

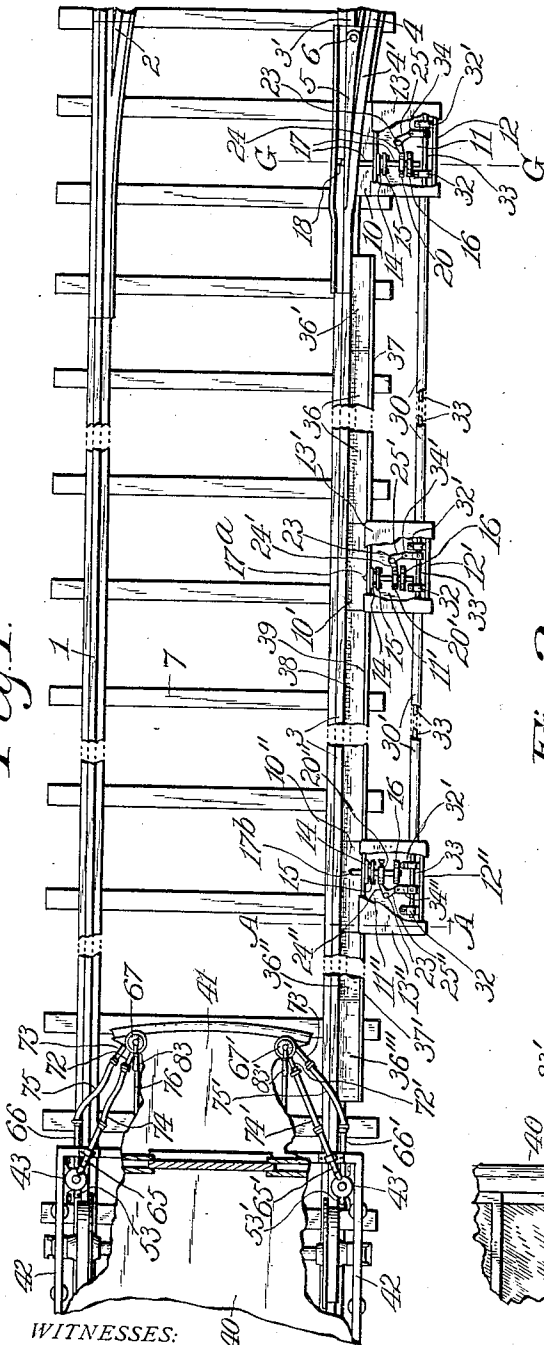
N. B. MITCHELL & J. W. TAGGART, SR.
 SWITCH OPERATING MECHANISM.
 APPLICATION FILED MAY 31, 1911.

1,042,812.

Patented Oct. 29, 1912.

3 SHEETS—SHEET 1.

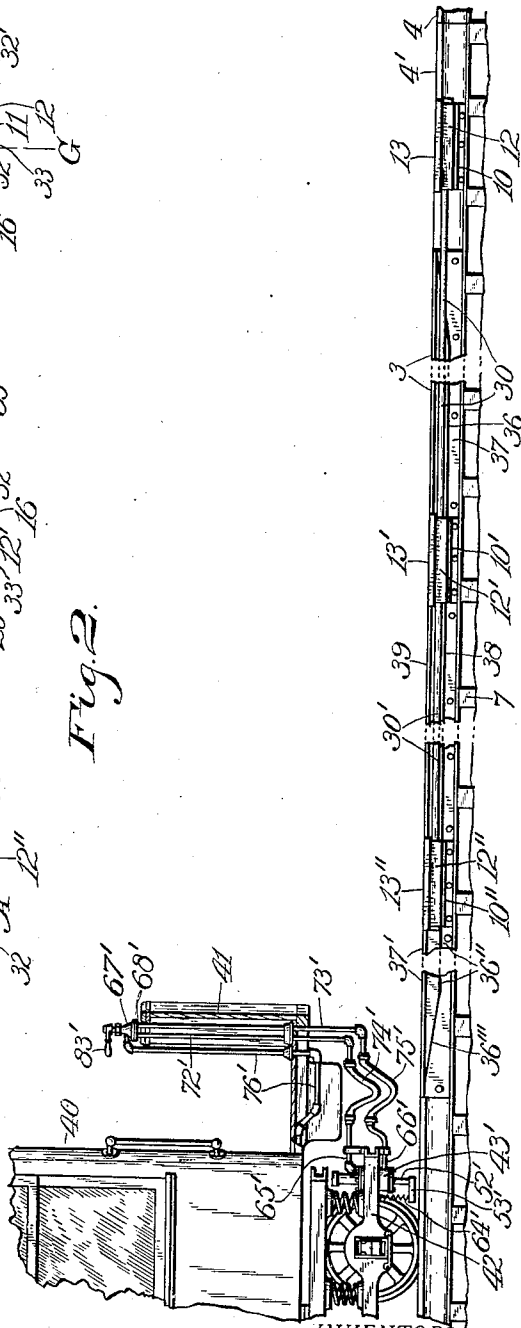
Fig. 1.



