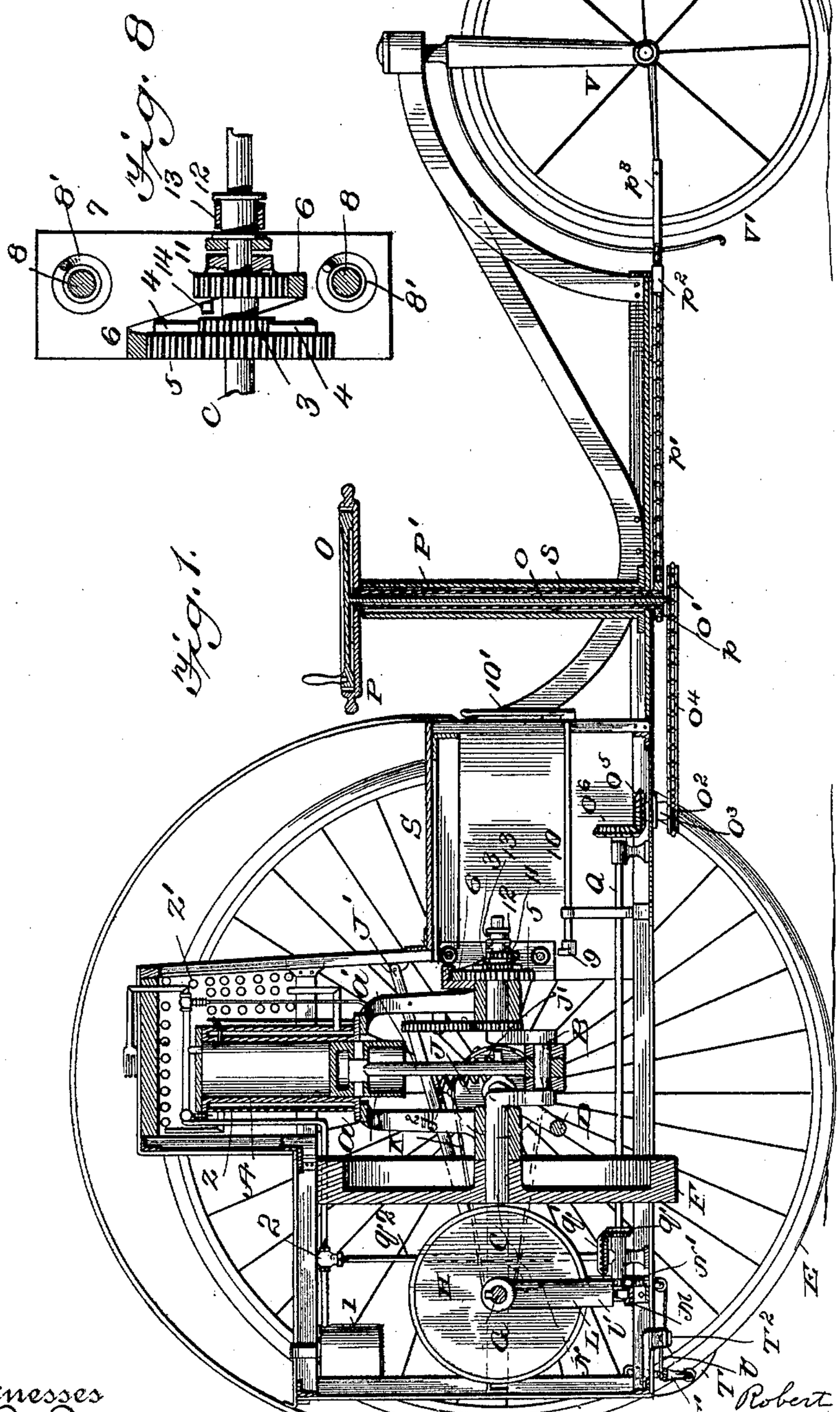
(No Model.)

3 Sheets—Sheet 1.

R. J. GIBBONS & M. A. WILCOX.

MOTOR VEHICLE.

No. 581,816. Patented May 4, 1897.



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(No Model.) 3 Sheets—Sheet 2.

