(No Model.) 2 Sheets—Sheet 1.

R. M. HUNTER.

ELECTRICALLY ACTUATED RAILWAY SWITCH.

No. 572,169. Patented Dec. 1, 1896.

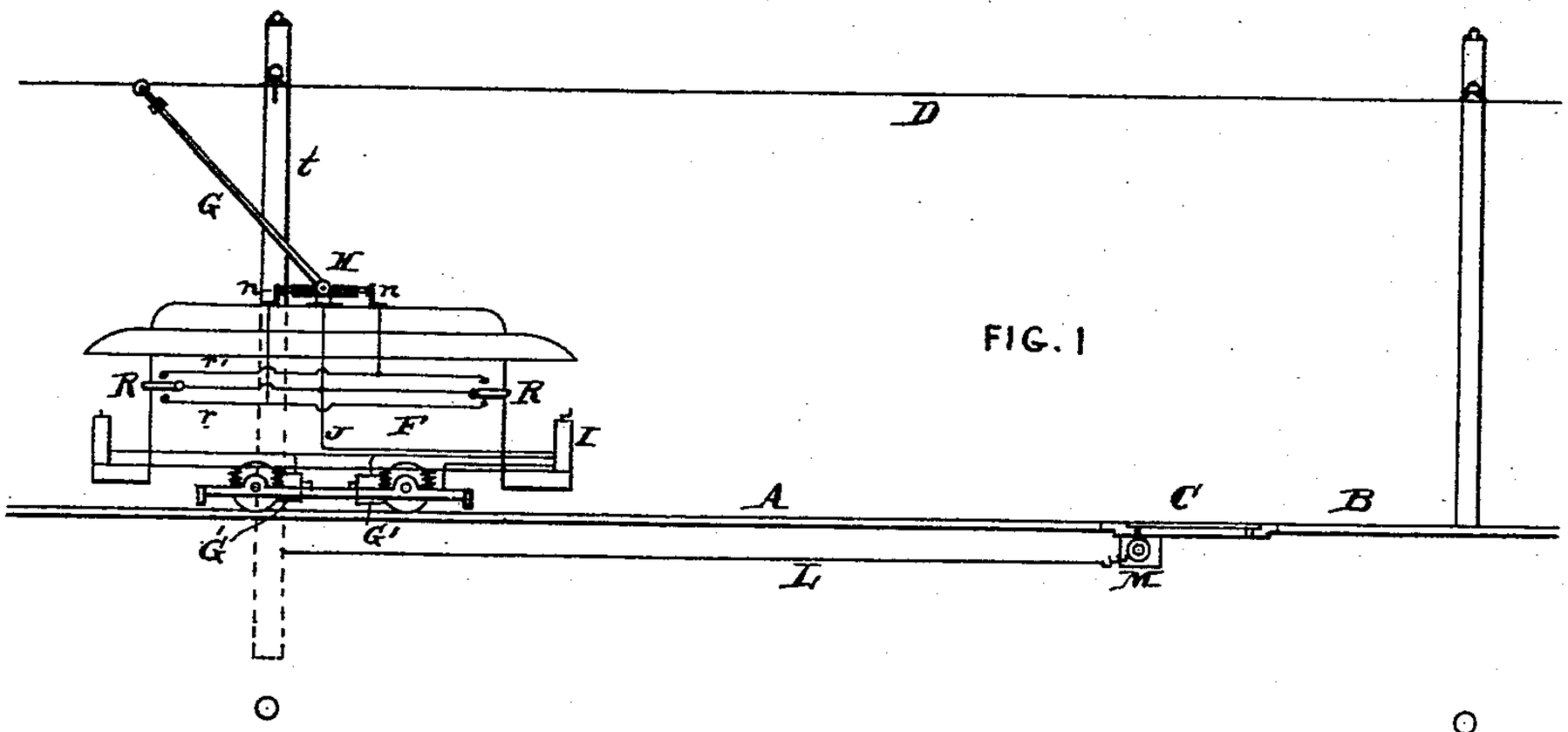

FIG. 1

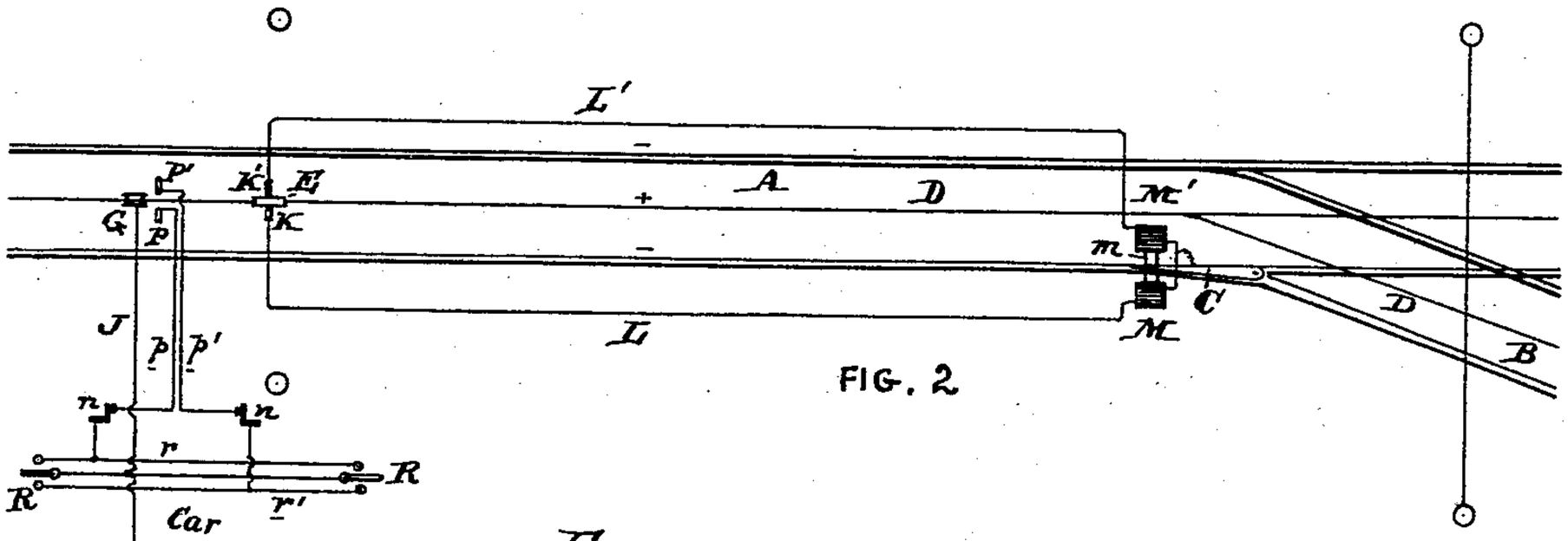

FIG. 2

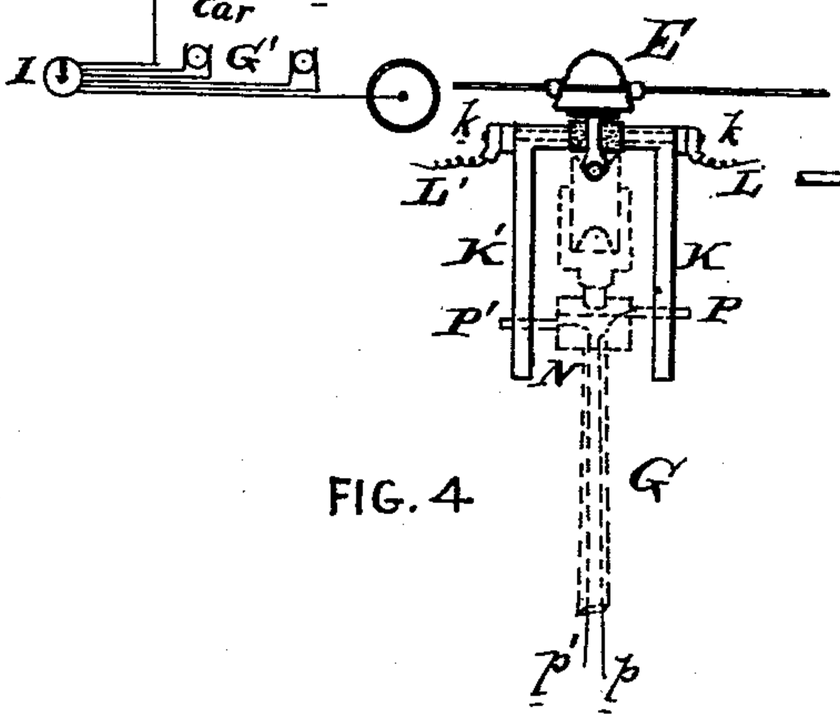

FIG. 4

