No. 701,909. Patented June 10, 1902.

J. D. MAXWELL.

MOTOR VEHICLE.

(Application filed Feb. 14, 1902.)

(No Model.) 2 Sheets—Sheet 1.

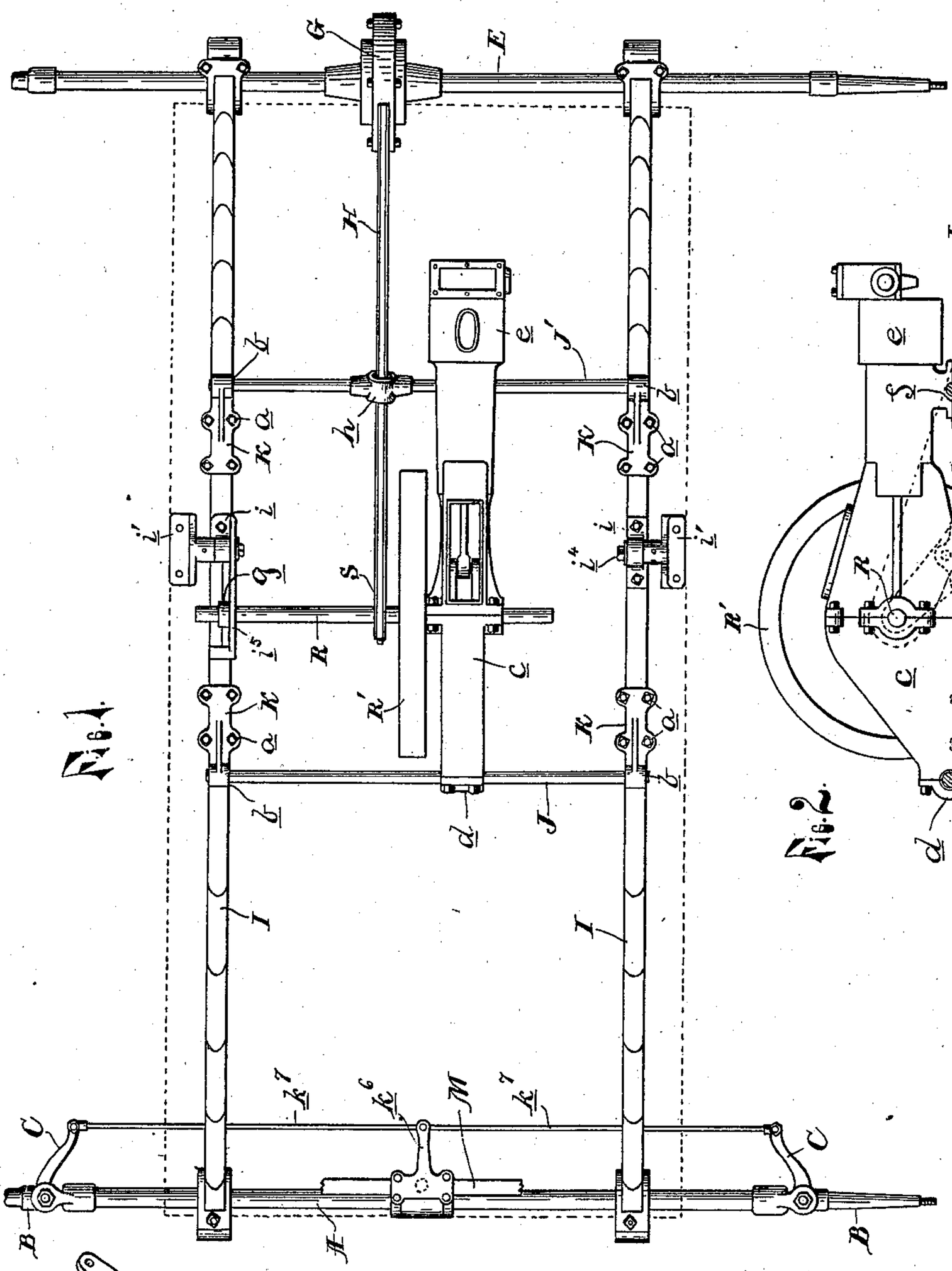

Fig. 1.

Fig. 2.

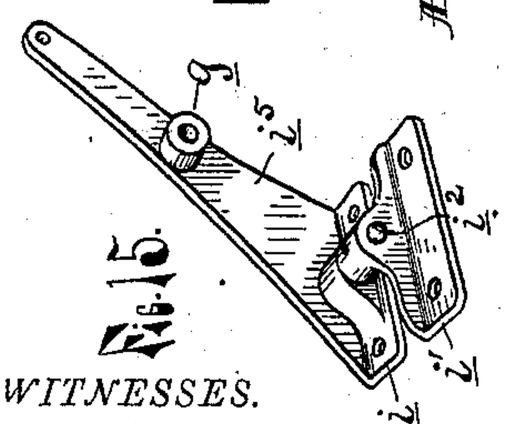

Fig. 15.

