(No Model.)

5 Sheets—Sheet 1

W. S. WOOTTON.

ROAD ENGINE.

No. 591,027. Patented Oct. 5, 1897.

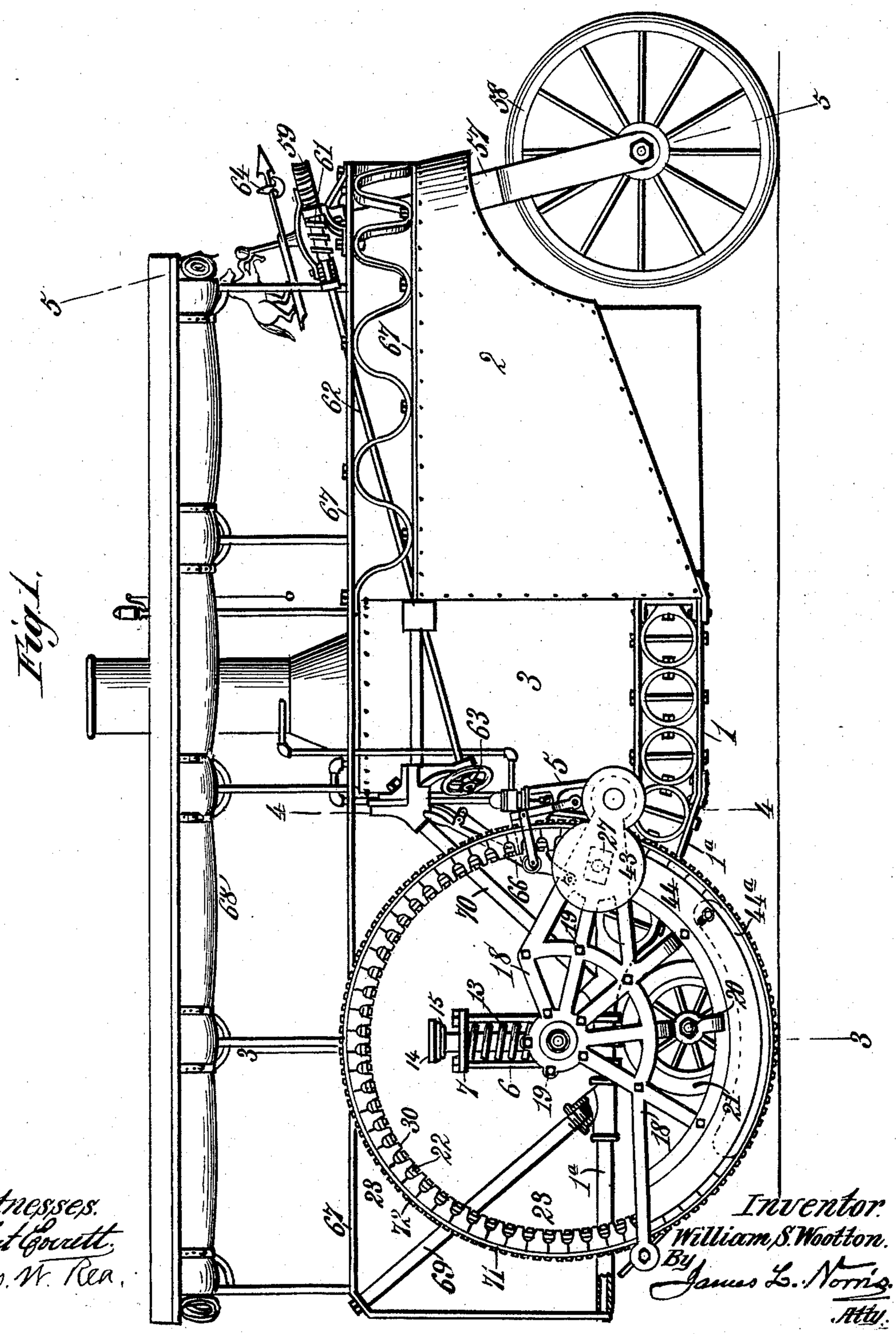

Fig. 1.

Witnesses.
Robt Govett.
Geo. W. Rea.

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William S. Wootton.
By James L. Norris.
Atty.

(No Model.)

