W. H. PARRISH, JR.

SIGNAL.

APPLICATION FILED MAY 2, 1908.

912,159. Patented Feb. 9, 1909.

2 SHEETS—SHEET 1.

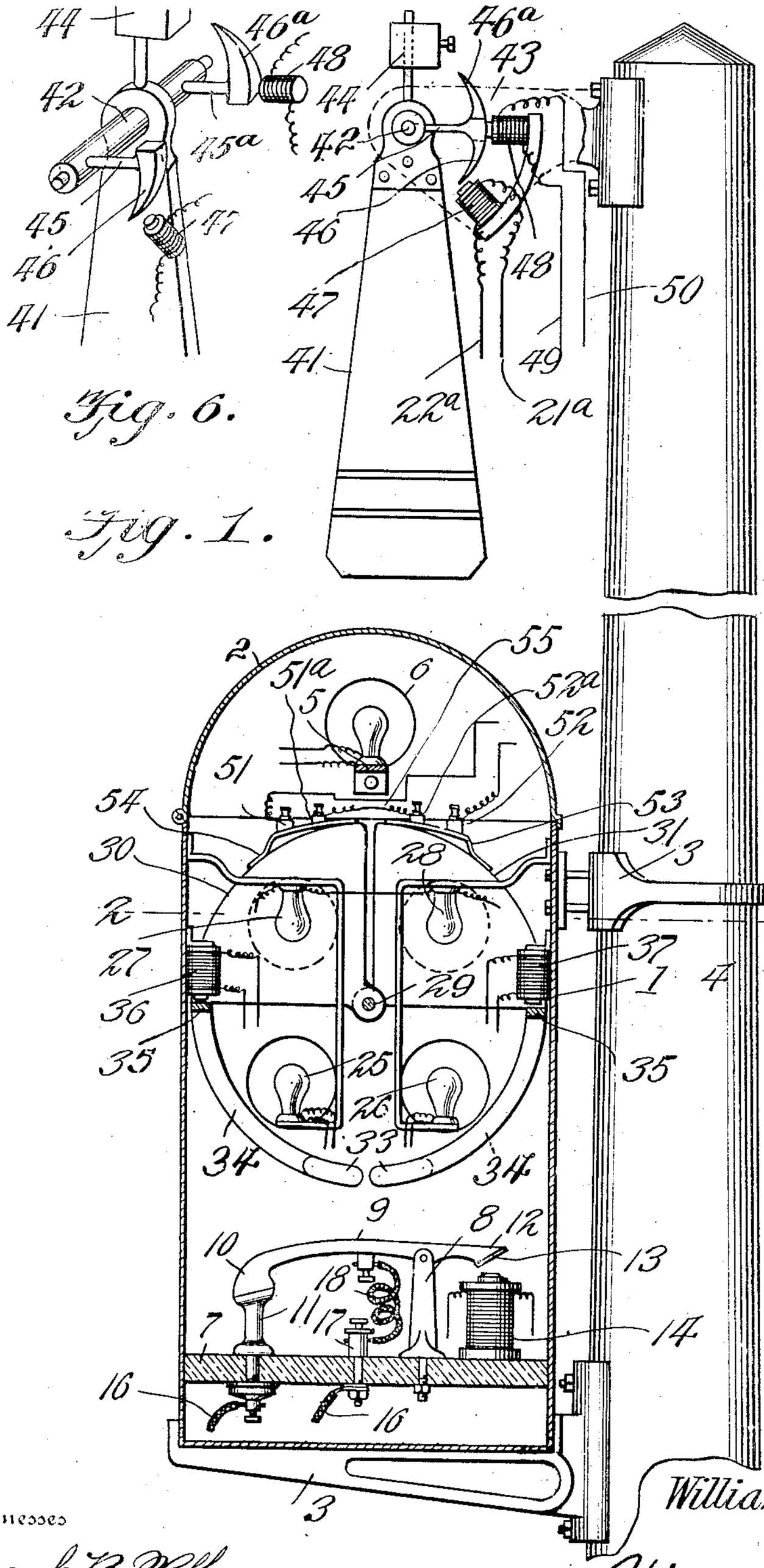

Fig. 6.

Fig. 1.

Witnesses

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2 SHEETS—SHEET 2.

