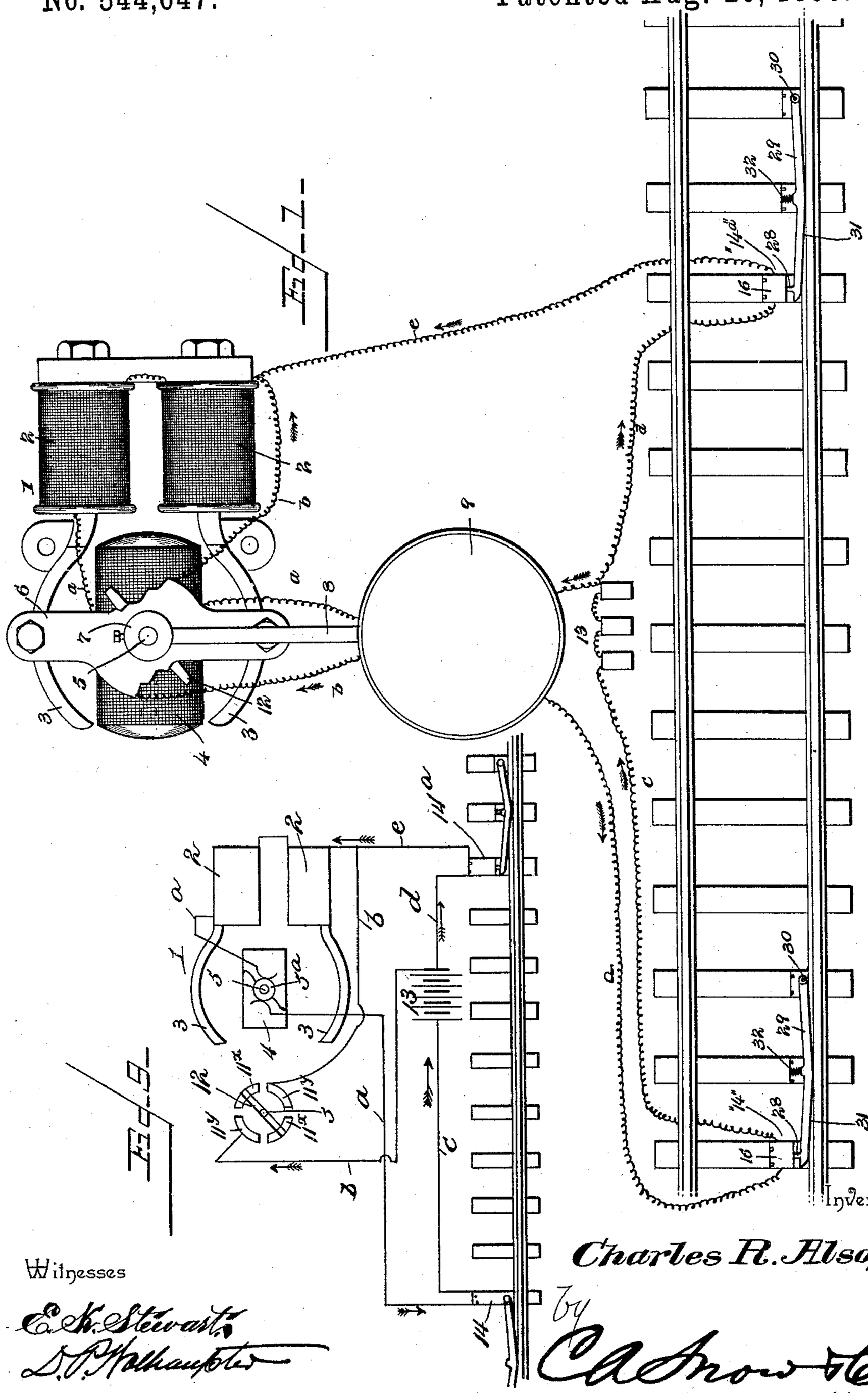
(No Model.) 2 Sheets—Sheet 1.

# C. R. ALSOP.

## AUTOMATIC ELECTRICAL RAILWAY SIGNAL.

No. 544,647. Patented Aug. 20, 1895.




