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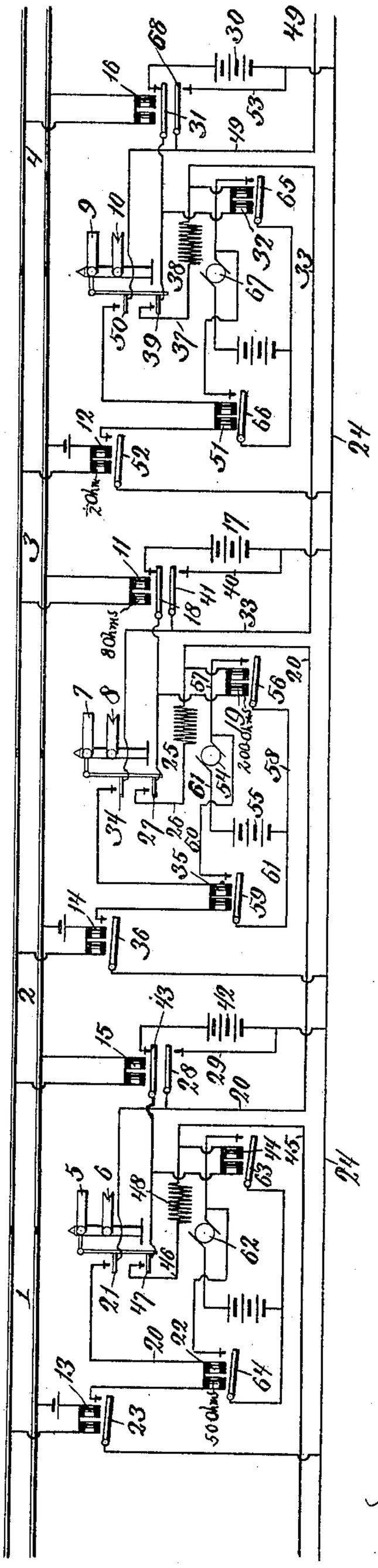
A. J. WILSON.

ELECTRIC SIGNALING SYSTEM.

(Application filed Oct. 23, 1900.)

(No Model.)



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ELECTRIC SIGNALING SYSTEM.

SPECIFICATION forming part of Letters Patent No. 688,046, dated December 3, 1901.

Application filed October 23, 1900. Serial No. 34,096. (No model.)

To all whom it may concern:

Be it known that I, ADONIRAM J. WILSON, a citizen of the United States, and a resident of Westfield, Union county, and State of New Jersey, have invented certain new and useful Improvements in Electric Signaling Systems, of which the following is a specification.

This invention relates to an improved electric signaling system.

The invention seeks, among other things, to avoid the employment of numerous line-wires, to provide an arrangement whereby home and distant signals may be operated with safety and economy, and one in which such signals may be worked on the normal danger principle.

One of the distinguishing features of the invention is the arrangement of the signal-circuit, which includes two magnets controlling the operation of two signals arranged at separate points along the track, one of said magnets being responsive to a given current on the line and controlling the movement of one signal and the other magnet being unresponsive to such given current and controlling the movement of the other signal. By the term "responsive" I mean responsive so as to work the circuit-controller designed to be operated by the magnet. The term "unresponsive" would mean the contrary.

Another feature of the signal-circuit is the employment of the signal-circuit to operate or control a home and a distant signal, the home signal being so arranged as to initiate the operation which puts the distant signal to "safety." The signals themselves may be of any type desired. For example, they may be of the inclosed-disk type or of the exposed-blade type, and the power for operating the signals may be derived from electrical devices or motors, or from water or air and pressure, or any other suitable apparatus. In some cases the battery or other generator in the signal-circuit may be employed to operate the signals directly. In this case the responsive and unresponsive magnets might be the field-magnets of two separate motors. Again, the signal-circuits may be employed to bring the signals into operative connection with other generators for the purpose of operating the signals.

In the accompanying drawing are shown in diagram several blocks of railway equipped with home and distant signals normally at "danger" and showing one embodiment of the various features of the invention. In this particular embodiment the signals themselves are exposed semaphore-blades, a home and a distant signal being arranged at the entrance of each block and the power for operating a home and a distant signal at the entrance of a block being derived from a single motor.

