April 23, 1929. E. W. SWARTWOUT 1,710,326

ELECTRIC TRAIN SYSTEM

Filed March 15, 1924 5 Sheets-Sheet 1

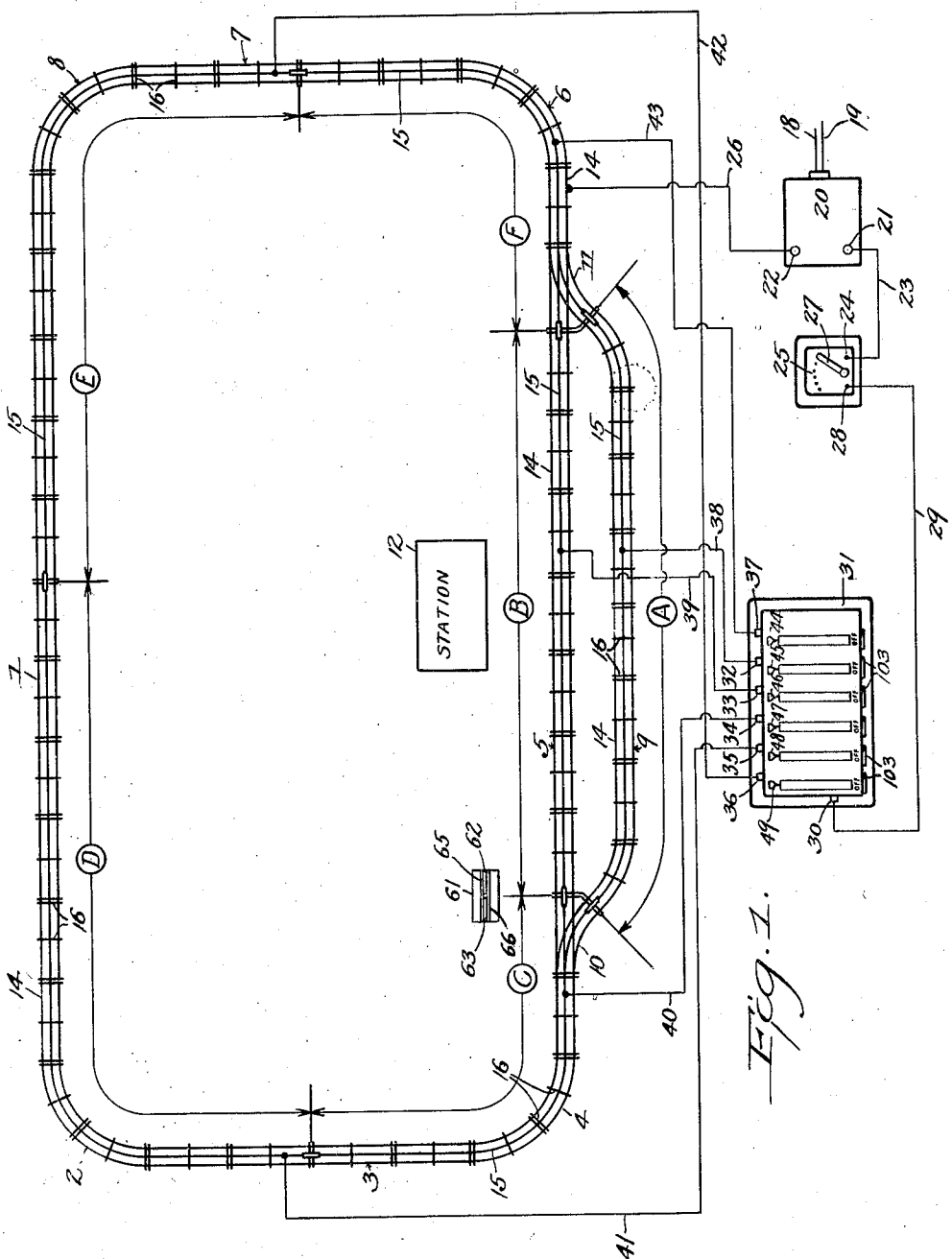


Fig. 1.

WITNESSES

Olwen W. Holmes

INVENTOR,
Everett W. Swartwout,
BY
Henry J. Locke,
His ATTORNEY.

