No. 664,809. Patented Dec. 25, 1900.

G. P. DORRIS.

GEARING FOR MOTOR VEHICLES.

(Application filed Dec. 11, 1899.)

(No Model.) 4 Sheets—Sheet 1

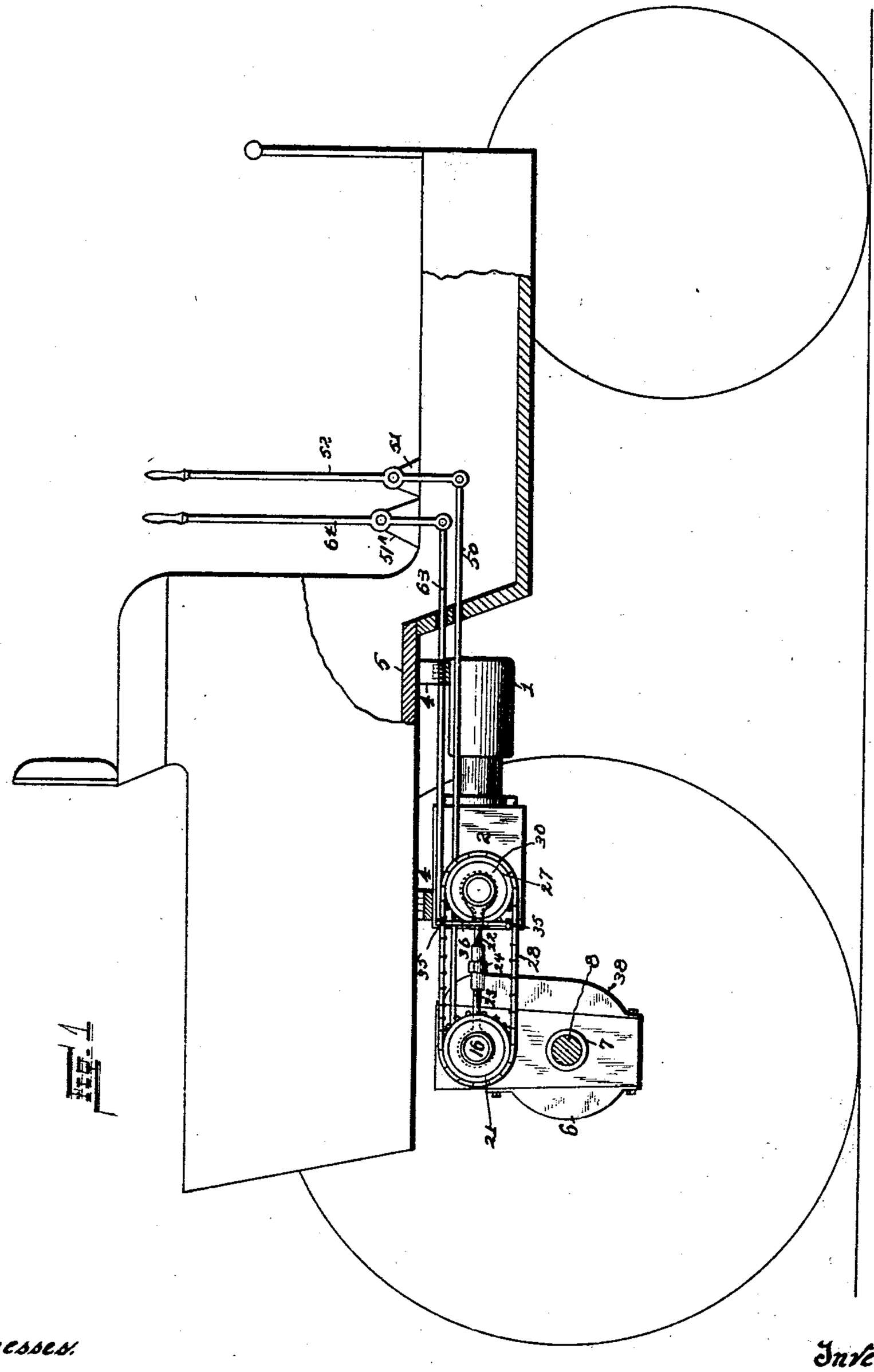

FIG. 1

Witnesses.

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FIG. 2.

