March 28, 1950 A. W. HAGEMAN 2,502,149

RAILWAY SWITCH

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FIG. 1.

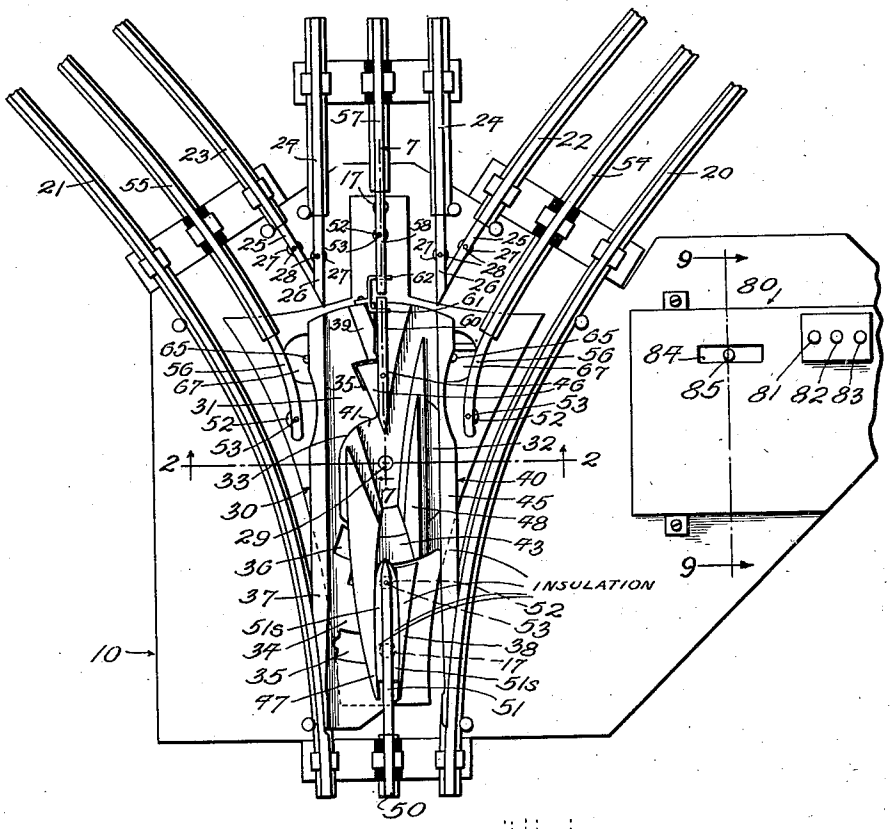


FIG. 2.

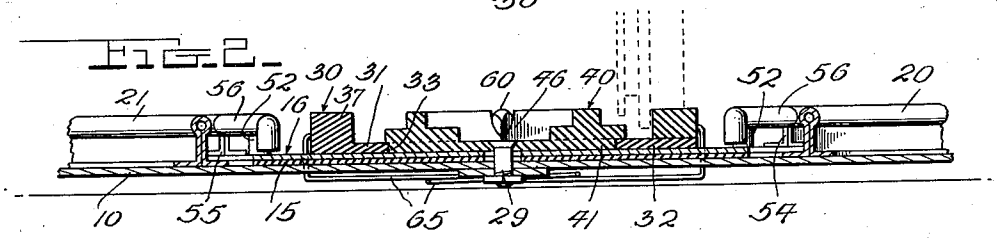
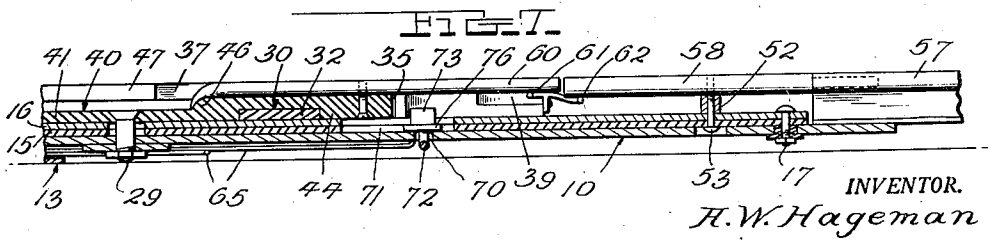


FIG. 7.



