(No Model.)

J. H. PALMER.

CAR STARTER.

No. 407,369. Patented July 23, 1889.

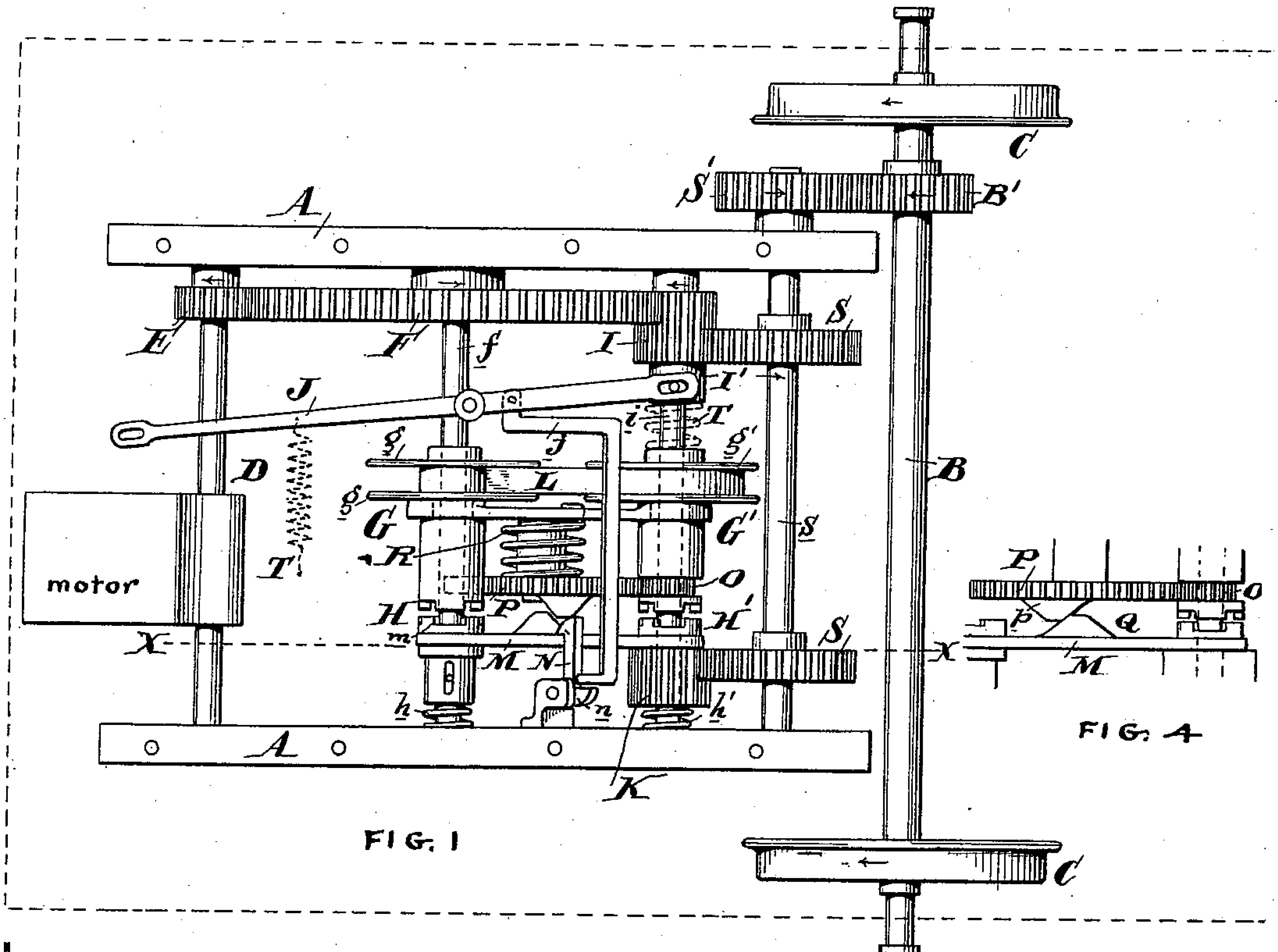


FIG. 1

FIG. 4

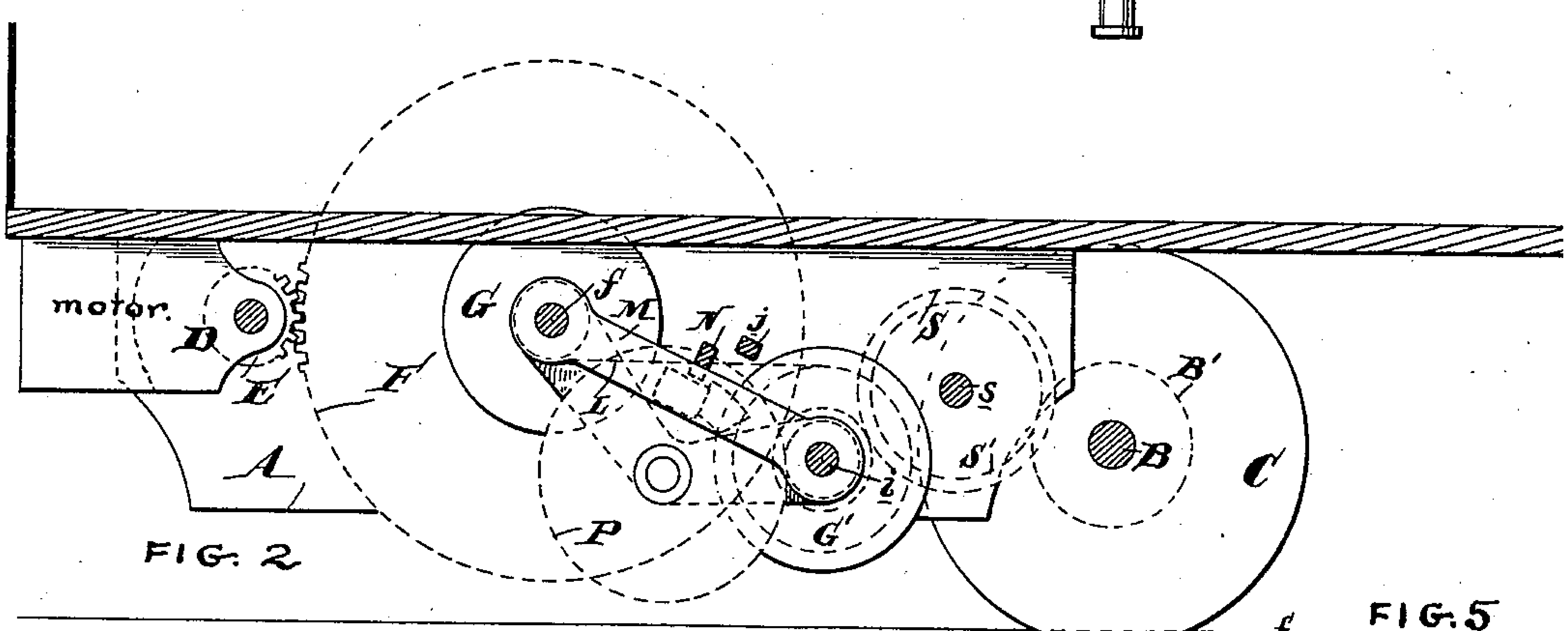


FIG. 2

