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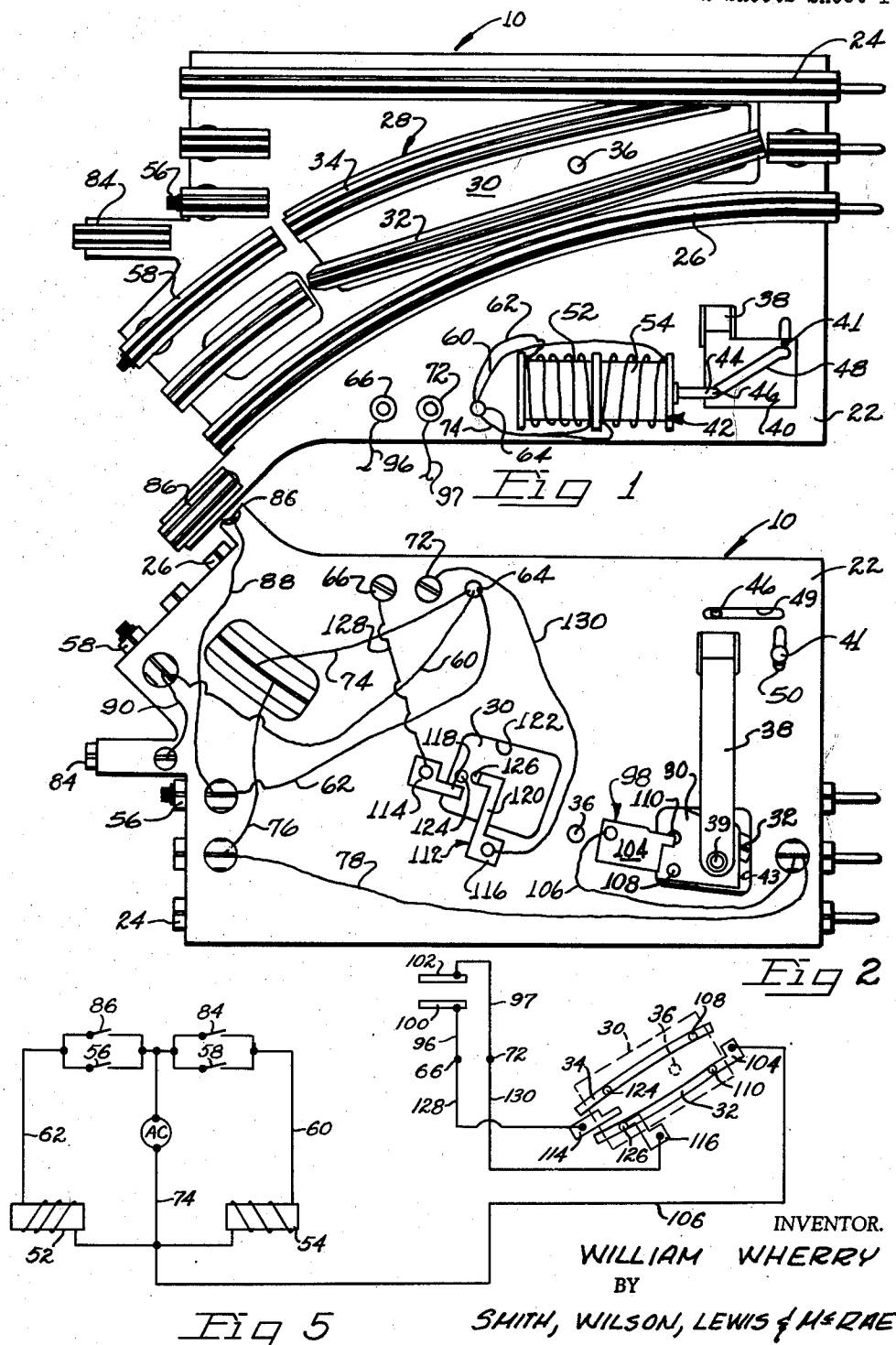
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MODEL TRAIN SWITCHING MECHANISM