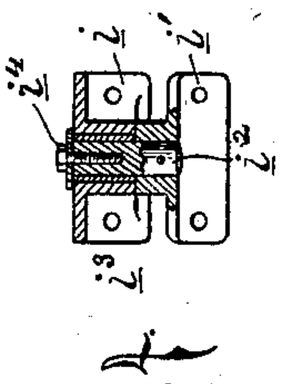

Fig. 17.

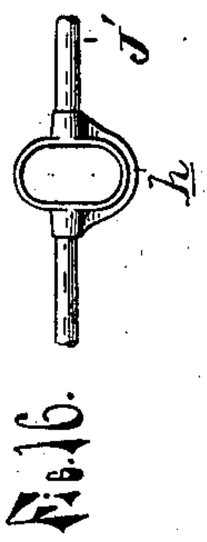

Fig. 16.

WITNESSES.

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No. 701,909. Patented June 10, 1902.

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MOTOR VEHICLE.

(Application filed Feb. 14, 1902.)

(No Model.) 2 Sheets—Sheet 2.

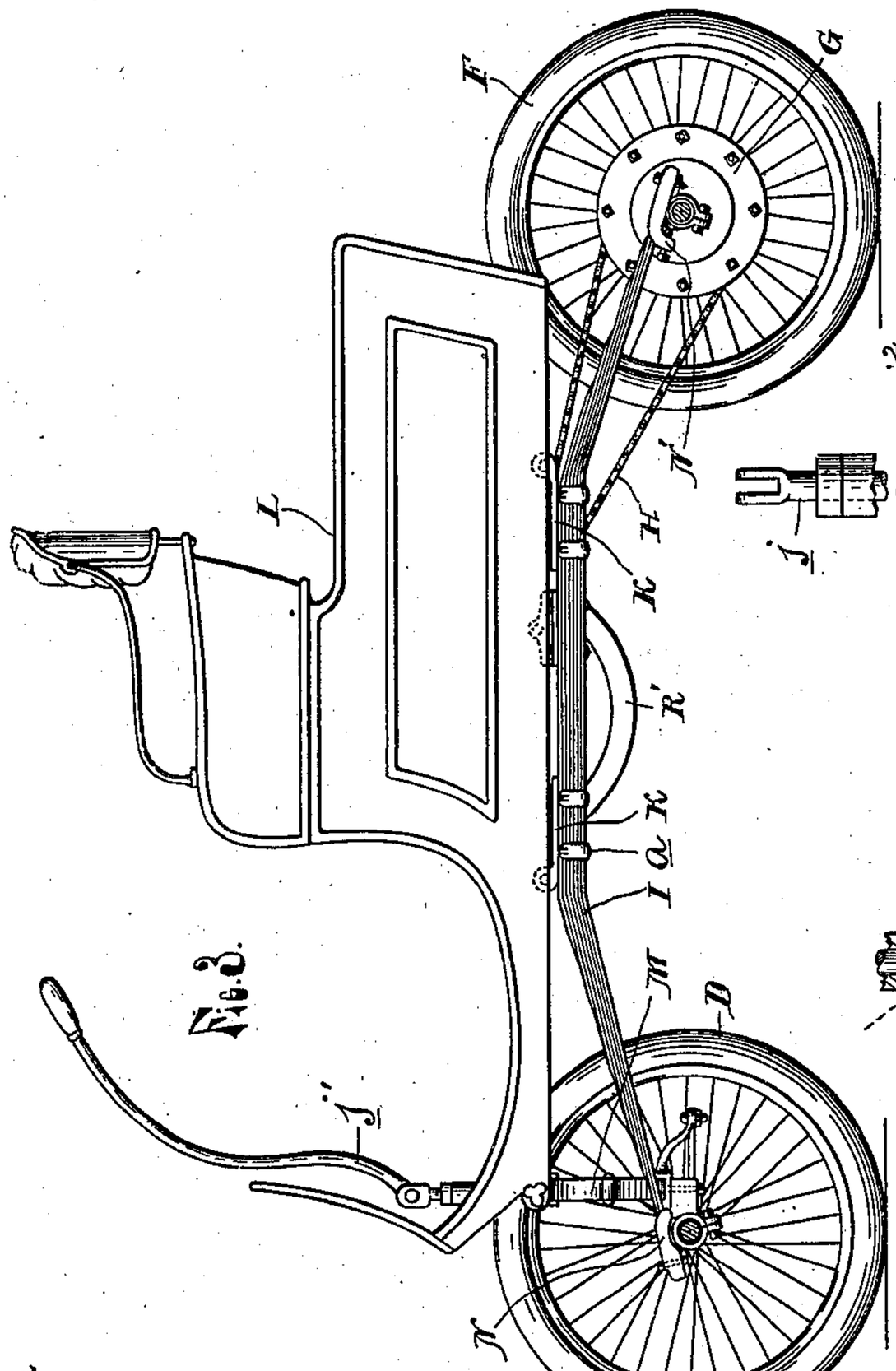

Fig. 2.

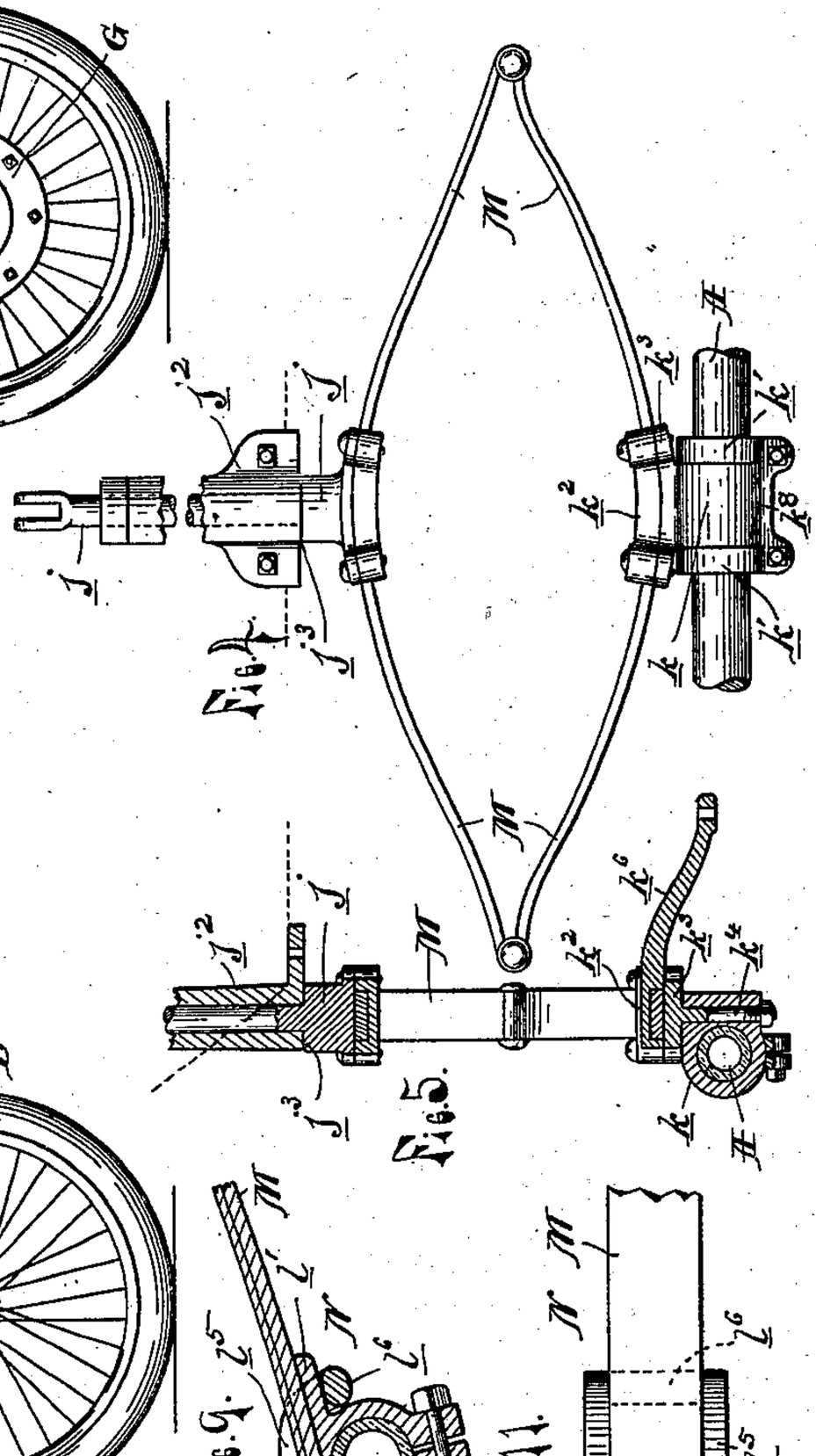

Fig. 4.

