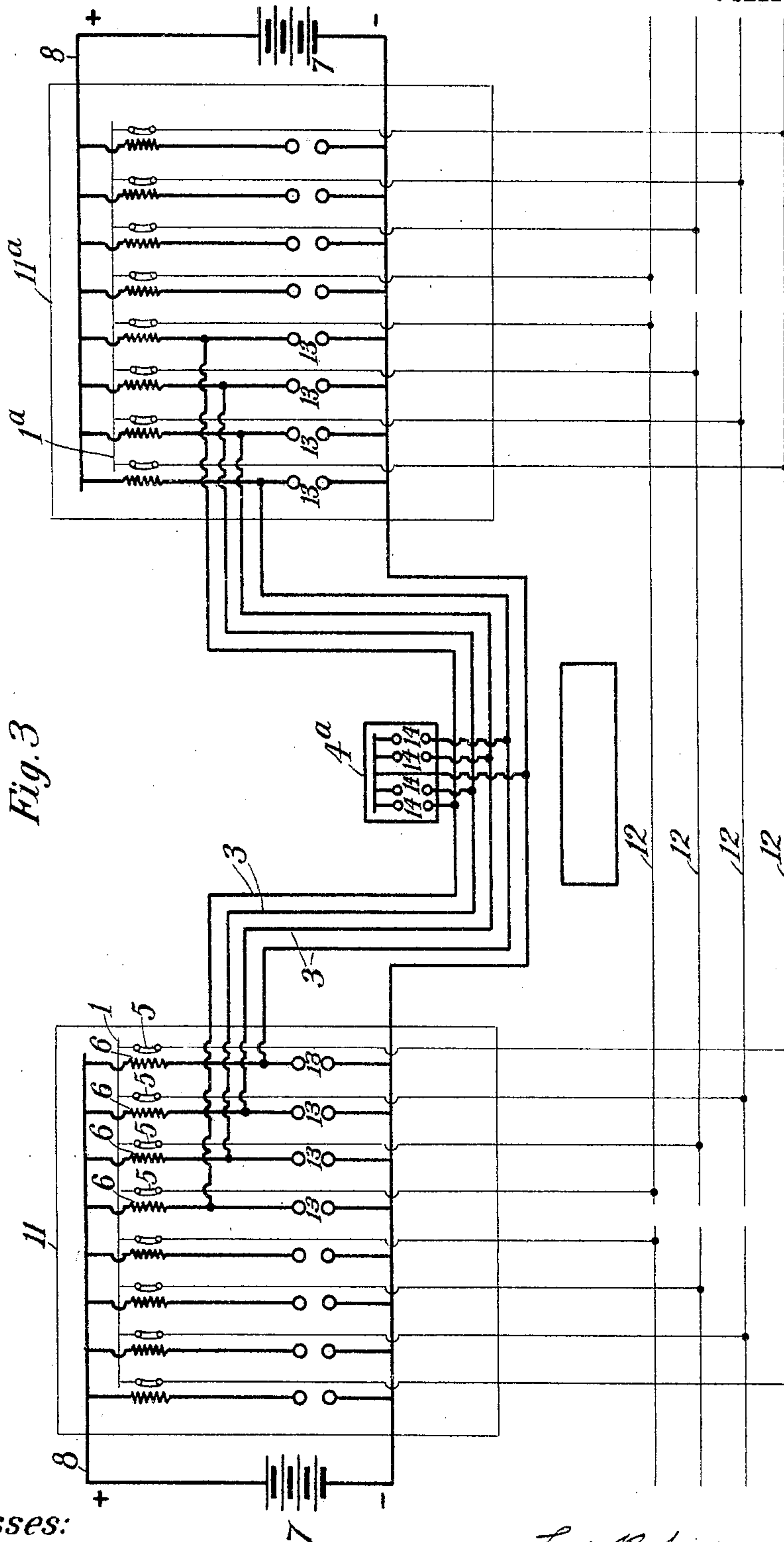
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5 SHEETS—SHEET 3.



