(No Model.)

2 Sheets—Sheet 1.

W. ROBINSON.

CAR MOTOR.

No. 572,685.

Patented Dec. 8, 1896.

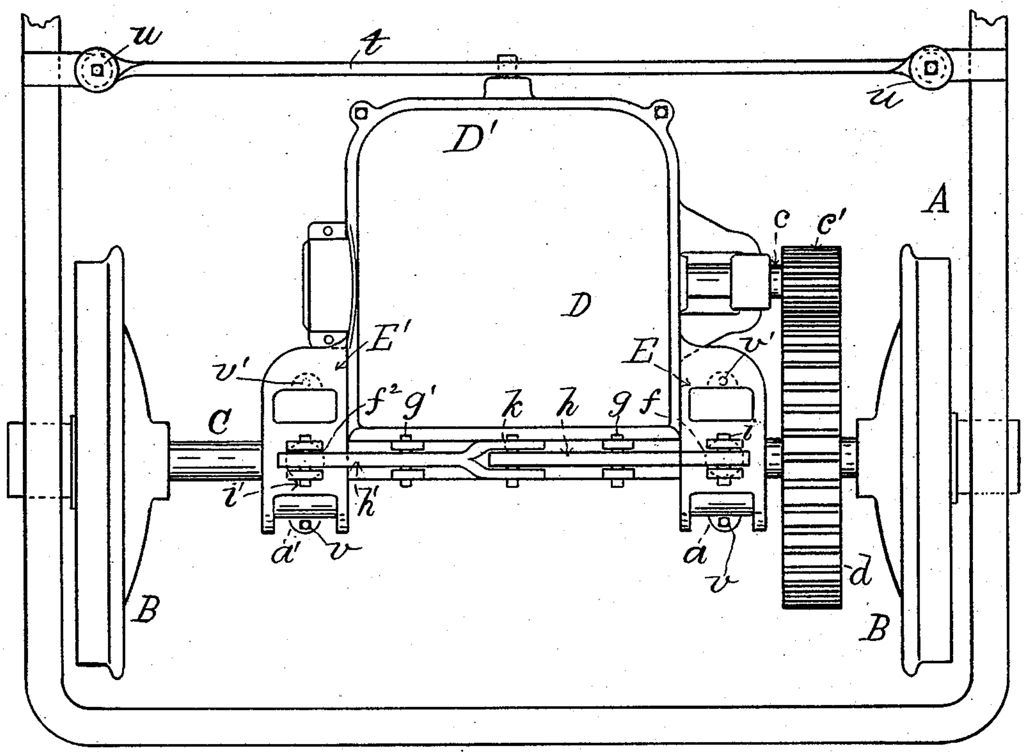

FIG. 1.

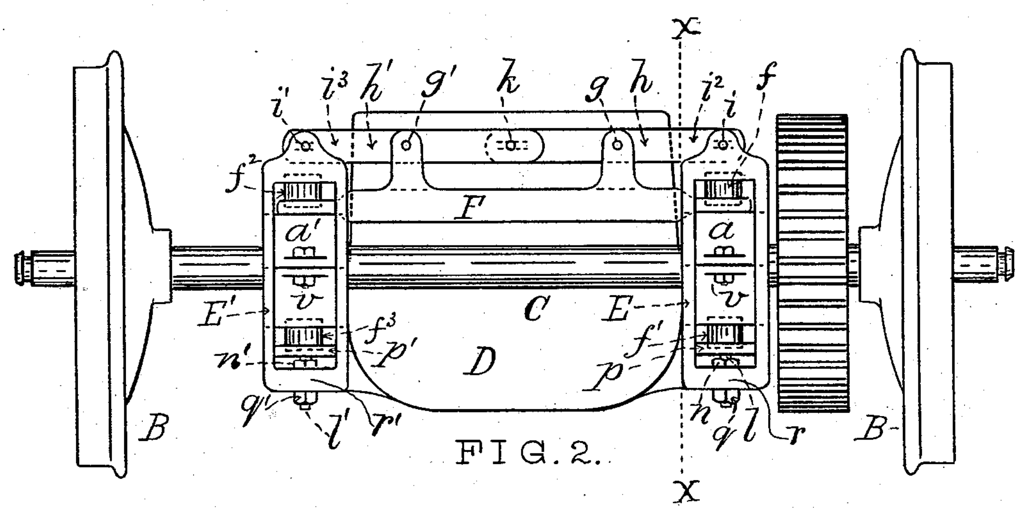

FIG. 2.

