No. 751,529. PATENTED FEB. 9, 1904.

J. D. MAXWELL.

MOTOR VEHICLE.

APPLICATION FILED JUNE 22, 1903.

NO MODEL.

Fig. 1.

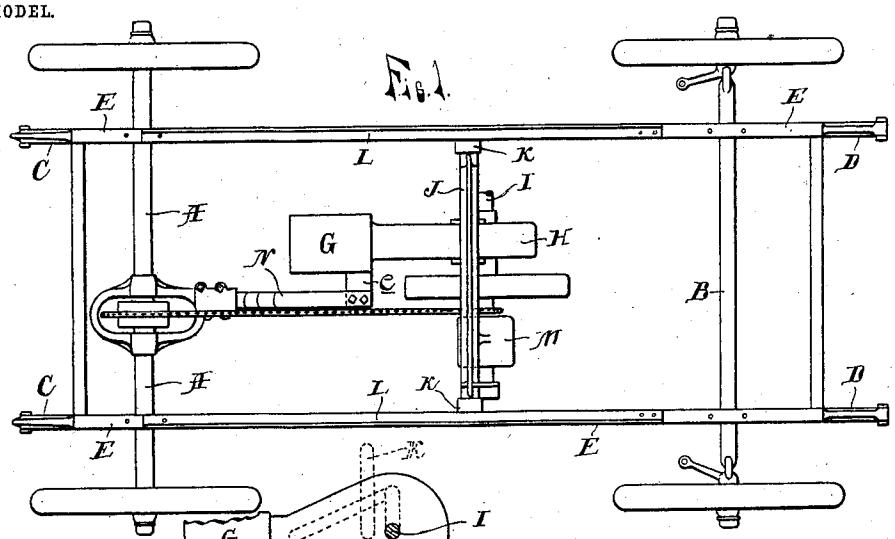


Fig. 4.

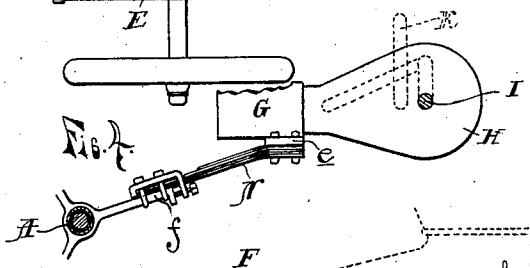


Fig. 2.

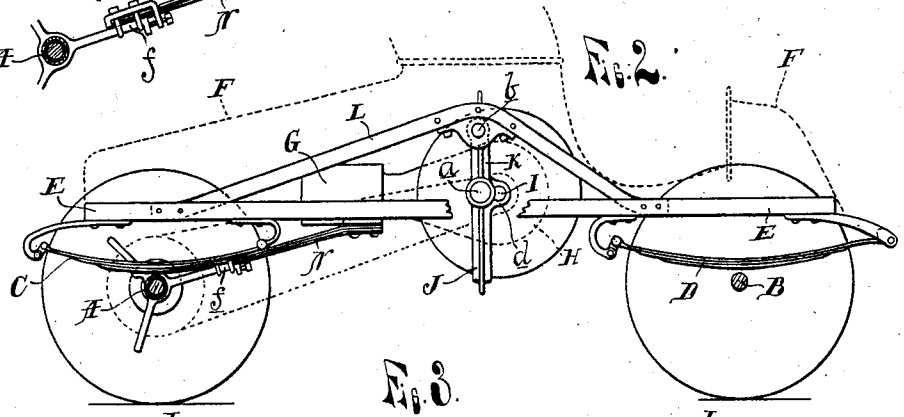
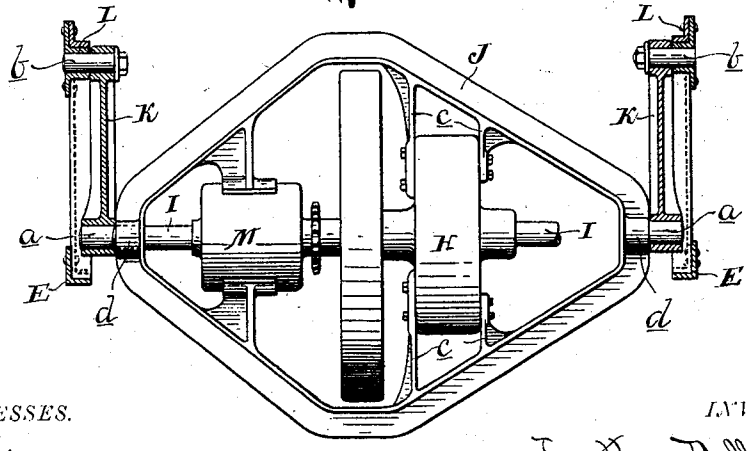


Fig. 3.



WITNESSES.

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No. 751,529. Patented February 9, 1904.

UNITED STATES PATENT OFFICE.

