(No Model.)

2 Sheets—Sheet 1.

F. J. SPRAGUE.

ELECTRIC RAILWAY MOTOR.

No. 324,892. Patented Aug. 25, 1885.

Fig 1.

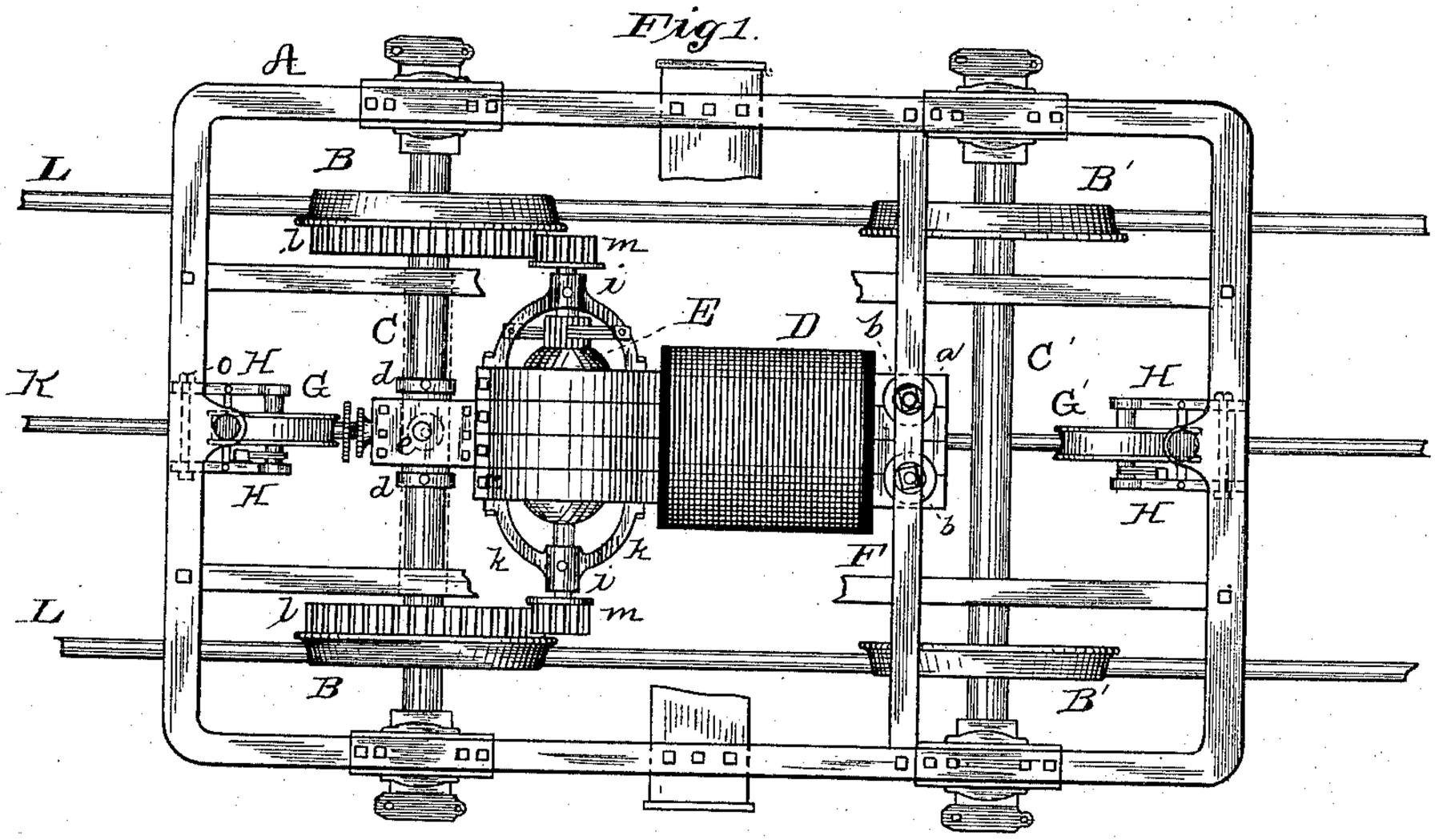
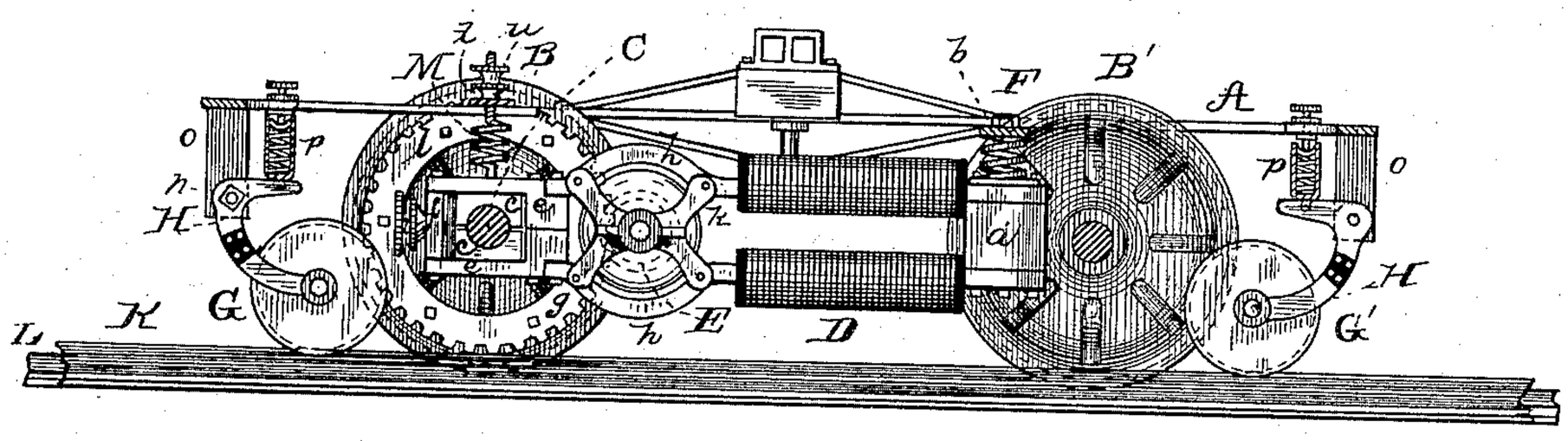