April 23, 1929. E. W. SWARTWOUT 1,710,326

ELECTRIC TRAIN SYSTEM

Filed March 15, 1924 5 Sheets-Sheet 2

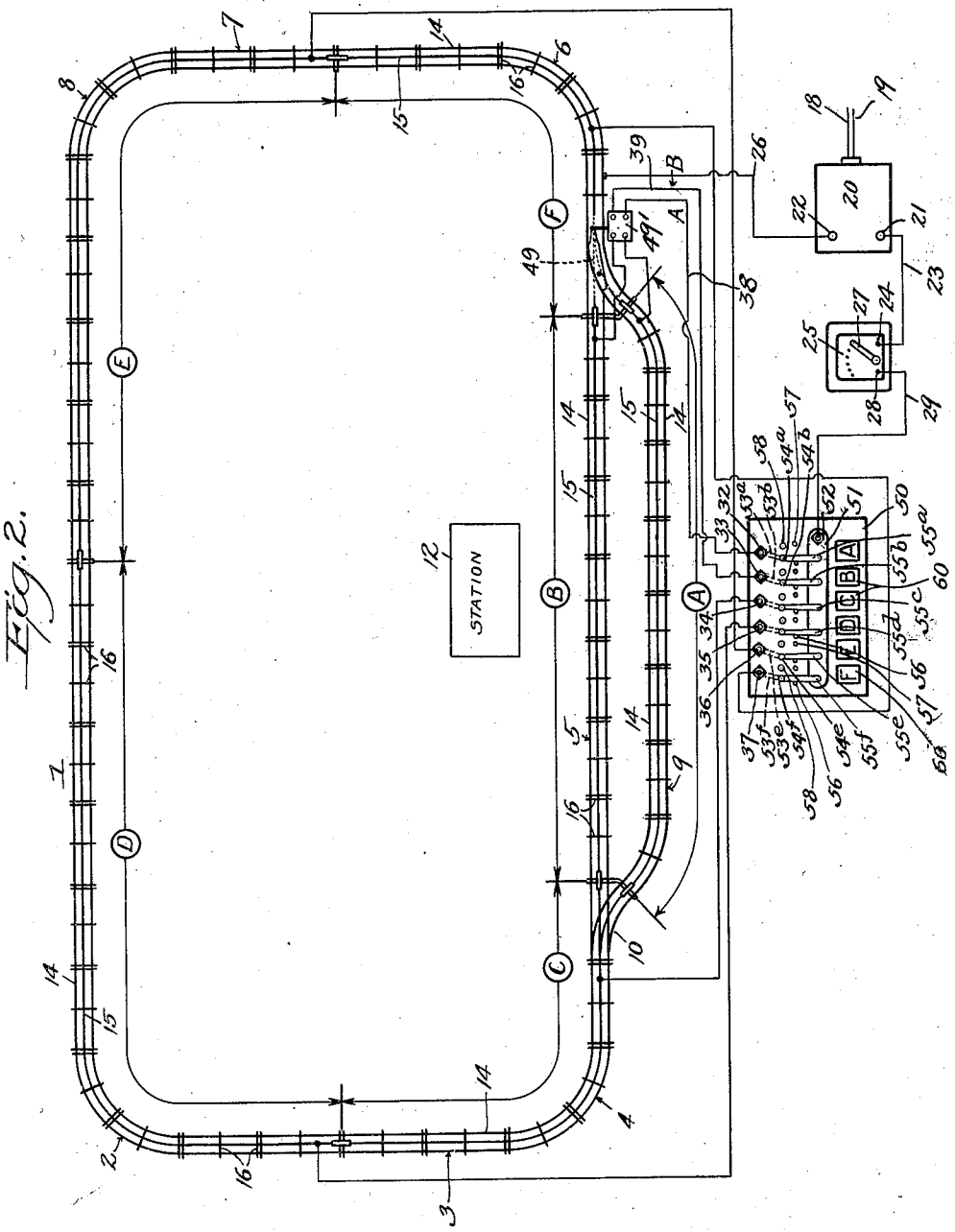


Fig. 2.

WITNESSES

Olive N. Holmes

INVENTOR,
Everett W. Swartwout,
BY
Henry J. Lucke,
ATTORNEY.

April 23, 1929. E. W. SWARTWOUT 1,710,326

ELECTRIC TRAIN SYSTEM

Filed March 15, 1924 5 Sheets-Sheet 3

Fig. 3.

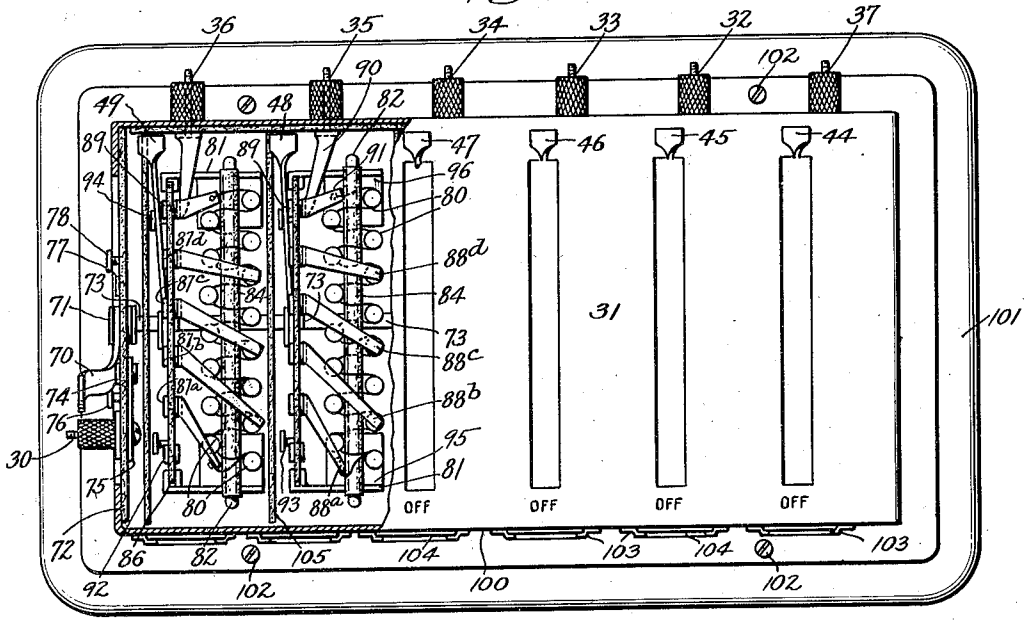
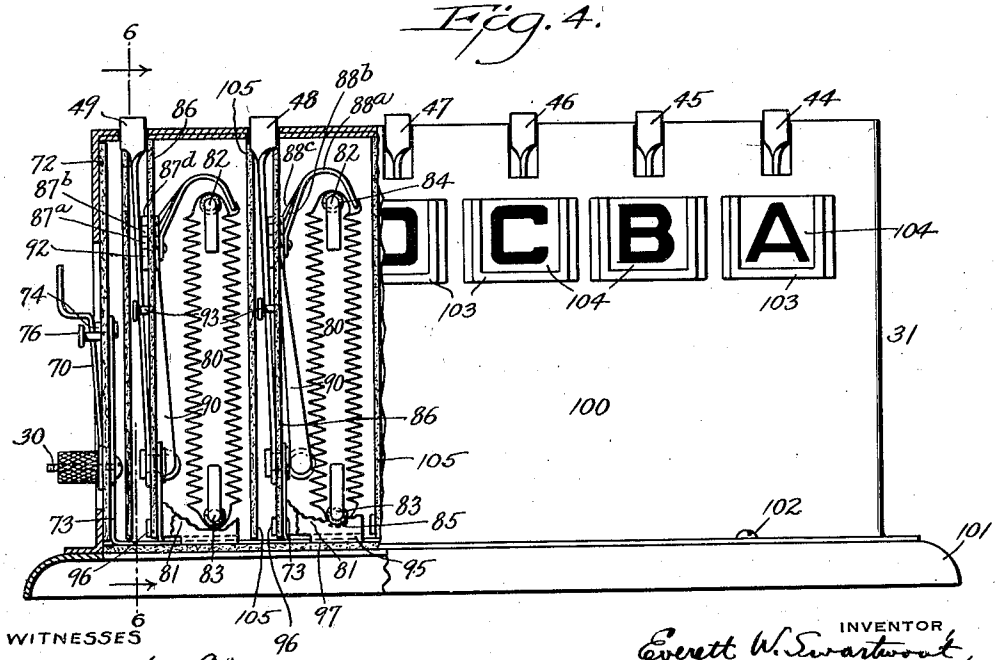


Fig. 4.



WITNESSES

Oliver W. Holmes

INVENTOR

Everett W. Swartwout,

BY

Henry J. Lucke,

ATTORNEY.

April 23, 1929. E. W. SWARTWOUT 1,710,326

ELECTRIC TRAIN SYSTEM

Filed March 15, 1924 5 Sheets-Sheet 4

Fig. 5.

