Jan. 30, 1940. E. E. McKEIGE ET AL 2,188,756

BLOCK SIGNAL AND TRAIN CONTROL SYSTEM FOR TOY RAILROADS

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FIG. 1.

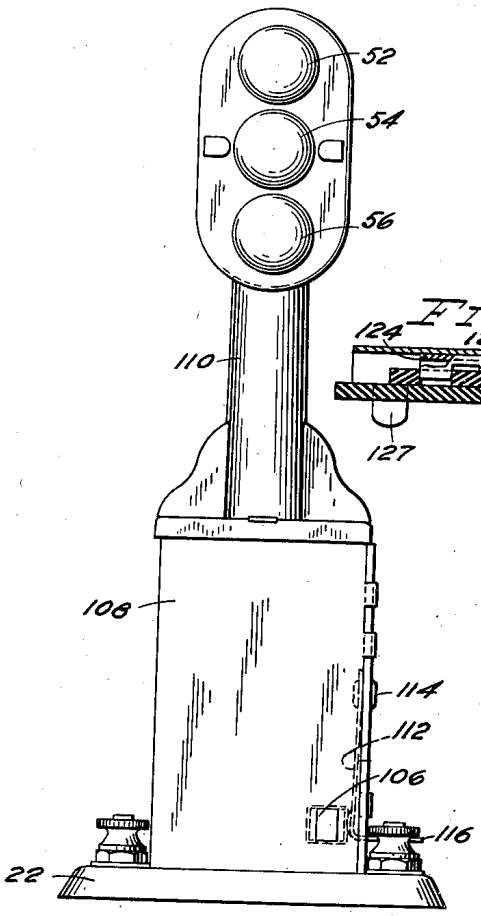


FIG. 2.

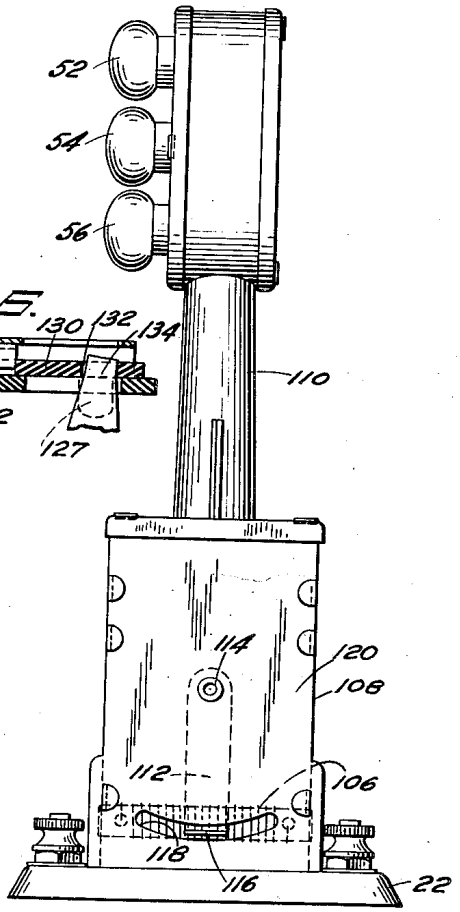


FIG. 6.

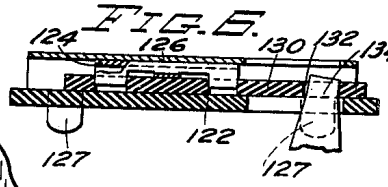


FIG. 3.

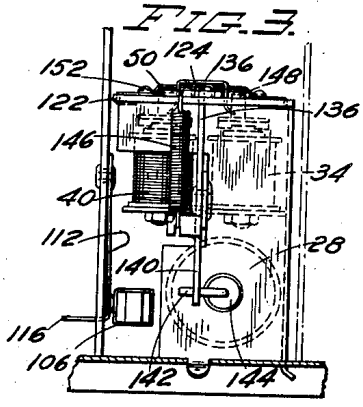


FIG. 4.

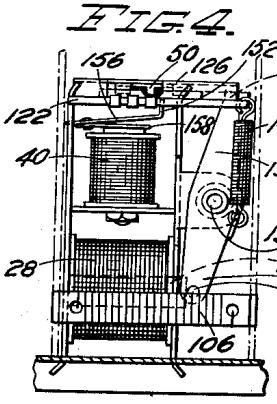


FIG. 5.

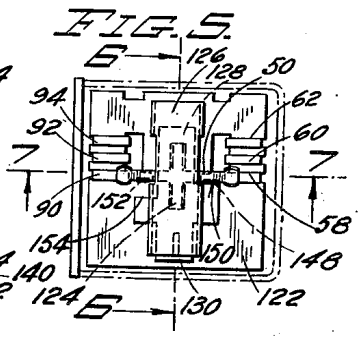


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FIG. 13.

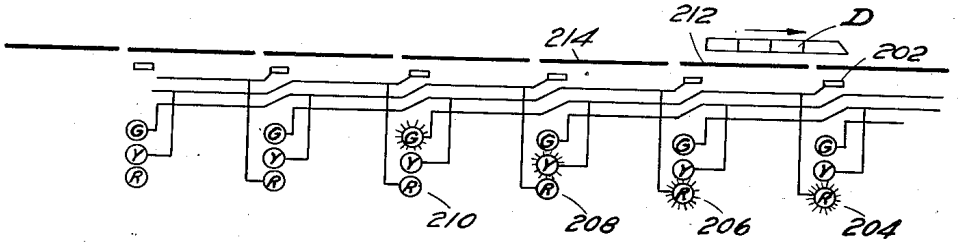


FIG. 7.

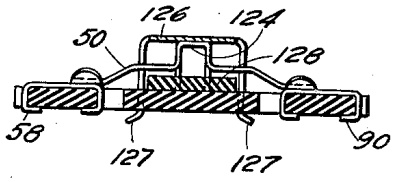


FIG. 8.

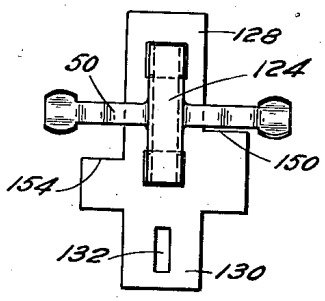


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FIG. 12.