Referring now to the particular embodiment as shown in the drawing, 1, 2, 3, and 4 are the blocks of the track, insulated from each other in the usual manner.

5 and 6, 7 and 8, and 9 and 10 are the home and distant signals arranged at the entrance of the blocks 2, 3, and 4. The rails of the several blocks are connected in similar rail-circuits. The rails of the block 3, for example, are connected with the magnet 11 and the magnet 12. These magnets are in series and are so arranged that the magnet 11 is normally responsive and the magnet 12 normally unresponsive to the current of the circuit. The magnet 12 will be made responsive by the approaching train after the magnet 11 has been shunted, and thereby deënergized, by the train. Various arrangements may be employed for having the magnets of the rail-circuit responsive and unresponsive; but it is preferred to simply wind the magnets to different resistances—say magnet 12 to a resistance of half an ohm and the magnet 11 to a resistance of eight ohms—and connect the magnets into series, as shown. In the operation of the rail-circuit when a train enters the block 3 it shunts the magnet 11, and by thus reducing the resistance of the circuit makes the magnet 12 responsive. The magnet 11 is of course at the same time deënergized. The rail-circuits of the other blocks are arranged in the same way, the magnets 13 and 14 of blocks 1 and 2 corresponding to magnet 12 of block 3 and the magnets 15 and 16 of blocks 2 and 4 corresponding to magnet 11 of block 3.

Referring now to the signal-circuit for the home signal 7 and the distant signal 6, which guard the block 3, this circuit may be traced as follows: starting from battery 17 to circuit-controller 18, operated by magnet 11, the magnet 19, wire 20, circuit-controller 21, operated by the movement of home signal 5, magnet 22, circuit-controller 23, operated by

magnet 13, common return-wire 24, back to battery. Connected in multiple with or in a bridge across this circuit is a suitable resistance. This resistance will hereinafter be referred to as a "resistance-coil," that being the most convenient, but only one of the possible forms of such resistance. This resistance-coil is numbered 25, and the branch or bridge in which it is arranged is numbered 26. This branch contains a circuit-controller 27, operated by the movement of the home signal 7. A circuit-controller 28, operated by the magnet 15, is arranged in a branch 29, one end of which is connected to the wire 20 and the other end to common wire 24. When the circuit-controller 28, which is normally open, is closed, battery 17 is shunted from magnet 22, although the current may flow through the magnet 19. The circuit-controller 27 is normally open, and the magnets 19 and 22 are so arranged that when the current flows through both of them and the circuit-controller 27 is open the magnet 19 will be responsive and the magnet 22 unresponsive to this current. This responsiveness and unresponsiveness of these magnets to the current may be provided for in various ways; but I prefer to simply wind the magnet 19 to a comparatively high resistance—say two hundred ohms—and the magnet 22 to a comparatively low resistance—say fifty ohms. When the circuit-controller 27 is closed, so as to include the resistance-coil 25 in multiple with the magnets 19 and 22, the current flowing from the battery through magnet 22 will be increased sufficiently to render this magnet responsive, while at the same time the magnet 19 receives enough current to make it responsive. The other signal-circuits shown are similar to that just described.

The signal-circuit for the home signal 9 and distant signal 8 is as follows: from battery 30, through circuit-controller 31, operated by magnet 16, high-resistance magnet 32, wire 33, circuit-controller 34, operated by home signal 7, low-resistance magnet 35, circuit-controller 36, operated by magnet 14, common wire 24, to battery. This circuit has connected with it the bridge-wire 37, containing the resistance-coil 38 and normally open circuit-controller 39, operated by the movement of the home signal 9. It also has connected with it the bridge-wire 40, containing the circuit-controller 41, operated by magnet 11, one end of the bridge-wire 40 being connected to wire 33 and the other end to common wire 34. The circuit for the home signal 5 and its corresponding distant signal (not shown) is only shown in part. This circuit starts from battery 42, runs through circuit-controller 43, operated by magnet 15, high-resistance magnet 44, wire 45, &c. The bridge-wire 46 across this circuit contains the normally open circuit-controller 47, operated by the movement of the home signal 9, and the resistance-coil 48.