WITNESSES:

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 G. W. Poyner.

Fig. 2.



INVENTORS:

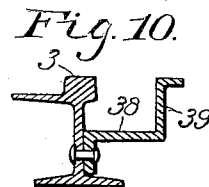
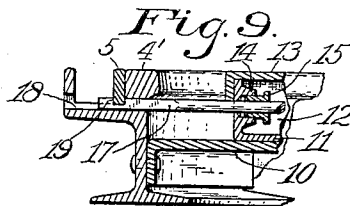
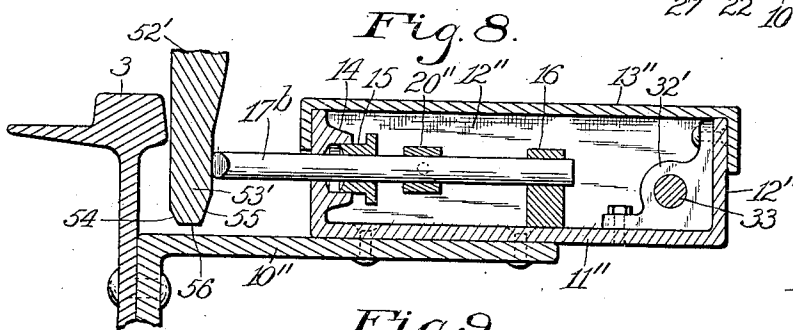
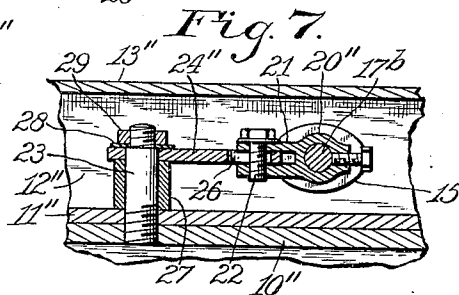
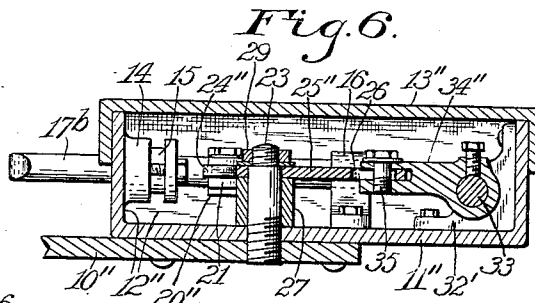
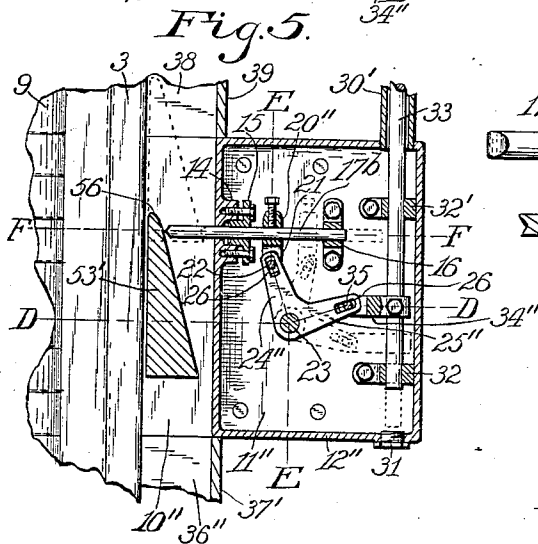
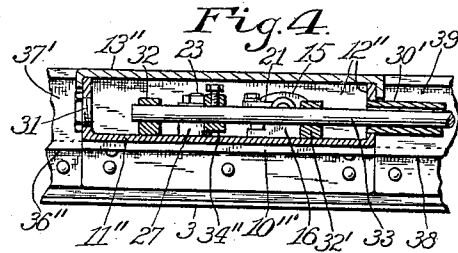
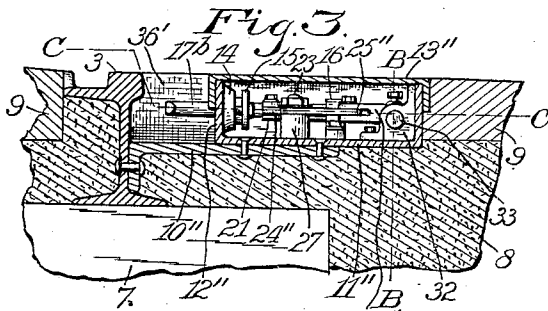
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3 SHEETS—SHEET 2.



