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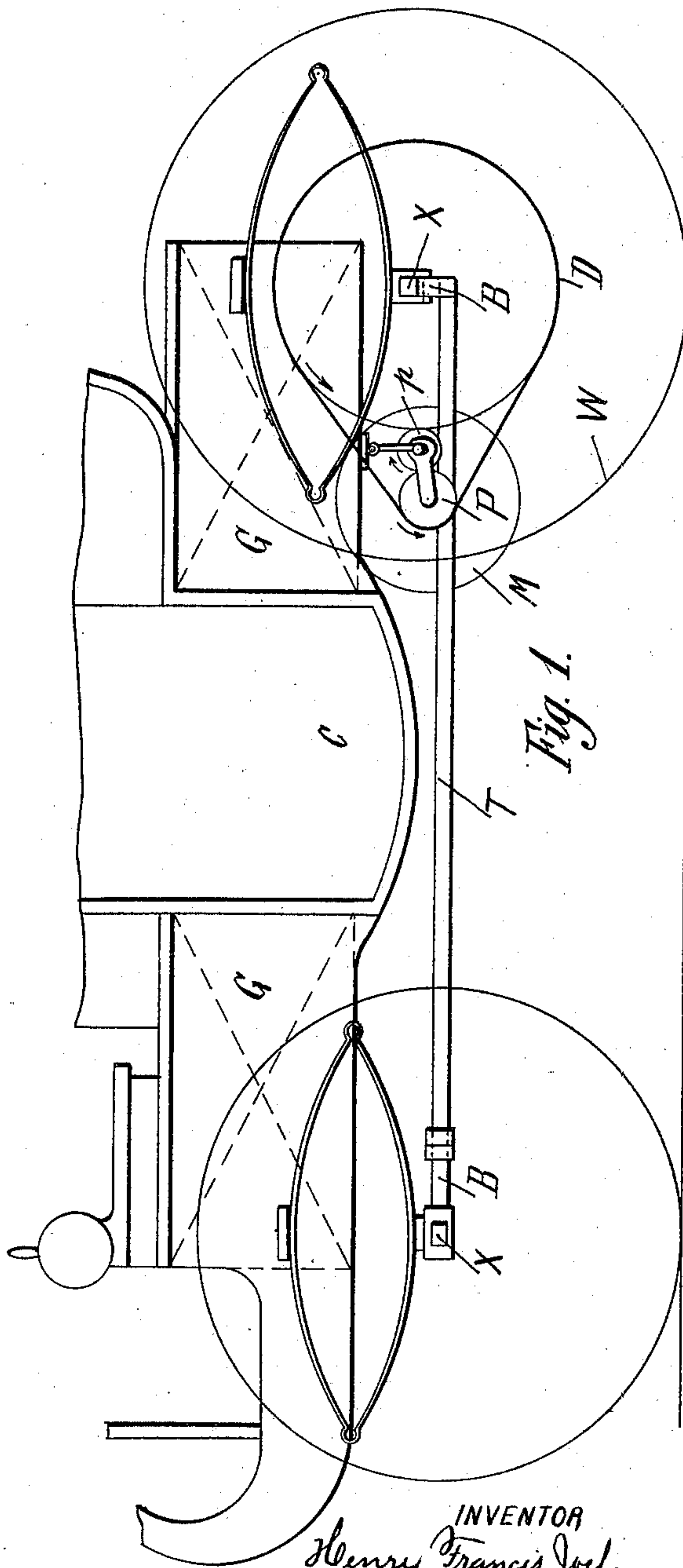
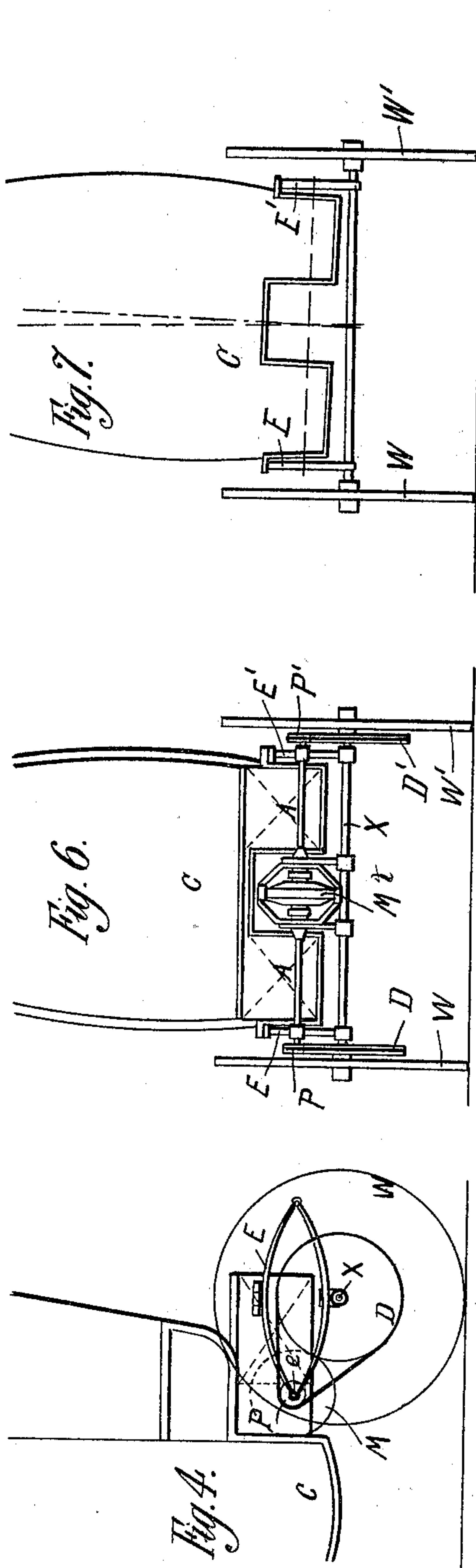
Patented May 30, 1899.

