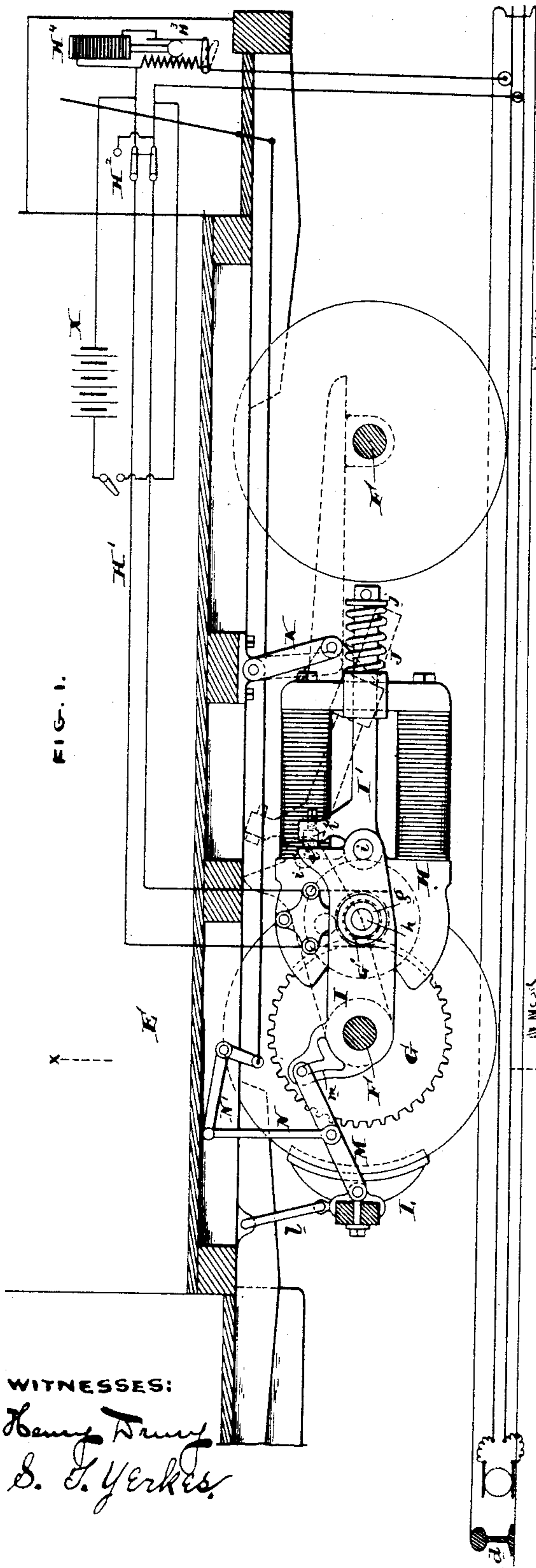


(No Model.)