Witnesses

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(No Model.) 2 Sheets—Sheet 2.

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## AUTOMATIC ELECTRICAL RAILWAY SIGNAL.

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Fig. 6.

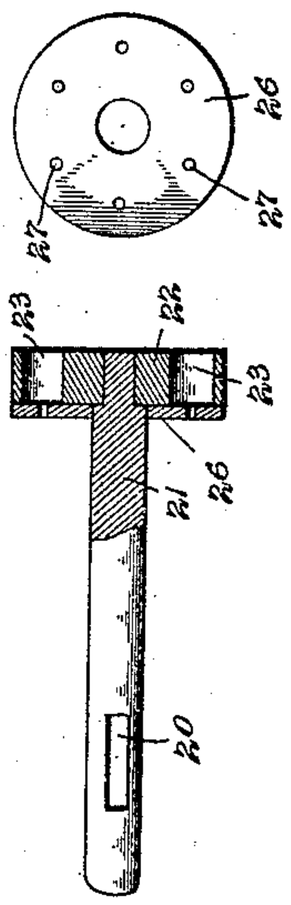



Fig. 7.




Fig. 4.

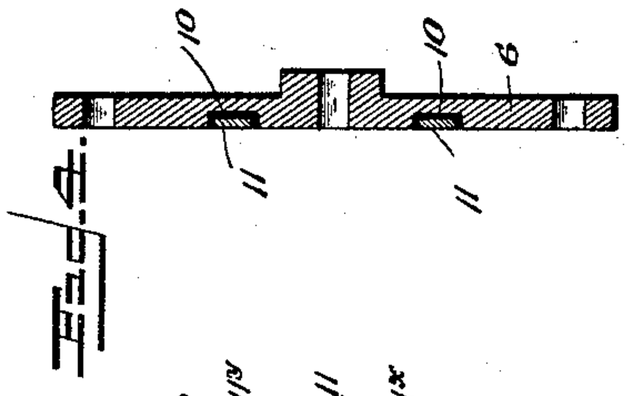



Fig. 3.

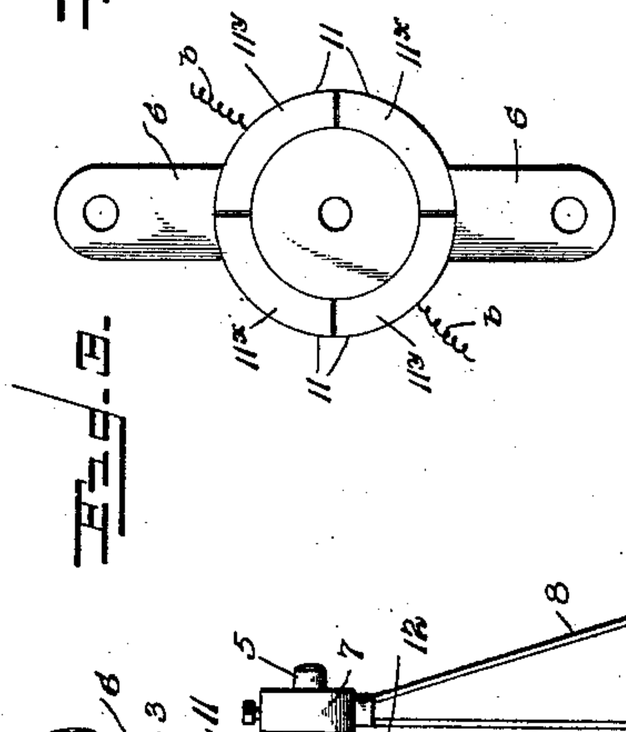



Fig. 2.