H. F. JOEL.
AUTOMOTOR CARRIAGE.

(Application filed Feb. 4, 1899.)

(No Model.)

2 Sheets—Sheet 1.



WITNESSES:
Ella L. Giles.
[Signature]

INVENTOR
Henry Francis Joel
BY *[Signature]*
ATTORNEYS

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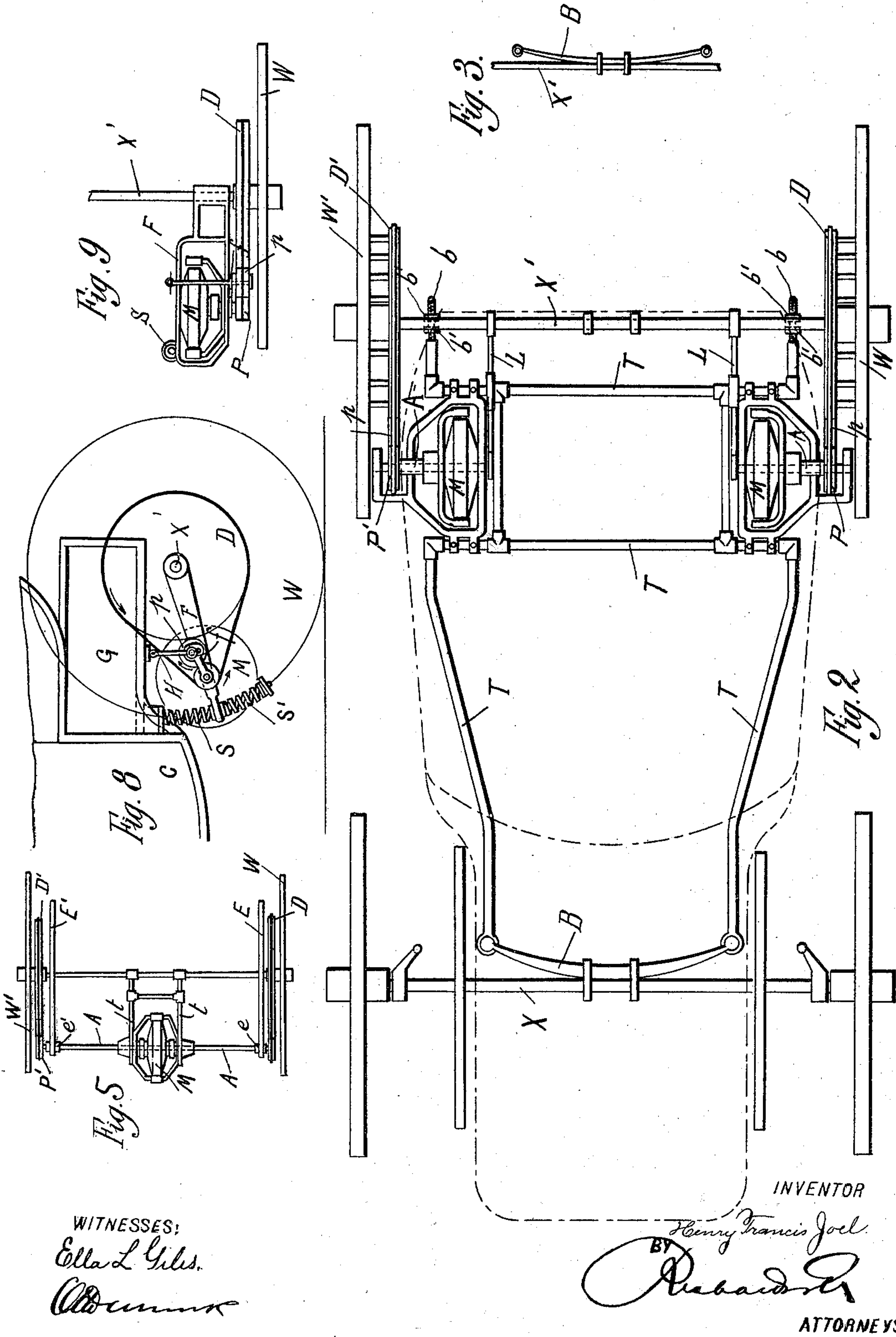
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UNITED STATES PATENT OFFICE.

