

No. 624,319.

Patented May 2, 1899.

J. N. FORBES.
MOTOR VEHICLE.

(Application filed June 25, 1897.)

(No Model.)

4 Sheets—Sheet 2.

Fig. 2.

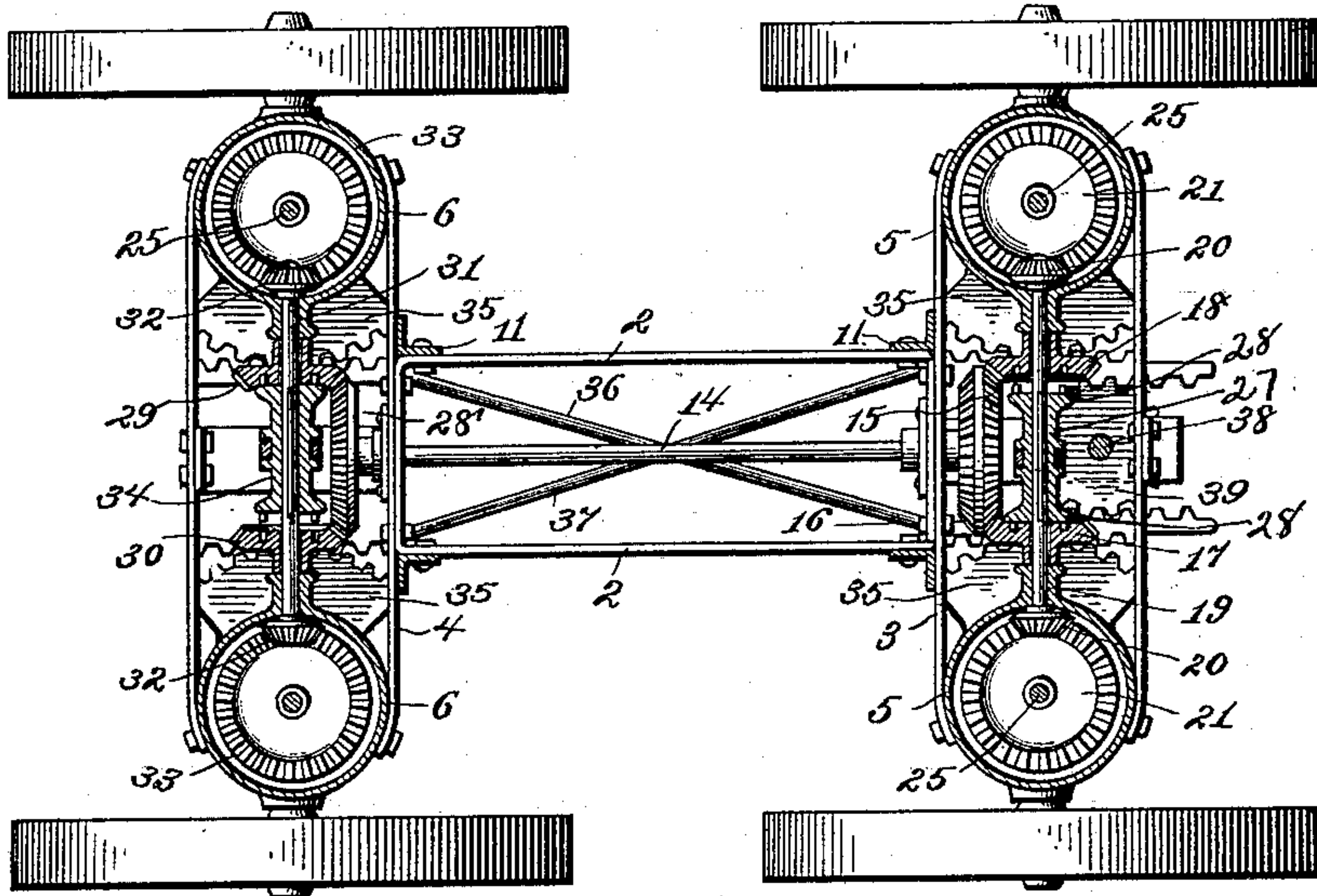
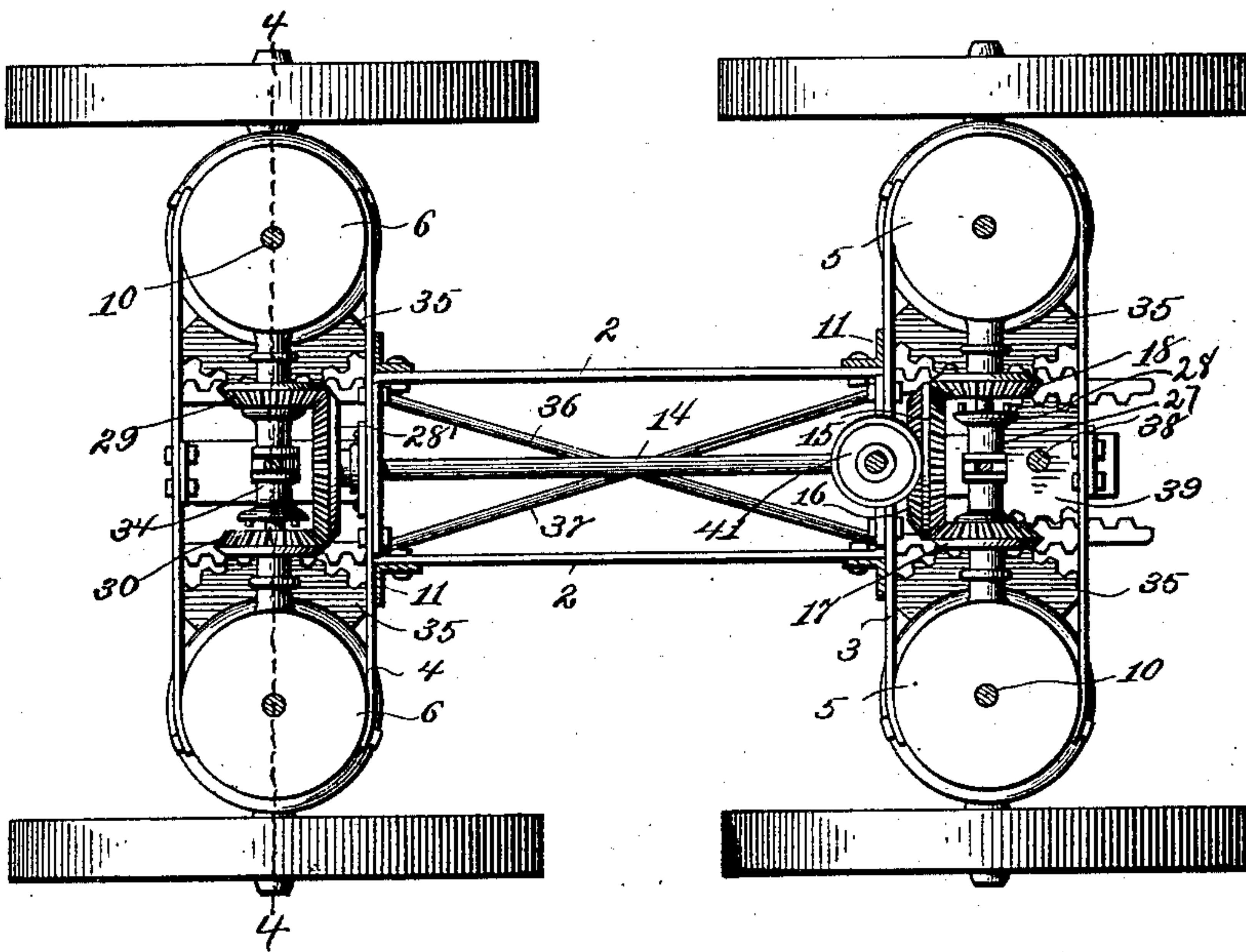