The signal-circuit for the distant signal 10 and its corresponding home signal in advance is only shown in part. This circuit runs through wire 49, normally open circuit-controller 50, operated by the movement of the home signal 9, low-resistance magnet 51, circuit-controller 52, operated by magnet 12, and through common wire 24, back to the battery. (Not shown.) This circuit is bridged by the wire 53, connected at one end to common wire 24 and at the other end to wire 49, and it contains the circuit-controller 68, operated by magnet 16. The circuit-controllers 21 and 47 are normally open, with the home signal 5 at "danger," and are closed by the movement of this signal to "safety." To insure that these circuit-controllers will be open when signal 5 is at "danger" and will be closed when the signal is at "safety," I prefer to connect the circuit-controllers mechanically with the signal, as is indicated in the drawing. The circuit-controllers 34 and 27 are arranged in the same way with respect to home signal 7, and the circuit-controllers 50 and 39 are arranged in the same way with respect to the home signal 9.

The power for operating the home and distant signals 7 and 8 is derived from a motor 54, the generator for which is the battery 55. The motor 54 is employed at different times to pull the signals 7 and 8 to "safety," the signals going to "danger," when released, by gravity. A suitable apparatus may be provided for this purpose. When the magnet 19 is made responsive, it closes the circuit-controller 56, and thereby completes the following circuit through the motor: from battery 55, wire 61, motor 54, wire 57, circuit-controller 56, to wire 58, back to battery. When this circuit through the motor is closed, the home signal 7 is pulled to "safety," and when it is thereafter opened the signal 7 goes to "danger" by gravity. When the magnet 35 is made responsive, it closes the circuit-controller 59, included in the following circuit with the motor 54: from battery 55, wire 61, motor 54, wire 60, circuit-controller 59, back to battery. When this circuit is closed, the motor pulls the distant signal 8 to "safety," and when it is opened this signal goes to "danger" by gravity. The signals 5 and 6 are operatively connected in the same way with the motor 62, which is connected up in circuit in the same way as described for motor 54, the magnet 44 working the circuit-controller 63, which when closed operates the motor to put the signal 5 to "safety," and the magnet 22 working the circuit-controller 64, which when closed operates the motor 62 to put the distant signal 6 to "safety." In the same way magnet 32 works the circuit-controller 65 and the magnet 51 works the circuit-controller 66 for the purpose of operating the motor 67 to put the signals 9 and 10 to "safety."

Assuming that the blocks are free from trains with the signals standing normally at "danger" and all the circuit-controllers normally open and all in their normal position—

