No. 758,634. PATENTED MAY 3, 1904.

H. J. FISHER.

DRIVING MECHANISM FOR MOTOR CARS.

APPLICATION FILED JULY 5, 1902.

NO MODEL. 2 SHEETS—SHEET 1.

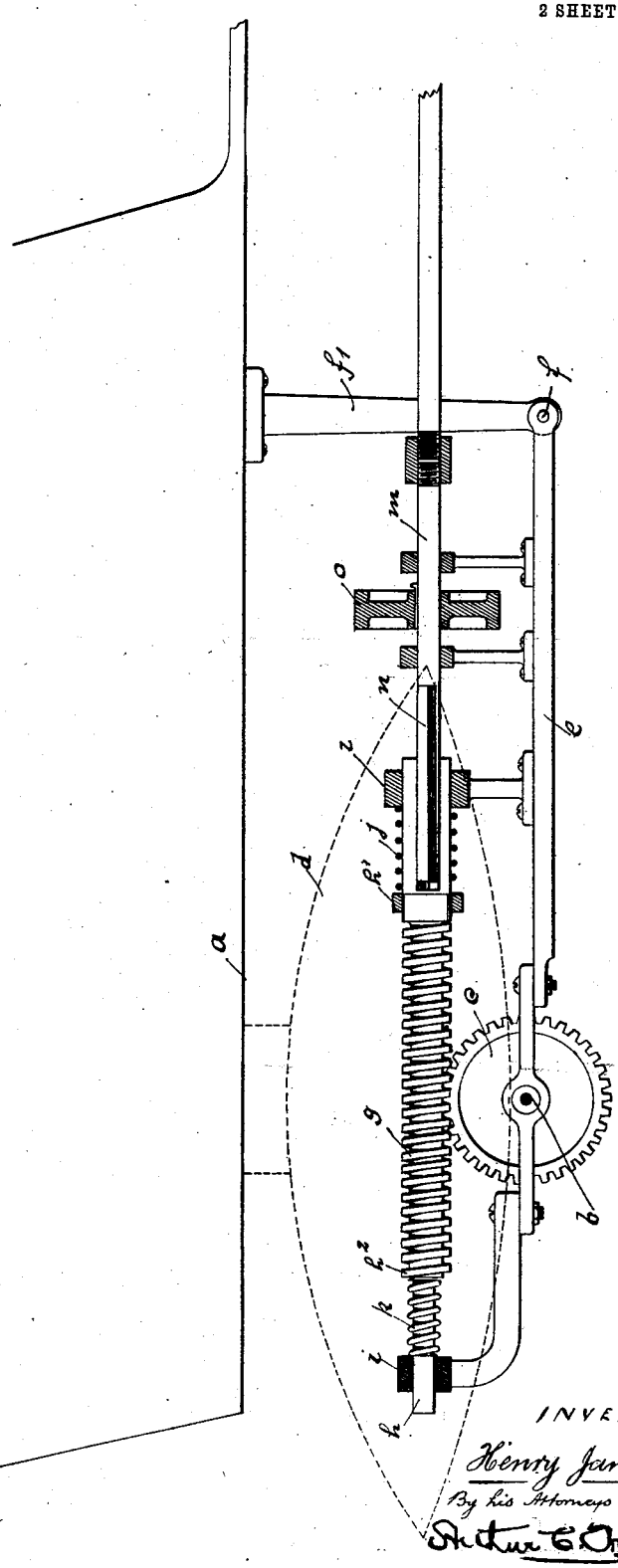



Fig. 1.

WITNESSES:

Fred White

Domingo A. Ulma

INVENTOR:

Henry James Fisher,

By his Attorneys

Arthur E. Fraser & Co

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 758,634. PATENTED MAY 3, 1904.

H. J. FISHER.

DRIVING MECHANISM FOR MOTOR CARS.

APPLICATION FILED JULY 5, 1902.