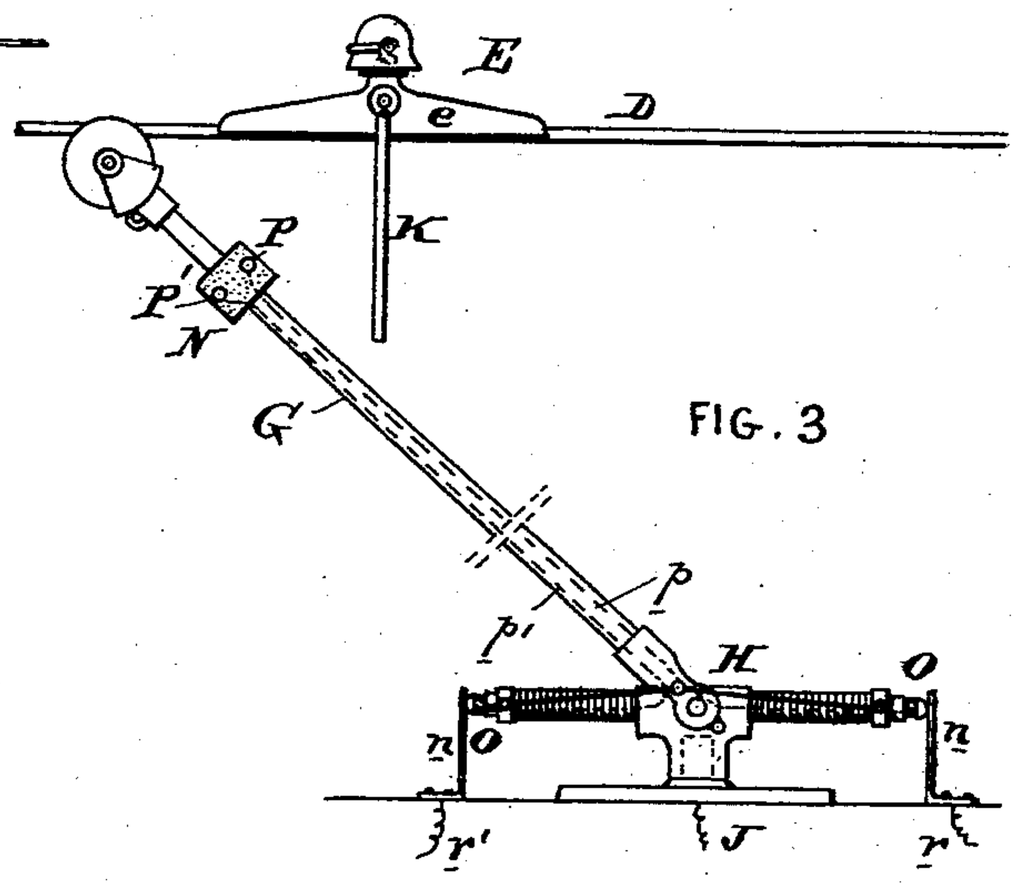

FIG. 3

Attest
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(No Model.) 2 Sheets—Sheet 2.

