E. F. BUBB.

AUTOMATIC SWITCH.

APPLICATION FILED MAY 5, 1910.

1,004,981.

Patented Oct. 3, 1911.

3 SHEETS—SHEET 1.

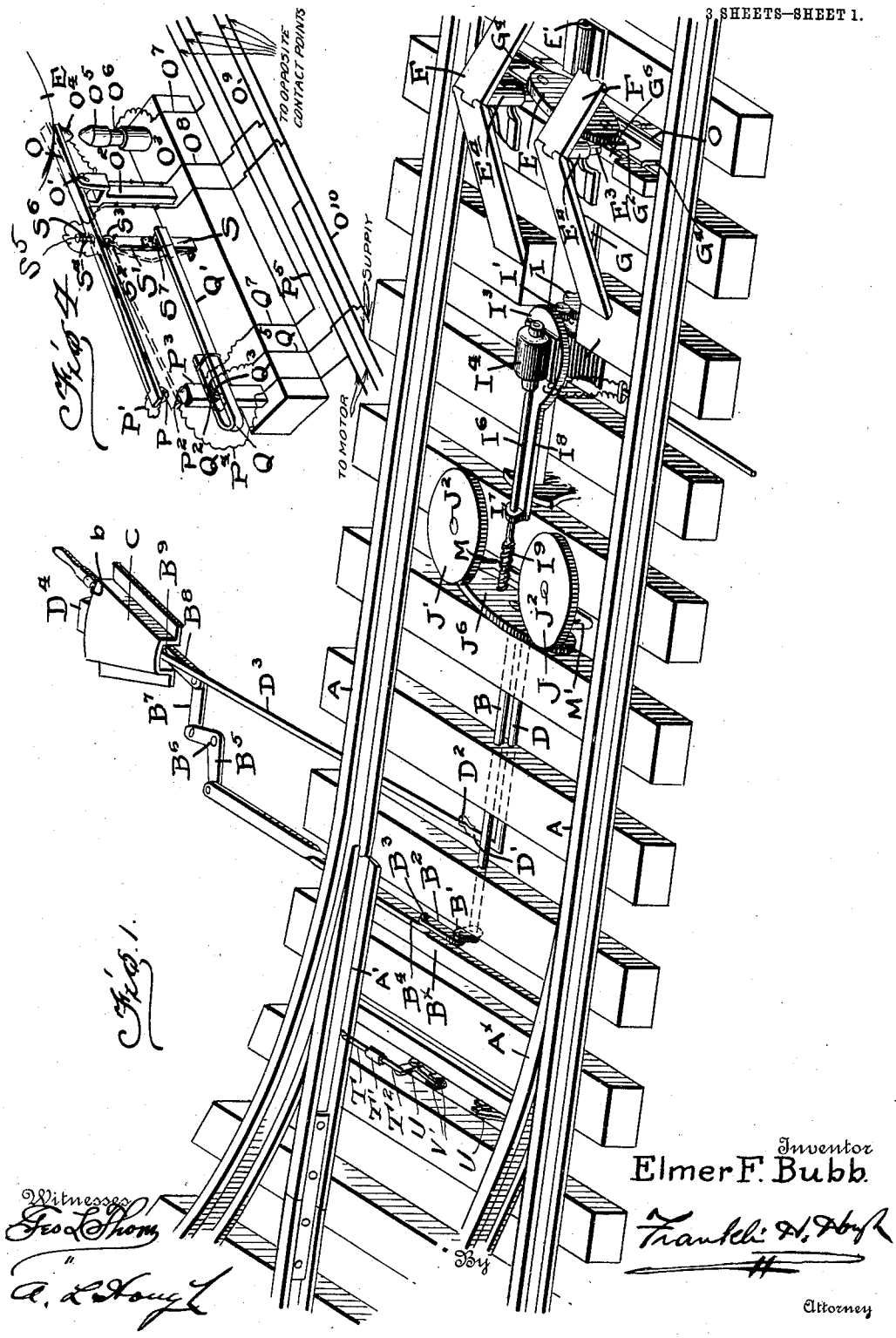

Fig. 1.