WITNESSES:

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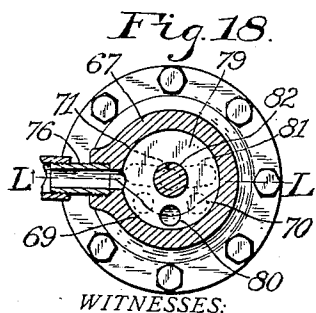
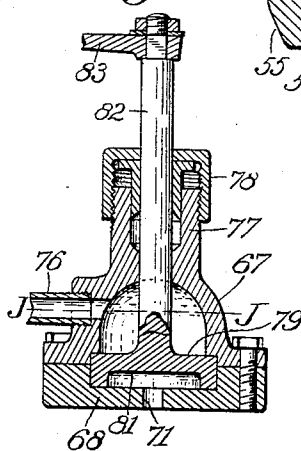
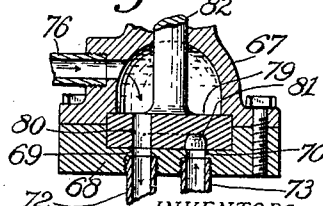
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3 SHEETS—SHEET 3.



WITNESSES:

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UNITED STATES PATENT OFFICE.

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SWITCH-OPERATING MECHANISM.

1,042,812.

Specification of Letters Patent.

Patented Oct. 29, 1912.

Application filed May 31, 1911. Serial No. 630,302.

To all whom it may concern:

Be it known that we, NELSON B. MITCHELL and JOHN W. TAGGART, Sr., citizens of the United States, residing at Indianapolis, in the county of Marion and State of Indiana, have invented a new and useful Switch-Operating Mechanism, of which the following is a specification, reference being had to the accompanying drawings and to the letters and figures of reference marked thereon.

This invention relates to railway switches and more particularly to the type of switch in which a single switch point is employed, such as are commonly used in connection with street-railway tracks, the invention having reference particularly to mechanism for changing the switches on the approach of cars to the switches without necessitating the stopping of the cars in case the switches require to be changed or reset.

The object of the invention is to provide improved switch operating mechanism that will be so constructed as to be adapted to be arranged on the ground at the outer side of the track where the mechanism will not be liable to be obstructive to wagons and the like vehicles traveling on streets, and which therefore will not be interfered with by the vehicles or draft-animals, a further object being to provide switch operating mechanism of simple and relatively inexpensive construction, and which will be reliable in all seasons of the year and durable and economical in use.

A still further object of the invention is to provide improved mechanism for the cars whereby to operate the mechanism on the ground at the switches.

