

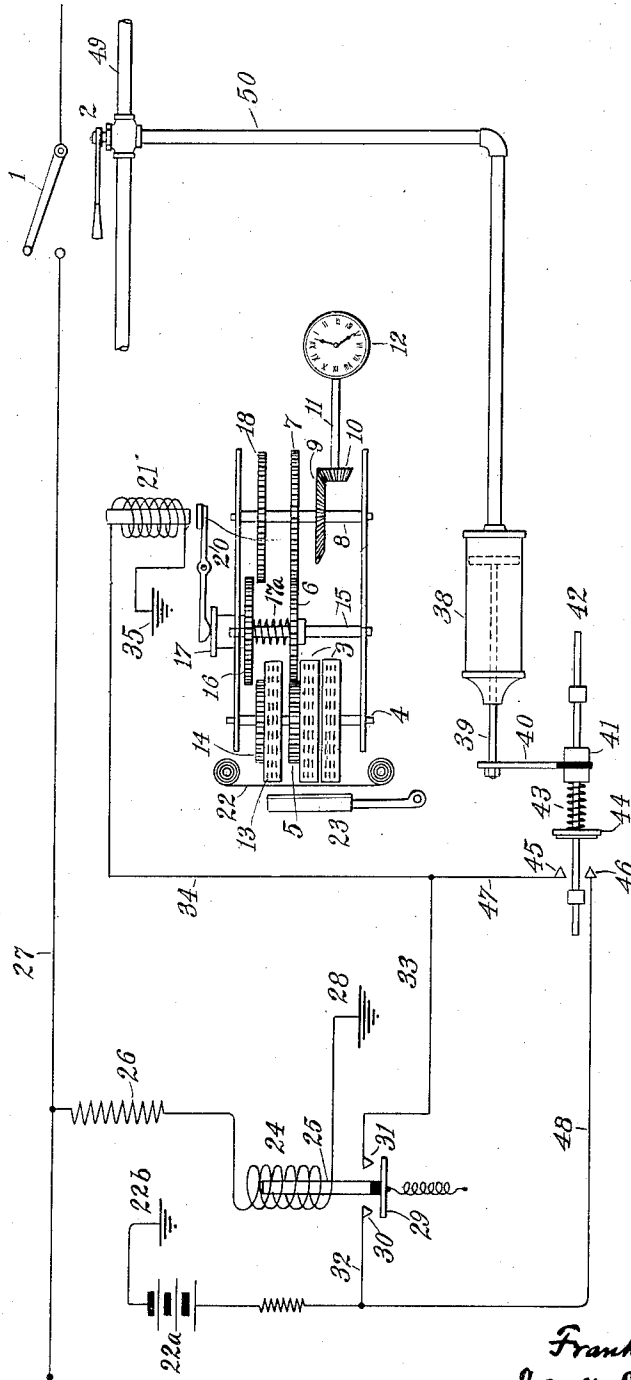
F. HEDLEY & J. S. DOYLE.
TIME RECORDING DEVICE FOR ELECTRIC TRAINS.
APPLICATION FILED MAY 17, 1910.

1,020,419.

Patented Mar. 19, 1912.

2 SHEETS—SHEET 1.

Fig. 1.



