No. 842,315. PATENTED JAN. 29, 1907.

R. J. HEWETT.

SINGLE TRACK SIGNALING SYSTEM.

APPLICATION FILED AUG. 22, 1906.

2 SHEETS—SHEET 1.

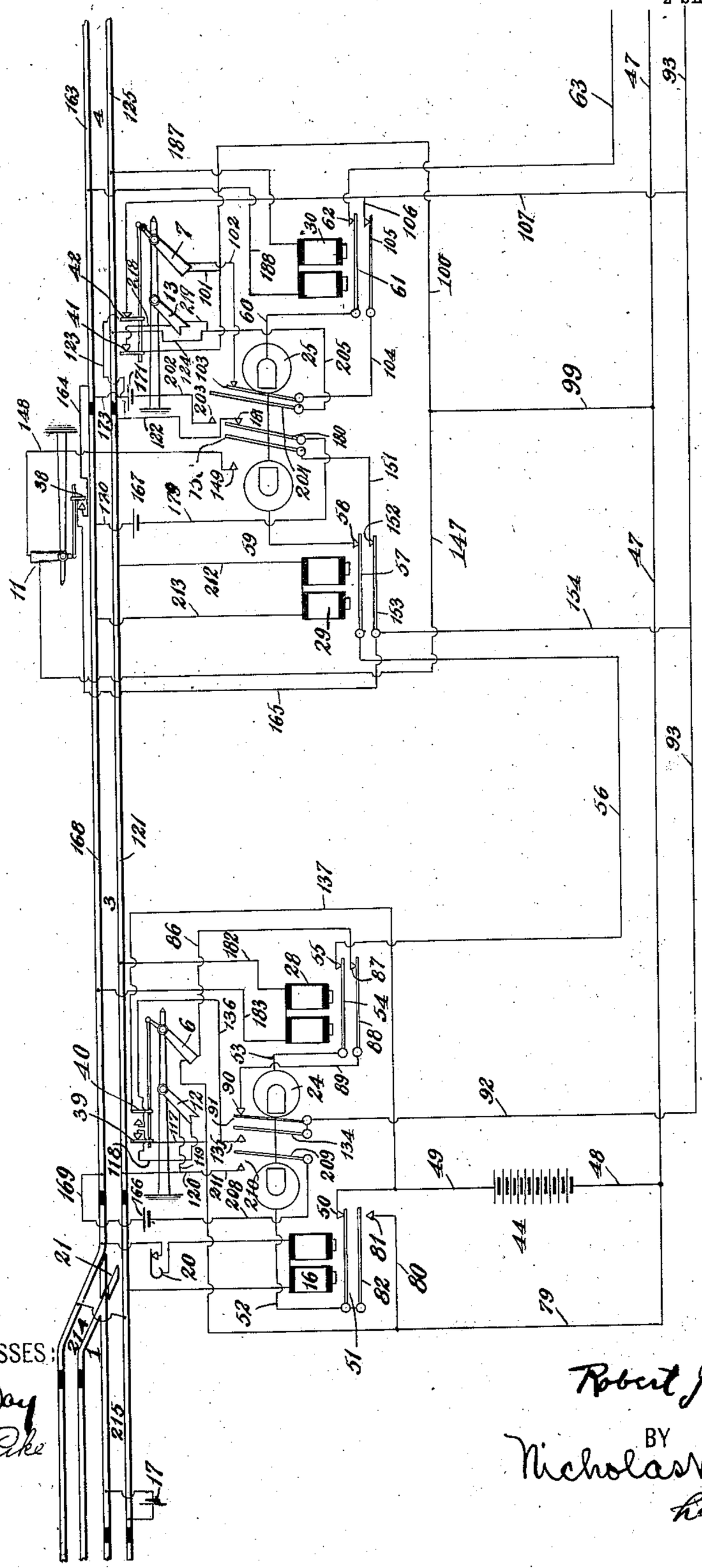

Fig. 1.

WITNESSES:

Leonard Day

May V. McPike

INVENTOR

Robert J. Hewett

BY

Nicholas W. Goodlett Jr.

his ATTORNEY

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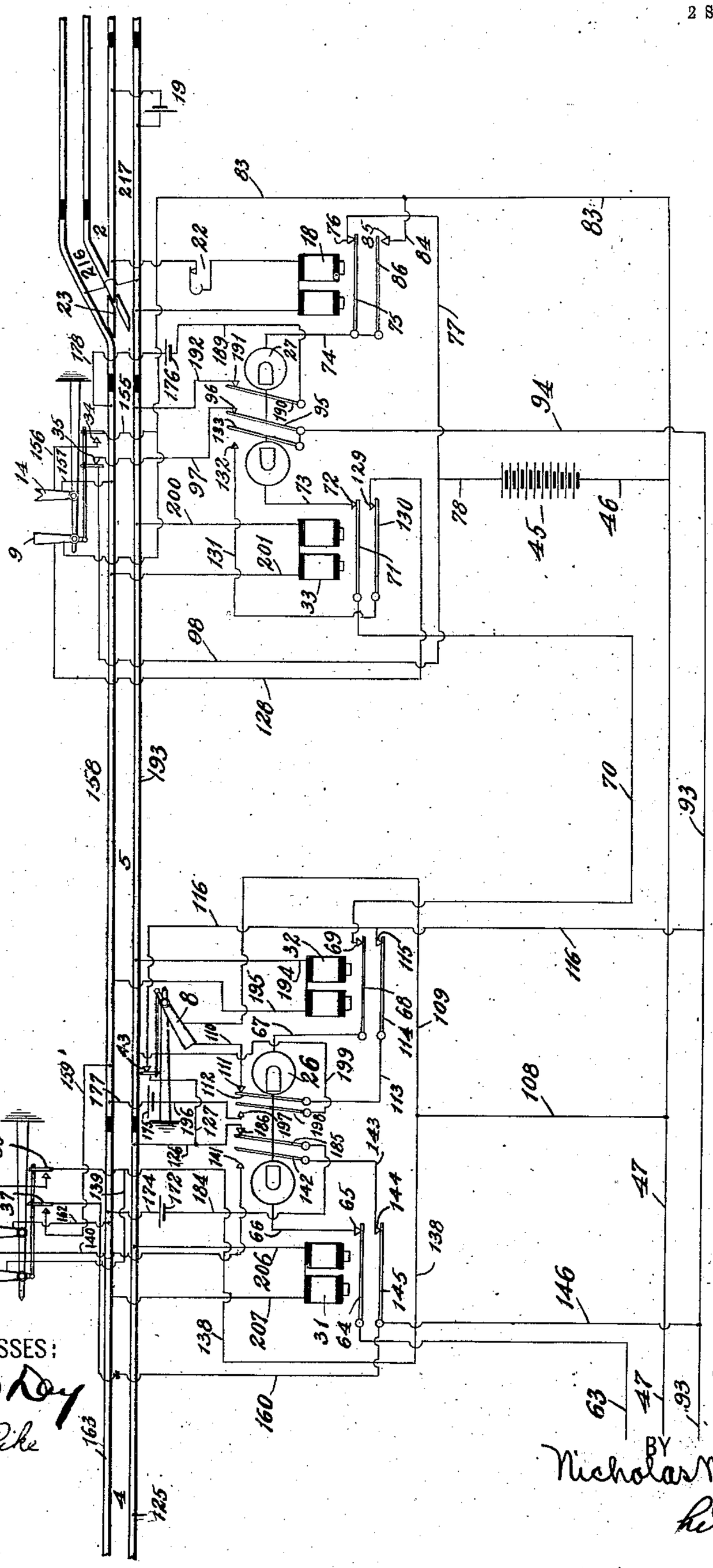

Fig. 2.

WITNESSES:

Leonard Day

May V. McPike

INVENTOR

Robert J. Hewett

BY

Nicholas M. Goodlett Jr.

His ATTORNEY

UNITED STATES PATENT OFFICE.

ROBERT JOSEPHUS HEWETT, OF WESTFIELD, NEW JERSEY, ASSIGNOR TO THE HALL SIGNAL COMPANY, A CORPORATION OF MAINE.

SINGLE-TRACK SIGNALING SYSTEM.