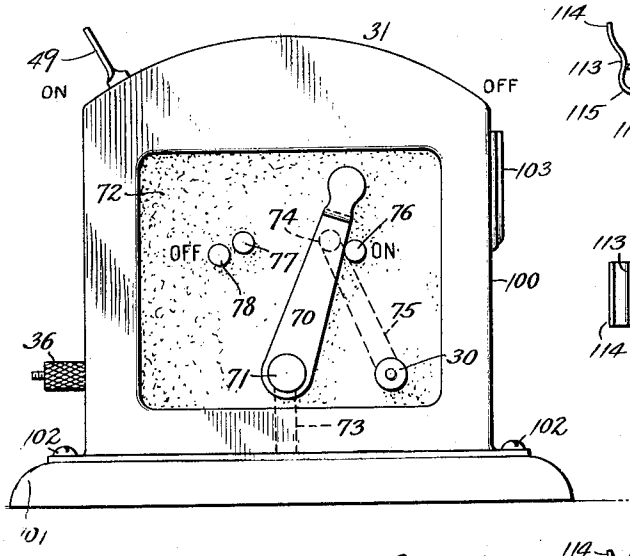


Fig. 8.

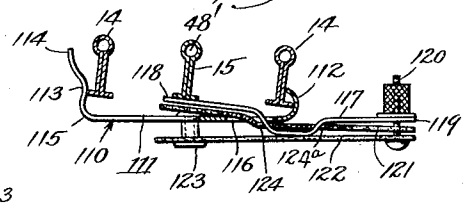


Fig. 9.

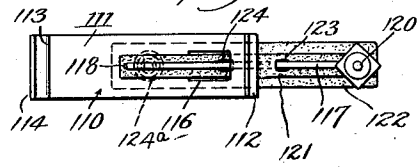


Fig. 10.

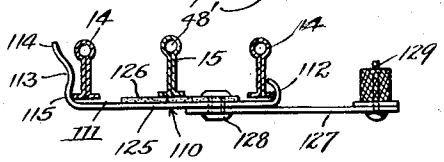


Fig. 6.

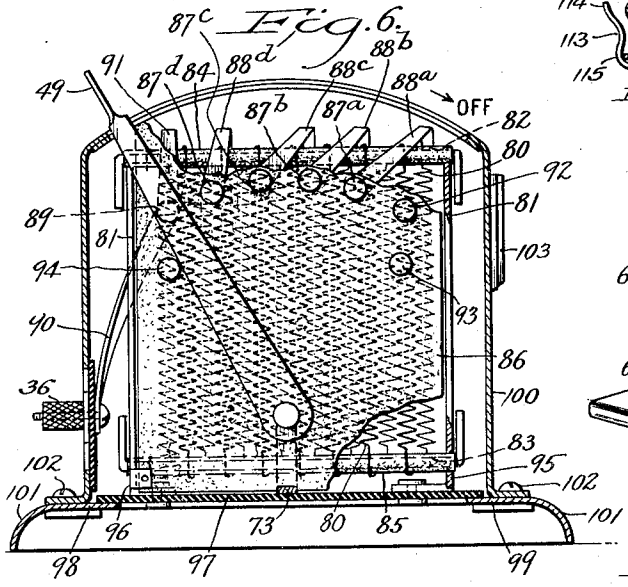


Fig. 11.

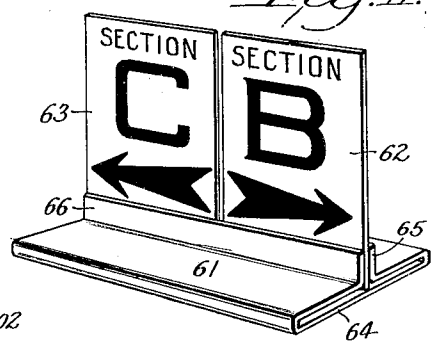


Fig. 7

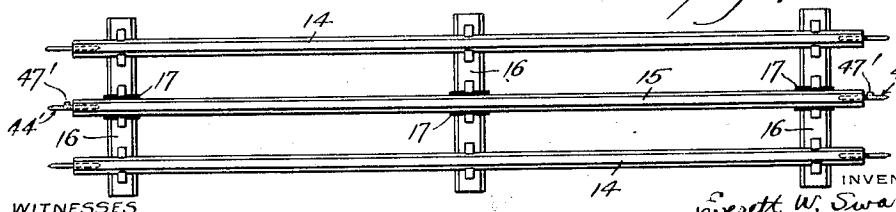
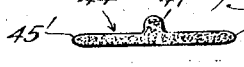


Fig. 7a.



WITNESSES

Oliver W. Holmes

INVENTOR

Everett W. Swartwout,

BY

Henry J. Locke,

ATTORNEY.

