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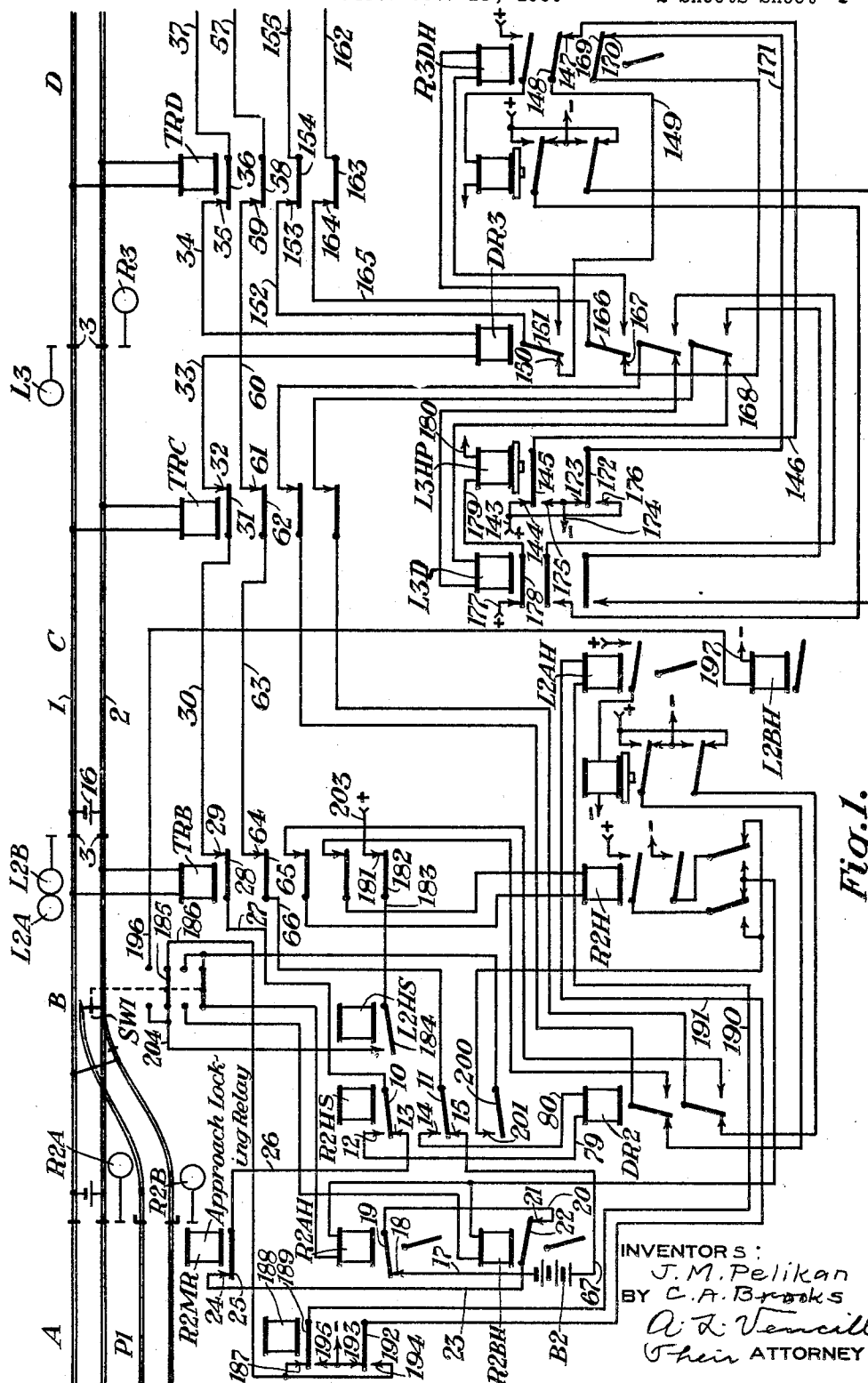
J. M. PELIKAN ET AL

