

M. J. M. O'HARA.  
ELECTRIC RAILWAY SWITCH.

No. 587,752.

Patented Aug. 10, 1897.

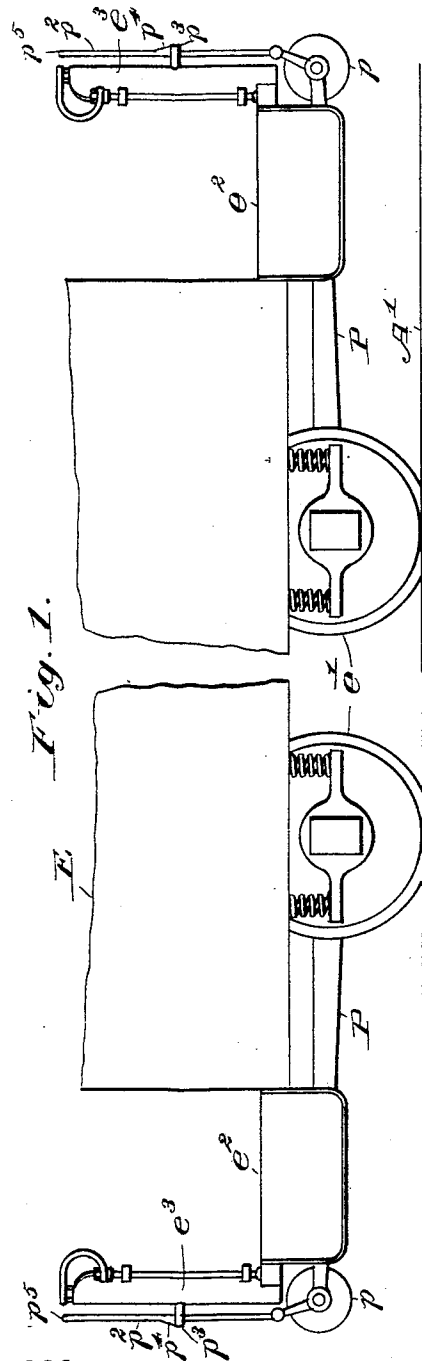


Fig. 1.

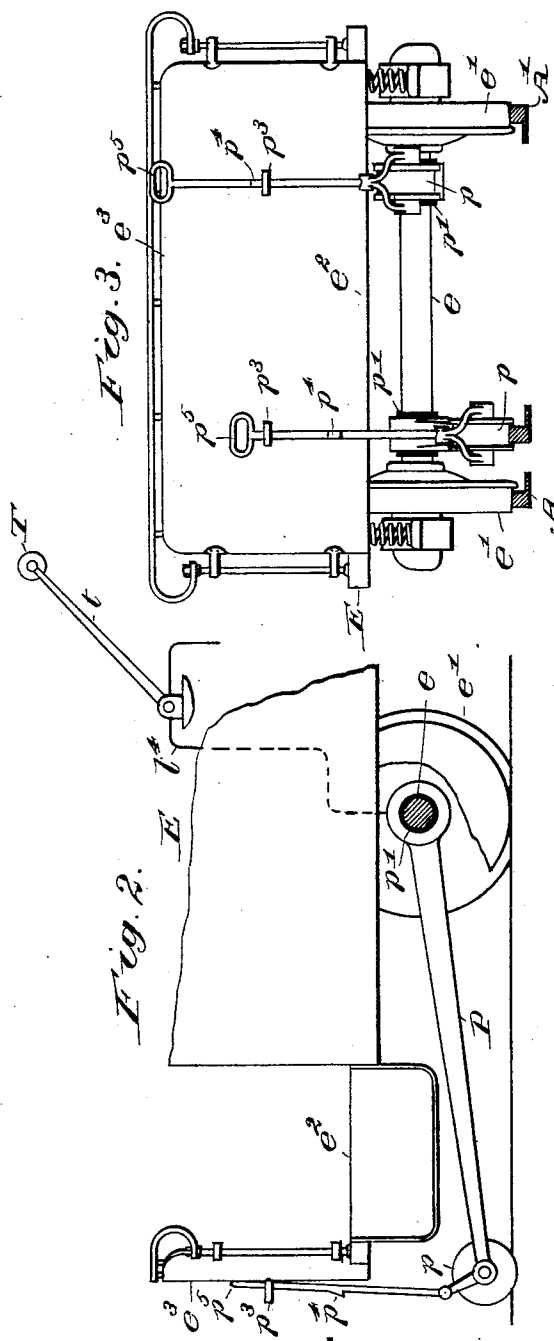


Fig. 2.

Fig. 3.

WITNESSES.

