The present invention relates to toy train controllers, and is more particularly directed toward controllers for use with toy railroad systems on which a single train is operated at one time, this train being of the type which is normally equipped with remote-controlled automatic reversing mechanism and also carries a remote control accessory, such as a whistle, to be operated at will irrespective of whether the train is running forward, backward, or is stopped.

In my prior Patents 2,155,343, of August 18, 1939, and 2,316,551, of April 13, 1943, I have shown and described toy train controllers for the same general purpose as the present controller, and the present invention is more particularly directed toward improvements relating to the structural inter-relations of the various parts entering the electric circuits of such controllers, whereby they may be economically manufactured, assembled, inspected, and tested.

The invention also contemplates structures in which the electrical parts for the aforesaid purposes are so assembled as to provide a rugged structure unlikely to be damaged or get out of order when in use.

A further object of the invention is to provide a structure for the above purposes having an ornamental, protective cover of shock resistant plastic which can be detached at will to permit inspection of the electrical parts.

Other and further objects will appear as the description proceeds.

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

In the drawings:

Fig. 1 is a perspective view of the toy train controller;

Fig. 2 is a top plan view of the toy train controller with the control handles removed and a portion broken away to show the interior construction;

Fig. 3 is a top plan view of the controller with the control handles and cover removed;

Fig. 4 is a longitudinal section on the broken line 4-4 of Figs. 2 and 3;

Fig. 5 is a transverse section on the line 5-5 of Figs. 3 and 4;

Fig. 6 is an inverted plan view of the contact bearing plate assembly;

Fig. 7 is a wiring diagram; and

Figs. 7a, 7b, 7c and 7d are fragmentary views illustrating different positions of the movable contactor.

In the drawings, the laminated field of the transformer is shown at 10. It is of the usual form and carries a primary winding 11 and a secondary winding in three parts numbered 12, 13 and 14 (see Fig. 7). The part 12 of the secondary winding is wound so as to be carried about a coil form 15, and has a bared, exposed upper face 16, one end of the coil being connected to a lead or tap 17, the other end to a terminal 12" carried by the form 15. The other coils 13 and 14 have taps or leads 13', 13'', and 14', 14'' respectively, as indicated in the wiring diagram (Fig. 7). The primary winding 11 is connected to soldering lugs 17, 17 carried by the form 15, and these lugs are connected to a two-conductor current supply cord as indicated at 18.

The coil core assembly 19 is secured by means of rivets 20 to a bottom plate 21 having a depressed central portion 22 (as shown in Fig. 5) to accommodate the coils, and to an upper top bracket or plate 23 having side members 24, 24 extending upwardly above the level of the exposed coil winding 16. The members 24, 24 are bent laterally as indicated at 25, 25, and downwardly as indicated at 26, 26, and are provided with openings 27, 27. The corners of the top bracket have threaded openings 28, and upwardly bent anchorage lugs 29. The bottom plate 21 is welded at 30 to a sub-base 31.

The coil core assembly with lead wires, upper bracket, lower plate, and sub-base form a pre-assembled unit.

The second pre-assembled unit employed in the complete toy train controller carries all the parts on a flat insulating plate 40. The right-hand side of the plate has an opening 41 and a concentric arc-shaped slot 42. A shaft 43, splined as indicated at 43', has a reduced portion 44 extending through the opening 41 and a stop lug 45 extending into the slot 42. The lower end of the shaft 43 passes through a conductor strip 46 and a spring contact arm 47. These parts are secured in place by a washer 48, the lower end of the shaft being upset as indicated at 49. The strip 46 extends to the right, as indicated at 50, to form a soldering lug, and its left end carries a contact 51 which extends up through a hole punched in the plate 40. The left end of the plate 40 is provided with an opening 52 and two arc-shaped slots 54, 55. The opening 52 receives a shaft 56 (splined as indicated at 56') having a flange 57 provided with two laterally extending arms 58, 59. The flange carries a yieldable multiple arm con-
3 tactor 60 having two outwardly extending contact arms 61 and 62. The lower end of the shaft 56 receives a spring 63 having upwardly bent ends 64, 65 which extend through the slots 54 and 55 and up past the sides of the arm 59. The lower end of the spring 63 bears on a contact strap 66, and is held in place on the shaft by a ring 67. The spring 63 urges the shaft downwardly to bring projections 57' against the top of the plate, and holds the contacts 61 and 62 against the upper face of the plate or against the contacts which protrude through the plate, and the leaders 64, 65 of the spring bias the shaft 56 to the orientation shown in Figs. 3, 4, 5, 6, 7. The slots 54 and 55 are the proper length to limit the swing or throw imparted to the shaft 56.