that is, open, excepting the circuit-controllers 43, 18, and 31, which are normally closed—the operation of the system is as follows: A train in the rear of block 1 operates the rail-circuit of the block in which it is and closes the circuit from battery 42, thereby energizing the magnet 44 and closing at 63 the circuit of the motor 62, thereby putting to "safety" the home signal 5 of block 2 and closing the circuit-controllers 21 and 47. After sundry operations, which will be understood from the following description, the train enters block 1, putting to "danger" behind it the home and distant signals at the entrance of block 1. As the train proceeds in block 1 magnet 13 is made responsive, thereby closing circuit-controller 23 and completing the circuit from battery 17 as follows: from battery 17, circuit-controller 18, high-resistance magnet 19, wire 20, circuit-controller 21, low-resistance magnet 22, circuit-controller 23, and common wire 24, to battery. Magnet 19 is thus made responsive, completing at 56 the circuit through the motor 54, which pulls the home signal 7 of block 3 to "safety," and thereby closes circuit-controllers 34 and 27. The bridge-wire 26, containing resistance-coil 25, is thus closed at 27, and magnet 22 is thereby made responsive, which closes at 64 the circuit of the motor 62. Motor 62 then pulls the distant signal 6 to "safety." Thus the signals 5 and 6 stand at "safety" in advance of the train. When the train enters block 2, it shunts the magnet 15, thereby opening at 43 the signal-circuit from battery 42 and deënergizing magnet 44 and putting the home signal 5 to "danger" behind the train. The movement of the home signal 5 to "danger" opens the circuit-controllers 21 and 47, which movement of the circuit-controller 21 deënergizes the magnet 22, thus releasing the distant signal 6, so that it goes to "danger" also behind the train. The opening of circuit-controller 47 breaks the branch through resistance-coil 48. The shunting of magnet 15 also closes the normally open circuit-controller 28, thereby keeping the battery 17 in closed circuit through magnet 19 and circuit-controller 28, but cutting out or shunting all that part of the signal-circuit which is on that side of the circuit-controller 28 farthest from the battery 17. The shunting of magnet 15 also reduces the resistance of the rail-circuit, so that magnet 14 is made responsive. This closes at 36 the signal-circuit from battery 30 as follows: from battery 30, magnet 32, wire 33, circuit-controller 34, magnet 35, circuit-controller 36, and common wire 24, to battery. The closing of this circuit energizes magnet 32, thereby closing at 65 the circuit of the motor 67, which puts to "safety" the home signal 9, guarding block 4, the movement of which signal closes the normally open circuit-controllers 50 and 39. The closing of the latter circuit-controller closes the bridge-wire 37 through the resistance-coil 38, thereby making responsive magnet 35, which closes at 59 the circuit of the motor 54, thereby putting to "safety" the distant signal 8 in advance of the train. As long as the train remains in the block 2 magnet 15 will be shunted and the brake at 43 in the circuit of the battery 42 will keep the home signal 5 at "danger." The brake at 43 will also keep at "danger" the distant signal guarding the block 2, which is located at the entrance of block 1. When the train enters block 3, it shunts the magnet 11, thereby opening at 18 the circuit of battery 17 and deënergizing magnet 19, thereby putting to "danger" the home signal 7 behind the train. The movement of the home signal 7 to "danger" opens circuit-controllers 34 and 27, which movement of the circuit-controller 34 deënergizes magnet 35, and thus releases the distant signal 8, so that it goes to "danger" also behind the train. The opening of circuit-controller 27 breaks the branch through resistance-coil 25. The shunting of magnet 11 also closes at 41 the normally open branch 40, thereby keeping battery 30 in closed circuit with magnet 32, but cutting out or shunting all that part of the signal-circuit which is on that side of the circuit-controller 41 farthest from the battery 30. As long as the train remains in block 3 circuit-controller 18 will be open, thus holding to "danger" behind the train home signal 7 and distant signal 6, guarding the block 3. Moreover, during this time the circuit-controller 41 will be closed and the distant signal 8 will remain at "danger" behind the train. The shunting of magnet 11 also makes responsive magnet 12, thereby closing the circuit through wire 49, circuit-controller 50, magnet 51, circuit-controller 52, and wire 24, back to the battery of this circuit. This puts to "safety" in the manner already described the home signal at the exit end of block 4 and thereafter the distant signal 10. When the train enters block 4, magnet 16 is shunted, signals 9 and 10 go to "danger" behind the train, and distant signal 8 is held at "danger" as long as the train remains in block 4.

From this description of the operation it will be seen that the movement to "safety" of a home signal guarding a block is made to necessarily precede the movement to "safety" of the distant signal guarding the same block. The movement to "safety" of the home signal initiates the operation which puts to "safety" the distant signal. For example, the distant signal 6 can only go to "safety" when magnet 22 has been made responsive, and this magnet cannot be made responsive until the home signal 7 has gone to "safety," and thereby closed at 27 the bridge-wire 26. It will also be seen that a distant signal at the entrance to a block cannot go to "safety" until after the home signal at the entrance to the same block has gone to "safety." For example, the magnet 22 cannot be made responsive to put the distant signal to "safety" until after circuit-controller 21 has been closed by the movement of home signal 5 to "safety."