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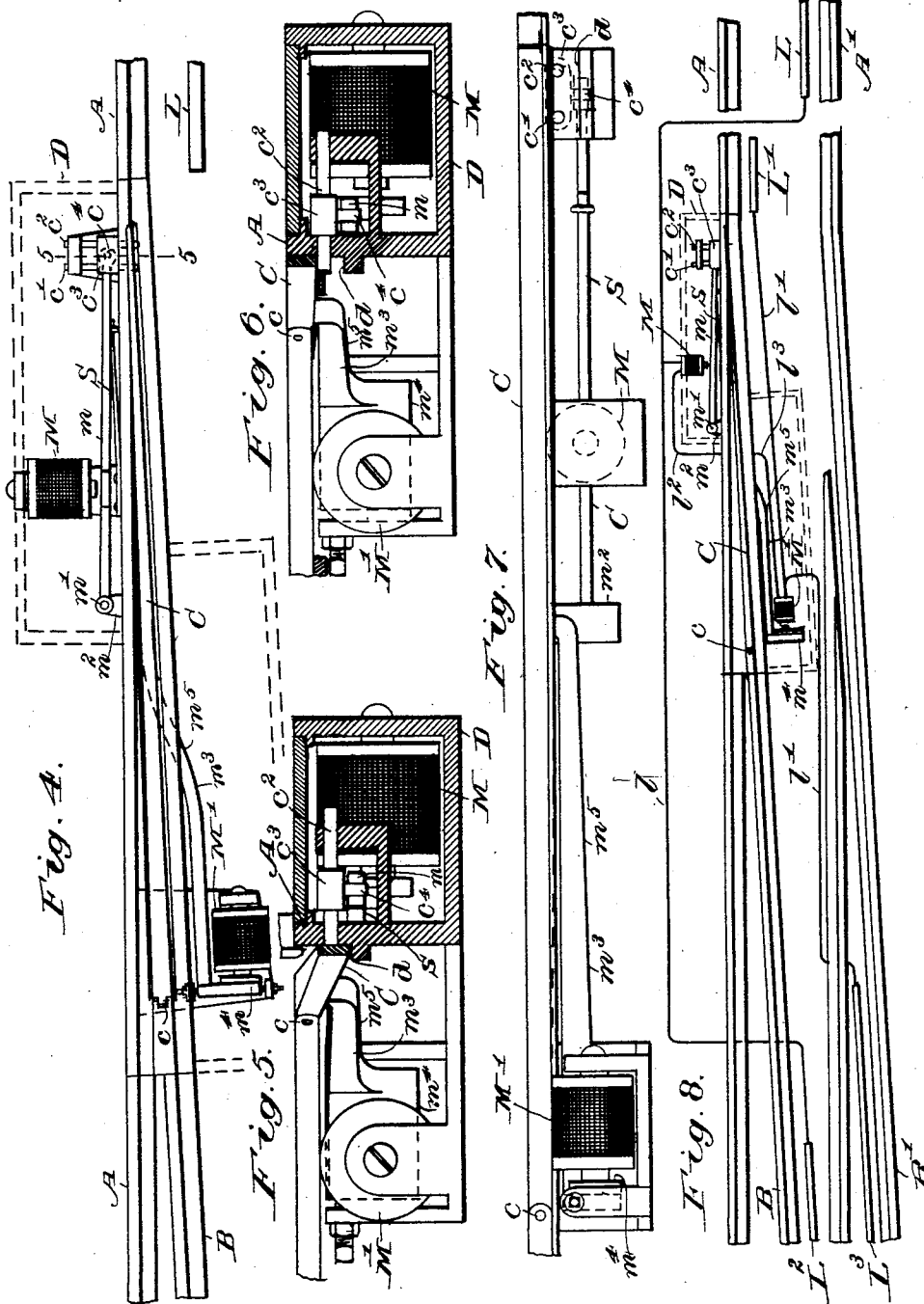
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By Albert M. Moore,  
His ATTORNEY.

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# UNITED STATES PATENT OFFICE.

MATTHEW J. M. O'HARA, OF WILMINGTON, MASSACHUSETTS.

## ELECTRIC-RAILWAY SWITCH.

SPECIFICATION forming part of Letters Patent No. 587,752, dated August 10, 1897.

Application filed March 27, 1897. Serial No. 629,476. (No model.)

*To all whom it may concern:*

Be it known that I, MATTHEW J. M. O'HARA, a citizen of the United States, residing at Wilmington, in the county of Middlesex and Commonwealth of Massachusetts; have invented a certain new and useful Improvement in Electric-Railway Switches, of which the following is a specification.

My invention relates to electric-railway switches; and it consists in the devices and combinations hereinafter described and claimed.

The object of this invention is to furnish a cheap, safe, and effective switch, not easily clogged, and which may be operated from the platform of the car.

