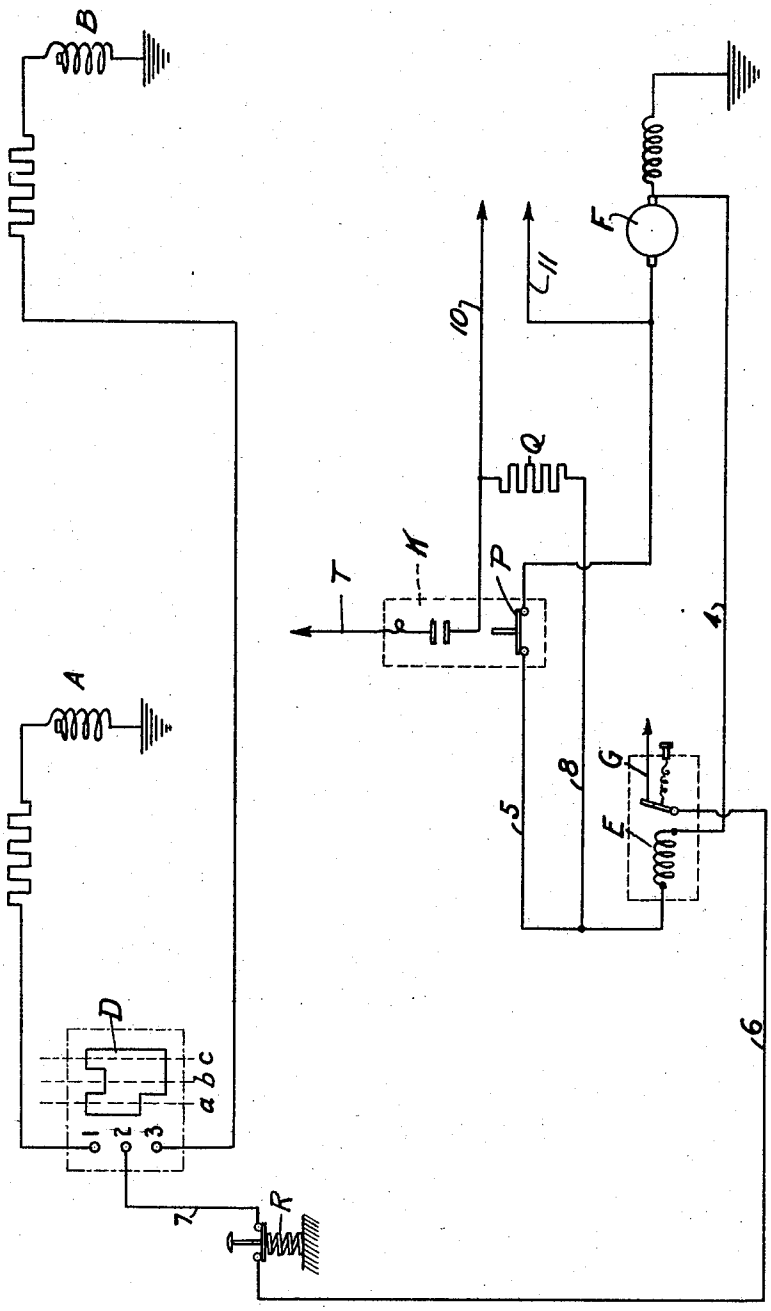
March 10, 1931. E. MURPHY 1,795,790

CAR DOOR CONTROL

Filed Dec. 27, 1928



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Patented Mar. 10, 1931 1,795,790

UNITED STATES PATENT OFFICE

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CAR-DOOR CONTROL

Application filed December 27, 1928. Serial No. 328,820.

For a detailed description of the present form of my invention, reference may be had to the following specification and to the accompanying drawings forming a part thereof:

In the controlling of car doors it has heretofore been suggested that the motor which operates a car-door, to close or open it, should be dominated by a counter electromotive force magnet, whereby the opening and closing of the door by the motorman could only occur when the car was standing still and the said magnet therefore deenergized. In such arrangements, however, it still remained necessary for the motorman to perform some act that would cause the door to open after the car came to a standstill or close before the car restarted. In brief, the said suggested arrangement did not eliminate the need of action by the motorman to open or close the door, but only permitted such action to take effect on the door when the car was stopped. In my present invention my purpose is to make the stopping or starting of the car automatically open or close the door without need of any door-opening or door-closing action by the motorman.

In the accompanying drawing, A and B represent two magnets each of which controls a door-operating engine. Such magnets and their mode of action on the door engine are well known and require no description. Each magnet, when energized, causes the engine it controls to open its door and when deenergized causes it to close its door. An example of such an arrangement of magnets and door operation is found in the United States patent to Thomas Farmer, Jr., No. 1,216,300, which is selected solely for the purpose of illustration and without limiting the invention to this particular disclosure. D represents the plate of a selector switch that may be set so that its contacts 1, 2 and 3 will bear thereon along the dotted line *a*, thereby connecting 1 and 2 and directing the energizing current of line 7 from 2 to the magnet A, or will bear thereon along the dotted line *b*, thereby connecting 2 and 3 and directing the said current from 2 to magnet B, or, thirdly, will bear thereon along dotted line *e*, thereby connecting 1, 2 and 3 and directing the current from 2 to both magnets A and B. Since the doors, in my plan, are to open and close automatically without action by the motorman, this selector switch becomes necessary and may be set by the motorman as described, or, in other ways, so as to direct or limit the automatic action to the desired door or group of doors.