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2 Sheets-Sheet 1



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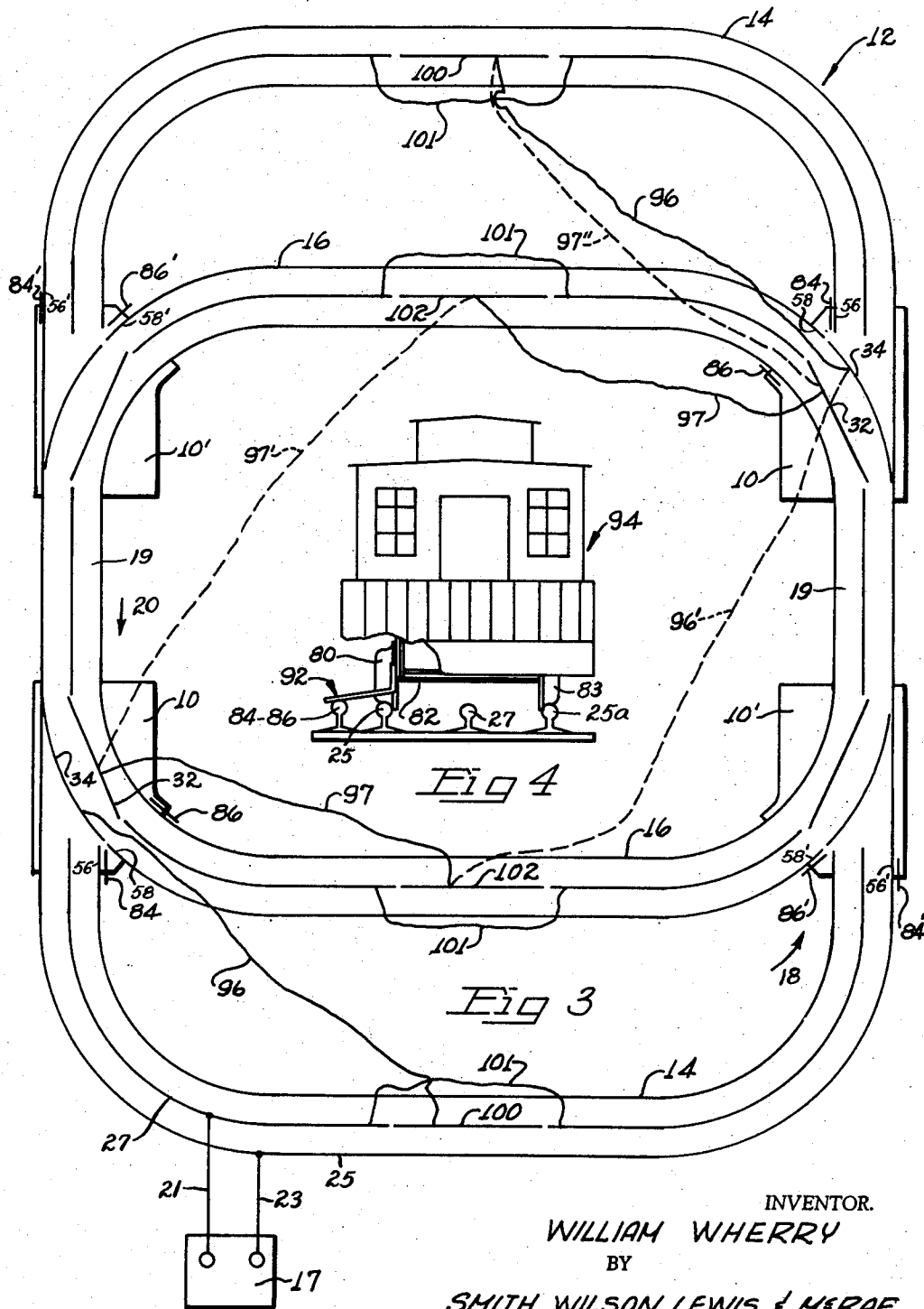
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MODEL TRAIN SWITCHING MECHANISM

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8 Claims. (Cl. 104-153)

The present invention relates to electrically operated model railroad train systems. More particularly, this invention relates to a model railroad system utilizing a novel switching arrangement whereby three or more trains may be run simultaneously on the same track system without danger of collision.

