

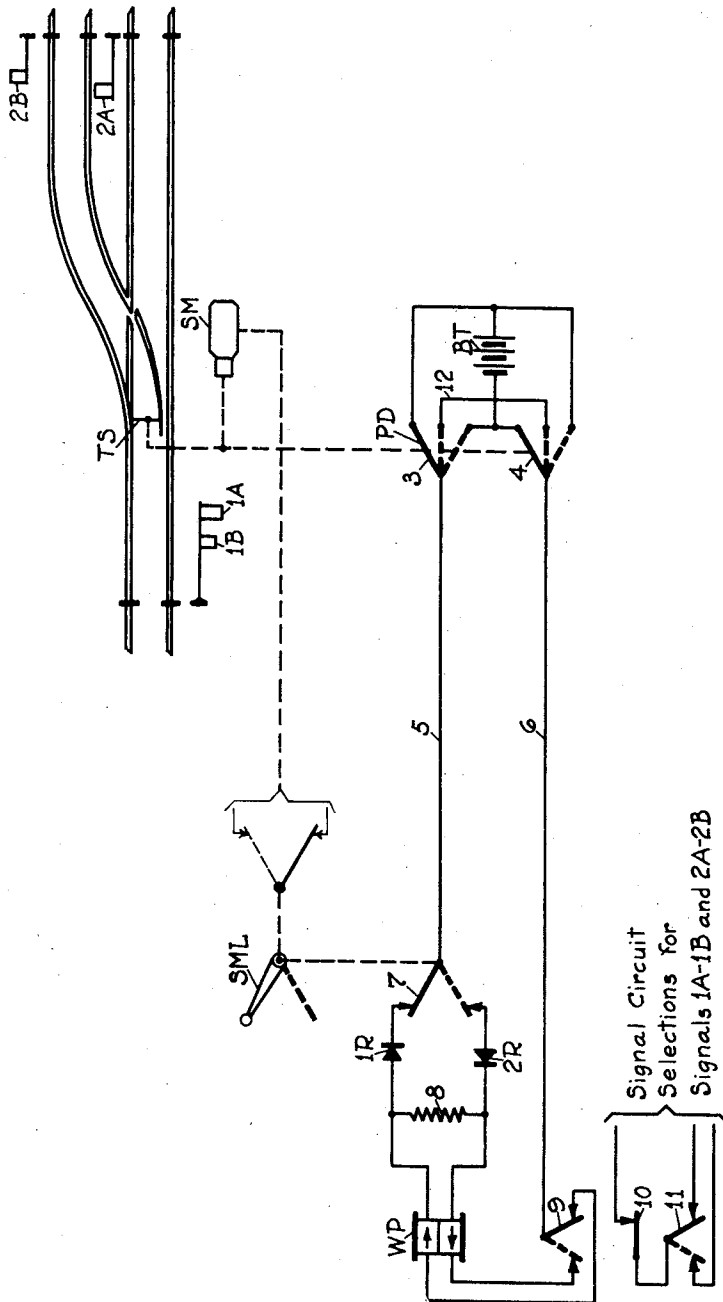
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RAILWAY TRAFFIC CONTROLLING SYSTEM

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RAILWAY TRAFFIC CONTROLLING SYSTEM

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This invention relates to traffic controlling systems for railroads, and more particularly pertains to the indication of the position of power operated track switches in such systems.

5 The present invention purposes to provide an indicating system wherein a polar-neutral relay is controlled over a polarized circuit in accordance with the position and locked condition of its associated track switch, as well as the correspondence of such track switch with its control lever. The present invention also provides means associated with the polar-neutral relay for checking whether or not its polar contacts have properly responded in accordance with the polarity applied to its operating windings.

10 Various other features, advantages and characteristic functions of the present invention will be in part apparent from the accompanying drawing, and in part pointed out as the description thereof progresses.

15 In describing the invention in detail, reference will be made to the accompanying drawing which illustrates in a simplified and diagrammatic manner the circuits and parts of a switch indication system embodying the present invention.

20 With reference to the accompanying drawing, a track switch TS is shown as operated by a switch machine SM which may be of any suitable type, such for example, as disclosed in the patent to W. K. Howe, Patent No. 1,466,903, dated September 4, 1923.

25 Associated with the switch machine SM and track switch TS is a suitable point detector contact mechanism PD which may be of any suitable type, such for example, as shown in the patent to C. S. Bushnell, Patent No. 1,517,236, dated November 25, 1924. For convenience in describing the present invention, the point detector contact mechanism PD is merely shown as having two movable contacts 3 and 4 each of which cooperates with three fixed contacts to indicate the three conditions of the movable contacts. The movable contacts 3 and 4 of the point detector contact mechanism are jointly operated by the track switch TS and the switch machine SM so as to assume normal or reverse extreme positions when the track switch is in a normal or reverse position respectively and locked by the switch machine, and so as to assume intermediate or midstroke positions whenever the track switch is being operated by the switch machine or whenever the track switch is unlocked. The movable contacts 3 and 4 are shown in their normal positions.

