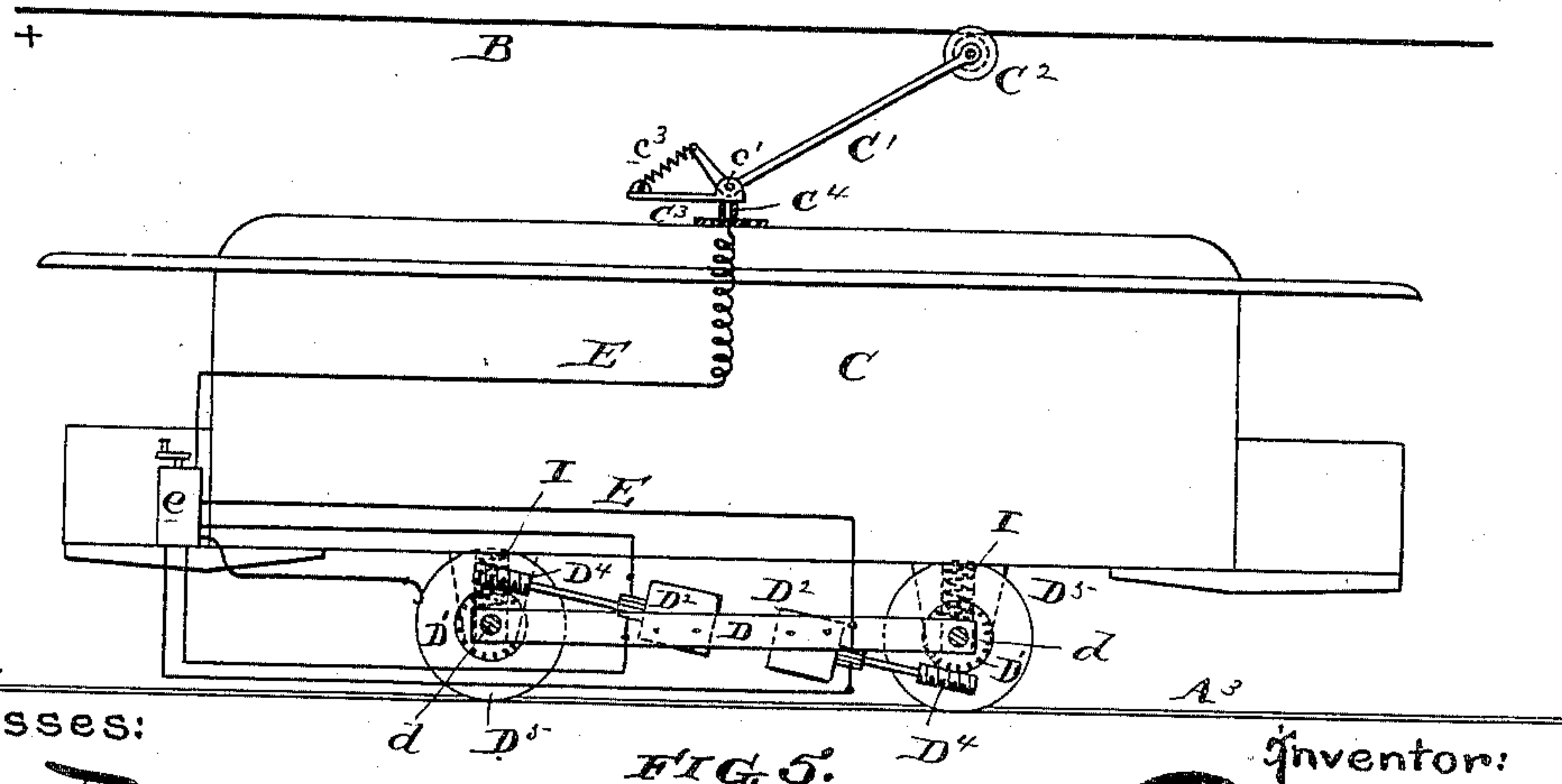