HENRY FRANCIS JOEL, OF LONDON, ENGLAND.

AUTOMOTOR-CARRIAGE.

SPECIFICATION forming part of Letters Patent No. 625,772, dated May 30, 1899.

Application filed February 4, 1899. Serial No. 704,560. (No model.)

To all whom it may concern:

Be it known that I, HENRY FRANCIS JOEL, a subject of the Queen of Great Britain and Ireland, residing at London, England, have
5 invented a new and useful Improvement in Automotor-Carriages and the Like, (for which I have made applications for Letters Patent in Great Britain under No. 17,813, dated August 18, 1898; in France under No. 268,630,
10 dated August 23, 1898; in Belgium under No. 107,665, dated August 29, 1898, and in Italy under No. 40/156, dated September 1, 1898,) of which the following is a specification.

This invention relates to automotor-carriages and the like; and it consists of an improved underframe and support for a motor or motors, whereby automatic adjustment of the relative speed of the driving-wheels on one axletree when passing around a curve is
20 effected and the motors are suspended so as to maintain a good driving grip upon the driving-wheels, while at the same time (being entirely detached from the carriage-body) they are so elastically supported upon their frame
25 as to diminish jar and vibration and to admit a certain compensating movement of the motor relatively to its driving-wheel to facilitate starting.

Figure 1 is an elevation of my improved
30 automotor-carriage, and Fig. 2 is a plan of the underframing of the same with the body of the carriage removed. Fig. 3 is a detached detail of one spring attachment of the frame to the hind axle. Fig. 4 is an elevation of
35 a modified form of motor-frame having the same functions as that illustrated in the former figures. Fig. 5 is a plan of the same. Fig. 6 is a hind elevation of the same; and Fig. 7 is a diagrammatic hind view of the
40 body, showing the body tilted relatively to the axle in passing around a curve. Figs. 8 and 9 are an elevation and a plan, respectively, of an equivalent, but modified, form of motor-frame having the same utility and
45 functions as those in the preceding figures.

I construct an improved underframe (shown in Figs. 1, 2, and 3) with light steel tubes T T, joined with sockets and made to follow the shape of the carriage C. I attach this frame
50 to the axles X X' of the carriage-wheels W W' by means of bow-springs B B. The spring attached to the front axle is placed horizon-

tally, as shown in Fig. 2, while the spring attached to the rear axle is placed vertically and underneath it, as shown in Fig. 3, and
55 these springs are connected to the frame T by suitable bolts and nuts, of which the horizontal attachments to the hind spring have a long screwed pin or bolt *b* and double adjusting-nuts *b' b'*, by which the frame can
60 be adjusted at will relatively to the back spring B and axle X'. The electric motors M M are self-contained, each in its own frame or cradle, and the latter are supported on and bolted to the frame T in the
65 position as shown. I further apply adjusting tension-rods L L between the bearings of the motor-axles and the hind axle X', such tension-rods having right and left handed
70 nuts upon them. By this means the motors can be accurately adjusted as to position to the back driving-wheels W W' and will produce any desired pressure on the driving
75 band, belt, or chain between the motor and the driving-drum D. These motors have the armature-axles extended with pulleys P P' at each end. Belts or chains connect these pulleys and gear with the concentric drums or
80 rims D D, fixed on the carriage-wheels W W'. A small jockey or friction pulley *p*, supported on an arm pivoted to the axle of the pulley P, runs between the pulley P and the drum D
85 and is larger than the space between P and D, and while assisting to drive the wheel W or W' also equalizes the friction on the axle of the armature-pulley P and on the axle at the bearing of the carriage-wheels. The pulley
90 *p* is mounted on a standard fixed to the under side of the carriage-body, and thus jams between the pulley P and the drum D when the carriage-body leans over to one side. The special advantages attained by this frame and gear are:

(a) The carriage when turning around a sharp corner will under the pressure of cen-
95 trifugal force force down the jockey-pulley *p* between the driving-pulley P and the drum D on the outside of the curve, and thus increase the belt grip, and on the inner side the pulley *p* will be lifted and slacken the
100 belt on that side and allow it to slip and the wheel W to move more slowly, while on the outer wheel W' the belt is tightened and that wheel continues to move around quickly to

make the turn. This action is automatic and can be adapted as may be required.

