

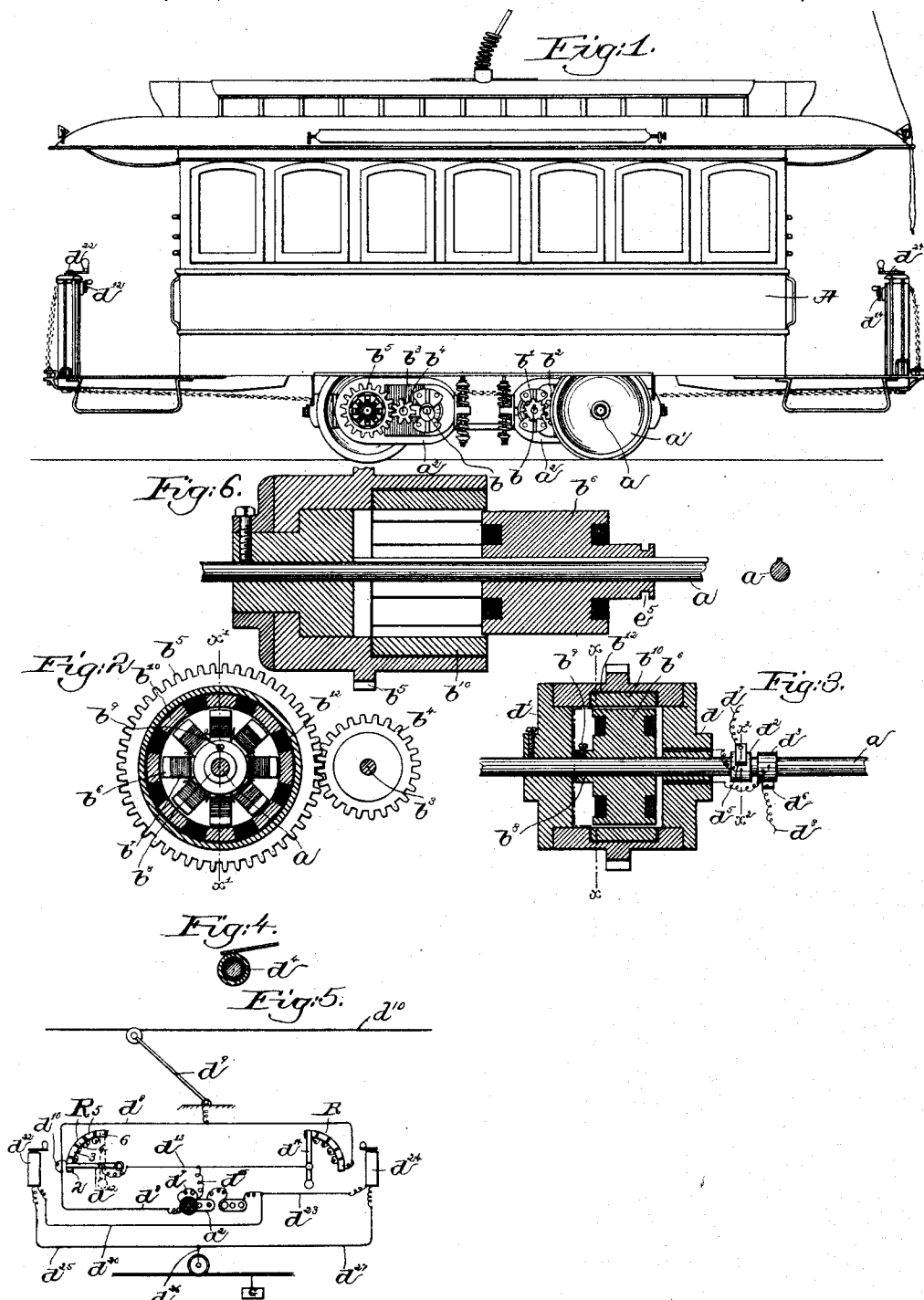
(No Model.)

W. D. MACQUESTEN.

CONTINUOUSLY OPERATED ELECTRIC MOTOR.

