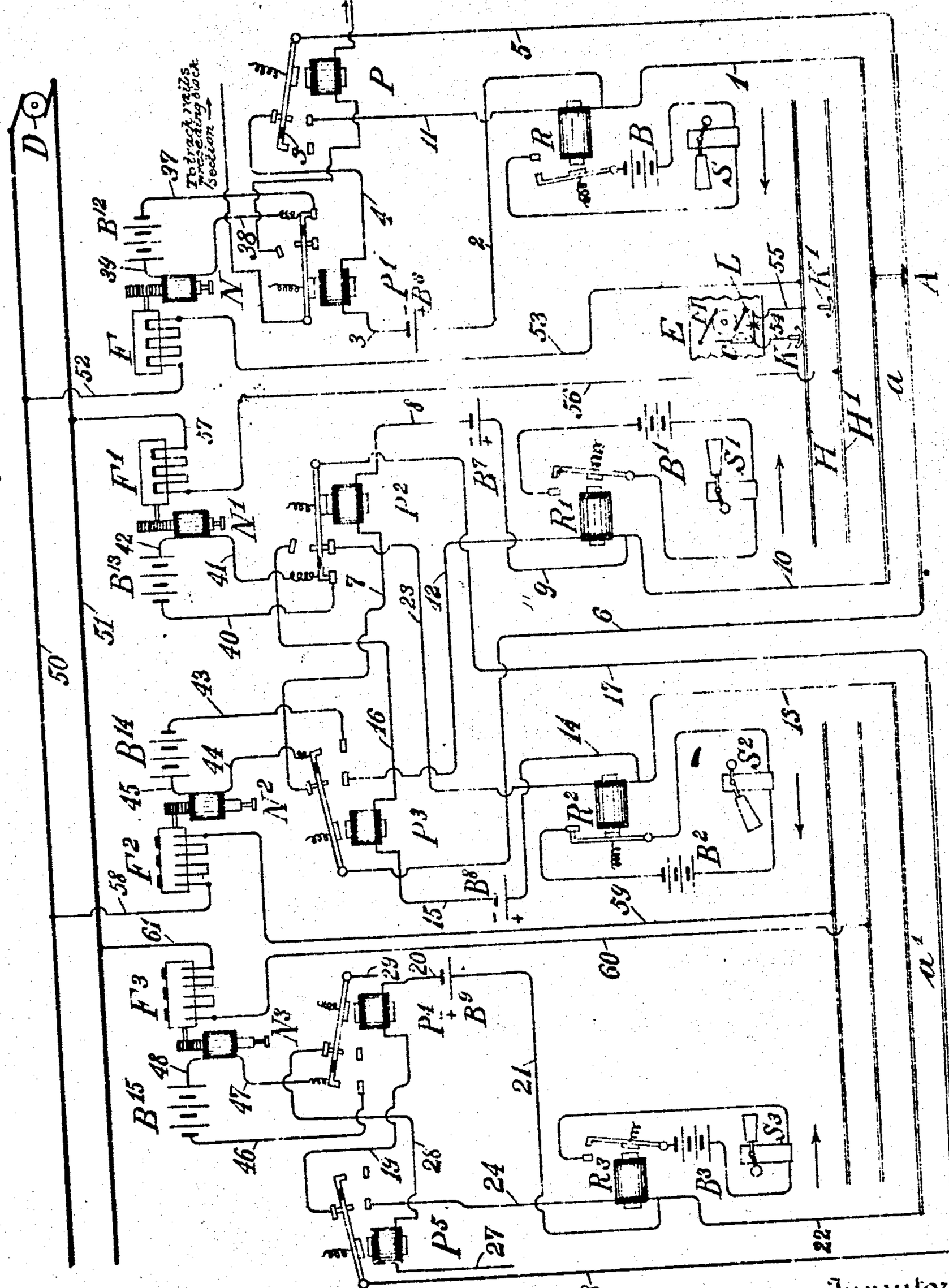
W. G. ROOME.

ELECTRIC RAILWAY.

APPLICATION FILED DEC. 4, 1903.

Patented May 18, 1909.