Fig. 3.



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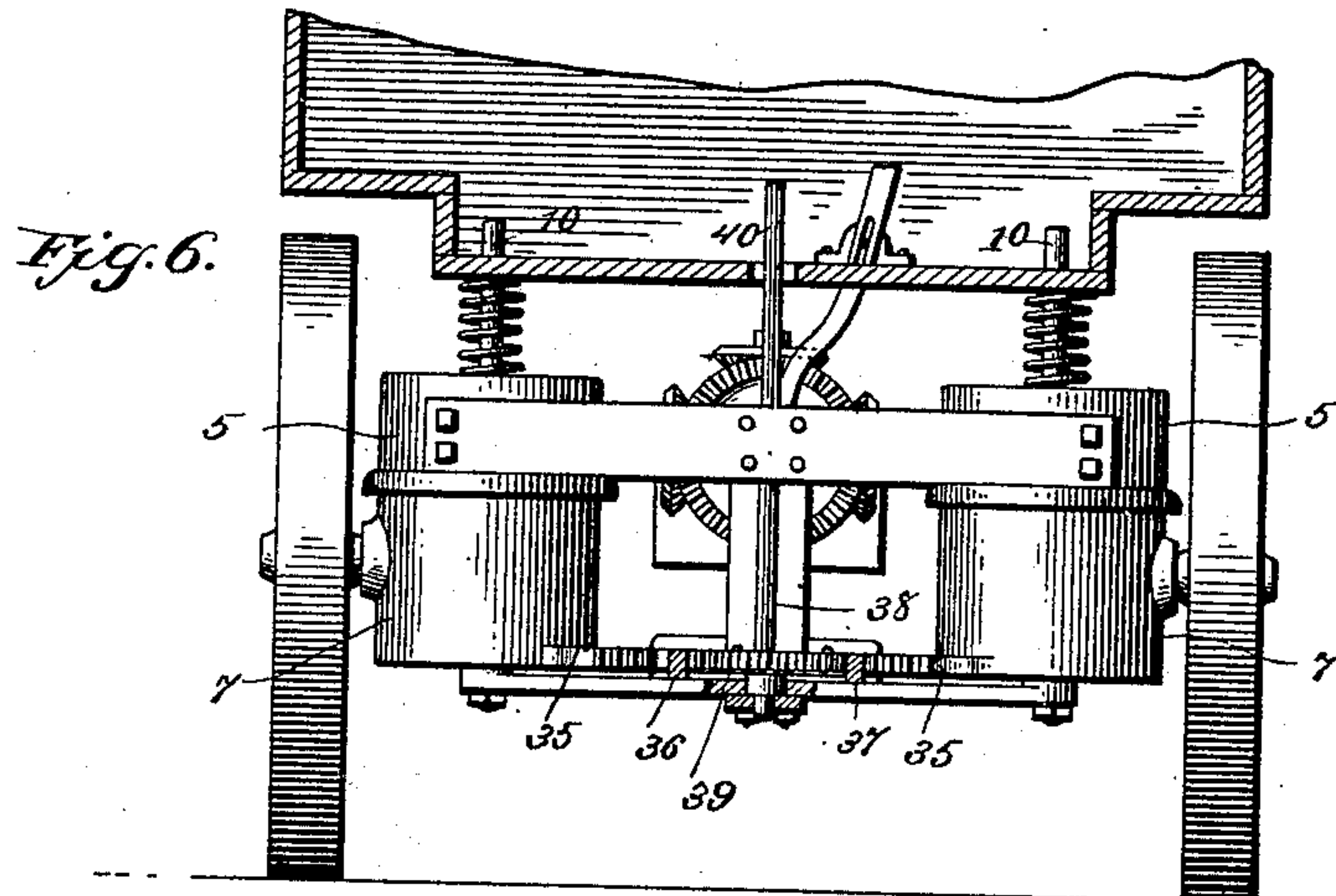
