

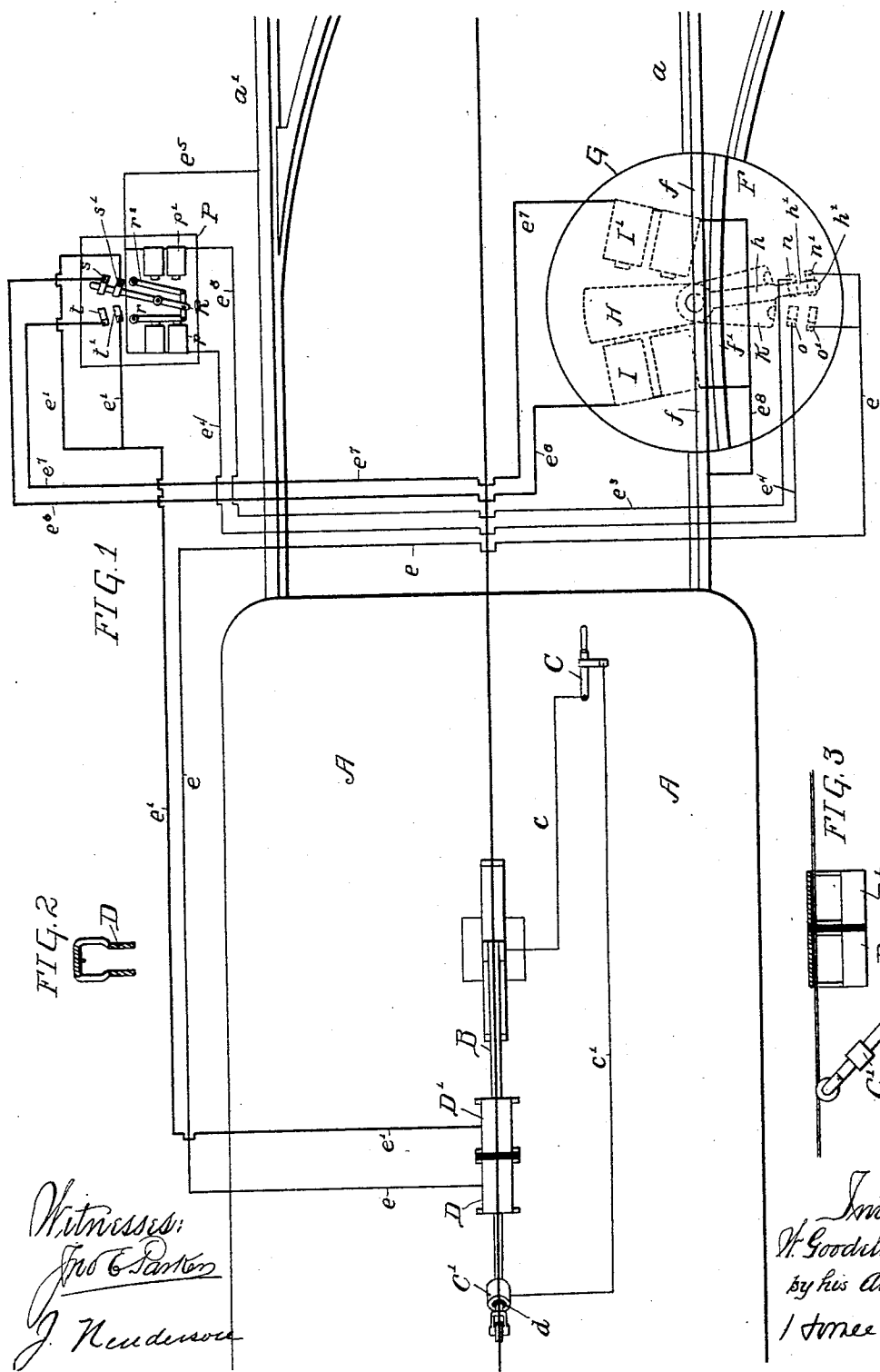
(No Model.)

2 Sheets—Sheet 1.

W. G. CLARK.
RAILWAY SWITCH.

No. 579,959.

Patented Apr. 6, 1897.