April 23, 1929. E. W. SWARTWOUT 1,710,326

ELECTRIC TRAIN SYSTEM

Filed March 15, 1924 5 Sheets-Sheet 5

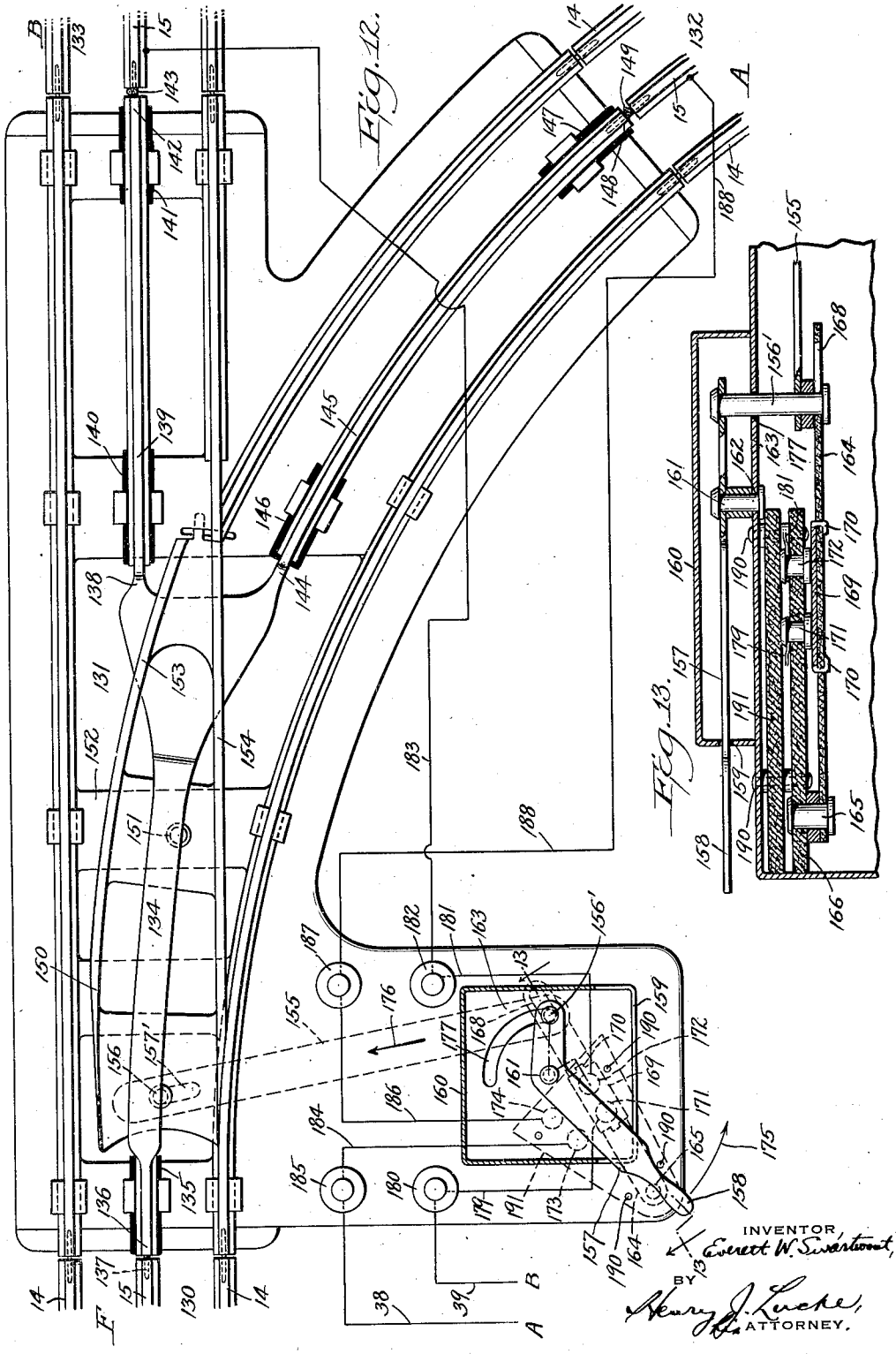


Fig. 12.

Fig. 13.

INVENTOR,
Everett W. Swartwout,
BY
Henry J. Lucke,
ATTORNEY.

Patented Apr. 23, 1929. 1,710,326

UNITED STATES PATENT OFFICE.

EVERETT W. SWARTWOUT, OF WHITE PLAINS, NEW YORK.

ELECTRIC TRAIN SYSTEM.

Application filed March 15, 1924. Serial No. 699,415.

This invention relates to improvements in electrical train systems, and particularly electrical toy train systems.

An object of the invention is to provide an electrical train system whereby the speeds of one or more trains may be varied under control.

A further feature of the invention is to provide a train system and track arrangement whereby the speed of a train may be varied at desired locations of the track.

Pursuant to a preferred form of the invention, the track is divided into sections and suitable control means are connected to the different track sections whereby any desired variation of speed or cessation of movement of the train is effected. Such control means may include a number of switch elements corresponding to the various sections of the track, and may be designated corresponding to designations of the track sections. In certain forms of the control means, the switching device comprises individual switching members for controlling the degree of speed or cessation of movement of trains through the respective track sections.

Preferably for simplicity of construction and assembly, the third or inner rail of the track is divided into sections insulated from one another, and from the outer rail or rails, to effect the division of the trackway into the desired sections or "blocks". It will be observed, however, that such "blocks" may also be formed by dividing the outer rails into sections and employing insulation strips at the junctions of the "blocks".

The above and other features of my invention are applicable to electric train propulsion generally where it is desired to control the train or trains remote from each train, as in yard control where the trains or car are under observation from the tower or other point of control.

Further features and objects of the invention will be more fully understood from the following detail description and the accompanying drawings, in which

Fig. 1 is a diagrammatic plan view showing a variable form of track arrangement and one form of switching device, embodying my invention;

Fig. 2 is a similar diagrammatic plan view, showing a form of track arrangement and another form of switching device, embodying my invention;

Fig. 3 is a detail plan view of the control device indicated in Fig. 1, at the top of its casing in horizontal section;

Fig. 4 is a side elevation of Fig. 3, partly broken away at the side of the casing in vertical section;

Fig. 5 is a front elevation as viewed at the left of Figs. 3 and 4;

Fig. 6 is a sectional elevation on line 6—6 of Fig. 4;

Fig. 7 is a detail top plan view of "a piece" of track;

Fig. 7ª is a detail elevation of one form of insulation connector for contiguous portions of a rail;

Fig. 8 is a detail transverse elevation of the outer and inner rails and an electrical connector for the inner rail, the rails being shown in a stage of being assembled;

Fig. 9 is a detail top plan view of the combined clamp and connector;

Fig. 10 is a detail transverse elevation of a clamp for the outer and inner rails and an electrical connector for the outer rails;

Fig. 11 is a detail perspective view of a sign or indicator serving designations for contiguous track "blocks";

Fig. 12 is a detail plan view of a track switch for a siding or turn-out and electrical connections including a switch for controlling the direction and speed of a train; and

Fig. 13 is a detail sectional elevation on line 13—13 of Fig. 12.

Referring to the embodiment shown in Fig. 1, the track 1 may be of any configuration and number of track "pieces" as may be desired. The invention contemplates variation of the trackway as is customarily or usually carried out in the play with toy electrical trains. The trackway shown in Fig. 1 comprises the longitudinal track portion designated 1, the curve designated 2, the side track portion 3, the curve 4, the opposite longitudinal track portion 5, the curve 6, the opposite end track portion 7, leading through the curve 8 to the beginning of the aforesaid longitudinal track portion 1; and also a loop or siding track portion 9 connected at one end by the track switch 10 to a portion of the longitudinal track portion 5 and at its opposite end by the track switch 11 to another portion of the longitudinal track portion 5.

The several track portions may be divided into "blocks" of a number and of lengths to suit the fancy or purposes of the user, and

as an illustration of a subdivision into track "blocks" I have indicated a block A extending a length indicated by an arrowed line including the major part of the loop or siding 9; similarly, the track block B extending a length indicated by a similar arrowed line and including the major part of the longitudinal track portion 5, and similarly blocks C, D, E and F, indicated by similar arrowed lines.

The indication 12 marked "station", represents a station, and such stations may be of any desired number and at any desired locations.

The trackway comprises the usual "pieces" of track formed of the outer rails 14, and on which run the wheels of the locomotive or other motor and of the cars; the central rail 15 corresponds to a "third" rail of an electric train system, on which slides a suitable contact maker, usually spring-pressed, carried by the locomotive or motor. The standard or other suitable forms of locomotives, motors or other driving unit are applicable to the particular trackway arranged and assembled pursuant to the present invention.

Each "piece" of track is held together as a unit by ties 16, usually by direct connection to the outer rails 14, and indirectly through an insulator 17 to the inner rail 15.