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Witnesses:
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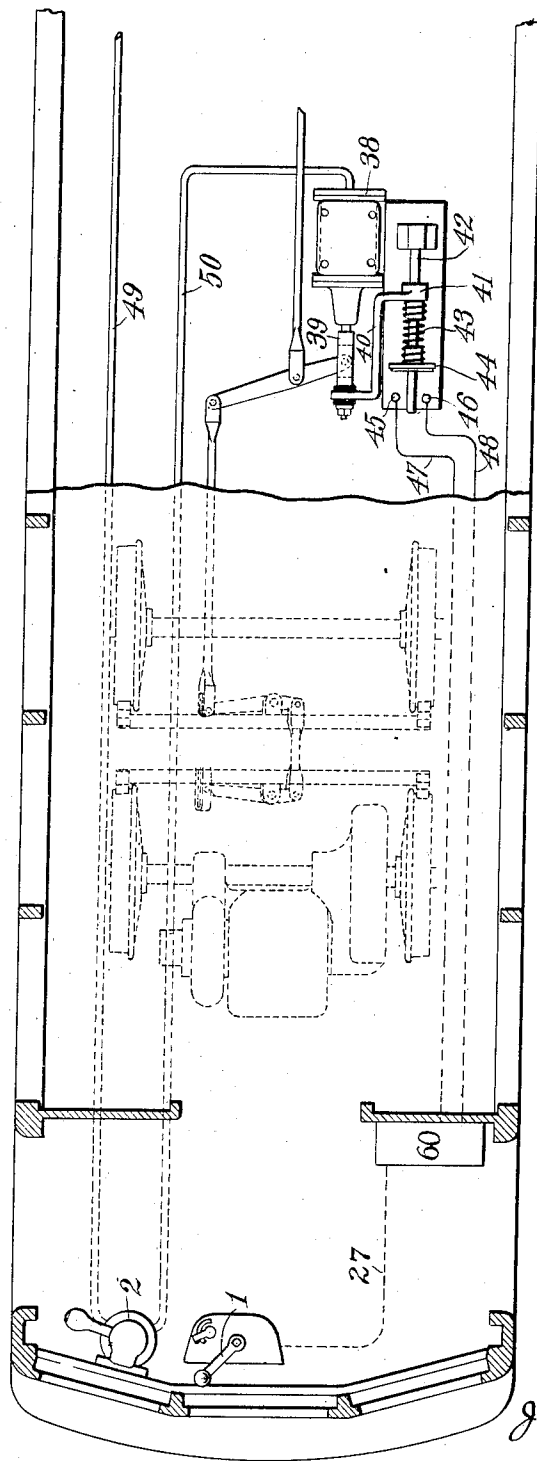
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2 SHEETS—SHEET 2.

Fig. 2



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UNITED STATES PATENT OFFICE.

FRANK HEDLEY, OF YONKERS, AND JAMES S. DOYLE, OF NEW YORK, N. Y.

TIME-RECORDING DEVICE FOR ELECTRIC TRAINS.

1,020,419.

Specification of Letters Patent.

Patented Mar. 19, 1912.

Application filed May 17, 1910. Serial No. 561,798.

To all whom it may concern:

Be it known that we, FRANK HEDLEY and JAMES S. DOYLE, both citizens of the United States, residing at Yonkers, in the county of Westchester and State of New York, and New York, in the county and State of New York, respectively, have invented certain new and useful Improvements in Time-Recording Devices for Electric Trains and the Like, of which the following is a full, clear, and exact description.

In the operation of electric railways it has been found that considerable power is wasted by unskilful or careless motormen, who fail to take full advantage of opportunities for "coasting," that is, allowing the train to run under its own momentum without taking current from the line, as for example down a slight grade, or on a level stretch of track, or in approaching a station. Various means have therefore been devised for keeping some sort of a check on the motormen, so that knowledge of their work may be gained, with the object of ascertaining who of them are exercising skill and care in handling their trains. In such case suitable rewards or bonuses can be offered to the motormen, based upon the power or current saved as determined by the information afforded by the registering devices.

In a prior patent granted to us Nov. 23, 1909, No. 940,810, we have described and claimed broadly means for recording the time or portion of a "run" spent in coasting, that is, running with current and brakes both "off." In general it is found that for determining the motorman's saving or waste of power this coasting time is the most advantageous basis; but there are circumstances in which it is desirable to know other items as well, as for example to serve as a check on other records. For this purpose we have been led to devise our present invention, which has for its chief object to provide apparatus for recording the sum of the time during which the train is taking current from the line, that is, the time of acceleration of the train, and the time during which brakes are on, that is, the time of "deceleration."

A further object is to provide apparatus for this purpose which shall be of the simplest possible character and withal thoroughly reliable in operation.

To these and other ends the invention consists in the novel features of construction

and combinations of elements hereinafter described.

A convenient and effective embodiment of the invention is illustrated diagrammatically in the accompanying drawing, in which—

Figure 1 is a diagram showing the wiring of the system, and Fig. 2 is a sectional plan view of a portion of an electrically propelled car with our apparatus installed therein.

The switch 1 in Fig. 1 is intended to represent any suitable "controller" by which the motor or motors of the car or train are controlled, and 2 is intended to represent a suitable brake-controller by which the brakes may be applied and released, these parts being also shown in Fig. 2. According to our invention the connection of the recording device to these controllers, or, in general, the controlling instrumentalities of the car or train, is such that whenever the controlling instrumentalities are so manipulated by the motorman as either to deliver current to the motor or to apply the brakes the recording device will be set in operation and will continue in operation until the current is cut off and the brakes released. Or, stated otherwise, the arrangement is such that the recording device will record the sum of the time during which the current is on with the brakes off and the time during which the brakes are on with the current off. These times are in fact the periods of acceleration and "deceleration"; since when the current is on, the train is being accelerated and when the brakes are on the speed of the train is being diminished or prevented from increasing.