Fig. 2.

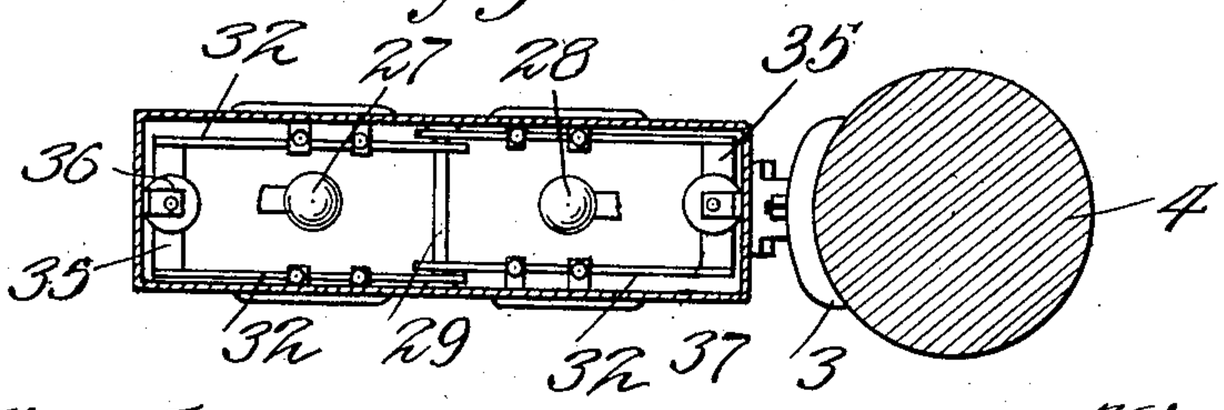

Fig. 4.