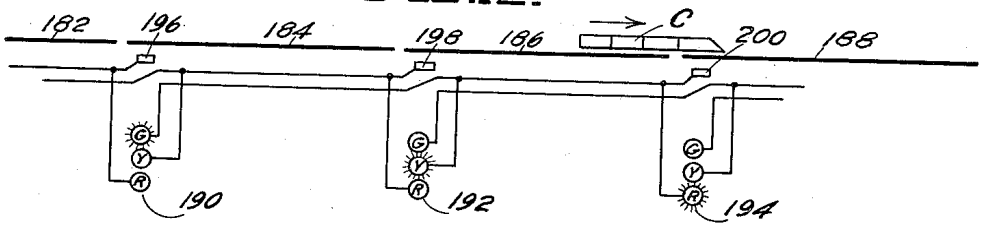


FIG. 9.

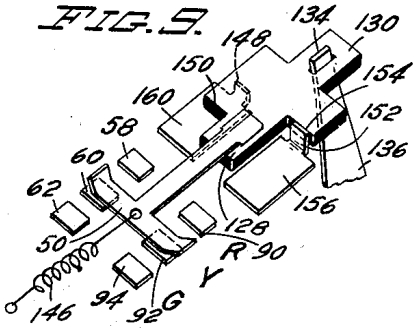


FIG. 10.




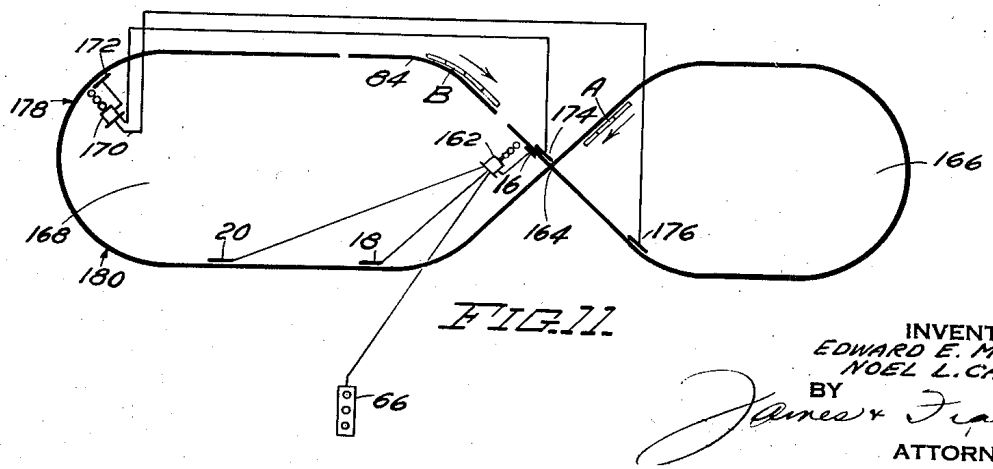


FIG. 11.




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Patented Jan. 30, 1940 2,188,756

# UNITED STATES PATENT OFFICE

2,188,756

## BLOCK SIGNAL AND TRAIN CONTROL SYSTEM FOR TOY RAILROADS

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Application July 6, 1938, Serial No. 217,694

23 Claims. (Cl. 246—85)

This invention relates to toy railroads, and more particularly to an automatic block signal and train control therefor.

The primary object of the invention is to generally improve block signal systems for toy railroads, and also safety train control systems for toy railroads. These systems may be advantageously combined in order to both signal and control the toy trains.

Such systems are well known in connection with real railroads the track of which is ordinarily divided into a series of successive blocks having signals associated therewith. In a real railroad the service rails are mounted on wooden ties or sleepers and are therefore insulated from one another and are available to signal the presence of a train in the block, said train closing a signal circuit between the two service rails. Similar systems have been proposed for toy railroads, but are inconvenient and expensive and are therefore not commonly used in connection with ordinary toy train sets sold under commercial production and volume sale conditions. Conventional toy tracks have the rails mounted on metallic ties, and the service rails are both grounded. It would be inconvenient and expensive to insulate the service rails from one another throughout the track system, and any signal system based on the use of such tracks would be inapplicable to existing toy train sets already in use.

One important object of the present invention resides in the provision of a signal system which will be applicable to conventional toy tracks having grounded service rails. In accordance with the present system, short contact strips are used to mark the passage of a train out of a block, and these strips may be placed at any desired points along the track. The system is therefore applicable to existing train sets and is very flexible in meeting varied track layout conditions. However, the contact strips provide only a momentary signalling current, whereas the signal condition and train control condition should be maintained until another block is reached, and it is a further object of the present invention to overcome this difficulty.

Other objects of the present invention center about the train control system, and are to provide a slow speed or "caution" condition, as well as the "stop" and full speed conditions; to provide a small holding potential instead of complete deenergization or open-circuiting of the control section for the "stop" condition in order to prevent undesired operation of the remote control reversing mechanism of trains having such mechanism; to utilize a single resistor to provide both the holding potential and the slow speed potential, depending on the condition of the signal; and finally, to make the slow speed potential a readily adjustable or variable potential so that it may be set to accommodate varied conditions such as the use of a long or heavily loaded train in contradistinction to a short or lightly loaded train.

Still another object is to arrange the system for manual control at a remote point. Because of the use of several trains on the track system with variable speeds relative to one another, and because of the possible and preferable use of a number of signals on the track system, and finally because of the manual push button control which may be used to interfere with the normal functioning of the system, situations may arise in which the signal control impulses conflict, and an improper or unsafe signal may result with consequent collision between trains. This danger is aggravated when using short contact strips to mark the termination of the blocks, for a wrong signal may be displayed while a train is in a block and will not be corrected until the train leaves that block. Accordingly, it is a further object of the present invention to overcome the foregoing difficulty and to so arrange the selector mechanism of the signal system that one signal, preferably a red or danger signal, will be dominant in the event of conflict in signals. Furthermore, the selector system is so arranged that yellow or "caution" is always indicated after red or "danger", and before reaching green or "clear". It is found that almost all difficulty is overcome by this arrangement, for ordinarily the conflict in signals, if it arises at all, consists in a premature green signal impulse, and in the present system this is ignored until the leading train has safely passed out of the red and yellow blocks.

The signal system is applicable to any track layout. However, one track layout is particularly noteworthy and affords great entertainment while using a simple system having only a single signal. In accordance with a feature and object of the present invention, a single signal may be applied to a track layout in the form of a "figure 8". The signal is mounted ahead of the cross-over, and the track contact strips are so placed as to prevent collision between trains at the cross-over, the second train being stopped and held at the cross-over until the first train completes one loop of track, and safely passes

the other branch of the cross-over. This train is in turn held at the cross-over while the previously stopped train completes its circuit about the loop. The trains are thus put through the different signal and control conditions in a highly realistic and entertaining manner.