The insulating plate 40 carries a contact 68 connected to a soldering lug 69, the contact 68 being in the path of the right arm 61 of the contactor so as to be engaged by it after it moves away from the contact 51, as shown more clearly in Figs. 7c and 7d. The plate 40 also carries a contact 70 with a wide face. This contact is in position to be engaged by the left arm 62 of the contactor 50 before the right arm leaves the contact 51 as shown more clearly in Fig. 7b. The extreme left end of the plate 40 carries a downwardly extending rectifier bracket 71 held in place by a rivet 72 and a projection 73 entering a hole 74 in the insulating plate 40. The bracket 71 carries a pin 75 on which is mounted a spacer 76, a conducting strap 77, a washer 78, and a rectifier disc 79. The strap 77 is secured to contact 70. The lower end of the bracket 71 has a soldering lug 80, and a resistance wire 81 is soldered to this lug, wound about an asbestos insulator 82, and connected to a wire 83 which in turn is connected to the soldering lug 69.

The rear edge of the insulating plate 40 carries four binding posts which, read from left to right, are marked U, A, B, and C, respectively. The binding post U is directly connected with the strap 65; the binding post A carries a soldering lug 84; the binding post B carries a soldering lug 85; while the binding post C carries a soldering lug 86. Lug 85 also extends forwardly as indicated at 85', and supports a circuit breaker 87. This circuit breaker is of the bimetallic, thermally operated, overload type and has a soldering lug 87'.

The insulating plate 40 is provided with four holes 88 to receive the upwardly extending lugs 25 carried by the top bracket 23. These lugs may be twisted slightly, as indicated in Fig. 3, to lock the insulating plate in position.

The soldering lug 50 is connected to the lead 14' from the coil 14, the soldering lug 84 with the lead 13' from the coil 13, the lug 87 on the circuit breaker to the lead 12' from the coil 12, the lug 86 on post C to the terminal 12' of the coil 12 (by wire 85'), and the soldering lug 72 on the rectifier bracket with the lead 14' from the coil 14. These operations complete the assembly of the electrical parts of the transformer and controller.

An inverted cup-shaped molded plastic cover 90 is apertured as indicated at 91, 91 to pass down over the shafts 43 and 56. It also has holes 91' for the binding posts. This cover extends down past the coil core assembly and the bottom plate 21, so as to completely enclose all the electrical parts. The corner portions of the bottom plate 21 are cut away as indicated at 92 to accommodate the corner portions 93 of the cover, so that the cover and bottom plate fit closely and the bottom edges of the cover are held against lateral movement. The top of the cover is provided with four holes indicated at 93 for screws 94 which enter holes 28 to secure the cover in place. It is thus apparent that the entire assembly of the electrical parts and the testing of the same may be accomplished when the cover is off, and the cover may be readily taken off at any time when it is desired to inspect the interior.

The shafts 43 and 56 carry operating handles 95 and 96 fitting the splines on the shafts. The handle 96 has a projection 97 entering an arbor recess 98 in the cover, and the handle 95 has a similar projection (not shown) entering recess 99 in the cover. These insure the proper orientation of the handles.

The controller is adapted to be used with toy train equipment carrying cars and reversible locomotive with step-by-step reverse mechanism and whistle in the same manner as shown in my prior Patent 2,155,343. To the drawings, Fig. 7, the wheel bearing rails of such track are illustrated at 100, 100, and the power rail at 101. The binding post U of the controller is connected by a wire 102 with the wheel bearing rails, and the power rail is connected by a wire 103 with either the binding post B or the binding post A, the latter giving a higher output voltage than B. A truck on the locomotive is indicated at 104. The propulsion motor of the locomotive is indicated at 105. It has a field winding 106 permanently connected to the current collector bearing on the power rail, and an armature connected to the locomotive frame through a reversing switch 107. This reversing switch is operated by a ratchet and pawl 108 under the control of an indexing coil 109 adapted to step the reversing switch once for each impulse of current received, as to open the circuit, then reclose the circuit with reverse connections through the armature. A permanent lamp or other load in the locomotive or train is indicated at 110. The coil of a relay is indicated at 111 and its armature at 112, this relay being of the type discussed in my Patent 2,155,343. This relay is normally open even though propulsion current is carried by it. It is sensitive to an impulse of direct current. The relay 112 controls the circuit to the motor 113 for operating the blower of a whistle.

