No. 688,456. Patented Dec. 10, 1901.

W. J. BELL.

ELECTROMECHANICAL AUTOMATIC STREET RAILWAY SWITCH.

(Application filed July 2, 1901.)

(No Model.) 2 Sheets—Sheet 1.

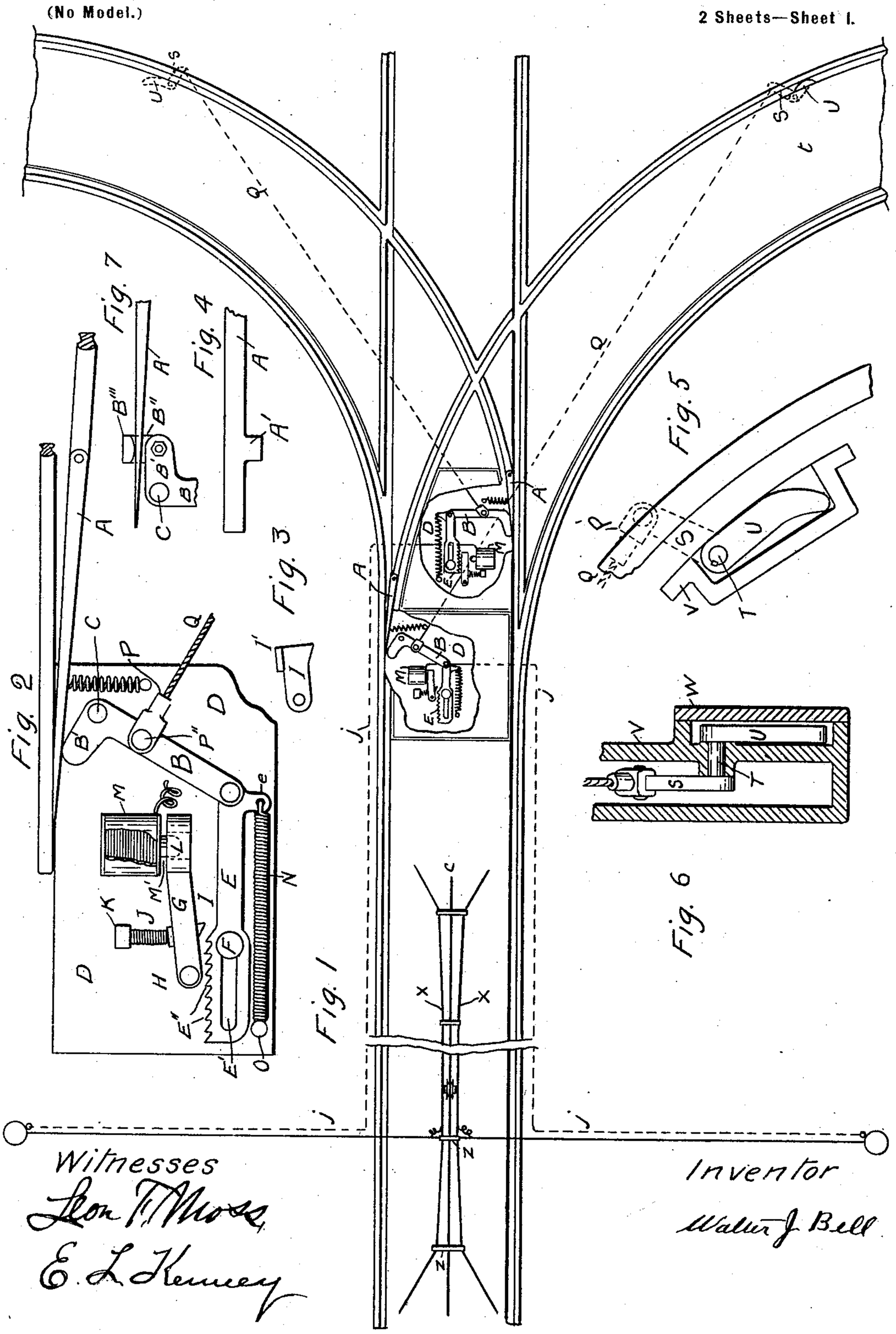

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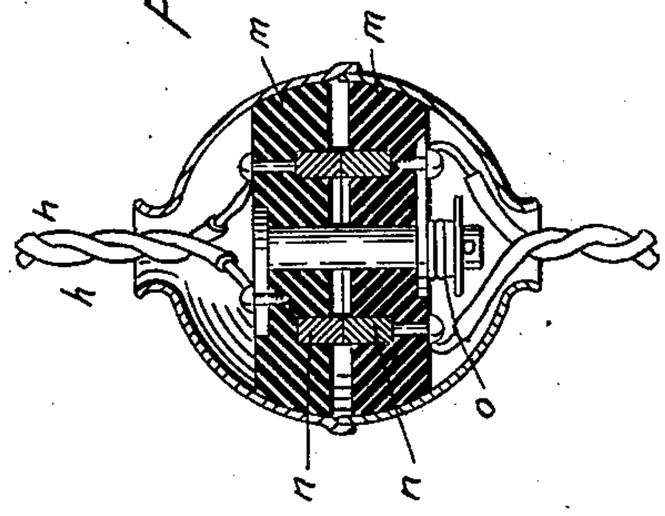
Fig. 7