1,910,360

RAILWAY TRAFFIC CONTROLLING APPARATUS

Filed Oct. 18, 1930

2 Sheets-Sheet 1



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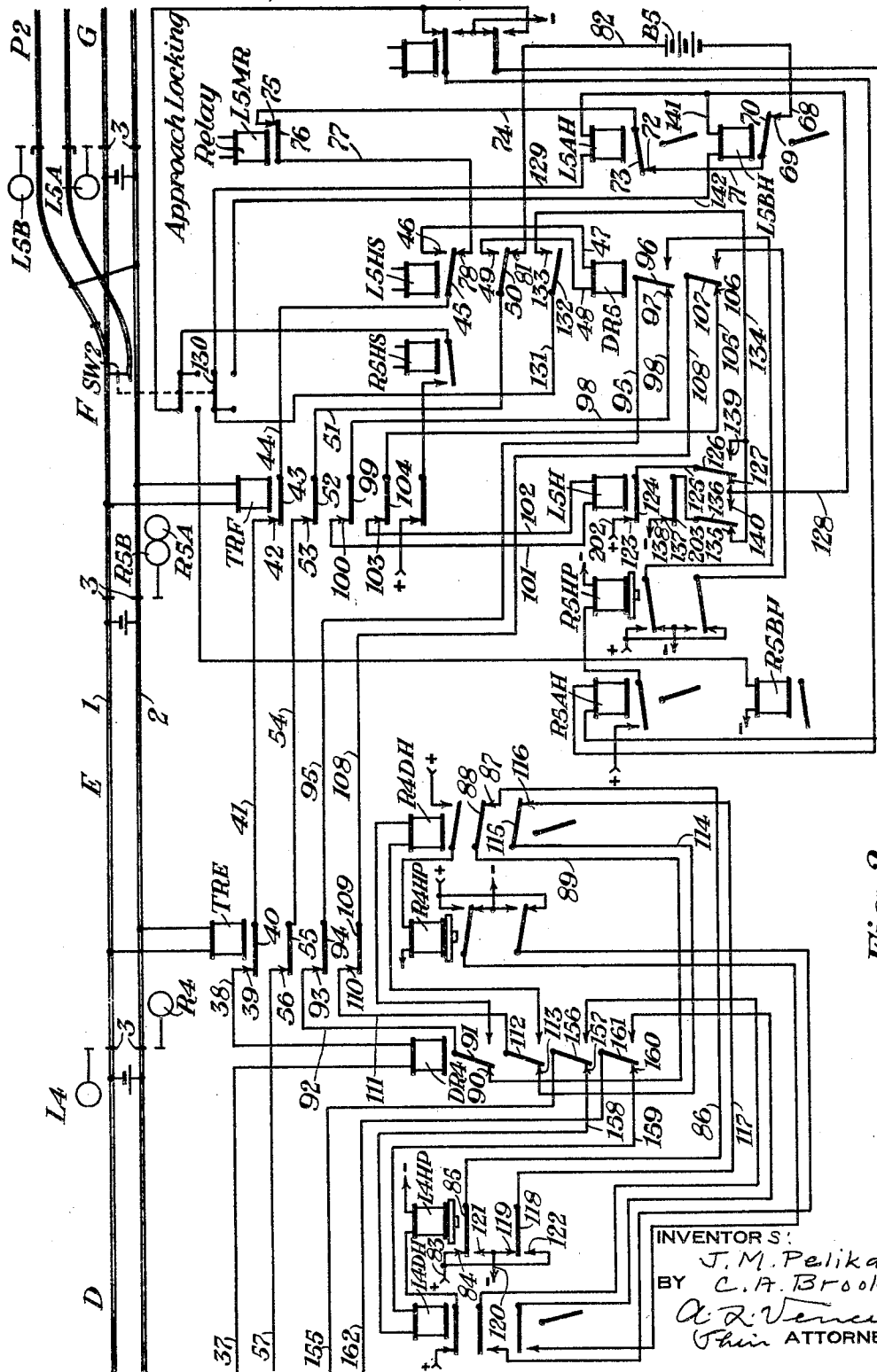
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2 Sheets-Sheet 2



UNITED STATES PATENT OFFICE

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RAILWAY TRAFFIC CONTROLLING APPARATUS

Application filed October 18, 1930. Serial No. 489,616.

Our invention relates to railway traffic controlling apparatus, and more especially it relates to that class of apparatus wherein a despatcher located at a central despatching office directs the traffic through the stretch. We will describe one form of apparatus embodying our invention, and then point out the novel features thereof in claims.

The accompanying drawings, Figs. 1 and 2 when placed end to end with the right hand end of Fig. 1, next to the left hand end of Fig. 2, are a diagrammatic view of one form of the apparatus of our invention as applied to a stretch of single track from a passing siding P1 shown at the left hand end to a passing siding P2 shown at the right hand end. By means of the customary insulated rail joints, designated in the figures by the reference character 3, the traffic rails 1 and 2 of this stretch of track are arranged in track sections A, B, C, D, E, F and G, with only the right hand end of the section A and the left hand end of the section G shown. The sections B and F include a switch of the sidings P1 and P2 respectively, while the intervening track is divided into the intermediate sections C, D and E. It is to be understood, however, that our invention is not confined to this particular arrangement of track sections and that this arrangement is only one of many convenient ways of dividing a stretch of single track.

