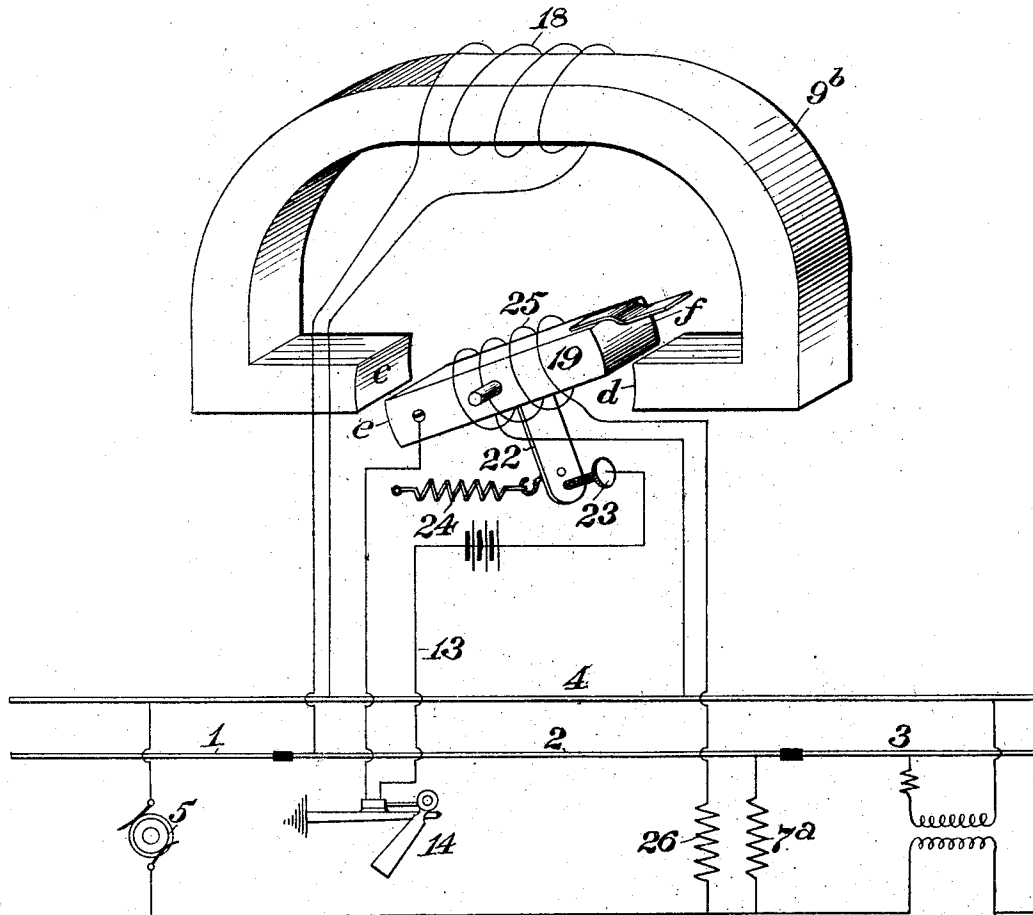


No. 827,270.

PATENTED JULY 31, 1906.

J. B. STRUBLE.
ELECTRIC SIGNALING.

APPLICATION FILED MAR. 12, 1902. RENEWED JUNE 4, 1904.



WITNESSES:
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ELECTRIC SIGNALING.

No. 827,270.

Specification of Letters Patent.

Patented July 21, 1903.

Application filed March 12, 1902. Renewed June 4, 1904. Serial No. 211,144.

To all whom it may concern:

Be it known that I, JACOB B. STRUBLE, a citizen of the United States, residing at Wilkinsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Electric Signaling, of which the following is a specification.

In the application for Letters Patent, Serial No. 82,523, filed November 16, 1901, I have described and claimed certain improvements in electric signaling especially applicable to signaling for electric railways, and wherein provision is made for maintaining a signal at danger position under certain conditions in case it has a tendency to be shifted improperly to clear position by leakage from the main current from the motors of the cars. In application, Serial No. 97,861, filed March 12, 1902, I have described certain further or additional improvements in electric signaling for electric railways wherein alternating currents are employed in the track-circuits and provision is made whereby the signal cannot be cleared by a direct current on the track-circuit due to leakage from the motor-circuit, but only by the alternating current.