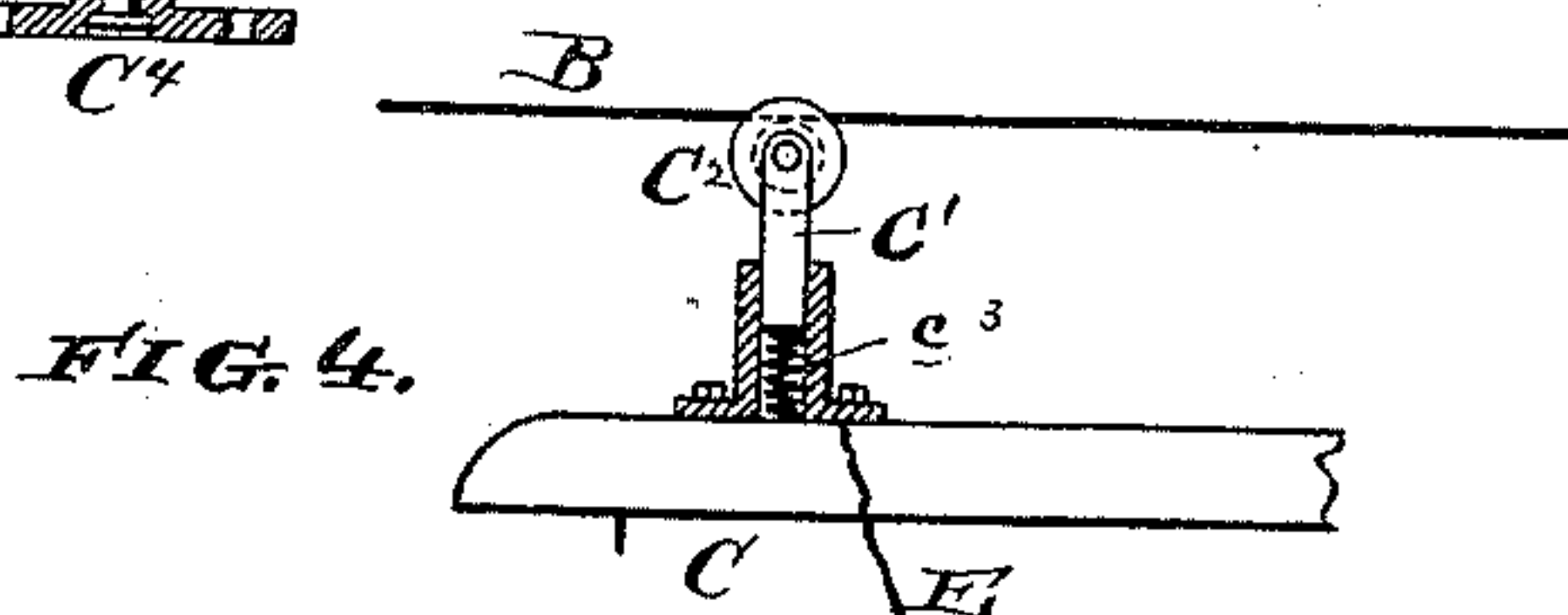
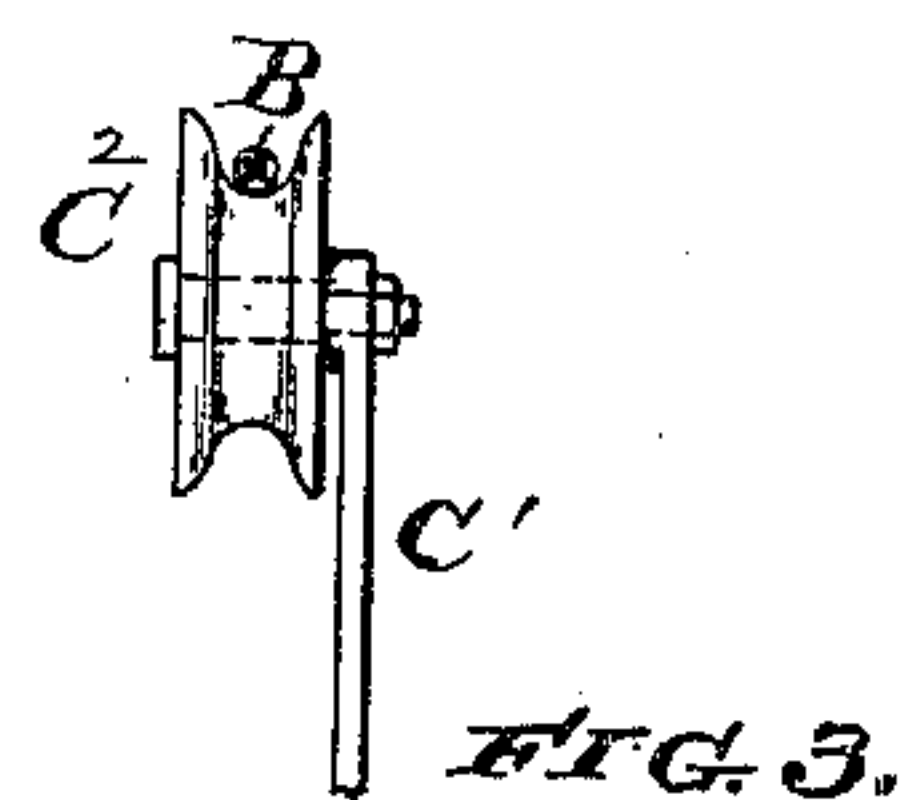
