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No. 827,269.

PATENTED JULY 31, 1906.

J. B. STRUBLE.

ELECTRIC SIGNALING.

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

FIG. 1.

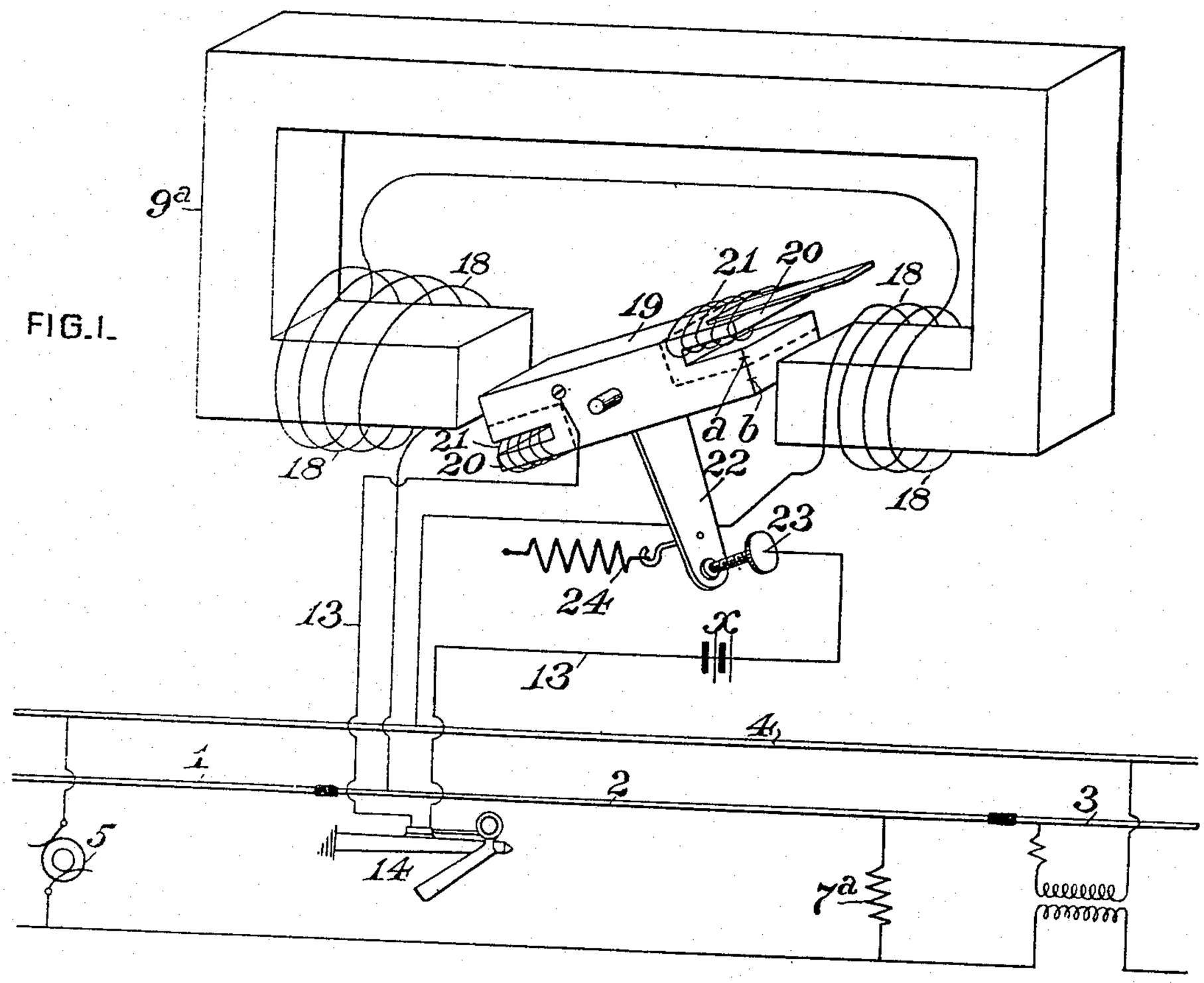
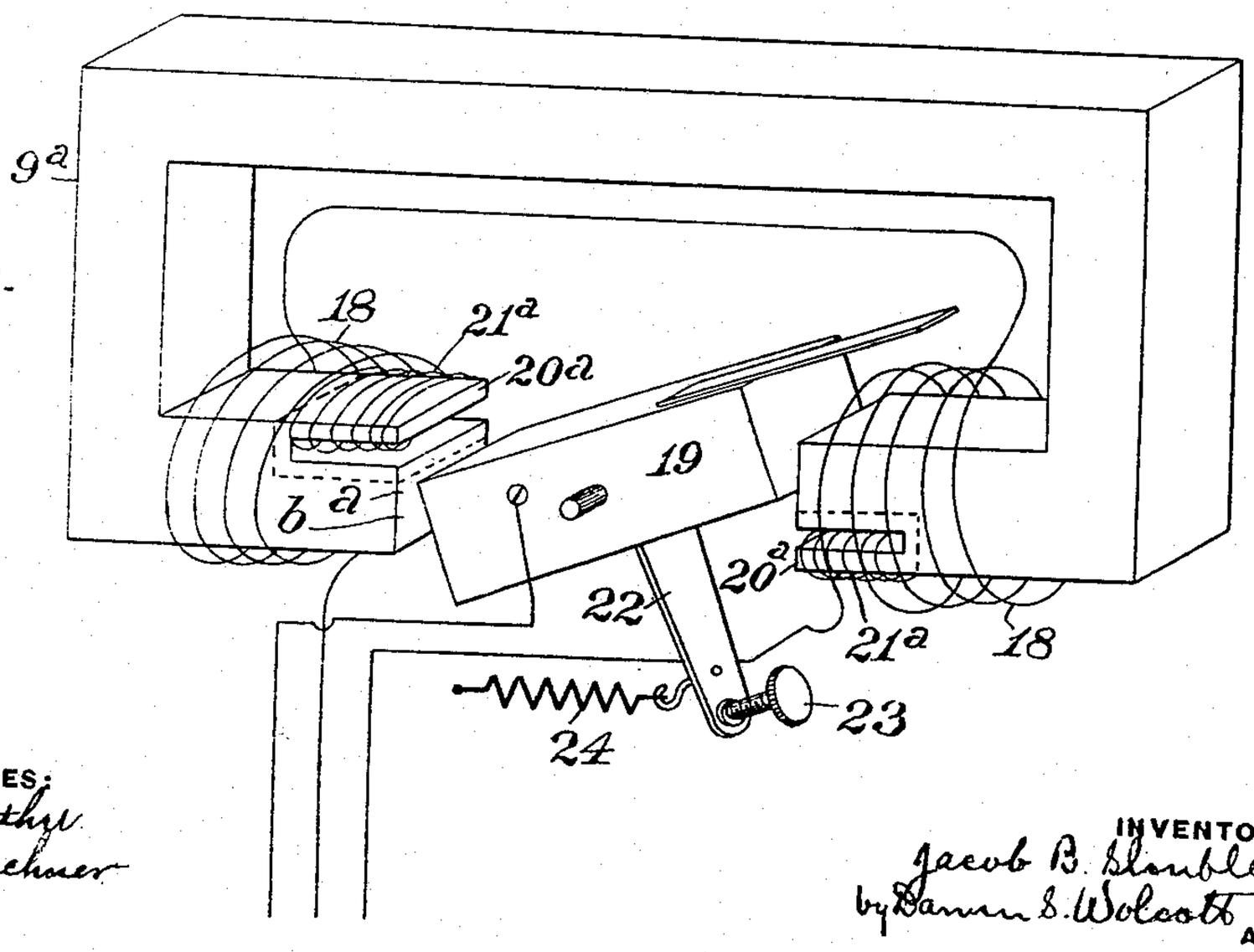