The source of current is usually from a lighting system in a home or like building, the lead wires of which are indicated 18, 19, see Fig. 1, and are connected to the input terminals of a transformer 20. The output terminals of the transformer are indicated at 21, 22, and in the arrangement shown in Fig. 1, the lead 23 connects the terminal 21 of the transformer 20 to the terminal 24 of any suitable rheostat 25. The output terminal 22 of the transformer 20 is connected by the lead 26 to one of the outer track rails 14. The switch arm 27 of the rheostat 25 makes connection with the desired switch point of the rheostat to control the current applied to the trackway as a whole. The other terminal 28 of the rheostat 25 is connected by the lead 29 to a terminal 30 of the control device 31. The control device 31 includes any desired number of output terminals corresponding to the number of track blocks, such as six in the instance illustrated in Fig. 1. The output terminals of the control device 31 are designated respectively 32, 33, 34, 35, 36, 37, leading to the respective track blocks. The terminal 32 is connected by the lead 38 to any suitable part of the third rail 15 of the block A; similarly the terminal 33 is connected by the lead 39 to any suitable part of the third rail 15 of the block B, terminal 34 is connected by the lead 40 to the third rail 15 of the block C; the lead 41 connects similarly the terminal 35 to the inner rail 15 of the block D; similarly, the lead 42 connects the terminal 36 to the inner rail 15 of the block E, and the lead 43 connects the terminal 37 with the inner rail 15 of the block F.

If desired, the rheostat 25 may be omitted and the output terminal 21 of the transformer 20 connected directly by a lead to the terminal 30 of the control device 31, as will be understood.

The control device 31 further comprises a series of levers 44, 45, 46, 47, 48 and 49, see Figs. 3 and 4, corresponding in number to the number of track blocks, i. e., six in the present instance, which levers 44—49 are indicated in Fig. 1 in full circuit closed position, thereby providing for the full current supplied by the rheostat 25 for any particular setting of its regulator 27, whereby the third rail of the respective track blocks are supplied with full current. However, upon moving any of the levers 44—49 toward their respective "off" positions, see Fig. 6, ohmic resistance is introduced to decrease the current supplied through the corresponding leads 38—43, and thus correspondingly controlling the speed of the motor or locomotive as it passes from one track block to the succeeding track block.

In Fig. 7 is illustrated, as an example, a piece of track in which the third rail 15 is provided, see Fig. 7a, with an insulating connector 44′ of fibre, preferably formed to have the opposite pointed end portions 45′, 46′ and an intermediate enlarged or laterally projecting portion 47′. The end portion 45′ is inserted into one opening 48′, see Figs. 8 and 10, of one section of a third rail and the opposite end portion 46′ inserted into the opening 48′ of the inner rail 15. The enlargement or projection portion 47′ of the insulating connector serves to electrically insulate the two contiguous sections of the inner rail 15, 15 from one another, while the end portions 45′, 46′ and the body portion 44′ serve to mechanically connect the track ends to one another.

In the arrangement shown in Fig. 2, the track is divided into similar blocks and connected by a similar system of electrical connections through a rheostat 25 or equivalent to the inner rails of the respective blocks and similarly connected to the outer rails of the respetive blocks, and like elements are designated by the same reference numbers as in the arrangement shown in Fig. 1.

However, in the arrangement shown in Fig. 2, the leads 38, 39 of the blocks A, B are respectively connected to binding posts of a combined track and circuit switch 49′, for indirect connection with the respective inner rails 15 of the blocks A, B, as described more fully hereinafter.

The control device of the arrangement shown in Fig. 2, is of a simpler type than that shown in Fig. 1, and provides either for full de-energization of the circuit through the desired track blocks or the full closure of the circuit of the desired track blocks, the

amperage of the current being regulated as a whole by the rheostat 25 by proper setting of its switch arm 27.

Such control device in the form as is indicated in Fig. 2 comprises a board of suitable insulating material 50 on which is mounted a flat strip of metal 51 serving as a common "bus", to which is attached a binding post 52, for connection to the lead 29 of the rheostat 25, similarly as in Fig. 1. The terminals 32—37 are suitable binding posts mounted on the insulation board 50, and connected by conductors 53^a, 53^b, 53^c, 53^d, 53^e, 53^f, to the respective contacts 54^a, 54^b, 54^c, 54^d, 54^e, 54^f, respectively mounted on the board 50. The switches 55^a 55^b, 55^c, 55^d, 55^e, 55^f are respectively pivoted directly to the "bus" or common connector strip 51. The stops 56 limit the movement of the pivot switches 55^a, etc., at closure position and the stops 57 limit the switches 55^a, etc., at open position. The contacts 58 are "dead" contacts, and serves to frictionally hold the pivot switches 55^a when in open position.

Preferably, the insulation board 50 is provided with holders or pockets for receiving cards designating the different track blocks, such as A, B,—F for identifying the respective pivot switches 55^a corresponding to the blocks of the trackway of like designation. Such holders are similar to holders for cards employed on the outer face of filing drawers or cabinets, and permit ready exchange of the lettered or other block designations 60 when the respective blocks of the trackway are changed or interchanged.

In Fig. 11, I have indicated a stand 61 for holding cards 62, 63 designating contiguous blocks, such as blocks B and C; as indicated in Fig. 11; such stand comprises the base 64 of metal or similar stiff material folded upon itself and flanged vertically as indicated at 65, 66 at a proper spacing from one another to frictionally retain the various cards 62, 63. Such stand 61 may be placed at the junctures of contiguous track blocks. When it is desired to change the block designations, the cards 62, 63 are removed from the stand 61, and the proper cards of the new designations inserted between the vertical flanges 65, 66.

The control device 31 indicated generally in Fig. 1 is shown in greater detail in Figs. 3, 4, 5 and 6. As is indicated in Fig. 5, the control device may include a switch 70 for closing or opening in common the respective circuits through the respective resistances of the block sections. The switch 70 is suitably pivoted on the conducting pin 71, extending through a suitable perforation in the sheet of insulation 72, and connected to the common conductor strip 73, see Figs. 5 and 6, to which are connected the pivots of the respective switch members 44—49. The contact 74 is mounted in a suitable perforation of the insulating sheet 72 and is connected by the strip 75 of conducting material to the contact corresponding to the contact 30 of Fig. 1. The stop 76 limits the full closure position of the switch 70. The contact 77 is a "dead" contact and is provided with a stop 78.