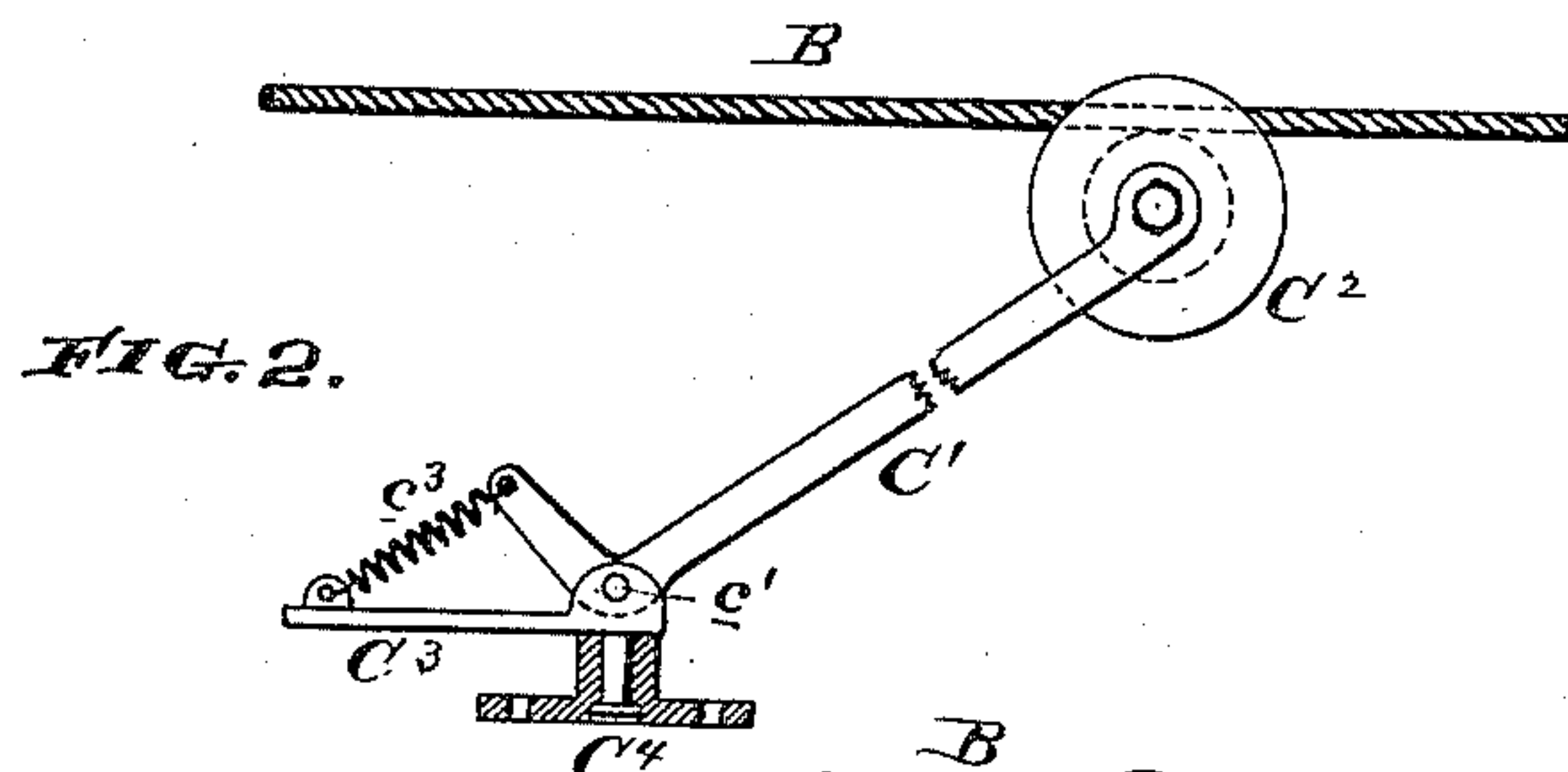
