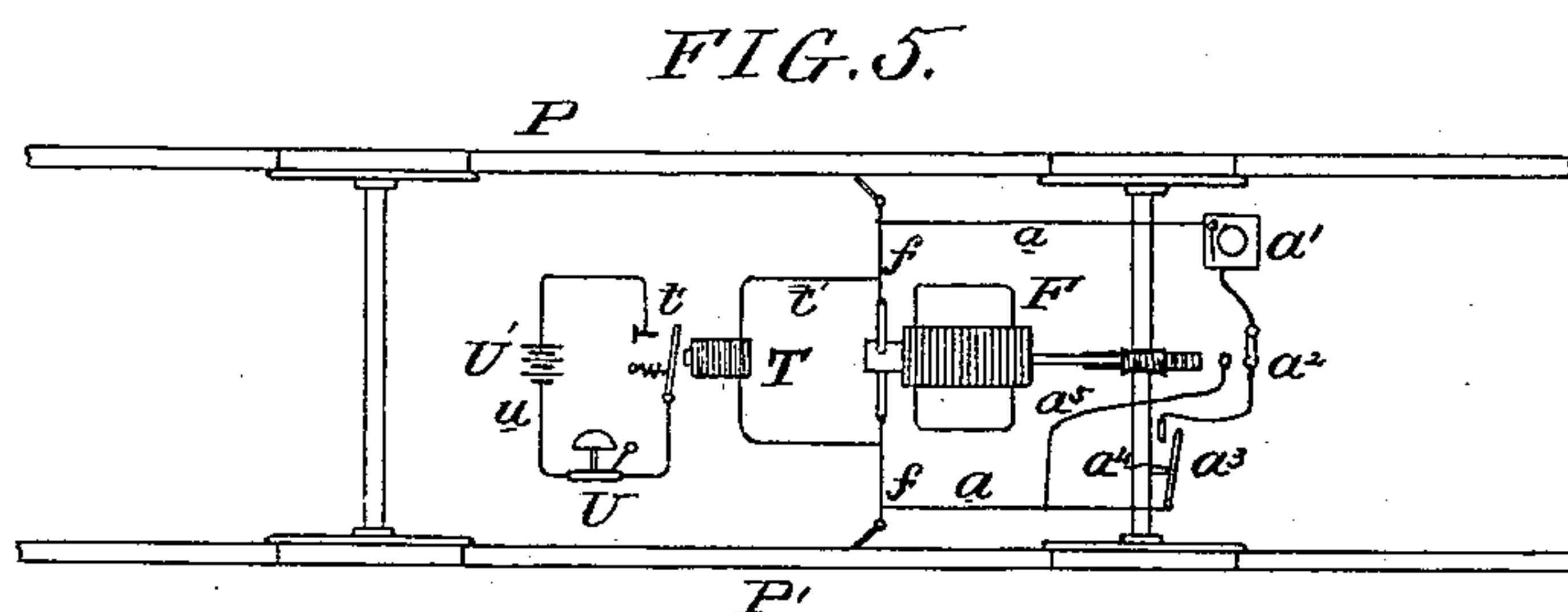