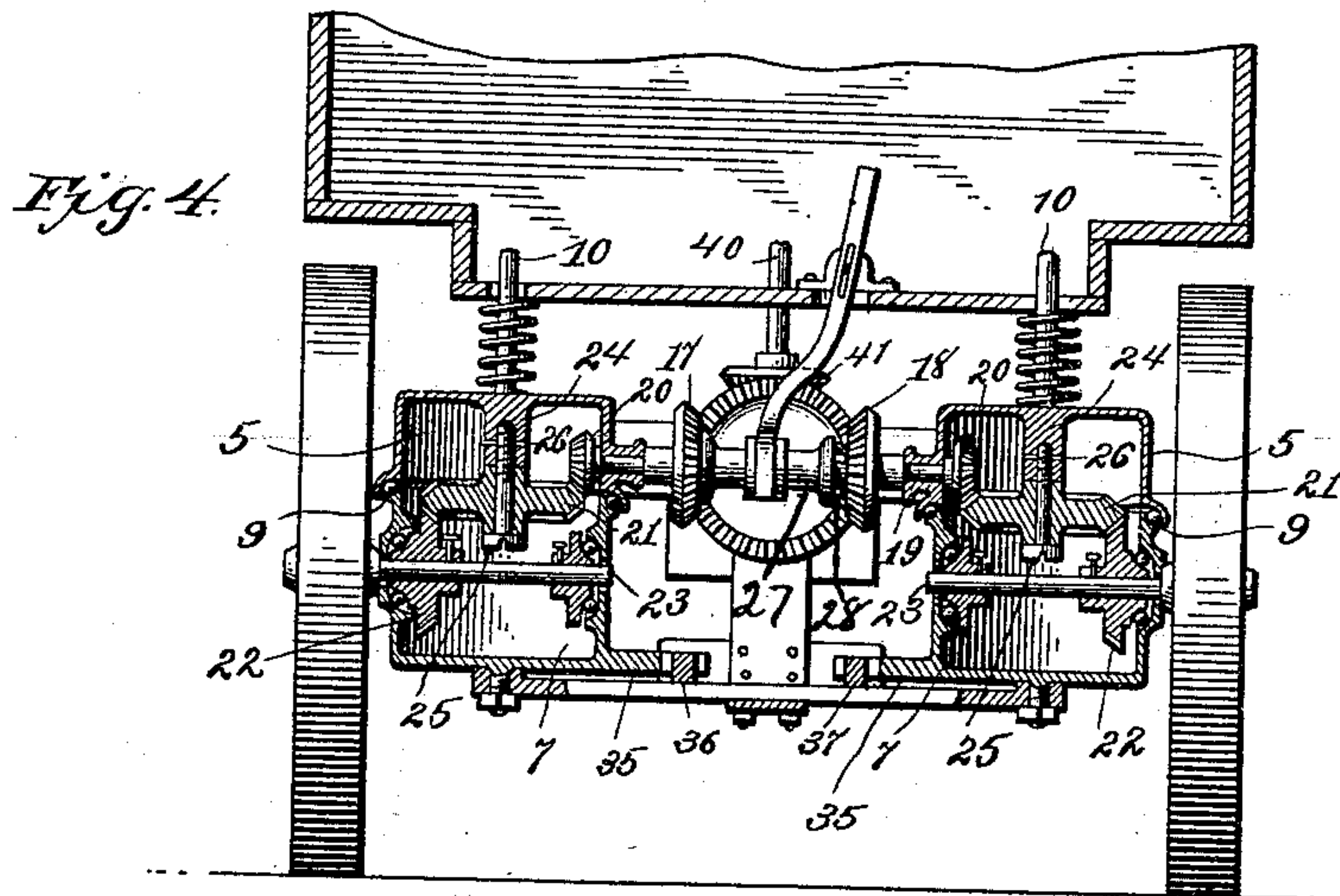
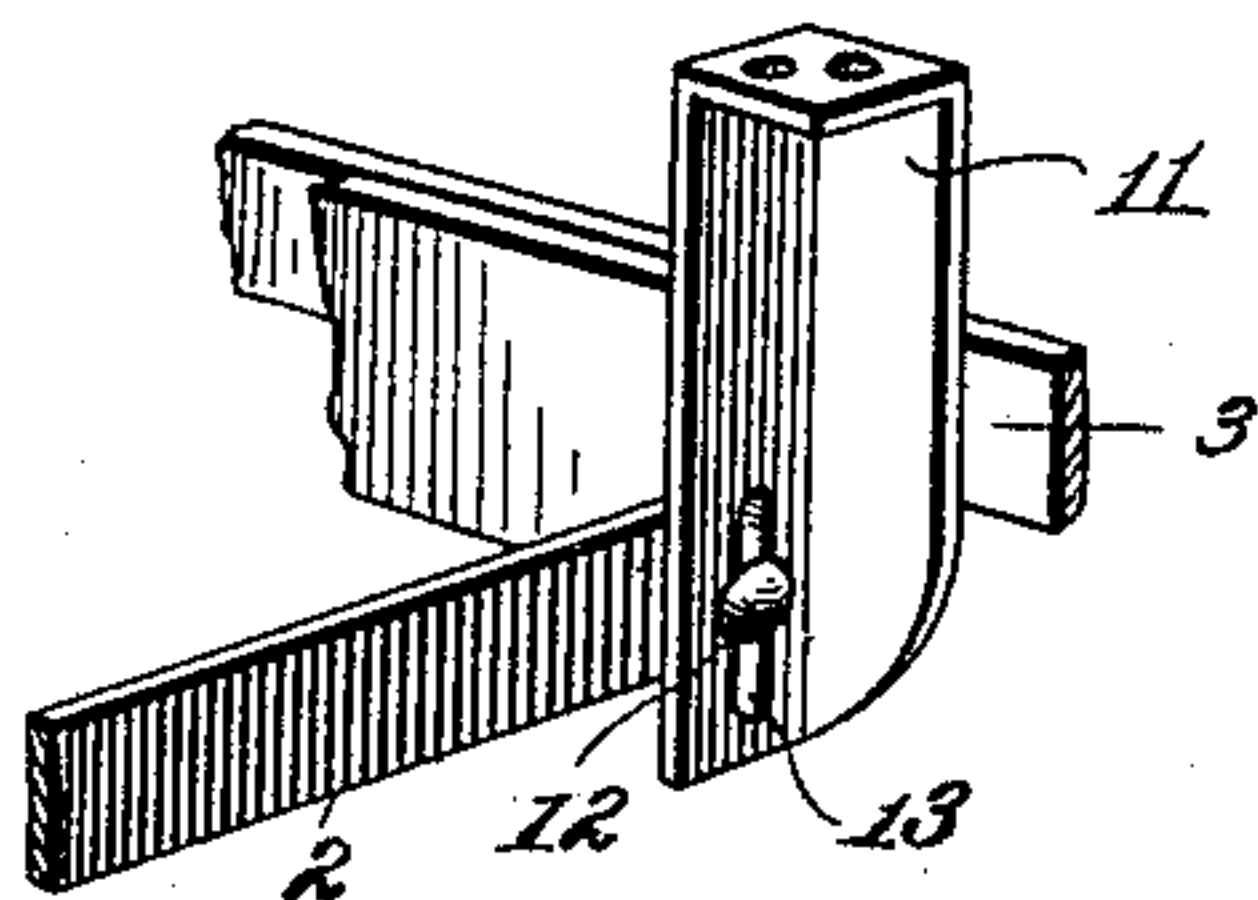