In the accompanying drawings, on two sheets, Figure 1 is a side elevation of a part of a car provided with switch-operating trolleys, the trolleys being in a raised position; Fig. 2, a side elevation of an end portion of a car with a switch-operating trolley in operative position and an overhead trolley, showing the connection between said trolleys; Fig. 3, a front elevation of a portion of a car with the supporting-rails and supplementary rails in vertical cross-section and a switch-trolley on the supplementary rail; Fig. 4, a plan of the outer rail of a curve or branch, the corresponding main-line rail and trolley-rail, the switch-tongue and its supporting means, and electromagnet; Fig. 5, a vertical cross-section on the line 5 5 in Fig. 4, the switch-tongue being down to render the main line continuous; Fig. 6, like Fig. 5, except that the switch-tongue is raised in Fig. 6; Fig. 7, an inner side elevation of the switch-tongue and adjacent parts of the rails connected thereby with the magnets and tongue-supporting devices; Fig. 8, a general plan of the invention, except the parts carried by the car, showing the electrical connection.

A A' indicate the rails of the main line; B B', rails of the branch line; C, a switch tongue or point, one end of which turns on a horizontal pivot  $c$ , projecting inwardly from the adjacent main rail A, and the other end of which is supported, when it is desired to make the branch continuous with the main line, on one or more bolts  $c' c^2$ , connected by a yoke  $c^3$ , said yoke being pivoted at  $c^4$  to the outer end of an armature-lever  $m$ , which turns on a

vertical stud  $m'$ , supported on a bracket  $m^2$ , which may be secured on the main-line rail A.

The armature-lever  $m$  is normally drawn away from the electromagnet M by a spring S, represented as a flat spring arranged between said armature-lever and said rail A to hold the bolts  $c' c^2$  under the free end of the switch-tongue C. The bolts  $c' c^2$ , armature-lever  $m$ , and magnet M are protected by a box D, preferably of metal, the bolts projecting through the side of said box toward the switch-tongue, as shown in Figs. 5 and 6, and the rail A resting upon the top of the box. The tongue C is of such depth and is so limited in its downward movement by a stop-ledge  $d$  on the box D as not to allow said bolts to spring over said switch-tongue.

When the magnet M attracts the armature-lever  $m$ , the bolts are drawn out from under the switch-tongue C, which then falls into the position shown in Fig. 5 and rests upon said ledge  $d$ , disconnecting the branch from the main line.

The switch-tongue C is raised by the action of another magnet M', Fig. 7, on a bell-crank lever  $m^3$ , the short arm  $m^4$  of which lever is provided with an armature and the long arm  $m^5$  of which bell-crank lever reaches under said switch-tongue, so that when the magnet M' is energized said tongue is raised and the bolts  $c' c^2$  are forced under the switch-tongue by the contraction of the spring S. The normal position of the switch-tongue is shown in Fig. 5, the free end of the switch-tongue being supported upon the ledge  $d$  to disconnect the branch from the main line.

Two short supplementary conducting rails or plates  $L L^2$  are connected by the line  $l$  to the magnet M, and said magnet is connected by the line  $l^2$  to a rail of the main line or to any other ground, said supplementary rails being insulated from the ground. Two other insulated supplementary conducting-rails  $L' L'^2$  are connected by the line  $l'$  to the magnet M', said magnet being connected by another line  $l'^2$  to a rail of the branch line or to any other ground, Fig. 8.

The car E, Figs. 1, 2, and 3, is of any usual construction used in cars for electric street-railways, except as hereinafter stated, being provided with axles  $e$ , flanged wheels  $e'$ , plat-

forms  $e^2$ , and dashers  $e^3$ . The car carries a trolley T, supported on a conducting trolley-pole  $t$ , for the usual purpose of taking the electric current from the overhead-trolley wire.

5 I use four switch-operating trolleys  $p$ , each supported on a trolley-arm P, turning on and insulated from the axle  $e$ , the insulation being indicated at  $p'$  in Figs. 2 and 3. Each pole or arm T is connected by a conducting-wire  $t^4$  to the trolley-pole  $t$  and trolley T, so that when a trolley  $t$  runs over a supplementary rail a current of electricity passes from the overhead-trolley wire through one of the magnets above described. The switch-operating trolleys  $p$  are so arranged that when 10 lowered sufficiently each will strike one of the supplementary rails, and if held down long enough will pass over a second supplementary rail, said trolleys  $p$  being at the same distance from the car-wheels as the supplementary rails are from the wheel-supporting rails nearest to them, respectively.