R. J. GIBBONS & M. A. WILCOX.

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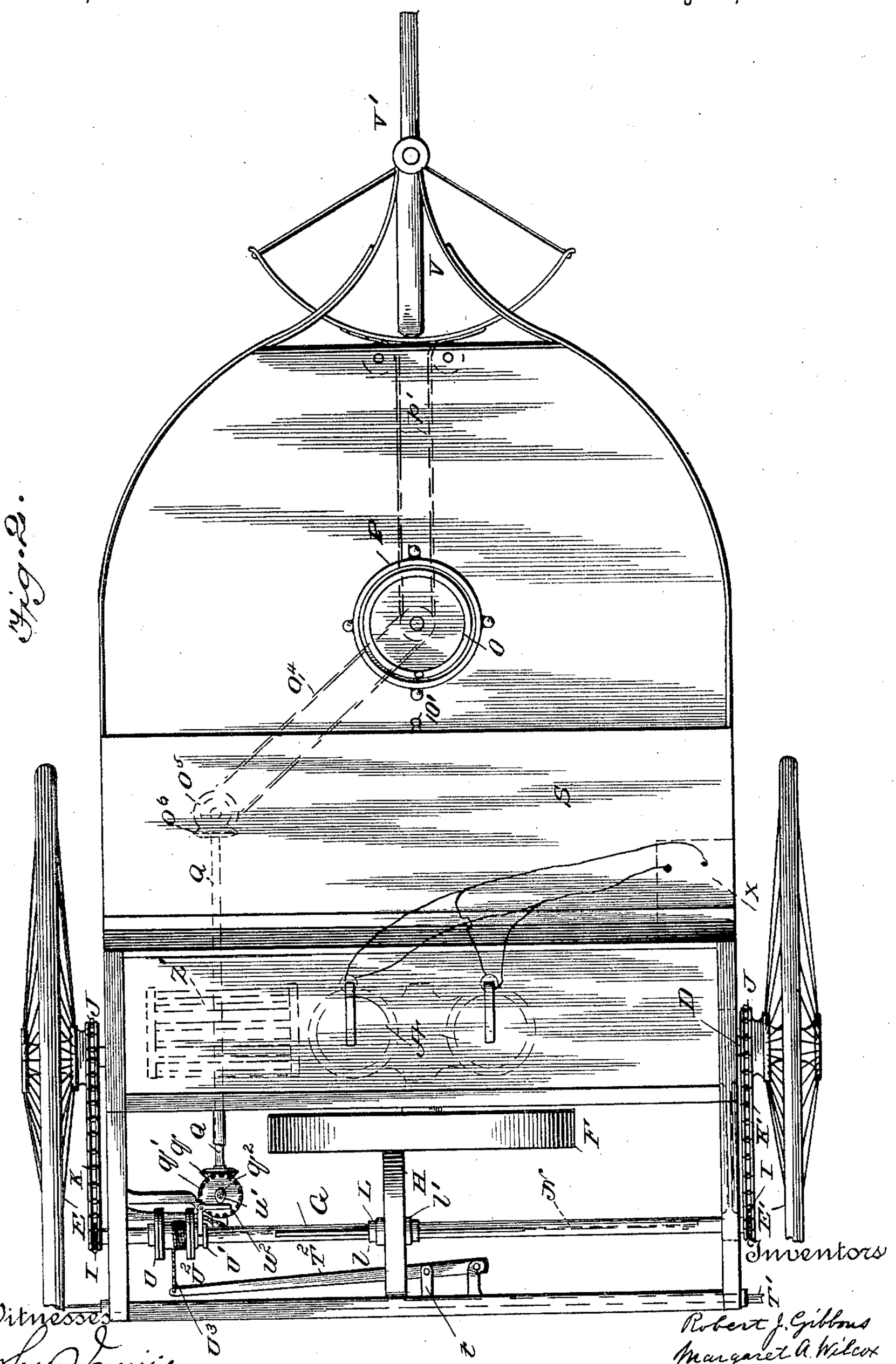
Fig. 2.



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(No Model.) 3 Sheets—Sheet 3.

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MOTOR VEHICLE.

No. 581,816. Patented May 4, 1897.

Fig. 3.

