(No Model.) 2 Sheets—Sheet 1.

S. A. MUSTAIN.

SWITCH FOR ELECTRIC RAILWAYS.

No. 573,344. Patented Dec. 15, 1896.

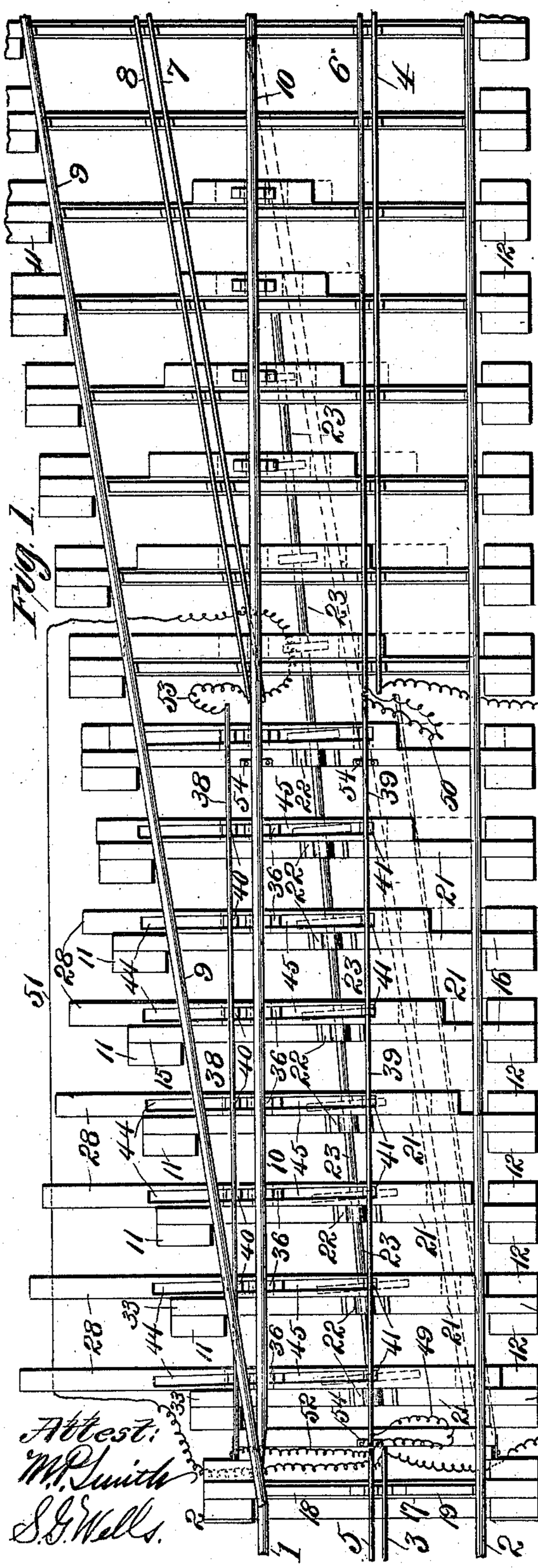

Fig. 1.