FIG. 2.



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JACOB B. STRUBLE, OF WILKINSBURG, PENNSYLVANIA, ASSIGNOR TO THE UNION SWITCH & SIGNAL COMPANY, OF SWISSVALE, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

ELECTRIC SIGNALING.

No. 827,269. Specification of Letters Patent. Patented July 31, 1906.

Application filed March 12, 1902. Renewed June 4, 1904. Serial No. 211,143.

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 an 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 the signaling for electric railways, said invention comprising, generally stated, an alternating current in the track-circuit and a translating device included in such circuit and controlling the signal-circuit.

The invention described herein relates to certain improvements in a relay which may be used in the signaling system set forth in the said application.

The invention is hereinafter more fully described and claimed.

In the accompanying drawings, Figure 1 is a diagrammatic view illustrative of one form or embodiment of my improvement, and Fig. 2 illustrates a modification of the same.

Similar characters of reference designate corresponding parts in both of the figures.

In the practice of my invention one of the lines of rails is divided into a series of blocks or sections 1, 2, and 3 by insulation at suitable points between the ends of adjacent rails at such points, while the other line of rails 4 is made electrically continuous. 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. These connections to the rail-section may be direct, as shown in Fig. 1, a suitable resistance 7^a being interposed, as shown, 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 in series with the generator 5, as described and shown in my application for patent filed, Serial No. 97,861. Translating devices in the form of motor mechanisms—such, for example, as the relay 9^a—have their field-coils 18 included in the track-circuits and the movable member or armatures 19 suitably pivoted. In order to control the signal, such control being effected in the construction shown through the medium of an auxiliary circuit, the armature is provided with a contact-arm 22, adapted when the armature is shifted by an alternating current in the track-circuit to bear against the contact-pin 23, said arm and point being included in a circuit 13, which also includes as a part thereof suitable mechanism known in the art for operating or controlling this signal 14 and also a suitable generator x.

If while the alternating current is shunted by wheels on section 2 a direct current should flow through the coil or coils 18, the armature 19 would be shifted into alinement with the poles of the magnet 9^a, such movement being in the direction of movement imparted to the armature by the action of the spring 24 as soon as said spring is allowed to operate by the shunting of the alternating current, so that the action of the direct current on the relay is only cumulative of the action of the spring 24 to open the signal-circuit 13 when the alternating current is shunted. In order to clear the signal when an alternating current is flowing through the coil or coils 18, I provide suitable means whereby the center of the magnetic field is shifted, so that the action of the alternating current in the coils 18 will be to so shift the armature to an angular position, and thereby cause its contact-arm 22 to bear upon the contact-point 23 and close the signal-circuit. This shifting of the center of the magnetic field may be effected, as shown in Fig. 1, by slotting the ends of the armature, thereby forming a tongue 20, around which is placed a closed circuit formed by turns 21 of wire or metal tapes suitably insulated. In lieu of forming tongues 20 on the ends of the armature, they may be formed in a similar manner at the ends of the poles of the magnet, as shown in Fig. 2, the tongues 20^a being surrounded by a closed circuit 21^a, as in the construction shown in Fig. 1.

As a direct current will not induce an operative current in an adjoining circuit, it will be apparent that so long as a direct current only flows through the coil or coils 18 the center of the magnetic field of the poles of the magnet or the armature will correspond to points a on a median line passing through the

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armature and the poles of the magnet, so that the armature will be shifted into alinement with the poles of the magnet. If, however, an alternating current should be passed through the coil or coils 18, an induced current will be set up in the closed circuits 21 21ª in a direction opposite to the alternating current in the coils 18, so that the magnetic field produced in the tongues 20 and in a portion of the body of the armature or poles of the magnet adjacent to such tongue and of a thickness approximately equal to the thickness of the tongues, as indicated by dotted lines, will be opposite that generated in the remaining portions of the poles of the magnet and the armature, so that the magnetic field produced by the alternating current in the coils 18 will have its center no longer coinciding with the median line of the poles or armature, but will be shifted to one side of such axis approximately to points *b*, so that the attractive force thus produced by the alternating currents in the coils 18 will tend to shift the armature to an angular position, as shown, bringing the contact-arm against the contact-point 23.