Witnesses:
Geo E Parker
J. Henderson

Inventor:
H. Goodell Clark,
by his Attorney,
James Pettit

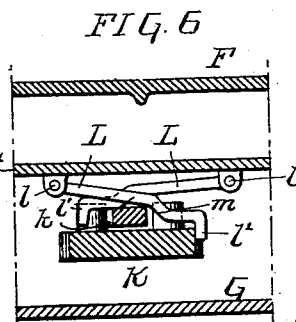
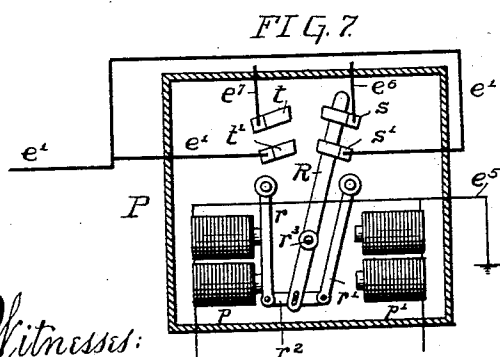
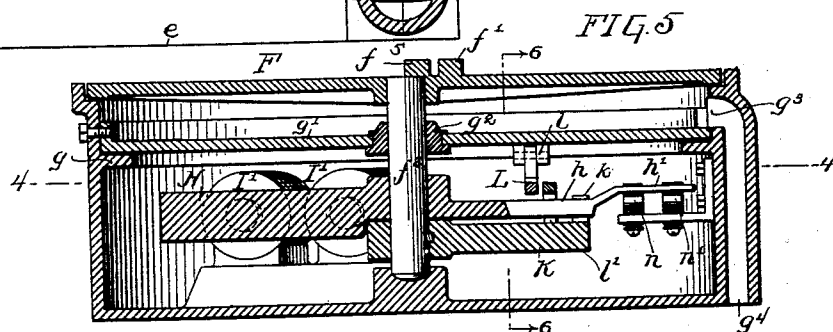
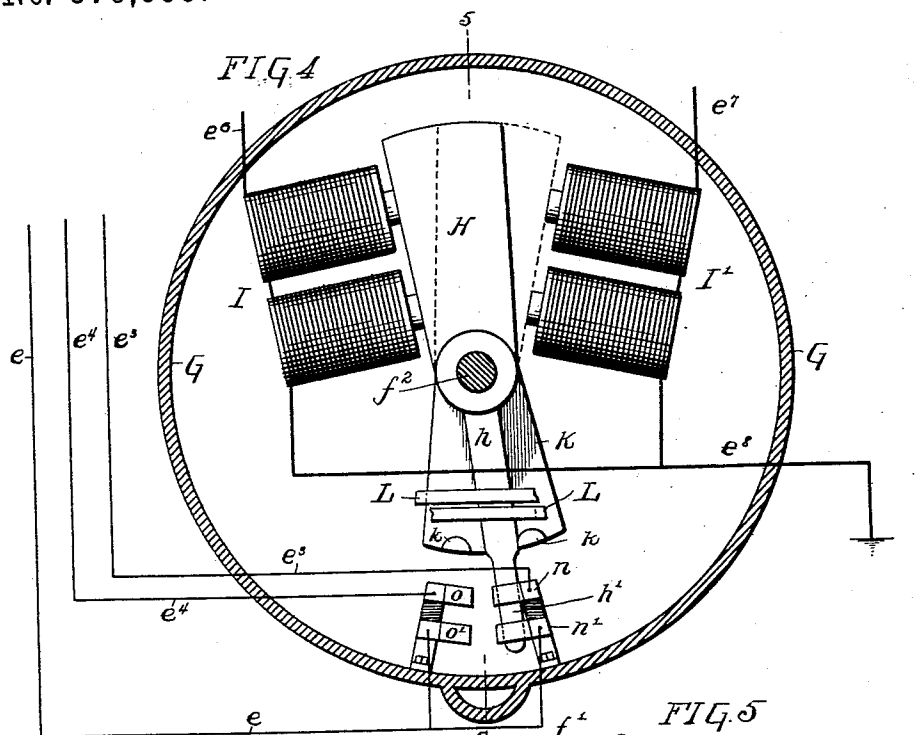
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2 Sheets—Sheet 2.

W. G. CLARK.
RAILWAY SWITCH.

No. 579,959.

Patented Apr. 6, 1897.



Witnesses:
John E. Parker
J. Henderson

Inventor:
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UNITED STATES PATENT OFFICE.

