(No Model.) 2 Sheets—Sheet 1.

H. W. LEONARD.

COMBINED TRACK AND TRAIN LIGHTING.

No. 405,895. Patented June 25, 1889.

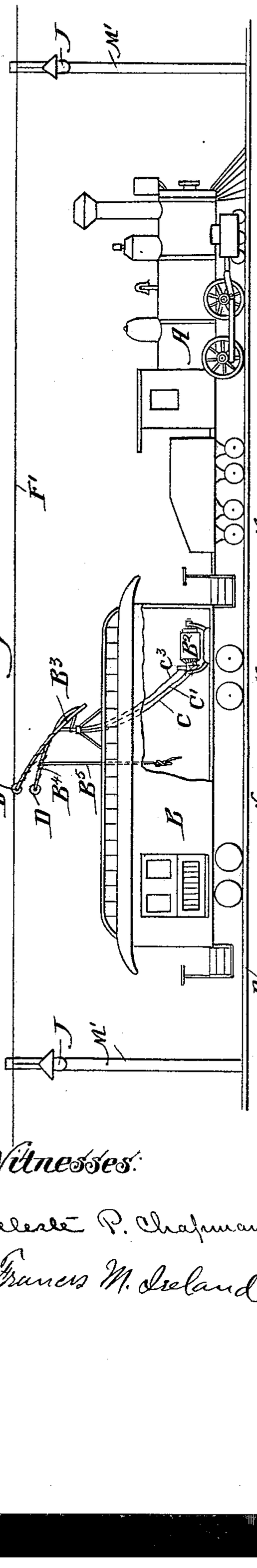

Fig. 1.

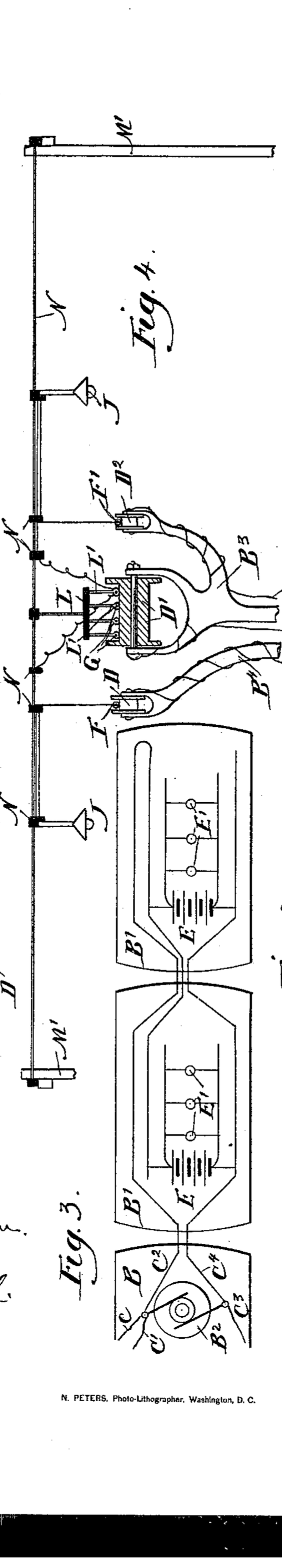

Fig. 4.

Fig. 3.

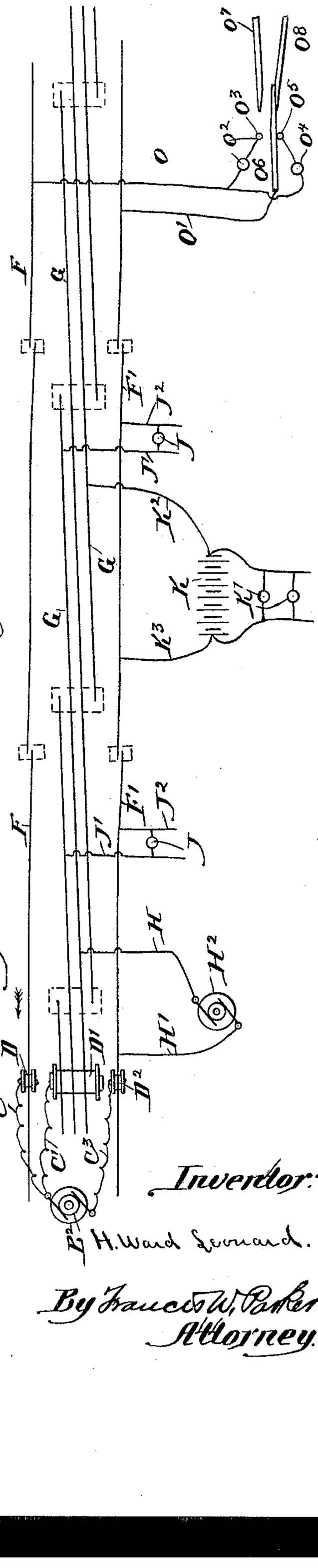

Fig. 2.