30 The track switch TS is shown as having asso-

ciated therewith suitable signals 1A—1B and 2A—2B for controlling traffic thereover.

35 The switch machine SM is indicated as controlled by a switch machine control lever SML, which control may be of any suitable type employed in interlocking systems, such as shown for example in the pending application of R. M. Phinney, Ser. No. 539,486, filed May 23, 1931. This lever SML, which is manually operable for the control of the switch machine SM, is provided with a contact 7 which is included in the circuits for the relay WP so as to determine whether or not the track switch is in correspondence with its lever SML, as described in detail hereinafter.

40 The point detector contacts PD are connected to the central office by suitable line wires 5 and 6 which are supplied with energy by a battery BT located at the track switch.

45 A switch position indicating relay WP of the polar-neutral type is provided with two windings, each winding of which, when energized with the normal potential applied to the line wires 5 and 6 by battery BT, will operate both the polar contacts and the neutral contacts of this relay. However, when a resistor 8 is included in series with either of these windings the polar contacts of the relay will respond to such a degree of energization, but the neutral contacts will remain in their dropped away positions. The relay WP may be provided with any required number of polar and neutral contacts, but for the purpose of understanding the present invention only contacts 9, 10 and 11 have been shown.

50 Also, associated with the relay WP are suitable asymmetric units or rectifiers 1R and 2R. These asymmetric units are preferably of the copper-oxide type, but it is to be understood that any type of one-way electrical valve may be employed in this connection and still be within the scope of the present invention.

55 The relay WP may be employed for any of the purposes required of a switch position repeating relay in an interlocking system such as the selection of signal circuits, lock circuits and the like, but for the sake of simplicity in the present disclosure, the contacts 10 and 11 of this relay have been indicated by a legend as included in the signal selecting circuits for the signals 1A—1B and 2A—2B, which selections may be made in accordance with any of the usual practices the details of which are unnecessary for an understanding of the present invention.

It is believed that the nature of the invention, 55

its advantages and characteristic features can best be understood by further description being set forth from the standpoint of operation.

Operation

5 With the switch machine control lever SML in a normal position, as illustrated, the switch machine SM will also be in a normal position locking the track switch TS in a normal position. Thus, 10 the contacts 3 and 4 of the point detector contact mechanism PD are in normal positions, thereby energizing the relay WP over a normal polar-neutral operating circuit closed from the positive terminal of the battery BT, through contact 4 in 15 a normal position, line wire 6, polar contact 9 of relay WP in a right hand position, upper winding of relay WP, rectifier unit 1R in its low resistance direction, switch machine control lever contact 7 in a normal position, line wire 5, contact 3 in a 20 normal position, to the negative terminal of the battery BT.

With energy flowing in this normal polar-neutral operating circuit, the polar contacts of the relay WP are actuated to the right and its 25 neutral contacts are picked up.

Upon the operation of the control lever SML to a reverse position, it is readily apparent that the normal polar-neutral operating circuit, above traced, is immediately broken by contact 7 so 30 that the neutral contacts of relay WP drop away. As the rectifier unit 2R is so included in the circuit as to oppose current flow through the resistance 8 with contact 7 in a reverse position, the relay WP is entirely de-energized except for 35 what leakage current the rectifier 2R may permit depending upon its type and efficiency, it being understood that this value (if present) is very small and of no practical consequence in this connection.

40 The switch machine operates the track switch to the reverse position and during such operation the contacts 3 and 4 are in mid-positions so that the energy from battery BT is entirely removed from the line wires 5 and 6 which are shunted 45 by the wire 12.

When the track switch TS reaches its reverse locked position, the contacts 3 and 4 are operated to reverse extreme positions in which energy is supplied over the line wires 5 and 6 to relay WP 50 through a reverse polar operating circuit closed from the positive terminal of the battery BT, through contact 3 in a reverse position, line wire 5, contact 7 in a reverse position, rectifier unit 2R in its low resistance direction, resistor unit 8, upper winding of relay WP, polar contact 9 in a 55 right hand position, line wire 6, contact 4 in a reverse position, to the negative terminal of the battery BT. The current which flows in this reverse polar operating circuit is of insufficient value to operate the neutral contacts of the relay WP by reason of the resistance value of the resistor 8, but is of sufficient value to cause the polar contacts of the relay WP to be actuated to left hand positions. It is to be understood in this connection that, with the usual construction of polar-neutral relays, the polar armature will quickly assume its opposite position with snap-action like response, but in the event that the polar structure of the relay to which the present invention is applied does not have such characteristics, the contact 9 may be made a make-before-break type 70 contact.