R. M. HUNTER.
ELECTRIC RAILWAY.

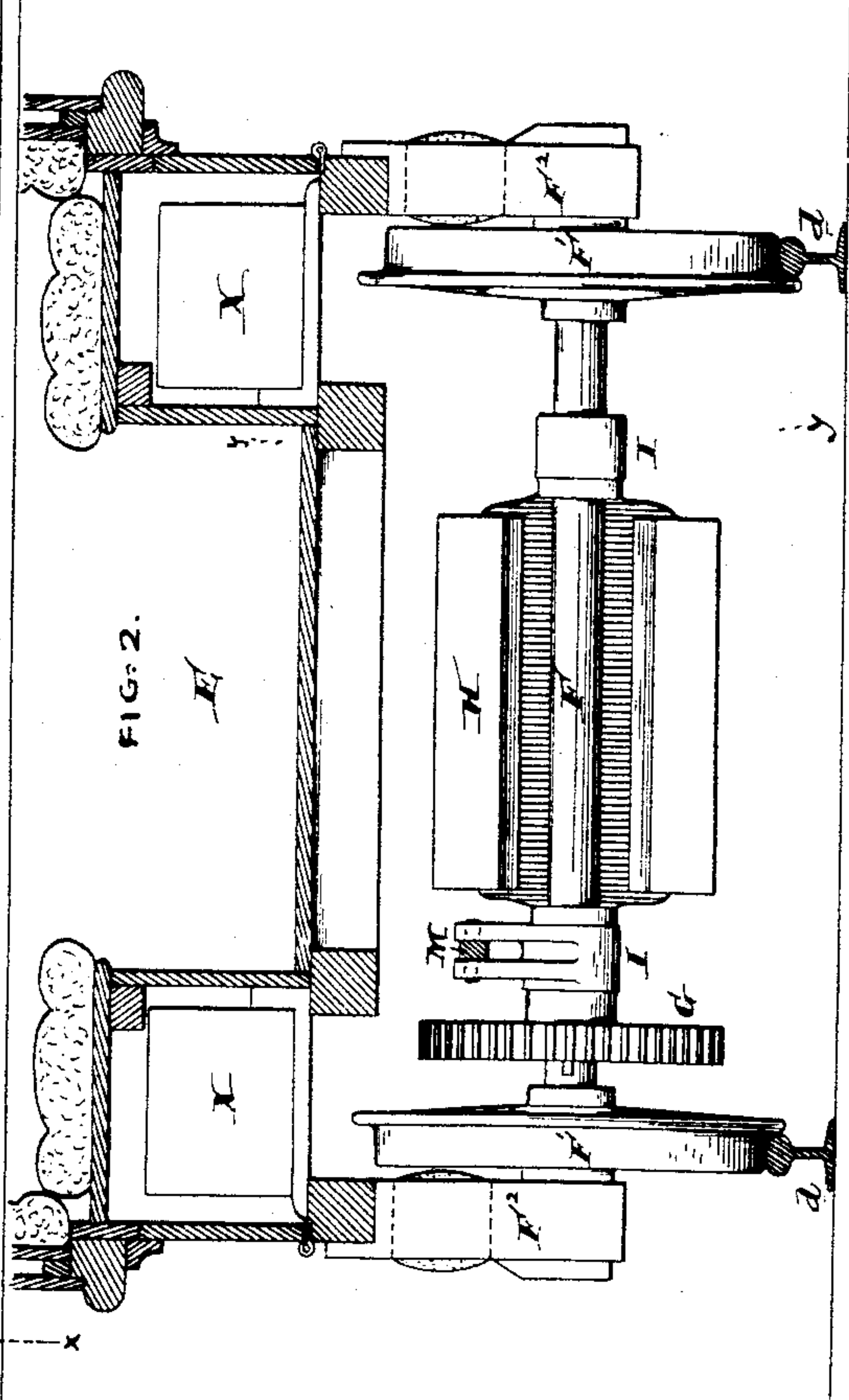
No. 541,165.

Patented June 18, 1895.



WITNESSES:

Henry Tracy
S. S. Yerkes.



INVENTOR:

R. M. Hunter

UNITED STATES PATENT OFFICE.

RUDOLPH M. HUNTER, OF PHILADELPHIA, PENNSYLVANIA.

ELECTRIC RAILWAY.

SPECIFICATION forming part of Letters Patent No. 541,165, dated June 18, 1895.

Original application filed January 12, 1887, Serial No. 224,150. Divided and this application filed September 7, 1889. Serial No. 323,294. (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 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. 106, is a division of my application Serial No. 224,150, filed January 12, 1887.

My invention forming the subject matter of this application more specifically relates to the motor connections with the car or vehicle without regard to whether the source of supply is a line conductor extending along the railway or a battery carried upon or with the car or vehicle. The motor is connected in such a manner that it may be moved about the axle to a certain degree, being opposed in such movement either by the action of gravity or a spring or both combined. This forms an elastic connection between the motor and axle and greatly facilitates the operation of the machine. The car is also provided with a brake which is connected to the hinged supporting frame for the motor in such a manner that as the motor swings about the axle in starting or while running, the brake is removed; but as soon as the motor is stopped and allowed to fall back to its normal position the brake is applied automatically. Provision is made to throw the brake out of action independently of the movement of the motor.

The foregoing are the essential features of the invention but there are many details fully set out hereinafter.

In the drawings, Figure 1 is a sectional elevation of an electrically-propelled vehicle embodying my invention on line *xx* of Fig. 2, and Fig. 2 is a cross-section of same on line *yy*.

