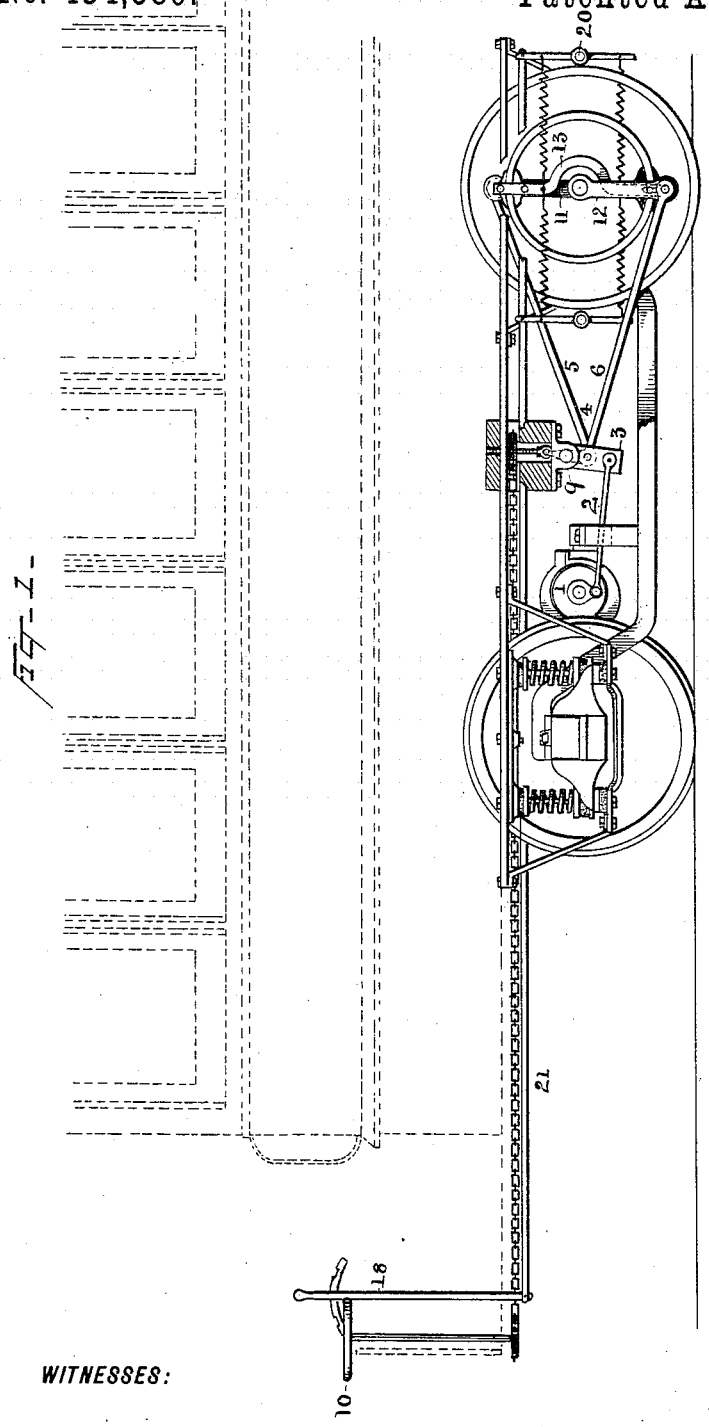
(No Model.) 3 Sheets—Sheet 1.

T. A. EDISON.

PROPELLING MECHANISM FOR ELECTRIC VEHICLES.

No. 434,589. Patented Aug. 19, 1890.



WITNESSES:

Norris A. Clark

Charles M. Catlin.

INVENTOR

Thomas A. Edison,

BY

Dyer & Seely.

ATTORNEYS.

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T. A. EDISON.