921,740.



Witnesses

Ivan Konigsberg.

Alex. P. Melvin

Inventor

Wm. G. Roome

UNITED STATES PATENT OFFICE.

WILLIAM G. ROOME, OF LOS ANGELES, CALIFORNIA, ASSIGNOR TO THE UNION SWITCH AND SIGNAL COMPANY, OF SWISSVALE, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

ELECTRIC RAILWAY.

No. 921,740. Specification of Letters Patent. Patented May 18, 1909.

Original application filed March 3, 1902, Serial No. 96,536. Divided and this application filed December 4, 1902. Serial No. 133,847.

To all whom it may concern:

Be it known that I, WILLIAM G. ROOME, a citizen of the United States, at present residing at Los Angeles, California, but formerly residing at Jersey City, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Electric Railways, of which the following is a specification.

The present invention relates to a system for controlling the supply of propulsion current to a sectional third rail conductor of an electric railway, and is a division of the invention set forth in my application for patent filed March 3rd, 1902, Serial No. 96,536. The general manner in which the result is secured, consists in dividing a third rail or other conductor into a number of sections of a desired length, all of which are connected with a feed conductor extending from a generator at a power station through circuit controllers, controlled primarily through controlling or track circuits. The controlling or track circuits preferably form part of a signaling system so that the railway may be used jointly by cars or trains provided with electric motors or steam trains.

I will describe the application of my invention to a railway and then point out the novel features thereof in claims.

The accompanying drawing is a diagrammatic view of a portion of a railway having my invention applied thereto.

Referring now to the drawing, D designates a generator located at a power house for supplying current for propelling motor cars along a railway.

H designates a sectional conductor which is designed to be connected to the feeder conductor in the manner hereinafter set forth. In the usual practice the current from the sectional conductor after passing through the car motors is returned to the generator. In the drawings I have shown a feeder conductor 50 and a return conductor 51 as extending from the generator D. I have also shown an additional sectional conductor H^1.

The railway along which the motor and other cars travel is divided into block sections. I have shown two such block sections a, a^1.

S, S^1, S^2 and S^3, designate railway signals each of which comprises a semaphore or other signal device and an operating mechanism for the semaphore or other signal device. Two such railway signals are shown as being provided for each block section. The railway signal at one end of a block section controls the passage of cars or trains into its block section at that end while the railway signal at the other end of the block section controls the passage of cars or trains into its block section at that end. For example, the railway signals S and S^2 control the passage of cars or trains along the railway in the direction of the arrows beneath them and the signals S^1 and S^3 control the passage of cars or trains along the railway in the direction of the arrows beneath them. In other words, the signals are adapted to control the passage of cars or trains along the railway in both directions. Each semaphore or signal device is, when the block section which it controls is free of a car or train, in a position indicating "danger" or "stop" and is moved to a position indicating "safety" or "clear" as a car or train approaches its block section, and after the car or train enters its block section, it is moved again to a position indicating "danger" or "stop".

Each block section is provided with a controlling or track circuit which comprises a plurality of batteries opposed to each other as to flow of current and a plurality of magnets, which, owing to the batteries being opposed, are deënergized. When, however, a pair of wheels and their axle are on the track rails of a track circuit, both of said magnets will be energized by the batteries of the track circuit to attract their armature and thereby control other circuits. The track circuits of each block section comprise armatures of magnets included in the track circuits of the block sections on both sides thereof.

The controlling or track circuit for the section a, starting from one of the track rails, is wires 1 and 2, track battery B^8, magnet P^1, wire 4, armature and back contact of magnet P^1, wire 5, the other track rail, wire 6, the armature and back contact of magnet P^3, wire 7, magnet P^2, wire 8, battery B^7 and wires 9 and 10 to first track rail. The batteries B^6 and B^7 are included in the track circuits in series with each other and are arranged to oppose or neutralize

each other as regards flow of current. The track circuit for the block section a^1 starting from one of the rails is wires 13 and 14, battery B^8, wire 15, magnet P^3, wire 16, the armature and back contact of magnet P^2, wire 17, the other track rail, wire 18, the armature and back contact of magnet P^3, wire 19, magnet P^4, wire 20, battery B^9 and wires 21 and 22 to the first mentioned track rail.