WILLIE GOODELL CLARK, OF PHILADELPHIA, PENNSYLVANIA.

RAILWAY-SWITCH.

SPECIFICATION forming part of Letters Patent No. 579,959, dated April 6, 1897.

Application filed May 2, 1896. Serial No. 589,930. (No model.)

To all whom it may concern:

Be it known that I, WILLIE GOODELL CLARK, a citizen of the United States, and a resident of the city of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Railway-Switches; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to certain improvements in switches for street-railway systems, and is more especially designed for use in connection with an electrically-operated system, such as an overhead trolley, although with slight modifications it may be adapted to other systems, such as underground or storage-battery systems, and the switch mechanism proper may be employed on cable or horse railways without employing any electrical operating devices.

In the accompanying drawings, Figure 1 is a diagram illustrating the general arrangement and construction of a switch constructed in accordance with my invention, illustrating its adaptation to an overhead-trolley railway system. Figs. 2 and 3 show, respectively, a section and an elevation of the contacts carried by the trolley-wire. Fig. 4 is a sectional plan view, on the line 4 4, Fig. 5, of the switch mechanism. Fig. 5 is a transverse sectional elevation on the line 5 5, Fig. 4. Fig. 6 is a sectional elevation of a portion of the same on the line 6 6, Fig. 5; and Fig. 7 is an elevation of a controlling-switch which forms part of the electrical system.

The switch is designed, primarily, for use on trolley or other electrical systems; and the object of the invention is to place the switch under the control of a motorman of each car, so that he may be able to turn the switch without leaving the car or stopping the same.

Referring to Fig. 1, A represents a trolley-car running on supporting-rails $a a'$ and provided with a trolley-pole B for conducting the current from the trolley-wire to the controlling-box and from thence to the car-motor, as usual.

The trolley-pole B forms a conductor for the current, or, if hollow, may carry the usual conducting-wire, and from its base or from any suitable point between the trolley-wire

and the controller-box the main current-conducting wire is connected to a wire c , leading to a switch-lever C, placed at any convenient point on the front platform of the car, within reach of the motorman. From the opposite contact-block of this switch extends a wire c' to a ring or collar C', formed of conducting material and firmly secured near the upper end of the trolley-pole, but insulated therefrom by a ring of rubber d or other suitable material.

The trolley-wire carries a frame, yoke-shaped in cross-section and provided with two contact-plates D D', insulated from each other and so arranged and disposed that as the trolley-pole is carried along by the car the conducting-collar C' will make contact first with the plate D and then with the plate D', and if the switch C be closed the current from the trolley-wire will be transmitted, through the wire c , the switch and the wire c' , and the collar C', first to one of said plates and then, as the car travels a little farther, to the second of said plates, and from there conducted away through wires ee' , connected to said plates D D', respectively. If the switch C is opened by the motorman, no current can reach these plates, as they are insulated from the trolley-wire.

Referring to Figs. 4, 5, and 6, F represents a circular plate in the form of a turn-table, carrying a straight rail f , which normally connects the sections of the rail forming the main road, and a curved rail f' , which when the plate F is turned is made to connect the main rail a with the curved portion of the rail leading to a branch road. This plate F is firmly secured to a vertical shaft f^2 , adapted to a suitable step-bearing f^3 in the base of a box G.

The box G contains the switch-operating mechanism, and as this mechanism must be kept clear of water and dirt it is provided with an inwardly-projecting flange g , to which is keyed or bolted a plate g' , suitable packing being introduced between the flange and the plate to make the interior of the box perfectly water-tight. At the center of the plate g' is a bearing g^2 for the upper end of the shaft f^2 , and at one side of the box, at the top of the plate, I preferably form an opening g^3 , leading to a duct g^4 , which may be con-

nected, if necessary, to a sewer or drain to conduct away any water which may accumulate on top of the plate g' below the turn-table.

5 Loosely mounted on the shaft f^2 is an armature H, under the control of oppositely-disposed electromagnets or solenoids I I', arranged on opposite sides of the armature and operating, as they are energized, to attract
10 the armature and through suitable intervening mechanism effect the movement of the plate F. The armature H is loosely mounted on the shaft f^2 and is provided with a tail-piece h , adapted to play between two lugs k ,
15 secured to or formed integral with a lever K, which is fastened to the shaft f^2 , the movement of the armature drawing the tailpiece against one or other of the lugs k and through the lever K turning the shaft f^2 in the desired
20 direction.

