(No Model.)

R. M. HUNTER.

ELECTRICALLY PROPELLED VEHICLE.

No. 418,893. Patented Jan. 7, 1890.

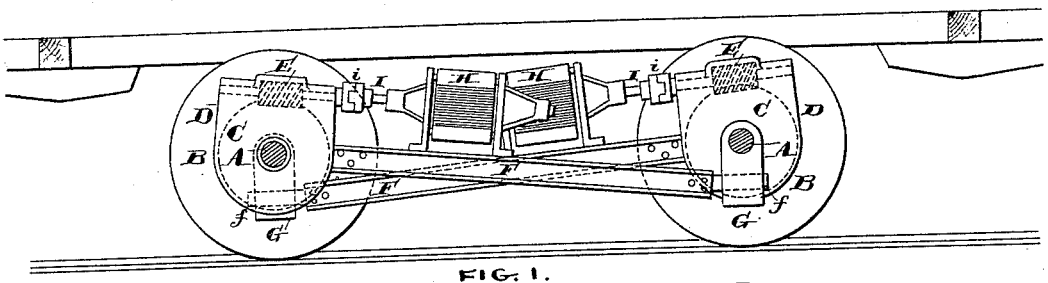


FIG. 1.

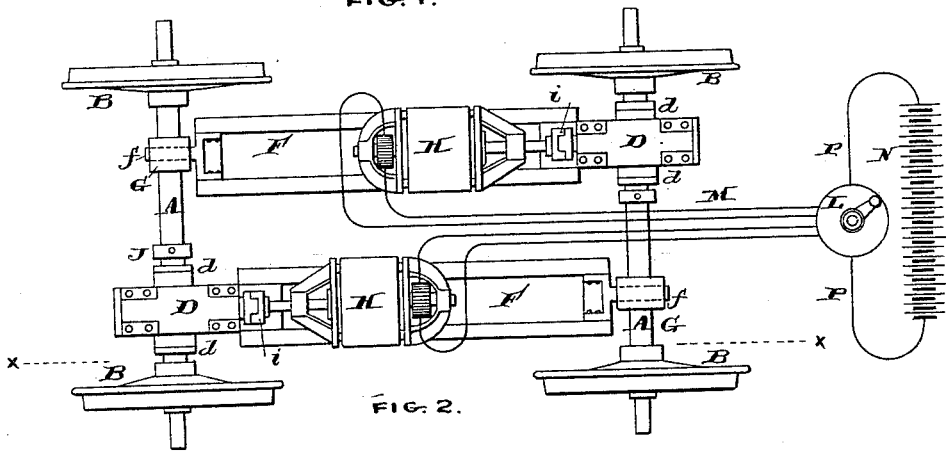
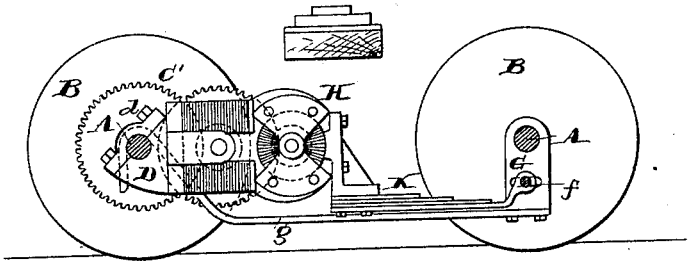


FIG. 2.

FIG. 3.



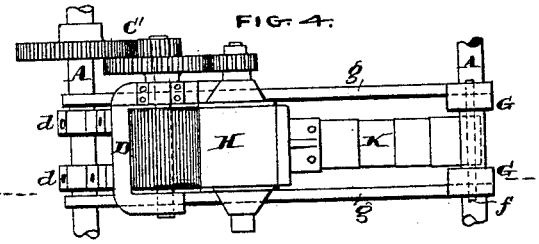


FIG. 4.

WITNESSES:

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RUDOLPH M. HUNTER, OF PHILADELPHIA, PENNSYLVANIA.

ELECTRICALLY-PROPELLED VEHICLE.