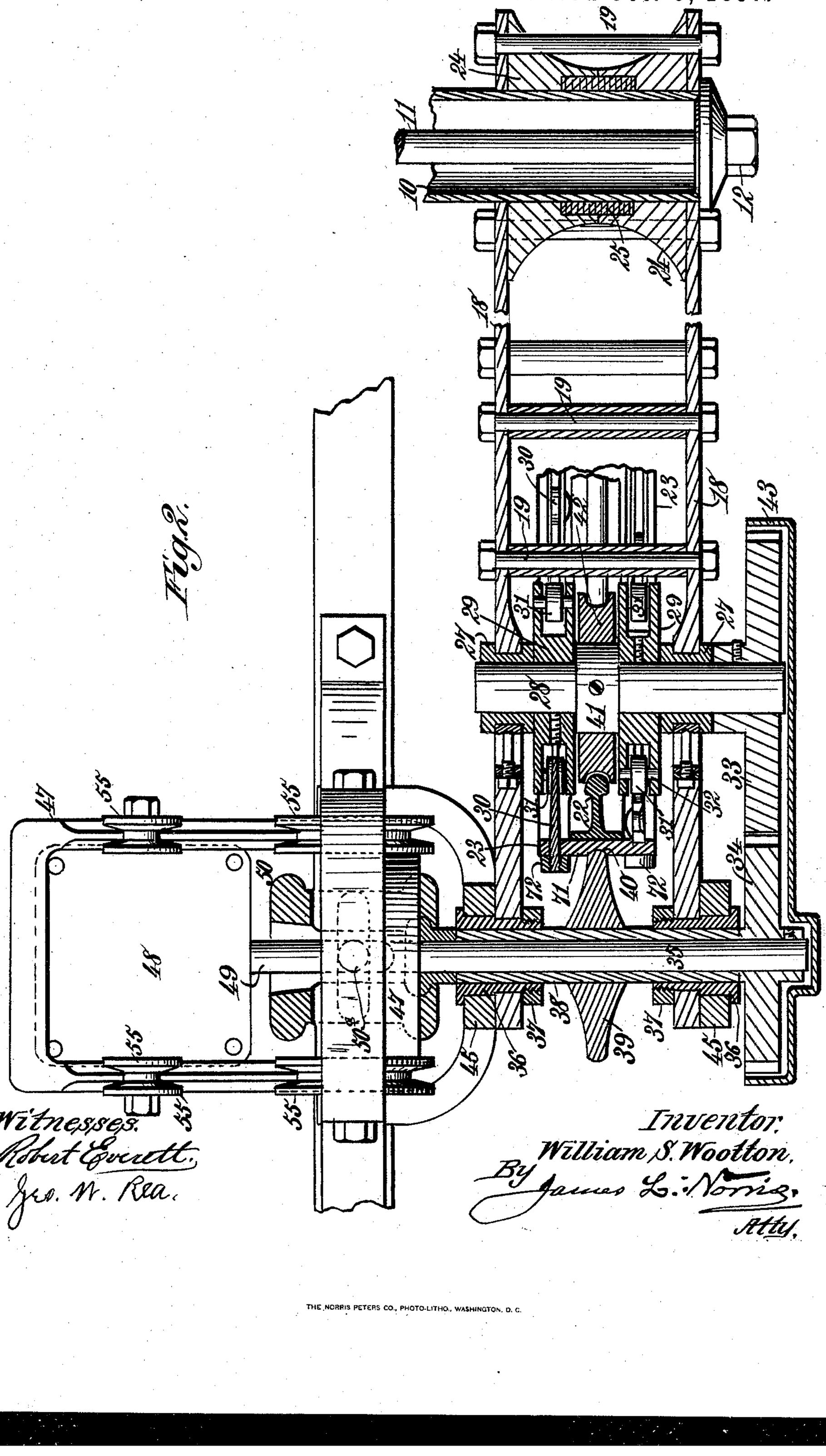
5 Sheets—Sheet 2.

W. S. WOOTTON.

ROAD ENGINE.

No. 591,027. Patented Oct. 5, 1897.

Fig. 2.



Witnesses.
Robert Everett,
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(No Model.)

5 Sheets—Sheet 3.

W. S. WOOTTON.

ROAD ENGINE.

No. 591,027. Patented Oct. 5, 1897.

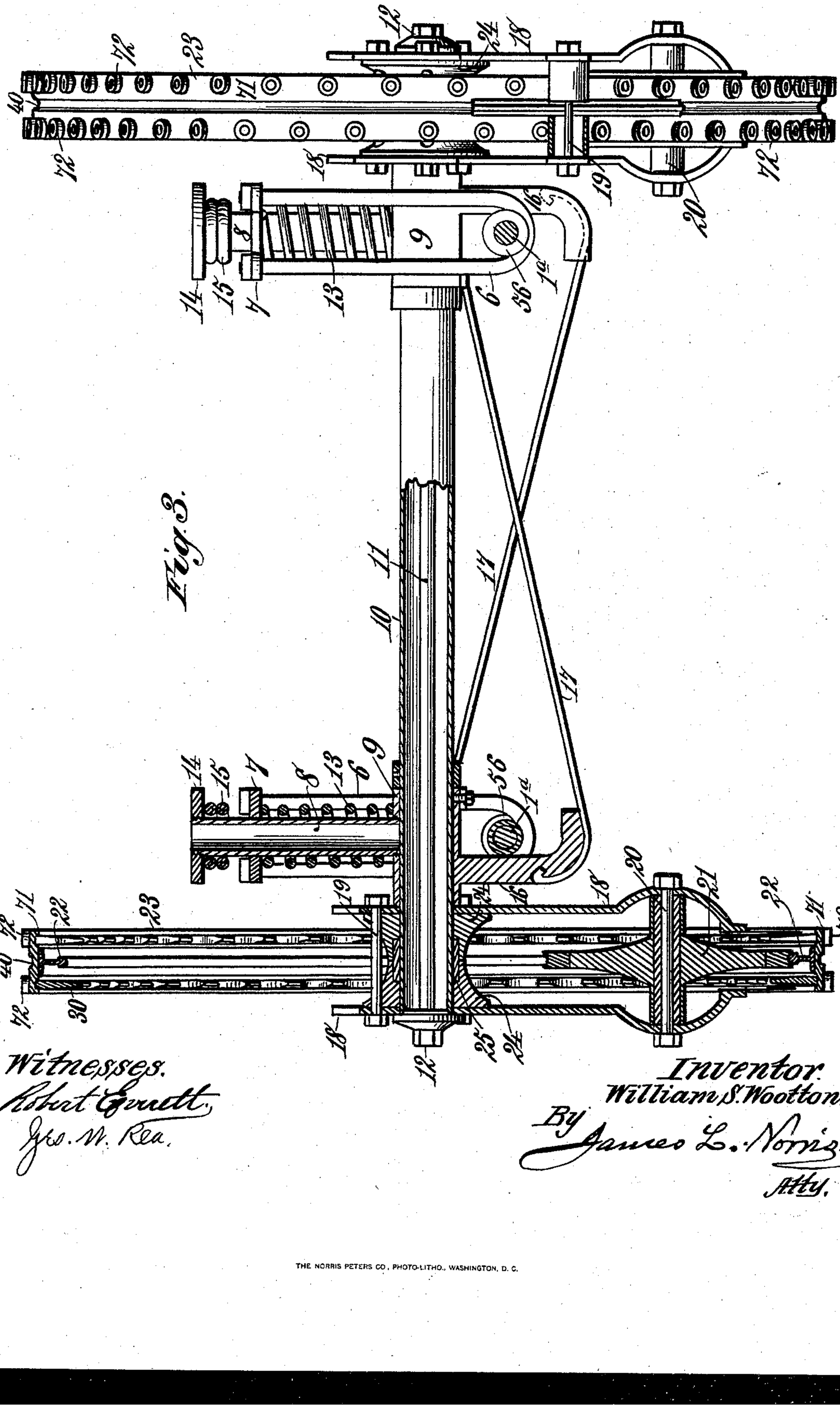

Fig. 3.

