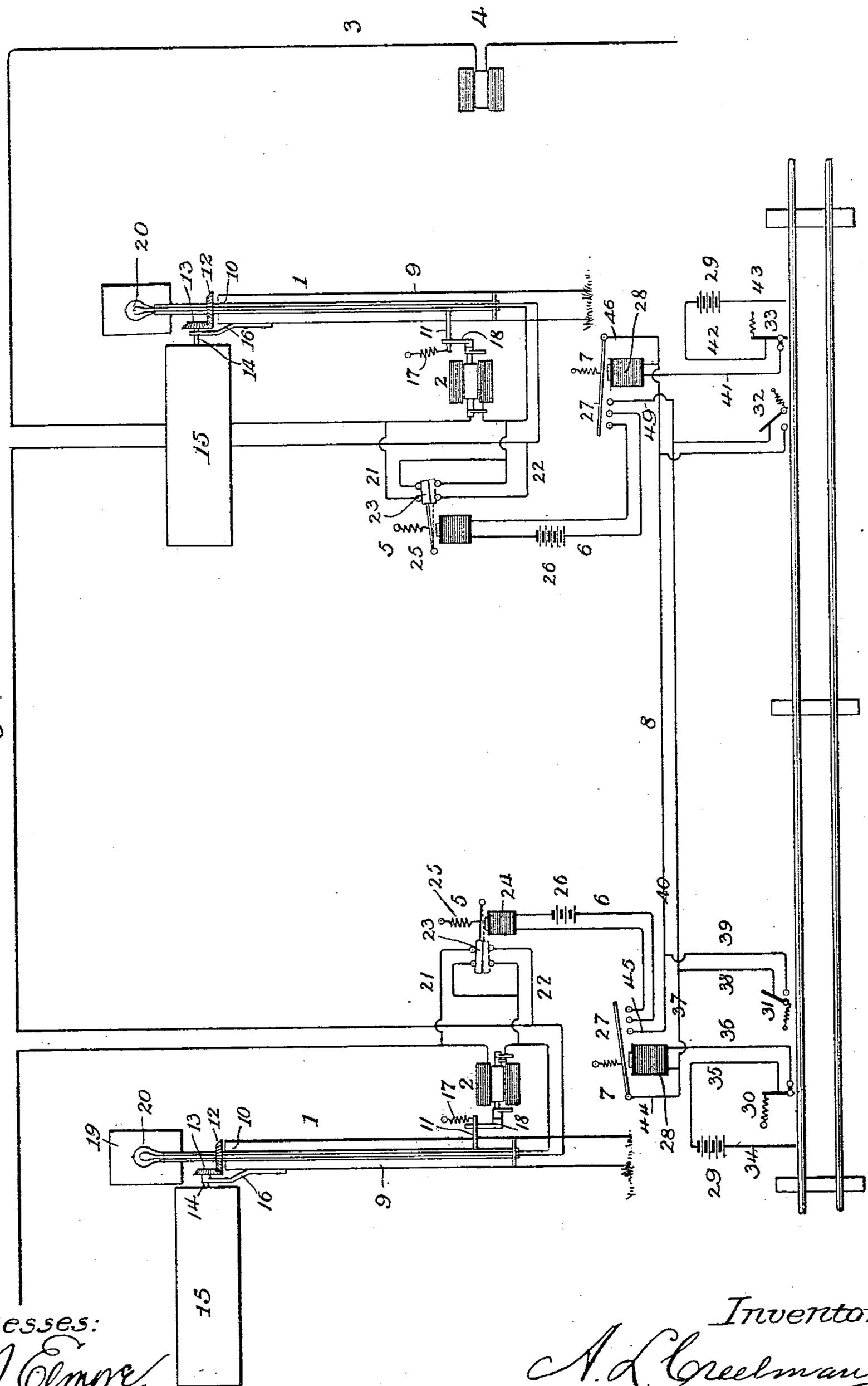
(No Model.) 2 Sheets—Sheet 1.

A. L. CREELMAN.

BLOCK SIGNAL SYSTEM.

No. 560,193. Patented May 19, 1896.

