

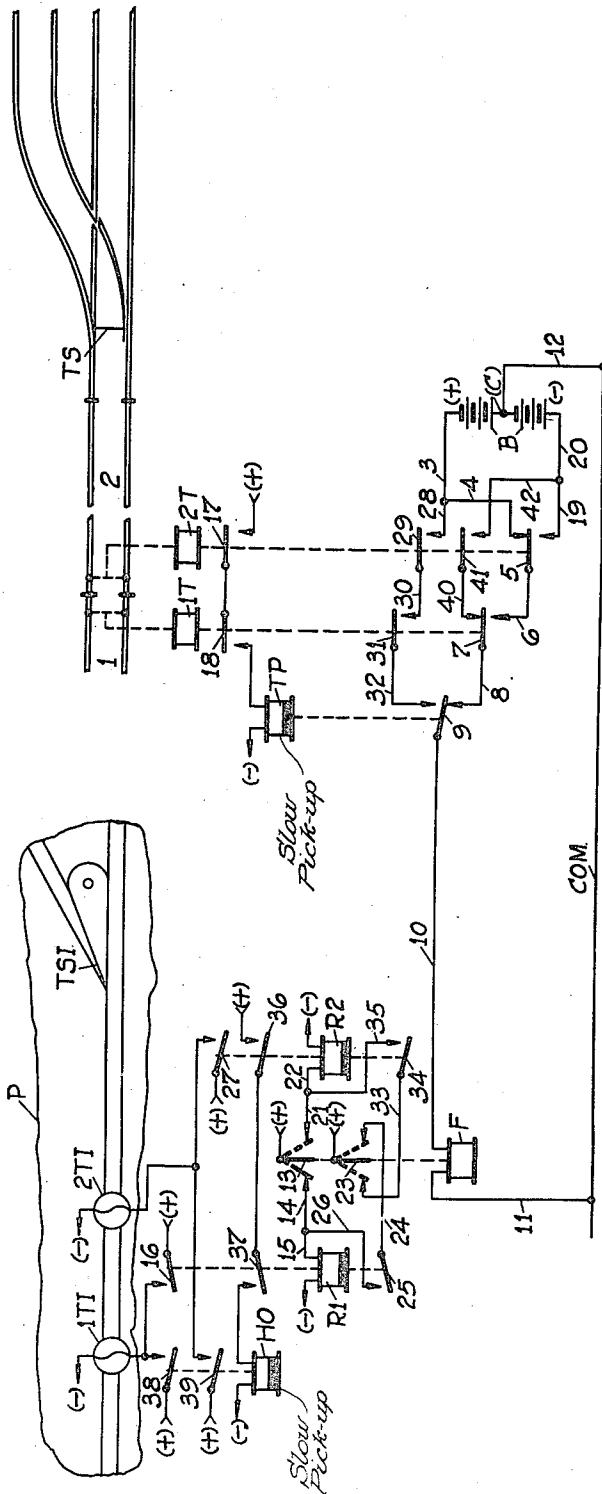
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CENTRALIZED TRAFFIC CONTROLLING SYSTEM FOR RAILROADS

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CENTRALIZED TRAFFIC CONTROLLING
SYSTEM FOR RAILROADSNeil D. Preston, Rochester, N. Y., assignor to
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This invention relates to railway centralized traffic controlling systems, and more particularly to a communicating means for such a system whereby information may be transmitted to a remote point concerning the presence or absence of trains in a plurality of track sections over a minimum number of line circuits.

In centralized traffic controlling systems, it is expedient to employ a minimum number of line wires extending from the control point to the various distant locations both because of the cost of the line wire as well as the increased cost of maintenance of a larger number of wires over the considerable distances necessary to extend such circuits. It is found expedient in such systems to not only provide means for transmitting information to the control point concerning the operated positions of the various devices, such as switches and signals, but also to transmit information concerning the presence or absence of trains in various track sections, and consequently in systems requiring this information from a number of track sections considerable saving may be made by multiplying the use of the line circuits employed to transmit this information.

In view of the above and other considerations, it is proposed in accordance with the present invention to provide a means whereby information may be transmitted to a remote point concerning the presence or absence of trains in each of two track sections and to accomplish such transmission over a single line circuit.