Witnesses:  
W. A. Pauling  
G. J. Rathjen

Lewis B. Stillwell Inventors:  
Henry Lathey  
by Clifford & Price Attys.

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L. B. STILLWELL & H. LATEY.

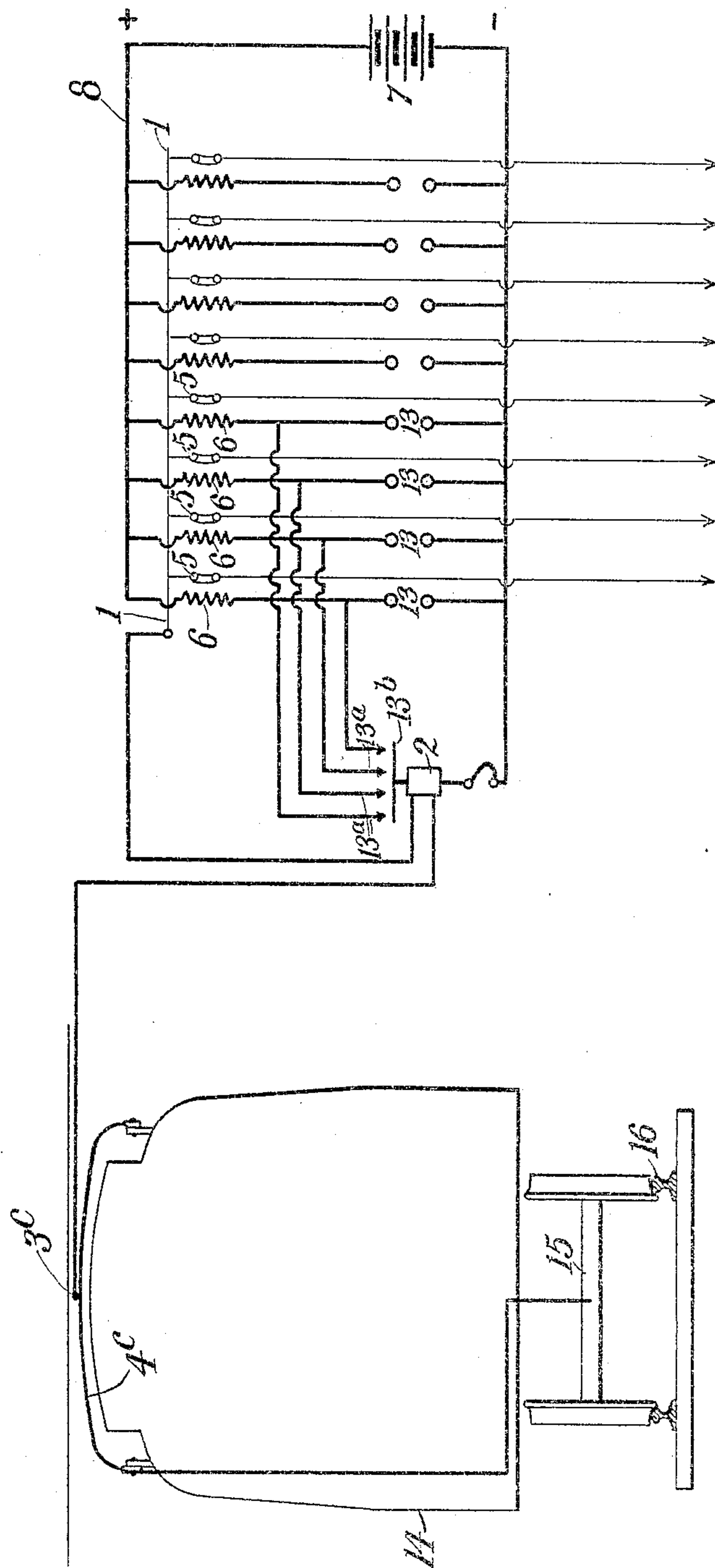
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5 SHEETS—SHEET 4.