Fig. 1.



Witnesses:
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(No Model.) 2 Sheets—Sheet 2.

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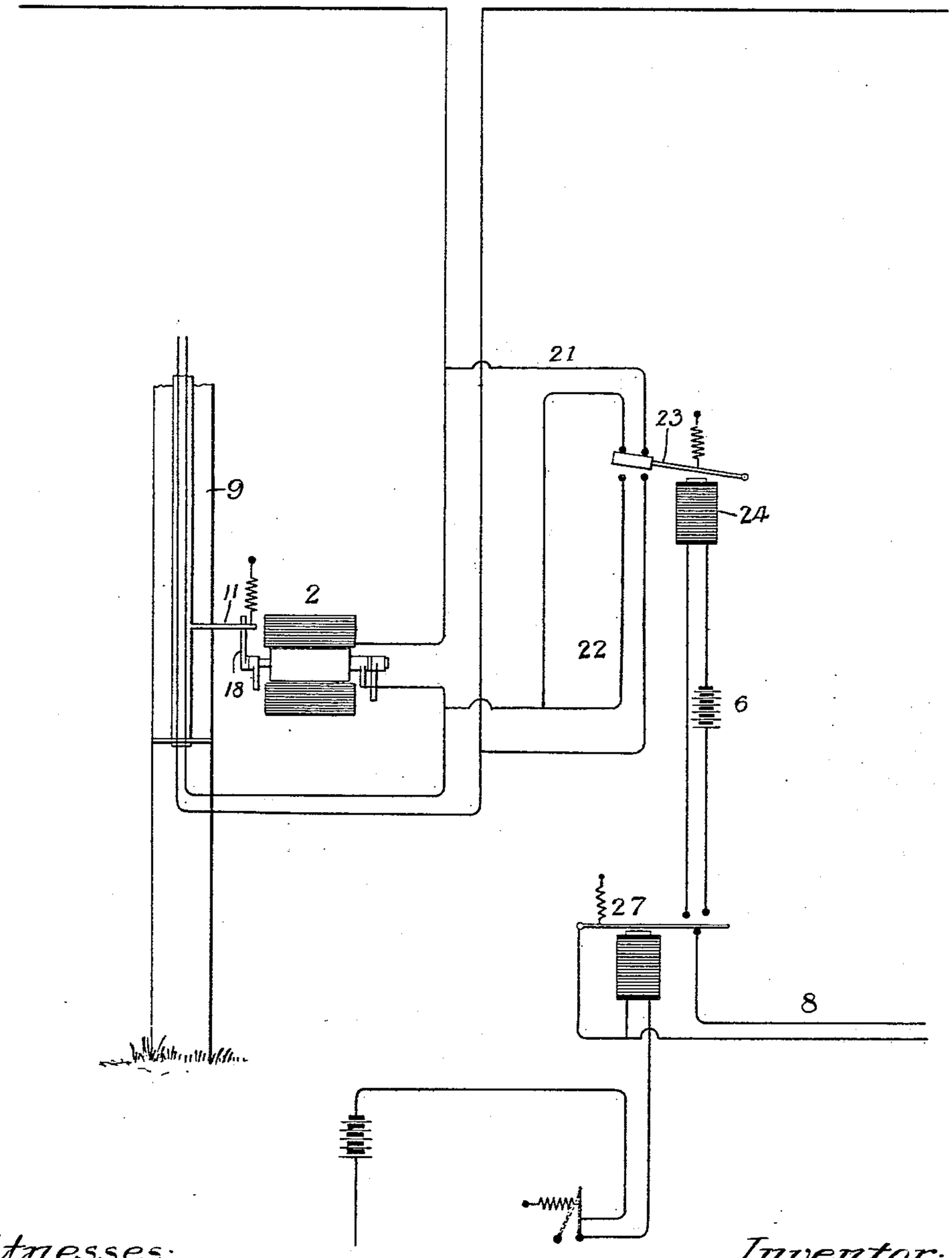
Fig. 2.



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UNITED STATES PATENT OFFICE.