Witnesses:
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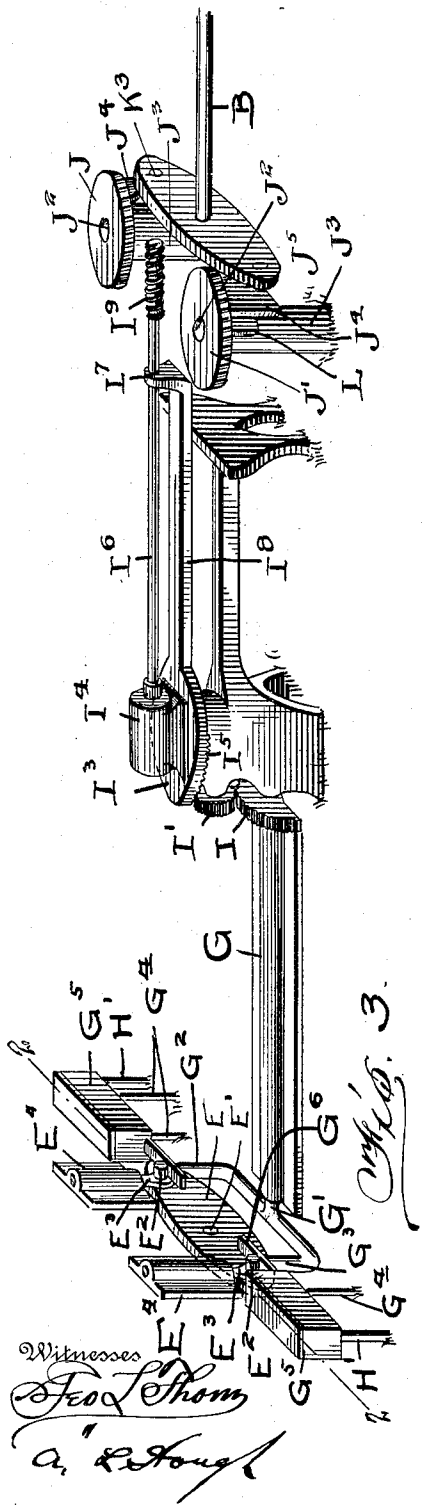

Fig. 3.

