(No Model.) 4 Sheets—Sheet 1.

M. E. HERTEL.

MOTOCYCLE.

No. 583,749. Patented June 1, 1897.

Fig. 1.

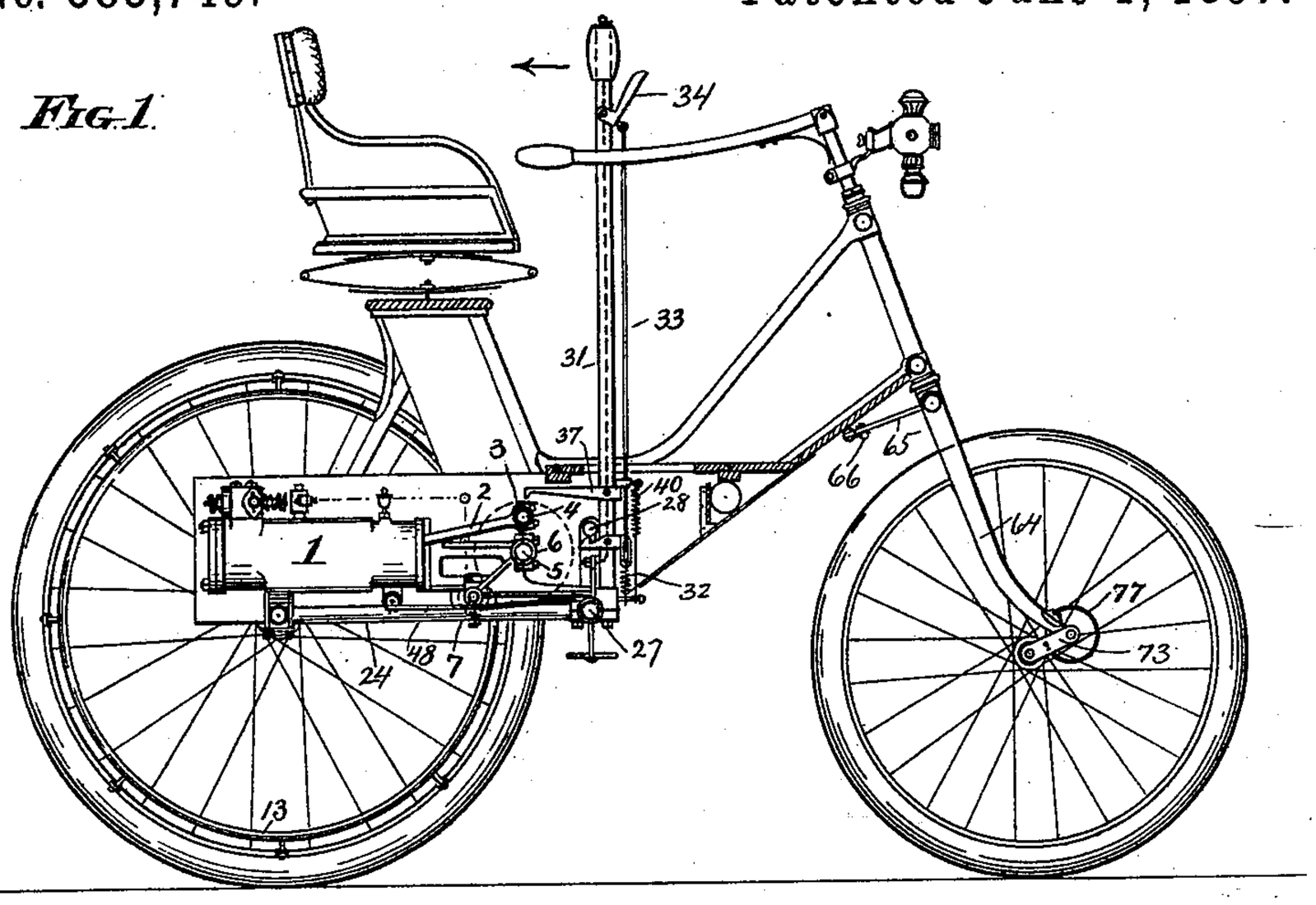

Fig. 2.

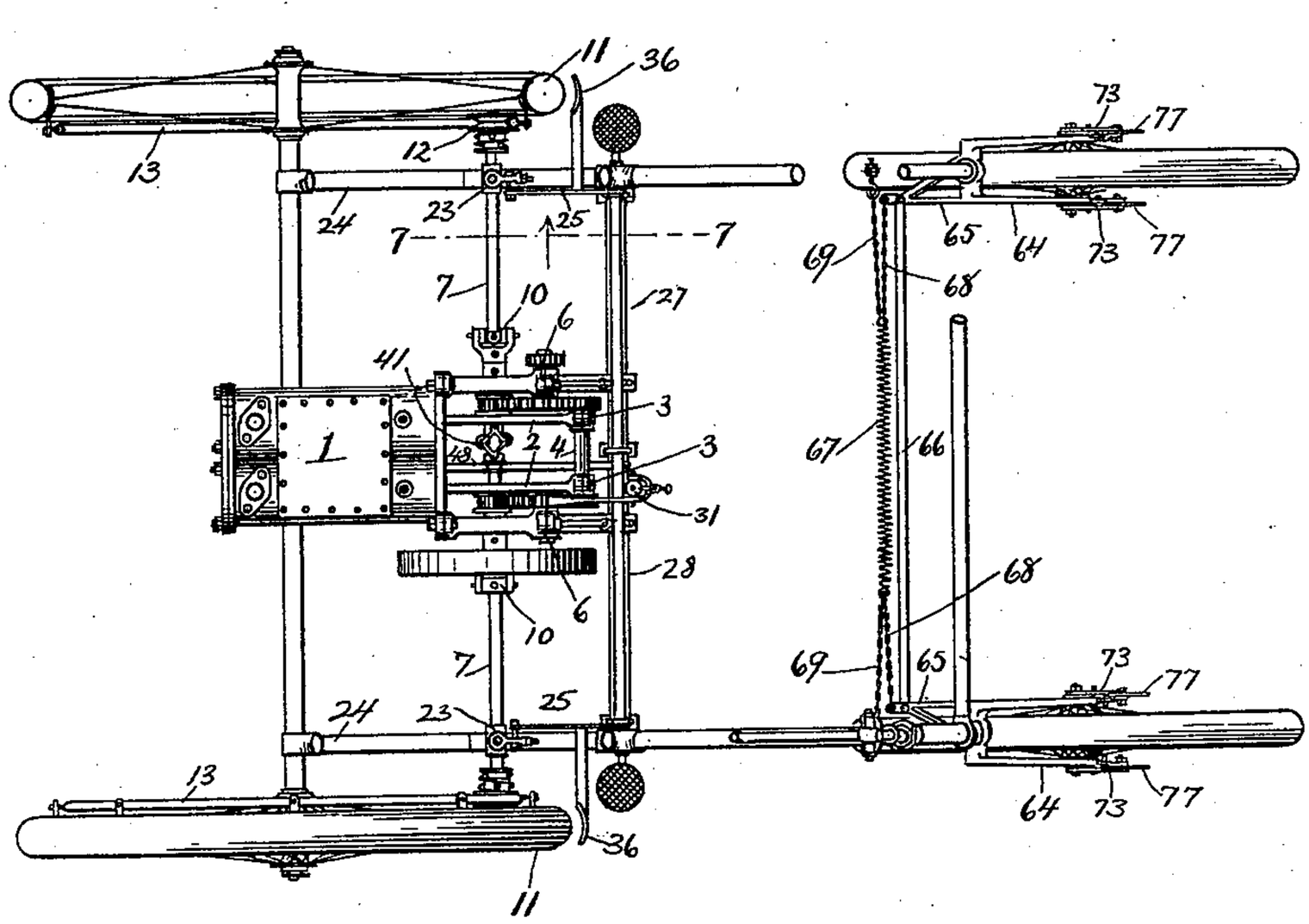

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FIG. 6.