Wayside signals are shown located at intervals along the way to govern the traffic. Each signal governing traffic from the left to the right is designated by the reference character R with an exponent corresponding to its location, while each signal governing traffic from the right to the left is designated by the reference character L with an exponent corresponding to its location. These signals may be of the well known semaphore types or any of the well known light signal types. Inasmuch as these signals, with their operating circuits form no part of our invention, the operating circuits are not shown in the Figs. 1 and 2 for the sake of clearness as it is thought that they would add nothing to the understanding of our invention. Suf-

fice it to say that all of the signals shown in the Figs. 1 and 2, except signals R5B and L2B, are of the three position type and are capable of displaying proceed, caution or stop. The two signals R5B and L2B are of the two position type capable of displaying either a caution or a stop signal. As a matter of fact, our invention is equally adapted to a train carried cab signal system, as for example, the well known "Coder" type, wherein the despatcher located at a central despatching office would exert a control over the train controlling current.

The control of the siding switch at each of the passing sidings may be either despatcher controlled, remote controlled, or local controlled. The exact form of the despatcher control system between the despatching office and the controlling devices located along the way may be that of any of the well known types, as for example, that disclosed in the U. S. Patent 1,650,575 to Wallace, and inasmuch as this control system forms no part of our invention, all that is shown of it in the Figs. 1 and 2 is the controlling relays, together with the contacts operated thereby. In the Figs. 1 and 2, each of the despatcher control relays is designated by the reference character HS, plus the reference character of the signal at which the relay is located, for example, the relay R2HS located at the signal R2. Despatcher controlled relay R2HS when energized, lifts its armatures 10, 11 and 200 up into engagement with the front contacts 12, 14 and 201, respectively, and when the relay is deenergized, these armatures fall into engagement with their respective back contacts. Each despatcher controlled relay of this system is to be considered as operating in a like manner. It is to be understood that other devices could be used as the means whereby the despatcher opens and closes the control circuits, equally as well as the neutral relays shown and still not depart from the scope of our invention.

Each track section is equipped with a track circuit consisting of a source of current spanning the rails at one end of the section and a track relay spanning the rails of

the section at the opposite end. For illustration, take the track section C of Fig. 1, where a battery 16 spans rails 1 and 2 at the left hand end of the section and a relay 5 TRC spans the rails 1 and 2 at the right hand end of the section.

At each signal location, there is provided a directional relay designated by the reference character DR with an exponent corresponding to the location. Each of these 10 directional relays is a direct current polarized relay which has polar contacts of such design that they stay, when the relay becomes deenergized, in the position to which 15 they were last moved by the energization of the relay, and furthermore these polar contacts have enough contact pressure to hold the circuit passing through the contact properly closed even when the relay is deenergized. All of the directional relays are included in a directional control circuit in series and this circuit is supplied with current from either of two sources, one located at 20 one end of the stretch and the other located at the opposite end. In the figures, these two sources of current are designated as battery B2 located at the left hand end and battery B5 located at the right hand end. This 25 directional control circuit is supplied with current of one polarity from one source and current of the reverse polarity from the other source. This circuit when supplied with current from the battery B2 consists of the following elements: battery B2, wire 17, 30 back contact 18 of relay R2AH to be further described, armature 19, wire 20, back contact 21 of relay R2BH, wire 23, front contact 24 of an approach locking relay R2MR to be later referred to, armature 25, 35 wire 26, back contact 13 of the despatcher control relay R2HS, armature 10, wire 27, armature 28 of the track relay TRB for the section B, contact 29, wire 30, armature 31 of the track relay TRC for the section C, 40 contact 32, wire 33, coil of directional relay DR3, wire 34, contact 35 of the track relay TRD of the section D, armature 36, wire 37, coil of directional relay DR4, wire 38, contact 39 of the track relay TRE of the section E, armature 40, wire 41, contact 42 of the track relay TRF of the section F, armature 43, wire 44, armature 45, contact 46 with the armature 45 of the relay L5HS 45 raised by the despatcher energizing this relay, wire 47, coil of a directional relay DR5, wire 48, contact 49, armature 50 of the despatcher controlled relay L5HS in its raised position, wire 51, armature 52, contact 53, 50 wire 54, armature 55, contact 56, wire 57, armature 58, contact 59, wire 60, contact 61, armature 62, wire 63, contact 64, armature 65, wire 66, armature 11, back contact 15 and 60 wire 67 back to the battery B2.