The invention may be placed in any standard motor controlling the circuit. For purposes of illustration and without intention of limiting the invention thereto such a system has been diagrammatically shown in the drawing. Referring thereto K indicates the usual circuit closer of a standard type motor control, which is a part of practically all commercial equipment and is operated to admit current to the motor through the wire T leading from the usual trolley. It is also to be understood that the back stop G is also connected to the same control. The first effect of operating the controller is to close the switch K, thereby admitting current to the motor, and opening the switch P, thereby breaking the short circuit around the resistance Q, which is in series with the magnet E. Thus before the controller starts to regulate the speed of the car, the magnet E has the resistance Q in series with it. The conductor 10 goes to the contact plates of the usual controller, so that the said controller as it is turned will first cut out the resistance in the motor circuit then change the motors from series to multiple together with a temporary inclosure of the resistance, and then cuts out the resistance to regulate the motors after they are in multiple. The conductor 11 leads

from the controller to the motor, as is obvious from the drawing.

In operation the motorman, when he starts, first closes switch K and opens the switch P, as aforesaid. The closing of the switch K starts the motor and then by a further movement of the controller the speed of the car is regulated.

While the car is running the counterelectromotive magnet E is energized and thereby opens the circuit from the control through the line G leading to the door control at D. At this time the doors cannot be manipulated as long as the motors are receiving current. It is only after the motor controller has cut off the motor from the trolley that the magnet E receives current from the motors while they are still running by inertia. Therefore, the magnet E is called a "counterelectromotive" force magnet, because the electromotive force of the motors running under their own inertia supplies it with current and this current does not cease to flow until the motor has come to a stop. When the motor actually has stopped, the magnet E is deenergized and its armature is accordingly released, thereby establishing the control connection with the door operating circuit 6. The said circuit 6 is now energized and the doors will open automatically without any other action by the motorman. Prior to the present invention, when the car was stopped the motorman had to do something to cause the doors to open, but by the present invention the stopping of the car automatically causes the door to open without the intervention of the motorman. The switch marked R is an emergency feature for use when the train stops in a tunnel or some place where the doors should still remain closed. For instance, in the subways now existing in many of the large cities a train may be held up by signals between stations. Ordinarily as the train comes to a stop under the present invention the doors would automatically open. This, however, is undesirable under the circumstances and the switch R is operated to render the door controlling circuit ineffective. In other words, it is undesirable under normal conditions to open the doors when the train stops except at the regular station stops. So long as the switch R remains closed after the stopping of the car or train it will automatically open the doors.

In the drawings the switch marked D is shown with an irregular contour so as to provide a selective control over the number of doors which will be operated automatically when the train comes to a stop. For instance, the doors on the side of the car or train next to the station platform are the only ones which are normally opened, those on the other side of the car or train remaining closed. The widest portion of the switch D is designed to control all the doors on both sides and the other portions are each so designed to control the doors only on one side or the other.

E is a counter E. M. F. magnet connected by the wires 4 and 5 to the respective armature terminals of the propelling motor F, or by wires 4 and 8 when the controller in its usual operation breaks wire 5 and connects wire 8 to the trolley. When the motor stops there is no current in E and its armature drops back against a trolley-connected back-stop G. The current then goes from said back-stop by wires 6 and 7 to the selector and thence to the valve magnet A and to whatever others may be also connected to the selector. These valve magnets being energized will cause the opening of the doors which they respectively control. When the car starts again the magnet E is energized once more and acts to shut off the current from the line 6, 7 leading to the valve magnets and the doors are thereby caused to close. All of this takes place without any action by the motorman, except to start and stop the car or train.

To insure the setting of selector switch D, it may be interlocked with the usual removable controller handle in any suitable way, whereby the said controller handle can only be removed or replaced when the selector switch is properly set.

What I claim as new and desire to secure by Letters Patent is:

1. In car-door operation, a door-engine controller and means for automatically working said controller to close and open a door by means of a counter electromotive force magnet bridging the armature terminals of the car propelling motor.

2. In car-door operation, a door engine, a magnet for controlling said engine to cause the opening or closing of a door, a circuit closer for said magnet, and a counter electromotive force magnet, connected across the terminals of the car-propelling motor and acting automatically on the said circuit closer to cause the closing of the door by the starting of said motor and its opening by the stopping of said motor.

3. In car-door operation, a controlling magnet for controlling door engines, a selector switch for directing current to one or more of said controlling magnets, a circuit closer in a circuit leading to said switch, and a counter electromotive force magnet for said circuit closer connected across the terminals of the car-propelling motor and acting automatically on said circuit-closer to cause the closing of the selected door or doors by the starting of said motor and the opening thereof by stopping of said motor.

4. In car-door operation, a controlling magnet for controlling a door engine, means whereby said magnet, when energized, will

cause a door-opening movement of the said engine and when deenergized will cause a door-closing movement thereof, a circuit-closer in the circuit of said magnet, and a counter electromotive force magnet connected across the terminals of the car-propelling motor and acting automatically on said circuit-closer to cause a door-closing movement of said engine on the starting and a door-opening movement thereof on the stopping of said motor.

Signed at Albany, county of Albany, State of New York, this 24th day of December, 1928.

ERNEST MURPHY.