Sept. 3, 1929. J. C. KOERBER 1,726,670

TOY ELECTRIC RAILWAY SYSTEM

Original Filed Feb. 7, 1928

Fig. 1.

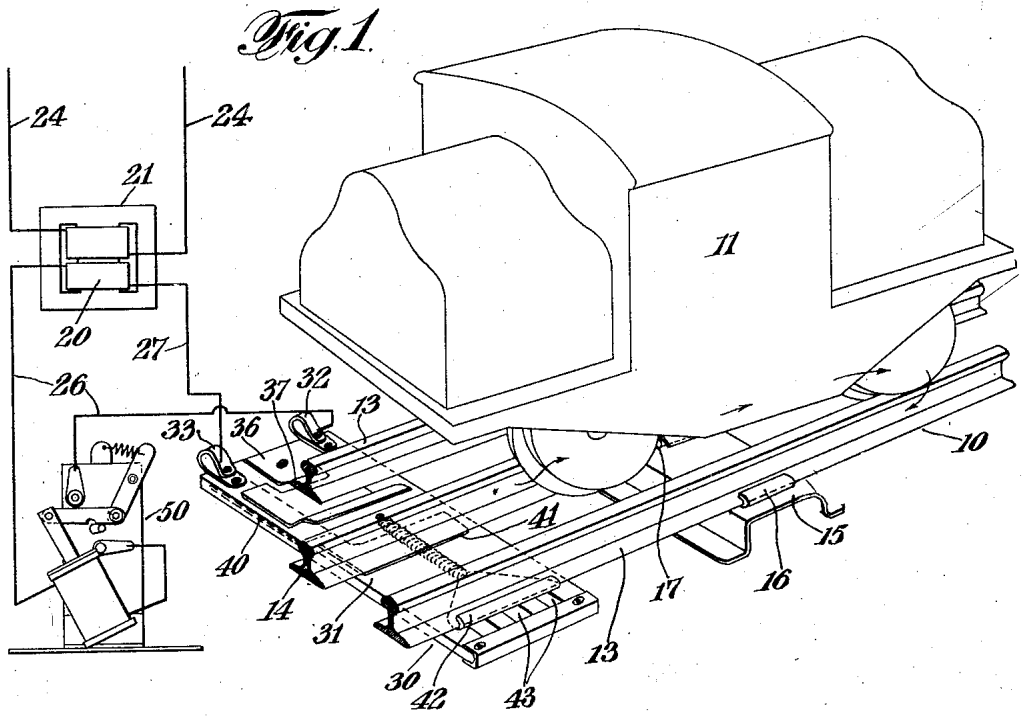


Fig. 2.

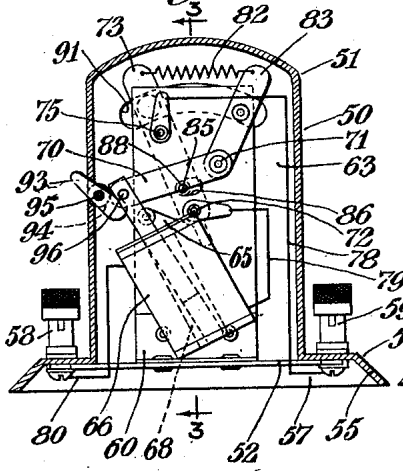


Fig. 3.

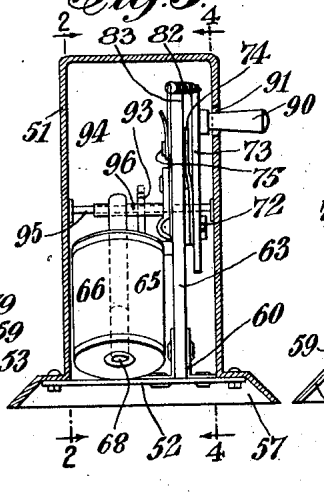
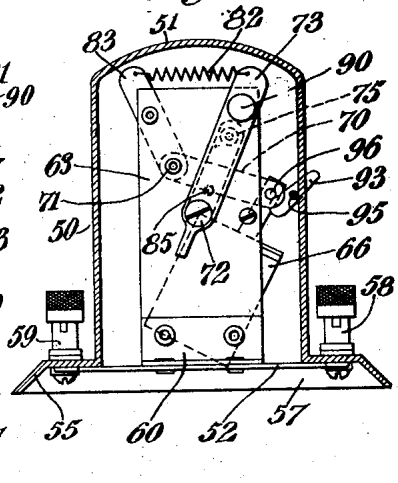


Fig. 4.