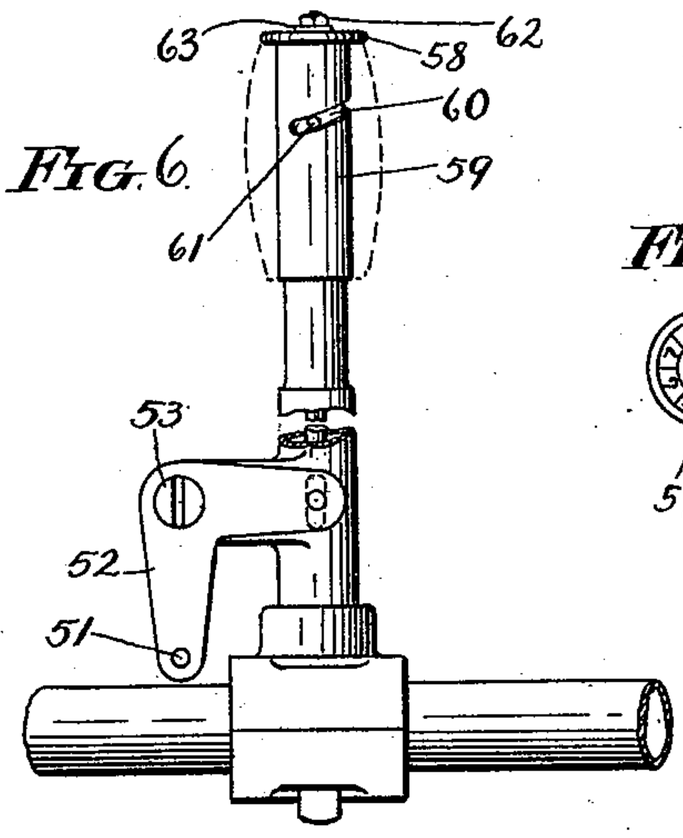


FIG. 3a

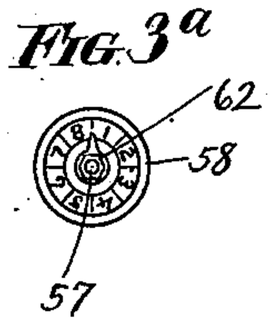
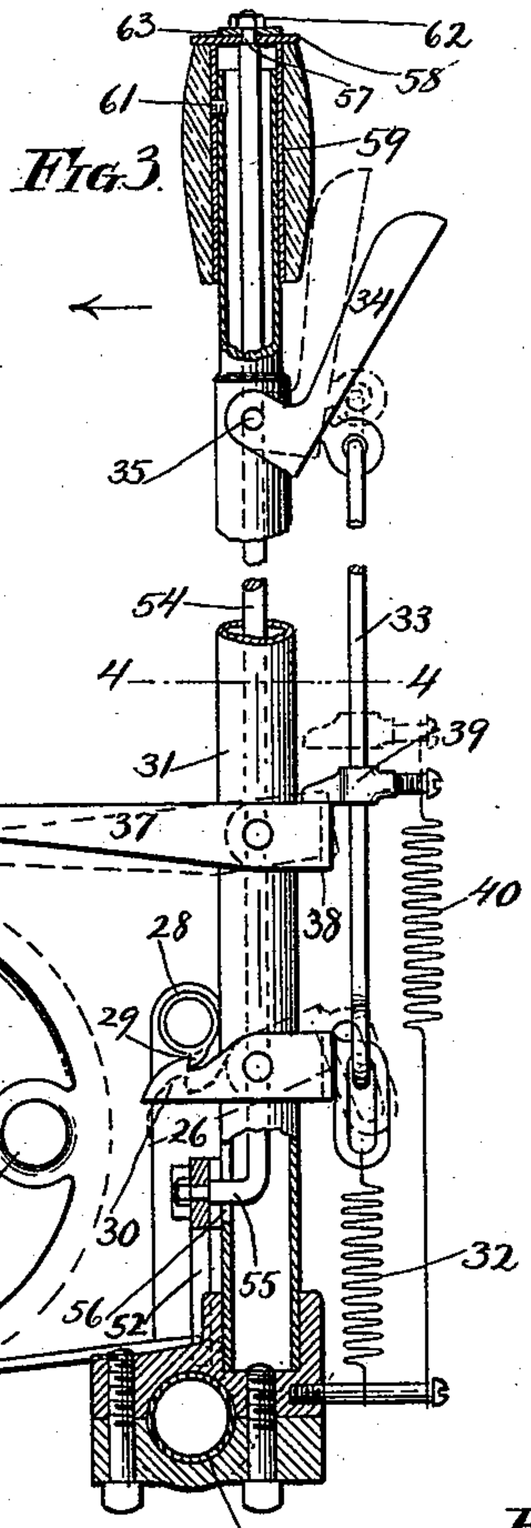


FIG. 3.



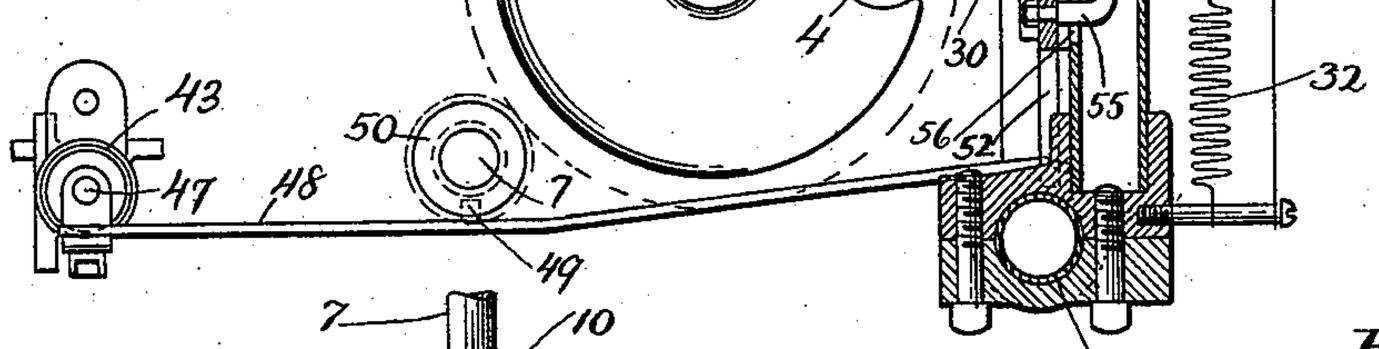


FIG. 4.

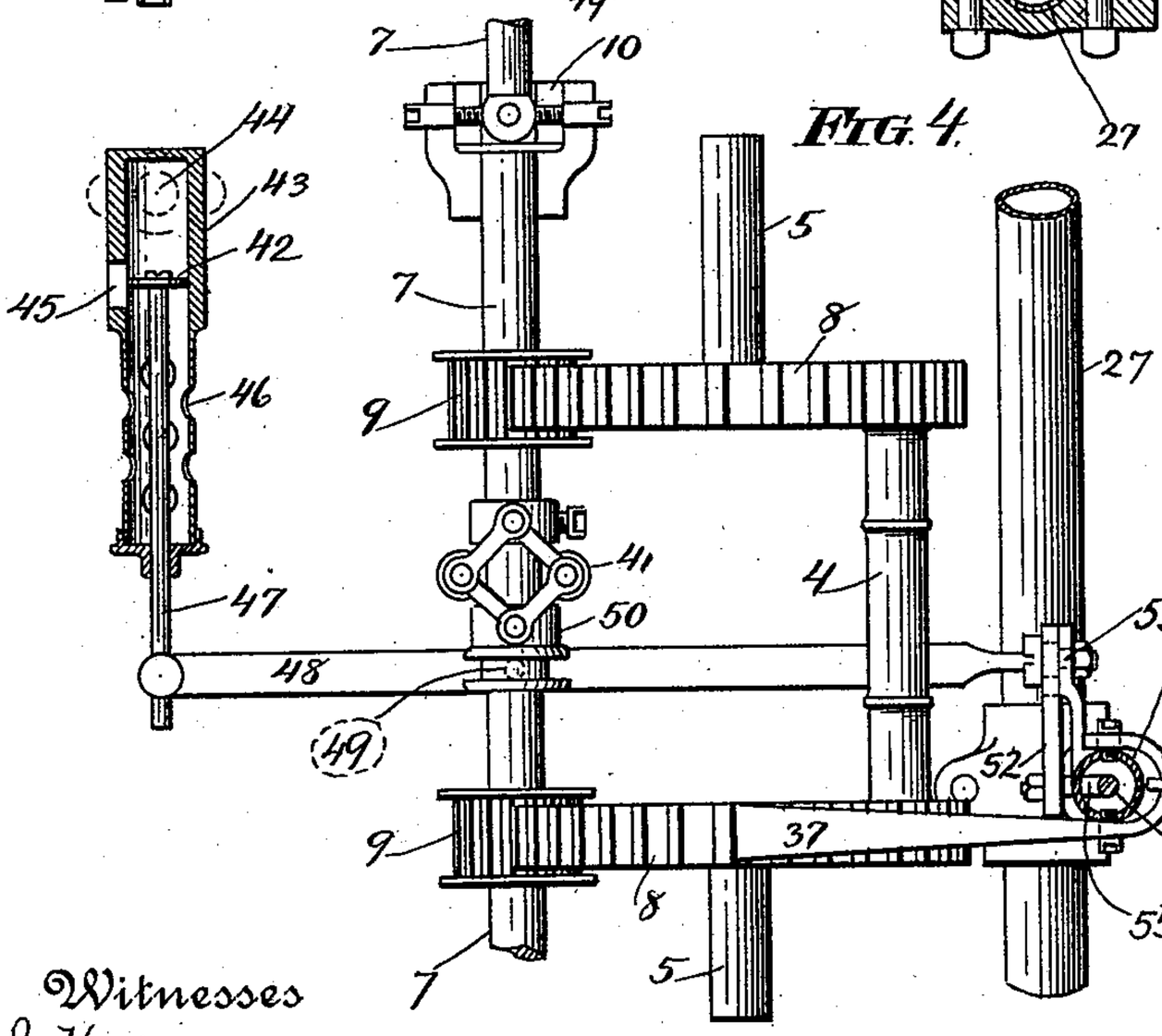
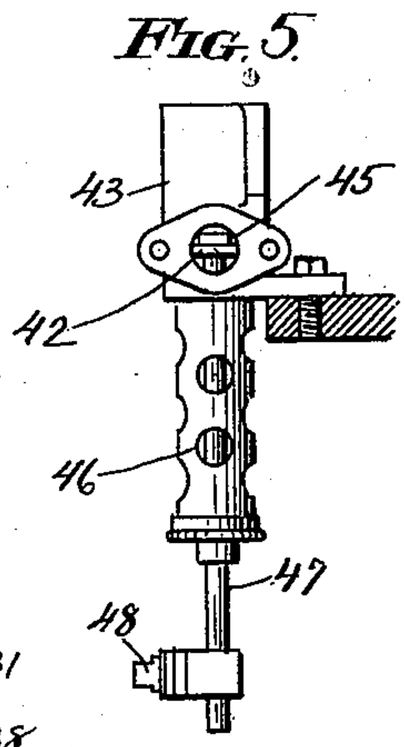


