(No Model.)

J. S. CONNELLY.

CAR MOTOR.

No. 347,470. Patented Aug. 17, 1886.

Fig. 1.

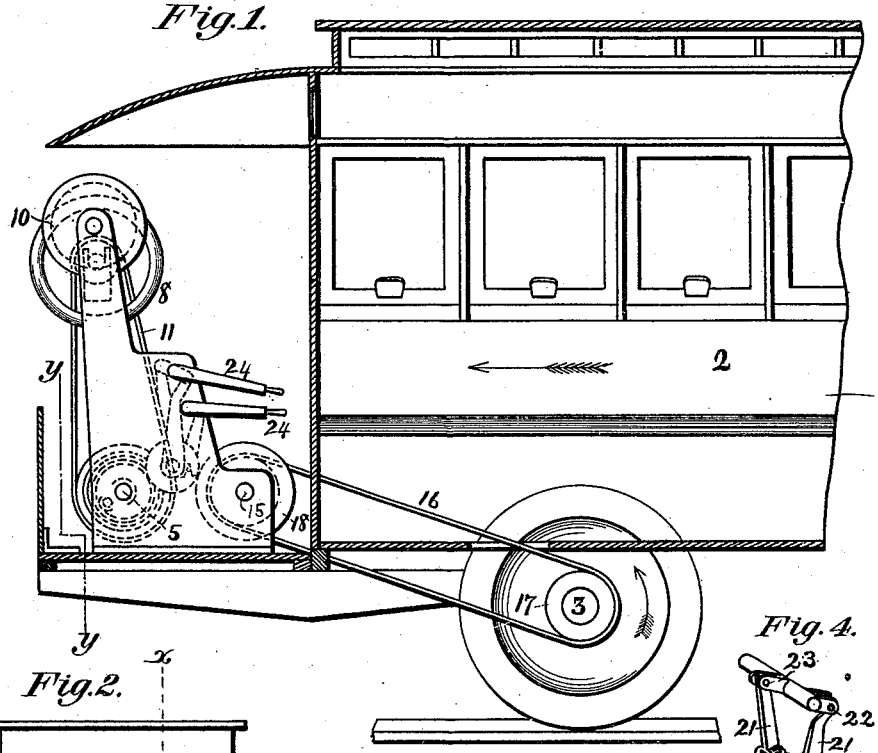


Fig. 2.

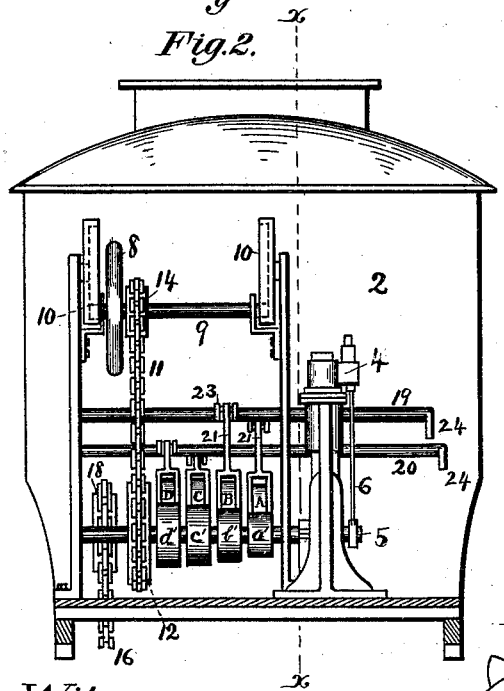
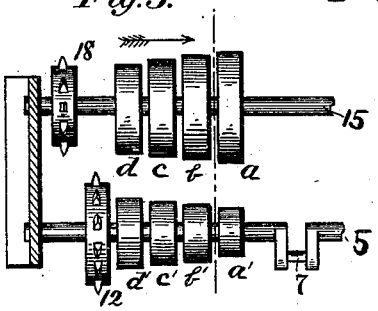


Fig. 4.

Fig. 3.



