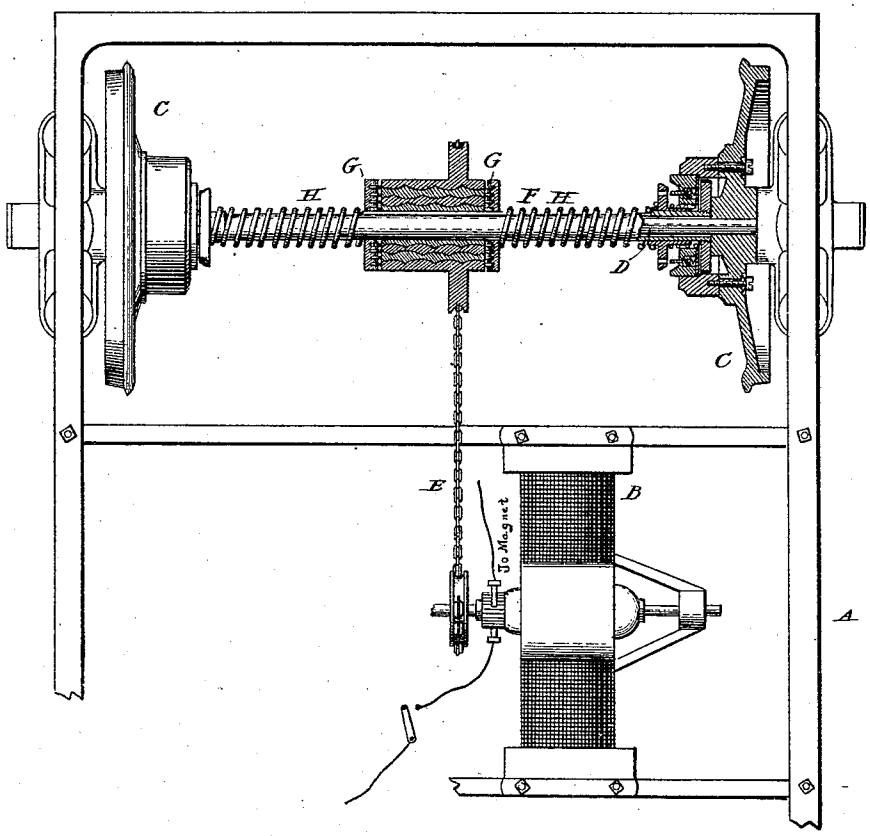
(No Model.) 2 Sheets—Sheet 1.

E. H. JOHNSON.

POWER TRANSMITTING DEVICE FOR ELECTRIC RAILWAYS.

No. 469,944. Patented Mar. 1, 1892.

Fig. 1.



Witnesses
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(No Model.) 2 Sheets—Sheet 2.

E. H. JOHNSON.

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Fig. 2.

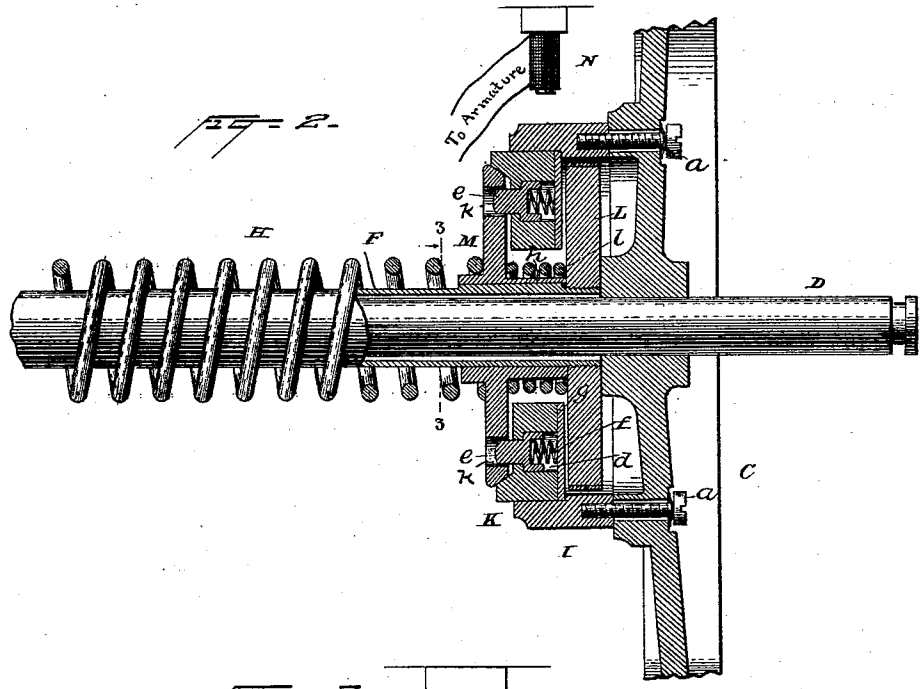


Fig. 3.