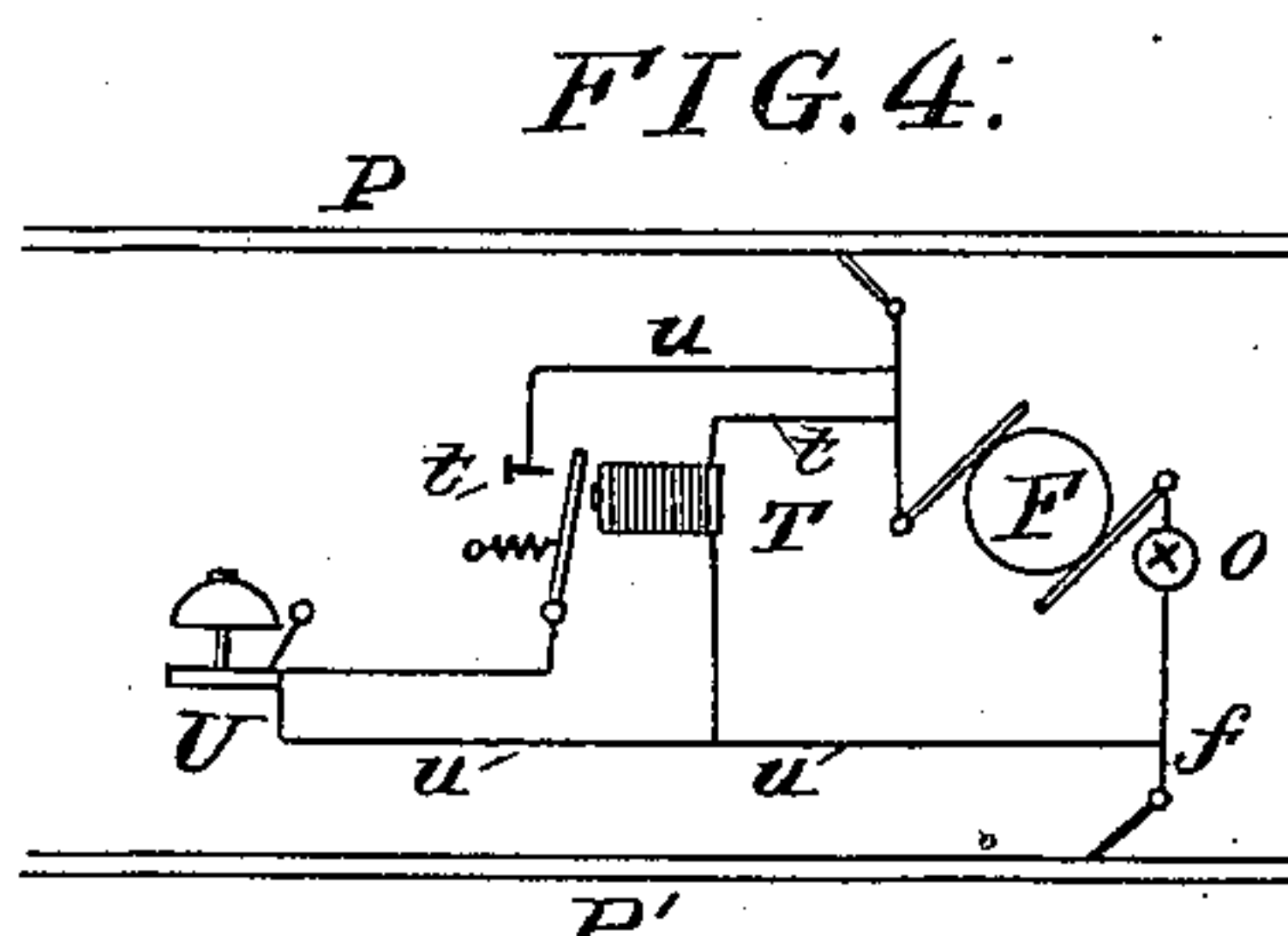
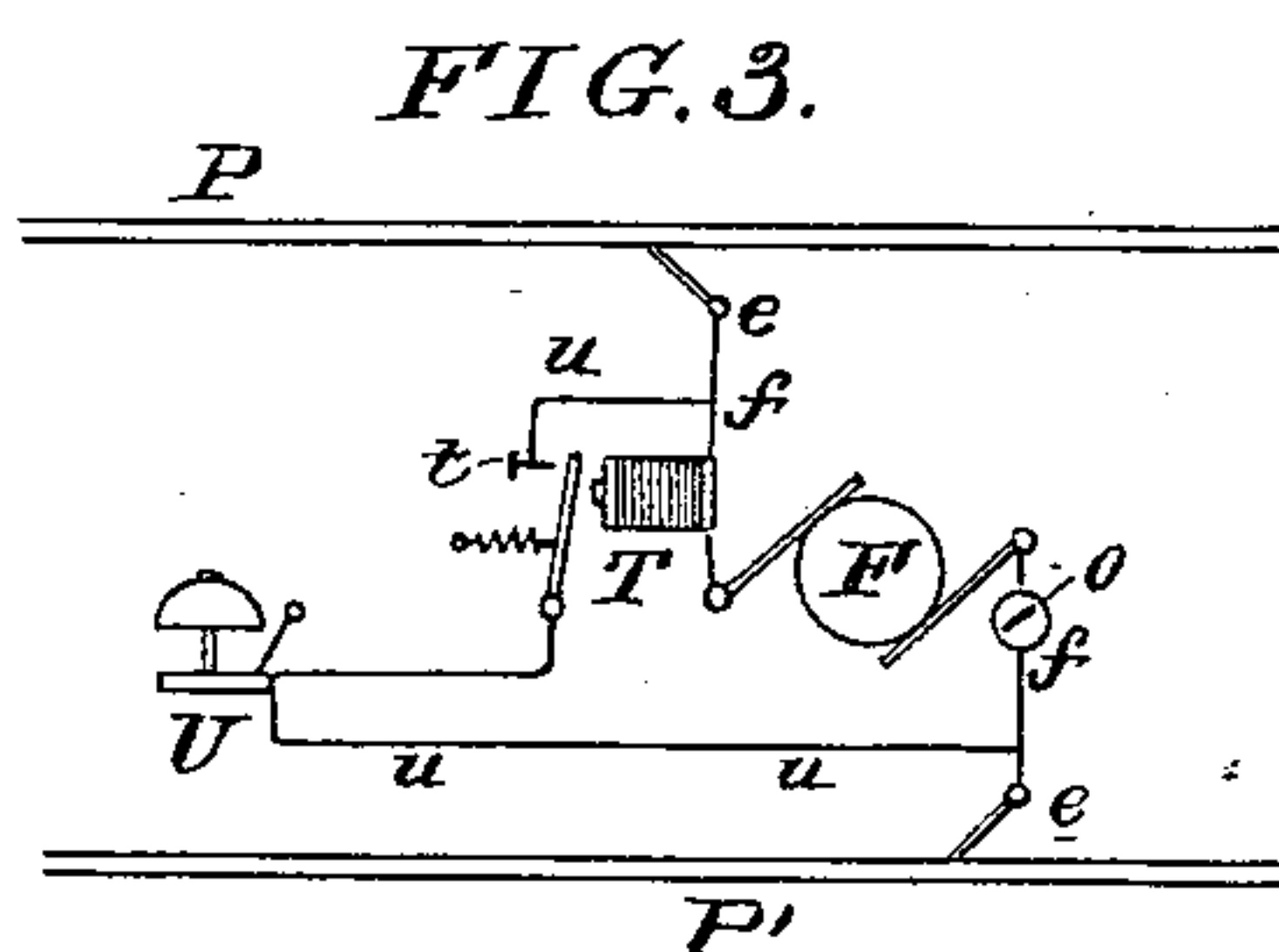