FIG. 5

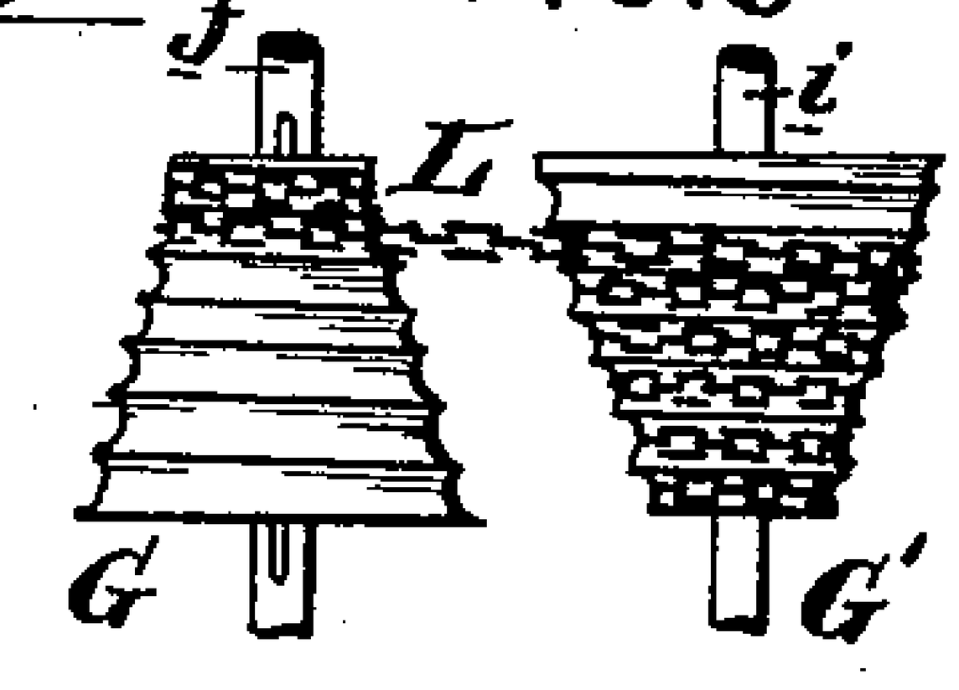
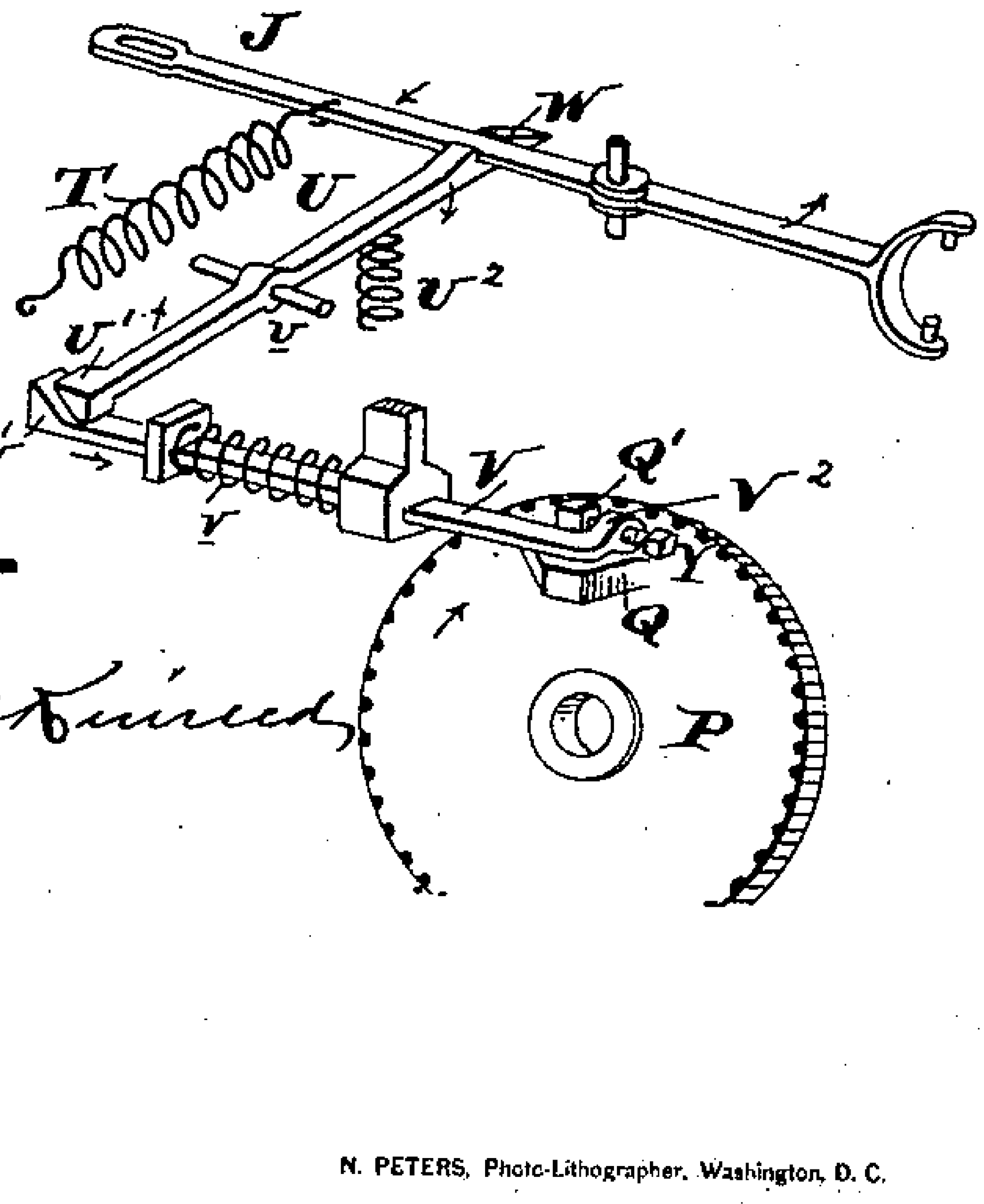