F, F^1, F^2 and F^3 designate circuit controllers and N, N^1, N^2 and N^3, solenoids for operating the circuit controllers in one direction. Each circuit controller may be of the same construction as that set forth in the application hereinbefore referred to, and the solenoid may be geared to the circuit controller in a manner similar to that shown and described in the said application. That is to say, the core of each solenoid is geared or otherwise connected to the switch and is acted upon in one direction by a weight to move and hold the circuit controller in one position. When the solenoid is energized the cores are moved and thereby the circuit controller too and held in another position. When the solenoids are deënergized the cores are again moved by the weight to bring the circuit controllers to their original or open position. Any other form of circuit controller may be employed and it may be operated in any desired way. In the drawings I have shown two circuit controllers for each block section and their operating solenoids included in circuits which are controlled by the two magnets of each track circuit.

E designates a car provided with a motor M, a lamp L, a controller C and shoes K, K^1, which travel along the conductors II, II^1.

54, 55, designate conductors extending from the shoes to the motor. The lamp L is connected across the conductors 54, 55 and acts as a signal to the motorman.

Assuming now that a pair of wheels and axle A of a car or train is on block section *a*, they will act as a bridge and form a part of circuits for the batteries B^6 and B^7 of that block section so that both magnets P^1, and P^2 will be energized to attract their armatures. The attraction of the armatures of these magnets will accomplish three results: first, the opening of the circuit of a magnet in each of the track circuits of the block sections on both sides of the block section *a*, in this case opening the circuits on the magnets P^3 and P; second, the closing of local circuits through solenoids N, N^1 of circuit controllers F, F^1; and third, the closing of a circuit through relay magnet R^2 to close a local circuit, which includes a battery B^2, for the mechanism of the railway signal S^2, provided no car or train is in the block section a^1, and thus have the semaphore moved from danger to safety. The circuit including the relay R^2 may be traced as follows: Starting from one pole of battery B^9, it is wires 21, 22, track rail of block section a^1, wire 13, relay R^2, wire 23, armature of magnet P^2, wire 17, other track rail of block section a^1, wire 18, armature and back contact of magnet P^3, wire 19, magnet P^4 and wire 20 to other pole of battery B^9. The armature of magnet P^4 is so adjusted that it will not respond to current through its coils when it is in series with relay R^2. This is true of all P magnets when in series with a magnet. Thus it will be seen that a train in any block section acts through the track circuit of that block section to open circuits which would have to be closed before power current could be supplied to the supply or third rail conductor of adjacent blocks on each side of the block sections in which the train is, and also opens or holds open circuits to prevent a clear signal being given.

Returning now to the consideration of the train in block section *a* and without any consideration of a train in block section a^1, upon the attraction to the magnets P^1, P^2, of their armatures, local circuits, one comprising a battery B^{12}, wires 37, 38, and 39, and armature of magnet P^1 and the other comprising a battery B^{13}, wires 40, 41 and 42, and armature of magnet P^2, will be closed through solenoids N, N^1, geared to rotary circuit controllers or switch F, F^1. The solenoids will then act to operate the circuit controllers F, F^1, to close the connections between the conductors 50, 51, and II, II^1, which are wires 52, 53 and 56, 57, and thereby supply power or propulsion current to the supply or third rail conductors. So long as the circuit controllers of any block are closed, the car may travel through that block section, and the lamp L will be lighted, thereby acting as a safety signal to the motorman. Should the lamp L go out it acts as a danger signal as it is always in circuit with the feed conductors. When the magnets P^1, P^2, attract their armatures, they open circuits of magnets P^3 and P in the adjacent block sections in both sides of the block section *a*. The magnets P^3 and P control through their armatures, circuits which include solenoids of circuit controllers provided between the feed conductors 50, 51, and the supply conductors II, II^1, of the respective block sections. Therefore, a train in each block section acts through the track circuit thereof to control the supply of power or propulsion current to one of the supply or third rail conductors of the adjacent block sections on both sides, and unless the driver of the car or train obeys the signals of the block sections he will run the danger of entering a block section in which he cannot obtain power or