Fig. 5.



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Fig. 8.

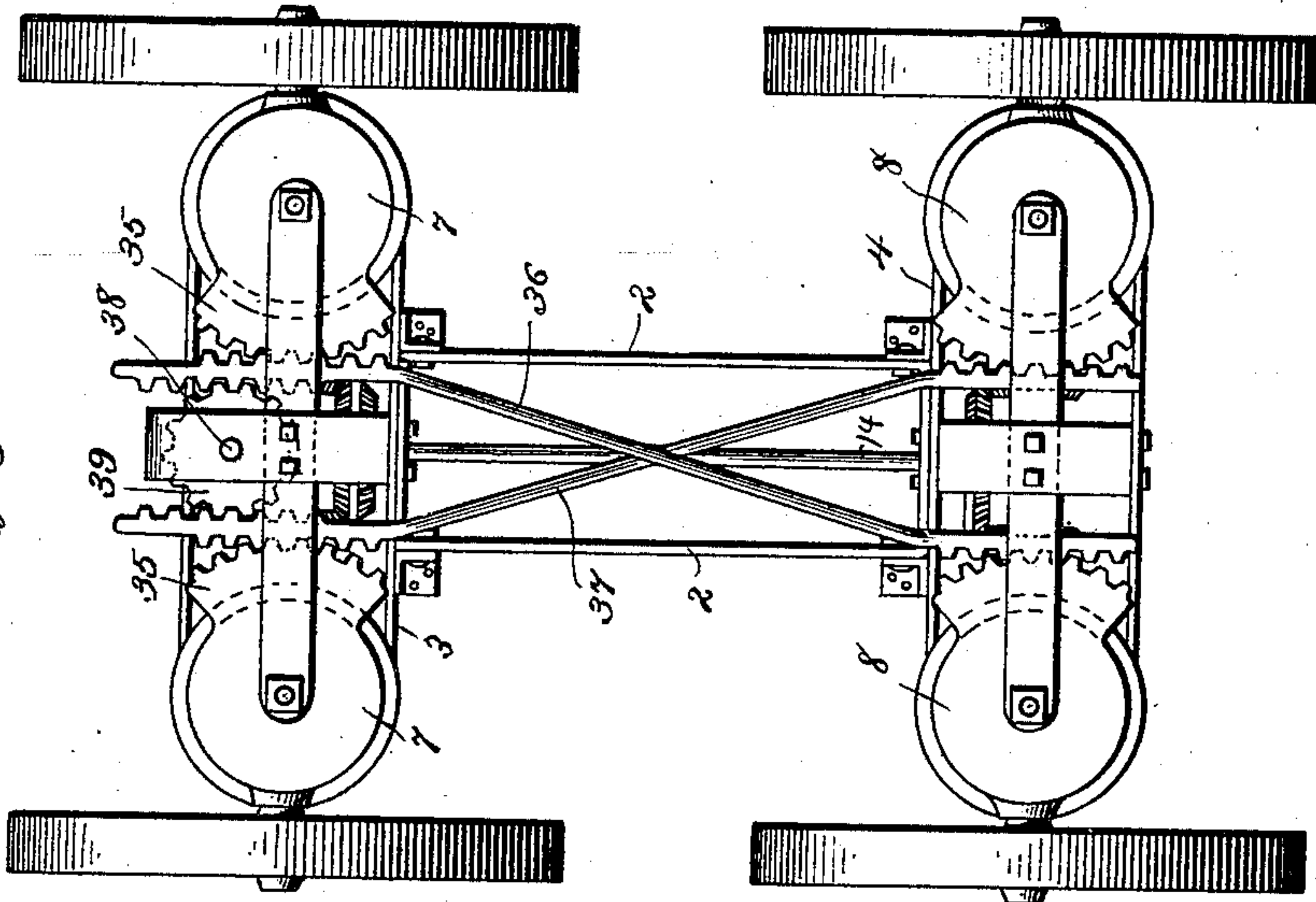
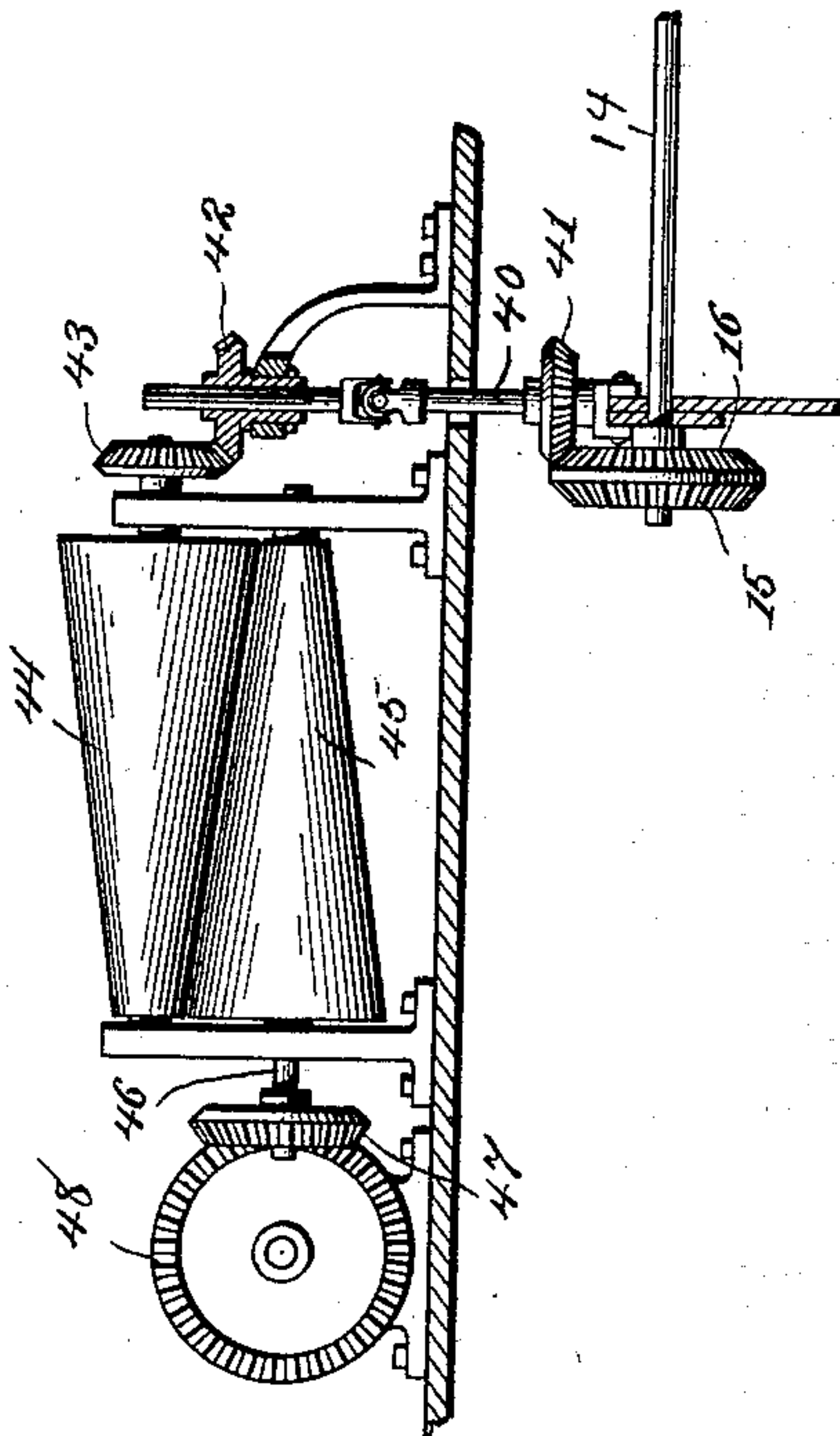


