

No. 696,741.

Patented Apr. 1, 1902.

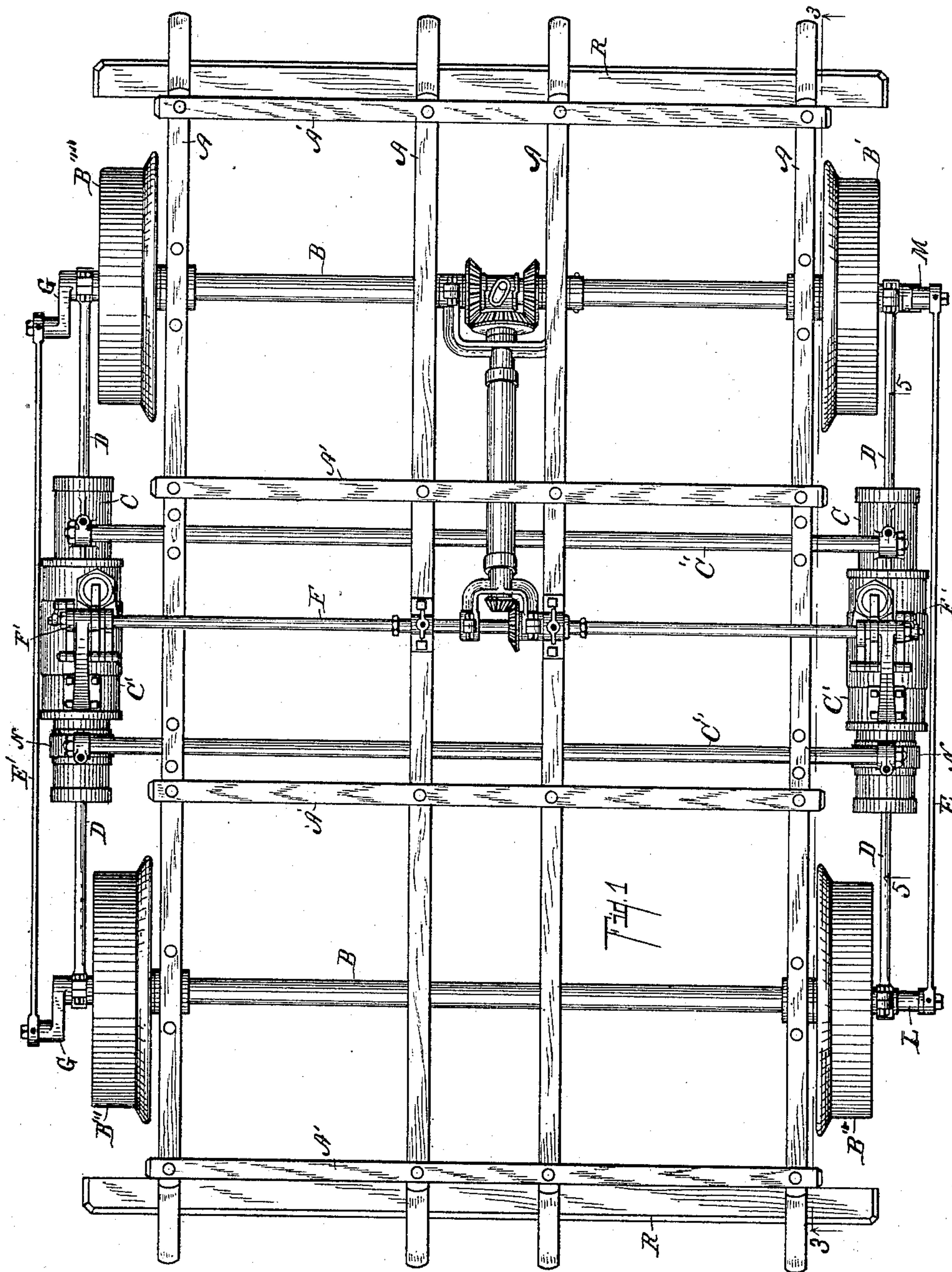
J. G. MATTHEWS.

