

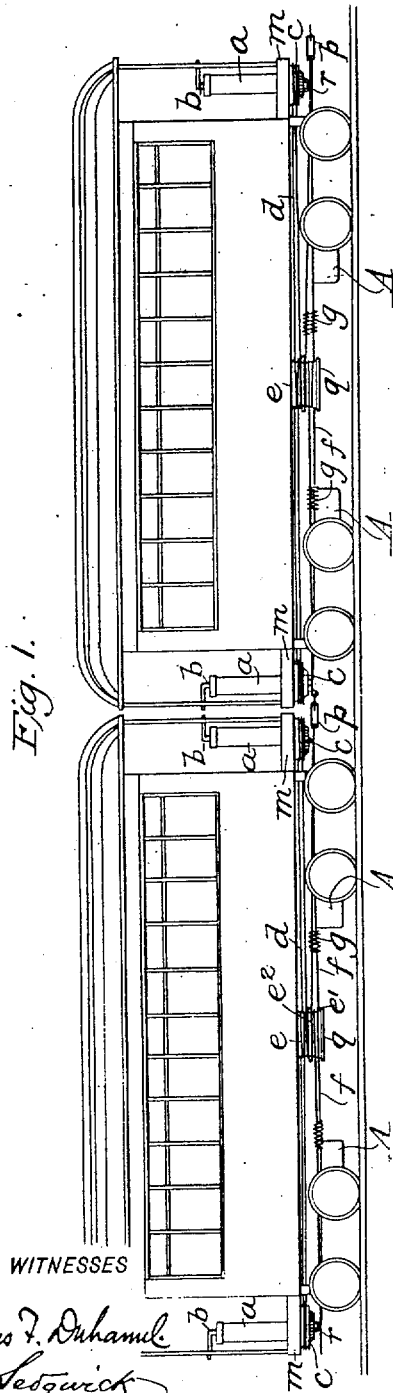
TRAIN CONTROLLING APPARATUS FOR ELECTRIC CARS.

(Application filed Aug. 17, 1899.)

(No Model.)

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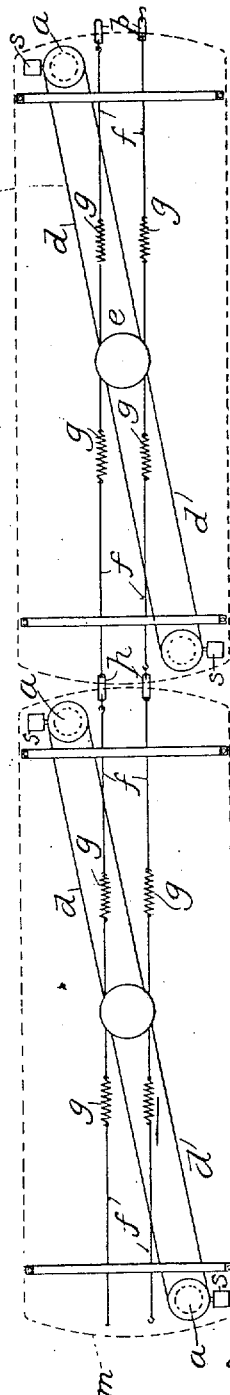
Fig. 1.



WITNESSES

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Fig. 2.