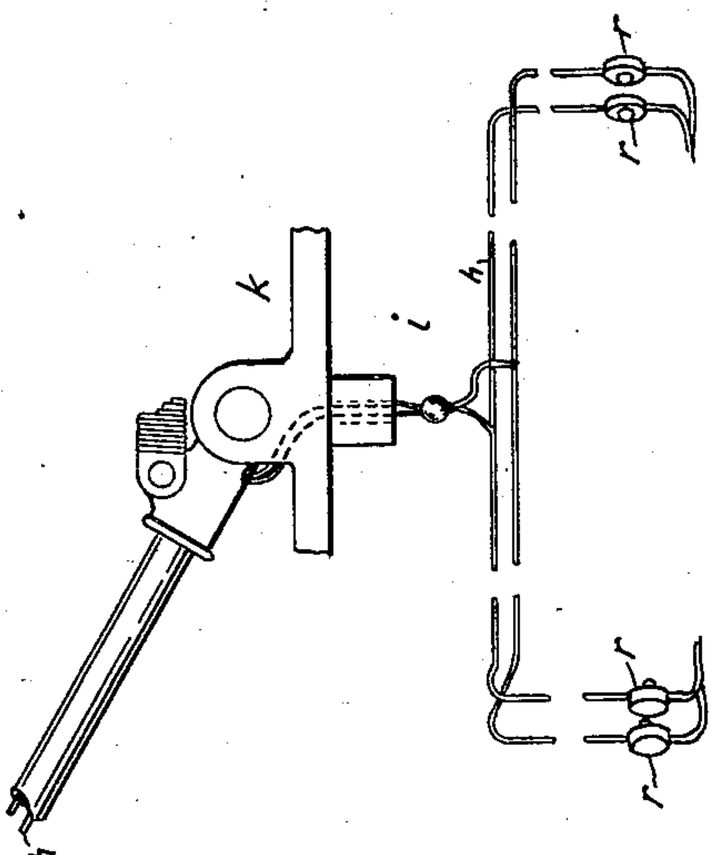


Fig. 8

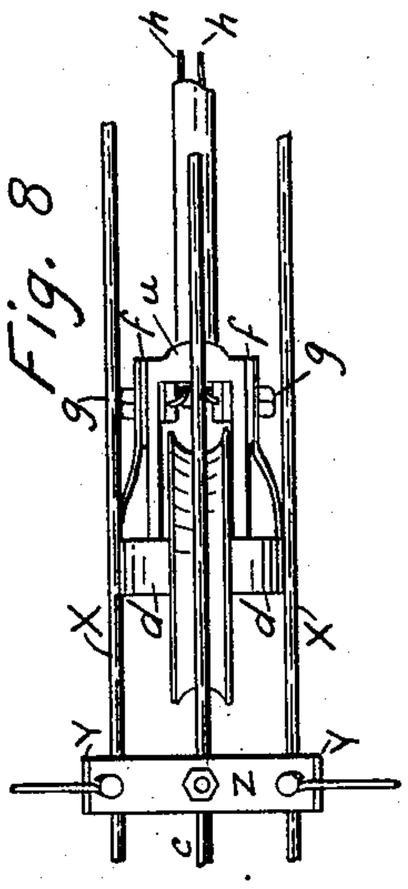


Fig. 9

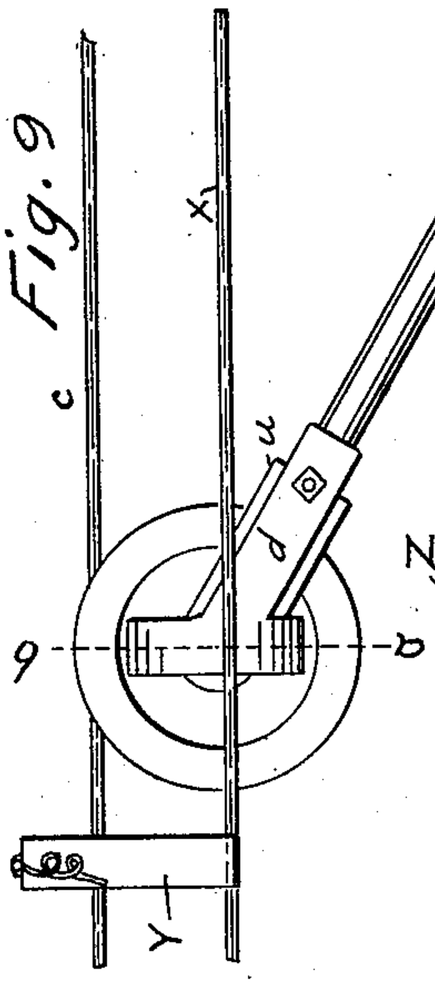
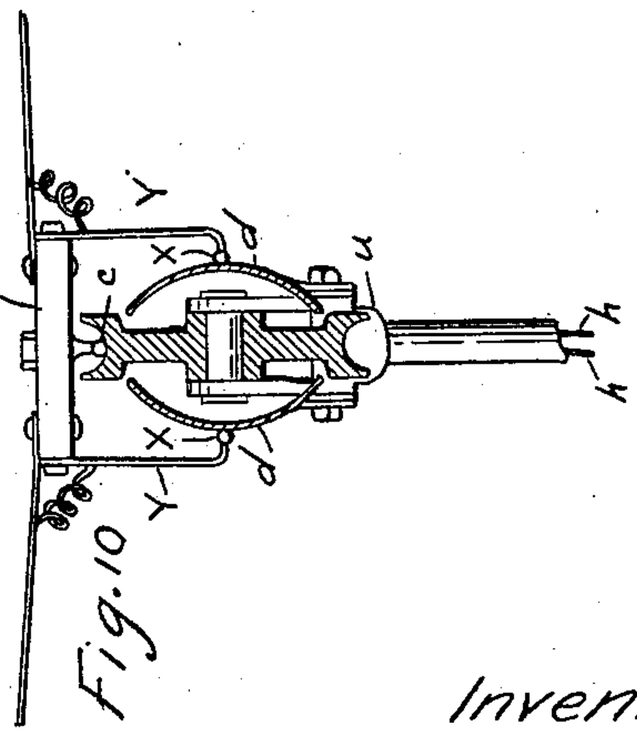


Fig. 10



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UNITED STATES PATENT OFFICE.

WALTER J. BELL, OF LOS ANGELES, CALIFORNIA, ASSIGNOR OF ONE-HALF TO LEON F. MOSS, OF LOS ANGELES, CALIFORNIA.

ELECTROMECHANICAL AUTOMATIC STREET-RAILWAY SWITCH.

SPECIFICATION forming part of Letters Patent No. 688,456, dated December 10, 1901.