Fig. 4



Witnesses:  
W. A. Pauling  
G. J. Rathjen

Inventors  
Lewis B. Stillwell  
Henry Latex  
by Clifford & Price Attys.



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5 SHEETS—SHEET 5.

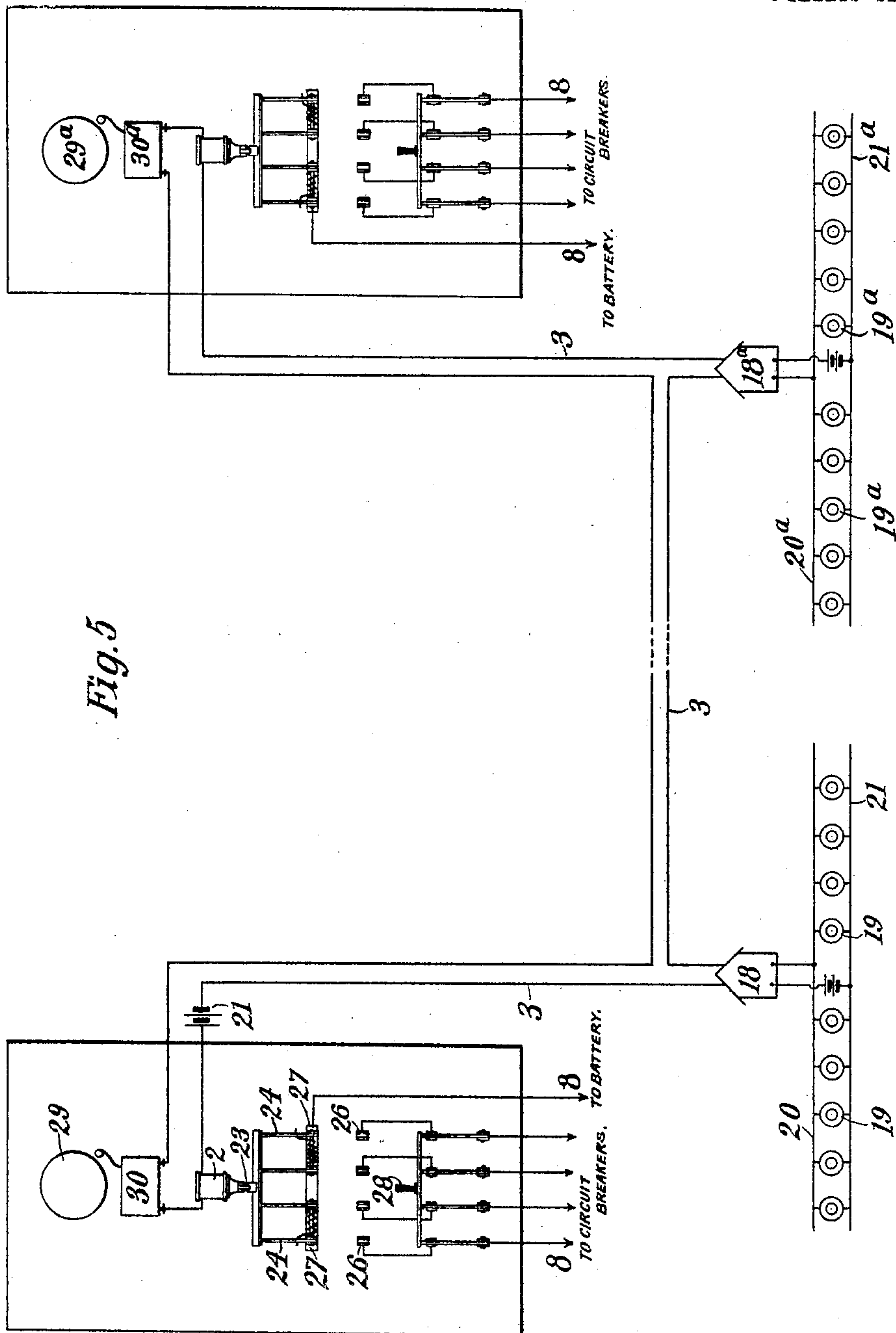


Fig. 5

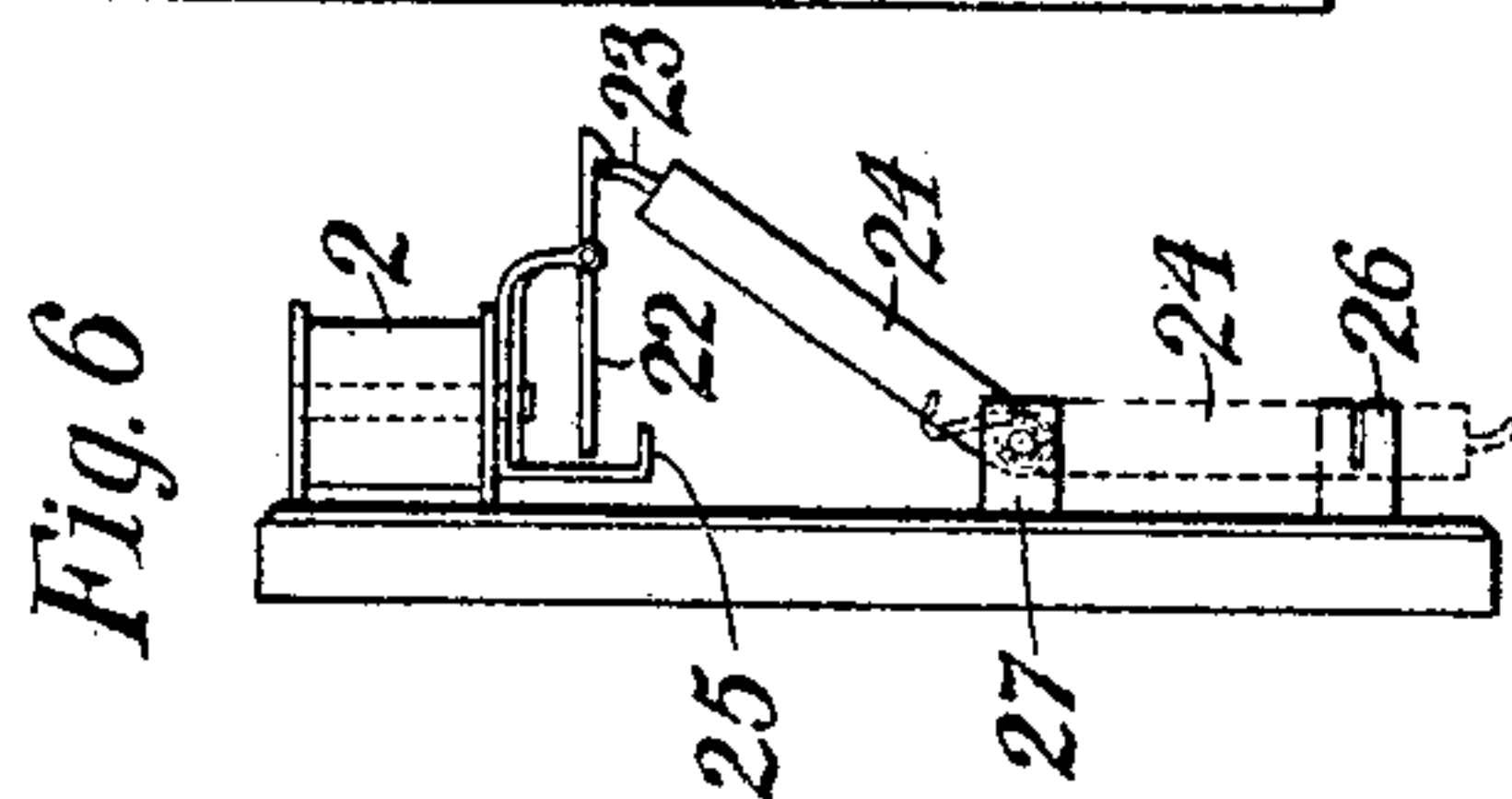


Fig. 6

Witnesses:  
W. A. Pauling  
G. J. Rathjen

Inventors  
Lewis B. Stillwell  
Henry Latey  
by Clifford & Price Attys.