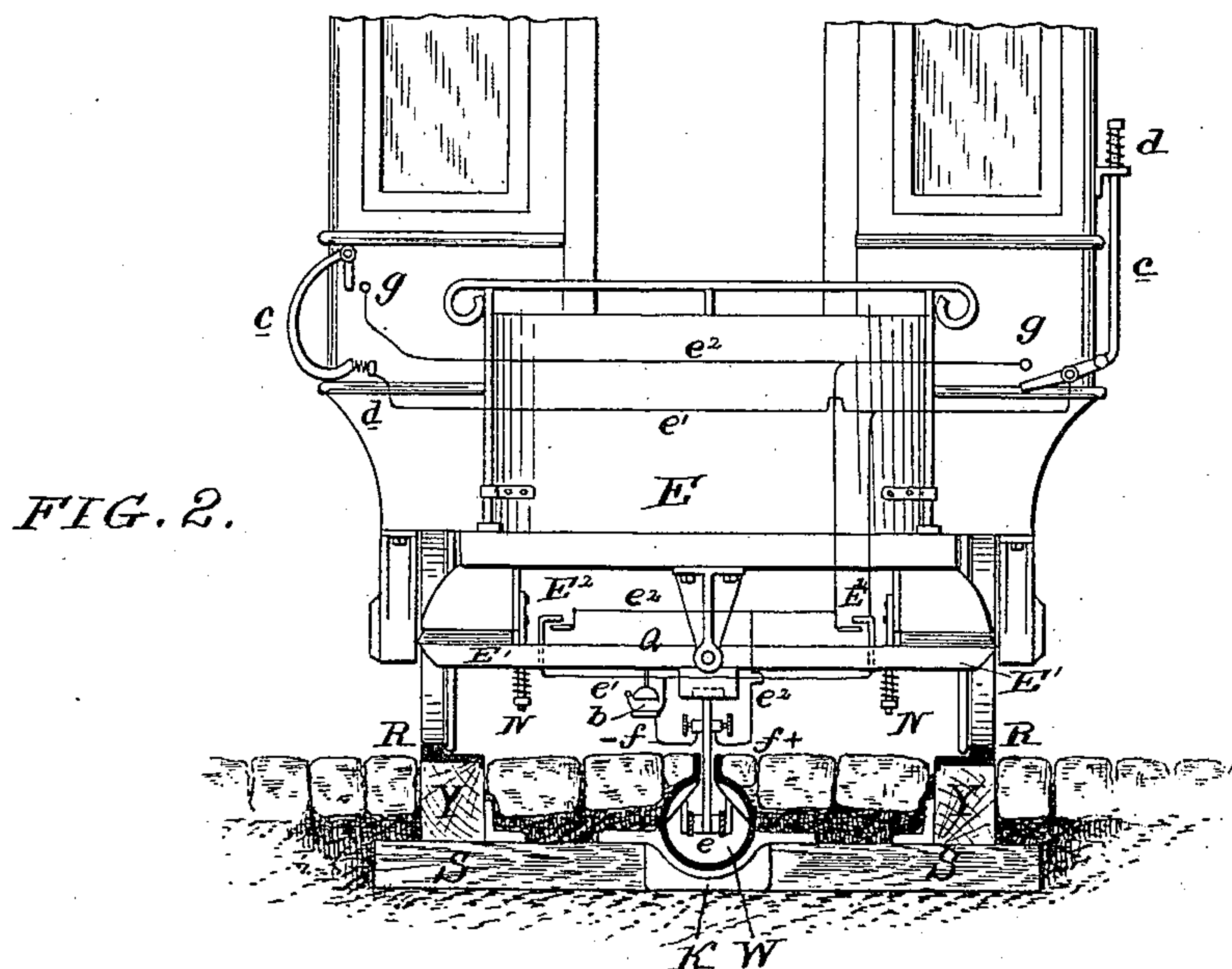
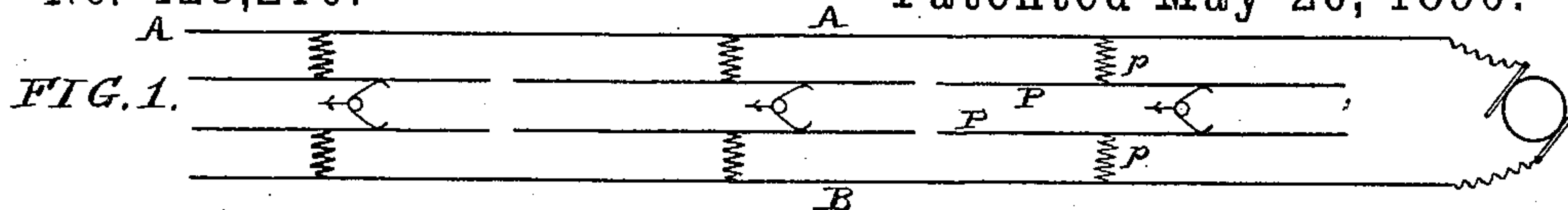