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(No Model.) 2 Sheets—Sheet 2.

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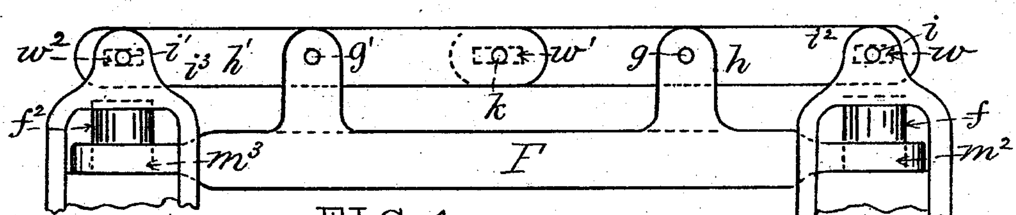

FIG. 4

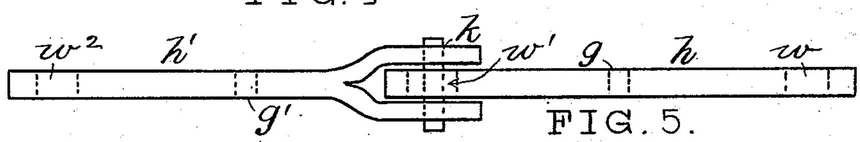

FIG. 5.

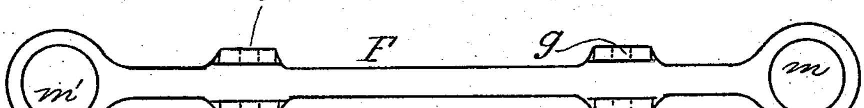

FIG. 6.

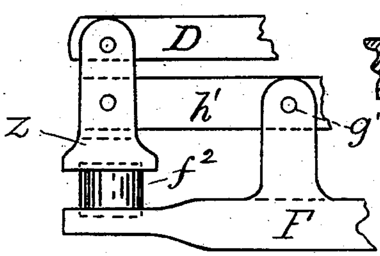

FIG. 8.

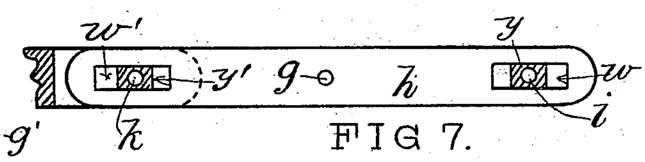

FIG 7.

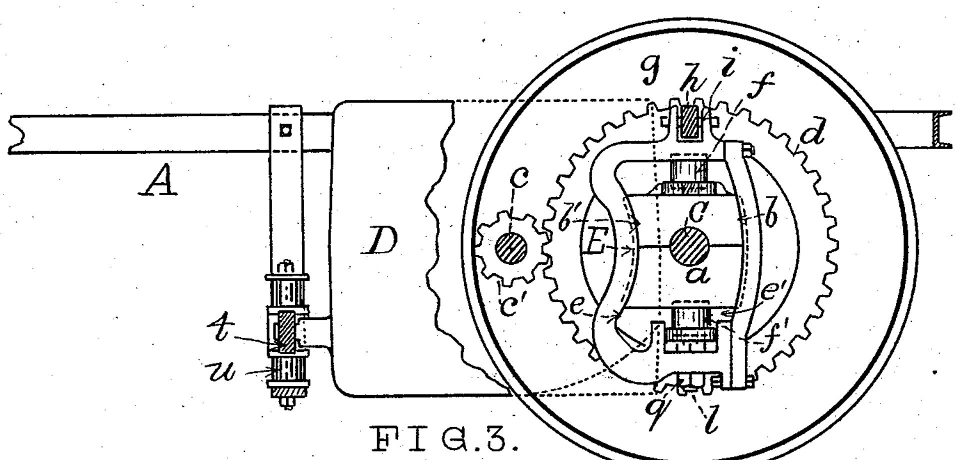

FIG. 3.

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UNITED STATES PATENT OFFICE.