Further objects of the invention center about the structure of the signal, and are to provide signal and control mechanism which is compact, simple, rugged, inexpensive to manufacture, and dependable in operation.

To the accomplishment of the foregoing and other objects which will hereinafter appear, our invention consists in the block signal and train control elements and their relation one to the other as hereinafter are more particularly described in the specification and sought to be defined in the claims. The specification is accompanied by drawings in which:

Fig. 1 is a front elevation of a signal embodying features of the present invention;

Fig. 2 is a side elevation of the same;

Fig. 3 is a front elevation of the selector mechanism mounted within the base of the signal;

Fig. 4 is a side elevation of the same;

Fig. 5 is a plan view of the same;

Fig. 6 is an enlarged section taken in the plane of the line 6—6 of Fig. 5;

Fig. 7 is an enlarged section taken in the plane of the line 7—7 of Fig. 5;

Fig. 8 shows the slider of the selector switch;

Fig. 9 is a schematic view explanatory of the operation of the slider;

Fig. 10 is a wiring diagram for the complete signal and train control system when using a single signal;

Fig. 11 illustrates the application of the system to the cross-over of a "figure 8" track;

Fig. 12 is explanatory of the application of the system to a track divided into continuous blocks each associated with a signal; and

Fig. 13 is a modification of such a system.

Referring to the drawings, and more particularly to Fig. 10, the track comprises grounded service rails 12 and an insulated third rail 14. Track contact strips 16, 18 and 20 are disposed at spaced intervals which in practice are, of course, much greater than as shown in Fig. 10. The strips mark the passage of a train and close suitable control circuits. Strips of this character are known, and in some arrangements are applied close to the third rail to feed energy to a circuit the other side of which is grounded, and in other cases are applied close to the service rails to ground a circuit the other side of which is connected to the third rail or transformer. The present arrangement is of the latter type, that is, the strips are applied adjacent the service rails. They may be in the form of clips slipped over the service rail with insulation therebetween, or in the form of strips so close to the service rail as to be touched by the flange of a passing car wheel, thereby grounding and completing an otherwise open circuit. The present system is preferably of the three-position type, although its features may be applied to a somewhat simplified system of the two-position type, and it will be noted that the three contact strips are marked "R", "Y" and "G", and may, for convenience, be referred to as "red", "yellow" or "green" contact strips, thus denoting the signal position which is controlled by the respective strips.

The base of the signal is indicated at 22, and is provided with suitable binding posts. Strip 16 is connected by conductor 24 to a binding post marked "R", and this in turn is connected by means of a conductor 26 to an operating magnet or solenoid 28 which, when energized, produces a red signal and may therefore be referred to as a "red" magnet. Strip 18 is connected by conductor 30 to a binding post marked "Y", and this is connected through a conductor 32 to a magnet 34 which, when energized, produces a yellow signal, and is therefore marked "Y" and may be referred to as a "yellow" magnet. Strip 20 is connected through conductor 36 to a binding post marked "G", and this is connected by conductor 38 to a magnet 40 which, when energized, produces a green signal and is therefore marked "G" and may be referred to as a "green" magnet. The opposite terminals of the selector magnets 28, 34 and 40 are all connected in common to a conductor 42 which leads to a binding post 44 which is connected by a conductor 46 to the third rail 14. It will be evident that the passage of a train over any one of the contact strips completes a circuit through the corresponding selector magnet.

The selector magnets move a slider 50 to any one of three positions, and specific mechanism for this purpose is described later. The movement of slider 50 may be applied to any type of signal. It may, for example, be applied to a semaphore arm in order to move the same to horizontal, diagonal or vertical positions. With such an arrangement a single lamp may be used to produce red, yellow or green signals by mounting appropriate lenses on the semaphore arm. In the present case, three separate lamps are used, these being the red, yellow and green lamps 52, 54 and 56. As is usual with toys, the lamps are received in grounded sockets, the system being a single wire system. The center or insulated terminals of the sockets are connected to stationary contacts 58, 60 and 62, one or another of which is engaged by a sliding contact or the slider 50. This in turn is connected by a lead 64 to the conductor 42 and terminal 44 heretofore referred to. It will be evident that either the red, yellow or green lamp will be energized in response to passage of a train over the contact strips 16, 18 or 20, respectively.

The arrangement as so far described is obviously well adapted for remote manual control. It is merely necessary to ground a desired one of the three selector magnet circuits. A suitable panel 66 is provided, this carrying three switches which may conveniently be in the form of push buttons 68, 70 and 72. The "red", "yellow" and "green" terminals of the base of the signal are respectively connected to the "red", "yellow" and "green" push buttons by means of conductors 74, 76 and 78 which may be combined as a single flexible cable. The push button system is grounded at 80, as by connecting it to the nearest convenient point on the track system, or, if desired, a four-wire cable may be used, the fourth wire corresponding to the ground wire 80 and leading back to the grounded terminal 82 on the signal base 22. It will be evident that by depressing any one of the three buttons a corresponding signal indication may be obtained.

So far, the description has been limited to the signal system. The train control system is readily combined with the signal system, the same selector magnets functioning for both the signal and train control systems. A section of the third rail 14 is insulated from the remainder of the third rail, thus forming a control section or block 84.

Control section 84 is separated from the remainder of the third rail at the points 86 and 88, as by extracting the connecting pins of the track. The distance between points 86 and 88 is preferably equal to the length of the train plus the stopping distance of the train. In a multiple signal system the control section 84 corresponds to the red or danger block, and the signal is preferably mounted at the end of this danger block, that is, at the point 86. The "red" contact strip 16 is located just beyond point 86 and marks the exit of a train from the danger block. The energization of control section 84 is controlled by the selector mechanism, or more specifically, by the slider 50, and for this purpose, additional stationary contacts 92 and 94 are provided. While not necessary, a third contact 90 is provided in order to keep the switch structure symmetrical. The reason contact 90 is not necessary is that it corresponds to deenergization of control section 84. Contact 94 manifestly applies the full track potential to control section 84, the current being fed from third rail 14 through conductor 46, terminal 44, conductors 42 and 64, slider 50, contact 94, conductor 96, terminal 98 and conductor 100 leading to the insulated third rail section. For the yellow or slow speed condition, the potential applied to the insulated section 84 is reduced by connecting a resistor 102 in series therewith. Specifically, the current flowing from slider 50 to contact 92 passes through a conductor 104, resistor 102, conductor 96, and thence through terminal 98 and conductor 100 to the insulated section.