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UNITED STATES PATENT OFFICE.

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TOY ELECTRIC-RAILWAY SYSTEM.

Original application filed February 7, 1928, Serial No. 252,441. Divided and this application filed September 11, 1928. Serial No. 305,236.

This invention relates to toy electric railways and has for its principal object to provide a railway of this character with improved circuit controlling means. A further object of my invention is to provide an electric toy railway with an improved means for automatically and manually controlling the electric circuits used to supply current to the toy cars. A further object is to provide an electric toy railway with circuit controlling means which will insure safety and economy of operation.

Toy electric railways as usually constructed comprise a track having two wheel bearing rails and a third rail which is insulated and is generally located between the wheel bearing rails. Electric current is supplied to the train through the rails. The third rail serves as one terminal and is electrically connected to the motor or other electrical devices on the cars through a collector or shoe carried by the car and adapted to contact with the third rail. One or both of wheel bearing rails form the other terminal, these rails being part of the grounded return circuit and receiving current from the car body and car wheels.

It often happens in the operation of such toy railways that the train, from one cause or another, becomes derailed and a car wheel comes into contact with the third rail in such a way as to short circuit the source of current supply. When the car motor or other electrical device on the car is operated by alternating current from a transformer, the short circuit results in a heavy flow of current through both the primary and secondary windings of the transformer. If the short circuit is allowed to continue, the transformer as well as other parts of the circuit become overheated, due to the heavy current therethrough. Aside from the fact that this condition results in an unnecessary waste of electrical energy, the overheating of the various connections may constitute a fire hazard. Toy railway tracks and connections are often laid on floor carpets or close to other inflammable objects or material, and the heavy short circuit current flowing, for example, through a poor electrical contact located close to inflammable material may result in setting the material on fire. When the toy electric railway is supplied with direct current from a storage battery the fire hazard resulting from a short circuit occurring, as above described, is greater because a storage battery when short circuited gives a very heavy current.

In the toy electric system constructed in accordance with the present invention, I provide means which operate to open the supply circuit whenever a car becomes derailed and forms a short circuiting contact with the third rail, and in this manner I not only avoid the fire hazard, above referred to, but I also avoid the continued waste of energy which would otherwise result if the car were allowed to remain in its short circuiting derailed position. Furthermore in my improved system with the particular construction of track rails and their arrangement relative to one another, I find that whenever a car is derailed the car always forms, at least momentarily, a short circuiting contact with the third rail and thus serves to operate the circuit breaker and disconnect the rails from the source of supply. In this case, for example, with a number of trains operating on the same track or section, the derailment of one train will serve to cut off the power from the remaining trains thus causing them to stop.

In the particular embodiment of my invention herein described, the means for interrupting the circuit is a magnetic circuit breaker. The circuit breaker is preferably constructed so as to be operable at comparatively low voltage and may be connected in the supply circuit from the secondary winding of the usual stepdown transformer employed in supplying current to the railway from the usual house lighting mains. Also, in the preferred embodiment of my invention the circuit breaker is provided with means whereby it may be tripped and when tripped may be reset by hand, the circuit breaker thus forming a means for automatically controlling the supply circuit and also a means whereby the circuit may be manually controlled as desired. The device is preferably formed as a separate unitary structure which may be conveniently connected to the supply circuit at any point desired. The device forms an attractive addition to the toy railway; it serves to stimulate interest in the toy railway and also serves as a source of instruction for the young.

Other objects of my invention include economy and simplicity of construction, ease

of manipulation and strength, durability and efficiency in use.

Further objects and advantages of my invention will appear from the following description taken in connection with the accompanying drawing which shows one embodiment of my invention and wherein:

Figure 1 is a perspective view of a portion of a toy railway track and a derailed toy locomotive, together with a diagrammatic showing of the circuits for supplying current to the rails of the track.

Figure 2 shows one form of an improved circuit breaker adapted for use in the system shown in Figure 1, this figure being a sectional view taken on the line 2—2 of Figure 3.

Figure 3 is a sectional view taken on the line 3—3 of Figure 2, certain of the parts being shown in elevation.

Figure 4 is a sectional view taken on the line 4—4 of Figure 3.