The recording device may be of any suitable character, one form of the same being illustrated diagrammatically in the drawing. In this form the time-printing wheels 3, loose on the shaft 4 so as to rotate thereon, are suitably connected with a driving gear 5 also loose on the shaft but in mesh with a connecting gear 6 which is driven by a gear 7 rigidly mounted on a shaft 8. The latter shaft is rotated by a bevel gear 9 in mesh with a bevel gear 10 whose shaft 11 is driven continuously by a clock, indicated diagrammatically at 12. The shaft 4 also carries a loosely mounted time-printing wheel 13 and a driving gear 14 therefor, and on the shaft 15, which supports the connecting gear 6, is an axially movable connecting gear 16 secured to a hub 17, the hub and

the gear 16 being rotatable, as well as slidable, on the shaft 15. The gear 16 and its hub are normally held with the gear out of mesh with the driving gear 14 by a spring 17^a but when the hub is pushed in the gear 16 meshes with 14 and also with a gear 18 fixed on the clock-driven shaft 8. It will therefore be seen that when the connecting gear is thus advanced into operative connection with the time-printing wheel 13 the latter will be rotated by the clock and that when the said connecting gear is retracted or disconnected by the spring 17^a the wheel 13 will cease to turn. For the purpose of advancing the gear 16 an armature lever 20 is provided, with one end bearing on the hub 17 and the other end in the field of an electro-magnet 21, so that when the magnet is energized the lever will be actuated and the hub 17 advanced. Extending across the time-printing wheels is an ink-ribbon 22, and back of the ribbon is a platen or printing hammer 23, so that throwing the hammer forward, by any suitable means not shown, will cause a time-imprint to be made on a card or strip of paper inserted between the hammer and the ribbon.

The energization of the electromagnet 21 can be put under the control of the electrical controlling instrumentalities of the train in a variety of ways, one of which will now be described. The magnet 21 may be energized from any suitable source of current, in the present instance a battery 22^a, grounded at 22^b. The solenoid 24, whose core 25 controls one circuit of magnet 21 and battery 22, is energized whenever the controller 1 is in an "on" position, that is, when the train motor is taking current; a convenient arrangement for the purpose being to connect the solenoid, through a resistance 26, to the wire 27 which carries current to the train motor. It will therefore be seen that when the wire 27 is "energized" by closing the switch or controller 1 current will flow through the solenoid to ground 28. The core 25 will then be lifted, bringing the bridge piece 29, carried by the core, into engagement with the contacts 30, 31, and establishing a circuit as follows: ground 22^b and battery 22^a, wire 32, contact 30, bridge piece 29, contact 31, wire 33, wire 34 and magnet 21 to ground 35. The magnet 21 is thereby energized and the connecting gear 16 is brought into mesh with gears 18 and 14. The time printing wheel 13 is thus set in motion, and continues to move until the solenoid 24 is deenergized by cutting off the current at the controller 1; whereupon the core 25 drops, breaking the circuit at contacts 30, 31, deenergizing the magnet, 21, and permitting the spring 17 to disconnect the gears 14, 16, 18, as already described. The above operations are of course repeated at each closing and opening of the switch 1, that is, whenever the cur-

rent is thrown on and cut off from the train motors, and it will therefore be seen that the time printing wheel 13 adds together the separate times during which the train motor or motors are taking current.

For the purposes of recording the sum of the times during which the brakes are "on", the following instrumentalities may be provided, in conjunction with the brake-cylinder 38. The piston 39, working in the brake-cylinder, is connected by a rod 40 to a block 41, sliding on a rod or guide 42 and connected by a spring 43 to a bridge piece 44 sliding on the same rod and cooperating with contacts 45, 46, the first of which is connected to wire 34 by a shunt wire 47, and the latter to the battery 22 by a shunt wire 48. Now suppose the brake controller 2 is manipulated to admit compressed air from the pipe 49 (connected with the compressed air reservoir, not shown) through pipe 50 to the brake cylinder 38 in rear of the piston. The latter is thereby advanced, bringing the bridge piece 44 into engagement with the contacts 45, 46, and establishing the following circuit: ground 22^b and battery 22^a, through wire 48, contact 46, bridge piece 44, contact 45, wires 47 and 34, to magnet 21 and ground 35. The magnet 21, being thus energized, actuates its armature lever 20, which throws the connecting gear 16 into mesh with gears 14 and 18. The time-printing wheel 13 is thus set in motion. When the controller 2 is turned back to "off" position to release the brakes the air escaping through pipe 50 permits the piston 39 to be retracted in the usual way, thereby breaking the circuit by withdrawing the bridge piece 44 from engagement with contacts 45, 46; whereupon magnet 21 is deenergized, unless it should happen that the motorman should carelessly throw on the current by manipulation of the controller 1 before releasing the brakes, in which case the circuit first traced through the magnet 21, by way of contacts 30, 31, and wire 33, would keep the magnet energized and the time-printing wheel 13 in motion.