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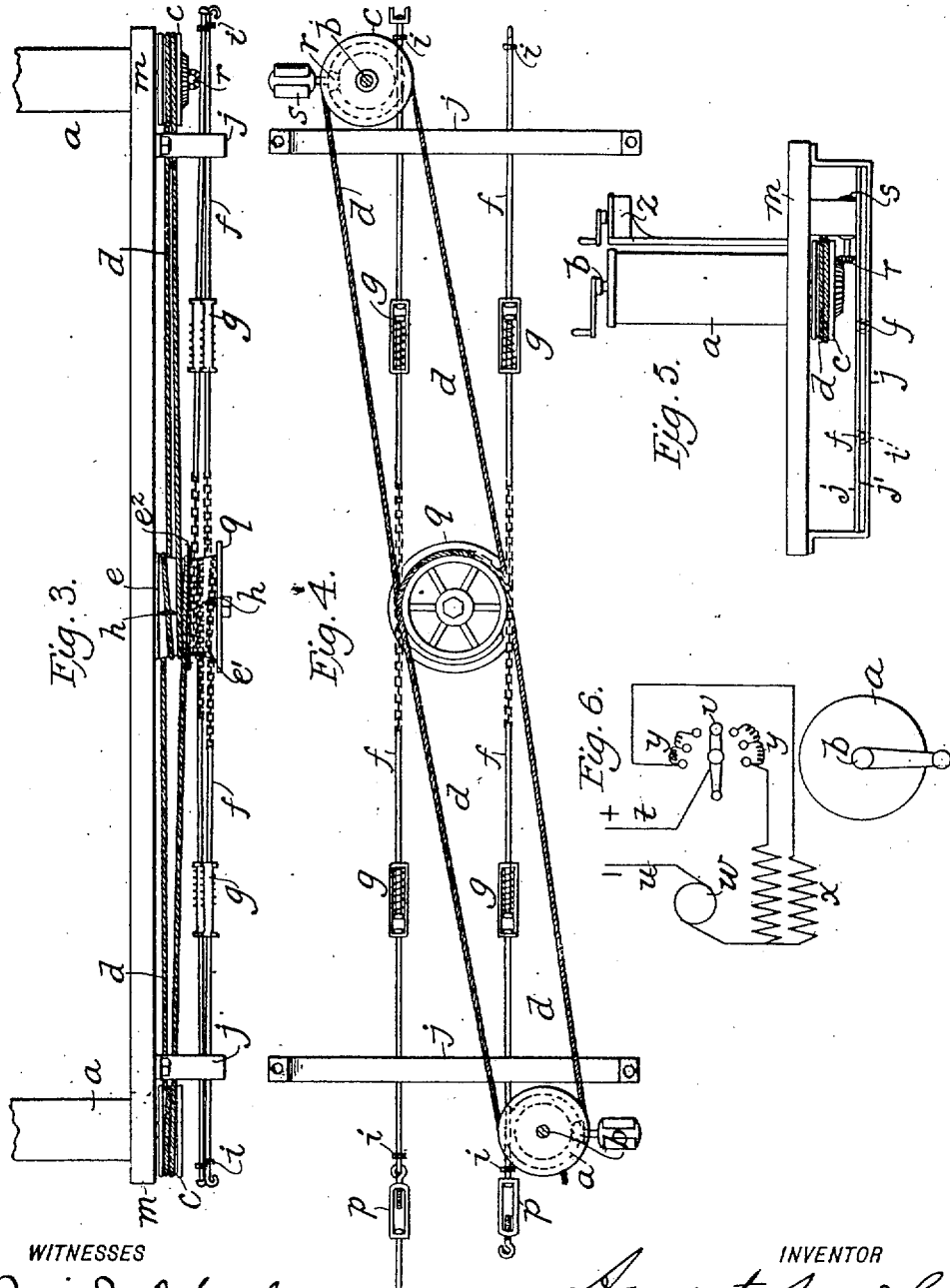
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3 Sheets—Sheet 2.



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No. 645,764.

Patented Mar. 20, 1900.

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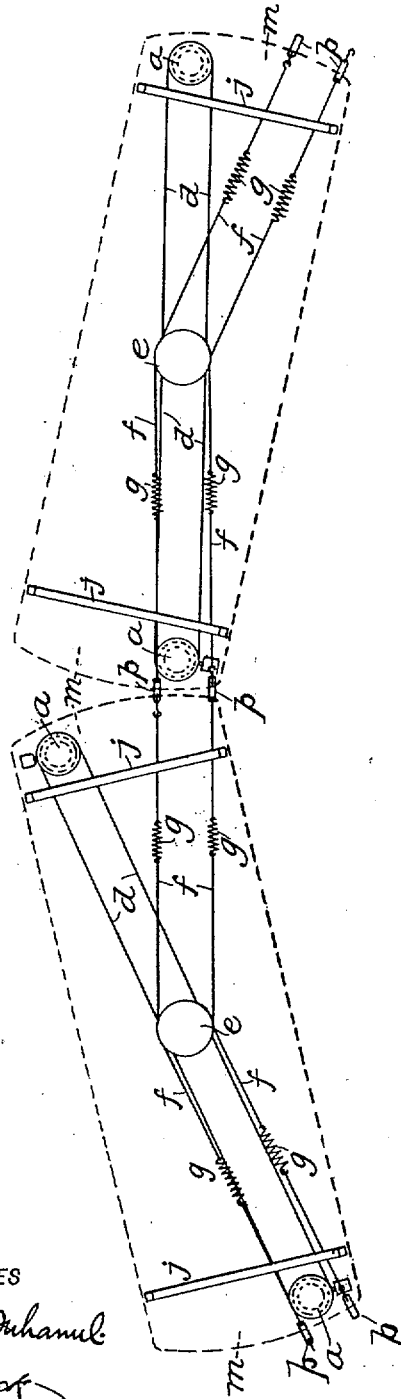
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3 Sheets—Sheet 3

Fig. 7.