This is a continuation-in-part of application Serial No. 763,861, now abandoned.

It is an important object of this invention to provide a model train switch which may be used as either a leading switch or as a trailing switch.

Another object of this invention is to provide a Y-type switch which, when used as a trailing switch, will reverse the direction of the through segment of the track after a train has passed thereover.

Another object of this invention is to provide a switch which when used as a leading switch will operate to provide a through segment of track in accordance with the direction of an oncoming train.

A further object of this invention is to provide a model railroad track system having at least two loops and provided with trailing switches which will operate to alternately de-energize and energize segments of the track whereby trains running over the switch will be alternately stopped and started at predetermined locations ahead of the switch in order to avoid colliding with other trains running simultaneously on the railroad system.

It is another object of the invention to provide a railroad system whereby three or more trains may be run in the same direction simultaneously without colliding and without the necessity for manual control of the various switches.

A still further object of the invention is to provide a bridging mechanism secured to the caboose of a train which is adapted to actuate a trailing switch after the train has passed thereover.

Other objects of this invention will appear in the following description and appended claims, reference being had to the accompanying drawings forming a part of this specification wherein like reference characters designate corresponding parts in the several views.

In the drawings:

FIGURE 1 is a top plan view of one embodiment of a switch constructed according to the present invention.

FIGURE 2 is a bottom plan view of the switch of FIGURE 1 with the cover plate removed.

FIGURE 3 is a top plan diagrammatic view of a model train track system utilizing the switch of FIGURE 1.

FIGURE 4 is a rear elevational view of a model train caboose showing the bridging mechanism used to operate the switch of FIGURE 1.

FIGURE 5 is a schematic illustration showing the circuitry of the switch of FIGURE 1 and associated train track components.

Before explaining the present invention in detail, it is to be understood that the invention is not limited in its application to the details of construction and arrangement of parts illustrated in the accompanying drawings, since the invention is capable of other embodiments and of being practiced or carried out in various ways. Also, it is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation.

Briefly, the present invention comprises a switch 10, illustrated in FIGURES 1 and 2, which may be utilized

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to assemble a track system 12 such as is illustrated in FIGURE 3, upon which three or four model trains may be run simultaneously without the necessity for manual control. The track system 12 comprises an outer loop 14 and an inner loop 16, a loop being defined as a complete track circuit usually having the shape of an ellipse. Each loop is adapted to accommodate a pair of model trains. As will be more fully explained hereinafter, the track system 12 may be enlarged by the addition of more loops, the addition of each loop making possible the running of two more trains. A left-hand switch 10 is provided at two of the four points of intersection of the two loops 14, 16 and a right-hand switch 10' is provided at each of the two remaining points of intersection. In the arrangement shown in FIGURE 3, the switches 10' are used as leading switches for trains converging toward the main line 19 as indicated by the arrow 18 and are adapted to automatically switch oncoming trains onto the main line 19. The switches 10 are used as trailing switches for diverging trains leaving a main line 19 as indicated by the arrow 20 and are adapted to reverse the direction of the through segment after the train has passed over and thus switch the next succeeding train onto the alternate loop. Additionally, the trailing switches 10 are adapted to de-energize a section of track on the loop ahead of a train which passes thereover to thus stop that train and to energize a section of track on the other loop to start a train which may have been previously stalled thereon.