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RAILWAY SWITCH

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FIG. 3

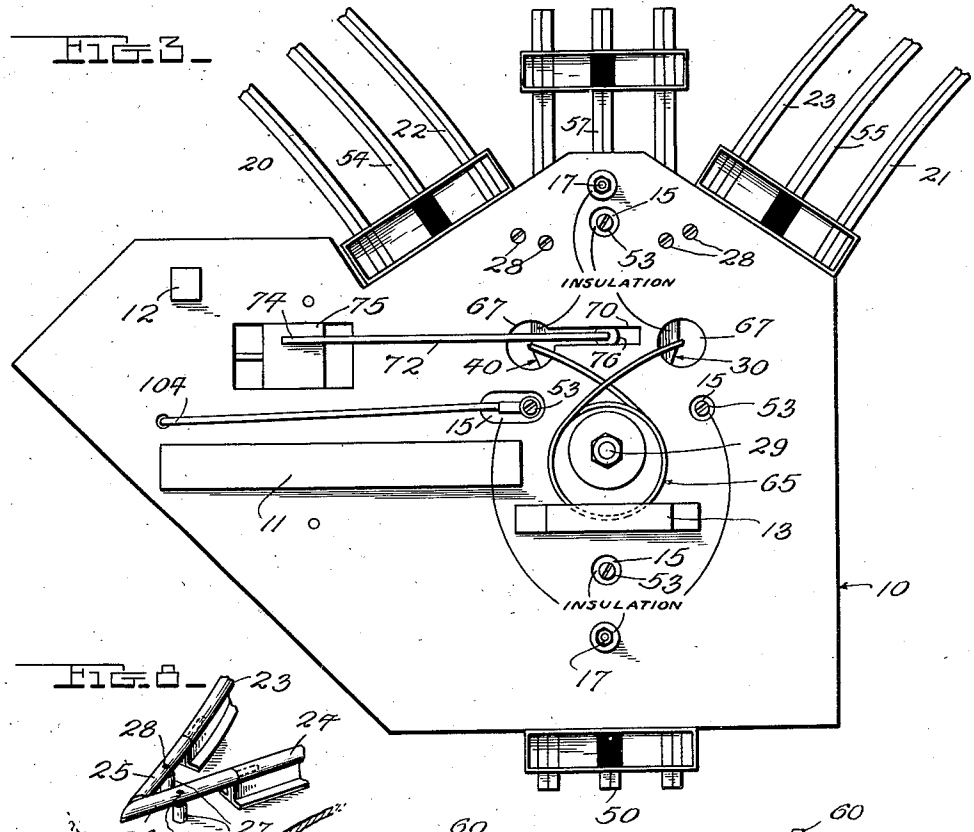


FIG. 6

FIG. 5

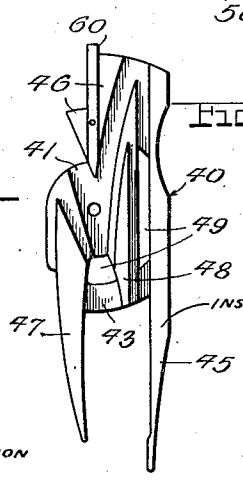


FIG. 4

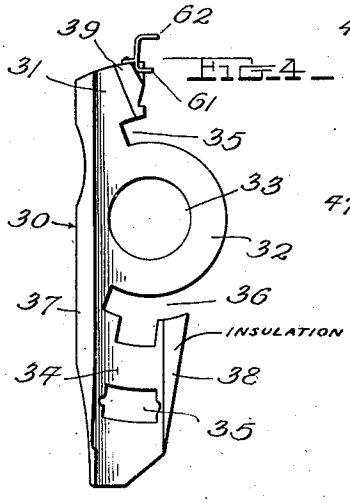
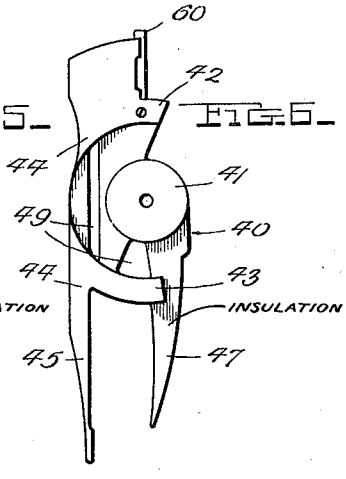