To the rear axle *F* is journaled a frame *I* also provided with journals *g* in which the motor shaft *h* of the motor *H* is journaled, and this shaft is connected to the axle by means of spur wheel *G* and pinion *G'* or other

equivalent power transmitting device. The other end of the motor is supported by a link *K* from the car body between the wheel base or by an extension forward to the other axle as indicated in dotted lines in which case the motor would be supported wholly by the axles and independently of the car body. From this construction it will be seen that the motor may swing about the axle to which it is geared, it mounting the spur wheel *G*. From this construction it will be seen that the electric motor will be connected to one axle through a frame work independent of the motor proper having bearings arranged at a distance apart to insure steadiness, while the other or free end of the motor is supported by a single support which may be connected to the carbody or upon the opposite axle by means of the box *O*² and the extension indicated by dotted lines from the motor whereby the motor may be supported independently of the carbody, if so desired. Hinged to the frame *I* at *i* forward of the motor shaft *h* is the bar *I'* which extends forward and slides through a guide block *J'* pivoted to the motor. Upon the extreme end of this bar is a head *j*, and arranged between this head and the block *J'* is a spring *J*. The hinge joint at *i* is provided with a stop *i'* so that in effect the jointed frame *I I'* is very similar to a rule which can fold in one direction but not in the other; that is, it can fold upward but not downward below the point shown. Upon starting the motor the pinion *G'* mounts the spur wheel and carries the motor up, causing the frame *I I'* to bend as indicated in dotted lines Fig. 1. This compresses the spring *J* which always resists the tendency of the motor to mount the spur wheel in starting or while in motion; and assisted by the gravity action of the motor, it produces the effect of an elastic connection of the motor with the axle making the working smooth and enabling the motor to overcome the inertia of the car at rest without trouble, and in a most gradual and easy manner. By this arrangement the power of the motor in starting the car is greatly increased as the movement of the motor shaft is relatively greater in starting than it would be when the car was in motion.

The specific construction of the jointed frame may be greatly modified, the construction herein shown being simply one method of putting the invention into effect.

5 There are many ways of supporting the motor in connection with the hinge frame I by which the same effect can be attained. Hence I do not limit myself to the specific construction here shown.

10 L is the brake shoe and is hung by a link l, and may be applied by a link M which has a pin on its end working in a slot m in the frame I. When thrown to the top of the slot m the brake will be applied when the motor
15 is at rest or when it ceases to exert its propelling effect, as then the frame I will pull the brake shoe against the wheel. The slot m is made somewhat eccentric with respect to the hinge point of the bar M so that when said
20 bar is shoved down by the lever N' and connections N, the brake will be removed and will not be applied by any movements of the motor until the bar M is raised to the top of the slot again. This is important as in run-
25 ning backward the brake would remain applied if it were not for this provision.

The current supplied to the motor may come from line conductors C C extending along the railway and be supplied by a suitable current
30 collecting device moving with the car, or the current may come from batteries X carried or moving with the car.

H' is the motor circuit and is provided with a current reversing switch H² and a resistance
35 changer H³ which may be regulated by hand or made automatic as shown, having a helix H⁴ which actuates the switch contact core. Any suitable form of regulator may be used.

I do not limit myself to the details of construction as they may be modified in various
40 ways without departing from my invention.

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

45 1. The combination of the car body, the axles and wheels therefor, an electric motor having its shaft connected with the axle by a hinged frame, a power transmitting connection between the motor shaft and axle, and an elastic
50 support for the motor permitting it to rise and fall bodily while maintaining the transmitting connection with the axle.

2. The combination of the car body, the axles and wheels therefor, an electric motor having
55 its shaft connected with the axle by a hinged frame independent of the motor proper, a power transmitting connection between the motor shaft and axle carried by the hinged frame, a support for the motor permitting it
60 to rise and fall, and a stop to limit the downward movement of the motor.

3. The combination of a car, an electric motor elastically supported upon the axles and
65 gearing with one of the axles of the car, a hinge frame connecting the axle and motor shaft whereby the motor is adapted to travel around the axle, and a spring to oppose this

action to the end that the motor is connected to the axle with an elastic connection.

4. The combination of a car, an electric motor gearing with one of the axles of the car, a
70 hinge frame journaled to both the axle and motor shaft whereby the motor is adapted to travel around the axle and also upon its own shaft, and a spring to oppose this action to
75 the end that the motor is connected to the axle with an elastic connection.

5. The combination of a car, an electric motor connected to one of the axles by means of
80 a frame having journals on the axle and gearing with the axle of the car whereby the motor is adapted to travel around the axle, a spring to oppose this action, a brake, and a connection between the motor and brake
85 whereby when the motor assumes its normal position at rest the brake shall be applied.

6. The combination of a car, an electric motor connected to one of the axles by means of
90 a frame having journals on the axle and gearing with the axle of the car whereby the motor is adapted to travel around the axle, a spring to oppose this action to the end that the motor is connected to the axle with an
95 elastic action, a brake, a connection between the motor and brake whereby when the motor assumes its normal position at rest the brake shall be applied, and means to throw the brake out of action without disturbing the motor.