Switch 10' is the mirror image of switch 10 and therefore the following description of switch 10 is also applicable to switch 10', the numerals being the same with primes. Referring specifically to FIGURES 1 and 2, switch 10 is adapted for use in a three rail system in which the outer rails 25 and 25a (referred to in the art as "ground" rails) are electrically common to ground while the center rail 27 (referred to in the art as a "hot" rail) is electrically insulated therefrom and which receive power by means of leads 21, 23 connected to a transformer 17. The switch 10 is of conventional construction and comprises a base plate 22 on which is mounted a straight section of track 24 and a curved section 26 diverging therefrom to form a Y-type intersection. A train may be directed along the straight section 24 or onto the curved section 26 by means of a movable bridging track section 28, which may be termed a frog. The frog 28 comprises a plate 30 having a straight rail 32 and a curved rail 34. The rails 32, 34 are insulated from one another and from the remainder of the fixed rails. The rails 32, 34, and all other rails hereinafter termed "insulated" rails, may be insulated as desired according to conventional practice, for example by providing pads of insulating material thereunder or by fabricating the mounting plate 30 of an insulating material. The plate 30 is pivotable about the point 36 and is pivoted by means of a link 38 which is pivotally attached thereto at 39 through the opening 43 in the base plate 22. A double-acting solenoid 42 is mounted on the upper side of the plate 22 and is operatively connected to a plate 40, provided at one end of the link 38, by means of an operating rod 44 having a downturned portion 46 cammingly extending into a diagonal slot 48 formed in the plate 40 and thence through a guide slot 49 in the base 22. A guide 41 projects downwardly from the plate 40 into a slot 50 to direct the link 38 in directions transverse of the straight section of track 24. The double-acting solenoid 42 comprises a pair of oppositely wound coils 52, 54 which, upon energization, will move the solenoid core (not shown) to the left or to the right respectively.

As shown in FIGURE 1, the switch 10 is in a position to direct a train over the curved section 26. However, energization of the coil 54 would serve to pivot the frog

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28 to a position where the straight through section 24 would be complete.

Operation of the switch 10 may be readily understood by reference to FIGURE 1. As will be appreciated, the purpose of switch 10 is to direct a train either along the straight through path of rail 24 or to turn the train along the curved path of rail 26. When the curved path is to be used, the frog 28 is positioned as shown in FIGURE 1. In this position, the curved rail 34 is used as an outer wheel rail interconnecting rail 24 with rail 58, and the straight rail 32 is used as a center hot rail. The curvature of rail 34 must, of course, match the curvature of rail 26 to prevent derailment of the train. When the straight through path of switch 10 is to be used, the coil 52 is energized to pivot frog 28 to a position where the rail section 24 will be complete. In this position, the straight rail 32 is used as an outer wheel rail interconnecting rail 26 with rail 56, and the curved rail 34 is used as a center hot rail. Again, the rail 32 is parallel with the outer rail 24 to prevent derailment of the train.

The switch 10 may be operated by an oncoming train when it is used as a leading switch or by an outgoing train when it is used as a trailing switch. For operation by an oncoming train, the switch 10 is provided with an insulated dead rail section 56 on the straight section 24 and a corresponding dead rail section 58 on the curved section 26. As may be seen in FIGURES 1 and 2, leads 60, 62 extend from the dead rails 56, 58 through an opening 64 in the base plate 22 and thence to one end of one of the coils 52, 54. The other end of each of the coils 52, 54 is always connected to a hot center rail by means of a lead 74 which extends through the opening 64 and into connection with a center rail. The various center rails of the switch 10 are maintained at the same potential by means of jumper leads 76, 78 in order that they may always provide power to trains passing thereover.

When a train, such as the train car 94 shown in FIGURE 4, crosses over a dead rail section 56, 58 the wheel 83 will complete a circuit through the axle 82 to the wheel 80 which is in electrical contact with the ground rail. This will complete a circuit through one of the coils 52, 54, thus actuating switch 10 to pivot the frog 28 to either the straight through or curved position as the case may be.

For example, assume a train is approaching the switch so as to travel over section 56. When the front wheels of the train are directly over section 56, a circuit is completed by the axle 82 from section 56 to rail 24 (which is a continuation of ground rail 25). Section 56, being connected to one side of coil 52 by lead 62, will connect this side of coil 52 to ground. The other side of coil 52 is always connected to the hot center rail by lead 74. Consequently, power from transformer 17 will be applied to coil 52, actuating this coil to push member 44 outwardly and move frog 28 to the straight through position.

Additional insulated segments of track 84, 86, which may be termed fourth rails, are provided on the base plate 22 adjacent the trailing end of the straight and curved rail sections 24, 26. The fourth rails 84, 86 operate in cooperation with the bridging mechanism 92 provided on the caboose of each train as may be seen in FIGURE 4. The fourth rails 84, 86 must, of course, be positioned on the same side of the track as the bridging mechanism 92. Therefore, as may be noted in FIGURE 3, the location of the fourth rails is reversed to the other side of the track on the right-hand switches 10'. The right-hand switches 10' may consequently be used as trailing switches when it is desired to run trains in a clockwise direction.

