March 29, 1927. 1,622,815

H. P. SPARKES

CONTROLLING DEVICE

Filed Dec. 17, 1923

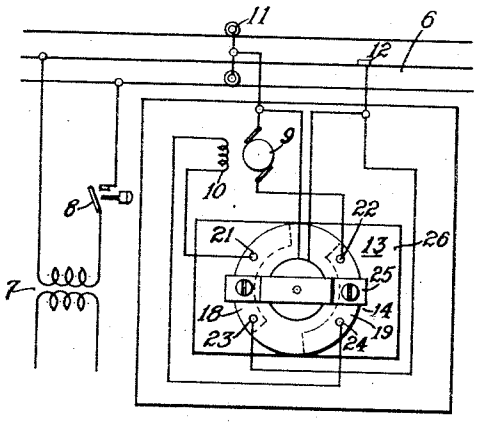


Fig. 1.

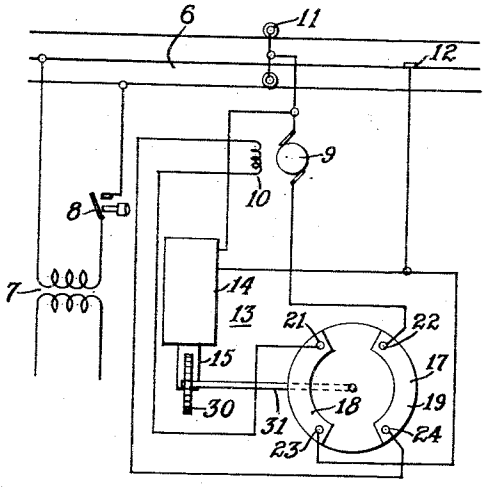


Fig. 3.

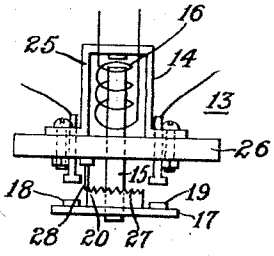


Fig. 2.

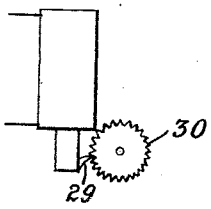


Fig. 4.

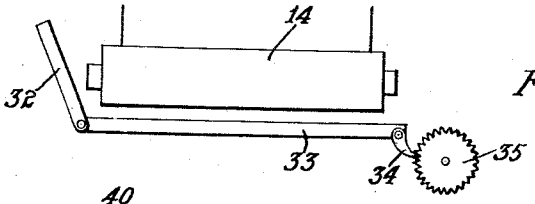


Fig. 5.

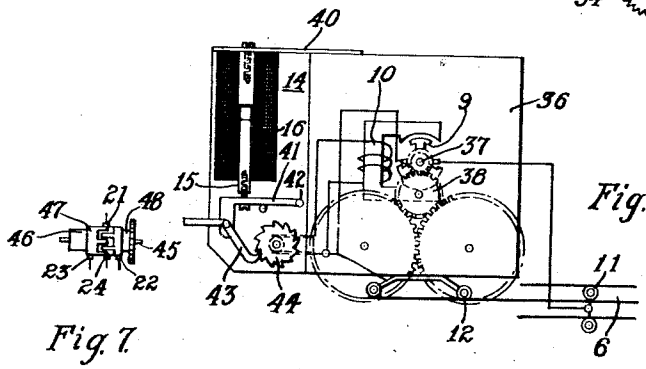


Fig. 6.

Fig. 7.

INVENTOR

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Patented Mar. 29, 1927. 1,622,815

UNITED STATES PATENT OFFICE.

HARRY P. SPARKES, OF PITTSBURGH, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO B. H. SMITH, OF SWISSVALE, PENNSYLVANIA.

CONTROLLING DEVICE.

Application filed December 17, 1923. Serial No. 681,216.

My invention relates to controlling devices and particularly to controlling devices for toy electric trains.

One object of my invention is to provide means whereby an electric toy train may be so controlled as to be started, reversed and stopped by the manipulation of a single remotely disposed switch.

Another object of my invention is to provide a control system, of the above-indicated character, that shall be applicable to an ordinary toy train system.

Another object of my invention is to provide a reversing switch or controller for a toy electric train that shall be controlled by the continuity of the current traversing the track circuit.

Another object of my invention is to provide a controller having a single actuating winding and means whereby a controller drum is turned each time the winding is energized.

A further object of my invention is to provide a controlling device, of the above-indicated character, that shall be simple and inexpensive to construct, easily installed and effective in its operation.