Application filed July 2, 1901. Serial No. 66,876. (No model.)

To all whom it may concern:

Be it known that I, WALTER J. BELL, a citizen of the United States, residing at No. 1046 West Thirty-seventh street, in the city of Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Electromechanical Automatic Street-Railway Switch, of which the following is a specification.

My invention relates to improvements in street-railway switches whereby the motorman or other operative upon an electric-railway car can switch the car without alighting from it or stopping it and whereby the car will automatically reset the switch after passing through it. I attain these objects by a system of wires, levers, rods, and other appliances upon the car, attached to the trolley-pole and running to and attached to the switch, so arranged that when the motorman or other operative on the car presses an electric button the car is switched to the right or left, as desired, by an electric current taken from the same wire that supplies the motor of the car, said electric current being conducted to a metal piece on the fork or yoke that holds the trolley-wheel and thence to a magnet in the switch, thereby tripping the same and permitting a spring which works on the levers to throw the switch to the desired position, the switch being thereafter reset to its original position after the car has passed beyond it by means of the flange on the car-wheel pressing against and opening the resetting switch-rail, which is connected by a rod or cable to the main switch-lever. I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a plan view. Fig. 2 is a detail plan of the switch-throwing mechanism. Fig. 3 is a plan view of the pawl forming a portion of said mechanism shown separate for clearness of illustration. Fig. 4 is a detail elevation of a portion of the switch-rail, showing the projecting lug on the bottom thereof. Fig. 5 is a plan of the resetting device with the covering-plate removed. Fig. 6 is a view, partly in section, of the same. Fig. 7 is a detail of the switch-rail and actuating-lever used in case it is desired that the switch remain set for either curve. Fig. 8 is a detail plan view of the trolley. Fig. 9 is an elevation of the trolley and its connections to the car, showing diagrammatically the electrical connections in the car. Fig. 10 is a vertical section through the center of the trolley-wheel on line *a b*. Fig. 11 is a section through the electric swivel used to prevent twisting of the wires when the trolley is reversed.

The switch-tongue A has a projection A′, against which presses the shorter arm B′ of the lever B, said lever being pivoted on the stud C, which is fixed to the base-plate D. To the longer arm of this lever is pivoted a link E, having a slot E′ sliding on the pin F, and on one side of this link there are teeth E″. The armature-lever G, pivoted on the stud H, carries also the pawl I, said pawl having a projection I′, which is engaged by the edge of said lever G. Bearing against the projection I′ is a spring J, which reacts against the projection K, affixed to the base-plate D. Said spring causes pawl I to normally engage the teeth of the link E. Affixed to the armature-lever G is the armature L, adapted to be attracted by the pole-piece M′ of the magnet M. On the link E is formed the projection *e*, to which the end of the retractive spring N is affixed, the other end of the said spring being affixed to the pin O, projecting from the base-plate D. At a suitable point on lever B by means of the pin P″ is mounted the connecting-piece P, into which is affixed a rod or cable Q. Said rod passes through a tube or other projecting conduit to the resetting device. To the other end of said rod is fixed a similar connecting-piece P′, which has a pivotal connection with the resetting-lever S, said lever being keyed or otherwise affixed to the shaft T. To the top of said shaft is keyed or otherwise affixed the resetting-rail U. Shaft T is mounted in the frame V. Secured to the top of said frame is the covering-plate W. One terminal of the wire on magnet M is grounded in any suitable manner, and the other terminal is connected to a wire *j*, which is passed underground through suitable insulation to the foot of the stay-pole and up the stay-pole and along the stay-wire to one of the side wires X X, said wires being held by the first spring-pieces Y, affixed to the insulating-block Z.