7. The combination of a car, an electric motor gearing with the axle of the car, a hinge
100 frame connecting the axle and motor shaft whereby the hinge frame is adapted to travel around the axle and move with the motor, a spring to oppose this action, a stop to hold the
105 motor when at rest in a normal position in which the compression of the spring is reduced, a brake, and a connection between the motor and brake whereby when the motor assumes its normal position at rest the brake
110 shall be applied.

8. The combination with a car, of the brake, a spring to apply said brake, and an electric
115 motor having a rotating armature to move the brake shoe away from the wheels and rotate the axle.

9. The combination with a car, of the brake, a spring to apply said brake, an electric motor having a rotating armature to move the
120 brake shoe away from the wheels and rotate the axle, a source of electric energy, a motor circuit, and means to vary the power of the motor.

10. The combination with a car of a brake moved by gravity, and an electric motor having
125 a rotating armature to remove said brake and simultaneously move about the axle.

11. The combination with a car, of a brake moved by gravity, a spring to assist in applying the brake, and an electric motor having a
130 rotating armature to remove said brake and also rotate the car axle.

12. The combination with a car, of a gravity brake, and an electric motor having a rotating

armature to remove said brake and also rotate the car axle, a source of electric energy, a motor circuit, and means to vary the power of the motor.

5 13. The combination with a car of an electric motor to propel the same, a motor circuit, means to put the motor into and out of action, a brake, and a connection between said brake and motor whereby the act of the motor coming to rest applies the brake.

10 14. The combination with a car of an electric motor to propel the same, a motor circuit, means to put the motor into and out of action, a brake, a connection between said brake and motor whereby the act of the motor coming to rest applies the brake, and independent means to throw the brake out of action when the motor is at rest.

15 15. The combination of a car, an electric motor to propel the same having its shaft parallel with the axle, a frame formed of movable parts rearwardly connected together and supported from the ground through the media of the axles, a spring support between the motor and frame, and gearing between the axle and motor shaft.

20 16. The combination of a car body supported on the axles by springs, an electric motor to rotate the axle having its shaft parallel with the axle and located wholly between the two axles, a frame having journals by which the motor is hinged to the axle, a gearing between the axle and motor shaft, and a spring support for the motor sustained by the axles independently of the car body and its supporting springs.

25 17. The combination of the car body and its supporting wheels and axles, with an electric motor to propel the same, a jointed frame hinged to the axle at one end and connected to the motor at the other end, bearings on the part of said jointed frame which is hinged to the axle in which the motor shaft is received, and a mechanical power-transmitting device connecting the axle and motor shaft.

30 18. The combination of the car body and its supporting wheels and axles, with an electric motor to propel the same, a jointed frame capable of folding in one direction but not in the other hinged to the axle at one end and connected to the motor at the other end, bearings on the part of said jointed frame which is hinged to the axle in which the motor shaft is received, and a mechanical power-transmitting device connecting the axle and motor shaft.

35 19. The combination of the car body and its supporting wheels and axles, with an electric motor to propel the same, a jointed frame hinged to the axle at one end and connected to the motor at the other end, a spring acting upon said jointed frame to resist its being folded, bearings on the part of said jointed frame which is hinged to the axle in which the motor shaft is received, and a mechanical power-transmitting device connecting the axle and motor shaft.

20. The combination of the car body and its supporting wheels and axles, with an electric motor to propel the same, a jointed frame hinged to the axle at one end and connected to the motor at the other end, bearings on the part of said jointed frame which is hinged to the axle in which the motor shaft is received, a spur wheel secured to the axle, and a pinion secured to the motor shaft and meshing with each spur wheel the weight of the motor being hung from the frame at or near its middle joint to offer a resistance to the motor mounting the spur wheel.

21. The combination of the car body and its supporting wheels and axles, with an electric motor to propel the same a jointed frame hinged to the axle at one end and connected to the motor at the other end, bearings on the part of said jointed frame which is hinged to the axle in which the motor shaft is received, a spur wheel secured to the axle and a pinion secured to the motor shaft and meshing with each other the weight of the motor being hung from the frame at or near its middle joint to offer a resistance to the motor mounting the spur wheel, and a spring to assist the action of the weight.

22. The combination of the car body and its supporting wheels and axles, with an electric motor to propel the same, a jointed frame hinged to the axle at one end and connected to the motor at the other end, bearings on the part of said jointed frame which is hinged to the axle in which the motor shaft is received, a spur wheel secured to the axle and a pinion secured to the motor shaft and meshing with each other whereby the motor shall have a tendency to mount the spur wheel, and a spring to resist the tendency of the mounting action of the motor and folding action of the jointed frame.