The distance between the lugs k is much greater than the distance which the turn-table must turn to properly shift the switch, so that there is some lost motion of the tail-piece h as it moves between said lugs before
25 striking one of the lugs and moving the lever K, this lost motion being for the purpose of enabling the electromagnets to first overcome the inertia of the armature and permit the latter to gain some little headway or speed
30 before striking the lug, and as the force or power exerted by the magnet is greatly increased as the armature approaches its poles the heavier work of shifting the turn-table is
35 thrown on the magnets at a time when the best results may be attained, that is, while the armature is traveling and while it is very near the poles of the magnet.

In order to securely hold the turn-table in
40 either position to which it may be moved, I provide on the interior of the box G a pair of locking-levers L, pivoted at l to the plate g' and provided with depending tongues l' , adapted to engage with the sides of the lever
45 K and to hold such lever in the position to which it is moved by the armature. Each lever L is provided with an inclined portion m , in such position as to be acted upon by the tailpiece h , and when such tailpiece is moved
50 by the magnet it will act on the inclined face m of that lever L which is acting to lock the lever K in position, the first movement of the tailpiece acting to raise such lever until the tongue l' is disengaged from the side of the lever,
55 when the further movement of the tailpiece brings it into contact with one of the lugs k to effect the movement of the lever, while the opposite locking-lever L drops by gravity until its locking-tongue l' is in engagement
60 with the opposite side of the lever K when the latter has reached the opposite position.

Projecting from the tailpiece h is a contact-plate h' , adapted to be moved into contact
65 with contact-plates $n n'$ in one position and contact-plates $o o'$ in the opposite position, these contact-plates forming part of the

switching connection and are suitably supported in but insulated from the box G.

At any convenient point near the switch, 70 such as a near-by trolley-pole, is secured a box P, in which are electromagnets $p p'$, adapted to act upon pivoted armatures $r r'$, connected by a cross-bar r^2 to a switching-lever R, which is pivoted at r^3 to the box, the
75 arrangement being such that when the electromagnets p are energized the armature r will be attracted and the switching-lever R will be thrown to the right to make contact between two contact-plates $s s'$, and when the
80 magnet p' is energized the armature r' will be attracted and the lever R will be thrown to the left to make electrical contact between two contact-plates $t t'$.

Referring to Fig. 1, it will be seen that the 85 wire e , extending from the plate D, is connected to the contact-plates n' and o' in the box G. From the contact-plates, respectively, extend wires $e^3 e^4$ to the electromagnets $p p'$ in the switch-box P, a wire e^5 extending from
90 the magnets to the return-rail or ground. From the plate D' extends a wire e' to the contact-plates $s' t'$ in the box P; from the contact-plates s and t , respectively, extend wires e^6 and e^7 to electromagnets I I' in the box G,
95 and from thence extends a wire e^8 to return-rail or ground.

When the parts are all in the position indicated in Fig. 1, with the rail f extending in
100 such manner as to communicate with the straight or main track, the motorman has, by closing the switch C, placed the system in readiness to shift the turn-table so that his car will turn around the curve. The current
105 first passes from the wire c to the switch C, from thence by wire c' to the collar C', and as the car travels along the collar will make contact with the plate D, sending the current
110 through wire e , contact-plate n' , switch-lever h' , contact-plate n , wire e^3 , electromagnet p' , wire e^5 , to ground, thus energizing the magnet p' and attracting the armature r' and throwing the switch-lever R to the left, making
115 electrical contact between the contact-plates t and t' in the box P.

As the car moves along, the collar C' breaks
120 contact with the plate D and comes into electrical contact with the plate D', and the current from the trolley-wire then passes from the wire c' , collar C', and plate D', through
125 the wire e' , contact-plate t' , switch-lever R, which, as previously described, has been shifted to the left by the energizing of the magnet p' , from thence to contact-plate t , wire e^7 , magnets I', wire e^8 , to return-rail or
130 ground. When the magnet I' is energized, it attracts the armature H, moving its tail-piece h , which first comes into contact with the inclined portion m of the lever L and lifts the tongue l' from contact with the side of the
135 lever K. Further movement of the tailpiece at the time when the armature is approaching the poles of the magnet and the magnet is exercising its greatest force brings the tail-

piece into contact with one of the lugs k of the lever K and moves said lever, turning the shaft f^2 and the turn-table until the curve-rail f' is in alinement with the main rail and in position for the car to travel around the curve to the branch line.