FIG. 6



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FIG. 10

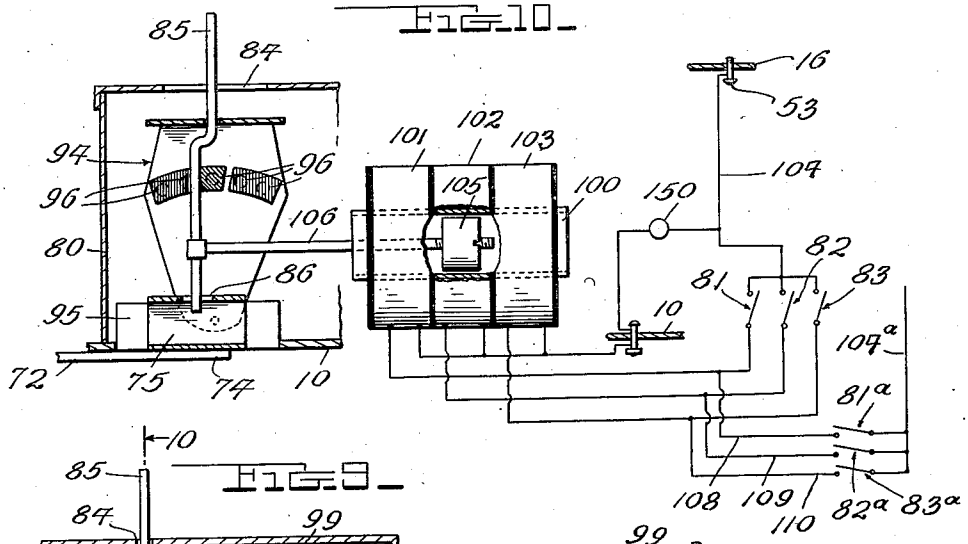


FIG. 9

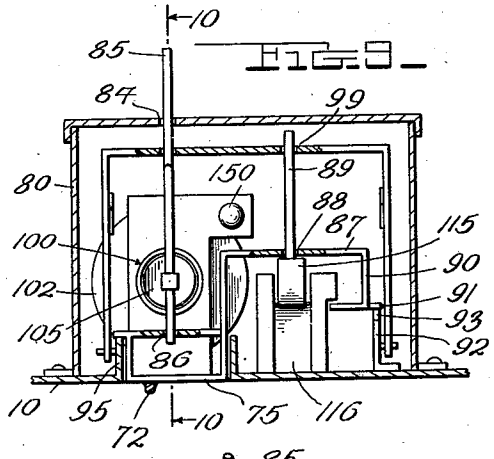


FIG. 12

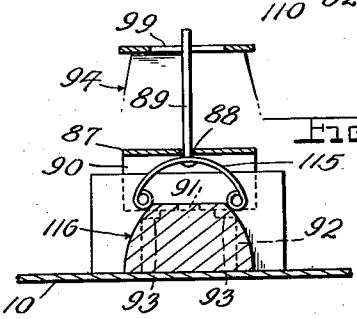


FIG. 11

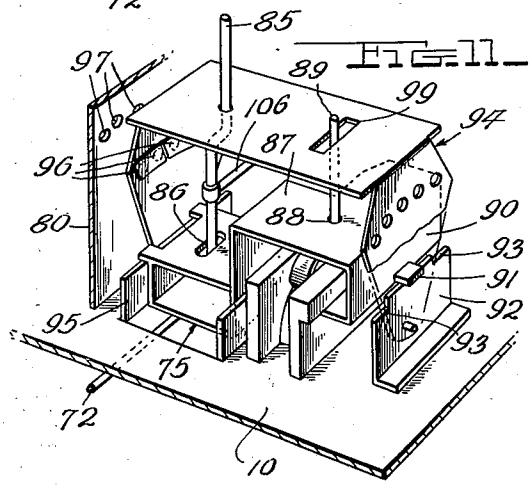


FIG. 13

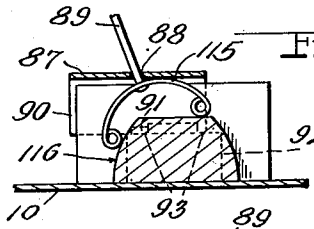
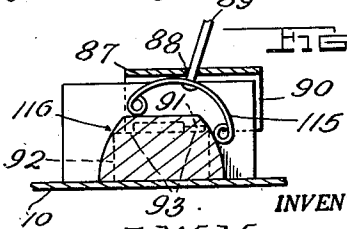


FIG. 14



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UNITED STATES PATENT OFFICE

2,502,149

RAILWAY SWITCH

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Application October 26, 1945, Serial No. 624,850

10 Claims. (Cl. 246—440)

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This invention relates to a railway switch and is herein illustrated as applied in a toy railway structure having turnouts at each side of a central track.