R. M. HUNTER.

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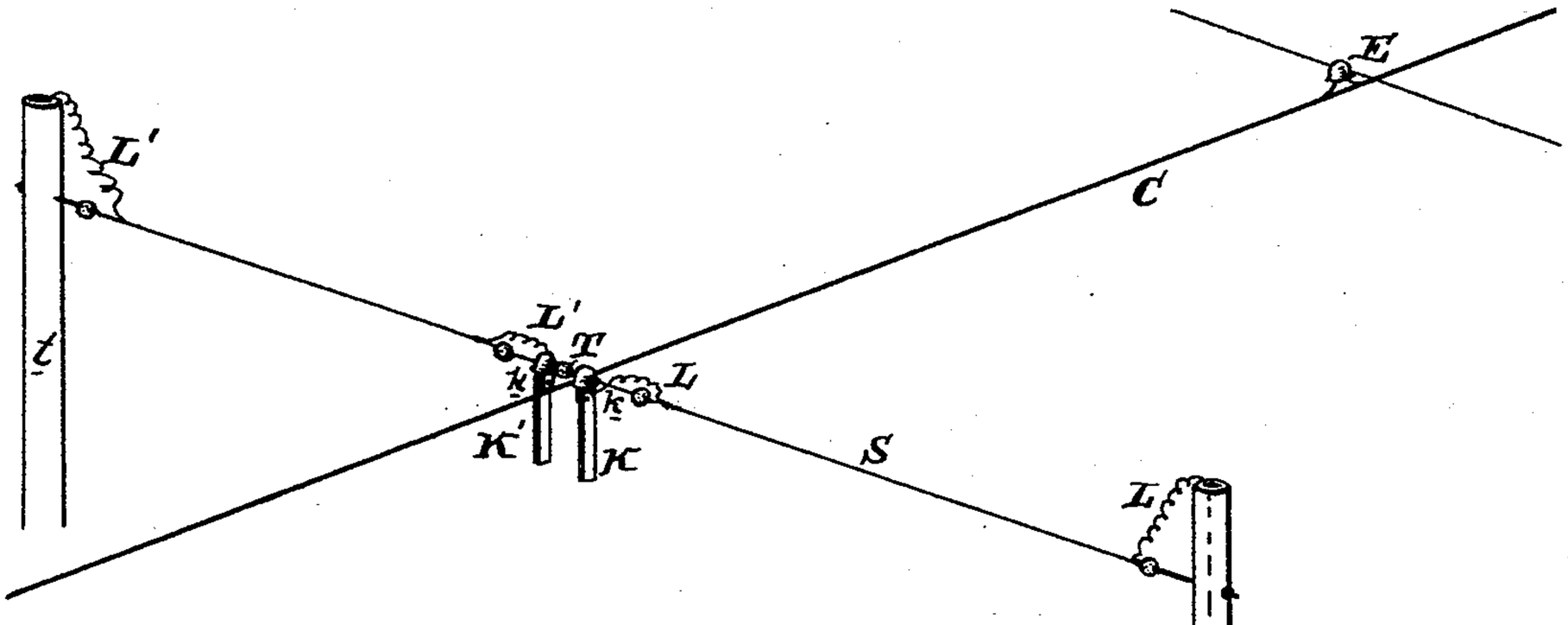
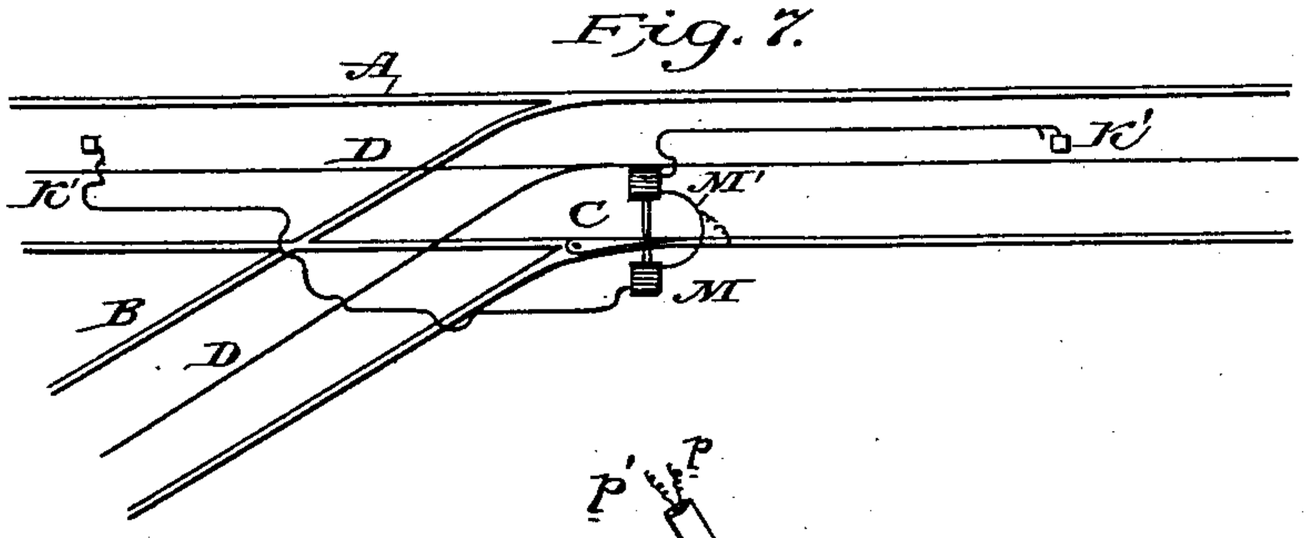