23. The combination of the axle F, the hinged frame I journaled on said axle, an electric motor H having its shaft *h* carried in journals *g* on the frame I, gearing connecting the axle and motor shaft, a brake shoe, and a connection between said brake shoe and frame I whereby the movements of the frame about the axle remove or apply the brake.

24. The combination of the axle F, the hinged frame I journaled on said axle, an electric motor H having its shaft *h* carried in journals *g* on the frame I, gearing connecting the axle and motor shaft, a brake shoe, and a connection between said brake shoe and frame I whereby the movements of the frame about the axle remove or apply the brake, and independent means under the control of the operator to throw the brake out of action.

25. The combination of the axle F, the hinged frame I journaled on said axle, an electric motor H having its shaft *h* carried in journals *g* on the frame I having slot or guide-way *m m'*, gearing connecting the axle and motor shaft, a brake shoe, and a connection M between said brake shoe and slot or guide-way of the frame I whereby the movements

of the frame about the axle remove or apply the brake, and means under the control of the operator to move the connection M in the slot *m.m'* to throw the brake out of action.

5 26. The combination of the axle F, the hinged frame I journaled on said axle, an electric motor H having its shaft *h* carried in journals *g* on the frame I, gearing connecting the axle and motor shaft, a brake shoe, and
10 a connection between said brake shoe and frame I whereby the movements of the frame about the axle remove or apply the brake, and a spring acting on said frame I to apply the brake.

15 27. The combination of the axle F, the hinged frame I journaled on said axle, an electric motor H having its shaft *h* carried in journals *g* on the frame I, gearing connecting the axle and motor shaft, a brake shoe, and
20 a connection between said brake shoe and frame I whereby the movements of the frame about the axle remove or apply the brake, a spring acting on said frame I to apply the brake, and independent means under the control of the operator to throw the brake out of
25 action.

28. The combination of the axle F of the car, the hinged frame I journaled on the axle, the brake shoe L, a connection between the
30 brake shoe and frame I to apply or remove the brake, a spring to move the frame in one direction to apply the brake, and an electro magnet acting on the frame to oppose the action of the spring and remove the brake.

35 29. The combination of the car truck, the jointed frame I I' journaled on the axle, an electric motor having its shaft journaled on the frame I, gearing connecting the motor shaft and axle, and a spring J to resist the
40 bending of the parts I and I' of the jointed frame, substantially as and for the purpose specified.

30. The combination of the car truck, the jointed frame I I' journaled on the axle and
45 having stops *v'* to allow it to bend upward but not downward, an electric motor having its shaft journaled on the frame I, gearing connecting the motor shaft and axle, a spring J to resist the bending of the parts I and I' of
50 the jointed frame, and a support for suspending the free end of the motor from the ground through the media of the axles.

31. In an electrically propelled vehicle the axles and carbody supported thereby, in combination with an electric motor having its
55 shaft hinged to one axle and movable about it by a frame independent of the motor, gearing between the motor shaft and axle, and a flexible support for the motor arranged between the two axles. 60

32. In an electrically propelled vehicle the axles and carbody supported thereby, in combination with an electric motor having its shaft hinged to one axle and movable about
65 it, gearing between the motor shaft and axle, and a flexible support for the motor extending toward and supported by the other axle.

33. In an electrically propelled car the combination of the axles with an electric motor connected to one axle through a frame work
70 independent of the motor proper having bearings arranged at a distance apart, and supported at the other end by a single support.

34. In an electrically propelled car the combination of the axles with an electric motor
75 connected to one axle through a frame work independent of the motor having bearings arranged at a distance apart, and supported at the other end by a support carried by the axles independent of the carbody. 80

35. In an electrically propelled car the combination of the axles with an electric motor flexibly connected to one axle through a frame
85 work independent of the motor proper having bearings arranged at a distance apart, and supported at the other end by a single support.

36. In an electrically propelled vehicle the axles and carbody supported thereby in combination with an electric motor having its
90 shaft connected to one axle by a frame independent of the motor journaled on the axle and movable about it, gearing between the motor shaft and axle, and a flexible support for the motor. 95

37. The combination with a pivotally supported motor, of a brake connected therewith and operated by the movements thereof.

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

RUDOLPH M. HUNTER.

Witnesses:

ERNEST HOWARD HUNTER,
S. T. YERKES.