With the above mentioned and minor objects in view, the invention comprises a plurality of boxes arranged in a row at the outer side of a track, in proximity to a switch, one of the boxes containing mechanism for changing or shifting the switch, being directly connected therewith, the remaining boxes containing mechanism adapted to be actuated by a device carried by a car for operating the particular mechanism that is directly connected with the switch, all the mechanism being operatively connected together; and the invention consists further in the novel parts and in the combinations and arrangements of parts as hereinafter particularly described and claimed.

Referring to the drawings, Figure 1 is a plan of a section of railway having a switch connected therewith to which the improved operating mechanism is applied, a fragment of a car being illustrated that is provided with improved devices for controlling and operating the mechanism on the ground; Fig. 2, a side elevation of Fig. 1; Fig. 3, a fragmentary section on the plane of the line A A in Fig. 1; Fig. 4, a section on the line B B in Fig. 3; Fig. 5, a section on the line C C in Fig. 3; Fig. 6, a section on the line D D in Fig. 5; Fig. 7, a fragmentary section on the line E E in Fig. 5; Fig. 8, a section on the line F F in Fig. 5; Fig. 9, a fragmentary section on the line G G in Fig. 1; Fig. 10, a fragmentary section of one of the track rails and a guide attached thereto; Fig. 11, a sectional view of a compressed air cylinder and device carried by the car for actuating the mechanism on the ground; Fig. 12, a section partly broken away on the line H H in Fig. 11; Fig. 13, a perspective view of one of the actuating devices; Fig. 14, a section on the line I I in Fig. 11; Fig. 15, a top plan of the valve-seat for controlling admission of compressed air to the cylinder; Fig. 16, an inverted plan of the air controlling valve; Fig. 17, a vertical section of the complete valve and its seat and casing; Fig. 18, a section on the line J J in Fig. 17; Fig. 19, an enlarged fragmentary section on the line K K in Fig. 11; and Fig. 20, a fragmentary section similar to Fig. 17 but with the air controlling valve set in a different position.

Throughout the different figures of the drawings like elements or features of construction are indicated by similar reference characters.

In the drawings the numeral 1 indicates one track rail and 2 a siding rail leading therefrom, 3 the opposite track rail and 4 the siding rail leading therefrom and connected continuously therewith by a lead rail 4', against which is normally arranged a switch point 5 which is connected at one end to a pivot 6 so as to form a continuation of the rail 3 with the main track rail 3' when the switch is set for the main track, the switch point 5, as will be understood, being moved away from the lead rail 4' when the switch is set to lead a car onto the siding rails. The rails are supported upon cross-ties 7 or otherwise as may be preferred, the

spaces between the cross-ties usually being filled with concrete 8 and paving bricks 9 when the railway is in city streets, the surface of the paving being on the plane of the

5 top of the rails. The invention preferably comprises three boxes, and therefore three suitable brackets 10, 10', 10'', are provided which are secured rigidly to the outer side of the rail with
10 which a switch point is connected, there being one bracket for each box, the boxes being adapted to exclude snow, water and debris, and protect the mechanism mounted therein as hereinafter described. The boxes
15 comprise bottoms 11, 11', 11'', secured, respectively, upon the three brackets, the bottoms preferably being of the same length as the brackets and they have side walls 12, 12', 12'', thereon upon which are close fitting
20 covers 13, 13', 13'', adapted to be removed if necessary to gain access to the mechanism in the boxes without disturbing the surrounding paving structure. The portions of the side walls of the boxes adjacent the rail are each provided on the
25 inner side thereof with a packing box 14 and gland 15, and each bottom is provided with a bearing box 16 arranged oppositely to the packing box. The bearing box that
30 is on the bottom 11 supports the inner end of a switch rod 17 which extends through the packing box with which the side wall 12 is provided, the switch rod extending also through a guide way 18 that is cut in the
35 lead rail 4' partially below the plane of the switch point 5, the upper side of the switch rod having a suitable recess 19 therein which receives the under side of the switch point, so that the switch point may be shifted on
40 longitudinal movement of the switch rod. A push bar 17^a is movably mounted in the bearing box 16 that is on the bottom 11' and it extends through the packing box and the wall 12' toward the adjacent rail. Another
45 push bar 17^b is arranged in the bearing box 16 that is on the bottom 11'' and it extends movably through the adjacent packing box and the wall 12'' toward the adjacent rail. It is designed, as will hereinafter appear,
50 that either one of the push bars shall be projected toward the rail when the other push bar is retracted, the switch rod being retracted, as will be seen, when the switch point is normally set for the main track.
55 The switch rod 17 has a collar 20 adjustably secured thereto and similar collars 20' and 20'' are secured to the push bars 17^a and 17^b, respectively, each collar having a jaw 21 thereon extending horizontally and
60 provided with a vertical pivot 22. Each box bottom is provided with a vertical pivotal post 23, on each of which a bell-crank is pivotally supported in horizontal position, the bell-cranks having arms 24, 24', 24'', and
65 arms 25, 25', 25'', respectively, each arm