Fig. 5.

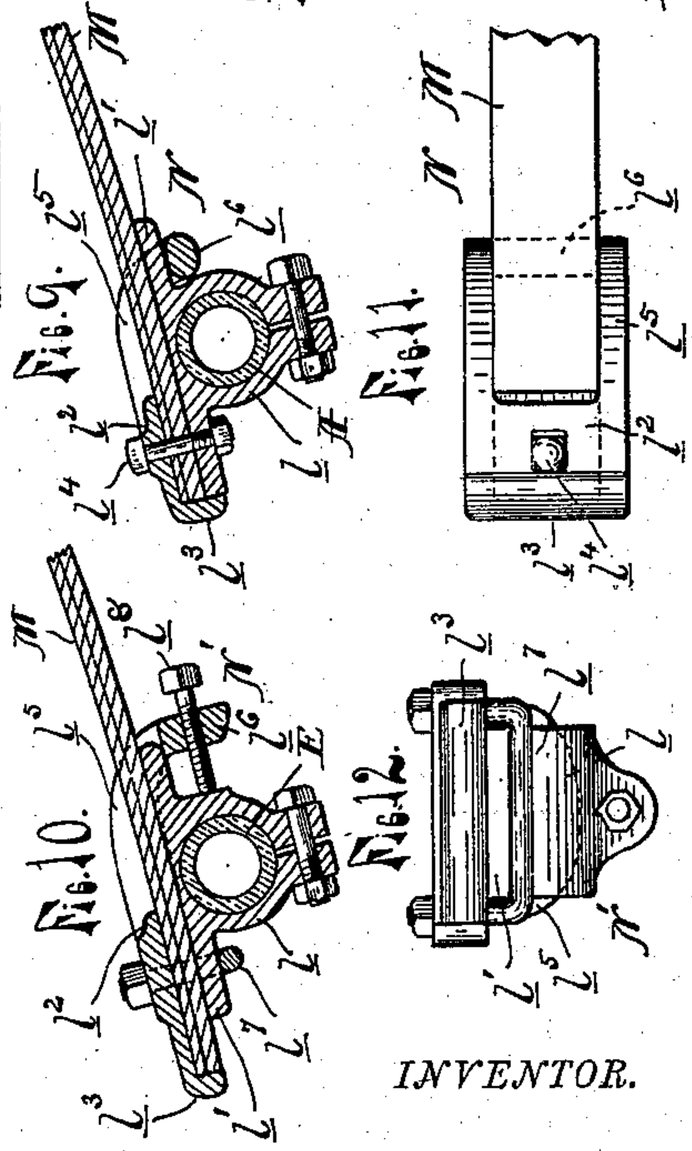

Fig. 9.

Fig. 11.

Fig. 10.

Fig. 12.

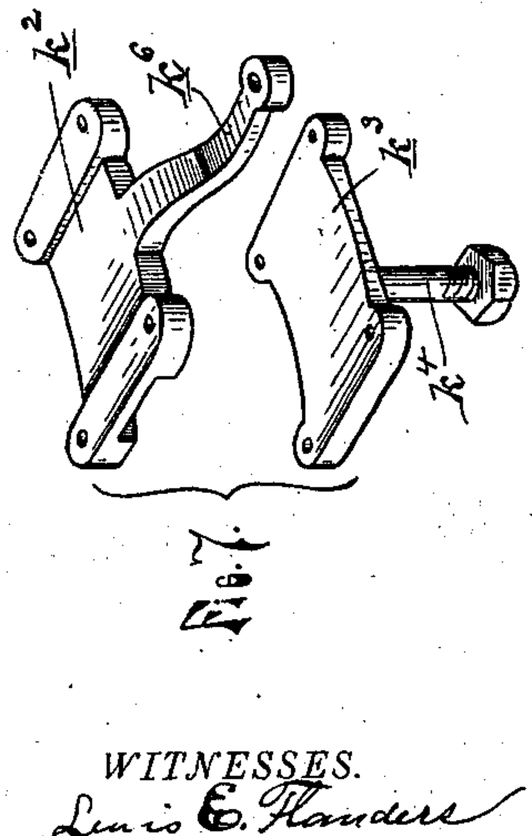

Fig. 7.

Fig. 6.

Fig. 8.

Fig. 13.

WITNESSES.

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UNITED STATES PATENT OFFICE.

JONATHAN D. MAXWELL, OF DETROIT, MICHIGAN.

MOTOR-VEHICLE.

SPECIFICATION forming part of Letters Patent No. 701,909, dated June 10, 1902.