Referring to Figure 1, 10 represents a portion of the track of a toy railway, and 11 a locomotive adapted to run on a track, but shown in a derailed position. Track 10 comprises two outside wheel bearing rails 13 and an inner third rail 14 insulated from the rails 13. The rails are supported on sheet metal ties 15 to which they are secured by ears 16 struck up from the ties. Between the metal ties and the third rail are strips of insulating material 17 which serve to insulate the third rail from the tie and thus from the outside rails 13. The locomotive 11 is provided with a suitable motor, not shown, which is geared to the locomotive wheels, and the current for operation of the motor passes from the outside circuit through the third rail to a current collector or shoe on the locomotive, not shown, thence through the motor to the body of the locomotive and thence through the locomotive wheels to the outside rails in the manner customary in the art.

One of the outside rails and the third rail are connected to opposite terminals of an alternating current supply circuit which comprises the secondary winding of a transformer 21. The transformer 21 is preferably of the step-down type and has a primary adapted to be supplied with relatively high voltage alternating current from the supply conductors 24 which may receive their energy from the usual house lighting system.

The secondary winding 20 of the transformer is connected to the track through conductors 26 and 27, and for the purpose of forming a connection between the track rails and the conductors 26 and 27 I provide a connector clip 30.

Clip 30 comprises an insulating base 31 upon which are mounted two terminal clips 32 and 33 which are insulated from one another and are shown in Figure 1 as connected with the supply conductors 26 and 27 respectively. Terminal 32 is electrically connected with a rail engaging member 36 which, as shown, comprises a portion 37 which extends over the bottom flange of an outside rail 13 and serves to form electrical connection with the rail. Terminal 33 is connected by means of conducting strip 40 secured to the underside of the base 31, with a contact 41 which is mounted on the insulating base 31 and is located beneath and in contact with the third rail 14. The base 31 which carries the terminals and contacts, above described, is held in position beneath the track by means of a member 42 which is slidably mounted in slots 43 formed in the insulating base 31 and is normally urged towards its innermost position by means of a spring 44 mounted on the underside of base 31. Member 42 engages over the flange of the outer rail 13 opposite to the rail engaged by the member 36. The clip 30 is thus held in position by the members 36 and 42 with the terminal 32 electrically connected to the rail 13 and the terminal 33 connected to the rail 14.

Interposed in the circuit from the secondary 20 of the transformer 21 is a circuit breaker 50 which, in case of excessive current flowing to the track, is adapted to break the circuit between the track and source of supply. Circuit breaker 50 comprises a casing 51 formed with an interior chamber open at the bottom. Closing this opening, is a base plate 52 which is removably secured to the underside of the casing 51 and is adapted to support the circuit breaker mechanism and contacts. The casing 51 is preferably formed with an enlarged base provided with downwardly inclined flanges 55 forming a bottom space 57 through which the circuit terminal connections from binding posts 58 and 59 extend. Suitably secured by means of L-shaped members 60 to the base plate 52 is a supporting member or plate 63 of insulating material, which forms, in effect, a switchboard for the circuit breaker. Secured to the insulating member 63 by means of a bracket 65 is a solenoid coil 66 in which is movably supported a solenoid core. Core 68 is connected at its upper end to a bar 70 pivotally secured at 71 to the supporting member 63.

Pivotally secured at 72 on the member 63 is a switch lever 73 which is adapted to make and break contact with the end of an eyelet or rivet 75 secured to the member or plate 63 near its upper end. Contact between lever 73 and rivet 75 is preferably through a leaf spring 74 which is secured to the body portion of the lever 73. The eyelet 75 is connected by means of a conductor 78 to the binding post 59. The switch lever 73 is connected through its pivotal support and

through conductor 79 to one terminal of the solenoid coil 66 and the other terminal of the solenoid coil is connected by means of a conductor 80 to the other binding post 58. The switch lever 73 is normally biased to a position to break contact with the eyelet 75, by means of a spring 82 which is secured at one end to the upper end of the switch lever 73 and at its other end to a strip 83 suitably secured by eyelets to the supporting member 63. The switch lever intermediate its ends carries a pin 85 which projects through an arcuate slot 86 in the member 63 and is adapted to be received in a notch or recess 88 in the lower edge of the pivotal bar 70 when the bar is in its lowermost position, thus holding the switch lever in a position in which the lever makes contact with the eyelet 75.