Referring to FIGURES 2 and 5, it may be seen that each fourth rail is connected to the ground end of one of the coils 52, 54. This connection is conveniently effected by jumper leads 88, 90. Jumper lead 88 ex-

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tends from rail 86 to section 56 and lead 90 extends from rail 84 to section 58. As previously described, section 56 is connected to the ground side of coil 52 by lead 62 and section 58 is connected to the ground side of coil 54 by lead 60.

When the caboose of a train passes over a fourth rail, the bridging mechanism 92, which is a strip of metal secured to the body of the caboose 94 and electrically connected to axle 82, slides over the rail 84, 86 to make electrical contact therewith and cause the circuit to be completed through the axle 82 to the ground rail 25. Completion of the circuit will energize one of the coils 52, 54 in a manner similar to energization of the coils by an oncoming train as previously explained. In this connection, it is to be noted that the fourth rails 84, 86 are offset to be in front of the insulated rails 56, 58 so that the coils 52, 54 will not be energized simultaneously. This would occur if the wheels of the caboose contacted the rails 56, 58 while the bridge 92 contacted the fourth rails 84, 86. If this were to happen, the frog 28 would not be pivoted.

Pivoting of the frog 28 by means of the fourth rail is not adapted to complete the rail in the direction of travel of the train which actuates the solenoid but is adapted to reverse the switch to accommodate the next succeeding train. In this manner, the next train will not follow in the same direction and ram the train ahead but will diverge onto a different loop.

For example, assume a train is leaving the switch so as to travel over fourth rail 84. When the rear wheels of the train are directly in line with rail 84, bridging mechanism 92 will contact rail 84 and complete a circuit through axle 82 to ground rail 25. A circuit will thus be completed to the ground side of coil 54 which may be traced from lead 60 to section 58, from section 58 to rail 84 via lead 90 and from rail 84 to bridge 92, thence through axle 82 to ground rail 25. The other side of coil 54 is always connected to the hot center rail by lead 74. Consequently, power from transformer 17 will be applied to coil 54, actuating this coil to pull member 44 inwardly and move frog 28 to the curved through position.

The track system 12, illustrated in FIGURE 3, as previously mentioned carries either three or four trains simultaneously. This is accomplished by alternately starting and stopping the trains. For this purpose, track sections 100, 102, having insulated center rail portions, are provided at approximately the center of the loops 14, 16. Jumper leads 101 are provided to bypass the sections 100, 102 and keep the rest of the track energized. As each train leaves a trailing switch 10, the switch 10 acts to de-energize a section of track, for example the section 100 ahead of the train and to energize a section of track 102 on the other loop section.

The alternate energization and de-energization of the track sections 100, 102 is accomplished by a pair of switching mechanisms provided on the underside of the base plate 22 of the switch 10. One switching mechanism 98 is provided to alternately energize the rail sections 32, 34 of the frog 28. The other switching mechanism 112 is provided to make an electrical connection between the energized rail section 32, 34 and one of the track sections 100, 102.

The switching mechanism 98 comprises a spring blade 104 mounted on the base 22. The blade 104 is always maintained at the hot rail potential by means of a lead 106 which extends from the blade 104 to a hot rail. The blade 104 is shaped to alternately contact one of a pair of staggered contact points 108, 110, each of which is secured to a rail 32, 34 of the frog 28, i.e. contact point 108 is connected to rail 34 and contact point 110 is connected to rail 32. Consequently, either the curved rail 34 or the straight rail 32 will be energized, depending upon the position of the frog 28.

