

No. 691,473.

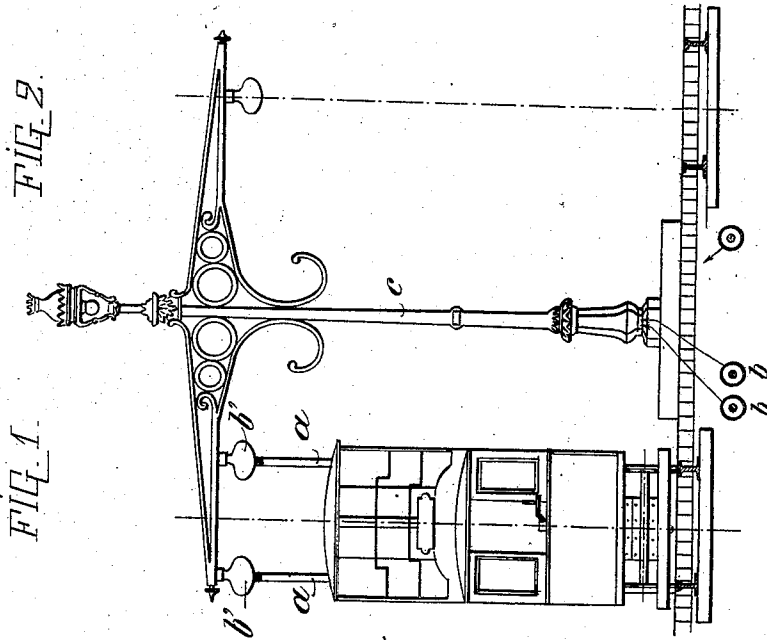
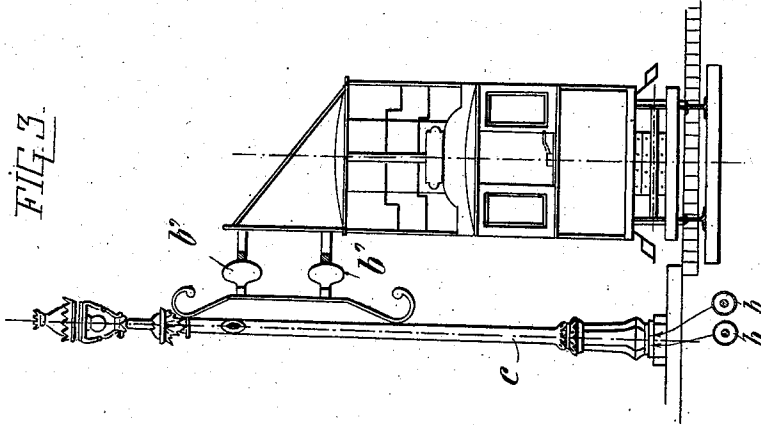
Patented Jan. 21, 1902.

CLAUDE MARIE JOSEPH (DIT CLAUDIUS) LIMB.
ELECTRIC TRACTION SYSTEM.

(Application filed Jan. 26, 1901.)

(No Model.)

6 Sheets—Sheet 1.



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6 Sheets—Sheet 2.

FIG. 5.

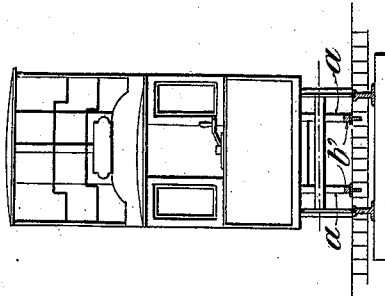
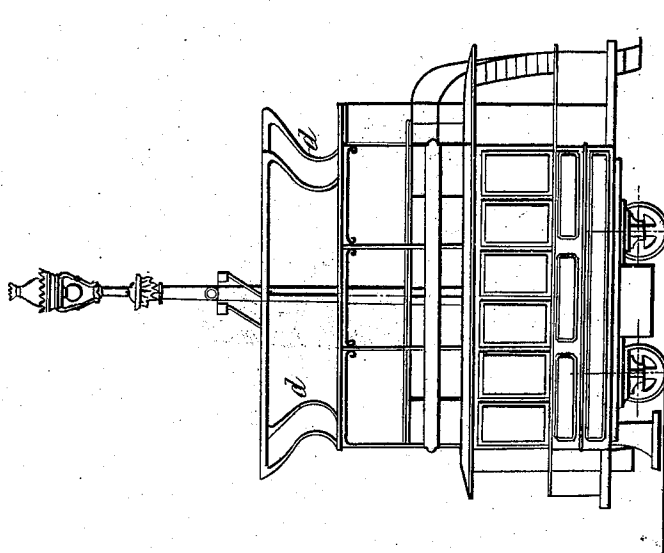


FIG. 4.