MOTOR CAR.

(Application filed Sept. 7, 1900.)

(No Model.)

3 Sheets—Sheet 1.



Witnesses:

A. E. Houghton

Otis A. Earl

Inventor,

John G. Matthews

By

Fred L. Chappell

Att'y.

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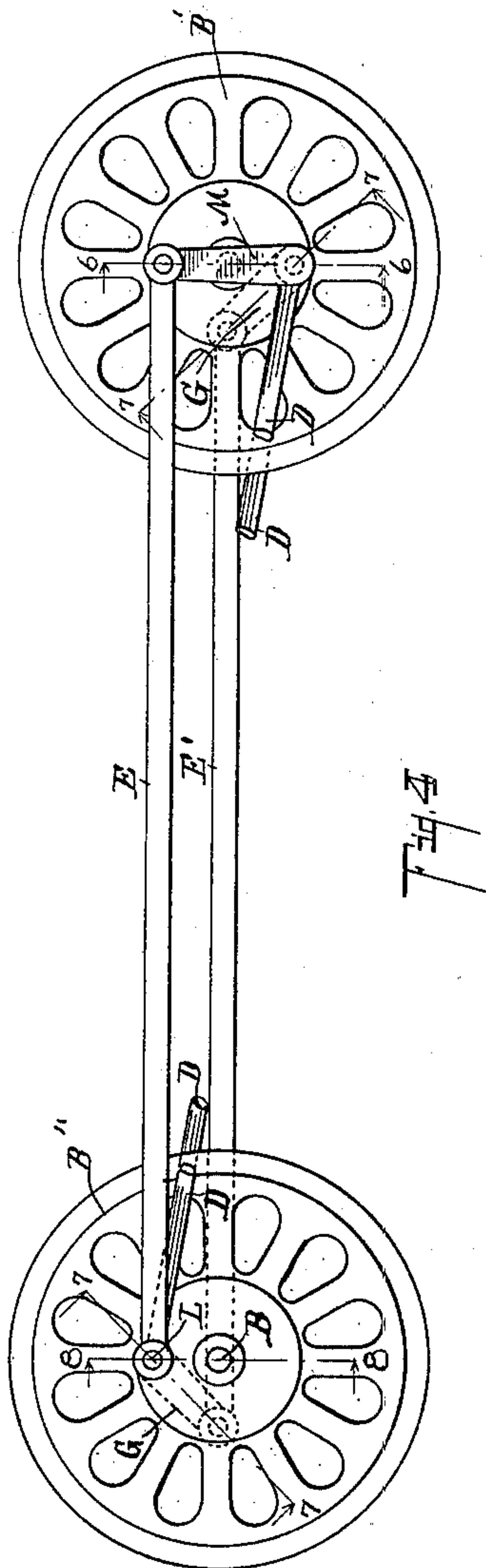
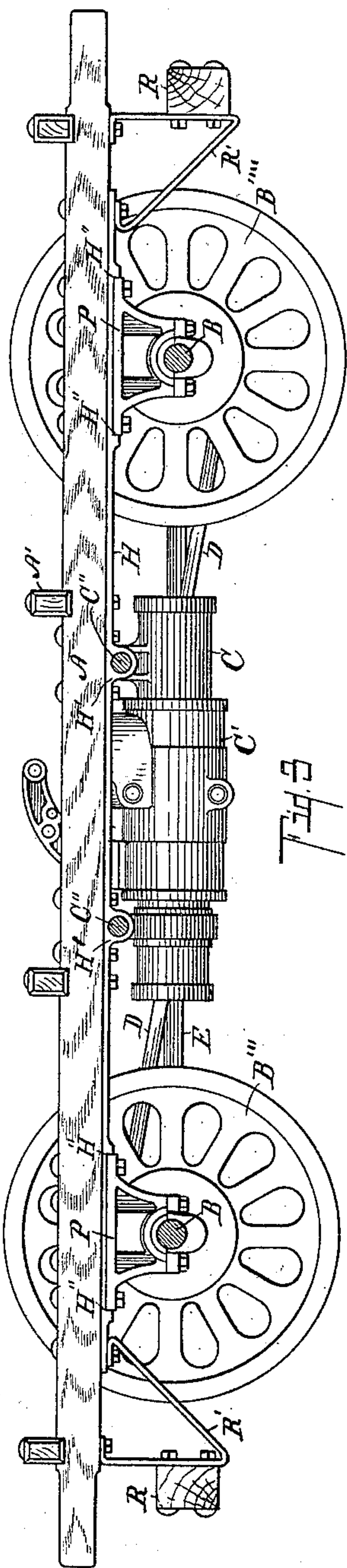
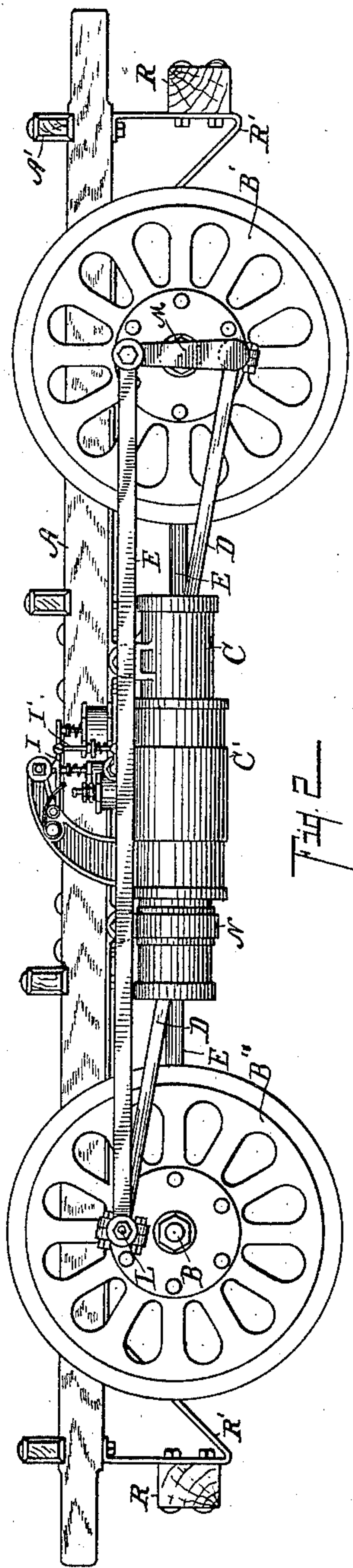
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3 Sheets—Sheet 2.