propulsion current. The signals, therefore, so far as electric cars or trains are concerned have the double function of notifying whether a car is in the second block section ahead and also whether the supply or third rail conductor is chargeable. Steam trains passing along the railway act to open the supply of current to the supply or third rail conductors of adjacent block sections on both sides. A steam or electric train is thus insured of protection from following or approaching trains for the distance of a block section. The magnets P^3 and P^4 of block section a^1 will, when a pair of wheels and axle bridges the track rails of the block section, be energized by the batteries B^8, and B^9, to close circuits on the solenoids N^2 and N^3 which operate the circuit controllers F^2 and F^3. The circuit for the solenoid N^2 includes the wires 43, 44 and 45, battery B^{14} and armature of magnet P^3. The circuit for the solenoids N^3 includes the wires 46, 47 and 48, battery B^{15} and armature of magnet P^4. The magnets P and P^5 are included in the track circuits of the block sections adjacent to a and a^1, respectively.

58, 59, 60 and 61 designate the conductors between the conductors 50 and 51 and the supply or third rail conductors of block section a^1 and which are controlled by the circuit controllers F^2 and F^3.

Relay magnet R^2 controls the local circuit of railway signal S^2 which local circuit includes a battery B^2 and relay magnet R^3 controls the local circuit of railway signal S^3 which last mentioned local circuit includes a battery B^3.

It will be seen from the foregoing that if a motorman operating a car carefully observes his signals that no accident can happen and he will not be deprived of his propulsion current. Should, however, he pass a danger signal, the operating power is cut off so that the car will be brought to a stop.

What I claim as my invention and desire to secure by Letters Patent is:

1. The combination of a feeding and a return conductor, a sectional supply conductor, a sectional return conductor, circuit controllers for connecting the sections of the supply and return conductors with the feeding and return conductor, a railway divided into block sections and each block section having a section of the supply and return conductors and circuit controllers, a track circuit for each block section comprising sources of current supply, magnets which control the operation of the circuit controllers for that block section and contacts included in a circuit controlled by magnets of adjacent block sections.

2. The combination of a feeding conductor, a return conductor, a sectional supply conductor, a sectional return conductor, circuit controllers for connecting each section of the supply and return conductors with the feeding and return conductors, a railway divided into block sections and each block section having a section of the supply and return conductors, circuit controllers for each block section, a track circuit for each block section comprising sources of current supply, magnets which control the operation of the circuit controllers of that block section and contacts included in a circuit controlled by magnets of adjacent block sections, a railway signal for each block section, and a local circuit for each railway signal which is controlled from the magnet of the track circuit thereof.

3. The combination with insulated track sections and current feeding and return conductors, of sectional supply and return conductors for the respective track sections, circuit controllers for connecting the sectional supply and return conductors with the feeding and return conductors, an electrically propelled car and its motor, contacts carried by the car for putting the motor in circuit with the sectional supply and return conductors, a track circuit comprising the rails of the track section and including two sources of current opposed to each other and two magnets, said track circuit arranged to be a closed circuit when a car is occupying the rails of the track section and means brought into action by the presence of an axle and wheels on the track rails for preventing the establishment of a circuit between the feeding conductor and the sectional supply conductor of an adjacent track section.

4. The combination with insulated track sections and current feeding and return conductors, of sectional supply and return conductors for the respective track sections, circuit controllers for connecting the supply and return conductors with the feeding and return conductors, a track circuit comprising the rails of a track section and including sources of current and magnets, and a circuit controlled by one of said magnets for preventing the connection of the feeding conductor with the sectional supply conductor of an adjacent track section.

5. The combination with insulated track sections and current feeding and return conductors, of sectional supply and return conductors for the respective track sections, electro-magnetically actuated circuit controllers for connecting the supply and return conductor sections in circuit with the feeding and return conductors, an electrically propelled car and its motor, contacts carried by the car for putting the motor in circuit with the power supply and return conductors, a track circuit comprising the rails of the track section and including two sources of current and two magnets, said track circuit arranged to be a closed circuit

when a car is occupying the rails thereof, and a circuit controlled by one of the magnets for preventing the sectional supply conductor of an adjacent track section from being connected in circuit with the feeding conductor.