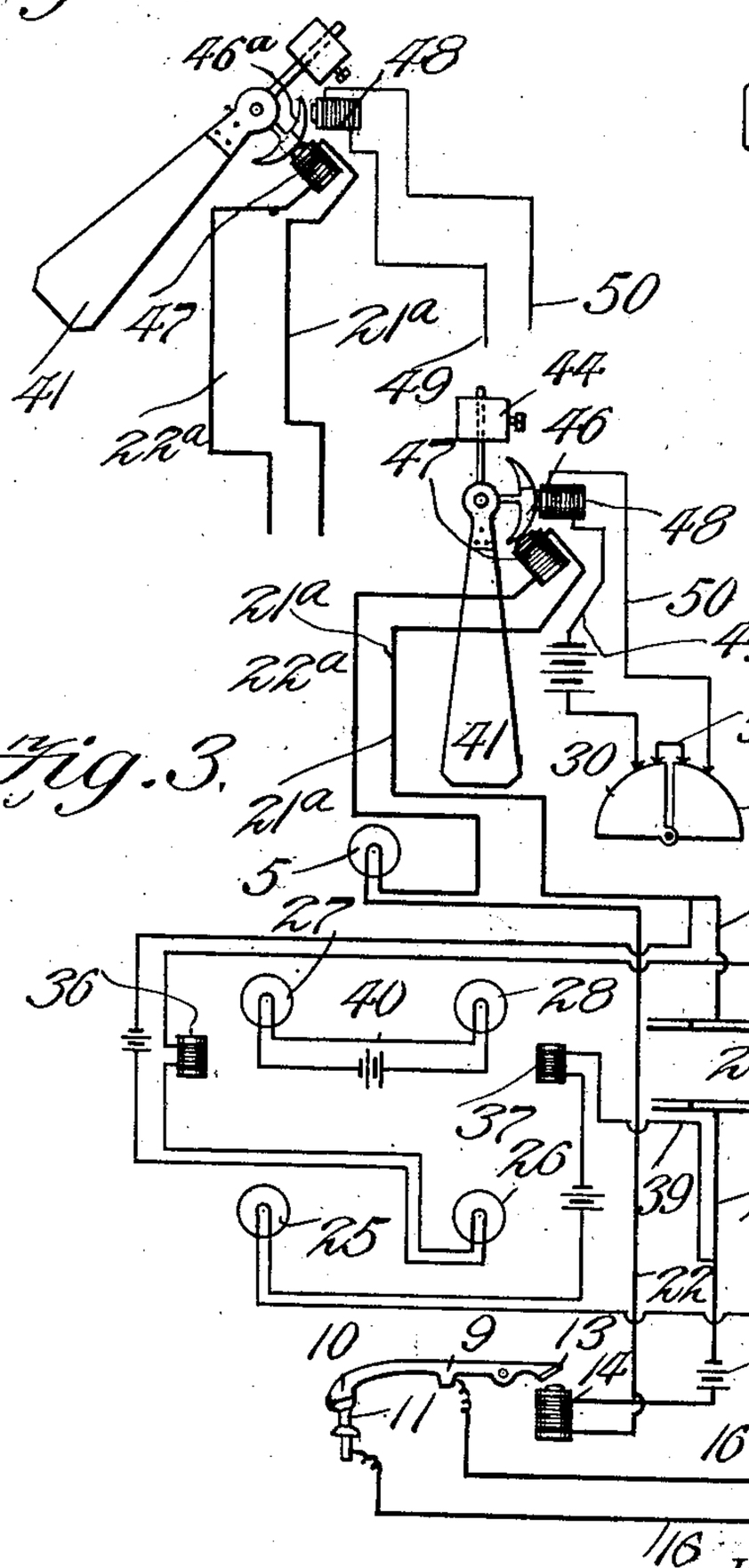

Fig. 5.

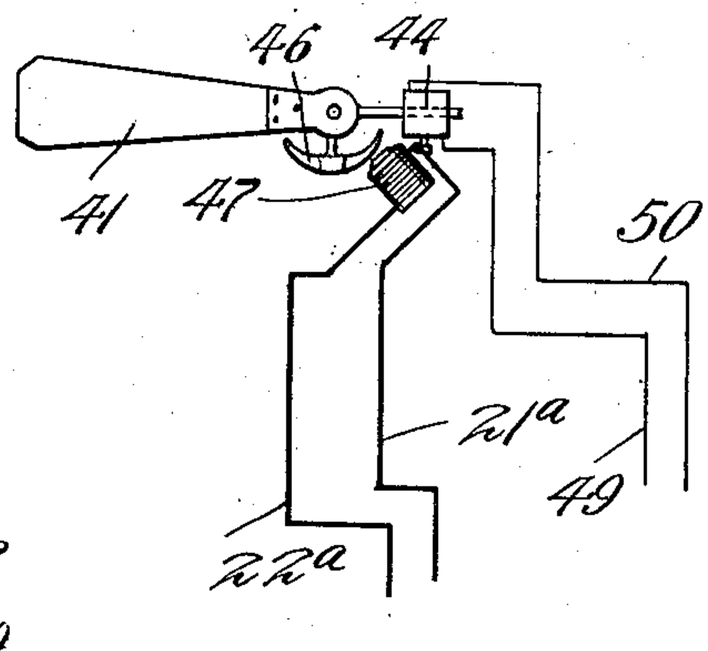

Fig. 3.

Witnesses

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SIGNAL.

No. 912,159. Specification of Letters Patent. Patented Feb. 9, 1909.

Application filed May 2, 1908. Serial No. 430,601.

To all whom it may concern:

Be it known that I, WILLIAM H. PARRISH, Jr., a citizen of the United States, residing at Nashville, in the county of Davidson and State of Tennessee, have invented new and useful Improvements in Signals, of which the following is a specification.

This invention relates to an improvement in the type of signaling apparatus shown in my prior U. S. Patent No. 847,105, dated March 12, 1907, designed primarily for service at a grade crossing of electric and steam railroads to automatically control the travel of the electrically operated train. Such patented apparatus provides automatic signaling means for indicating to the motorman of an approaching electric train the presence of a train upon the steam railroad within a specified distance of the crossing, the apparatus operating to cut out the power to the electric train in the normal operation of the device when a steam train and the electric train are simultaneously approaching the crossing. An automatic testing device is also provided in combination with the train controlling mechanism and is constructed and arranged to automatically advise the motorman of the approaching electric train of any defect in the main signaling and controlling apparatus, whereby failure of the main signaling and controlling apparatus is automatically guarded against.