having a slot 26 therein. The arms 24, 24', and 24'' each extend into a jaw 21 and the slot in the arm receives the pivot 22 whereby the arm may actuate or be actuated by the
70 push bar, one arm actuating the switch rod. Preferably the pivotal posts have each a collar 27 thereon affording ample bearing for the bell-crank, or the post may be otherwise provided with a bearing-shoulder for the bell-crank. The upper end of the post
75 has a relatively small screw-threaded end portion extending beyond a shoulder on which rests a washer placed upon the bell-crank, the washer being secured to the shoulder by a nut 29 screwed onto the end
80 portion of the post, so that the bell-crank is substantially guided pivotally. A tube 30 is connected to the side-walls 12 and 12' and a similar tube 30' is connected to the opposite portion of the wall 12' and also to the
85 wall 12'', so that the three boxes are connected together by means of casing tubes. The farther side of the walls 12 and 12'' opposite the ends of the tubes are apertured so that the boxes may be used interchangeably
90 and have the tubes connected to either one of the two opposite sides thereof, the apertures when not connected with the tubes being closed each by a plug 31. Each box is provided on the inner side thereof with two
95 guide boxes 32 and 32' arranged adjacent the walls 12, 12', 12'', respectively, at the farther side of the boxes from the packing box, all the guide boxes being in alinement with the casing tubes, and a single connecting
100 rod 33 extends movably through the tubes 30 and 30' and is supported to move longitudinally in the guide boxes. The connecting rod is provided with rigidly connected jaws 34, 34', 34'', suitably arranged
105 in the three mechanism boxes, respectively, and each jaw is provided with a pivot pin 35, the pivot pins extending through the slot 26 in the arms 25, 25', 25'', respectively, of the bell-cranks, so that when the rod 33
110 moves longitudinally the switch rod and the push bars move in unison. A horizontal guide 36 is secured to the outer side of the rail 3 and extends from the bracket 10' toward the bracket 10 and has an upwardly
115 extending inclined portion 36', the guide having an upright flange 37' thereon extending opposite the rail in the plane of the inner side of the wall 12', the top of the guide 36 being in the plane of the top of the
120 bracket 10' which serves as a portion of the guide 36. A similar guide 38 extends from the bracket 10' to the bracket 10'' and has a flange 39 thereon extending from the wall 12' to the wall 12''. Another guide 36''
125 having an inclined end portion 36''' and provided with a flange 37' extends from the bracket 10'' so as to constitute a continuation thereof. The horizontal guides, as will be seen, are somewhat below the plane of
130

the top of the rail, the flanges of the guides extending up to said plane, and the top of the several boxes being in the plane of the top of the rail, the several guides and the brackets and the inner sides of the walls of the boxes constituting with the rail 3 a narrow channel into which the push bars 17^a and 17^b may be projected to be actuated by a device carried by the car and to be lowered to operative position.