One of the features of the invention is the provision of a switch in which the selection of direction of train passage is accomplished by movement of parts which are interfitted for relative rocking about a common center, and in which each rockable part includes connective structures lying beneath the wheel tread plane and rail portions projecting into said plane for receiving and guiding the wheels.

Another feature is the provision of a pair of rockable parts each having upwardly extending rail portions which act, in selected positions relative to one another and to stationary track elements, for guiding the train wheels for passage to the middle track or by turnout to a selected side.

A further feature is the provision of a switch structure in which rockable means selectively determine the movement of a train to the middle track or by turnout to a selected side, together with a selective actuator and locking structure for positioning said parts.

With these and other features as objects in view, as will appear in the course of the following description and claims, an illustrative form of practicing the invention is shown on the accompanying drawings, in which:

Fig. 1 is a top plan view of a toy railway switch embodying the invention;

Fig. 2 is a view of the parts at the section line 2—2 of Fig. 1;

Fig. 3 is a bottom view;

Fig. 4 is a top view of a rockable part;

Figs. 5 and 6 are respectively top and bottom views of another rockable part;

Fig. 7 is a view of the parts at the section line 7—7 of Figs. 1 and 3.

Fig. 8 is a perspective view of a frog point;

Fig. 9 is an upright section through the illustrated actuating and locking device, essentially on line 9—9 of Fig. 1;

Fig. 10 is an upright section, essentially on line 10—10 of Fig. 9, with the electrical circuits indicated;

Fig. 11 is a perspective view of the slide, locking piece, rocker, and associated elements with a part of the rocker broken away for clearness; and

Figs. 12 to 14 show the locking and unlocking elements in the several switch positions.

In these drawings, a main base plate 10 is

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supported and stiffened by bottom members 11, 12, 13 so that it is supported above the floor or table upon which the railway system is mounted.

An insulating sheet 15 is positioned on top of plate 10; and upon it in turn is a second metal plate 16. Plates 10 and 16 are clamped upon the sheet 15 by the bolts 17 but kept insulated from one another by insulated bushings, (Fig. 7). This construction is employed in the illustrated employment with a toy railroad in which the outer or tread rails are of one polarity while the central or power rail is of the other polarity and serves to prevent short-circuiting. The illustrated form shows and describes the middle track as "straight" or alined with the approach rails, but it will be understood that this is not restrictive.

The outer curved rails 20, 21 are secured electrically and mechanically to the plate 10, and are continuous. The stubs 22, 23 of the other rails leading to the turnouts, and the stubs 24 of the straight-through track are likewise electrically and mechanically connected to the plate 10. In the preferred construction (Fig. 8) these stubs are joined in pairs to form the frog point by bars 25, 26, which are received at one end in the usual hollow rail head of the stub, are supported intermediate the ends by posts 27 fastened by screws 28 to the plate 10, and at the other end are beveled to provide the frog point.

Two parts shown generally at 30, 40 in Figs. 4 to 6, are each rockable about an axis defined by the central pivot 29 (Fig. 3). These parts are illustrated as being insulating material for a toy railway of the type illustrated.

The part 30 (Fig. 4) has a number of parts located in a plane and resting upon the insulated plate 16: comprising a web portion 31, a ring portion 32 providing a central hole 33 concentric with the axis of rocking, and a second web portion 34 having an aperture 35. The web portions 31, 34 are spaced from the ring portion 32 by arcuate slots 35, 36. A straight rail portion 37 extends upwardly from the web and ring portions along the length of the part; short rail portions 38, 39 likewise extend upwardly therefrom and provide parts of the track for the left-hand turnout. The rail portions 37 and 38 provide switch points for "through" and left-hand turnout, respectively. These rail portions are illustrated as integral with the web and ring portions; and the rockable part may be formed as a single unit by molding a suitable plastic such as synthetic resin.

The part 40 (Figs. 5 and 6) has a central disk

41, the arcuate ring segments 42, 43 and the web portion 44 for resting upon the insulated plate 16. A straight rail portion 45 extends upwardly from the web portions, together with an inner frog point 46 and the short rail portions 47, 48 which respectively form parts of the track for right-hand and left-hand turnouts. The rail portions 45 and 47 provide switch points for "through" and right-hand turnout, respectively. These short rail portions are also connected to the segments 42, 43 to stiffen the assembly. This part 40 is also illustrated as being in one piece, formed by molding a plastic.