SPECIFICATION forming part of Letters Patent No. 418,893, dated January 7, 1890.

Original application filed June 5, 1889, Serial No. 313,217. Divided and this application filed September 16, 1889. Serial No. 324,076. (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 Electrically-Propelled Vehicles, of which the following is a specification.

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

This application, Case 108, is a division of my application No. 313,217, filed June 5, 1889, and relates, generally, to electric cars or other vehicles, and may be used in conjunction with batteries carried by the car or vehicle or with line-conductors extending along the railway, from which the motors derive their current.

Specifically the invention relates to the means employed for connecting the motors on the axles, preferably so that each is independent in its motions with respect to the other. Both motors are supported by frames from both axles; but each is connected so as to rotate different axles. In detail each motor is supported by frame-work, which enables the motor to be journaled on one axle with a flexible connection with the other axle, whereby there shall be no binding, and yet the motor shall be positively coupled with the axle which it drives.

In the drawings, Figure 1 is a sectional elevation on line *x x* of Fig. 2, showing my improved manner of supporting the motors on the axles. Fig. 2 is a plan view of same. Fig. 3 is a sectional elevation of a modification of same, taken on line *y y* of Fig. 4; and Fig. 4 is a plan view of the devices shown in Fig. 3, with the wheels and parts of the axles cut away.

A are the axles. B are the wheels thereof.

C are the worm-wheels, secured to the axles by keys, so as to rotate the axles with them.

D is a dust-box inclosing the worm and worm-wheel, and is journaled on the hub of the worm-wheel or the axle.

E is the worm, which meshes with the worm-wheel, and is journaled in the frame or box D.

F are frames which are secured at one end to the boxes D, and thereby journaled to the axles at *d*, and have their other ends provided with pins *f*, which extend through links G, supported upon the axles, with provision for lateral movement. In practice there may be one or two of these frames and motors. I have shown two, and they are journaled and hung from opposite axles. It will thus be seen that each motor H, secured upon the frames F, is in effect journaled to the axles which it rotates, and is pivoted by a flexible or universal joint on the other axle and with provision to allow the axles to have any relative movement desired, as in jumping switches, frogs, cross-tracks, &c., without binding on the journals or displacing the motor-connection with the axle.

I is the motor-shaft, and may be connected directly with the worm E or through a flexible coupling *i*, which permits of a limited amount of spring to the parts without binding. I prefer to hang the pivoted end *f* of the frame F to the link below the axle. These two motors are thus free to have all kinds of relative movements, and are carried by the axles independent of the car-body, which is supported on springs in the usual way.

L is the regulator, and may be carried on the car-body, if desired, and is connected by flexible conductors M with the motors H H, the flexibility thereof permitting the free independent movements of the motors without rupture of the conductors.

N is a source of electric supply, and P is a circuit for supplying current from N to the regulator L, and thence by conductors M to the motors. This source of power N may be batteries carried by the car, or current may be supplied by the usual line-conductors extending along the railway, and current-collectors carried by the car—as, for instance, is set out in Letters Patent No. 400,916, April 9, 1889, or No. 403,192, May 15, 1889, granted to me.

It is not essential that worm and worm-

wheel gearing shall be used between the axles and motor-shaft, nor that the motor shall be supported without elasticity. In Figs. 3 and 4 I have the motor H, journaled to one axle A by journals *d* and frame D, and connected at the other or free end to springs K, which terminate in a pin *f*, journaled in a link or frame G, loosely journaled on the other axle A. This frame or link G in this case may be double and have extensions *g* loosely supported on the other axle, forming a light frame. As shown, the motor-shaft I is geared to the axle A by gears E′ C′, and the gearing and motor are free to move about the axle, since the spring K and link G permit such movement. It is also evident that the axles may move independently and relatively to each other without binding of the motor on the axle.

It is apparent that the frame D, the motor-frame, and springs K of Figs. 3 and 4 correspond to the frame D F and motor of Figs. 1 and 2, and hence, broadly considered, the construction shown in the various figures are equivalents. In Figs. 3 and 4 I have only shown one motor connected to drive one axle; but it is evident that the apparatus may be duplicated, as in Fig. 2, to drive both axles from separate motors.