NO MODEL. 2 SHEETS—SHEET 2.

Fig. 2.

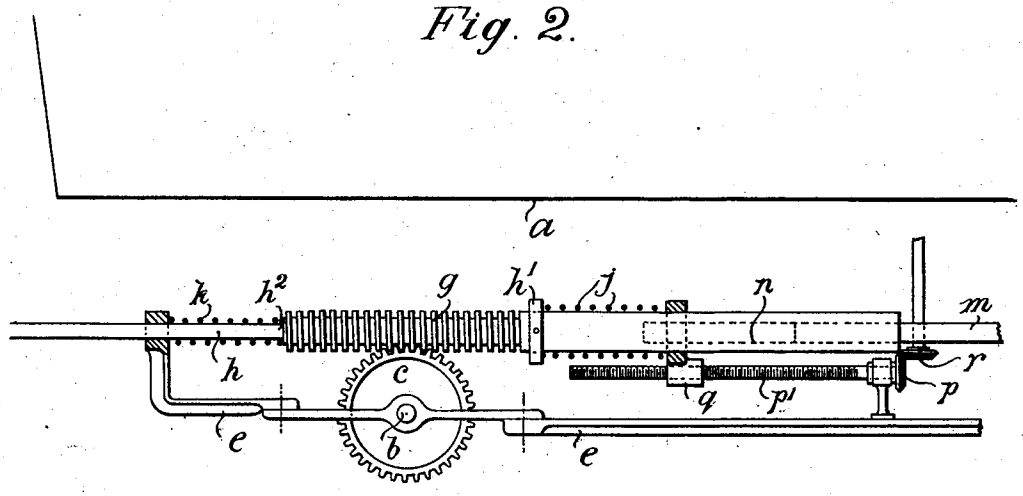
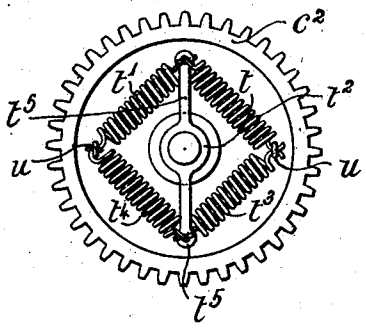



Fig. 3.




WITNESSES:

Fred White

Thomas J. Wallace

INVENTOR:

Henry James Fisher

By his Attorneys:

Ruthven & Fraser Co.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 758,634. Patented May 3, 1904.

# UNITED STATES PATENT OFFICE.

HENRY JAMES FISHER, OF LONDON, ENGLAND.

## DRIVING MECHANISM FOR MOTOR-CARS.

SPECIFICATION forming part of Letters Patent No. 758,634, dated May 3, 1904.

Application filed July 5, 1902. Serial No. 114,493. (No model.)

*To all whom it may concern:*

Be it known that I, HENRY JAMES FISHER, engineer, of 102 Shooter's Hill road, Blackheath, London, England, have invented an Improvement in Driving Mechanism for Motor-Cars, of which the following is a specification.

This invention relates to motor-cars, and has for its object to provide a simple means of driving the car so that it may be readily and easily started and stopped without shock or undue strain upon the parts and whereby it is prevented from running away or starting by gravity when on an incline.