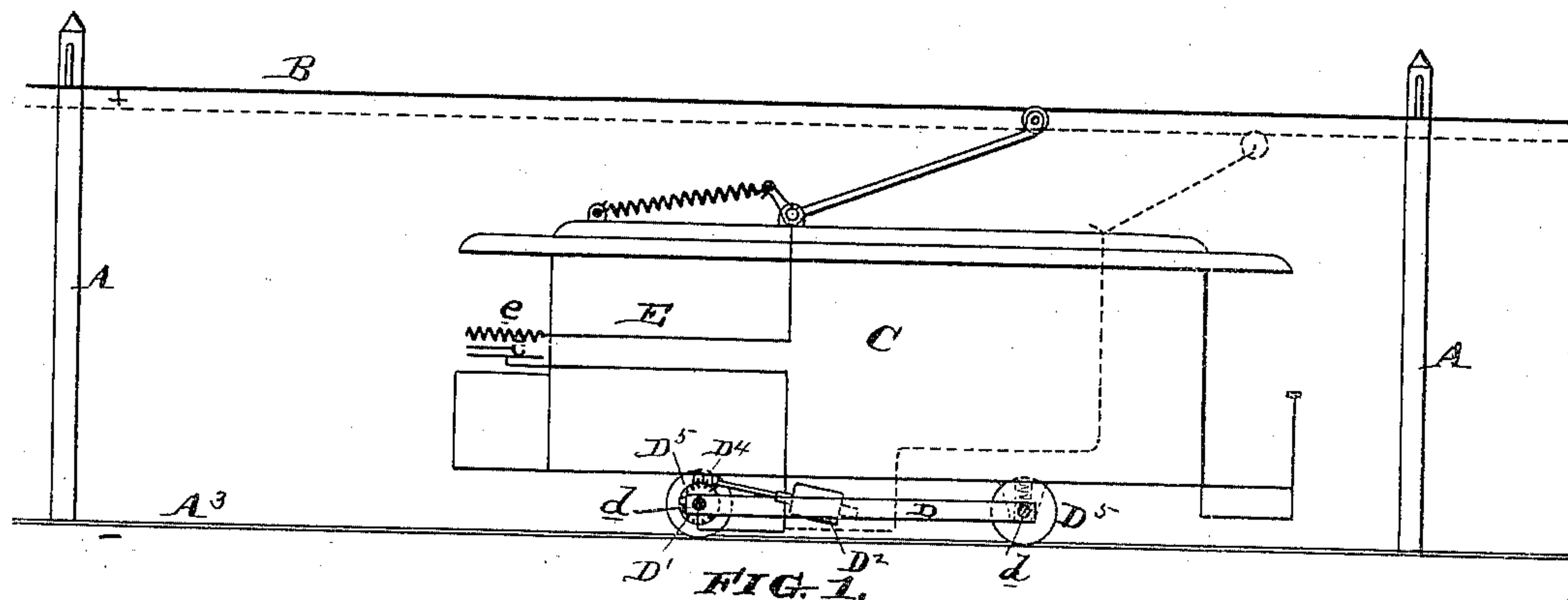