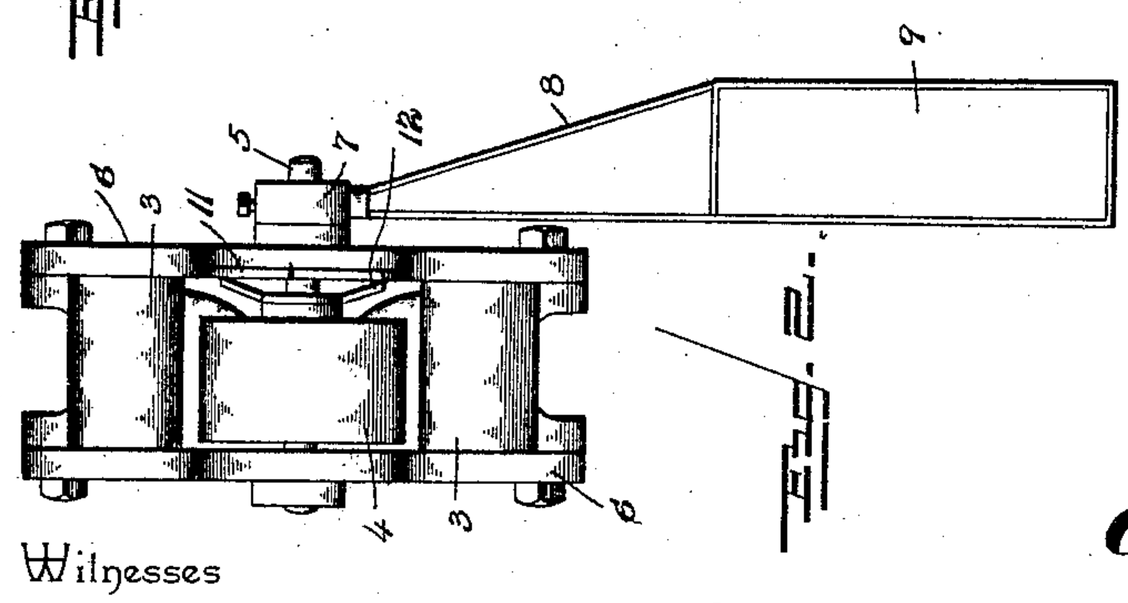



Fig. 5.

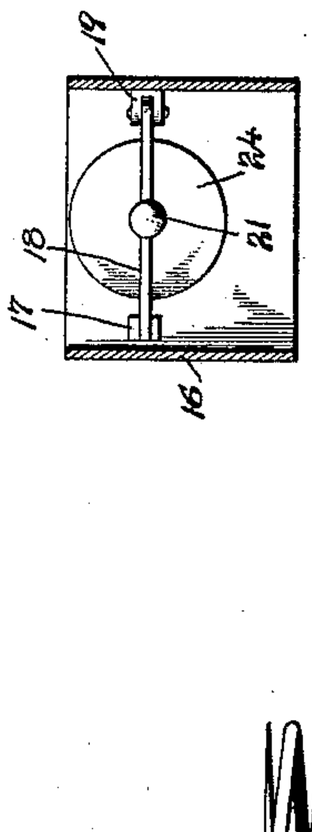
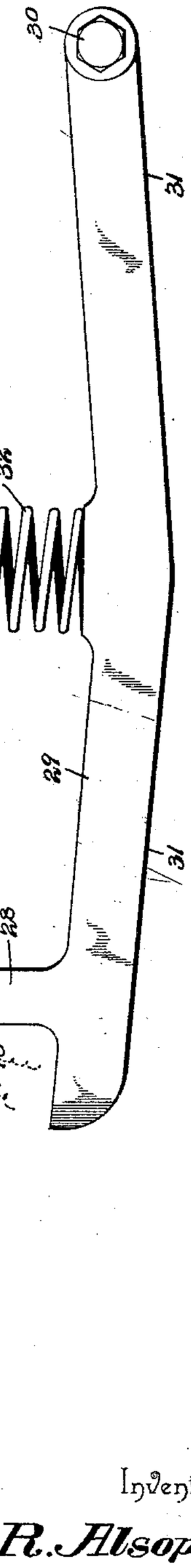



Fig. 1.

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# UNITED STATES PATENT OFFICE.

CHARLES RICHARD ALSOP, OF MIDDLETOWN, CONNECTICUT.