In practicing my invention, I provide in an ordinary standard electric toy train system a small electromagnet disposed in the locomotive and connected to the track circuit for actuating a controller or switch that comprises contact segments which are engaged by stationary contact members when the controller is actuated. A pawl and ratchet mechanism is provided between the movable member of the electromagnet and the controller for turning the controller and thus the contact segments when the electromagnet is energized. Since the electromagnet is connected to the track circuit, a simple push-button switch in the circuit to the track is used to energize and de-energize the same and, consequently, the electromagnet. Each time the electromagnet is energized, the relation of the contact members and the segments is altered and the train can be caused to respond to each operation of the electromagnet.

In the accompanying drawings:

Figure 1 is a diagram of circuits and apparatus embodying one form of my invention;

Fig. 2 is an elevational view, partially diagrammatic, of the unitary reversing device shown in Fig. 1;

Fig. 3 is a diagram of circuits and apparatus embodying another form of my invention;

Fig. 4 is a side elevational view of the electromagnet and ratchet device shown in Fig. 3;

Fig. 5 is a view of still another form of device embodying my invention;

Fig. 6 is a detail view of one form of my invention illustrating its application to a toy locomotive; and

Fig. 7 is a detail view of the drum shown in Fig. 6.

My invention comprises, in general, a standard toy track circuit 6 consisting of two rails and a central insulated third rail or trolley conductor to which a source of voltage is connected through a transformer 7 and a push-button switch 8. Ordinarily, the armature 9 of the motor on the toy locomotive is connected in series with its field-magnet winding 10 and one terminal of this circuit is connected to the wheels 11 of the locomotive and the other terminal is connected to a current collector 12. In my present invention, a reversing switch or controller 13 is placed between the armature 9 and field-magnet winding 10 for the purpose of changing the relative connection therebetween and thus the direction of movement of the locomotive.

The controller 13 comprises, in general, an electromagnet 14 having a movable magnetizable member or armature 15, a winding 16, a drum or disk 17, upon which is mounted conducting segments 18 and 19 and a pawl and ratchet mechanism 20 between the drum or disk 17 and the armature 15 for so actuating the drum 17 each time the winding 16 is energized as to cause contact members 21, 22, 23 and 24 to so engage the conducting segments as to effect any desired operation of the armature 9 of the motor.

Referring particularly to Fig. 1 of the drawings, the electromagnet is provided with a stationary magnetizable member 25, which is mounted on a base 26 upon which the contact members 21, 22, 23 and 24 are also mounted. The winding 16 is connected between the wheels 11 and the current collector 12 and, consequently, is energized except when the push button 8 is depressed

and the circuit from the transformer 7 is opened. The drum or disk 17 having the conducting segments 18 and 19 thereon is mounted on the movable armature or core member 15 which, of course, is rotatable as well as longitudinally movable. A circular rack or ratchet 27 is mounted on the disk 17 and a pawl 28 is mounted on the base 26.

With this arrangement, when the core member 15 is moved upwardly, the pawl 28 engages the ratchet 27 and turns the disk 17 to any desired position. If it is assumed the contact members 21, 22, 23 and 24 are connected as shown, it is possible to have the segments 18 and 19 first open the circuit through the armature and field winding and on the next operation reverse the connection of the field winding with respect to the armature. This, of course, reverses the motor. With the segments 18 and 19 in the position indicated, current flows from the wheels 10 through the armature 9, the contact member 22, segment 19, contact member 24, field winding 10, contact member 21, segment 18, contact member 23, and thence to the collector 12. The next movement of the disk could be arranged to so move the segments that they do not engage certain of the contact members and thus stop the motor. The next movement moves the segment 18 into engagement with the contact members 21 and 22 and the segment 19 into engagement with the contact members 23 and 24. This reverses the direction of current flow through the field winding 19 and, consequently, reverses the direction of rotation of the motor.

From the above, it will be seen that it is only necessary to depress the button of the switch 8 and then release it to cause the track circuit 6 to be re-energized and, consequently, the winding 16 to be energized and the controller to be notched one step for each time the circuit is re-energized. It will further be seen that a controller of this unitary construction can be placed in any standard locomotive without changing any structural part of the same and that the control is obtained from an ordinary push button switch remotely disposed with respect to the locomotive.

In Figs. 3 and 4 of the drawings, I have illustrated an electromagnet 14 having a movable core member 15 having a pawl 29 thereon which engages a ratchet wheel 30 that is mounted on a shaft 31 upon which a disk or drum 17, similar to that shown in Fig. 1, is also mounted. With this device, the upward movement of the core member 15 notches the ratchet wheel 30 around and the contact members 21 to 24, inclusive, engage different parts of the segments 18 and 19, as heretofore set forth. The movement of the core member 15 may be retarded to preclude the same from being actuated when the locomotive passes over a switch or crossover in the track circuit.