Witnesses.
Robert Gerdtt,
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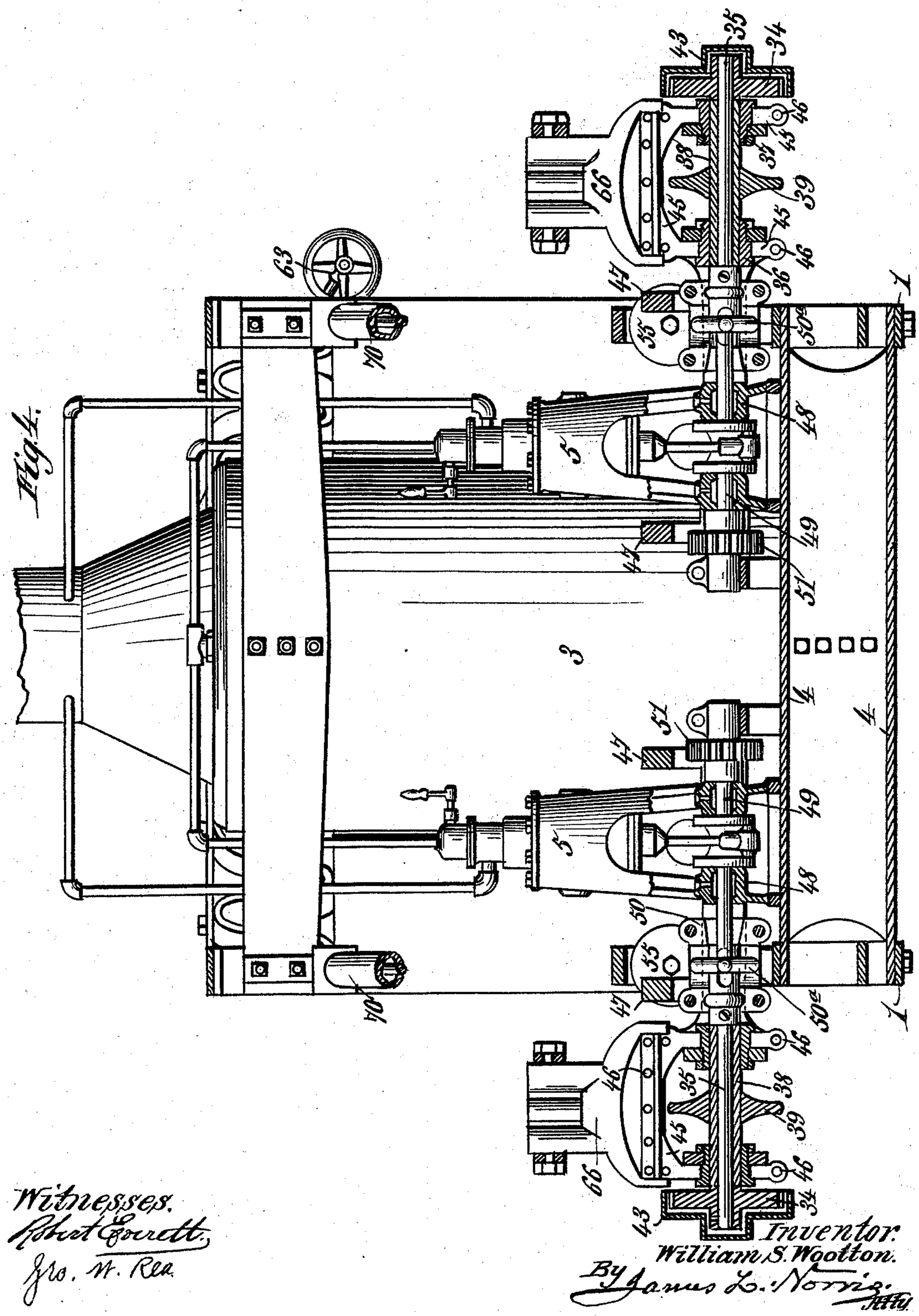
(No Model.) 5 Sheets—Sheet 4.

W. S. WOOTTON.

ROAD ENGINE.

No. 591,027. Patented Oct. 5, 1897.



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(No Model.)

5 Sheets—Sheet 5.

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ROAD ENGINE.

No. 591,027. Patented Oct. 5, 1897.

Fig. 5.

