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CONTROL FOR ELECTRIC TRAINS

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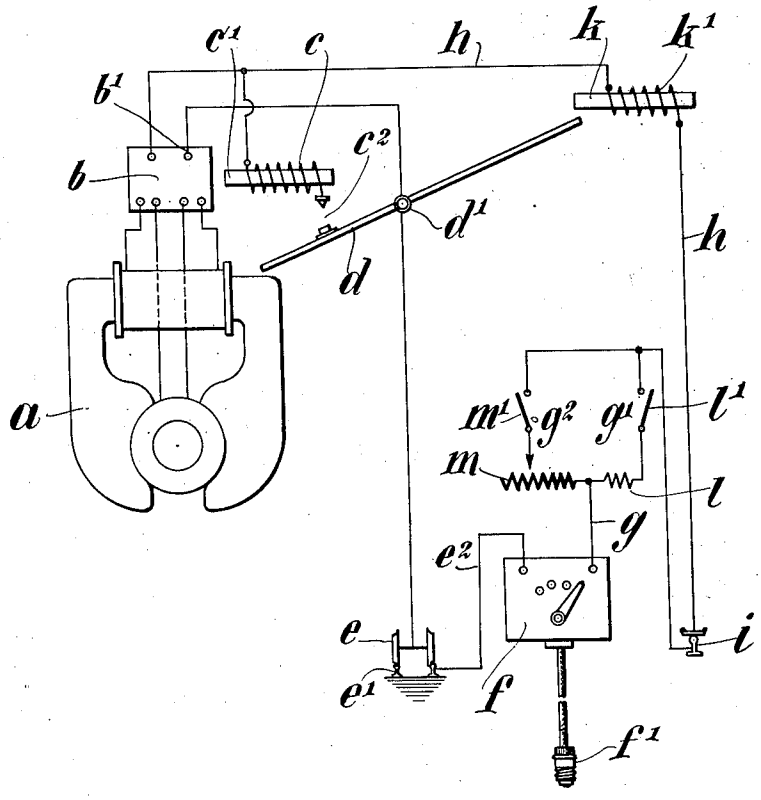

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CONTROL FOR ELECTRIC TRAINS

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9 Claims. (Cl. 104—151)

The present invention relates to controlling mechanisms for electric trains and embodies, more specifically, an improved control for a toy electric train by means of which the locomotive may be started and stopped intermittently, the direction of travel of the locomotive being changed at will each time the locomotive is started.

In existing forms of trains, a form of control is provided in which a reversing switch is utilized for reversing the direction of travel of the locomotive when the power is again applied thereto after having been shut off. This control switch is operated by a solenoid which is in parallel with the locomotive motor and is automatically disconnected by a switch which is opened when the locomotive motor is energized. This switch is in series with the solenoid and is actuated by the field magnetism of the locomotive motor thus breaking the solenoid circuit when the field of the motor is excited. In this manner, the direction of travel of the locomotive must be reversed each time it is stopped and started again. The difficulty of incorporating a more sensitive control in these small mechanisms is considerable and the expense thereof, together with other considerations, has prevented such form of control from being used.

An object of the present invention, therefore, is to provide a controlling mechanism for locomotives of the above character, such mechanism enabling the locomotive to be operated in either forward or reverse direction at will regardless of the manner in which power is supplied thereto.

A further object of the invention is to provide a control of the above character which is simple in construction and operation, and is readily applied to standard forms and makes of locomotives.

A further object of the invention is to provide a control of the above character which is inexpensive in construction and installation and effective in operation.

A further object of the invention is to provide a mechanism operated by an auxiliary electrical circuit, which will control the operation of solenoid reversing switches on toy electric trains designed to run on alternating current.

A further object of the invention is to provide an auxiliary circuit of such nature that the current it allows to pass will not move the locomotive, but which will be sufficient to operate the mechanism controlling the solenoid reverser described above.

Further objects, not specifically enumerated above, will be apparent as the invention is described in greater detail in connection with the accompanying drawing in which the single figure represents, diagrammatically, the connections and elements by means of which the locomotive is controlled as desired.

In the drawing, a designates an electric motor having a reversing switch b connected thereto, for reversing the polarity of the armature with respect to the fields and thus reversing the direction of travel of the locomotive. A solenoid c having a plunger c' operates the reversing switch and is connected in parallel with the driving motor a when a butterfly switch d is in the closed position. The butterfly switch d is pivoted in the motor truck frame at d' and is thus electrically connected to driving wheels e which, when resting on the rails, become the ground leg e' of the driving circuit. The butterfly switch is weighted in such a manner that the contacts c^2 are normally closed. Terminal b' of the controller b is grounded to the truck frame and the wheels e. The wheels e, engaging the ground rails e', are connected to the power transformer f by an external wire e^2. The other terminal of the controller b is connected to the third rail i by wire h. The third rail i is connected to the remaining terminal of the transformer f by an external connection g, thus completing the circuit. The transformer f uses as a power supply, 110 volts alternating current by means of the plug f'. The output of the transformer is variable and is normally set at 19-21 volts.