Many toy trains are equipped with remote control reversing systems. Most of these systems work on the principle that whenever the current supply to the train is completely interrupted, a reversing switch on the train is actuated so that when the train is again energized it will run in the opposite direction. Undesired reversing of the train may be avoided by making the reversing mechanism sensitive to a minute holding current so slight as to be incapable of driving a locomotive even when lightly loaded. The present system is arranged for use with such a train, and therefore the control section 84 is not completely open-circuited for the "stop" or "danger" position, but instead is supplied with a small holding potential. For this purpose a resistor 106 is connected in series between conductors 64 and 96. It is convenient to use a single resistor for both the "stop" and slow speed conditions, and such an arrangement is shown in Fig. 10, the conductor 104 leading to an intermediate point or tap on a single resistor. This tap may be made movable or variable, thus determining the slow speed potential and consequently the train speed which is obtained during the "caution" condition. In effect, the slider 50 short-circuits a part of the resistor when resting on contact 92 so that only the part 102 of the resistor is effective, and the slider 50 short-circuits the entire resistor when resting on contact 94 so that the resistor is ineffective.

Inasmuch as contacts 90, 92 and 94 are disposed opposite and correspond to signal contacts 58, 60 and 62, it follows that the control conditions established for insulated section 84 correspond to the signal conditions displayed by the signal lamps.

Referring now to Figs. 1 and 2 of the drawings, the signal comprises base 22 carrying a selector casing 108 surmounted by a suitable post 110 carrying at its upper end the three signal lamps 52, 54 and 56 which are respectively colored red, yellow and green. The lamp sockets are grounded except for insulated center terminals which are connected by three conductors which extend downwardly through hollow post 110 to the selector switch in casing 108. The resistor 106 previously referred to extends across casing 108 near the bottom thereof, and the slow speed tap is obtained by means of an oscillatable contact arm 112 pivoted at 114, and the lower end of which is bent outwardly to act as a handle 116 projecting through an arcuate slot 118 in casing wall 120. Wall 120, unlike the other three walls of the casing, is preferably made of insulation, thus providing an insulated mounting for contact arm 112. The exposed handle 116 may be moved to one side or the other in order to determine the slow speed potential.

The selector and switch mechanism is next described with reference to Figs. 3 through 9 of the drawings. The stationary contacts 58, 60 and 62 for the signal lamp control are mounted at one side of a preferably horizontal insulation plate 122 (Fig. 5) located at the top of the selector mechanism. Stationary contacts 90, 92 and 94 for the train control circuits are mounted in symmetrical relation on the opposite side of insulation plate 122. The sliding contact 50 is made of a resilient material such as phosphor bronze, and is bent to form outwardly projecting arms which ride over the stationary contacts. The center portion of slider 50 is bent upwardly to inverted trough or channel shape, as is indicated at 124 (Figs. 7 and 8), and rides beneath and in contact with the underside of a stationary brass plate 126 (Figs. 6 and 7). The side edges of plate 126 are bent downwardly and are secured to insulation plate 122 by appropriate tongue and slot connections (Figs. 6 and 7), but the resulting downwardly turned sides are cut away intermediate the ends of plate 126 to permit the desired movement of sliding contact 50. The inverted trough-like member 126 is connected to terminal 44 of the signal, that is, referring to Fig. 10, it is connected to the conductor 64, and constitutes a means for transferring current to slidable contact 50 without necessitating the use of a flexible conductor. Moreover, plate 126 acts as a housing for protectively enclosing the slider, and it also functions to guide the slider during its movement, as will subsequently appear.

The spring contact 50 is mounted on and carried by an insulation slide plate the ends 128 and 130 of which fit between the side walls of member 126 and are guided thereby. End 130 is slotted at 132 to receive the upper end 134 (Fig. 6) of a lever 136 (Fig. 4) which is pivoted at 138. The lower end 140 of the lever is connected by means of a link 142 to solenoid or magnet plunger 144 which is received within the horizontally disposed solenoid or magnet 28. A spring 146 normally tends to move lever 136 in a counterclockwise direction as viewed in Fig. 4, and thereby moves solenoid plunger 144 to its outward position and at the same time moves the slidable contact 50 to the "green" contacts. Solenoid 28 is the "red" magnet previously referred to in connection with Fig. 10, and is energized when a train passes the "red" contact strip, thus pulling the sliding contact to the "red" position. This is the position shown in Figs. 4 and 5 of the drawings.

The slidable contact is retained in the "red" position by a suitable detent 148 (Fig. 3), this detent acting on a stop shoulder 150 of the slide plate (Figs. 5 and 8). The detent is normally

elevated, but may be released by energization of "yellow" magnet 34, thus permitting return spring 146 to move the selector to the "yellow" or mid-position. Further movement is, however, prevented by a second detent 152 (Figs. 3 and 4) which engages a second stop shoulder 154 (Figs. 5 and 8) on the slide plate. This detent may be released by energization of the "green" magnet 40, whereupon the return spring 146 moves the selector to the "green" position. The "yellow" and "green" magnets 34 and 40 are disposed vertically, as is best shown in Figs. 3 and 4. In Fig. 4, it will be seen that detent 152 is formed by upwardly bending the end of a plate 156, and this is preferably made of iron or magnetic material. A thin leaf spring made of non-ferrous material is disposed between armature 156 and the magnet, as is indicated by spring 158. The detent is normally urged upwardly by spring 158, but upon energization of the magnet, the armature 156 is pulled down to the magnet, thus releasing detent 152.

The operation of the selector may be clarified with reference to Fig. 9, which is a schematic diagram having some of the parts re-arranged to clarify the operation. The red, yellow and green lamp contacts are shown at 58, 60 and 62. The "stop", slow, and full speed contacts are shown at 90, 92 and 94. Slidable contact 50 is shown in mid-position, that is, in the "yellow" position. The slidable contact is connected to and is moved by the insulation slide plate 128, 130. The plate is normally moved to the "green" position by any appropriate restoring spring such as the spring 146. When the "red" solenoid is energized, the slide plate is pulled to the "red" position by arm 136. It is retained in that position by detent 148 bearing against stop shoulder 150. When the "yellow" magnet is energized, the armature 160 of detent 148 is pulled downwardly from stop shoulder 150, thus permitting spring 146 to move the selector from the "red" position toward the "green" position. However, when the selector reaches the "yellow" position, it is arrested by detent 152 bearing against the stop shoulder 154, as shown in Fig. 9. When the "green" magnet is energized, the armature 156 of detent 152 is pulled down, thus freeing the slide plate for continued movement under the influence of spring 146 to the "green" position.