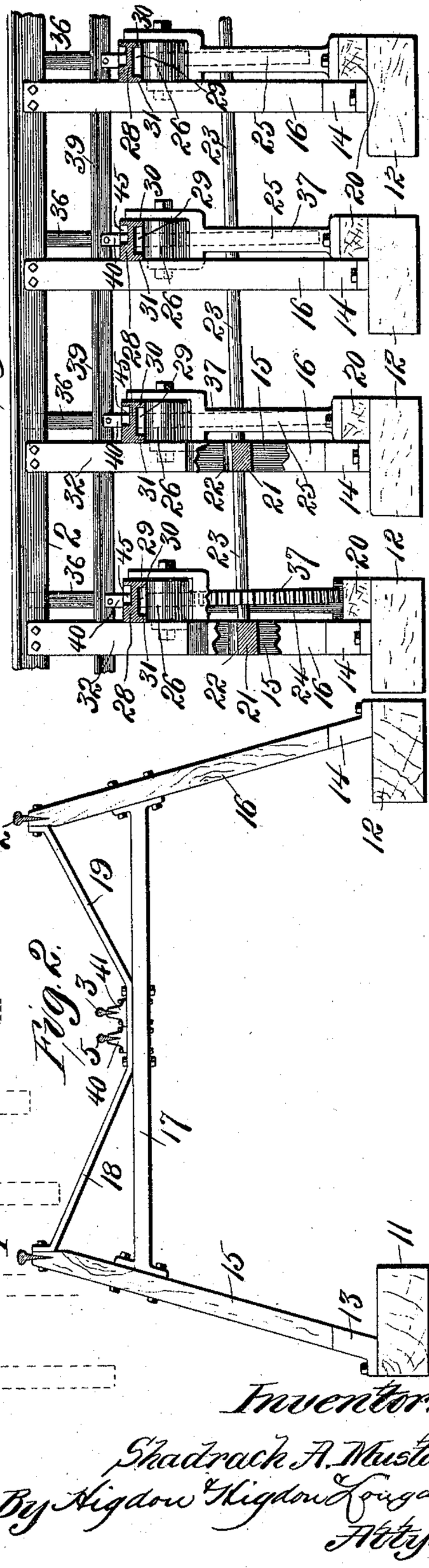

Fig. 3.

Fig. 2.

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Inventor:
Shadrack A. Mustain.
By Higdon & Higdon & Longan
Atty's.

(No Model.)

2 Sheets—Sheet 2.

S. A. MUSTAIN.

SWITCH FOR ELECTRIC RAILWAYS.

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Fig. 4.