Other objects, purposes and characteristic features of the present invention will become apparent as the description progresses, during which, reference will be made to the accompanying drawing which shows in a diagrammatic and conventional manner a system for indicating at a distant point the condition of two adjacent track sections in accordance with the present invention.

A portion of a control panel P is diagrammatically shown in the accompanying drawing which has a miniature track diagram marked thereon to correspond to an actual track layout shown at the right. The track layout includes a track switch TS which may be controlled from the above mentioned control panel P and its operated position may be indicated by actuating the miniature switch point indicator TSI in any convenient manner such as disclosed in the prior application of S. N. Wight, Ser. No. 431,748, filed February 27, 1930.

The section of the track approaching the switch TS is shown divided into two adjacent

track sections 1 and 2 with the respective track relays 1T and 2T arranged in the conventional manner to detect the presence of a train therein. The track diagram on the control panel P also contains two miniature incandescent lamps 1TI and 2TI which are arranged therein at positions so that they may be readily associated with the corresponding track sections 1 and 2.

The apparatus associated with the control panel P includes a three-position polar line relay F and two neutral relays R1 and R2, which neutral relays are shown with heavy base lines to indicate that their drop-away time is considerably longer than their pick-up time. A third neutral relay HO at the control panel and a similar relay TP at the track location are marked "Slow pick-up" to indicate that their operating time is considerably longer than that of the relays R1 and R2. A polarized source of energy is shown at the track location as a split potential battery B, and the symbols (+) and (−) are used to indicate opposite terminals of local sources of energy at both the control panel and the track location, which sources have not been shown herein.

In describing the operation of the system, it will be considered that an approaching train enters the first track section 1 thereby dropping the associated track relay 1T. Energy is now applied over a normally de-energized line circuit to the line relay F at the control point, which circuit may be traced from the (+) terminal of battery B, wires 3 and 4, front contact 5 of relay 2T, wire 6, back contact 7 of relay 1T, wire 8, back contact 9 of relay TP, line wire 10, through the windings of relay F, wire 11, common line wire COM, wire 12 to the center terminal (C) of battery B. This energization of the relay F, or with current flowing from right to left through its operating winding (which may be termed for convenience (+) polarity) operates its polarized contacts to their extreme left hand positions thereby completing a circuit for picking up relay R1 from (+), polar contact 13 of relay F in its left hand position, wires 14 and 15, through the windings of relay R1 to (−). An indication of the occupancy of section 1 is then given on the control panel by energizing the indicating light 1TI over an obvious circuit completed at front contact 16 of relay R1.

When the train occupying section 1 progresses to a point in which it is occupying section 2 as well as section 1, it is obvious that both relays 1T and 2T will be dropped which completes a circuit for energizing the slow acting relay TP at back con-

tact 17 of relay 2T in series with back contact 18 of relay 1T. The relay TP however is arranged so that its pick-up time is greater than the cumulative operating times of the relays F and R2, and consequently during the time before the back contact 9 of relay TP opens, a circuit for applying the reverse polarity of energy to relay F is completed from the center terminal (C) of battery B, wire 12, common line wire COM, wire 11, through the operating winding of relay F, line wire 10, back contact 9 of relay TP, wire 8, back contact 7 of relay 1T, wire 6, back contact 5 of relay 2T, wires 19 and 20, to the (—) terminal of battery B.

This reverse polarity of energization of the relay F, or namely with current flowing from left to right through its windings (which may be conveniently termed (—) polarity) operates its polarized contacts to their extreme right hand positions thereby completing a circuit for picking up relay R2 from (+), contact 13 of relay F in its right hand position, wires 21 and 22, through the operating winding of relay R2, to (—). Inasmuch as the relay R1 has slow releasing characteristics, it does not drop while the polarized contacts of relay F are shifting from their left hand position to their right hand position, and a stick circuit is then completed to hold up relay R1 from (+), contact 23 of relay F in its right hand position, wire 24, front contact 25 of relay R1, wires 26 and 15, through the operating winding of relay R1 to (—).