WILLIAM ROBINSON, OF BOSTON, MASSACHUSETTS.

CAR-MOTOR.

SPECIFICATION forming part of Letters Patent No. 572,685, dated December 8, 1896.

Application filed July 12, 1893. Serial No. 480,280. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM ROBINSON, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented a new and useful Car-Motor, of which the following is a specification.

In electric-car motors as generally used, one end of the motor is journaled directly to the axle without elasticity. The result is that electric cars pound the rail-joints very seriously, since each pair of driving-wheels strikes the joints with the force of a solid hammer equivalent to the weight of the wheels and motor mounted thereon without flexibility. To obviate this difficulty in a simple and effectual manner is the object of my invention. To this end I support the motor on spring-cushions located, preferably, above the axles, and equalize the pressure on said springs by means of a system of levers.

The nature of my invention will be clearly understood from the description which follows, reference being had to the accompanying drawings, which form a part of this specification, in which—

Figure 1 is a plan view of a portion of a car-truck, showing an electric motor mounted therein, illustrating my invention. Fig. 2 shows a back end elevation of the same with the truck-frame omitted; and Fig. 3 is a side elevation, partly in section, the latter being a section through the line x x, Fig. 2. Figs. 4, 5, 6, and 7 are enlarged details of parts of my invention, and Fig. 8 shows a modification in the method of applying a part of my invention to the motor.

Similar letters of reference indicate corresponding parts in all the figures.

A is a portion of a car-truck supported by the wheels B, which are mounted on the axle C.

D is an electric motor having one end flexibly supported by the axle C in the manner hereinafter described.

The motor journal-boxes a a', which contain the motor journal-bearings, are mounted on the axle C, as shown. These boxes are identical in construction. It will be sufficient, therefore, to describe one of them in detail, for instance the box a. This box is curved on its outer and inner sides, as shown at b b'. These curved surfaces are made, as nearly as practicable, on curved lines described from the center of the pinion-shaft c, the pinion on said shaft engaging the gear-wheel d on the axle C. The motor D is provided with the slotted pedestals E E', embracing the boxes a a' and capable of up-and-down motion on said boxes. These pedestals are provided with inner curved surfaces e e', corresponding to the curves of the box a and described from the same center, that is, from the center of the shaft c. Above the box is placed the cushion or spring f, supported, directly or indirectly, by said box, while below said box a and pressing upwardly against the same is placed the spring-cushion f'. At the opposite side of the motor, in like manner, the cushion f^2 is placed above the box a' and the cushion f^3 below the same.

The curved pedestal E' embraces the curved box a' in the same way that the curved pedestal E embraces the box a at the opposite side of the motor. Thus it will be seen that the motor D is capable of up-and-down motion with reference to the axle C on the supporting-cushions f and f^2. At the same time, since the pedestals E E' and the boxes a a' are curved from the center of the pinion-shaft c, the up-and-down movement of the motor with reference to the car-axle C will not change the relative distance of the car-axle C from the center of the shaft c. In other words, the teeth of the pinion c' and those of the gear-wheel d mesh exactly whatever the varying vertical position of the motor may be with reference to the car-axle C. Thus it will be seen that the motor D is free to vibrate vertically on the cushions f f^2 without disturbing the proper meshing of the pinion and gear-wheel.

The bottom cushions f' f^3 prevent any violent or irregular upward movement of the motor with reference to the car-axle C.

It is evident that while my invention, as thus far described, provides for allowing a proper vertical movement of the motor with reference to the car-axle, yet it is incomplete in this, that when the pinion c' is revolving in one direction it will tend to climb the gear-wheel d, located at one side of the motor, and to thus remove the pressure from the cushion f to a greater extent than from the cushion

f^2 at the opposite side of the motor, and, on the contrary, when said pinion c' is revolving in the opposite direction it will tend to increase the pressure on the cushion f to a greater extent than on the cushion f^2 at the opposite side of the motor. This irregular pressure upon the cushions is a very objectionable feature, and to equalize this pressure is the principal object of my invention.

F is a bridge extending between the motor journal-boxes a a' and supported by said boxes, said bridge F being provided with the fulcrum-bearings g g'.