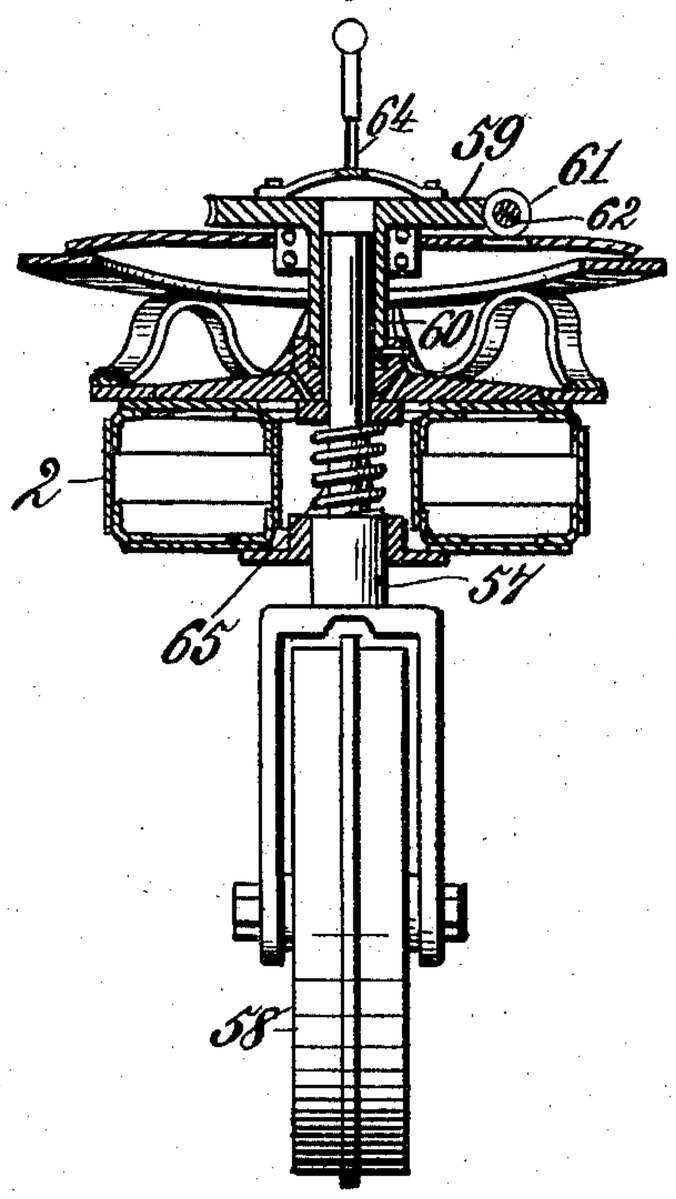


Fig. 7.

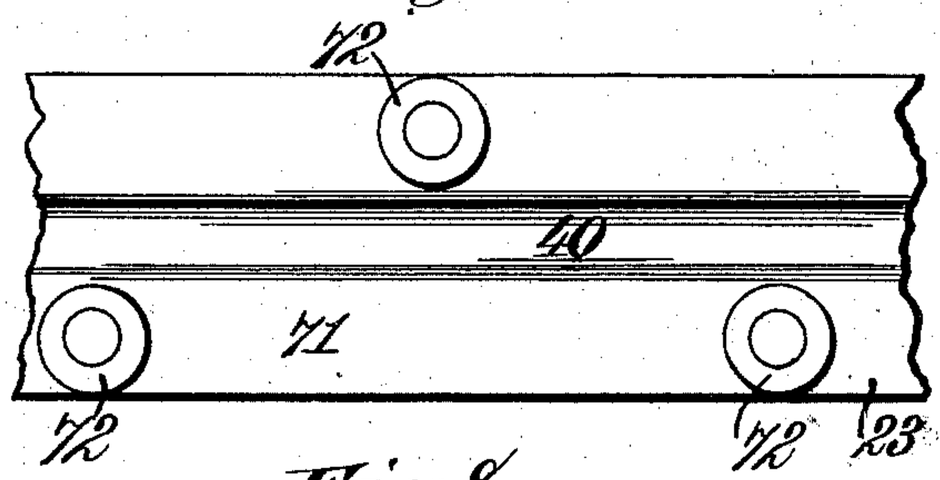


Fig. 8.

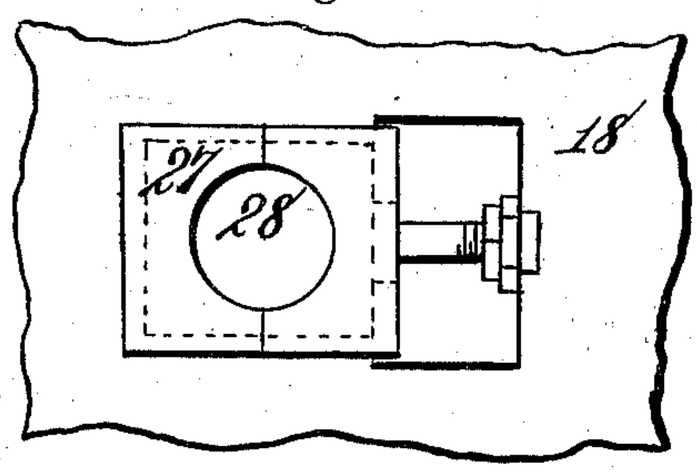
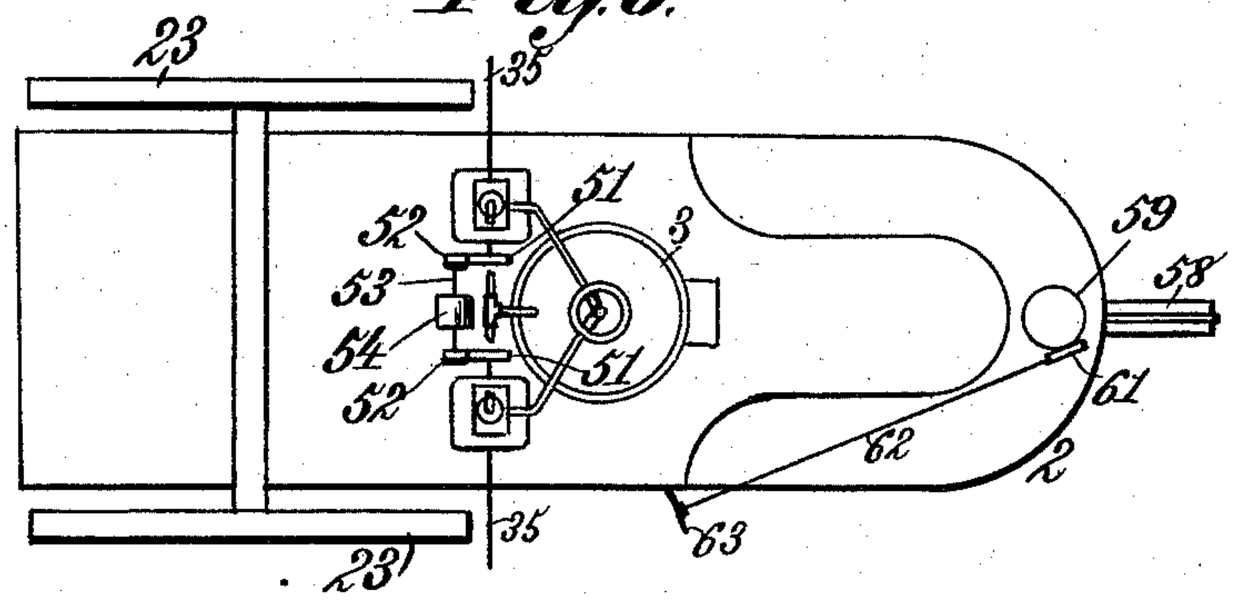


Fig. 6.