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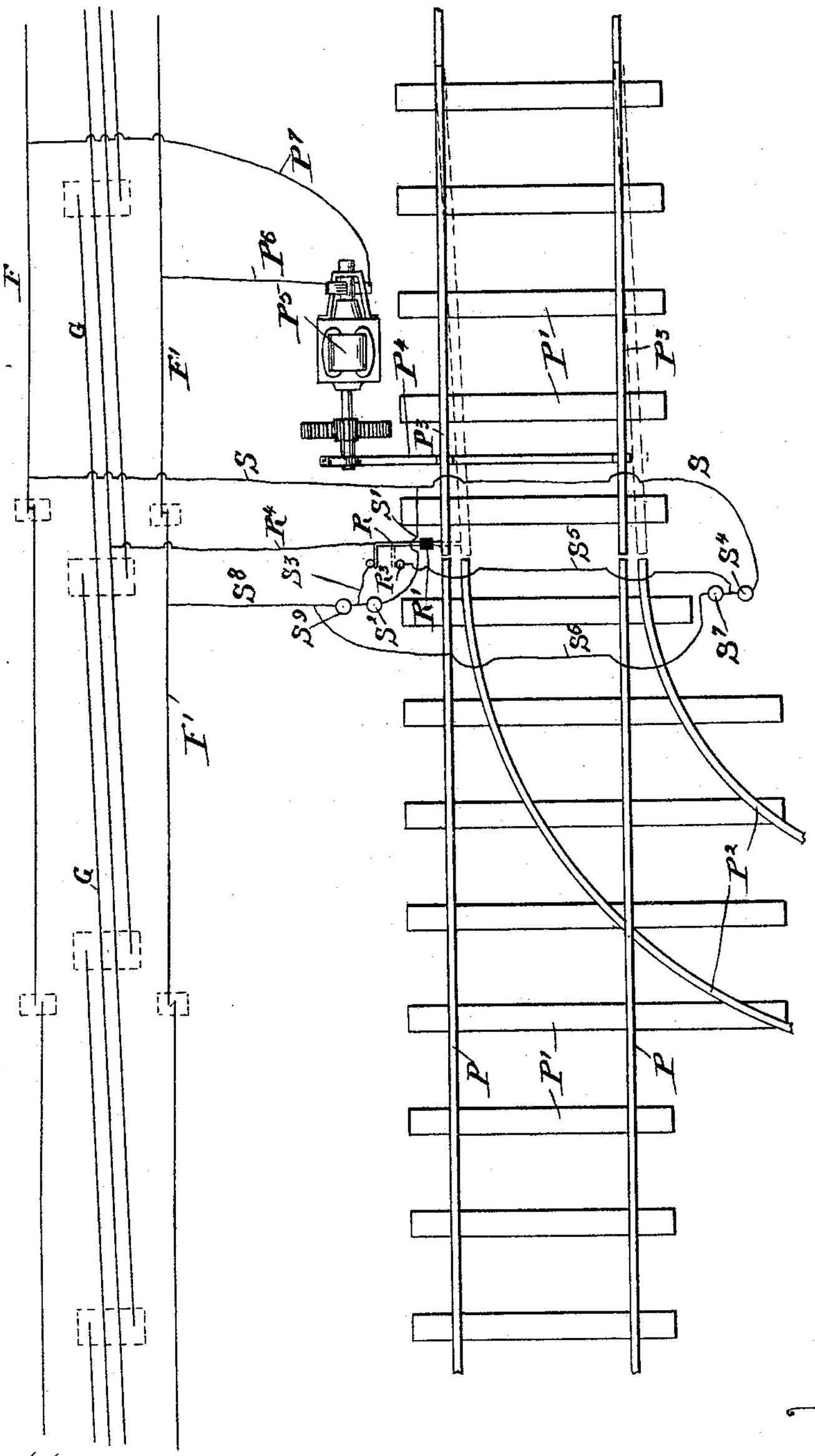
Fig. 5.



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UNITED STATES PATENT OFFICE.

HARRY WARD LEONARD, OF CHICAGO, ILLINOIS.

COMBINED TRACK AND TRAIN LIGHTING.

SPECIFICATION forming part of Letters Patent No. 405,895, dated June 25, 1889.