The insulating-block Z also serves to carry the trolley-wire *c*. The central portions of the side wires X X are parallel with, a few inches below, and on opposite sides of the trolley-wire, about on a line with the pin of the trolley-wheel, being placed in such position that the metal pieces *d d* will always come in contact with each side wire while the trolley is passing between them. The ends of these wires, however, should diverge and be connected to stay-wires, so that the pieces *d d* on the trolley-yoke in entering between the wires X X will not be liable to catch them and tear them from their supports. These wires should be located near the approach to the switch, as shown in Fig. 1, and can be of any desired length, so that while the car is in motion the motorman or other operative of the car can conveniently form the necessary electric circuit by pressing the button.

To the side of the trolley-yoke *u* are fixed metal pieces *d d*, of the form substantially as shown in the drawings, being held thereto by the bolts *g g* and insulated therefrom by the insulating-pieces *f f*, said bolts *g g* being electrically connected with metal pieces *d d* and insulated from the yoke. To the inner ends of bolts *g g* are connected the wires *h h*, which run through the interior of the trolley-pole and down through the bracket K to the electric swivel *i*, situated in the joint connecting the trolley-pole to the car, and thence passing to a point at each end of the car are connected to one terminal of the push-buttons or switches *r r*, located conveniently within reach of the motorman. These wires are crossed over at one end of the car, so that the motorman shall always have to press the right-hand button when he wishes to go to the right, and vice versa, the other terminal of these push-buttons being connected at any suitable point with that portion of the wiring of the car that supplies the motor with current. The electric swivel *i* is substantially of the form shown in the drawings, Fig. 11, and is so arranged as to prevent the wires *h h* from twisting or breaking when the trolley-pole is reversed, said swivel being composed of the following parts:

m m are two wheels or disks of vulcanite, inlaid in each of which is one circular band of brass *n n*, occupying such position that when the two hemispheres are together the two bands of brass are always in contact, forming a continuous circuit for the second wire. The spring *o* regulates the tension with which the two hemispheres are held together and determines the tension on the wires which work the swivel. The working parts of the swivel should be suitably incased, as shown in Fig. 11.

In case it is desired that the track remain normally set for one of the curves the device in Fig. 7 is to be used to switch the car straight ahead. In this case the lever B is inverted, and the bolt B″ is bolted thereto, so that the projection B‴ presses against the lug A′ of the switch-tongue on the side next the rail. When the spring N moves lever B, the effect is to pull the switch-tongue away from the rail, thus opening the switch to the center track. The other parts of the apparatus remain as hereinbefore described.

The operation of the device is as follows: When it is desired to throw the right-hand switch, for instance, the motorman or other operative on the car operates the right-hand push-button or switch on forward end of the car, thereby allowing a current of electricity to flow from the feed-wire through the right-hand wire *h*, the bolt *g*, and the metal piece *d* to the side wire X, thence through the spring Y to the wire *j*, thence to the magnet M, and then to the ground. This causes the pole-piece M′ of the magnet to attract the armature L. This moves the armature-lever G and the pawl against the pressure of the spring *j*, thereby releasing the teeth of the link E. Said link being then pulled by the tensile force of the spring N to the position shown in Fig. 2 and causing the short arm B′ of lever B to press against the lug A′ of the switch-tongue A moves said switch-tongue against the rail, thereby causing the car to take the right-hand track. This movement also places the resetting device in the position shown at *t*. When the flange of the car-wheel reaches the resetting-rail U of the resetting device, it pushes the same away from the car-rail, thereby causing lever S by means of the cable or rod Q to pull the switch-lever B back to its normal position, and the arm B′ having been withdrawn from the switch-tongue A it is pulled to the open position by the spring ordinarily attached to it, and thereupon the spring J pressing the pawl I into the teeth E″ of the link E the switch is held open.