Now whenever the current is "on", or the brakes are "on", or both, the train is consuming power; and inasmuch as the time-printing wheel 13 is in motion whenever and as long as the current or brakes or both are "on" it will be seen that the printing wheel takes account of the total time during which the train consumes power. As the train starts on a run a card or slip of paper is inserted in the recording device and an imprint taken. Suppose, for example, that the imprint from wheel 13 is 02, meaning two minutes, and that from the wheels 3 is A10 40. When the train completes the round trip another record is taken on the same card or slip, reading, for instance, 57 and P12 04. Simple subtraction at once shows that in a run of one hour and twenty-four minutes

power was expended on the train, either in the motors or in the brake shoes, for 55 minutes, leaving 29 minutes as the time during which both brakes and current were off. The record card, made by the motorman himself, thus constitutes a permanent record upon which to determine what part, if any, he is to receive of any reward or bonus offered for efficient work.

10 The printing devices and the clock, the solenoid 24, the battery 22^a, etc., may be mounted in any convenient position on the car, as for example in a suitable casing 60 in the front vestibule, as in Fig. 2.

15 It is to be understood that the invention is not limited to the specific construction and arrangement herein illustrated and described, but is capable of other embodiments without departure from its proper spirit and scope.

20 We claim:

1. The combination with the motor- and brake-controlling instrumentalities of an electrically propelled vehicle, of a recording device having clock-driven mechanism for making time-records, and means associated with said controlling instrumentalities for setting said mechanism in operation whenever current is supplied to the propelling motor of the vehicle or the brakes are applied, whereby the said recording mechanism will sum up the periods of acceleration and deceleration of the vehicle.

2. The combination with the motor- and brake-controlling instrumentalities of an electrically propelled vehicle, of a recording device having clock-driven mechanism for making time records, and electromagnetic means under the control of said controlling instrumentalities for putting the said clock-driven mechanism in operation whenever current is supplied to the propelling motor of the vehicle or the brakes are applied.

3. The combination with the motor-controller and the brake-controller of an electrically propelled vehicle, of a time-recording device, an armature controlling the time-recording device, an electromagnet arranged to actuate the armature to set the time-recording device in operation, and parallel circuits for the electromagnet to energize the same, one circuit being controlled by the motor-controller and the other by the brake-controller.

4. The combination with a conductor for supplying current to a vehicle motor, of a

controller in circuit with said conductor to open and close the circuit therethrough, a solenoid connected to said conductor so as to be energized thereby when the circuit thereof is closed, a circuit controlled by said solenoid, an electromagnet in the circuit controlled by the solenoid, a time-recording device arranged to be set in operation whenever the electromagnet is energized, a brake-controller, and means, dependent for operation upon manipulation of the brake-controller to throw on the brakes, for energizing the said electromagnet to set the time-recording device in operation independently of the said solenoid.

5. The combination with the motor- and brake-controllers of an electrically propelled vehicle, of a time-recording device, an electromagnet arranged to set the time-recording device in operation when the electromagnet is energized, a circuit for the electromagnet, having separated contacts, a solenoid under the control of the motor-controller, means actuated by the solenoid for closing said circuit through the said contacts, and means, dependent for operation upon manipulation of the brake-controller to throw on the brakes, for establishing a shunt circuit around the said contacts and through the electromagnet; whereby the electromagnet will be energized and the time-recording device set in operation whenever the motor-controller is manipulated to deliver current for propelling the vehicle, and whenever the brake-controller is manipulated to throw on the brakes.

6. The combination with the controlling instrumentalities of an electrically propelled vehicle, of a time-recorder having continuously clock-driven means for recording the total time of a run or trip and having clock-driven recording means capable of intermittent operation, and means for setting the intermittently operable recording means in operation wherever the vehicle is taking current from the source of power or the brakes are applied.

In testimony whereof we affix our signatures in the presence of two subscribing witnesses.

FRANK HEDLEY.
JAMES S. DOYLE.

Witnesses:

GEO. KEEGAN,
H. M. NORRIS.