Referring to the magnets of the signal-cir-

cuits for the signals—as, for example, the magnets 19 and 22 of the signal-circuit for the signals 7 and 6—it is to be observed that in the embodiment of the invention shown in the drawing responsiveness and unresponsiveness of these magnets is made to depend on the difference in the amount of current received by the magnets from the battery 17. It is to be understood, however, that such arrangement for making the magnets responsive and unresponsive is not the only one that may be employed. This part of the invention includes in its scope any arrangement whereby these magnets are made to be responsive and unresponsive to a given current and whether one or more batteries are utilized for the purpose or whether any other arrangement is resorted to for making these magnets responsive and unresponsive. The same latitude of arrangement with respect to the magnets of a track-circuit—as, for example, the magnets 14 and 15—is also within the scope of the invention. Again, the magnets of a signal-circuit—as, for example, the magnets 19 and 22—may be employed in any suitable way to connect the signals with the source of power which moves the signals. For example, these signals may be employed to operate clutches arranged to connect the signals with any suitable source of power.

What I claim as new, and desire to secure by Letters Patent, is—

1. In an electric signaling system, the combination of a home signal, a distant signal guarding the portion of the track that is guarded by the home signal, a signal-circuit for said signals and containing two magnets, one of said magnets being responsive to a given current and controlling the movement of the home signal, and the other magnet being unresponsive to said current and controlling the movement of the distant signal, and means for controlling the current of the signal-circuit to make responsive one or both of said magnets to affect one or both of said signals, the home signal being so connected with the said signal-circuit that the movement of the home signal initiates the responsiveness of said unresponsive magnet.

2. In an electric signaling system, the combination of a home signal, a distant signal normally at danger guarding the same portion of track that is guarded by the home signal; a signal-circuit for said signals and containing two magnets, one of said magnets being responsive to a given current and controlling the movement of the home signal, and the other magnet being unresponsive to said current and controlling the movement of the distant signal; and means for controlling the current of the signal-circuit to make responsive said responsive magnet to put the home signal to safety and to make responsive said unresponsive magnet to put the distant signal to safety.

3. In an electric signaling system, the combination of a home signal, a distant signal normally at danger guarding the same portion of track that is guarded by the home signal; a signal-circuit for said signals and containing two magnets, one of said magnets being responsive to a given current and controlling the movement of the home signal, and the other magnet being unresponsive to said current and controlling the movement of the distant signal; and means controlled by a train in the rear of said signals for controlling the current of the signal-circuit to make responsive said responsive magnet to put the home signal to safety and to make responsive said unresponsive magnet to put the distant signal to safety, and means controlled by a train in advance of said signals for putting or holding said signals to danger.

4. In an electric signaling system, the combination of a home signal, a distant signal guarding the same portion of track that is guarded by the home signal; a signal-circuit for said signals and containing two magnets, one of said magnets being responsive to a given current and controlling the movement of the home signal, and the other magnet being unresponsive to said current and controlling the movement of the distant signal; and means for controlling the current of the signal-circuit to make responsive said responsive magnet to put the home signal to safety and to make responsive said unresponsive magnet to put the distant signal to safety, the movement of the distant signal to safety being dependent upon the movement of the home signal to safety.

5. In an electric signaling system, the combination of a home signal and a distant signal; a signal-circuit for said signals and containing two magnets, one of said magnets being responsive to a given current and controlling the movement of the home signal, and the other magnet being unresponsive to said current and controlling the movement of the distant signal; a resistance-coil and means for connecting the resistance-coil in multiple with said signal-circuit and disconnecting it therefrom for making responsive and unresponsive said unresponsive magnet to affect the distant signal.

6. In an electric signaling system, the combination of two signals located at a substantial distance from each other; a signal-circuit containing two magnets for controlling respectively said signals, one of said magnets being responsive and the other unresponsive to a given current; a resistance-coil and means for connecting the resistance-coil in multiple with said signal-circuit and disconnecting it therefrom for making responsive one or both magnets, whereby one or both signals may be operated.

