

No. 869,275.

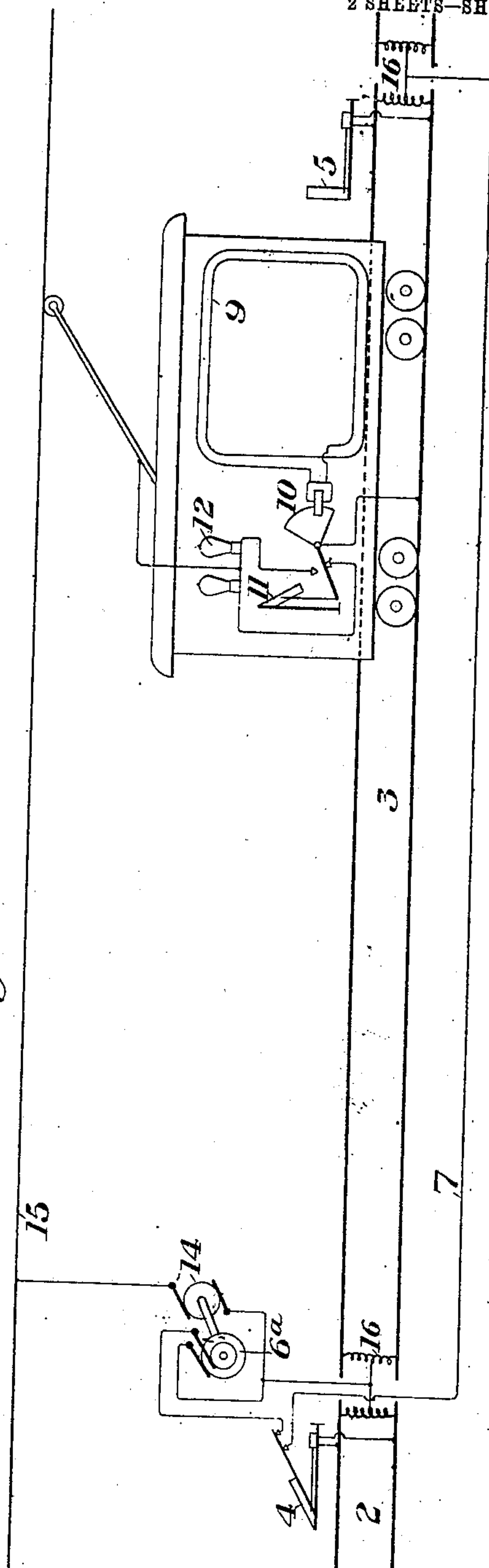
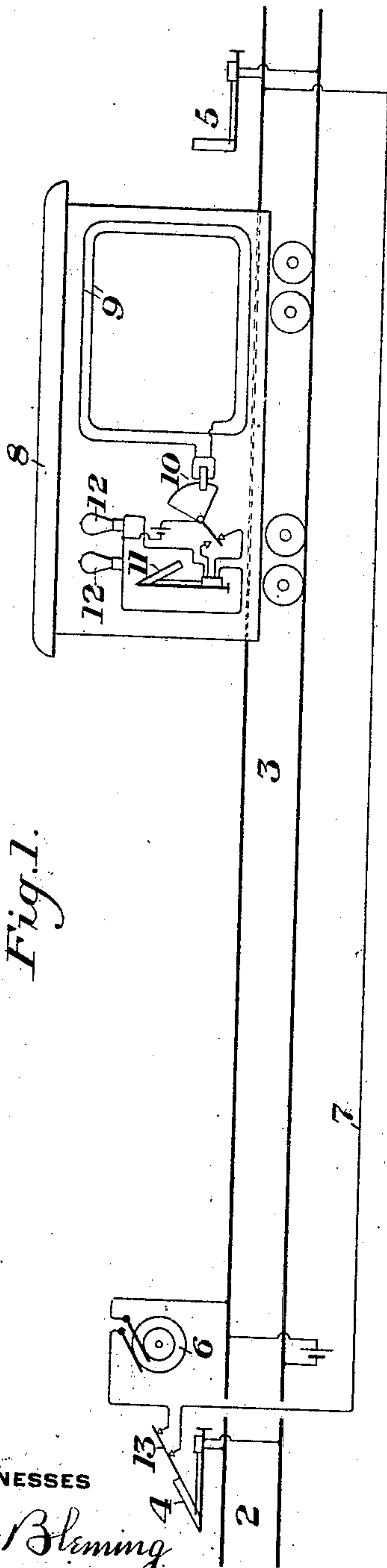
PATENTED OCT. 29, 1907.