Where the switch is constructed for toy trains having large drive gears adjacent the wheels, as shown by dotted lines in Fig. 2 the short rail portions may be cut away at the guard-rail sides, to allow free passage, as shown in the figures.

When made for toy trains, the distance between the tops of the rails and the top of the plate 10 should be equal to the height of normal track rails 20, 21; and hence the interfitting of the web portions of parts 30, 40 permits a minimum total height with a maximum thickness of the web portions. To this end, the slots 35, 36 represent cutting away the webs in part 30, and openings 49 occur through the part 40.

When the parts 30, 40 are fitted together (Fig. 2) the web portions lie in the same plane so that the upper surfaces thereof define the bottoms of grooves provided to receive the wheel flanges, and the tops of the rail portions likewise lie in a plane and serve to receive the wheel treads.

In the illustrated form, with a central third rail, the third rail 50 at the approach to the switch is extended by a bar 51 which is connected electrically and mechanically by a post 52 and screw 53 to the insulated plate 16 (Figs. 1 and 2), this bar 51 thus overlying the web 34 of part 30 but terminating short of the path of train wheels which are making either turnout; with lateral insulation 51s to prevent contact by the metal train wheels or auxiliary electrical equipment as the train is making a turn out. The stubs 54, 55 at the turnouts are extended by bars 56 which curve toward the rails 20, 21 so that their ends are closer in the horizontal plane to the end of bar 51 for decreasing the gap; the bars 56 have their tops curved or beveled downward at the free end to give a smooth sliding surface for the collector brushes; and the bars 56 are connected by similar posts 52 and screws 53 to the plate 16. The stub 57 of the "through" track likewise is extended by a bar 58 similarly connected by a post 52 and screw 53. When the structure is provided for trains having a single collecting brush, or with two brushes spaced a lesser distance than the gap between bars 51 and 58, a metal contact rail portion 60 is carried by the part 40: the part 30 carries at a point outside of wheel tread or flange contact, an insulated connector spring having one arm 61 to engage the bar 60 and a second arm 62 to engage the rail portion 58 when the parts 30, 40 are in position for "straight-through" passage of a train, whereby the rail portion 60 is energized, and it will be noted that if either part 30 or 40 is in position for a turnout, the connector spring opens the connection so that portion 60 is not energized, and hence this portion 60 does not cause short-circuiting upon passage of the train for a turnout.

Beneath the plate 10 is a spiral coil spring 65

having its central portion guided by the bridge 13 and having its ends extended upwardly through holes 67 in the plates 10, 16 and insulation 15, with the upper terminals turned toward one another and engaged in the parts 30, 40. This illustrated engagement is at the frog side of the axis, so that the effect of the spring is to cause the switch point ends of rail portions 37, 45 to move into engagement with the rails 21, 20.

A slot 70 in base plate 10 underlies a wider slot 71 in the insulated plate 16 and the sheet 15. A switch link 72 has an upturned end 73 positioned between the parts 30, 40. The other end 74 of the link is secured to the switch actuating slide 75. The washer 76 fits the end 73 and holds it above the plate 10.

The switch actuator and lock acts upon the switch link 74. In the illustrated form, the parts are within a housing 80 having the three electric switch levers 81, 82, 83 on its top, and a slot 84 through which extends the actuator 85 for manually actuating the switch. The housing 80 is positioned on the plate 10, and the latter is dimensioned and arranged so that the housing is cleared by a passing train. The illustrated form of plate 10 permits additional like switch units to be connected at the ends of the tracks formed by the rail stubs, with clearance between the switch parts themselves, and clearance by the trains.

With the illustrated parts, the switch can be moved selectively to any of its three positions either by mechanical movement of the actuator 85 by hand, or by electric means.

Within this housing 80 is mounted for sliding movement the slider 75 which has a slot 86 in its top (Figs. 10 and 11) into which the lower end of actuator 85 extends. The slider has a lateral extension 87 having a hole 88 in which loosely fits the unlocking lever 89, and also having the down-turned skirt 90 with the locking lug 91 which cooperates with the locking piece 92 fastened to the top of the plate 10, and having end notches 93.