No. 842,315. Specification of Letters Patent. Patented Jan. 29, 1907.

Application filed August 22, 1906. Serial No. 331,549.

To all whom it may concern:

Be it known that I, ROBERT JOSEPHUS HEWETT, a citizen of the United States, and a resident of Westfield, in the county of Union, State of New Jersey, have invented certain new and useful Improvements in Single-Track Signaling Systems, of which the following is a specification.

This invention relates to single-track signaling systems.

The system embodying the invention may extend over any desired number of blocks and may be alternated, if desired, with other systems. In this type of systems there are provided signals on one side of the track to protect the rear of trains running in one direction, which will be designated "inrunning" trains, and there are provided signals on the opposite side of the track to protect the rear of trains running in the opposite direction, which will be termed "outrunning" trains.

It is desired to provide a block between predetermined localities, preferably two passing stations, which block is provided with such a system that after an approaching train, either inrunning or outrunning, reaches a predetermined locality, it will affect suitable means, preferably a selector-circuit extending throughout the block, so as to cause the signal or signals corresponding to the direction of its movement to indicate "safety" and also to cause the signal or signals corresponding to the train movements of opposite direction to indicate "danger," it being further provided that in case two trains approaching in opposite directions reach said predetermined localities simultaneously that they will not both be stopped by a danger-signal, but that one will receive a danger-signal and that one will receive a safety-signal and may proceed into the block without useless delay to traffic. It is also preferred that the system operate so that a train immediately following a train which has obtained right of way through the block may continue to hold the right of way against an opposite train movement and may enter the block after said first train has progressed a sufficient distance to insure the safe entrance of said second train—that is, it is desired that adjacent train movements in the same direction succeed one another rather than alternate with train movements in the opposite direction.

In carrying out these objects it is preferred to have one or the other set of signals indicate "safety," while the remaining set indicates "danger." It is also preferred to employ a selector-circuit which includes a plurality of polarized selectors of such a character that the objects of the invention may be accomplished.

Further objects of the invention are to provide subsections in a block, particularly in a long block, and to employ home and distant signals or at least signals which have an overlap control.

In the preferred form of the invention track-batteries or other equivalents are provided for the subsections and are arranged automatically to be connected in a rail-circuit by the action of a train and coöperating means.

The above and further features of the invention will be apparent in the following description and will be pointed out in the claims.

An embodiment of the invention is shown in the accompanying drawings, forming part of this specification, and in which—

Figure 1 shows the inrunning entrance to and a portion of a block provided with the system. Fig. 2 shows the outrunning entrance to and the remaining portion of a block provided with the system.

Referring now more particularly to the drawings, 1 designates a preliminary track-section comprised in a passing station, and 2 designates a similar preliminary track-section comprised in a second passing station. Sections 1 and 2, respectively, precede the inrunning entrance and the outrunning entrance of a block extending therebetween. This block is shown subdivided into a plurality of subsections, the first from the inrunning entrance of the block being designated by 3, the second by 4, and the third by 5.

6, 7, and 8 designate, respectively, inrunning home signals, one for each of the subsections 3, 4, and 5, respectively.

9, 10, and 11 designate outrunning home signals for each of the subsections 5, 4, and 3, respectively.

12 and 13 designate inrunning distant signals, one for each of the respective subsections except the last from the inrunning end of the block and, namely, for subsections 3 and 4, respectively.

14 and 15 are outrunning distant signals, one for each of the respective subsections except the last subsection from the outrunning end of the block and, namely, for subsections 5 and 4, respectively.

16 designates a track-relay normally connected in circuit with a track-battery 17 through the opposite rails of the preliminary section 1, while 18 designates a similar track-relay normally connected in circuit with the track-battery 19 through the opposite rails of the preliminary section 2.

20 designates a switch-circuit closer connected in series with track-relay 16, normally closed, as shown, and which is opened when the rail-switch 21 is opened. 22 designates a similar switch-circuit closer connected in series with the track-relay 18, normally closed, as shown, and opened when the rail-switch 23 is opened. These two relays16 and 18 therefore constitute track or train controlled means and they control a selector-circuit, as will hereinafter appear.

24, 25, 26, and 27 designate electromagnetic devices, and particularly polarized selectors, preferably located, as shown, respectively near the ends of the respective subsections.

28 and 29, 30 and 31, 32 and 33 are pairs of track-relays which bridge across the opposite insulated rails of the subsections 3, 4, and 5, respectively. The respective connections of these relays are preferably made to the rails of the subsections near the ends of said subsections.

34 and 35, 36 and 37, and 38 are circuit-controllers mechanically operated, respectively, by the outrunning home signals 9, 10, and 11. Circuit-controllers 34, 36, 37, and 38 are open when their associated home signals are at "danger," while circuit-controller 35 is closed when its associated home signal 9 is at "danger."

39 and 40, 41 and 42, and 43 are circuit-controllers mechanically operated, respectively, by the inrunning home signals 6, 7, and 8. Circuit-controllers 39, 41, 42, and 43 are closed when their associated home signals are respectively at "safety," while circuit-controller 40 is opened when its associated home signal is at "safety."

When the indication of a home signal is opposite to that indicated in the drawings, the condition of the associated circuit-controller or circuit-controllers is likewise opposite to that shown in the drawings—namely, a circuit-controller which is open when its associated home signal is at "safety," is closed when the signal is at "danger" and vice versa.

Each of the selectors 24, 25, 26, and 27 comprises one or more polarized armatures, as shown, which are positively thrown in one direction or the other, according to the direction of current passing through the coils of the selector. These armatures are so mounted that they remain in the position into which they have been thrown even after the deënergization of the coils in the selector. They are therefore termed "dead-beat" armatures. These armatures constitute circuit-controllers for various circuits and will be referred to below in connection with said circuits.

44 and 45 designate similar sources of electric energy, (shown as batteries,) located, respectively, near the opposite ends of the block. These batteries are normally connected in a circuit extending throughout the block through the selectors, so that one battery is in opposition to the other and so that normally no current flows in said circuit. This circuit may be traced as follows: positive pole of battery 45, wire 46, common wire 47, wire 48, positive pole of battery 44, negative pole of battery 44, wire 49, contact 50, armature 51, selector 24, wire 53, armature 54 of track-relay 28, contact 55, selector-wire 56, armature 57 of track-relay 29, contact 58, wire 59, selector 25, wire 60, armature 61 of track-relay 30, contact 62, selector-wire 63, armature 64 of track-relay 31, contact 65, wire 66, selector 26, wire 67, armature 68 of track-relay 32, contact 69, selector-wire 70, armature 71 of track-relay 33, contact 72, wire 73, selector 27, wire 74, armature 75 of track-relay 18, contact 76, wires 77 and 78 to negative pole of battery 45.

Each of the batteries 44 and 45 is so arranged that it will be cut out of the circuit traced above upon the deënergization of the corresponding track-relay 16 or 18. The deënergization of the inrunning track-relay 16 thereby closes an inrunning clearing selector-circuit from battery 45, which may be traced as follows: positive pole of battery 45, wire 46, common wire 47, wires 79 and 80, contact 81, armature 82 of track-relay 16, wire 52, selector 24, wire 53, armature 54, contact 55, selector-wire 56, armature 57, contact 58, wire 59, selector 25, wire 60, armature 61, contact 62, selector-wire 63, armature 64, contact 65, wire 66, selector 26, wire 67, armature 68, contact 69, selector-wire 70, armature 71, contact 72, wire 73, selector 27, wire 74, armature 75, contact 76, wires 77 and 78 to negative pole of battery 45. This circuit is normally open, as shown at 81, but when closed is traversed by a current in a given direction and may be termed to be energized with a characteristic polarity. The energization of this circuit serves to energize the polarized selectors 24, 25, 26, and 27, so that all their armatures are moved to the right, as illustrated in the drawings.