It is now obvious that with both relays R1 and R2 picked up, the indicating light 1TI will continue to be lighted to indicate the occupancy of section 1, and the indicating light 2TI will also be lighted to indicate the occupancy of section 2 by an obvious energizing circuit completed at front contact 27 of relay R2. Shortly after the relay R2 picks up, the relay TP at the track location picks up and changes the (—) polarity of energization of the relay F back to the (+) polarity over a circuit from the (+) terminal of battery B, wires 3 and 28, back contact 29 of relay 2T, wire 30, back contact 31 of relay 1T, wire 32, front contact 9 of relay TP, line wire 10, through the windings of relay F, wire 11, common line wire COM, wire 12 to the center terminal (C) of battery B.

This (+) polarity of energization of the relay F shifts the polarized contacts from their right-hand to their left-hand positions, but the relays R1 and R2 do not drop during this shifting of the contacts of the relay F because of their previously mentioned slow releasing characteristics, and the energizing circuit for relay R1 is again completed by contact 13 of relay F in its left hand position, and a stick circuit for holding up relay R2 is completed from (+), contact 23 of relay F in its left hand position, wire 33, front contact 34 of relay R2, wires 35 and 22, through the operating windings of relay R2 to (—). Both the relays R1 and R2 are thus held up as long as both track sections 1 and 2 are occupied, and the relay HO is now energized by a circuit completed at front contact 36 of relay R2 in series with front contact 37 of relay R1, which relay HO then picks up to complete multiple energizing circuits for the indicating lights 1TI and 2TI at front contacts 38 and 39 respectively.

When the previously considered train leaves track section 1 and is occupying track section 2 only, the track relay 1T obviously picks up and opens the energizing circuit for the slow acting relay TP, but inasmuch as the operating characteristics of relay TP are so arranged that its

drop-away time exceeds the cumulative drop-away time of either relay R1 or R2 plus that of relay F, the previously traced energizing circuit for relay F is now opened at front contact 31 of relay 1T for a predetermined period of time, or as long as front contact 9 of relay TP remains closed. This de-energization of the relay F causes its polarized contacts to assume their de-energized or center positions long enough to effect the dropping of both relays R1 and R2 thus obviously de-energizing the slow acting relay HO, but this relay HO does not drop immediately and the energizing circuits for both indicating lights 1TI and 2TI are maintained closed by the respective front contacts 38 and 39.

However, as soon as the relay TP drops, (—) polarity of energization is applied to the relay F over a circuit from the center terminal (C) of battery B, wire 12, common line wire COM, wire 11, through the operating windings of relay F, line wire 10, back contact 9 of relay TP, wire 8, front contact 7 of relay 1T, wire 40, back contact 41 of relay 2T, wires 42 and 20 to the (—) terminal of battery B. This energization of relay F is effective to pick up relay R2 and energize the indicating lamp 2TI in the manner previously described, and the relay HO, which is sufficiently retarded to remain up until relay R2 picks up, then drops to extinguish the indicating lamp 1TI at front contact 38.

It may be stated at this point that the slow-acting relay HO is provided for the purpose of maintaining an indication of the occupancy of both track sections during the period in which the relays R1 and R2 are being dropped to allow either relay R1 or R2 to be again picked up in response to the departure of the train from one of the sections. It will be obvious that if a train, after occupying both sections 1 and 2, leaves section 2 and occupies section 1 only, the line circuit will be de-energized for a sufficient period to drop both relays R1 and R2, but the following energization will be of the (+) polarity which again picks up relay R1 to light the indication lamp 1TI.

When the train progresses out of section 2, the relay 2T picks up to de-energize the line relay F at back contact 41. The relay R2 is then de-energized which drops to extinguish the indicating lamp 2TI at front contact 27 and the system is again in its normal condition, as shown.

It will now be obvious that a train entering the track section 1 is effective to light its corresponding indicating lamp 1TI by applying the (+) polarity to the responsive means associated with the control panel, and when both sections 1 and 2 become occupied, this existing (+) polarity on the responsive means at the control panel is quickly changed to the (—) polarity, which effects the lighting of both indicating lamps 1TI and 2TI. In the case just described, or that is, with section 1 being the first to become occupied, the polarity is again changed back to the original polarity, or specifically when the (+) polarity is applied first, the occupancy of both sections changes this polarity to (—), but after a predetermined interval of time this (—) polarity is again changed to the original (+) polarity. The second change in polarity, however, does not affect the indication displayed by the indicating lamps 1TI and 2TI. When only one of the track sections is again occupied, the responsive means at the control panel is de-energized for a predetermined time to allow this responsive means to be conditioned for the following line circuit energization, the polarity of

which is determined by the particular section then occupied.