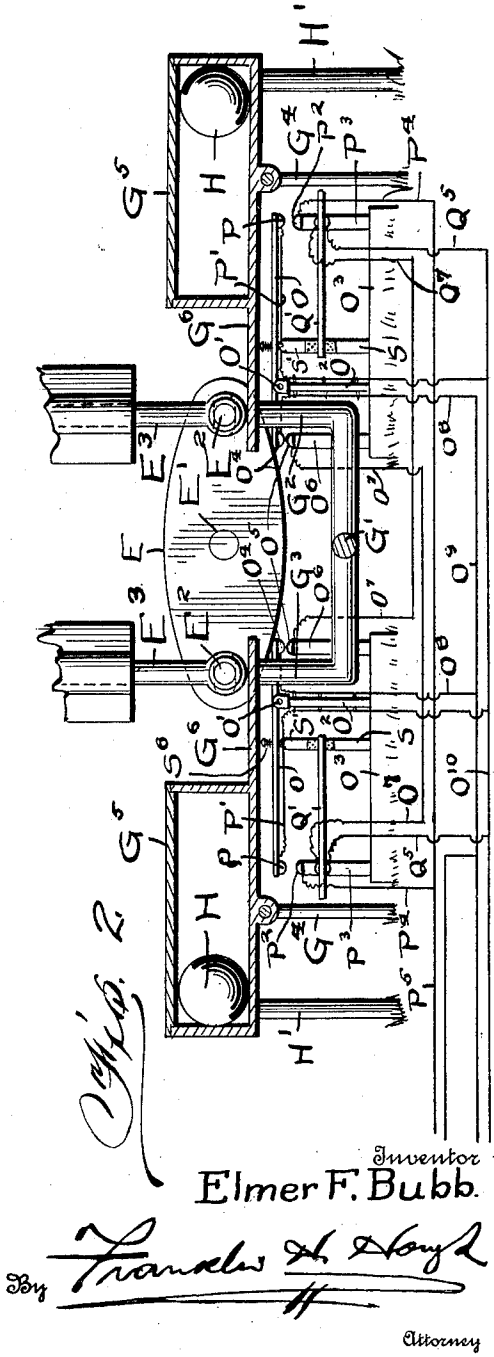

Fig. 2.

Witnesses

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3 SHEETS—SHEET 3.

Fig. 5.

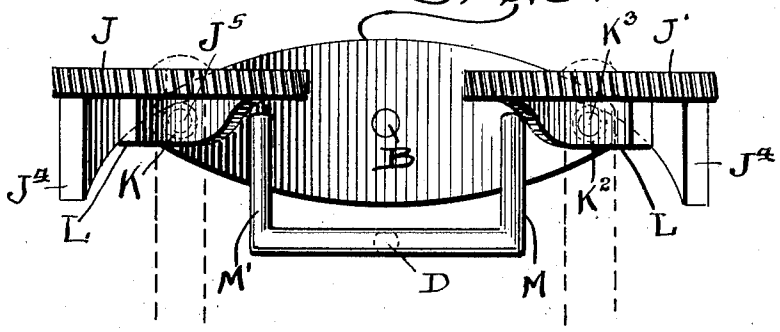


Fig. 9.

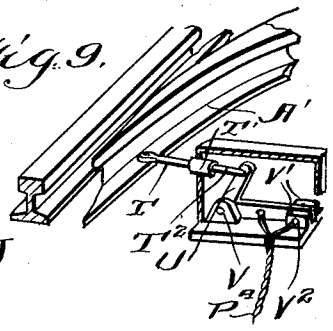
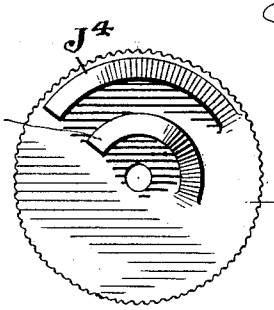


Fig. 6.



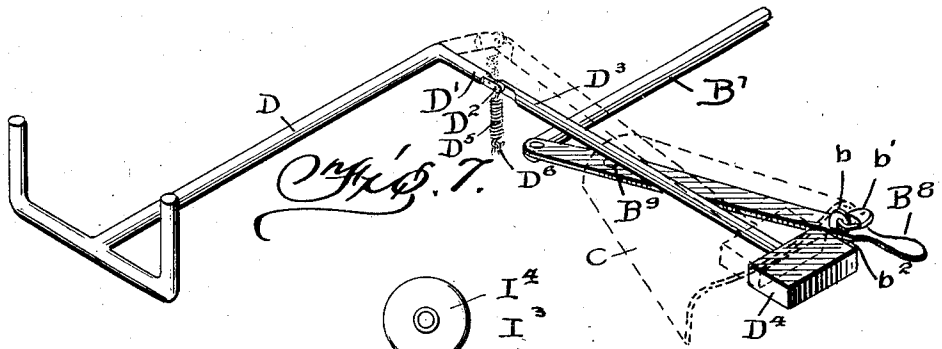
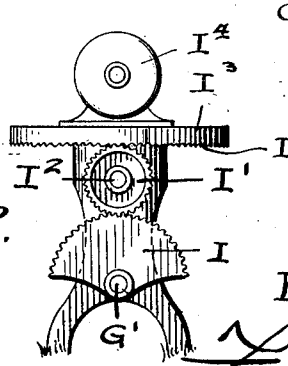


Fig. 7.

Fig. 8.



Witnesses

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UNITED STATES PATENT OFFICE.