Witnesses.
Robert Sewell,
Geo. W. Rea.

Inventor.
William S. Wootton.
By James L. Norris.
Atty.

UNITED STATES PATENT OFFICE.

WILLIAM S. WOOTTON, OF ROANOKE, VIRGINIA, ASSIGNOR TO VESTA L. WOOTTON AND J. J. WOOTTON, OF SAME PLACE.

ROAD-ENGINE.

SPECIFICATION forming part of Letters Patent No. 591,027, dated October 5, 1897.

Application filed February 4, 1897. Serial No. 622,033. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM S. WOOTTON, a citizen of the United States, residing at Roanoke, in the county of Roanoke and State of Virginia, have invented new and useful Improvements in Road-Engines, of which the following is a specification.

My invention relates to road-engines or steam-carriages of a general character similar to that described and shown in Letters Patent granted to me December 20, 1887, No. 375,307, and August 7, 1888, No. 387,612, in which the machine is propelled by an engine or engines geared with hubless and spokeless track wheels or rims of large diameter, a portion of the weight being sustained by bearing-wheels which run on the inner peripheries of said track-wheels or hubless rims.

It is a purpose of my present invention to provide an improved road-engine comprising simplicity of construction and great strength with a very high degree of flexibility, so as to obviate shocks or jars in running the machine over uneven surfaces or upon ordinary rough roads, and which shall be capable of furnishing adequate power where a quick and easy portability is of prime importance.

To these ends and for other purposes hereinafter apparent my invention consists in features of construction and novel combinations in the parts of a road-engine, as herein described and claimed.

In the annexed drawings, illustrating the invention, Figure 1 is a side elevation of a road-engine embodying my improvements. Fig. 2 is a sectional plan, on an enlarged scale, of a portion of one of the driving wheels or rims, showing also its relations to parts of the engine-frame and main frame and driving-gears. Fig. 3 is a transverse vertical section on the line 3 3 of Fig. 1. Fig. 4 is a transverse sectional elevation on the line 4 4 of Fig. 1. Fig. 5 is a vertical section on the line 5 5 of Fig. 1. Fig. 6 is a plan of the road-engine in diagram and on a reduced scale, showing a power counter-shaft connected with both engines by spur-gearing and carrying a pulley or band wheel for transmitting power to drive other machinery when so desired. Fig. 7 is a plan of a portion of the outer periphery of one of the hubless track wheels or rims. Fig. 8 is a detail side elevation showing the manner of putting in boxes for the shafts of the pinions that gear with the inner periphery of a hubless rim.

Referring to the drawings, the numeral 1 designates the main frame of the machine, which frame may be of any suitable or approved construction and preferably comprises the water-tank 2 as an integral or rigidly-secured portion. The main frame 1 also carries the boiler 3, supported from its bottom edge by the flanges of suitable cross joists or bars 4, riveted or bolted to the sides of the boiler at front and rear. One of these joists is shown at 4 in Fig. 4 riveted at its ends to the main frame and at its middle to the boiler, while its flat top surface supports the engines 5 or an engine-bed. The top flanges of these joists 4 should be circularly cut away to receive the boiler and afford it adequate support.

The boiler and engines are preferably of the vertical type. Two engines are shown, though one will sometimes be sufficient. As my invention does not reside in these parts their construction need not be shown or described in detail.

The main frame 1 is provided on both sides of the machine with horizontal rearward extensions 1^a, Figs. 1 and 3, passed through eyes or loops at the lower ends of hangers 6, on the upper ends of which are secured cross-heads 7, that are centrally perforated for passage of vertical steel tubes 8, Fig. 3, screwed at their lower ends into boxes 9 for a main tubular steel shaft or axle 10, having a rod 11 passed longitudinally therethrough and screwed up tightly by nuts 12 on its ends. The vertical steel tubes 8 are surrounded between the cross-heads 7 and boxes 9 by spiral springs 13, that carry or support a portion of the weight of the machine through the said hangers 6 and their connections. There is on the upper end of each vertical tube or spring-support 8 a flange or collar 14 to hold in place rubber rings 15 for cushioning the cross-heads 7 on any jolting of the rear portion of the engine-carriage in passing over obstructions. The boxes 9 are furnished with depending shanks 16 for attachment of diagonally transverse truss-rods 17, Fig. 3, each

of which also connects with a box 9 on the other side of the machine.

On the ends of the main shaft or axle 10 are supported frames 18, Fig. 1, each of which is constructed in parallel-arranged halves connected by transversely-arranged bolts 19, Figs. 1, 2, and 3, disposed at appropriate or required points. In the lower portions of the frames 18 are supported the axles 20 of the peripherally-grooved bearing-wheels 21, that support the rear end of the machine, the said grooved bearing-wheels 21 being each arranged to take over and run on the central inner-periphery track 22 of one of the two centerless track-wheels or rims 23, that are of large diameter. By reference to Figs. 2 and 3 it will be seen that the frames 18 take on opposite sides of the respective track-wheels or drive-rims 23, which are in a manner caged in said frames. Between the halves of the frames 18 are annular or centrally-cored filling-pieces 24, Figs. 2 and 3, each of which is provided with an internal annular recess to receive a collar 25, fixed on the shaft or axle 10 and more effectually secure the same against end play.