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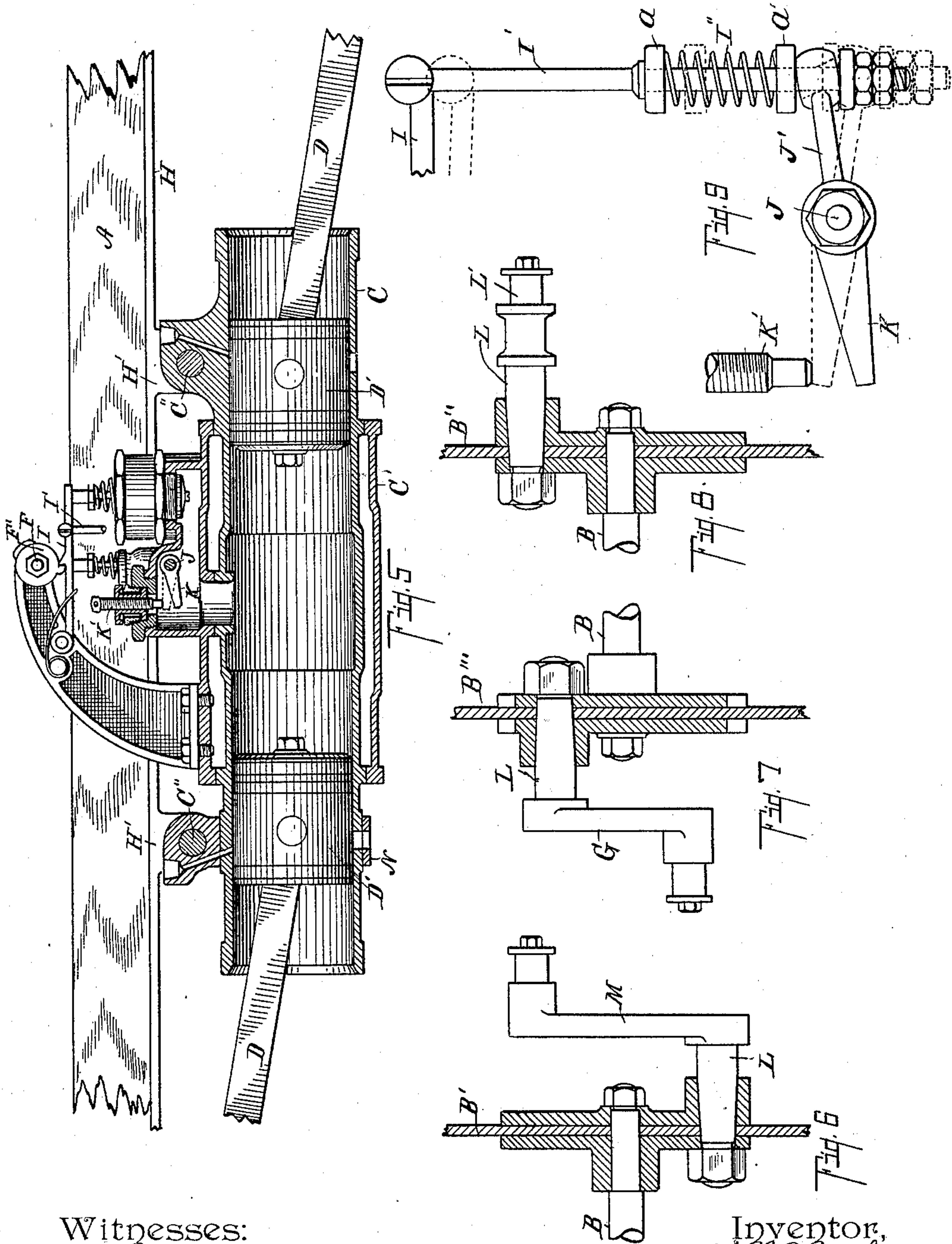
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MOTOR CAR.

