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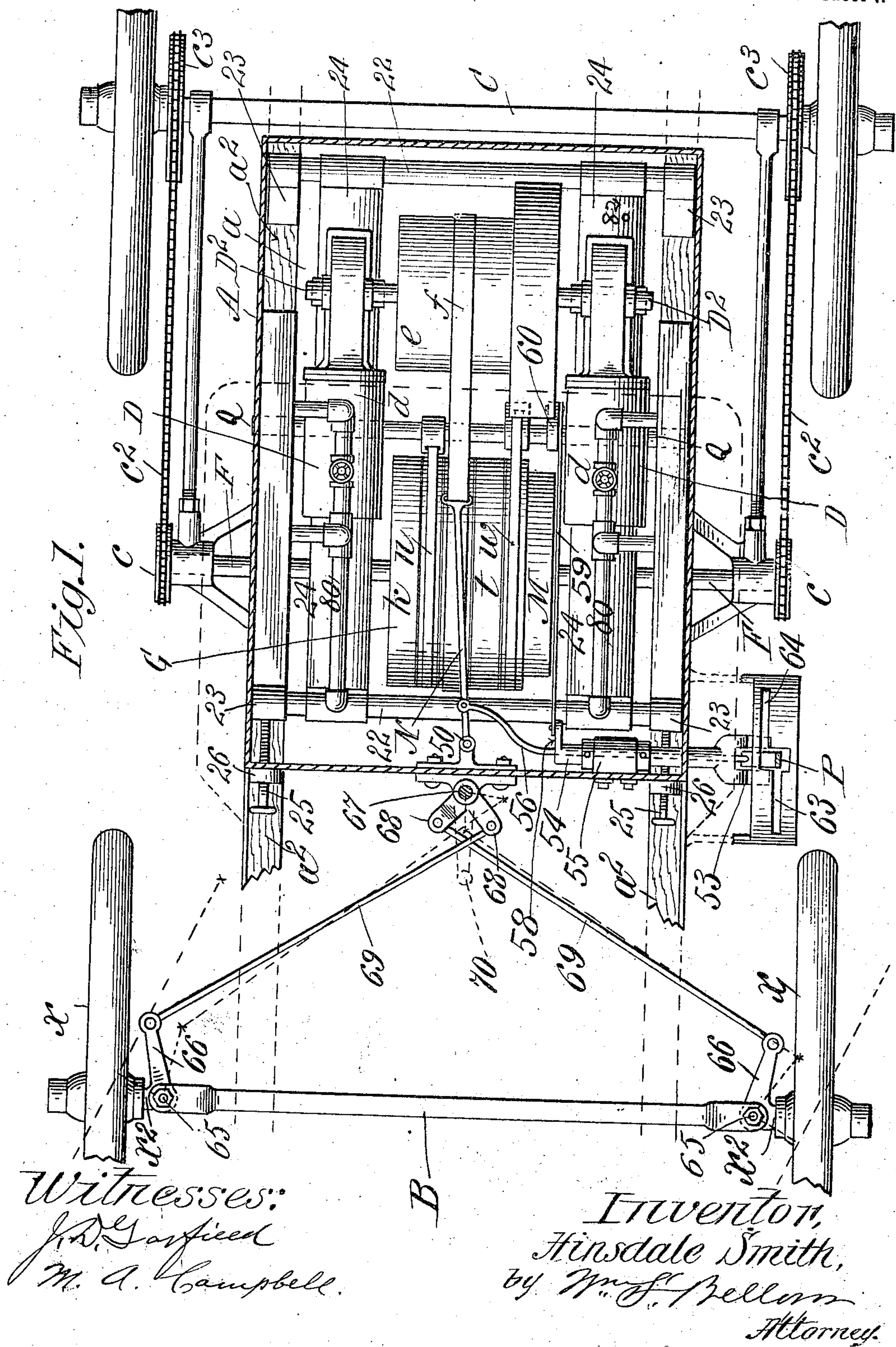
Patented Dec. 20, 1898.

H. SMITH.
MOTOR VEHICLE.

(Application filed May 10, 1898.)

(No Model.)

4 Sheets—Sheet 1.



No. 616,267.

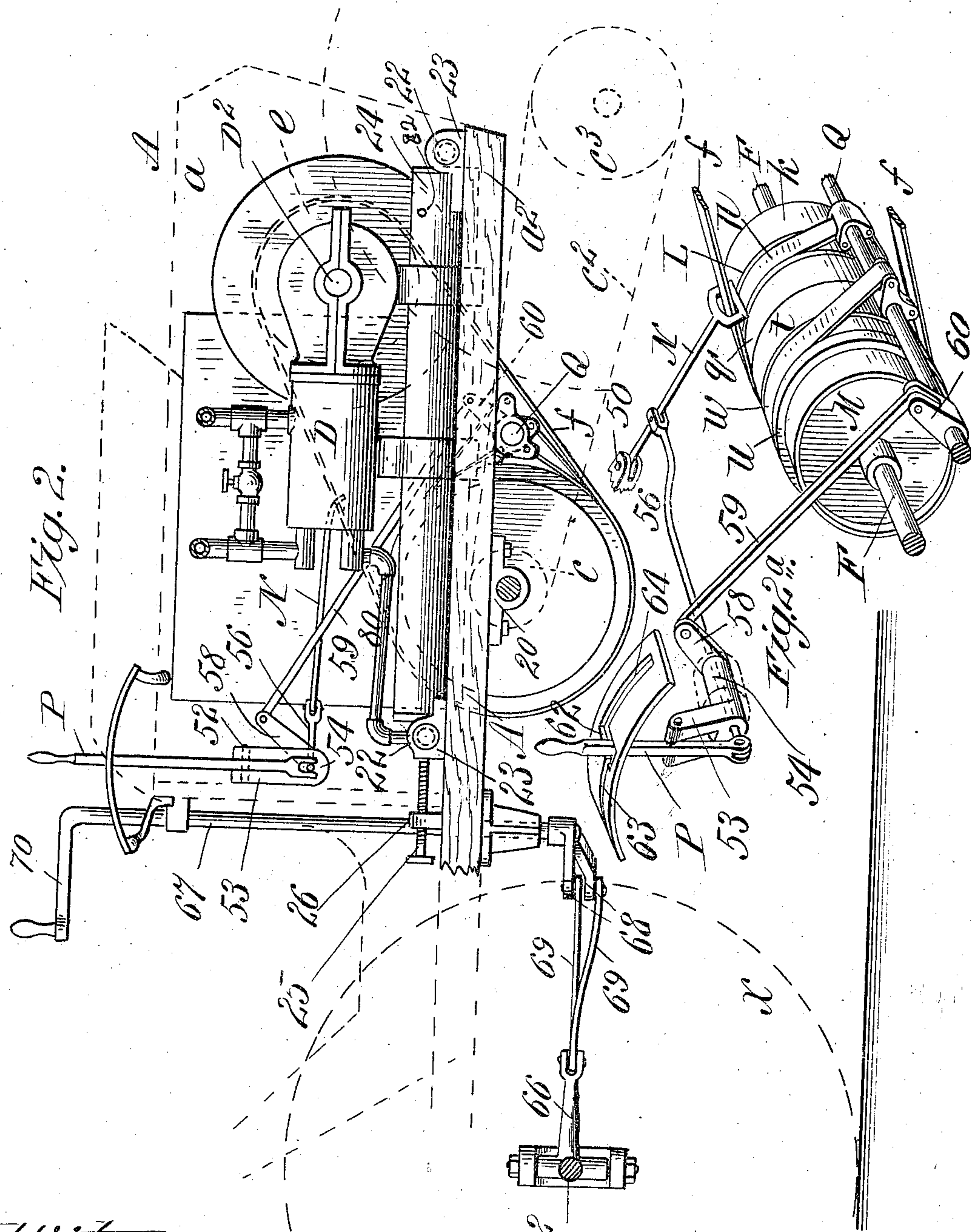
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(No Model.)