Application filed February 14, 1902. Serial No. 94,010. (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 more specifically to improvements in the running-gear of motor-vehicles of the type of the automobile driven by gasolene or other gas, vapor, or steam engine and in which the body and motor are supported upon springs.

My invention is designed with the general object in view to make an efficient running-gear composed of few and simple parts specifically adapted for the commercial manufacture on a large scale, while at the same time an easy and comfortable riding vehicle of pleasing appearance and moderate cost is produced.

To this end my invention embraces several specific features, one of which relates to the support of the body, whereby the jar or vibration of the engine, which is so particularly noticeable in the use of the gasolene and vapor engines, is prevented from being transmitted to the body. Another feature relates to the mounting of the motor, whereby its frame is made a structural part of the running-gear and at the same time affords great facility for the alinement.

The invention also has reference to a novel construction of axle-clips for connecting the springs to the axles, all as more fully hereinafter described, and shown in the accompanying drawings, and more specifically pointed out in the claims.

Figure 1 is a plan view of my improved running-gear, the body being removed. Fig. 2 is a side elevation of Fig. 1, partly in section. Fig. 3 is a similar side elevation, together with the body. Fig. 4 is a detached front elevation of the combined steering-rod and front spring. Fig. 5 is a vertical central section of Fig. 4. Figs. 6, 7, and 8 represent the parts of the axle-clip shown in Figs. 4 and 5 in detached views. Figs. 9 and 10 are vertical longitudinal sections of the front and rear axle-clips for fastening the side springs to the front and rear axle, respectively. Fig. 11 is a plan view of Fig. 9. Fig. 12 is an end elevation of Fig. 10. Fig. 13 is a perspective view of a part of Fig. 10 detached. Fig. 14 is a horizontal section of the part which pivotally connects the body with the side springs. Fig. 15 is a perspective view of the part shown in Fig. 14, and Fig. 16 is an elevation of the loop through which the chain passes in the bar J'.

A is the front axle, B represents stub-axles pivotally secured to the front axle, C represents the steering-arms connecting the stub-axles with the steering-gear, D represents the front wheels, E is the rear axle, in which the drive-shafts for the rear wheels are journaled, F represents the rear wheels, secured to the drive-shafts, and G is the rear-axle casing, inclosing the usual compensating gear, which transmits the motion from the motor-shaft through the sprocket-chain H to the rear drive-wheels, all arranged and operating in a well-known manner.

I I are two side springs, the ends of which are rigidly secured to the front and rear axles, respectively, to form a connecting-reach. These side springs may be of the semi-elliptic kind in common use, or, as will be more desirable, they are made with a level body portion which is comparatively rigid and with inclined front and rear portions, the latter being shorter and more inclined than the front portions, as they will have to bear the greater load.

J J' are two bars, tubes, or rods transversely connecting the side springs at or near the ends of their level body portions, and the ends of these rods are suitably secured to the springs in any manner that will permit of their independent adjustment. To this end I provide bearing-plates K, resting on top of the springs and secured thereto by U-shaped clamping-bolts *a*, said plates having sockets *b*, in which the ends of the rods are secured, preferably by brazing.

The motor is directly supported upon the transverse rods J J' by means of its frame, which to this end is formed with a crank-casing *c* of suitable strength to form a structural member of the running-gear by being provided at its forward end with clamping-bearings *d*, and near its rear end, adjacent to the cylinder *e*, with a clamping-bearing *f*, through

which the rods J J′ pass and upon which the frame of the motor is clamped, all in such manner that the motor is thereby supported in a horizontal position in the longitudinal line of the vehicle.

The crank-shaft R of the motor extends laterally toward one of the side springs and is supported thereupon by an end bearing *g*. It carries the usual balance-wheel R′ and the drive-pinion S, which transmits the motion through a chain H to the rear wheels. This chain passes through a guard loop or eye *h*, formed in the bar J′, as more particularly shown in Fig. 16.

The body L is pivotally supported upon each of the side springs by means of pivotal side bearings, particularly shown in Figs. 14 and 15, and consisting of two plates *i i′*, the former being bolted to the top of the side spring and the latter to the under side of the body-frame, so that the body rests upon it. The plate *i′* carries the pivot-pin i^2, which projects outwardly and engages into a socket formed on the plate *i*. This socket has a bushing i^3 of rubber or other like material, causing friction which surrounds the pivot-pin and is compressed around it by a screw i^4 and washer all in such manner as to increase the friction of the pivot. The plate *i* on the side which supports the engine-shaft is formed with a forwardly-extending bracket i^5, in which the bearing *g* for the engine-shaft is formed.

The front end of the body is supported upon a double elliptical spring M, which carries the steering-post *j*, to which the steering-handle *j′* is pivotally secured.