FIG. 3



Witnesses:
Henry Drury
E. W. Breckinridge

Inventor:
John H. Palmer
By his atty

N. PETERS, Photo-Lithographer, Washington, D. C.

UNITED STATES PATENT OFFICE.

JOHN H. PALMER, OF PHILADELPHIA, PENNSYLVANIA.

CAR-STARTER.

SPECIFICATION forming part of Letters Patent No. 407,369, dated July 23, 1889.

Application filed October 25, 1888. Serial No. 289,089. (No model.)

To all whom it may concern:

Be it known that I, JOHN H. PALMER, of the city and county of Philadelphia, and State of Pennsylvania, have invented an Improvement in Car-Starters, of which the following is a specification.

My invention relates to car-starters in general; and it consists of certain improvements, which are fully set forth in the following specification, and shown in the accompanying drawings, which form a part thereof.

More specifically, my invention relates to car-starters for vehicles propelled by steam, electricity, or other motive power. Ordinarily in starting such a car it is necessary in order to overcome the inertia of the car and put it in motion to employ a much larger initial motive power than is required for ordinary running. This will necessarily exert an excessive strain upon the engine or motor, which will in time weaken it, or require a motor of greater power to be employed than would otherwise be necessary for the mere propulsion of the car. It is to overcome this fault that my invention is intended, so that no greater power is required from the motor to start the car than to propel it afterward.

The principle upon which my invention operates is imparting from the motor through the starting mechanism a gradually accelerated speed to the car-wheels until they reach the desired running speed and the car is fully started, when the car-starter is cut out of operation by lever mechanism operated by the driver, or automatically, and the motor is brought into connection with the axles by proper gearing to continue the propulsion of the car.

In carrying out my invention I secure my car-starter to a frame under the body of the vehicle and couple it with the axle or axles of the car by suitable gearing. The starting mechanism consists of two loose drums mounted on shafts, one of which is connected by gearing with the motor and the other with the car-axles. These drums are connected by a band, chain, or rope, which may be wound from the one to the other upon rotation of the drums. The drums are connected to their shafts when the car-starter is operated by clutch mechanism controlled by a lever in the hands of the driver, and the winding of the band from one drum to the other imparts an accelerated speed to the shaft of that drum from which the band is unwound and through that shaft to the car-wheels. When the proper speed is obtained, the car-starting mechanism, by shifting the lever, is cut out of connection with the motor, which is simultaneously geared with the axles to continue the propulsion of the car. By automatic mechanism the band is wound back to its former position for operation again to start the car. Thus it will be seen that in starting the car the motor is connected with the axle in such a manner as to impart an increasing speed to the car axles and wheels until they attain the desired rate, when the starting mechanism is cut out of connection with the motor, the latter being instantly geared with the axles, so as to continue the propulsion of the car without any further change in the relative speeds of the motor and car-axles.