4 Sheets—Sheet 2.



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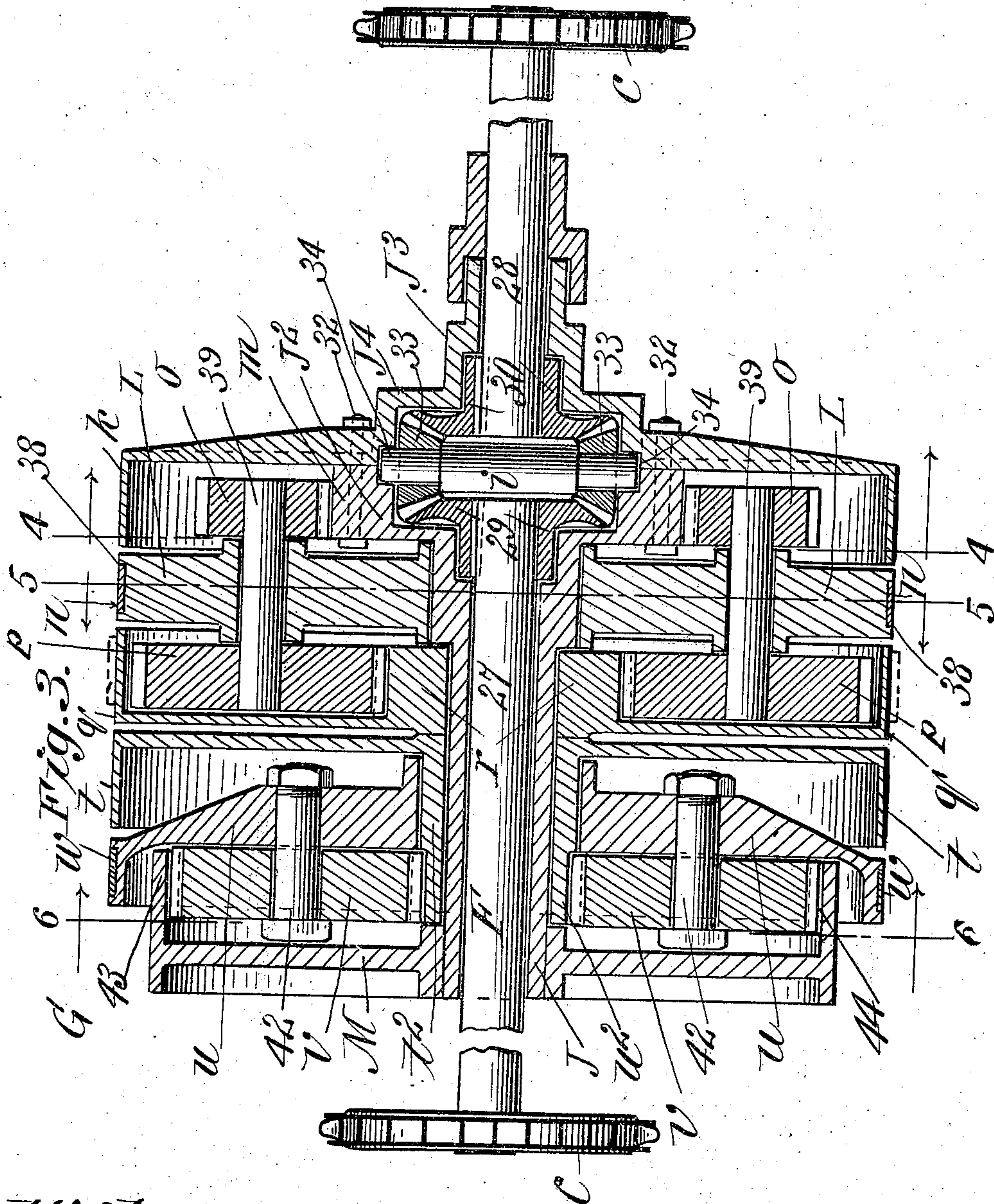
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4 Sheets—Sheet 3.



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4 Sheets—Sheet 4.

Fig. 4.

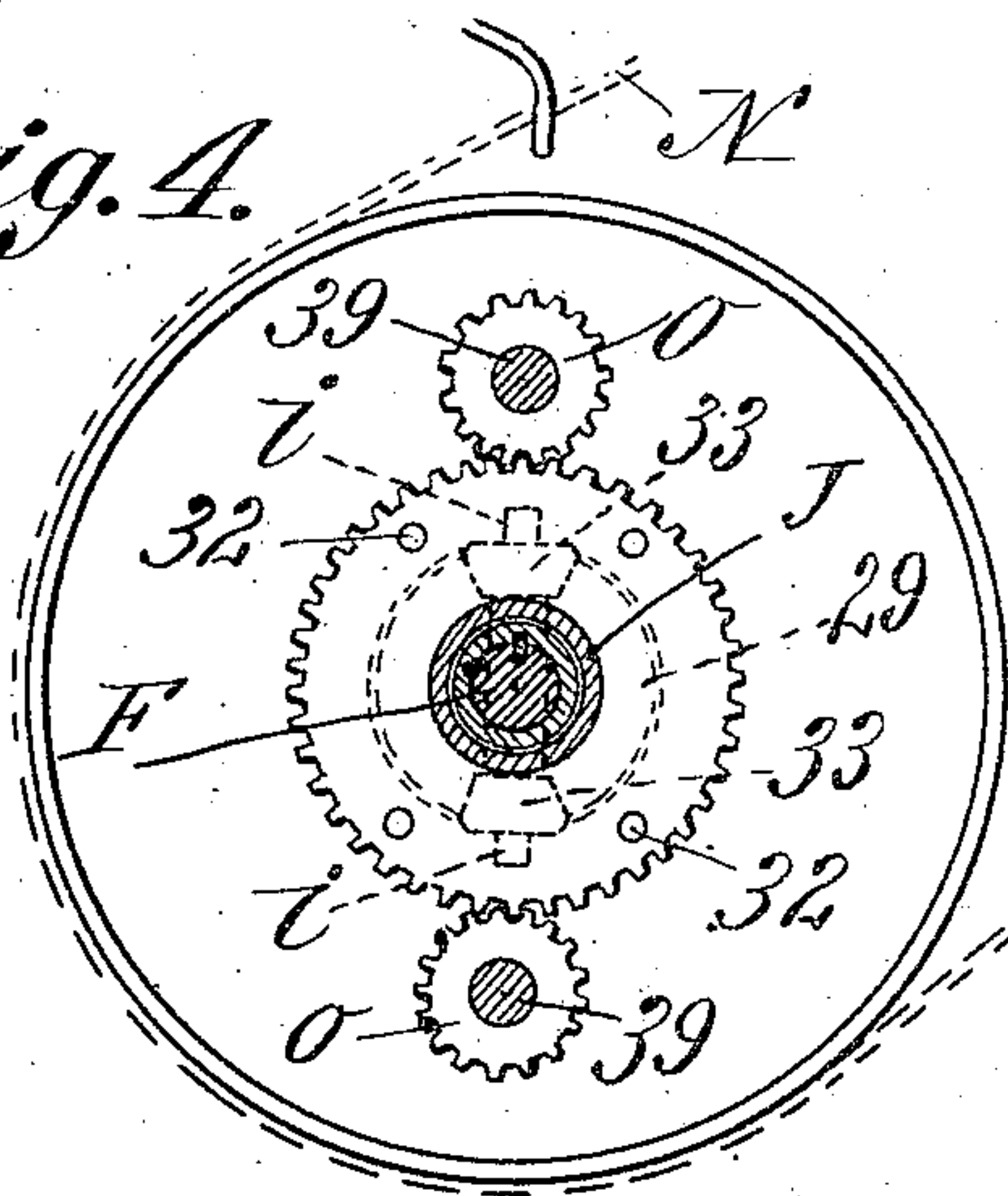


Fig. 5.