The body L is supported upon the spring M through the medium of a guide-bearing j^2, secured at the lower front edge of the body and resting upon a shoulder j^3 of the steering-post. The lower portion of the spring M is connected to the front axle in the axis of the steering-post in the following manner: A block *k*, sleeved upon the front axle, is held in place thereon against lateral displacement by two split clamping-collars *k′*, united by a cross-bar k^8. The block *k* is formed with a flat bearing on top, upon which the spring M is supported by means of two clamping-plates k^2 k^3, (see Figs. 5 and 7,) the lower one of which is formed with a pivot-pin k^4, which turns loosely in a hole k^5 in the block *k* and bears a nut at its lower end, while the upper plate k^2 is formed with a rearwardly-projecting arm k^6, to which the connecting-rods k^7 of the steering mechanism are pivotally secured.

The ends of the side springs are secured to the front axle by clips N, (shown in detail in Figs. 9 and 11,) in which *l* is a split clamping-collar formed on top with a bearing-plate *l′* for the spring to rest on, and l^2 is a clamping cap-piece extending over the extreme end of the spring and provided with a depending rear flange l^3, forming a stop for the end of the spring. The cap, spring, and bearing-plate are provided with coincident holes, through which a clamping-bolt l^4 passes to connect the parts together. The clamping-piece is also formed with two side bars l^5 and a cross-bar l^6, uniting the side bars in such manner that the side bars bear upon the top of the axle, and thereby press the cross-bar against the under side of the bearing-plate. The rear ends of the side springs are secured to the rear axle by similar clips N′, except that instead of the bolt l^4 the cap-piece is secured by a U-shaped bolt l^7, which passes beneath the bearing-plate *l′*, and with the addition of a set-screw l^8, which passes through the cross-bar l^6 and bears against the hub of the clamping-collar. In this machine the rear clips permit adjustment of the rear axle for the purpose of tightening the drive-chain.

The parts being constructed and arranged as shown and described, they are intended to accomplish the following results:

First. In supporting the motor in the manner described it will be seen that perfect facility is afforded for its accurate alinement. The cross-bars J J′, being independently clamped to the side bars, can be adjusted jointly or independently forward or backward and at the same time the motor-frame can be laterally adjusted upon the bars in any way that may be necessary to a perfect adjustment. In making the motor-frame a direct structural part of the running-gear I obtain sufficient rigidity without adding the weight of a separate frame and at the same time avoid the disadvantage of an absolutely rigid supporting-frame, which on uneven ground would not allow the weight to be brought on all four wheels.

Second. It is well known that all reciprocating engines, especially gas and vapor engines, if supported upon springs produce a teetering motion which if the engine is supported upon the side springs causes an alternate deflection in the spring-arms—that is to say, as one end goes up the other goes down. There is therefore a central point in each spring which does not partake of this motion, and at this point, which is located between the points at which the cross-bars J J′ are connected, I support the body upon each side spring, providing for the necessary balance to maintain the body by supporting it additionally upon the front axle, which is not affected by the engine motion. In this manner the body is not only supported upon the side springs entirely independent of the motor and its supports, but also free from the jar and vibrations caused by the movement of the engine, which makes the vehicle easy and pleasant to ride without the use of separate springs intended to counteract the engine motion. By the use of the friction-bushings in the side bearings the wear upon the pivots is reduced and the rocking motion of the body is checked.

Third. The clips N clamp the springs I only at their extreme outer ends. The whole

length of the springs are therefore rendered effective. At the same time they have a bearing upon the whole bearing-plate l' by reason of the cap-pieces, which by giving them a bearing upon the axle press the cross-bar l^6 of the cap-piece against the under side of the bearing-plate l' by the clamping force of the bolt against the other end, thus virtually making it the equal of another bolt. The clip N' permits the usual adjustment of the rear axle for tightening the chain, and it will be noticed that in addition to the other advantages which the clip N has it has the set-screw l^8 on the inside under the spring, where it is less liable to tear the clothing or be broken off.

Fourth. The connection between the spring M and the front axle is made through the block k, which is sleeved upon the front axle. Thus if the front axle is slightly turned, as it will be by the motion of the side springs, it will have no effect upon the steering-rod, which if the block were fast upon the axle would cause it to bind. At the same time the spring M still bears upon the top of the axle and has no tendency to turn the block and cause a binding of the pivot-pin k^4. By this construction the steering-gear is free from all strain and not subject to undue wear, and at the same time the front end of the body is freely supported upon the spring M, and any undue vibration upon the body through this spring is counteracted by increasing the friction on the pivot-pins i^2.