The numeral 40 indicates a railway car, 41 the platform or vestibule thereof and 42 the truck frame of the car. Two cylinders 43 and 43' are secured to opposite portions of the truck frame so as to be approximately above the two track rails and forward of the leading wheels of the car, the diameter of the lower portion of the bore of each cylinder preferably being somewhat less than the upper portion so that an upwardly facing stop shoulder 44 is formed in the cylinder. The upper end of each cylinder has an annular head 45 thereon into which one end of a cylindrical casing 46 is secured and provided on the opposite end thereof with a cap 47. A piston 48 is fitted in the larger portion of the bore of the cylinder and preferably is prevented from rotating by means of a spline 49 inserted in the inner side of the cylinder wall and projecting therefrom into a suitable recess in the periphery of the piston, the piston being provided with a packing ring 50 which is split to receive the spline. The lower end of the cylinder is provided with an annular head 51 through which extends a piston rod 52 or 52', the two piston rods being each provided with a rearwardly extending wedge 53 or 53', the wedges being somewhat similar but designed to a right-hand and left-hand, each wedge having a vertical face adapted to slide against the outer side of the rail head for guidance when in operation, said side having a lower beveled edge 54 adapted to engage the upper edge of the rail to guide the wedge in its downward movement if necessary. The opposite side of the wedge diverges rearward from the guiding side and is adapted to engage the push bars for retracting them and preferably has a lower beveled edge 55. The bottom 56 of the narrower end of the wedge is relatively narrow so as to be wedge-like as a result of the bevel edge formation. Preferably the piston rod is prevented from rotating in the cylinder by means of a gibbed spline 57 seated in the head 51 and extending into a longitudinal groove 58 cut into the piston, the groove however being slightly wider than the spline so as to permit slight rotary movement of the piston-rod in order to avoid strains if not exactly positioned when moved down into contact with a rail. The piston-rod has a relatively small upper portion 59 extending from a shoulder 60 and through the pis-

ton 48, a nut 61 being screwed onto the upper end of the rod. A coil spring 62 is seated against the nut and also against the upper side of the piston 48, and another spring 63 is seated against the shoulder 60 and also against the under side of the piston, so that the piston may move slightly on the smaller portion 59 of the rod. The ends of the springs may be so seated on opposite sides of the piston so as to prevent the rod from rotating appreciably in the piston, in which case the guiding spline 57 may be omitted, or if used it is possible to dispense with the guiding spline 49. The piston-rods and consequently the wedges are moved upward and normally held in their elevated position by means of springs 64 and 64' connected to the truck frame or to the cylinder if preferred and also to the wedge. Air-pipes 65 and 65' are connected with the upper portions of the cylinders, and other air-pipes 66 and 66' are connected with the lower portions of the cylinders, respectively, so that the pistons may be moved upward or downward by air pressure, it being desired in some cases to move the wedges upward as rapidly as possible in order to avoid accidents. Two controlling valves are provided for admitting the compressed air to the cylinders and they comprise two valve cases 67 and 67' provided with removable bottoms 68 and 68', respectively, each bottom being adapted to constitute a valve-seat in which are two inlet ports 69 and 70 and also a centrally arranged exhaust port 71. An air-pipe 72 is connected with the port 69 and a similar pipe 73 is connected with the port 70 of one valve, and corresponding pipes 72' and 73' are connected with corresponding ports of the other valve. Flexible pipe connections 74 and 74' are connected with the pipes 72 and 73, respectively, and also with the pipes 65 and 65', respectively, and similar flexible pipe connections 75 and 75' are connected with the pipes 72' and 73' and also with the pipes 66 and 66', respectively. The valve cases 67 and 67' are supplied with compressed air through supply pipes 76 and 76' connected therewith, respectively. Each valve case has a packing box 77 thereon provided with a packing nut 78. A rotary valve 79 is arranged upon the valve-seat and has a port 80 which may be brought into register with either one of the ports 69 or 70, the under side of the valve having an exhaust cavity 81 which extends over the exhaust port 71 and may be brought over either one of the other ports so as to form communication between it and the exhaust port. The valve has a stem 82 which extends through the packing box and nut and is adapted to be rotated, the stems of the two valves having operating handles 83 and 83' thereon, respectively.

