

No. 648,092.

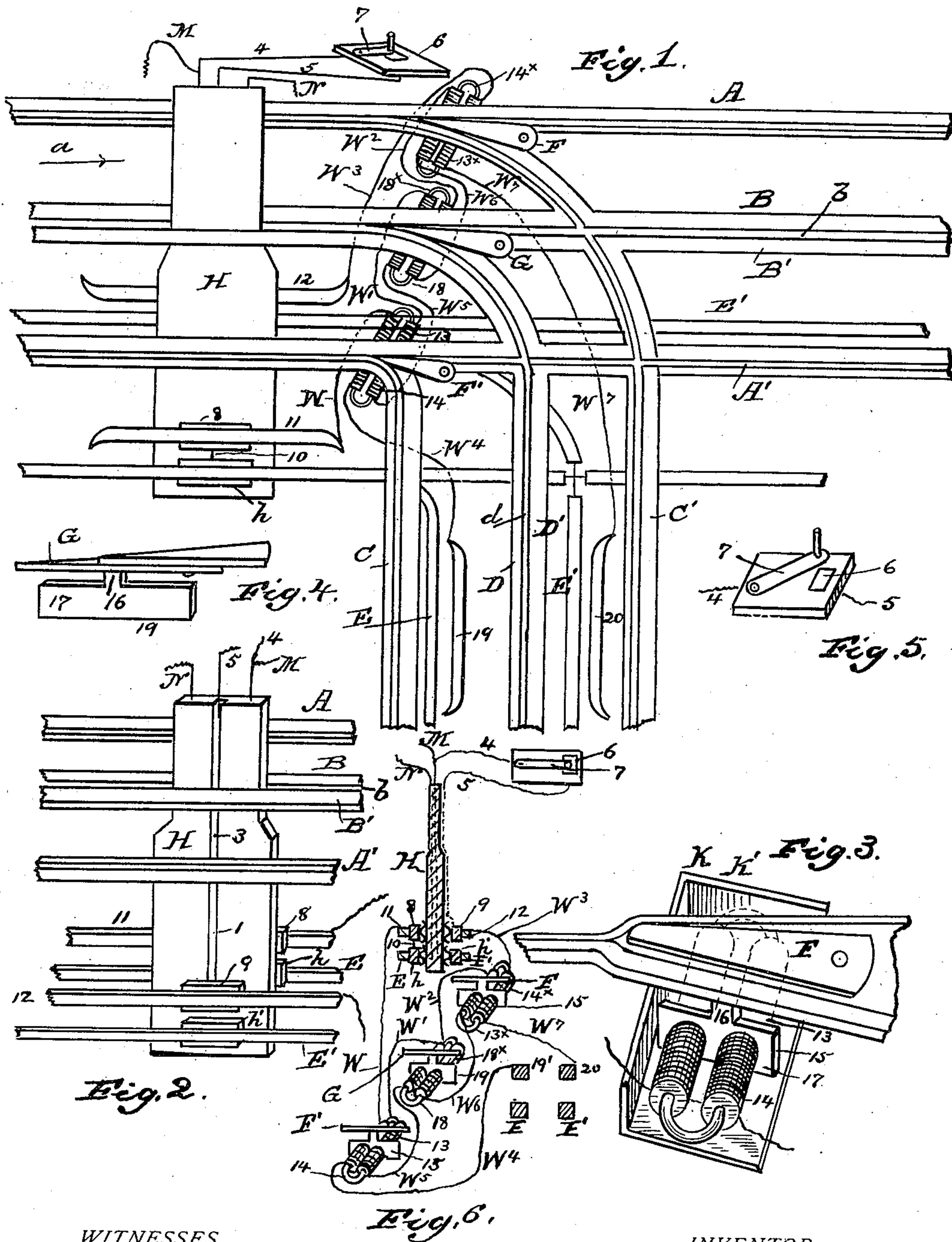
Patented Apr. 24, 1900.

P. B. WILLIAMS.

ELECTROMAGNETIC ELECTRIC RAILWAY TRACK SWITCH.

(Application filed Oct. 5, 1899.)

(No Model.)



WITNESSES

E. H. Bates  
A. G. Heylman.

INVENTOR

P. B. Williams



# UNITED STATES PATENT OFFICE.

PHILIP B. WILLIAMS, OF WASHINGTON, DISTRICT OF COLUMBIA.