ELMER FRANKLIN BUBB, OF CHICAGO, ILLINOIS.

AUTOMATIC SWITCH.

1,004,981. Specification of Letters Patent. Patented Oct. 3, 1911.

Application filed May 5, 1910. Serial No. 559,493.

To all whom it may concern:

Be it known that I, ELMER F. BUBB, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Automatic Switches; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to new and useful improvements in automatically and electrically operated switch apparatus, affording means whereby a switch may be thrown by the locomotive or car passing over the rails and comprises various details of construction and combinations and arrangements of parts which will be hereinafter fully described and then specifically defined in the appended claims.

I illustrate my invention in the accompanying drawings, in which:—

Figure 1 is a perspective view showing my apparatus as applied to the switch rails of a railway. Fig. 2 is a cross sectional view through the apparatus, parts being shown in elevation as on the line 2—2 of Fig. 3. Fig. 3 is an enlarged detail perspective view of the means for causing the switch to be opened and closed. Fig. 4 is an enlarged detail perspective view showing the circuit closing apparatus. Fig. 5 is a detail elevation of the means for rocking the shaft adapted to actuate the switch points. Fig. 6 is a bottom plan view of one of the gear wheels shown in Fig. 5 and illustrating the cam projections thereon. Fig. 7 is a detail perspective view of the switch head releasing mechanism, and Fig. 8 is a detail in elevation of the gear mechanism and motor carrying member. Fig. 9 is a detail perspective view of a circuit breaker attached to the switch points of the switch.

Reference now being had to the details of the drawings by letter, A, A designate the main rails of a railway and A′ a switch point rail. Journaled in suitable bearings in the ties is a rock shaft B having a crank arm B′ fixed to one end and which crank arm is pivotally connected to a link B^2 pivoted at B^3 to the bar B^4, which latter is pivotally connected by the pin B^3 to the bar $B^\times$ which connects the two switch points A′ and $A^\times$. B^5 designates an angle lever pivotally mounted upon a fixed pin B^6 and connected by means of a link B^7 with the operating lever B^8, which latter is pivotally mounted upon a pivot B^9, a suitable casing C being mounted over the lever B^8.

Upon reference to Fig. 7 of the drawings it will be seen that a lug *b* passes through an aperture in the lever B^8 and the tongue of a padlock *e′* passes through an aperture in said lug *b* and serves to hold the latter from moving through the aperture in which it is mounted, while a head b^2 prevents the lug from moving in the opposite direction through the apertures of the lever. A second rock shaft, designated by letter D, shown in Fig. 7 of the drawings as being mounted in suitable bearings parallel to the shaft B, has an angled end D′, an enlarged view of which is shown in Fig. 7, and said end D′ is pivotally connected by means of a pin D^2 with a rod D^3 having a head D^4 at one end which is adapted to normally hold the lever in the position shown in Figs. 1 and 7 of the drawings, in which it prevents the lever B^8 from tilting upon the pivotal pin B^9, by reason of the head D^4 being positioned in the path of the lug *b*. A coiled spring D^5 is fastened to a fixed eye D^6 at one end and its other end fastened to the pivotal pin D^2 and serving to normally hold the rock shaft D and rod D^3 in the position shown in solid lines in Fig. 7 of the drawings.

Referring to Figs. 1 and 2 of the drawings will be seen an oval-shaped plate E which is fixed to a rock shaft E′ journaled in suitable bearings upon the ties of the railway and pivotally connected to the pins E^2 upon said plate E, one upon either side of the shaft E′, are the posts E^3 guided in their longitudinal movements by the plates E^4 which are fastened in any suitable manner upon the ties. The upper end of each of said posts E^3 is connected pivotally to the inner ends of the two depressible plates F which are hinged together at their meeting ends and normally positioned with their free ends resting upon the upper faces of the ties, as shown in Fig. 1 of the drawings. The upper hinged ends of said plates F project a suitable distance above the ties at one side or the other and said plates are adapted to be depressed by any suitable mecha-

nism carried by the car or locomotive and provided for the purpose of causing a switch point rail to be thrown in one direction or the other.