FIG. 5

Fig. 7.



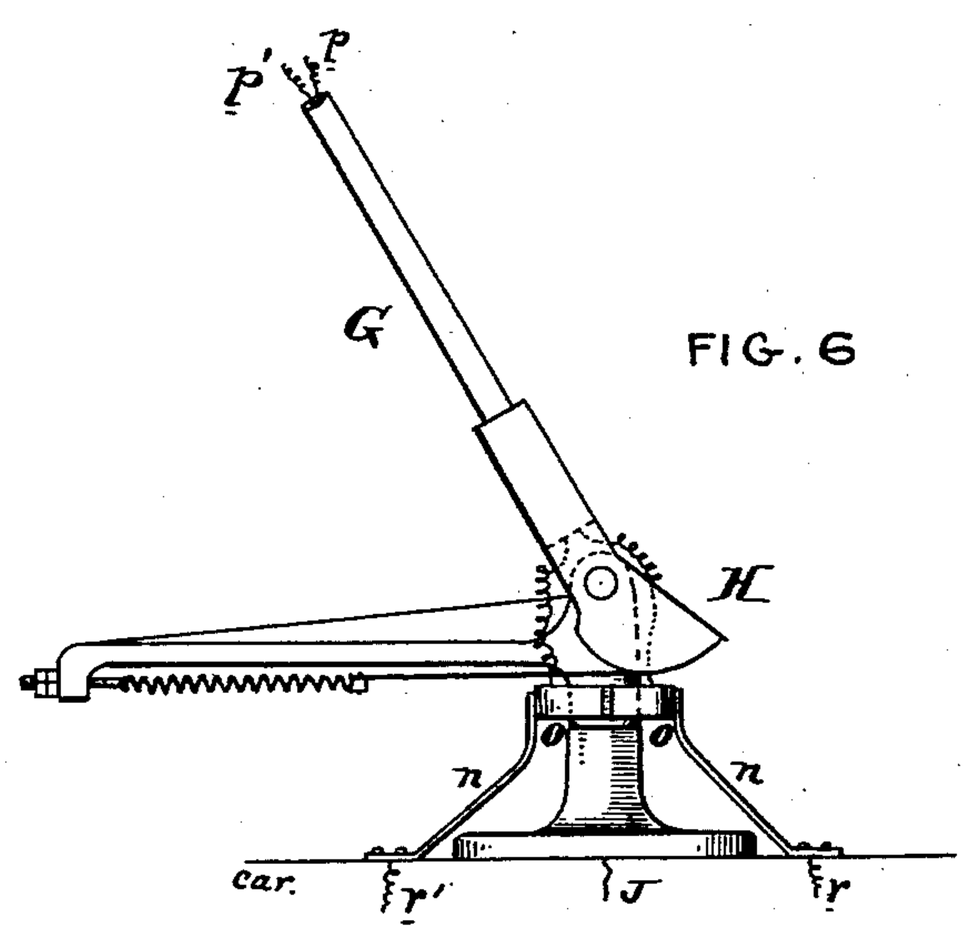


FIG. 6

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UNITED STATES PATENT OFFICE.

RUDOLPH M. HUNTER, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO THE GENERAL ELECTRIC COMPANY, OF NEW YORK.

ELECTRICALLY-ACTUATED RAILWAY-SWITCH.

SPECIFICATION forming part of Letters Patent No. 572,169, dated December 1, 1896.

Application filed July 25, 1894. Serial No. 518,512. (No model.)

To all whom it may concern:

Be it known that I, RUDOLPH M. HUNTER, of the city and county of Philadelphia, and State of Pennsylvania, have invented an Improvement in Electrically-Actuated Railway-Switches, of which the following is a specification.

My invention has reference to electrically-actuated switches for electric and other railways; and it consists of certain improvements which are fully set forth in the following specification and shown in the accompanying drawings, which form a part thereof.

This application (Case No. 282) has particular reference to the adaptation to an electric railway of an electrically-actuated switch for the track, so that at branching points of the railway the motorman on the car can at will throw the switch in advance to permit him to run upon the main line or upon the branch track, as desired.

My invention is adapted to any railway, whether the cars are operated electrically or otherwise; but it is especially adapted to electrically-propelled vehicles such as are found in the systems known as the "trolley-roads," and wherein there is greater difficulty in providing an electrically-actuated switch than in systems employing conduits.

In carrying out my invention I provide the track-switch with suitable electric power devices for positively moving the switch in either direction, and these electric power devices are put into electric circuit with the working conductors of the electric railway through suitable switches upon or controlled by the car, which switches may be under the immediate control of the motorman. To accomplish this, it is necessary that the car shall be provided with a contact device which shall close a circuit between the working conductor of the railway and the electric circuits in immediate connection with the electric power devices of the switch.