ELECTROMAGNETIC ELECTRIC-RAILWAY-TRACK SWITCH.

SPECIFICATION forming part of Letters Patent No. 648,092, dated April 24, 1900.

Application filed October 5, 1899. Serial No. 732,618. (No model.)

*To all whom it may concern:*

Be it known that I, PHILIP B. WILLIAMS, a citizen of the United States of America, and a resident of the city of Washington, in the District of Columbia, have invented certain new and useful Improvements in Electrically-Operated Railway-Switches, of which the following is a specification.

My invention has relation to improvements in electrically-operated railway-switches of that kind or style particularly adapted for conduit systems of street-railways, wherein switch arms or rails are pivotally interposed at curves or turns of the tracks to switch or direct a car to another section or line of road; and the objects are to simplify and improve the existing art by providing a more certainly acting device or appliance which may be operated by circuits opened and closed from a switch-arm on the car; also, to provide an electrical switch-operating mechanism which is simple in construction, arrangement, and aggroupment and which is certain and efficient in operation.

With these purposes or objects in view my invention consists in the novel construction of parts and their combination, as will be hereinafter fully described and then particularly and distinctly pointed out in the claims.

I have fully and clearly illustrated my invention in the accompanying drawings, to be taken as a part hereof, and wherein—

Figure 1 is a diagrammatic view of the complete apparatus or device as applied in actual operation, showing a section of straight track and a section of intersecting track with curve at the junction, the switch-points, and the switch-point electric actuating means. Fig. 2 is a detail view of the common form of plow, showing the relation of my switch shoes and rails and the insulated bed for containing a wire making circuit with the switch-board on the car. Fig. 3 is a detail perspective showing the arrangement of the magnets and the armatures between them and connected to the switch-point of a rail. Fig. 4 is a detail view of the slot-switch with its armature. Fig. 5 is a detail view of the switch designed for attachment on a car to close the circuit which operates the switches.

Fig. 6 is a detail vertical section through the plow, cross-section through the circuit-rails and extra rails, and diagrammatic indication of the circuits.

Referring to the drawings, A A' designate the rails of the straight piece or section of track, and B B' the slot-rails thereof, having a slot *b* between them. C C' designate the track-rails of the intersecting curved track, and D D' the slot-rails, having a slot *d* between them, which opens into and from the straight slot *b*. E E' are the circuit-rails. F F' are the rail switch-points, and G is the slot switch-point. All these parts, elements, and appliances are of the ordinary construction and arranged and disposed as usual and in a well-known manner.

H designates the plow, of any approved construction, having at a determined point thereon, on opposite sides thereof, the shoes *h h'*, arranged to contact with the circuit-rails E E', as usual. In the plow is formed a vertical groove 1, in which is disposed a suitable non-conducting substance 3, in which is embedded a suitable wire 5, connected to the contact-plate 6, provided with a switch 7, from which a wire 4 leads to a point of connection in the main-circuit wire M, whereby the circuit may be completed by bridging the space between the points of the wires in a well-known manner. On opposite sides of the plow are secured shoes 8 9, which are insulated from the plow, the former of which is in circuit with the main shoe *h* by wire 10, and the latter is in circuit connection with contact-plate 6 by wire 5. In alinement with the shoes 8 9 and supported by any suitable means are oppositely-arranged extra circuit-rails 11 12, with which the shoes 8 9 contact. These extra circuit-rails are placed at a determined point or distance from the switches, so that the switches will be thrown in the right direction prior to the car entering the curve.

Referring to Fig. 3 of the drawings, K K' designate suitable casings or boxings arranged under the tracks and within which are operatively disposed oppositely-arranged electromagnets 13 14 and 13<sup>x</sup> 14<sup>x</sup>, having a space between them sufficient to permit the movement of the armature 15 requisite to



move the switch-points to direct the cars in the desired direction. The armatures 15 consist of a soft-iron stem 16 and a similar metal bar 17, arranged between the poles of the magnets, as best shown in Figs. 3 and 6 of the drawings.

Intermediate of the rail switch-points and their magnets are disposed electromagnets 18<sup>x</sup>, between which is arranged a depending armature 19, which has the requisite reciprocative movement to throw the slot switch-tongue G in the desired direction to open and close the slot.