Upon the deënergization of outrunning track-relay 18 the outrunning clearing selector-circuit is closed and may be traced as follows: positive pole of battery 44, wire 48, common wire 47, wires 83 and 84, contact 85, armature 86, wire 74, selector 27, wire 73, contact 72, armature 71, selector-wire 70,

contact 69, armature 68, wire 67, selector 26, wire 66, contact 65, armature 64, selector-wire 63, contact 62, armature 61, wire 60, selector 25, wire 59, contact 58, armature 57, selector-wire 56, contact 55, armature 54, wire 53, selector 24, wire 52, armature 51, contact 50, wire 49 to negative pole of battery 44. This circuit is normally open, as shown at 85, but when closed serves to energize all the selectors with a characteristic polarity opposite to that imparted to them by the inrunning selector-circuit traced above. This energization of the selectors 24, 25, 26, and 27 serves to move all of the armatures of the selectors to the left.

The signal-circuit for inrunning home signal 6 may be traced as follows: positive terminal of battery 45, wire 46, common wire 47, wire 79, home signal 6, wire 86, contact 87, armature 88, wire 89, contact 90, armature 91 of polarized relay 24, wire 92, battery-wire 93, wire 94, armature 95 of polarized selector 27, contact 96, wire 97, circuit-controller 35, wire 98, wire 78 to negative pole of battery 45. This circuit is normally closed when the parts are as shown in the drawings.

The signal-circuit for inrunning home signal 7 may be traced as follows: positive pole of battery 45, wire 46, common wire 47, wire 99, wires 100 and 101, home signal 7, wire 102, armature 103 of selector 25, wire 104, armature 105, contact 106, wire 107, battery-wire 93, wire 94, armature 95, contact 96, wire 97, circuit-controller 35, wire 98, wire 78 to the negative pole of battery 45. This circuit is normally closed when the parts are as shown in the drawings.

The signal-circuit for inrunning home signal 8 may be traced as follows: positive pole of battery 45, wire 46, common wire 47, wire 108, wire 109, home signal 8, wire 110, contact 111, armature 112 of selector 26, wire 113, armature 114, contact 115, wire 116, battery-wire 93, wire 94, armature 95, contact 96, wire 97, circuit-controller 35, wire 98, wire 78 to negative pole of battery 45. This circuit is normally closed when the parts are as shown in the drawings.

The signal-circuit for the inrunning distant signal 12 may be traced as follows: positive pole of battery 45, wire 46, common wire 47, wire 79, wire 117, circuit-controller 39, wire 118, distant signal 12, wire 119, wire 120, rail 121 of subsection 3, wire 122, wire 123, circuit-controller 42, wire 107, battery-wire 93, wire 94, 95, 96, 97, 35, 98, 78 to negative pole of battery 45. This circuit is closed when the parts are as shown in the drawings.

The signal-circuit for inrunning distant signal 13 may be traced as follows: positive pole of battery 45, wire 46, common wire 47, wire 99, wire 100, circuit-controller 41, wire 218, distant signal 13, wire 219, wire 124, rail 125 of subsection 4, wire 126, wire 127, circuit-controller 43, wire 116, battery-wire 93, 94, 95, 96, 97, 35, 95, 78 to negative pole of battery 45. This circuit is closed when the parts are as shown in the drawings.

It should be noted that all of the signal-circuits just traced for the inrunning signals are supplied with energy in multiple from the source of electric energy or battery 45. When these circuits are initially energized, the circuits for the home signals are first closed, since the circuits for the distant signals include circuit-controllers, which are held open when the home signals are at "danger" and are not closed until the home signals have gone to "safety." When the signals have been put to "safety" by the energization of their respective circuits, they are held at "safety" by the continued energization of said circuits. Although the circuits just traced are diagrammatically indicated as including respective signals, it is to be understood that each particular circuit is connected through some well-known signal mechanism—such as a releasing-magnet, clutch device, motor, &c.—as it is not necessary that the current in these circuits be itself employed as a motive power to cause a signal movement. This statement applies to all signals as well as to the inrunning signals the circuits for which have been traced. All signals have a "bias to danger," so that if an associated circuit is broken the signal cannot give a false indication of "safety," but must indicate "danger" until the faulty circuit is repaired.

The outrunning signals are provided with signal-circuits similar to those traced for the inrunning signals, but supplied with energy from battery 44. The signal-circuit for outrunning home signal 9 may be traced as follows: positive pole of battery 44, wire 48, common wire 47, wire 83, home signal 9, wire 128, contact 129, armature 130 of track-relay 33, wire 131, contact 132, armature 133 of selector 27, wire 94, battery-wire 93, wire 92, armature 134 of selector 24, contact 135, wire 136, circuit-controller 40, wire 137, wire 49 to negative pole of battery 44; open, as shown, at 135, 40, and 132.

The signal-circuit for home signal 10 may be traced as follows: positive pole of battery 44, 48, and 47, wire 108, wire 138, wire 139, home signal 10, wire 140, contact 141, armature 142 of selector 26, wire 143, contact 144, armature 145 of track-relay 31, wire 146, battery-wire 93, 92, 134, 135, 136, 40, 137, 49 to negative pole of battery 44. This circuit is open at contact 135, controller 40, and contact 141 when the parts are as shown in the drawings.

The signal-circuit for home signal 11 may be traced as follows: positive pole of battery 44, 48, 47, 99, wire 147, home signal 11, wire 148, contact 149, armature 150 of selector 25, wire 151, contact 152, armature 153 of track-relay 29, wire 154, battery-wire 93, 92, 134,

135, 136, 40, 137, 49 to negative pole of battery 44. This circuit is open at contact 135, controller 40, and contact 149 when the parts are as shown in the drawings.

The signal-circuit for distant signal 14 may be traced as follows: positive pole of battery 44, 48, 47, 83, wire 155, circuit-controller 34, wire 156, distant signal 14, wire 157, rail 158, wire 159, circuit-controller 37, wire 160, 146, 93, 92, 134, 135, 136, 40, 137, 49 to positive pole of battery 44. This circuit is open at circuit-controller 34, circuit-controller 37, circuit-controller 40, and contact 135 when the parts are as shown in the drawings.

The signal-circuit for distant signal 15 may be traced as follows: positive pole of battery 44, 48, 47, 108, 138, circuit-controller 36, wire 161, distant signal 15, wire 162, rail 163 of subsection 4, wire 164, circuit-controller 38, wire 165, 154, 93, 92, 134, 135, 136, 40, 137, 49 to negative-pole of battery 44. This circuit is open at circuit-controller 36, circuit-controller 38, circuit-controller 40, and contact 135 when the parts are as shown in the drawings.

166 and 167 designate track-batteries or their equivalents respectively connected to the opposite ends of rail 168 of subsection 3 by wires 169 and 170. 171 and 172 designate track-batteries or their equivalents respectively connected to the opposite ends of rail 163 of subsection 4 by wires 173 and 174. 175 and 176 designate similar track-batteries or their equivalents connected, respectively, to the opposite ends of rail 158 of subsection 5 by wires 177 and 178. These batteries are arranged to be connected one at a time across two rails of the associated subsection through the medium of armatures controlled by the selectors 24, 25, 26, and 27, so as to complete local inrunning or local outrunning track-relay circuits.

The local inrunning track-relay circuit for subsection 3 may be traced as follows: battery 167, wire 179, armature 180 of selector 25, contact 181, wire 122, rail 121 of subsection 3, wire 182, track-relay 28, wire 183, rail 168 of subsection 3, wire 170 back to battery 167.

The local inrunning track-relay circuit for subsection 4 may be traced as follows: battery 172, wire 184, armature 185 of selector 26, contact 186, wire 126, rail 125 of subsection 4, wire 187, track-relay 30, wire 188, rail 163 of subsection 4, wire 174 back to battery 172.

The local inrunning track-relay circuit for subsection 5 may be traced as follows: battery 176, wire 189, armature 190 of selector 27, contact 191, wire 192, rail 193 of subsection 5, wire 194, track-relay 32, wire 195, rail 158 of subsection 5, wire 178 back to battery 176. The local inrunning track-relay circuits traced above are all closed when the parts are as shown in the drawings.

The local outrunning track-relay circuit for subsection 5 may be traced as follows: battery 175, wire 196, contact 197, armature 198 of selector 26, wire 199, rail 193 of subsection 5, wire 200, track-relay 33, wire 201, rail 158 of subsection 5, wire 177 back to battery 175.