What I claim as my invention is—

1. In a motor-vehicle running-gear, the combination with side springs of semi-elliptic or like shape and supported at their ends upon front and rear axles to which said ends are rigidly connected, of transverse rods supported upon said side springs at corresponding points intermediate their length and having their ends secured thereto independently of each other, the motor supported upon said transverse rods independently of the side springs and the body supported upon the side springs independently of the motor.

2. In a motor-vehicle running-gear, the combination with side springs of semi-elliptic or like shape and supported at their ends upon front and rear axles to which said ends are rigidly connected, of transverse rods supported upon said side springs at corresponding points intermediate their length and having their ends adjustably connected to said springs independently of each other, a motor supported upon said transverse rods intermediate between the side springs and forming with its frame a rigid connecting member between the transverse rods and a vehicle-body pivotally supported upon the side springs at points intermediate between the points at which the transverse rods are supported.

3. In a motor-vehicle running-gear, the combination with side springs the ends of which are secured to the front and rear axles and upon which the motor and the body are supported, of a motor having its frame near the opposite ends formed with bearings at right angles to the frame, transverse rods passing through said bearings and having their opposite ends supported upon and adjustably secured to said side springs independently of each other, the motor-frame being laterally adjustably secured upon the transverse rods.

4. In a motor-vehicle running-gear, the combination with side springs the ends of which are secured to the front and rear axles and upon which the motor and the body are supported, of a motor having its frame formed at or near the ends with clamping-bearings, of transverse rods passing through said bearings and adjustably supporting the motor upon said rods, and plates secured to the ends of the transverse rods said plates secured upon the side springs by clamping-bolts and forming means for the longitudinal adjustment of the motor.

5. In a motor-vehicle running-gear, the combination with side springs the ends of which are secured to the front and rear axles and upon which the motor and the body are supported, of a motor having its frame formed with bearings at right angles thereto, transverse rods passing through said bearings and having their ends supported upon and secured to the side springs independently of each other, and a body having side bearings supporting the body upon the side springs independently of the motor at a point intermediate between the ends of the transverse rods.

6. In a motor-vehicle running-gear, the combination with side springs secured at their ends to the front and rear axles and carrying the motor and the body, of transverse rods rigidly connecting the side springs together at points intermediate their ends and forming the supports of the motor, the frame of the motor being provided near its opposite ends with bearings through which the transverse rods pass, and a body provided with side bearings pivotally supporting the body upon the springs intermediate between the points at which the motor is supported upon said springs.

7. In a motor-vehicle running-gear, the combination with side springs secured at their ends to the front and rear axles and upon which the body and the motor are supported, of a motor having its frame provided with bearings at right angles to the frame, transverse rods passing through said bearings and supporting the motor upon the side springs the ends of said rods being rigidly secured to the side springs independently of each other and a vehicle-body pivotally connected to the side springs at a point between the points where the transverse rods are connected.

8. In a motor-vehicle running-gear, the combination with side springs secured at their ends to the front and rear axles and carrying the motor and the body, of a motor supported upon transverse rods secured in bearings in the frame of the motor and having their ends

rigidly connected to the side springs, a vehicle-body provided with side bearings pivotally supporting the body upon the side springs independently of the motor, between the points at which the transverse rods are secured to said springs, an elliptic spring interposed between the front end of the body and the front axle, and means for creating friction upon the points of the side bearings of the body.

9. In a vehicle running-gear, the combination with the side springs and the axles to which the ends of the side springs are secured, of clips each comprised of a split collar securing the clip to the axle and formed with a bearing-plate extending crosswise over the axle and upon which the flattened end of a side spring is supported, a cap-piece having an outer end which bears upon the outer end of the spring, and an inner end formed of two side bars which bear upon the top of the axle and a cross-bar uniting the outer ends of the side bars and bearing against the under side of the inner end of the bearing-plate and a bolt which clamps the outer ends of the cap-piece and of the bearing-plate together.

10. In a vehicle running-gear, the combination with the side springs and the rear axles to which the ends of the springs are secured, of clips, each composed of a split collar secured upon the axle and formed with a bearing-plate extending crosswise over the axle and upon which the flattened end of the side spring is supported, a cap-piece having an outer end which bears upon the outer end of the side spring and confines it against endwise movement and an inner end formed of two side bars extending inwardly over the axle and bearing upon the top of the same and a cross-bar uniting the ends of the side bars and bearing against the under side of the inner end of the bearing-plate, a bolt adjustably clamping the outer end of the cap-piece to the outer end of the bearing-plate and a set-screw carried by the cross-bar of the cap-piece and adapted to adjust said cap-piece longitudinally upon the bearing-plate.