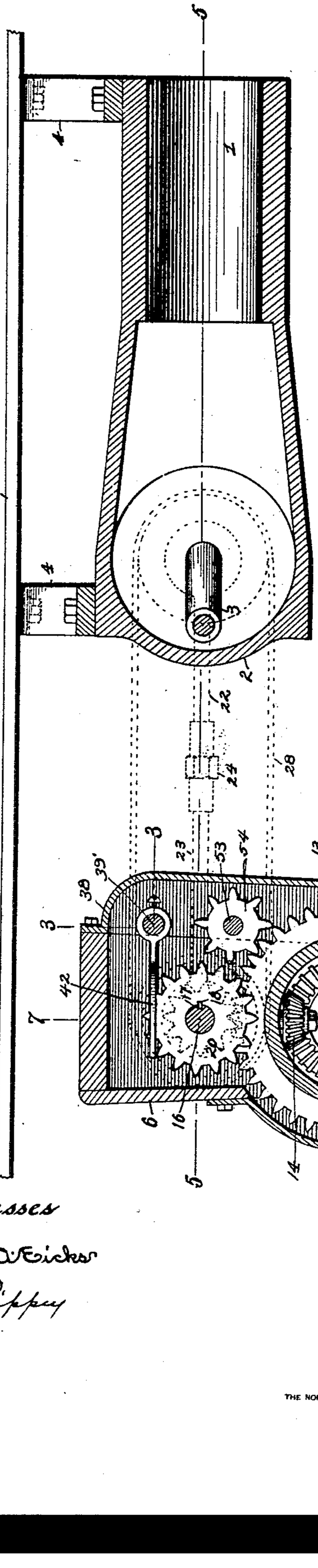


FIG. 3.

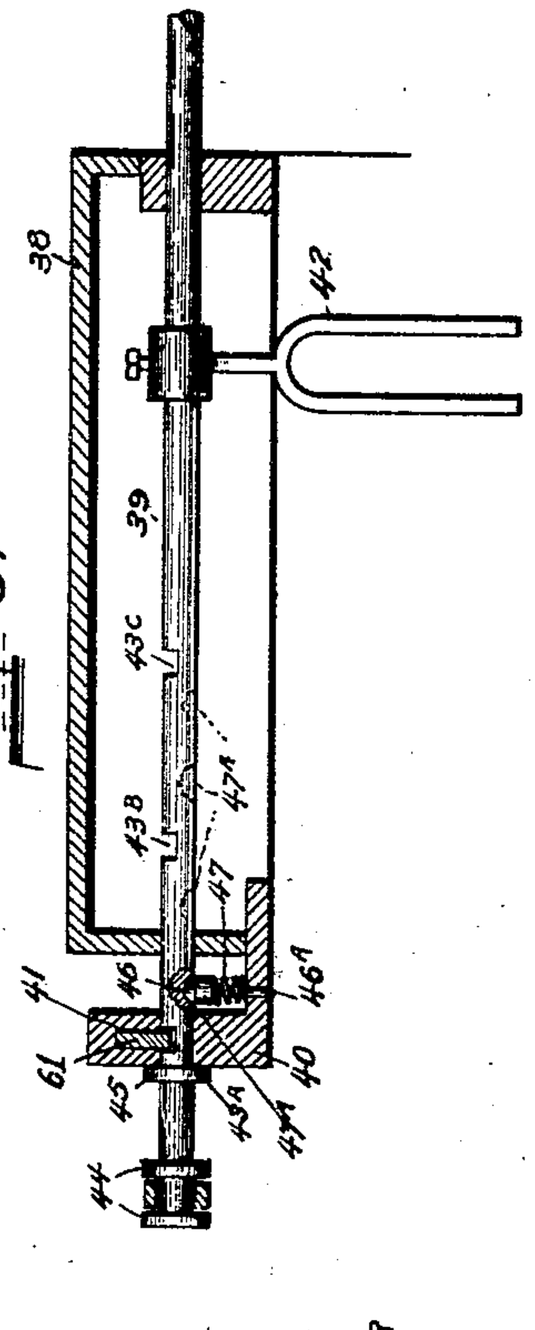
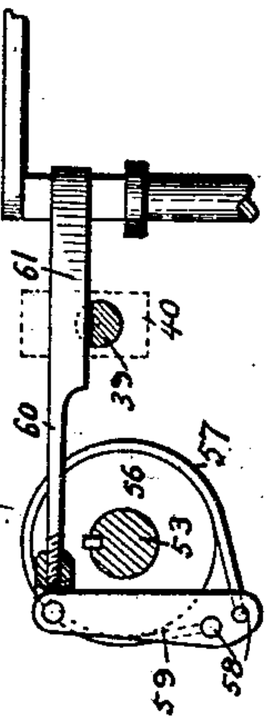


FIG. 4.



Witnesses

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(No Model.) 4 Sheets—Sheet 3.

