No. 821,317. PATENTED MAY 22, 1906.

F. L. SESSIONS.

CONDUCTOR FOR ELECTRIC CARS.

APPLICATION FILED AUG. 14, 1902.

3 SHEETS—SHEET 1.

Fig. 1.

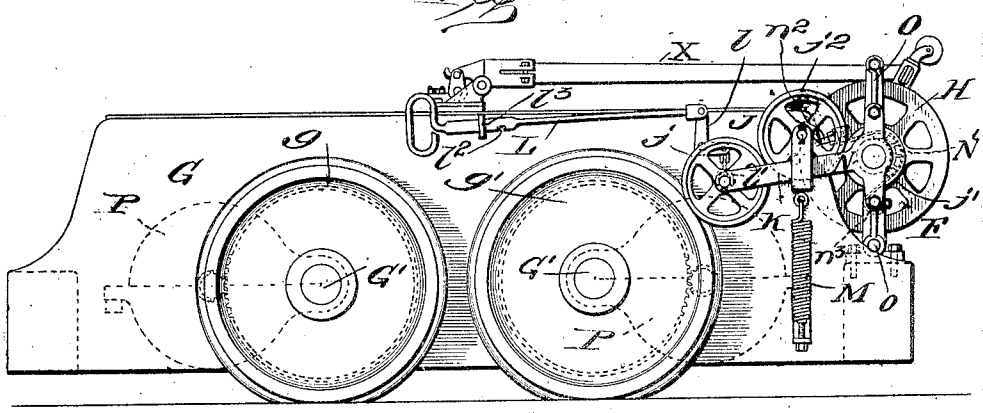
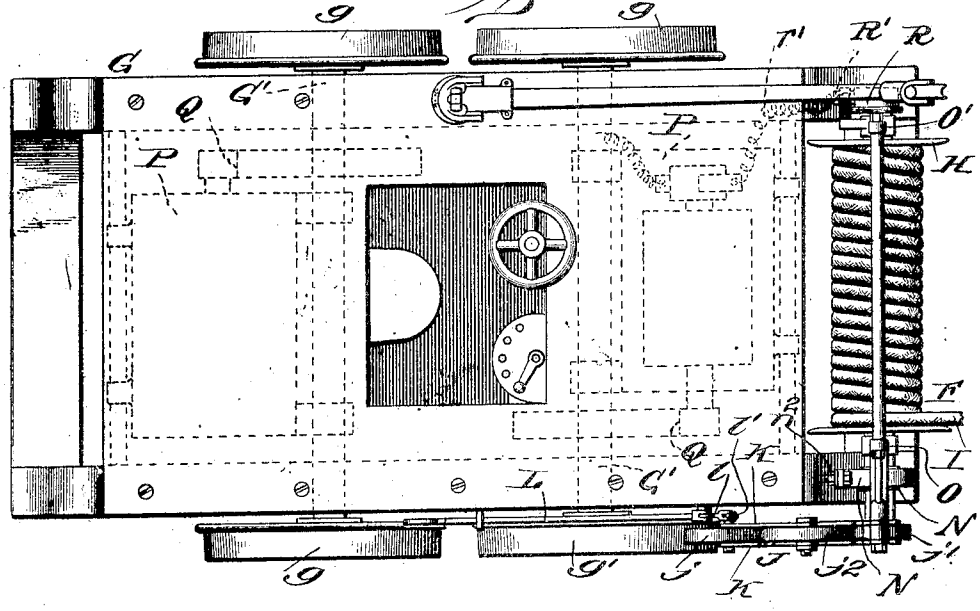


Fig. 2.



Witnesses

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3 SHEETS—SHEET 2.