If the turn-table be left in the position last described and an approaching car is to travel directly along the main line and not around the curve, the switch C is closed and the current acts on the opposite sets of magnets of the switch-box and the turn-table to move the turn-table from its then position to shift the rail f into alinement with the main track.

If the parts are arranged as shown in Fig. 1, with the main track continuous, and the approaching car is to travel on the main track, the switch C is opened, and as no current is then established through either of the wires e or e' the switch remains in its then position.

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

1. The combination of the turn-table having switching-rails on its upper surface, a vertical shaft carrying said turn-table, a lever secured to said shaft, lugs on said lever, an armature adapted to play between and to act on said lugs to move the lever, electromagnets adapted to act on said armature, and an electric circuit in which said electromagnets are situated, substantially as specified.

2. The combination of the turn-table having switching-rails on its upper surface, a vertical shaft carrying the same, a lever secured to said shaft, lugs on said lever, an armature loosely mounted on the shaft and having a tailpiece adapted to play between and to operate through the lugs to effect the movement of the lever, an electric circuit under the control of the motorman of the car, and electromagnets situated in said electric circuits and adapted to act upon said armature.

3. The combination of the turn-table having switching-rails on its upper surface, a vertical shaft carrying said turn-table, a lever secured to said shaft, lugs on said lever, levers or pawls adapted to lock said lever in position, an armature loosely mounted upon the shaft, a tailpiece secured to or formed integral with said armature and adapted to operate upon the locking levers or pawls and upon the main lever, an electric circuit under the control of the motorman of the car, and electromagnets situated in said circuit and adapted to act upon said armature.

4. The combination of the turn-table having switching-rails on its upper surface, a shaft, f^2 , carrying said turn-table, a lever, K , secured to said shaft, an armature, H , loosely

mounted on the shaft and having a tailpiece, h , lugs, k , provided upon the lever and adapted to be acted upon by the tailpiece, an electric circuit under the control of the motorman of the car, and electromagnets situated in said electric circuit and adapted to act upon the armature, H , substantially as specified.

5. In a railway system, a switch, an armature adapted to operate the switch, a contact-plate carried by or under the control of the armature, electromagnets situated on opposite sides of said armature, a controlling-switch comprising a switching-lever, an armature or armatures secured thereto, electromagnets adapted to act upon said armatures, an electric circuit extending from an approaching car to said controlling-switch, and an electric circuit extending from the car to the magnets of the turn-table, substantially as specified.

6. In a railway switching system, a rail-switch, armature and electromagnets for controlling the movement of the switch, circuits extending through the car to said magnets, a switch on said car circuit-controlling devices carried by the armature, an intervening switch-controlling mechanism for determining the magnet-circuit to be energized and a circuit extending from the car to said intervening switch-controlling mechanism, substantially as specified.

7. An electric-railway switching mechanism comprising the electromagnets, I , I' , an armature, H , adapted to be acted upon by the electromagnets to effect the movement of the switch, a contact-plate, h' , carried by the armature, contact-plates, n , n' , o , o' , with which said contact-plate, h' , is adapted to make contact, a controlling-switch comprising a switch-lever, R , contact-plates, s , s' , t , t' , with which said switch-lever is adapted to make electrical contact, electromagnets, p , p' , for controlling the movements of the switch-lever, contact-plates, D , D' , insulated from each other, a contact block or collar, C' , in an electric circuit under the control of a switch-lever, C , on the car, an electric circuit extending from the plate, D , to wire, e , contact-plates, n' , and o' , wires extending from contact-plates, n , o , to magnets, p' , p , respectively, ground-wire extending from the magnets, wire, e' , extending from plate, D' , to contact-plate, s' , t' , wires, e^6 , e^7 , extending from the contact-plates s and t , to the electromagnets, I , I' , respectively, and a wire extending from said magnets to the ground.

In witness whereof I have hereunto set my hand this 18th day of April, A. D. 1896.

W. GOODELL CLARK.

Witnesses:

JNO. E. PARKER,
EDMUND S. MILLS.