## AUTOMATIC ELECTRICAL RAILWAY-SIGNAL.

SPECIFICATION forming part of Letters Patent No. 544,647, dated August 20, 1895.

Application filed October 22, 1894. Serial No. 526,648. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES RICHARD ALSOP, a citizen of the United States, residing at Middletown, in the county of Middlesex and State of Connecticut, have invented a new and useful Automatic Electrical Railway-Signal, of which the following is a specification.

This invention relates to automatic electrical railway-signals; and it has for its object to provide a new and useful signal of this character operated by the flange of a car-wheel to provide means for displaying a signal of danger for use on railways, both steam and electric, and also being especially adapted for use on cuts, curves, grade-crossings, in connection with the block system, and for single-track street-railways to indicate when a car is between any two places for passing, so that there will be no danger of cars meeting between those points.

With these and other objects in view, which will readily appear as the nature of the invention is better understood, the same consists in the novel construction, combination, and arrangement of parts hereinafter more fully described, illustrated, and claimed.

In the drawings, Figure 1 is a side elevation of an electrical railway-signal constructed in accordance with this invention, showing diagrammatically the arrangement of the track-circuit closers and the wiring in connection therewith. Fig. 2 is a detail end elevation of the motor device. Fig. 3 is a side elevation of the bearing-plate with the switch-contact segments thereon. Fig. 4 is a longitudinal sectional view of the construction shown in Fig. 3. Fig. 5 is an enlarged detail sectional view of one of the track-circuit closers. Fig. 6 is a detail cross-sectional view on the line $x\,x$ of Fig. 5. Fig. 7 is an enlarged detail sectional view of the reciprocating cushion-piston of the track-closer. Fig. 8 is a detail elevation of the flexible valve-plate for said piston. Fig. 9 is a diagrammatic view showing the circuit connections.

Referring to the accompanying drawings, 1 designates a signal-operating electric motor that is adapted to be suitably supported at any convenient position alongside of a railway-track where it is most desirable to locate the signal to be operated. The said motor 1 is preferably of the ordinary bipolar two-part commutator type, and essentially comprises a pair of field-magnets 2, from which are extended the curved pole-pieces 3, between which is arranged to revolve the ordinary armature 4, mounted on the armature-shaft 5, which also carries the ordinary two-part commutator $5^a$. The armature-shaft 5 is mounted between the opposite bearing-plates 6, that are secured to opposite side edges of the pole-pieces 3, and practically serve to complete the frame of the motor for supporting the revolving armature.

In the present invention the armature-shaft 5 has mounted on one end thereof the collar 7, from which is extended a target-arm 8, carrying in its outer end a swinging target 9, that is constructed preferably of a light frame and may be of any desired color, so as to display a signal on both sides, in order that the same may be observed from the track at either side of the signal, and according to the direction in which the armature 4 revolves the target 9 will be either swung up to a signaling position, as indicated in dotted lines, or allowed to drop to an inactive position.

In the present invention one of the side-bearing arms 6 for the armature-shaft 5 is provided on the inner side thereof with a circular groove 10, in which is fitted a circular series of segmental switch contact-plates 11, that are insulated from each other and also from the side-bearing arm to which they are secured. The said circular group of switch contact-plates 11 are arranged in two pairs, with the plates of each pair being located diametrically opposite to each other, one pair of said switch-plates, which may be additionally designated as $11^x$, have no wire connections therewith, while the other diametrically-opposite switch-plates, which may be additionally designated as $11^y$, have connected therewith the circuit-wires $b$, one of which connects with the wiring of the motor at the field-magnets, and the other of which wires connects with a battery 13 or other source of electrical energy.