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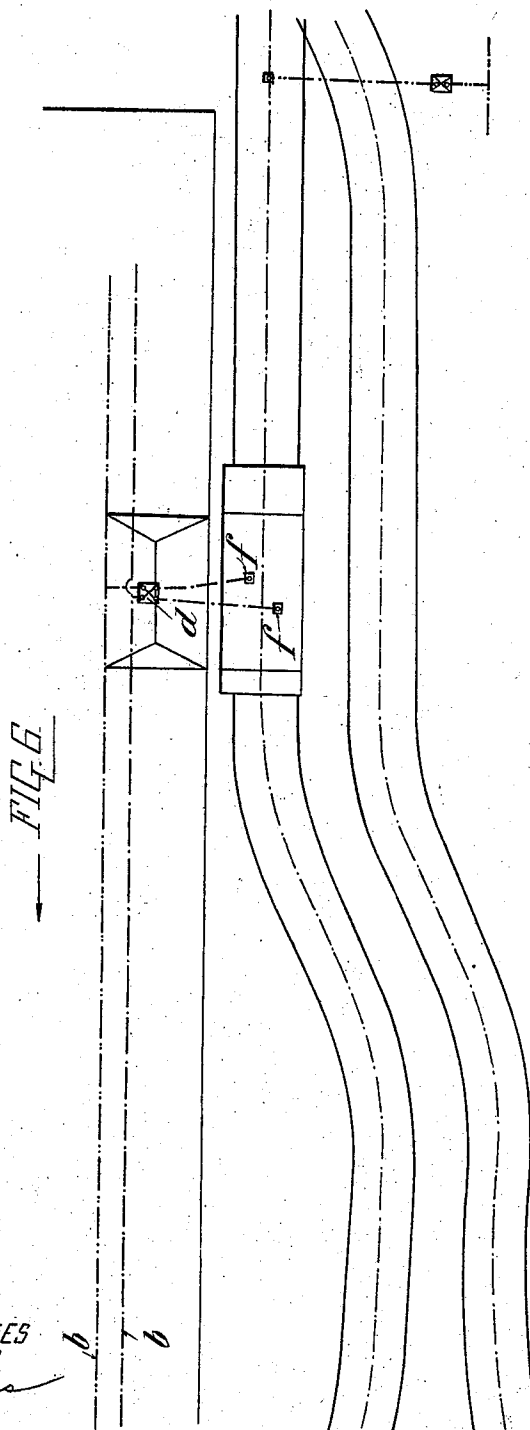
Patented Jan. 21, 1902.

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ELECTRIC TRACTION SYSTEM.

(Application filed Jan. 26, 1901.)

(No Model.)

6 Sheets—Sheet 3.



WITNESSES

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No. 691,473.