Mounted in a suitable bearing member G, shown clearly in Fig. 3 of the drawings, is a rock shaft G′ having one end forked, terminating in the angled ends G^2 and G^3. Mounted upon the posts G^4 are the pivotal housing members G^5, each of which has a bottom portion G^6 extending toward each other, the end of one projection resting immediately above the angled end G^2 of the forked part of the rock shaft G′ and the other over the angled end G^3. A ball H is mounted in each of said housings and, when the parts are in their normal positions, the bottoms of the two housings will be held horizontally in alinement with each other. Posts H′ are mounted one at each outer end of the housing G^5 and are provided for the purpose of limiting the outer tilting movements of said housings.

Fixed to the shaft G′ is a segment gear I, a detail view of which is shown in Fig. 8 of the drawings, and said segment gear is in mesh with the teeth of the pinion I′ mounted upon a stub shaft I^2, and I^3 designates a platform supporting the motor I^4. The under surface of said platform is provided with gear teeth I^5 with which the teeth of the pinion I′ are in mesh and affording means whereby, as the shaft is rocked into one position or another, the platform will be rotated upon its central axial pivot in a corresponding direction. A motor shaft I^6 projects from the motor and is journaled in an aperture in the upturned end I^7 of the integral arm I^8 which projects from said platform. The shaft I^6 has a worm gear I^9 at its free end and adapted, as it is swung in one direction, to engage the worm gear upon the horizontally disposed rotatable wheel J, while it is adapted to mesh with the worm gearing of a wheel J′ also horizontally journaled in the event of its being swung in the opposite direction. Each of said wheels J and J′ is pivotally mounted upon a pin J^2 which are fastened to the vertical pulleys J^3. Each of said wheels J and J′ is of similar construction and a bottom plan view of one of said wheels J is shown in Fig. 6 of the drawings and both wheels in elevation in Fig. 5. Upon reference to Figs. 5 and 6, it will be noted that an integral cam J^4 and L project from the under surface of each wheel, the cam edge of one of which is adapted to contact with an anti-friction roller K mounted upon a pin J^5 carried by the plate J^6 fixed to the rock shaft B, while the cam upon the other wheel J′ is adapted to contact with a similar anti-friction roller K^2 journaled upon a pin K^3 projecting from the end of the plate J^6 opposite that from which the pin J^5 projects. It will be noted that the under face of each wheel J and J′ is provided with a cam projection L which is concentrically mounted with relation to the cam J^4 and one of said cams L is adapted to actuate an angled end M integral with a rock shaft D, while the other cam member L is adapted to actuate a similar angled end M′ which is parallel to the end M.

Referring to Figs. 2 and 4 of the drawings will be seen the electrical apparatus for causing the switch to be thrown in one direction or the other by the starting of the motor. There are two electrical circuit closers, one under each end of the tilting member E and extending outwardly therefrom, said devices being similar in construction and wired so that the initial circuit closing member of one operates the secondary circuit closing member of the other, each of which is arranged as follows: A bar O is pivotally mounted upon a pin O′ carried by the forked end of the post O^2, shown plainly in Fig. 4 of the drawings, said post rising from the block O^3. One end of the bar O is positioned underneath one end of the tilting plate E, said end carrying a contact point O^4 arranged to contact with a yielding contact point O^5 mounted upon a standard O^6 on said base O^3, said yieldable contact point telescoping the upper end of the standard O^6. Mounted on the other end of the bar O is a contact point P arranged to contact with a terminal P^2 mounted upon a standard P^3 rising from the base O^3 adjacent to its outlet end and fixed to the standard P^3 is a bar Q bent U-shaped at one end and has an extended arm Q′. An electro-magnet Q^2 is fastened to the short arm of the bar Q and directly opposite upon the long or extended arm of the bar a similar electro-magnet Q^3 is fastened. Hinged to the block O^3 is a strip S, the upper end of which is hinged to a strip S′ which in turn has an eye S^2 in its upper end connected to an eye S^3 formed at the lower end of the pin S^4 which passes through an aperture in the bar O and has a coiled spring S^6 interposed between the head of the pin S^5 and the upper surface of the bar O. The long arm Q′ of the bar Q has a laterally projecting lug S^7 which is normally positioned adjacent to the hinge connecting the strips S and S′ and is adapted, as the two electro-magnets are drawn together as they are energized, to move against the hinge by reason of the arm Q′ yielding and causing the joint between the strips S and S′ to break and assume the position shown in dotted lines in Fig. 4 which action will cause the terminal P to move into contact with the terminal P^2 and close the circuit.