My preferred form of apparatus adapted to a trolley-road consists, essentially, in providing circuits from the power devices of the switch to a point overhead and adjacent to the trolley-wire and terminating in two contacts. On the trolley of the car I provide two contacts, one adapted to each of the suspended contacts, and from these contacts I prefer to bring down into the body of the car electric circuits, either one of which may be thrown into connection with the trolley-wire by a suitable hand-switch under the control of the motorman. If the motorman throws the switch on the car in one direction, one contact on the trolley-arm is in electrical connection with the trolley, and in passing the suspended contacts current is supplied to one of them and to one portion of the power devices for throwing the switch, with the result of making the switch move in one direction. If it is desired to make the switch move in the other direction, the motorman has simply to throw the hand-switch in the opposite direction and the desired result will be accomplished.

The switch on the car may be so arranged that if the motorman throws it to the right the track-switch will be thrown to the right, and vice versa. By this means the approaching car can always be caused to pass over the track desired, because the motorman has under complete control the movements of the track-switch fifty or more feet in advance of him. It is evident that by simply duplicating these circuits and suspended contacts the switch may be reset by the motorman after he has passed. Ordinarily this would not be necessary, as each car would have full control of the switch on the approach of the car toward it. It is also evident if certain of the cars are required to pass up one track and others to pass over the branch track that by the employment of two suspended conductors, one in front and the other to the rear of the switch, the approaching car might cause the switch to be thrown in the right direction for its continuous travel and then to be reset automatically after the car passes along, whereby the next approaching car may pass onto the branch track. In this case it would not be necessary for the motorman to operate any hand-switch upon the car. The hand-switch, however, is necessary where the switch is to be thrown either to the right or to the left by the motorman on the approaching car.