The coupling rocker 94 is pivoted adjacent its lower end to a flange 95 turned up from the plate 10 and to the piece 92. Its sides have five openings 96 each, the center opening of each set being covered by a green light-filter, and the two end openings of each being covered by a red light-filter: these openings being selectively revealed in three openings 97 in each side of the housing 80 as the rocker is in one of its end positions or in its center position. The actuator 85 fits closely in a hole in the rocker: while the unlocking lever 89 is received in a slot 99.

For electrical actuation, a tube 100 supports three axially spaced coils 101, 102, 103 and guides the iron solenoid core 105 which is rigidly connected by threaded brass rod 106 to the actuator 85: the core can be adjusted along the rod so that when the core is drawn within the central energized coil 102, the actuator is in a predetermined corresponding position. Electrically, one terminal of each coil is connected to ground, that is, to the plate 10. The other terminal of each coil is connected to a selected one of the switches 81, 82, 83, and thence by conductor 104 to the insulated plate 16. When remote control is desired, the conductors 108, 109, 110 can be carried to a panel having switches 81*a*, 82*a*, 83*a*, and thence by a conductor 104*a* to the general conductor which leads to the central third rail, in the illustrated form.

The unlocking lever 89 is connected at its lower end, below the extension 87, to a sliding lifter having curls at its ends and operating against a cam piece 116. This cam 116 is fixed to plate 10 and has a flat top shorter than the span between the curled ends of the lifter 115, and having sloping end surfaces shown as convex curves leading from the flat top, (Figs. 12–14). When lifter 115 is in the end positions of Figs. 13 and 14, the extension 87 is lowered, and the locking lug 91 engages one of the notches 93; while in the centered position of lifter 115 (Fig. 12) the extension 87 is raised, so that the lug is clear of the locking piece 92.

An electric lamp bulb 150 is supported from the plate 10 and within the rocker 94 for illuminating the filters 96 opposite the holes 97. This bulb may be connected electrically as shown in Fig. 10.

The operations of operating and locking the track switch are as follows:

It will be assumed that the mechanical parts are in position for passage of a train along the central set of rails. That is, the parts 30, 40 have the switch points 37, 45 engaged with rails 21, 20, and the switch points 38, 47 correspondingly withdrawn toward the center; as shown in Fig. 1. The parts are held in this position by the action of the spiral spring 65 upon the parts 30, 40, and by the engagement of the end curls of the lifter 115 with the ends of cam piece 116. The actuator 85 is near the center of slot 84, and the rocker 94 is in central position. The rod 106 positions core 105 within coil 102. The openings 96 and their filters cause "red-green-red" to show at the housing openings 97, thus indicating that "central" passage is ready.

If it is desired to effect turnout toward the right, the actuator 85 is moved toward the right in slot 84 (Figs. 1 and 10), either by hand or by closing a switch 83 or 83*a* so that the corresponding coil 103 is energized to draw the core 105 toward the right. During the first part of the movement of the actuator 85, it moves freely in the slot 86 of the slider 75 and does not move the track switch link 72: but at its upper end, it causes a positive movement of the unlocking rocker 94 clockwise in Fig. 10. This phase of free movement of the rocker 94 continues essentially until the end wall of its slot 99 engages the upper end of the unlocking lever 89, shortly before which event the actuator 85 also comes to the end of the slot 86 in the slider 75 and moves this slider and its extension 87 toward the right. Thereafter, for a short transit the upper and lower ends of the unlocking lever 89 are both being pushed toward the right (Fig. 12) at the same linear rate. The right-hand end of the lifter 115 passes down the right-hand end slope of cam piece 116, from the position of Fig. 12 toward that of Fig. 14, with a relative clockwise rocking and downward movement of the lever 89 toward the position of Fig. 14; during which rocking of the lever 89 its upper end moves in the slot 99 at a rate greater than the movement of the rocker 94. The continued movement of the extension 87 is thus without resistance by the locking lever 89 and brings the locking lug 91 past the end of the locking piece 92, whereupon the weight of the slider 75 and extension 87 causes the lug 91 to drop into the end notch 93 because the only prevailing support for this weight is then at the engagement of the slider 75 on the flange 95. The switch link 72 is moved with the slider to change the switch points. It will be noted that