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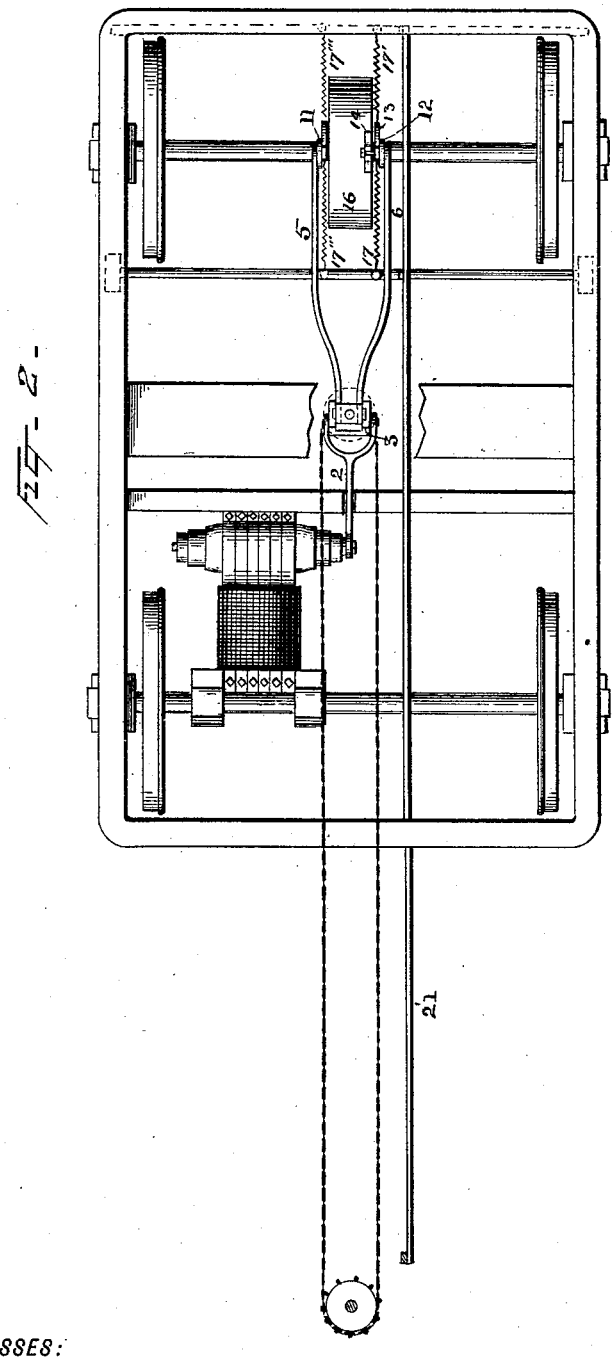

Fig. 2.

WITNESSES:

Norris A. Clark.

Charles M. Cattin

INVENTOR

Thomas A. Edison,

BY

Dyer & Seely

ATTORNEYS

(No Model.) 3 Sheets—Sheet 3.

T. A. EDISON.

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Fig. 3.