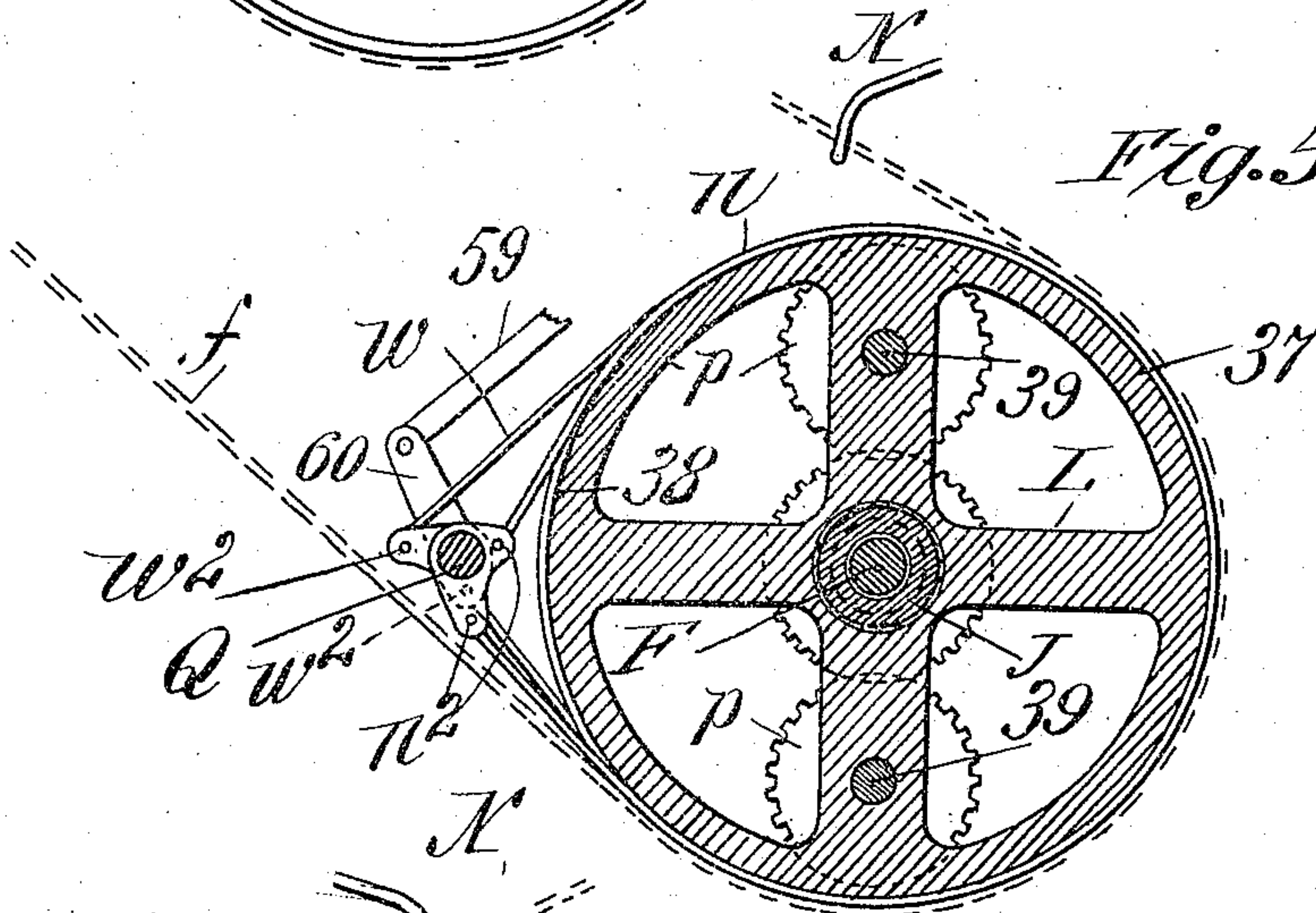
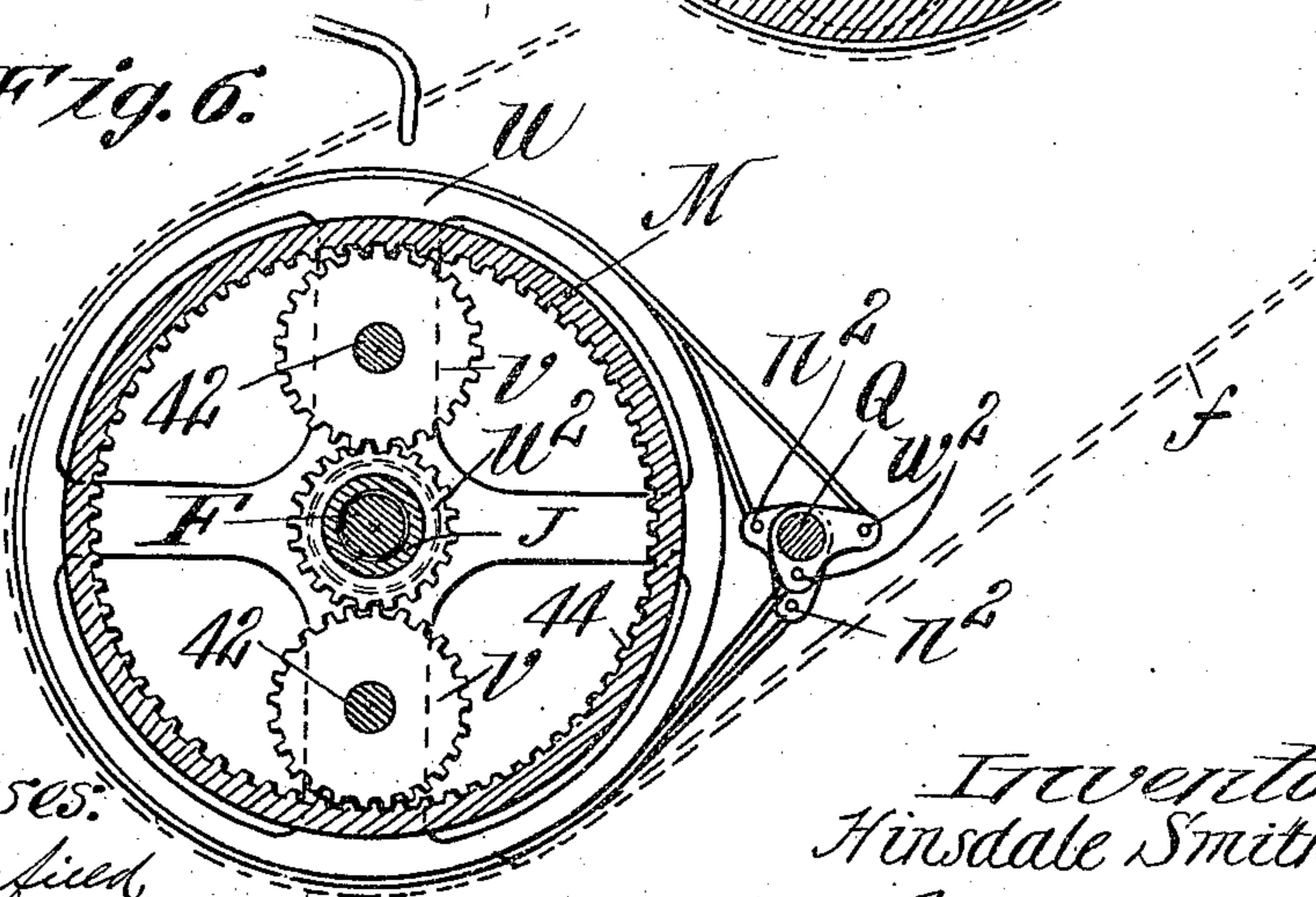


Fig. 6.