The local outrunning track-relay circuit for subsection 4 may be traced as follows: battery 171, wire 202, contact 203, armature 204 of selector 25, wire 205, rail 125 of subsection 4, wire 206, track-relay 31, wire 207, rail 163 of subsection 4, wire 173 back to battery 171.

The local outrunning track-relay circuit for subsection 3 may be traced as follows: battery 166, wire 208, armature 209 of selector 24, contact 210, wire 211, rail 121 of subsection 3, wire 212, track-relay 29, wire 213, rail 168 of subsection 3, wire 169 back to battery 166. These latter local outrunning track-relay circuits are open, respectively, at contacts 197, 203, and 210 when the armatures of the selectors are in the position illustrated in the drawings.

When the selectors 24, 25, 26, and 27 have been energized with the opposite polarity, the outrunning local track-relay circuits will be closed instead of the local inrunning track-relay circuits, as described and as shown in the drawings.

The various circuits and coöperating devices are shown in the drawings in the condition in which they are left after an outrunning train has progressed throughout the block from station to station and has left preliminary section 1 to continue its outrunning course. The operation of the system in response to such an outrunning train will now be described.

As the train enters preliminary section 2 its wheels and axles bridge the opposite rails of said section and shunt out track-relay 18, which is thereupon deënergized and releases its armatures 75 and 86. Armature 75 breaks contact with 76 and cuts battery 45 out of the normal selector-circuit, the first circuit described. Armature 86 contacts with 85 and closes the outrunning selector-circuit previously described and energized by battery 44. This selector-circuit energizes each of the selectors 24, 25, 26, and 27 with a characteristic polarity, and said selectors respectively reverse each of the sets of armatures 209, 134, and 91; 150, 180, 204, and 103; 142, 185, 198, and 112; and 133, 95, and 190 from the right-hand position illustrated in the drawings to a left-hand position to first break certain circuits and then make certain other circuits, as will forthwith be described. Armature 91 breaks at 90 signal-circuit for inrunning home signal 6 previously described. Armature 103 of selector 25 breaks at 102 signal-circuit for inrunning home signal 7 previously described. Armature 112 of selector 26 breaks at 111 the signal-circuit for inrunning home signal 8 pre-

viously described. Thereupon these signal-circuits being deënergized the inrunning home signals 6, 7, and 8 are caused to go to "danger" by gravity or by other suitable provisions. Home signal 6 opens circuit-controller 39 and closes circuit-controller 40. On going to "danger" home signal 7 opens circuit-controllers 41 and 42. Likewise home signal 8 on going to "danger" opens circuit-controller 43. The opening of circuit-controllers 39 and 42 breaks the signal-circuit for inrunning distant signal 12 at two points—namely, said circuit-controllers 39 and 42. Distant signal 12 is then caused to go to "danger." The opening of circuit-controllers 42 and 43 breaks the signal-circuit for distant signal 13 at two points—namely, controllers 42 and 43. Distant signal 13 is thereupon caused to go to "danger." Thus it is evident that the first signal movement caused by an outrunning train entering preliminary section 2 is to put the signals of the block at "danger" against a train movement in the opposite direction. Not until inrunning home signal 6 has been put at "danger," closing circuit-controller 40, can the first outrunning home signal 9 be put to "safety," since this signal-circuit includes said circuit-controller 40, as previously described.

The signal-circuit for outrunning home signal 9, previously described as open at 40, 135, and 132, is now closed at these three points, and the home signal 9 is caused to go to "safety." The signal-circuit for home signal 10 is likewise closed at 40, 135, and 141, and signal 10 is caused to go to "safety." Likewise the signal-circuit for home signal 11 is closed at 40, 135, and 149, and signal 11 is also caused to go to "safety." As outrunning home signals 9, 10, and 11 go to "safety" circuit-controllers 34, 36, 37, and 38 are closed and circuit-controller 35 is open. The closing of circuit-controller 34 and circuit-controller 37 completes the signal-circuit for outrunning distant signal 14 previously described, which is thereupon caused to go to "safety." The closing of circuit-controllers 36 and 38 completes the signal-circuit for outrunning distant signal 15 previously described, whereupon said signal is caused to go to "safety." All the signals illustrated have now been caused to assume opposite positions from those illustrated in the drawings, all the outrunning signals indicating "safety" and all the inrunning signals indicating "danger."

Besides affecting the various signals, as just described, the movement to the left of the selector-armatures effects certain changes in the local track-relay circuits as follows: Armatures 190, 185, and 180, respectively, open the inrunning track-relay circuits for subsections 5, and 3 at contacts 191, 186, and 181. Armatures 198, 204, and 209, respectively, close the outrunning track-relay circuits for subsections 5, 4, and 3 at contacts 197, 203, and 210, respectively. No matter whether the inrunning or the outrunning track-relay circuits are the ones energized the track-relays 28, 29, 30, 31, 32, and 33 will be energized to hold their associated armatures attracted, as shown in the drawings.

As the advancing outrunning train enters subsection 5 it shunts out track-relays 33 and 32 by bridging the opposite rails 158 and 193. These two track-relays are then deenergized to release their armatures 68 114 and 71 130, and the circuit for home signal 9 is then broken by armature 130 at contact 129, whereupon said signal 9 goes to "danger," opening circuit-controller 34, which breaks the signal-circuit for distant signal 14, causing said signal 14 also to go to "danger." Armatures 71 and 68 break the selector-circuit at 72 and 69, so that an opposing through-train may not obtain control thereof. This breaking of the selector-circuit, although it deënergizes the selectors, does not affect the position of their dead-beat armatures, which have a tendency to remain in the last extreme position to which they are moved.

As the train leaves preliminary section 2 battery 19 reënergizes track-relay 18 to attract its armatures 75 and 86 and restore the same to the position shown in the drawings.

As the train advances into subsection 4 it shunts out track-relays 31 and 30 to release armatures 64 145 and 61 105 respectively. Armature 145 breaks the circuit for home signal 10 at contact 144, whereupon home signal 10 goes to "danger" and opens circuit-controllers 36 and 37. The opening of circuit-controller 36 breaks the signal-circuit for distant signal 15, which thereupon also goes to "danger." Armatures 61 and 64 break the selector-circuit at two additional points—namely, 62 and 65.

As the advancing train leaves subsection 5 battery 175 reënergizes track-relays 32 and 33 to attract their associated armatures. Armature 130 in again making contact with 129 closes the circuit for home signal 9, causing said signal to go to "safety" and open circuit-closer 35 and close circuit-controller 34 in the circuit for distant signal 14. Although 34 is closed, distant signal 14 cannot go to "safety," because its circuit is now open at controller 37.

As the train enters subsection 3 it shunts out track-relays 28 and 29 to release their associated armatures. Armature 153 breaks the circuit for home signal 11 at contact 152, whereupon said home signal goes to "danger." Armatures 54 and 57 open the selector-circuit at two additional points—namely, 55 and 58.

As the train entirely leaves subsection 4 battery 171 reënergizes track-relays 30 and 31, causing them to attract their associated

armatures. Armature 145 closes the circuit for home signal 10 at 144, causing said signal to go to "safety" and close circuit-controllers 36 and 37. The closing of circuit-controller 37 completes the circuit for distant signal 14, which thereupon goes to "safety." The two breaks in the selector-circuit at 62 and 65 are closed by armatures 61 and 64, respectively.