R. M. HUNTER.
ELECTRIC RAILWAY.

Patented July 22, 1890.



Witnesses:

Henry Denny
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UNITED STATES PATENT OFFICE.

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THOMSON-HOUSTON ELECTRIC COMPANY, OF CONNECTICUT.

ELECTRIC RAILWAY.

SPECIFICATION forming part of Letters Patent No. 432,752, dated July 22, 1890.

Original application filed May 15, 1889, Serial No. 310,855. Divided and this application filed April 11, 1890. Serial No. 347,510. (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, of which the following is a specification.

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

This application, Case No. 136, is a division of my application, Case No. 96, filed May 15, 1889, and Serial No. 310,855.

My invention has particular reference to electric railways in which a suspended conductor is arranged along the railway, and embodies an electrically-propelled car having the electric motor or motors supported upon the axles, so that their connection with the axles which they rotate is independent of the movements of the car-body, which latter rests on springs in the ordinary way, and combining with such an electric car a current-collecting device carried, preferably, above the roof of the car and making a traveling connection with the side of the conductor adjacent to the car, which collecting device would usually be an under-running contact, and in which the said contact device is capable of movement with reference to the conductor or conductors, whereby the trolley or contact device may follow irregularities in the location of the suspended conductor. The details of the current collector or trolley may be modified as desired, and such contact device may be made with provision for movement about a vertical and also a transverse axis, whereby its upper or free end is movable. Springs may be employed to hold it in a position whereby it may maintain contact with the conductor. In this construction of railway there is automatic compensation for any variation in the altitude of either the suspended conductor or the car-body which supports the contact device or trolley independently of the connection of the motors with the axles. I also provide conductors between the trolley and motor, which conductors are preferably flexible or

made with giving connections, including, if desired, the regulating apparatus and any translating device, which are desirably secured to the car-body. It is immaterial what the details of construction may be, as any type of motor may be employed, and such motor may be supported by the axles or their boxes in any manner desired so long as it retains its connection for driving the axle independent of the movement of the car-body, and any form of collecting device may be used which meets the requirements of the invention.

The object of my invention is to enable the motor or motors to have a positive connection with the axles, so as to remain in connection for positive power transmission as distinguished from chains or belts, (in which latter case the motor is upon the car-body,) and at the same time provide a current-collecting device supported by the car-body and movable vertically therewith, and having provision for maintaining a continuous contact with the suspended conductor. By this means the vertical movement of the car-body and its collector does not affect the perfect working of the motor and driving-gear, and where the conductor is above the car the height of the car is utilized in reaching the conductor, and allows the collector being reduced to small size and weight. These points are found of the utmost practical importance in the construction and operation of railways of this class. The flexible conductor-connections are carried by the car and connect the collector with the motor, including the regulator, and allow for the rise and fall of the car-body in relation to the motor.

In the drawings, Figure 1 is an elevation of an electric railway embodying my invention. Fig. 2 is an elevation showing the preferred form of contact trolley or collector. Fig. 3 is a cross-section through the suspended conductor and showing the upper part of the trolley. Fig. 4 is a sectional elevation of a modified form of contact-trolley, and Fig. 5 is an elevation of an electric railway embodying my improvements as showing the preferred form of contact-trolley arranged upon the car.

A are the posts arranged along the side of the railway-tracks A^3 , which latter may, if desired, form the return conductor. The supply-conductor B is suspended from the poles in any suitable manner, preferably so as to leave the under side or the face of the conductor adjacent to the car unobstructed. While it is preferable to arrange the suspended conductor above the car-body, I do not confine myself to that location, as it may be arranged at any elevation with respect to the rails desired.