Application filed February 7, 1889. Serial No. 299,012. (No model.)

To all whom it may concern:

Be it known that I, HARRY WARD LEONARD, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Combined Track and Train Lighting, of which the following is a specification.

My invention relates to devices and means for operating electric systems for trains and local translating devices along the track from a motor fixed upon the train, and my object is to provide convenient means therefor.

My invention is illustrated in the accompanying drawings, wherein—

Figure 1 is a side view of a locomotive and car, parts broken away to show the dynamo. Fig. 2 is a diagrammatic view of the track and local devices and trolleys and generator. Fig. 3 is a similar diagrammatic view of the train-lighting system, and Fig. 4 is a cross-section showing the arrangement of wires and trolleys. Fig. 5 is a plan and diagrammatic view of a mechanism for controlling switches and lights.

Like parts are indicated by the same letters in all the figures.

A is the locomotive; B, the baggage-car; B′ B′, the passenger-cars; B^2, the dynamo; B^3, a trolley carrying two rollers, and B^4 another trolley carrying one roller and controlled by the cord B^5. From one pole of the dynamo pass the conductors C along trolley B^4 to roller D, C′ along trolley B^3 to roller D′, and C^2 to the car-lighting system. From the other pole of the dynamo pass the conductor C^3 along trolley B^3 to the roller D^2, and conductor C^4 to the car-lighting system. The dynamo will be regarded as moving in the direction of the arrows in Figs. 1, 2, and 3, and toward the observer in Fig. 4.

E E are storage-batteries, and E′ E′ lamps or translating devices on the cars coupled in multiple arc, as shown, or in any other suitable manner, between the conductors C^3 and C^4, the whole serving as electric-light plant for moving trains.

Suspended along the track are the two outside systems of wires F and F′, consisting of a series of conductors of suitable length overlapping and their ends insulated, so as to make a discontinuous conductor on each side of and along the track. Midway between these are placed a series of short diagonally-arranged conductors G G, their ends insulated from each other and overlapping, as indicated. The trolleys are so constructed that when the trolley B^3 is elevated in its normal position (indicated in Figs. 1 and 4) the roller D′ and the roller D^2 bear, respectively, against the diagonal conductors G G and the discontinuous conductor F′, as indicated in Fig, 2. It will be clear that when any one of the conductors G G, against which the roller D′ bears, is connected with that portion of the discontinuous conductor F′ against which the roller D^2 bears a circuit will be formed through such connection. Such a circuit is shown as composed of the conductors H and H′, making connection with the motor H^2, the circuits starting from the generator B^2, through the conductor C′, roller D′, conductor G, conductor H, motor H^2, conductor H′, conductor F′, roller D^2, conductor C^3 to generator B^2. When the train is proceeding in the opposite direction, the trolleys could be made reversible on the car, so as to retain the same relative position, or, if not so, the car being reversed, the roller D^2 would traverse the discontinuous conductor P, in which event the motor H^2 would require to be switched in proper manner into a similar circuit connected with the conductor F. In like manner the lamp J, coupled between the conductors J′ and J^2, is operated. So, also, the storage-battery K and lamps K′ K′ are operated when the roller D′ is on that conductor G with which the conductor K^2 from the battery is connected, and when the roller D^2 is on that portion of the conductor F′ to which the conductor K^3 leads from the battery. These wires G G are suspended from the block L by the links L′ L′. The lamps J J might be suspended along the wire M, which is stretched between the posts M′ M′, the several wires, lamps, and the like being suspended by means of the blocks N N, or in any other convenient and desirable manner. Proceeding from the two adjacent portions of the discontinuous conductors F and F′ are the conductors O and O′. The conductor O is branched and passes first through the lamp