The wiring for the contact points referred to in the foregoing description is as follows:—Assuming the wires O^9 and O^{10} as

the source of supply and wire O^9 as the positive wire, the current will pass through the wires O^8 to the terminals O^4 and, when the tilting plate E is rocked, either of the terminals O^4 which is depressed contacts with a terminal O^5 which is electrically connected by a wire O^7 to the electro-magnets Q^2 and Q^3 of the circuit closing device on the opposite side of the tilting plate E, thence back through the wire Q^5 back to the supply wire O^{10} which completes as may be called the initial circuit. When the electro-magnets Q^2 and Q^3 are energized and brought together, the lug S^7 breaks the joint between the strips S and S', the current passes through the switch operating motor, wire P^5 to one of the terminals P^2, through the terminal P, wire P' and back to the wire O^{10}, thus completing the circuit.

Attached to the switch point rail A' is a bar T which carries an insulator T' to which is secured a bar T^2 pivotally connected to an arm of a bell crank lever U which is fulcrumed in a bearing V. The opposite arm of the lever U serves as a knife blade switch and contacts with the blades V' of the terminal V^2 of the switch, and the relation between the knife blade switch and terminal V^2 is such that, when the switch point rail is spaced from the main rail, the parts contact but, when the switch point rail bears against the main rail, the contact is broken. The wires P^4 communicating from the terminals P^2 and wire P^5 are broken, one of the terminals contacting with the bell-crank lever U and the other with the terminal V^2 and, as there is a circuit breaker attached to each switch point, only one being shown in the drawing as they are duplicates, the terminals of each of the wires P^4 are connected to one or the other of the circuit breakers.

In operation, assuming that it is desired to throw the switch points to the right, the two depressible plates F upon one side being depressed by any apparatus carried by the car or locomotive will cause the post E^3 to be depressed and with it the plate E will be tilted upon its pivotal stub shaft E'. The end of the plate E tilting downward will cause the pin E^2 to contact with the projecting end G^6 of the adjacent housing G^5, causing the latter to tilt upon its post G^4, which will allow the ball H to roll to the opposite end of the housing and insure the shaft G' being rocked sufficiently to actuate the apparatus for setting the motor into operation. As the shaft G' is caused to rock by reason of the extension G^6 and the housing coming in contact with the angled end of the arm G^2, the segment gear I will cause a partial rotary movement to be imparted to the pinion I' which in turn will transmit the motion to the pivotal platform I^3, causing the same to make a partial revolution sufficient to swing the motor shaft I^6 with its worm at one end into mesh with the worm wheel J. As one end of the plate E tilts against one end of the bar O, as shown in Figs. 2 and 4 of the drawings, the contact point O^4 will be thrown into electrical connection with the yielding terminal O^5, closing the circuit and causing the electro-magnets Q^2 and Q^3 to be energized. Said magnets being energized and drawn toward each other, the yielding arm Q' will be moved laterally and the lug S^7 upon said arm coming in contact with the hinge connecting the springs S and S' will cause the same to assume the position shown in dotted lines in Fig. 4 of the drawings and which will draw down the bar O so that the terminal P will come in contact with the terminal P^2 and close the circuit, thus energizing the motor and causing the same to rotate the gear wheel which is in mesh with the worm wheel upon the motor wheel I^6. As the cam projection L comes in contact with the end M of the shaft D, the latter will be rocked and a longitudinal movement will be imparted to the rod D^8, shown in Fig. 7 of the drawings, which will cause the head D^4 to be drawn to the position shown in dotted lines in Fig. 7 and out of the path of the lug *b* which will allow the lever B^8 to swing freely. Immediately after the shaft D has been tilted in the manner described, the cam projection J^4 upon the wheel J^2 will come in contact with the anti-friction roller J^5 upon the adjacent end of the plate J^6 and cause the same to tilt and rock the shaft B which, through its connections with the switch lever B^8, will cause the same to swing upon its pivot and the switch points A' and $A^\times$ moved toward the switch lever.