The collector wheel or contact C^2 is pivoted to the upper or free end of an upwardly-extending arm C' , which may be made in any suitable manner, and preferably adapted to extend upwardly and rearwardly with respect to the travel of the car. In Fig. 1 this arm is shown as pivoted to the roof of the car on a transverse axis c' , and is held up toward the suspended conductor by a spring c^3 , the connection on the transverse axis being sufficiently loose to allow some lateral play at the free end of the arm.

In the constructions shown in Figs. 2 and 5 the collector-arm C' is shown as hinged to a plate C^3 , pivoted on a vertical axis C^4 in the middle of the car, and the arm is pressed upward by a spring c^3 . This construction permits of the collector-wheel following all irregularities of the conductor, and also compensating for all elevations of the car-body with respect to the rails. In this form of contact device the arm is hinged upon a transverse axis, so as to have its end capable of being raised or lowered vertically at its free end, and the entire contact device with its spring is movable about the vertical axis, thus permitting any action of the contact device desired, even to swinging entirely around its vertical axis in reversing the car. By making the arm trail and forming the contact, whether it be a shoe or a roller, with a deep groove, the said arm is caused to move laterally by any variations in the alignment of the conductor.

The car-body C is supported upon the axles by the usual springs I, and is free to ride up and down upon the axles. Carried upon the axles or their boxes is a frame D, upon which the motor or motors D^2 are secured and by it journaled to the axles d . There may be one or more motors, as desired, and one may be used for each axle.

The car-wheels are marked D^5 , and are secured to the axles d . On the axles d are secured worm-wheels D' , with which worms D^4 on the motor-shaft mesh. Any other mechanical power-transmitting gearing may be used, if desired. By this construction it is seen that the motors are supported by the axles in such a way as to permit direct gearing, which cannot be affected by any vertical movements of the car-body on its springs.

E are the motor-circuits on the car and extend from the current-collecting device to the motors. These circuits may include a resist-

ance changer or regulator e , which is preferably supported upon the car-body, and the circuits form flexible or giving connections between the vertically-movable collector and the motors supported by the axles, permitting vertical movement of the car-body without interfering with the electrical connection between the collector and motors. The regulator e (shown in Fig. 5) may include the various switches for controlling the motor or motors. The most flexible or giving circuits are preferably those extending between the motor and regulating apparatus. It is evident that the motors may be independently controlled, if desired, and it is also evident that both the outgoing and the return conductors may be suspended, if desired, (see dotted lines in Fig. 1,) and two current-collecting devices be employed to complete the circuit through the car.

In place of the current-collecting device above specified that shown in Fig. 4 may be employed, wherein the contact shoe or wheel C^2 is supported upon a vertically-movable rod C' , guided at the bottom by a tubular standard on the top of the car and pressed upward or toward the conductor by means of a spring c^3 .

It will be seen that, broadly considered, the collector is supported on springs through the frame of the car-body, and is free to rise and fall independently of the motors which are carried on the axles. The current-regulating apparatus may be located or connect with the other end of the car, and is preferably upon the platform or arranged to be operated therefrom.

As before stated, I do not confine myself to the details of construction here shown, as they may be modified in various ways without departing from the spirit of my invention. In this application I do not claim the specific form of the collector, as that forms subject-matter of my applications hereinbefore referred to.

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

1. The combination of a railway-track, a suspended conductor arranged along said track, a car running upon said track, an electric motor supported upon the axle of the car, a current-collecting device carried by the car-body and making contact with said suspended conductor, having its end adjacent to the conductor movable laterally, a motor-circuit carried on the car connecting the current-controlling device with the motor, and current-controlling devices to control the current in said motor-circuit.

2. The combination of a railway-track, a suspended conductor arranged along said track, a car running upon said track, an electric motor supported upon the axle of the car, a current-collecting device carried by the car-body and making contact with said suspended conductor, having its end adjacent to the conductor movable laterally and vertically, a mo-

tor-circuit carried on the car connecting the current-collecting device with the motor, and current-controlling devices to control the current in said motor-circuit.