FIG. 5.



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MOTOCYCLE.

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FIG. 7.

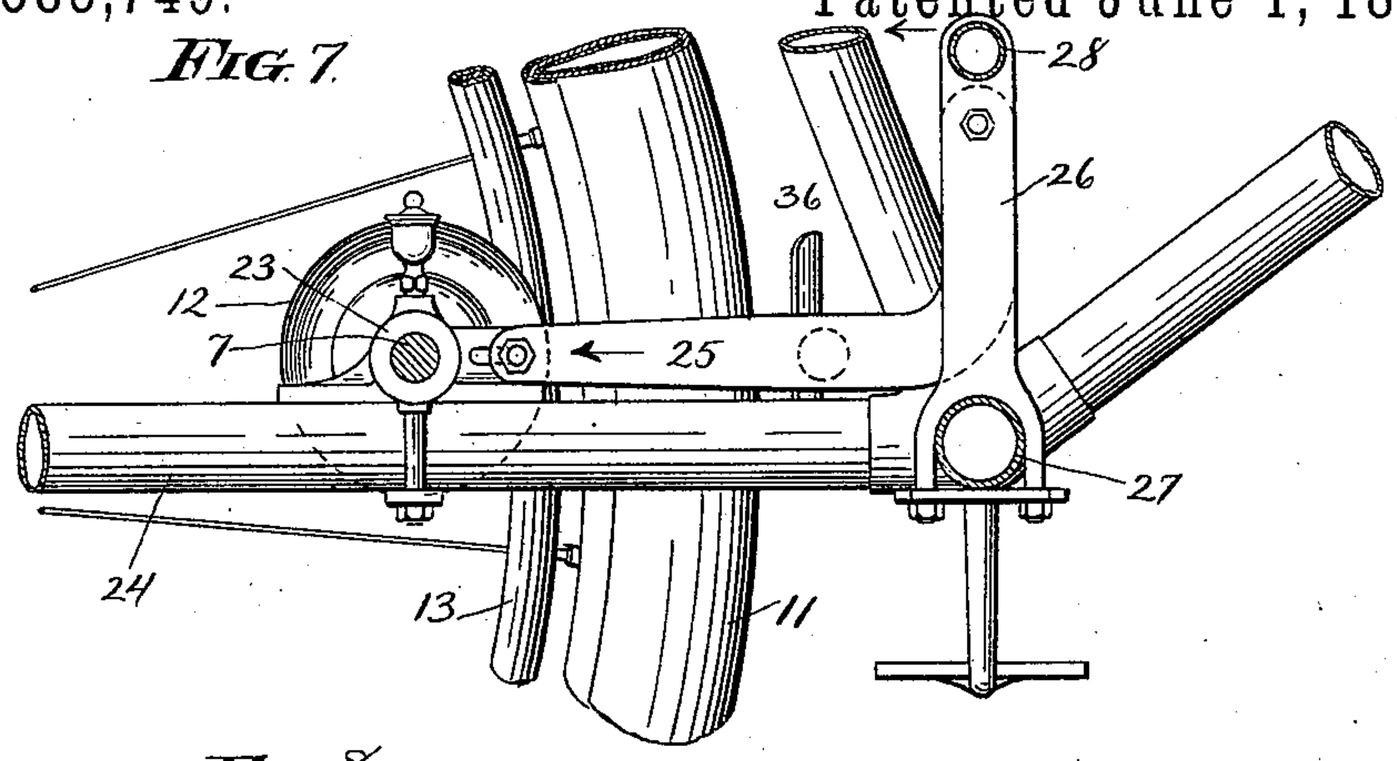


FIG. 8.

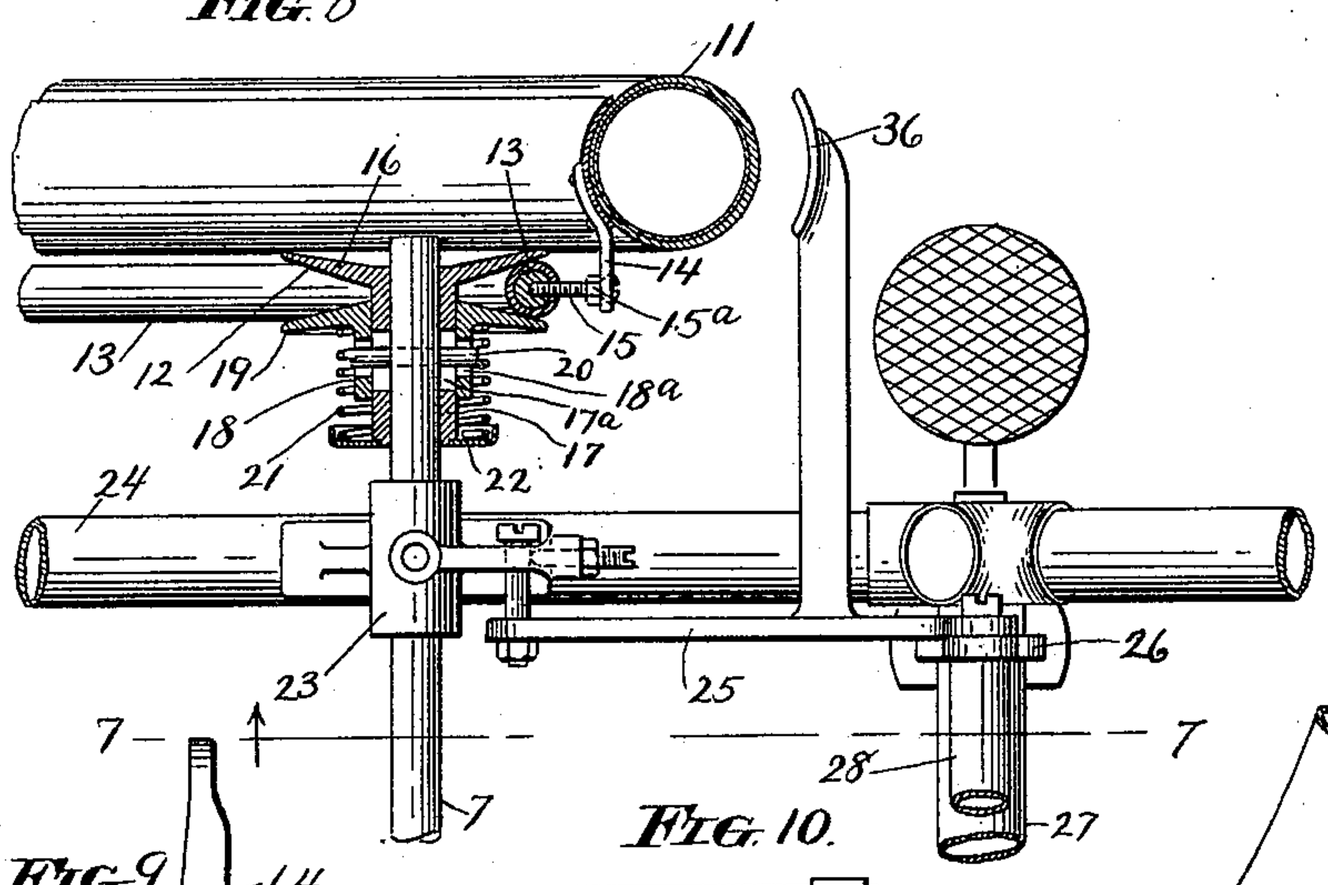


FIG. 9.