It will be noted upon reference to Fig. 2 of the drawings that a similar electric circuit closing apparatus is provided for operation when one end or the other of the plate E is tilted downward and adapted to start the motor to throw the switch as may be desired. In the event of it being desired to operate the switch without the electric-circuit closing apparatus, the lug *b* may be removed from the lever, thus allowing the same to swing freely by the manipulation of the same by hand.

What I claim to be new is:—

1. An automatically operated switch apparatus for railways comprising, in combination with the main tracks and switch points, a rock shaft mounted in suitable bearings and having a forked end, an oscillating plate, pins projecting therefrom, a vertically movable post pivotally connected to each of said pins, depressible plates connected to each of said posts and adapted to be actuated as a car passes over the tracks, gear mechanism, connections between the same and switch points, a motor, means for throwing the same into gear with the mechanism for operating the switch points, and

electrical means for starting the motor as said plate is tilted.

2. An automatically operated switch apparatus for railways comprising, in combination with the main tracks and switch points, a rock shaft mounted in suitable bearings and having a forked end, an oscillating plate, pins projecting therefrom, a vertically movable post pivotally connected to each of said pins, depressible plates connected to each of said posts and adapted to be actuated as a car passes over the tracks, a tilting housing, a weighted ball movable therein, a projection upon said housing positioned underneath the pin upon said oscillating plate and positioned over one end of the forked part of the rock shaft, a motor, a rotatable platform upon which the motor is mounted, gear connections between teeth upon said platform and said rock shaft, horizontally disposed rotatable gear wheels, a motor shaft with worm thereon adapted to be thrown into mesh with one of said horizontally disposed gear wheels, means for starting the motor as the worm is thrown into mesh with one of said gear wheels, and mechanism actuated by said gear wheels for causing the switch points to be moved in one direction or the other.

3. An automatically operated switch apparatus for railways comprising, in combination with the main tracks and switch points, a rock shaft mounted in suitable bearings and having a forked end, an oscillating plate, pins projecting therefrom, a vertically movable post pivotally connected to each of said pins, depressible plates connected to each of said posts and adapted to be actuated as a car passes over the tracks, a tilting housing, a weighted ball movable therein, a projection upon said housing positioned underneath the pin upon said oscillating plate and positioned over one end of the forked part of the rock shaft, a motor, a rotatable platform upon which the motor is mounted, gear connections between teeth upon said platform and said rock shaft, horizontally-disposed rotatable gear wheels, cams upon the under surface thereof, a motor shaft and worm thereon movable against one of the gear wheels having said cam projections, a second rock shaft having a forked end, the arms of which are adapted to be actuated by one of said cams, connections between said second referred to rock shaft and switch points, and electrical mechanism adapted to be actuated as the first referred to rock shaft tilts.