the actuator 85, the link 72, and the lug 91 are spaced from one another in a direction transverse to the slider movement, so that a minor springing or bending is produced in the link 72 in a horizontal plane and of the actuator 85 whereby to assure that the lug 91 will engage its notch 93 and that any looseness at the switch points is taken up. The end 73 of the link pushes part 40 in a clockwise direction about the pivot axis 29, thereby withdrawing switch point 45 from rail 20 and moving switch point 47 into engagement with the rail portion 37 of part 30: simultaneously the part 40 also moves rail portion 46 until it is alined with rail stub 22, and moves third rail portion 60 out of contact with the energizing connector spring arm 61. This is done against the action of spiral spring 65. The openings 96 show "red-red-green" through the housing 80, indicating that the right-hand turnout is set. The lug 91 engages the notch 93, and holds the track parts against return movement when the supply of energy to the actuator by hand or by the selected coil 103 ceases.

If it is now desired to reset the track switch for "central" passage the actuator 85 is pushed back toward the center, either manually or by closing switch 82 or switch 82*a*. The rocker 94 is immediately moved, but the actuator 85 has an initial free movement in the slot 86 of slider 75: the rocker moves lever 89 so that the left end of the lifter 115 pivots on the cam piece 116 and raises the extension 87 and releases the lug 91 from its locking notch 93. The action of spring 65 and of the actuator now moves the part 40 back again, until switch point 45 engages rail 20 and switch point 47 is clear, and the rail portion 45 also passes to alinement with the stub 24 and contact rail 60 encounters spring arm 61 and becomes energized. The coil 102 has been moving the core 105 toward the left, thus activating the actuator 85 and the rocker 94 initially; and the combined action of the spring 65 and the core 105 cause the resetting of the switch points together with a movement of the slider 75 so that the lever 89 is carried to the position of Fig. 12. The rocker openings 96 show "red-green-red" again.

If it be desired to prepare a left-hand turnout, the actuator 85 is moved to its left-hand limiting position either manually or by closing switches 81 or 81*a* to energize coil 101. If the action is initiated from the right-hand turn-out condition, the initial action is as described above for return to "central" passages, but the continued movement of the actuator 85 moves the lifter 115 from the position of Fig. 14 into that of Fig. 13. If the action is initiated from "central" passages, the lifter 115 passes from the position of Fig. 12 to that of Fig. 13. In either event, as the actuator 85 passes its central position, the rocker 94 and lever 89 travel with it, and the slider 75 and link 72 are moved toward the left until the lug 91 drops into its other end locking notch 93. Meanwhile the part 40 remains in position with its switch point 45 engaged with rail 20, but part 30 is rocked counter-clockwise about the axis 29 until the switch point 37 is withdrawn from rail 21, and switch point 38 is brought to contact with rail portion 45. At the same time, the rail portion 39 is moved into alinement with the frog bar 25 in extension of rail stub 23, and with the rail portion 46 on the part 40, it being noted that the switch point 38 is also then alined with rail portion 46 and 48. The movement of the connector spring separates its arms 61, 62 from

the third rail portions 60, 58, so that 60 is de-energized. The holes 96 of the rocker show "green-red-red" through the housing 80, indicating a turnout to the left.

Return from left-hand turnout is similar to that from right-hand turnout. The locking lug 91 is lifted by the action of lever 89 and lifter 115, and the slider is thus released.

While one preferred form has been illustrated by way of detailed practice, it is obvious that the invention is not limited thereto, but many forms may be employed within the scope of the appended claims.

I claim:

1. A track switch for selective passage to a right, a central and a left track, comprising rails which provide said tracks and have been cut away between the switch point positions and the frog positions, a pair of rockable parts pivoted intermediate the switch point and frog positions, one said rockable part having rigidly fixed thereto switch points for the left and central tracks, the other said rockable part having fixed thereto switch points for the right and central tracks, each rockable part having rigidly fixed thereto rail portions extending from the switch points and constructed and arranged to cooperate in selected positions of the rockable parts to procure the selected passage, and means effective to selectively move the rockable parts to and hold each of them in one of two individual positions.

2. A track switch comprising a base, rails and rail stubs on said base for providing for selective passage to a right, a central and a left track, two rockable parts pivotally mounted on said base, and individually movable between end positions, one said rockable part having rigidly fixed thereto switch points for the left and the central track, the other said rockable part having rigidly fixed thereto switch points for the right and the central track, means effective to normally move the rockable parts oppositely whereby the central passage is selected, and means effective for selectively moving one of said rockable parts of its other end position whereby to procure passage to the right or the left track, said rockable parts having rail portions thereon to complete the rail transit from the switch points to the selected track.