This directional control circuit when supplied with current from the battery B5 lo-

cated at the right hand end of the stretch consists of the following elements: battery B5, wire 68, back contact 69 of the relay L5BH to be later described, armature 70, wire 71, back contact 72 of the relay L5AH, 70 armature 73, wire 74, front contact 75 of the approach locking relay L5MR to be later referred to, armature 76, wire 77, back contact 78 of the despatcher controlled relay L5HS, armature 45, wire 44, armature 75 43 of the track relay TRF, contact 42, wire 41, armature 40 of track relay TRE, contact 39, wire 38, coil of directional relay DR4, wire 37, armature 36 of the track relay TRD, contact 35, wire 34, directional 80 relay TR3, wire contact 32 of the track relay TRC, armature 31, wire 30, contact 29 of the track relay TRB, armature 28, wire 27, armature 10 of the despatcher controlled relay R2HS, front contact 12 with the armature 10 raised by the despatcher energizing the relay R2HS, wire 79, coil of a directional relay DR2, wire 80, contact 14, armature 11 in its raised position, wire 66, 85 armature 65, contact 64, wire 63, armature 62, contact 61, wire 60, contact 59, armature 58, wire 57, contact 56, armature 55, wire 54, contact 53, armature 52, wire 51, armature 50, back contact 81 and wire 82 back to the battery B5. Thus with the despatcher 90 controlled relay L5HS, located at the right hand end of the Fig. 2, energized and its front contacts 46 and 49 closed, current will flow from the battery B2 located at the left hand end of the figures through the several 95 directional relays and in this case the polarity of the current is such as to cause the polar armatures of each directional relay to occupy the left hand position, that is, the position as shown in the Figs. 1 and 2. 100 When the despatcher controlled relay R2HS, located at the left hand end, is energized, so as to close its front contacts 12 and 14, then current is supplied to the directional relays from the battery B5 located 105 at the right hand end and this time the polarity of the current is reversed with respect to that supplied by the battery B2 and the polar armatures of the several directional relays will therefore occupy the right hand 110 position, that is, the position opposite to that shown in the figures. Furthermore, it is to be noted that the despatcher cannot supply current from both the batteries B2 and B5 to this directional control circuit at 115 the same time, inasmuch as the current from battery B2 passes through the back contacts of the relay R2HS and the current from the battery B5 passes through the back contacts 78 and 81 of the relay L5HS. 120 Once direction of traffic has been established by the despatcher energizing either the relay L5HS or the relay R2HS, so that current is supplied to the directional control circuit by either the battery B2 or the bat- 125 130

tery B5, then the signal control circuits that govern the wayside signals come into play and will now be described. Let us first consider, the control circuits for the signals L5A and L5B which govern traffic leaving the passing siding P2. Associated with the signals L5A and L5B are three relays L5H, L5AH and L5BH, each of which is a direct current polarized relay. The control circuit for the relay L5H starts from positive battery at signal location L4 and extends along wire 83, front contact 84 of a relay L4HP, associated with signal L4 as will be described later, armature 85, wire 86, back contact 87 of a relay R4DH associated with the signal R4 as will be described later, armature 88, wire 89, polar contact 90 of the directional relay DR4, armature 91, wire 92, contact 93 of the track relay TRE, armature 94, wire 95, armature 96 of the directional relay DR5, contact 97, wire 98, armature 99 of the track relay TRF, contact 100, wire 101, coil of the relay L5H, wire 102, contact 103, armature 104, wire 105, contact 106 of directional relay DR5, armature 107, wire 108, armature 109, contact 110, wire 111, armature 112 of directional relay DR4, contact 113, wire 114, armature 115, back contact 116, wire 117, armature 118, front contact 119 and wire 120 to common battery. With the relay L4HP deenergized so that its armatures 85 and 118 are down in contact with the back contacts 121 and 122 respectively, then the current supplied to the relay L5H by the circuit just traced is reversed in polarity.

With the relay L5H energized and its polar armature occupying the position as shown in the Fig. 2, then a control circuit is completed to the relay L5AH which circuit is as follows: positive battery, wire 202, contact 123 of relay L5H, armature 124, wire 125, polarized armature 126 of relay L5H, contact 127, wire 128, coil of the relay L5AH, wire 129, circuit controller 130, operated by the switch SW2 in a manner to be later described, wire 131, armature 132 of the despatcher controlled relay L5HS in a raised position, contact 133, wire 134, contact 135, polarized armature 136, neutral armature 203, front contact 137, and wire 138 to common battery.