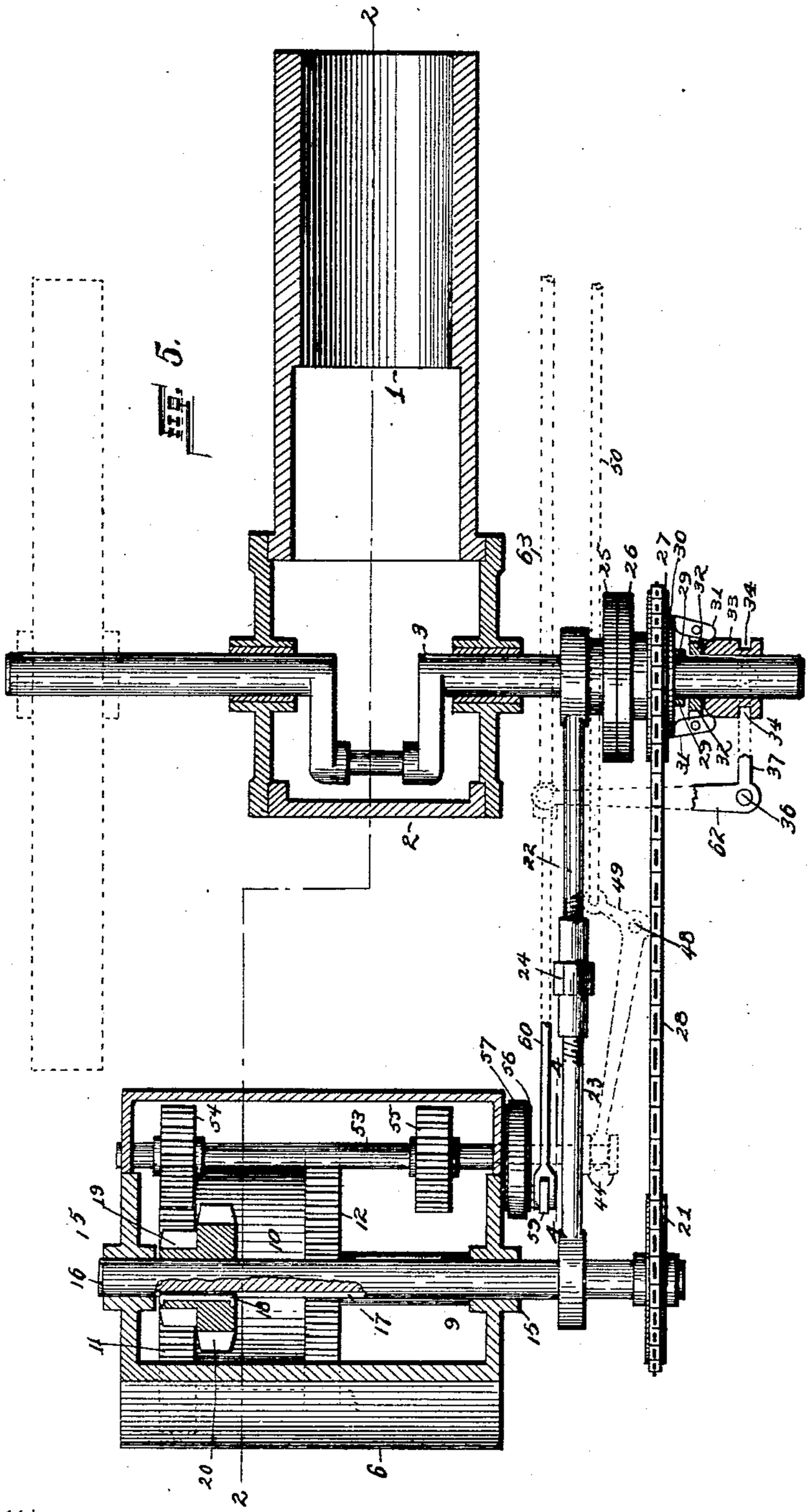

FIG. 5.

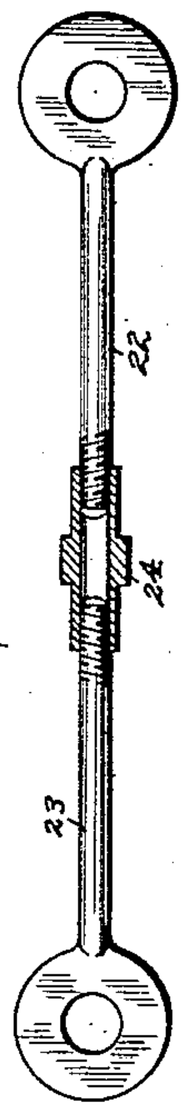

FIG. 6.

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(Application filed Dec. 11, 1899.)

(No Model.) 4 Sheets—Sheet 4.