The signaling mechanism constructed to operate as above described includes controlling circuits and signal lamps governed by the action of the apparatus to indicate whether the way is clear for the passage of the electrically operated train, whether a steam train is approaching the crossing and caution should be observed by the motorman of the electrically operated train, at which time the current supply to the electric train is cut off, and to indicate when the main controlling mechanism is inoperative, in order that the motorman may be warned in time to bring his train to a stop.

The object of the present invention is to provide for use in conjunction with the lamp signaling circuits and controlled by the main signaling apparatus and test device a semaphore mechanism moved to its prescribed signaling positions simultaneously with the energization of the respective coacting signaling lamps, thus rendering the apparatus more effective for use for both night and daylight signaling.

The invention will be described in the following specification, reference being had to the accompanying drawings, in which:—

Figure 1 is a vertical sectional view, partly in elevation, illustrating the signal-box in use with my signaling apparatus. Fig. 2 is a transverse section of the same on line 2—2 of Fig. 1. Fig. 3 is a diagrammatic view of the wiring for the signaling apparatus. Figs. 4 and 5 are views showing different positions of the semaphore arm. Fig. 6 is a perspective view of the semaphore arm and associated parts.

Referring particularly to the drawings, wherein similar reference-numerals indicate like parts throughout the several views, my improved signaling and controlling apparatus comprises in its essential details a signal-box or casing 1, preferably of rectangular shape in cross-section and constructed of sheet-metal or the like, so as to be wholly inclosed, a hinged cover, as 2, being provided to afford access to the interior of the casing. The signal-box is supported through the medium of suitable brackets 3 on a post or standard 4, the latter being arranged at one side of the track-rails immediately adjacent the grade-crossing. The signal-box is so arranged relative to the respective tracks that the signals operative within the box are visible only to the motorman of the electrically-controlled train and invisible to the engineer of the steam-operated trains.

The signaling and controlling apparatus includes a visual signal, as an incandescent lamp 5, arranged within the signal-box, preferably in the upper portion thereof, and visible through bull's-eyes 6, secured in the sides of the box and colored green to indicate the usual caution-signal.

Supported upon a base 7, arranged within the lower part of the signal-box, is an automatic circuit-breaker, including a standard 8, on which is pivotally supported a contact-lever 9, one terminal of the lever, as 10 being arranged in the normal position of the lever to engage a contact-post 11, secured in the base 7, the opposite end of the lever, as 12, carrying an armature 13, disposed within the influence of an electro-magnet 14, also supported on the base 7. The contact-lever 9 and contact-post 11 form a part of the feed-circuit for the trolley wires or conductors 15 of the electrically-operated railroad. The feed-wires 16 are directly connected to the contact-post 11 and the lever

9, as shown in Fig. 1, the connection to the lever being preferably through the medium of a binding-post 17 and a coiled strip of conductor, as 18, to permit the necessary movement of the lever without destroying the contact.

The track-rails 19 and 20 of the steam-railroad are for a specified length on each side of the electric road-crossing to be so arranged as to provide uninterrupted metallic conductors—such, for instance, as bonding the meeting ends of the rails of each track. Each of these independent track-rails constitute one terminal of the normally open circuit of the main signaling and controlling system, which circuit includes conductors 21 and 22, terminally connected to the respective track-rails, as shown, and including in series in the circuit the signal 5, the electro-magnet 14, and a suitable source of energy, as a battery 23.

As above constructed and arranged it will be apparent that the normally open circuit referred to will become a closed circuit by the presence of a steam-operated train upon the particular section of track adjacent the grade-crossing, the wheels and axles of the car of the train serving to electrically connect the normally spaced terminals. Upon the closing of the main circuit the green signal is flashed, and the energizing of the electro-magnet 14 serves to rock the lever upon its pivotal support and break contact with the trolley-feed-post terminal 11, thereby breaking the feed to the trolley-wires and depriving the approaching electrically-operated train of power.

