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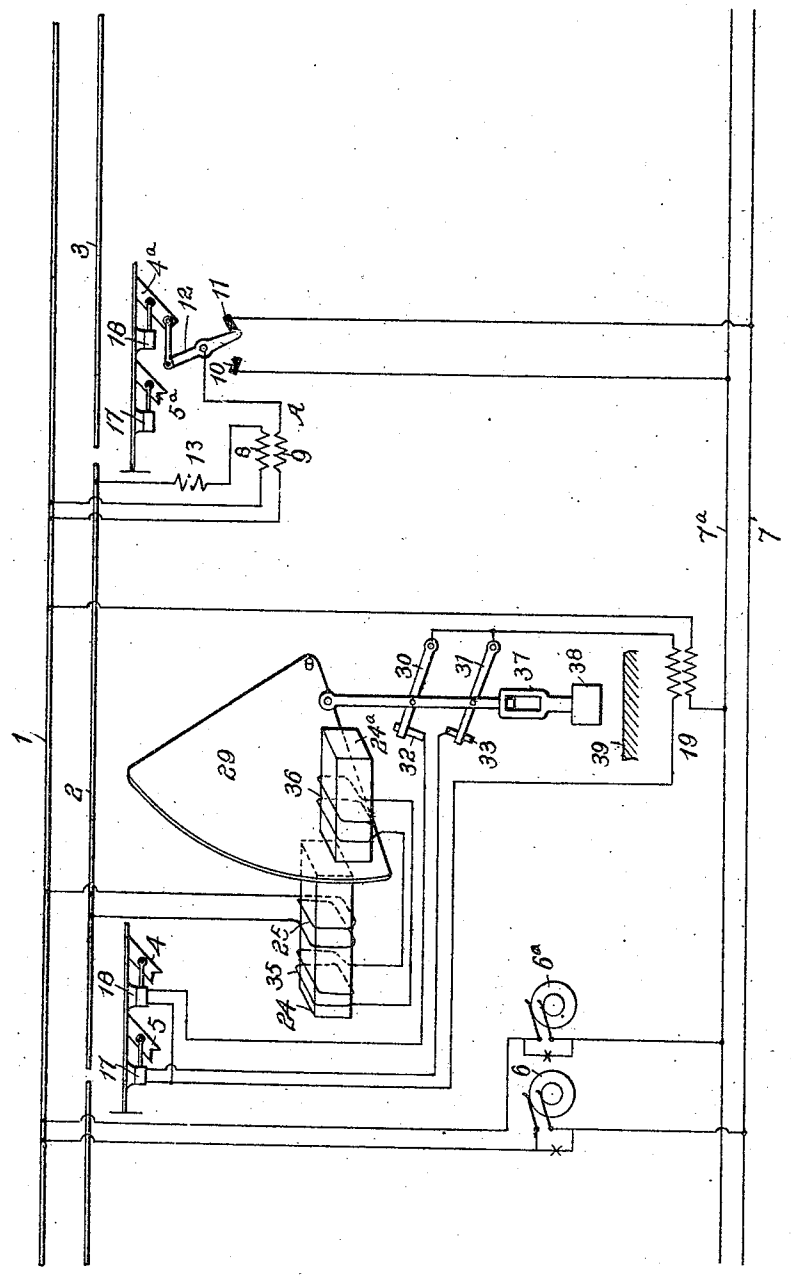
J. B. STRUBLE.

ELECTRIC SIGNALING.

APPLICATION FILED DEC. 3, 1902. RENEWED JAN. 17, 1906.

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# UNITED STATES PATENT OFFICE.

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## ELECTRIC SIGNALING.

No. 849,172. Specification of Letters Patent. Patented April 2, 1907.

Application filed December 3, 1902. Renewed January 17, 1906. Serial No. 296,446.

*To all whom it may concern:*

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

In an application filed December 3, 1902, Serial No. 133,711, I have described and claimed a signaling apparatus for railways involving the control or operation of one or more signals by another signal or signals by modifying or changing one or more of the characteristics of an alternating current.

The invention described and claimed in the present application relates to a signaling apparatus for railways in which one signal is controlled by another by modifying one of the characteristics—*i. e.*, the frequency of the alternations of the signaling-current employed in the track-circuit for operating or controlling the signals.

In the accompanying drawing is shown diagrammatically two tracks-sections with signals and operating and controlling circuits, &c., embodying my invention.