In the construction shown in Fig. 1 the induced current in the coil 21 is not produced directly by the alternating current in the coil or coils 18; but such current in the coil or coils 18 will produce an alternating magnetic field from pole to pole of the magnet through the armature, and such alternating field will induce an alternating current in the coils 21, and such induced current will generate a magnetic field in the tongues 20 and in a portion of the body of the armature adjacent to such tongue (indicated by dotted lines) as will neutralize a portion of the magnetic circuit produced by the coil or coils 18. This neutralizing of a portion of the armature amounts practically, as regards the magnetic circuit produced by alternating currents, to removing or cutting away a portion of the armature and the shifting of the center of attraction of the alternating magnetic field to coincidence with the remaining portion of the ends, and the armature will be brought to angular position, as shown.

In the arrangement shown in Fig. 2 the current is induced in the closed circuits 21 21ª directly by the alternating current in the coil or coils 18, and the neutralization of a portion of the poles of a magnet has the same effect as cutting away or removing bodily a portion of such poles, so that the centers of the attraction of the magnetic field of the poles will be shifted to points outside of the median line of the poles and will correspond to a point *b* eccentric to the middle of the pole, as shown in Fig. 2.

It is characteristic of either of the constructions shown and described that a direct current will not have any effect toward clearing the signal, which can be done only by the action of the alternating current, and that a direct current will only act in the same direction as the spring and only when the alternating current is shunted or is weaker than the direct current.

What I claim as my invention is—

1. A signaling apparatus having in combination a source of alternating currents, a track-circuit in circuit with the source of alternating currents, a motor in circuit with the track-circuit, the movable member of the motor being adapted to control a signal and means for neutralizing a portion of the magnetic circuit of the motor, substantially as set forth.

2. A signaling apparatus having in combination a source of alternating currents, a track-circuit in circuit with the source of alternating currents, a motor in circuit with the track-circuit, the movable member of the motor being adapted to control a signal, one of the members of the motor having portions surrounded by closed circuits whereby a portion of the magnetic circuit may be neutralized when the motor is energized by an alternating current, substantially as set forth.

3. A signaling apparatus having in combination a source of alternating currents, a track-circuit in circuit with the source of alternating currents, and a motor included in the track-circuit, the movable member of the motor being adapted to control a signal, the poles of the stationary member being provided with tongues surrounded by closed circuits, substantially as set forth.

4. A translating device for signaling purposes comprising a field, a movable member actuated thereby and coils which when excited by an alternating current will cause a shifting of the movable member in one direction and which when excited by a direct current and not by an alternating current will cause a shifting of the movable member in another direction.

5. A translating device for signaling purposes comprising a field, a movable member actuated thereby and coils which when excited by an alternating current and a direct current simultaneously will cause a shifting of the movable member in one direction and which when excited by a direct current and not by an alternating current will cause a shifting of the movable member in another direction.

6. A translating device for signaling purposes comprising a field, a movable member actuated thereby and coils arranged to produce relatively displaced magnetic fields when excited by an alternating current whereby the movable member will be shifted in response thereto.

7. A track-circuit for signaling purposes comprising track-rails, an alternating-current supply, and a translating device, said translating device including a field, and a movable

member and coils, some of which are in circuit with the track-rails and arranged to produce relatively displaced magnetic fields whereby the movable member will be shifted in response thereto.

8. A track-circuit for signaling purposes comprising track-rails, an alternating-current supply and a translating device, said translating device comprising a field, a movable member actuated thereby and coils which when excited by an alternating current will cause a shifting of the movable member in one direction and which when excited by a direct current and not by an alternating current will cause a shifting of the movable member in another direction.

9. A track-circuit for signaling purposes comprising track-rails, an alternating-current supply and a translating device, said translating device comprising a field, a movable member actuated thereby and coils which when excited by an alternating current and a direct current simultaneously will cause a shifting of the movable member in one direction and which when excited by a direct current and not by an alternating current will cause a shifting of the movable member in another direction.

In testimony whereof I have hereunto set my hand.

JACOB B. STRUBLE.

Witnesses:

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F. E. GAITHER.