Feb. 24, 1942. A. EHRET ET AL 2,274,538

REMOTE CONTROL SYSTEM FOR TOY ELECTRIC RAILROADS

Filed March 16, 1940

Fig. 2.

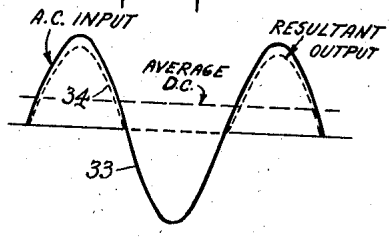


Fig. 1.

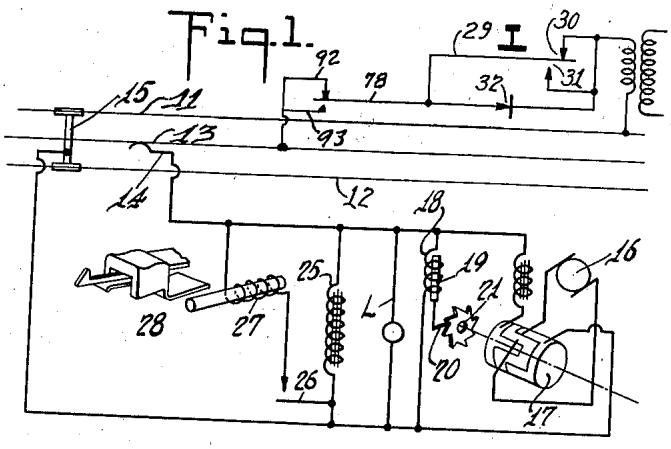
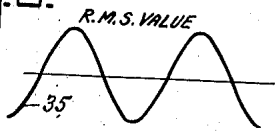


Fig. 3.



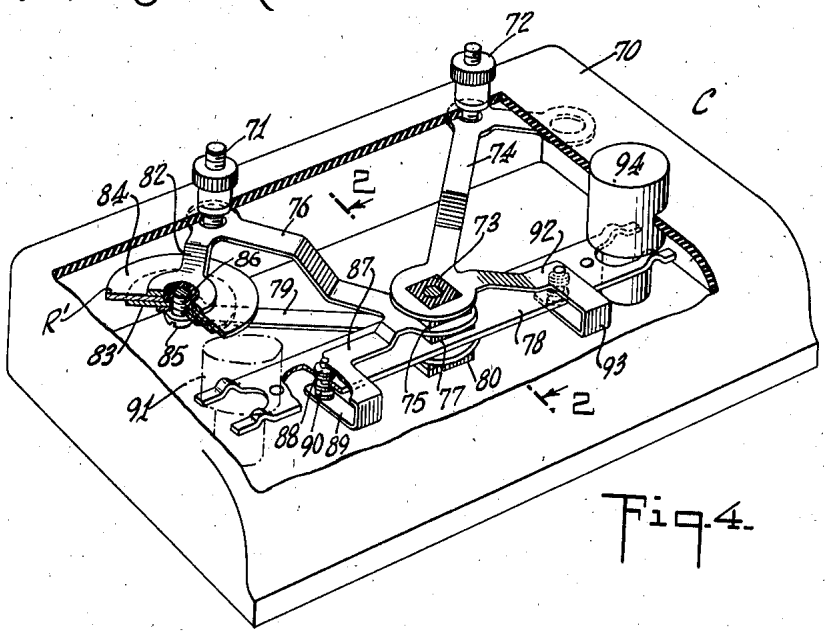
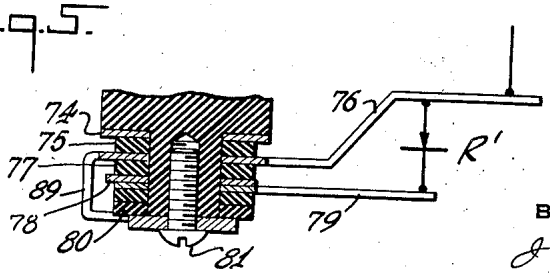


Fig. 4.

Fig. 5.



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REMOTE CONTROL SYSTEM FOR TOY ELECTRIC RAILROADS

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Application March 16, 1940, Serial No. 324,330

7 Claims. (Cl. 104—150)

The present invention relates to remote control systems for toy electric railroads, and is more particularly directed toward remote control systems wherein it is possible to control an uncoupling device carried by the train from a remote point without the necessity of any particular track construction other than that necessary for supplying current to the toy trains.

According to the present invention the toy train, in addition to having the usual reversible locomotive and other electrically operated accessories, has a relay controlled uncoupling mechanism which does not function when the usual alternating current employed for operating the train is impressed on the track, but which does function when a substantial lower direct current voltage is imposed on the circuit.