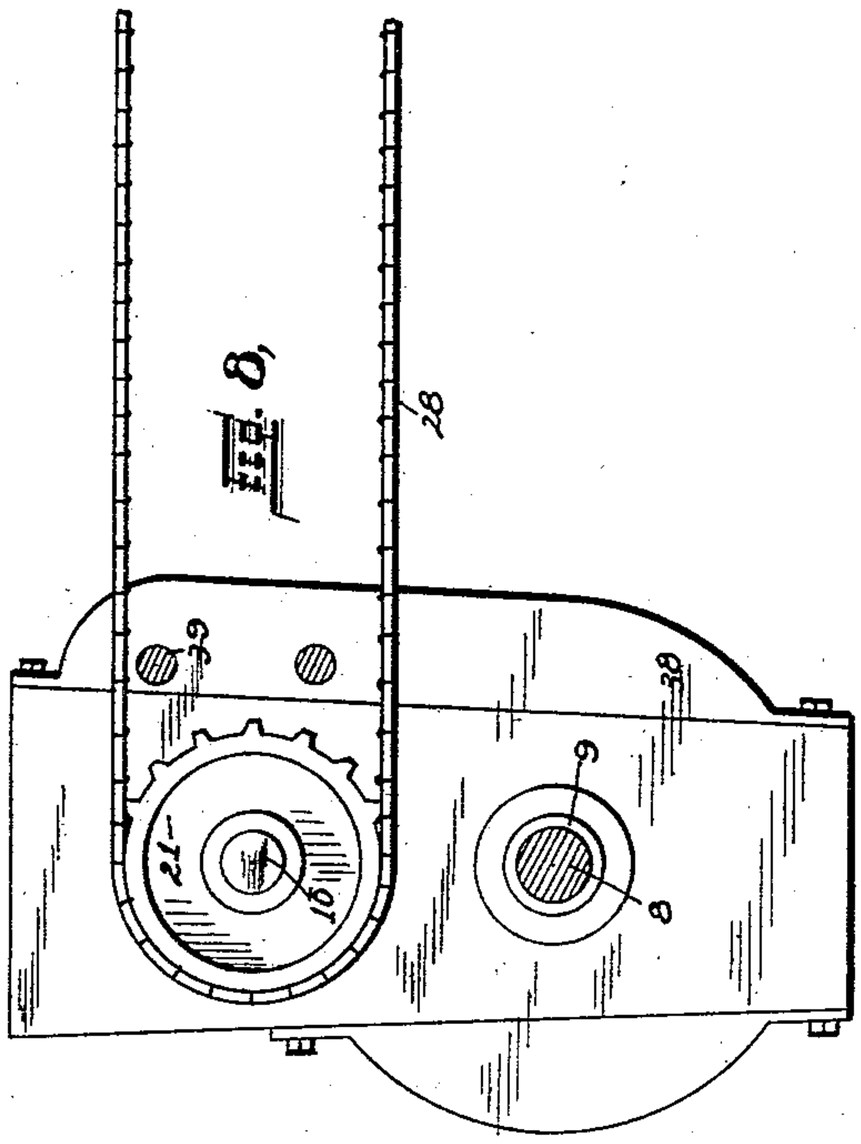

Fig. 8.