R. M. HUNTER.
ELECTRIC RAILWAY.

No. 428,210.

Patented May 20, 1890.



WITNESSES:

David S. Williams
George F. Drury

INVENTOR:

Wm. H. Smith

UNITED STATES PATENT OFFICE.

RUDOLPH M. HUNTER, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO
THE THOMSON-HOUSTON ELECTRIC COMPANY, OF CONNECTICUT.

ELECTRIC RAILWAY.

SPECIFICATION forming part of Letters Patent No. 428,210, dated May 20, 1890.

Original application filed March 18, 1886, Serial No. 195,742. Divided and this application filed February 8, 1889. Serial No. 299,169. (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 Electric Railways, (Case 82,) of which the following is a specification.

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

This application (Case 82) is a division of my application, Serial No. 195,742, filed March 18, 1886.

The object of my invention is to provide an electrically-propelled vehicle with suitable signaling devices, which may be used as indicating-signals or as danger-signals to indicate, first, when passengers are getting on or off the cars; second, when cars are getting too close together on the same line of railway, and, third, to sound an intermittent danger-signal for clearing the track.

In carrying out my invention I provide the car with a movable part on the platform, which may be used by the passenger in getting on or off the platform—such, for instance, as a movable step or hand rail—and which movable part shall close an alarm-circuit on the car and cause a danger-signal bell to ring, or cause a movement of the danger-indicator (of whatever form it may be) to show the man in charge of the motor that it would be dangerous to start the car. I do not confine myself to any particular details of construction, as these parts may be varied in many ways.

In the case of the danger-signals on the car to indicate automatically the too close approach of two cars I provide the car with a circuit, including an electric bell or danger-signal, and control said circuit by means of an electro-magnet in such circuit-connection with the motor that the increase or decrease in current passing through the motor will correspondingly energize the electro-magnet, and when such change in current is a decrease below a given quantity the magnet releases its armature and closes the alarm-circuit. This operates when two or more cars are upon a circuit to which current for one car alone is supplied, and is induced by the

automatic reduction in the resistance between the two working-conductors by bringing such two or more motors in multiple connection. It is evident that while this improvement would operate under some conditions by simply stopping the car, yet in others the signal could be cut out when the car was stopped. It is especially designed to operate automatically when the cars are in motion. The details of these circuits can be considerably varied without in the least departing from the spirit of the invention.

In the case of the intermittent danger signal or gong I provide a circuit on the car in which the signal is located, and which circuit is preferably derived from or in shunt relation to the motor, and this circuit is intermittently broken and closed by any suitable device, such as a pin on the axle or other moving part. In practice the circuit would be provided with a switch, which would only be closed when the alarm was to be sounded. The source of electric power may be such as desired, and in the case of the hand-operated signals may be carried by the car. The interrupter might be dispensed with, if desired.

In the drawings, Figure 1 is a plan view of an electric-railway circuit. Fig. 2 is an end view of a car and cross-section of an electric railway embodying my invention. Figs. 3 and 4 are diagrams showing arrangements of circuits on the car and connections with the working-conductors, and Fig. 5 is a plan view of car-wheels and some of the electrical connections on the car and embodies part of my improvements.

A and B are line or supply conductors, and, if desired, may be used as working-conductors.

P P' are the working-conductors, and are shown in sections, connected with the supply-conductors through branch and preferably resistance-conductors *p*, substantially as set out in my patent, No. 381,555, of 1888.

C is the generator.

E is the car or vehicle, and may be made in any suitable manner.

I may use the rails R as conductors, or the conductors may be put in a conduit W, as set out in my application, Serial No. 205,200, of 1886, and connection may be made therewith

by a sliding or traveling collector device e , passing through the slot and carried by or with the car. The rails R are shown as supported on stringers r , which rest upon cross-ties S , connected by a yoke K , upon which the conduit is secured. The line conductor or conductors may be suspended or otherwise arranged, and various forms of current-collecting devices may be used, as set out in my various applications mentioned and my application, Serial No. 214,309, of 1886.