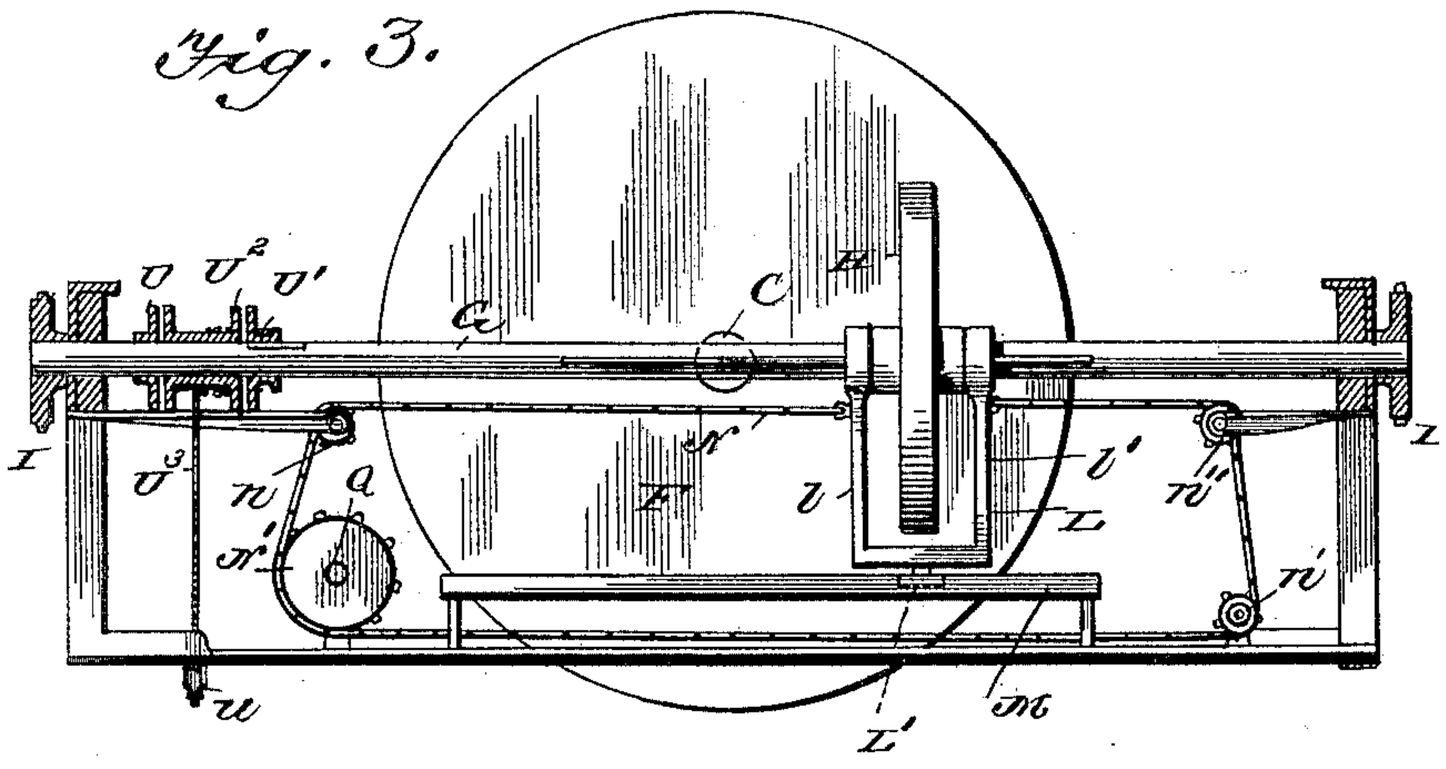

Fig. 5.

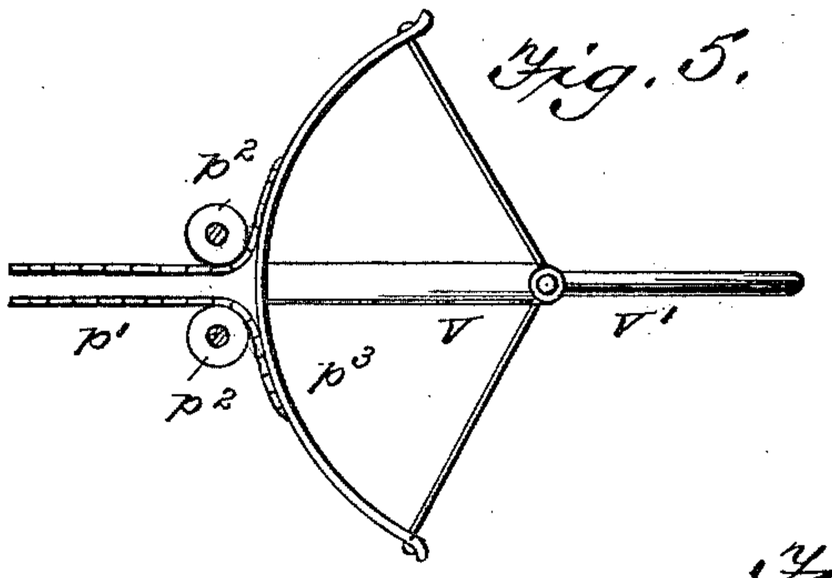

Fig. 4.