It will be understood that when the circuit is closed over the switch-plates to which the wires $b$ are connected said switch-plates will provide for completing the circuit through the field-magnets and the armature-windings of

the electric motor, it being noted that the circuit is completed through the armature of the motor in the usual way by means of the motor-wires *a*, which connect with the brushes of the commutator $5^a$. The circuit is closed over the pair of diametrically-opposite plates $11^y$, to which the wires *b* are connected by means of a rotating switch-bar 12, that is mounted on the armature-shaft at one side of the side-bearing plate carrying the switch-plates, and said switch-bar is adapted to contact with and span the space between the diametrically-opposite separate pairs of plates 11. Normally the switch-bar 12 connects the inactive switch-plates $11^x$, and when turned by the rotation of the armature-shaft provides for abnormally connecting and closing the circuit over the plates $11^y$ in the manner to be more particularly referred to. The battery 13 also has connected therewith the circuit-wires *c* and *d*, both of which connect with track-circuit closers 14 and $14^a$, duplicates in construction, and which will be more particularly described. The circuit-closers 14 and $14^a$ are arranged at different points along a track at both sides of the signal device, as illustrated in the drawings, and the different parts of the circuit-closer 14 will be so arranged that the electric circuit will be normally closed therethrough, and the said circuit-closer 14 is adapted to have connected therewith one of the motor-wires *a*, as clearly illustrated in the drawings. The other of said circuit-closers $14^a$ is adapted to have the parts thereof so arranged that the electric circuit will be normally opened thereby.

By means of the wiring just described the motor-signal device will be operated as follows: When a car-wheel engages with the normally-open circuit-closer $14^a$, the circuit will be closed through said circuit-closer over the wire *e*, the motor-wires *a*, including the commutator $5^a$, the normally-closed circuit-closer 14, and through the battery 13, and as this circuit is completed the magnets of the motor will be energized so as to cause the armature to revolve and elevate the target up to a horizontal signaling position. This movement of the armature carries the switch-bar 12 around into contact with the diametrically-opposite switch-plates $11^y$, and closes the circuit through the wires *b* and the motor-wires *a* to keep the magnets of the motor energized, and the normally-closed circuit-closer 14 that is included in the circuit of the wires *a* is still included in the last-named circuit, together with the battery 13, as indicated by the arrows on Fig. 1 of the drawings. With the circuit thus arranged and the target elevated it will be obvious that when the train reaches the circuit-closer 14 and opens or breaks the circuit the target 9 will fall to its original normal position.

The track-circuit closers 14 and $14^a$ are of the same construction and are substantially constructed as will now be described. A housing-box 16 is adapted to be arranged at one side of one of the rails of the track, and fitted within the box 16 is a pair of normally-separated contact plates or springs 17, to which are adapted to be connected the separate parts of the circuit-wires herein described, and said normally-separated contact plates or springs 17 are adapted to have work therebetween a contact-lever 18, which, when forced between the said plates or springs, closes the circuit therethrough, and when the device is used as a normally-open circuit-closer, as indicated by $14^a$ in the diagram, the contact-lever 18 is normally held away from and out of contact with the plates or springs 17, and, as illustrated in Fig. 5 of the drawings in dotted lines, when the device is used as a normally-closed circuit-closer the contact-lever 18 is adapted to be normally held between the plates or springs 17 to close the circuit thereover. In either of the arrangements described the contact-lever 18 is pivotally secured at one end, as at 19, to one side of the housing-boxing 16, and is arranged to work loosely in the lever-opening 20, formed in the piston-stem 21.

The piston-stem 21 carries at one end a cushion-piston 22, provided with a series of vent openings or holes 23 therein, and adapted to work inside of a closed cushion-cylinder 24. The closed cushion-cylinder 24 accommodates within the same a coiled spring 25, working against one side of the piston 22, to normally hold the contact-lever 18 in a position either in or out of contact with the plates or springs 17, according to whether the circuit is to be normally open or closed through the instrument. The said cushion-piston 22 is adapted to support at one side thereof a flexible valve-plate 26, provided therein with a series of small vent holes or perforations 27, and the outer end of the piston-stem 21, which carries the piston 22 and the valve-plate 26, is adapted to be engaged by an offstanding push-arm 28, projected from one side of a pivoted track-lever 29 near the swinging end thereof. The track-lever 29 is pivoted at one end, as at 30, at one side of one of the rails of the track, and is provided with a double inclined side 31 disposed sufficiently close to the rail so as to be engaged by the flange of the car-wheel, which moves the lever away from the rail, in order to operate upon the piston-stem 21. The lever 29 is normally held in close proximity to the rail adjacent to which it works by means of a spring 32, suitably supported at one side of the lever and adapted to bear against the same at an intermediate point.