I do not limit myself to any special form of gearing, nor to the minor details of construction, as they may be modified in various ways without departing from the spirit of my invention.

Matters shown and not claimed herein form subject-matter of other applications; hence such matters are not dedicated to the public, but form subject-matter of my application of which this is a division, and my applications Serial No. 215,199, of September 23, 1886; Serial No. 217,346, of October 27, 1886; Serial No. 224,150, of January 12, 1887; Serial No. 264,456, of February 18, 1888; Serial No. 268,360, of March 24, 1888, and Serial No. 271,141, of April 19, 1888—that is to say, I do not claim, broadly, a motor journaled upon the axle and supported elastically at the other end either through the axles directly or by a frame supported by said axles; nor a construction in which a frame is journaled to one axle and flexibly supported above the other axle, and having a motor supported by the frame and gearing with the axle to which the frame is journaled; nor two frames supported by the axles, combined with a motor for each frame, and connecting-gearing between the motors and axles whereby each motor drives different axles with or without flexible electrical connections between them; nor two electric motors supported partly by each axle and respectively connected by power-transmitting connections with different axles and with or without connecting flexible electrical connections, as said features are set out and claimed in my applications above referred to.

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

1. In an electrically-propelled vehicle, the combination of the axles, a frame journaled upon one axle and loosely or flexibly connected with the other axle, a motor supported on the frame, and connecting-gearing between the motor and axle on which the frame is journaled, consisting of a worm-wheel secured on the axle and a worm rotated by the motor-shaft.

2. In an electrically-propelled vehicle, the combination of the axles, a frame journaled upon one axle and loosely or flexibly connected with and below the other axle, a motor supported on the frame, and connecting-gearing between the motor and axle on which the frame is journaled.

3. In an electrically-propelled vehicle, the combination of a worm-wheel secured upon one axle, a frame journaled concentric with the axle on each side of the worm-wheel and having an extension flexibly connected with the other axle, a worm meshing with the worm-wheel and held thereto by a frame, and an electric motor supported on the frame and having its shaft adapted to rotate the worm.

4. In an electrically-propelled vehicle, the combination of a worm-wheel secured upon one axle, a frame journaled concentric with the axle on each side of the worm-wheel and having an extension flexibly connected with the other axle, a worm meshing with the worm-wheel and held thereto by a box-frame inclosing the worm and worm-wheel, and an electric motor supported on the frame and having its shaft adapted to rotate the worm.

5. In an electrically-propelled vehicle, the combination of two independent frames journaled upon each axle and flexibly supported from the other axle, a motor independently supported by and movable with each frame, and connecting-gearing between the motor and axle to which its frame is journaled.

6. In an electrically-propelled vehicle, the combination of two independent frames—one journaled upon each axle and flexibly supported from the other axle—a motor independently supported by and movable with each frame, and connecting-gearing between the motor and axle to which its frame is journaled, consisting of worm and worm-wheels.

7. In an electrically-propelled vehicle, the combination of two independent frames—one journaled upon each axle and flexibly supported from the other axle—a motor independently supported by and movable with each frame, connecting-gearing between the motor and axle to which its frame is journaled, flexible electrical conductors between the two motors, and a regulator to control the current to the motors.

8. In an electrically-propelled vehicle, the combination of two independent frames—one journaled upon each axle and flexibly sup-

ported from the other axle, with provision for lateral movement—a motor independently supported by and movable with each frame, and connecting-gearing between the motor and axle to which its frame is journaled.

9. In an electrically-propelled vehicle, the combination of two independent frames—one journaled upon each axle and flexibly supported from and below the other axle—a motor independently supported by and movable with each frame, and connecting-gearing between the motor and axle to which its frame is journaled.

10. The combination of two axles with two frames, one of which is secured to one axle and the other to the other axle, motors supported by the said frames and mechanically connected with the respective axles, and detachable connections between the other ends of the frames and the opposite axles.

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

RUDOLPH M. HUNTER.

Witnesses:

ERNEST HOWARD HUNTER,

E. M. HUNTER.