In a motor-car having my invention applied thereto the shaft to be driven carries a worm-wheel or is connected thereto through suitable differential or other gearing. The said worm-wheel is adapted to be driven from the motor, preferably through a worm, which while being capable of rotation is also adapted to travel endwise in either direction against the action of resilient members. The arrangement is such that in applying the motive power to the worm it will either impart a rotary motion to the worm-wheel and immediately move the car, or if the load is greater than the resistance of the resilient member at the time the said worm will be traveled endwise against the action of such resilient member until the latter receives a degree of compression substantially equal to the power required to start the car, whereupon the latter will move. The resilient member allows the motor to get up a certain amount of impetus before the car is started, whereby the extra tractive force required to start the car is gradually and efficiently applied, so that the direct thrust upon the driving-axle and the reactionary shock upon the motor are greatly minimized, if not wholly avoided. When the momentum of the car is for any reason such that it tends to increase the speed of the car beyond that at which it is being driven or allowed to run, then the worm-wheel pressing against the worm causes it to travel endwise against the action of the resilient member, so that the shock to the supporting parts which would otherwise occur is avoided and the energy is partially absorbed by the springs. This absorption of shock on the axle also means less strain on the tires, due to the gradual application of the power and also to the gradual absorption of the momentum when the speed of the car is checked or reduced. The driving and driven shafts and interposed gearing are preferably mounted upon a frame which is pivoted to the vehicle-body.

I will now refer to the accompanying drawings, in which—

Figure 1 is a sectional elevation of the driving-gear of a motor-car having my invention applied thereto. Fig. 2 shows a means for releasing the gear. Fig. 3 shows a modification in the application of the springs.

Referring now to Fig. 1, *a* is the undercarriage of the car. *b* is the rear axle of the vehicle, which is driven from the worm-wheel *c* through differential gear, (not shown,) said axle being supported from the body of the car *a* through springs *d* in the usual way. (These are shown in dotted lines.) *e* is the framework, mounted upon the rear axle at one end and pivoted at the other end, as at *f*, to a bracket *f'*, fixed to the body of the car. Disposed above and adapted to drive the worm-wheel *c* and at right angles to the driven shaft or axle *b* is mounted a horizontal worm *g*. The worm *g* is formed upon a spindle *h*, provided with a collar *h'* at one end of the worm and, if required, a collar at the other end of the worm, although at this end the spindle may be reduced so that the end of the screw forms the collar, as at $h^2$. The spindle is mounted in bearings *i*, adapted to allow the worm to rotate therein and also to travel endwise in either direction. Between the collars *h'* and $h^2$ and their adjacent bearings are disposed spiral springs *j* and *k*, respectively, one of which is compressed when the worm is moved endwise from its central position. The worm *g* is driven from the motor-driven shaft *m*, which forms an extension of the worm and is coupled thereto to a sliding connection, such as *n*, which may conveniently be a squared portion on the shaft sliding in a squared hole in the spindle *h*, so as to permit the endwise motion referred to. The motor-driven shaft carries a fly-wheel *o* and is conveniently driven from the motor through a flexible connection and clutch device. In the drawings the motor-shaft is shown extended toward the engine and broken off.

In operation, assuming the motor to be at work, then as soon as the clutch connecting the motor power and worm is put into engagement the worm is caused to rotate, and this will either impart a rotary motion to the worm-wheel *c* and immediately move the car, or if the load is greater than the resistance of the spring the power of the motor will travel the worm endwise against the spring *k* until the latter is compressed to a degree which is substantially equal to the power required to start the car. It will thus be seen that if the power required to compress the spring be less than that required to start the car the former will be gradually compressed until the pressure of the worm against the wheel is sufficiently great to overcome the inertia of the car. By this means the car is started gradually and without any shock or undue strain upon the parts. Should the car be going down hill and the speed thereof tend to increase beyond the speed determined by the speed of the worm, then the worm-wheel *c* will press against the worm *g* and cause it to travel endwise against the spring *j*, and the latter will remain under compression until the speed of the car is reduced to the speed as governed or determined by the speed of the worm, thus cushioning the shock which would otherwise be received by the worm-bearings or other supporting parts. The pitch of the worm *g* is such that the worm cannot be rotated by the worm-wheel *c*. Should the motive power be disengaged from the worm *g*, then the momentum of the car will in the same way tend to compress the spring, and so bring the car to rest without shock or undue strain upon the working parts, and the car will continue to travel until the fly-wheel comes to rest. Should the car be at rest upon an incline and the worm stationary, it will be seen that the worm acts as a brake on the worm-wheel and prevents any rotation of the latter, and so prevents the car from running away.