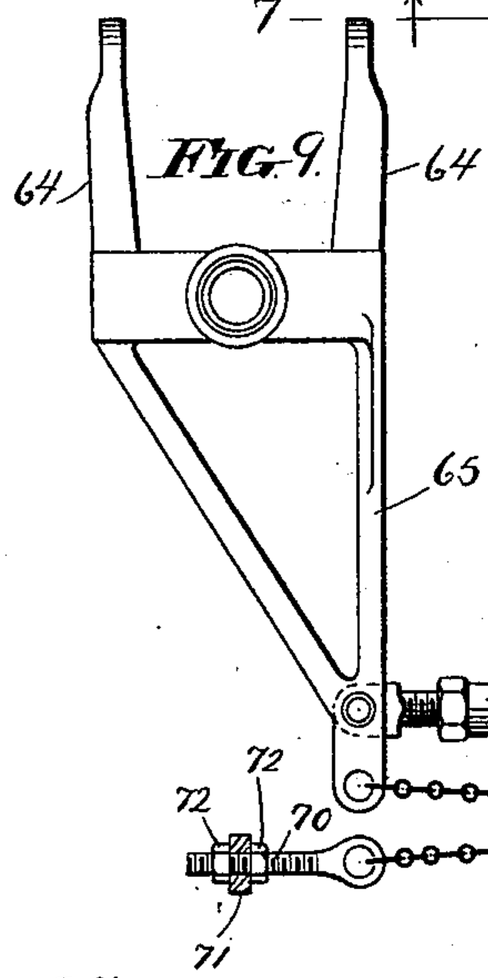


FIG. 10.

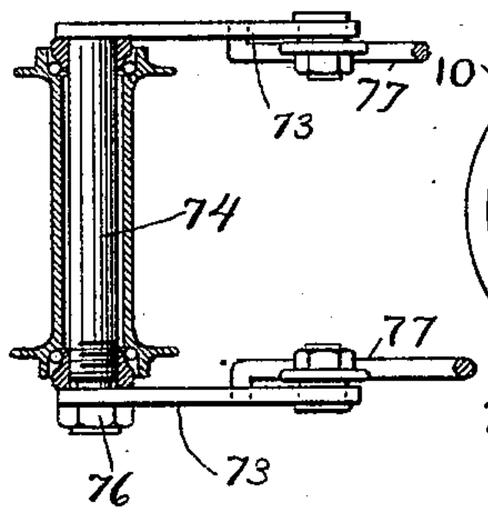
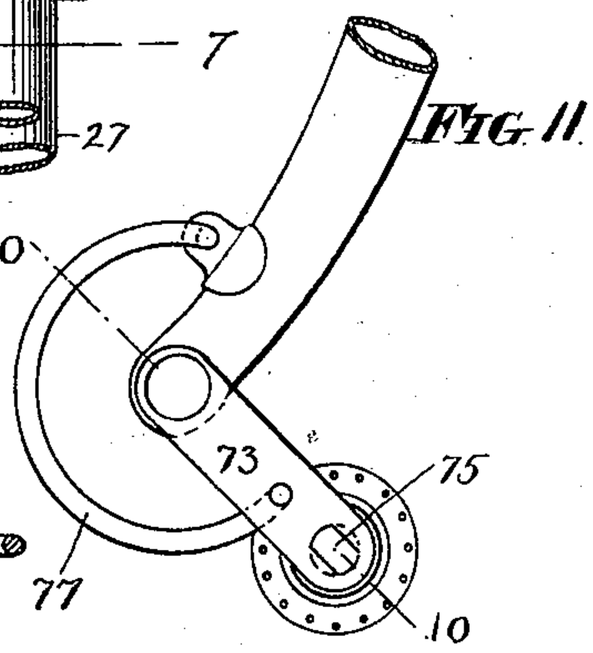


FIG. 11.



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MOTOCYCLE.

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FIG. 12.

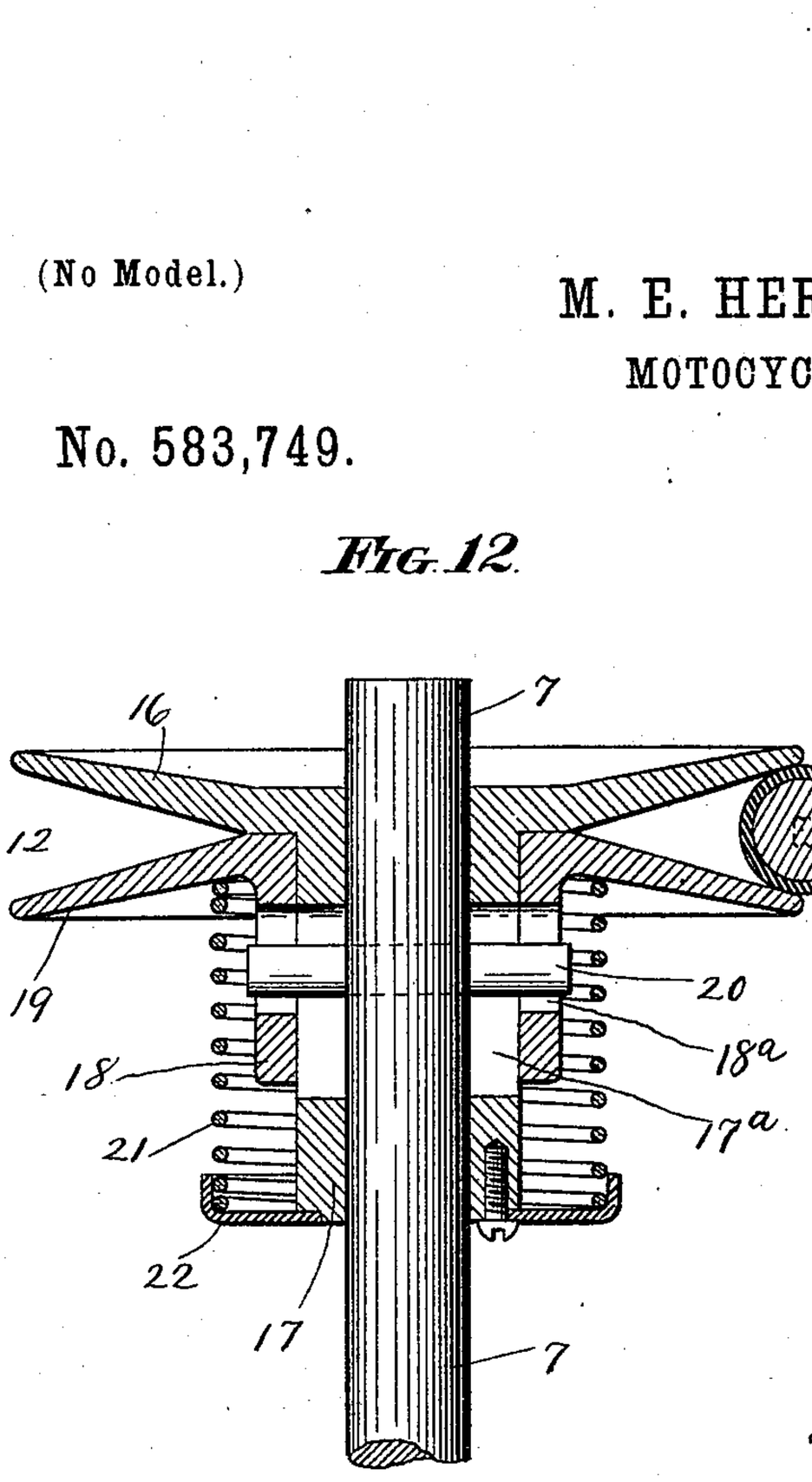


FIG. 13.