With the polar contact 9 in a reverse position, a reverse polar-neutral operating circuit is then 75 closed from the positive terminal of the battery

BT, through contact 3 in a reverse position, line wire 5, contact 7 in a reverse position, rectifier unit 2R in its low resistance direction, lower winding of relay WP, polar contact 9 in a reverse position, line wire 6, contact 4 in a reverse position, to the negative terminal of the battery BT. 5

With the resistor 8 thus excluded from the energizing circuit of the relay WP, sufficient current is caused to flow through the lower winding to effect the picking up of the neutral contacts of 10 the relay WP. Thus, the relay WP upon the picking up of its neutral contacts indicates both that its polar contacts have responded properly to the polarity applied to the line circuit including wires 5 and 6 and that its polar contacts are in 15 positions corresponding to the position of the contacts of the switch machine control lever SML. With such a condition existing, the signal circuits for the signals 1A—1B and 2A—2B will be selected according to the reverse position of the track 20 switch, and it will be safe for the movement of traffic in accordance with such selections subject to the various other automatic signalling features which may be used in connection therewith.

It is believed that the operation of the system 25 back to its normal condition will be readily apparent, but for the sake of definiteness the normal polar operating circuit will be pointed out.

The normal polar operating circuit is closed from the positive terminal of battery BT, through 30 the contact 4, line wire 6, polar contact 9 in a reverse left hand position, lower winding of relay WP, resistor 8, rectifier unit 1R in its low resistance direction, lever contact 7 in a normal position, line wire 5, contact 3 in a normal position, to the negative terminal of the battery BT. 35

The normal polar-neutral operating circuit has already been pointed out above.

Thus, an indication system for a railway power operated track switch has been shown and described wherein the relay WP not only indicates 40 the position and locked condition of the track switch with which it is associated, but also indicates the correspondence of the track switch with its control lever as well as the check is the actual 45 response of its polar contacts to its energizing current.

It should be noted that this embodiment of the present invention provides an indication circuit which has all of the protection of the usual polarized circuit, namely, two breaks and two crosses must occur in order to cause a false indication. 50

It should also be noted that should the polar contacts of the relay WP actually fail to respond, then the neutral contacts will be energized only 55 when the lever SML and the track switch TS are in positions corresponding to the position of such polar contacts.

Having thus described an indication system for a railway track switch as one specific embodiment 60 of the present invention, it is desired to be understood that this form is selected to facilitate in the disclosure of the invention rather than to limit the number of forms which it may assume; and, it is to be further understood that various modifications, adaptations and alterations may be applied to the specific form shown 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. 70

What I claim is:—

1. In combination; a relay having polar and neutral contacts, said polar contacts responding to changes in the direction of energization of said relay when said relay is energized to one degree, 75

and said neutral contacts responding to the energization of said relay so as to be picked up only when said relay is energized to another degree relatively higher than said one degree of energization; a two-position control means; pole changer contacts operable to normal and reverse positions; means energizing said relay to said one lower degree in one direction or the other depending upon the normal or reverse position of said pole changer contacts; and asymmetric circuit means energizing said relay to said another degree only when said two-position control means is in correspondence with said polar contacts of said relay and then only if said polar contacts have properly responded to the polarity of energization of said relay to said one degree, said means depending upon the position of said pole changer contacts.

2. In combination, a track switch, a manually operable control lever for governing the power operation of said track switch, a polar-neutral relay, a line circuit supplied with energy of one polarity or the other in accordance with the position of said track switch, and circuit means including a polar contact of said relay and a contact operated by said lever to cause said relay to receive sufficient energy from said line circuit to pick up the neutral contacts of said relay only when its polar contacts are in polar positions corresponding to the polarity of the energy supplied to said circuit and only if said manually operable control lever is in a corresponding position, said circuit means including asymmetric means to check the polarity of the energy in said line circuit against the positions of said polar contacts.

3. In combination, a track switch, a manually operable control lever for governing the power operation of said track switch, a polar-neutral relay, and means including polar contacts of said relay and contacts of said lever for energizing said relay with a polarity in accordance with the position of said track switch to a degree sufficient to pick up the neutral contacts of said relay only when said control lever, said track switch and the polar contacts of said relay are in corresponding positions, said means also including polarity detecting means with which the positions of the polar contacts are compared.

4. In combination, a polar-neutral relay having polar and neutral contacts of which the polar contacts will respond to a certain degree of current and of which the neutral contacts will only respond to current of a higher degree than said certain degree, a switch machine, a lever for controlling said switch machine, a current limiting element for said relay to limit said current to said certain degree, a source of direct current, unidirectional current controlling means for energizing said relay from said source through said current limiting element by current of a polarity to operate said polar contacts to a different position effective only if said lever and switch machine assume a corresponding position, and means including a polar contact of said relay to exclude said current limiting element only if such polar contact assumes a position in correspondence with said lever.