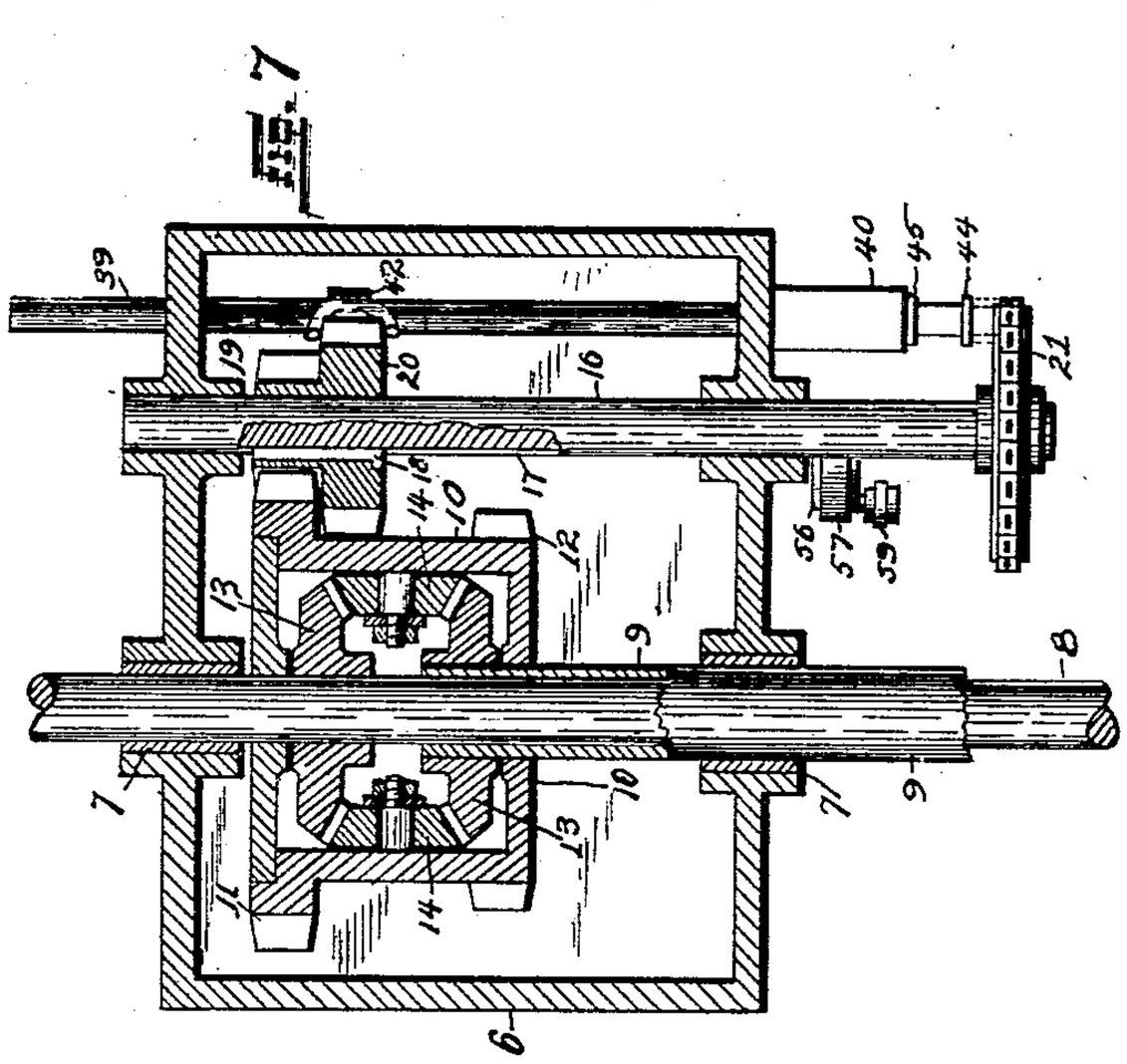

Fig. 7.

Witnesses

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UNITED STATES PATENT OFFICE.

GEORGE PRESTON DORRIS, OF ST. LOUIS, MISSOURI.

GEARING FOR MOTOR-VEHICLES.

SPECIFICATION forming part of Letters Patent No. 664,809, dated December 25, 1900.

Application filed December 11, 1899. Serial No. 739,897. (No model.)

To all whom it may concern:

Be it known that I, GEORGE PRESTON DORRIS, of the city of St. Louis, in the State of Missouri, have invented certain new and useful Improvements in Gearing for Motor-Vehicles, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

My invention relates to gearing for motor-vehicles; and it consists of the novel construction, combination, and arrangement of parts hereinafter described, shown, and claimed.

Figure 1 is a side elevation of a motor-carriage with my improved gearing applied to the motor. Fig. 2 is a longitudinal sectional view taken approximately on the line 2 2 of Fig. 5. Fig. 3 is a detailed sectional view taken approximately on line 3 3 of Fig. 2. Fig. 4 is a detailed sectional view taken on the line 4 4 of Fig. 5. Fig. 5 is a longitudinal sectional view taken on the line 5 5 of Fig. 2. Fig. 6 is a view showing the rod connecting the engine-crank with a shaft located in bearings in the frame containing the gearing apparatus. Fig. 7 is an enlarged vertical sectional view taken approximately on the line 7 7 of Fig. 2. Fig. 8 is an enlarged side view of the frame in which is located the gearing apparatus.

Referring by numerals to the accompanying drawings, 1 indicates the engine-cylinder, and 2 the closed crank-cylinder, in the opposite end of which are formed suitable bearings for the engine-crank 3. To the top of the forward end of the engine-cylinder 1 and to the top of the rear end of the crank-cylinder 2 are attached supports 4, the upper ends of which are secured to plate or bar 5, which is suitably positioned in the bottom or bed of the carriage or vehicle. In this manner the entire engine frame or casing is swung beneath the vehicle, and all the weight of said frame and casing is supported by the hangers 4, while the weight of the gearing frame and casing 6 is supported upon the rear axle of the vehicle in the manner yet to be described.

Formed in the outer portion of the sides of the frame 6 are the horizontally-alined bearings 7, in which operates the rear axle of the motor-carriage, which axle comprises the solid shaft 8, which carries one of the rear wheels of the vehicle, and a tubular shaft 9, which carries the opposite wheel, the inner end of which tubular shaft terminates at a point within the frame 6 adjacent the center thereof.

Arranged upon the inner end of the shaft 9 and the solid shaft 8 is a cylindrical shell 10, upon one end of which is formed a large gear-wheel 11 and upon the opposite end of which is formed a smaller gear-wheel 12.