It is apparent that with the relay L5H energized with current of a polarity to cause its polar armatures 126 and 136 to be moved to the right hand position and in engagement with contacts 139 and 140 respectively, the current supplied to the control circuit for the relay L5AH just traced will be reversed in polarity.

The relay L5AH controls the operating circuits for the signal L5A, which circuits as stated previously are not shown in the figure, but which are well known in the art and it is deemed sufficient to say that with the re-

lay L5AH energized with current of normal polarity, the proceed operating circuit for signal L5A is closed and with the relay L5AH energized with current of the reverse polarity then the caution operating circuit for the signal L5A is closed, while with the relay L5AH deenergized, then the stop operating circuit for signal L5A is closed. With the switch SW2 set for traffic to move out of the siding P2, the switch circuit controller 130 connected to this switch SW2, shown diagrammatically by a dotted line, is shifted to its lower position in the figure. With the switch SW2 thus set and the circuit controller 130 moved to its lower position, the control circuit to the relay L5BH is selected. This circuit for relay L5BH is controlled by the relay L5H in the same manner that L5H controls the circuit of relay L5AH when the switch SW2 is set for the main track and the circuit controller 130 occupies its upper position as shown in the figure. The circuit for the relay L5BH branches from the wire 128 and extends along wire 141, coil of the relay L5BH, wire 142, circuit controller 130 in its lower position, wire 131, armature 132 in its raised position, contact 133 and then back to battery over the same circuit as traced in connection with relay L5AH. This relay L5BH controls the operating circuits to the signal L5B in the same manner as relay L5AH controls the operating circuits of the signal L5A—that is to say, with L5BH energized with current of normal polarity the proceed circuit is closed, with L5BH energized with current of the reverse polarity the caution circuit is closed, while with the relay deenergized, the stop circuit for L5B is closed.

The leaving signals R2A and R2B which govern traffic from the passing siding P1 to the right are controlled by the control relays R2H, R2AH, and R2HB in a manner similar to that described for the control relays of the leaving signals L5A and L5B and it is thought not necessary to trace in detail the control circuit for the respective relays R2H, R2AH, and R2BH. Each signal of the intermediate sections is controlled by means of a direct current polarized relay designated by the reference character DH prefixed by the reference character of the signal. Taking the signal L4 by way of illustration, this signal is controlled by the relay L4DH. The controlling circuit of the relay L4DH starts from positive battery at the signal location L3 of Fig. 1 and extends along wire 143, front contact 144 of the relay L3HP, armature 145, wire 146, back contact 147 of the relay R3DH which controls the signal R3, armature 148, wire 149, polar contact 150 of the directional relay DR3, armature 151, wire

152, contact 153 of the track relay TRD, armature 154, wire 155, polar armature 156 of the directional relay DR4, contact 157, wire 158, coil of relay L4DH, wire 159, contact 5 160 of directional relay DR4, armature 161, wire 162, armature 163, contact 164, wire 165, polar armature 166 of directional relay DR3, contact 167, wire 168, armature 169 of relay R3DH, back contact 170, wire 171, armature 172, contact 173 and wire 174 to common battery. With the relay L3HP deenergized so that its armatures 145 and 172 are in engagement with the back contacts 175 and 176 respectively, the current supplied to this control circuit for relay L4DH is reversed in polarity. The relay L4DH controls the three operating circuits for the signal L3 in the same manner as described in connection with the relay L5AH for the signal L5A. It is to be noted that the control circuit for the relay L4DH, which controls the signal L4, is controlled by both the directional relays DR3 and DR4 and by the track relay DRT for the section D, and 25 that the polarity of this circuit is governed by the relay L3HP associated with the control relay L3DH for the signal L3 in advance.

The relay L3HP is a slow-releasing relay and is energized whenever the relay L3DH is energized by a circuit consisting of positive battery, wire 177, armature 178, wire 179, coil of the relay L3HP, and wire 180 to common battery. The control relay at each 35 of the intermediate signals has associated with it a slow-releasing relay which governs the polarity of the current supplied to the control relay at the next signal in the rear, in the same manner as the relay L3HP, associated with the control relay L3DH, governs the polarity of the current supplied to the relay L4DH.

