

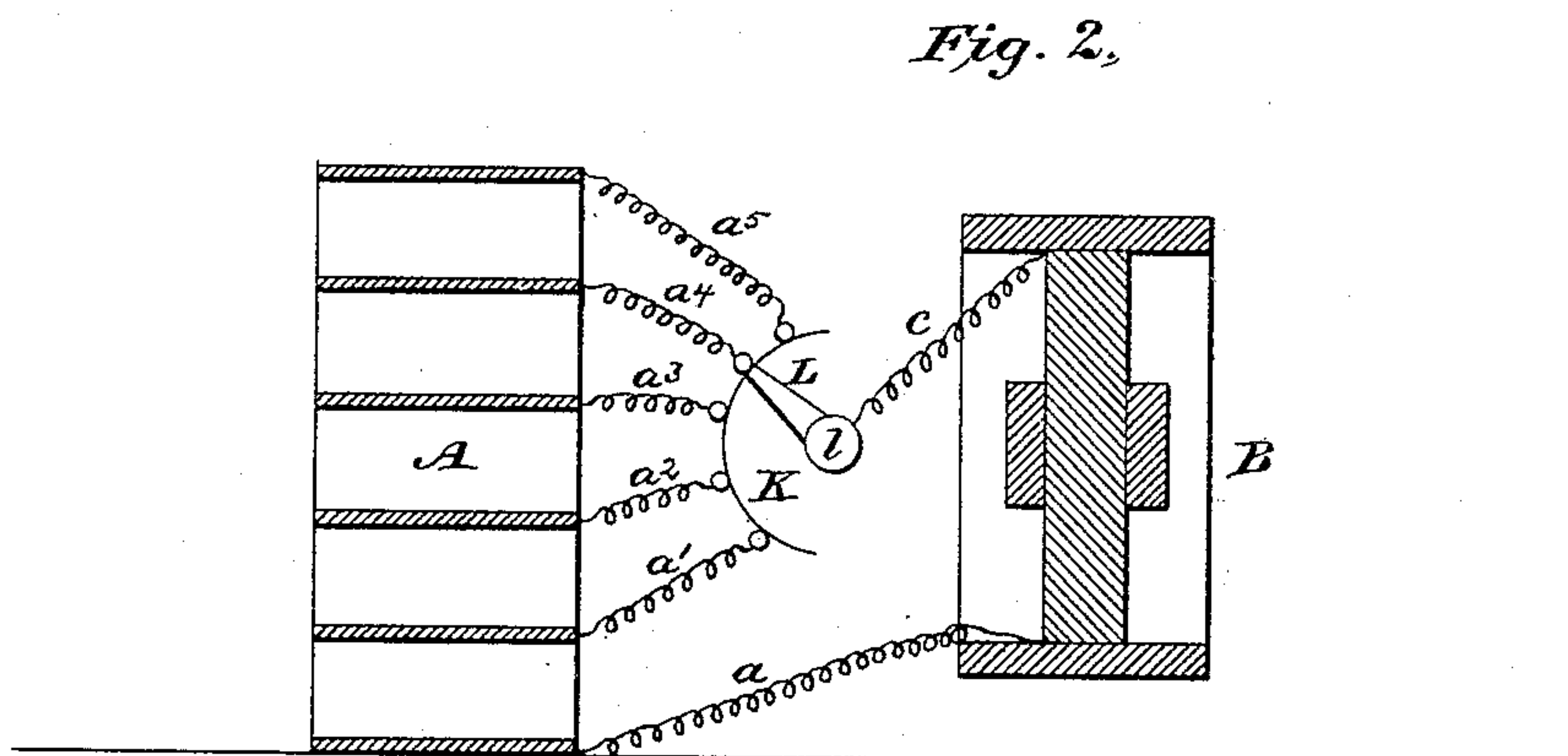
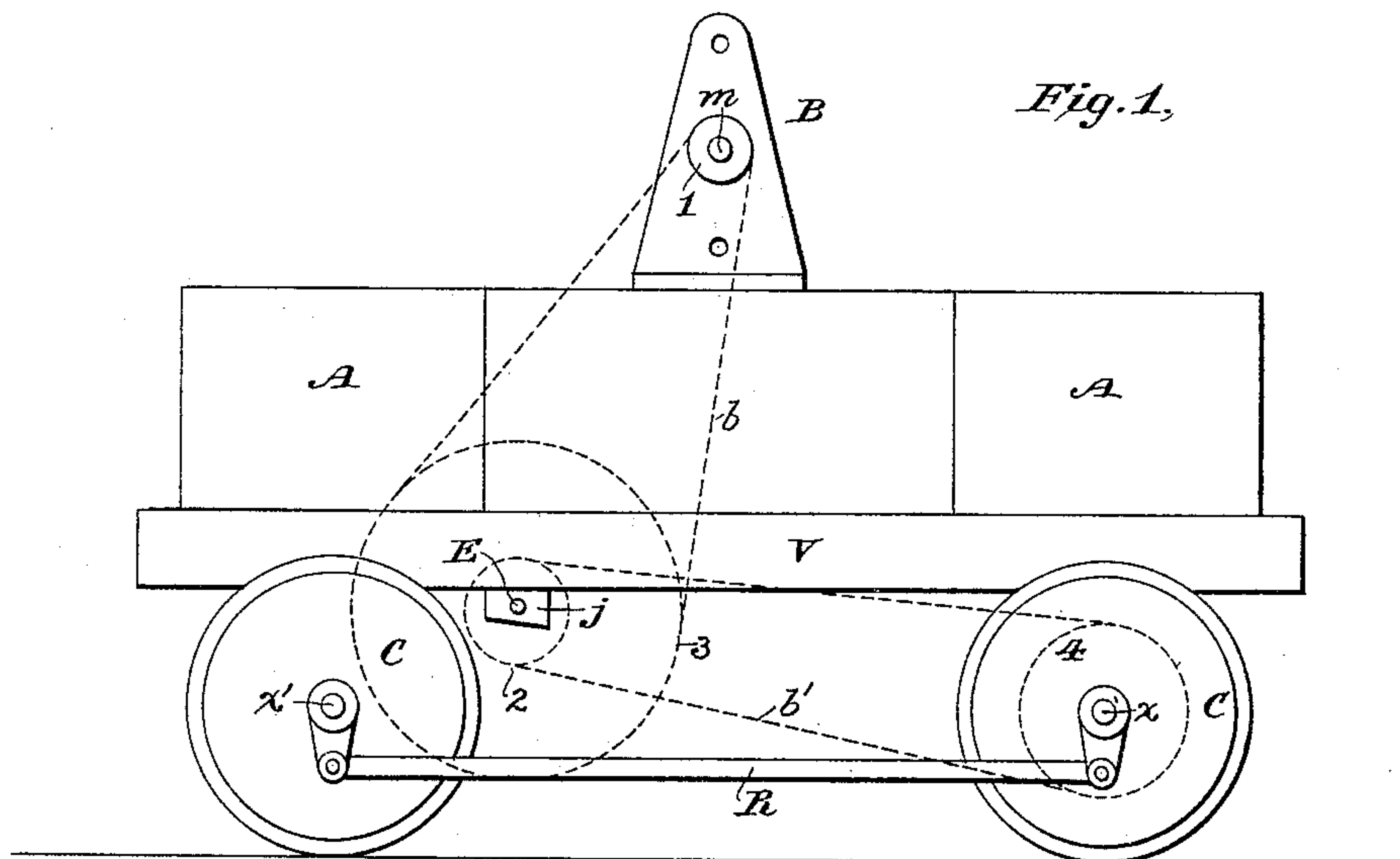
(No Model.)