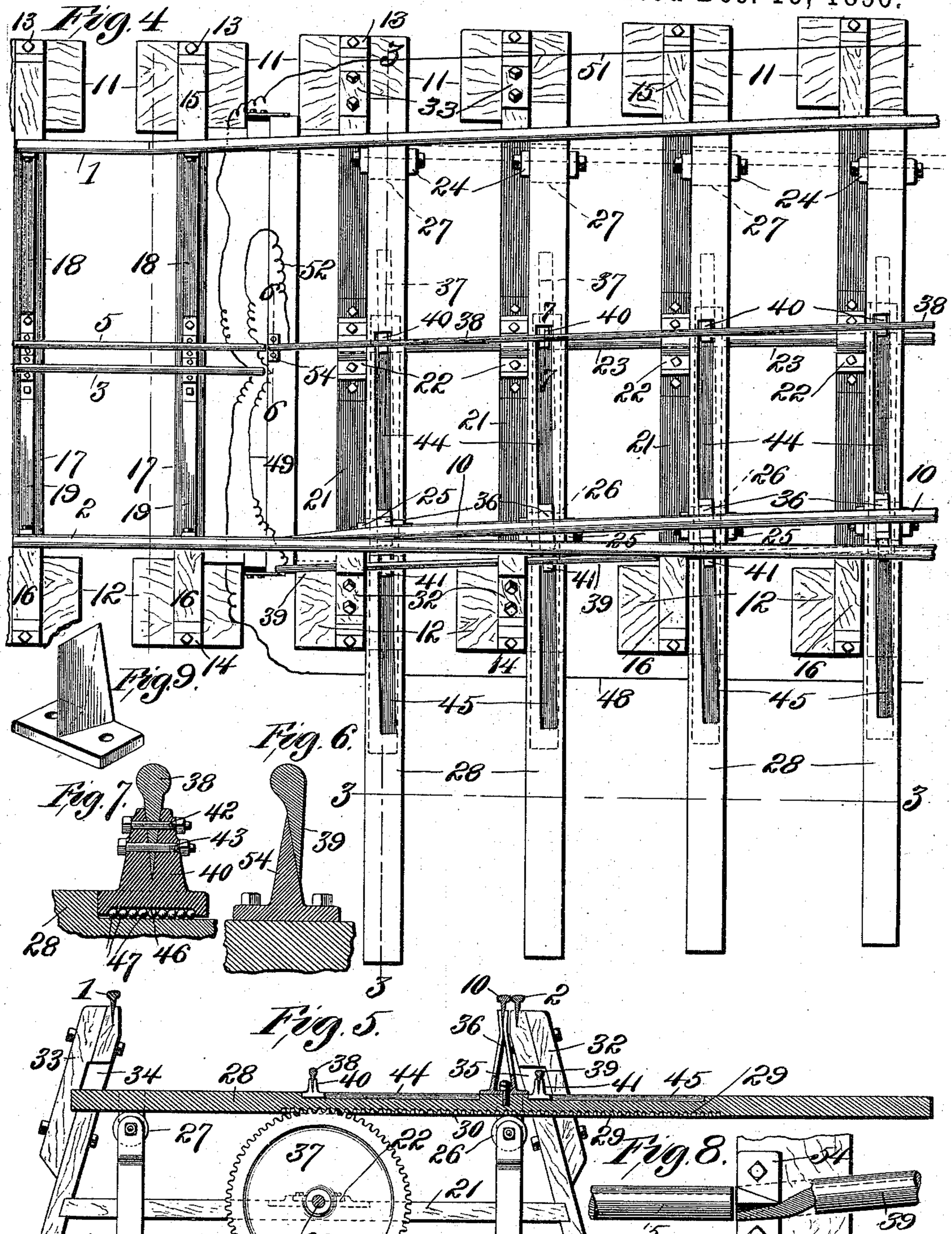

Fig. 9.

Fig. 7.

Fig. 6.

Fig. 5.