Upon the inside of the shell 10 is a pair of beveled gear-pinions 13, one of which is fixed to the axle 8, the opposite one of which is fixed to the tubular shaft 9, and a plurality of small pinions 14, carried by the shell 10, mesh with these beveled gear-pinions 13. These pinions 13 and 14 form a differential gear which allows the two wheels of the rear axle to turn at different speeds when the motor-carriage is being turned around; but as said gearing is not an essential part of my invention it will not be described in detail.

Formed in the upper end of frame 6 are the horizontally-alined bearings 15, in which is rotatably arranged a counter-shaft 16. In this counter-shaft is formed a continuous groove 17, and upon said shaft is arranged to slide a double pinion, the same being provided with a key 18, which slides in the groove 17. The smaller one, 19, of this double pinion is constructed so that it will mesh with the larger gear-wheel 11, previously mentioned, and the larger one, 20, of the double pinion is constructed to mesh with the smaller gear-wheel 12. Keyed to this counter-shaft 16, outside the frame 6, is a sprocket-wheel 21.

Pivoted to the crank-shaft 3, outside the crank-cylinder 2, is a rod 22, connected to a similar rod 23, pivoted to the counter-shaft 16, outside the casing 6, by means of a turnbuckle 24, which may be tightened or loosened, as desired.

Keyed to the crank-shaft 3, outside the rod 22, is a disk 25, the same comprising one half of the friction-clutch, the opposite half comprising the disk 26, arranged to engage against the face of the disk 25, and the small sprocket-wheel 27, connected with the sprocket-wheel 21 by the chain 28. This disk 26 and sprocket-wheel 27 are loosely mounted upon the crank-

shaft 3 and are arranged to slide a short distance laterally thereupon.

Seated in the crank-shaft 3, just outside the sprocket-wheel 27, is a pair of rectangular lugs 29, and arranged to slide upon said lugs and upon the shaft 3 is a disk 30. Engaging upon the outer face of this disk 30 is a pair of fingers 31, the same to be pivotally held in the periphery of the ring 32, which is loosely mounted upon the shaft 3. Arranged to slide on the outer end of said shaft 3 is a collar 33, in the periphery of which is formed a groove 34, and the inner end of said collar is rounded and engages directly beneath the outer ends of the fingers 31. Rotatably held in a pair of bearings 35, which extend outwardly from the end of the crank-shaft cylinder, is a vertically-arranged rod 36, upon which is fixed a laterally-projecting arm 37, the outer end of which is bifurcated and passed halfway around the collar 33, and pins are passed through the bifurcated ends, which pins engage in the groove 34 of said collar 33.

38 indicates the metallic plate or casing that is fitted over the front and open side of the rectangular frame 6, and arranged in bearings formed in the side of one end of this casing is a shifting rod 39, the same projecting a short distance on each side of the plate or casing 38, and said shifting rod 39 projects through a lug 40, which is formed integral with the top edge of the frame 6 and which lug projects laterally a short distance from said frame. This lug 40, in addition to being provided with an aperture through which the shifting rod operates, is provided with a rectangular aperture 41, the same extending through said lug at right angles to the aperture through which the rod operates.

Adjustably located upon the shifting rod 39, within the frame 6, is a rearwardly-extending fork 42, the same engaging on each side of the pinion 20. Formed in that portion of the rod 39 that operates through the lug 40 are three rectangular notches 43^A, 43^B, and 43^C.

Rigidly secured upon the rod 39, outside the lug 40, is a pair of collars 44, and fixed upon said rod and bearing against the lug 40 is a collar 45. A spring-actuated pawl 46 is pivoted to a pin 46^A inside the lug 40, the free end of said pawl actuated upwardly by spring 47, engaging in circular recesses 47^A, located in the under side of the rod 39 at suitable intervals between the notches 43^A, 43^B, and 43^C.

Fulcrumed upon an arm 48, that projects downwardly from the vehicle, is a bell-crank 49, the free end of which is bifurcated and is passed between the collars 44, rigidly fixed upon the shifting rod 39. To the opposite arm of this bell-crank 49 is connected the rear end of a rod 50, the same extending forwardly into the lower portion of the forward end of the vehicle or carriage. Fixed in this portion of the carriage is a block 51, and pivoted to the upper portion of the block 51 is a lever 52, to the lower end of which is pivoted the rod 50, previously mentioned.

Rotatably arranged in the plate or cover 38 and adjacent the shifting rod 39 is a shaft 53, upon which is keyed a pinion 54, the same meshing with the large gear-wheel 11, and keyed upon said shaft in the opposite end of the frame 6 from this pinion 54 is a pinion 55, the same being of such size as that it will readily mesh with pinion 20 when said last-mentioned pinion is moved to a proper position upon the shaft 16.