5 3. The combination of a railway-track, a suspended conductor arranged along said track, a car running upon said track, an electric motor supported upon the axle of the car, a current-collecting device carried by the car-
10 body and making contact with said suspended conductor and having its end adjacent to the conductor movable laterally, a spring to press said contact device upward against the con-
15 ductor, a motor-circuit carried on the car connecting the current-collecting device with the motor, and current-controlling devices to control the current in said motor-circuit.

4. The combination of a railway-track, a suspended conductor arranged along said
20 track, a car running upon said track and having its car-body supported on springs, an electric motor supported by the axle of said car and adapted to rotate it, a current-collecting device carried by the car-body and having its
25 free end movable vertically and laterally, a flexible motor-circuit carried by the car-body connecting the collector device with the motor, and a current-controlling device to control the current in said motor-circuit.

30 5. The combination of a railway-track, a suspended conductor arranged along said track, a car running upon said track and having its car-body supported on springs, an electric motor supported by the axle of said car
35 and adapted to rotate it, a rearwardly-extending current-collecting device carried by the car-body and having its free end movable vertically and laterally, a flexible motor-circuit carried by the car-body connecting the col-
40 lector device with the motor, and a current-controlling device to control the current in said motor-circuit.

6. The combination of a railway-track, a suspended conductor arranged along said
45 track, a car running upon said track and having its car-body supported on springs, an electric motor supported by the axle of said car and adapted to rotate it, a current-collecting device carried by the car-body and having
50 its free end movable vertically and laterally, a spring to press the contact device upward against the conductor, a flexible motor-circuit carried by the car-body connecting the collector device with the motor, and a current-
55 controlling device to control the current in said motor-circuit.

7. The combination of a railway-track, a suspended conductor arranged along said
60 track, a car running upon said track, an electric motor supported by the axle independent of the car-body, a car-body supported upon the axles by springs, an upwardly-extending con-

tact device movable about vertical and transverse axes and located in the middle of the car, conductors or circuits leading from the con- 65
tact device to the motor, and a regulator for controlling the current in said motor-circuit.

8. The combination of a railway, a suspended electric conductor arranged along the railway, a traveling car having its car-body 70
supported on springs, an electric motor supported on and coupled with each axle independent of the car-body, an upwardly-extending current-collector supported on the car-body and having its free end movable to fol- 75
low variations in the alignment of the suspended conductor, electric-motor circuits leading from the collector to each of the motors, and current-controlling devices for control-
80 ling the flow of the current.

9. The combination of a railway, a suspended electric conductor arranged along the railway, a traveling car having its car-body supported on springs, an electric motor sup- 85
ported on and coupled with each axle independent of the car-body, an upwardly-extending current-collector supported on the car-body and having its free end movable to follow variations in the alignment of the sus-
90 pended conductor, flexible electric-motor circuits leading from the collector to each of the motors, and current-controlling devices for controlling the flow of the current supported on the car-body independent of the motors.

10. The combination of a railway, an elec- 95
tric conductor extending along the railway at a considerable elevation, a car having its body supported on the axles by means of springs, an electric motor supported by the
100 axles independent of the car-body, an upwardly and rearwardly extending collector-arm supported by the car-body with provision for movement at its free end and making a traveling contact with the under side of the
105 conductor, motor-circuits carried on the car-body connecting the collector with the motor, and a current-regulator to control the current in said motor-circuit.

11. The combination of a railway, a sus- 110
pended conductor, a car having its body supported on springs, a motor supported by the axle independent of the car-body, a current-collecting device supported upon the car-body with provision for vertical movement, and having a contact device carried thereby 115
making an under moving contact with the conductor, and an electric circuit between the current-collecting device and the motor.

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

R. M. HUNTER.

Witnesses:

MAURICE H. HOLMES,
ERNEST HOWARD HUNTER.