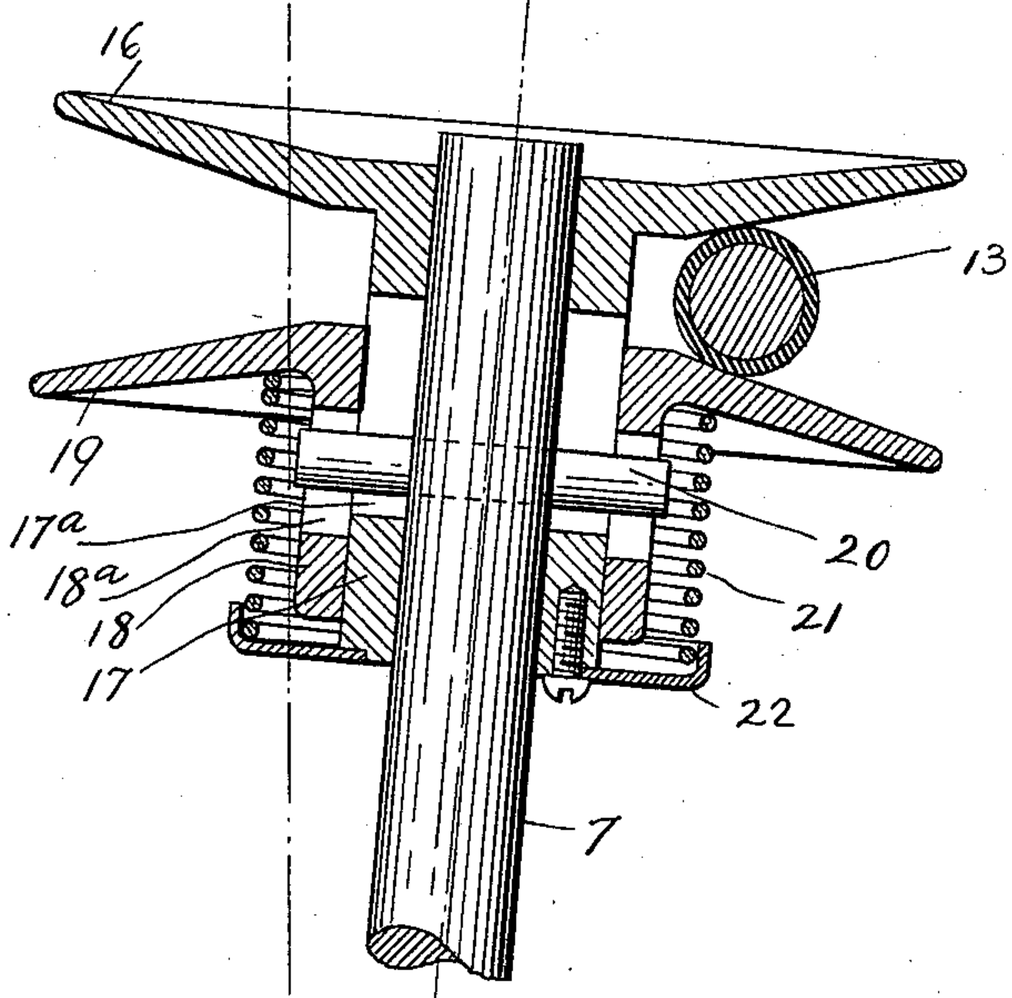
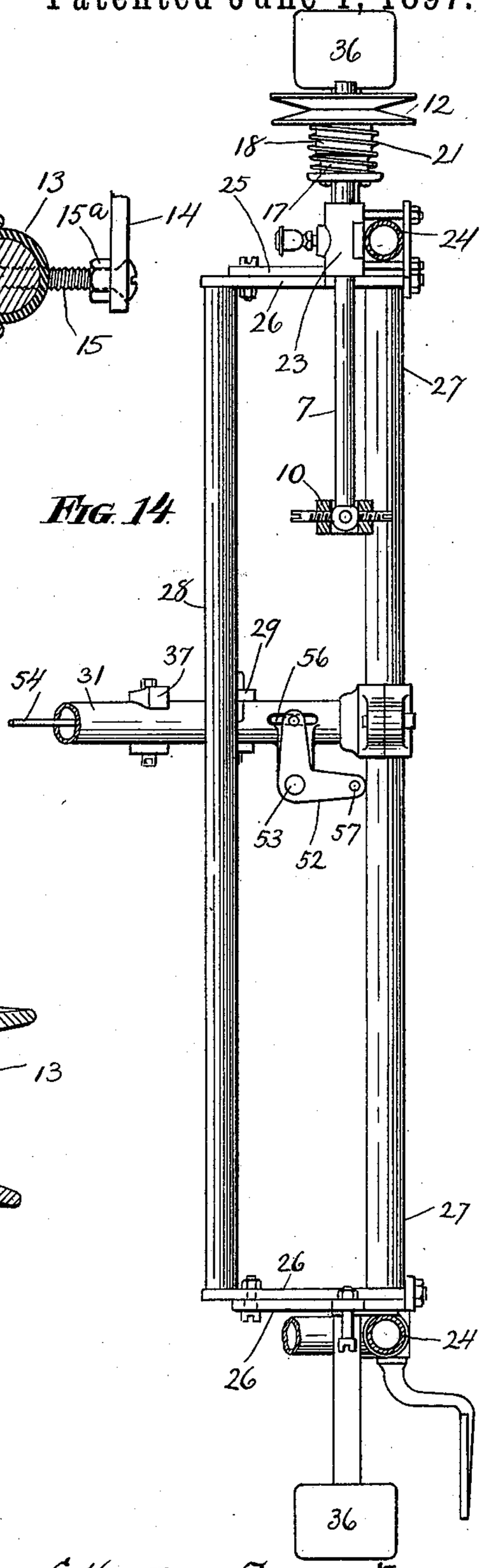


FIG. 14.



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UNITED STATES PATENT OFFICE.

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MOTOCYCLE.

SPECIFICATION forming part of Letters Patent No. 583,749, dated June 1, 1897.

Application filed February 24, 1896. Serial No. 580,315. (No model.)

To all whom it may concern:

Be it known that I, MAX E. HERTEL, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Motocycles and other Vehicles, of which the following is a specification.

Owing to variations in the character of the road traveled the load upon the driving-wheels (or, in other words, the resistance offered to their progress) is constantly varying. In order to prevent these variations from producing material variations in the speed of the vehicle, I so associate a speed-governor with the moving parts of the machine and with the valve for controlling the supply of fuel to the motor that when the speed decreases the governor will condition the valve to admit an increased supply of fuel, and thereby cause the motor to generate an increased power for overcoming the increased resistance, and vice versa, and this constitutes one feature of the present invention. This regulation of the speed of a vehicle by means of a governor is possible only to the point where the motor reaches its maximum capacity, and after this point is reached an increase in the resistance will result either in a decrease in the speed of the vehicle or else in stopping it altogether, according to the amount of the increased resistance.

When the motor has reached its maximum capacity and is still unable to overcome the resistance, it becomes necessary to lower the "speed" of the gearing between it and the driving-wheels, and hence I use variable gearing for this purpose, and the construction of this gearing constitutes another feature of the invention. By lowering the speed of the gearing some speed in the vehicle is sacrificed, but this sacrifice enables the motor to continue until the point is reached where the motor has again reached its maximum capacity and the gearing has been adjusted to the lowest speed provided for.

In order to prevent sudden variations in the speed of the vehicle from producing corresponding variations in the speed of the motor and thereby subjecting the machine to severe shocks and strains, the motor is connected with the driving-wheels by means of gearing comprising two coöperating members having frictional engagement with each other, and the construction of this gearing constitutes another feature of the invention. These cooperating friction members permit of a lost motion between the motor and driving-wheels whenever the relations of the load and power are suddenly varied, either by a variation in the load due to a variation in the resistance or by a variation in the power due to a change in the speed of the motor.