When the controller is connected to the source of power and to the track as indicated, train operation may be carried on by manipulating the handles 95 and 96. When the handle 95 is in the extreme counter-clockwise position, the contact arm 47 is off the exposed face of the coil and the circuit to the track is open. The locomotive is started and the speed controlled by the manipulation of handle 95. The path of the current may be traced from the contact arm 47, strap 45, contact 51, contact 50, strap 65, to binding post U, and from the power rail through wire 103, binding post B, strap 85, circuit breaker 87, wire 87' to the coil 12.

If the operator desires to stop the locomotive, the handle 96 can be shifted to move the contacts from the position shown in Fig. 7 to the position shown in Fig. 7a. This opens the circuit to the track, thus de-energizing the relay 108. Release of the handle 96 allows the contactor 95 to return to normal position, re-energizing the relay 108, and notching the indexing mechanism one step, which keeps the propul-
sion motor circuit open. Another similar manipulation of the handle 91 will operate the indexing mechanism again and start the locomotive in the other direction.

If, on the other hand, the operator desires to blow the whistle, the handle 96 is turned in a clockwise direction, shifting the parts in the position shown in Fig. 7 through the intermediate steps shown in Figs. 7b, 7c and 7d. This operation does not open the circuit to the track, but it introduces the rectifier into the circuit so as to supply a small component of direct current to the propulsion circuit. This small direct current component is effective to actuate the relay 112 and connect the motor 113 in the circuit so that the whistle blows as long as the handle 96 is in this position. Releasing the handle 96 permits the spring 63 to restore the parts to normal position. A fixed potential is available between the binding posts B and C for low voltage accessories, such as switches, lamps, etc.

Since it is obvious that the invention may be embodied in other forms and constructions within the scope of the claims, I wish to be understood that the particular form shown is but one of these forms, and various modifications and changes being possible, I do not otherwise limit myself in any way with respect thereto.

What is claimed is:

1. A sub-assembly for a toy railroad train controller, comprising an insulating plate, a shaft pivotedly secured thereto and carrying a swingable contact arm, a second shaft pivotedly secured to the plate, spring means biasing the second shaft to a mid position, contactors carried by the second shaft, electrically connected together, and movable over the surface of the plate, three plate carried contacts, a strap connected to the swingable contact and carrying a fixed contact engageable by a contactor when the second shaft is in mid position and disengageable therefrom when the second shaft is shifted in one direction, a plate carried binding post connected to the second shaft, a second fixed contact engageable by a contactor on movement of the second shaft in the other direction before the first fixed contact is disconnected from a contactor, and a third fixed contact engageable by a contactor after disengagement from the first fixed contact, a bracket carried by the insulating plate, a rectifier carried by the bracket and connected to the second fixed contact, a resistor carried by the bracket and connected to the third fixed contact and to the rectifier, whereby the circuit to the binding post may be interrupted by turning the second shaft in one direction to tension the spring means or may be changed by turning the shaft in the other direction to include the rectifier in series and then include the rectifier in shunt with the resistor, a step-down transformer unit comprising a coil-core assembly having a principal secondary winding, at least a part of which is exposed, and a supplemental secondary winding, secondary winding taps, a bottom plate, a top bracket, and means to secure the coil-core assembly, plate and bracket together, a connection from the rectifier and resistor to one of the supplementary secondary winding taps, a connection from the other supplementary secondary winding tap to the swingable contact, means to secure the first sub-assemble to the transformer unit with the swingable contact movable on the exposed winding, an inverted cup-shaped cover detachably secured to the top bracket and extending down past the first sub-assembly and the bottom plate, the cover being apertured for the shafts and binding posts, and shaft operating handles detachably carried by the shafts whereby the electrical connections may be completed, inspected and tested when the cover is off.