The resistances for the respective blocks are similar in construction and comprise each a length of suitable electrical resistance wire 80 mounted, see Fig. 6, on an open frame 81 of metal, at the upper end 82, and lower end 83 are wrapped insulation or fibre 84, 85, respectively and a sheet of insulation or fibre board 86 interposed between the resistance wire 80 and its switch member, say 49, see Fig. 6. The contacts 87^a, 87^b, etc., are metal contacts mounted in perforations in the insulating sheet 86, and respectively connected by strips 88^a, 88^b, etc., to different points of the resistance wire 80, for attaining the desired regulation of speed. The full contact 89, mounted in a perforation in the sheet 86, is connected by the strip 90 of conducting material to the binding post 36 leading to the inner rail 15 of a track block. The end of the resistance wire 80 is connected by the strip 91 of conducting material to the contact 89.

The contact 92, mounted similar to contacts 87^a, 87^b, is a "dead" contact, similarly as above. The pins 93, 94 are stops for the "off" and full "on" positions of the switch 44.

The frame 81 is mounted at its bottom in opposite notches in the vertical flanges of the oppositely disposed plates 95, 96, riveted or otherwise secured to the sheet 97 of insulation supported by the opposite end plates 98, 99. The outer casing 100 of the control device is of any suitable material and appropriately shaped for the purpose. The bottom of the casing 100 may be outwardly bulged, as indicated at 101, secured by rivets 102 to the casing proper 100.

At the front side of the casing 100 are disposed a set of pockets 103, see Figs. 3 to 6, inclusive, for reception of the cards 104 designating the blocks, similar to the cards 61 described in connection with the control device set forth in Fig. 2.

The respective frames 81 carrying the resistances 85 for the other respective blocks are assembled within the casing 100, as indicated in Figs. 3 and 4, in a manner similar to the resistance 80 for the block F, and a sheet 105 of insulation is interposed between the successive resistance units.

From the above, it will be perceived that the trackway is divided into any desired number of blocks and respectively of desired length or configuration, and the control device affords control of the speed or cessation of movement of one or more trains in the respective blocks.

My invention further affords varied play and interest for two or more trains on the same trackway whereby the movement of the

trains are respectively controlled to provide for different relative speeds or direction of travel of the trains.

In like manner, electric trains or other units may be controlled from a tower or like central location, to move the trains or other units along the trackway or sidings or the like, without the need of an operator on the trains, as is commercially practicable where the trains are within observation of the operator at the central location.

In carrying out the above invention, I prefer certain forms of clip connectors respectively for the outer rails and for the inner rail. In Figs. 8 and 9, I have shown one form of such clip connector, comprising a plate 110 of metal or like material having a flat base portion 111, a re-entrantly curved end portion 112 for engagement with one of the outer rails 14 and a double curved end portion 113 for the other outward rail 14. The double curved end portion 113 comprises the outwardly flared terminal portion 114 and the re-entrantly curved portion 115, the former facilitating the slipping of the outer rail past the terminal portion 114, after the opposite outer rail 14 has been disposed within the curve portion 112, and the re-entrant curve portion 115 serving to resiliently hold the base of the first named outer rail 14 in position. The base 111 is provided with the slot 116, see Fig. 9, through which projects the conducting strip 117 extending at its end portion 118 in contact with the base of the inner rail 15 and at its opposite end portion 119 is provided with an opening through which passes the post 120, threaded at its outer end to receive a nut and serving as a binding post. The strip 121 is of insulation and also passes through the slot 116, but below the conducting strip 117, see Fig. 8. The lowermost strip 122 is of insulation, and serves to carry the rivet 123 at one end and is provided with a suitable opening through which projects the head portion of the stem of the post 120. The plate 122 may be of greater width than the plates 121 and 117, to afford additional support and stability. Preferably, the conducting strip 117 is passed through spaced openings 124, 124ª, see Fig. 9, to lend additional rigidity to the combined clamp and connector.

In Fig. 10, I have illustrated an improved clip connector for the outer rails 14 while insulating the inner rail 15. The plate 125, of metal or like conducting material has the formation of the aforesaid plate 110, and like parts thereof are designated by the same reference numbers. The plate 126 is of insulation and is located at the upper face of the plate 125, to support and insulate the base of the inner rail 15 from the plate 125. The conductor strip 127 is directly secured to the plate 125, as by means of the rivet 128, which may also secure the insulating plate 126. The binding post 129 is directly connected to the conductor strip 127, to afford leading of the current to the two outer rails, 14, 14.

In Figs. 12 and 13 I have indicated an improved form of combined track and circuit switch, under control of a manually operated switching member, whereby the track switch may be thrown to one of two positions and the energization of the third rail correspondingly controlled.

In Fig. 12, the piece of track 130 comprises the usual outer rails 14, 14 and inner rail 15. Comparing Fig. 12 with Fig. 2, such piece of track 130 corresponds to the juncture of block F with block B on the straight-ahead and to block A on the track loop or siding. The track switch 131 corresponds accordingly to the track switch 49 indicated in Fig. 2, but in reversed position. The piece of track 132, similarly corresponds to the piece of track at the juncture of the block A with the track switch 131 and the piece of track 133 corresponds to the piece of track at the juncture of the block B with the track switch 131.

The track switch 131 proper is of the regulation or of any approved type, and comprises generally the third rail 134, insulated by the fibre strip 135, and connected at its end 136 by a conducting pin 137 to the inner track 15 of the block F; its end 138 is soldered to the inner rail portion 139, insulated at 140 and 141, and is also insulated at its end 142 by insulation pin 143 from the third rail of the block B. The end 144 of the third rail connector 134 is soldered to the third rail portion 145, which is insulated at 146 and at 147, and is also insulated at its end 148 by the pin 149 from the third rail 15 of the block A.

The switch frog 150, of the regulation type, is a plate, which extends upwardly from its face and is pivoted at 151 to the tie 152, and carries the curved rail 153 on one side and the straight rail 154 on the opposite side.

Pursuant to my invention, the switch frog 150 is connected to the link 155 by a pin 156 and slot 157′ connection, which link 155 at its opposite end is pivoted by the pin 156′, see also Fig. 13, to the lever 157. The handle 158 of the lever 157 projects through a suitable slot 159 in the housing 160. The throw lever 157 is fulcrumed on the pin 161 riveted in a suitable opening 162 in the plate 163 of the housing 160.

To the pin 156′ is also pivoted one end of a link 164, of a strip of insulation, the other end of which is pivoted by the pin 165 to the strip 166 of insulation. The pivot connection of the pin 156′ at its bottom 167 with the insulation link 164 is by means of the slot 168.

The insulating strip 164 carries the bridge contact 169, consisting of a strip of metal, the ends 170, 170 of which are passed through

openings in the fibre strip and bent back to hold the contact bridge piece 169 in position.

The strip 166, of insulation, carries the pair of spaced contacts 171, 172, located to be bridged by the bridge contact 169 when the fibre strip 164 is in its position as shown in Figs. 12 and 13, namely, when the switch frog 150 is in position to connect track piece 137, of block F in straight-ahead relation with the trackway of block B.