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UNITED STATES PATENT OFFICE.

HINSDALE SMITH, OF SPRINGFIELD, MASSACHUSETTS.

MOTOR-VEHICLE.

SPECIFICATION forming part of Letters Patent No. 616,267, dated December 20, 1898.

Application filed May 10, 1898. Serial No. 680,268. (No model.)

To all whom it may concern:

Be it known that I, HINSDALE SMITH, a citizen of the United States of America, and a resident of Springfield, in the county of Hampden and State of Massachusetts, have invented certain new and useful Improvements in Motor-Vehicles, of which the following is a full, clear, and exact description.

This invention relates to improvements in motor-vehicles, and more particularly to the manner of mounting the motor apparatus and to the speed changing and reversing mechanism and the operating or controlling and gaging or indicating devices therefor.

The object of the improved mode of mounting the motor, inclusive of all the motor apparatus, movably and adjustably on the vehicle independently of the driving-shaft for the vehicle which is driven by the motor, is principally to thereby cause the adjustably-mounted motor to become the tightener for the belt between the motor pulley or drum and the driving-shaft for the vehicle, which through the belt is driven by said motor-pulley.

The object of the improvements in the speed changing and reversing mechanism is to provide by a practical, comparatively simple, and light and durable and operative mechanism means whereby at the will of the rider while the motor is running the vehicle may remain immovable or whereby it may be run forward at a slow speed, at a more or less faster speed, as provided for, or caused to run backward, and one which, moreover, provides that of the two driven wheels of the vehicle one may run faster than the other, as required, on rounding curves or corners and all without interfering with the capabilities of the mechanism for driving said wheels.

The invention consists in combinations and arrangements of devices and parts and in the construction of parts and mechanism, all substantially as will hereinafter fully appear, and be set forth in the claims.

Reference is to be had to the accompanying drawings, wherein this invention is illustrated, and in which—

Figure 1 is a plan view showing the body and running-gear of the motor-vehicle and comprising especially illustration of the movable support for the motor and its conjunc-

tive apparatus, the steering-gear, and the mechanism for effecting the speed controlling, changing, and reversing mechanism. Fig. 2 is substantially a side elevation of the same, inclosing portions of the carriage-body, being understood as removed for disclosing the therewithin-contained mechanism. Fig. 2^a is a perspective view illustrating the controlling devices for the speed changing and reversing mechanism. Fig. 3 is a central sectional view, on a larger scale, of the mechanism through means of which, in conjunction with the motor and shiftable devices, the vehicle may be stationary or run at slower or faster speeds forwardly or propelled backward at a very slow speed. Figs. 4, 5, and 6 are cross-sectional views, on a scale smaller than Fig. 3, taken, respectively, on the lines 4, 5, and 6 of said Fig. 3 and as seen in the directions indicated by the arrows, respectively, on the section-lines.

Similar characters of reference indicate corresponding parts in all of the views.

In the drawings, A represents the body of the vehicle, comprising, as shown, although not necessarily, a box-like inclosure *a* and the sills or supports *a*², suitable supporting-springs being understood as interposed, as usual, between the body and the front and rear axles B C.

D represents the motor, the same being understood as advantageously a gasoline-motor having the double cylinders *d d*, the pistons thereof conjointly operating the motor-shaft D², on which is the comparatively wide fixed drum or pulley *e*.

F represents the driving-shaft for the vehicle, horizontally and transversely supported in suitable journals 20 therefor secured to the sills *a*² *a*² of the vehicle-body provided at its ends with the sprockets *c*, the rear vehicle-wheels also having sprockets, operated by the chain *c*² from the shaft F.

The belt *f* runs around the motor-shaft pulley *e* and around the speed controlling and changing mechanism, which as a whole is represented by the letter G, the same being composed of certain sleeve-like and disk-like parts, which will be hereinafter particularly pointed out and described.

The motor is mounted to be adjustably moved on the body of the vehicle independ-

ently of the vehicle driving-shaft F by manner of means as follows: Substantially a motor-supporting frame is comprised by the two transverse bars 22 22, supported at their ends on the sills of the body, one thereof being considerably in advance of and parallel with the other, each, as shown, having at its end a flat-based casting or slide-block 23, and, furthermore, by the longitudinally-ranging bars 24 24 at opposite sides, which are engaged or connected with said transverse bars 22 22.

Not only the motor, inclusive of its cylinders, motor-shaft, and the pulley, but also conjunctive apparatus comprised as a part of the motor, such as the gasoline storage, and vaporizing appliances and the muffler are supported on the motor-frame.

25 25 represent duplicated screw-shafts screw-engaging through suitable fixed members 26 26, which are fixed on or comprised in portions of the body, and having forcing engagements with the motor-supporting frame, whereby such frame may be forced and held with the motor-shaft properly distant from the vehicle driving-shaft F, on which is the aforementioned cylindrical speed controlling, changing, and reversing mechanism G.

By moving the motor-frame and motor relatively to the shaft F the driving-belt f may be taken up or placed in any tension which may be considered most advantageous.

The mechanism referred to generally by the letter G, around which the motor-driven belt runs, comprises means whereby under a constant running of the belt in the same direction the vehicle driving-shaft F will remain either stationary or be driven forwardly at either of two speeds or be reversely driven, and this mechanism will be now described in detail in conjunction with the controlling devices therefor.

For the purposes of acquiring the compensating capability, so that one of the rear wheels may rotate slightly faster than the other, the vehicle driving-shaft is made in the two sections or lengths 27 28, as shown in Fig. 3, and engaged by means as follows: Surrounding the section 27 of the shaft F is a loose sleeve J, having at one end a cup-shaped enlargement J², and having connected thereto, as by the bolts 32, the second sleeve-section J³, with the cup-shaped enlargement J⁴ endwise arranged relative to the cup-shaped enlargement J² of the sleeve J; thus constituting a case or inclosure for the bevel-gears 29 and 30, respectively secured on the shaft-sections 27 28, and for the paired bevel-gears 33 33, journaled on the shaft i, which is located and transversely arranged between the adjacent but somewhat separated ends of the said shaft-sections, the ends of said shaft i being supported in sockets 34 therefor oppositely provided in the walls of the gear case or inclosure constituted by the aforesaid cup-shaped sleeve-sections, said bevel-gears 33 33 meshing into said bevel-gears

29 30. The sleeve-section J² has its cup-shaped inner end portion radially extended in the edge-flanged disk constituting the pulley k. Rotation imparted to this pulley k directly causes the two united sleeve-sections to be correspondingly rotated, and the sleeve-sections, through their shaft i and gears 33 33 thereon, which are revolved bodily within and by the sleeve-cups, being in mesh with the shaft-section gears 29 30, insure that both shaft-sections 27 28 are rotated as one with the sleeve. In short, the rotation of the pulley k causes the rotation of shaft F at the same rate of speed.

If the shaft-sections 27 or 28 have rotating forces imparted thereto through the sprocket-and-chain connection with the rear wheels of the vehicle unequally, as by one wheel turning faster or on a greater radius than the other in rounding curves or turning around, this becomes possible by the compensating gearing 28 29 and 33 33, all while the mechanism retains its capability for rotatably driving both said shaft-sections from the power transmitted through the pulley k or otherwise to the sleeve.

Compensating gearing between two shaft-sections whereby both may be driven together and whereby one may have the faster or slower motion relative to the other, substantially as described, is not claimed as a new contrivance by me, although the combination and arrangement thereof in a speed-controlling mechanism as herein set forth embody the novelty.