C. A. FAURE.

PROPELLING VEHICLES BY ELECTRICITY.

No. 383,561.

Patented May 29, 1888.



Witnesses.
Charles R. Trux.
J. H. Walker.

Inventor.
Camille A. Faure.
By his Attorney *M. B. Vanize.*

UNITED STATES PATENT OFFICE.

CAMILLE ALPHONSE FAURE, OF NEW YORK, N. Y., ASSIGNOR TO THE
ELECTRICAL ACCUMULATOR COMPANY, OF NEW YORK.

PROPELLING VEHICLES BY ELECTRICITY.

SPECIFICATION forming part of Letters Patent No. 383,561, dated May 29, 1888.

Original application filed May 25, 1887, Serial No. 239,318. Divided and this application filed January 19, 1888. Serial No. 261,251. (No model.) Patented in France October 20, 1880, No. 139,258, and in England January 11, 1881, No. 129.

To all whom it may concern:

Be it known that I, CAMILLE ALPHONSE FAURE, a citizen of the Republic of France, and a resident of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in the Art of Propelling Vehicles by Electricity (for which I have obtained Letters Patent in France, dated October 20, 1880, No. 139,258, and in Great Britain, dated January 11, 1881, No. 129,) of which the following is a specification.

My invention is an improvement in the application of electricity as a motive power for driving or propelling vehicles.

In practical operations I place accumulators or storage-batteries upon a tram-car, where the electric potential stored in the so-called "reservoir" is, by means of a dynamo-machine or motor, translated into mechanical motion to drive the car. The quantity or amount of electric potential so transformed is, however, consumed at a variable rate, a rate adapted to the demands of the load and of the grade upon which the car is traveling. In ascending a grade a greater amount of the electric potential is transformed into mechanical motion than is the case where the car is descending a grade under the influence of gravity accelerated by its own momentum. In this latter case the momentum of the car operates the dynamo, which converts the mechanical motion into dynamic electricity, and this, acting upon the storage-battery reproduces therein an electric potential, so that the net expenditure of electric potential in any given distance traveled is equal to the difference between the expenditure of energy used to propel the car and the amount of energy of a like form reclaimed by the movements of the car acting under the influence of gravity and its own momentum.