No. 429,314.

Patented June 3, 1890.



Witnesses.
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UNITED STATES PATENT OFFICE.

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CONTINUOUSLY-OPERATED ELECTRIC MOTOR.

SPECIFICATION forming part of Letters Patent No. 429,314, dated June 3, 1890.

Application filed July 8, 1889. Serial No. 316,799. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM D. MACQUESTEN, of New York, county of New York, State of New York, have invented an Improvement in Continuously-Operated Electric Motors, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention relates to electric motors employed to drive mechanism, and has for its object to enable the said motor to be run continuously while the mechanism it is used to drive remains at rest.

My invention is especially applicable to electric-railway cars or carriages, which may be such as now commonly employed on the overhead and conduit systems of electric railways, whereby the car may be easily started with a minimum amount of current.

My invention therefore consists in the combination, with an electric motor, of a loose gear connected to the armature of the said motor and provided with a series of armatures, and a magnetic-clutch mechanism consisting of a series of magnets co-operating with said armatures to hold the said gear fast or stationary when desired, substantially as will be described.

Figure 1 is a side elevation of an electric-railway car provided with a continuously-operated motor in accordance with my invention; Fig. 2, a side elevation, on an enlarged scale, of my improved magnetic clutch; Fig. 3, a transverse section of the magnetic clutch shown in Fig. 2, the section being taken on line $x' x'$, and the axle or shaft being shown in elevation; Fig. 4, a detail to be referred to; Fig. 5, a diagram of circuits illustrating the operation of the magnetic clutch, and Fig. 6 a modification to be referred to.

The car A, mounted on axles a , having wheels a' , may be of any usual or well-known construction, such as now commonly used on street-railways. The car A is provided, as herein shown, with two electric motors a^2 , which may be of any desired construction, and which are suspended below the car-floor in any usual manner. Each electric motor, as herein shown, has its armature-shaft b , provided on one end with a pinion b' , in mesh with a gear b^3 on a counter-

shaft b^3 , provided at or near its opposite end with a pinion b^4 in mesh with a loose gear-wheel b^5 , which encircles the axle a of the car, and which may be held fast or rigid thereon, as will be described. The loose gear-wheel b^5 may be held fast on the axle a by an electric or magnetic clutch, preferably made as a series of magnets, each consisting of an iron core b^6 , wound with wire b^7 , the said cores being herein shown as connected to or forming part of a common hub b^8 , securely fastened on the axle a , as by a set-screw b^9 . (See Figs. 2 and 3.) Each magnet b^6 has co-operating with it an armature b^{10} , secured to or forming part of the gear-wheel b^5 , the said armatures extending around the inner periphery of the gear-wheel and magnetically separated from each other by insulation b^{12} . The gear-wheel b^5 is supported, as herein shown, by two cylindrical hubs $d d'$ fast on the axle, upon which the said gear-wheel runs loose when the car is not in motion.

The magnetic clutch may be controlled, as will be described, so that the car may be started gradually, thereby obviating injury to the working parts and shocks and jars to the passengers.

The magnets b^6 may be continuously wound, as represented in Fig. 2, one end of the wire being preferably connected to a commutator, (shown in Fig. 3 as a metal collar d^2 on the axle a), the other end of the said wire being connected to the second collar d^3 on the said axle, the said collars being separated from the axles by insulation. (See Fig. 4.) The commutators $d^2 d^3$ have co-operating with them brushes $d^5 d^6$, one of which, as d^5 , is connected by wire d^7 in circuit with the motor, as clearly shown in Fig. 5, and the other brush d^6 is connected by wire d^8 and trolley-arm d^9 to the trolley-wire d^{10} . The wire d^8 is connected by wire d^{10} to one end of a resistance coil or box R, of any usual or well-known construction, it being composed, as herein shown, of five sections, (marked 2 3 4 5 6, respectively,) with which co-operates, as shown, a switch-lever d^{12} , connected to a wire d^{13} , joined at its opposite end to a similar lever d^{14} , the wire d^{13} being connected by wire d^{15} to one of the motors a^2 . When the switch-lever d^{12} is in contact with the section 2, the

current from the trolley-wire passes directly to the motors and the magnetic clutch is rendered inoperative, as the resistance of the line-circuit is less than the resistance of the magnetic clutch.