Thus, with the direction of traffic established by the despatcher energizing the relay L5HS and by track sections F, E and D being unoccupied, a proceed signal will be displayed by the signal L5A in the event that switch SW2 is set for the main track, or by the signal L5B in the event that the switch SW2 is set for the passing siding P2. With the track section D occupied however, the control relay L4DH is down and its associated slow-releasing relay L4HP, is also down, and current of the reverse polarity is 55 supplied to the relay L5H and then, in turn, current of the reverse polarity is supplied to the relay L5AH, or the relay L5BH if the switch is set for the siding, and thus a caution signal is displayed by the signal L5A, or signal L5B in case the switch is set for the siding. It is to be noted that the control circuit for the relay L5H passes through the back contacts 87 and 116 of the control relay R4DH associated with the opposing signal R4 and thereby checks the stop position

of this opposing signal R4, and likewise the circuit for the relay L4DH passes through the back contacts 147 and 170 of the control relay R3DH and thereby checks the stop position of the opposing signal R3. The control circuits for the relays L3DH and L3HP associated with the next intermediate signal L3 are similar to those just traced and described, in connection with the relays L4DH and L4HP associated with the intermediate signal L4 and it is thought that they can be readily understood from the Fig. 1 and that it is not necessary to trace these control circuits.

The control of the signals L2A and L2B which govern the traffic over the switch SW1, is by the means of control relays L2AH and L2BH respectively. The circuit for the relay L2AH starts from positive battery and extends along wire 203, front contact 181 of the track relay TRB of the section B, armature 182, wire 183, armature 184 of the despatcher controlled relay L2HS, wire 204, circuit controller 185 which is connected to the switch SW1 as indicated by the dotted line, wire 186, front contact 187 of a relay 188 controlled by traffic in advance of the track section A, armature 189, wire 190, coil of the relay L2AH, wire 191, armature 192, contact 193, and to common battery. It is to be observed that this circuit for the relay L2AH is controlled through the track relay TRB of the section B, the energized position of the despatcher controlled relay L2HS, the position of the switch SW1 and by the relay 188 controlled by traffic in advance. The circuit for the relay L2BH extends from the positive battery along wire 203, contact 181, armature 182, wire 183, armature 184 in its raised position, wire 204, circuit controller 185 when moved to its upper position by switch SW1 being set for traffic to the siding P1, wire 196, coil of the relay L2BH and wire 197 to common battery.

Signals R5A and R5B govern traffic moving to the right over the switch SW2 and are controlled by the relays R5AH and R5BH respectively and the control circuit of the relay R5AH is similar to that just described in connection with the relay L2AH and the control circuit for the relay R5BH is similar to the control circuit just traced for the relay L2BH.

It was pointed out in connection with the directional control circuit that before the despatcher could complete the circuit for traffic in one direction, the control relays for the leaving signals governing traffic in the opposite direction must each be in a down position—that is, in a position to insure that the opposing leaving signals are indicating stop. Attention is now called to the fact that before the control circuit for an intermediate signal can be completed, not only

must the directional relays occupy the proper position but also the control relay of the opposing intermediate signal must be down—that is, in a position to insure that the opposing intermediate signal is each indicating stop.

In other words, in our invention, only signals governing traffic through the stretch in one direction can indicate clear at any one time and the opposing signals must indicate stop. Attention is also called to the fact that the directional circuit governing traffic from the left to the right is controlled through the approach locking relay L5MR and likewise the directional circuit governing traffic from the right to the left passes through a front contact of the approach locking relay R2MR. Thus whenever a leaving signal has been cleared and a train is approaching this signal, the signal may be put to stop by the dispatcher; but the opposing leaving signal cannot be cleared until the approach locking circuit is released. The approach locking circuit is not shown in the figures, it being understood that it is in a manner well known in the art.

Assuming that the dispatcher selects the direction of traffic from the right to the left by energizing the relay L5HS and that each of the track sections of the stretch is unoccupied, the signals governing the traffic from the right to the left will be cleared. Then with a train moving past the signal L5A on the main track or signal L5B on the passing siding P2, it will shunt the track relay TRF of the section F and the deenergizing of the track relay TRF will open the directional circuit at the contacts 42 and 53, and then as the train advances it will in turn shunt the track relay of each successive section to thereby hold the directional circuit open all the time it occupies this stretch of track. Thus once the dispatcher has selected the direction of traffic and a train has entered the stretch, the dispatcher cannot change the direction of traffic until the train has cleared the stretch of track. While the train by shunting the track relays maintains the directional circuit open, the fact that the directional circuit is deenergized does not affect the control circuits, inasmuch as the polar armatures of the directional relays remain in the position to which they have last been moved and they maintain sufficient contact pressure so that the circuits passing through the contacts are held properly closed. However, as the train moving from the right to the left enters the track section F and shunts the track relay TRF, the contacts 100 and 103 are opened and the relay L5H deenergized and with the relay L5H deenergized, the contacts 123 and 137 in the control circuit of the relays L5AH and L5BH are opened with the result that the signals L5A and L5B are set