Fig. 7.



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UNITED STATES PATENT OFFICE.

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MOTOR-VEHICLE.

SPECIFICATION forming part of Letters Patent No. 624,319, dated May 2, 1899.

Application filed June 25, 1897. Serial No. 642,270. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH N. FORBES, a citizen of the United States, residing at Cromanton, in the county of Calhoun and State of Florida, have invented certain new and useful Improvements in Horseless Carriages; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in motor or horseless carriages, and more particularly to the manner of gearing the driving-shaft to the ground-wheels, the invention contemplating a construction by which the body of the vehicle carries the engines and is spring-supported to take up jolts or jars, the driving mechanism being geared and arranged in such manner as to permit a rocking movement of the body, as well as allow both the front and rear wheels to be turned in rounding a corner, and for throwing the driving-shaft into gear with the shafts or axles of the ground-wheels to propel the vehicle either forward or backward.

The object of the invention is to provide simple, cheap, and durable mechanism for accomplishing the above ends; and it consists in the construction and combination of the parts, as will be hereinafter fully set forth, and particularly pointed out in the claims.

In the accompanying drawings, forming part of this specification, Figure 1 is a side elevation of a motor-carriage constructed in accordance with my invention. Fig. 2 is a horizontal sectional view on a line with the main axle of the driving-wheel. Fig. 3 is a plan view with the body of the vehicle removed. Fig. 4 is a transverse sectional view on the line 4 4 of Fig. 3. Fig. 5 is a detail view showing the manner of connecting the body to the running-gear of the vehicle. Fig. 6 is a front view of the running-gear and driving mechanism carried thereby. Fig. 7 is a detail sectional view showing the manner of connecting the engines to the main shaft of the driving mechanism. Fig. 8 is a bottom view of the running-gear of the vehicle.

The numeral 1 designates the body of the vehicle, which may be of any suitable construction or style. The drawings illustrate

the coach having a canopy-top, with a seating capacity for six or more. The front and rear of this body are undercut, as shown in Fig. 1, to permit the ground-wheel to pass under the same in making a short turn.

2 2 designate the longitudinal reach-bars of the running-gear, which are rigidly connected to the front and rear hounds 3 and 4, the said hounds being secured at their ends to cylindrical casings 5 and 6, respectively, said casings being mounted upon similar casings 7 and 8, mounted upon the front and rear axles of the ground-wheels. The bearing-surfaces of the upper and lower casings are constructed to receive antifriction-rollers 9, and the stub-axles of the ground-wheels pass into said casings and are journaled in ball-bearings formed therein. By this construction the ground-wheels will be permitted to have independent movement with respect to the running-gear, the body of the vehicle being mounted upon said running-gear, so as to have the ordinary rocking or spring movement thereon. Any style of spring may be interposed between the body and running-gear, and when the ordinary coil-spring is employed the casings 5 and 6 are provided centrally with uprights 10, as shown in the drawings; but it will be understood that the ordinary elliptical springs may be used and their ends rest in suitable clips attached to the said casings. The body of the vehicle is further connected to the running-gear by depending corner-brackets 11, which fit at the intersection of the reach-bars 2 and hounds 3 and 4, these parts being connected by bolt and nut 12, which passes through a slot 13 in the bracket 11, or said slot may be located in the running-gear instead, this permitting spring movement of the body with respect to the running-gear.