JONATHAN D. MAXWELL, OF DETROIT, MICHIGAN.

MOTOR-VEHICLE.

SPECIFICATION forming part of Letters Patent No. 751,529, dated February 9, 1904.

Application filed June 22, 1903. Serial No. 162,460. (No model.)

To all whom it may concern:

Be it known that I, JONATHAN D. MAXWELL, a citizen of the United States of America, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Motor-Vehicles, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to improvements in means for carrying the motor on the vehicle, and is especially applicable to the construction of automobiles with single-cylinder gas or gasolene engines. With single-cylinder engines mounted upon a spring-frame the angularity of the piston-rod at the moment at which the explosion takes place sets up a rhythmic vibration, which imparts an unpleasant motion to the body mounted upon the frame; and it is the object of my invention to eliminate this motion, while at the same time the motor is carried in a manner to free it from the vibrations due to the inequalities of the road-bed. This object I obtain by supporting the engine in a novel manner based upon the discovery I have made that these vibrations of the engine are of an oscillating character—that is to say, at the time the explosion takes place a downward impulse is imparted to the rear end of the engine, while the front end, formed by the crank-casing, simultaneously has an upward impulse. There is therefore between the two opposite ends a neutral point, around which, so to speak, the engine as a whole would revolve in a vertical plane if suddenly released from its supports. This point, as may be readily found by observation, is located when the engine is in the usual horizontal position in a transverse line intersecting the axis of the engine at right angles a little distance in rear of the engine-shaft. This line, which is parallel to the axis of the engine-shaft, I term the "neutral axis of vibration," and according to my invention I support the engine from the frame on its neutral axis of vibration at two points, making these the only connection with the frame, and, in addition, I provide a third support for the engine upon the rear axle. By making this latter support flexible, so as to compensate for the vibration due to the road-bed, I provide a support for the motor which renders it free from the vibrations of the road, while at the same time it is impossible for the motor to impart any vibrations to the vehicle frame and body, all as more fully hereinafter described, and shown in the accompanying drawings, in which—

Figure 1 is a plan of a motor-vehicle embodying my invention, the body being omitted. Fig. 2 is a side elevation, the body being shown in dotted outline only. Fig. 3 is a detached and enlarged cross-section showing the suspension-frame of the motor in elevation. Fig. 4 is a representation of part of Fig. 2, showing the rear support of the motor more in detail.

A represents the rear-axle casing, B the front axle, C the rear springs, mounted upon the rear-axle casing, D the front springs, E the vehicle-frame, mounted upon said front and rear springs, and F the body, all these parts forming a motor-vehicle running-gear of known construction.

G represents a single cylinder gas or gasolene engine of known type and construction, its frame being formed in one with the usual crank-casing H, in which the crank-shaft I is journaled.

J is a transverse frame provided at its opposite ends with trunnions *a a*.

K represents hangers formed with suitable bearings on their lower ends to receive the trunnions *a* and with suitable bearings at their upper ends to freely suspend the hangers from pivot-pins *b b*, carried by the frame of the vehicle in any suitable manner, the drawings showing it carried on raised girders L, supported upon the longitudinal sills of the frame.

Within the transverse frame J the forward end of the engine-frame is rigidly supported in such manner that the trunnions *a* will be in the neutral axis of vibration. As shown in the drawings, this may be done by connecting the crank-casing, by means of brackets *c*, to the upper and lower sides of the cross-frame, and the casing M of the transmission-gear may be similarly connected to the cross-frame. If desired, the cross-frame may also be provided with bearings *d* for the direct support

of the crank-shaft, all as may be found most convenient and suitable for the proper accommodation and necessary support of the different parts of the actuating drive mechanism. The transverse frame J thus becomes a rigid part of the engine-frame itself, and as it is located below the driver's seat there is ample room for it within the body of the vehicle. It is obvious, however, that this frame may be constructed in many different ways to suit other styles of vehicle bodies and frames.

The third support is provided by a bar or spring N, secured to the rear end of the engine-frame and flexibly supporting the weight thereof upon the rear axle. To adapt this support to form the distance-bar, it is secured in close alinement with the sprocket-chain or other drive connection by providing a suitable bracket or lug *e* on the engine-cylinder, which lug projects laterally and to which the forward end of the bar or spring N is secured. The rear end is directly secured to the casing of the rear axle or, what is the same thing, to the housing or frame, which at this point is usually provided to unite the two halves of the axle-casing together. As shown in the drawings, this frame is provided with a suitable bearing-flange *f* for the rear end of the bar or spring N to rest upon and to which it is secured, preferably adjustably, so that the tension of the sprocket-chain may be suitably adjusted, all of which is well known.

I preferably use a spring N, built up of several leaves; but a flexible bar may be used or any other equivalent means for obtaining the desired result—that is, a combined spring-support and distance-bar.