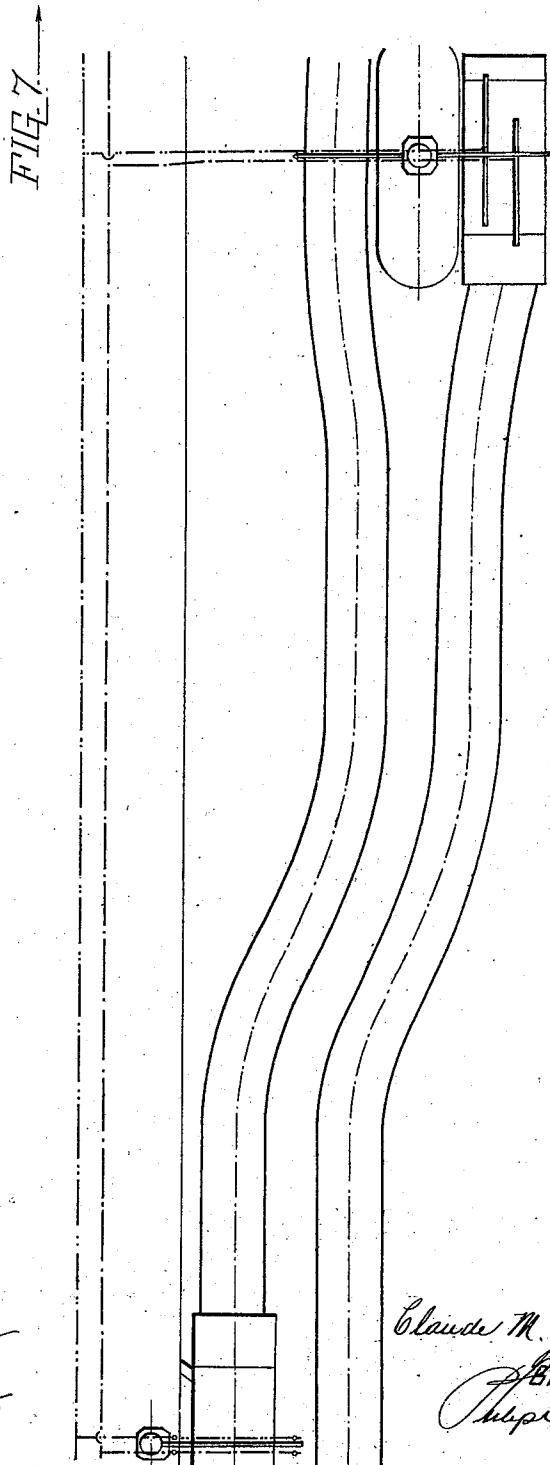
Patented Jan. 21, 1902.

CLAUDE MARIE JOSEPH (DIT CLAUDIUS) LIMB.
ELECTRIC TRACTION SYSTEM.

(Application filed Jan. 26, 1901.)

(No Model.)

6 Sheets—Sheet 4.



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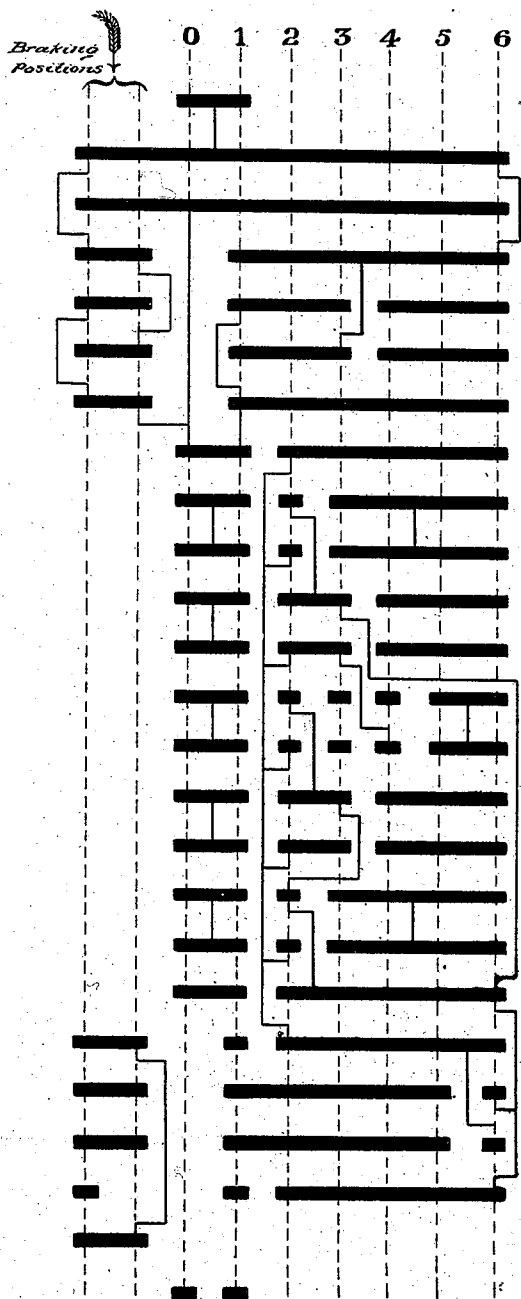
Patented Jan. 21, 1902.

CLAUDE MARIE JOSEPH (DIT CLAUDIUS) LIMB.
ELECTRIC TRACTION SYSTEM.