The operation of this portion of the circuit is such that when current is applied from the transformer through wires g and h and the ground connection e^2, the solenoid c is energized (switch d being closed) and the reversing switch is operated. Simultaneously, the field of the motor a is energized and the butterfly switch d is attracted by the field pole piece, thus breaking the circuit through the solenoid c. The butterfly d is held in the open position, after the current has been shut off, by the residual magnetism in the core k' of magnet k.

In the circuit included by wire h, a magnet k is connected. This magnet has a core k' which projects in close proximity to the right hand end of the butterfly switch d, preferably leaving only .001 inch of gap between the core and switch when the latter is attracted by the field of motor a. Between the power transformer and third rail, the wire g is connected to two circuits in parallel. The main circuit designated g^2 includes a variable

resistance m and switch m' while the other, auxiliary circuit g' includes a fixed resistance l and switch l'. When switch l' is closed, the fixed resistance l is in series with magnet k, motor a and solenoid c. The resistance of this circuit is such that the current flowing at this time is insufficient to operate the motor a and solenoid c but is sufficient to destroy the residual magnetism of the soft iron core k' of the magnet k (it being remembered that the system operates upon alternating current). Upon destroying the residual magnetism of core k' the butterfly switch d drops to its closed position. If the switch m' is now closed, current will flow through the solenoid c and motor a, actuating the reversing mechanism and reversing the direction of travel of the locomotive.

From the foregoing description, it will be seen that opening and closing the switch m' will cause the locomotive to be stopped and started in the forward direction. If it is desired to reverse the direction of travel of the locomotive, switch l' is first closed, destroying the residual magnestism of core k' and permitting the switch d to close, and then the switch m' is closed in the usual manner. The speed of the engine is varied by varying the resistance m, this being the usual practice in existing designs. It is necessary that the current flowing through the switch l' and resistance l be insufficient to operate the motor and solenoid but sufficient to destroy the residual magnestism in the magnet core k'. This permits practically full voltage to be impressed upon the motors and electromagnets but limits the amount of current so that the locomotive is not started when the switch l is closed.

It will be apparent that the invention may be modified to adapt it to various forms of locomotives and connections and the arrangement of parts may be varied as desired without departing from the scope of the invention as defined in the appended claims.

I claim as my invention:

1. A control for an electric train comprising a motor, a reversing switch for the motor, means in parallel with the motor for operating the switch, means in series with the motor for preventing operation of the switch operating means, a switch and variable resistance for the motor, and an auxiliary switch and resistance in parallel with the switch and variable resistance for controlling the means for preventing operation of the switch operating means.

2. A control for an electric train comprising a motor, a reversing switch for the motor, means in parallel with the motor for operating the switch, means in series with the motor for preventing operation of the switch operating means, a switch and variable resistance for the motor, and an auxiliary switch and resistance for controlling the means for preventing operation of the switch operating means.

3. A control for an electric train comprising a motor, a reversing switch for the motor, means in parallel with the motor for operating the switch, means in series with the motor for preventing operation of the switch operating means, a control for the motor, and an auxiliary control in parallel with the motor control for the means for preventing operation of the switch operating means.

4. A control for an electric train comprising a motor, a reversing switch, means in series with the motor for preventing operation of the switch, a control for the motor, and an auxiliary control for the means for preventing operation of the switch.

5. A control for an electric train comprising a motor, a reversing switch for the motor, means in parallel with the motor for operating the switch, means in series with the motor for preventing operation of the switch operating means, and remote means to control the last named means.

6. A control for an electric train comprising a motor, a reversing switch for the motor, means in parallel with the motor for operating the switch, means in series with the motor for preventing operation of the switch operating means, and means to control the last named means.

7. A control for an electric train comprising a motor, a reversing switch for the motor, means in parallel with the motor for operating the switch, and means in series with the motor for preventing operation of the switch operating means.

8. A control for an electric train comprising a motor, a reversing switch for the motor, means in parallel with the motor for operating the switch, and means normally acting on the operating means for preventing operation thereof.

9. A control for an electric train comprising a motor, a reversing switch for the motor, means for operating the reversing switch, and means normally acting on the operating means for preventing operation thereof.

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