As is well understood in the art, the feed-wires for an electrically-operated circuit are arranged to feed and control only a certain block or length of the trolley-conductors. In the present instance the feed-wires controlled by the signaling apparatus described are to be arranged to feed and control a certain length or block on each side of the grade-crossing, while that portion of the trolley-conductors directly overlying the crossing, as at 24, is to be so arranged in the trolley-feeding system as to be at all times energized or "live" conductors. This particular arrangement will prevent the use of the signaling apparatus from depriving the electric train of power in the event the steam-operated train enters the prescribed section of track while the electrically-operated train is on or immediately adjacent the crossing. In this event, notwithstanding the complete operation of the device, the electrically-operated train will be given power to cross the track and avoid being stopped immediately upon the steam-tracks. The use of the above described signaling and controlling apparatus thereby insures that the presence of a steam-operated train within the prescribed section of track adjacent the grade-crossing will be immediately signaled to the motorman of the advancing electrically-operated train and the latter train automatically deprived of power to advance, thereby compelling the stopping of the electrically-operated train until after the passage of the steam-operated train, as such electrically-operated train can receive no motive power until the main circuit is broken by the steam-operated train traveling beyond the prescribed track-section and the return of the contact-lever 9 to normal position by gravity.

As the signaling and controlling apparatus is entirely automatic in its operation, it is possible that such apparatus may fail of actuation notwithstanding the presence of a steam-operated train upon the prescribed section of track. As such failure would be mainly liable through a defect in the main circuit, I have arranged for combination with said circuit an auxiliary or test circuit, in the use of which the motorman of the advancing electrically-operated train is at once notified of any defect in the main circuit. To this end I secure within the signal-box two visual signals 25, 26 preferably incandescent lights and showing through white bull's-eyes fixed in openings in the opposite side walls of the box, these signals being hereinafter termed "clear-signals". Above the lamps 25 and 26 I arrange two additional visual signals 27, 28, also preferably incandescent lamps, arranged to show through red bull's-eyes fixed in the side walls of the casing, these signals being hereinafter termed "danger-signals". The respective clear and danger signals are arranged in alinement, so that one clear-signal is directly beneath a danger-signal, as shown in Fig. 1. A pivot-rod 29 is mounted in the side walls of the casing, centrally between and equally spaced from the four signals just referred to.

Independent shutters 30 and 31 are pivotally mounted upon the rod 29, each of the shutters comprising quadrant-shaped plates 32, maintained in spaced relation, so as to lie adjacent the respective side walls of the signal-box and beyond the plane of the respective signals. The plates 32 are of such size as to close the openings in the side walls of the box through which the signals are visible, the respective signal-showing-openings of the clear and danger signals being so spaced relative to each other that when the shutters are in the upper or normal position, as shown in Fig. 1, the danger-signals are concealed and the clear-signals exposed, while in the lower or operative position of the shutters the clear-signals are concealed and the danger-signals exposed. Each shutter is preferably provided with a counterweight 33 carried by a curved arm 34 connected by a transverse armature-bar with the plates of the shutter which latter are

coupled together by said armature-bar. Electro-magnets 36, 37 are secured to the interior of the box for coöperation with said armature 35 to hold the respective shutters in normal position to conceal the danger signals.

Each track-rail 19 and 20 as well as that portion of the conductors of the main circuit system beyond the signal-box, are in circuit with one of the electro-magnets, and one of the clear-signals, as shown in Fig. 3. For instance, the track-rail 19 is in circuit with a conductor 38, including in series the electro-magnet 36 and the clear-signal 26, located remote from said magnet, the terminal of the conductor 38 being in electrical engagement with the conductor 21 of the main circuit immediately beyond the signal-box. The track-rail and main conductor 22 is similarly in circuit with a conductor 39, electro-magnet 37, and clear-signal 25. The respective test-circuits thus include one of the prescribed sections of rail and all that portion of the conductor of the main circuit connected with that rail-section.

As the test-signals noted are primarily designed to provide a means for automatically indicating any defect in the main circuits of the system, the entire length of such circuit beyond the signal-box is included in the particular test-circuit, the ends of the conductors 38 and 39 being connected to the respective track-rails, and to the main circuit-conductors. As thus connected each of the test signal-circuits is a normally closed circuit, including the entire length of the main circuit beyond the signal-box, and in the event the electrical continuity of such circuit is broken for any reason whatever the particular test-circuit immediately becomes an open or broken circuit.