In the forward lower portions of the frames 18 are provided adjustable split boxes 27, Figs. 1, 2, and 8, for the shafts 28, which carry pinions 29, gearing with the drive-rims or track-wheels 23 on the inner periphery of each. As shown, the inner periphery of each large wheel or rim 23 is provided on opposite sides of its inner peripheral track 22 with staggered teeth 30, with which the pinions 29 are engaged. The teeth or gearing-surfaces of the pinions 29 consist, preferably, of series of rollers 31, Fig. 2, on shafts 32, mounted in the grooved or recessed periphery of each pinion. The pinions 29 are arranged in pairs on the shafts 28, so that through the staggered or alternating arrangement of the rim-teeth 30, on opposite sides of the inner rim-track 22, a continuous propulsion may be imparted to the centerless track-wheels or drive-rims 23, while the roller-teeth 31 of the pinions will serve also to largely reduce the friction and facilitate a steady movement of the carriage.

There is secured on the outer end of each pinion-shaft 28 a spur-gear 33, meshing with and driven from a spur-gear 34, carried by a drive-shaft 35, that is driven from the engine or engines, as hereinafter described. The shaft 35 is mounted in trunnioned boxes or tubular trunnions 36, secured to the forward portions of the frames 18 by nuts 37 or otherwise. Intermediate this shaft 35 and the boxes or trunnions 36 is a revoluble sleeve 38, that loosely surrounds the said shaft. This sleeve 38 supports and serves as a shaft for a pressure or thrust wheel 39, the periphery of which is in contact with a central track 40 on the outer circumference of the centerless wheel or drive-rim 23 to take the thrust of said wheel or rim in propelling the machine. On each pinion-shaft 28, between the pinions 29, Fig. 2, is a fixed collar 41, surrounded by a loose peripherally-grooved roller 42 to take loosely on or against the inner peripheral track 22 of the drive-rim 23, for some little play is desirable between the said drive-rim and the pressure or thrust wheel 39, that is in front of said drive-rim. A shield 43, Figs. 1 and 2, may be provided to cover and protect the spur-gears 33 34, and the lower portions of the frames 18 may support shields 44, of plate-steel or other suitable material, to prevent gravel and mud from gaining access to the inner periphery of the drive-rims. As indicated in Fig. 1, an additional shield 44^a may be arranged to have a slight play between the inner side of the shield 44 and the teeth or cogs 30 of the centerless drive-rim, and this additional or inner shield may have its forward end pivotally and adjustably attached to the main shield, as shown. There is trunnioned or pivotally mounted on the boxes or trunnions 36 of the frames 18 a pair of frames 45, each of which is formed in two parts bolted together at the several points 46, Fig. 4, and connected also with the main frame 1 through frames 47, that partly support the engine-bed 48, Figs. 2 and 4. The frames 47 also support the engine-shafts 49, which may have any usual or suitable connections with the working parts of the engines. The engine-shafts 49 are in alinement with the drive-shafts 35 of the track-wheel or drive-rim gearing. Any suitable coupling may be provided for connecting the drive-shafts with the engine-shafts. As shown, the coupling 50 may be constructed in two parts—that is, split—to be taken off when the engines are employed for running machinery. On the engine-shafts 49 are spur-gears 51, Figs. 4 and 6, to mesh with spur-gears 52 on a counter-shaft 53, carrying a band-wheel or pulley 54, that may be belted to any machine which it is desired to run with power furnished from the engines 5, the engines being set "quartering" and the couplings 50 being meanwhile disconnected to render the shafts 35 inoperative. The couplings 50 are each slotted to take the cross 50^a of one coupling part and to permit end play when the shafts 35 and 49 are coupled for propelling the road-carriage.

The frames 45 pivot upon the trunnions 36 on a line crossing the couplings 50, while the frames 47 are connected with said frames 45 and main frame 1 in such manner as to afford a transverse movement of frames 47 through a slide-constructed bottom and top roller track, but with rigidity as against forward and backward movement of the frames 47, which are closely held down on sliding surfaces by four rollers 55, Fig. 2, that are strongly attached to the main frame 1 and engine-bed, these several frames thus connecting with each other hinge fashion and working with the universal couplings of the engine-shafts to allow lateral oscillation of the main frame contingent on unequal spring

action and make the connections of drive-rims 23 with the main frame practically immovable forward and backward. In propelling the engine over uneven ground, owing to the action of the wagon-springs, there are continual variations in distance of the main frame from the ground, and the two sides of the main frame vary in distance from the ground relative to each other, as is the case with all vehicles having springs. So the position of the two frames 18 vary in the drive-rims in their independent rotatory movement, as either side of the main frame may be depressed or elevated relative to the other, requiring a lengthening and shortening of the drive-shafts; and there is thus required a movement in the end-playing universal couplings of the engine-shafts and their connections, as well as in the frames 47 and connections. To accommodate this requirement, the couplings 50 are slotted and the rear extensions 1^a of the main frame are passed through sleeves 56, Fig. 3, supported in the hangers 6 to permit axial movement relative to the main frame, incident to the approach and simultaneous variations in approach of the two coupled drive-shafts 35 and contiguous parts, to the level of the greatest horizontal diameter of the drive-rims. The lateral movement of the main frame 1 is controlled at the rear or main axle 10 by the shanks 16, depending from the boxes 9, against which shanks the elastically-supported hangers 6 touch, taking under the sleeves 56 and within their flanges; and although the main frame is not allowed lateral movement here it is allowed backward and forward movement through the said sleeves. As a result of putting in operation the engines 5, while geared independently with the track-wheels or drive-rims 23, there will be a transferring of weight to said rims through the gearing connections and a consequent buoying or lifting of the main frame 1 with relaxing of the springs 13 followed by locomotion. This relaxing of the springs 13 is a valuable feature in giving "slack" to the engines, the said springs carrying a large part of the weight, and for every pound of weight removed from them by transfer to the drive-rims there will be a corresponding relaxation of the springs, and the engines will be thus enabled to start up without being required to simultaneously actuate the drive-rims.