(b) The motors are fixed on a springy bed independently of the carriage, and the vibration of the motors is not communicated to the carriage.

(c) The frame T gives a direct drive to the front axle and by the method of attachment with springs allows of the elastic rise of the motor relatively to the back axle when starting without disengagement of the driving connection of the motor-pulley and the driven wheel which is so necessary in a moving carriage.

The batteries are fixed under the seats in the receptacles G, the steering-gear is in front, and a controller is placed at the side of the front seat, the whole making a self-contained, practical, and elegant motor-carriage.

Figs. 4, 5, and 6 show another method of fixing the motors. In this case the axle A, carrying the motor M, with pulleys P P' at the ends, passes directly through a bearing $e e'$, formed at the end of the elliptic carriage-springs E E', which thus support the motor, the motor M in this instance being placed in the center of the axle A and kept equidistant from the axles by the light frame t . The internal field-magnets of the motor revolve and drive the two pulleys P P', the external armature being stationary. When turning around a corner, the body of the carriage is thrown over a little, as shown in the diagram Fig. 7, the spring E inside is pulled up and opened, thus bringing the pulley P nearer to the drum D and causing the belt to slacken, while the outside spring E' is compressed and slightly elongated, thus tending to tighten the belt and keep the outside wheel going at its full speed with the same object and the same result as in the example shown in Figs. 1, 2, and 3.

Another method of gearing is shown in Figs. 8 and 9. The motor M and pulley P are fixed on a light metal frame F, pivoted at one end to the axle X' of the carriage-wheels W, and supported at the other end by means of an extension of the frame F and a double spiral spring S S', fixed under the carriage C, so that the whole frame F, with the motor and gear, is free to move up and down on its pivot at the axle, and the springs S S' form an elastic support for the motor and softens any shock or vibration when traveling along rough roads and admits of an elastic play of the motor relatively to the driving-wheel without disengagement when starting. The frame allows the motor to be coupled or geared directly to the wheel. In this arrangement the arm carrying the jockey-pulley p , which is slightly larger than the space be-

tween P and D, is carried on a rod or link H, attached to the under side of the carriage, the object being to automatically adjust the belt as in the preceding examples by the rock of the car-body as it passes around curves. When the carriage is thrown over, the link H presses the jockey-pulley as a wedge between the pulley P and drum D and so increases the grip on the latter and also the driving friction of the jockey-pulley. The reverse action takes place on the other side.

Having now particularly described my said invention, I declare that what I claim, and desire to secure by Letters Patent, is—

1. In an automotor-carriage the combination with the axles and carrying-springs of such carriage having a motor-suspending frame elastically connected to said axles and a motor thereon of a driving-gear between the said motor and two driving-wheels on the same axle adapted by means operated by the obliquity of the body of the carriage when turning a curve to engage more firmly with that driving-wheel which is on the outside of the curve and less firmly with that upon the inside of the curve, substantially as described.

2. In combination in an automotor-carriage a motor-suspending frame pivoted at one end upon the hind driving-axle and having elastic connections at its other end, a motor mounted thereon, driving connections between the motor-shaft and driving-wheel, and an intermediate jamming-pulley between the motor-pulley and driving-drum, adapted to increase the grip upon that driving-wheel traveling upon the outside of a curve and to release the grip upon the other wheel upon the inside of the curve, by means operated by the obliquity of the carriage-body to the vertical on passing such curve, substantially as described.

3. In combination in an automotor-carriage, a motor-suspending frame, motors carried thereon, an elliptical carriage-spring placed vertically, forming attachment between rear ends of frames and the center of rear driving-axle, an elliptical carriage-spring placed horizontally forming the attachment between the front ends of frames and the center of front axle, and means for driving between motor-shaft and driving-axle adapted to permit the elastic vertical play of the former to the latter without disengagement to facilitate the starting of the motor.

In witness whereof I have hereunto set my hand in presence of two witnesses.

HENRY FRANCIS JOEL.

Witnesses:

REGINALD WILLIAM JAMES,
RICHARD A. HOFFMANN.