In the drawings, Figure 1 is a plan view of my improved car-starter. Fig. 2 is a sectional view of the same through the line *x x* of Fig. 1. Fig. 3 is a perspective view of the lever-operating mechanism. Fig. 4 is a view in detail of the clutch-actuating wheel, and Fig. 5 is a plan view of a modified form of speed-increasing gearing.

A is a frame, which may be secured to the bottom of the car and supports the car-starting mechanism in any suitable position. I prefer, however, to arrange it horizontally, as shown in the drawings.

B is one of the axles, and C are the car-wheels.

D is the motor-shaft carrying a gear-wheel E, which gears with the large power gear-wheel F of the car-starter. This gear-wheel F is secured to the shaft *f*, upon which is loosely journaled the drum G, which is preferably provided with disks *g*, between which the band, rope, or chain of the car-starter is wound upon the drum, as is hereinafter explained.

H is a clutch keyed upon the shaft *f* and adapted to engage with the drum G to secure it to the shaft *f*. A spring *h* normally forces the clutch H over to engage with the drum G.

I is a transmitting gear-wheel loosely jour-

naled upon the shaft *i*, and connected by a collar I′ to the pivoted hand-lever J, whereby it may be shifted on the shaft *i*.

G′ is a drum similar to the drum G, loosely journaled on the shaft *i*.

H′ is a clutch keyed upon the shaft *i* and adapted to engage with the drum G′ to secure it to the shaft *i*. A spring *h*′ normally forces the clutch H′ over to engage with the drum G′.

K is a gear-wheel carried by the clutch H′.

L is a band or chain secured at its ends to the drums G and G′ and adapted to be wound from one to the other. The length of this band depends upon the acceleration of velocity desired, as will be hereinafter more fully explained.

M is a link between the clutches H and H′, resting against collars *m* thereon.

N is a catch pivoted to the frame, adapted to hold the link M, and with it the clutches H and H′, out of connection with the drums G and G′. This catch is provided with a pin or projection *n*.

J′ is a bar secured to the lever J, adapted to slide in guides on the frame. When the lever is drawn over, the end of this bar strikes the projection *n* and unlatches the catch N, thus freeing the link M, and allowing the clutches H and H′ to be pushed forward by the springs *h* and *h*′, to engage with the drums G and G′ and connect them, respectively, with the shafts *f* and *i*.

O is a gear-wheel carried by the drum G′.

P is a gear-wheel upon a shaft secured to the frame, the teeth of which mesh with those of the wheel O.

p is a lug upon the face of the wheel P, adapted to strike a lug or projection Q upon the link M to push back this link and allow it to be clutched and held back by the catch N disconnecting the clutches from the drums. The number of teeth in the gear-wheel P is such that it will perform almost one complete revolution while the drums G G′ are rotated sufficiently to unwind the band or chain L from drum G′ upon the drum G. At this moment the lug *p* pushes back the link M and releases the drums from the clutches.

R is a spring about the shaft of the wheel P, which is wound up while the wheel P is rotated by the gear-wheel O on the drum G′, and operates to rotate the wheel P in the opposite direction when the drum is released from the clutch, thereby rotating the wheel O and drum G′ and rewinding the band upon the latter again into operative position for starting the car after again stopping.

S S are gear-wheels, preferably upon a counter-shaft *s*, gearing with the wheels K and I.

S′ is a gear-wheel upon the counter-shaft *s*, gearing with the wheel B′ upon the axle B, to rotate the car-wheels.