14 designates the main shaft of the driving mechanism, which extends at the center of the vehicle between the hounds 3 and 4, upon which it is journaled by any approved antifriction-bearing. This shaft extends beyond the hounds at each end, and at its forward end has mounted thereon a gear-wheel having bevel-teeth 15 and 16, the teeth 15 engaging bevel-wheels 17 and 18, mounted on a transverse shaft 19, bearing at its ends in the upper casings 5 at the forward end of the vehicle. The shaft 19 is provided at its ends

with bevel-pinions 20, located within the casings 5, and these bevel-pinions engage the upper teeth of a double bevel-wheel 21, mounted horizontally in the casings 5, the lower teeth of said bevel-wheels meshing with bevel-pinions 22 on the stub-axes 23 of the front supporting-wheels. The preferred manner of supporting the horizontal bevel-wheels 21 is shown in the accompanying drawings, in which the cover of each casing 5 is provided with a depending boss 24, having a central threaded recess to receive a spindle 25, a lateral pin or set-screw 26 holding the said spindle against rotation. The head of this spindle and adjoining bearing-surface of the bevel-wheel may be provided with cones to form bearings for interposed balls. By gearing the main driving-shaft 14 to the axles of the supporting-wheels in the manner hereinbefore described the said supporting-wheels will be driven forward or backward, according to which bevel-wheels 17 and 18 are in mesh with the teeth 15 of the bevel gear-wheel mounted on said driving-shaft, and in order to throw the shaft 19 in engagement with either one of the bevel-wheels 17 and 18 the said shaft is provided between said bevel-wheels with a sleeve 27, in sliding engagement with the shaft by the ordinary groove and spline, the ends of said sleeve having clutch-sections 28, adapted to engage clutch-faces formed on the said bevel-wheels. This sleeve is connected to an ordinary lever within reach of the driver or motorman, by which the sleeve can be shifted to engage one or the other of the bevel-wheels 17 and 18, or to an intermediate point to let the driving-wheels run free. It will also be noted that by gearing the shaft 19 to the horizontal bevel-wheels 21 and said bevel-wheels to the pinions on the stub-axes the supporting-wheels will be allowed to turn, and in so doing the said pinions will ride upon the said bevel-wheels.

The rear end of the main driving-shaft 14 has mounted thereon a bevel-wheel 28', which meshes with the bevel-wheels 29 and 30 on a transverse shaft 31, corresponding with the shaft 19 hereinbefore referred to and bearing in the upper casings 6 at the rear end of the vehicle. The ends of this shaft 31 are provided with bevel-pinions 32, in mesh with a horizontally-disposed double bevel-wheel 33, the latter meshing with pinions on the stub-axes of the rear supporting-wheels, said stub-axes bearing in the casings 8. The shaft 31 is also provided with a sleeve 34, interposed between the gear-wheels 29 and 30 and having clutch-sections to engage said wheels, and this latter clutch mechanism is connected to the means which operate the clutch at the forward part of the machine so that they will both be shifted in unison.

As hereinbefore stated, the supporting-wheels of the vehicle will be permitted to have an independent movement with respect to the running-gear by reason of the two-part cas-

ings turning one upon the other, and in order to turn the casings simultaneously in the operation of steering or turning the vehicle each lower casing is provided with a segment-rack 35. The segment-racks extending from the casings at one end of the vehicle are connected to the segment-racks at the other end by rods 36 and 37, each rod connecting a casing or wheel on one side of the vehicle with the casing or wheel on the other side and at the opposite end. At the forward end of the vehicle to have a bearing in the running-gear is a vertical shaft 38, upon the lower end of which is mounted a gear-wheel 39, in mesh with the rack-bars on the ends of the rods 36 and 37, as shown in detail in Fig. 8, the said rack-bars in turn meshing with the segment-racks attached to the movable casings of the forward supporting-wheels. The upper end of the shaft 38 has a hand-wheel located in front of the driver, by which the said gear-wheel is turned to move the wheels with respect to the running-gear in making a turn. By this arrangement the turning of the hand-wheel in one direction will turn the forward wheels to guide the vehicle either to the right or to the left, and by means of the connecting-rods 36 and 37 the rear supporting-wheels will also be moved to assist in the turn, the last-mentioned wheels being turned at an angle with respect to the forward wheels.