It will be evident that while the normal position of the signal is "green" or "clear", in the event of conflict of signals, the red signal dominates. It will also be evident that the system cannot change from red to green without stopping at the red position until the "yellow" magnet is energized, and without again stopping at the "yellow" position until the "green" magnet is energized.

Referring now to Fig. 11, I show the application of the signal and train control system to a "figure 8" track. The signal, generally designated 162, is mounted ahead of the cross-over 164. The insulated section 84 is disposed ahead of the signal. The "red" contact strip 16 is disposed at the signal and beyond the end of the control section 84. The "yellow" contact strip 18 is disposed beyond the transverse branch of the cross-over 164, while the "green" contact strip 20 is placed still more remotely. With this arrangement, it will be evident that when a leading train A passes the "red" contact 16, a following train B will face a red signal and will be stopped in control section 84. The following train B will remain stopped until the leading train A runs entirely around the right-hand loop 166 of the "figure 8", and until it safely passes the cross-over 164, as is evidenced by it reaching the "yellow" contact strip 18. At this time train B proceeds, and runs around the right-hand loop 166. If train A reaches the control section 84 before train B again passes cross-over 164, as is usually the case, train A will be stopped until train B reaches contact strip 18. In this way collision at the cross-over is effectively prevented, and the onlooker sees the train slow up or stop in response to appropriate signal indications, each train stopping to await the safe passage of the other. The right-hand loop 166 and left-hand loop 168 may be, and preferably are, made different in size, the left-hand loop being made larger. The margin of safety by which the trains pass one another may be reduced to as small an amount as desired by simply moving the contact strips 18 and 20 nearer to the cross-over 164. For example, the slow speed starting potential may be fed to train B, while train A is still on the cross-over, but passing the same so rapidly that there is no danger of it being reached by the slowly starting train B. However, it is better practice to place contact strip 18 away from the cross-over by an amount at least equal to the length of the train.

If desired, the system may, of course, be elaborated by additional signals. In Fig. 11, one additional signal is shown, this being the signal 170 having "red" contact strip 172, a "yellow" contact strip 174, and a "green" contact strip 176 connected to it by appropriate conductors. An insulated control section may be provided by removing connecting pins of the track sections as at the points 178 and 180. With this arrangement it will be impossible for train A to run into train B no matter how slowly train B starts up or how rapidly train A is running, because train A cannot pass signal 170 which is set against it until train B passes the "yellow" contact strip 174, which is preferably disposed at or beyond the "red" contact strip 16 of signal 162, so that when train A is permitted to run past signal 170, it will be facing the red signal at 162, thus protecting it against collision at the cross-over until train B has safely made the circuit of track loop 166.

Greater variety of the operation of the system may be obtained by manual manipulation of the remote control push buttons on panel 66. This push button control need be connected to only one of the signals, for the remainder of the system will operate in response to a change produced at one signal. For example, if signal 162 is kept red despite the safe passage of train A beyond the contact strips 18 and 20, train A will be stopped by an automatically produced red signal at 170, for train B will not have passed contacts 174 and 176.

The system may, of course, be further elaborated to simulate a real continuous block signal system, although at much greater cost. The arrangement is schematically indicated in Fig. 12, in which the outside or grounded rails of the track are omitted. The center or third rail is divided up into successive blocks or control sections 182, 184, 186, and 188. Each section is preferably made long enough to stop a train therein, as is indicated by the train C which is shorter than the sections. A signal with selector mechanism as already described is provided at each block, these signals being generally designated 190, 192 and 194. A contact strip is provided at each signal or at the exit of each block, these strips being marked 196, 198, 200, etc. On

examination of Fig. 12, it will be seen that each contact strip is connected to three signals. For example, the contact strip **200** acts as a "red" strip for the adjacent signal **194** in which the red lamp is illuminated. It acts as a "yellow" strip for the signal **192** in which the yellow lamp is illuminated. It acts as a "green" strip for the signal **190** in which the green lamp is lighted. Thus with train C running out of block **186**, a train running into block **186** is deenergized, a train running into block **184** is permitted to proceed but only under slow speed, while a train entering block **182** is permitted to proceed at full speed. Each signal is connected to three spaced contact strips just as before, but the signals have been brought so close together that the blocks overlap, and instead of using three different contact strips at substantially the same location for three different signals, one contact strip may be connected to the three different signals, as shown in Fig. 12.

Reverting to Fig. 11, in accordance with this same idea the contact strips **16** and **174** may be combined and a single contact strip my be used for the two shown. In such case the contact strip acts as a "red" strip for signal **162** and acts as a "yellow" strip for signal **170**.

In the arrangement of Fig. 12, a second train can enter a block in which a first train is still present, provided that the first train is moving out of that block. Collision does not occur because although the leaving train is accelerating only slowly, the trailing train has already been decelerated by a slow speed block, and enters a deenergized block. The unoccupied part of the block is ordinarily as great as the stopping distance of the train, and in practice, for the sake of economy in the use of signals, the blocks may be made still longer.

However, if it is desired to use a large number of signals, the system may be made safe while using only short blocks, and such a system is shown in Fig. 13, in which the blocks may, if desired, be shortened down to substantially the train length. In this arrangement, the contact strip such as the strip **202** acts as a "red" strip for the adjacent signal **204**, and acts as a "yellow" strip, not for the next rear signal **206**, but rather for the signal behind the next signal, namely the signal **208**, as shown. It acts as a "green" strip for the still more remote signal **210**. This arrangement applies to each contact strip, and in practice two adjacent signals show red at any one time. For example, in the drawing, with train D leaving block **212**, the red lamp is displayed at signal **204** for block **212** and also at signal **206** for block **214**. There is accordingly at least one full de-energized block between any two trains on the track.

It is believed that the construction and operation, as well as the many advantages of our improved signal and train control system for toy trains, will be apparent from the foregoing detailed description thereof. It will also be apparent that while we have shown and described our invention in preferred forms, many changes and modifications may be made in the structure disclosed without departing from the spirit of the invention defined in the following claims. In the claims, the terms "no speed potential" or "substantially no potential" are intended to include the case of true zero potential or open circuit, as well as the slight holding potential which is provided when dealing with certain types of remote control train.