As a further means for preventing sudden variations in the speed of the vehicle from producing corresponding variations in the speed of the motor I arrange a fly-wheel on a shaft which derives its motion from the motor through the medium of speed-multiplying gearing, and this constitutes another feature of the invention. It enables the fly-wheel to be run at a high speed while the motor is running at a comparatively low speed. When the machine is in operation, a certain amount of energy is stored up in this fly-wheel, and when the resistance to the progress of the vehicle varies this energy is instantly expended in opposition to variation. Very frequently these variations are of very short duration, as, for example, when they are caused by the wheels coming in contact with stones or running into little hollows, and in these cases the energy stored in the fly-wheel and in the moving vehicle and load will be sufficient to in a great measure prevent them from affecting the speed of the vehicle and thereby affecting the governor and consequently the speed of the motor. This insures a steady and uniform as distinguished from an unsteady and jerky progressive movement of the vehicle.

Another feature of the invention consists in transmitting motion from the crank-shaft of the motor to a counter-shaft through the medium of a speed-multiplying gearing and transmitting the motion of this counter-shaft directly to the driving-wheels instead of transmitting motion from the motor directly to the shaft of the driving-wheel.

Another feature of the invention consists in incorporating in the gearing for transmitting motion from the motor to the driving-wheel two coöperating members which are

separable and connecting one of these members with the brake, so that this member and the brake move together.

Another feature of the invention consists in combining with this movable member of the gearing and the brake a single lever by which both are operated.

Another feature of the invention consists in connecting one of these two separable members of the gearing and the device for starting the motor with a single operating-lever, the parts being so arranged that when the lever is moved in the direction necessary for starting the motor it moves the separable member of the gearing aforesaid away from its coöperating member.

Another feature of the invention consists in providing hand mechanism by which the motor may be started (or, in other words, by which its initial movement may be produced) by the operator from his position on the seat of the vehicle.

Another feature of the invention consists in providing a single lever for operating the mechanism for starting the motor, the brake, and one of the separable members of the gearing.

Another feature of the invention consists in providing the valve-gearing with a part that is common to and connected with both the governor and the hand mechanism for operating the valve, so that said part may be moved and the valve thereby influenced either by the governor or by the hand mechanism.

Another feature of the invention consists in providing the separately-swiveled steering-wheels with extension-arms and so connecting them by means of a rigid rod that the wheels are held in proper positions with relation to each other.

Another feature of the invention consists in incorporating a spring in a connection between arms projecting from the forks of the front wheels and connecting the opposite ends of this spring with the frame, whereby the front wheels are held in the planes parallel with the rear wheels.

Another feature of the invention consists in journaling each of the front wheels of a motocycle or the front wheel of a bicycle or other vehicle upon an axle which is supported by and rigidly connects a pair of links located upon opposite sides of the wheel, which links in turn are pivoted to the prongs of the fork and extend backward from their pivotal points, the links being held in normal positions by springs of the particular shape hereinafter described.

These and other features of the invention are particularly pointed out in the claims hereinafter, and in order that the invention may be fully understood I will describe it with reference to the accompanying drawings, which are made a part of this specification, and in which—

Figure 1 is a view of a motocycle embodying the invention, the near wheels and portions of the frame being omitted and the remaining parts being shown either in side elevation or longitudinal section. Fig. 2 is a plan view of some of the parts thereof and a horizontal section of others, still others being omitted. Fig. 3 is a sectional elevation of some of the parts, including the valve mechanism, a portion of the gearing for transmitting motion from the motor to the driving-wheels, and the single lever by which, in connection with devices carried by it, the operation of the machine is controlled. Fig. 4 is a view showing the operating-lever in horizontal section on the line 4 4, Fig. 3, and the other parts of Fig. 3 in plan view or horizontal section. Fig. 5 is a plan view of the valve-casing, the valve, and some of the valve-gearing. Fig. 6 is a rear elevation of some of the parts, including a portion of the operating-lever aforesaid (an intermediate portion of it being broken away) and some of the parts of the valve-operating mechanism. Fig. 7 is a view showing some of the parts in longitudinal section on the line 7 7, Figs. 2 and 8, and others in elevation, the principal parts in this figure being the brake, the separable members of the gearing for transmitting motion from the motor to the driving-wheels, and the means connecting the brake and one of these separable members, so that they move together. Fig. 8 is a view of the parts shown in Fig. 7, some of them being shown in plan and others in horizontal section. Fig. 9 is a plan view showing in detail the fork of one of the front wheels, its extension-arm, and a portion of the mechanism for connecting said arm to the frame and to the corresponding arm of the fork of the other wheel. Fig. 10 is a section on the line 10 10, Fig. 11, looking in the direction of the arrow. Fig. 11 is a side elevation of a portion of the fork of one of the front wheels and the link mechanism by which the axis of the wheel is carried. Fig. 3ª is a view of the end of the hand-lever. Figs. 12 and 13 are section elevations shown in the two separable members of the gearing for transmitting motion from the motor to the driving-wheel, Fig. 12 showing the parts geared to the highest and Fig. 13 to about the lowest speed. Fig. 14 is a rear elevation of some of the parts, including especially the brake-shoes, one of the friction-wheels, and the mechanism for operating them.

The present invention is not concerned with the construction of the frame further than that the frame shall be of such construction that it will afford suitable means for the attachment of the parts hereinafter described and for the accomplishment of the several objects of the invention, nor is the invention concerned with the details in the construction of the motor itself, (*i. e.*, the device in which is generated the power for driving the vehicle,) a motor of suitable construction being shown at 1 in Figs. 1 and 2. Preferably this motor has two cylinders, a piston fitting in

each cylinder, and pitmen 2, both of which are connected at their outer ends, as shown at 3, to the crank 4 of a crank-shaft 5, journaled in bearings 6, supported by the frame. Motion is transmitted from the crank-shaft 5 to a counter-shaft 7 through the medium of intermeshing cogs and pinions 8 and 9, carried by the crank-shaft and counter-shaft, respectively. Preferably, in order to keep the weight of the machine at a minimum, the cogs 8 enter into and form component parts of the crank-shaft itself. That is to say, the crank-shaft is made up of the two cylindrical portions that form the journals and fit in the journal-boxes 6, the offset or eccentric portion which forms the wrist or wrists to which the pitmen are connected, and a pair of disks to which these three parts are rigidly secured in the relative position described, the peripheries of these disks being provided with teeth, so that at one and the same time they form a part of the crank-shaft and the cog-wheels for transmitting its motion. The counter-shaft is formed in three sections, the central one of which carries the fly-wheel F and the pinions 9 and is journaled in bearings fixed to the frame, whereby it is positively held against endwise or lateral displacement, while the outer sections have their inner ends connected to the central section by means of universal joints 10, which may be of any desired construction. To each of the outer sections of the counter-shaft is secured near its outer extremity one of the two separable members of the gearing by which motion is transmitted from the motor to the driving-wheel 11. This member of the gearing is in the form of a friction-wheel 12, having in its periphery a V-groove, and the member which coöperates with it takes the form of a ring 13, which is secured to the driving-wheel and is concentric with the axis thereof. Preferably this ring is coated on its exterior with rawhide or some other material for deadening sound and increasing friction and is secured to the rim of the wheel by means of arms 14, each of which has a perforation through which a screw 15 passes loosely and is screwed into the ring, a lock-nut 15ª being provided for locking the screw to the arm when the ring has been brought to a position concentric with the axis of the wheel, this latter being done by properly manipulating the screws 15.

It has been stated that the friction-wheel 12 has a V-groove in its periphery, but the invention is not limited to a groove which is a strictly V shape. Any flaring groove will answer the purpose. Preferably this friction-wheel is constructed of two disks, one of which, 16, has a hub 17, which fits loosely upon the counter-shaft 7, so as to be capable of sliding endwise thereon, said hub being of sufficient length to receive and form a bearing for a sleeve 18 of the second disk 19. The shaft is provided with a perforation in which a pin 20 is fixedly secured, so as to be incapable of any movement relative thereto, and the projecting ends of this pin occupy longitudinal slots 17ª and 18ª, formed through the hub 17 and sleeve 18, said slots being of sufficient length to permit of the necessary movement of the hub 17 upon the shaft 7 and of the hub 18 upon the sleeve 17. This arrangement permits both of the disks to move relatively to each other and to the shaft in the direction of the axis of the shaft, so that the friction-wheel as a whole may move upon the shaft to accommodate itself to the position of the ring 13 and the two disks of which the friction-wheel is made up may move relatively to each other for the purpose of changing the point of contact between the friction-wheel and the ring. The two disks of the friction-wheel are acted upon by a spring 21, which bears at one end against the disk 19 and at the other end against a flange or shoulder 22, fixed to the hub 17, the arrangement being such that the spring tends constantly to force the disks of the friction-wheel toward each other, the spring being of sufficient strength to hold the disks in contact with the ring 13 with sufficient force to produce sufficient friction between the friction-wheel and the ring for transmitting the movement of the shaft 7 to the driving-wheel 11 under normal conditions. The initial tension of the spring is such that it will cause the disks of the friction-wheel to meet the maximum resistance that is put upon them when the machine is geared to the highest speed provided for, and by reason of the flaring faces of the disks composing the friction-wheel in lowering the speed of the gearing the disks will be forced apart and the spring put under a greater tension in order to meet the increased resistance that is put upon the friction-wheel as an incident to lowering the speed of the gear. In this way the amount of friction produced by the disks of the friction-wheel is automatically regulated and made directly proportional to the maximum power that the gearing is called upon to transmit from the motor to the driving-wheel.