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# UNITED STATES PATENT OFFICE.

AUGUST SUNDH, OF YONKERS, NEW YORK.

## TRAIN-CONTROLLING APPARATUS FOR ELECTRIC CARS.

SPECIFICATION forming part of Letters Patent No. 645,764, dated March 20, 1900.

Application filed August 17, 1899. Serial No. 727,531. (No model.)

*To all whom it may concern:*

Be it known that I, AUGUST SUNDH, a citizen of the United States of America, and a resident of Yonkers, county of Westchester, and State of New York, have invented certain new and useful Improvements in Train-Controlling Apparatus for Electric Cars, of which the following is a specification.

My invention relates to controlling electric cars in trains comprising a plurality of cars each having its own driving motor or motors and motor-controllers adapted for operating individually; and it consists in mechanical apparatus whereby all the driving-motors of the train may be controlled from any one of the motor-controllers in the train, as hereinafter described, reference being made to the accompanying drawings, in which—

Figure 1 is a side elevation of a train of two cars provided with my improved controlling apparatus. Fig. 2 is a plan view of the controlling apparatus with the car-bodies indicated in dotted lines. Fig. 3 is a side elevation of the bottom of a car-body, showing the equipment of controlling apparatus on an enlarged scale. Fig. 4 is a plan view of the controlling apparatus independently of the car-body, also on an enlarged scale. Fig. 5 is an end elevation of a car-platform and some of the controlling apparatus. Fig. 6 is a diagram of an electric-motor circuit for an auxiliary motor to be used for operating the controlling apparatus when in the case of a long train it may require more than hand-power. Fig. 7 is a diagram indicating the action of the apparatus on curves.

The essential feature of the invention is a wire or other rope system so combined with the several motor-controllers and extended from car to car throughout the train that turning the hand-lever of any one of the controllers will cause like movement of all the controllers in unison, and thus effect like control of all the cars in the train for uniform operation of the motors of the respective cars, so that each will do its due measure of work without liability of any one being overloaded by first getting the current and being damaged by overheating in consequence of being unable to start promptly.

The motor-controllers *a* are located on the platforms *m* of the cars and connected in the motor-circuits, as usual.

*A* indicates the motors, also arranged as usual. The controller-shafts *b* are extended downward through the platforms and have a pulley *c* thereunder. The two pulleys of the controller-shafts of each car are connected by an endless wire rope *d*, so as to be rotated one by the other, said rope traversing the car diagonally in consequence of the controllers being in a diagonal line relatively to the car, thus enabling the rope to be wound around the upper part of a pulley *e*, located at the center of the car, so as to be turned in unison with the controllers. On the lower part *e'* of said pulleys *e*, which is preferably separated from the upper part by a flange *e''*, I arrange train ropes, chains, or other equivalent train connections, hereinafter designated "train-ropes" *f*, to transmit motion from any one car to all the others, said ropes being detachably coupled between the cars for readily coupling and uncoupling, as is the practice in making up and unmaking trains. The ropes *f* are each coiled one or more turns around the parts *e'* of the pulleys *e* and are preferably secured thereto by staples *h* or other positive means of connection. The adjacent terminals of the ropes *f* of adjoining cars are connected to one another, so that said ropes will remain taut and serve to simultaneously operate the pulleys *e* of all the cars. The terminals of the ropes *f* at the ends of the train will then hang free or may be inserted through the slotted guard *j* and be provided with stops *i* to prevent their escape therefrom. The pulleys *e* may have a wide flange *g* to prevent the ropes from running off. As the controllers turn only about half an entire revolution, not much length is needed between the stops *i* of ropes *f* and the guards *j* for free action of the pulleys *e* without hindrance by the stops *i*.

An essential advantage of the location of the pulleys *e* at the centers of the cars results from the small variation in the distance apart of the centers of adjoining cars whether the train is running on curves or on a straight rack, this variation being so little that with slightly-elastic couplings *g* the proper tension

of the ropes *f* will be maintained at all times, and said ropes will extend in straight lines between the car-pulleys *e*, uninfluenced by the lateral play of the ends of the cars. The couplings *g* must, however, be sufficiently stiff to transmit the requisite power for working the controllers without too much yielding.