The main driving-shaft 14, hereinbefore mentioned, is driven from an engine or motor of any approved construction using either electricity, gas, or compressed air. In Fig. 7 of the drawings I have shown the manner of connecting the engine to the main shaft, which consists in providing a vertical shaft 40, having a pinion 41 in mesh with the teeth 16 of the double bevel-wheel on said shaft 14, and the upper end of this vertical shaft 40 passes through a pinion 42, suitably supported and geared to the pinion 43, projecting from a shaft of a conical friction-wheel 44. The conical friction-wheel 44 is adapted to be thrown in contact with a similar wheel 45 on a shaft 46, having a bevel-wheel 47, driven by the motor. I prefer to use two motors or engines, and in said Fig. 7 the wheel 47 is shown to be a bevel-wheel, and the wheel 48 shows the manner of connecting one of the engines thereto. I lay no claim to the motors or engines for driving the vehicle, as my said invention relates to the manner of gearing or arranging the driving mechanism with respect to the supporting-wheels.

By providing the vertical shaft 40 so that it will be slid through the pinion 42 any vertical movement of the body of the vehicle upon the running-gear will not interfere with the proper gearing of the engine with the driving-shaft 14, and in order to permit the body of the vehicle to have a rocking movement on the springs said shaft 40 has a knuckle-joint, as shown.

From the foregoing description, in connection with the accompanying drawings, the

construction and operation of my improved gearing for motor-carriages will be readily understood, and it will be noted that I provide a simple and durable construction which permits the vehicle to be built comparatively light, the mechanism also providing for making a short turn, as well as for quickly reversing the direction of the vehicle. The construction also provides an increased security against overturning, since the ground-bearing is not appreciably lessened when making short turns.

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

1. In a motor-carriage, the combination with the running-gear, of a transverse shaft having gear-wheels loosely mounted thereon and in mesh with a gear-wheel driven from the motor, a clutch interposed between the gear-wheels on the transverse shaft and adapted to be thrown in engagement therewith, pinions at the ends of the transverse shaft, bearings adapted to turn with respect to the running-gear and carrying the stub-axes upon which the supporting-wheels are mounted, pinions on said axles and interposed gear-wheels connecting the pinions to the transverse shaft, substantially as shown and for the purpose set forth.

2. In a motor-carriage the combination with the running-gear, of casings secured thereto, casings connected to the aforesaid casings to turn with respect thereto, the latter carrying the stub-axes upon which the supporting-wheels are mounted; together with a transverse shaft supported in the stationary casings and driven from the motor, pinions on said transverse shaft, and interposed horizontal gear-wheels connecting the aforesaid pinions, substantially as shown and for the purpose set forth.

3. In a motor-carriage, the combination with the running-gear, of a longitudinal shaft mounted thereon and provided at its ends with bevel-wheels, transverse shafts supported by the running-gear and having bevel-wheels loosely mounted thereon and in gear with the bevel-wheels of the longitudinal shaft, sleeves interposed between the bevel-wheels and having clutch-faces which engage therewith; together with movable bearings for the stub-axes of the supporting-wheels, pinions on said stub-axes, and horizontally-disposed gear-wheels connecting said pinions to pinions on the transverse shafts, substantially as shown and for the purpose set forth.

4. In a motor-carriage, the combination with the running-gear, of casings 5 and 6 rigidly secured thereto, casings 7 and 8 connected to the aforesaid casings and having interposed ball-bearings, transverse shafts supported in the stationary casings and driven from a suitable motor, said shafts having pinions located within said casings; together with stub-axes upon which the supporting-wheels are mounted bearing in the movable casings, pinions mounted on said stub-axes, and a horizontal gear-wheel supported by either the stationary or movable casings so as to connect the shafts and stub-axes, substantially as shown and for the purpose set forth.

5. In a motor-carriage, the combination with the running-gear, of casings 5 and 6 rigidly secured thereto, casings 7 and 8 connected to the aforesaid casings and having interposed ball-bearings, transverse shafts supported in the stationary casings and driven from a suitable motor, said shafts having pinions located within said casings, stub-axes for the supporting-wheels journaled in the movable casings and provided with a pinion, and horizontal gear-wheels connecting the stub-axes to the transverse shafts; together with segment-racks projecting from the movable casings, rods extending across the vehicle to connect the wheels on one side with the wheels at the opposite end of the other side, a gear-wheel in mesh with said segment-racks, and means for turning said gear-wheels, substantially as shown and for the purpose set forth.

6. In a motor-carriage, the combination with the running-gear having a horizontal shaft in mesh with the supporting-wheels, a body supported upon springs resting on the running-gear, brackets or braces depending from the body and connected to the running-gear by bolts which engage slots therein; together with the jointed vertical shaft having a gear-wheel in mesh with a gear-wheel on the horizontal shaft, and a gear-wheel carried by the body of the vehicle to slide upon the upper end of the vertical shaft, the last-mentioned gear-wheel being driven from a suitable motor, substantially as shown and for the purpose set forth.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

JOSEPH N. FORBES.

Witnesses:

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H. M. SPICER.