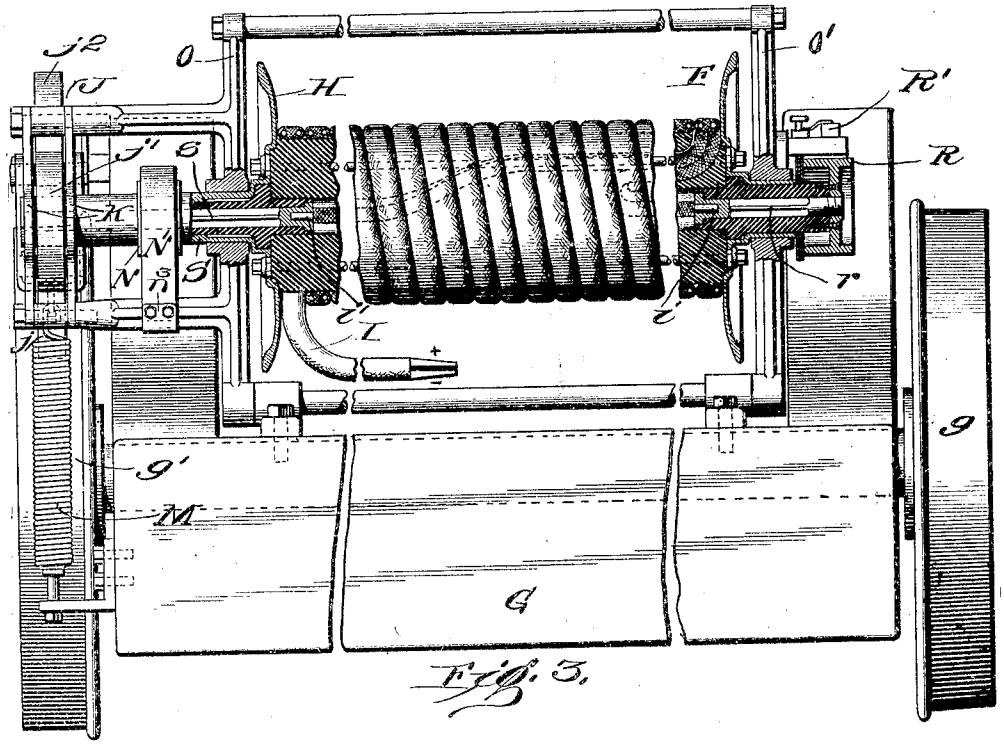


Fig. 5.

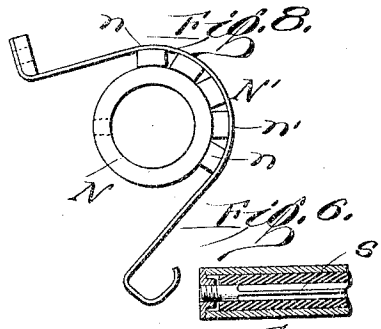


Fig. 8.

Fig. 6.

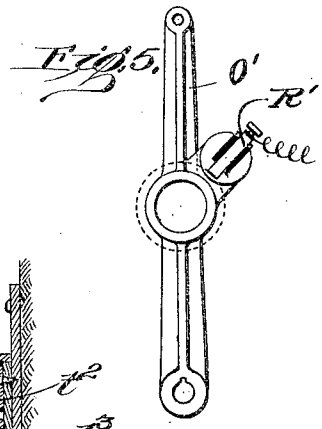


Fig. 5.

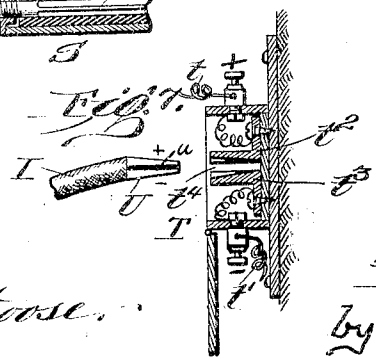


Fig. 7.

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3 SHEETS—SHEET 3.