(Application filed Jan. 28, 1901.)

(No Model.)

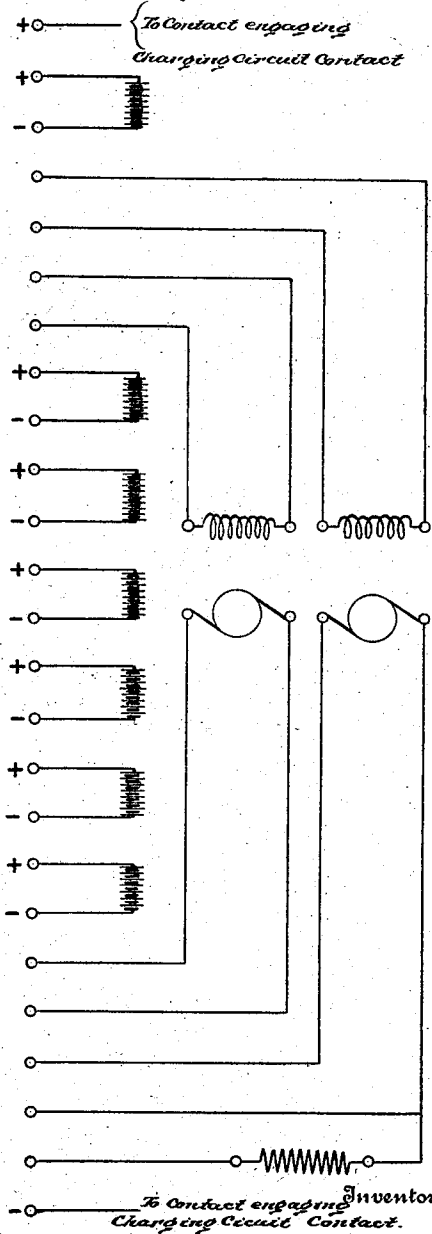
6 Sheets—Sheet 5.



Witnesses

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FIG 8



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No. 691,473.

Patented Jan. 21, 1902.

CLAUDE MARIE JOSEPH (DIT CLAUDIUS) LIMB.

ELECTRIC TRACTION SYSTEM.

(Application filed Jan. 26, 1901.)

(No Model.)