L. H. THULLEN.

BLOCK SIGNALING SYSTEM.

APPLICATION FILED MAY 15, 1907.

2 SHEETS—SHEET 1.



WITNESSES

G. B. Blumling
W. W. Swartz

INVENTOR

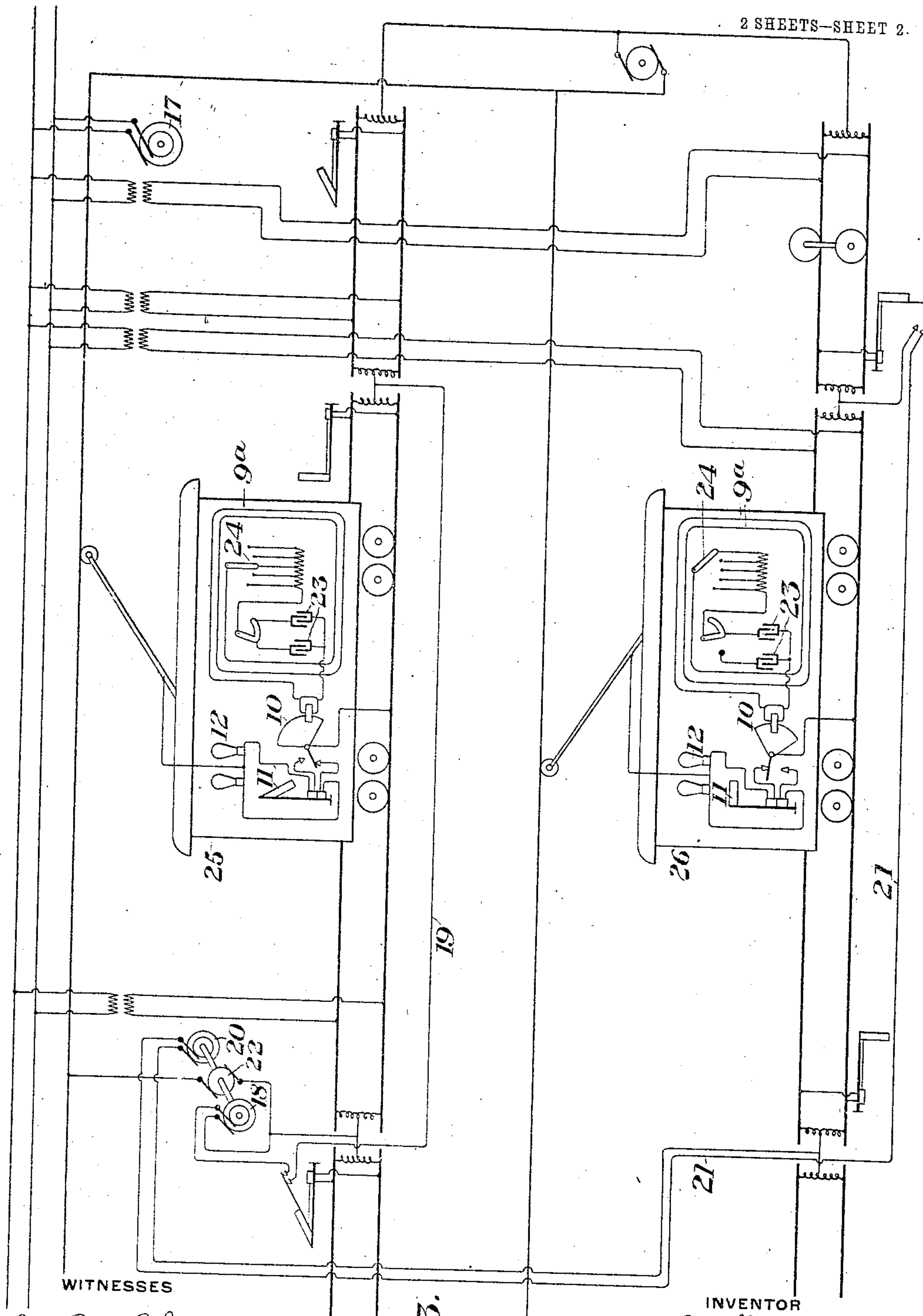
by L. H. Thullen,
Baker & Byrnes,
his Atty.