It is evident that the counter-shaft *s* might be dispensed with, and the wheels S might be carried upon the axle B, operated by the gear-wheels K and I. In that case the axle B would simply be substituted for the shaft *s*.

When the car is running, the wheel I is geared with the wheel F, transmitting power from the motor-wheel E to the car-wheels C. After the car has been brought to a standstill by stopping the rotation of the motor-wheel, and it is desired to start up and operate the starting mechanism for that purpose, the lever J is shifted, drawing the wheel I out of gear with the wheel F. This gear-wheel I is made of a sufficient breadth to gear always with the wheel S on the counter-shaft, whether gearing with the wheel F or not. The shifting of the lever J forces over the bar J′, the end of which strikes the projection *n* of the catch N, lifting it from the link M and allowing the clutches H and H′ to be connected with the drums G and G′, respectively. The drum G, being thus connected with the shaft *f*, will rotate, winding up the band L from the drum G′. As the band is unwound, the diameter of the drum G′ decreases, while that of the drum G increases, thus accelerating the speed of rotation of the drum G′, and this accelerated motion is transmitted by the gear-wheel K to the wheels S on the counter-shaft, and thence to the car-wheels C, starting the vehicle slowly, and gradually bringing it to its full speed. As the wheel I is geared to one of the wheels S, it is apparent that to this wheel also will be imparted an accelerated motion. When it has reached the proper gearing speed to gear with the wheel F, the lever J is shifted, making the connection between the wheels F and I to continue the propulsion of the car. Simultaneously with the shifting of the lever J to make this connection the drums G and G′ are disconnected from the clutches H and H′ by the operation of the lug *p*, which strikes the lug Q upon the link M, forcing it back until it is caught by the catch N, (see Figs. 1 and 4;) but while the wheel P, carrying this lug *p*, has been rotating the spring R has been wound up, and the moment the clutches H and H′ are disconnected the spring will operate to rotate the drums G and G′ in the opposite direction to bring the band L back upon the drum G′ for operation to start the car again. The shifting of the lever J to make the connection between the gear-wheels F and I may be done by the hand, an expert driver being able to tell by the touch when the proper gearing speed is obtained. To assist in this operation, a spring T may be employed to force the lever over, as shown in dotted lines in Fig. 1. I prefer, however, to make this shifting of the lever automatic by the mechanism shown in Fig. 3, as is more fully explained hereinafter. The lever J may broadly be considered as a shifter, which is not to the lever type, various forms of shifters being known in the arts.

The number of teeth in the wheel F relative to the number in the wheel I depends upon the variation of the diameters of the drums G and G′ caused by the winding of the band L, or, in other words, upon the length of the band L, so that the acceleration im-

parted thereby to the wheel I will bring it into proper gearing speed with the wheel F, and at that moment these two wheels are geared together by the shifting of the lever J. In practice, however, it may sometimes be expedient to accelerate the speed of the wheel I slightly beyond the proper gearing speed, so that the interval required for shifting it will allow it to slow down to the proper gearing speed after the clutches H and H′ are disconnected. The ends of the band L must be so secured to the drums that a rotation of the drum G in one direction will cause the drum G′ to rotate in the opposite direction, since the wheels F and I must rotate in opposite directions.

In practice I prefer that the wheel P, carrying the lug *p*, shall not make a complete revolution before reversing, and thus it will never pass the projection or lug Q on the link M, but merely press against it sufficiently to force the link back to be caught by the latch N. In Fig. 1 this lug is shown in its extreme position before the car-starting mechanism is operated, and in Fig. 4 it is shown at the moment of disconnecting the clutches.

The shifting of the lever and gear-wheel I when the car-starting mechanism is cut out of operation may be accomplished automatically by the mechanism shown in Fig. 3.

T is a spring secured to the upper portion of the lever J, tending to shift it.

U is a lever pivoted to the frame at *u*, provided with a projection or pin W to hold the lever against the action of the spring T. The end of this lever is beveled at U′.