Fig. 2.



ATTEST:
E. C. Rowland
Thos. Riddle.

INVENTOR:
Frank J. Sprague.
By Dyer & Seely
Attys.

(No Model.)

2 Sheets—Sheet 2.

F. J. SPRAGUE.

ELECTRIC RAILWAY MOTOR.

No. 324,892. Patented Aug. 25, 1885.

Fig. 3.

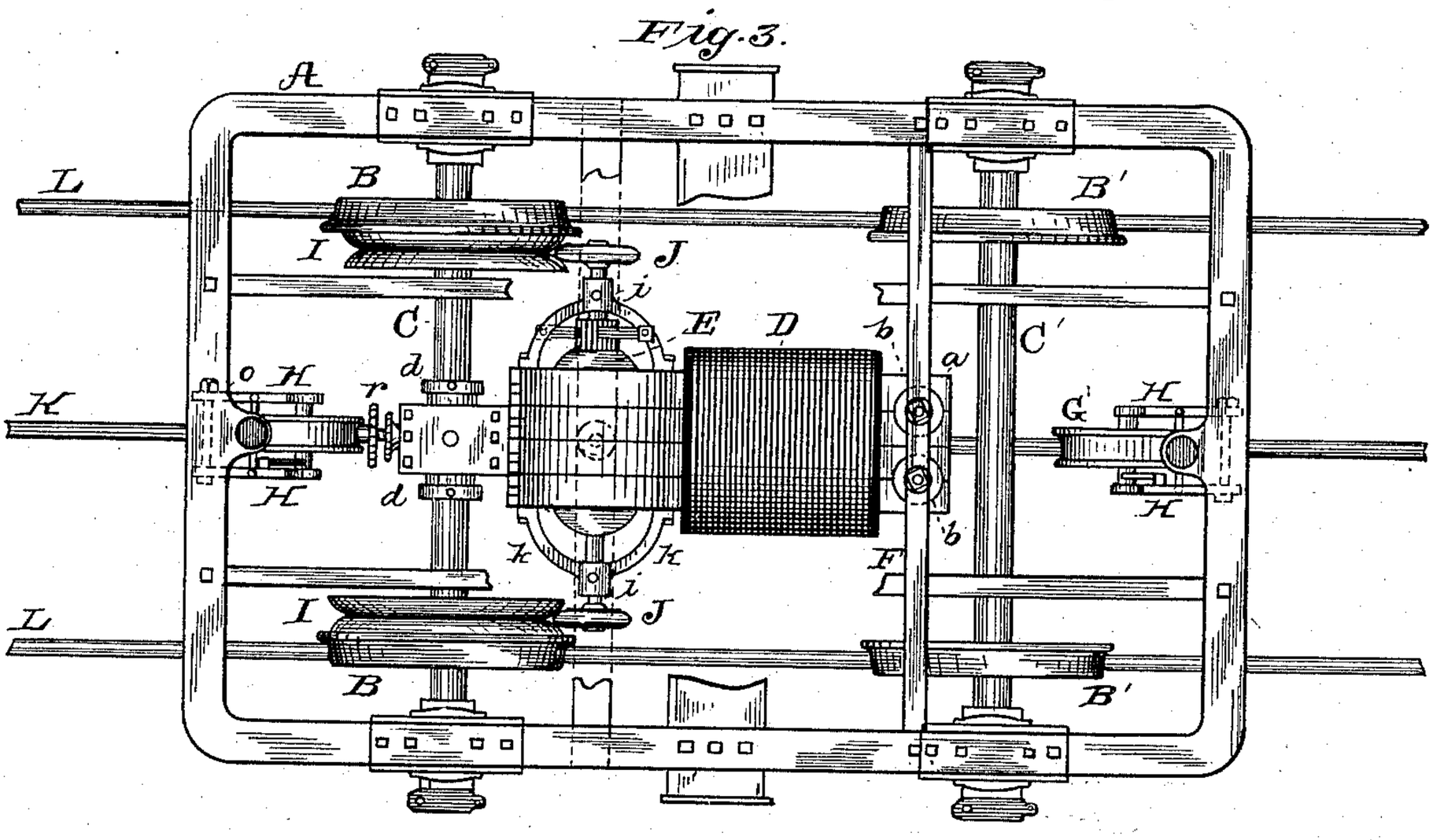
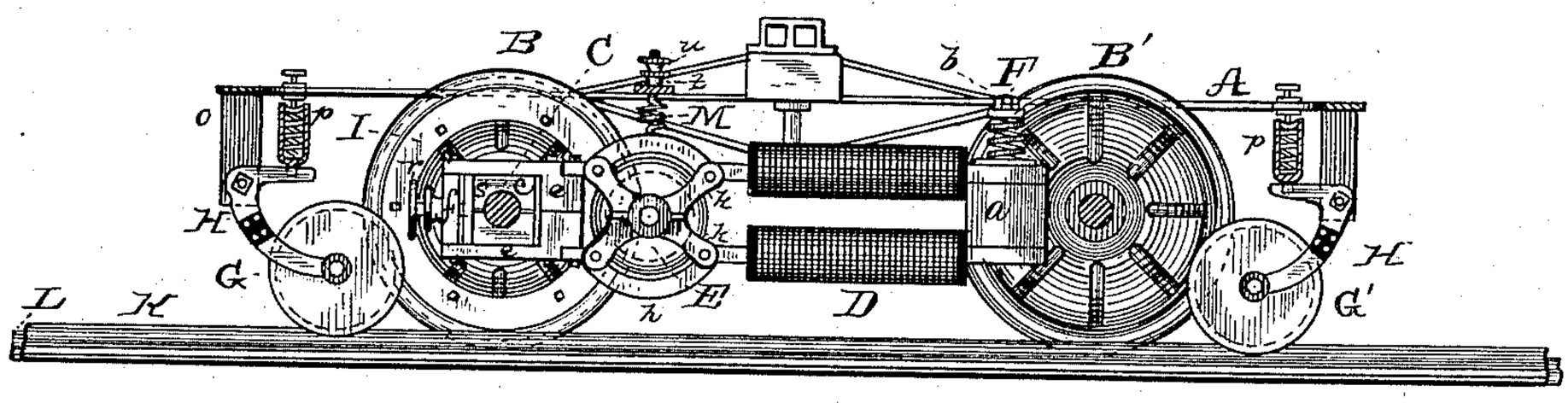


Fig. 4.