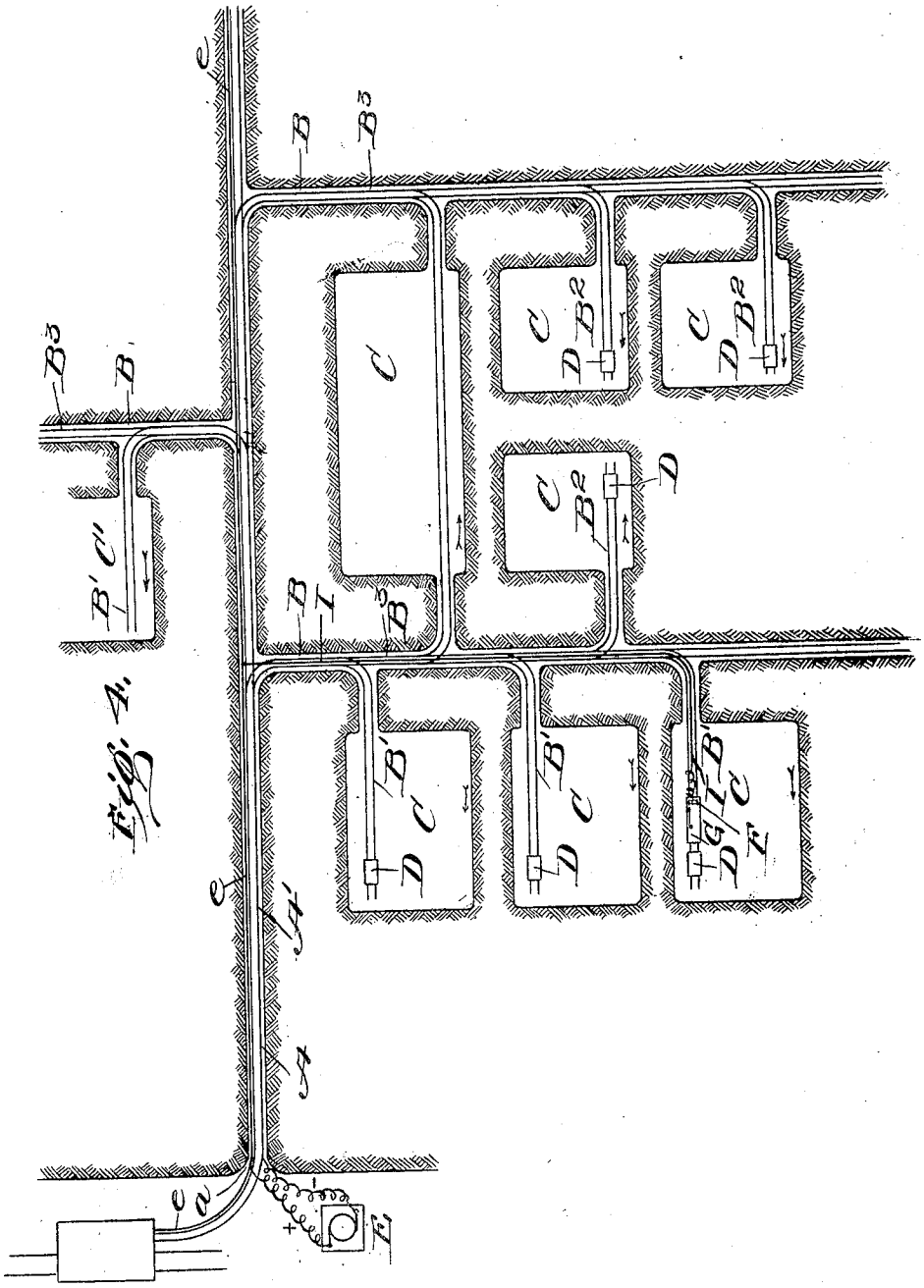


Fig. 4.

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UNITED STATES PATENT OFFICE.

FRANK L. SESSIONS, OF COLUMBUS, OHIO, ASSIGNOR TO JOSEPH A. JEFFREY, OF COLUMBUS, OHIO.

CONDUCTOR FOR ELECTRIC CARS.

No. 821,317. Specification of Letters Patent. Patented May 22, 1906.

Application filed August 14, 1902. Serial No. 119,667.

To all whom it may concern:

Be it known that I, FRANK L. SESSIONS, a citizen of the United States, residing at Columbus, in the county of Franklin and State of Ohio, have invented certain new and useful Improvements in Conductors for Electric Cars, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to improvements in mechanism by which an electric connection can be temporarily made between a conductor which is relatively fixed and a motor or other translating device which is relatively remote from said conductor.

One of the purposes of the invention is to provide an apparatus by which the temporarily-used conductor can be readily put in position between the fixed conductor and the distant translating device and by which it can, when desired, be readily and rapidly again taken up and put in stored condition.

In the drawings, Figure 1 is a side elevation of a mechanism embodying my improvements. Fig. 2 is a top plan view. Fig. 3 is a view partly in end elevation and partly in transverse section. Fig. 4 is a diagrammatic illustration of one of the uses to which the invention can be put. Figs. 5 to 8 show details.

In the drawings I have selected a showing of parts of a coal-mine (presented conventionally) as a convenient means for illustrating circumstances and a place where the present invention can be advantageously employed.