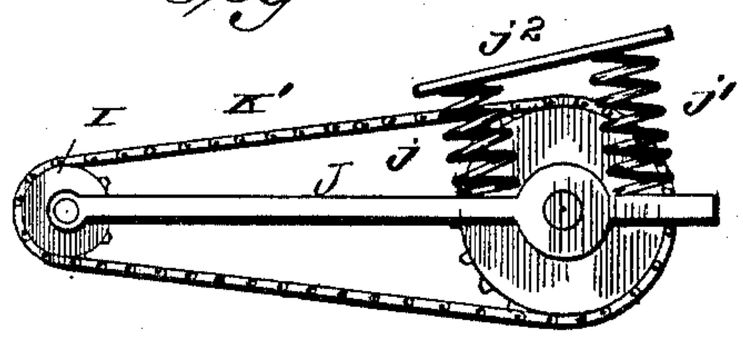

Fig. 6

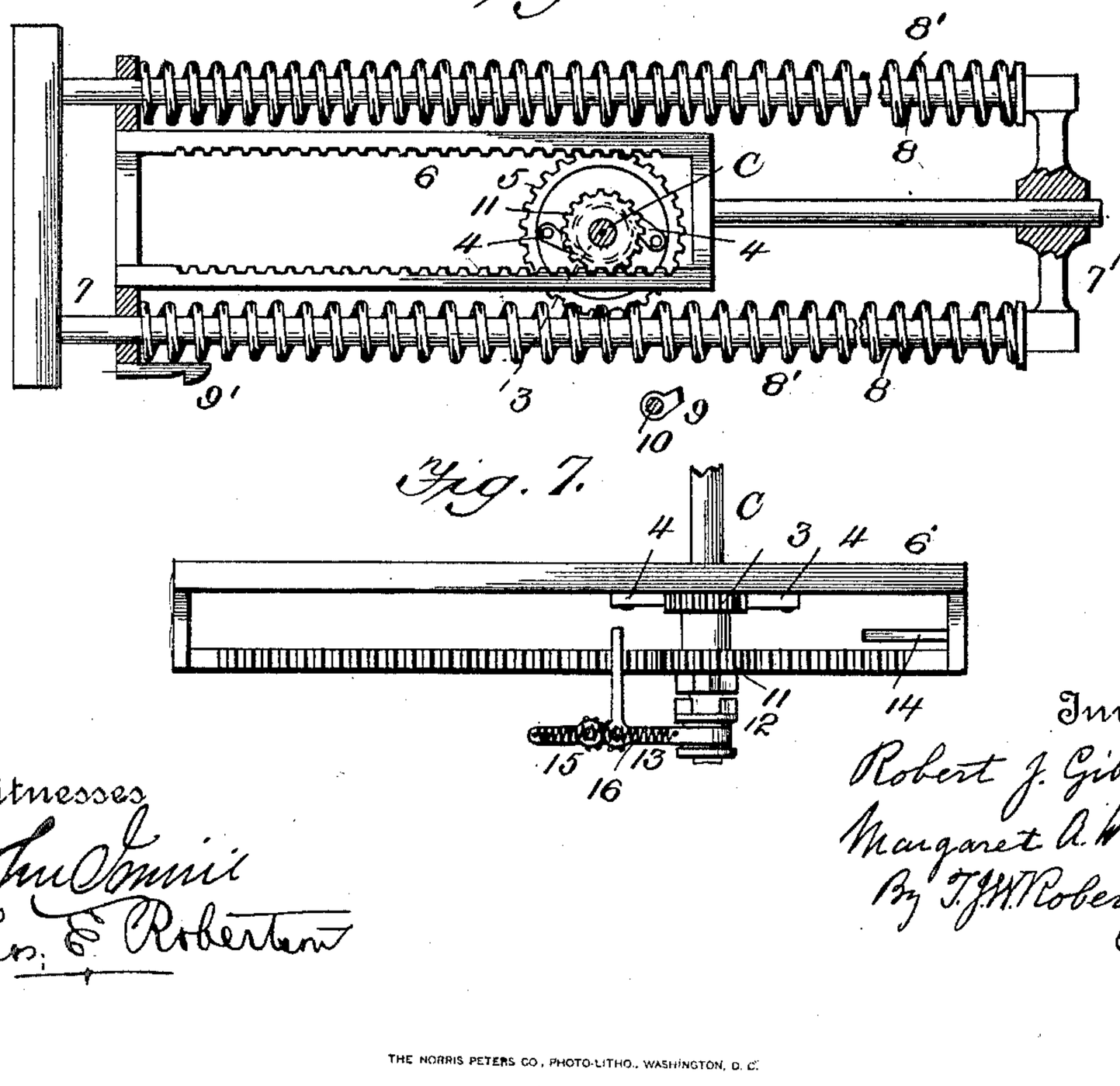

Fig. 7.