(Application filed Sept. 7, 1900.)

(No Model.)

3 Sheets—Sheet 3.



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UNITED STATES PATENT OFFICE.

JOHN G. MATTHEWS, OF THREE RIVERS, MICHIGAN, ASSIGNOR TO THE
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MOTOR-CAR.

SPECIFICATION forming part of Letters Patent No. 696,741, dated April 1, 1902.

Application filed September 7, 1900. Serial No. 29,246. (No model.)

To all whom it may concern:

Be it known that I, JOHN G. MATTHEWS, a citizen of the United States, residing at the city of Three Rivers, in the county of St. Joseph and State of Michigan, have invented certain new and useful Improvements in Motor-Cars, of which the following is a specification.

This invention relates to improvements in locomotive-cars, and particularly to improvements in the engine and driving mechanism for such cars, the improvements being especially adapted for light railway-cars, although they can be utilized with engines in other relations.

The objects of the invention are, first, to provide an improved construction of locomotive-car especially adapted for light-weight cars; second, to provide an improved double-pistoned engine-cylinder for use in such improved locomotive-car; third, to provide an improved double-pistoned engine-cylinder with improved couplings therefor to the driving-wheels; fourth, to provide in an improved motor-car improved couplings for the driving-wheels whereby they will always be in the proper relative positions to receive impulses from the engine; fifth, to provide in a motor-car an improved construction and arrangement of parts, whereby strain on the framework due to the action of the engine is reduced to a minimum; sixth, to provide an improved and compact structure of engine for the purpose described.