V is a sliding bar or bolt on guides on the frame, having one end beveled at V′ in contact with the beveled end H′ of the lever U.

V^2 is a short arm or hook on the end of the bar or bolt V, adapted to be struck by a pin Q′ on the lug Q, carried by the wheel P. As the wheel P rotates and the lug Q operates the clutches in the manner heretofore described, the pin Q′ strikes the adjusting-screw Y in the arm of the bolt V, drawing its beveled end V′ against the beveled end U′ of the lever U. This will raise one end of the lever U, lowering the other and releasing the lever J, allowing it to be shifted by the spring T. Springs U^2 and *u* bring the lever U and bolt V back to position.

I find it convenient to secure the adjusting-screw Y to the arm or hook V^2, which may be adjusted to more exactly operate the bolt V at the proper time and compensate for any wearing away of the parts.

In place of the superimposed bands or chains on the drums G G for producing the accelerated speed, I may use two cone-drums and chain or bands, as shown in Fig. 5.

It is manifest that the mere details of construction here shown are capable of variation without departing from the principles of my invention, and therefore I do not limit my invention thereto.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A vehicle having axles and wheels, in combination with a motor to propel the vehicle and speed-increasing power-transmitting mechanism, substantially as set out, between the motor-shaft and axle for automatically accelerating the speed of the axle with a given rotation or speed of the motor.

2. A vehicle having axles and wheels, in combination with a motor to propel the vehicle and speed-increasing power-transmitting mechanism, substantially as set out, between the motor-shaft and axle for automatically accelerating the speed of the axle with a given rotation or speed of the motor, fixed speed-transmitting gear between the motor-shaft and axle for imparting a definite rotation of the axle to a given speed of the motor-shaft, and clutch mechanism for putting either the accelerating transmitting mechanism or fixed speed-transmitting gear into connection between the motor-shaft and axle.

3. A self-propelling vehicle, in combination with a motor to propel it, a variable or accelerating power-transmitting mechanism between the motor-shaft and axle, clutch mechanism for connecting or disconnecting said accelerating power-transmitting mechanism into or out of action, gearing between the motor-shaft and axle for imparting a fixed speed to the axle with a given speed of the motor-shaft, and means for connecting or disconnecting said gearing.

4. A self-propelling vehicle, in combination with a motor to propel it, a variable or accelerating power-transmitting mechanism between the motor-shaft and axle, clutch mechanism for connecting or disconnecting said accelerating power-transmitting mechanism into or out of action, gearing between the motor-shaft and axle for imparting a fixed speed to the axle with a given speed of the motor-shaft, means for connecting or disconnecting said gearing, and connecting mechanism between the clutch mechanism and the means for connecting or disconnecting the fixed speed-gearing, whereby said accelerating power-transmitting mechanism and fixed speed-gearing are alternately put in or out of action.

5. A self-propelling vehicle, in combination with a motor to propel it, a shaft rotated by the motor, a second shaft connected with the axle by a power-transmitting device, and a speed-accelerating power-transmitting mechanism between the two shafts.

6. A self-propelling vehicle, in combination with a motor to propel it, a shaft rotated by the motor, a second shaft connected with the axle by a power-transmitting device, and a speed-accelerating power-transmitting mechanism between the two shafts, consisting of two drums and a connecting band, chain, or rope, substantially as set out.

7. A self-propelling vehicle, in combination with a motor to propel it, a shaft rotated by

the motor, a second shaft connected with the axle by a power-transmitting device, a speed-accelerating power-transmitting mechanism between the two shafts, consisting of two drums, a connecting band, chain, or rope, substantially as set out, and mechanism to unwind said connecting-band back into operative position after said drums have been operated.

8. A self-propelling vehicle, in combination with a motor to propel it, a shaft rotated by the motor, a second shaft connected with the axle by a power-transmitting device, a speed-accelerating power-transmitting mechanism between the two shafts, consisting of two drums, a connecting band, chain, or rope, substantially as set out, and mechanism to unwind said connecting-band back into operative position after said drums have been operated, consisting of gear-wheels O and P and spring R.