In practical use the switch point 5 re-

mains in the position in which it may have been used by the last car passing over it, and when a car approaches a switch as illustrated in Fig. 1 if the switch be adjusted for the main track as shown and it be desired to run the car onto the siding, after the car carries the wedge 53' past the inclined guide 36''' the wedge is lowered by the motorman as the result of the operation of the handle 83' while the car is moving, and the wedge is moved between the push bar 17^b and the rail and forces the push bar away from the rail, thus moving the connecting rod 33 and shifting the switch point away from the lead rail 4' so as to guide the car onto the siding. It will be understood that when the push bar 17^b is retracted the push bar 17^a is projected and therefore the wedge should be elevated before it reaches the push bar 17^a. If another car following should continue on the main track the wedge should be lowered after it passes the push bar 17^b so as to engage the push bar 17^a and retract it and thus again close the switch. In case a car is overloaded the wedges descend only until they slide upon the guides and brackets attached to the rail which guides the wedge at the proper height to engage the push bars. It will be understood that when a switch point is arranged to operate in connection with the rail 1 the devices on the opposite side of the car are to be put in operation for changing the switch.

In the operation of the controlling valve it will be understood that when the air is admitted through the port 80 and the port 69 so as to admit air to one end of the cylinder the other port 70 is in communication with the exhaust port 71 to permit the escape of air from the opposite end of the cylinder. Other results of operation of the valve and other parts of the mechanism will be readily understood from the description of the construction and functions thereof.

Having thus described the invention what is claimed as new, is—

1. Switch-operating mechanism including a box having two guides, a bar or rod slidingly mounted in the two guides and extending beyond the box, a collar secured to the bar or rod and having a pivot thereon, an operating-rod slidingly guided in the box at right-angles to the bar or rod, a jaw fixedly mounted on the operating-rod and having a pivot thereon, and a bell-crank pivotally supported in the box and having slotted arms, the slot in one arm receiving one of the pivots and the slot in the remaining arm receiving the remaining one of the pivots.

2. Switch-operating mechanism including a movable switch-rod, a fixedly supported guide rail, a plurality of push-bars slidingly supported to move toward or from the guide

rail, the push-bars having uncovered and free projecting ends presented toward the rail, an operating-rod connected with the switch-rod and the plurality of push-bars, a plurality of guides supporting and guiding the operating-rod intermediately of the push-bars, a wedge movable between the guide rail and the ends of the push-bars, and an inclined guide for elevating the wedge above the plane of the switch-rod.

3. Switch-operating mechanism including two inclosing-boxes spaced apart, two brackets secured to the two inclosing-boxes respectively and projecting beyond one side thereof to form portions of a horizontal guide bar, a horizontal bar supported between and in connection with the two brackets to form a portion of the guide bar and having an upright flange extending from one to the other of the inclosing-boxes, a movably supported switch-rod, a horizontal guide bar connected with one of the brackets and extending toward the switch-rod and also upwardly to a plane above the switch-rod, a rail supporting the two brackets and the horizontal guide bars, two push-bars movably supported in the two inclosing boxes respectively, and an operating-rod connected with the switch-rod and the two push-bars.

4. Switch-operating mechanism including a plurality of boxes arranged in a row, tubes fixedly connecting the boxes together, a switch-rod movably mounted in one of the boxes, a plurality of push-bars movably mounted in the remaining boxes respectively, a connecting rod extending through the tubes and into all the boxes, the connecting rods being incased in and guided by the tubes and a plurality of bell-cranks pivotally mounted in the boxes respectively and operatively connected with the connecting rod, one of the bell-cranks being operatively connected with the switch-rod and the remaining bell-cranks operatively connected with the push-bars respectively.

5. Switch-operating mechanism including a rail, a movably supported switch-rod, two push-bars movably supported opposite one side of and extending toward the rail at a distance therefrom, two bell-cranks pivotally supported horizontally adjacent to the push-bars respectively, one arm of one of the bell-cranks being operatively connected to one of the push-bars, one arm of the remaining bell-crank being operatively connected to the remaining one of the push-bars, a connecting-rod operatively connected with the remaining arms of the two bell-cranks and also with the switch-rod, and a wedge suitably supported by a car on the rail and movable into sliding contact with the rail and the adjacent ends of the push-bars, said wedge being supported at its narrow end and having beveled under edges.