In the case of steam-motors or when it is required to put the motor out of gear with the driven gear it can be done by drawing back one of the collars against one of the springs, in which case the momentum of the car if the latter is in motion will travel the worm endwise until it is out of engagement with the worm-wheel. If the car is at rest, the worm may be disengaged by giving it a reverse rotation, which may be done by hand or by the motor. When the worm is thus disengaged from the worm-wheel, the car will be free to travel backward or forward independently of the motor, so that it may be used for coasting or may be drawn in case of accident. If it is desired to use the car for coasting, the latter should be provided with the necessary brakes.

The means shown in Fig. 2 for drawing back the collar comprise a bevel-wheel *p* and screwed spindle *p'*, screwing into a block *q*, which forms an abutment for the spring *j*. The screw-spindle is mounted in suitable bearings, and the abutment is adapted to slide endwise under the action of the screwed spindle, which is driven by suitable gearing, such as *r*, from a hand-wheel conveniently disposed upon the vehicle, but not shown.

In operation the rotation of the screwed spindle through the gearing draws back the collar and allows the worm *g* and spring *j* to slide endwise until the worm is free and out of engagement with the worm-wheel, when the latter can rotate freely.

If it should be necessary to stop the car after the worm has been moved out of engagement with the worm-wheel, the worm can be put into gear again, preferably after it has been caused to rotate.

In some cases the springs at the ends of the worm may be dispensed with, and I may substitute therefor a resilient member or members in or connected with the worm-wheel between same and the shaft it drives or between the wheel and a suitable hub thereon. These resilient members in the worm-wheel may be used instead of or in addition to the resilient members or springs of the worm-spindle.

Fig. 3 shows a construction of worm-wheel with the resilient members applied thereto. In this case $c^2$ is the toothed rim of the worm-wheel. *t* is a hub fixed to the shaft and upon which hub the toothed rim $c^2$ is loosely fitted. The parts *c* and *t* are connected by four springs $t' t^2 t^3 t^4$, which pass from projections $t^5$ on the hub to projections *u* on the loose rim. The springs are arranged oppositely, as shown, so as to take up power when the worm-wheel is rotating in either direction, two of the springs being in tension at one time. It will be obvious that the number and strength of the springs may be varied to suit requirements.

What I claim, and desire to secure by Letters Patent, is—

1. The improvements in driving-gear for vehicles comprising the combination of a driving-shaft, a spindle carrying a worm and having a sliding connection with said driving-shaft, a driven shaft, a worm-wheel on the driven shaft normally in gear with the worm on the spindle, bearings in which said worm-spindle can slide, collars at either end of the worm, springs between said collars and bearings, and a frame pivoted to the body of the vehicle, upon which the driving-shaft, driven shaft and gearing are mounted, all substantially as and for the purpose set forth.

2. The improvements in driving-gear for vehicles comprising the combination of a driving-shaft, a spindle carrying a worm and having a sliding connection with said shaft, permitting a longitudinal motion of the spindle but not of the driving-shaft, a driven shaft, a worm-wheel on the driven shaft normally in gear with the worm on the spindle, bearings in which said worm-spindle can slide, collars at either end

of the worm, and springs between said collars and bearings, all substantially as described.

3. The improvements in driving-gear for vehicles, comprising the combination of a driving-shaft, a spindle carrying a worm and having a sliding connection with said driving-shaft, a driven shaft, a worm-wheel on the driven shaft and normally in gear with the worm on the spindle, bearings in which said worm-spindle can slide, resilient members between the worm and bearings, means for allowing said worm to move endwise in either direction against the action of the resilient members independently of the driving-shaft, and a frame pivoted to the body of the vehicle, upon which the driving-shaft, driven shaft and gearing are mounted, all substantially as and for the purpose set forth.