Inasmuch as the operation of the present system is not entirely symmetrical with the previously considered condition when section 2 becomes occupied before section 1, it will now be considered that section 2 only is occupied by a train progressing in the opposite direction. With section 2 only occupied, (—) polarity is applied to relay F which picks up relay R2 to energize the indicating lamp 2TI all in a manner previously described, and when the train now being considered is occupying both sections 1 and 2, the same polarity, or (—) polarity, is applied to relay F as long as back contact 9 of relay TP remains closed, which condition is different from that previously described inasmuch as, in the first case the polarity on relay F was changed before relay TP picked up. However, as soon as the relay TP picks up to close its front contact 9, the polarity on relay F is shifted from (—) to (+) quickly thereby effecting the picking up of relay R1 and sticking up relay R2 to light both the indicating lamps 1TI and 2TI in a manner obvious from the foregoing description. The remaining operation of the system effected by the train now being considered is similar to the operation first described and will not be traced in detail.

A communicating means for a railway traffic controlling system has thus been provided in which information as to the occupied or the unoccupied condition of one or both of two track sections may be transmitted to a remote point over a single polarized line circuit, without the employment of alternating current, or the like. Such a communicating system obviously necessitates a means for transmitting four distinctive conditions, or namely, the unoccupied condition of both sections, the occupancy of one section only, the occupancy of the other section only, and the occupancy of both sections. A means for transmitting these four distinctive conditions over a single line circuit has been provided by assigning the de-energized condition of the circuit to the unoccupied condition of both sections, by selecting the polarity of energization of the circuit according to the occupancy of either section only, and by shifting the polarity of such energization more rapidly than certain retarded means at the distant point can follow to set up a condition distinctive of the occupancy of both sections.

The present system resensitizes the responsive means after setting up the fourth condition by pole-changing the line energization as soon as one or both sections becomes unoccupied by de-energizing the line circuit for an extended period after which a distinctive polarity of energization is applied if one section only is then occupied. The track sections to be indicated need not necessarily be adjacent as shown herein, but in most cases, the apparatus along the trackway is so grouped that it is expedient to indicate adjacent sections over the same line circuit. It is also contemplated that the line wire COM in the present system may be the same common wire that is used for various other control and indicating circuits in the centralized traffic controlling system.

The above rather specific description of one form of the present invention is given solely by way of example, and is not intended, in any manner whatsoever, in a limiting sense. It is also to be understood that various modifications, adaptations and alterations may be applied to

meet the requirements of practice, without in any manner departing from the spirit or scope of the present invention, except as limited by the appended claims.

Having thus described my invention, what I claim is:—

1. In a system for indicating traffic conditions in railway track sections, a single line circuit connecting a control point and two distant track sections, means for applying distinctive conditions of energization to said line circuit in accordance with the occupancy of said track sections, two slow-releasing relays at said control point, an indicator energized through a front contact of each slow-releasing relay, means for energizing one of said slow-releasing relays when one polarity of energization is applied to said line circuit, means for energizing the other of said slow-releasing relays when another polarity of energization is applied to said line circuit, means for energizing both of said slow-releasing relays when the polarity of said line circuit is changed from one polarity to another, and means for retaining both of said indicators energized for a period of time after the front contacts of said slow-releasing relays have opened.

2. In a railway track section indicating system; a control point; two distant track sections; a line circuit connecting the control point and the two distant track sections; two slow-acting relays at the control point; an indicator controlled by each slow-acting relay; means including a polar relay for energizing one, the other, both or neither of said slow-acting relays in response to the occupancy of one, the other, both or neither of said track sections; and means for de-energizing said polar relay for a period of time in response to the changing from the occupied condition of both track sections to the occupied condition of one track section only, said period of de-energization of said polar relay being effective to de-energize both of said slow-acting relays.