Further objects will definitely appear in the detailed description to follow.

I accomplish these objects of my invention by the devices and means described in this specification. The invention is clearly defined, and pointed out in the claims.

The features of my invention as applied to a motor railway-car are clearly illustrated in the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a plan view of the frame of a motor hand-car with the principal parts of the engine in position. Fig. 2 is a side elevation of the structure appearing in Fig. 1, taken from the right hand of the page. Fig. 3 is a longitudinal detail sectional elevation

taken on a line corresponding to line 3 3 of Fig. 1, showing the details of construction and position of parts. Fig. 4 is a detail side elevation of the driving-wheels, cranks, and connecting-rods, the position of the rods on the farther side being indicated by dotted lines, the engine-cylinders being omitted. Fig. 5 is an enlarged detail longitudinal sectional elevation taken on line 5 5 of Fig. 1, showing the structure of the engine-cylinder and adjacent connected parts and the means of supporting the cylinder. Fig. 6 is an enlarged detail sectional view taken on line 6 6 of Fig. 4, showing the crank and wrist-pin connections for the coupling-rods and pitman at that point—namely, on wheel B'. Fig. 7 is an enlarged detail sectional view taken on line 7 7 of Fig. 4, showing the details of the crank and wrist-pin for the connection of the coupling-rods and pitman on the farther side of the driving-wheel at that point—namely, on wheels B''' and B''''—these parts being identical, but placed at different angles. Fig. 8 is an enlarged detail sectional view taken on a line corresponding to line 8 8 of Fig. 4, showing the details of the construction and the action of the connecting-rod and pitman at that point—namely, on wheel B''. Fig. 9 is an enlarged detail view of the means for actuating the electric igniter at the middle of the cylinder, the detail being enlarged and showing the relation of parts omitted from Fig. 5.

In the drawings all of the sectional views are taken looking in the direction of the little arrows at the ends of the section-lines, and similar letters of reference refer to similar parts throughout the several views.

Referring to the lettered parts of the drawings, A A A A represent the longitudinal beams of the frame and A' A' A' A' the cross-beams.

R R represent cross protecting-timbers at each end, which are supported by the iron bracing-brackets R' R'.

To the under side of the outer side pieces A, I secure a longitudinal metallic strip H, to which are secured the brackets R for the axle-boxes and cross-rods C' C' for the support of the engine-cylinder, and these cross-rods extending through eyes H' in the longitudinal

nal pieces H. The brackets P fit in between the shoulders H'' H'' on the bars H and are secured in position by suitable bolts. Thus the axles and their boxes and the engine-cylinders are supported in a fixed relation to each other and are strongly braced independent of the frame.

B B are axles which extend out through the bearings at each side and are provided with driving-wheels B' B'' B''' B''''. The engine-cylinders C are open at each end, and a piston D' D' is in each end of the cylinder. A pitman D is pivoted to each piston D' and extends outwardly from the cylinder and is connected to a suitable wrist-pin L, so as to actuate its proper driving-wheel, there being an engine-cylinder on each side of the car. To the wrist-pin L of the wheel B' is secured a crank M, which extends radially across the center of the wheel B to the opposite side, the end of the crank being provided with a journal to receive the end of the connecting-rod E. The wrist-pin L of the wheel B'' is extended at L' into the same plane with the end of the crank M to receive the opposite end of the coupling-bar E at that side. It will thus be seen that the wrist-pins of the driving-wheels B' B'', to which the pitmen are connected, are opposite each other, so that when they are forced outwardly from the engine-cylinder they will serve to rotate the driving-wheels in the same direction, one being above the center and the other below, and as the driving-wheels are coupled by the bar E and rotate together they are always kept in the same relation to their respective piston-heads within the engine-cylinder.