O^2 to the contact O^3, and then through the lamp O^4 to the contact O^5. The conductor O′ leads to the contact-plate O^6, which alternately engages the plates O^3 O^5. It will now be seen that when the poles D^2 and D are in contact with the discontinuous wires F′ and F a circuit will be formed through that one of the lamps O^2 O^4 against whose contact the plate O^6 rests. A somewhat similar construction to those last described is shown in Fig. 5 in detail. P P are railroad-rails on the ties P′ P′, and P^2 are the rails of the switch-track, and P^3 P^3 the movable rails of the switch. These rails are secured to the cross-rod P^4, which is driven by means of the gear and eccentric from the motor P^5. This motor is coupled by means of the wires P^6 and P^7 with the conductors F′ and F, or with those portions of such conductors as are adjacent to the motor. The conductors F and F′ must be unbroken or their parts connected at the point where the last-described devices are connected, as shown. So it will be seen that, no matter in which direction the tain is moving, if the two outside trolleys are in contact with the conductors F F′ a current will pass through the motor and the same will operate to move the switch. R is a moving contact-bar projecting from one of the rails P^3 and insulated therefrom. It is adapted to successively engage the contact-blocks R^2 R^3, as shown in full and dotted lines. From the contact-bar R passes the conductor R^4 to one of the conductors G. From the conductor F passes the conductor S, one branch S′ going to the light S^2 and thence by conductor S^3 to the contact-plate R^2. This same conductor S passes through the light S^4, and thence forms two branches, one conductor S^5 passing directly to the contact-plate R^3, and conductor S^6, which passes through the lamp S^7 and thence to the conductor S^8, which leads to the conductor F′. From the contact-plate R^2 a current may pass along S^3 through lamp S^9, conductor S^8 to conductor F′. The object of this construction is to cause the lights S^2 and S^9, and S^4 and S^7 to be lighted in such manner as to indicate the position of the switch by the action of the train moving in either direction.

The use and operation of my invention are as follows: When the train is moving in the direction indicated in Fig. 1, the trolley B^3 should be normally elevated, so that the roller D′ will be in engagement with the conductors G, and the roller D^2 will be in engagement with the conductor F′, as indicated in Fig. 2. The dynamo now being in operation, a current will pass thence along the conductors C^2 and C^4 (indicated in Fig. 3) along the cars of the train, and will energize the several lamps E′ E′ and supply the batteries E E. At the same time a current will pass from such generator along conductor C′ and roller D^2 to conductor F′, and along conductor C′ and roller D′. To make a complete circuit for such current to pass, it will only be necessary to connect the translating devices or insert conductors between such wires G and F′, or between adjacent portions thereof. This is shown in Fig. 2, where, beginning at the left, there is first a motor H^2, connected between the conductors G and F′ by means of the conductors H and H′, so that when the train is passing that conductor G and that portion of the discontinuous conductor F′ to which such motor is coupled the said motor will be energized and may be used for any desired work. In like manner the lamp J or a series of such lamps or several series of them are coupled by means of the conductors J′ and J^2, and in like manner the storage-battery K, with its dependent lamps K′ K′, by the conductors K^2 K^3 to the conductors G and F′.

O is a conductor from the conductor F, leading through the lamp O^4 to the contact-plate O^5.

O′ is a conductor leading from the conductor F′ to the movable contact-plate O^6, and O^2 is a lamp in a branch of the conductor O which leads to the contact-plate O^3. The contact-plate O^6, moving between the contact-plates O^3 and O^5, and adapted to alternately engage them, is itself moved back and forth by the bars O^7 and O^8, projecting, for example, from a switch or forming part of such switch. Now, if the lamp O^2 is red and the lamp O^4 green—one indicating that the switch is thrown in one direction and the other that it is thrown in the other direction—it will be possible for the engineer on the train carrying the dynamo B^2 to determine which way the switch is standing by freeing the trolley B^4, so that it will bear its roller D against the conductor F. Then it is clear that a current will pass through that one of the lamps O^2 O^4 whose contact-plate is in engagement with the contact-plate O^6. If engaged, as shown in full lines, there will be a current passing from the dynamo through conductor C, roller D, conductor F, conductor O, lamp O^4, contact-plate O^5, contact-plate O^6, conductor O′, conductor F′, roller D^2, conductor C^3 to and through dynamo B^2, thus energizing the lamp O^4. The lamps J J are suspended in any desired manner—as, for example, from the cross-wire M, suspended on the posts M′ M′—and in like manner the wires F, F′, and G may be suspended, as well as the block L, which supports the wires G in its links L′. All these devices may be supported by means of the insulation-blocks N N, if desired. These several translating devices (exhibited in Fig. 2) are placed upon one side of the track, and all but the last described would only be operative when the train was moving in the direction indicated; but they might be easily coupled so as to be operative from either side, or suitable switches might be provided, or these local translating devices might be duplicated and connected with the conductor F, so as to operate when the train is moving in either direction. In this event such translating devices as the motor and the storage-battery should be provided with

reversing-switches, so as to send the current through them in proper direction no matter which way the train is moving.