For coupling the ropes *f* of adjacent cars I may use turnbuckles *p* or any equivalent coupler which can be readily extended to compensate for the retraction by the elastic couplings *g* when the ropes are uncoupled and make it easier for the trainman to couple the chains and after such coupling tighten them up to apply the proper tension to the ropes *f* and the elastic couplings *g*.

The guards *j* for the ropes *f* each consists of two parallel bars suspended beneath the car-platform and presenting a slot *j'* of sufficient length to permit the range of swaying movement of the ropes *f* required by lateral movements of the car ends.

The lower parts *e'* of the pulleys *e* are in a sufficiently-lower plane than the pulleys *c* to permit the lateral play of the car ends, and hence of the pulleys *c*, without conflict with the ropes *f*.

In a long train the resistance of the series of coupled controller-operating mechanisms of the several cars may be too great for efficient operation by one motorman. I have for such contingency provided for each controller a small auxiliary motor *s*, geared with the controller-shaft *b* and being in suitable connection with a source of current by a branch circuit *u* and a switch *y* for being at any time brought into use for assisting the motorman as he may require it. The circuit of this motor may be adapted for operating it in either direction, as diagrammatically indicated by the reversely-wound field-coils *w* and resistance-coils *y*, or other known means of graduating the force of the current may be employed for regulating the operation of the motor. This auxiliary-motor switch may be contained in the controller-box *a'*, if desired; but I have here represented it in a separate box *z*. These motors will be geared with the shafts *b* of the controllers by bevel-wheels 2 or other means by which their armatures will turn freely when the circuit is off and the controllers are turned by hand or by the ropes.

What I claim as my invention is—

1. In an electric-car-train system, the combination of train-ropes and pulleys connected from car to car, and the motor-controller shafts of the respective cars connected with the train-rope pulleys thereof for actuating the train-ropes from any one of the controllers and thereby actuating the other controllers.

2. In an electric-car-train system, the combination of train-ropes and pulleys connected from car to car, said pulleys located in the centers of the horizontal planes of the cars respectively, and the motor-controller shafts of the respective cars connected with the train-rope pulleys thereof to operate the train-ropes

from any one of the controllers and thereby actuate the other controllers.

3. In an electric-car-train system, the combination of train-ropes and pulleys connected from car to car, said pulleys located in the centers of the horizontal planes of the cars respectively, and the motor-controller shafts of the respective cars connected by ropes and pulleys with the train-rope pulleys thereof, to operate said train-rope pulleys from either one of the motor-controllers of a car and thereby operate the several motor-controllers, the two controllers of each car and the train-rope pulleys being connected by an endless rope coiled on the train-rope pulleys intermediately of the controller-pulleys.

4. In an electric-car-train system, the combination of train-ropes and pulleys connected from car to car under the car-bodies, said pulleys located in the centers of the horizontal planes of the cars respectively, and the motor-controller shafts of the respective cars extended through the platforms and connected by ropes and pulleys with the train-rope pulleys, to operate said train-rope pulleys from either one of the motor-controllers of a car and thereby operate the several motor-controllers.

5. In an electric-car-train system, the combination of train-ropes and pulleys connected from car to car, the motor-controller shafts of the respective cars connected with the train-rope pulleys thereof, for actuating the train-ropes from any one of the controllers and thereby actuating the other controllers, and an auxiliary motor to one or more controllers and geared therewith, to reinforce the power of the motorman for actuating the controlling apparatus.

6. In an electric-car-train system, the combination of train-ropes and pulleys connected from car to car, said pulleys located in the centers of the horizontal planes of the cars respectively, and said ropes having elastic coupling-joints, and the motor-controller shafts of the respective cars connected with the train-rope pulleys thereof, to operate the train-ropes from any one of the controllers and thereby actuate the other controllers.

7. In an electric-car-train system, the combination of train-ropes and pulleys connected from car to car by extensible and contractile couplings, said pulleys located in the centers of the horizontal planes of the cars respectively, and said ropes having elastic coupling-joints, and the motor-controller shafts of the respective cars connected with the train-rope pulleys thereof, to operate the train-ropes from any one of the controllers and thereby operate the other controllers.

Signed by me at New York, N. Y., this 15th day of August, 1899.

AUGUST SUNDH.

Witnesses:

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C. SEDGWICK.