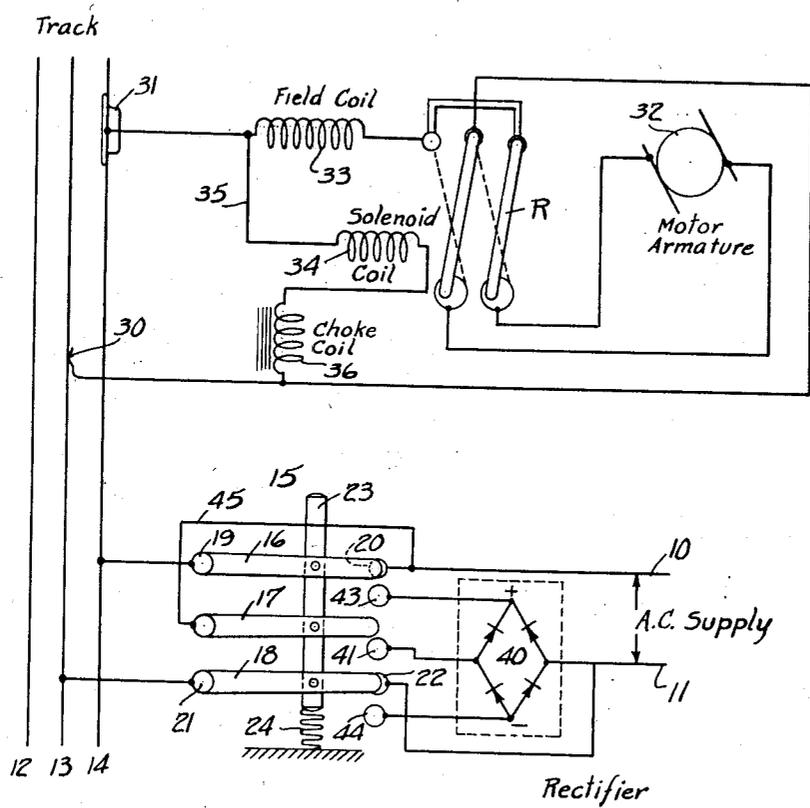


Feb. 14, 1933.

J. L. BONANNO  
REMOTE CONTROL SYSTEM

1,897,748

Filed Aug. 27, 1931



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# UNITED STATES PATENT OFFICE

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## REMOTE CONTROL SYSTEM

Application filed August 27, 1931. Serial No. 559,607.

The present invention relates to remote control systems and is more particularly directed to remote control systems designed for effecting the reversal of alternating current motors.

The present invention contemplates a remote control system for alternating current motors and the like wherein rectified current from the alternating current source is utilized to actuate a motor reversing switch. This switch is generally in the form of an electromagnetic device and has a coil connected in shunt with the motor. The coil circuit has sufficiently high alternating current impedance to limit the flow of alternating current so that the coil is then ineffective to actuate the reversing switch, but the coil is capable of operating it on rectified or direct current.

The present invention is more particularly designed for employment with toy electric railroads for reversing the direction of motion of the toy train by means of a remote control connected into the alternating current supply circuit.

The accompanying drawing diagrammatically illustrates one form of remote control system suitable for controlling the propulsion motor of a toy electric locomotive.

The alternating current supply mains are indicated at 10 and 11 and the three rails of the track layout are indicated at 12, 13, and 14. A control switch is indicated at 15. This switch has three movable connectors 16, 17, and 18. A connector 16 is adapted to bridge contacts 19 and 20 while the connector 18 is adapted to bridge contacts 21 and 22 so that the alternating current supply is connected to the third rail 13 and track rail 14 of the track rail layout. These three connectors are secured to a push button 23 held in the position indicated by a spring 24 so that alternating current is normally impressed on the track circuit.

The current collector of a toy locomotive is indicated at 30 and one of the wheels of the running gear is indicated at 31. The locomotive carries the propulsion motor whose armature is indicated at 32 and whose field coil is indicated at 33. The armature and

field are interconnected by a reversing switch R which may be constructed along the lines indicated in Patent No. 1,766,329. The operating coil for the reversing switch is connected at 34. One side of this coil is connected to the grounded side of the motor by a lead indicated at 35 while the other side of the coil is connected to the live side of the motor circuit preferably through a choke coil indicated at 36. The alternating current impedance of the circuit including coils 34 and 36 is so high that alternating current for the propulsion motor does not affect the reversing switch.

A four element bridge type rectifier is indicated at 40. One side of the rectifier is connected directly with the alternating current supply lead 11 while the opposite side is connected to a contact 41. The direct current output terminals of the rectifier are connected to contacts indicated at 43 and 44.