As the train enters preliminary section 1 it shunts out track-relay 16, which releases its armatures 51 and 82. Armature 51 cuts out the battery 44 at 50, and armature 82 connects the common wire 47 with the inrunning end of the selector-wires through the medium of contact 81, &c. However, as the inrunning selector-circuit, which would be supplied with power from battery 45, is now broken at 55 and 58 the closing of armature 82 on 81 does not complete this circuit. As soon, however, as the advancing train entirely leaves subsection 3 track-battery 166 reënergizes track-relays 28 and 29, which attract their armatures and close the two breaks in the inrunning selector-circuit—namely, at 55 and 58. It should be noted that this selector-circuit has a polarity opposite to that of the outrunning selector-circuit closed when the train entered preliminary section 2. All the selectors 24, 25, 26, and 27 are now energized with a polarity opposite to that given them by the outrunning selector-circuit. All their armatures are thrown to the right, as shown in the drawings. Outrunning home signal 11 does not go to "safety," because its circuit is opened by armature 150 breaking contact with 149, although the former break in its circuit at 152 is closed when track-relay 29 attracts its armature 153. Consequently distant signal 15 also does not go to "safety," since home signal 11 maintains circuit-controller 38 open, which is included in the circuit for distant signal 15. Armature 142 breaks the circuit for home signal 10 at 141, said signal going to "danger" and opening circuit-controllers 36 and 37. The opening of circuit-controller 36 causes distant signal 15 to go to "danger" by breaking its circuit. Armature 133 breaks the circuit for home signal 9 at 132, causing said signal to go to "danger," closing circuit-controller 35 and opening circuit-controller 34. The circuit for distant signal 14 being opened at controller 34 and 37 must also go to "danger." The closing of said circuit-controller 35 now completes the circuit for each of the inrunning home signals 6, 7, and 8, said circuits having been previously traced. Said signals thereupon go to "safety." Home signal 6 opens circuit-controller 40 and closes circuit-controller 39. Home signal 7 closes controllers 41 and 42. Home signal 8 closes circuit-controller 43. The closing of circuit-controllers 39 and 42 completes the circuit for distant signal 12, previously traced, so that said signal goes to "safety." The closing of circuit-controllers 41 and 43 completes the circuit for distant signal 13, previously traced, so that said signal goes to "safety."

The complete system and apparatus has now been placed in the position illustrated in the drawings, with the exception of track-relay 16, which is deënergized, so as to cut out battery 44. If a second outrunning train should at this time enter preliminary section 2, it could not gain control of the block, but could merely cut out battery 45, in which case both batteries 44 and 45 would be cut out, permitting no energization of their selector-circuit. The outrunning train in preliminary section 2 would be blocked by the danger indication of signals 9 and 14 and would be obliged to wait at the passing-station until section 1 was clear. On the other hand, if a third train advancing in an inrunning direction should enter preliminary section 1 on the branch unoccupied by the leaving outrunning train it would be permitted to enter and traverse the block by the safety indication of the inrunning signals just described. Returning to the original condition of all clear subsections and a single outrunning train, which we have traced in its progress until it is wholly within preliminary section 1, the last operation upon the system would occur when it left preliminary section 1: Then track-battery 17 would reënergize track-relay 16 to cut in track-battery 44. The normal selector-circuit is now reëstablished with battery 44 in opposition to battery 45, so that no current flows in said circuit and the complete system and apparatus in the state illustrated in the drawings.

If the next train to approach the through-block should be an inrunning train, it would shunt out track-relay 16 on entering preliminary section 1, so as to cut out battery 44 and prevent an outrunning train from gaining control of the through-block. In this case the cutting out of battery 44 would have no immediate effect upon the signal-circuits, as the selectors would still maintain their armatures in the positions illustrated. The inrunning train would be permitted to advance by the safety indication of the inrunning signals 6 and 12, &c. On entering subsection 3 track-relays 28 and 29 would be shunted out, releasing their armatures, as heretofore described. Signals 6 and 12 would go to "danger." As the train advanced into subsection 4 track-relays 30 and 31 would be shunted out, releasing their armatures and causing signals 7 and 13 to go to "danger." Likewise when the train advanced into subsection 5 track-relays 32 and 33 would be shunted out, releasing their armatures, so that signal 8 would go to "danger." As this train left each of the subsections the various track-relays would be energized and the signals 6, 13, and 12 would be caused to return

to "safety" in the order named in a manner similar to that described for outrunning signals 9, 10, and 14. In fact, the system is similar in its operation, as is apparent from the circuits described, in response either to an outrunning or an inrunning train. It is, however, provided that normally when no trains are present in any of the subsections that one complete set of signals, either inrunning or outrunning, should be at "safety," while the other set is at "danger." This feature is interchangeable—that is, it may not always be that the inrunning signals are at "safety" while the outrunning signals are at "danger," as shown in the drawings. The indication depends upon the last train movement. A complete inrunning train movement leaves all the circuits and signals in the reverse condition from that illustrated, while a complete outrunning train movement leaves all as shown in the drawings.

The provision of both home and distant signals makes it possible for successive trains moving in the same direction to follow one another with one clear subsection ahead of each train. It is possible for a second train moving in the same direction to maintain control over the block so long as a similar train is in the block. This is apparent from the fact that so long as a train is in a subsection the associated track-relays hold the selector-circuit open, and the armatures of the selectors remain in their same positions, so that a signal of a clear subsection is caused to return to "safety." More specifically, if an outrunning train has obtained control of the block, enters subsection 5, and then a second outrunning train enters preliminary section 2 when the first train proceeds into subsection 4, then outrunning home signal 9 is caused to go to "safety," as has been previously described. Distant signal 14, however, remains at "danger," requiring the second train to proceed with caution into subsection 5. As soon as the first outrunning train leaves subsection 4 home signal 10 goes to "safety," but distant signal 15 remains at "danger." The second train may then proceed with caution into subsection 4. In this instance when the first outrunning train leaves subsection 3 home signal 11 goes to "safety," because the second outrunning train occupying subsection 4 has shunted out track-relays 30 and 31 to break the selector-circuit at 62 and 65, which prevents the train, now in preliminary section 1, from oppositely polarizing the selectors 24, 25, 26, and 27, so that armature 150 of selector 25 would open the signal-circuit for home signal 11 at 149, as it did when a single outrunning train passed through the block. The second outrunning train in subsection 4 is then permitted to proceed into subsection 3. The track at either end of that illustrated may be provided with any suitable system to protect the trains in those localities. From the above it will be apparent that it is possible for the first outrunning train to have progressed through the block into preliminary section 1, for the second to have progressed into subsection 3, for a third to have progressed into subsection 4, for a fifth to have progressed into subsection 5, and for a sixth to be in preliminary section 2, waiting to be permitted to enter the block as soon as subsection 5 is clear. Similar successive inrunning train movements are likewise provided for, as is apparent from the circuits and apparatus described.

The effect of the switch-operated circuit-controllers 20 and 22 is to break the circuit through track-relays 16 and 18, respectively, when the siding-switches 21 and 22 are opened. Thus the opening of track-switch 21 to permit entrance to branch 214 of preliminary section 1 will open circuit-controller 20 to deënergize track-relay 16 and prevent the changing of the selector-circuits until the switch 21 is closed. The switch-operated circuit-controller 22 is likewise opened by track-switch 23 when said switch is open to give entrance to branch 216 of preliminary section 2.

215 and 217 denote the main-line branches of the preliminary sections 1 and 2, respectively.

The rail sides of the various sections are insulated one from another, as diagrammatically indicated.

It is to be understood that various changes are considered to be within the scope of this invention. The several devices employed in the system have been merely diagrammatically illustrated and obviously permit of various embodiments being employed. In particular, it may sometimes be preferable to provide the track-relays 28, 29, 30, 31, 32, and 33 with double windings of respectively a small and a large number of turns, so that as track-batteries 166 and 167, 171 and 172, and 175 and 176 are alternately connected in the rail-circuits of the respective subsections the track-relay at the opposite end of a subsection may have one of these windings connected in parallel with the other winding which is permanently connected across the track-rails, as is illustrated in the drawings. This connection would be made by a selector. This expedient is well known in the art, and if shown in the drawings would merely complicate the circuits, so as to obscure rather than to clarify the present invention.

Although the various subsections are shown provided with home and distant signals, it should be noted that each distant signal illustrated is controlled by a portion of the track succeeding the next distant signal or overlaps said signal in its control. This feature of overlap control of signals for the subsections is capable of attainment by

circuits other than those illustrated and is within the scope of the present invention.

In some instances it is preferable to reverse the connections of both the batteries 44 and 45, so that the negative poles of each are respectively connected to the common wire 47 instead of the positive poles, as illustrated and described.

What is claimed, and what is desired to be secured by Letters Patent, is set forth in the following claims:

1. In a single-track signaling system; a block provided with a set of one or more inrunning signals and a set of one or more outrunning signals; and a track-controlled magnetic device normally maintaining one of said sets at safety and the other of said sets at danger, so as to prevent useless delay to traffic.