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UNITED STATES PATENT OFFICE.

ROBERT J. GIBBONS AND MARGARET A. WILCOX, OF CHICAGO, ILLINOIS.

MOTOR-VEHICLE.

SPECIFICATION forming part of Letters Patent No. 581,816, dated May 4, 1897.

Application filed March 14, 1896. Serial No. 583,220. (No model.)

To all whom it may concern:

Be it known that we, ROBERT J. GIBBONS and MARGARET A. WILCOX, citizens of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Motor-Vehicles, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to an improvement in motor-vehicles; and it consists in improved means for starting the operating mechanism of the carriage, for changing the speed of the same, and for applying the brakes, &c.

The invention also consists in the details of construction, as hereinafter described and then definitely claimed at the end hereof.

In the accompanying drawings, which indicate the preferable ways of carrying out our improvement, Figure 1 represents a longitudinal vertical section of our improvement as applied to a vehicle. Fig. 2 represents a plan view of the same. Fig. 3 is a detail of a portion of the driving-power. Fig. 4 represents a detail of another portion of the driving mechanism. Fig. 5 is a detailed view of part of the steering apparatus. Figs. 6, 7, and 8 are detailed views of an automatic starter.

The views as above described are drawn to different scales for the purpose of better illustrating the details of the vehicle.

Referring now to the details of the drawings by letters and figures, A represents the working cylinder of a gas-engine which forms the motive power for the vehicle, and working in this cylinder is a piston *a*, whose piston-rod *a'* is secured to a crank B, which crank is formed on a horizontal shaft C, and said horizontal shaft transmits motion, by means of frictional gearing hereinafter described, so as to operate the driving-shaft D, on which the driving-wheels E E' are secured. This gas-engine is supplied with gas from a gas-generating apparatus 1, which consists of a reservoir or tank wherein the oil is held and evaporated by a vacuum caused by suction-strokes of the engine, which gas after being generated is mixed with air, which enters through a small inlet made in a valve 2, when the gas and air are ready for use in the gas-engine.

While we have shown and partially described a gas-engine for use on our vehicle, it is of course easily understood that any other suitable power may be substituted therefor, and we have therefore only described such parts of the gas-engine as will be necessary for one to easily understand the operation of the various parts of the device.

The igniting apparatus for the gas-engine consists of an electric spark coil which is charged by a battery X, placed under the seat of the vehicle, as shown in Fig. 2.

It might be well to state that the cylinders of the engine have water-jackets Z and water-pipes Z', through which water is kept in circulation to prevent said cylinders from becoming unduly heated.

Connected to the horizontal shaft C is a fly-wheel F, from which rotary motion is transferred to a supplemental shaft G by means of a friction-wheel H, slidingly secured to said supplemental shaft G, and which friction-wheel bears on the fly-wheel F. On each end of the supplemental shaft G is a sprocket-wheel I, through which power is transmitted to sprocket-wheels J on the driving-shaft by means of the sprocket-chains K K'.

The friction-wheel H, which has just been described as bearing against the fly-wheel F, is slidingly secured to the supplemental shaft G, and in order to change the location of this friction-wheel H, so as to get greater speed when it contacts near the periphery of the fly-wheel B, or greater power when it contacts near the axle of said fly-wheel, we provide a yoke L, whose arms *l l'* bear on each side of the hub of said friction-wheel H, and at the bottom of the yoke is an antifriction-roller L', which travels in a guide M. Secured to the arm *l* of the yoke is one end of a chain N, which chain passes over a guide-pulley *n* and around a sprocket-wheel N', and is then continued around two other guide-pulleys *n' n''*, and then has its other end attached to the other arm *l'* of the yoke.

The parts just described are operated when the sprocket-wheel N' is caused to rotate, and the friction-wheel H may thus be caused to travel back and forth on the supplemental shaft G, so as to change the speed of the vehicle in a manner which will be easily understood.