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2 SHEETS—SHEET 2.



E. B. Blemmy
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UNITED STATES PATENT OFFICE.

LOUIS H. THULLEN, OF SWISSVALE, PENNSYLVANIA, ASSIGNOR TO THE UNION SWITCH & SIGNAL COMPANY, OF SWISSVALE, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

BLOCK-SIGNALING SYSTEM.

No. 869,275.

Specification of Letters Patent.

Patented Oct. 29, 1907.

Application filed May 15, 1907. Serial No. 373,708.

To all whom it may concern:

Be it known that I, LOUIS H. THULLEN, of Swissvale, Allegheny county, Pennsylvania, have invented a new and useful Block-Signaling System, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a diagram showing my invention as applied to a system of signaling on a steam railroad, using direct current for the track or signaling circuit; Fig. 2 is a similar diagram as applied to an electric road using direct current for propulsion purposes; and Fig. 3 is a diagram showing the application of the invention to an electric road in which alternating current is employed for propulsion purposes, using a current of one frequency in one track and a current of different frequency for a second track.

My invention relates to electric signaling systems for railways, and more particularly to a cab and block system wherein the current for the signal operating relay in the cab is obtained by induction from a wire or other conductor extending parallel to the track. I am aware that a system of this general character has heretofore been proposed in which the current for the signal operating relay is obtained by means of Hertzian waves. My invention differs from the said system, inasmuch as in the former the Hertzian waves are entirely different from the current produced by induction, the former being considered transmission of energy by means of radiation, which requires a current of exceedingly high frequency, and is not operative by a current of ordinary frequency; while my invention can be operated by a current of low frequency, and in fact, by a current of any number of alternations, which is impossible with the system which employs Hertzian waves or electrical radiation.

Referring to Fig. 1, the numerals 2 and 3 designate adjacent block sections. 4 is a signal at the entrance to the block 2, and 5 is a signal at the entrance to the block 3. 6 is an alternating current generator which can be driven by any suitable source of energy, and which supplies a circuit 7, which includes one of the track rails of the block 3 and a conductor 7 extending parallel with and adjacent to the track. 8 designates a locomotive or car having mounted thereon an induction coil 9, a relay 10 controlled by the circuit of said coil, a signal 11, and signal lamps 12 controlled by the said relay. The circuit 7 extends through a circuit breaker 13, controlled by the signal 4.

The induction coil 9 consists of a number of turns or windings placed on the car in such position that it will be threaded by a maximum number of lines of force emanating from the conductor 7, the current in the conductor 7 being controlled by means of the circuit breaker 13 operated by the signal 4. The system is

worked on the closed circuit principle; that is, when the signal 4 is at clear, the circuit through the conductor 7 is complete; but when the signal 4 is set at danger this circuit is broken. The current in the coil 9 is also operated on the closed circuit principle; that is, when the conductor 7 is carrying current, the relay 10 will operate to close the circuit of the signal 11 and lamps 12; and when no current exists in the conductor 7 the current through the signals 11 and 12 will be broken.

I do not limit myself to the use of a relay of any particular character, it being well known that a relay can be constructed which will operate at any desired frequency in the manner described; neither do I limit myself to any particular type of signal in the cab, as it is apparent that any suitable form of signal can be used to attract the engineer's attention.

The arrangement shown in Fig. 2 is similar to that shown in Fig. 1, except that Fig. 2 shows my invention applied to an electric road in which the generator 6^a is driven by an electric motor 14 which may derive its supply from the conductor 15 which supplies the propulsion current. 16 designates the bonds for the track sections.

Fig. 3 shows my invention applied to an electric road having two adjacent tracks, each of which is divided into blocks in the same manner as in Fig. 2. 17 designates a generator for the propulsion current. 18 is the generator which supplies the current for the conductor 19 which extends parallel to the track and corresponds to the conductor 7 of Figs. 1 and 2. 20 is a generator which supplies the current for the conductor 21, which is in similar relation to the second track. 22 is a motor for driving the generators 18 and 20. On a two, three or four track road, the current in the conductors parallel with the track, which furnish currents to the apparatus on the cars by means of induction, must necessarily be of a different phase or frequency, so that a car traversing one track and collecting current from the conductor parallel to that track, will not be operated by any current except the current taken from the wire pertaining to that track. This I accomplish by including in the circuit of the induction coil 9^a of the cars means for maintaining or tuning said circuits to a certain resonance corresponding to the current in the particular conductor by which this particular signal mechanism is to be operated. Such means may consist of condensers 23 and adjustable impedance coils 24. These condensers, and the impedance coils may be so adjusted with reference to each other that at a given frequency they will be in resonance; that is at a given frequency a maximum amount of current will traverse the circuit of the relay; while with a different frequency there will be but a small amount of current traversing the circuit, which will be insufficient to operate the relay.

thus, in Fig. 3 I have shown one adjustment on the car 25 of one track, and a different adjustment on the car 26 on the other track.