at stop. As the train advances from the section F into the section E and shunts the track relay TRE of the section E, the control circuit for the relay L5H is still held open at the contacts 93 and 110 of the track relay TRE and thus signals L5A and L5B are still held in the stop position. With the train passing on into the section D from the section E, the track relay TRD of the section D will now be shunted and the control relay L4DH governing the signal L4 is deenergized, with the result that the signal L4 is set at stop.

The deenergizing of control relay L4DH also opens the control circuit for the slow-releasing relay L4HP and with L4HP down, the current that is now supplied to the relay L5H will be of the reverse polarity to thereby reverse the armatures 126 and 136 to the right hand position. As pointed out previously with relay L5H reversed, current will be supplied to either the relay L5AH or L5BH, depending upon the position of the switch, of a reverse polarity and thereby cause either the signal L5A or L5B to display a caution signal. As the train advances from the section D into the section C and the track relay TRC is shunted, then we find that the control relay L4DH will be energized but with current of the reverse polarity to cause a caution signal to be displayed by the signal L4. The energizing of L4DH closes the control circuit to the relay L4HP with the result that the relay L5H is again energized with current of normal polarity and the armatures 126 and 136 moved to the left hand as shown in Fig. 2 and relay L5AH or L5BH energized in a manner to close the proceed circuit to the signal L5A or L5B respectively.

With the switch SW1 set for the main track and assuming that the track section A is unoccupied so that the relay 188 is energized and that the dispatcher selects the relay L2HS, the signal L2A will clear and the train moving from the right to the left can advance on the main track. In the event the dispatcher has set the switch SW1 for the passing siding and selected the relay L2HS, then the train traveling from the right to the left can advance into the passing siding under the caution signal displayed by the signal L2B.

The movement of a train from the left to the right is accomplished in a manner similar to that just described for the train moving from the passing siding P2 to the passing siding P1.

Although we have herein shown and described only one form of apparatus embodying our invention, it is understood that various changes and modifications may be made therein within the scope of the appended claims without departing from the spirit and scope of our invention.

Having thus described our invention, what we claim is:

1. In combination, a stretch of railway over which traffic moves in both directions, and having a first and a second end, a despatcher controlled relay, a directional relay and a source of current located at each end of the stretch; a first circuit to control the directional relay located at the first end of the stretch, including a front contact of the despatcher controlled relay located at the first end of the stretch, and a back contact of the despatcher controlled relay and the source of current located at the second end of the stretch; a second circuit to control the directional relay located at the second end, including a front contact of the despatcher controlled relay located at the second end, and a back contact of the despatcher controlled relay and the source of current located at the first end of the stretch, and a signal located at each end of the stretch to govern traffic in opposite directions through the stretch and each signal controlled by the directional relay located at its respective end of the stretch.

2. In combination, a stretch of railway over which traffic normally moves in either direction, a directional circuit for the stretch, a source of current at each end of the stretch normally connected to said directional circuit, a directional relay at each end of the stretch, a despatcher controlled means at each end of the stretch each adapted when energized to disconnect the source of current at its end of the stretch from the directional circuit and to connect the directional relay at its end to said circuit to thereby control said relay by current supplied at the opposite end of the stretch, and a signaling device at each end of the stretch to govern traffic in opposite directions through the stretch each controlled by the directional relay at its end of the stretch.

3. In combination, a stretch of railway over which traffic normally moves in either direction arranged in track sections, a directional circuit for the stretch, a source of current at each end of the stretch each normally connected to said directional circuit, a directional relay at each end of the stretch, a despatcher controlled means at each end of the stretch each adapted when energized to disconnect the source of current at its end of the stretch from the directional circuit and to connect the directional relay at its end to said circuit to thereby control said relay by current supplied at the opposite end of the stretch, a track relay for each section responsive to traffic conditions of the section adapted to control said directional circuit, and a signaling device at each end of the stretch to govern traffic through the stretch controlled

by the directional relay at its end of the stretch.