3. In combination, two adjoining railway track sections, a polar relay, means for energizing said polar relay in a first or second direction according as one or the other of said track sections is occupied, two slow releasing indicator relays, a pick-up circuit for one indicator relay including a contact of said polar relay in a first direction, a stick circuit for said one indicator relay including a contact of said polar relay in its second direction, a pick-up circuit for the other indicator relay including a contact of said polar relay in said second direction, a stick circuit for said other indicator relay including a contact of said polar relay in its first direction, means including said pick-up and stick circuits for distinctively controlling said indicator relays in accordance with the occupied and unoccupied condition of either or both of said track sections, and indicators for said track sections distinctively controlled by said indicator relays in accordance with the occupied and unoccupied condition of either or both of said track sections.

4. In a railway centralized traffic controlling system, a control location, two distant track sections, indicating means at said control location for indicating the occupancy of each of said track sections, a line circuit connecting said control location with said distant track sections, means responsive to the occupancy of only one of said sections for energizing said line circuit with a first polarity, means responsive to the occupancy of only the other of said sections for energizing said line circuit with a second polarity, means

responsive to the sequential occupancy of said first and both said sections for impulsing said line circuit with said first polarity, with said second polarity and with said first polarity in the order named, and means for controlling said indicating means in accordance with said conditions of energization of said line circuit.

5 In combination, a line circuit, a polar relay at one end of said line circuit, two slow-acting 10 relays having pick-up circuits controlled by said polar relay, means at the other end of said line circuit for selectively applying either polarity of energization thereto, means to effect the energization of one or the other of said slow-acting 15 relays according to the polarity applied to said line circuit, a third slow acting relay, and means responsive to a rapid change in the polarity applied to said line circuit for energizing and maintaining energized all three of said slow acting 20 relays.

6. In a system for indicating traffic conditions in railway track sections, a single line circuit connecting a control location with two distant track sections, a three-position polar relay included in said line circuit at said control location, a first slow relay and a second slow relay, means controlled by the contacts of said polar relay in a first position and in a second position for energizing said first slow relay and said second slow relay respectively, stick circuits for said slow relays, means including said stick circuits for energizing both of said slow relays when said contacts are quickly shifted from one position to another, an indicator controlled by each of said relays, means at said track sections for applying one polarity of energization to said line circuit throughout the occupancy of one of said sections, means at said track sections for applying another polarity of energization to said line circuit throughout the occupancy of the other of said sections, means responsive to the simultaneous occupancy of said sections for rapidly changing said line circuit energization from a first polarity to a second polarity and back to said first polarity, and means responsive to said rapid change in energization of said line circuit with each of said polarities for maintaining both of said slow relays energized.

7. In combination, a line circuit, a polar relay at one end of said line circuit, two slow acting relays having pick up circuits controlled by said polar relay, means at the other end of said line circuit for selectively applying either polarity of

energization thereto, means to effect the energization of one or the other of said slow acting relays according to the polarity applied to said line circuit, a third slow acting relay, means responsive to a rapid change in the polarity applied to said line circuit for energizing all three of said slow acting relays, and means for distinctively indicating the polarity applied to said line circuit and said rapid change.

8. In a railway centralized traffic controlling system, a control location, two distant track sections, indicators at said control location for indicating the occupancy of each of said track sections, a line circuit connecting said control location with said distant track sections, means for energizing said line circuit with a first polarity when a train occupies only one of said track sections, means for energizing said line circuit with a second polarity when a train occupies only the other of said track sections, means for repeating the energization of said line circuit once and only once with each of said polarities when a train simultaneously occupies both of said track sections, and means responsive to said repeated energization of the line circuit for energizing each of said indicators throughout the occupancy of its associated track section irrespective of the length of time of said occupancy.

9. In a system for indicating various railway traffic conditions, a single line circuit connecting a track location and a distant point, two indicators at said distant point, means for rendering one of said indicators active when one polarity of energization is applied to said line circuit, means for rendering the other of said indicators active when the other polarity of energization is applied to said line circuit, means at said track location for applying one polarity of energization to said line circuit under one traffic condition, means at said track location for applying the other polarity of energization to said line circuit under another traffic condition, means at said track location for quickly changing the polarity of energization of said line circuit a plurality of times and then maintaining the energization of the line constant when both of said traffic conditions exist, and means responsive to said quick change in polarity and said constant energization of said line for maintaining both of said indicators active throughout the existence of both of said traffic conditions irrespective of their duration.

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