The strip 166 also carries a pair of spaced contacts 173, 174, see Fig. 12, to be bridged by the bridge contact 169 when the fibre strip 164 is in its opposite position, when the lever 158 has been shifted in the direction of the arrow 175, as indicated in Fig. 12, whereby the link 155 is shifted in the direction of the arrow 176, see Fig. 12. The slot 168 in the link 164 and the slot 156^a in the link 155 allow for lost motion in effecting the above shifting of position.

In such movement the pin 156′ moves within the arcuate slot 177 in the plate 163 of the casing 160.

Upon the hand lever 158 attaining its extreme position, limited by the length of the horizontal slot 159 in the casing 160, the switch frog 150 is rocked about its pivot, 151, clockwise as viewed in Fig. 12 from above, to position the frog 150 for connection of the track piece 130 of block F with the trackway of the siding or loop A.

The contact 171 of the pivoted insulating strip 166 is connected by the lead 179 to the binding post 180, which is connected by the lead 39 to the terminal 33 of the control device, see Fig. 2, corresponding to block B.

The contact 172 of the pivoted insulating strip 166 is connected by the lead 181 to the binding post 182, connected by the lead 183 to the third rail 15 of the trackway of block B, whereby the third rail of block B is energized when the switch frog 150 interconnects block B and block F, namely as shown in Fig. 12. It will be noted that for this position of the bridge contact 169 and the switch frog 150, the circuit is disconnected from the lead 38 to the third rail 15 of block A.

The contact 173 of the pivoted insulating strip 166 is connected by the lead 184 to the binding post 185, to which the lead 38 is connected, and the contact 174 of the pivoted insulating strip 166 is connected to the lead 186 to the binding post 187, to which is connected one end of the lead 188, the other end of which is connected to the third rail 15 of the block A, whereby upon the bridge member 169 being shifted to its other position, above noted, to interconnect the contacts 173, 174, and thereby energize the third rail of block A, through the bridge contact 169 the disconnection of contacts 171, 172 de-energizes the third rail of block B.

Accordingly, the manual shifting of the switch lever 158 serves to shift the switch frog 150 from one to the other of its positions and correspondingly controls the electrical circuit for the respective third rails.

For convenience of assembly of the strip 166, and insulation of the respective pairs of contacts 171, 172 and 173, 174, the strip 166 is mounted in spaced relation from the plate 163 of the casing 160 by rivets 190, see Figs. 12 and 13, the spacing from the plate 163 being attained by the sheet 191 of fibre or like insulation. The sheet 191 serves also as an abutment for the upper faces of the contacts 171, 172 and 173, 174, to effect pressure and thus secure intimate contact at the opposite faces of these contacts with the bridging contact 169 at its respective positions of engaging the aforesaid pairs of these contacts.

The insulating pins 143 and 149, respectively serving to insulate the third rail 15 of the block B from the third rail 139 of the trackway and to insulate the third rail 15 of the block A from the third rail 145 of the switch-out of the track switch are similar in construction and arrangement as the insulating pin 44′, shown in Figs. 7 and 7^a.

Referring to Fig. 2, showing the combination of a series of blocks and loops assembled to form the trackway, and also comprises a track switch and combined track and circuit switch, it will be perceived that upon setting the regulating arm of the rheostat 25 to control the desired maximum current supplied from the transformer 23, and upon setting the pivot switches 55^a—55^f to closing position, as shown in Fig. 2, the trackway of each block is correspondingly energized, excepting the block A or block B depending upon the setting or the manual lever 158 of the combined track and circuit switch. Accordingly, upon placing a train, say in the block B and a second train in, say, block A, both locomotives being faced to travel on the trackway in counterclockwise direction, as viewed from above in Fig. 2, either train is actuated according to the setting of the lever 158, and the other train is non-actuated if the switch lever 158 is properly set to either of its circuit closing positions, and only that train is actuated and continued over the trackway switch corresponding to the circuit closing position of the combined trackway and current switch member; this action takes place irrespective of whether the pivot switch 55^b is in its circuit closing position. The converse holds similarly true for the setting of the combined trackway and circuit closing switch in its opposite or other position.

From the above, it will be apparent that the speed of a train in any particular block or blocks is controlled independently of the other blocks and irrespective of the direction of travel of the train in any of the blocks; there is also provided common means

for controlling the two or more trains on the trackway whenever desired.

Whereas I have described my invention by reference to specific forms thereof it will be understood that many changes and modifications may be made without departing from the spirit of the invention.

I claim:

1. The combination of a trackway formed of a plurality of trackway sections; a "third rail" for each section; means for electrically insulating each "third" rail from the track rails of its section and from the "third rail" of adjacent trackway sections; a transformer providing a source of electrical energy and having two output terminals; a set of rheostats, each rheostat comprising an individual movable switch arm, a set of contacts, one of said contacts being wholly electrically insulated, a set of resistances connected serially with one another and taps extending respectively to the remainder of said sets of contacts; a main rheostat for controlling the current input to the entire system; a connection from one transformer terminal to the input terminal of said main rheostat; a connection from the output terminal of said main rheostat to said sets of resistances of said rheostats in common; leads respectively permanently connecting said individual switch arms with said "third rails"; and a conductor permanently connecting the track rails of said plurality of trackway sections with the remaining pole of said source of electrical energy.

2. The combination of a trackway formed of a plurality of trackway sections; a "third rail" for each section; means for electrically insulating each "third" rail from the track rails of its section and from the "third rail" of adjacent trackway sections; a transformer providing a source of electrical energy and having two output terminals; a set of rheostats, common means for unitarily insulating said rheostats, each rheostat comprising an individual movable switch arm, a set of contacts, one of said contacts being wholly electrically insulated, a set of resistances connected serially with one another and taps extending respectively to the remainder of said sets of contacts; a main rheostat for controlling the current input to the entire system; a connection from one transformer terminal to the input terminal of said main rheostat; a connection from the output terminal of said main rheostat to said sets of resistances of said rheostats in common; leads respectively permanently connecting said individual switch arms with said "third rails"; and a conductor permanently connecting the track rails of said plurality of trackway sections with the remaining pole of said source of electrical energy.

3. The combination of a trackway formed of a plurality of trackway sections connected to one another to form an endless trackway; a "third rail" for each section; means for electrically insulating each "third" rail from the track rails of its section and from the "third rail" of adjacent trackway sections; a transformer providing a source of electrical energy and having two output terminals; a set of rheostats, each rheostat comprising an individual movable switch arm, a set of contacts, one of said contacts being wholly electrically insulated, a set of resistances connected serially with one another and taps extending respectively to the remainder of said sets of contacts; a main rheostat for controlling the current input to the entire system; a connection from one transformer terminal to the input terminal of said main rheostat; a connection from the output terminal of said main rheostat; to said sets of resistances of said rheostats in common; leads respectively permanently connecting said individual switch arms with said "third rails"; and a conductor permanently connecting the track rails of said plurality of trackway sections with the remaining pole of said source of electrical energy.