F is the electric motor on the car for propelling it, and f is the motor-circuit and has the regulator O therein for controlling the motor. In shunt relation with the motor is a circuit $e' e^2$, normally open, but having circuit-closers g in or operated by the hand-rails c against the action of springs d , and circuit-closers E^2 , operated by the pivoted or hinged steps E' against the action of springs N . It will be seen by this construction that stepping on the steps or pulling the hand-rail will close the circuit $e' e^2$ and sound the danger-signal b . While the circuit containing the signal is in shunt relation with the motor-circuit it is evident that any source of electric power may be used. If two of such cars as here set out should run upon the same section of working conductor or portion of electric railway designed for one car there would be more or less danger of collision, if the sections were short and provision were not made to guard against it. To signal the driver of each car automatically when on the same section, I provide the motor with the circuits, &c., shown in Figs. 3, 4, and 5, the construction of Fig. 4 being preferred. In Fig. 3 a magnet T is in the motor-circuit and attracts an armature t against the action of its spring, and the armature controls a shunt or alarm circuit u , containing the electric bell or signal U . In the construction shown in Fig. 4 the magnet T is in a shunt-circuit t' around the motor F . The gong or alarm U may be rung by a separate battery U' , if desired, as shown in Fig. 5. If now one car is on a section, the power of the magnet T is such that the switch t is kept open; but as soon as two cars are upon the same section the current flowing through each motor-circuit is reduced and the power of the magnets T decreased until the power of the springs moves the armature to close the alarm-circuits u . The alarms U will then continue to ring until the cars are run upon separate sections again, or separated by distances greater than the length of a section. The cars are also provided with an alarm-gong a' under the control of the driver by a switch a^2 to notify vehicles and persons on the track, and this gong or signal may be of the kind known as the "striking-gong" or a "vibrator." It is placed in a shunt-circuit a with the motor, and which shunt may be opened and closed by the driver or operator along by the switch a^2 and circuit a^5 , or may be operated intermittently by the revolution of the axle of the

car or other moving part having a pin or projection a^4 , which operates a circuit-breaking spring a^3 in the shunt-circuit a . This intermittent circuit-breaker would have no effect so long as the switch a^2 was open; but when closed the alarm would be automatically sounded. The source of electric power for this alarm is immaterial, and, if desired, might be carried on the car.

This application is confined to the electric bells, signals, or alarms when used in connection with line or working conductors extending along the railway.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In an electric railway, the working-conductors, in combination with a motor or car, connecting devices for conveying electric current to the motor from the conductors, an alarm or electric bell arranged in a branch circuit derived from the motor-circuit and receiving electricity from the working-conductors, and a switch to open or close said alarm-circuit.

2. In an electric railway, the working-conductors arranged along the railway, in combination with a motor or car, traveling collecting devices for conveying electric current to the motor from the conductors, an alarm or electric bell arranged in a branch circuit connecting the positive and negative working-conductors through the traveling collecting devices and in parallel with the motor, and an interrupter independent of the bell to intermittently break said alarm or branch circuit.

3. The combination of a railway, conductors extending along the railway, an electrically-propelled vehicle, a motor-circuit connecting with the conductors, an electric motor to propel the vehicle, an alarm or signal carried by the vehicle, a shunt-circuit around the motor, including the alarm or signal and receiving current from the same source as the motor, and a switch to control the action of the alarm or signal independently of the motor.

4. The combination of a railway, conductors extending along the railway, an electrically-propelled vehicle, a motor-circuit connecting with the conductors, an electric motor to propel the vehicle, an alarm or signal carried by the vehicle, a shunt-circuit around the motor, including the alarm or signal and receiving current from the same source as the motor, an interrupter independent of the bell to interrupt the shunt or signal circuit, and a switch to control the action of the alarm or signal independently of the motor.

5. In an electric railway, two continuous main or supply conductors, a stationary source of electric supply therefor, two working-conductors, one or both made in sections and connected with the main or supply conductors by an electrical connection independent of the motor-cars, and traveling motor-cars re-

ceiving electricity from said working-conductors, in combination with automatic electric danger-signals carried by the motor-cars in shunt relation with the motor-circuit and motor to sound an alarm should too many motors come upon the same section, substantially as and for the purpose specified.

6. In electric railway having working-conductors and traveling motors receiving electricity from said working-conductors, in combination with automatic electric danger-signals, consisting of a shunt around the motor containing an electro-magnet, and an auxiliary circuit containing the alarm and closed by the armature of the shunt electro-magnet and controlled by the current passing through the motors onto the cars to sound an alarm should too many motors come upon the same section, substantially as and for the purpose specified.

7. In an electric railway, the working-conductors, in combination with an electrically-propelled car or vehicle, connecting-brushes to convey electricity from the working-conductors to the electric motor on the car, a derived circuit having an electric bell or alarm, a step or platform over which a passenger walks, and a circuit-closer actuated thereby to close the alarm-circuit and thus indicate the position of a passenger.