Keyed to the shaft 53, just outside the plate or cover 38, is a brake-pulley 56, around which passes a strap 57. The end of this strap 57 is pivotally secured to two pins 58, carried by the lower end of a vertically-arranged lever 59, the upper end of said lever being pivotally connected to the rear end of the locking-bar 60, the opposite end of which is provided with a widened portion 61, which operates through the rectangular aperture 41 in the lug 40. The end of this widened portion 61 of the locking-bar is pivotally connected to the inner end of an arm 62, that is carried by the vertically-arranged rod 36, and pivotally held upon the same pin that connects the inner end of this rod 62 with the end of the locking-bar 60 is a rear end of a rod 63, the same extending forwardly beneath the body of the vehicle or carriage, and the forward end of said rod is pivotally connected to the lower end of a hand-lever 64, the same being pivoted in front of the seat of the vehicle to the block 51^A in all respects similar to the block 51.

The operation is as follows: When the various parts are in the position shown in the drawings and it is desired to go ahead, the operator on the seat of the vehicle pushes the upper end of the lever 64 forwardly, which movement throws the inner end of the arm 62 rearwardly, thus causing a slight rotation of the vertical shaft 36. The bifurcated arm 37, carried by said shaft 36, will move the collar 33 inwardly upon the crank-shaft 3, upon the result of which the forward ends of the fingers 31 will engage against the outer face of the plate 30, and this action forces the outer disk 26 of the friction-clutch against the fixed disk 25, and following this action the rotary movement of the crank-shaft 3 is imparted, through the sprocket-wheels 27 and 21 and the chain 28, to the shaft 16 and from this shaft 16 through the pinion 19 and gear-wheel 11 to the rear axle of the vehicle. Thus the vehicle moves forwardly at a low speed, owing to the fact that the low gearing is in use, and as soon as the vehicle is well under way or whenever it is desired the operator throws the high or speed gearing into operation by pulling the upward end of the lever 64 rearwardly, which pulls the wider portion 61 of the locking-bar 60 forwardly out of the notch 43^A, in which it has been positioned, and at the same time pushes the upper end of the lever 52 forwardly, which actuates the bell-crank 49, which instantly acts to throw the shifting rod 39 laterally, and the pinion 20 is

carried by the fork 42 over and into mesh with the small gear-wheel 12. The operator now throws the upper end of the hand-lever 64 forwardly, thus setting up the friction-clutch and causing the widened portion 61 of the locking-bar 60 to engage in the notch 43^B, which has been brought into coincidence with the aperture 41 at the time the bell-crank 49 actuated the shifting rod, and it is obvious that the pinion 20 must be in perfect mesh with the gear-wheel 12 before this notch 43^B coincides with the aperture 41 to allow the hand-lever 61 to be actuated to set up the friction-clutch and return the locking-bar to its normal position. The vehicle now moves forwardly at a high speed, owing to the fact that the pinion 20, which is larger than the pinion 19, is in mesh with the gear-wheel 12, which is smaller than the gear-wheel 11. It will be readily seen that whenever the hand-lever 64 is pulled backwardly the brake, comprising the lever 59 and the strap 57, acts upon the pulley 56, and said brake can be thrown into operation at any time, regardless of the position of the gearing. Said brake operates simultaneous with the release of the friction-clutch, and said brake may be operated when the vehicle is moving at either speed, and the speed of the vehicle is slightly decreased by setting the brake whenever the gearing is shifted. When it is desired to back the vehicle, the upper end of the lever 64 is pulled rearwardly, which pulls the wider portion 61 of the locking-bar 60 forwardly out of the notch 43^B, and at the same time the upper end of the lever 52 is pushed forwardly, which actuates the bell-crank 49, which instantly acts to throw the shifting rod 39 laterally, and the pinion 20 is carried by the fork 42 over and into mesh with the pinion 55 upon the shaft 53. After this operation takes place and the hand-lever 64 is moved forwardly to set up the friction-clutch and lock the bar 60 in the notch 43^C the rotary motion to the rear axle of the vehicle from the crank-shaft 3 is reversed, owing to the throwing into mesh of the intermediate gearing carried upon the counter-shaft 53. A reversal of the movements of the lever 52 will of course reverse the shifts and changes described, and when these reverse movements take place the bell-crank 49 acts each time to instantly shift the rod 39.

No combination of movements of the lever 52 and lever 64 can disarrange the gearing, as the automatic locking-bar 60 prevents lateral movement of the shifting rod 39 at all times except when the wider portion 61 is withdrawn from the notches in said shifting rod, and the friction-clutch cannot be set up except when the gearing is in proper mesh and one of the notches 43 is in coincidence with the aperture 41.