4. The combination of a trackway formed of a plurality of trackway sections, certain of said sections being connected to one another to form a continuous trackway and a remaining section having track rails adapted as a trackway extending laterally of said continuous trackway and further including a "third rail" insulated therefrom; a switch trackway section including a movable track rail; a manually operable switch lever; a "third rail" for each section; means for electrically insulating each "third" rail from the track rails of its section and from the "third rail" of adjacent trackway sections; a source of electrical energy; a set of rheostats, each rheostat comprising an individual movable switch arm, a set of contacts, one of said contacts being wholly electrically insulated, a set of resistances connected serially with one another and taps extending respectively to the remainder of said sets of contacts; a lead connecting one pole of said source of electrical energy to said sets of resistances of said rheostats in common; leads respectively permanently connecting said individual switch arms with said "third rails"; electrical switch means disposed adjacent said switch trackway section and operable by said switch lever for connecting said "third rail" of said remaining section to energize the same from said source of energy and de-energize the "third rail" of an adjacent section when said movable track rail is moved to connect the track rails of said remaining section with said continuous trackway; and a conductor permanently connecting the track rails of said plurality of trackway sections with the remaining pole of said source of electrical energy.

5. The combination of a trackway formed of a plurality of trackway sections, certain of said sections being connected to one another to form a continuous trackway and a remaining section having track rails adapted as a trackway extending laterally of said continuous trackway and further including a "third rail" insulated therefrom; a switch trackway section including a movable track rail and further including a "third rail" in substantial alignment with the "third rail" of said remaining section; a manually operable switch lever; a "third rail" for each section; means for electrically insulating each "third" rail from the track rails of its section and from the "third rail" of adjacent trackway sections; a source of electrical energy; a set of rheostats, each rheostat comprising an individual movable switch arm, a set of contacts, one of said contacts being wholly electrically insulated, a set of resistances connected serially with one another and taps extending respectively to the remainder of said sets of contacts; a lead connecting one pole of said source of electrical energy to said sets of resistances of said rheostats in common; leads respectively permanently connecting said individual switch arms with said "third rails"; electrical switch means disposed adjacent said switch trackway section and operable by said switch lever for connecting said "third rail" of said remaining section to energize the same from said source of energy and de-energize the "third rail" of an adjacent section when said movable track rail is moved to connect the track rails of said remaining section with said continuous trackway; and a conductor permanently connecting the track rails of said plurality of trackway sections with the remaining pole of said source of electrical energy.

6. The combination of a trackway formed of a plurality of trackway sections, certain of said sections being connected to one another to form a continuous trackway and a remaining section having track rails adapted as a trackway extending laterally of said continuous trackway and further including a "third rail" insulated therefrom; a switch trackway section including a movable track rail and further including a "third rail" in substantial alignment with the "third rail" of said remaining section and with the "third rail" of the adjacent trackway section of said continuous trackway; a manually operable switch lever; a "third rail" for each section; means for electrically insulating each "third" rail from the track rails of its section and from the "third rail" of adjacent trackway sections; a source of electrical energy; a set of rheostats, each rheostat comprising an individual movable switch arm, a set of contacts, one of said contacts being wholly electrically insulated, a set of resistances connected serially with one another and taps extending respectively to the remainder of said sets of contacts; a lead connecting one pole of said source of electrical energy to said sets of resistances of said rheostats in common; leads respectively permanently connecting said individual switch arms with said "third rails"; electrical switch means disposed adjacent said switch trackway section and operable by said switch lever for connecting said "third rail" of said remaining section to energize the same from said source of energy and de-energize the "third rail" of an adjacent section when said movable track rail is moved to connect the track rails of said remaining section with said continuous trackway; and a conductor permanently connecting the track rails of said plurality of trackway sections with the remaining pole of said source of electrical energy.

7. The combination of a trackway formed of a plurality of trackway sections, certain of said sections being connected to one another to form a continuous trackway and a remaining section having track rails adapted as a trackway extending laterally of said continuous trackway and further including a "third rail" insulated therefrom; a switch trackway section including a movable track rail and further including a "third rail" in substantial alignment with the "third rail" of said remaining section; a manually operable switch lever; a "third rail" for each section; means for electrically insulating each "third" rail from the track rails of its section and from the "third rail" of adjacent trackway sections; a source of electrical energy; a set of rheostats, each rheostat comprising an individual movable switch arm, a set of contacts, one of said contacts being wholly electrically insulated, a set of resistances connected serially with one another and taps extending respectively to the remainder of said sets of contacts; a lead connecting one pole of said source of electrical energy to said sets of resistances of said rheostat in common; leads respectively permanently connecting said individual switch arms with said "third rails"; electrical switch means disposed adjacent said switch trackway section and operable by said switch lever for alternately connecting said "third rail" of said remaining section and relative to the "third rail" of an adjacent section of said continuous trackway and the "third rail" of said remaining section respectively with said

source of electrical energy and simultaneously respectively connecting said movable track rail with a track rail of said adjacent trackway section and a track rail of said remaining section; and a conductor permanently connecting the track rails of said plurality of trackway sections with the remaining pole of said source of electrical energy.

8. The combination of a main trackway section, a third rail section for said main trackway section, insulating means for said main third rail section, a siding trackway section, a third rail section for said siding trackway section, insulating means for said siding third rail section, a trackway section disposed adjacent said siding trackway section and posterior of said main trackway section, a third rail section for said posterior third rail section, a source of current, individual means for controlling the current supplied respectively to said main third-rail section, said siding third rail section and to said posterior third rail section, a trackway switch for connecting and disconnecting said siding trackway section relative to said posterior trackway section and relative to said siding trackway section, said trackway switch comprising a movable track member, a multiple third rail member disposed adjacent the tracks of said trackway switch, insulating means for said multiple third rail member, means for insulating said multiple third rail member from said siding third rail section, means for insulating said multiple third rail member from said posterior third rail section, a group of contacts, a conductor leading from one contact of said group of contacts to said siding third rail section, a conductor leading from a second contact of said group of contacts to said posterior third rail section, a conductor leading from a third contact of said group of contacts to said source of current, and common means for operating said movable track member and contacts simultaneously to energize the siding third rail section when the switch is positioned to connect with the siding trackway section, at the same time de-energizing said posterior third rail section, or to energize said posterior third rail section when the switch is positioned to communicate with said posterior trackway section and simultaneously to de-energize said siding third rail section.

In testimony whereof I have signed this specification this 12th day of March, 1924.

EVERETT W. SWARTWOUT.