In carrying out the present invention in practice the circuit between the transformer and the track is provided with an impulse sending current controller which operates the propulsion motor reversing mechanism and with means for introducing into the circuit a low direct current potential without opening the propulsion motor circuit.

Inasmuch as the uncouplers or similar devices are intended for quick action rather than for sustained operation over a substantial period of time, it is possible to use a very small rectifier to provide a direct current component. As the duration of the direct current impulse may be short, full operating alternating current voltage may be quickly restored to the circuit so that the lights and propulsion motor may continue to function. This sequence of operations may be carried out by a simple switch.

The accompanying drawing shows, for purposes of illustrating the present invention, one of the many embodiments in which the invention may take form, it being understood that the drawing is illustrative of the invention rather than limiting the same.

In the drawing:

Figure 1 is a circuit diagram;

Figure 2 illustrates the effect of superposing the output of a half wave rectifier on the alternating current wave form;

Figure 3 illustrates the R. M. S. value of the current going to the track;

Figure 4 is a perspective view of a controller; and

Figure 5 is a sectional view on the line 2—2 of Figure 4 looking in the direction of the arrow.

The track rails of a conventional 3-rail toy railroad track layout are indicated at 11 and 12 and the third rail at 13. The reference character 14 indicates a collector shoe bearing on the third rail of the track and the reference character 15 represents the running gear of the train. Where all the apparatus on the train is on one vehicle, such as a switching locomotive, the usual locomotive collector shoe and trucks are sufficient, but where the apparatus is on different vehicles it will be understood that additional current collectors and trucks will be employed.

The collector shoe 14 and the truck 15 are connected to a propulsion motor 16 with associated reversing switch 17, and to an electromagnetically operated reversing switch actuator 18. Each time the track is deenergized the coil 19 of the device 18 drops its armature 20 below the tooth on the indexing wheel 21, so that on the next impulse the armature is lifted and the indexing wheel and reversing switch 17 turn one step to open the motor circuit. On the next impulse the reversing switch 17 is moved another step and the circuit for the motor completed with the connections reversed. With such reversing mechanisms it is therefore important that the circuit to the track should not be unintentionally opened. The collector shoe 14 and truck 15 may also be connected to a lamp load or other devices indicated generally at L.

A relay, indicated at 25, is connected between the collectors and has armature 26 adapted to close a circuit through the coil 27 of an electromagnetically operated uncoupling device 28. The relay 25 is one which will not respond to the maximum potential which can be delivered by the transformer to the track, but one which will respond to a small amount of direct current applied to the track circuit. The relay may be of the type shown in United States Patent No. 2,155,343. Owing to the inertia of the armature and the lost motion in the relay armature spring the current through the coil 27 may be maintained for a short interval after the direct current ceases to flow in the relay coil.

As shown in Figure 1 the portion of the track supply circuit for the coupler control may include an upwardly biased spring 29 normally connecting the power rail and transformer through a fixed contact 30, a lower contact 31 against which the spring 29 may be moved, and a half wave rectifier 32 connected in circuit when the spring is depressed.

The alternating current wave form is indicated at 33, Figure 2, and the result brought about by interposing the half wave rectifier in the circuit

by the dotted wave form 34. The use of a non-shunted rectifier results in a high average direct current potential but due to cutting off one-half the wave the R. M. S. value of the current going to the track is considerably reduced, as indicated by the curve 35 of Figure 3.

Figures 4 and 5 illustrate the structure of a controller C suitable for the above purposes. It has a body of insulating material 70 which supports two binding posts 71 and 72 connected to the transformer and to the third rail as indicated. The body 70 has a downwardly extending square post 73 which receives a contact strip 74 connected with the binding post 72, an insulating washer 75, a contact strip 76 connected with the binding post 71, an insulating washer 77, a comparatively stiff contact spring 78, a conducting strip 79 bearing against the strip 78, corresponding with the spring 29 of Figure 1, insulating washers 80, and the binding screw 81. The conducting strip 76 has an arm 82 connected to one side 83 of a dry rectifier R' preferably of the copper oxide type. The other element 84 of the rectifier and the conducting strip 79 are in engagement, these parts being held in place by a screw 85 threaded into a boss 86 carried by the insulating body 70. The strip 76 has an extension 87 which overlies the left end of the comparatively stiff spring 78 and carries an upper contact 88 normally in engagement with the spring 78. It also has a U-shaped extension 89 which passes underneath the left end of the strap 78 and provides another contact 90 below the strap 78. The contacts 88 and 90 correspond with contacts 30 and 31 of Figure 1. The left end of the strap 78 is operable by a push button 91.

The conductor strap 74 at the right of Fig. 4 has an extension 92 with a contact normally in engagement with the right-hand end of the stiff strip 78 and passes under the stiff strip 78 as indicated at 93 to form another contact below the strip 78. The right-hand end of the strip 78 is operable by a push button indicated at 94.