We claim:

1. A block signal for toy railroad systems, said signal comprising a selector movable to any of three positions, a signal controlled by said selector to indicate "stop", "caution", or "clear", the selector position corresponding to said signal indications, and means determining the position of said selector, said selector being biased normally to the "clear" producing position, a first magnet for pulling said selector to the "stop" producing position, a detent for holding said selector at the "stop" producing position, a second detent for holding said selector at the "caution" producing position, a second magnet for releasing the first detent, and a third magnet for releasing the second detent.

2. A speed control device for use with toy railroad systems having a potential source, service rails, and a power rail with an insulated section, said control device comprising a selector movable to any of three positions, switch mechanism moved by said selector to supply the insulated track section with substantially no potential, a moderate slow speed potential, or full track potential, in accordance with said selector positions, and means determining the position of said selector, said selector being biased normally to the full potential position, a first magnet for pulling said selector to the no potential position, a detent for holding said selector at the no potential position, a second detent for holding said selector at the moderate potential position, a second magnet for releasing the first detent, and a third magnet for releasing the second detent.

3. A block signal for use with toy railroad systems having a potential source, service rails, and a power rail with an insulated section, said signal comprising a selector movable to two positions, a signal controlled by said selector to indicate "stop", or "clear", switch mechanism also moved by said selector to deenergize or energize the insulated track section in accordance with said selector positions and signal indications, and means automatically determining the position of said selector, said selector being biased normally to the "clear" producing position, a magnet for pulling said selector to "stop", a detent for holding said selector at the "stop" producing position, and a magnet for releasing the detent.

4. A block signal for use with toy railroad systems having a potential source, service rails, and a power rail with an insulated section, said signal comprising a selector movable to any of three positions, a signal controlled by said selector to indicate "stop", "caution" or "clear", switch mechanism also moved by said selector to supply the insulated track section with substantially no potential, a moderate slow speed potential, or full track potential, in accordance with said selector position and signal indication, and means determining the position of said selector, said selector being biased normally to the "clear" producing position, a magnet for pulling said selector to the "stop" producing position, a detent for holding said selector at the "stop" producing position, a second detent for holding said selector at the "caution" producing position, a second magnet for releasing the first detent, and a third magnet for leasing the second detent.

5. A block signal system for a toy railroad, comprising a conventional track having grounded service rails and a power rail insulated from said service rails, a block signal, red, yellow and green lamps on said signal, contact strips associated with the track to be engaged by a train

running on the track, there being a "red" strip at the signal, a "yellow" strip spaced from the "red" strip, and a "green" strip still more remote from the "red' strip, a three-position sliding switch in said signal, contacts controlled by said switch for selectively energizing a red, yellow or green lamp, and means to determine the position of the selector switch, said selector being biased normally to the "green" producing position, a magnet connected to the "red" contact strip for moving the selector to the "red" producing position, a detent for holding the selector at the "red" producing position, a second magnet connected to the "yellow" contact strip for releasing the detent and permitting the selector to move to the "yellow" producing position, a second detent for holding the selector at the "yellow" producing position, and a third magnet connected to the "green" contact strip for releasing the second detent.

6. A control system for a toy railroad, comprising a conventional track having grounded service rails and a power rail insulated from said service rails, a control section of said power rail being insulated from the remainder of the power rail, a control device, contact strips associated with the track to be engaged by a train running on the track, there being a "stop" strip, a "slow" strip spaced from the "stop" strip, and a "go" strip still more remote from the "stop" strip, a three-position sliding switch in said device, to be connected in series with a supply conductor leading to the insulated power rail section, and contacts controlled by said switch, said contacts being so arranged in the supply circuit that said insulated section is supplied with a no speed potential by one contact, a moderate slow speed potential by a second contact, or full track potential by a third contact, and means to determine the position of the selector switch, said selector being biased normally to the full potential position, a magnet connencted to the "stop" contact strip for moving the selector to the no potential position, a detent for holding the selector at the no potential position, a second magnet connected to the "slow" contact strip for releasing the detent and permitting the selector to move to the moderate potential position, a second detent for holding the selector at the moderate potential position, and a third magnet connected to the "go" contact strip for releasing the second detent.

7. A block signal system for a toy railroad, comprising a conventional track having grounded service rails and a power rail insulated from said service rails, a control section of said power rail being insulated from the remainder of the power rail, a block signal disposed near the end of the control section, stop and go lamps on said signal, contact strips associated with the track to be engaged by a train runnnig on the track, there being a "stop" strip at the signal and a "go" strip remote from the "stop" strip, a sliding switch in said signal, contacts controlled by said switch for selectively energizing a stop or go lamp, and additional contacts controlled by said switch whereby said insulated section is substantially denergized or energized corresponding to the stop or go lamp, and means to determine the position of the selector switch, said selector being biased normally to the "go" producing position, a magnet connected to the "stop" contact strip for moving the selector to the "stop" producing position, a detent for hlding the selector at the "stop" producing position, and a second magnet connected to the "go" contact strip for releasing the detent.

8. A block signal system for a toy railroad, comprising a conventional track having grounded service rails and a power rail insulated from said service rails, a control section of said power rail being insulated from the remainder of the power rail, a block signal disposed near the end of the control section, red, yellow and green lamps on said signal, contact strips associated with the track to be engaged by a train runnning on the track, there being a "red" strip at the signal, a "yellow" strip spaced from the "red" strip, and a "green" strip still more remote from the "red" strip, a three-position switch in said signal, contacts controlled by said switch for selectively energizing the red, yellow or green lamp, a resistor in said signal to be connected in series with a supply conductor leading to the control section, and contacts controlled by said switch whereby said control section is supplied with no speed potential, a moderate slow speed potential, or full track potential, corresponding to the red, yellow or green lamps, and means to determine the position of the selector switch, said selector being biased normally to the "green" producing position, a magnet connected to the "red" contact strip for moving the selector to the "red" producing position, a detent for holding the selector at the "red" producing position, a second magnet connected to the "yellow" contact strip for releasing the detent and permitting the selector to move to the "yellow" producing position, a second detent for holding the selector at the "yellow" producing position, and a third magnet connected to the "green" contact strip for releasing the second detent.