Referring to Figs. 1 and 6, it will be seen that the extra rail 11 is connected by wire *w* to the magnet 13, and the magnet 13 is connected by wire *w'* to the magnet 18<sup>x</sup>, which in turn is connected by wire *w''* to the magnet 14<sup>x</sup>, and that the magnet 14<sup>x</sup> is connected to the extra rail 12 by wire *w'''* to complete the circuit between the extra rails 11 12, and thereby move the respective switch-tongues in the direction to close the slot in the straight track and direct the car to turn into the curved track, the complete operative circuit being completed by extra rails 12 through the shoe 9, wire 5 to switch 7, and thence through switch to wire 4 and thence to main shoe *h'*.

It will be seen from the foregoing description that if a car approaching from the direction of the arrow *a* enters with the power-shoe within the precinct of the extra rails 11 12 the effect or result will be, when the power-shoe is equipped with the extra shoes 8 9, that the circuit is completed through the respective magnets and the switch-points are all moved to direct the car from the straight track to the curved track. It will also be perceived that if the switch 7 is not moved to close the circuit the circuit through the magnets is not created and the car will proceed on the straight track.

Of course if the switch-points have been thrown or moved to direct the car onto the curved track they would so remain unless means were supplied or provided for reversing the current and returning the switches to their normal positions on the straight track, and this I accomplish by arranging extra rails 19' 20 at the other side of the curve, which have the same contact with the shoes 8 9 as in the first approaching instance. The extra rail 19 has connection by wire *w''''* with magnet 14, thence by wire *w'''''* with magnet 18, thence by wire *w''''''* to magnet 13<sup>x</sup>, and thence by wire *w'''''''* to extra rail 20, and through said rail to shoe 9, and completed through wires 4 5 and switch 7 and shoe *h'*.

It is apparent that the extra rails must be placed at such distances on opposite points of the curve as to prevent the second operation of returning the switches to their normal positions that all the cars of the train shall be past the switches before they are returned to the position from which moved.

The operation is as follows: On a car ap-

proaching from the direction of the arrow *a* the motorman at the proper time turns the switch-arm 7 so as to connect the circuit between the wires 4 and 5. As the car moves forward the shoes 8 and 9 contact with the extra rails 11 12, thereby completing the circuit through the wires 4 5 and magnets, which eventuates in moving the switches to direct the car onto the curved track, in which position they remain until the extra rails 19' 20 are engaged, when the current is reversed and the opposite magnets excited and the switches thus returned to normal position.

If it is not required to switch the car, the circuit is left open by permitting the switch-arm 7 to remain out of circuit.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination with the pivotally-operating switch-points, the plow and the main-circuit rails of a conduit-railway, of armatures secured to the switch-points, and extending down beneath the road-bed, electromagnets arranged adjacent to the armatures to move the switch-points to turn them to direct a car from a straight line to the curve, extra rails on opposite sides of the plow, wire-circuits from the extra rails to the magnets, shoes on the plow to contact the extra rails, an insulated wire leading from one of the said shoes to a point on the car, and a switch on the car to open and close the circuit between the said insulated wire and the return-wire 4, substantially as described.

2. The combination with the pivotally-operating switch-points, the plow and the main-circuit rails of a conduit-railway, of armatures secured to the switch-points and extending down beneath the road-bed, electromagnets arranged adjacent to the armatures to move the switch-points to turn them to direct a car from a straight line to the curve, extra rails on opposite sides of the power-shoe, wire-circuits from the extra rails to the magnets, shoes on opposite sides of plow to contact with the extra rails, an insulated substance secured in the plow, wire embedded in the insulated substance and connected to the shoe 9, and leading to a point on the car, and a switch on the car to open and close the circuit between said wires 5, 4, and M, substantially as described.

3. The combination with the pivotally-operating switch-points, the plow and the main-circuit rails of conduit-railway, of armatures secured to the switch-points and extending down beneath the road-bed, electromagnets arranged adjacent to the armatures to move the switch-points to turn them from their normal position, extra rails on opposite sides of the plow, wire-circuits from the extra rails to the electromagnets, electromagnets disposed opposite to the first-named magnets, extra rails remote from the first-named extra rails wire-circuits from these extra rails to the lat-



5 ter magnets, shoes on the plow to contact with the extra rails in succession a wire from one of said shoes to a point on the car, and a switch on the car to open and close the circuits through the magnets, whereby when the car approaches the switches from either direction they are moved from their normal po-

sition, and on leaving the field the switches are returned to their normal position.

PHILIP B. WILLIAMS.

Witnesses:

WM. I. LEE,

H. J. WILLIAMS.