7. In an electric signaling system, the combination of two signals located at a substantial distance from each other; a signal-circuit containing two magnets for controlling respectively said signals, one of said magnets being responsive and the other unresponsive

to a given current; a resistance-coil and means for connecting the resistance-coil in multiple with said signal-circuit and disconnected therefrom for making responsive one or both magnets, whereby one or both signals may be operated, and means controlled by one signal for connecting and disconnecting said resistance-coil.

8. In an electric signaling system, the combination of two signals located at a substantial distance from each other; a signal-circuit containing two magnets for controlling respectively said signals, one of said magnets being responsive and the other unresponsive to a given current; a resistance-coil and means for connecting the resistance-coil in multiple with said signal-circuit and disconnected therefrom for making responsive one or both magnets, whereby one or both signals may be operated, said signal-circuit including a normally closed circuit-breaker operated by a train in advance of both of said signals to hold said signals at danger.

9. In an electric signaling system, the combination of two signals located at a substantial distance from each other; a signal-circuit containing two magnets for controlling respectively said signals, one of said magnets being responsive and the other unresponsive to a given current; a resistance-coil arranged to be connected in multiple with said signal-circuit and disconnected therefrom for making responsive one or both magnets, whereby one or both signals may be operated, and means controlled by one signal for connecting and disconnecting said resistance-coil, said signal-circuit including a normally closed circuit-breaker operated by a train in advance of both of said signals to hold said signals at danger.

10. In an electric signaling system, the combination of a home signal and a distant signal normally at danger; a normally-deënergized signal-circuit for said signals and containing two magnets, one of said magnets being responsive to a given current and controlling the movement of the home signal, and the other magnet being unresponsive to said current and controlling the movement of the distant signal; a resistance-coil arranged to be connected in multiple with said signal-circuit and disconnected therefrom for controlling said unresponsive magnet to affect the distant signal; means controlled by a train in the rear of said signals for making responsive both of said magnets; and means controlled by a train in advance of said signals for making unresponsive both of said magnets.

11. In an electric signaling system, the combination of a home signal and a distant signal normally at danger; a normally-deënergized signal-circuit for said signals and containing two magnets, one of said magnets being responsive to a given current and controlling the movement of the home signal, and the other magnet being unresponsive to said current and controlling the movement of the distant signal; a resistance-coil arranged to be connected in multiple with said signal-circuit and disconnected therefrom for controlling said unresponsive magnet to affect the distant signal; means controlled by a train in the rear of said signals for making responsive both of said magnets; means controlled by a train in advance of the distant signal and in the rear of the home signal for making unresponsive said unresponsive magnet so as to hold the distant signal at danger; and means controlled by a train in advance of said signals for deënergizing both of said magnets.

12. In an electric signaling system, the combination of a home signal and a distant signal normally at danger; a normally unresponsive signal-circuit for said signals and containing two magnets, one of said magnets being responsive to a given current and controlling the movement of the home signal, and the other magnet being unresponsive to said current and controlling the movement of the distant signal; a resistance-coil arranged to be connected in multiple with said signal-circuit and disconnected therefrom for controlling said unresponsive magnet to affect the distant signal; a rail-circuit controlled by a train in the rear of said signals for making responsive both of said magnets; and a rail-circuit controlled by a train in advance of said signals for deënergizing both of said magnets.

13. In an electric signaling system, the combination of a home signal and a distant signal normally at danger; a normally-deënergized signal-circuit for said signals and containing two magnets, one of said magnets being responsive to a given current and controlling the movement of the home signal, and the other magnet being unresponsive to said current and controlling the movement of the distant signal; a resistance-coil arranged to be connected in multiple with said signal-circuit and disconnected therefrom for controlling said unresponsive magnet to affect the distant signal; a rail-circuit controlled by a train in the rear of said signals for making responsive both of said magnets, a rail-circuit controlled by a train in advance of the distant signal and in the rear of the home signal for deënergizing said unresponsive magnet so as to hold the distant signal at danger; a rail-circuit controlled by a train in advance of both said signals for deënergizing both of said magnets.