When the parts are in the normal position, as indicated in the drawing, the circuit is completed from the binding post 71 through the strip 76, extension 87, contact 88, strip 79, upper contact on the right-hand end of the strip 79 to the extension 92 of strap 74. As the strap 79 is in conducting relation with the strap 78, the rectifier R' is short circuited. Pressing down the button 94 will open the circuit to the track and then reclose the circuit when the lower contact 93 is reached, this single back and forth movement therefore operates 19 and 20 twice and effects a motor reversal.

When the button 91 is pressed down it disconnects the longer and stiffer strip 78 from the strip 76 and introduces the rectifier in circuit. Thereupon the R. M. S. value of the current is so low that the coupler does not operate reliably when the rectifier is introduced in the circuit except at the instant when the rectifier is again shorted during which time the full alternating current input is available for the operation of the coupler. At the instant the rectifier is again shorted, which occurs twice each time the button is pressed and released, there is enough inertia in the relay armature and enough lost motion in the relay armature spring to maintain the circuit through the coupler even though the direct current is removed. The result is that the coupler receives "two kicks" one of which will generally suffice to lift the coupler head.

Certain of the structural features herein shown are described and claimed in copending application of Joseph L. Bonanno, Serial No. 324,246, filed March 16, 1940.

It is obvious that the invention may be embodied in many forms and constructions within the scope of the claims and we wish it to be understood that the particular form shown is but one of the many forms. Various modifications and changes being possible, we do not otherwise limit ourselves in any way with respect thereto.

What is claimed is:

1. In a toy railroad, the combination with means for supplying a two conductor track circuit with alternating current either continuously or with interruptions or with alternating current of substantially lower voltage with a superposed direct current potential without current interruption, of a train supplied by said track circuit, the train having a propulsion motor operable by the higher voltage alternating current, a propulsion motor reverser operable by interruption of said higher voltage alternating current but not responsive to the drop in voltage to the lower voltage, a relay incapable of operating on said higher alternating current voltage but operable on the reduced voltage with direct current component and remaining closed for a short interval after restoration of the higher alternating current voltage, and a relay controlled device not responsive to the reduced voltage with direct current component but responsive to the alternating current flowing in said short interval.

2. A toy railroad such as claimed in claim 1, wherein the current supplying means includes a normally short circuited half wave rectifier and a manually operable switch to introduce the rectifier into circuit.

3. A toy railroad such as claimed in claim 1, wherein the current supplying means includes a normally short circuited half wave rectifier, and manually operable switch means to introduce the rectifier into circuit and to restore the higher potential to the circuit.

4. A toy railroad such as claimed in claim 1, wherein said relay controlled device is in the form of an electromagnetically operated uncoupling device.

5. A remote control system, an alternating source of predetermined maximum potential and uniform frequency, a load circuit including a relay incapable of operating on said alternating current potential but operable on a small direct current potential and remaining closed for a short interval after restoration of the higher alternating current voltage, a control switch biased to closed circuit position and having one contact connected to the load circuit and the other contact connected to the source, a half wave rectifier having one side connected to the source connected contact of the control switch and the other side to the load connected contact of the control switch whereby the rectifier is normally shunted and the separation of the contact of the control switch will introduce the rectifier into circuit with the load without opening the circuit to the load, the control switch having a third contact connected with one of the first mentioned contacts and engageable with the other first mentioned contact on continuation of the movement which caused the introduction of the rectifier into the circuit to again shunt the rectifier so that only a short pulsation of direct

current is interposed, and a relay controlled device not responsive to the reduced voltage with direct current component but responsive to the alternating current flowing in said short interval.

6. A toy train having electromagnetically operated uncoupling means responsive to propulsion current potential for disconnecting the vehicles of the train, a vehicle carried relay controlling the circuit of the uncoupling means, the relay adapted to be continuously subjected to propulsion current and being incapable of operating on a predetermined maximum potential and uniform frequency of such propulsion current but responsive to a small direct current potential to close the circuit for the electromagnetically operated uncoupling means, and a relay controller including a normally short circuited half wave rectifier which when unshunted supplies an alternating current of a substantially reduced alternating current voltage and superposed direct current to which the relay is responsive but below the voltage to which the uncoupling means is responsive, the relay controller including contacts for again shunting the rectifier so that full propulsion current is supplied the uncoupling means during the interval required for the relay to open the circuit for the uncoupling means, said interval being of sufficient duration to permit the uncoupling means to operate.

7. The combination of claim 6, having a second electromagnetically operated device responsive to impulses of alternating current voltages insufficient to actuate the relay but not responsive to the drop in potential when the rectifier is unshunted.

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