On the opposite side of the car the driving-wheels B''' and B'''' are provided with wrist-pins L, which occupy the same relative positions to these wheels as the wrist-pins of the wheels B' B'' do to those wheels. Cranks G are connected to these wrist-pins L and extend in a line oblique to a radial line and to a position one-quarter way around the circle, and to these cranks G is secured the coupling-rod E'. It will thus be seen that the coupling-rods E E' to each side positively couple all the driving-wheels together, so that one cannot be rotated without its acting upon all of the others and rotating them in the same direction so that all the driving-wheels are always in the proper position to be acted upon by the engines at each side.

Each engine consists of a cylinder C, which is open at each end and contains a piston D' in each end which reciprocates back and forth under the action of any suitable explosive. The central part of the cylinder is somewhat enlarged, and in this part the explosive mixture is compressed by the pistons D' D' moving toward each other at the center.

An aperture is in the upper side of the cylinder, and to this is connected the ignition or explosion chamber. This explosion-chamber is provided with the usual inlet and exhaust valves, although exhaust-valves are provided

in the under side of the engine-cylinder, so that it is only necessary to exhaust the residuary gases remaining in the cylinder at this point.

The exhaust-valves and inlet-valve are of any usual construction. The igniter is provided with a spring, as clearly appears in Fig. 5, which permits a considerable motion of the igniter by the cam without actuating the electrode K, the details clearly appearing in Fig. 9. This avoids a close adjustment and permits the proper movement of the igniter in a compact space, which, of course, is desirable where the igniter is located above or at one side of the cylinder.

The cylinder, as I have already stated, is supported by the cross rods or bars C'' C'', the rod extending through a suitable ear formed integral with the cylinder at one end and through an ear on a collar which embraces the cylinder at the opposite end.

The water-jacket for the cylinder C' is bored out and slipped over the end of the cylinder and fits tightly into position on suitable collars on the cylinder turned to fit the interior of the same.

The bracket which fits the cam-shaft is preferably secured to this water-cylinder, as clearly appears in Fig. 5. I have not shown the pump and attachments for supplying a current of water to this water-jacket, as they may be of any desired or usual construction.

I have thus described all of the parts of my improved motor railway-car in their preferred form. I am aware that they can be greatly varied in their form and arrangement without departing from my invention. I have shown a convenient and practical construction of double-piston cylinder, but am aware that its form could be greatly varied and still serve its purpose very satisfactorily in this connection. The metallic plates on the under side of the frame serve to bind all the operating parts together and are very useful to that end and possess great merit. However, the parts might be satisfactorily supported by increasing the strength of the frame.

While I have shown an engine at each side, a single engine might be utilized to drive the car; but the expense of the additional cylinder is very slight, and by providing two cylinders a great advantage is secured in explosive-engines on account of the facility with which the smaller engine can be kept cool and in working order. I have shown the couplings on the driving-wheels on opposite sides of the car. The same couplings might be applied all on one side; but this would of course increase the complexity of the structure. I mention these modifications merely to indicate the scope of the invention and the utilities of the different parts and special combinations when independently considered.

Many other modifications than those I have mentioned would be obvious to the skilled mechanic and it would be idle to attempt to enumerate them all here.

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

1. In a motor-car the combination of the
5 framework; metallic bars or plates H under
the framework and secured thereto, provided
with seats for the boxing of the driving-gear
and with holes for the supporting-rods for the
cylinder; axles B, B, with driving-wheels B',
10 B'', B''', B''', secured thereto; cranks or wrist-
pins on said driving-wheels in the same rela-
tive positions at each side, but arranged at
an angle to each other on opposite sides; par-
allel coupling-rods E, E', coupling the wheels
15 at each side together by means of said cranks
and wrist-pins; an engine-cylinder to each
side of said frame supported on the rods C''
extending transversely across the frame
through the holes in the plate H, said cylin-
20 der being open from end to end; piston-heads
D', D', in the ends of said cylinders adapted
to reciprocate to and from the center thereof;
pitmen D extending out at opposite ends of
said cylinders and connecting said pistons to
25 oppositely-arranged wrist-pins or cranks on
the driving-wheel, all coacting substantially
for the purpose described.