6 Sheets—Sheet 6.

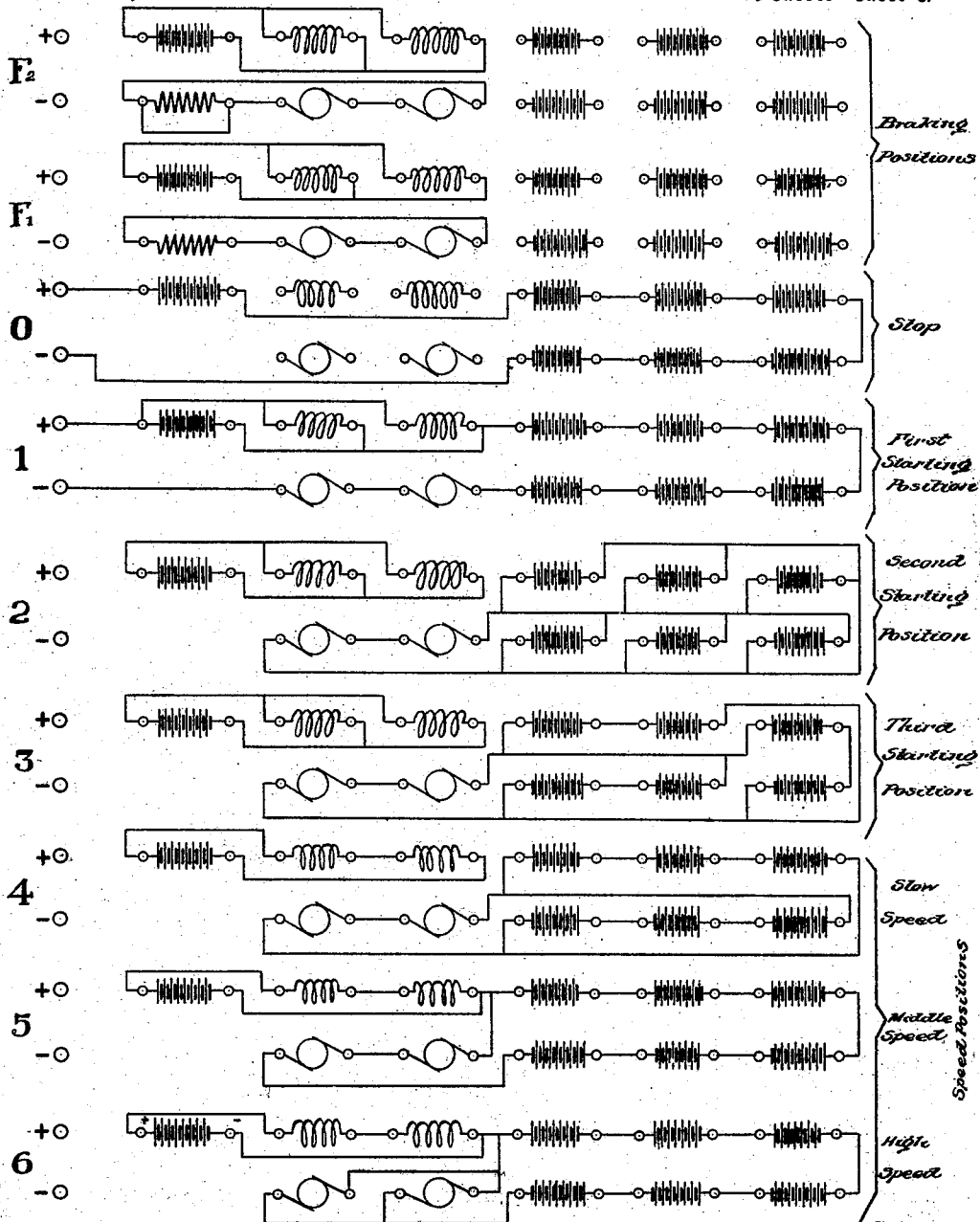


Fig. 9

Claude M. J. (dit Claudius) Limb.

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James L. Lumb

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Attorney

UNITED STATES PATENT OFFICE.

CLAUDE MARIE JOSEPH (DIT CLAUDIUS) LIMB, OF LYONS, FRANCE.

ELECTRIC-TRACTION SYSTEM.

SPECIFICATION forming part of Letters Patent No. 691,473, dated January 21, 1902.

Application filed January 26, 1901. Serial No. 44,872. (No model.)

To all whom it may concern:

Be it known that I, CLAUDE MARIE JOSEPH (dit CLAUDIUS) LIMB, a citizen of the Republic of France, and a resident of Lyons, France, have invented a new and useful Improvement in Electric-Traction Systems, which improvement is fully set forth in the following specification.

The present invention relates to a new system of electric traction with fixed stations and vehicles worked by accumulators and is essentially characterized by the two following conditions: The accumulators are automatically recharged at every station; the starting after a stoppage at the station being effected by making use of the main charging-current instead of the battery.

It will be seen that this system of electric traction will admirably suit tramway systems in towns, becoming, as it does, more useful in proportion as the lines are provided with a greater number of fixed stations or stopping-places—as, for example, in Paris; but this system is also applicable for traction purposes on main or long lines, where the complication arising from the necessity of points and switches renders the employment of the overhead-trolley system almost impossible.

In order to render the following explanations clear, there is represented, by way of example, in the accompanying drawings the improved system of traction in connection with overhead wires and conductors level with the ground.

Figure 1 illustrates a system of electric traction with double overhead conductors arranged above the cars. Fig. 2 represents a single overhead conductor, the return being effected by the rails. Fig. 3 represents an arrangement with a double overhead conductor arranged at the side. Fig. 4 is a side view of the vehicle shown in Fig. 1. Fig. 5 illustrates an arrangement for a double contact arrangement on a level with the ground. Figs. 6 and 7 show a schematic plan view of the whole arrangement of a tram system. Fig. 8 shows, diagrammatically, the controller-contacts in relation to their accompanying circuit-contacts; and Fig. 9 shows, diagrammatically, the circuit connections in the several positions of the controller.