6. Switch-operating mechanism including a rail, a series of boxes arranged adjacent to the rail in a row, a switch-rod movably mounted in one of the boxes for controlling a switch-point, a plurality of push-bars movably mounted in the remaining boxes of the series opposite to the rail and operatively connected with the switch-rod, one of the push-bars being projected and the other retracted relatively to the boxes, a guide supported horizontally by the rail in a plane below the push-bars, a cylinder carried by a car on the rail, a piston-rod movable in the cylinder and having a wedge thereon to be moved into position onto the guide and against the rail for moving the projected one of the push-bars, the wedge having beveled under edges, a piston movable in the cylinder for moving and controlling the piston-rod, and a valve for admitting compressed air into the cylinder.

7. In switch-operating mechanism, the combination with a rail and a movable switch-point, of a bracket secured to the rail, an inclosing-box secured to the bracket, a switch-rod movably mounted in the inclosing-box and extending through the side wall thereof, the switch-rod being operatively connected with the switch-point, an operating-rod extending movably into the inclosing-box, and movable means in the inclosing-box connecting the operating-rod with the switch-rod.

8. In switch-operating mechanism, the combination with a rail having a guideway therein, and a switch-point movably supported at one side of the rail, of a bracket secured to the opposite side of the rail from the switch-point, an inclosing-box secured upon the bracket, a switch-rod movably mounted in the inclosing box and extending through the side wall thereof, the switch-rod extending also into the guideway and being connected with the switch-point, and an operating-rod extending into the inclosing-box and operatively connected therein with the switch-rod.

9. In switch-operating mechanism, the combination of an inclosing-box comprising a bottom and a side wall and also a removable cover, the side wall being provided with a packing-box, a bearing-box secured on the bottom opposite the packing-box, a push-bar movable in the bearing-box and the packing-box, a collar secured to the push-bar and having a jaw thereon, a pivotal post fixed upon the said bottom, a bell-crank pivotally mounted on said post, one arm of the bell-crank being connected with said jaw, a rod movably supported in the box and extending through the wall thereof, and a jaw fixedly connected to the rod and connected also to the remaining arm of the bell-crank.

10. In switch-operating mechanism, the combination with a rail, a switch-point movably supported at the inner side of the rail, and a switch-rod movably supported at the outer side of the rail and operatively connected with the switch-point, of two push-bars permanently and movably mounted opposite the outer side of the rail and extending toward the rail, two bell-cranks pivotally supported horizontally adjacently to the two push-bars respectively in reversed arrangement relatively one to the other, one arm of one of the bell-cranks being operatively connected to one of the push-bars, one arm of the remaining bell-crank being operatively connected with the remaining one of the push-bars, one of said push-bars being projected toward and the other retracted from the rail, a connecting-rod operatively connected with the remaining arms of the two bell-cranks and also with the switch-rod, and a wedge suitably supported by a car on the rail and movable into sliding contact with the outer side of the rail to retract the projected push-bar and project the retracted push-bar, for moving the switch-rod and the switch-point.

11. In switch-operating mechanism, the combination with a rail, a switch-point movably supported at the inner side of the rail, and a switch-rod movably supported at the outer side of the rail and operatively connected with the switch-point, of two inclosing-boxes fixedly supported opposite the outer side of the rail, two push-bars movably mounted in the two inclosing-boxes respectively and extending toward the outer side of the rail, two bell-cranks pivotally mounted in the two inclosing-boxes respectively in relatively reversed arrangement, one arm of one of the bell-cranks being operatively connected with one of the push-bars, one arm of the remaining bell-crank being operatively connected with the remaining one of the push-bars, one of said push-bars being projected and the other retracted relatively to the inclosing-box, a connecting-rod extending through one and into the other one of the inclosing-boxes and operatively connected with the remaining arms of the two bell-cranks and also with the switch-rod, and a guide secured to the outer side of the rail and extending horizontally below the plane of the push-bars and between the rail and the plane of the adjacent sides of the inclosing boxes.

In testimony whereof, we affix our signatures in presence of two witnesses.

NELSON B. MITCHELL.

JOHN W. TAGGART, SR.

Witnesses:

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E. T. SILVIUS.