4. In combination, a stretch of railway over which traffic normally moves in either direction, a normally deenergized directional circuit for the stretch, a source of current and a directional relay at each end of the stretch, despatcher controlled means to selectively connect one or the other of said directional relays to said directional circuit and to render the source of current located at the end opposite that of the selected relay active to energize said circuit and thereby control the selected relay, and a signal at each end of the stretch to govern traffic in opposite directions through the stretch each controlled by the directional relay at its end of the stretch.

5. In combination, a stretch of railway over which traffic normally moves in either direction, signals located at intervals to govern traffic in one direction through the stretch, other signals located at intervals to govern traffic in the other direction through the stretch, polarized directional relays located at intervals to control said signals adapted when energized by current of one polarity to clear the signals for one direction and when energized by current of the reverse polarity to clear the signals for the opposite direction, a directional circuit for energizing said relays in series; a source of current at each of the opposite ends of the stretch, one adapted to supply current of one polarity to the directional circuit and the other adapted to supply current of the reverse polarity to said circuit; and a despatcher controlled means to render at times one or the other of said sources active and thereby clear the signals for the corresponding direction of traffic.

6. In combination, a stretch of railway over which traffic normally moves in either direction arranged in track sections, a track circuit for each track section responsive to traffic conditions of the section, signals located at intervals to govern traffic in one direction through the stretch, other signals located at intervals to govern traffic in the other direction through the stretch, polarized directional relays located at intervals to control said signals adapted when energized by current of one polarity to clear the signals for one direction and when energized by current of the reverse polarity to clear the signals for the opposite direction, a directional circuit for energizing said relays; a source of current at each of the opposite ends of the stretch, one adapted to supply current of one polarity to the directional circuit and the other adapted to supply current of the reverse polarity to said circuit; a despatcher controlled means to render at times one or the other of said sources active and thereby clear the signals for the corre-

sponding direction of traffic, and means controlled by each of said track circuits to render the despatcher controlled means ineffective as long as a train occupies the section.

5 7. In combination, a stretch of railway over which traffic normally moves in either direction, arranged with two adjacent intermediate track sections, a track circuit for each of said track sections responsive to traffic conditions of the section; two signaling circuits for each track section, one for each direction of travel; a polarized relay located at the junction of said sections adapted to close the signaling circuit of each section associated with one direction of travel and to open the signaling circuit of each section associated with the other direction of travel when energized with current of a normal polarity and to close the last two mentioned circuits and open the first two mentioned circuits when energized with current of reverse polarity, a despatcher controlled means, and a directional circuit controlled jointly by the despatcher controlled means and the track circuit of each section to supply current of either normal or reverse polarity to said polarized relay.

8. In combination, a stretch of railway over which traffic normally moves in either direction arranged with two adjacent intermediate track sections, a track circuit for each section responsive to traffic conditions of the section; two signaling circuits for each track section, one for each direction of travel; a polarized relay located at the junction of said sections adapted to close the signaling circuit of each section associated with one direction of travel and to open the signaling circuit of each section associated with the other direction of travel when energized with current of a normal polarity and to close the last two mentioned circuits and open the first two mentioned circuits when energized with current of reverse polarity, a despatcher controlled relay at each end of the stretch, a directional circuit controlled by said despatcher relays adapted to energize said polarized relay with current of normal polarity when one of the despatcher relays is selected and to energize said polarized relay with current of reverse polarity when the other despatcher relay is selected, and means controlled by the track circuit of each of the two sections to control the directional circuit.

9. In combination, a stretch of railway arranged in track sections, a track relay for each track section responsive to traffic conditions of the section, a plurality of wayside signals located at intervals to govern traffic through the stretch, a traffic governing relay for each signal, a despatcher controlled means, a circuit including all of the traffic governing relays in series under the joint control of the despatcher controlled means

and all the track relays of the stretch, and a signaling circuit for each signal jointly controlled by the traffic governing relay for the signal and the track relay of the section in advance of said signal.

10. In combination, a stretch of railway arranged in track sections, a track relay for each track section responsive to traffic conditions of the section, directional relays located at intervals along the way, a despatcher controlled means, a directional circuit including all the directional relays in series under the joint control of the despatcher controlled means and all the track relays of the stretch, and a signaling circuit for each direction of traffic associated with each track section jointly controlled by a directional relay and the track relay for the section with which said signaling circuit is associated.

In testimony whereof we affix our signatures.

JOHN M. PELIKAN.
CHARLES A. BROOKS.

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