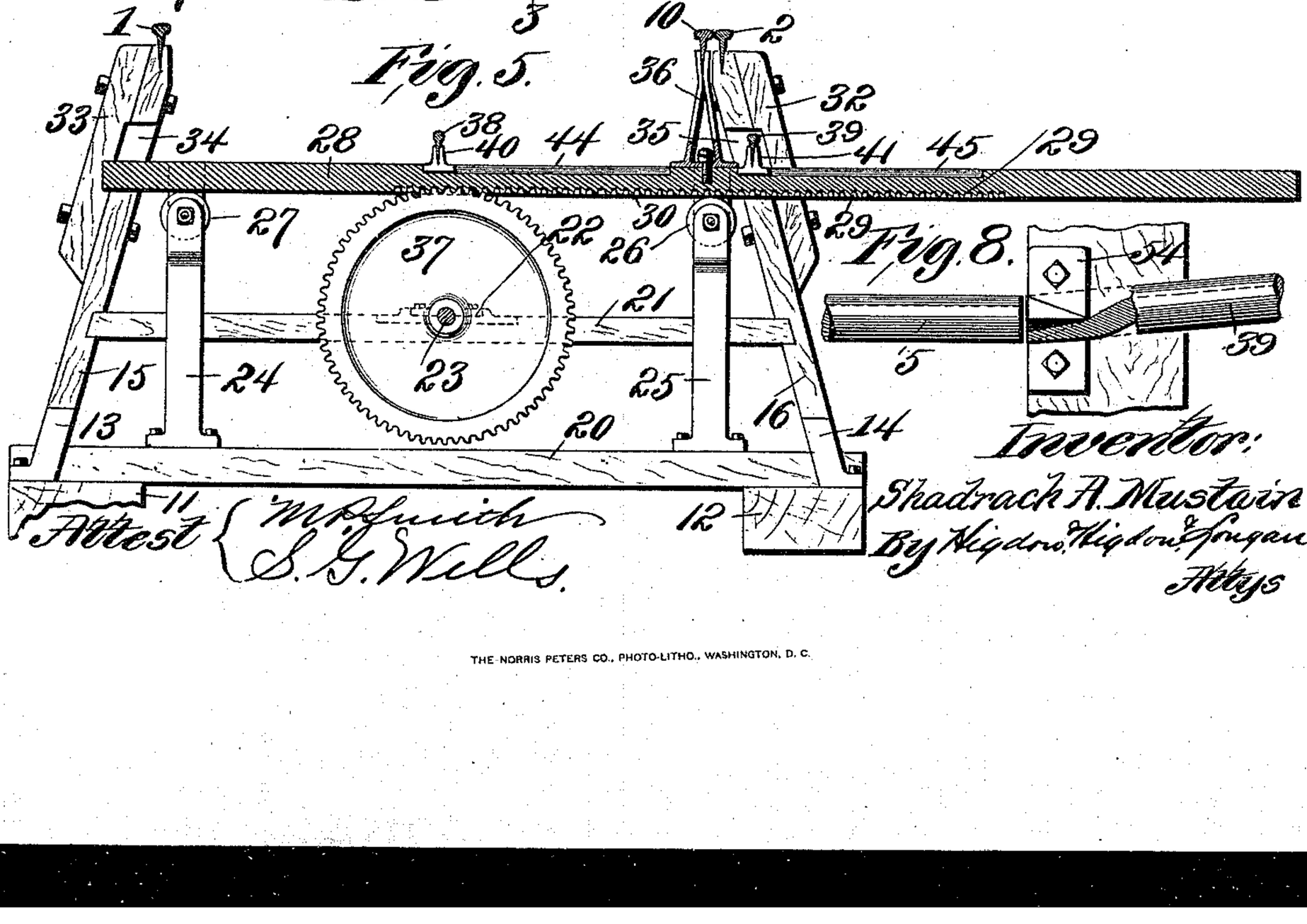

Fig. 8.

Witnesses:
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UNITED STATES PATENT OFFICE.

SHADRACH A. MUSTAIN, OF RINCON, TERRITORY OF NEW MEXICO,
ASSIGNOR TO BAILEY J. MUSTAIN, OF SAME PLACE.

SWITCH FOR ELECTRIC RAILWAYS.

SPECIFICATION forming part of Letters Patent No. 573,344, dated December 15, 1896.

Application filed June 22, 1896. Serial No. 596,438. (No model.)

To all whom it may concern:

Be it known that I, SHADRACH A. MUSTAIN, of the city of Rincon, Doña Aña county, Territory of New Mexico, have invented certain new and useful Improvements in Switches for Electric Railways, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

My invention relates to an improved switch for electric railways; and it consists in the novel construction, combination, and arrangement of parts hereinafter described and claimed.

In the drawings, Figure 1 is a plan view of my improved switch for electric railways, showing the switch closed. Fig. 2 is a transverse sectional view on the line 2 2 of Fig. 1. Fig. 3 is a sectional view on the line 3 3 of Fig. 4. Fig. 4 is an enlarged detail plan of a part of the switch, showing the switch open. Fig. 5 is a transverse sectional view on the line 5 5 of Fig. 4. Fig. 6 is a sectional view on the line 6 6 of Fig. 1. Fig. 7 is a sectional view on the line 7 7 of Fig. 4. Fig. 8 is a top plan view, partly in section, of the part shown in Fig. 6. Fig. 9 is a perspective of a stop which is shown in section in Fig. 6 and in plan in Fig. 8.

Referring by numerals to the accompanying drawings, 1 and 2 are the main-line rails, and 3 and 4 are the main-line trolley-wires for operating the car-brakes.

5 and 6 are the main-line trolley-wires for operating the car-motors.

7 is the trolley-wire of the switch for operating the brake, and 8 is the trolley-wire of the switch for operating the car-motor.

9 is the outside rail of the side-track, and 10 is the movable switch-rail.

In the construction of my main line I use the sills 11 and 12. Mounted upon said sills are plates 13 and 14, and posts 15 and 16 have their lower ends attached to said plates. Some distance below the upper ends of said posts a cross-bar 17 is positioned, and braces 18 and 19 have their lower ends attached near the center of said cross-bar 17 and their upper ends attached to the upper ends of the posts 15 and 16, as shown in Fig. 2.

All the rails used in my present invention have wide wedge-shaped webs, the lower edge of the rail being drawn down comparatively thin, as shown in cross-section in Fig. 7 and on a smaller scale in Figs. 2 and 5.