Let A indicate one of the main entries or passage-ways which are in practically constant use and one or more of which extend to the surface of the earth, as at *a*. These main entries are equipped with permanent rail-tracks, as indicated at A'. From the main entries are carried to the right and to the left cross-entries or side entries, such as indicated at B, these being in more or less continuous use while that part of the coal area is being worked. From these, rooms such as shown at C C C' are turned to the right or the left, or both. The coal is mined at the inner ends of these rooms, extending them farther and farther in the directions relative to the entries indicated by the arrow. The entries are equipped with rail-tracks, as at B^3, connecting by switch with the main-entry track A' and also connecting with branch tracks $B' B^2$, which extend into the several rooms. These latter tracks are extended gradually by adding sections as the rooms are respectively elongated by the taking out of the coal. One of the common practices is to provide each room with a coal-car, as illustrated at D D, into which is loaded such coal as may be mined at the end of the room. Then these individual and separated cars are "gathered"—that is, brought out one by one from the rooms and coupled up to form a train on the entry-track, either B^3 or A', after which they are hauled to the mouth of the mine and emptied. After the coal has been exhausted from that part of the territory which is reached by the cross-entry B and its communicating rooms that section of the mine is for most purposes "abandoned" and the mining operations are carried on along other cross-entries and in the rooms communicating therewith.

In mines where electrical power is used for hauling the cars and performing other operations it is the general practice to employ a generating apparatus at a suitable point outside of the mine, as indicated at E, and to carry the current to the interior along an insulated conductor, as at *e*, and back to the generator along the track-rails in the entries. The main entries are provided with permanently-fastened conductors, and heretofore it has been necessary to provide the cross-entries and the rooms with stationary conductors communicating with those in the main entry or entries. Then when that part of the mine is worked out these stationary conductors and their numerous supports are removed and carried to some other part of the mine, inasmuch as if allowed to remain in position much capital would be tied up thereby, for it will be remembered that many of these mines have entries extending a mile or more under the earth. If the lateral or branching conductors are allowed to remain, they of course can be utilized upon such rare occasions as may demand the presence of electrical conductors to permit the transporting of electrical locomotives; but such infrequent occasions do not justify the holding of a large quantity of valuable conductors and conductor-hangers in position for brief use.

By means of the improved mechanism herein presented I am able to carry on the op-

erations above referred to at a great reduction of cost and at the same time am enabled to readily and immediately perform many operations which are now conducted under the assistance of permanent or temporarily-fixed conductors.

F indicates as an entirety a winding mechanism by which a flexible conductor or section of a conductor can be wound up or paid out, as desired.

G indicates as an entirety the transporting mechanism which carries the winding mechanism. I prefer to construct this to be of the character of a car adapted to fit and move along the tracks at A′ B′ B² B³, it being provided with wheels *g g′*, fitted to the track-rails.

The winding mechanism F includes with other parts a reel H, mounted in suitable supports on the carrier G. To this reel are connected the ends of the positive and negative conductor-sections of wire, respectively insulated, but bound together in the form of a cable I, the end of the negative conductor being shown at *i′* and that of the positive at *i*. The other ends of the cable conductors are respectively connected to the fixed positive conductor *e* in the entry and the negative or return conductor, the track-rails at A′.

As the carrier or car G moves away from the fixed conductor in the entry A it pays out the cable. As it returns toward the entry it automatically takes it up and winds it again. The winding mechanism is as a whole indicated by J. As here constructed it consists of a wheel *j*, actuated by the car-wheel *g′*, preferably by frictional contact of the periphery of the latter with the smooth peripheral surface on the former. Power for winding is transmitted from the wheel *j* to the wheel *j′* on the axis of and rigidly connected to the winding drum or reel. Preferably it is so transferred to an intermediate wheel or idler *j²*, which engages peripherally and frictionally with the initial wheel *j* of the train and the final wheel *j′*.

When it is desired to take up or cause the winding of the cable upon the reel, the bodily motion of the support or car G through this train of wheels causes the rotation of the drum, and this automatically winds the cable; but such winding can be stopped either by unclutching some member of the wheel-train or by moving one of them bodily out of active position, and I prefer the latter method of disconnecting and arrange the wheel *j* so as to be movable from and toward the drive-wheel *g′*. To effect this, I mount it in a movable arm K, and in order to maintain fixed relations between wheels *j*, *j′*, and *j²* I fix their axes to the bars K and swing the whole train together. The disengagement is effected by means of a rod L, pivoted to a bell-lever *l*, which is at *l′* flexibly connected to the bars or frames K. The rod L has a lock or stop provided by forming a notch *l²* in it and passing it through a guide or loop *l³*. The notched part and the loop hold the winding mechanism out of connection with the wheel *g′*. When the locking parts are disengaged, the wheel *j* is drawn down to the track-wheel *g′* by a spring M, and as I desire to employ a controlling device to regulate the speed with which the drum shall unwind when the cable is paying out I arrange it (the drum) so that it also can swing with the train of driving-wheels, and as it swings in one direction it brings the friction disk or drum N against a friction device of the form of a concave at N′. The above-described arms or frames K are rigidly secured to the upright bars O O′, which carry the main drum or reel, these uprights being pivoted at *o o*. The stationary friction band or element N′ is shown as formed of a series of bars *n*, secured to a metal strap or equivalent *n′*, one end *n²* of which is fastened to a stationary holder, as the body of the carriage or car G, and the other end *n³* of which is fastened to the swinging frame.