4. A transformer for toy electric railroads, comprising a preassembled coil-core assembly including a laminated field, a primary winding having a portion exposed, a principal secondary winding having a portion exposed, a supplemental secondary winding, and taps for said secondary windings, a bottom plate below the field, a top plate above the field, and means to secure the plates and field together with the secondary leads adjacent the bottom plate and the exposed portion at the top; a second preassembled unit comprising an insulating plate carrying a swingable arm cooperate with the exposed portion, a resistor, a rectifier, a change-over switch, contacts cooperate with the change-over switch and connected to the swingable arm, the rectifier and the resistor respectively, and output binding post one of which is connected to the change-over switch; tap connections to the secondary windings, to the resistor, to the rectifier, to the swingable arm, and to the other binding post; a cover secured to the top plate and extending downward past the bottom plate and about the coil-core assembly and the second preassembled unit, the swingable arm and change-over switch having actuating means extending upwardly through holes in the cover to be accessible.

5. A controller for an alternating current operated toy train having a locomotive motor reversible by step-by-step mechanism responsive to interruption of the propulsion current and a train carried accessory operable when direct current is superposed on the alternating current, and comprising a step-down transformer with coil-core assembly including a principal secondary winding of a voltage output to provide
propulsion current for train operation, part of which is exposed, and with a supplemental secondary winding, a rectifier and a resistor, each permanently connected with one side of the supplemental secondary winding, a bracket secured to the coil core assembly, an insulating plate carried by the bracket and spaced from the exposed face of the principal secondary winding, a swingable current collector carried by the plate and bearing on the exposed secondary to vary the propulsion current voltage, a plate carried conductor connected to said swingable current collector, to the other side of the supplemental secondary winding, and to a plate carried contact, a second plate carried contact connected to the rectifier, a third plate carried contact connected to the resistor, a plate carried switch biased to a mid position, train connectable output binding posts, one connected to the plate carried switch and the other to the principal secondary winding, the plate carried switch having a first contactor normally bearing on the first plate carried contact but movable therefrom when the contactor is shifted in one direction to effect momentary current interruption, and a second contactor normally free of any contacts but movable when the contactor is shifted to the other direction to contact the rectifier connected contact before the first contactor leaves the first fixed contact, the third or resistor connected contact being positioned in the path of a contactor to be engaged thereby after it is disengaged from the contactor and while it is on the second contact, whereby the supplemental winding may be connected in series with the resistor and principal secondary winding and to the rectifier to supply a direct current component.

6. A controller such as claimed in claim 5, having a plate supported overload circuit breaker permanently connected between one of the binding posts and the secondary coil.

7. A controller such as claimed in claim 5, wherein the contactors are in the form of a resilient spring extending in opposite directions from the second shaft axis, and the fixed contacts are disposed about said axis.

8. In a toy transformer for use with toy trains having step-by-step circuit control mechanism operable by interruption of current supply and other circuit control mechanism operable by superposed direct current, a coil-core assembly wherein the secondary coil has an upper exposed face, a bottom plate, a top bracket, means for securing the top bracket, the core and the bottom plate together, the top bracket having side portions extending upwardly above the level of the exposed coil face, an insulating plate bridging the said side portions and carrying a pair of output binding posts for supplying secondary current to the train, a wire connecting one of the binding posts to the end of the secondary coil remote from the exposed portion thereof, a shaft pivoted to the insulating plate and carrying a swingable contact bearing on the coil face whereby variable voltages may be received from the coil, a second shaft secured to the plate to oscillate between two extreme positions, connected to the other binding posts, and carrying swingable contactors, spring means acting on the second shaft to bias it and the contactors to a mid position, a plate-carried fixed contact connected to the swingable contact and in contact with one of the contactors on the second shaft only when the latter is in mid position, whereby the circuit between the binding posts may be momentarily opened by shifting the first contact in one direction and releasing it, a second fixed plate-carried contact in a position to be engaged by the contactor when in its other shifted position, a third fixed plate-carried contact engageable by the other contactor before the first contactor leaves the first fixed contact and while it is on the second fixed contact, a supplemental secondary winding having one end connected with the first fixed contact, a resistor connecting the second fixed contact with the other end of the supplemental winding, a rectifier connecting said third fixed contact with the said other end of the supplemental winding, and a plate-carried bracket supporting the rectifier and resistor.

9. A toy transformer such as claimed in claim 8, wherein the bracket for supporting the rectifier and resistor extends down alongside the core.

10. A toy transformer as claimed in claim 8, having an inverted box-shaped cover aperture for the shafts and binding posts, the bottom of the cover extending below the bottom plate and interengaging therewith to prevent clamping, screen for securing the cover against the top bracket, and shaft-operating handles detachably secured to the protruding ends of the shafts.

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No references cited.