It is well known in the art that a combination of condensers and impedance coils can be so arranged that by cutting in and out capacity or inductance the apparatus can be tuned for any frequency, and can be readily changed to be tuned at a number of frequencies. I do not, therefore, restrict myself to any particular arrangement of conductors and impedance coils, it being also well known that these can be connected either in multiple or in series, depending upon their size and capacity, to accomplish the desired results. Neither do I limit myself to any particular location of the induction coils, nor of the conductors extending adjacent to the track. The latter may be either overhead, at the side of the track, or between the track rails, and the location of the induction coils will be changed accordingly, being placed in each case in the best position for obtaining a maximum induction.

What I claim is:—

1. In a block signaling system, a conductor extending adjacent to the track throughout substantially the length of the block from signal to signal, a signal-controlled circuit breaker in the circuit of said conductor, and a coil on the car or other vehicle in inductive relation to said conductor, and signal mechanism on the car or other vehicle operated by said coil; substantially as described.
2. In a block signaling system, a conductor extending adjacent to the trackway throughout substantially the length of the block, means for supplying said conductor with alternating current, a block signal, a circuit breaker controlled by said signal and controlling the circuit of said conductor, a coil on a car or other vehicle in inductive relation to the conductor, a relay operated by said coil, and signal mechanism controlled by the relay; substantially as described.
3. In a block signaling apparatus, a block signal, a conductor extending adjacent to the trackway and having its circuit controlled by the signal, a coil carried by the car or vehicle in inductive relation to said conductor, signal mechanism on the car operated by said coil, and means whereby the signal mechanism is controlled only by a current of certain frequency; substantially as described.
4. In a block signaling system, a signal, a conductor extending adjacent to the trackway and having its circuit controlled by the signal, a coil carried by the car or other

vehicle in inductive relation to the conductor, a relay operated by said coil, signaling mechanism on the car controlled by the relay, and means for maintaining the relay operating circuit in resonance with a current of predetermined frequency; substantially as described.

5. In a block signaling system, a closed track circuit, a conductor extending adjacent to the track, and having its circuit controlled by the track circuit, a coil on the car or other vehicle in inductive relation to said conductor, and means for controlling the current in said conductor by the passage of a train in the block; substantially as described.

6. In a block signaling system, a closed track circuit, a conductor extending adjacent to the trackway, and having its circuit controlled by the track circuit, a coil on the car or other vehicle in inductive relation to the conductor, and a relay operated by the track circuit to control the current in the conductor extending adjacent to the trackway; substantially as described.

7. In a block signaling system, a signal, a closed track circuit, a conductor extending adjacent to the trackway and having its circuit controlled by the signal, a coil carried by the car or other vehicle in inductive relation to the conductor, and means for controlling the current in the conductor extending adjacent to the trackway by means of the track circuit; substantially as described.

8. In a block signaling system, a signal, a closed track circuit, a conductor extending adjacent to the trackway and having its circuit controlled by the signal, a coil carried by the car or other vehicle in inductive relation to the conductor, a signal mechanism on the car connected to said coil, and means for adjusting the signal mechanism to be in tune with the conductor extending adjacent to the trackway; substantially as described.

9. In a block signaling system, a closed track circuit, a conductor extending adjacent to the track, a signal circuit on the vehicle, means for inducing a current in said circuit from the said conductor, and means for maintaining the resonance of the signal circuit in accord with the frequency of the current in said conductor; substantially as described.

10. In block signaling mechanism, a plurality of tracks, a conductor adjacent to each track, an electrically controlled signal device on each vehicle, and means for inducing a current in the circuits of the signals from the track conductors, the said circuits being each tuned with respect to the current in the particular conductor for that track; substantially as described.

In testimony whereof, I have hereunto set my hand.

LOUIS H. THULLEN.

Witnesses:

JAMES CHALMERS, JR.,
W. L. McDANIEL.