4. The improvements in driving-gear for vehicles comprising the combination of a driving-shaft, a spindle carrying a worm, and having a sliding connection with said driving-shaft, a driven shaft, a worm-wheel on the driven shaft normally in gear with the worm on the spindle, a resilient member arranged between the driving-shaft and the driven shaft, said member being adapted to yield when starting the vehicle, and a frame pivoted to the body of the vehicle, upon which the driving-shaft, driven shaft and gearing are mounted, all substantially as and for the purpose set forth.

5. The improvements in driving-gear for vehicles comprising the combination of a driving-shaft, a spindle carrying a worm, and having a sliding connection with the driving-shaft, a driven shaft, a worm-wheel on the driven shaft, normally in gear with the worm on the spindle, a resilient member arranged between the driving-shaft and the driven shaft, said member being adapted to yield when the speed of the driven shaft is increased by the momentum of the vehicle, and a frame pivoted to the body of the vehicle, upon which the driving-shaft, driven shaft and gearing are mounted, all substantially as and for the purpose set forth.

6. The improvements in driving-gear for vehicles comprising the combination of a driving-shaft, a spindle carrying a worm, and having a sliding connection with the driving-shaft, a a driven shaft, a worm-wheel on the driven shaft, normally in gear with the worm on the spindle, a resillient member disposed between the driving-shaft and the driven shaft, permitting the rotary movement of the latter independently of the rotary movement of the worm-spindle, and a frame pivoted to the body of the vehicle, upon which the driving-shaft, driven shaft and gearing are mounted, all substantially as and for the purpose set forth.

7. The improvements in driving-gear for vehicles comprising the combination of a driving-shaft, a spindle carrying a worm, and having a sliding connection with the driving-shaft, a driven shaft, a worm-wheel on the driven shaft normally in gear with the worm on the spindle, a resilient member disposed between the driving-shaft and the driven shaft, permitting rotary movement of the latter independently of the rotary movement of the worm-spindle, stops for limiting the longitudinal movement of the worm-spindle means for moving one of said stops to permit the worm to travel endwise out of engagement with the worm-wheel, and a frame pivoted to the body of the vehicle, upon which the driving-shaft, driven shaft and gearing are mounted, all substantially as and for the purpose set forth.

8. The improvements in driving-gear for vehicles comprising the combination of a driving-shaft, a spindle carrying a worm, and having a sliding connection with the driving-shaft, a driven shaft, a worm-wheel on the driven shaft normally in gear with the worm on the spindle, resilient members at the ends of said worm, means for allowing said worm-spindle to move endwise in either direction against the action of the resilient members independently of the driving-shaft, means for releasing the worm from engagement with the worm-wheel, and a frame pivoted to the body of the vehicle, upon which the driving-shaft, driven shaft and gearing are mounted, all substantially as and for the purpose set forth.

9. The improvements in driving-gear for vehicles comprising the combination of a driven shaft, a worm-wheel on said driven shaft, a worm for driving said worm-wheel, resilient members at the ends of said worm, means for mounting said worm adapted to permit it to move endwise in either direction against the action of the resilient members, means for driving the worm from the motor, a screwed spindle, a nut on the worm-spindle engaging with the screwed spindle, means for operating the screwed spindle so as to travel the worm out of and into engagement with the worm-wheel, substantially as and for the purpose set forth.

10. The improvements in driving-gear for vehicles, comprising the combination of a driving-shaft, a spindle carrying a worm, a driven shaft, a worm-wheel connected with the driven shaft, and normally in gear with the worm on the spindle, a resilient member arranged between the driving-shaft and the driven shaft, and a frame having a pivotal connection with the body of the vehicle, upon which said shafts and gearing are mounted, substantially as and for the purposes set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

HENRY JAMES FISHER.

Witnesses:
HENRY ALLEN PRYOR,
ALFRED B. CAMPBELL.