The switching mechanism 112 comprises a pair of

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spring blades 114, 116 mounted on the base 22 and having finger elements 118, 120 extending over an opening 122 provided in the base 22. A pair of staggered contact points 124, 126 are provided extending through the opening 122, each of which is secured to a rail 32, 34, i.e. contact point 124 is connected to rail 34 and contact point 126 is connected to rail 32. Each contact point 124, 126 is located to make electrical contact with one of the fingers 118, 120 at such time as the rail 32, 34 to which it is secured is energized. Consequently, the blades 114, 116 will be alternately energized in accordance with the position of the frog 28. A lead 128, 130 extends from each blade 114, 116 to a terminal post 66, 72 and a lead 96, 97 extends from each terminal post 66, 72 to a track section 100, 102 to provide the desired energization and de-energization. The energization and de-energization of the track sections 100, 102 is correlated with train traffic to the end that when a train passes over the switch 10 it will de-energize the track section 100 or 102 which is in its path and energize the track section on the alternate loop. The rail 32, being connected to section 102 via lead 97, will cause energization of section 102 when it is energized and the rail 34, being connected to section 100 via lead 96, will cause energization of section 100 when it is energized. When the train engine reaches the de-energized section of track it will stop. It will not proceed until the track is again energized which will occur only when another train has passed over the switch 10 and reversed the direction of the frog 28. It may readily be seen that the trains running on the track system 12 cannot collide since they cannot travel on the same loop section at the same time. It is however, necessary to properly space the trains and set the switches 10, 10' when first starting them running.

When it is desired to run only three trains, the track system 12 shown in FIGURE 3 may be modified to keep the trains in simultaneous motion for longer periods. The modification comprises running one lead 97 to the insulated track section 102 behind one trailing switch 10, as shown by the dotted line 97', rather than to the track section 102 ahead of the switch 10, as indicated in the solid line. The other lead 97 is run to the insulated track section 100 ahead of its trailing switch 10, as shown by the dotted line 97'', and replaces the lead 96 which was previously connected thereto. The disconnected lead 96 is then run to the insulated track section 102 behind its trailing switch 10, as shown by the dotted line 96', to replace the lead 97 which previously was connected thereto. This arrangement, unlike the unmodified arrangement, does not require that two trains be stalled at all times. As a result, two trains will be running at all times, and usually, three trains will be running simultaneously. It is preferred to start the three train hook-up with two trains positioned on the outer loop sections to receive power from the insulated sections 100. The sections 100 may be made hot by arranging one of the trailing switches 10 in the straight through position and the other switch in the curved position. The third train is positioned on a center loop section and is stalled.

The track system 12 may be enlarged to any desired size by adding more loops. When more loops are added it is necessary, however, to alter the wiring from the trailing switches 10 to the insulated rail sections 100, 102. The guiding principle is that a switch 10 should not control the movement of a train on a loop section unless it is the immediate switch that directs traffic onto the loop. Thus, if a loop were added to the track system 12 of FIGURE 3, the lead 97 running from the straight rail 32 to the insulated rail 102 should be disconnected and a lead running from the curved rail 34 of the new switch 10 should be connected thereto. In this way there is no danger of starting a train when it should be stopped. The addition of each new loop permits two more trains to be run on the system, the number of possible trains being directly related to the number of half loops.

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As may be seen, the present invention provides a model train switch and track system which is simple in construction and permits the easy assembly of a complicated train system. The provision of automatic controls allows a large number of trains to be run simultaneously which will add greatly to the enjoyment of model train enthusiasts, particularly the very young who are unable to control train systems which require the manipulation of a complicated series of manual controls.

Having thus described my invention, I claim:

1. In an electrically operated model railroad system on which three or more trains may be run simultaneously in the same direction, the combination comprising at least two loops of model railroad track; leading and trailing switches interconnecting the loops to form main line track sections each common to a pair of loops; said leading switches having means operable by oncoming trains to direct oncoming trains onto the main line track sections; said trailing switches having means operable by a departing train to direct the next succeeding departing train from a main line track section to an alternate loop section; an insulated power rail section in each loop section intermediate a leading and trailing switch; power lines leading from said trailing switches to said insulated rail sections; switching means in said trailing switches adapted to de-energize the insulated power rail section in the loop section ahead of a train which passes over the switch and to energize an insulated power rail section in the alternate loop section.