4. An automatically operated switch apparatus for railways comprising, in combination with the main tracks and switch points, a rock shaft mounted in suitable bearings and having a forked end, an oscillating plate, pins projecting therefrom, a vertically movable post pivotally connected to each of said pins, depressible plates connected to each of said posts and adapted to be actuated as a car passes over the tracks, a tilting housing, a weighted ball movable therein, a projection upon said housing positioned underneath the pin upon said oscillating plate and positioned over one end of the forked part of the rock shaft, a motor, a rotatable platform upon which the motor is mounted, gear connections between teeth upon said platform and said rock shaft, horizontally-disposed rotatable gear wheels, cams upon the under surface thereof, a motor shaft and worm thereon movable against one of the gear wheels having said cam projections, a second rock shaft having a forked end, the arms of which are adapted to be actuated by said cams, a bar pivotally connected to said shank portion of said second referred to rock shaft, a head upon said bar, a lever having pivotal link connections with the switch point, and a projection upon said lever positioned in the path of said head.

5. An automatically operated switch apparatus for railways comprising, in combination with the main tracks and switch points, a rock shaft mounted in suitable bearings and having a forked end, an oscillating plate, pins projecting therefrom, a vertically movable post pivotally connected to each of said pins, depressible plates connected to each of said posts and adapted to be actuated as a car passes over the tracks, a tilting housing, a weighted ball movable therein, a projection upon said housing positioned underneath the pin upon said oscillating plate and positioned over one end of the forked part of the rock shaft, a motor, a rotatable platform upon which the motor is mounted, gear connections between teeth upon said platform and said rock shaft, horizontally-disposed rotatable gear wheels, cams upon the under surface thereof, a motor shaft and worm thereon movable against one of the gear wheels having said cam projections, a second rock shaft having a forked end, the arms of which are adapted to be actuated by said cams, a bar pivotally connected to the shank portion of said second refererd to rock shaft, a head upon said bar, a spring fastened to the pivotal connection of said bar, a lever having pivotal link connections with the switch points, and a lug upon said bar adapted to contact with said head to prevent the lever oscillating.

6. An automatically operated switch apparatus for railways comprising, in combination with the main tracks and switch points, a rock shaft mounted in suitable bearings and having a forked end, an oscillating plate, pins projecting therefrom, a vertically movable post pivotally connected to each of said pins, depressible plates connected to each of said posts and adapted to

be actuated as a car passes over the tracks, oscillating housings, a weighted ball in one of the latter, a projection upon each housing positioned underneath one of said pivotal pins, a pivotal circuit closing bar, terminals thereon, one end of said bar mounted underneath the end of said tilting plate, hinged strips connected to said bar, a U-shaped member having a yielding arm, electro-magnets mounted upon each arm of said member, one end of said arm adapted, as the electro-magnets are drawn toward each other, to break the joint between said strips and allow one of the terminals of the contact point to lower to close a circuit, a motor and electrical connections between the same and said terminal contacts, switch releasing and operating means, and gear connections between the same and said motor.

7. An automatically operated switch apparatus for railways comprising, in combination with the main tracks and switch points, a rock shaft mounted in suitable bearings and having a forked end, an oscillating plate, pins projecting therefrom, a vertically movable post pivotally connected to each of said pins, depressible plates connected to each of said posts and adapted to be actuated as a car passes over the tracks, oscillating housings, a weighted ball in one of the latter, a projection upon each housing positioned underneath one of said pivotal pins, a pivotal circuit closing bar, terminals thereon, one end of said bar mounted underneath the end of said tilting plate, hinged strips connected to said bar, a U-shaped member having a yielding arm, electro-magnets mounted upon each arm of said member, one end of said arm adapted, as the elctro-magnets are drawn toward each other, to break the joint between said strips and allow one of the terminals of the contact point to lower to close a circuit, a motor and electrical connections between the same and said terminal contacts, a movable platform upon which the motor is mounted, a worm upon the shaft of the motor, horizontally disposed gear wheels, a plurality of cams projecting from the under surface of one of said gear wheels, means actuated by one cam upon each gear wheel for releasing the switch apparatus, and mechanism actuated by the other cam of the gear wheel to throw the switch point.

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

ELMER FRANKLIN BUBB.

Witnesses:

HELGE JOHNSON,

JAS. AUGUST JOSTISON.