The lever h is pivotally supported by the bridge F, as shown, at g, and the lever h' is pivotally supported by said bridge F, as shown, at g'. The outer end i^2 of said lever h engages the motor, or an attachment thereto, preferably above the cushion f, as shown at i, and the outer end i^3 of the lever h' engages the motor, or an attachment thereto, preferably above the cushion f^2, as shown at i'. The inner ends of the levers h h' are flexibly connected together, as shown at k.

In the case of a single reduction-motor the pinion c' will be on the armature-shaft, but in the case of a double reduction-motor said pinion c' will be on the counter-shaft. It will be sufficient for description, however, to regard the shaft c as the armature-shaft and the pinion c' as located on said armature-shaft.

The operation is as follows: When the torque of the armature exerted upon the gear-wheel d causes a compression of the upper cushion f next to said gear-wheel, this carries the outer end i^2 of the lever h downwardly, and this movement of course throws the inner end of said lever h, together with the inner end of the lever h', upwardly, and the upward movement of the inner end of the lever h' throws the outer end i^3 of said lever h' downwardly, thus compressing the cushion f^2 in a manner corresponding to the compression of the cushion f on the opposite side of the motor. Thus the pressure is equalized on the cushions f and f^2 on the opposite sides of the motor. It will be observed that when the torque of the armature is exerted in the reverse direction upon the gear-wheel d the pressure of the motor upon the cushion f is decreased, and thus the outer end i^2 of the lever h is raised somewhat, thus depressing the inner ends of the levers h h' and consequently raising the outer end i^3 of the lever h' to a level with the outer end of the lever h, whereby the pressure upon the cushions f f^2 is equalized. Thus a perfect equalization of pressure on the cushions f f^2 at opposite sides of the motor is secured regardless of the direction of the torque of the armature with reference to the gear-wheel d. By this arrangement it will be seen that there can be no twisting or binding of the teeth of the armature-pinion c' relatively to the teeth of the gear-wheel d, since the teeth of the armature-pinion are kept in a position exactly parallel to the teeth of said gear-wheel.

It will be noted that the bridge F preferably rests rigidly on the journal-boxes a a', thus giving fixed fulcrum-points g g' for the bearings of the levers h h'. Thin cushions, however, might, if desired, be placed between the boxes a a' and the bridge F in order to absorb vibrations, but I prefer to use the bridge, as shown.

In Figs. 2 and 6 I have shown the bridge F as having its ends formed with cups m m', in which rest the cushions f f^2, the bridge F resting directly on the boxes a a'. In Fig. 4, however, the bridge F is shown as having its ends formed with open spaces m^2 m^3, through which pass the cushions f f^2. Thus the latter are allowed to rest directly upon the boxes a a'. Furthermore I have shown the bridge F constructed and arranged in what I regard as the simplest and most convenient form, but it might be supported otherwise than by the motor journal-boxes, for instance by the ordinary wheel journal-boxes, either directly or through the medium of portions of the truck-frame, without varying from the spirit or substance of my invention.

The bottom cushions f' f^3 are pressed against the bottom of the journal-boxes a a', the normal pressure being adjusted by means of the screws l l'. These screws l l' pass through the bottom of the pedestals E E', as shown at r r'. The vertical movement of said screws l l' raises and lowers the cups or plates p p', which support the cushions f' f^3, said cups p p' moving vertically within the pedestals E E', as shown in Fig. 2. The nuts n n' adjust vertically the screws l l', and thus compress the cushions f' f^3 to such extent as may be required for the practical operation of the apparatus. The lock-nuts q q', located below the pedestals, lock the screws l l' in position. By this simple arrangement any normal pressure desired may be brought to bear in adjusting the upper and lower cushions f f^2 and f' f^3, inasmuch as any compression exerted upon the bottom cushions f' f^3 will extend also to the upper cushions f f^2, provided said pressure is greater than the pressure exerted by the weight of the motor upon the upper cushions f f^2.

The inner end D' of the motor D is supported flexibly in any usual or suitable manner. For instance, the nose of the motor engages the arch-bar t, which is supported by cushions u u, the latter being supported by the truck-frame A. Thus the entire weight of the motor is supported on springs under practical working conditions.