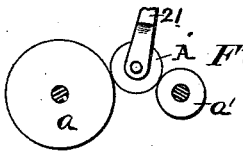
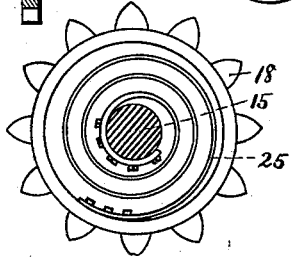


Fig. 5.

Fig. 6.



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UNITED STATES PATENT OFFICE.

JOHN S. CONNELLY, OF BROOKLYN, ASSIGNOR OF ONE-HALF TO THOMAS E. CONNELLY, OF NEW YORK, N. Y.

CAR-MOTOR.

SPECIFICATION forming part of Letters Patent No. 347,470, dated August 17, 1886.

Application filed May 7, 1886. Serial No. 201,425. (No model.)

To all whom it may concern:

Be it known that I, JOHN S. CONNELLY, of Brooklyn, in the county of Kings and State of New York, have invented a new and useful Improvement in Car-Motors; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to an improvement on a car-motor for which on the 19th day of March, 1886, I filed an application for patent, Serial No. 195,791.

The object of the invention is to provide a motor apparatus for use on street-cars of such construction that engines of small power may be used successfully, and with a saving of expense as compared with the present common use of horse-power and cable lines. As in the device for which I have already made application for a patent, I use on each car a continuously-running engine, together with devices for throwing the engine into and out of gear with the driving-axle of the car, and thus starting or stopping it. The continuous motion of the engine while the car is stationary stores sufficient energy to overcome the inertia of the car and to enable it to be started with ease.

My present invention consists in certain improvements in the gearing which connects the engine with the driving-axle and transmits power from one to the other.

I will now describe my invention so that others skilled in the art may manufacture and use it, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a vertical longitudinal section of a part of a street-railway car provided with my improved device, the section being on the line *x x* of Fig. 2. Fig. 2 is a vertical cross-section on the line *y y* of Fig. 1, showing a front view of the motor apparatus. Fig. 3 is a detail plan view showing two of the shafts of the motor, together with their friction-wheels and sprocket-pulleys. Fig. 4 is a perspective view of a part. Figs. 5 and 6 are detail views of parts.

Like symbols of reference indicate like parts in each.

In the drawings, 2 is the car to which my improvement is applied. 3 is the driven car-axle. 4 is a gas-engine situate on the front platform of the car, and 5 is a shaft journaled in suitable bearings and driven by a pitman, 6, which is connected by a crank-pin, 7, on the shaft, in the usual way.

8 is a fly-wheel keyed to a shaft, 9, which is journaled in suitable anti-friction bearings, 10, preferably above the engine. The fly-wheel shaft is driven by a sprocket-chain, 11, which connects a sprocket-wheel, 12, on the shaft 5, with a sprocket-wheel, 14, of relatively less diameter on the fly-wheel shaft, so that as the engine moves continuously the driven fly-wheel shall be rotated at a much higher rate of speed.

15 is a shaft journaled adjacent to and parallel with the shaft 5, and connected with the car-axle 3 by a sprocket-chain, 16, which is fitted around a sprocket-wheel, 18, on the shaft, and a similar sprocket, 17, on the axle.

On the shaft 15 is a series of fixed plain-faced friction-wheels, *a b c d*, of successively larger diameters, and on the shaft 5 is a second series of friction-wheels, *a′ b′ c′ d′*, the smallest, *a′*, being opposite to the largest wheel, *a*, of the other series, and the opposite wheels *d* and *d′* being of about the same diameter.

Suspended above the series of friction-wheels just named is an intermediate series of wheels, A B C D, any one of which may be moved to connect by frictional contact the peripheries of its opposite pair of wheels *a a′*, &c. If the wheel A be moved to connect the wheels *a* and *a′*, it will transmit motion from the moving shaft 5 to the shaft 15, which, owing to the relatively small diameter of the primary wheel *a′*, will be a slow motion; but if the wheel D be moved to connect the wheels *d* and *d′*, a much faster motion will be given to the shaft 15. If all the intermediate friction-wheels be disconnected from the other wheels, no motion will be transmitted to the shaft 15, though the shafts 5 and 9, with the fly-wheel 8, being geared with the engine, revolve continuously. The intermediate friction-wheels, A B C D, may be journaled in any suitable manner, so that they may be moved into contact with the other wheels, though I prefer to arrange them as shown in the drawings. Two shafts, 19 and 20, are journaled