When the operator desires to pay the cable out, at which time the drum is rotated under the strain of the cable, he draws the rod L longitudinally, this resulting in a lifting of the swinging frame K O, so as to first lift the drive-wheel *j* from the track-wheel *g* and immediately thereafter attain a frictional engagement of the reel disk or drum N with the friction-band N′, and such engagement he has under his control, increasing or decreasing the retarding of the reel's rotation as he deems necessary. It will be noted that this retarding means which I employ to prevent the too rapid paying out of the cable and the incident liability to backlashing operates independently of the tension or draft on the cable—that is, the frictional resistance applied to prevent the too rapid rotating of the drum as the locomotive moves away from a fixed point and to keep the cable taut—is uniformly applied irrespective of the draft or tension of the cable. Then when he wishes to have the cable automatically taken up he releases the rod L and permits the spring M to draw the swinging frame downward until wheel *j* contacts with track-wheel *g′*, and thereupon the driving mechanism causes the reel to rotate and wind up the cable, which action, however, he also has under his control, as he can increase or decrease the force of engagement between wheels *g′* and *j*, so that the winding shall be faster or slower, as necessary.

It will be seen that as a mere reel carrier or support the carriage G can be of any of several sorts and can be either self-propelling or propelled by an outside agency. I prefer to have it self-propelling and place upon the same carriage or car one or more motors, as indicated at P P, the details of which in construction and relative arrangement can be any that are well known or suitable. Those

shown are indicated as being respectively connected with the axles G′ of the car G by gearing at Q.

The current carried by one section of the conductor in the cable is taken through a circuit having the parts *r*, collector R, and brush R′ to a conductor-section *r*′, which is connected to the translating device—as, for instance, to a motor or motors, such as those at P. From the latter it returns through the metal of the frame of the reel—as, for instance, from the bar O and sleeve-shaft S through the rod *s* to the negative wire terminal *i*′, thence back through the return-wire to the return side of the circuit in the main entry at A′. Thus current is constantly supplied to the car-motors not only when the car is moving away from the fixed conductors and the cable is automatically paying out, but also as it returns toward them when the cable is being automatically reeled up.

It will now be seen by examining Fig. 4 that a mechanism of this sort can without depending upon an expensive fixed conductor be used at a relatively long distance down a side entry or cross-entry B or for entering a room, such as at C′, and after coupling to the coal-car D for drawing the same into the cross-entry and after drawing out the desired number of such cars from the several rooms can draw the train formed thereof out to the main entry, depending at all times upon its own reeled section of conductor. After it reaches the main entry A the terminals of the cable are detached from the fixed conductors and the trolley X is again brought into use, the latter engaging with the conductor *e*, the branch circuit of the trolley being also connected to the motors.

Any well-known means may be employed for connecting the cable I into the electric circuit. For illustration I have shown in Fig. 7 a connecting-box, (indicated as a whole by T.) *t* is a conductor leading from the conductor *e* to the positive connector-section t^2 within the box, and *t*′ is a conductor grounding the negative connector-section t^3 to the track. The sections t^2 and t^3 are so shaped and correlated as to form a socket t^4 for the plug U, in which the positive and negative wires of the cable I terminate. This plug is formed with a positive and a negative portion, as shown, insulated from each other by the insulating-strip *u*. The insertion of the wire into and the removal of it from the socket t^4 will respectively make and break the circuit through the reel.

What I claim is—

1. The combination of the car, the electric motor thereon, the portable electric conductor, the reel for winding the portable conductor, the reel-rotating devices adapted to be driven by the motor, and the swinging frame for the reel, and the devices which rotate it, substantially as set forth.

2. The combination of the car, the motor for propelling the car, the portable conductor on the car, the reel for winding the conductor, the vibratable frame for the reel, the driving devices for rotating the reel and adapted to engage with one of the car-track wheels, the spring for forcing the driving devices toward said track-wheel, means for regulating the speed of the drum, and devices under the control of the operator for bringing alternately into play said speed-controlling devices and said spring, substantially as set forth.