There are as many lifting-rods  $p^2$  as there are switch-operating trolleys  $p$ , each lifting-rod  $p^2$  being guided vertically in a loop  $p^3$ , secured to the front of the dasher  $e^3$ , and each having a hook  $p^4$ , which engages the upper surface of said loop when said lifting-rod is raised and prevents the corresponding trolley 30  $p$  from falling. The lifting-rods  $p^2$  are provided at their upper ends with suitable handles  $p^5$ .

When the car, moving to the left in Fig. 8, approaches the branch B B' and it is desired 35 to run the car onto said branch, the motorman drops the switch-trolley  $p$  at his right at the front of the car just before the car reaches the insulated supplementary conducting-rail L', so that when said trolley  $p$  touches said rail L' the circuit is closed from the overhead-trolley wire through the trolley T, trolley-pole  $t$ , trolley-arm P, trolley  $p$ , rail L', line  $t'$ , magnet M' to ground, which raises the switch-tongue and causes the car to take 45 the branch line. After the car has passed the switch the motorman allows the same trolley  $p$  to remain down until it comes in contact with the supplementary rail L', from which the current passes through the magnet M to the ground, drawing the bolts  $c' c^2$  out from under the switch-tongue, allowing the switch-tongue to fall and disconnecting the branch B B' from the main line A A'.

When the car returns and it is desired to 55 pass from the branch onto the main line, the motorman drops the trolley  $p$  at his right upon the supplementary rail L', closing the circuit through the magnet M' and raising the switch-tongue, and the same trolley  $p$  60 after passing the switch, coming in contact with the supplementary rail L, closes a circuit from the trolley-wire through the magnet M and drops the switch-tongue. When the car is moving in either direction wholly 65 upon the main line A A', no movement of the switch will be necessary unless the motorman on the car which last previously

passed from the main line onto the switch or from the switch onto the main line has carelessly left the switch-tongue in its raised position. If this should happen, the motorman who desires to pass the switch on the main line will drop the trolley  $p$ , which will strike the supplementary rail L' or L just before reaching the switch. 70 75

The vertically-movable switch-tongue above described cannot be clogged by sticks or rubbish, cannot catch any displaced part of the brake mechanism or the fender, carriage-wheels will pass freely over it without 80 being caught and broken, and no guard-rail is required to be used with it. Said switch is therefore cheaper, less dangerous, and less liable to be rendered inoperative by accident than switches in common use. 85

I claim as my invention—

1. The combination of a railway main line, a branch line, a switch-tongue, a horizontal pivot, on which said tongue is movable vertically, and horizontal bolts, normally supporting said tongue and adapted to slide out from under said tongue. 90

2. The combination of a railway main line, a branch line, a switch-tongue, a horizontal pivot, on which said tongue is movable vertically, horizontal bolts, normally supporting said tongue, an electromagnet and its armature, movable with said bolts, and a normally open electric circuit, in which said magnet is arranged and by the closing of which said armature is attracted to draw said bolts from 100 under said tongue.

3. The combination of a railway main line, a branch line, a switch-tongue, a horizontal pivot, on which said tongue is movable vertically, to connect and disconnect said main line and said branch line, a normally open electric circuit, an electromagnet, a lever, provided with an armature adapted to be attracted by said magnet when said circuit is 110 closed, to raise said tongue.

4. The combination of the main line and branch line of a railway, a switch-tongue, a horizontal pivot on which said tongue is movable vertically, an electromagnet, its armature, bolts connected to said armature, a spring, to draw said armature away from said magnet and to throw said bolts under said tongue, when said tongue is raised, to connect said main line and said branch line, an open 120 electric circuit including said magnet, a car for said railway, having a trolley, an electric conductor for said trolley, and an electric-circuit closer carried by said car and electrically connected with said trolley and adapted to connect said conductor with said open circuit to energize said magnet and draw said bolts from under said magnet. 125

5. The combination of the main line and branch line of a railway, a switch-tongue, a horizontal pivot on which said tongue is movable vertically, an electromagnet, its armature, bolts connected to said armature, a spring, to draw said armature away from said 130

magnet and to throw said bolts under said tongue, when said tongue is raised, to connect said main line and said branch line, an open electric circuit including said magnet, a car 5 for said railway, having a trolley, an electric conductor for said trolley, an electric-circuit closer carried by said car and electrically connected with said trolley and adapted to connect said conductor with said open circuit to 10 energize said magnet and draw said bolts from under said magnet, another magnet, having an armature arranged to raise said switch-

tongue, another open electric circuit including said last-named magnet and adapted to be electrically connected with said trolley by 15 said circuit-closer to connect said branch line with said main line.

In witness whereof I have signed this specification, in the presence of two attesting witnesses, this 22d day of March, A. D. 1897.

MATTHEW J. M. O'HARA.

Witnesses:

ALBERT M. MOORE,  
GRACE E. HIBBERT.