My invention may be carried out by a variety of apparatus, but I have shown a good

practical construction, which I will now describe.

Referring to the drawings, Figure 1 is a side elevation of an electric railway and track-switch embodying my improvements. Fig. 2 is a plan view of same, showing the circuits on the car arranged to one side. Fig. 3 is an enlarged side elevation of one form of trolley device and the conductors. Fig. 4 is a front elevation of same with a trolley indicated by dotted lines. Fig. 5 is a perspective view illustrating a method of hanging the suspended conductors without connection with the trolley-wire. Fig. 6 is a side elevation of the lower part of another form of trolley adapted to my invention. Fig. 7 is a diagram showing the circuits for resetting the switch.

A and B represent the rails and are usually the negative circuit of the railway. A represents the rails of the main line, and B represents the rails of the branch line, of railway.

C is the track-switch at the junction of two tracks and may be of any suitable construction.

D is a suspended trolley-wire and may be suspended from poles and cross-wires in any of the well-known manners.

The track-switch C may be operated by any electrically-actuated power device, but for simplicity I have shown an electromagnetic device consisting of a core *m*, secured to the free end of the switch and extending into two solenoids M M'. When one of the solenoids M is energized, the track-switch is moved to the right, and when the solenoid M' is energized the said switch is moved to the left. One terminal of these solenoids is connected with the rail-circuit or return. The other terminals of said solenoids M M' are respectively connected with the circuits L L', terminating in two suspended contacts K K', arranged adjacent to the trolley-wire. In the preferred form these contacts are pivoted on transverse axis *k*, so that they may swing freely in planes parallel with the trolley-wire. In the construction shown in Figs. 3 and 4 these contact-plates K K' are shown as pivoted on each side of the plate *e* of the insulator E, to which the trolley-wire D is connected, but are insulated therefrom.

The trolley G of the car F is provided with two contact-pins P P', carried by a suitable insulating-support N, one of said pins projecting so as to strike one contact, K, and the other pin so as to strike the other contact, K'. As the trolley G moves along both pins P P' strike the respective contacts K K', but the current passes only through the pair of contacts corresponding to the closed electric circuit on the car. In the construction shown in Fig. 3 the pivot-support H for the trolley is provided with contacts O O on its ends, which contacts are respectively in circuit with the two pins P P' by electric conductors *p p'*. On the top of the car in any suitable manner is arranged contacts *n*, so that when the trolley is in position the electric circuit extends from said pins P P' down into the car, as clearly shown in Figs. 1 and 2. A switch-lever R is electrically connected with the motor-circuit J, and when thrown upon either contact of the circuits *r r'* it puts the corresponding pins P P' into electric circuit with the suspended trolley-wire D. It will then be seen that as the car moves along current will be delivered from the pin P or P' in circuit with the corresponding hanging contact K or K', and the corresponding solenoid M M' will thus be energized as desired.

G' are the motors on the car for operating it, and I are the speed controlling or regulating switches and may be of any of the well-known constructions. The contacts O *n* permit the trolley to be reversed without interfering with the construction heretofore employed.

Another form of trolley which is extensively used is that shown in Fig. 6. In this case the pivot-plate, which is movable upon a vertical axis, is provided with commutator-contacts O O, with which suitable contact-springs *n* make connection. The construction is substantially the same as that before described.

In place of hanging the contacts K K' from the insulator structures of the overhead wire said conductors may be suspended from a separate cross-wire S, connected at the top of poles *t* and divided at the middle by an insulator T, as clearly shown in Fig. 5. In this manner there is no connection between the trolley-wire and the pivoted contact-plates K K'. The spanning-wire S for the contacts may be utilized as part of the conductor for the contacts and may connect with the circuits L L', which may extend down through the poles and along the roadway to the solenoids M M'.