When a car-wheel flange passes at one side of the lever 29, the same is moved away from the rail and operates upon the piston-stem 21, so as to either close or open the circuit with the plates or springs 17, as will be obvious. At the same time the valved piston 22 is forced back within the cylinder 24, and the valve 26 opens to allow the cushioning liquid or air that is within the cylinder to pass through

the vent openings or holes in the piston. When the lever 29 is returned swiftly to its normal position by the spring 32, the valve-plate 26 closes and causes the liquid or air opposite the spring 25 to act as a cushion and retard the return of the piston and thereby providing, in the case of the normally-open circuit-closer 14ª, for maintaining the circuit closed sufficiently long through the plates 17 and the lever 18 until the electric motor has entirely elevated the target, it, of course, being understood that the liquid or air slowly passes back to the spring side of the piston through the small vent holes or perforations 27 of the valve-plate 26.

The circuit-closers described may be set at any desired distance apart, and one pair of normally-open and normally-closed circuit-closers may be set at each side of the signal, so that the signal will be operated by the approach of a train from either direction, and other modifications of the apparatus will suggest themselves, so it will, therefore, be understood that changes in the form, proportion, and the minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of this invention.

Having thus described the invention, what is claimed, and desired to be secured by Letters Patent, is—

1. In an electric railway signal, an electric motor, a swinging signal target attached to the armature shaft of said motor, suitably arranged track circuit closers, and a switch device included in the circuit of the motor windings and said circuit closers to provide for automatically closing the circuit through the motor when the target reaches an elevated position, substantially as set forth.

2. In an electric railway signal, an electric motor, a swinging target attached to the armature shaft of the motor, a series of contact plates fitted to one of the bearing plates for the armature shaft, one pair of said contact plates having circuit-wire connections therewith, suitably arranged track circuit closers included in circuits with the motor windings and with said contact plates having the wire connections therewith, and a revolving switch bar attached to the armature shaft of the motor and working against said contact plates, said switch bar being adapted to automatically close the circuit through the motor when the target reaches its elevated position, substantially as set forth.

3. In an electric railway signal, an electric motor, a swinging target attached to the armature shaft of the motor, separate pairs of circularly arranged switch contact plates fitted to one of the bearing plates of the armature shaft, certain of said switch plates being included directly in the circuit of the motor windings, a revolving switch bar attached to the motor shaft and working against said switch contact plates, suitably arranged normally open and normally closed track circuit closers, a battery or other source of electrical energy, and suitable circuit connections included in a circuit with the normally closed circuit closer and the motor windings, substantially as set forth.

4. In an electric railway signal, the track circuit closer consisting of a pair of normally separated contact plates or springs included in an electrical circuit, a suitably arranged pivoted contact arm adapted to work between said plates or springs, a closed cushion cylinder, a spring pressed valved cushion piston working within said cylinder and having a reciprocating piston stem connected with said pivoted contact arm, and a spring actuated pivoted track lever adapted to be arranged adjacent to the track rail and adapted to have its moving end work against the outer end of said piston stem, substantially as set forth.

5. In an electric railway signal, the track circuit closer consisting of a pair of normally separated contact plates or springs included in an electrical circuit, a suitably arranged pivoted contact arm adapted to work between said plates or springs, a closed cushion cylinder adapted to contain liquid or air, a piston working within the cylinder and provided with a series of vent openings or holes and a piston stem working outside of the cylinder and connected with said pivoted contact arm, a spring arranged at one side of said piston, a flexible valve plate supported to work at the opposite side of the piston and provided with a series of small vent holes or perforations, and a spring actuated pivoted track lever arranged to work against the outer end of said piston stem, substantially as set forth.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

CHARLES RICHARD ALSOP.

Witnesses:
GEO. A. COLES,
BENJAMAIN FOUNTAIN.