9. A block signal system for a toy railroad, comprising a conventional track having grounded service rails and a power rail insulated from said service rails, a control section of said power rail being insulated from the remainder of the power rail, a block signal disposed near the end of the control section, red, yellow and green lamps on said signal, contact strips associated with the track to be engaged by a train running on the track, there being a "red" strip at the signal, a "yellow" strip spaced from the "red" strip, and a "green" strip still more remote from the "red" strip, a three-position sliding switch in said signal, contacts controlled by said switch for selectively energizing the red, yellow or green lamp, a resistor in said signal, an adjustable tap movable between the ends of said resistor, said resistor being connected in series with a supply conductor leading to the control section, and additional contacts controlled by said switch for short-circuiting the tapped portion or all of said resistor, whereby said control section is supplied with a small holding potential, a moderate slow speed potential, or full track potential, corresponding to the red, yellow or green lamps, and means to determine the position of the selector switch, said selector being biased normally to the "green" producing position, a magnet connected to the "red" contact strip for moving the selector to the "red" producing position, a detent for holding the selector at the "red" producing position, a second magnet connected to the "yellow" contact strip for releasing the detent and permitting the selector to move to the "yellow" producing position, a second detent for holding the selector at the "yellow" producing position, and a third magnet connected to the "green" contact strip for releasing the second detent.

10. A block signal system for a toy railroad, comprising a conventional track having grounded service rails and a power rail insulated from said service rails, a block signal, red, yellow and green lamps on said signal, contact strips associated with the track to be engaged by a train running on the track, there being a "red" strip at the signal, a "yellow" strip spaced from the "red" strip, and a "green" strip still more remote from the "red" strip, a three-position sliding switch in said signal, said switch including a horizontal insulation plate, a slider horizontally reciprocable thereover, stationary contacts secured to said insulation plate, the contacts being connected to the red, yellow and green lamps, and three magnets for determining the three positions of the sliding switch respectively, each of said magnets being connected to a respective one of the aforesaid contact strips.

11. A control system for a toy railroad, comprising a conventional track having grounded service rails and a power rail insulated from said service rails, a control section of said power rail being insulated from the remainder of the power rail, a control device, contact strips associated with the track to be engaged by a train running on the track, there being a "stop" strip, a "slow" strip spaced from the "stop" strip, and a "go" strip still more remote from the "stop" strip, a three-position sliding switch in said device, said switch including a horizontal insulation plate, a slider horizontally reciprocable thereover, and stationary contacts secured to said insulation plate, a resistor in said device to be connected in series with a supply conductor leading to the insulated power rail section, the switch contacts being so connected that said insulated section is supplied with a no speed potential, a moderate slow speed potential, or full track potential, and three magnets for determining the three positions of the sliding switch, each of said magnets being connected to a respective one of the aforesaid contact strips.

12. A block signal system for a toy railroad, comprising a conventional track having grounded service rails and a power rail insulated from said service rails, a control section of said power rail being insulated from the remainder of the power rail, a block signal disposed near the end of the control section, stop and go lamps on said signal, contact strips associated with the track to be engaged by a train running on the track, there being a "stop" strip at the signal and a "go" strip remote from the "stop" strip, a sliding switch in said signal, said switch including a horizontal insulation plate, a slider horizontally reciprocable thereover, and stationary contacts secured to said insulation plate in spaced relation, two of the contacts being connected to the stop and go lamps, additional contacts on the insulation plate whereby said control section is either substantially deenergized or energized, corresponding to the stop and go lamps, and magnets for determining the positions of the sliding switch, each of said magnets being connected to a respective one of the aforesaid contact strips.

13. A block signal system for a toy railroad, comprising a conventional track having grounded service rails and a power rail insulated from said service rails, a control section of said power rail being insulated from the remainder of the power rail, a block signal disposed near the end of the control section, red, yellow and green lamps on said signal, contact strips associated with the track to be engaged by a train running on the track, there being a "red" strip at the signal, a "yellow" strip spaced from the "red" strip, and a "green" strip still more remote from the "red" strip, a three-position sliding switch in said signal, said switch including a horizontal insulation plate, a slider horizontally reciprocable thereover, stationary contacts secured to said insulation plate in spaced relation, three contacts being connected to the red, yellow and green lamps, a resistor in said signal to be connected in series with a supply conductor leading to the control section, and additional contacts on the insulation plate whereby said control section is supplied with no speed potential, a moderate slow speed potential, or full track potential corresponding to the red, yellow and green lamps, and three magnets for determining the three positions of the sliding switch, each of said magnets being connected to a respective one of the aforesaid contact strips.

14. A block signal system for a toy railroad, comprising a conventional track having grounded service rails and a power rail insulated from said service rails, a control section of said power rail being insulated from the remainder of the power rail, a block signal disposed near the end of the control section, red, yellow and green lamps on said signal, contact strips associated with the track to be engaged by a train running on the track, there being a "red" strip at the signal, a "yellow" strip spaced from the "red" strip, and a "green" strip still more remote from the "red" strip, a three-position sliding switch in said signal, said switch including a horizontal insulation plate, a slider horizontally reciprocable thereover, stationary contacts secured to said insulation plate in spaced relation, three contacts being connected to the red, yellow and green lamps, a resistor in said signal, an adjustable tap movable between the ends of said resistor, said resistor being connected in series with a supply conductor leading to the control section, additional contacts on the insulation plate so connected as to short-circuit the tapped portion or all of the resistor whereby said insulated section is supplied with a small holding potential, a moderate slow speed potential, or full track potential, corresponding to the red, yellow and green lamps, and three magnets for determining the three positions of the sliding switch, each of said magnets being connected to a respective one of the aforesaid contact strips.

15. A toy train system including a cross-over, two trains, and a single block signal for preventing collision between the trains at the cross-over, said system comprising a track arranged in the form of a "figure 8", two trains on said track running behind one another in the same direction, a section of the power rail leading to the cross-over being insulated from the remainder of the power rail, a combined block signal and train control device at the end of said control section near the cross-over, said signal being wired to points on the track so selected as to establish a "danger" block which extends all the way from the approach side of the cross-over, completely around one loop of the "figure 8", and back to a point behind the return side of the cross-over, said device having signal means to indicate danger when a train is in the aforesaid loops of the "figure 8", and having train control means to simultaneously deenergize the insulated power rail section.

16. A toy train system including a cross-over,

two trains, and means for preventing collision between the trains at the cross-over, said system comprising a track arranged in the form of a "figure 8", two trains on said track running behind one another in the same direction, said track being ordinary track with grounded service rails and an insulated power rail, a section of said power rail leading to the cross-over being insulated from the remainder of the power rail, track contact strips associated with said track to be engaged by a train running on the track, there being a "stop" strip at the signal ahead of the cross-over and a "go" strip beyond the crossing or return side of the cross-over, a selector for substantially deenergizing or energizing the insulated control section, and means for automatically moving said selector, said means being connected to said "stop" and "go" track contact strips for energization therefrom.