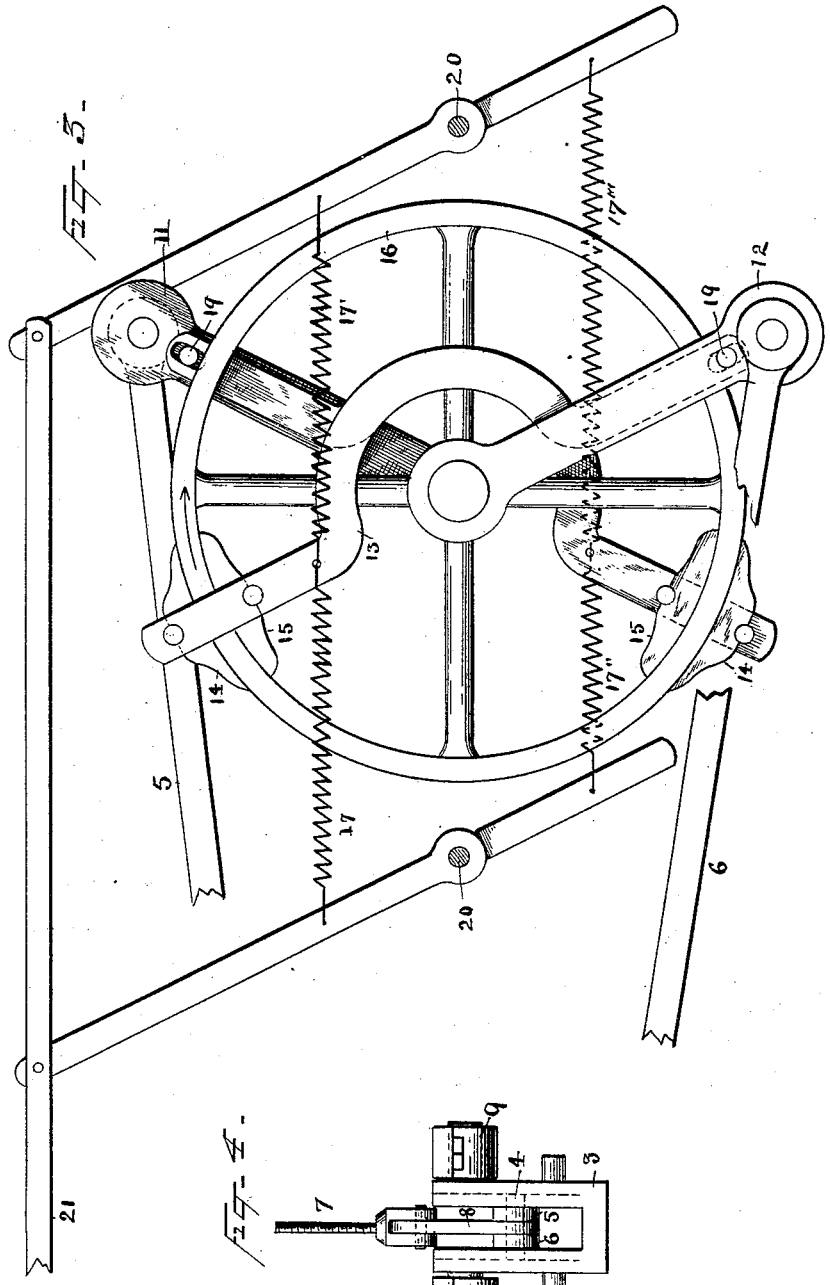

Fig. 4.

WITNESSES:

Norris A. Clark

Charles M. Catlin

INVENTOR

Thomas A. Edison,

BY

Dyer & Seely

ATTORNEYS.

UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF LLEWELLYN PARK, NEW JERSEY.

PROPELLING MECHANISM FOR ELECTRIC VEHICLES.

SPECIFICATION forming part of Letters Patent No. 434,589, dated August 19, 1890.

Application filed February 20, 1890. Serial No. 341,108. (No model.)

To all whom it may concern:

Be it known that I, THOMAS A. EDISON, a citizen of the United States, residing at Llewellyn Park, in the county of Essex and State of New Jersey, have invented an Improved Propelling Mechanism for Electric Vehicles, (Case No. 853,) of which the following is a specification.

My invention relates to means for applying the continuous rotary movement of a propelling-shaft—for example, the shaft of a continuously and steadily revolving electric motor on a car—to move the mechanism forward or backward and at any desired speed.

The object of my invention is to secure the desired control of cars or other mechanism by simple mechanical means without the necessity of stopping or reversing the motor by breaking or changing the circuit or otherwise, to provide means for controlling the speed, and means whereby great power can be exerted in starting the car or in overcoming obstructions.

In the accompanying drawings, which illustrate my invention, Figure 1 is a side elevation of a car having my improvement applied thereto. Fig. 2 is a plan of the mechanism, the car-body being removed. Fig. 3 is an enlarged detail of the friction device, and Fig. 4 is a detail of the speed-changing device.

My invention is especially applicable in electric railways employing a constant potential circuit. It is desirable in such a system to keep the motor in constant rotation for the purpose of obtaining the greatest possible efficiency, and by maintaining the counter electro-motive force to prevent burning out the armature upon a sudden application of the load by closure of the circuit.

In the drawings, 1 is a motor, the armature of which is supposed to be in constant rotation. This motor is mounted in any suitable manner on the truck or car. From a crank on the armature-shaft a pitman extends to a pivoted frame 3. In suitable guideways in said frame (see Fig. 4) is placed a head or sliding pin 4, which forms a bearing or connection for the two propelling-rods 5 6. To the head or pin is connected a screw 7 by means of the link 8, through the medium of which the pin, and with it the end of rods 5 6, can be moved nearer to or farther from the center 9, upon which frame 3 is pivoted. Upon the screw above referred to is mounted a sprocket-wheel which can turn, but is held from moving up or down by the frame in which it is supported, and a chain extends therefrom to that portion of the car occupied by the driver, and at that point is also placed an ordinary hand-wheel 10, carrying at the bottom of its axle a second sprocket-wheel. By turning wheel 10 in one direction or the other the driver can raise or lower the screw, and hence pin 4, thus regulating the distance between said pin and the dead-center 9, and hence the length of movement of rods 5 and 6. At their opposite ends these rods connect with arms 11 12, which are centered on an axle of the car.

13 is an arm, one end of which is connected to arm 12 by means of a pin projecting from said arm 12 and extending into a slot in arm 13. The opposite end of arm 13 carries two pawls or clamping-shoes 14 15—one outside and one inside of the rim of the wheel 16—placed on the driving-axle, preferably midway between the wheels. Upon the other arm 11 on the opposite side of the rim is an arm of the same form and connection as 13, except that its ends are reversed—that is, its pawls or shoes are diametrically opposite shoes 14 15 in Fig. 1, where the apparatus is shown with the crank of the motor at rest in its lowest position.