The cup-shaped end portion J² of the sleeve J, which is widely surrounded by the flange constituting the pulley k, is externally provided with or formed into a spur-gear m. Next to the pulley k is a disk or spider L, having a rim 37 circumferentially the same size as the pulley k, the same being loose and rotatable on the sleeve J and having its rim rabbeted or formed with a groove or depression 38, within which may be sunk the strap n, combined with which are operating devices whereby the strap may be constricted about the rim, holding the said part L from turning, or the strap may be rendered loose thereabout, so that the said part L may turn. A journal-stud or preferably two or more journal-studs 39 are provided through and endwise extending beyond the opposite faces of the spider L between its rim and axis, each journal-stud carrying on its one end a pinion gear-wheel o in mesh with the sleeve-gear m and at its other end a larger gear-wheel p. Next to the disk or spider L is a pulley q, which is circumferentially the same size as pulley k and disk L, the same being loosely mounted for rotation upon the sleeve J, and this pulley q has formed on as a part thereof or attached thereto at its hub portion the gear wheel or pinion r, in mesh with which are the gear wheel or wheels p, mounted on and bodily revoluble with the disk L when the same is permitted to turn. Alongside the pulley q is another pulley t of

equal size, the same having the elongated sleeve-like hub loosely surrounding the sleeve J, having intermediately of its length, mounted loosely thereon, the disk or spider *u*, having a rim circumferentially the same as the rims of the pulleys *t*, *q*, and *k* and the disk L, the extremity of the hub *t*² of the pulley endwise beyond the part which is surrounded by the said disk *u* being externally formed or provided with the pinion-gear *u*². The disk or spider *u* carries the one or preferably two or more journal shafts or studs 42, having rotatably mounted thereon the spur-gears *v v*. The disk *u* has its circular rim formed with a depression or rabbet, receiving therein the strap *w*, combined with which are its strap-operating devices to be hereinafter described, whereby it may be constricted about the rim, holding the disk *u* from turning or be rendered loose thereabout, so that said disk may turn.

Having already described how directly turning the pulley *k* rotates the shaft as one therewith, it will now be pointed out that if the strap *n* is constricted to hold disk L against being turned and the belt *f* is running about the pulley *q*, rotating same, this pulley will, through the gear-wheels *r p o m*, rotate the sleeve, but at a considerably-reduced rate of speed; accordingly as the pinions *o o* are smaller than the sleeve-gear *m*, which they now are caused to drive. If the belt *f* is running upon the pulley *q* and the strap *n* is loosened from its constriction about the disk or spider L, whereby the latter is free for rotation, the pinion *r* at the hub of the pulley *q* will cause the gear-wheels *p* and *o* to be rotated, and it being assumed that the resistance against rotation of the shaft F and sleeve J is considerable the rotations of said wheels *p* and *o* will cause them, instead of turning the sleeve J and shaft F, to have their revoluble movements without further effect than to cause the spider-disk L to turn, the pinions *o o* roving idly about the spur gear-wheel *n*. Again, if strap *n* is rendered loose and strap *w* constricted to hold disk *u* against being turned and the belt is shifted onto pulley *t* (the belt at all times running in the same direction) the rotation of pulley *t* through its pinion *u*² and the intermediate disk-carried gear-wheels *v v* rotates the disk M and internal gear, which is a part thereof, in the reversed direction, correspondingly reversing the sleeve J and the driving-shaft F, the size of the pinion *u*² relative to the internal gear determining the extent of decrease in the speed which the vehicle driving-shaft will have when reversely rotated; and even while pulley *t* is rotated by the belt *f* if the strap *w* is loosened the rotation of the pinion *u*² will cause the intermediate gears *v v* to revolve the disk *u* without overcoming the resistance afforded by the internal gear-wheel M, around within which the said intermediate gears *v v* rove, all without effect to rotate the shaft F to drive the vehicle.

While my invention is not limited in certain portions thereof to any special mechanism for effecting the shifting of the belt from one of the positions mentioned to another and for operating the disk-holding straps, I have provided new and advantageous shifting and controlling means of extreme simplicity which are easy of operation and certain in result and the manipulation of which may be apparent or readily understood by any one having little or no knowledge of mechanical matters.

In referring to the drawings, Figs. 1 and 2 more especially, it will be perceived that the belt-shifter N is pivotally supported, as at 50, upon a suitable support or fixture therefor, preferably on the body of the vehicle, for transverse shifting movements horizontally back and forth.

P represents a controlling-lever pivotally mounted, as at 52, at the forward portion of the vehicle-body, at one side thereof, upon an upwardly-extending crank-like arm or fork 53 of a horizontally and transversely arranged rock-shaft 54, mounted in a suitable journal-bracket 55 therefor. (Seen in Fig. 1.)

The connecting-rod 56 is attached at the lower end of the controlling-lever and to the belt-shifter N. The said connecting-rod preferably is extended centrally through the rock-shaft, which for this purpose is made tubular.

Adjacent the speed-changing mechanism and parallel with the axis thereof is the rock-shaft Q, provided with the lever or crank arm 60, which, by connecting-rod 59, is secured to the crank-arm 58 of the rock-shaft 54. The said rock-shaft has opposite the disk or gear carriers L and *u* the variously-extended crank portions *n*² *n*² and *w*² *w*², with which the ends of the straps *n* and *w* are respectively connected, as seen in Figs. 2, 5, and 6, the arrangement of the connection-points for the straps being so opposed that the movement of the rock-shaft in one direction causes a tensioning or tightening of the one strap and simultaneously causes the loosening of the other strap, and vice versa.

A forward-swinging motion of the lever P will cause the rock-shaft on which it is mounted to tighten the strap *n*, whereupon, the belt running on pulley *q*, the vehicle will be caused to be forwardly driven at the slow speed. The swinging of the lever back into an upright position, whereby the strap *n* becomes released, and swinging the upper end of the lever transversely outward, inwardly moving its lower member, which is below the pivotal support thereof on the lever-arm 53 of the rock-shaft 54, causes the shifting of the belt onto pulley *k*, whereby the vehicle will be driven at its highest speed. Swinging the lever P transversely in the opposite direction—that is, inwardly in the proper extent—causes, through the swinging of the belt-shifter, the belt to be brought onto the pulley *t*, and upon next swinging the already-inwardly-shifted lever P rearwardly the strap *w* is tightened,

holding disk-carrier *u* and insuring the propulsion of the vehicle backwardly at the very much reduced speed.

In order to render manifest and easily gaged the proper positions and movements of the controlling-lever for the purposes as explained, a plate *R* is provided, which has a slot therein of peculiar conformation, upwardly through which the lever is extended. The slot comprises the transverse portion 62 at the middle of the plate, the forward extension 63 having its line of forward extension within the outer end margin of the said portion 62, and the rearward longitudinal extension 64 is in line with the rear margin of the portion 62, and it will be understood that with the lever *F* upright and in the slot portion 62 opposite the slot extension 63 the belt will be on pulley *q* and neither of the straps tightened. The throwing of the lever outward will place belt on pulley *k*, the straps both remaining loose. The swinging of the lever inwardly slightly will replace the belt on pulley *q*, and then on swinging the lever forward in slot portion 63 the strap *n* will be tightened, causing the driving at the reduced speed, bringing the lever back into central slot portion 62. Moving it transversely inward will carry belt over onto pulley *t*, and then the rearward longitudinal swinging of the lever to the rear of the slot extension 64 will cause tightening of the strap *w*, insuring the reversed driving at the much-reduced speed.