17. A toy train system including a cross-over, two trains, and a single block signal for preventing collision between the trains at the cross-over, said system comprising a track arranged in the form of a "figure 8", two trains on said track running behind one another in the same direction, said track being ordinary track with grounded service rails and an insulated power rail, a section of said power rail leading to the cross-over being insulated from the remainder of the power rail, a block signal at the end of said control section near the cross-over, track contact strips associated with said track to be engaged by a train running on the track, there being a "red" strip at the signal ahead of the cross-over and a "green" strip beyond the crossing or return side of the cross-over, red, and green signal lamps on said signal, a selector for energizing a red or green lamp and for substantially deenergizing or energizing the insulated control section corresponding to the red and green lamps, and means for automatically moving said selector, said means being connected to said "red" and "green" track contact strips for energization therefrom.

18. A toy train system including a cross-over, two trains, and a single block signal for preventing collision between the trains at the cross-over, said system comprising a track arranged in the form of a "figure 8", two trains on said track running behind one another in the same direction, said track being ordinary track with grounded service rails and an insulated power rail, a section of said power rail leading to the cross-over being insulated from the remainder of the power rail, a block signal at the end of said control section near the cross-over, track contact strips associated with said track to be engaged by a train running on the track, there being a "red" strip at the signal ahead of the cross-over, a "yellow" strip beyond the crossing or return side of the cross-over, and a "green" strip still more remote from the return side of the cross-over, red, yellow and green signal lamps on said signal, a resistor connected in series with a current supply lead for said insulated power rail section, an adjustable tap for said resistor, a selector for energizing a red, yellow or green lamp and for short-circuiting a part or all of the resistor corresponding to the yellow and green signals, whereby the insulated control section is supplied with a small holding potential, or a moderate slow speed potential, or full track potential corresponding to the red, yellow and green lamps, and means for automatically moving said selector to any of its three positions, said means being connected to said "red", "yellow" and "green" track contact strips for energization therefrom.

19. A block signal system for a toy railroad, comprising a conventional track having grounded service rails and a power rail insulated from said service rails, a control section of said power rail being insulated from the remainder of the power rail, a block signal disposed near the end of the control section, stop and go lamps on said signal, contact strips associated with the track to be engaged by a train running on the track, there being a "stop" strip at the signal, and a "go" strip remote from the "stop" signal, a sliding switch in said signal, contacts controlled by said switch for selectively energizing a stop or go lamp, and additional contacts controlled by said switch whereby said insulated section is substantially deenergized or energized corresponding to the stop or go lamps, and means to determine the position of the selector switch, said selector being biased normally to the "go" producing position, a magnet connected to the "stop" contact strip for moving the selector to the "stop" producing position, a detent for holding the selector at the "stop" producing position, and a second magnet connected to the "go" contact strip for releasing the detent, and a pair of remote control push button switches connected to the aforesaid magnets for energizing the same under manual control when desired.

20. A block signal system for a toy railroad, comprising a conventional track having grounded service rails and a power rail insulated from said service rails, a control section of said power rail being insulated from the remainder of the power rail, a block signal disposed near the end of the control section, red, yellow and green lamps on said signal, contact strips associated with the track to be engaged by a train running on the track, there being a "red" strip at the signal, a "yellow" strip spaced from the "red" strip, and a "green" strip still more remote from the "red" strip, a three-position switch in said signal, contacts controlled by said switch for selectively energizing the red, yellow or green lamp, a resistor in said signal to be connected in series with a supply conductor leading to the control section, and contacts controlled by said switch whereby said control section is supplied with no speed potential, a moderate slow speed potential, or full track potential, corresponding to the red, yellow or green lamps, and means to determine the position of the selector switch, said selector being biased normally to the "green" producing position, a magnet connected to the "red" contact strip for moving the selector to the "red" producing position, a detent for holding the selector at the "red" producing position, a second magnet connected to the "yellow" contact strip for releasing the detent and permitting the selector to move to the "yellow" producing position, a second detent for holding the selector at the "yellow" producing position and a third magnet connected to the "green" contact strip for releasing the second detent, and a remote switch panel with three push button switches connected to the aforesaid magnets for energizing any one of the magnets under manual control when desired.

21. A block signal system for a toy railroad, comprising a conventional track having grounded service rails and a power rail insulated from said service rails, a control section of said power rail being insulated from the remainder of the power rail, a block signal disposed near the end of the control section, red, yellow and green lamps on

said signal, contact strips associated with the track to be engaged by a train running on the track, there being a "red" strip at the signal, a "yellow" strip spaced from the "red" strip, and a "green" strip still more remote from the "red" strip, a three-position sliding switch in said signal, said switch including a horizontal insulation plate, a slider horizontally reciprocable thereover, stationary contacts secured to said insulation plate in spaced relation, three contacts being connected to the red, yellow and green lamps, a resistor in said signal to be connected in series with a supply conductor leading to the control section, and additional contacts on the insulation plate whereby said control section is supplied with no speed potential, a moderate slow speed potential, or full track potential, corresponding to the red, yellow and green lamps, and three magnets for determining the three positions of the sliding switch, one of said magnets being connected to each of the aforesaid contact strips, and a remote switch panel with three push button switches connected to the aforesaid magnets for energizing any one of the magnets under manual control when desired.

22. A speed control device for use with toy railroad systems having a potential source, service rails, and a power rail with an insulated section, said control device comprising a selector movable to either of two positions, switch mechanism moved by said selector to supply the insulated track section with substantially no potential or full track potential, in accordance with said selector positions, and means determining the position of said selector, said means including a spring normally biasing said selector to the full potential position, a first magnet for pulling said selector to the no potential position, a detent for holding said selector at the no potential position, and a second magnet for releasing the detent.

23. A block signal system for a toy railroad comprising a conventional track having grounded service rails and a power rail insulated from said service rails, a block signal, red and green lamps on said signal, contact strips associated with the track to be engaged by a train running on the track, there being a "red" strip at the signal and a "green" strip remote from the "red" strip, a sliding switch in said signal, said switch including an insulation plate, a slider reciprocable thereover, stationary contacts secured to said insulation plate, the contacts being connected to the red and green lamps respectively, resilient means normally biasing the slider to the contact connected to light the green lamp, a first magnet for moving the slider to the contact connected to light the red lamp, a detent for holding the slider in the latter position, and a second magnet for releasing the detent, the first of said magnets being connected to the "red" strip and the second magnet being connected to the "green" strip.

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