2. In a motor-car the combination of the
framework; metallic bars or plates H under
30 the framework and secured thereto, provided
with seats for the boxing of the driving-gear
and with holes for the supporting-rods for the
cylinder; axles B, B, with driving-wheels B',
B'', B''', B''', secured thereto; cranks or wrist-
35 pins on said driving-wheels in the same rela-
tive positions at each side, but arranged at
an angle to each other on opposite sides; par-
allel coupling-rods E, E', coupling the wheels
at each side together by means of said cranks
40 and wrist-pins; an engine-cylinder supported
on the rods C'' extending transversely across
the frame through the holes in the plate H,
said cylinder being open from end to end;
piston-heads D', D', in the ends of said cyl-
45 inder adapted to reciprocate to and from the
center thereof; pitmen D extending out at
opposite ends of said cylinder and connect-
ing said pistons to oppositely-arranged cranks
on the driving-wheel all coacting for the pur-
50 pose specified.

3. In a motor-car the combination of the
framework; axles B, B, with driving-wheels
B', B'', B''', B''', secured thereto; cranks or
wrist-pins on said driving-wheels in the same
55 relative positions at each side, but arranged
at an angle to each other on opposite sides;
parallel coupling-rods E, E' coupling the
wheels at each side together by means of said
cranks and wrist-pins; an engine-cylinder
60 open from end to end; piston-head D', D', in

the ends of said cylinder adapted to recipro-
cate to and from the center thereof; pitmen
D extending out at opposite ends of said cyl-
inder and connecting said pistons to oppo-
sately-arranged wrist-pins or cranks all coact- 65
ing for the purpose specified.

4. In a motor-car, the combination of the
framework; axles B, B, with driving-wheels
B', B'', B''', B''', secured thereto; coupling
means for said axles and driving-wheels; an 70
engine-cylinder open from end to end; pis-
ton-heads D', D', in the ends of said cylinder
adapted to reciprocate to and from the cen-
ter thereof; pitmen D extending out at oppo-
site ends of said cylinder and connecting said 75
pistons to oppositely-arranged wrist-pins or
cranks, all coacting for the purpose specified.

5. In a motor-car the combination of the
framework; driving-wheels secured to suit-
able axles thereunder; parallel coupling-rods 80
coupling said driving-wheels and axles to-
gether, said coupling-rods being connected in
different relative positions to said wheel; an
engine-cylinder open at both ends; pistons
toward each end of said engine-cylinder and 85
adapted to reciprocate to and from the center
thereof; and couplings from said pistons to
the driving-wheels arranged to drive the front
and rear wheels in the same direction on the
outward stroke of the pistons, coacting for 90
the purpose specified.

6. In a motor-car, the combination of the
framework; driving-wheels secured to suit-
able axles thereunder; coupling means be- 95
tween said axles and driving-wheels; an en-
gine-cylinder open at both ends; pistons to-
ward each end of said engine-cylinder and
adapted to reciprocate to and from the center
thereof; and couplings from said pistons to
the driving-wheels arranged to drive the front 100
and rear wheels in the same direction on the
outward stroke of the pistons, coacting for
the purpose specified.

7. In a motor-car, the combination of the
framework; bars of metal beneath the same; 105
boxings secured to said bars carrying the
axles and driving mechanism; and an engine-
cylinder suspended from said bars with op-
positely-acting pistons therein coupled to said
driving-gear, and arranged to act simultane- 110
ously in opposite directions, whereby strain-
ing of the frame is avoided, as specified.

In witness whereof I have hereunto set my
hand and seal in the presence of two wit-
nesses.

JOHN G. MATTHEWS. [L. S.]

Witnesses:

F. N. WHITESELL,
W. J. PRIDMORE.