S forms the seat of the vehicle, and immediately in front of this seat is a standard *s*, from which the shafts of the wheels O and P project. The inner wheel O is secured to a shaft *o*, on the lower end of which is secured a sprocket-wheel *o'*, from which power is conveyed to another sprocket-wheel o^2 on a shaft o^3 by means of a sprocket-chain o^4. On the other end of this shaft o^3 is a bevel-gear o^5, which through its companion gear o^6 transmits motion to a shaft Q, and on the rear end of this shaft is secured the sprocket-wheel N', before referred to. On the shaft Q is also secured a bevel-gear *q*, which through the bevel-gear *q'* operates the shaft q^2, which shaft when turned opens or shuts the valve 2, heretofore referred to. The operation of these parts is as follows: When the wheel O is turned, the shaft Q is operated through the sprocket-wheels, sprocket-chain, and bevel-gears above described, and as this shaft Q rotates the shaft q^2 is operated through the bevel-gears *q q'* and causes the valve 2 to open, thus allowing gas and air to enter the engine to operate the piston in the usual manner. Simultaneously with the opening of the valve 2 the shaft Q also operates the sprocket-wheel N', which causes the chain N to move the friction-wheel H, as hereinafter described. As the vehicle commences to move, the wheel O is turned further, which allows a larger supply of gas and air to pass through the valve to the engine and at the same time moves the friction-wheel H farther from the axle of the fly-wheel F, and as more and more gas is admitted to the engine the friction-wheel is caused to travel nearer the periphery of the fly-wheel B in order to get the greatest amount of speed.

Of course it is understood that when the wheel O is turned backward in order to close the valve 2 to shut off the supply of gas the frictional wheel H is moved back to its original position. We wish it to be also understood that the parts are so arranged that the valve is opened fully before the friction-wheel H travels to the end of its outward movement in order that said friction-wheel may be moved back and forth to some extent without changing the supply of air and gas, so that the engine may be driven at practically the same speed whether the vehicle is traveling on a level or on a slight upgrade, the additional power required for the upgrade being given by moving the friction-wheel H nearer to the axle of the fly-wheel, which would of course give more power to the vehicle, but of course run the same at a slower speed, although the engine is running uniformly all the time.

The valve 2, above mentioned, is so arranged that when it is shut it may be opened by turning the shaft q^2 in either direction, and as the shaft continues to rotate the valve is opened wider until it is opened to its full extent. This construction is made to enable the friction-wheel H to be moved either side of the center of the fly-wheel, in order that the direction of rotation of the supplemental shaft G may be reversed, in order to move the vehicle backward.

It will thus be seen that when it is desired to move the vehicle backward it will be unnecessary to reverse the engine and that all it is necessary to do is to rotate the wheel O in a backward direction until the friction-wheel H is moved to the opposite side of the fly-wheel B, when the rotating parts of the vehicle are run in the opposite direction. The brakes are also operated by the same parts which open the valve 2 and control the position of the friction-wheel H, and said brakes and their operating mechanism may be described as follows:

T T represent the brake-shoes, which bear against the tires of the driving-wheels, and which brake-shoes are connected with the brake-beam T'. This brake-beam is connected by means of a link *t* with a lever T^2, whose function will be described later. Firmly secured to the supplemental shaft G is a disk U, and slidingly secured to the same shaft is another disk U', and between which disks is a loose pulley U^2, and this loose pulley U^2 is connected with a strap or chain U^3, which passes around pulley *u* and is connected to the above-mentioned lever t^2. The shaft q^2 carries a cam *u'*, which when the shaft q^2 is operated at the proper time turns against an L-shaped lever u^2, whose other end operates the disk U' on the supplemental shaft G. Thus it will be seen that when the shaft q^2 is operated to close the valve 2 it also turns the cam *u'* against the lever u^2 and forces the slidingly-secured disk U' against the loose pulley U^2 and holds the loose pulley by friction against the pulley U. This causes the loose pulley to move as the supplemental shaft G rotates, and as said pulley U rotates it winds up the strap or chain U^3 and moves the lever T^2, which movement, through the link *t*, operates the brake-beams T' and forces the brake-shoes T against the driving-wheels and stops the vehicle.

The above-mentioned wheel P has a hollow spindle P' connected thereto, through which the above-mentioned shaft *o* of the wheel O rotates, and on the lower end of this hollow spindle P' is secured a sprocket-wheel *p*, around which sprocket-wheel a chain *p'* passes, the ends of this chain passing around guide-pulleys p^2 and are then secured to the opposite ends of a quadrant p^3. This quadrant is secured to the steering-head V of the front wheel V', and as the before-mentioned wheel P is rotated to the right or left the steering-wheel V' is caused to move likewise.

In Fig. 4 we show a device which is intended to prevent unnecessary strain being placed on the driving-chains, which consists of connecting the axle boxes or bearings formed on the supplemental shaft G and the driving-shaft D by a bar J', and the weight of the vehicle and its load are carried by this bar J by means of the springs *j j'* and the bearing-

plate j^2. It will of course be easy to understand that when the weight of the vehicle and its load, through some sudden jar or shock, tends to force the supplemental shaft G downward the latter will move in an arc of a circle of which the driving-shaft is a center, and thus relieve the chains of all strain.