above the friction-wheels. The wheels A and B are suspended by hangers 21 from crank-arms 22 and 23, which are situate diametrically opposite to each other on the shaft 19, and the wheels C and D are in like manner suspended from the shaft 20. The shafts 19 and 20 are operated by hand-levers 24. If the shafts be turned by their levers so that the crank-arms 22 and 23 shall be horizontal, as shown in Fig. 4, none of the intermediate wheels will be in contact with their friction-wheels; but if either shaft be turned so that its crank-arms shall be perpendicular the lower wheel will then rest against and transmit motion between its friction-wheels.

To start the car the operation is as follows: The engine being in continuous motion, the fly-wheel S, from its rapid rotation, will have accumulated considerable momentum. The driver turns the lever 24 of the shaft 19 so as to connect the wheels *a* and *a'* by the frictional wheel A. This causes the shaft 15 and the driven car-axle to turn slowly, and on account of the great power of the fly-wheel the starting can be accomplished with a small engine. As the car gains headway the driver disconnects the wheel A and throws the wheel B into gear, thus increasing the speed, and by using the other wheels, C and D, the car can be driven at still greater rapidity. In ascending a grade, where power is desirable rather than speed, it may be found preferable to use the slowest wheel, A, as the connecting-wheel.

In order to prevent sudden jars of the machinery in thus starting the car, I have devised the further improvement shown in Fig. 6, which is designed to transmit the initial motion gradually to the axle. The sprocket-wheel 18 is mounted loosely on its shaft 15, but is connected therewith by a coiled spring, 25, which is fastened at its inner end to the shaft, and at the other end is fastened to the inside of a peripheral flange of the sprocket-wheel. If, now, the shaft 15 be put in motion, as before described, it will not immediately rotate the sprocket, but will wind the spring 25, exerting thereby a constantly-growing force on the sprocket and its driven parts until—say at about the second revolution of the shaft—the spring will be tensioned sufficiently to start the sprocket-wheel, which it will do gently and without jar.

By means of the apparatus above described the starting, stopping, and speed of the car are put under complete and easy control of the driver, who need only manipulate the hand-levers 24, the engine itself running continuously from one end of the trip to the other.

It is evident that the sprockets and chains which I have shown in the drawings may be replaced by other known mechanical connecting devices. I shall therefore designate them in the following claims by the generic word "gearing."

I shall also use the word "clutch" as a generic term indicating the frictional connecting device which I have shown for connecting and disconnecting the shafts 5 and 15, or its mechanical equivalent.

I claim as my invention—

1. In a car, the combination of an engine, a driven car-axle, a sprocket-wheel mounted on a shaft and driving the axle, gearing connecting the engine and the sprocket-wheel shaft, a clutch movable to connect or disconnect the gearing with or from the shaft, and a spring connecting the sprocket-wheel with its shaft, substantially as and for the purposes described.

2. In a car, the combination of an engine, a fly-wheel mounted on a shaft, gearing connecting the fly-wheel with the engine and arranged substantially as described, whereby a high rate of speed relatively to the speed of the engine may be communicated to the fly-wheel, and friction-wheels transmitting motion from the fly-wheel shaft to the driven axle of the car, one of which wheels is movable to connect or disconnect the axle and shaft, substantially as and for the purposes described.

3. As a device for transmitting motion, the combination of a rotary shaft having friction-wheels of different diameters mounted thereon, an adjacent shaft, also having friction-wheels, and intermediate friction-wheels movable to connect with the opposite friction-wheels of the said shafts, substantially as and for the purposes described.

4. In a car, the combination of an engine, a shaft, 5, driven by the engine, a shaft, 9, and its fly-wheel S, driven by the shaft 5, a shaft, 15, connected with the car-axle, and a clutch movable to connect or disconnect the shaft 5 with the shaft 15, substantially as and for the purposes described.

In testimony whereof I have hereunto set my hand this 16th day of April, A. D. 1886.

JOHN S. CONNELLY.

Witnesses:
R. H. WHITTLESEY,
THOMAS W. BAKEWELL.