In the motor-gearing of my improved construction but one friction-clutch is employed, a minimum number of gears are employed, only two levers are made use of to control the vehicle, and none of the gearing is in mesh except when the vehicle is running.

The gearing runs in proportion to the speed of the vehicle, and said gearing is very compact and can be made practically noiseless by placing a casing or cup beneath the frame and filling the receptacle thus formed wholly or partially with oil.

The entire mechanism is very simple, is easily controlled, and will not easily get out of gear.

I claim—

1. In a gearing for motor-vehicles, an engine-casing, a gearing-frame positioned rearwardly from said engine-casing, driving-gears arranged within the gearing-casing for driving the rear axle, which driving-gear is driven by the engine, a connecting-rod between the driving and the driven shafts, and means under control of the operator whereby said gearing is thrown into and out of gear and shifted to obtain different speeds, substantially as specified.

2. In a gearing for motor-vehicles, an engine-casing swung beneath the vehicle-body, a gearing-frame positioned rearwardly from the engine-casing, through which gearing-frame the rear axle of the vehicle passes, gearing arranged within the gearing-casing for driving the rear axle, which gearing is driven by the engine, means whereby said gearing is thrown into and out of gear, means whereby a certain set of the gearing is shifted to obtain different speeds and to reverse the motion of the rear axle, and means whereby the shifting mechanism is locked in either of its set positions, substantially as specified.

3. In a gearing for motor-vehicles, a suitable gearing-casing through which the rear axle of the vehicle passes, a drum arranged upon said axle, gear-wheels of different diameters integral with said drum, a shaft passing through the gear-casing which is driven from the engine, a double pinion carried by and sliding upon said shaft, which double pinion meshes with the different-sized gear-wheels, a shifting rod arranged in the gear-casing, connections from said shifting rod to the double pinion, and means whereby said shifting rod is locked in any one of its set positions, substantially as specified.

4. In a gearing for motor-vehicles, a suitable gearing-casing through which the rear axle of the vehicle passes, a drum arranged upon said axle, gear-wheels of different diameters integral with said drum, a shaft passing through the gear-casing which is driven from the engine, a double pinion carried by and sliding upon said shaft, which double pinion meshes with the different-sized gear-wheels, a shifting rod arranged in the gear-casing, connections from said shifting rod to the double pinion, a lock for engaging the shifting rod in any one of its set positions, and means whereby said shifting rod and lock are operated from the front of the vehicle, substantially as specified.

5. In a gearing for motor-vehicles, an engine-casing a gear-casing through which gear-casing passes the rear axle of the vehicle, gearing arranged upon said rear axle, a counter-shaft, a double pinion carried by said shaft, means whereby said double pinion is shifted to mesh with the first-mentioned gearing, means whereby said shifting mechanism is locked at any one of its set positions, gearing from the counter-shaft to the crank-shaft of the engine, and means whereby said last-mentioned gearing is thrown into and out of gear, substantially as specified.

6. In a gearing for motor-vehicles, constructed with a plurality of differential speed-gears, the combination with a shifting rod in which is formed a plurality of notches, of a locking-bar adapted to engage in any one of said notches and of a spring-actuated pawl located beneath said shifting rod and adapted to engage in circular recesses in the under side of said rod substantially as specified.

7. In a gearing for motor-vehicles, constructed with a plurality of differential speed-gears, the combination with a shifting rod in which is formed a plurality of notches, of a locking-bar adapted to engage in any one of said notches, and means whereby the shifting rod and locking mechanism are independently operated, substantially as specified.

8. In a gearing for motor-vehicles, a gear-casing through which the rear axle of the vehicle passes, gearing arranged upon said rear axle, a counter-shaft driven from the crank-shaft of the engine, a double pinion upon said counter-shaft, a second counter-shaft, gearing mounted on said second counter-shaft, a brake arranged on said second counter-shaft, means whereby the double pinion is shifted upon the first counter-shaft to mesh with the gearing on the axle or with the gearing on the second counter-shaft, means whereby said shifting mechanism is locked in any one of its set positions, which locking mechanism actuates the friction-clutch on the second counter-shaft whenever the shifting mechanism is unlocked, substantially as specified.

9. A motor-vehicle having an engine-cylinder integral with which is a rearwardly-projecting crank-cylinder, both of which are rigidly suspended from the vehicle-bed, a gearing-casing; a rod having a turnbuckle joining the two parts thereof and pivotally joining the crank-shaft and a driven shaft, and a chain connecting sprocket-wheels located on each driven shaft and the crank-shaft, and causing the former to rotate when the mechanism is in gear, substantially as specified.

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

GEORGE PRESTON DORRIS.

Witnesses:
R. C. BIENENSTOK,
JOHN C. HIGDON.