The outer portion of the counter-shaft is journaled in a bearing 23, that is slidably mounted upon a part 24 of the frame, and this permits of the lateral movement of the outer end of the counter-shaft for the purpose of moving the friction-wheel out of contact with the ring 13 when it is desired to prevent the transmission of any motion from the counter-shaft to the driving-wheel. On the other hand, it permits the friction-wheel to be moved toward the ring with sufficient force to cause the ring to sink deeper and deeper into the groove of the wheel, thereby forcing its two jaws apart and bringing the point of contact between the ring and wheel nearer the axis of motion of the wheel. The effect of this is to lower the speed of the gear and at the same time proportionately increase the frictional contact between these two coöperating members of the gear.

The journal-boxes 23 are connected by links

25 to a pair of arms 26, that are fulcrumed upon a part 27 of the frame, and these arms are rigidly connected by a tie-rod 28, extending from one of them to the other. This tie-rod is provided with a tooth 29, which is arranged in operative relation to a dog 30, which is pivoted to a hand-lever 31, that is fulcrumed to the part 27 of the frame. This dog is under the influence of a spring 32, which tends to hold it normally in position to engage the tooth 29, and the dog is connected by a rod 33 to a hand-lever 34, that is fulcrumed to the hand-lever 31 at 35. When the hand-lever 31 is moved in the direction of the arrow, Figs. 1 and 3, it will engage the tie-rod 28 and move it in the same direction, and thereby move the friction-wheel 12 out of engagement with the ring 13. If the motion in this direction is continued far enough, the brake-shoes 36, which are fixed to links 25, will be brought into contact with the driving-wheels and thus, it will be seen, by a single continuous movement of the lever 31 the friction-wheels may be moved out of engagement with their coöperating rings, so as to prevent the transmission of motion from the countershaft to the driving-wheels, and at the same time the brakes applied. On the other hand, if the operating-lever 31 be moved in the opposite direction and the dog 30 be allowed to remain in normal position it will engage the tooth 29 on the cross-arm 28 and move the parts in the opposite direction, thereby moving the brake-shoes out of engagement with the wheels and at the same time moving the friction-wheels into engagement with the rings on the driving-wheels. If, however, when the lever is moved in this latter direction the hand-lever 34 be pressed against the lever 31, as indicated by dotted lines in Fig 3, the dog 30 will be out of the path of the tooth 29, and hence the tie-rod 28 and the parts whose movement depend upon its movement will remain at rest.

In order to start a gasolene-motor as usually constructed, it is necessary to produce by manual power an induction stroke and a compression stroke of the piston. In order to do this, a dog 37 is pivoted to the hand-lever 31, and this dog is arranged in operative relation to one of the cogs 8, its heel 38 being in position to be engaged by a tappet 39, adjustably secured to the rod 33. This tappet is under the influence of the spring 32 and also of the spring 40, so that normally these springs hold the dog out of engagement with the cog-wheel, but when the lever 34 is pressed to the dotted position already described the tappet 39 is elevated and permits the dog to fall into engagement with the cog-wheel. While this condition exists a movement of the lever 31 in the direction of the arrow in Fig. 3 will cause the dog to move the cog-wheel 8 in the direction of the arrow placed upon it, while a movement of the lever 31 in the opposite direction will cause the dog to drag over the teeth of the cog-wheel and engage at a new point on the periphery thereof. By thus moving the lever back and forth the cog-wheel may be turned far enough to cause the piston to make the strokes that are necessary in order to inspire a charge and compress it. When this is done, if the charge is ignited the motor will start, and by releasing the pressure upon the lever 34 the springs 32 and 40 will again automatically withdraw the dog 37 from engagement with the cog-wheel 8.

When the motor is in operation and the friction-wheels 12 are out of engagement with the rings 13, the motor may run at a speed which is controlled by a governor 41 and by the hand mechanism hereinafter described, to which the action of the governor is subordinate. By properly manipulating the hand mechanism, notwithstanding the action of the governor, the motor may be set to running at a high speed before it is geared with the driving-wheels, and this is an important improvement in a motocycle, since it enables the operator to store up considerable energy in the fly-wheel before gearing the motor with the driving-wheels, and thus he is enabled to overcome resistances that he could not overcome if the gearing between the motor and driving-wheels were not separable or if the separable members thereof had a toothed engagement instead of a frictional engagement with each other.

The present invention is not limited to a governor of any particular construction, nor is it limited to a valve of any particular construction. In the drawings I have shown a plug-valve 42, mounted in a valve-casing 43, having a fuel-induction port, which is indicated by dotted lines at 44, and an eduction-port 45, through which the charge escapes on its way to the motor-cylinders, the casing being also provided with air-induction ports 46. The stem 47 of the valve is pivotally connected to one end of a lever 48, which carries at an intermediate point a pin 49, occupying a groove in a sleeve 50, which is capable of moving longitudinally upon a counter-shaft 7 and forms a part of the governor, the other end of said lever being passed through a perforation 51 in one end of a bell-crank lever 52, which is fulcrumed at 53 to the hand-lever 31. The hand-lever is preferably formed of a tube, and within it is a rod 54, the lower end of which is bent at right angles, as shown at 55, and passed out through a slot 56, the extremity of this bent portion of the rod being pivotally connected to the other arm of the bell-crank lever 52. The slot 56 permits the rod 54 to move up and down, but prevents it from rotating. The upper end of the rod 54 has a reduced portion 57, forming a shoulder, and on this reduced portion is loosely mounted, so as to be capable of turning, a disk 58, to which is permanently secured a sleeve 59, which surrounds the upper portion of the lever 31 and is provided with a spiral slot 60, in which fits

a pin 61, that is permanently fixed to the lever 31. The disk 58 is held in place on the reduced end 57 of the rod 54 by means of a nut 62, a washer 63 being interposed between the nut and disk. With this arrangement by turning the sleeve 59 the spiral slot and pin will cause it to move endwise upon the lever 31, and being connected with the rod 54, so that they are capable of only a rotary movement relatively to each other, this rod will partake of the endwise movement of the sleeve. This endwise movement of the rod will cause a movement of the bell-crank lever 52, and this in turn will cause a movement of the lever 48. During this action the pin 49 constitutes the fulcrum of the lever 48 and the operator is enabled to move the valve 42 to any desired position within the range of its possible movement, and thus regulate the supply of fuel to the motor. On the other hand, when the governor is in action the bell-crank lever 52 constitutes the fulcrum of the lever 48, so that independently of the movement of the valve by the operator the valve will be moved by the governor under the conditions that control the actions of the latter. As shown in Fig. 3ª, I prefer to provide the disk 58 with a graduated scale and to provide the washer 63 with an index by means of which the operator may be guided in adjusting the valve.