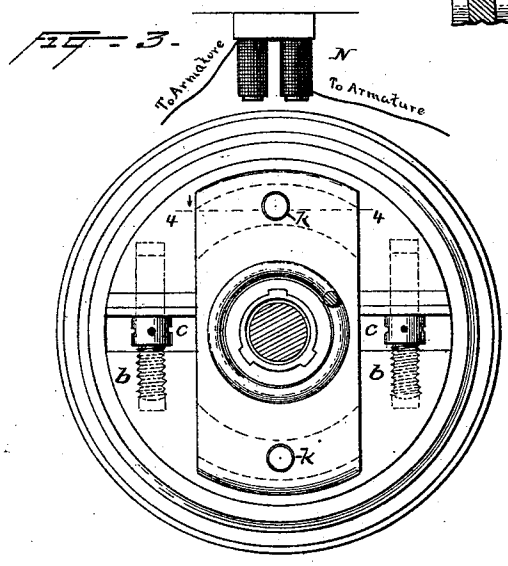
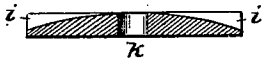


Fig. 4.



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UNITED STATES PATENT OFFICE.

EDWARD H. JOHNSON, OF NEW YORK, N. Y.

POWER-TRANSMITTING DEVICE FOR ELECTRIC RAILWAYS.

SPECIFICATION forming part of Letters Patent No. 469,944, dated March 1, 1892.

Application filed May 18, 1891. Serial No. 393,229. (No model.)

To all whom it may concern:

Be it known that I, EDWARD H. JOHNSON, a citizen of the United States, residing at the city of New York, in the county and State of New York, have invented a certain new and useful Improvement in Power-Transmitting Devices for Electric Railways, of which the following is a specification.

In my application filed March 4, 1891, Serial No. 383,780, is set forth an arrangement of gearing for electrically-propelled vehicles, in which the motor is connected with the running-gear of the vehicle through a frictional connecting device whose frictional engagement is fixed, or, in other words, a device whose members have a degree of frictional engagement or relation which is fixed and unchanged during the operation of the device, as distinguished from one in whose operation the friction members are moved into increasing or decreasing frictional engagement. The fixed frictional engagement is proportioned to the capacity of the motor, so that when the motor is called upon to exert power greater than that which it is designed for the friction device will slip and prevent the increase of the strain on the motor. In my present invention I employ a similar device; but in addition thereto I provide means for enabling the motor to start and to apply its power gradually. In the application referred to the frictional connecting device was normally in direct connection or engagement with the motor, so that when the motor started its power was at once applied to the full load. In my present invention I employ a loose connection between these parts, and I provide an elastic cushion so situated and arranged with reference to the motor that the first operation of the motor when it is started is to compress the said elastic cushion, and the power is not applied to move the car until it has accomplished this compression to an extent dependent upon the load which exists on the car in any case, at which time the loose connection arrives at an effective engagement. The motor is thus provided with a gradual load, and is allowed to make one or more revolutions before the full load is placed upon it and to attain the degree of efficiency required to enable it to start the car with a moderate current.

In carrying my invention into effect I prefer to provide one or more of the wheels of the car with a friction-surface, and I place upon or in connection with a hollow shaft surrounding the axle a friction-ring in engagement with such friction-surface, so that when the ring is turned the car may be started. I so construct the said friction-ring that the amount of its frictional engagement with the wheel is adjustable, and I adjust it as set forth in the application already referred to, so that it will slip when the load is too great for the motor. I connect the motor with a screw mechanism mounted upon the car-axle, and consisting of one or more threaded nuts movable along the hollow shaft extending along the axle. Upon the hollow shaft, in proximity to the screw mechanism, is a spirally-coiled spring, the other end of which is suitably held from longitudinal movement, so that the first movement of the motor is applied to the compression of the spring, and this continues until the spring is so compressed that the nut will not travel farther along the shaft, but will take hold of the shaft and turn the friction member connected therewith, so as to start the car, unless the load on the car is too great, in which case the friction member is caused to slip on the wheel. The hollow shaft on the axle forms a support independent of the wheel for the screw mechanism and friction member. By making the wheel loose on the axle these parts could be fixed upon the axle and the loose hollow shaft dispensed with.