5. In combination, a polar-neutral relay having polar and neutral contacts of which the polar contacts will respond to a certain degree of current and of which the neutral contacts will only respond to current of a higher degree than said certain degree, two windings for said relay, an asymmetric unit of one polarity included in series with one of said windings, an asymmetric unit of

the opposite polarity included in series with the other of said windings, a polar contact of said relay for connecting a source of current to one or the other of said windings depending on the polar position of said contact, a resistance for connecting like terminals of said windings together, said resistance being of a value so that said relay is energized only to said certain extent if the energizing current must flow through said resistance, whereby current may flow through a winding of said relay without flowing through said resistance to cause response of said neutral contact only if the polarity of the current flowing and the position assumed by said polar contact correspond.

6. In combination, a polar-neutral relay having polar and neutral contacts of which the polar contacts will respond to a certain degree of current and of which the neutral contacts will only respond to current of a higher degree than said certain degree, two asymmetric units, a resistance unit, said asymmetric units, said resistance unit and a polar contact of said relay being so connected with said relay that current of said certain degree will flow through one asymmetric unit said relay and through said resistance when the polar position of said polar contact does not conform to the polarity of the current flowing, but whereby current of said higher degree may flow through one asymmetric unit and said relay without passing through said resistance if said polar contact assumes a position to conform with the polarity of the current flowing.

7. In combination, a polar-neutral relay having polar and neutral contacts of which the polar contacts will respond to a certain degree of current and of which the neutral contacts will only respond to current of a higher degree than said certain degree, an asymmetric unit, a resistance unit, said asymmetric unit said resistance unit and a polar contact of said relay being so connected with said relay that current of said certain degree will flow through said asymmetric unit said relay and through said resistance when the polar position of said polar contact does not conform to the polarity of the current flowing, but whereby current of said higher degree may flow through said asymmetric unit and said relay without passing through said resistance if said polar contact assumes a position to conform with the polarity of the current flowing.

8. In combination; two line wires having applied thereto potential of one polarity or the other from a substantially constant source of potential; a relay having polar and neutral contacts, said polar contacts responding when said relay is energized to one degree or to a relatively higher degree, and said neutral contacts responding only when said relay is energized to said higher degree; a resistor; a two-position control means; a first circuit means including polar contacts of said relay, said resistor and said control means for at times connecting said relay and said resistor in series across said two line wires, said means being effective only when said polar contacts are out of correspondence with said two-position control means, whereby said relay is energized to said one degree; a second circuit means including polar contacts of said relay and said two-position control means for at times connecting said relay directly across said two line wires, said means being effective only when said polar contacts and said two-position control means are in corresponding positions, whereby said relay is energized to said higher degree; and means allowing current to flow through said first and

second circuit means only in a particular direction when said two-position control means is in one position and allowing current to flow in said first and second circuit means only in an opposite direction when said two-position control means is in its other position.

9. In combination; two line wires having energy of one polarity or the other applied thereto from a substantially constant source of potential; a relay having polar and neutral contacts, said polar contacts responding when said relay is energized to one degree or to a relatively higher degree, and said neutral contacts responding only when said relay is energized to said higher degree; a resistor; a two-position control means; two rectifier units poled in opposite directions; a first circuit means including polar contacts of said relay and contacts of said two-position control means for at times connecting said relay and said resistor in series with one or the other of said rectifier units depending upon the position of said two-position control means, across said two-line wires, said means being effective only when said polar contacts are out of correspondence with said two-position control means; and a second circuit means including polar contacts of said relay and contacts of said two-position control means for at times directly connecting said relay in series with one or the other of said rectifier units depending upon the position

of said two-position control means, across said two line wires, said means being effective only when said polar contacts are in correspondence with said two-position control means; whereby said neutral contacts pick up only when there is correspondence between said two-position control means and said polar contacts and only when said polar contacts have properly responded to the polarity of the potential applied to said line wires.

10. In combination; a power operated track switch; a manually operable control lever for governing the operation of said switch; two line wires supplied with energy of one polarity or the other in accordance with the position of said track switch; a polar neutral relay; a resistor; rectifier means; and means including said resistor, said rectifier means, polar contacts of said relay, and contacts operated by said lever for controlling the connection of said relay across said line wires so as to cause said relay to receive sufficient energy to operate its polar contacts whenever said relay receives energy and so as to receive sufficient energy to pick up the neutral contacts of said relay only when its polar contacts are in polar positions corresponding to the polarity of the energy supplied to said circuit and only if said manually operable control lever is in a corresponding position with said polar contacts.

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