11. In a vehicle running-gear, the combination with the side springs supporting the body and motor, of the front axle rigidly secured to the ends of the side springs and having pivoted stub-axles provided with crank-arms, the block *k* centrally sleeved upon the front axle and held in place thereon against longitudinal displacement, the spring M interposed between the front axle and the forward end of the body and having the upper and lower side thereof pivotally supported in vertical bearings in the front end of the body and in the bearing-block *k* respectively, and the arm k^6 carried by the spring and connected with the crank-arms of the stub-axles.

12. In a vehicle running-gear, the combination with the side springs supporting the body and motor upon the axles and having their ends rigidly secured thereto, of the body having side bearings pivotally supporting the body upon the side springs, the elliptic spring M interposed between the front axle and the forward end of the body free to turn upon its vertical axis and the block *k* sleeved upon the front axle and to which the spring is pivotally connected in the vertical axis of the spring substantially as described.

13. In a vehicle running-gear, the combination with the side springs having their ends rigidly connected to front and rear axles, the front axle carrying steering-wheels pivotally connected to the ends of the axle, of a vehicle-body pivotally supported upon the side springs, an elliptic spring interposed between the front axle and the front end of the vehicle free to turn upon its vertical axis, a steering-post mounted upon the top of the spring a pivot-pin secured to the under side of the spring in the axis of the steering-post a block sleeved upon the front axle and provided with a vertical bearing for the pivot-pin, in which said pivot-pin is secured free to turn and steering connection between the lower end of the spring and the front wheels.

14. In a vehicle running-gear, the combination, with the vehicle-body supported upon side springs and the front axle to which the ends of the side springs are rigidly secured and carrying steering-wheels pivotally connected to the front axle, of the elliptic spring M interposed between the front axle and the front end of the vehicle-body, the steering-post *j* secured upon the top of the spring M, the bearing j^2 secured to the body of the vehicle and through which the steering-post passes, the clamping-plates k^2 k^3 secured to lower part of the spring M, the steering-arm k^6 carried by the clamping-plate k^2 and connected with the steering-wheels, the pivot-pin k^4 carried by the plate k^3 and provided with a nut upon its lower end, the block *k* sleeved upon the front axle and provided with a bearing k^5 through which the pivot-pin passes and the split collars *k'* united by a cross-bar k^8 and securing the block *k* against endwise movement upon the front axle.

15. In a vehicle running-gear, in combination with side springs and cross-bars connected therewith intermediate between the ends and supporting the motor, of a vehicle-body pivotally supported on side bearings upon said springs at corresponding points intermediate between the cross-bars, each side bearing consisting of two plates, one secured upon the side spring and the other supporting the body, the two plates pivotally connected side by side upon the same horizontal plane by a pivot-pin secured in one of the plates and journaled in a bearing formed in the other plate at right angles to the side spring, the body-supporting plate being supported outside of the side spring free to oscillate upon the pivot.

16. In a vehicle running-gear, in combination with side springs supported upon the front and rear axles and having raised body portions, of a vehicle-body pivotally sup-

ported intermediate its ends upon the raised body portions of the side springs free to oscillate in a vertical longitudinal plane and an elliptic spring interposed between the front axle and the forward end of the body in the longitudinal center of the body, the top of said spring being substantially on a level with the top of the raised body portion of the side springs and pivotally connected with the vehicle-body in the vertical axis of the spring free to turn the spring upon said axis, the under side of said spring pivotally connected to a bearing-block sleeved upon the front axle whereby said bearing-block pivotally supports the spring on the front axle free to turn said spring upon its vertical axis independent of the rocking motion of said front axle caused by the action of the side springs.

17. In a vehicle running-gear, in combination with side springs secured to the front and rear axles and formed with raised horizontal main portions of tubular cross-bars securing the side springs together at the ends of the raised main portions, bearing-plates supported upon the raised main portions of the side springs and provided with sockets into which the ends of the cross-bars are secured, said bearing-plates independently adjustably secured upon the raised main portions of the side springs by clips clamping the plates and the component parts of the side springs together, and a motor adjustably secured upon the tubular cross-bars at right angles thereto by means of clamping-bearings formed on the motor-frame.

18. In a vehicle running-gear, in combination with the front and rear axles, and the side springs rigidly clipped at their ends to said axles and supporting the body and the motor, of a block centrally sleeved upon the front axle, split clamping-collars secured upon said front axle on opposite sides of the block and an elliptic spring interposed between the front axle and the front end of the body free to turn upon its vertical axis, the lower end of said spring secured between clamping-plates one of which carries a steering-arm and the other a pivot-pin pivotally supporting the spring upon the block.

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

JONATHAN D. MAXWELL.

Witnesses:
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OTTO F. BARTHEL.