The forks 64 of the front wheels are provided with arms 65, which extend rearward, and to each of these arms is pivotally connected one end of a rigid rod 56, by which the arms are connected, so that they move together. Theoretically the projected axes of all the wheels of a vehicle should extend to a common center or pivotal axis. When the wheels are all in parallel planes and the vehicle traveling in a straight line, this pivotal axis is located at an infinite distance, but when the wheels are moved out of parallel planes in order to turn the vehicle the pivotal axis approaches one side or the other, accordingly as the wheels are turned in one direction or the other, and in making a short turn it is brought quite near. Where the two steering-wheels swivel about a common center—as, for example, where they are carried by a single axle which swivels about a central pivot or king-bolt—this condition is maintained by maintaining the steering-wheels in parallel planes, but where they do not swivel about a common center they must not be maintained in parallel planes, excepting when the vehicle is traveling in a straight line. The extent of the pivotal movement of the two wheels must differ, the one nearer the pivotal axis requiring a greater movement than the other. In order to accomplish this differential movement, the parts are so constructed, proportioned, and arranged that a line drawn through the center about which either of the wheels swivels and through the point of connection between the arm 65 of said wheel and the rod 66 will form an angle with the plane of the wheel instead of being parallel with it. Between these arms is also a connection comprising a spring 67 and two chains or similar inelastic devices 68, by which the ends of the spring are connected to the arms, the ends of the spring being also connected by chains or other inelastic devices 69 to the opposite sides of the frame, whereby the front wheels are held normally in planes parallel with the rear wheels. The connections between the spring 67 and the sides of the frame are preferably adjustable, and to this end I incorporate therein screws 70, which pass through perforated lugs 71, carried by the frame, and I arrange on these screws check-nuts 72, which engage opposite sides of the lugs 71. Pivoted to each of the prongs of each of the forks of the front wheels is a link 73, which extends backward from its pivotal point, the two links upon opposite sides of the wheel being rigidly connected, so that they are compelled to move together. Preferably they are connected by means of the axle 74, one end of which is permanently secured to one of the links and the other end of which has a non-circular portion 75, fitting in a non-circular perforation of the other link, a nut 76 being provided for preventing the withdrawal of the non-circular portion of the axle from the eye of the link. The links are held in normal positions, with a yielding pressure, by means of springs 77, located upon opposite sides of the wheel 7, each of which is connected at one end to one prong of the fork and at the other end to one of the links. I am aware that it is not new, broadly, to journal the front wheel of a bicycle in links pivoted to the forks, but I believe myself to be the first to use for this purpose links which extend backward instead of forward from their pivotal points and which are rigidly connected, so that they are compelled to move together. The advantage of this construction is that it lessens the jar upon the machine when a stone is encountered.

Having thus described my invention, the following is what I claim as new therein and desire to secure by Letters Patent:

1. In a motocycle, the combination with a vehicle, and a motor carried thereby, of gearing for transmitting motion from the motor to the driving-wheel, said gearing including a two-part shaft, two cog-wheels, one carried by each part of said shaft, a wrist-pin carried by and connecting the cog-wheels eccentrically, a counter-shaft and pinions carried by the counter-shaft and gearing with the cog-wheels, substantially as set forth.

2. In a motocycle, the combination with a vehicle and a motor carried thereby, of gearing for transmitting motion from the motor to the driving-wheel, said gearing including separable coöperating members, and a shaft carrying one of said members and having a universal joint, a movable box in which said shaft is journaled, and means for moving the

box and thereby separating or bringing together the separable, coöperating members of the gearing, substantially as set forth.

3. In a motocycle, the combination with a vehicle and a motor carried thereby, of gearing for transmitting motion from the motor to the driving-wheel, said gearing including two coöperating members having frictional engagement with each other, one of said members consisting of a wheel constructed of two disks one of which has a hub upon which the other fits and is movable endwise, and a spring for forcing them toward each other, substantially as set forth.

4. In a motocycle, the combination with a vehicle and a motor carried thereby, of gearing for transmitting motion from the motor to the driving-wheel, said gearing including a shaft having its axis disposed eccentrically with relation to the driving-wheel, a friction-wheel slidably mounted thereon, means holding the wheel against rotary motion relatively to the shaft, and a circular member carried by the driving-wheel with which the friction-wheel has frictional engagement, whereby the friction-wheel may slide upon its shaft to accommodate itself to variations in the position of the circular member, substantially as set forth.

5. In a motocycle, the combination with a vehicle, a motor carried thereby, and gearing for transmitting. motion from the motor to the driving-wheel, said gearing including a member carried by the driving-wheel and a member adapted to coöperate therewith, the latter member being movable into and out of engagement with the former, of a brake-shoe, means connecting it with the movable member aforesaid, and means for operating them, substantially as set forth.

6. In a motocycle, the combination with a vehicle, a motor carried thereby, gearing for transmitting motion from the motor to the driving-wheel, said gearing including a circular member carried by the driving-wheel and a friction-wheel adapted to coöperate therewith, of a brake-shoe, means connecting it with the friction-wheel, and means for moving the brake-shoe and friction-wheel, substantially as set forth.

7. In a motocycle, the combination with a vehicle, and a motor carried thereby, of gearing for transmitting motion from the motor to the driving-wheels, said gearing including a friction-ring carried by each of the driving-wheels, a movable friction-wheel arranged in operative relation to each of said rings, a single hand-lever, and means connecting it with both of the friction-wheels, whereby they may be moved into and out of engagement with the friction-rings, substantially as set forth.

8. In a motocycle, the combination with a vehicle, and a motor carried thereby, of gearing for transmitting motion from the motor to the driving-wheels, said gearing including a friction-ring carried by each of the driving-wheels, and a movable friction-wheel arranged in operative relation to each of the friction-rings, a brake-shoe arranged in operative relation to each of the driving-wheels, a single hand-lever, and means connecting it with both of the friction-wheels and both of the brake-shoes, substantially as set forth.

9. In a motocycle, the combination with a vehicle, a motor carried thereby, and gearing for transmitting motion from the motor to the driving-wheel, of a governor, and hand mechanism for operating the valve of the motor, the valve-gearing having a part common to and connected with both the governor and the hand mechanism aforesaid, substantially as set forth.

10. In a motocycle, the combination with a vehicle, a motor carried thereby, and gearing for transmitting motion from the motor to the driving-wheel, of mechanism for throwing the motor into and out of gear with the driving-wheel, mechanism for starting the motor, and a single hand-lever common to both of said mechanisms, substantially as set forth.

11. In a motocycle, the combination with a vehicle, a motor carried thereby and gearing for transmitting motion from the motor to the driving-wheel, of mechanism for throwing the motor in and out of gear with the driving-wheel, mechanism for starting the motor, brake mechanism, and a single hand-lever common to all of these mechanisms, substantially as set forth.

12. In a motocycle the combination with a vehicle, a motor carried thereby, and gearing for transmitting motion from the motor to the driving-wheel, of mechanism for throwing the motor into and out of gear with the driving-wheel, mechanism for starting the motor, a single hand-lever common to both these mechanisms, a valve for controlling the supply of fuel to the motor, and hand mechanism associated with the hand-lever aforesaid for operating the valve, substantially as set forth.

13. In a motocycle, the combination with a vehicle, a motor carried thereby, and gearing for transmitting motion from the motor to the driving-wheel, of a hollow hand-lever for operating said gearing, valve-gearing, and hand mechanism carried by the hand-lever aforesaid for operating the valve-gearing, substantially as set forth.

14. In a motocycle, the combination with a vehicle, a motor carried thereby and gearing for transmitting motion from the motor to the driving-wheel, of a hand-lever, a dog carried thereby and adapted to be engaged with a part of the gearing for starting the motor, and a second dog carried thereby and adapted to be engaged with the gearing for throwing the motor into and out of gear with the driving-wheel, substantially as set forth.

15. In a motocycle, the combination with a vehicle, a motor carried thereby, and gearing

for transmitting motion from the motor to the driving-wheel, of a hollow hand-lever, a rod arranged within the hollow hand-lever and connected with the valve-gear, and a sleeve connected to the rod and mounted upon the hand-lever so that by moving the sleeve the rod is moved and the valve thereby operated, substantially as set forth.

16. In a motocycle, the combination with a vehicle, a motor carried thereby, and gearing for transmitting motion from the motor to the driving-wheel, of a hollow hand-lever, a rod arranged within the hand-lever and movable endwise, a cap, means connecting the rod and cap so that the cap is capable of rotary but incapable of endwise movement relatively to the rod, said cap and hand-lever having screw engagement with each other, substantially as set forth.

17. In a motocycle, the combination with a vehicle, a motor carried thereby, and gearing for transmitting motion from the motor to the driving-wheel, of a hollow hand-lever, a rod arranged within the hollow hand-lever and having connection with the valve-gear, a cap connected with the rod so that when the cap is moved the rod is moved and the valve operated, and an indicator carried by the cap for indicating the position of the valve, substantially as set forth.

18. In a motocycle, the combination with a vehicle having two steering-wheels, a motor carried by the vehicle, and gearing for transmitting motion from the motor to the driving-wheel, of arms projecting from the forks of the steering-wheels, a rigid connection between said arms, a second connection between said arms including a spring, and means connecting the ends of the spring with opposite sides of the frame, substantially as set forth.

19. The combination with a wheel, of a fork, a pair of links each pivoted at its forward end to one of the prongs of the fork, an axle extending through the hub of the wheel and rigidly connected to both of the links at their rear ends, and a pair of springs each of which is connected at one end to one of the prongs of the fork, whence it proceeds forward, downward and rearward and has its other end connected to one of the links, substantially as set forth.

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Witnesses:
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