The parts illustrated in Fig. 5 may be regarded as a continuation of those shown in Fig. 2, with another and additional device for track lighting and switching exhibited, the same being coupled so as to signal and switch regardless of the direction in which the train is moving. Suppose now the train to be moving along this portion of the track indicated in Fig. 5 toward the left. As soon as the rollers D' and D^2 engage that portion of the discontinuous conductor F' and that one of the conductors G to which the devices illustrated in Fig. 5 are attached, a current will pass from conductor G along conductor R^4 to contact-rod R, thence to contact-plate R^3, the parts being in the position shown in full lines, thence along conductor S^3, through lamp S^9, conductor S^8 to conductor F', and thence through the rollers, trolleys, and dynamo, energizing the lamp S^9, which we will suppose to be a red lamp and which indicates that the switch is thrown in the position shown in full lines, and therefore indicates that the switch is in proper position for a train moving from right to left. If now the switch had been in the position shown in dotted lines, the current would be as follows: From conductor S, through conductor R^4 to contact-plate R, contact-plate R^3, conductor S^5, lamp S^7, conductor S^6, conductor S^8 to conductor F', thence through the dynamo, thus energizing the lamp S^7, and showing that the switch is in the position shown in dotted lines. If this be desired and the train moving from right to left desires to pass off on the switch, no action will be taken; but if the engineer desires to continue his course toward the left on the main track he will raise the trolley B^4, so as to bring the roller D against the conductor F, thus sending a current through the motor P^5 by means of the conductors P^6 and P^7, and moving the switch over into the position shown in full lines.

We will now suppose that the train is moving from the left toward the right, the parts being as shown in full lines. In this event it will be clear that the roller D^2 will be in contact with the conductor F, and the current will pass from the conductor F through conductor S, conductor S', lamp S^2, conductor S^3, contact-plate R^2, contact-rod R, conductor R^4 to conductor G, thence through the dynamo, energizing the lamp S^2, which like S^9 is a red lamp and indicates that the switch is in the position shown in full lines. If now the switch be in the position shown in dotted lines, the train still moving from left to right, the roller D^2 being against conductor F, the current will be as follows: From conductor F along conductor S, through lamp S^4, conductor S^5, contact-plate R^3, contact-rod R, conductor R^4 to conductor G, thence through the dynamo, thus energizing the lamp S^4, which, like the lamp S^7, is green, and which indicates that the switch is in the position shown in dotted lines. The engineer will then throw the trolley carrying the roller D so as to bring such roller in contact with the conductor F', when the current will again be thrown through the motor and the switch be moved. Thus it will be seen that, regardless of the direction in which the train is moving, the position of the switch will be indicated, and that the engineer may throw the switch in either direction from a moving train, both indication and motion of the switch being secured by means of the energy derived from the generator on the train.

With a dynamo or generator on a moving train, as in the case of electric lighting for such trains, it becomes economically possible to light the track from such generator, and also to light local systems—as, for instance, for depots and the like. This requires track-lighting usually both in front and behind the moving train. A prominent distinction between track-lighting and track-signaling by means of a generator on a moving train will be found in the fact that the signaling devices operate intermittently and not continuously, whereas in lighting the track it is essential that the lamps or translating devices should be continuously operated for a considerable portion of time, and the energy required to so operate or energize such local translating devices or track-lighting lamps would require a generator of some considerable capacity, and hence the desirability of combining the track and train lighting, since the generator used for energizing the train-lamps could be simultaneously used to energize the track-lamps.

I claim as new and desire to secure by Letters Patent—

1. The combination of a movable generator, conductors, and translating devices connected thereto, energized therefrom, and moving therewith, a series of fixed conductors and translating devices connected therewith, and a movable connection from the generator to the fixed conductors to complete the circuit therethrough, and thus energize the fixed translating devices from the movable generator, some of such fixed translating devices being normally always energized.

2. The combination of a movable generator, conductors, and translating devices connected thereto, energized therefrom, and moving therewith, a series of fixed conductors and translating devices connected therewith, and a movable connection from the generator to the fixed conductors to complete the circuit therethrough, and thus energize the fixed translating devices from the movable generator, some of such fixed translating devices being normally always energized, said fixed conductors overlapping, so as to be in contact with the movable connection in such manner as to keep one of them normally always in contact with such conductors.

3. The combination of a movable generator, conductors, and translating devices connected

thereto, energized therefrom, and moving therewith, a series of fixed conductors and translating devices connected therewith, and a movable connection from the generator to the fixed conductors to complete the circuit therethrough, and thus energize the fixed translating devices from the movable generator, some of such fixed translating devices being normally always energized, said local or fixed translating devices consisting in part of local systems containing converters, such as storage-batteries.

In witness whereof I have hereunto set my hand this 5th day of February, 1889.

HARRY WARD LEONARD.

Witnesses:

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CELESTE P. CHAPMAN.