When the push button 23 is depressed against the tension of the spring, the alternating current circuit for the rectifier is completed by a lead 45 connecting the supply wire 10 with the contact 17 which now engages contact 41. The direct current output terminals 43 and 44 are connected to the track circuit through the movable contacts 16 and 17 and one has now supplied a rectified or pulsating direct current to the track circuit. This rectified current will energize solenoid coil 34 and actuate the reversing switch to shift the parts from the full line to the dotted line position (or to shift them the other way) so that the motor field and armature are reversed relative to one another. This action takes place very quickly, and upon release of pressure on the button 23 the alternating current propulsion circuit is restored and the motor operates with alternating current. Opening and closing the alternating current circuit does not affect the direction of the operation of the motor.

As the motor operation is carried out by alternating current and the rectifier is employed only momentarily, it is possible to effect the desired motor control with a very much smaller rectifier than would be re-

quired were rectified propulsion current supplied to the motor.

The present design is particularly well adapted for use with toy electrical motors for it makes possible to secure reverse control without adding any additional equipment to the locomotive, except the choke coil; and if one desires to eliminate the choke coil it is possible to design the solenoid coil so that it will have sufficient impedance to cut down the alternating current to a low value.

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

What is claimed is:

1. The combination with a reversible electric motor and a reversing switch in one of the circuits of the motor for reversing the motor, of a non-polarized electromagnetic reversing switch operating means responsive to rectified alternating current of sufficient voltage to operate the motor, comprising a solenoid coil connected in a shunt circuit of sufficient alternating current impedance to be ineffective when such alternating current is impressed.

2. In combination, a source of alternating current supply, a reversible electric motor, a reversing switch for changing the motor connections so that the motor may be reversed, a switch for connecting the motor directly to the alternating current source of supply, a rectifier connected to the alternating current source and having direct current output terminals engageable by said latter mentioned switch to supply rectified current to the motor terminals, and electromagnetic operating means for the reversing switch functioning upon the application of direct current to the motor and of sufficient alternating current impedance to be ineffective when alternating current is impressed.

3. In combination, a source of alternating current supply, a reversible electric motor, a reversing switch for changing the motor connections so that the motor may be reversed, a switch for connecting the motor directly to the alternating current source of supply, spring means for normally holding this switch in such position, a rectifier connected to the alternating current source and having direct current output terminals engageable by said latter mentioned switch to supply rectified current to the motor terminals when moved out of its normal position against said spring means, and electromagnetic operating means for the reversing switch functioning upon the application of direct current to the motor and of sufficient alternating current impedance to be ineffec-

tive when alternating current is impressed, the spring means acting to restore the switch to normal position to prevent overheating of the rectifier and electromagnetic means.

4. A toy locomotive having two contacts adapted to collect current from a track circuit, a propulsion motor with field and armature, a non-polarized locomotive carried electromagnetically operated reversing switch for changing the direction of rotation of the motor, the circuit for the solenoid coil of the switch operating means being in shunt with the motor and having sufficient alternating current impedance to be ineffective when alternating propulsion current is impressed, but being effective upon application of rectified current from the source of propulsion current irrespective of the polarity of the rectified current.

5. A toy locomotive having two contacts adapted to collect current from a track circuit, a propulsion motor with field and armature, a non-polarized locomotive carried electromagnetically operated reversing switch for changing the direction of rotation of the motor, the circuit for the solenoid coil of the switch operating means being in shunt with the motor and including a choke coil to provide sufficient alternating current impedance to render the switch operating means ineffective when alternating propulsion current is impressed, the direct current resistance of the solenoid coil and choke coil being low enough to allow operation of the switch operating means by rectified current from the source of propulsion current and irrespective of the polarity of the rectified current.

6. The method of reversing the direction of rotation of an alternating current motor having an electromagnetically operated reversing switch in the circuit thereof which consists in disconnecting the motor and coil of the electromagnetic switch operating means from the source of alternating current supply and connecting them to a rectifier connected to said source so that the rectified current may actuate the switch.

7. In a toy railroad, a track layout, a single phase alternating current source, a rectifier connected to one side of the source, a switch for connecting the source to two rails of the track layout or for connecting said rails to the rectifier and the other side of the rectifier to the other side of the source, whereby alternating or rectified current may be applied to the rails, a locomotive on the rails having reversible propulsion motor and connections to the rails, an electromagnetically operated reversing switch for the motor carried on the locomotive, and means to operate the reversing switch when the rectified current is applied to the tracks.

8. In a top railroad, a track layout, a single phase alternating current source, a

rectifier connected to one side of the source,  
a switch for connecting the source to two  
rails of the track layout or for connecting  
said rails to the rectifier and the other side  
5 of the rectifier to the other side of the  
source, whereby alternating or rectified cur-  
rent may be applied to the rails, means to  
bias the switch toward the first mentioned  
position, a locomotive on the rails having  
10 a reversible propulsion motor and connec-  
tions to the rails, an electromagnetically op-  
erated reversing switch for the motor car-  
ried on the locomotive, and means to op-  
erate the reversing switch when the rectified  
15 current is applied to the tracks.

Signed at New York in the county of  
New York and State of New York this 24  
day of August, 1931.

JOSEPH L. BONANNO.

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