The drive-rims or centerless track-wheels 23, owing to their large diameter—say, six to eight feet—pass smoothly over a rough surface, and the large diameter of these rims will give, relatively, little additional weight to the machine, being only rims without spokes and hubs. The bearing-points of the rear supporting-wheels 21 will vary in the rims 23, as more or less power is exerted to move the road-engine or carriage, and the more or less advanced position assumed by these wheels 21 will support the rims in the function or character of a spoke while mounting obstructions. The several arcs of the rims 23, operating as "thrust-bars," so to speak, in taking the push-force, give steadiness and firmness to stay the rims and resist concussion from the outer periphery. The springs 13 compress the easier on passing of the machine over rough surfaces in having the weight more or less borne by the arcs of rims 23, the main frame 1 or body of the machine having an oscillatory movement forward and backward at the trunnions 36, through which the frames 18 and 45 are pivotally connected. The weight of the main frame 1 is thus not wholly supported from the axles rear and front, being partly carried by the springs 13, and in proportion as weight is removed from these springs through transfer to the centerless drive-rims the impediments to forward movement of the machine will be lessened, and it will be enabled to readily mount and pass over obstructions with much greater facility in fact than if the weight were supported wholly from a central axis.

For guiding the machine and supporting its front end there is mounted in the forward portion of the main frame a vertically-extended rotatable shank 57, the lower end of which is bifurcated to receive the journals or axle of the forward wheel 58, which may be termed a "guide-wheel," though the carriage may be guided on abrupt curves to advantage by applying more power to that track-wheel or drive-rim 23 which is on the side opposite the course desired to be traveled, or by cutting off steam from the rear wheel on the inside of the curve to be turned.

On the upper end of the shank 57 is mounted a gear-wheel 59, which may have on its under side an elongated hub 60, Fig. 5, internally grooved its whole length to take onto a key or feather on the said shank. There is meshed with the gear-wheel 59 a worm 61, secured on one end of a shaft 62, that is extended rearward and fitted with a hand-wheel 63, through which the machine may be steered. As the forward or guide wheel 58 is not visible from the rear portion of the machine, an indicator or pointer 64, Fig. 1, is mounted in an elevated position on the top plane of the gear-wheel 59 and parallel with the vertical plane of the guide-wheel 58 to indicate the direction and degree of inclination given to it from the hand-wheel 63 in steering the carriage or road-engine. Between a part of the main frame 1 and a shoulder on the wheel-shank or support 57 is arranged a spiral spring 65, surrounding said shank, as shown in Fig. 5, to take up shock or jar from contact with obstructions and afford an elastic support for the forward end of the machine.

The machine is well adapted to all the uses of a portable engine, in employment as a stationary engine for driving machinery, and also as a traction-engine. There is a perfect flexibility of movement in the several parts constituting the framework of the machine, tending greatly to preserve it from strain and

racking in traveling over very rough surfaces, and the connections of all its several parts and arrangement of its gearing are such as will reduce friction and wear to a minimum. In drawing gang-plows or like implements they are attached to the rear of the main frame 1 and their adjustment to a required depth is maintained in all the variations of soil, hard and soft, as when the wheels 23 track more deeply in soft soil more power is taken to drive the engine, and in this the main frame is the more elevated from the impression or track of the wheels, but remains the same from the top of the soil. Thus the plows make, automatically, a nearly uniform cut downward, requiring little attention to do good work.

The speed of the machine may be checked or its stopping effected by reversing one or both engines, thus causing a transfer of the weight of the machine greatly to the rear, compressing the rear springs, and lowering the rear part of the machine-frame. By the independent gearing of the track-wheels, with a separate engine for each and the facility of checking either track-wheel in turning curves, greater speed is permitted in propelling the machine, and this with perfect safety.

The spur-gears 51, Figs. 4 and 6, or the gears 52 may be clutched or latched to their shafts, so they may be thrown out of mesh except when the engine is employed to drive machinery, as these gears are not concerned in propelling the carriage.

The machine may be provided with any suitable brake 66 and its appropriate operating mechanism so arranged that the brake-shoe can be quickly applied to the drive-rim when necessary and be held away from contact therewith when the use of the brake is not required.

The frames 1 and 1^a and water-tank 2 may support a suitably-braced superstructure 67, from which a canopy 68 may be supported. As shown in Fig. 1, additional braces or struts 69 and 70 may be extended between the frames 1^a and 67 to further strengthen the machine.

In the construction of the centerless drive-rims or track-wheels 23 I prefer to employ an ordinary railroad-rail of such length and size as may be desirable to form a rim of the required diameter. This rail is so bent into a circle that the usual top surface of the rail will form the inner-periphery track 22, while the base portion of the curved rail has shrunk thereon a broad metal tire 71, in which is formed the outer peripheral track or groove 40, in which the thrust-wheel 39 is engaged. This tire 71 is secured to the base of the rail or rim proper by means of bolts which are so constructed and arranged that their heads will form the teeth 30 on the inner periphery of the track-rim. The nuts 72 on the outer ends of these bolts will constitute a very serviceable shoeing for the centerless track-rim. It will be seen that with this construction each tooth 30 is a separate piece of metal and constitutes the head of a bolt which is passed through the rim proper and through the tire 71, holding them securely together by means of the nuts 72, that also provide a roughened shoeing for the track-rim. The bolts or teeth are staggered, as shown, along the opposite sides of the rim, and any bolt or tooth may be readily removed and a new one substituted when necessary. To aid in effectually staying the teeth or bolts 30, they may have rivets inserted between them to press the teeth outward against the tire and somewhat expand the rim diametrically the better to support the tire.

What I claim as my invention is—

1. In a road-engine, the combination of a main frame 1 supporting a boiler and engines, a main rear axle elastically connected with said main frame, the centerless track-wheels or drive-rims disconnected from said axle but having their axes coincident therewith, the two-part frames 18 supported on the ends of the main rear axle and extended on both sides of each of said track-wheels, the bearing-wheels 21 having their axles supported in said two-part frames and running on a track 22 on the inner periphery of the said drive-rims, a thrust roller or wheel mounted in the forward portion of each frame 18 in contact with the outer periphery of each track-wheel or drive-rim, a steady-roller mounted in contact with the inner periphery of each drive-rim opposite said thrust-wheel, and gearing connecting the engines with teeth on the inner periphery of each drive-rim, substantially as described.