In Fig. 5 of the drawings, I have shown an electromagnet 14 having a clapper type of armature 32 upon one arm 33 of which is a pawl 34 that engages a ratchet wheel 35 that is mounted on a shaft with a disk or drum substantially as set forth with respect to Fig. 3 of the drawings. A device of this character is believed to operate with less chattering on alternating current circuits and is preferred in that connection. The operation of reversing the motor with a device of this character is similar to that heretofore set forth and need not be repeated.

Referring to Figs. 6 and 7, the motor having the armature 9 and field-magnet winding 10 is supported in a framework 36 which supports a pinion 37, an idler pinion 38 and two gear wheels 39. A bracket 40 on the framework 36 supports the winding 16 of the electromagnet 14 and the movable core member 15 is connected to a lever arm 41 that is pivoted to the framework 36 at a point 42. A counter-balanced pawl 43 is pivotally mounted on the lever arm 41 and engages a ratchet wheel 44 that is mounted on a shaft 45 with a drum 46. Two segmental conductors 47 and 48 are mounted on the drum and they are engaged by stationary contact members 21, 22, 23 and 24 which are connected to the armature, field-magnet winding and the circuit as shown in Figs. 1 and 3.

With the arrangement shown in Figs. 6 and 7, every time the track circuit is re-energized, the lever arm is moved upwardly by reason of the upward movement of the core member 15, to thus turn the drum 46 a definite amount. The movement of the drum alternately connects the contact members 21 and 24 to the segments 47 and 48 in the reverse direction to thus change the connection of the field winding 10 to the track circuit 6. This causes the motor and, consequently, the locomotive to reverse each time the track circuit is energized.

My invention is not limited to the particular structures or arrangements shown, as it may be variously modified without departing from the spirit and scope of the invention, as set forth in the appended claims.

I claim as my invention:

1. In a toy electric train system, the combination with two uninsulated rails and an insulated third rail, a locomotive having a current collector for the third rail, a motor and a reversing switch connected to the current collector, of a pawl and ratchet device for actuating the reversing switch, an electromagnet connected to the current collector for actuating the pawl and ratchet device, and a manually operable switch normally

biased to the closed position for controlling the energization of the third rail whereby the motor may be started, stopped and reversed solely by the opening and closing of the last-mentioned switch.

2. In a toy electric train system, the combination with two rails insulated from each other and constituting a continuous track circuit coextensive with the travel of the train, a locomotive having a current collector for one of said rails, a motor and a reversing switch for the motor, of means for actuating the reversing switch, an electromagnet for actuating said means and a manually operable switch normally biased to the closed position of controlling the energization of said rails whereby the locomotive may be controlled solely by the opening and closing of the last-mentioned switch.

3. In a toy electric train system, the combination with two rails insulated from each other, a supply circuit connected thereto, a locomotive having a current collector for one of said rails, a motor on the locomotive and a reversing switch for the motor, of means on the locomotive for actuating said reversing switch, an electromagnet permanently connected electrically to said rails in parallel with said motor and reversing switch and arranged to actuate said means each time the train circuit is energized and a manually operable switch in the supply circuit operative alternately to stop and reverse the locomotive by the energization and de-energization of said electromagnet.

4. A controlling device for the motor of a toy electric locomotive comprising a step-by-step reversing switch in the motor circuit, a push button switch in the track circuit and slow-acting electromagnetic means on the locomotive controlled solely by impulses of current in the track circuit of the locomotive for notching the reversing switch each time the push button switch is operated.

5. In a toy electric train system, the combination with a locomotive having a motor and a reversing switch for the motor, said reversing switch being of the step-by-step type having alternate circuit-opening and circuit-closing positions, of a circuit-interrupting switch in the supply circuit operative alternately to stop and reverse the locomotive for appreciable periods when actuated to break the circuit momentarily.

In testimony whereof, I have hereunto subscribed my name this 14th day of December 1923.

HARRY P. SPARKES.

Certificate of Correction.

Patent No. 1,622,815. Granted March 29, 1927, to HARRY P. SPARKES.

It is hereby certified that error appears in the printed specification of the above-numbered patent requiring correction as follows: Page 3, line 16, claim 2, for the word "of" read *for;* and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 19th day of April, A. D. 1927.

[SEAL.]

M. J. MOORE,
Acting Commissioner of Patents.