9. In a car-starter for a motor-car, the combination of a main power gear-wheel operated by the motor, a transmitting gear-wheel adapted to gear with said main power gear-wheel, mechanism, substantially as described, operated by the power gear-wheel to accelerate the rotation of said transmitting gear-wheel, a shifter to connect said transmitting gear-wheel and power-wheel when the former has been accelerated to a proper gearing speed, and gearing between said transmitting gear-wheel and the car-axle.

10. In a car-starter for a motor-car, the combination of a main power gear-wheel operated by the motor, a transmitting gear-wheel adapted to gear with said main power gear-wheel, mechanism, substantially as described, operated by the power gear-wheel to accelerate the rotation of said transmitting gear-wheel, a shifter, and automatic devices to shift said shifter and to connect said transmitting gear-wheel and power-wheel when the former has been accelerated to a proper gearing speed, and gearing between said transmitting gear-wheel and the car-axle.

11. In a car-starter for a motor-car, the combination of a main power gear-wheel operated by the motor, a transmitting gear-wheel adapted to gear with said main power gear-wheel, mechanism, substantially as described, operated by the power gear-wheel to accelerate the rotation of said transmitting gear-wheel, a shifter to connect said transmitting gear-wheel and power-wheel when the former has been accelerated to a proper gearing speed, a clutch actuated by the shifter to bring said accelerating mechanism into operation, and gearing between said transmitting gear-wheel and the car-axle.

12. In a car-starter for a motor-car, the combination of a main power gear-wheel operated by the motor, a transmitting gear-wheel adapted to gear with said main power gear-wheel, mechanism, substantially as described, operated by the power gear-wheel to accelerate the rotation of said transmitting gear-wheel, a shifter to connect said transmitting gear-wheel and power-wheel when the former has been accelerated to a proper gearing speed, a clutch actuated by the shifter to bring said accelerating mechanism into operation, means, substantially as described, to disconnect said clutch when the proper acceleration is obtained, and gearing between said transmitting gear-wheel and the car-axle.

13. In a car-starter, the combination of a power gear-wheel and its shaft with a transmitting gear-wheel adapted to gear therewith, loosely journaled on its shaft, drums loosely journaled on each of said shafts, a shifter to shift said transmitting gear-wheel to connect and disconnect it with said power gear-wheel, a band or flexible connection between said drums, clutches operated by the shifter when shifted to disconnect said gear-wheels and to secure said drums to their shafts, and gearing between said gear-wheel and the car-axle.

14. In a car-starter, the combination of a power gear-wheel and its shaft with a transmitting gear-wheel adapted to gear therewith, loosely journaled on its shaft, drums loosely journaled on each of said shafts, a shifter to shift said transmitting gear-wheel to connect and disconnect it with said power gear-wheel, a band or flexible connection between said drums, spring-clutches secured to said shafts, adapted to engage with said drums and secure them to the shaft, a lock to hold said clutches out of connection, operated by the shifter when shifted to disconnect said gear-wheels to release said clutches, and gearing between said gear-wheel and the car-axle.

15. In a car-starter, the combination of a power gear-wheel and its shaft with a transmitting gear-wheel adapted to gear therewith, loosely journaled on its shaft, drums loosely journaled on each of said shafts, a shifter to shift said transmitting gear-wheel to connect and disconnect it with said power gear-wheel, band or flexible connection between said drums, spring-clutches secured to said shafts, adapted to engage with said drums and secure them to the shaft, a gear-wheel carried by one of said clutches, a lock to hold said clutches out of connection, operated by the shifter when shifted to disconnect said gear-wheels to release said clutches, and gearing between said gear-wheel on the clutch and the car-axle.

In testimony of which invention I hereunto set my hand.

JOHN H. PALMER.

Witnesses:
ERNEST HOWARD HUNTER,
E. M. BRECKINREED.