The rails 1 and 2 have their edges inserted in slots in the upper ends of the posts 15 and 16, and bolts pass through said posts and through said rails, holding them firmly in position. The road-bed under the movable parts of the switch is constructed as shown in cross-section in Fig. 5. The cross-sills 20 are mounted upon the sills 11 and 12, and slightly below the center of the posts 15 and 16 are cross-beams 21, on the centers of which are located bearings 22, and the shaft 23 is mounted in said bearings. Posts 24 and 25 are mounted upon the cross-sills 20 in a vertical position and carry at their upper ends rollers 26 and 27, upon which rollers rests a bar 28, extending transversely of the track. Upon the lower side of the bar 28 and at the center thereof and extending some distance both ways from said center is a series of gear-teeth 29. Upon each end of the teeth 29 are ribs 30 and 31, projecting downwardly from the bar 28 and designed to keep the points of the teeth 29 from cutting the rollers 27.

Blocks 32 and 33 are securely fastened upon the outside of the posts 15 and 16 and at the upper ends thereof, and recesses 34 and 35 are cut in the posts 15 and 16.

The movable switch-rail 10 is mounted upon the centers of the bars 28 by means of the posts 36. The shaft 23 is somewhat shorter than the movable switch-rail 10 and is positioned directly beneath the center of motion of said movable switch-rail. At convenient distances apart upon the shaft 23 are located gear-wheels 37, meshing into the racks 29 on the bars 28 and arranged in such a way that rotation of the shaft 23 moves said bar 28 transversely of the road-bed as required to carry the free end of the movable switch-rail 10 from one rail of the main-line track to the other when it is desired to either open or close the switch. The gear-wheels 37 upon the shaft 23 are graduated in size, the largest being near the free end of the switch-rail 10 and the smallest near the hinged end of said rail and as required to move the free end of the rail and the parts supporting it without moving the

opposite end. Upon each side of the movable switch-rail 10 are connecting trolley-wires 38 and 39, supported by posts 40 and 41, said posts having a V-shaped slot in their upper end in which said trolley-wires are inserted, and bolts 42 and 43 are positioned horizontally through said posts and trolley-wires. The bases of the posts 40 and 41 are positioned in recesses 44 and 45 in the upper face of the bars 28. The lower face of the base of each post is recessed, as indicated at 46 in Fig. 7, and said recess is filled with balls 47, thus forming a ball-bearing for said trolley-wires.

A flexible wire 48 connects the ends of the brake-operating trolley-wires 3 and 4, there being considerable space between the ends of said wires. A flexible wire 49 connects the main-line motor-wire 5 with the connecting-wire 39, and a similar flexible wire 50 connects the opposite end of said connecting-wire 39 with the main-line motor-wire 6. A flexible wire 51 connects the brake-operating wire 3 of the main line with the brake-operating wire 7 of the switch, and a flexible wire 52 connects the end of the motor-wire 5 with one end of the connecting-wire 38 and a similar flexible wire 53 connects the opposite end of said connecting-wire 38 with the end of the motor-operating wire 8 of the switch, as shown in Fig. 1.

A stop 54 (shown in plan in Fig. 8 and perspective in Fig. 9) is positioned near the center of the track and in the line of travel of the free end of the movable switch-rail 10 for the purpose of limiting the lateral motion of the connecting trolley-wires 38 and 39, the ends of said wires being designed to contact with said stop when said wires have been moved far enough to make the connections for which they are designed. The lower part of said trolley-wires is bent to one side, as shown in section in Fig. 8, and said stop is placed directly in line with the motor-operating trolley-wire 5. Said stop is so shaped and so positioned that the trolley-wire comes directly over the center of the stop no matter from which side it approaches, as shown in Fig. 6.

My improved switch is intended for use upon railway-lines where cars are run without attendants, and for this reason I employ one trolley-wire to operate the brake on the car and another trolley-wire to furnish the motive power to the car. The trolley-wires are placed between the rails and somewhat below them, as shown in Fig. 2.

As will be noticed in Fig. 1, there is a break between the brake-controlling wires 3 and 4 of a length equal to the length of the connecting-wire 39, and there is a similar break between the brake-controlling wire 3 of the main line and the brake-controlling wire 7 of the switch. At this point there is no means of controlling a car which is passing over the track unattended, but the distance is short and the brakes may be set on the car immediately before or immediately after passing these points.