2. In a road-engine, the combination of the main frame 1 and its elastically-connected main rear axle 10, the centerless track-wheels or drive-rims 23 each having on its outer periphery a central track 40 and on its inner periphery a central track 22 with staggered teeth on each side thereof, the two-part frames 18 supported on the ends of the main rear axle and extended on both sides of the said drive-rims, the frames 45 having trunnioned connections with the frames 18, the frames 47 connected with the said frames 45 and having a laterally-oscillating connection with the main frame, two independent engines, the engine-shafts mounted in the frames 47, the drive-shafts mounted in the frames 18 and 45 through their trunnioned connections or boxes, detachable universal couplings for connecting said engine-shafts with the drive-shafts, thrust-wheels or pressure-rollers sleeved loosely on the said drive-shafts to rotate thereon in contact with and in advance of the outer peripheral tracks of the centerless drive-rims, shafts mounted in boxes on the frames 18 and carrying pinions in mesh with the staggered inner peripheral teeth of the drive-rims and also a loose steady roller in contact with the central inner peripheral track of the drive-rims, and gearing connecting said pinion-shafts with the drive-shafts that couple with the engine-shafts, substantially as described.

3. In a road-engine, the combination of a flexibly-connected framework adapted for forward, backward and lateral oscillation, a main rear axle elastically connected with the main portion of the frame, the centerless track-wheels or drive-rims, the two-part frames extended on both sides of each of said track-wheels and supported on the ends of the said main rear axle, means for steadying said rims from the said two-part frames, and engines geared independently with teeth on the inner peripheries of said centerless drive-rims, substantially as described.

4. In a road-engine, the combination of a main frame 1 having horizontal rearward extensions 1^a, the main rear axle 10, the axle-boxes 9 provided with vertical standards 8 having cushioned heads 14, the hangers 6 having cross-heads 7, the springs 13 surrounding said standards between the said axle-boxes and hanger-heads, the depending shanks 16 on the axle-boxes, truss-rods 17 connecting said shanks of opposite axle-boxes, the sleeves 56 surrounding the rearward extensions 1^a of the main frame and engaged by the hangers 6 and shanks 16, the centerless track-wheels or drive-rims 23, frames 18 supported on the ends of the main rear axle 10 and provided with means for supporting and steadying the said centerless drive-rims or track-wheels, and engines geared with the inner peripheries of said wheels or rims, substantially as described.

5. In a road-engine, the combination of the main frame having an elastically-supported main rear axle, the centerless track-wheels or drive-rims, two-part frames supported on the ends of said axle and extended on both sides of the respective centerless track-wheels or drive-rims, pinion-shafts mounted in said frames, a pair of pinions carried on each of said pinion-shafts and each provided with a series of rollers journaled in its periphery and adapted to engage with staggered teeth on opposite sides of an inner peripheral track with which each track-wheel or drive-rim is provided, loose steady-rollers also carried on said pinion-shafts in contact with the said inner peripheral tracks of the drive-rims, drive-shafts geared with the pinion-shafts, engines having their shafts connected with said drive-shafts by universal couplings, sleeves loose on said drive-shafts, and thrust wheels or rollers mounted on said sleeves in contact with outer peripheral tracks of the track-wheels or drive-rims and in advance thereof, substantially as described.

6. In a road-engine, the combination of the main frame, a main rear axle elastically connected with said frame, the centerless track-wheels or drive-rims, the two-part frames supported on the ends of the main rear axle and extended on both sides of the said track-wheels, the rear bearing-wheels supported in said two-part frames, steady-rollers for the track-wheels, and the engines geared with inner peripheries of said track-wheels through universally-coupled and end-playing shafts, substantially as described.

7. In a road-engine, the combination of the main frame, a main rear axle, elastic or spring connections between said frame and axle, the centerless track-wheels or drive-rims and their independent engine-gearing, a guide-wheel for supporting the forward end of the main frame, worm-gearing for controlling the guide-wheel, and a direction-indicator mounted on the worm-gearing parallel with the vertical plane of the guide-wheel, substantially as described.

8. In a road-engine, the combination of the main frame, the rear centerless track-wheels or drive-rims, the rear bearing-wheels tracking in said rims, the engines independently geared with said rims, the forward supporting and guide wheel having a shank or support extended vertically through the forward portion of the main frame, a spring on said shank, a gear-wheel keyed on the upper portion of the said shank, worm-gearing for steering the guide-wheel through said gear-wheel, and an indicator or pointer mounted on the horizontal plane of said gear-wheel and in the vertical plane of the guide-wheel, substantially as described.

9. In a road-engine, the combination of a laterally, forwardly and backwardly oscillatory framework, a main rear axle having elastic and flexible connection with said framework, the centerless track-wheels or drive-rims, rear bearing-wheels tracking in said drive-rims, the engines independently geared with said drive-rims through shafts having universal and end-play couplings, the forward supporting and guide wheel, its steering or controlling mechanism, and a pointer for indicating the direction and degree of inclination given to said guide-wheel, substantially as described.

10. In a road-engine, the combination with the carriage-frame, the bearing-wheels, and the drive-gearing, of centerless track-rims each composed of a railroad-rail bent to circular form with the top surface of the rail forming an inner peripheral track for the bearing-wheels, a tire shrunk onto said rim, and bolts and nuts connecting the said rim and tire, the heads of said bolts being adapted to serve as cogs or teeth for meshing with the drive-gearing and the nuts on said bolts serving as a roughened shoeing for the track-rim, substantially as described.

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

WILLIAM S. WOOTTON.

Witnesses:
W. P. DUPUY,
E. L. MOIR.