2. In a single-track signaling system; a block provided with a set of one or more inrunning signals and a set of one or more outrunning signals; and track-controlled means normally maintaining one of said sets at safety and the other of said sets at danger, so as to prevent useless delay to traffic; said track-controlled means being responsive to the first train, either inrunning or outrunning, to approach said block to cause the set of signals corresponding to said first approaching train to indicate safety and to cause the other set of signals to indicate danger.

3. In a single-track signaling system; a block provided with a set of one or more inrunning signals and a set of one or more outrunning signals; a selector-circuit normally maintaining one of said sets at safety and the other of said sets at danger; means near each end of said block operable by a train to control said selector-circuit and cause one of said sets of one or more signals to indicate safety and to cause the other said sets of one or more signals to indicate danger.

4. In a single-track signaling system; a block provided with an inrunning and an outrunning signal; a plurality of dead-beat polarized electromagnetic devices for controlling said signals; a selector-circuit including said electromagnetic devices in series and normally maintaining one of said signals at safety and one of said signals at danger; means near each end of said block operable by a train to energize said selector-circuit with a characteristic polarity and cause one of said signals to indicate safety and cause the other of said signals to indicate danger.

5. In a single-track signaling system; a block provided with a set of one or more inrunning signals and a set of one or more outrunning signals; a selector-circuit; a plurality of electromagnetic devices included in said selector-circuit; each of said electromagnetic devices comprising one or more dead-beat polarized armatures; signal-circuits controlled by said armatures; train-controlled means near each end of said block for energizing said selector-circuit with a characteristic polarity positively to shift said armatures to a characteristic position.

6. In a single-track electric signaling system; a set of inrunning signals and a set of outrunning signals; said sets interchangeably normally at safety and at danger respectively according to the last train movement; a signal-circuit containing two polarized magnetic devices in series which are adapted to control the operation of said signals; a generator in series with said magnetic devices; and means for controlling said magnetic devices in a selective manner.

7. In a single-track electric signaling system, the combination of inrunning and outrunning signals; a signal-circuit containing two polarized electromagnetic devices adapted to control the operation of said signals and each comprising one or more armatures positively movable in two directions according to the polarity of said circuit; opposing sources of electric energy; means controlled by a train in the rear of the inrunning signal for cutting out one of said sources of electric energy and cause the other source to energize said electromagnetic devices to cause the inrunning signals to indicate safety and cause the outrunning signal to indicate danger; and means controlled by a train in the rear of said outrunning signal for cutting out the other of said sources of electric energy so that that remaining will energize said electromagnetic devices to cause the outrunning signal to indicate safety and cause the inrunning signal to indicate danger.

8. In a single-track electric signaling system, the combination of inrunning and outrunning signals; a signal-circuit containing two polarized electromagnetic devices adapted to control the operation of said signals and each comprising one or more armatures positively movable in two directions according to the polarity of said circuit; opposing sources of electric energy; means controlled by a train in the rear of the inrunning signal for cutting out one of said sources of electric energy and cause the other source to energize said electromagnetic devices to cause the inrunning signal to indicate safety and cause the outrunning signal to indicate danger; and means controlled by a train in the rear of said outrunning signal for cutting out the other of said sources of electric energy so that that remaining will energize said electromagnetic devices to cause the outrunning signal to indicate safety and cause the inrunning signal to indicate danger and means controlled by a train between said signals for holding both signals at danger.

9. In a single-track electric signaling system, the combination of inrunning and outrunning signals; a signal-circuit containing two polarized electromagnetic devices adapt-

ed to control the operation of said signals and each comprising one or more armatures positively movable in two directions according to the polarity of said circuit; opposing sources of electric energy; means controlled by a train in the rear of the inrunning signal for cutting out one of said sources of electric energy and cause the other source to energize said electromagnetic devices to cause the inrunning signals to indicate safety and cause the outrunning signal to indicate danger; and means controlled by a train in the rear of said outrunning signals for cutting out the other of said sources of electric energy so that that remaining will energize said electromagnetic devices to cause the outrunning signal to indicate safety and cause the inrunning signal to indicate danger; said two train-controlled means, when simultaneously actuated, operating to hold one signal at safety and the other signal at danger.

10. In a single-track electric signaling system, the combination of inrunning and outrunning signals; a signal-circuit containing two polarized electromagnetic devices adapted to control the operation of said signals and each comprising one or more armatures positively movable in two directions according to the polarity of said circuit; opposing sources of electric energy; means controlled by a train in the rear of the inrunning signal for cutting out one of said sources of electric energy and cause the other source to energize said electromagnetic devices to cause the inrunning signal to indicate safety and cause the outrunning signal to indicate danger; and means controlled by a train in the rear of said outrunning signal for cutting out the other of said sources of electric energy so that that remaining will energize said electromagnetic devices to cause the outrunning signal to indicate safety and cause the inrunning signal to indicate danger; said two controlled means, when simultaneously actuated, operating to hold one signal at safety and the other signal at danger and means controlled by a train between said signals for holding both signals at danger.

11. In a single-track signaling system; a block comprising a plurality of subsections; inrunning home and distant signals for one subsection; outrunning home and distant signals for a second subsection; track-controlled means at a distant subsection for controlling each distant signal; one set of home and distant signals normally at safety and the other set normally at danger; train-controlled means near the inrunning end of said block to cause the inrunning home and distant signals to indicate safety and to cause the outrunning home and distant signals to indicate danger; and train-controlled means near the outrunning end of said block to cause the outrunning home and distant signals to indicate safety and to cause the inrunning home and distant signals to indicate danger; said two train-controlled means, when simultaneously actuated, operating to maintain all signals at normal position.

12. In a single-track signaling system; a block comprising a plurality of subsections; inrunning home and distant signals for one subsection; outrunning home and distant signals for a second subsection; track-controlled means at a distant subsection for controlling each distant signal; one set of home and distant signals normally at safety and the other set normally at danger; train-controlled means near the inrunning end of said block to cause the inrunning home and distant signals to indicate safety and to cause the outrunning home and distant signals to indicate danger; and train-controlled means near the outrunning end of said block to cause the outrunning home and distant signals to indicate safety and to cause the inrunning home and distant signals to indicate danger; train-controlled means between said inrunning and outrunning signals to cause both the inrunning and the outrunning signals to indicate danger.

13. In a single-track signaling system; a block comprising a plurality of subsections; inrunning home and distant signals for one subsection; outrunning home and distant signals for a second subsection; track-controlled means at a distant subsection for controlling each distant signal; one set of home and distant signals normally at safety and the other set normally at danger; train-controlled means near the inrunning end of said block to cause the inrunning home and distant signals to indicate safety and to cause the outrunning home and distant signals to indicate danger; and train-controlled means near the outrunning end of said block to cause the outrunning home and distant signals to indicate safety and to cause the inrunning home and distant signals to indicate danger; said two train-controlled means near the ends of the block, when simultaneously actuated, operating to maintain all signals at normal position.

14. In a single-track signaling system; a block comprising a plurality of subsections; inrunning home and distant signals for one subsection; outrunning home and distant signals for a second subseetion; track-controlled means at a distant subsection for controlling each distant signal; one set of home and distant signals normally at safety and the other set normally at danger; train-controlled means near the inrunning end of said block to cause the inrunning home and distant signals to indicate safety and to cause the outrunning home and distant signals to indicate danger; and train-controlled means near the outrunning end of said block to cause the outrunning home and distant signals to indicate safety and to cause the inrunning home and distant signals to indicate danger; said two train-controlled means near

the ends of the block, when simultaneously actuated, operating to maintain all signals at normal position; and train-controlled means between said inrunning and outrunning signals to cause both the inrunning and the outrunning signals to indicate danger.

15. In a single-track electric signaling system; a block comprising a plurality of subsections; a set of inrunning home and distant signals for one subsection; a set of outrunning home and distant signals for a second subsection; a plurality of electromagnetic selectors each comprising one or more polarized armatures positively movable in two directions by the said selectors; local circuits controlled by said polarized armatures, and normally maintaining one or the other of said sets of signals at safety and the other set at danger according to the direction of the last train movement; a signal-circuit including said electromagnetic selectors in series; means actuated by a train in the rear of the inrunning signals to energize said signal-circuit with a characteristic polarity so as to cause said inrunning signals to indicate safety and to cause said outrunning signals to indicate danger; and train-controlled means for a distant subsection for controlling the distant signal at a subsection remote from said distant subsection.