I claim that my invention is superior to any switching apparatus heretofore invented in the following particulars: first, the ease with which the switch can be operated—namely, by the motorman or other operative on the car merely touching an electric push-button, whereby the electric current trips the switch and allows the mechanical parts to complete the switching, whereupon the flange of a wheel of the car after passing over and beyond the switch proper resets it, all of this being done without any action on the part of the operatives of the car except the pressing of the button; second, the entire switch being incased earth, mud, and snow are excluded and kept from interfering with the operation of the switch and there is no part of the switch or the apparatus by means of which it is operated which extends above the ground in such a way as to cause accidents or which projects from the car or from the poles or wires in any way which would be unsightly or inconvenient; third, by the overhead system of applying the electric current to the switch the expensive and inconvenient equipment of levers and other attachments on the car and shock to the car and switch incidental to the operation

of switches by mechanical contrivances extending out from or reaching out from the car are made entirely unnecessary, and the switch can be thrown from the car when it is not in motion; fourth, by means of the swivel shown in Fig. 11 the wires which pass up the trolley-pole are prevented from twisting when the trolley is reversed; fifth, by having a number of teeth on lever E allowance is made for the car-wheels pushing outward the resetting switch-rail, sometimes farther than at other times, so that the switch will be reset and the pawl I engage one of the teeth E″ at whatever position the lever E may have reached after the flange of the car-wheel has passed the resetting switch-rail; sixth, the resetting switch-rail operates and is also set in position by a pull and not by a push, so that either a rod or a cable can be used in connecting it with the switch, and it can therefore be placed at any convenient distance from the switch, whereby any desired number of cars may pass through the switch before it is reset; seventh, the resetting switch-rail being curved substantially as shown in the drawings will not derail the car from whichever direction it approaches should the switch-rail from some accidental cause remain closed; eighth, the metal pieces *d d* on the trolley-fork, which come in contact with the side wires X X, being nearly semicircular in form will not catch on the trolley-wire, but will readily glance off in case the trolley-wheel should escape from the trolley-wire; ninth, although the metal pieces *d d* always come in contact with the side wires X X when passing between them there is no danger of their tripping the switch, as the metal pieces are not electrically charged except when the electric button is pressed; tenth, by the use of the pawl I, Fig. 3, the teeth E″ are more readily engaged without the swinging of the heavier armature-lever G during the resetting of the switch, thereby securing quick action and rendering it impossible for the lever E to slip back before the teeth E″ are engaged, and, eleventh, in case of the switching device described herein getting out of order or where cars are run not equipped with the device the switching can be done in the ordinary manner with the hand-lever now in common use, the device not in any way interfering with the operation thereof.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination of a switch-point, a spring-pressed lever operatively connected with the switch-point, an armature normally engaging and restraining the lever, an electromagnet in circuit with the car arranged to move the armature and release the lever to effect the movement of the switch-point, and mechanical means operated by the car to move the lever to effect the resetting of the switch.

2. The combination of a switch-point, a lever connected therewith, a spring to retract the lever, a pivoted armature normally engaging the lever, an electromagnet in circuit with a controller on the car adapted to attract the armature and release the lever, and mechanical means operated from the car to move the lever to effect the resetting of the switch.

3. The combination of a spring-pressed switch-point, a bell-crank lever connected therewith, a spring-pressed bar connected to the lever and provided with shoulders, a pivoted armature carrying a spring-dog adapted to normally engage a tooth on the bar and an electromagnet in circuit with a controller on the car and adapted to attract the armature and thereby release the bar.

4. The combination of the wires, the switch-tongue A, and spring attached, with the lever B, and the shorter arm B′ pivoted on the stud C, the link E and the slot E′, provided with the teeth E″ intended to engage the pawl I, said pawl having a projection I′ which is engaged by the said lever G; the spring J which reacts against the projection K affixed to the base-plate D; the armature-lever G to which is affixed the armature L adapted to be attracted by the pole M′ of the magnet M; there being attached to the lever E the spring N, substantially as set forth.

5. The combination with electric switch-wires flanking the trolley-wire, a trolley-pole, and contacts at the sides of the pole said contacts being vertically curved for the purpose specified.

6. The combination with electric switch-wires flanking the trolley-wire and diverging at their ends, an insulating-block from which the switch-wires are yieldingly suspended, a trolley-pole, and vertically-curved contacts supported on the trolley-pole.

In witness whereof I have signed my name to this specification in the presence of two witnesses.

WALTER J. BELL.

Witnesses:
LEON F. MOSS,
E. L. KENNEY.