I have referred to the friction member as being connected with the hollow shaft. I prefer, however, that the operating connection between them shall be of such character that when the motor is not in operation the friction member shall be entirely disconnected from the shaft, so that the motor may be at such times disengaged entirely from the car-wheels. To this end I fix upon the shaft, in proximity to the friction-ring and so as to receive the pressure of the spring or elastic cushion, an intermediate connecting-plate, normally held by another spring out of engagement with the friction member, but adapted to positively engage the friction member on being turned from its normal position. Thus the first movement of the motor and

compression of the spring causes the intermediate connecting device to be brought into engagement with the friction member in readiness to start the car, when the spring has been further compressed sufficiently to prevent the threaded sleeve from traveling farther along the shaft and to cause it to turn said shaft and start the car.

My invention is illustrated in the accompanying drawings.

Figure 1 is a plan view of a portion of the truck of an electric-railway car provided with my invention, portions of the same being shown in section; Fig. 2, a front elevation of a portion of the axle with the connecting devices in vertical section; Fig. 3, a cross-section on the line 3 3 of Fig. 2, and Fig. 4 a cross-section of the intermediate connecting-plate on the line 4 4 of Fig. 3.

A indicates a portion of the truck-frame, and B is the electric motor supported thereon for propelling the car.

The wheels C C are fixed upon the axle D.

The motor B is connected by a sprocket-chain E or other suitable gearing with a screw mechanism, such as is set forth in my patents, Nos. 450,743 and 450,744, dated April 21, 1891, the same consisting of two or more concentric sleeves threaded one upon another, the inner one being secured to the sleeve F, which is placed upon the axle by a spline or feather, and the outer one being geared to the motor.

G G are collars on the axle, provided with horizontal rollers for receiving the end-thrust of the concentric sleeves.

Coiled upon the sleeve F at each end of the screw mechanism is a spring H or H′.

Each of the two wheels C is provided with gearing such as constitutes my invention, the arrangement of one wheel being shown in Figs. 2, 3, and 4. The wheel C is provided with a hollow hub I, extending out over the axle and secured to the wheel by bolts *a*, which bolts pass loosely through holes in the wheel, for a purpose to be presently explained. Placed within the hollow hub I is the friction-ring K, the same being made in two parts, united together by the screw-threaded bolts *b*, which between the two halves of the ring have placed upon them nuts *c*. By turning the nuts *c* the two halves of the friction-ring are made to engage the inner surface of the hub I with a greater or less degree of friction. The friction-ring K is provided with two or more holes *d*, within each of which is placed a pin *e*, normally projected from the hole by a spring *f*, which is attached to the plate *g* on one side of the ring.

Fixed upon the end of the sleeve F is a disk L, which extends out close to the hub I, and preferably has its periphery covered with leather or other soft material.

M is the intermediate connecting-plate, which has a hub *h* keyed to the sleeve F. This plate is provided with grooves *i*, which are entered by the pins *e* of the friction-ring and at the middle of each groove with a hole *k*. A light spring *l* is placed between the plate M and the disk L to hold the plate M away from the ring K.

N is an electro-magnet supported above the hub I from the bottom of the car, the coils of which are as indicated in the armature-circuit of the motor, so that the magnet is energized when current is applied to the motor.

The operation of these devices is as follows: When current is applied to the motor, it turns the screw mechanism and half the concentric sleeves are moved in one direction along the sleeve F, so as to compress the spring H, while the other half are moved in the other direction and compress the spring H′. The magnet N, being energized at the same moment, raises the hub I, (the bolts *a* being loose in the wheel C and ring K,) so that the disk L, which is fixed to sleeve F is brought into engagement with the hub I and the sleeve F is prevented from turning, whereby the screw mechanism is allowed to move along it. The spring H will thus be compressed until it obtains sufficient tension to turn the plate M against the spring *l*, a slight degree only of compression being sufficient to accomplish this, and as soon as the same is turned enough to bring the holes *k* opposite the pins *e* the pins are forced up by the springs *f* and enter such holes and so bring the plate M into positive engagement with the friction-ring K, and this being in frictional engagement with the hub I the wheel C is turned and the car is started as soon as the screw mechanism has compressed the springs sufficiently to enable the load to be overcome. When the motor is stopped, the screw mechanism runs back to its central position, and the pressure on the plate M being relieved it turns back to its normal position under the influence of the spring *l*, so that the pins *e* are disconnected from the holes *k* and the motor is disconnected from the frictional connecting device.