The cars are provided, for the purpose of

effecting an automatic recharging of their accumulators, with one or two insulated bars or conductors *a*, according to whether it is intended to use the rails for the return of the charging-current or whether the employment of two distinct and insulated wires *b* is preferred. These conductors are placed either above the vehicle, as represented in Fig. 1, or at the side, as shown in Fig. 3, or below the vehicle, as indicated in Fig. 5. On stopping at the station the two conductors come in contact with two contacts *b'*, (supported on a column *c* in the case of overhead contacts.) These contacts are permanently connected with the charging-wire *b*. When the conductors *a* are arranged below the vehicle, the contacts *f f*, Fig. 6, are on a level with the ground and are also connected to the charging-wire *b*, not directly, however, but by means of a switch *d* of any suitable description, placed outside the track—say in the waiting-room or at any other suitable point. The switch device when set to indicate “stop” establishes a connection between the battery and the two charging-contacts. In the first position of starting, the connections are still effective, and the conductors of the motor are placed under tension on the charging-wires by the intermediate action of a resistance, as is the case ordinarily, or by simply placing them in the circuit of the charging-current, an arrangement which avoids all leakage of electric energy and the need of employing a special starting resistance.

A number of different combinations may be employed. By way of example, the following will be indicated: The distribution being under five hundred and fifty volts, two hundred and ten elements mounted in tension are placed in separate groups of thirty, thus giving seven groups. One of them will be used for the separate excitation of the motors and also for lighting of the carriage with lamps of fifty-five to sixty volts. The other groups furnish the energy for the conductors for driving purposes: No. 0, seven groups charged, the connections to the motor being cut; No. 1, excitation of the motors in parallel and connections established on the group of thirty accumulators in charge, two conductors under tension in the charge-circuit; No. 2, excitation of the motors in parallel on

their group of accumulators and the two conductors under tension on the six groups of accumulators in parallel; No 3, excitation in parallel, two conductors in tension on two groups in tension, three in quantity; No. 4, excitation in series, the two conductors under tension on three groups under tension and two in quantity; No. 5, excitation in series, the two conductors under tension on the six groups under tension, and, No. 6, excitation in series, the two conductors in parallel on six groups under tension. It will be seen from this that the effect of each combination is to practically double the speed. The combinations Nos. 1, 2, and 3, in which the excitations are effected in parallel, correspond to the positions for starting, which the motor could not support indefinitely, but which produce energetic couples without any appreciable loss of energy as regards the battery. This therefore gives us three normal speeds of travel.

It would also be possible to provide the combination-switch with an arrangement for a more energetical brake system than can be obtained by simply reversing the handle to a position indicating a speed less than the one by which the vehicle is animated. It is sufficient to provide the device with one or two positions on the other side of zero corresponding to various brake-powers, either by sending a current induced by the motors into a magnetic brake or by effecting a short circuit on the motor-conductors. The excitation of the motors being independent of the brake effect, even when under slow speed, will not fail, there being no risk of the self-excitation being retarded. Another advantage of this combination is that it prevents a car from getting out of hand, since every combination corresponds to a certain limit of speed, which cannot be exceeded without putting the brake-power into action. On a descent it is sufficient, if the speed is excessive, to move back the handle to one of the preceding combina-

tions, and the accumulators will be recharged at that time. 45

It is clear that the battery can be reduced to a minimum, since it does not lose power in starting the vehicle from a fixed station and since it recharges itself automatically the moment it arrives at a station. 50

It is easy to ascertain by experience that on certain lines of Paris the total time of stops varies as regards the total time of movement between 1 to 3 to 1 to 5, and this is more than is really required to recharge the accumulators without overstraining the apparatus. 55

When the traffic is of less extent, it will be advisable to have a sector distribution or to form a complete installation. The number of accumulators will be regulated according to the voltage of the distribution, the system being able to work just as well on five hundred and fifty volts as on one hundred and ten. 60 65

I claim--

In an electric-traction system, a charging-circuit, a contact or contacts at a station connected in said circuit, a vehicle, electric accumulators on said vehicle, a contact or contacts on said vehicle in position to engage the charging-circuit contact or contacts upon the arrival of the vehicle at the station, a motor on the car, and a controller on the car adapted to be operated by the motorman to control the circuit connections between the contact or contacts on the car, the accumulators and the motor, said controller having contacts arranged to direct the charging-circuit through the motor when the controller is moved to its starting position. 70 75 80

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

CLAUDE MARIE JOSEPH (DIT CLAUDIUS) LIMB.

Witnesses:

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MARIN VACHOR.