For the purposes of embodying in the motor-vehicle the compensating gearing 29 30 33 33 and combining the same in the speed controlling and reversing mechanism in connection with the vehicle driving-shaft, substantially as described and illustrated, it has been necessary to employ the sleeve *J J*³ in part to form and to have mounted thereon the speed-controlling gearing; but it will be apparent that except for the compensating gearing the united part *J J*² might itself directly constitute the vehicle driving-shaft and could very properly be made solid instead of annular or tubular.

Inasmuch as the novelties in the composition and combination of the parts constituting the speed-gearing are not dependent on their special arrangement in the motor-vehicle, such mechanism is herein claimed for any and all uses to which it may be put in varying situations without departing from my invention.

The relative sizes of the various gears are arbitrary and variable according to the speed effects to be acquired, and the device may be extended in a manifest way to have more than two forward driving-speeds by a supplemental or duplication of certain of the mechanism described in an obvious way, and the said speed-gearing herein described is susceptible by the turning of the central rotatable element (the shaft *F* or the sleeve *J*) to impart rotation to the wheels *k q t* instead

of having motion in the opposite direction from said wheels.

The front wheels *x x* are mounted on journals *x*² *x*², which at 65 are pivoted to the ends of the axle *B* in a manner already common in this class of vehicles, said journals having the rigid rearwardly-extending lever extensions 66 66.

On a suitable supporting part of the vehicle, at or near the front of the seat, is the vertical steering-shaft 67, having the leftward and rightward diagonally forwardly extended short members 68 68, the leftward one thereof being by rod 69 connected with the right-hand axle journal-lever extension 66, and the rightward lever member 68 being by a similar rod 69 connected with the left-hand axle journal extension 66, the said rods 69 69 crossing each other near their connections with the lever extensions of the steering-shaft 67. The said shaft 67 has on its upper end a suitable steering-handle 70.

The motor-support, hereinbefore referred to as comprised in the longitudinal members 24 and the transverse members 22, is advantageously constituted by having these members constructed as tubes or receptacles connected together and having their interiors in communication the one with the other. Thus while a motor-support of sufficient strength is acquired and one which has the capability of adjustment as and for the purpose explained the motor-support may be utilized in the performance of a double duty—namely, to constitute, in addition to the support, also a receptacle or receiver usefully embodied as a motor-equipment appliance or adjunct.

Referring to Figs. 1 and 2 as an illustration of one mode of utilization of the motor-support, it will be pointed out that 80 80 indicate the exhaust-passages of the motor-cylinders, the same leading into the hollow motor-support, so that the latter becomes a muffler for minimizing or practically overcoming the puffing noise usually heretofore attendant on the exhaust of the gasoline-motor. 82 indicates a relief-opening in the hollow motor-support to be provided when the latter is utilized as the muffler. The hollow support may, in lieu of constituting a muffler-chamber, be employed as a receptacle for the gasoline or other fluid employed in the motor or for holding a motor-cooling liquid.

I claim—

1. The combination with an axially or centrally arranged rotatable part having a fixed gear-wheel *m*, of a second rotatable part *q*, also having a fixed gear-wheel *r*, a disk or gear-carrier *L*, mounted to be rotated having united gears *o p* thereon, the one *p* adapted to be driven by the gear on said part *q*, and through its therewith-connected gear, driving the gear *m* on the first-named rotatable part, shiftable means for driving either of said rotatable parts, and means for permitting or re-

straining the turning of the gear-carrying disk q , substantially as described.

2. The combination with an axially or centrally arranged rotatable part having a fixed gear-wheel m , of a second rotatable part q , also having a fixed gear-wheel r , a disk or gear-carrier L , mounted to be rotated between said two rotatable parts having a depression 38 in its rim, and carrying united gears o and p , the one p adapted to be driven by the gear-wheel r on said rotatable part q , and through its therewith-connected gear o , driving said gear-wheel m on the first rotatable part, a shiftable belt for driving either of said rotatable parts, and a strap encircling said disk and located within the depression thereof, and having means operative to render it loose or constricted about said disk for permitting or restraining the turning of the disk, substantially as and for the purposes described.

3. The combination with an axially or centrally arranged rotatable part having a comparatively large fixed gear-wheel m , of a second rotatable part q , having a smaller gear wheel or pinion r , a disk or gear-carrier L , with the united gear-wheels o and p rotatably mounted thereon, the one p adapted to be driven by the said pinion, and through its therewith-connected gear o , driving the larger gear m on the first-named rotatable part, shiftable means for driving either of said rotatable parts, and means for permitting or restraining the turning of the gear-carrying disk, substantially as and for the purpose set forth.

4. The combination with an axially or centrally arranged rotatable part having a fixed gear-wheel m , of a second rotatable part q also having a fixed gear-wheel r , a disk or gear-carrier L , mounted to be rotated, having united gears o and p thereon, the one adapted to be driven by the gear r on said second-rotatable part, and through its therewith-connected gear o driving the gear m on the first-named rotatable part, shiftable means as a shiftable-belt for driving either of said rotatable parts J or q , means for permitting or restraining the turning of the gear-carrying disk, a single movable hand-operated part, connections between same and said shiftable driving means, and connections between same and said disk-restraining means whereby at pleasure, through said single hand-operated part, the driving means may be caused to cooperate with either of said two rotatable parts, and the said restraining means either engaged with or free from the said gear-carrying disk L , substantially as and for the purposes set forth.

5. The combination with an axially-arranged rotatable part having a fixed gear-wheel m , and also having a fixed internal gear-wheel M , of a second rotatable part q , also having a fixed gear-wheel r , a third rotatable part t , having a fixed gear u^2 , a gear-carrying disk L adapted to be rotated having

two united gears o and p thereon, the one adapted to be driven by the gear r , and through its therewith-connected gear driving the gear 70 on the rotatable part J , a second gear-carrying disk u also rotatably mounted carrying one or more gears v meshing as intermediates with both the gear u^2 and with the internal gear of the rotatable part, shiftable means 75 for rotatably driving either of said three rotatable parts, and means for restraining or rendering free either of said disk carriers L or u , substantially as and for the purposes as set forth.

6. The combination with an axially or centrally arranged rotatable part J having a fixed gear-wheel m , and a circumferentially-extended portion to constitute a pulley k , of a second rotatable part q , also comprising a pulley and a centrally-arranged fixed gear-wheel r , a disk or gear carrier L , mounted to be rotated between said two pulleys having united gears o and p thereon, the one p adapted to be driven by the gear on said pulley q , 90 and through its therewith-connected gear o driving the gear m on the said rotatable part J , a strap n encircling the gear-carrying disk, a rock-shaft having portions extended in different directions with which the ends of the strap are connected, a belt f shiftable from one of said pulleys to the other, a belt-shifter 95 therefor, and a lever having operating engagements with both the belt-shifter and strap, substantially as and for the purposes set forth. 100

7. The combination with an axially or centrally arranged rotatable part J , having fixed thereon, an internal gear M , of a pulley t , rotatable about said central part J provided 105 with a pinion u^2 centrally thereof, a rotary gear-carrier u provided with one or more gear-wheels v meshing as intermediates between the said pulley-pinion and the teeth of said internal gear, and means for temporarily restraining the gear-carrier against rotation 110 whereby the rotations of the pulley t will then insure the reverse rotation of the said first-named rotatable part J , substantially as described. 115

8. The combination with a centrally-arranged rotatable part J , provided with a pulley or like rotating device k , and provided with an internal gear M fixed thereon, of a second pulley t provided with a centrally-arranged pinion u^2 , a gear-support u provided 120 with one or more gear-wheels v meshing as intermediates between said pinion u^2 and internal gear-wheel M , means for permitting or restraining the rotation of said support u for the intermediate gear-wheels, and a shiftable belt and shifting means whereby it may be in driving contact around either of said pulleys k or t , substantially as and for the purposes described. 125

9. The combination with a centrally-arranged rotatable part provided with a spur-gear m and an internal gear M , of a wheel or pulley q to be driven, provided centrally with 130

a gear wheel or pinion r , a gear-support rotatably mounted and having the united gears p and o in mesh with said pinion and spur-gear $r m$, a second wheel or pulley t to be driven provided with a gear-wheel, a second gear-support provided with one or more gear-wheels v in mesh with both the gear-wheel on pulley t and said internal gear M , and means for restraining either one of said gear-supports from being rotated at any given time, as desired, and a shiftable driver for rotating either of said wheels or pulleys $q t$, substantially as and for the purposes set forth.