To obtain greater ease in starting our vehicle, we have applied an automatic starter, (illustrated in detail in Figs. 6, 7, and 8 and shown partly in Fig. 1,) which is intended to have a stored power which when released is utilized to turn the driving-shaft of the engine and start the same in its operation. The description of this device may be given as follows: To the horizontal shaft C of the engine is secured a ratchet-wheel 3, with which engage pawls 4, secured to a cog-wheel or pinion 5, which meshes with the upper part of a double rack-bar 6. This double rack-bar is secured to a head 7, traveling on rods 88, and to this head 7 are secured expansion-springs 8, which are arranged to be compressed between the head 7 and a similar head 7′, and when the springs are so compressed a catch 9, secured to a shaft 10, hereinafter described, engages with a hook 9′ and holds the head 7 in position to retain the springs in their compressed state. The shaft 10 and its handle or lever 10′ are placed in such a position as to be easily reached by the operator, and this lever is arranged so as to control the movement of the catch 9. When it is desired to start the vehicle, the wheel O is turned to admit a supply of gas and air, and the lever 10′ is then moved in order that the engine may be started to pump, compress, and fire the charge. This movement of said lever 10′ causes the catch 9 to disengage with the hook 9′, when the compressed springs 8 cause the head 7 and its double rack to move outward, and as said rack moves it operates the pinion 5, which, through the pawls 4 and ratchet-wheel 3, operates the horizontal shaft C of the engine and starts all the mechanism in motion to move the vehicle.

Of course it is always necessary to again compress the springs 8 if the automatic starter is to be again used, and the mechanism for accomplishing this consists of the following parts: A small pinion 11 is loosely journaled to the shaft C, which meshes with the lower part of the rack-bar 6, and which pinion forms one half of a clutch, the other half of which is formed on a sliding collar 12, which rotates with said shaft C. This collar 12 is grooved, and in the groove is one end of a bell-crank lever 13, the other end of said lever projecting into the path of a rod 14, hereinafter described. This bell-crank lever 13 usually occupies the position shown in Fig. 7, and it has a second lever 15 geared thereto, and a spring 16 is provided, whose ends are so connected to the ends of said levers 13 and 15 that as soon as said levers are moved slightly out of line with each other the ends of the spring will be on one side of the pivots of said levers, and the spring will therefore cause said levers to move as far as they are allowed or until the clutches on the pinion 11 and collar 12 lock. The spring also serves the function of holding said clutches locked as long as the said levers 13 and 15 are out of line with each other. By the time the stored power of these springs has been fully utilized to start the engine the latter has sufficient power to drive the vehicle, and the rotary motion of its driving-axle is used to automatically recompress the springs in order that they may be used for a future starting. This is accomplished as follows: When the double rack-bar was moved to the left in starting, as hereinbefore described, the rod 14 was moved with it, and when said rack-bar is moved to near the end of its movement the said rod 14 comes in contact with and slightly moves the bell-crank lever 13. The moment this lever is moved out of line with its companion lever 15 the spring 16 acts, as before described, to complete the movement of the lever 13, and the latter acting on the collar 12 causes the latter to engage with the clutch on the small pinion 11, and as said collar 12 moves with the driving-shaft C motion is transmitted to said pinion 11, which, being in engagement with the lower half of the rack-bar 6, causes the latter to move to the right, the pawls 4 on the pinion 5 slipping over the teeth on the ratchet-wheel 3 as said rack moves backward or toward the right. The rack-bar is thus moved to its normal position, and when it reaches almost the end of the movement its end 7 strikes the bell-crank lever 13 and moves it in line with its companion lever 15, at the same time disengaging the clutch by moving the collar 12 away from the pinion 11, this action allowing the driving-shaft to freely rotate in said pinion, and during the movement of these parts the hook 9′ has slipped past the catch 9 and is engaged thereby to prevent the springs from moving the rack-bar toward the left again until the same has been again released by the movement of the handle or lever 10 and its catch 9.

From the above it follows that the "starter" is automatically reset, or rather reset by the action of the driving-shaft, immediately after the starter has expended its force and the engine begins work on its own accord.