The circuit may be traced as follows, viz: trolley-wire, trolley-arm d^3 , wires d^8 , switch d^{10} , lever d^{12} , wires d^{13} d^{15} to the motors, through the latter, thence by wire d^{20} to the switch d^{22} at one end of the car, or by wire d^{23} to the switch d^{21} at the opposite end of the car, according to which direction the car is moving, thence from the switch d^{22} by wires d^{25} d^{26} , through the car-wheel to the ground, or from the switch d^{21} by wires d^{27} d^{26} and car-wheel to the ground.

When it is desired to start the car, the magnetic clutch is gradually brought into operation by moving the switch-lever d^{12} , so as to interpose resistance in the motor-circuit and thus cause the current to flow through the magnetic clutch—as, for instance, when the lever d^{12} is moved into contact with the section 6, as indicated by dotted lines, the entire strength of the current flows through the coils of the magnetic clutch. It will thus be seen that when the resistance R is cut out of the motor-circuit the magnetic clutch is not energized, but is at rest, and the car is not in motion.

If it is desired to start the car, the resistance R is interposed in the motor-circuit, and the current, taking the circuit with the least resistance, flows through the coils b^7 of the magnets b^6 . As the current flows through the coils of the magnets it energizes the cores of the same, and the said cores have a magnetic attraction for their armatures b^{10} , which are continuously revolving by their cores. As the armatures b^{10} are fixed on the revolving gear-wheel, the magnetic attraction cannot draw or move the said armatures toward their magnets; but such is the influence of the magnetic attraction of the magnet for its armature that the magnet will tend to follow the revolving gear-wheel, and as a result the car-axle will be turned or revolved, slowly at first, but more rapidly as the magnetic attraction gradually increases, and prevents the movement of the armature away from its magnet until in the revolution of the car-axle the relative position of each magnet and its armature becomes unchanged—that is, the gear-wheel b^5 and the armature are revolving at the same speed.

When it is desired to stop the car, the magnetic device is first rendered inoperative by cutting out the resistance R—that is, by moving the lever d^{12} into its full-line position, Fig.

5, and then applying the brakes in ordinary manner.

The speed of movement of the car may be regulated as now commonly practiced by means of the switch d^{22} .

I have described the magnet-cores b^6 as continuously wound; but it is evident they may be wound individually and connected to a commutator or switch of any well-known construction, whereby the coils may be connected in circuit one at a time, if desired, to gradually increase the strength of the magnetic clutch. The car may also be gradually started by gradually decreasing the magnetic distance between the magnets b^6 and their armatures—as, for instance, as shown in Fig. 6, wherein the gear-wheel b^5 is made substantially wide and the hub b^8 and its attached magnet-cores b^6 are made wider, so that by moving the said hub longitudinally on the shaft a greater or less amount or surface of the magnets is brought into position to act on their armatures b^{10} .

I have specifically described my invention as applied to an electric-railway car; but it is evident that it may be employed in other places where the motor is doing work.

By the term "gear" employed in the claims I desire to be understood as including the well-known mechanical equivalent of the same for producing motion, such as friction-pulleys, &c.

I claim—

1. The combination, with an electric motor, of a loose gear connected to the armature of the said motor and provided with a series of armatures, and a magnetic-clutch mechanism consisting of a series of magnets co-operating with said armatures to hold the said gear fast or stationary when desired, substantially as and for the purpose specified.

2. The combination, with an electric car or carriage mounted on axles having wheels, of an electric motor and a loose gear connected to the armature of the said motor and provided with a series of armatures, and a magnetic-clutch mechanism consisting of a series of electro-magnets co-operating with the said armatures, and a switch to control the operation of the electro-magnets, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM D. MACQUESTEN.

Witnesses:

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