In operation when an excessive current passes through the solenoid coil, the core is raised, thereby rotating the arm 70 in a clockwise direction, as shown in Figure 2, raising the notch 88 from engagement with the pin 85 on the switch lever 73. Thereupon the switch lever 73, moving under the influence of the spring 82, rotates about its pivotal support in a clockwise direction, as viewed in Figure 2, and in so moving breaks contact with the eyelet 75, thus breaking the supply circuit. For the purpose of returning the switch lever to its circuit making position the switch lever is formed with a handle 90 which projects outwardly through an arcuate slot 91 in the casing 51 into position where it may easily be moved from outside the casing.

I also provide means for manually tripping the circuit breaker. This means consists of a short lever 93 pivoted to a rib or lug 94 secured to the inner wall of the casing 51. Lever 93 extends outwardly through a slot 95 to the outside of the casing where it can be easily operated by hand. The inner end of the lever 93 is adapted to engage the underside of a pin 96 which serves as the connecting link between the solenoid core and the bar 70. By pressing down on the outer end of the hand lever 93, the bar 70 is raised, thus releasing the pin 85 from the notch 88 and permitting the spring 82 to move the switch lever 73 in a circuit breaking position.

It will be noted that the circuit breaker mechanism and contacts can be removed from the metal casing 51 by removal of the supporting member of plate 52.

The circuit breaker constructed as above described forms a portable unitary self-contained device which can be readily connected in the circuit and conveniently located at the side of the tracks or other point desired. In certain cases, however, the circuit breaker may be built into the transformer 21 so as to form a unitary structure therewith.

This application is a division of my application, Serial Number 252,441, filed February 7, 1928.

I claim:

1. In a toy railway, a track comprising two wheel-bearing rails and a third rail located between said wheel bearing rails, a car adapted to run on said track, a source of current connected to said third rail and to at least one of said wheel bearing rails and an electromagnetic overload circuit breaker in circuit between said source and rails, the rails of said track being so constructed and arranged relative to one another that on derailment of a car, the source of supply will be short circuited through the rails and car and the circuit breaker will be opened.

2. In a toy railway, a track comprising two wheel bearing rails and a third rail located between the wheel bearing rails, a car adapted to run on said track, the rails of said track being so constructed and arranged that on derailment of said car, when running, a circuit will be closed from an outside rail through said car to said third rail, a source of current connected to said third rail and to a wheel bearing rail and an electric wayside device having an indicator operable upon the said closing of the circuit through the car to indicate said derailment.

3. In a toy railway, a track comprising two wheel bearing rails and a third rail located between the wheel bearing rails, a car adapted to run on said track, the rails of said track being so constructed and arranged that on derailment of said car, when running, a circuit will be closed from an outside rail through said car to said third rail, a source of current connected to said third rail and to a wheel bearing rail and an overload circuit breaker in circuit between said source and rails, said circuit breaker being adapted to be tripped upon the said closure of the circuit through said car.

4. In a toy railway, a track comprising two wheel bearing rails and a third rail located between the wheel bearing rails, a car adapted to run on said track, the rails of said track being so constructed and arranged that on derailment of said car, when running, a circuit will be closed from an outside rail through said car to said third rail; a source of current connected to said third rail and to a wheel bearing rail and a portable unitary encased electromagnetic overload circuit breaker in circuit between said source and rails and adapted to open the supply circuit on said closure of the circuit through said car, thereby de-energizing said rails.

5. In a toy railway, a track comprising two wheel bearing rails and a third rail located between the wheel bearing rails, a car adapted to run on said track, the rails of said track being so constructed and arranged

that on derailment of said car, when running, a circuit will be closed from an outside rail through said car to said third rail; a source of current connected to said third rail and to a wheel bearing rail and a portable unitary encased electromagnetic overload circuit breaker in circuit between said source and rails and adapted to open the supply circuit on said closure of the circuit through said car, thereby de-energizing said rails, said circuit breaker comprising a movable circuit breaking element and a handle for re-setting said element, said handle being located outside the casing of the circuit breaker and being movable with said element when the circuit breaker is operated.

6. In a toy electric railway, a track, cars adapted to run on said track, a source of current and connections between said source for supplying current to said cars for moving the same, an electric wayside device connected in circuit with said source, and having a visible means adapted to indicate the operating condition of said device; means whereby derailment of a car operates said device; and means whereby the operation of said device serves to disconnect the cars from the source of supply.

Signed at New York, in the county of New York, State of New York this 10th day of September 1928.

JOHN C. KOERBER.