As the test-circuits are normally closed circuits, the electro-magnet and clear-signals included in such circuits are normally energized. With the test-signals energized the respective shutters will be maintained in normal position through the holding power of the respective electro-magnets, and the clear-signals will be visible through the sides of the box. The motorman of the approaching electrically-operated train will thus be advised that the prescribed track-section of the steam-operated train is in proper circuit, and if he does not receive the main signal and cut-out he knows that there is no steam-operated train approaching the crossing and within the prescribed section. If, however, either of the prescribed track-rails or the main conductors connected thereto should for any reason be disturbed, so as to prevent completion of the main circuit or the bonding between the rail ends become broken—as, for instance, the track-section 19—the particular test-circuit will be broken, with the effect to deënergize the electro-magnet 36 and the clear-signal 26. The deënergization of the electro-magnet 36 releases the shutter 30, enabling the latter to gravitate to the lower or operative position, in which position it will shut out the clear-signal 25 and expose the danger-signal 27. As the opening of the test-circuit referred to extinguishes the clear-signal 26 and by the operation of the shutter 30 shuts off the clear-signal 25, the effect of the opening of either test-signal will eliminate both clear-signals and expose one or the other of the danger-signals.

In the operation of either test-circuit as described the motorman of the approaching electrically-operated train will by the elimination of the clear-signals and the showing of the danger-signal be at once advised of the defect in the main signal system. Hence said motorman will exercise every possible caution in approaching and before crossing the steam-railroad. The test-circuits therefore serve as an automatic check on the main signal system, providing a means whereby a defect in the main system is at once signaled to the motorman of approaching trains.

The danger-signals 27, 28, are independent of any of the signal-circuits, being, in the event such danger-signals are incandescent lamps, connected in an independent lamp-circuit 40, as shown in Fig. 3. It is to be understood, of course, that as the danger-signals are wholly independent of any of the signal-circuits the lights of said signals may be incandescent lamps, oil-lamps, or any preferred means of transmitting light.

In the improvement constituting the subject-matter of the present invention, a semaphore is provided which is moved to danger position by gravity, normally held in safety position by the test or danger-circuit, and adjusted and held in caution position by the caution-signal circuit. As shown in Fig. 1, the semaphore arm 41, which may be of ordinary form, is carried by a pivot-pin or axle 42, whereby the arm is pivotally mounted in suitable spaced bearings upon a bracket 43 supported by the post or standard 4 above the signal-box 1. The pivoted end of the arm carries a counterbalancing weight 44, operating, when the arm is not otherwise influenced, to swing said arm to the normal or danger position. Also fixed to the shaft 42 and extending at a proper angle therefrom are metallic stems 45 and 45ª carrying contact-heads or shoes 46 and 46ª, serving, respectively, as armatures for use in conjunction with and adapted to be influenced by electro-magnets 47 and 48, one of relatively greater power than the other, said magnets being supported upon the bracket and controlled respectively by the caution and danger-signal circuits of the apparatus. The magnet 47 is connected with the caution-

signal circuit by extensions 21ª and 22ª from the wires 21 and 22, while the magnet 48 is arranged in an independent circuit including wires 49 and 50 leading into the signaling-box 1 and connected therein by binding posts to contacts 51 and 52 supported in any suitable manner in fixed relation relative to the box to normally engage contact strips 53 and 54 carried by the shutters 30 and 31, so that when said shutters are in normal position concealing the danger-signal 27 and 28 the magnet 48 will be energized. For the purpose of bridging and forming an electrical connection between the strips 53 and 54 when the shutters are in normal position, contacts 51ª and 52ª are provided and suitably supported in the box and are connected by a conductor 55, such bridge being arranged to connect the strips for the passage of a current through the magnet 48 as long as the shutters expose the "clear" signal lights and conceal the red or "danger" signal light. As a result of this construction and arrangement of parts, it will be understood that normally the armature 46ª is attracted by the energized magnet 48, whereby the semaphore is drawn down and normally held in its vertical or safety position. When, however, the normally open-circuit of the main signaling and controlling system, including the conductors 21 and 22, is closed by an approaching steam-operated train and the electro-magnet 47 is thereby energized, such magnet 47 will overpower magnet 48 and the armature 46 will be attracted by said magnet 47 against the resistance of magnet 48 and the semaphore will accordingly be swung to and held in its oblique caution position shown in Fig. 4. Upon such circuit being again broken by the passage of the train over the crossing and beyond the protected point, the deënergization of the magnet 47 will release the arm and permit it to be drawn down and back to safety position by the magnet 48.