It will be observed that in the operation the contact-pins P P' strike the hanging plates K K' and maintain electrical connection therewith for a sufficiently long time to insure the electromagnetic power devices M M' to operate. The contact between the parts K and P or K' and P' constitutes a sliding contact, and thereby insures the working parts of same forming a good contact. It will also be understood that when the two parts come into connection the sparking is but trifling, and when the breaking of the contact takes place it will be evident that the swinging contacts K' leave the pins with great rapidity, and thus prevent any possibility of excessive sparking or the maintenance of such spark as may be formed for any appreciable time.

In some cases it is desirable to provide means for enabling the motorman to reset the switch after passing it, so that the next car will pass onto the branch without requiring any adjustment of the track-switch. To do this I simply duplicate the contacts K or K', or both, beyond the switch, so that the magnets M or M' may be operated as required

after the car has passed the switch. This is shown in Fig. 7. In this view I have shown one contact to operate magnet M′ on approaching the switch and one contact to operate magnet M to reset switch after the car has passed over it. While I have shown the resetting-contact on the main line, it is self-evident that it may be arranged on the branch track, as it is immaterial which track may be called the "branching" track. In practice it would be advisable to operate the switch by the cars of the track which are fewest in number.

The special form of apparatus is immaterial to my invention and can be modified or changed to suit the desires of the constructors.

I do not confine myself to any special forms of the various details employed in connection with this improvement, and illustrate the various forms shown in the drawings simply as examples of apparatus which may be employed for practically carrying my invention into operation.

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

1. The combination of a branching railway having positive suspended conductors, a track-switch at the juncture of the two railways, electric power devices for throwing the switch in either direction, two downwardly-extending loosely-swinging insulated contacts arranged at a distance in advance of the track-switch and movable on transverse axes on each side of the suspended conductor, electric circuits between the contacts and respective power devices, an electrically-propelled car having an upwardly-extending underrunning trolley device extending upward so as to pass freely between the swinging contacts and making contact with the suspended conductor and provided with laterally-projecting pins or contact devices for closing an electric circuit with either of the first-mentioned pivoted contacts by striking and then moving under them, and a switch device on the car for putting either of the laterally-projecting contacts on the car into electric circuit with the motor-circuit of the car.

2. The combination of a branching railway having a suspended positive working conductor, a track-switch, electromagnetic power devices for shifting said track-switch in either direction, circuits extending to a distance from said track-switch and terminating in loosely-swinging contacts insulated from the suspended conductor, and pivoted on transverse axes so as to swing parallel to the length of the suspended conductor and extend below the main contact of the trolley, an electrically-propelled car having a trolley receiving current from the suspended working conductor, and projecting devices carried on the trolley-arm for making temporary electrical connection with said swinging contacts and conductors for the purpose of supplying current to the electromagnetic power devices for shifting the switch.

3. The combination of a branching railway, a track-switch at the juncture of the tracks, electromagnetic power devices for operating said switch, a suspended conductor arranged at an elevation above the tracks of the railways, suspended contacts arranged at a distance in advance of the track-switch and respectively connected by circuits with the electric power devices for moving the track-switch in either direction, an electrically-propelled car, an upwardly-extending trolley pivoted to the roof of the car and making an under running contact with the suspended conductor or trolley-wire, contact devices on the trolley-arm for making contact respectively with the two suspended contacts, circuits from the trolley-contacts to the body of the car, a switch electrically connected with the motor-circuit or trolley-wire adapted to close the circuit leading to either of the trolley-contacts whereby the current may be supplied as desired to move the switch in either direction, and contact devices at the base of the trolley for maintaining electrical connection between the switch and trolley-contacts when the trolley is reversed.

In testimony of which invention I have hereunto set my hand.

R. M. HUNTER.

Witnesses:
ERNEST HOWARD HUNTER,
HELEN L. MOTHERWELL.