For the purpose of illustration I have shown my improvements applied to a four-wheeled vehicle designed for use upon a track, as the rails of a tramway. I place a number of cells of secondary battery upon the vehicle together with an electro-magnetic motor, such as the well-known dynamo-machine. On the armature-arbor I place a wheel or pulley, which may be belted or geared directly to

a wheel or pulley firmly fixed to an axle of the vehicle; but for the purpose of adjusting or varying the speed with which the power is applied I prefer to place a counter-shaft in convenient proximity to the motor, and to belt or gear from a wheel or pulley on the armature to a gear or pulley on the counter-shaft, and from a second pulley on the counter-shaft to a corresponding gear or pulley on the axle, and I prefer to mechanically connect the two axles by a rod or pitman, so as to avail, of the additional friction due to the application of driving-power to both axles.

The apparatus for varying the supply of energy to the motor consists of a switch or circuit-changer, by the movement of which the arrangement of the series of secondary cells with respect to the motor-circuit may be changed or varied.

In the accompanying drawing, V is a vehicle having wheels C C upon separate axles $x x'$. The body of the vehicle rests upon these wheels and axles. Upon the ends of the axles are cranks connected together by a pitman-rod, R. Upon the vehicle I place a series of cells of secondary battery A, preferably constructed according to the specification of my patent No. 252,002, January 3, 1882—that is, each cell consists of two or more plates or supports to which is mechanically applied a coating of active material or material to be rendered active. I prefer plates of lead, to which is mechanically applied a salt or an oxide of lead. In close proximity to these cells of battery I fix an electro-magnetic motor, B, which may be any of the well-known types of dynamo-electric machines. On the end of the armature m , I place a pulley or a gear-wheel, as 1, to the frame of the vehicle I place, in appropriate journals j , a counter-shaft, E, and upon this counter-shaft I place a wheel or pulley, 3, in line with pulley 1, and I mechanically connect pulleys 1 and 3 by a belt b . Upon shaft E, I place a second wheel or pulley, 2, and upon one of the axles, as x , I place a wheel or pulley, 4. Wheels 2 and 4 are mechanically connected by a belt, b' . The motor B is connected in electrical circuit with the battery A through a switch or circuit-changer, K, as shown in Fig. 2. One terminal of the battery is per-

manently connected to one terminal of the motor by wire *a*. The other terminal of the motor is connected by wire *c* to button *l* in electrical connection with the switch-lever *L*.

5 Lever *L* has a movement of rotation and may make contact successively with a series of contact-stops, as shown. Each stop is connected by separate wires *a'* to *a⁵* with different points in the series of cells, so that by placing lever *L* on any one of the series of contacts a variation is made in the application of the electrical energy, producing a corresponding variation in the work of the motor.

10 This combination of apparatus operates as follows: The storage-battery having received its appropriate charge from a suitable primary generator, and it being desired to impart motion to the vehicle, lever *L* is moved onto one of the contacts, as *a'*. As the motor starts, the lever *L* is moved onto point *a²*. More energy being thereby applied, its speed of rotation increases, as does the power of magnetic force producing rotation. The armature revolves, and with it pulley 1, which, being mechanically connected with pulley 3, causes said pulley and counter-shaft *E* to rotate. Pulley 2 imparts its motion to pulley 4, turning the wheels *C C*, and by virtue of the resulting friction the vehicle is propelled or driven. When a grade is reached requiring a variation of applied power, the lever *L* is moved in one direction or the other according as it is required to increase or decrease the energy applied. In ascending, more cells are included in circuit to increase the energy applied. In descending the motor is operated as a generator and driven by the momentum of the car. The number of cells in circuit is then regulated by the movement of arm *L*, so as to nearly equal the electro-motive force of the motor-dynamo, which electro-motive force is dependent upon the rate of motion of the car. In this manner the additional energy

used in ascending the grade is partially compensated for by its return, due to this charging operation of the motor-dynamo. 15

It is obvious that the apparatus here described operates in accordance with my improved method for propelling street-cars, in which chemical energy generated or rendered potential by dynamic electricity is stored and transported in suitable apparatus upon the moving car, and whereby the augmented rate of consumption necessary in ascending a grade or hill is partly compensated for and returned to the chemical form by the motor operated as a generator driven by the momentum of the car in descending the grade or in coming to a stop. 55

I do not herein claim the combination of a secondary battery, a dynamo-motor in circuit therewith, and means for applying the rotation of the armature to the propulsion of the vehicle, as that forms the subject of an application filed by me in the United States Patent Office, May 25, 1887, Serial No. 239,318, of which this is a division. 65

What I claim, and desire to secure by Letters Patent, is—

The method herein described of operating a vehicle propelled by an electric motor supplied with current from a secondary battery carried by the vehicle, consisting in braking the vehicle and returning current to the secondary battery to recharge it by decreasing the electro-motive force of the battery until the counter electro-motive force of the motor exceeds it when the vehicle is on a down grade or slowing down. 75

Signed at New York, county of New York, and State of New York, this 18th day of January, 1888. 80

CAMILLE ALPHONSE FAURE.

Witnesses:

FREDERICK EDER,
CHARLES R. TRUAX.