3. The combination in an electric locomotive, of a reel mounted on the frame thereof, a cable arranged to be wound upon said reel, means for throwing the reel in gear with a moving part of the locomotive so as to wind the cable on the reel, means independent of said first-described means and adapted to oppose the rotation of the reel in a direction to pay out the cable, and means for opposing the operation of the first-described means and retaining the reel out of connection with the driving mechanism of the locomotive, and in engagement with the said means for opposing its rotation in cable-paying-out direction.

4. The combination of the car, the reel-shaft mounted thereon, the reel on the said reel-shaft, the flexible cable carried by the reel, a train of power-transmitting devices interposed between said reel and a revolving part of said car, and having in said train a yielding connection, the elements of which are held in forced engagement with each other independent of the draft on the cable, and means for throwing said power-transmitting devices into and out of operation at will.

5. The combination with an electric car and a cable-reel mounted thereon, of a flexible cable adapted to be wound upon and paid off from said reel, a train of power-transmitting devices interposed between said reel and a revolving part of said car, and having in said train two friction elements held in engagement with each other independent of the draft on the cable and adapted to make the connection between said reel and said revolving part of the car a yielding one and means for throwing said train of power-transmitting devices into and out of operation at will.

6. The combination with a car and a cable-reel mounted thereon, of a flexible cable adapted to be wound upon and paid off from said reel, a train of power-transmitting devices interposed between said reel and a revolving part of the car, means for normally connecting said train of power-transmitting devices yieldingly with the said reel independently of the draft on said cable, and means for throwing said train of power-transmitting devices into and out of operation at will.

7. The combination with a car and a cable-reel mounted thereon, of a flexible cable

adapted to be wound upon and paid off from said reel, a power-driven shaft on the car, a train of power-transmitting devices interposed between said power-driven shaft and said cable-reel, and means for connecting said train of power-transmitting devices with said reel and maintaining the connection independent of the draft on the cable and means for disconnecting two elements of said train of power-transmitting devices and locking them in inactive relation to each other.

8. The combination with a car and a cable-reel mounted thereon, of a train of power-transmitting devices interposed between said cable-reel and a revolving shaft on the car, means for maintaining said train of power-transmitting devices yieldingly in operative driving engagement between said shaft and said reel independent of the tension on the cable, and means for locking said train of power-transmitting devices out of operative position.

9. In a mechanism for supplying current to an electric locomotive, the combination with an electric locomotive, of a flexible conductor, a reel for said flexible conductor movable with the locomotive, a train of power-transmitting devices for rotating said reel having in said train friction-driving elements held in forced engagement with each other independent of the draft on the cable, and a friction-retarding device operable independently of the draft on the cable to oppose the rotation of the said reel in cable-unwinding direction.

10. In a mechanism for supplying a current to an electric locomotive, the combination of a car, a flexible conductor, a reel for the flexible conductor movable with the car, a friction-driver for the reel having frictional surfaces forced together under substantially constant pressure independently of the draft on the cable, power devices for actuating the friction-driver, and means for rendering the friction-driver inoperative at will.

11. The combination with a car and a cable-reel mounted thereon, of a train of power-transmitting devices adapted to afford a yielding driving connection between one of the axles of said car and said reel and having in said train a spring-controlled friction-driving element adapted to be maintained in forced engagement with its coöperating friction element independently of the draft on the cable, and means operable at will for throwing said friction elements into and out of engagement with each other.

12. The combination of the car, the flexible conductor, the reel or winding devices for the flexible conductor, the power-driven devices for rotating the reel, means for disconnecting the power devices from the reel, and means independent of the flexible conductor and engaging with the reel for controlling its speed of rotation when subjected to draft by the cable.

13. The combination with the car, having track-engaging driving-wheels, the electric motor connected to and rotating with said track-wheels, the flexible electric conductor adapted to be connected with a conductor remote from the car, a reel for the said conductor, a friction-wheel for rotating the reel and engaging with the periphery of the track-wheel of the car, means for separating the friction-wheel from the track-wheel, and friction devices supported independently of the flexible conductor and engaging with the reel for regulating its speed of rotation.

14. The combination in an electric locomotive, of a cable-reel mounted on the frame thereof, a cable arranged to be wound upon said reel, means for throwing the reel into and out of gear with a movable part of the locomotive to wind the cable on the reel, said means including a friction-driving connection, and means operable independently of the tension on the cable for opposing the rotation of the reel.