10. The combination with a centrally-arranged rotatable part provided with a spur-gear m and an internal gear M , of a wheel or pulley q to be driven, provided centrally with a gear wheel or pinion r , a gear-support rotatably mounted and having the united gears p and o in mesh with said pinion and spur-gear $r m$, a second wheel or pulley t to be driven provided with a gear-wheel, one or more gear-wheels v in mesh with both the gear-wheel on pulley t and said internal gear M , a shiftable belt or driver for driving either of said pulleys according to its position, straps encircling and adapted to be constricted around said gear-supports, means for shifting said belt, and a rock-shaft having variously radially extended engagement portions in connection with the ends of said straps, and means for imparting a rocking motion whereby simultaneously, one of said straps will be in binding engagement on one of the gear-supports, the other being rendered loose, and vice versa, substantially as and for the purposes set forth.

11. The combination with a centrally-arranged rotatable part provided with a spur-gear m and an internal gear M , of a wheel or pulley q to be driven, provided centrally with a gear wheel or pinion r , a gear-support rotatably mounted and having the united gears p and o in mesh with said pinion and spur-gear $r m$, a second wheel or pulley t to be driven provided with a gear-wheel, one or more gear-wheels v in mesh with both the gear-wheel on pulley t and said internal gear, a shiftable belt or driver for driving either of said pulleys according to its position, straps encircling and adapted to be constricted around said gear-supports, and a rock-shaft having variously radially extended engagement connections with the ends of said straps, and means operative both for shifting said belt and for conjointly imparting a rocking motion whereby one of said straps will be in binding engagement on one of the gear-supports, the other being rendered loose, and vice versa, substantially as and for the purposes set forth.

12. In combination, an axially-arranged rotatable part having a fixed gear-wheel, and an enlarged pulley, and also having a fixed internal gear-wheel, of a second rotatable part or pulley also having, centrally, a fixed gear-wheel, a third rotatable part or pulley, of cir-

cumferentially the same size as the aforementioned pulleys having a fixed gear, a gear-carrying disk adapted to be rotated having two united gears thereon, the one adapted to be driven by the gear on said second rotatable part and through its therewith-connected gear driving the gear on the first rotatable part, a second gear-carrying disk also rotatably mounted carrying gears meshing, as intermediates, with both the gear on the said third rotatable part and with the internal gear of the first rotatable part, said gear-carrying disks being circumferentially similar to said pulleys and have depressions in their rims, the straps n and w encircling them, the rock-shaft having the differentially-radial strap engagement extensions, a belt-shifter, and means for shifting it, which is also connected for rocking said rock-shaft whereby the one strap may be tightened and the other simultaneously loosened and vice versa, substantially as described.

13. In a motor-vehicle, the combination with a traction wheel or wheels thereof, of a motor adjustably mounted on the vehicle for a bodily movement and provided with a pulley, of a vehicle driving-shaft having driving connections with the vehicle-wheels, and provided with changeable-speed gearing comprising a plurality of equal-sized pulley-like members adapted to have, both directly, and through reducing and reversing gearing, connections with the vehicle driving-shaft, a belt running around the motor-pulley, and also according to its shifted position around one or the other of the pulley members of the aforesaid changeable gearing, a belt-shifter for said belt, and means for bodily moving the motor and its pulley independently of the vehicle driving-shaft, toward or from the latter, substantially as and for the purposes set forth.

14. In a motor-vehicle, the combination with a vehicle driving-shaft consisting of two shaft members having driving connections with separate traction-wheels of the vehicle, and having on their adjoining ends, fixed bevel-gears, of a sleeve-like part loosely surrounding the sectional vehicle driving-shaft and comprising a spur-gear m , a pulley or driver as k , having the journal-shaft i with the bevel gear-wheels mounted thereon which are in mesh with the bevel gear-wheels of both the said shaft-sections, a second rotatable drive wheel or pulley q having a hub-provided pinion or gear-wheel r , the gear-carrying support L , having the united gears p and o respectively in mesh with the pinion r and sleeve-gear m , means for permitting or restraining from rotation the said gear-carrying support, and driving means shiftable to operate at pleasure either wheel k or wheel q , substantially as and for the purposes set forth.

15. In a motor-vehicle, in combination, a vehicle driving-shaft consisting of two shaft members having driving connections with

separate traction-wheels of the vehicle, and having on their adjoining ends, fixed bevel-gears, a sectional and united sleeve-like part loosely surrounding the sectional vehicle driving-shaft, and comprising a spur-gear *m*, a pulley or driver as *k*, having the journal-shaft *i* with the bevel gear-wheels mounted thereon which are in mesh with the bevel gear-wheels of both the said shaft-sections and said sectional sleeve comprising cupped members forming a casing for said several intermeshing bevel-gears, a second rotatable drive-wheel or pulley having a hub-provided pinion or gear-wheel *r*, the gear-carrying support *L*, having the united gears *p* and *o* respectively in mesh with the pinion *r* and sleeve-gear *m*, means for permitting or restraining from rotation the said gear-carrying support, and driving means, shiftable to operate at pleasure either wheel *k* or wheel *q*, substantially as and for the purposes set forth.

16. In a motor-vehicle, in combination, the sectional vehicle driving-shaft having, on the adjacent ends of its sections, the bevel gear-wheels 29, 30, the sleeve-like part rotatably surrounding the sectional shaft carrying the journal-shaft *i* provided with the bevel gear-wheels 33, 33, in mesh with said first-named bevel gear-wheel, and provided with the spur-gear *m*, the pulley *q* provided with a hub-like pinion *r*, the rotatable gear-carrying disk *L*, surrounding the sleeve, and provided with the gear-wheels *p* and *o* which mesh into gears *r m*, means for restraining said gear-carrier at pleasure against rotation and means for rotating pulley *q*, substantially as and for the purposes set forth.

17. In a motor-vehicle, in combination, the sectional vehicle driving-shaft having, on the adjacent ends of its sections, the bevel gear-wheels 29, 30, the sleeve-like part rotatably surrounding the sectional shaft, carrying transversely, within the chambered portion thereof, the journal-shaft *i*, provided with the bevel gear-wheels 33, 33, meshing into the bevel-wheels 29, 30, and provided with the fixed internal gear *M*, the pulley or drive-wheel *t* rotatable around, and independently of the sleeve, and provided at its hub with a pinion, the rotatable gear-support *u* provided with one or more spur gear-wheels *v*, meshing as intermediates with both said pulley-pinions and said internal gear of the sleeve, and restraining mechanism for said gear-support, substantially as and for the purposes set forth.

18. In a motor-vehicle, in combination, the sectional vehicle driving-shaft having on the adjacent ends of its sections, the bevel gear-wheels 29, 30, the sleeve-like part rotatably surrounding the sectional shaft, having journaled therewithin and bodily movable therewith, the bevel gear-wheels 33, 33, in mesh with said gears 29, 30, and also provided with the spur-gear *m*, and the pulley extension *k*, the pulley *q*, rotatable about the sleeve and having the hub-like pinion *r*, the rotatable gear-carrying disk *L*, loosely surrounding the

sleeve, and provided with the gear-wheels *p* and *o* which mesh into gears *r m*, means for restraining said gear-carrier at pleasure against rotation and shiftable means for rotating either pulley *q* or the sleeve through its part *k*, substantially as and for the purposes set forth.