From the above and the accompanying drawings it will be seen that we have produced a motor-vehicle which from the simplicity of the mechanism for starting, stopping, &c., can be managed without special skill or learning and that our vehicle is one which has great advantages accruing from the use of the variable-speed gearing, especially in the quick way in which it answers any change of the operating-wheel, and it will also be found very rapid in reversing, as the engine itself continues in its motion as though nothing had happened. Then by the use of our automatic starter we provide a vehicle which is practically a self-starting one, and thereby

are enabled to place all the operating parts in a complete housing, whereby they will be unaffected by bad weather, &c.

It is obvious that in lieu of the valve 2 for controlling the supply of gas and air to the gas-engine a "controller" may be used to feed current to an electrical motor, and the shaft q^2 would then be used to operate this controller in a similar manner to that in which the valve 2 is operated; and in the following claims we intend to cover such and all other fair equivalents of the devices shown, unless said claims are specifically limited thereto.

What we claim as new is—

1. In a motor-vehicle, suitable driving power, a valve controlling the same, and a variable-speed gearing, in combination with intermediate mechanism and means as the wheel O for operating said valve and varying said gearing, both by the movement of said means substantially as described.

2. In a motor-vehicle, suitable driving power, a valve controlling the same, a variable-speed gearing, and a brake, in combination with intermediate mechanism and means as the wheel O for moving the valve, varying said gearing and operating the brake, all by the movement of said means substantially as described.

3. In a motor-vehicle, suitable driving power, a valve for controlling the same, a brake and a steering-wheel, in combination with a hollow spindle, a second spindle working inside of said hollow spindle, means for connecting one of said spindles with said brake and valve, a connection between the other spindle and said steering-wheel, and wheels or handles secured to said spindles whereby they may be easily turned, whereby the movement of one of said spindles moves the valve and operates the brake, and the movement of the other spindle operates the steering-wheel substantially as described.

4. In a motor-vehicle, the combination of suitable driving power having a fly-wheel connected therewith, a friction-wheel deriving motion from said fly-wheel and transmitting motion to the driving-wheels of the vehicle, a yoke connected with said friction-wheel, guide-pulleys, a sprocket-wheel and a chain or cord coacting with said sprocket-wheel and passing around said guide-pulleys and having its ends connected to said yoke, whereby the yoke and its friction-wheel travel across the face of said fly-wheel as said sprocket-wheel is rotated, substantially as described.

5. In a motor-vehicle, suitable driving mechanism, a starter connected with the driving-shaft of said driving mechanism and constructed and arranged to rotate said shaft when released, in combination with mechanism substantially as described for automatically resetting the driving mechanism of said starter in operative condition, as set forth.

6. In a motor-vehicle, suitable driving mechanism, a starter having a connection with the driving-shaft of said driving mechanism, said starter having springs tending to operate said starter and normally held under tension, intermediate connections between said springs and said driving-shaft arranged to rotate said shaft when the springs are released, in combination with mechanism substantially as described constructed and arranged to automatically replace said springs under tension, as and for the purpose set forth.

7. In a motor-vehicle, suitable driving mechanism, a starter having a connection with the driving-shaft thereof, said starter having springs normally in a compressed state, intermediate connections between said springs and said driving-shaft arranged to rotate said shaft when the springs expand, and a hand-lever arranged to release said springs and allow them to expand, in combination with mechanism arranged to automatically recompress said springs ready for another operation, substantially as described.

8. The combination in a motor-vehicle and with the driving mechanism thereof, of an automatic starter comprising a ratchet-wheel connected with the driving-shaft of said driving mechanism, a pinion loosely connected with said driving-shaft, pawls on said pinion engaging said ratchet-wheel, a rack-bar engaging said pinion, and springs tending to hold said pinion in a certain position, means for holding said springs compressed, and a disengaging device, whereby the springs may be allowed to expand, thus moving the rack-bar and rotating the pinion, substantially as described.

9. The combination in a motor-vehicle and with the driving mechanism and driving-shaft thereof, of an automatic starter comprising a ratchet-wheel connected with said driving-shaft, a pinion loosely connected with said driving-shaft and having pawls thereon engaging the teeth of said ratchet-wheel, a second pinion loosely connected with said driving-shaft and having a clutch arranged to cause it to rotate with said shaft, a double rack-bar having one of its racks engaging the first-mentioned pinion, and its other rack-bar engaging the second-mentioned pinion, springs tending to keep one end of said double rack-bar in mesh with the pinions, a holding device arranged to normally hold the other end of said double rack-bar in mesh with the pinions, a tripping device, and means for operating the above-mentioned clutch, substantially as and for the purpose specified.

In testimony whereof we affix our signatures, in the presence of two witnesses, this 2d day of December, 1895.

ROBERT J. GIBBONS.
MARGARET A. WILCOX.

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