ATTEST:
E. C. Rowland
H. W. Kiddle.

INVENTOR:
Frank J. Sprague,
By Dyer & Seeley
Attys.

UNITED STATES PATENT OFFICE.

FRANK J. SPRAGUE, OF NEW YORK, N. Y.

ELECTRIC RAILWAY-MOTOR.

SPECIFICATION forming part of Letters Patent No. 324,892, dated August 25, 1885.

Application filed May 25, 1885. (No model.)

To all whom it may concern:

Be it known that I, FRANK J. SPRAGUE, of New York, in the county and State of New York, have invented a certain new and useful Improvement in Electric Railway-Motors, of which the following is a specification.

My invention relates to electric motors mounted upon railway-cars for the purpose of propelling the same; and my object is to so arrange and support the motor that the relative positions of the armature and field-magnet of the motor will not be changed, and the mechanical connections between the armature and the driving-axle will not be disturbed by any movement of the car-body on its springs at the same time that the driving-axle will be relieved of dead-weight.

My invention is illustrated in the accompanying drawings, in which—

Figure 1 is a plan view of an electric railway-motor embodying said invention and employing a cog-gearing between the armature and driving-wheels; Fig. 2, a section of the truck with the electric motor in elevation; Fig. 3, a view, similar to Fig. 1, of a motor employing a friction-gearing; and Fig. 4, a view, similar to Fig. 2, of this motor.

Referring first to Figs. 1 and 2, A is the frame of the truck of a railway-car, and B B and B′ B′ are the wheels of the same. The truck-body is supported from the axles C C′ through springs, in any usual manner.

D is the field-magnet of an electro dynamic motor, and E the armature thereof. The yoke or back piece, *a*, of the field-magnet is hung from a cross-piece, F, of the truck by heavy springs *b b*, or from the car-body itself in case of a street-car or other vehicle having no truck. The driving-axle C at its middle portion is inclosed in journals *c c*, situated between collars *d d* on the axle, and these journals are held by clamping parts *e e*, joined together on one side of the axle by a plate, *f*, to which they are bolted, and on the other side bolted to extended parts *g g* from the pole-pieces *h h* of the field-magnet. The clamping-pieces *e e* are of non-magnetic metal. The bearings *i i* of the armature-shaft are carried directly upon the field-magnet pole-pieces, being supported by arms *k k*, attached to the journal-boxes and said pole-pieces. Upon the inner side of each of the driving-wheels is a cog-gear wheel, *l*, which may be made in one piece with the wheel, but is preferably made itself in two parts, bolted or otherwise removably attached to the wheel; or, whether made in one or two parts, it may be secured directly to the driving-axle. Upon each end of the armature-shaft is a cog-wheel, *m*, and these engage, respectively, with the cog-surfaces of the driving-wheels, and thus communicate motion to said wheels to propel the car when the armature is revolved. The armature being carried rigidly by the field-magnet, these two parts must always maintain precisely the same relative position under every vertical or lateral movement of the wheels or of the car-body; and as the field-magnet which carries the armature is itself centered by the axle of the wheels to which the armature-shaft is geared, the engaging gears also must always maintain precisely the same relative position. At the same time the connection of the entire motor with the truck is through springs, so that its position is not affected by the movements of the truck on its springs.

G and G′ are contact-rollers running on the intermediate rail, K. Each contact-roller has bearings between the ends of the curved arms H H, pivoted at *n* between supports *o o*, extending down from the car, and having a spring, *p*, attached to the other end, connecting it with the car-body, whereby the roller is constantly maintained in good contact with the intermediate rail, K, which forms one side of the supplying-circuit. The other side of the circuit is formed by the working-rails L L and the ground. In the form shown in Figs. 3 and 4, friction-gears are used between the armature and driving-wheels instead of cog-gears, as before.