ALVAH LEWIS CREELMAN, OF CHICAGO, ILLINOIS.

BLOCK-SIGNAL SYSTEM.

SPECIFICATION forming part of Letters Patent No. 560,193, dated May 19, 1896.

Application filed December 21, 1894. Serial No. 532,594. (No model.)

To all whom it may concern:

Be it known that I, ALVAH LEWIS CREELMAN, of Chicago, county of Cook, and State of Illinois, have invented a new and useful Improvement in Block-Signal Systems, of which the following is a specification.

My invention has reference to electric block-signal systems; and it consists primarily in the operation of the signals by electromagnetic devices actuated by the current from a main power-wire, the action of said devices being controlled by a local or auxiliary circuit containing suitable circuit-controllers adapted to be operated by the passing train.

The invention consists also in providing improved means for the display and operation of the signal in advance of the train, so that the engineer will be apprised if the signal in the rear is not in proper working order without looking rearward.

The invention also consists in the details of construction and combination of parts hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a diagrammatic view of a single block or section of a railway-track having my improved signal system applied thereto. Fig. 2 is a similar view of one end of the same, showing the system adapted to be operated by a normally open circuit.

In applying my improved system I divide the line of railway into a series of blocks or sections of appropriate length, and at the end of each I locate a signal of any construction or form, which is adapted to be operated by an electric current. In the present instance I employ visual signals 1, of the construction more fully described hereinafter, which are adapted to be operated by electromotors 2, supplied by the electric current from a power-wire 3, extending along the track and connected to a dynamo 4 or other suitable source of electric supply. The action of the current from the power-wire on the motors is controlled by magnetic devices 5, included in local circuits 6, which latter are controlled by magnetic devices 7, included in turn in an auxiliary circuit 8, which latter circuit includes suitable circuit-controllers adapted to be operated, as more fully described hereinafter, by the passing train. The auxiliary and local circuits are normally closed, in which condition the signal, by means of the devices hereinafter described, will be held at "clear." When a train enters the block, it will act to open the auxiliary circuit and this will open the local circuits, by which the signals will be turned to "danger." Each of the signals consists of a standard or post 9, in which a vertical central shaft 10 is mounted, having near its lower end at the base of the standard a horizontal arm 11. At its upper end the shaft is provided with a horizontal beveled pinion 12, engaging a vertical beveled pinion 13 on the inner end of a short spindle 14, fixed to a signal-frame 15. This spindle is mounted to turn in a horizontal bearing in an arm 16 projecting from the side of the standard, the construction and arrangement being such that when the shaft is rocked or turned it will cause the signal-frame to be turned from a vertical to a horizontal position, indicating "danger" and "clear," respectively.

The arm 11 at the lower end of the vertical shaft is acted on by a spring 17, which tends to hold the parts in such position that the signal will be in its vertical position at "danger." The electromotor 2, before alluded to, is located adjacent to this arm, and has its rotary armature formed with a finger 18, arranged to engage and move the arm 11 and turn the signal to "clear," against the influence of the spring. This action of the armature will take place when the motor is energized by the passage of an electric current from the power-wire. On the end of the standard is mounted a box or casing 19, containing a transparent opening, and in this box is located an electric light 20, which is supplied by an electric current through conductors extending downward through the standard, including the motor and connected to the power-wire. These conductors include two shunt-circuits 21 and 22, adapted to be closed alternately by the vibration of an armature 23, which is controlled by an electromagnet 24, included in the local circuit 6, before alluded to. When the magnet is deënergized, a spring 25 will draw the armature to the position shown in full lines, thereby closing shunt-circuit 21, and the current from the power-wire will then pass through the light and the motor will be cut out, the result

being that the spring 17 will turn the signals to "danger" and the lights will be displayed. When, however, the armature 23 is drawn by its magnet to the position shown in dotted lines, shunt-circuit 21 will be opened and shunt-circuit 22 closed, thereby cutting out the light and allowing the motor to be energized, the result being that the signals will be turned to "clear" and the light extinguished.