3. A track switch as in claim 2, in which the rockable parts are mounted on a common pivot axis and comprise web portions lying in the same horizontal plane for rocking movement relative to one another and to the base, said portions being located between the path of car wheel flanges, and rail and switch point portions secured to said web portions and extending upward therefrom.

4. A track switch as in claim 2, for a central third rail electric railway, in which a third rail section extends between the right and he left switch points of said rockable parts, one said rockable part being cut away opposite the said third rail section, the other rockable part having a web extending between its switch points at a level between the third rail section and the base, said web having an aperture, and a support connected to the base and the third rail section and passing through said aperture.

5. A track switch comprising rails and rail stubs and a rockable part effective for selecting a direction of passage and having switch points thereon, and means effective to move said rockable part and hold the same in moved position; said means including a slider having a slot of limited length, an actuator slidable along said slot, a rocker constructed and arranged to move with said actuator, a fixed piece having a locking notch, said slider having a lug engageable with said notch, and means moved by said rocker for shifting said slider preliminary to sliding movement thereof whereby to release the lug from the notch, and a link connected to said slider and to said rockable part to move the said rockable part.

6. A track switch for selective passage to a right, a central and a left track, comprising a base, outer rails on said base, a pair of rockable parts pivoted on said base at a common upright axis between the switch point portions and the frog positions, switch points and rail portions connected to one rockable part for the left and central tracks, switch points and rail portions to the other rockable part for the right and central track, track connections including frogs on said base effective for providing continuity of said tracks from the rockable parts, and means for selectively moving said rockable parts.

7. A track switch for selective passage to a right, a central and a left track, comprising a base, outer rails on said base, two rockable parts pivoted on said base at a common upright axis, rail portions and switch points for the left and central tracks connected to one said rockable part, rail portions and switch points for the right and central tracks connected to the other said rockable part, the rail portions on one said rockable part being formed with a first frog for the right and left tracks, a second frog on the base for the central and left tracks, a third frog on the base for the central and right tracks, said rockable parts in each end position providing continuity of passage for car wheels over switch points and rail portions and one or the other of said second and third frogs, and means for moving each rockable part from one end position to the other.

8. A track switch for selective passage to a right, a central and a left track, comprising a base, outer rails on said base, two rockable parts pivoted on said base intermediate frog and switch point positions, said rockable parts having upwardly extending rail portions providing elements of the right, central and left tracks, a first frog on a rockable part formed by the rail portions thereof for the right and left tracks, switch points on one said rockable part for the left and central tracks, switch points on the other said rockable part for the right and central tracks, a second frog on the base for the central and left tracks, the said one rockable part in its end positions presenting rail portions selectively aligned with said second frog for car wheel transit to the central or left tracks, a third frog on the base for the central and right tracks, the said other rockable part in its end positions presenting rail portions selectively aligned with said third frog for car wheel transit to the central or right tracks, and means for moving the rockable parts to said selective positions.

9. A track switch for selective passage to a central and to right and left side tracks, comprising a base, outer rails on said base, two rockable parts pivoted on said base, one rockable part including a central track rail portion and switch point at one side of its axis, a left track switch point at the other side of its axis, and a left track rail portion rearward of said axis, the other rockable part including a central track rail portion and switch point at one side of its axis, a

right track switch point at the other side of its axis, and a right track rail portion rearward of said axis, two frogs on the base positioned for selective cooperation with said rail portions in the end positions of movement of the rockable parts, one said rockable part also having thereon a frog connected with the side track rail portion thereon and also having a further rail portion connected with said frog for selective alignment with the rearward rail portion on the other rockable part, and means for selectively moving said rockable parts.

10. A track switch comprising a base, rails and rail stubs on said base for providing for selective passage to a right, a central and a left track, two rockable parts pivotally mounted at a common upright axis on said base and individually movable between end positions, one said rockable part having switch points for the left and central tracks, the other said rockable part having switch points for the right and central tracks, the rockable parts having rail portions thereon to complete the rail transit from the switch points to the selected track, a spring engaged with said parts for rocking them in opposite directions for presenting the switch points in position for central track transit, means for

selectively moving said rockable parts against the action of said spring whereby to present the switch points in position for right or left track transit, and means for holding the rockable parts in the thus-moved positions.

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