# UNITED STATES PATENT OFFICE.

LEWIS B. STILLWELL, OF LAKEWOOD, NEW JERSEY, AND HENRY LATEY,  
OF NEW YORK, N. Y.

## SIGNALING SYSTEM FOR ELECTRICALLY-OPERATED RAILWAYS.

SPECIFICATION forming part of Letters Patent No. 771,027, dated September 27, 1904.

Application filed May 18, 1904. Serial No. 208,504. (No model.)

*To all whom it may concern:*

Be it known that we, LEWIS B. STILLWELL, a resident of Lakewood, in the county of Ocean and State of New Jersey, and HENRY LATEY, a resident of the city of New York, borough of Manhattan, in the county and State of New York, citizens of the United States, have invented certain new and useful Improvements in Signaling Systems for Electrically-Operated Railways, of which the following is a specification.

Our invention relates to improvements in signaling systems for electrically-operated railways; and it consists of certain novel parts and combinations of parts, particularly pointed out in the claims concluding this specification.

In the accompanying drawings, Figure 1 shows diagrammatically a system involving our invention. Figs. 2, 3, 4, and 5 illustrate diagrammatically modifications of the same. Fig. 6 is a detail of a switch shown in Fig. 5.

Similar reference-numerals indicate the same or corresponding parts in the several figures.

In the operation of electric roads it frequently becomes necessary or desirable to cut off the current from one or more sections of the supply-conductor, such as a trolley-wire or third-rail conductor. This may be necessary when firemen are working in the neighborhood of the conductor or in case of wreck or derailment or when for other reasons it is desirable that the current be cut off with the least possible delay. The usual method of accomplishing this result is by telephoning the power-station.

We have devised a system whereby the desired result can be accomplished with less delay and in a much surer and more satisfactory manner.

The following is a description of the systems illustrated in the drawings, which show our invention applied in forms which are at present preferred by us.

Referring to Fig. 1, 1 1<sup>a</sup> are the positive bus-bars of an electric-railway system at opposite ends of a given section of the road.

2 2 2 2 and 2<sup>a</sup> 2<sup>a</sup> 2<sup>a</sup> 2<sup>a</sup> are relays electrically connected with said bus-bars.

3 3<sup>a</sup> are signal-conductors arranged along the line, and 4 4 4 4<sup>a</sup> 4<sup>a</sup> 4<sup>a</sup> are boxes, called herein "alarm-boxes," through which the signal-lines 3 or 3<sup>a</sup> may be grounded.

10 10 are electrically-sensitive signals of suitable construction located in power or substations 11 11<sup>a</sup> at opposite ends of a given section of the road. These may be visible or audible signals, or they may be circuit-breakers, as hereinafter described, the term "signal" being used in this specification in a sense to include all such devices. The relays 2<sup>a</sup> 2<sup>a</sup> 2<sup>a</sup> 2<sup>a</sup>, signals 10<sup>a</sup> 10<sup>a</sup> 10<sup>a</sup> 10<sup>a</sup>, and conductors 3<sup>b</sup> 3<sup>b</sup> 3<sup>b</sup> 3<sup>b</sup> indicate extensions of the system in both directions, as will be readily understood.