The two local circuits 6 are supplied by batteries 26, and each circuit terminates in two contact-points through which they are closed by armatures 27, controlled by electro-magnets 28, included in the auxiliary circuit 8, before referred to. The energizing of these magnets 28 will close the local circuits, and their magnets in turn will close shunt-circuits 22, which will turn the signals to "clear" and extinguish the lights. The auxiliary circuit is supplied by two batteries 29, and the current may be grounded or the rail of the track may be used as the "return." In the auxiliary circuit are included four circuit-controllers 30, 31, 32, and 33, two being located at each end of the block, one normally closed and the other normally open. A train entering the block in either direction will temporarily open the closed controller, but will not disturb the open controller at the entrance end, but on leaving the block the open controller will be closed and the closed controller at that end remains unaffected. In this way my improved system may be applied to a single track. The block is represented as being occupied by a train, the various circuits being open and the signals displayed at "danger." Auxiliary circuit 8 being open, two separate open circuits are formed between batteries 29, and these circuits will remain open until either circuit-controller 31 or 32 has been operated upon, and this will form a circuit through conductors 34, battery 29, conductor 35, circuit-controller 30, conductor 36, magnet 28, conductor 37, conductor 38, circuit-controller 31, (this being closed,) conductor 39, conductor 40, magnet 28, (at the right,) conductor 41, circuit-controller 33, conductor 42, battery 29, (at the right,) conductor 43, and finally through the track to conductor 34. This will energize magnets 28, and they will remain energized after circuit-closer 31 has been open by the abridged or subdivided current in auxiliary circuit 8, through conductor 34, battery 29, (at the left,) conductor 35, circuit-controller 30, conductor 36, magnet 28, (at the left,) conductor 44, armature 27, (at the left,) conductor 45, conductor 40, magnet 28, (at the right,) conductor 41, circuit-controller 33, conductor 42, battery 29, (at the right,) conductor 43, the foregoing constituting one of the divisions of the abridged currents, the other division being through conductor 43, battery 29, (at the right,) conductor 42, circuit-controller 33, conductor 41, magnet 28, (at the right,) conductor 46, armature 27, (at the right,) conductor 49, conductor 37, magnet 28, (at the left,) conductor 36, circuit-controller 30, conductor 35, battery 29, (at the left,) and conductor 34. The first action of the circuit-controllers 30 and 33 is final, as the first opening thereof establishes two separate open circuits between conductors 40 and 37, and any subsequent vibrations of these circuit-controllers will not in any manner alter the conditions of these open circuits. In a like manner the first action of the circuit-controllers 31 and 32 is also final. The two abridged circuits above described having been formed, no subsequent vibration of these controllers will affect the closed circuit.

The following is the operation of the system by trains entering the block from both directions: A train entering the block from the left will open circuit-controller 30. This will open auxiliary circuit 8 and the local circuits 6, shunts 22, and will close shunt 21. The closing of shunts 21 will cut the currents out of the motors and will permit the springs 17 to turn the signals to "danger." The opening of shunts 22 permitted the current in power-wire 3 to pass into the electric lamps. Circuit-controller 32 has been closed, when the auxiliary circuit 8 will be closed, also the local circuits and finally shunts 22, thereby cutting out the lamps. The opening of shunts 21 permits the current to pass into the motors, and the signals will revolve against their actuating-springs to "clear." A train entering the block from the right will open circuit-controller 33. This will open auxiliary circuit 8, local circuits 6, and shunts 22 and will close shunts 21. The closing of shunts 21 will cut out the motors and allow the springs 17 to turn the signals to "danger." The opening of shunts 22 permitted the current in power-wire 3 to pass through the electric lamps. The signals will remain in this position until circuit-controller 31 has been reached and closed by a train leaving the block, when the auxiliary and local circuits and shunts 22 will be closed, thereby cutting out the lamps. The opening of shunts 21 permitted the current to pass to the motors, and the signals were turned thereby against the influence of springs 17 to "clear."