19. In a motor-vehicle, in combination, the sectional vehicle driving-shaft having on the adjacent ends of its sections, the bevel gear-wheels 29, 30, the sleeve-like part rotatably surrounding the sectional shaft, carrying axially transversely within the chambered portion thereof, which surrounds the ends of the shaft-sections, the suitably-journaled bevel gear-wheels 33, 33, meshing into the bevel-wheels 29, 30, and provided with the fixed internal gear *M* at its opposite end, the pulley or drive-wheel *t* rotatable around, and independently of the sleeve, and having an elongated hub provided at its end with a pinion, the rotatable gear-supporting disk *u* mounted on the extended hub of the said wheel *t* between the body of said wheel and said internal gear, and provided with one or more spur gear-wheels *v*, meshing as intermediates with both said pulley-pinions and said internal gear of the sleeve, and the strap for said disk, and operating means therefor, substantially as and for the purposes set forth.

20. In a motor-vehicle, in combination, the vehicle driving-shaft *F*, constituted by the aligned sections 27, 28, having on their adjacent ends the bevel gear-wheels 29, 30, the two-part sleeve formed with the cup-like end portions *J*² *J*⁴ fixed together constituting an internal chamber having journaled therein and bodily revoluble, the bevel gear-wheels 33, 33, meshing said gears 29, 30, and one of said sleeve-sections provided with spur-gear *m* and also being outwardly enlarged to constitute the drive-wheel or pulley *k*, said sleeve moreover, being provided suitably distant from said pulley with the fixed internal gear, the pulley *q* rotatable about the sleeve and provided with the hub-like pinion *r*, a third pulley *p* alongside pulley *q* having the elongated hub provided at its end with the pinion-gear *w*², the disk *L* rotatable about the sleeve between the pulleys *q* and *k* carrying one or more sets of united gear-wheels *p* and *o* meshing said pulley-pinion *r* and the gear-wheel *m* of the sleeve, the second disk *u* rotatably mounted upon the elongated hub of the pulley *t* having one or more wheels in mesh with, and intermediate between the pinion *w*² and the internal gear of the sleeve, the straps *n* and *w* adapted for binding engagements respectively around disks *L* and *u*, means for rendering them tight or loose as desired, a driving-belt shiftable onto either of the said three pulleys and driving connections between said shaft *F* and traction-wheels of the vehicle, substantially as described and shown, and for the purposes set forth.

21. In a motor-vehicle, a speed-governing

mechanism, having a shiftable belt, and having a strap encircling a cylindrical part which is comprised in said mechanism, a belt-shifter, a strap-tightener, and a lever having connections with the belt-shifter, whereby, when swung in one plane of movement, it operates the belt-shifter and also has connections with the strap-tightener, and whereby, when swung in another plane, it operates the said tightener without effect on the belt-shifter, substantially as described.

22. The combination with the belt F and a strap, of the belt-shifter N pivotally mounted, and a rock-shaft having differently-extended radial members with which are connected the ends of the strap, and having the arm 60, the rock-shaft 54 provided with an angular member having the lever P intermediately pivoted thereon and having a lever-arm 58, the connecting-rod 59 joining arms 58 and 60, and the connecting-rod 56 joining the lever P with the belt-shifter, substantially as and for the purposes set forth.

23. In a motor-vehicle, the combination with a speed-controlling mechanism comprising several rotatable pulleys and cylindrical members having respectively encircling straps, of a rock-shaft Q having variously and oppositely arranged radial extension members, with which the ends of the said straps are connected, a belt adapted to run around the said pulleys and to be shifted from one to the other thereof, a belt-shifter engaging the belt, a rock-shaft 54 having a controlling-lever pivotally mounted thereon, so as to swing in one plane independently of the rock-shaft, and so that when swung in another plane, it will rock said shaft, connections between this lever-operated rock-shaft and the first-named rock-shaft, and connections between the lever and the belt-shifter, substantially as described and for the purposes set forth.

24. In a change-speed mechanism, the combination with the shiftable belt F and the disk-restraining strap, of the belt-shifter N pivotally mounted, and a rock-shaft Q having differently-extended radial members with which are connected the ends of the strap, and having the arm 60, the tubular rock-shaft 54 provided with an angular member having the lever P intermediately pivoted thereon and having a lever-arm 58, the connecting-rod 59 joining rock-shaft arms 58 and 60, and the connecting-rod 56 joined to a member of the lever P, extending therefrom through the said tubular rock-shaft to connection with the belt-shifter, substantially as and for the purposes set forth.

25. A two-speed forward-driving and a reversing, mechanism, comprising a shiftable driving-belt and two cylindrical members and restraining-straps therefor, substantially as described, of a lever mounted to swing fore and aft to operate the straps and to swing transversely to effect the shifting of the belt

from one to another of its several positions, and the plate having a slot or opening therein comprising a central transverse portion 62, a forwardly-extending portion 63 having its position between the ends of the transverse portion and the rearward extension 64 having its arrangement in line with one end of said slot portion 62, constituting an indicator or gage for the positions of the said controlling-lever, substantially as described.

26. In a motor-vehicle, the combination with a speed-controlling and reversing mechanism comprising the rotatable pulleys *k q t* and the disks *L u* having respectively the encircling straps *n w*, of a rock-shaft Q having variously and oppositely arranged radial extension members, with which the ends of the said strap are connected, a belt *f* adapted to run around the said pulleys and to be shifted from one to the other thereof, a belt-shifter N engaging the belt, a rock-shaft 54 having a controlling-lever P pivotally mounted thereon, so as to swing in one plane independently of the rock-shaft, and so that when swung in another plane, it will rock said shaft, connections between this lever-operated rock-shaft and the rock-shaft Q, connections between the lever and the belt-shifter, and the gage and guard-plate, having the slot with the central transverse portion 62, the forward extension 63 at one side and the rearward extension 64 arranged at the other side, substantially as and for the purposes set forth.

27. In a motor-vehicle, the frame or support mounted on the vehicle, consisting of transverse hollow members joined to, and interiorly in connection with, longitudinal hollow members, and the motor bodily supported by said frame, and connected to communicate with the interior thereof, substantially as described.

28. In a motor-vehicle, a motor-support consisting of transverse and longitudinal hollow members joined to constitute a frame, the one member thereof being internally in communication with another, the same being movably mounted on the vehicle, and the motor supported on said hollow frame and movable therewith, a part of the motor apparatus having a passage connection or communication with the hollow frame, substantially as set forth.

29. In a motor-vehicle, a motor-supporting hollow frame, mounted on the vehicle, the motor mounted on said hollow frame, and having the exhaust passage or passages thereof connected to and communicating interiorly with said hollow frame, whereby the latter, in addition to constituting the motor-support, also constitutes a muffler for the motor, substantially as described.

30. In a motor-vehicle, a motor-support consisting of transverse and longitudinal hollow members joined to constitute a frame, the one member thereof being internally in communi-

cation with another, said frame being mov-
ably mounted on the vehicle, the motor
mounted on said hollow frame having com-
munication interiorly therewith, and bodily
5 and adjustably movable therewith, a vehicle
driving-shaft in fixed bearings on the vehicle
having a pulley-like driving appliance, and
a belt driven by the motor and in contact

around said pulley-like appliance, substan-
tially as and for the purposes set forth. 10

Signed by me at Springfield, Massachusetts,
this 9th day of May, 1898.

HINSDALE SMITH.

Witnesses:

WM. S. BELLOWS,

J. D. GARFIELD.