If in starting the load is too great for the motor even with the efficiency which it attains by the work performed by it in compressing the springs H H′, the friction-ring, whose engagement with the hub I has been previously determined, will slip on said hub and allow the motor time to continue to increase its efficiency until it can start the car without danger or until the load is relieved.

It will be seen that the screw mechanism which engages the hollow shaft or sleeve and is movable longitudinally thereon forms a loose connection between the motor and the friction member, whose engagement is not normally effective to start the load, but which is moved by the motor to a point at which it effectively engages the shaft, this point being determined by the spring or elastic cushion with reference to the load, and the spring forms a gradual starting load for the motor, which is independent of its connection with the actual load, or does not form the medium

through which the motive power is transmitted from the motor to the car-wheels.

What I claim is—

1. The combination of a wheeled vehicle, an electric motor thereon, a friction member in fixed frictional engagement with the running-gear of the vehicle, a mechanical connection between said friction member and the motor, and a gradual loading device for the motor independent of its connection with the friction member, substantially as set forth.

2. The combination of a wheeled vehicle, an electric motor thereon, a friction member in fixed frictional engagement with the running-gear of the vehicle, a loose connection between the motor and the friction member brought into effective engagement therewith by the movement of the motor, and a gradual loading device for the motor independent of its connection with the friction member, substantially as set forth.

3. The combination of a wheeled vehicle, an electric motor thereon, a shaft, a friction member in fixed frictional engagement with the running-gear of the vehicle, a connection between the shaft and the friction member, a nut engaging the shaft and movable longitudinally thereon, a connection between the motor and said nut, and an elastic cushion opposing the longitudinal travel of said nut, substantially as set forth.

4. The combination of a wheeled vehicle, an electric motor thereon, a shaft, a friction member in fixed frictional engagement with the running-gear of the vehicle, a connection between said friction member and the shaft, a screw mechanism consisting of concentric threaded sleeves, the inner one feathered on the shaft and the outer one geared to the motor, and an elastic cushion opposing the longitudinal travel of said sleeves, substantially as set forth.

5. The combination of the axle of a vehicle, a wheel fixed thereon, a loose sleeve on the axle, a friction member in fixed frictional engagement with said wheel, a connection between said friction member and said sleeve, a nut engaging the said sleeve and movable longitudinally thereon, a connection between the motor and said nut, and an elastic cushion opposing the longitudinal travel of said nut, substantially as set forth.

6. The combination of a wheeled vehicle, an electric motor mounted thereon for propelling the vehicle, a friction member normally in frictional engagement with the vehicle, and an intermediate connecting device connected with the motor so as to be moved thereby into positive engagement with the friction member, substantially as set forth.

7. The combination of a wheeled vehicle, an electric motor thereon, a friction member in fixed frictional engagement with the running-gear of the vehicle, an intermediate connecting device connected with the motor so as to be moved thereby into positive engagement with the friction member, and a gradual loading device for the motor independent of its connection with the friction member, substantially as set forth.

8. The combination of a wheeled vehicle, an electric motor mounted thereon, a shaft, a friction member in fixed frictional engagement with the wheel, the intermediate connecting device on said shaft adapted to engage the friction member and turn the same, the screw mechanism on the shaft connected with the motor, and the interposed spring, substantially as set forth.

9. The combination of the friction member engaging with the wheel, the shaft, the intermediate connecting-plate on the shaft, said plate and friction member having registering holes and spring-pins, the spring between the plate and the friction member, the screw mechanism on the shaft connected with the motor, and the spring coiled on the shaft between the screw mechanism and the connecting-plate, substantially as set forth.

This specification signed and witnessed this 11th day of May, 1891.

EDWARD H. JOHNSON.

Witnesses:
H. W. SEELY,
W. PELZER.