I I are friction-surfaces attached to the driving-wheels or the driving-axle, and J J are friction-wheels engaging therewith on the armature-shaft. Means are provided for adjusting the contact of the friction-surfaces. A screw, *r*, passes through the plate *f*, and sets against a plate, *s*, situated in contact with the journal-boxes in such manner that when the screw is turned, as the plate *s* cannot move the plate *f*, clamping parts *e e* and the field-magnet and armature are drawn in one direction or the other, and the friction-gears are thus adjusted. A similar device is shown in

Fgs. 1 and 2 for adjusting the cog-gears, if necessary.

It is evident that any other form of gearing may be employed—as belts or friction-clutches—as the relative position of the axle and armature-shaft never changes, except when purposely adjusted.

Another feature of the invention relates to means for relieving the driving-axle of the car of the dead-weight of the motor at the same time that the motor is centered upon such axle. To accomplish this, supporting-springs M are employed, which are connected with the sleeve centering the motor upon the axle, Figs. 1 and 2, or with the polar extensions of the field-magnet of the motor, Figs. 3 and 4, or at any other suitable point. These springs extend to cross-bars on truck-frame, or to the car-body in case no truck is used. Their tension is adjusted by nuts *t*, which are locked by other nuts, *u*. This adjustment may be such as to carry wholly or partly the weight of this end of the motor, or so as to actually exert a pressure upon the lower side of the driving-axle. By this feature of the invention the hammering effect which would result from supporting the motor directly upon the axle will be reduced to the minimum.

What I claim is—

1. The combination of a wheeled vehicle and an electro-dynamic motor mounted thereon and propelling the same, having its field-magnet sleeved on an axle of the vehicle, substantially as set forth.

2. The combination of a wheeled vehicle and an electro-dynamic motor mounted upon and propelling the same, the field-magnet of said motor being sleeved upon an axle of the vehicle at one end, and supported by flexible connections from the body of the vehicle at the other end, substantially as set forth.

3. The combination of a wheeled vehicle, an electro-dynamic motor mounted upon and propelling the same, and flexible connections between the field-magnet of the motor and the body of the vehicle, the armature of the motor being supported directly upon said field magnet, substantially as set forth.

4. The combination of a wheeled vehicle, an electro-dynamic motor mounted upon and propelling the same, the field-magnet of said motor being sleeved upon an axle of the vehicle, and the armature of said motor being supported upon the field-magnet, and gearing between the armature-shaft and the driving-wheels of the vehicle, substantially as set forth.

5. The combination of a wheeled vehicle, an electro-dynamic motor mounted upon and propelling said vehicle, extensions from the pole-pieces of said motor, and journal-boxes connected with said extensions and inclosing an axle of said vehicle, substantially as set forth.

6. The combination, with a wheeled vehicle, supported upon its axles by springs, of an electro-dynamic motor flexibly supported from such vehicle, and centered upon the driving-axle thereof, substantially as set forth.

7. The combination, with a wheeled vehicle, of an electro-dynamic motor centered upon the driving-axle thereof, and having its armature-shaft imparting motion to such axle, and a spring-support for the motor, relieving said axle wholly or partly of the dead-weight of motor, substantially as set forth.

8. The combination, with a wheeled vehicle, of an electro dynamic motor, centered upon the driving-axle thereof, and having its armature-shaft imparting motion to such axle, and an adjustable spring-support for the motor, relieving said axle wholly or partly of the dead-weight of motor, substantially as set forth.

9. The combination, with a wheeled vehicle, of an electro-dynamic motor centered upon the driving-axle thereof at one end, a spring-support for that end of the motor from the truck or body of vehicle, and relieving axle wholly or partly of dead-weight, and a spring support for the other end of motor from the truck or body of vehicle, substantially as set forth.

This specification signed and witnessed this 23d day of May, 1885.

FRANK J. SPRAGUE.

Witnesses:
A. W. KIDDLE,
RICHD. N. DYER.