14. In an electric block-signaling system, the combination of a series of blocks; home and distant signals normally at danger located at the entrance of each block; a normally open signal-circuit for the home and distant signals which guard a block, said circuit containing a magnet controlling the movement of the distant signal to safety and unresponsive to a given current in the circuit, and also containing a magnet controlling the movement of the home signal to safety and responsive to said given current; means controlled by the home signal for making re-

sponsive said unresponsive magnet; and means for closing said circuit in the rear of the home and distant signals to put them to safety in advance of a train.

15. In an electric block-signaling system, the combination of a series of blocks; home and distant signals normally at danger located at the entrance of each block; a normally open signal-circuit for the home and distant signals which guard a block, said circuit containing a magnet controlling the movement of the distant signal to safety and unresponsive to a given current in the circuit, and also containing a magnet controlling the movement of the home signal to safety and responsive to said given current; means controlled by the home signal for making responsive said unresponsive magnet; means for closing said circuit in the rear of the home and distant signals to put them to safety in advance of a train; means controlled by a train in advance of the distant signal and in the rear of the home signal for holding the distant signal to danger; and means controlled by a train in advance of the home signal for holding both the home and distant signals to danger.

16. In an electric block-signaling system, the combination of a series of blocks; home and distant signals normally at danger located at the entrance of each block; a normally open signal-circuit for the home and distant signals which guard a block, said circuit containing a magnet controlling the movement of the distant signal to safety and unresponsive to a given current in the circuit, and also containing a magnet controlling the movement of the home signal to safety and responsive to said given current; means controlled by the home signal for making responsive said unresponsive magnet; and a track-circuit for closing said circuit in the rear of the home and distant signals to put them to safety in advance of a train.

17. In an electric block-signaling system, the combination of a series of blocks; home and distant signals normally at danger located at the entrance of each block; a normally open signal-circuit for the home and distant signals which guard a block, said circuit containing a magnet controlling the movement of the distant signal to safety and unresponsive to a given current in the circuit, and also containing a magnet controlling the movement of the home signal to safety and responsive to said given current; means controlled by the home signal for energizing said unresponsive magnet; a track-circuit for closing said circuit in the rear of the home and distant signals to put them to safety in advance of a train; a track-circuit controlled by a train in advance of the distant signal and in the rear of the home signal for holding the distant signal to danger; and a track-circuit controlled by a train in advance of the home signal for holding both the home and distant signals to danger.

18. In an automatic electric block-signaling system the combination of three blocks; home and distant signals normally at danger at the entrance of each block; circuits operated or controlled by a train for operating the signals, train-controlled means in the rear of the first block for putting to safety the home signal at the entrance of the second block, mechanical means for putting and holding to danger the home and distant signals at the entrance of the first block, electrical means controlled by the train in the first block for putting to safety the home signal at the entrance of the third block and the distant signal to safety at the entrance of the second block.

19. In an electric signaling system, the combination of two signals separated from each other and guarding a common portion of the track, a signal-circuit for said signals containing two magnets, one of said magnets being responsive to a given current and controlling the movement of the signal in advance, and the other of said magnets being unresponsive to said current and controlling the movement of the signal in the rear; and a resistance-coil arranged to be connected in multiple with the said signal-circuit and disconnected therefrom for controlling the said magnets.

20. In an electric signaling system, the combination of two signals separated from each other and guarding a common portion of the track, a signal-circuit for said signals containing two magnets, one of said magnets being responsive to a given current and controlling the movement of the signal in advance, and the other of said magnets being unresponsive to said current and controlling the movement of the signal in the rear; and a resistance-coil arranged to be connected in multiple with said signal-circuit and disconnected therefrom, whereby one or both of said signals is controlled, the movement of the advance signal to safety initiating the operation which puts the signal in the rear to safety.

21. In an electric signaling system, the combination of two signals separated from each other and guarding a common portion of the track, a signal-circuit for said signals containing two magnets, one of said magnets being responsive to a given current and controlling the movement of the signal in advance, and the other of said magnets being unresponsive to said current and controlling the movement of the signal in the rear; a controlling means arranged to be connected or disconnected in multiple with said signal-circuit.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ADONIRAM J. WILSON.

Witnesses:
L. J. McCABE,
C. M. BARTLETT.