15. The combination of a car, a cable-reel mounted thereon, a cable adapted to be wound upon said reel, power-transmitting mechanism interposed between said reel and a revoluble part of the car, said reel being normally maintained in frictional driving connection with said train of power-transmitting devices, independent of the tension on the cable, means for throwing said train of power-transmitting devices into and out of commission, and a friction device adapted to retard the rotation of said reel in the direction to pay out the cable.

16. The combination of a car, a flexible conductor, a reel or winding device for the flexible conductor, power-transmitting devices for rotating the reel, means for throwing the power-transmitting devices into and out of operation, and means independent of the cable and engaging with the reel for controlling its unwinding movements when subjected to draft by the cable.

17. The combination of a car, a relatively stationary conductor, a flexible conductor carried by the car and adapted to have one end connected to the said stationary conductor, a reel or winding device for the flexible conductor, power-transmitting devices for rotating said reel, means for throwing said power-transmitting devices into and out of operation, and means independent of the cable and independent of said power-driven devices for controlling the speed of rotation of said reel in cable-paying-out direction when subjected to draft by the cable.

18. The combination of a car, a flexible conductor carried by the car, a reel or winding device for said flexible conductor, power-driven devices for rotating the reel, and means

independent of the flexible conductor and of said power-driven devices, for controlling the speed of rotation of said reel in cable-paying-out direction.

19. The combination of a car, supporting-wheels for the car, an electric motor adapted to rotate said wheels, a flexible conductor adapted to be connected to a conductor remote from the car, a reel for the said conductor, gearing for rotating said reel in the direction for winding up the flexible conductor thereon, means for throwing said gearing into and out of operation, and a friction-retarding device for said reel supported independently of said flexible conductor and engaging directly with the reel.

20. The combination of a car, a flexible cable, a motor on the car, a cable-winding reel, a cable on said reel, comprising two insulated wires, one wire being grounded to said drum, and the other wire extending through the insulated hub on said drum, and electrically connected with a collector-ring on the drum, a brush engaging with said collector-ring, and an electric conductor leading from said brush to the motor on the locomotive.

21. The combination of a car having supporting-wheels, a motor on the car adapted to drive certain of said supporting-wheels, a cable-reel, a flexible conductor adapted to be wound upon and paid out from said cable-reel, an electric conductor connecting said flexible conductor to the motor on the car, a bodily-adjustable wheel adapted to engage with a surface which will effect the rotation of the said wheel as the car travels in the direction to wind up the paid-out flexible conductor, and power-transmitting devices interposed between said bodily-movable wheel and the cable-reel, adapted to remain in operative relation to said wheel as it is moved into and out of operative position.

22. The combination of a car having supporting-wheels, a motor on the car adapted to drive certain of said supporting-wheels, a cable-reel, a flexible conductor adapted to be wound upon and paid out from said cable-reel, an electric conductor connecting said flexible conductor to the motor on the car, a bodily-adjustable wheel adapted to engage with a surface which will effect the rotation of the said wheel as the car travels in the direction to wind up the paid-out flexible conductor, means for normally holding said bodily-movable wheel yieldingly in engagement with its actuating-surface, and power-transmitting devices interposed between said bodily-movable wheel and the cable-reel adapted to remain in operative relation to said wheel as it is moved into and out of operative position.

23. The combination of a car having supporting-wheels, a motor on the car adapted to drive certain of said supporting-wheels, a cable-reel, a flexible conductor adapted to be wound upon and paid out from said cable-reel, an electric conductor connecting said flexible conductor to the motor on the car, a vertically-adjustable wheel adapted to engage with a surface which will effect the rotation of the said wheel as the car travels in the direction to wind up the paid-out flexible conductor, and power-transmitting devices interposed between said bodily-movable wheel and the cable-reel, adapted to remain in operative relation to said wheel as it is moved into and out of operative position.

24. The combination of a car having supporting-wheels, a motor on the car adapted to drive certain of said supporting-wheels, a cable-reel, a flexible conductor adapted to be wound upon and paid out from said cable-reel, an electric conductor connecting said flexible conductor to the motor on the car, a bodily-adjustable wheel adapted to engage with a surface which will effect the rotation of the said wheel as the car travels in the direction of the paid-out flexible conductor, a wheel connected to the said cable-reel, and power-transmitting means between the said bodily-adjustable wheel and the said wheel connected to the cable-reel.