The invention described in this application relates to certain further and additional improvements in a relay which may be employed in such signaling system.

The invention is hereinafter more fully described and claimed.

In the accompanying drawing is shown diagrammatically a form or embodiment of my improvement.

In the practice of my invention one of the lines of rails is divided into a series of blocks or sections 1 2 3, &c., by insulation inserted at suitable points between the ends of adjacent rails, while the other line of rails 4 is preferably made electrically continuous in any suitable manner known in the art. One terminal of an alternating generator 5 is connected to the rail 4, while the other terminal is connected to each of the rail-sections 1 2, &c., such connection being direct through a suitable resistance 7^a, if necessary, as shown in the drawing, or the connections to the sections may be made through the medium of transformers having their secondary coils connected to the rail-sections, while the primary coils are connected in multiple arc or

series with the generator, as shown in an application, Serial No. 97,861, above referred to. The field coil or coils 18 of a translating device or relay 9^b are connected to the track-rails of a block-section, so that when the block-section is unoccupied an alternating current will flow back and forth through the field-coils, thereby alternately changing the polarity of the poles *c* and *d* of the relay. The armature 19 of the relay is surrounded by a coil 25, which is connected to a source of alternating current, preferably to the circuit of the alternating generator 5, as shown, a suitable resistance 26 being interposed between the generator and the coil 25, if found necessary. The coil 25 is so arranged and connected to its generator with relation to the coil or coils 18 that the poles *c* and *f* will have the same polarity as the adjacent poles *c* and *d* of the magnet 9^a. The coils 18 and 25 should be so connected either to the same generator or to independent generators that the phase of the alternating current or current in both coils shall be the same or in such relation that the adjacent poles *c* and *e* or *d* and *f* shall simultaneously have the same polarity. By reason of thus similarly polarizing the adjacent poles of the armature and magnet the poles of the armature will be repelled by the poles of the magnet and the armature shifted to an angular position with its contact-arm 22 bearing against the contact-point 23 of the auxiliary circuit 13, which includes the operating or controlling mechanism of the signal 14.

As long as the field coil or coils 18 are excited by an alternating current alone or by an alternating current of greater magnetizing strength than any direct current which may flow through the coils by reason of leakage from the motor-current the armature will be held in such position as to maintain the circuit 13 closed and the signal in clear position. When, however, the alternating current though the coil or coils 18 is shunted, the poles of the magnet become practically neutral, and the armature will be shifted by the spring 24 away from the stop 23 and open the circuit 13. Similarly if a direct current flows through the coil or coils 18 while the alternating current is shunted or if the direct current is stronger than the alternating current in the track-circuit, so that the attraction produced

by it is greater, in effect, than the repulsion produced by the alternating current, the armature will be attracted by such poles and caused to move in a direction to open the circuit 13, such action being cumulative to the action of the spring 24.

It is characteristic of the improvement described herein that the signal can be cleared and held in a clear position only by an alternating current and that a direct current flowing through the coils 18 when the alternating current is shunted or when the direct current is stronger than the alternating current will tend to open the circuit 13 and put the signal to danger position. Hence an accidental shifting of the signal is never in a direction to cause an accident, although it may cause some delay in train movement.

What I claim as my invention is—

1. In a signaling apparatus, the combination with a track-circuit, of a source of alternating currents and a relay both included in the track-circuit, and an alternately-polarized armature adapted to control a signal, substantially as set forth.

2. In a signal apparatus, the combination with a track-circuit, of a source of alternat-

ing current and a relay both included in the track-circuit, an armature, and a coil surrounding the armature and in circuit with the source of alternating current, substantially as set forth.

3. In combination with the track-rails of a block-section, a source of alternating current for supplying alternating current thereto, and a relay having field and armature coils, one of said coils being energized from the alternating current in the track-circuit and the other coil from a source of alternating current exterior to the track-rails.

4. In combination with the track-rails of a block-section, a source of alternating current for supplying alternating current to the track-rails, and a relay having field and armature coils, and said field-coil being energized from the alternating current in the track-rails.

In testimony whereof I have hereunto set my hand.

JACOB B. STRUBLE.

Witnesses:

DARWIN S. WOLCOTT.
F. E. GAITHER.