The motor journal-boxes a a' are made in halves secured together by means of the clamps or screws v v'. These boxes are provided in the usual manner with ribs, as shown in dotted outline in Fig. 3, to keep them in proper lateral position relatively to the pedestals within which they are located.

When the levers h h' assume an angular position with reference to each other, they slide on the fulcrum-pins i, i', and k. I therefore provide these levers with slots w, w', and w^2, and within these slots I prefer to place the sliding blocks y y', through which said fulcrum-pins pass. (See Figs. 4, 5, and 7.) These sliding blocks, it will be understood, provide an enlarged wearing-surface, which makes the parts much more durable and prevents lost motion.

In Fig. 8 the upper spring-cup z is shown as a detachable part of the motor D instead of a fixed part, as in the other figures.

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

1. In combination, substantially as described, a motor, springs supporting one end of the same, and a series of levers supported on suitably-arranged bearings or fulcrums formed independently of said motor and its journal-boxes, said levers being arranged to distribute and equalize the pressure of said motor on said springs.

2. In combination, substantially as described, a motor arranged to drive an axle, springs supporting one end of said motor elastically upon said axle, and levers supported on fulcrums formed independently of the motor and its journal-bearings, said levers operating to equalize the pressure of said motor on said springs, thereby preserving the proper alinement of said motor with reference to said axle.

3. In combination, substantially as described, a motor spring-supported on a car-axle, levers engaging said motor, and suitably-arranged fulcrums supporting said levers, said fulcrums being formed independently of said motor and its journal-boxes and said levers being arranged to distribute and equalize the pressure of said motor on its supporting-springs.

4. In combination, substantially as described, a motor arranged to drive a car-axle, springs arranged to support one end of said motor flexibly with reference to said axle, a bridge or device formed independently of said motor and its journal-boxes, said device being provided with fulcrum-bearings, and levers pivoted in said fulcrum-bearings, said levers having their outer ends pivotally connected to the motor and their inner ends flexibly connected together, said levers operating to distribute and equalize the pressure of said motor on said springs.

5. In combination, substantially as described, a car-axle, a motor arranged to drive the same, said motor having one end flexibly supported by said axle and being adjustable on springs in a vertical plane, relatively to said axle, and a series of levers, with their fulcrum-supports formed independently of said motor and its journal-bearings, said levers being arranged to distribute and equalize the pressure of said motor on said springs during the varying conditions of service.

6. The combination, substantially as described, of a car-truck, a motor arranged to drive the same, said motor having one end flexibly supported on springs, said springs being in turn supported by the axle driven by said motor, a bridge supported by the journal-boxes and provided with fulcrum-bearings, and levers fulcrumed in said bearings, said levers being arranged to equalize the pressure of said motor on said supporting-springs.

7. The combination, substantially as described, of a motor-truck, a motor arranged to drive the same through power applied to the axle at a point outside of the center of said axle, said motor having one end supported by springs, said springs, in turn, being supported by said driven axle, and levers supported on fulcrum-bearings formed independently of the motor and its journal-boxes, said levers being arranged to neutralize the irregular torsional strain of said mechanism and to distribute and equalize the pressure on said supporting-springs.

8. In combination, substantially as described, a bridge provided with fulcrum-bearings and supported by the axle journal-boxes, a motor having one end resting on springs supported by said shaft or axle driven by said motor, and levers supported in the fulcrum-bearings of said bridge, said levers being arranged to transfer and equalize the pressure of said motor on said supporting-springs.

9. In combination, substantially as described, the car-axle C, the journal-boxes a, a' supported by said axle, springs supported by said journal-boxes, the motor D supported by said springs and arranged to drive said axle through the gear-wheels c', d, fulcrum-bearings g, g' also supported by said boxes a, a', but independent thereof, and the levers h, h' arranged to equalize the pressure of said motor on its said supporting-springs, thus preserving proper alinement between said gear-wheels.

10. In combination with an elastically-supported electric machine driving an axle or shaft through meshed gearing, a parallel-motion mechanism consisting, essentially, of levers engaging said electric machine and having fulcrum-bearings formed independently of the shaft or axle thereof, said levers being arranged to preserve proper alinement between the meshing gears of said machine by equalizing the load on the elastic supports of said machine, substantially as described.

WILLIAM ROBINSON.

Witnesses:
C. E. GRANT,
JAS. W. RIPLEY.