In the practice of my invention the line of rails 1 is made electrically continuous, while the other line of rails is divided into sections 2 3, &c., by means of insulation or any other means known in the art interposed between the adjacent ends of said sections. The generators 6 and 6ª have their terminals connected to the continuous rail 1, while the other terminals are connected to the feed-wires 7 and 7ª. These generators are so constructed or operated as to generate in their respective circuits currents of different frequencies. The feed-wires 7 and 7ª are connected to contact-plates 10 and 11 of a circuit breaking or shifting device, the movable member 12 of which is adapted to be shifted in accordance with the conditions existing upon the section 3, preferably by means of the home signal 4ª of said section. The movable member 12 is connected through the primary 9 of the transformer A to the continuous line of rails 1. By this construction a movement of the movable member 12 from one to the other of the contact-plates 10 and 11 will affect a change in the frequency of the current in the track-circuit of which rail 2 forms a part. The secondary 8 of the transformer A has its terminals connected, respectively, to the continuous line of rails and to the section-rails of section 2, a resistance 13 being interposed so as to prevent an excessive flow of current in the track-circuit when the latter is short-circuited by a train. At the entrance end of block 2, I employ a mechanism for controlling the signals operative on the shifting-field principle. The main exciting-coil 25 of this mechanism surrounding the core 24 has its terminals connected, respectively, to the continuous rail 1 and the rail-section 2. The core 24ª of this mechanism, which is arranged out of line with the core 24, is excited inductively by a closed circuit, including coils 35 and 36, one on the core 24 and the other on the core 24ª. A disk 29 is pivotally mounted in operative relation to the cores, so as to move freely between them, and is adapted to be shifted in one direction by electric energy and in the opposite direction by any suitable power, as gravity. Movable contact-fingers 30 and 31 are connected to the disk, so as to be shifted into and out of contact with plates 32 and 33, thereby closing the circuits through the motors 17 and 18 of signals 4 and 5. Provision is made for limiting the movement of the disk under certain conditions hereinafter specified by means of a slotted connection 37 with a weight 38, which normally rests upon a support 39. These circuits may include therein any suitable form of generator, preferably the secondary of a transformer 19, the primary of which has its terminals connected to the continuous rail 1 and the feed-wire 7.

The operation of the motor which actuates circuit-controllers 30 and 31 depends upon the density of the Foucault currents induced within the movable disk or member 29. As Foucault currents are proportional to the frequency, the motor is so constructed that the torque exerted by member 29 is likewise approximately proportional to the frequency. Hence when the movable member 12 of the circuit-shifting device is in contact with the plate 10 included in the circuit of the generator having a lower frequency the mechanical effort of disk 29 due to the currents induced in it will be sufficient only to raise the disk until its upward movement is arrested

by a weight 38, resting on a suitable support 39. By this movement contact-finger 30 is brought into electrical contact with plate 32, thereby closing the circuit through the motor of signal 4 and clearing said signal. When, however, signal $4^a$ is cleared, bringing the movable member 12 into contact with plate 11, a current of higher frequency traverses the track-circuit and sufficient torque is exerted, due to the increased density of the Foucault or eddy currents in the movable member 29 to lift weight 38 and bring both fingers 30 and 31 in contact with the plates 32 and 33, closing both signal-circuits and clearing both signals.

I claim herein as my invention—

1. In a signaling system for railways, the combination of sources of alternating currents of different frequencies, a signal-controlling mechanism operative by such currents, and means for effecting a change from one alternating current to the other in the operation of said signal-controlling mechanism.

2. In a signaling system for railways, the combination with a track-circuit, of sources of alternating currents, a translating device operative by such currents for controlling signal-circuits, a means for effecting a change in the frequency of alternations of said currents in said track-circuits.

3. In a signaling system, the combination of a series of track-sections, each comprising a track-circuit, a source of alternating current for each of said track-circuits of different frequencies, a translating device in circuit with each track-circuit for controlling signaling-circuits, said translating device being responsive to an alternating current of one frequency to control one signal-circuit and responsive to an alternating current of a different frequency to control a second signal-circuit, and means for effecting a change in the alternating current from one frequency to a different frequency.

4. In a signaling system, the combination of a series of track-sections, each comprising a track-circuit, a source of alternating current for each of said track-circuits of different frequencies, a translating device in circuit with each track-circuit for controlling signaling-circuits, said translating device being responsive to the alternating current of one frequency to control one signal-circuit, and responsive to an alternating current of a different frequency to control a second signal-circuit, and means for effecting a change in the source of alternating current from one frequency to a different frequency.

5. In a signaling system, the combination of a series of track-sections, each comprising a track-circuit, two signals provided for each track-section having their operated mechanisms included in separate signal-circuits, sources of alternating current for each of said track-circuits of different frequencies, a translating device in circuit with each track-circuit for controlling the signaling-circuits, said translating device being responsive to an alternating current of one frequency to control one signal-circuit and responsive to an alternating current of a different frequency to control a second signal-circuit, and means operated by one of the signals for effecting a change in the alternating-current frequency in the track-circuit of the preceding track-section.

6. In a signaling system, the combination of two block-sections, a source of alternating currents connected to the track-circuits of said sections, signals controlling one of said sections and governed by the currents in the track-circuit, and means controlled by a signal of one section for changing the frequency of alternations of the current in the track-circuit of the other section.

7. In a signaling system for railways, the combination of a series of track-sections, a track-circuit for each track-section, signal mechanisms controlled from the track-circuits, two sources of alternating current for supplying alternating current to the track-circuits, and means operated by a signal for effecting a change in the frequency of alternations of said currents in the track-circuit whereby the operation of another signal is controlled.

8. A controlling mechanism for a plurality of signals responsive to an alternating current of one frequency to control one signal and responsive to an alternating current of a different frequency to control a second signal and means for supplying the alternating currents of different frequencies to said mechanism.

In testimony whereof I have hereunto set my hand.

JACOB B. STRUBLE.

Witnesses:
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