The operation of the system shown in Fig. 1 may be thus described: The signal-lines 3 3<sup>a</sup> are connected with the positive bus-bars 1 1<sup>a</sup> through relays 2 2 2 2, located in substations at opposite ends of a section of the road. These lines may be grounded at either one of the alarm-boxes 4 or 4<sup>a</sup>, which alarm-boxes are located at suitable distances apart and may be of any suitable design and construction—such as a push-button, switch, or other similar device—which when operated will connect the line 3 or 3<sup>a</sup> to the ground, and thus short-circuit it. When so connected through either of these boxes 4 or 4<sup>a</sup>, current of sufficient volume will flow from the bus-bars 1 and 1<sup>a</sup> through relays or other signal-operating mechanism 2 2, energizing the same and operating their signals 10 at both ends of the line, whereby the attendants will be instructed to open the circuit-breakers and shut off current from the section wherein the alarm-box is situated.

Instead of having the relay 2 operate a visible or audible signal it may be made to open the line automatically and shut off the current from the section. Such an arrangement is illustrated in Fig. 2. In this figure 1 1<sup>a</sup> are the positive bus-bars feeding the trolley-wires or underground conductors 12 12 12 12. 2 2 are relays, 5 5 5 5 are circuit-breakers,



and 6 6 6 6 are trip-coils controlling said circuit-breakers. When the signal-line 3 through one of the alarm-boxes 4 is grounded, current from the positive bus-bars 1 and 1<sup>a</sup> flows through relays 2 2, energizing the same and closing the local circuits 8 through the contact-points 13<sup>a</sup> 13<sup>a</sup>, &c., and solenoid-bars 13<sup>b</sup>. In these local circuits 8 are situated suitable sources of suitable energy 7, the current from which then flows through the signal or trip coils 6 6 6 6 at both ends of the line-section and operates the circuit-breakers 5 5 5 5, thus automatically shutting off the current from the power-lines controlled by said circuit-breakers. 13 13 13 13, &c., are hand-switches, which may be located in these local circuits 8 to manually close them through said trip-coils, if desired.

In Fig. 3 we have shown another system involving our invention, in which an alarm or emergency switch 4<sup>a</sup> is employed which does not connect the signal-lines 3 to the ground, but which closes the local circuits 8 8 directly, and so dispenses with the use of relays for closing said circuits. In the system illustrated by this figure when one or more of the switches 14 in the emergency-alarm box 4<sup>a</sup> is or are closed current flows from the batteries 7 7 through the local circuits 8 8, energizing the signal or trip coils 6 and tripping the circuit-breakers 5, located in the main lines, and thus cuts the current off from the corresponding section or sections of power-lines.

Fig. 4 shows another modified form of our invention, and in this form means are provided for operating the system from the train itself. 14 is a railway-car, outside of which is mounted an alarm device 4<sup>c</sup>, such as a bow-trolley, connected through the axle 15 to the rail 16 and ground. Supported at any convenient location along the track, as above the car, is a signal-conductor 3<sup>c</sup>, connected with the positive bus-bar 1 through a relay 2. The alarm device 4<sup>c</sup> may be operated manually by a lever or by electricity or compressed air within the car, so as to make contact with the conductor 3<sup>c</sup>, thus grounding said conductor and causing current from the bus-bar 1 to flow through the relay 2, energizing it and closing the local circuit 8 through contacts 13<sup>a</sup> and tripping the circuit-breakers, as described. In this figure for the sake of simplicity only one bus-bar and one end of the line-section is shown.

In the systems heretofore described the signaling-circuits extending along the track have been normally open-circuited and operate to throw the main switches when short-circuited. In the system shown in Fig. 5 the signaling-circuits 3 are normally close-circuited and are open-circuited to throw the main switches. In this figure 18 18<sup>a</sup> are alarm-boxes, preferably of the well-known fire-alarm type and preferably located at