16. In a single-track electric signaling system; a block comprising a plurality of subsections; a set of inrunning home and distant signals for one subsection; a set of outrunning home and distant signals for a second subsection; a plurality of electromagnetic selectors, each comprising one or more polarized armatures positively movable in two directions; local circuits controlled by said polarized armatures, and normally maintaining one or the other of said sets of signals at safety and the other set at danger according to the direction of the last train movement; a signal-circuit including said electromagnetic selectors in series; means actuated by a train in the rear of the inrunning signals to energize said signal-circuit with a characteristic polarity so as to cause said inrunning signals to indicate safety and to cause said outrunning signals to indicate danger; means actuated by a train in the rear of said outrunning signals to energize said signal-circuit with a characteristic polarity so as to cause said outrunning signals to indicate danger and to cause said inrunning signals to indicate danger; and train-controlled means for a distant subsection for controlling the distant signal at a subsection preceding said distant subsection, said distant signal also being controlled by its associated home signal.

17. In a single-track electric signaling system; a block comprising a plurality of subsections; a set of inrunning home and distant signals for one subsection; a set of outrunning home and distant signals for a second subsection; a plurality of electromagnetic selectors, each comprising one or more deadbeat polarized armatures positively movable in two directions; local circuits controlled by said polarized armatures, and normally maintaining one or the other of said sets of signals at safety and the other set at danger according to the direction of the last train movement; a signal-circuit including said electromagnetic selectors in series; means actuated by a train in the rear of the inrunning signals to energize said signal-circuit with a characteristic polarity so as to cause said inrunning signals to indicate safety and to cause said outrunning signals to indicate danger; means actuated by a train in the rear of said outrunning signals to energize said signal-circuit with a characteristic polarity so as to cause said outrunning signals to indicate danger and to cause said inrunning signals to indicate danger; and train-controlled means at a distant subsection for controlling the distant-signal at a subsection preceding said distant subsection.

18. In a single-track electric signaling system; a block comprising a plurality of subsections; a set of inrunning home and distant signals for one subsection; a set of outrunning home and distant signals for a second subsection; a plurality of electromagnetic selectors each comprising one or more polarized armatures positively movable in two directions by the said selectors; local circuits controlled by said polarized armatures, and normally maintaining one or the other of said sets of signals at safety and the other set at danger according to the direction of the last train movement; a signal-circuit including said electromagnetic selectors in series; means actuated by a train in the rear of the inrunning signals to energize said signal-circuit with a characteristic polarity so as to cause said inrunning signals to indicate danger and to cause said outrunning signals to indicate danger; means actuated by a train in the rear of said outrunning signals to energize said signal-circuit with a characteristic polarity so as to cause said outrunning signals to indicate safety and to cause said inrunning signals to indicate danger; and train-controlled means at a distant subsection for controlling the distant signal at a subsection preceding said distant subsection; and train-controlled means within said blocks to cause all of said signals to indicate danger.

19. In a single-track electric signaling system; a block comprising a plurality of subsections; a set of inrunning home and distant signals for a second subsection; a plurality of electromagnetic selectors each comprising one or more polarized armatures positively movable in two directions; local circuits controlled by said polarized armatures, and normally maintaining one or the other of said sets of signals at safety and the other set at danger according to the direction of the last train movement; a signal-circuit including said electromagnetic selectors in series; means actuated by a train in the rear of the inrunning signals to energize said signal-circuit with a characteristic polarity so as to cause said inrunning signals to indicate danger and to cause said outrunning signals to indicate danger; means actuated by a train in the rear of said outrunning signals to energize said signal-circuit with a characteristic polarity so as to cause said outrunning signals to indicate safety and to cause said inrunning signals to indicate danger; and train-controlled means at a distant subsection for controlling the distant signal at a subsection preceding said distant subsection; and train-controlled means within said blocks to cause all of said signals to indicate danger.

cuits controlled by said polarized armatures, and normally maintaining one or the other of said sets of signals at safety and the other set at danger according to the direction of the last train movement; a signal-circuit including said electromagnetic selectors in series; means actuated by a train in the rear of the inrunning signals to energize said signal-circuit with a characteristic polarity so as to cause said inrunning signals to indicate safety and to cause said outrunning signals to indicate danger; means actuated by a train in the rear of said outrunning signals to energize said signal-circuit with a polarity so as to cause said outrunning signals to indicate safety and to cause said inrunnning signals to indicate danger; and train-controlled means at a distant subsection for controlling the distant signal at a subsection preceding said distant subsection; said two means in the rear of the inrunning and the outrunning signals, when actuated simultaneously, operating to maintain one set of home and distant signals at safety and the other set at danger so as to avoid useless delay to traffic.

20. In a single-track electric signaling system; a block comprising a plurality of subsections; a set of inrunning home and distant signals for one subsection; a set of outrunning home and distant signals for a second subsection; a plurality of electromagnetic selectors each comprising one or more polarized armatures positively movable in two directions; local circuits controlled by said polarized armatures, and normally maintaining one or the other of said sets of signals at safety and the other set at danger according to the direction of the last train movement; a signal-circuit including said electromagnetic selectors in series; means actuated by a train in the rear of the inrunning signals to energize said signal-circuit with a characteristic polarity so as to cause said inrunning signals and to cause said outrunning signals to indicate danger; means actuated by a train in the rear of said outrunning signals to energize said signal-circuit with a characteristic polarity so as to cause said outrunning signals to indicate safety and to cause said inrunning signals to indicate danger; and train-controlled means at a distant subsection for controlling the distant signal at a subsection preceding said distant subsection, said distant signal also being controlled by its associated home signal; said two means in the rear of the inrunning and the outrunning signals, when actuated simultaneously, operating to maintain one set of home and distant signals at safety and the other set at danger so as to avoid useless delay to traffic.

21. In a single-track electric signaling system; a block comprising a plurality of subsections; a set of inrunning home and distant signals for one subsection; a set of outrunning home and distant signals for a second subsection; a plurality of electromagnetic selectors each comprising one or more dead-beat polarized armatures positively movable in two directions; local circuits controlled by said polarized armatures, and normally maintaining one or the other of said sets of signals at safety and the other set at danger according to the last train movement; a signal-circuit including said electromagnetic selectors in series; means actuated by a train in the rear of the inrunning signals to energize said signal-circuit with a characteristic polarity so as to cause said inrunning signals to indicate safety and to cause said outrunning signals to indicate danger; means actuated by a train in the rear of said outrunning signals to energize said signal-circuit with a characteristic polarity so as to cause said outrunning signals to indicate safety and to cause said inrunning signals to indicate danger; and train-controlled means at a distant subsection for controlling the distant signal at a subsection preceding said distant subsection, said distant signal also being controlled by its associated home signal; said two means in the rear of the inrunning and the outrunning signals, when actuated simultaneously, operating to maintain one set of home and distant signals at safety and the other set at danger so as to avoid useless delay to traffic.

22. In a single-track electric signaling system; a block comprising a plurality of subsections; a set of inrunning home and distant signals for a second subsection; a plurality of electromagnetic selectors each comprising one or more polarized armatures positively movable in two directions by the said selectors; local circuits controlled by said polarized armatures, and normally maintaining one or the other of said sets of signals at safety and the other set at danger according to the last train movement; a signal-circuit including said electromagnetic selectors in series; means actuated by a train in the rear of the inrunning signals to energize said signal-circuit with a characteristic polarity so as to cause said inrunning signals to indicate safety and to cause said inrunning signals to indicate danger; means actuated by a train in the rear of said outrunning signals to energize said signal-circuit with a characteristic polarity so as to cause said outrunning signals to indicate safety and to cause said inrunning signals to indicate danger; and train-controlled means for a distant subsection for controlling the distant signal at a subsection preceding said distant subsection; said two means in the rear of the inrunning and the outrunning signals, when actuated simultaneously, operating to maintain one set of home and distant signals at safety and

the other set at danger so as to avoid useless delay to traffic; and train-controlled means within said block to cause all of said signals to indicate danger when actuated by a train.