In the practical operation of my improved switch the shaft 23 is rotated in any convenient way, thus rotating the gear-wheels 37 and moving the bars 28 by means of the racks 29. The bars 28 carry the movable switch-rail 10 from one of the main-line rails to the other, as required to open or close the switch.

When the main line is open, as shown in Fig. 1, the free end of the movable switch-rail 10 rests against the end of the side-track rail 9 and near to the end of the main-track rail 1. The connecting-wire 38, carried by the roller-bearings 47 under the post 40 and in the recesses 44, is moved only one-half as far as the movable switch-rail 10, and when said rail is in position to open the main-line track said connecting-wire 38 lies parallel with the rail and but a short distance to the outside thereof, the base of the post 40 abutting against the base of the post 36 and the front end of said connecting-wire retreats into the recess 34 in the post 15. During this operation the connecting-wire 39, which had previously laid close beside the movable switch-rail 10, strikes against the stops 54, one at each end of said connecting-wire, and is held thereby from passing the center of the track and in alinement with the motor-operating main-line wires 5 and 6. When the switch is open and the main line closed, this operation is reversed, the connecting-wires 38 and 39 assuming the position relative to the movable switch-rail 10 as shown in Fig. 4, the ends of the connecting-wire 38 striking against the stops 54, one in the center of the main-line track and one in the center of the switch-track, and thus make connection between the motor-operating wires 5 and 8.

The recesses 44 and 45 in the bars 28 are of sufficient length to carry the connecting-wires 38 and 39 just far enough to put them in alinement with the stationary wires, as required, and the stops 54 on each end of said wires prevent them going too far and thus hold them in alinement, as required.

I have not attempted to show or describe any means of rotating the shaft 23 and thus operate the gears 37 for the reason that the means best adapted to this purpose will depend very largely upon the conditions and location and requirements of the system to which the switch is to be applied. In some cases it may be convenient to get power directly from a steam plant for this purpose and in other cases it may be necessary to operate the switch manually, and, again, an electric motor may be arranged for operating the switch-moving mechanism and operated in the same way and by the same attendant that operates the motor and brake currents.

I have not shown or described any insulation in connection with my switch for the reason that the insulation and ground connections necessary to operate an electric railroad

are well known to those familiar with the art, and I have invented nothing new in this line beyond the flexible connections and movable connecting-wires, as already shown and described.

By making the rails with a wide wedge-shaped web, instead of the usual web and flanges, I am able to get greater strength with less weight and am thus able to place the supporting ties or posts farther apart.

A trolley-wire constructed, as I have shown, with a wide wedge-shaped web supported by posts enables the trolley-wheel of the car to run over said wire at a very high rate of speed without jumping the wire, and at the same time it makes a strong durable wire that is not liable to be injured by being placed low down between the rails.

In the construction of a switch in a railway in which the trolleys are placed between the rails and in which there are two trolleys, one for operating the motor and one for operating the brake, I find that there is a great advantage in using but three rails, one stationary main-line rail and one stationary side-track rail and a movable rail between said stationary rails, as already shown and described, the particular object of this construction being to provide means for switching the motor-trolley from the main-line wire to the side-track wire. I am not aware that this can be done or has been done in any other way than that shown by me herein.

There are various ways in which this construction may be made useful; but the particular object which I have in view is to control dump-cars or freight-cars which pass over a line unattended and are to be controlled and switched by manipulation of electric currents and mechanism by persons not upon the cars.

I claim—

1. In a railway, a stationary main-line rail, a stationary side-track rail, a movable switch-rail positioned between said stationary rails, posts supporting said movable rail, sliding bars carrying said posts, rollers under said sliding bars, posts supporting said rollers, toothed racks upon said bars, gear-wheels meshing into and operating said toothed racks, and a shaft connecting said gear-wheels.