2. In an electrically operated model railroad system on which three or more trains may be run simultaneously in the same direction, the combination comprising at least two loops of model railroad track; leading and trailing switches interconnecting the loops to form main line track sections each common to a pair of loops; said leading switches having electrical means operable by the engines of oncoming trains to direct oncoming trains onto the main line track sections; said trailing switches having means operable by the cabooses of departing trains to direct succeeding departing trains from main line track sections to alternate loop sections; an insulated power rail section in each loop section intermediate a leading and trailing switch; power lines leading from said trailing switches to said insulated rail sections; switching means in said trailing switches adapted to de-energize the insulated power rail section in the loop section ahead of a train which passes over the switch and to energize an insulated power rail section in the alternate loop section.

3. An electrically operated model railroad system on which three or four trains may be run simultaneously in the same direction comprising two loops of track intersecting at four points to form a pair of main line track sections common to the loops; a leading switch at one end of each main line track section to direct train traffic onto the main line; a trailing switch at the opposite end of each main line to alternately direct train traffic onto different loops; an insulated power rail section in each half loop section intermediate a leading and trailing switch; a power line leading from each trailing switch to each insulated rail section of the next adjacent loop section; means associated with said trailing switches to de-energize the insulated power rail section in the loop section ahead of a train which passes over the switch and to energize the insulated power rail section in the alternate loop section.

4. An electrically operated model railroad system on which three or four trains may be run simultaneously in the same direction comprising two loops of track intersecting at four points to form a pair of main line track sections common to the loops; a leading switch at one end of each main line track section to direct train traffic onto the main line; a trailing switch at the opposite end of each main line to alternately direct train traffic onto different loops; said leading switches having electrical means operable by the engines of oncoming trains to

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direct oncoming trains onto the main line track sections; said trailing switches having means operable by the cabooses of departing trains to direct departing trains from main line track sections to alternate loop sections; a power line leading from each trailing switch to each insulated rail section of the next adjacent loop section; means associated with said trailing switches to de-energize the insulated power rail section in the loop section ahead of a train which passes over the switch and to energize the insulated power rail section in the alternate loop section.

5. A model railroad system as claimed in claim 4 and further characterized in that each trailing switch comprises a base; a straight section of track and a curved section of track mounted on the base; a frog mounted on the base having a straight rail section and a curved rail section; said frog being pivotable to complete the straight track section and the curved track section; double-acting solenoid means mounted on the base; connector means between the frog and solenoid means; an elongated metal contact rail adjacent each of the trailing ends of the straight and curved track sections; a normally open electrical circuit between each of said contact rails, a coil of said double-acting solenoid and a power rail; said circuit adapted to be closed by bridging said contact rail to a power rail after a train has passed over the switch whereby said solenoid will be actuated to reverse the direction of the through section of track on the switch.

6. In combination, a switch for a model railroad system and a model train caboose having a bridging mechanism; said switch comprising a base; a straight section of track and a curved section of track mounted on the base; a frog mounted on the base having a straight rail section and a curved rail section; said frog being pivotable to complete the straight track section and the curved track section; double-acting solenoid means mounted on the base to pivot the frog; an elongated metal contact rail adjacent each of the trailing ends of the straight and curved track sections; and a normally open electrical circuit between each of said contact rails, a coil of said double-acting solenoid and a power rail; said circuit

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adapted to be closed by the bridging mechanism of the caboose as it passes thereover, thereby actuating said solenoid to reverse the direction of the through section of track on the switch.

7. A switch as described in claim 6 and further characterized in that a switching mechanism is provided on the base to alternately energize one of the straight rail and curved rail sections of the frog; and a lead extending from each of said rail sections adapted to be connected to an insulated power rail segment in a track system whereby to control the movement of trains after they have passed over the switch.

8. A switch as described in claim 6 and further characterized in the provision of a first switching mechanism to alternately energize one of the straight rail and curved rail sections of the frog; a second switching mechanism having a pair of elements each adapted to make electrical contact with one of the straight rail and curved rail sections when said rail sections are energized; and a lead extending from each of said elements of the second switching mechanism; said leads adapted to be connected to an insulated power rail segment in a track system whereby to control the movement of trains after they have passed over the switch.

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