23. In a single-track electric signaling system; a block comprising a plurality of subsections; a set of inrunning home and distant signals for one subsection; a set of outrunning home and distant signals for a second subsection; a plurality of electromagnetic selectors each comprising one or more polarized armatures positively movable in two directions by the said selectors; local circuits controlled by said polarized armatures, and normally maintaining one or the other of said sets of signals at safety and the other set at danger according to the last train-movement; a signal-circuit including said electromagnetic selectors in series; means actuated by a train in the rear of the inrunning signals to energize said signal-circuit with a characteristic polarity so as to cause said inrunning signals to indicate safety and to cause said inrunning signals to indicate danger; means actuated by a train in the rear of said outrunning signals to energize said signal-circuit with a characteristic polarity so as to cause said outrunning signals to indicate safety and to cause said inrunning signals to indicate danger; and train-controlled means at a distant subsection for controlling the distant signal at a subsection preceding said distant subsection, said distant signal also being controlled by its associated home signal; said two means in the rear of the inrunning and the outrunning signals, when actuated simultaneously, operating to maintain one set of home and distant signals at safety and the other set at danger so as to avoid useless delay to traffic; and train-controlled means within said block to cause all of said signals to indicate danger when actuated by a train.

24. In a single-track electric signaling system; a block comprising a plurality of subsections; a set of inrunning home and distant signals for one subsection; a set of outrunning home and distant signals for a second subsection; a plurality of electromagnetic selectors each comprising one or more dead-beat polarized armatures positively movable in two directions by the said selectors; local circuits controlled by said polarized armatures, and normally maintaining one or the other of said sets of signals at safety and the other set at danger according to the last train movement; a signal-circuit including said electromagnetic selectors in series; means actuated by a train in the rear of the inrunning signals to energize said signal-circuit with a characteristic polarity so as to cause said inrunning signals to indicate safety and to cause said inrunning signals to indicate danger; means actuated by a train in the rear of said outrunning signals to energize said signal-circuit with a characteristic polarity so as to cause said outrunning signals to indicate safety and to cause said inrunning signals to indicate danger; and train-controlled means at a distant subsection for controlling the distant signal at a subsection preceding said distant subsection, said distant signal also being controlled by its associated home signal; said two means in the rear of the inrunning and the outrunning signals, when actuated simultaneously, operating to maintain one set of home and distant signals at safety and the other set at danger so as to avoid useless delay to traffic; and train-controlled means within said block to cause all of said signals to indicate danger when actuated by a train.

25. In a single-track electric signaling system; a through-block comprising several subsections; an inrunning and an outrunning home signal near the respective inrunning and outrunning entrances of each subsection; an inrunning distant signal near the inrunning entrance to each subsection succeeded by a distant subsection within said block; an outrunning distant signal near the outrunning entrance of each subsection succeeded by a distant subsection within said blocks; a polarized electromagnetic selector near the end of each subsection and controlling the signals; said selectors normally maintaining the home and the distant signals at the opposite ends of the through-blocks at safety and at danger respectively; a selector-circuit including said selectors; train-controlled means near the inrunning end of the through-block operable to energize said selector-circuit with a characteristic polarity to cause the inrunning home and distant signals near the inrunning entrance to the through-blocks and to cause the home and distant signals near the outrunning entrance to the through-block to indicate danger; train-controlled means near the outrunning end of the through-block operable to energize said selector-circuit with a characteristic polarity to cause the outrunning home and distant signals near the outrunning home and distant signals near the outrunning entrance to the through-blocks and to cause home and distant signals near the inrunning entrance to the through-block to indicate danger; and train-controlled means at a subsection to cause the associated home signal and the distant signal of a preceding subsection to indicate danger when actuated by a train.

26. In a single-track electric signaling system; a through-block comprising several subsections; an inrunning and an outrunning home signal near the respective inrunning and outrunning entrances of each subsection; an inrunning distant signal near the inrunning entrance to each subsection succeeded by a distant subsection within said

block; an outrunning distant signal near the outrunning entrance of each subsection succeeded by a distant subsection within said blocks; a polarized electromagnetic selector near the end of each subsection and controlling the signals; said selectors normally maintaining the home and the distant signals at the opposite ends of the through-blocks at safety and at danger respectively; a selector-circuit including said selectors; train-controlled means near the inrunning end of the through-block operable to energize said selector-circuit with a characteristic polarity to cause the inrunning home and distant signals near the inrunning entrance to the through-blocks and to cause the home and distant signals near the outrunnning entrance to the through-block to indicate danger; train-controlled means near the outrunning end of the through-block operable to energize said selector-circuit with a characteristic polarity to cause the outrunning home and distant signals near the outrunning entrance to the through-blocks and to cause home and distant signals near the inrunning entrance to the through-block to indicate danger; and train-controlled means at a subsection for blocking the associated home signal and the distant signal of a preceding subsection, each distant signal also being controlled by its associated home signal.

27. In a single-track electric signaling system; two passing-stations; a through-block between said stations comprising several subsections; an inrunning and an outrunning home signal for each subsection; a inrunning distant signal for each subsection except the last from the inrunning end of said through-block; an outrunning distant signal for each subsection except the last from the outrunning end of said through-block; polarized electromagnetic selectors at predetermined localities throughout said through-block and controlling the signals; means at each passing-station for controlling all of said signals; said selectors normally interchangeably maintaining either all the inrunning or all the outrunning signals at safety and also at the same time either all the outrunning or all the inrunning signals at danger so as to avoid blocking both an inrunning train and an outrunning train entering the respective passing-stations simultaneously; a local track-circuit for each subsection to control the associated home signals; and means for each distant subsection for controlling the distant signal of the preceding subsection.

28. In a single-track electric signaling system; two passing-stations; a through-block between said stations comprising several subsections; an inrunning and an outrunning home signal for each subsection; an inrunning distant signal for each subsection except the last from the inrunning end of said through-block; an outrunning distant signal for each subsection except the last from the outrunning end of said through-block; polarized electromagnetic selectors at predetermined localities throughout said through-block and controlling the signals; means at each passing-station for controlling all of said signals; said selectors normally interchangeably maintaining either all the inrunning or all the outrunning signals at safety and also at the same time either all the outrunning or all the inrunning signals at danger so as to avoid blocking both an inrunning train and an outrunning train entering the respective passing-stations simultaneously; a local track-circuit for each subsection to control the associated home signals; and means for each distant subsection for controlling the distant signal of the preceding subsection, each distant signal also being controlled by its associated home signal.

29. In a single-track electric signaling system; a block comprising one or more insulated rail-sections; an inrunning and an outrunning signal for said block; a signal-circuit containing a source of energy and two polarized electromagnetic devices adapted to control the operation of said signals; means controlled by an inrunning train to permit the flow of a current of a given direction in said signal-circuit to cause said inrunning signal to indicate safety; means controlled by an outrunning train to permit the flow of a current in the opposite direction in said signal-circuit to cause said outrunning signal to indicate safety; a local track-battery at each end of an insulated rail-section; means controlled by said signal-circuit for connecting each battery one at a time in circuit through the rails of said section; and a track-relay for said battery which also controls a signal.

30. In a single-track signaling system; a block comprising a plurality of subsections; a plurality of inrunning signals and a plurality of outrunning signals for said block; track-controlled means normally maintaining one of said inrunning and one of said outrunning signals in opposite signaling positions; and track-circuits having overlap control of said signals, said track-circuits being controlled by said subsections.

31. In a single-track signaling system; a block provided with a plurality of inrunning signals and a plurality of outrunning signals; said block comprising a plurality of subsections; a selector-circuit normally maintaining one of said inrunning and one of said outrunning signals respectively in opposite signaling positions; and additional circuits having overlap control of said signals and being controlled by said subsections.

32. In a single-track signaling system; a block provided with a plurality of inrunning

signals and a plurality of outrunning signals; track-controlled means normally maintaining one of said inrunning signals and one of said outrunning signals in opposite signaling positions; and track-controlled circuits having overlap control of said signals.

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

ROBERT JOSEPHUS HEWETT.

Witnesses:
WM. L. MORRIS,
LEONARD DAY.