2. In a railway, a movable switch-rail, sliding bars carrying said rail, a section of trolley-wire positioned on each side of and parallel with said movable rail, flexible connections between the ends of one of said trolley-wire sections and the main-line trolley-wire, a flexible connection between one of the other trolley-sections and the main-line trolley-wire and a flexible connection between the other end of said last-mentioned section and the side-track trolley-wire.

3. In a railway, a movable switch-rail, sliding bars carrying said rail, recesses in said sliding bars upon each side of said rail, posts movably mounted in said recesses, a section of trolley-wire carried by said posts, there being one section of trolley-wire on each side of said movable rail and in position parallel with said rail, means of operating said sliding bars, and stops to limit the lateral movement of said trolley-wire sections.

4. In a railway, a main-line trolley-wire in two sections, the adjacent ends of said sections being some distance apart, a side-track trolley-wire having one end adjacent one end of one section of the main-line wire, flexible connections between the opposite section of the main-line wire, and said side-track wire and flexible connections between the two sections of main-line wire, connecting-sections of trolley-wire so positioned and operated as to make the main-line wire continuous when the main line is open and to make the side-track wire continuous with one section of the main-line wire when the side-track is open.

5. In a railway, a stationary main-line rail, a stationary side-track rail, a movable switch-rail between said stationary rails, mechanism for moving the free end of said movable switch-rail from one of said stationary rails to the other, a motor-operating trolley-wire mounted between the rails of the main line upon each side of the section of track occupied by said movable switch-rail, a brake-operating trolley-wire mounted beside said motor-operating trolley-wire, a ground-wire connecting the end of the brake-operating trolley-wire upon one side of the switch with the end of the brake-operating trolley-wire on the opposite side of the switch, a motor-operating trolley-wire between the side-track rails, a brake-operating trolley-wire between the side-track rails, a ground-wire connecting the end of said brake-operating trolley-wire with the end of the brake-operating trolley-wire of the main line which is upon the opposite side of the switch, movable sections of the motor-operating trolley-wire mounted upon opposite sides of said movable switch-rail, flexible connections between the ends of said movable sections and the ends of the immovable sections, and means of moving said switch-rail and said movable sections of trolley-wire, substantially as specified.

6. In a railway, the sills 11 and 12, the plates 13 and 14 attached to said sills, the posts 15 and 16 attached to said plates, the cross-bar 17 connecting the upper parts of said posts, the braces 18 and 19 having their lower ends attached to the center of said cross-bar and their upper ends attached to the upper ends of said posts 15 and 16 respectively, the rails 1 and 2 having wide wedge-shaped webs mounted with the lower edges of said webs in slots in the upper ends of said posts 15 and 16, bolts passing through said posts and said webs to hold said rails securely in position, the posts 40 and 41 supported by said cross-bar 17, the motor-operating trolley-wire 5 supported by said post

40 and the brake-operating trolley-wire 3 supported by the post 41, substantially as specified.

7. In a railway, the main-line rails 1 and 2, the main-line brake-operating trolley-wires 3 and 4 mounted between said main-line rails 1 and 2, the main-line motor-operating trolley-wires 5 and 6 mounted beside said brake-operating trolley-wires, the side-track rail 9, movable switch-rail 10, the side-track brake-operating trolley-wire 7 mounted between the rails of the side-track, the motor-operating trolley-wire 8 mounted beside said brake-operating trolley-wire 7, the movable trolley-wire sections 38 and 39 mounted upon opposite sides of the switch-rail, the ground-wire 48 connecting the end of the wire 3 with the end of the wire 4, the ground-wire 51 connecting the end of the wire 3 with the end of the wire 7, the flexible connection 49 between the wire 5 and the wire 39, the flexible connection 50 between the wire 39 and the wire 6, the flexible connection 52 between the wire 5 and the wire 38, the flexible connection 53 between the wire 38 and the wire 8, and means of moving said switch-rail and said trolley-wire sections 38 and 39, substantially as specified.

In testimony whereof I affix my signature in presence of two witnesses.

SHADRACH A. MUSTAIN.

Witnesses:

B. J. MUSTAIN,

K. FACKNER.