25. The combination of a car having supporting-wheels, a motor on the car adapted to drive certain of said supporting-wheels, a cable-reel, a flexible conductor adapted to be wound upon and paid out from said cable-reel, an electric conductor connecting said flexible conductor to the motor on the car, a bodily-adjustable wheel adapted to engage with a surface which will effect the rotation of the said wheel as the car travels in the direction of the paid-out flexible conductor, a wheel connected to the said cable-reel, power-transmitting means between said bodily-adjustable wheel and the said wheel connected to the cable-reel, and a brake adapted to engage said cable-reel in order to prevent too rapid rotation of the said reel as the cable is paid out therefrom.

26. The combination of a car having supporting-wheels, a motor on the car adapted to drive certain of said supporting-wheels, a cable-reel, a flexible conductor adapted to be wound upon and paid out from said cable-reel, an electric conductor connecting said flexible conductor to the motor on the car, a bodily-adjustable wheel adapted to engage with a surface which will effect the rotation of the said wheel as the car travels in the direction of the paid-out flexible conductor, a wheel connected to the said cable-reel, power-transmitting means between the said bodily-adjustable wheel and the said wheel connected to the cable-reel, and means for moving said bodily-adjustable wheel out of engagement with the surface which is adapted to cause its rotation, the said power-transmitting means being adapted to swing with the

said bodily-adjustable wheel as it is moved into and out of engagement with the surface which is adapted to effect its rotation.

27. The combination of a car, a cable-reel on the car, a flexible conductor adapted to be wound upon and paid out from the said reel, means for driving said reel, said means including friction-driving elements normally maintained in forced contact with each other, independently of the tension upon the said flexible conductor, and means for throwing said reel-driving means into and out of operation.

28. The combination of a car, a cable-reel on the car, a flexible conductor adapted to be wound upon and paid out from said reel, frictional driving elements for effecting the rotation of the reel normally maintained in forced contact with each other, independently of the tension on said flexible conductor, and a friction-retarding device adapted to resist the rotation of said reel when the car is moved in one direction.

29. The combination of a car, a cable-reel on the car, a flexible conductor adapted to be wound upon and paid out from the said reel, frictional power-transmitting devices interposed between said reel and a revoluble part of the car, the elements of said friction-gearing being normally held in forced contact with each other, means for throwing said reel-driving mechanism into and out of operation, and a friction-retarding device adapted to resist the rotation of the reel when the cable is paid out therefrom, independently of the tension on the cable.

30. The combination of a car, having supporting wheels and axles, a reel carried by the car, a flexible conductor having one end attached to the reel, and the other adapted to be attached to a fixed point, a train of power-transmitting devices interposed between one of said car-axles and said reel, and having friction-driving elements normally held in forced contact with each other, means for actuating said train of power-transmitting devices when the car moves toward the said fixed point, and a frictional device arranged independently of the said flexible conductor and adapted to resist the rotation of the said reel when the car moves away from said fixed point.

31. The combination of a car having supporting wheels and axles, a cable-reel carried thereby, a flexible conductor adapted to be wound upon and paid out from said reel, means for securing one end of said flexible conductor to a fixed conductor, driving means independent of the tension or draft on said flexible conductor and connected with one of said car-axles for rotating the reel when the vehicle moves toward the fixed conductor, and means for disconnecting said driving means from said axle at will.

32. The combination of a car, a cable-reel on the car, a flexible conductor adapted to be wound upon and paid out from said reel, friction-driving elements for imparting rotation to the said reel, normally held in forced engagement with each other independently of the tension on the flexible conductor, means for actuating said frictional driving elements when the vehicle moves in a direction to wind up the cable, and means separate from and independent of said friction-driving elements for frictionally resisting the rotation of the said reel when the vehicle moves in the opposite direction.

33. The combination of a car, a cable-reel carried thereby, a flexible conductor on the said cable-reel, means for securing one end of said flexible conductor to a fixed conductor, means adapted to rotate the said cable-reel comprising frictionally-engaging elements which are forced together with a pressure which is independent of the draft on the flexible conductor, and means for throwing said reel-rotating means into and out of operation.

34. The combination of a car, a cable-reel carried thereby, a flexible conductor on the said cable-reel, means for securing one end of said flexible conductor to a fixed conductor, means adapted to rotate the said cable-reel comprising frictionally-engaging elements which are forced together with a pressure which is independent of the draft on the flexible conductor, means for throwing said reel-rotating means into and out of operation, and frictional devices independent of said reel-rotating devices for resisting the rotation of the reel when the cable is paid off therefrom.

In testimony whereof I affix my signature in presence of two witnesses.

FRANK L. SESSIONS.

Witnesses:
F. C. COSEO,
CHAS. M. CONKEY.