6. The combination with insulated track sections and current feeding and return conductors, of sectional supply and return conductors for the respective sections, electromagnetically actuated circuit controllers for connecting such sectional conductors with the feeding and return conductors, a track circuit comprising the rails of a track section and including sources of current and two magnets, said track circuit arranged to be a closed circuit when a car is occupying the rails thereof, a circuit controlled by one of the magnets for shifting the controller to connect the supply conductor with the feeding conductor, and a second circuit controlled by the same magnet for preventing the completion of a circuit between the sectional return conductor of an adjacent track section and the main return conductor.

7. The combination of insulated track sections adapted to be used by electrically propelled cars and steam railway trains, a power system for the electric cars comprising sectional supply and return conductors for the respective track sections, a feeding conductor and a return conductor, circuit controllers for connecting the sectional supply and return conductors with the feeding and return conductors, and means comprising a track circuit brought into action by the presence of a car on a track section for preventing completion of a circuit between the sectional supply conductor of an adjacent track section and the feeding conductor.

8. The combination of insulated track sections, sectional supply and return conductors for the respective track sections, a feeding conductor and a return conductor, circuit controllers for connecting the sectional supply and return conductors with the feeding and return conductors, a track circuit comprising the rails of a track section and including sources of current and two magnets, said circuit adapted to be a closed circuit when a car is occupying its rails, circuits controlled by said magnets for operating said controllers, and other circuits controlled by said magnets for preventing the completion of circuits between the sectional supply and return conductors of both adjacent track sections with the feeding and return conductors.

9. The combination with insulated track sections and main current feed and return conductors, of sectional supply and return conductors for the respective track sections, circuit controllers for connecting the sectional supply and return conductors with the feeding and return conductors, a track circuit comprising the rails of a track section and including sources of current and magnets, and a circuit controlled by one of the magnets for preventing a connection between the sectional return conductor of an adjacent section with the main return conductor.

10. In an electric railway system, insulated track sections, a current feeder and a return, two series of sectional third rails or conductors for the respective track sections normally disconnected from the feeder and return, a series of switches for connecting said sectional conductors to and disconnecting them from the current feeder and return, electrical generators connected in normally open sectional track rail circuits which are adapted to be closed by the wheels and axles of a car as it passes over the track section in either direction, magnets included in said circuits for controlling the operation of said switches, and means controlled by one of said magnets for preventing the completion of a circuit between a sectional third rail in the rear of the track section over which the car is for the time being passing and the feeder, until said car shall have passed off the said track section.

11. An electric railway system embracing insulated track sections, a current feeder and a power house generator connected thereto, a return for the current to the power house generator, two series of sectional conductors or third rails, switches for connecting the same to and disconnecting them from the feeder and return, in combination with local batteries located beside the railway, normally open circuits including said batteries, switch controlling magnets, and sectional track rails, said circuits adapted to be closed by the presence of wheels and an axle on the track rails, additional local batteries and signal devices in normally open circuits for each track section, and means controlled by a switch controlling magnet in one track section, for closing one of the last named circuits in an adjacent section.

12. An electric railway system embracing insulated track sections, a current feeder and a return, sectional supply and return conductors for the respective track sections, normally open circuit connections between the same and the feeder and return, switches for closing said normally open circuit connections, local electrical generators wholly independent of the power house generator which supplies the feeder, normally open circuits including said electrical generators, switch controlling electro magnets, and the rails of a track section, said last named circuits adapted to be closed by wheels and an axle on the rails of a track section and thereby cause the corresponding sectional

conductors to be maintained in connection with the current feeder and return during the time that said wheels and axle are passing over said track section in either direction, whether the power house generator be in operation or not.

Signed at Jersey City in the county of Hudson and State of New Jersey this 26th day of November A. D. 1902.

WILLIAM G. ROOME.

Witnesses:
EDUARD REINBERG,
SARAH C. ROSS.