Assuming that the main signaling and controlling system should become inoperative through any defect, as hereinbefore described, thus preventing closure of the caution-signal circuit and the cut-out, it will be understood that the auxiliary or test-circuit will be operated, as above described with the effect to deënergize either the magnet 36 or the magnet 37, resulting in the dropping of one or the other of the shutters, whereby the connection between the wires 49 and 50 is broken, thus deënergizing the magnet 48 and allowing the semaphore arm to be swung upward to the danger or horizontal position by the action of its counter-weight. Hence it will be seen that the movement of the armature to danger position will occur simultaneously with the elimination of the clear-signal lamps and exposure of the danger-signal lamps.

The apparatus as constructed with the improved features herein set forth increases the general efficiency of the signaling system and provides a system adapted for both day and night use, both sets of signals operating in conjunction affording a higher degree of safety in the control of trains.

The above description and drawing describes the invention as particularly designed for use with a railroad-crossing with the respective tracks used for a steam-operated railroad and an electrically-operated railroad. In the invention the steam-operated railroad is given the right of way and the signals always set against the electric railway. It is to be understood that the invention is equally applicable to railroad-crossings wherein the crossing roads are both electric, as an urban and interurban road, and that either may be given the right of way in accordance with the arrangement of the signals.

While preferring specific details of construction and arrangement of parts described in the above specification and illustrated in the drawings, it is to be understood that I do not limit myself thereto, considering as within the spirit of the present invention all such changes of structure and variations or modifications of parts as may legally fall within the scope of the appended claims.

Having thus described the invention, what I claim as new is:—

1. A crossing signaling system, including a semaphore and controlling means therefor operated by one train to move the semaphore to a certain position for signaling the crossing train, and means for moving the semaphore to a different position in the event of defect of the first-mentioned means.

2. A crossing signaling system, including a semaphore and controlling means therefor operated by one train to move the semaphore to a certain position for signaling the crossing train, and test means influenced by and actuated in the event of defect of the first-mentioned means for movement of the semaphore to a different position.

3. A crossing signaling system including a main controlling circuit, a semaphore controlled thereby for operation to a prescribed position by one train for signaling the crossing train, and an auxiliary circuit also controlling said semaphore and adapted to be operated in the event of defect of said main circuit for movement of the semaphore to a different position.

4. A crossing signaling system, including a main circuit having a signal lamp therein, an auxiliary circuit having an independent signaling lamp therein, a semaphore controlled by both circuits, means operated by one train for energizing the main circuit for moving the semaphore to a certain position to signal the crossing train, and means for

operating the auxiliary circuit in the event of defect of the main circuit for movement of the semaphore to a different position.

5. A crossing signaling system, including a signal operated by one train for signaling the crossing train, a second signal adapted to be operated in the event of inoperation of the first named signal, and a third signal operable with either of the other signals.

6. A crossing signaling system, including a lamp circuit operated by one train for signaling the crossing train, a second lamp circuit adapted to be operated in the event of defect of the first-named circuit, and a signal controlled by both of said circuits for movement to different positions.

7. A railway crossing system, including a main normally open signaling circuit adapted to be closed by one train for signaling the crossing train, an auxiliary signaling circuit adapted to be operated in the event of defect of the main circuit to actuate a different signal, and a third signal controlled by both circuits for movement to different positions.

8. A railroad crossing system, including main and auxiliary signaling circuits, and a semaphore controlled by both circuits, one of said circuits being adapted to be operated by one train to move the semaphore to a certain position to signal the crossing train, and the other circuit adapted to be operated in the event of failure of the first circuit for movement of the semaphore to a different position.

9. A railroad crossing system, including a circuit normally arranged for operation by one train, an auxiliary circuit operable in the event of defect of the first named circuit, and a semaphore controlled by both circuits for movement to different positions.

10. A railroad crossing system, including a cut-out, a main circuit including a signal lamp and controlling the cut-out, said circuit adapted to be operated by one train to control the crossing train, an auxiliary circuit including a signal lamp and adapted to be operated in the event of defect in the main circuit, and a semaphore controlled by both circuits for movement to different positions.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM H. PARRISH, JR.

Witnesses:
K. T. McCONNICO.
W. S. BRYANT.