Under my system it will be observed that the two signals at the opposite ends of the block are operated simultaneously. In this way the engineer is enabled to determine if the signal in rear of his train is operating without the necessity of looking rearward. This is of great importance, as it is more difficult to discern the signal in the rear as the train advances to the end of the block; but by providing for the display of the signal also in advance of the train it is distinctly seen, inasmuch as the distance is being constantly diminished. While I prefer to thus provide for the simultaneous action of the two signals for the above purpose it is to be understood that I may omit one of the signals and adapt my system for the operation of a single signal. It is obvious, therefore, that so far as my im-

proved system is concerned employing a power-wire and controlling the action of the current therein by a local or auxiliary circuit either one signal may be used or they may be duplicated to operate simultaneously, as described.

In Fig. 2 I have shown my system operating under a normally open circuit. In this case a train entering the block closes the auxiliary circuit, which action will open local circuit 6 and permit armature 23 to close shunt-circuit 21, thereby cutting out the motor, allowing spring 17 to move the signal to "danger," and energizing the light. When the train leaves the block, the auxiliary circuit is opened, which will close local circuit 6 and close shunt-circuit 22, which action will cut out the light, energize the motor, and move the signal to "clear."

Having thus described my invention, I claim—

1. In a block-signal system the combination of a power-wire circuit, two signals at the opposite ends of the block adapted to be operated by the power-current, two magnetic devices adapted to control the action of the power-current on the signals, an independent auxiliary circuit adapted to control both of the magnetic devices simultaneously an independent source of electric supply for said auxiliary circuit, and suitable track instruments included in said auxiliary circuit and located at opposite ends of the block; whereby a train entering the block will, by the operation of the track instrument, cause the simultaneous action of both signals.

2. In a block-signal system the combination of a power-wire circuit, a signal adapted to be operated by the current therein, an electric light included in the power-wire circuit, shunt-circuits around the signal and electric light, a magnetic device arranged to open one and close the other of said shunt-circuits alternately, and an auxiliary circuit adapted to control the magnetic device and including suitable circuit-controllers arranged to be operated by the passing train.

3. In a block-signal system the combination of a power-wire circuit, a signal, an electric device included in the power-wire circuit and adapted to operate the signal, an electric light also included in the power-wire circuit, shunt-circuits around both the electric device and the electric light, a magnetic device adapted to open one shunt-circuit and close the other, a local circuit including the magnetic device, a second magnetic device adapted to control the local circuit, and an auxiliary circuit including the second magnetic device and including also suitable circuit-controllers arranged to be operated by the passing train.

4. In a block-signal system the combination of a power-wire circuit, a signal adapted to be operated by the current therein, a magnetic device controlling the action of the current on the signal, a local circuit including said magnetic device, an auxiliary circuit, two magnets included in said auxiliary circuit, armatures for said magnets also included in the auxiliary circuit and adapted by their movements to open and close the local circuits, and four momentarily-acting circuit-controllers included in the auxiliary circuit, two located at each end of the block one being normally open and the other normally closed.

5. In a block-signal system the combination of a power-wire circuit, signals at opposite ends of the block adapted to be operated by the current in the power-wire circuit, magnetic devices controlling the action of the current on the signals, local circuits including the magnetic devices, an auxiliary circuit, two magnets included therein, armatures for said magnets also included in the auxiliary circuit and controlling the local circuits, and two circuit-controllers at each end of the block included in the auxiliary circuit, one of the circuit-controllers at each end adapted to be operated momentarily by a passing train in one direction only to set the signals to "danger" and "clear" respectively.

6. In a block-signal system the combination of a power-wire circuit a signal, an electric device arranged to operate the signal and included in the power-wire circuit, a normally open shunt-circuit around the electric device, a magnetic device for closing the shunt-circuit and cutting out the electric device, a normally-closed local circuit including the magnetic device, a second magnetic device for holding the local circuit closed and a normally-closed auxiliary circuit including the second magnetic device and also circuit-controllers adapted to be operated to open the auxiliary circuit by the passing train.

In testimony whereof I hereunto set my hand, this 3d day of December, 1894, in the presence of two attesting witnesses.

ALVAH LEWIS CREELMAN.

Witnesses:
J. E. HASCHKE,
STEPHEN B. CRANE.