stations along the line. 20 is a circuit including a battery, and 19 19 are push buttons or other similar contrivances arranged at suitable intervals along the track, which when operated close the circuits 20 and set into operation the mechanism contained within the alarm-box 18, which mechanism automatically opens the signaling-circuit 3 a given number of times, which number is characteristic of the box operated. 18<sup>a</sup> is a similar box which when operated opens and closes the circuit a different number of times, which number is characteristic of that box. Included in the circuit 3 is a relay 2. (Shown in detail in Fig. 6.) This relay is composed of a magnet having a pivoted armature 22, shaped to form a hook at its outer end, which hook when in the position shown in the drawings engages with the projection 23 at the ends of pivoted switch-blades 24. The current normally flowing through the signaling-circuit retains the armature 22 in the position shown in engagement with the switch-blades 24. When current through the signaling-circuit is interrupted, the armature 23 drops downward against back-stop 25, releasing the switch-blades 24, which then fall in the position shown in dotted lines, making contact with the contact-point 26. The local circuits 8 to the circuit-breakers (not shown on this sheet) are then closed through contacts 27, switch-blades 24, and contacts 26. 28 is a four-point hand-switch of ordinary construction by which the said circuits may be opened or closed by hand. The signaling-circuit 3 includes also gong-operating mechanisms 30 and 30<sup>a</sup>. Each time the circuit 3 is opened the gongs are tapped once. The watcher at the station is by this means informed where along the line 3 is located the box which has been operated, and therefore where the trouble exists. If each box on the line has a characteristic plural number, then if a gong sounds once only the watcher will know that the interruption of the circuit is accidental, and he can therefore immediately by hand return the switch-blades 24 to their normal and elevated position and restore current to the line without delay.

Having thus fully described our invention, what we desire to claim by Letters Patent is—

1. In an electric-railway system the combination of a power-line divided into separate sections, a plurality of signal-circuits extending along the line, each of said signal-circuits being local to a section of the power-line, alarm-boxes connected with said signal-circuits, which boxes contain mechanism which, when operated, actuates signal mechanism at both ends of said power-line sections.

2. In an electric-railway system in combination with a power-line thereof, a main switch controlling the connection of the power-line and the bus-bars, a signal-circuit extend-



ing along the line, an alarm-box connected with said signal-circuit, said box containing mechanism which, when operated, actuates said main switch and shuts the current off from the power-line.

3. In an electric-railway system the combination of a power-line divided into separate sections, main switches at both ends of said sections connecting the same with the bus-bars, a signal-circuit extending along the line, an alarm-box connected with said signal-circuit, said box containing mechanism which, when operated, actuates said main switches at both ends of the power-line section.

4. In an electric-railway system in combination with the power-line thereof, a main switch controlling the connection on the power-line and the bus-bar, a signal-circuit extending along the line, a plurality of alarm-boxes connected with said signal-circuit, said boxes containing mechanism which, when operated, actuates said main switch to shut the current off from the power-line and sends a characteristic signal indicating which box has been operated.

5. In an electric-railway system and in combination with the power-line thereof, a signal-circuit extending along the line, an alarm-box connected with said signal-circuit, said box containing mechanism which, when operated, short-circuits said signal-lines, and devices at one or more stations included in said signal-

line and operated by the current flowing there-through when it is short-circuited.

6. In an electric-railway system and in combination with the power-line thereof, a signal-circuit extending along the line connected with the positive bus-bars of the system, an alarm-box connected with said signal-circuit, said box containing mechanism which, when operated, short-circuits said signal-circuit and actuates a relay controlling a local circuit including a source of power, and circuit-breakers operated thereby.

7. In an electric-railway system in combination with a power-line divided into separate sections, a plurality of signal-circuits extending along the line, each of said signal-circuits being local to a section of the power-line, alarm-boxes connected with said signal-circuits, which boxes contain mechanism which, when operated, actuates relays at both ends of a section, which relays control switch-operating mechanism for automatically disconnecting said section of the power-line from the bus-bars at both ends thereof.

In testimony whereof we have signed our names in the presence of two subscribing witnesses.

LEWIS B. STILLWELL.  
HENRY LATEY.

Witnesses:

HENRY G. KING,  
W. E. RUNDLE.