Near one end of each arm 13, I attach two springs pulling in opposite directions and normally holding the arms in their central position—that is, in line with 11 12. These springs 17 17′ 17″ 17‴ are shown connected to arms supported on the journaled rods 20, and the inclination of the arms is controlled by a rod 21, pivoted to the handle 18 at the driver's stand. There are four of said arms, two extending up in line with one arm 13 and two extending down in line with the other arm 13. The function of the springs is to cause a gripping action between the shoes 14 15 and the rim of the wheel by slightly tilting the arm 13 at the proper time, thereby decreasing the distance between the centers of the pins by which the shoes are loosely held.

In Fig. 3 the crank of the motor-shaft is supposed to be at the extreme of its motion toward the right and has moved the upper

end of arms 11 12 to the right, as shown. The same movement has thrown both pairs of clamping-shoes to the left.

With the upper end of the spring-supports thrown forward, as shown in Fig. 3, the mechanism is in condition to drive wheel 16, and hence the vehicle, backward, and the operation would be as follows: As the motor-crank moves from a vertical position toward the right, the upper pair of shoes are thrown to the left, as above stated. This is due to the combined action of the movement of arm 12 and the tension of spring 17, which before 12 moved to the right was under tension to the same degree that 17''' is under tension in the position shown. In moving to the left said shoes slip loosely over the rim, but as soon as 12 begins to move in the opposite direction the movement of arm 13 will be retarded by spring 17, and this will throw it slightly out of the median line of arm 12, which will at once cause a gripping of the wheel-rim, as before explained. Now, as arm 12 continues to move it will, by means of pin 19, carry the shoes 14 15, and consequently the wheel 16, along in the direction of the arrow. On the other hand, as soon as 11 begins to move in the opposite direction—that is, toward the left—the lower shoes 14 15 will release their pressure on the rim of the wheel, and the highly-strained spring 17''' will pull the arm 13 around without causing the shoes to grip, since said spring and the movement of the arm 11 both tend to move the shoes in the same direction. In this way the upper and lower shoes work alternately to drive the wheel in the same direction. Intermittent motion could be given to wheel 16 by the use of two shoes only. When it is desired to turn the wheel in an opposite direction, the handle 18 is moved to incline the spring-supporting arms in the opposite direction, thereby putting spring 17' and 17'' under tension instead of 17 and 17'''.

By the construction which I have described it is possible to vary the speed within wide limits while the car is in motion and without changing the speed of the motor-armature, and also to reverse the direction of travel of the car without reversing the motor-armature, and by adjusting the center 4 toward the center 9 to start the car slowly, and to exert an enormous force to overcome any obstacle or in starting the vehicle from a condition of rest.

I do not confine myself to the exact construction of devices shown and described, as it is evident that the apparatus may be largely modified without departing from the spirit of my invention. For example, the pawls or shoes, the mechanism for reversing the tension of the springs, and the mechanism for raising or lowering the head 4 may be replaced by other means adapted to operate in substantially the same manner.

Having thus described my invention, what I claim is—

1. The combination of a rotating shaft on a vehicle, a reciprocating pitman connecting to the shaft and to a pivoted frame supporting the head or pivot-pin of the propelling-rods and means for raising and lowering said head, whereby the speed may be varied while the vehicle is in motion without changing the speed of rotation of the shaft, substantially as described.

2. The combination of a reciprocating pitman connected to a pivoted frame supporting the head and pivot-pin of the propelling-rods, a screw connected to said head and longitudinally movable, and means for changing the position of said screw, whereby the speed of the driven mechanism may be varied without changing the speed of rotation of the shaft, substantially as described.

3. A propelling-clutch which consists of a wheel and shoes on either face of the rim thereof, said shoes being loosely pivoted to one end of an arm, the other end being loosely connected to the outer extremity of a radial arm, which is reciprocated by the motor, substantially as described.

4. The combination, in a propelling-clutch, of a wheel, a gripping device for the wheel at one end of an arm, the other end being connected to the outer extremity of a radial arm, and a reciprocated controlling-rod between radial arm and the motor, substantially as described.

5. The combination, in a propelling-clutch, of a wheel, arms extending across the wheel and having gripping devices bearing on the wheel-rim, radial arms reciprocated by the motor and connected to the opposite end of the first-mentioned arms, and springs for controlling the grip-carrying arms, substantially as described.

6. The combination, in a reversible propelling-clutch, of a wheel, gripping devices embracing the rim of the wheel on opposite sides, reciprocating arms carrying said gripping devices, springs connected to said arms for pulling them in one direction or the other, thereby gripping the rim when moving in one direction but not in the other, and means for reversing the tension of the springs, substantially as described.

This specification signed and witnessed this 14th day of February, 1890.

THOMAS A. EDISON.

Witnesses:
A. G. BRENIZER,
D. H. ANDERSON.