8. In an electric railway, the working-conductors, in combination with an electrically-propelled car or vehicle, connecting-brushes to convey electricity from the working-conductors to the electric motor on the car, a derived circuit having an electric bell or alarm, a hand-rail which the passenger holds in getting on or off the car, and a circuit-closer actuated thereby to indicate the position of the passenger who has caught the hand-rail in getting on or off the car.

9. In an electrically-propelled vehicle, the combination of an electric motor to propel the same, a motor-circuit, an electric signal-circuit in parallel with the motor-circuit, an electric signal or alarm in said signal-circuit, a circuit-closer for said signal-circuit, a movable support over which the passenger walks to operate said circuit-closer, a railway, line-conductors along the railway, and means for supplying current from the line-conductors to the vehicle.

10. In an electrically-propelled vehicle, the combination of an electric circuit, including an electric signal or alarm in shunt relation with the motor, with a circuit-closer for said circuit, a movable support over which the passenger walks to operate said circuit-closer, a railway, line-conductors along the railway, and means for supplying current from the line-conductors to the vehicle.

11. In an electrically-propelled vehicle, the combination of an electric circuit, including an electric signal or alarm, with a circuit-closer for said circuit, a movable hand-rail, and current-collecting devices for supplying current from the line-conductors to the vehicle to op-

erate said circuit-closer, a railway, and line-conductors along the railway.

12. In an electrically-propelled vehicle, the combination of an electric circuit, including an electric signal or alarm in shunt relation with the motor, with a circuit-closer for said circuit, a movable hand-rail to operate said circuit-closer, a railway, line-conductors along the railway, and current-collecting devices for supplying current from the conductors to the vehicle.

13. An electrically-propelled vehicle, an electric motor, and motor-circuit on said vehicle, in combination with an alarm or signal circuit on the vehicle, an alarm or signal in said circuit, an electro-magnetic device controlled by the current flowing through the motor-circuit to sound an alarm when the current falls below a given strength, a railway, line-conductors along said railway, and current-collecting devices for supplying current from the conductors to the vehicle.

14. An electrically-propelled vehicle, an electric motor, and motor-circuit on said vehicle, in combination with an alarm or signal circuit on the vehicle, an alarm or signal in said circuit, an electro-magnetic device in a shunt-circuit around the motor and controlled by the current flowing through the motor-circuit to sound an alarm when the current falls below a given strength, a railway, line-conductors along said railway, and current-collecting devices for supplying current from the conductors to the vehicles.

15. The combination of a railway, a conductor extending along the railway, a vehicle, an electric motor to propel the vehicle, a motor-circuit carried by the vehicle and including the motor, a collector carried by the vehicle and making a moving contact between the motor-circuit and conductor, a signal-circuit in parallel with said motor-circuit, and an electric signal in said signal-circuit.

16. The combination of a railway, a line-conductor extending along the railway, a vehicle, an electric motor to propel the vehicle, a motor-circuit carried by the vehicle and including the motor, a collector carried by the vehicle and making a moving contact between the motor-circuit and line-conductor, a signal-circuit in parallel with said motor-circuit, an electric signal in said signal-circuit, and a switch to control the current in the signal-circuit independently of the motor.

17. The combination of a railway, a conductor extending along said railway, a vehicle, an electric motor to propel the vehicle, a motor-circuit carried by the vehicle and including the motor, a collector carried by the vehicle and making a moving contact between the motor-circuit and conductor, a signal-circuit in parallel with said motor-circuit, an electric signal in said signal-circuit, and independent controlling devices for the current in the motor-circuit and signal-circuit.

18. The combination of a railway, an electric conductor extending along the railway, a traveling vehicle, an electric motor to propel said vehicle, an electric bell or signal, a
5 movable contact device for supplying current from the conductor to the motor and bell or signal, and independent means to control the current flowing, respectively, to the motor and bell or signal.
19. A railway, a line-conductor, a traveling
10 car, an electric bell or signal carried by the car, a current-collecting device movable with the car for supplying current from the line-conductor or to the electric bell or signal, and current-controlling devices to control the current flowing to the bell or signal. 15

In testimony of which invention I hereunto set my hand.

RUDOLPH M. HUNTER.

Witnesses:

ERNEST HOWARD HUNTER,
E. M. BRECKINREED.