It will be readily seen that my construction fully accomplishes the primary object of my invention. In addition thereto I accomplish another great advantage in that the engine is readily detachable by simply disconnecting the engine at its three points of support, which lets it drop right down and be removed without disturbing anything else. This is a great advantage in the manufacture, as it will be easy to do all the engine-testing with one rig. Each vehicle can thus be completed at once in the shop without further testing by simply attaching an engine previously tested to the otherwise finished vehicle.

Having thus fully described my invention, what I claim is—

1. In a motor-vehicle having a horizontally-disposed reciprocating motor the working stroke of which produces vibrations in the vertical plane of travel around a neutral axis which is parallel with the crank-shaft and adjacent thereto, the combination with the motor-frame and traction-axle, a longitudinally-disposed spring-arm, connecting the motor-frame at one end with the traction-axle and forming a combined distance-bar and yielding support for the motor, hangers suspended from the sides of the vehicle-frame in the vertical plane of the neutral axis of vibration of the motor, and a transverse frame rigidly united with the motor-frame and provided with trunnions pivotally supported by the hangers in said neutral axis.

2. In a motor-vehicle, the combination with the vehicle-frame and traction-axle, of a horizontally-disposed reciprocating motor having its crank-shaft wholly supported by the frame of the motor in parallelism with the traction-axle and operatively connected therewith, a longitudinally-disposed arm connecting the rear end of the motor-frame with the traction-axle and forming a combined distance-bar and support for the motor and means supporting the motor-frame near its forward end from the vehicle-frame at points in the neutral axis of vibration, said neutral axis being parallel to and in rear of the crank-shaft, substantially as described.

3. In a motor-vehicle, the combination with the vehicle-frame and traction-axle, of a horizontally-disposed reciprocating motor having its crank-shaft supported by the frame of the motor independently of the vehicle-frame and operatively connected with the traction-axle in parallelism therewith, a longitudinally-disposed arm connecting the rear end of the motor-frame with the traction-axle and forming a combined distance-bar and yielding support for the motor, and means supporting the forward end of the motor-frame from the frame of the vehicle said means supporting the motor-frame at points on opposite sides of the frame and located in a transverse axis parallel with the crank-shaft and in rear thereof and forming the neutral line of vibration of the motor, substantially as described.

4. In a motor-vehicle, the combination with the vehicle-frame and traction-axle, of a horizontally-disposed reciprocating motor having its crank-shaft wholly supported by the frame of the motor in parallelism with the traction-axle and operatively connected therewith, a longitudinally-disposed spring-arm rigidly and adjustably connecting the rear end of the motor-frame with the traction-axle and forming a combined distance-bar and spring-support for the motor, and hangers pivotally supporting the motor-frame at points on opposite sides thereof and in the neutral line of vibration of the engine with the frame of the vehicle, substantially as described.

5. In a motor-vehicle, the combination with the vehicle-frame and traction-axle, of a horizontally-disposed reciprocating motor having its crank-shaft wholly supported by the frame of the motor in parallelism with the traction-axle and operatively connected therewith, a longitudinally-disposed spring-arm rigidly connecting the rear end of the motor-frame with the traction-axle and forming a combined distance-bar and support for the motor and hangers suspending the motor-frame from the frame of the vehicle, said hangers pivotally

connected to the motor-frame at points located in a transverse line parallel to the crank-shaft and in rear thereof and forming the neutral axis of vibration.

6. In a motor-vehicle having a horizontally-disposed reciprocating motor the working stroke of which produces vibrations in a vertical longitudinal plane, the combination with the frame and traction-axle, of a longitudinally-disposed spring-arm supporting the rear end of the motor-frame upon the traction-axle and forming the distance-bar of the motor, a transverse frame to which the forward end of the motor-frame is rigidly secured and carrying the crank-shaft of the motor independently of the frame, trunnions on the ends of said transverse frame in the neutral axis of vibration of the motor and hangers pivotally supporting the transverse frame upon said trunnions from the frame of the vehicle.

7. In a motor-vehicle having a horizontally-disposed reciprocating motor the working stroke of which produces vibrations in a vertical longitudinal plane around a neutral axis which is parallel with the crank-shaft and adjacent thereto, means for supporting said motor comprising two pivotal points of support on the frame of the vehicle and located in the neutral axis of vibration of the motor and a yielding support at the opposite end of the motor connecting it with the traction-axle.

8. In a motor-vehicle, the combination with a running-gear and motor of the character described, of a longitudinally-disposed spring-arm at the rear end of the motor-frame and adapted to be connected to the traction-axle or proximate part thereof to form a combined distance-bar and support for the motor, a transverse vertical frame rigidly united with the motor-frame at the forward end and provided with trunnions at its ends and hangers adapted to pivotally suspend the motor from the sides of the vehicle-frame the parts arranged and combined with the motor to form a detachable unit as and for the purpose described.

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

JONATHAN D. MAXWELL.

Witnesses:

OTTO F. BARTHEL,

THOMAS G. LONGSTAFF.